CHEMICAL HYDROLOGY OF VASCULAR PLANT GROWTH:

ROLE OF ROOT-FUNGUS ASSOCIATIONS

By

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To the Faculty of Washington State University:

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Abstract

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Plant-fungal associations are important in every ecosystem, because 95% of land plants live with mycorrhizal fungi, which increase nutrient acquisition and weathering. In this study, the effect of vascular vegetation and ectomycorrhizal fungi was examined on chemical weathering and denudation fluxes at the scale of the Hubbard Brook sandboxes (Chapter 1) and in column growth experiment (Chapter 3). Fungal weathering mechanisms were also tested in liquid-culture experiments (Chapter 2).

The main approach was a simple mass-balance on base cations (Ca, K and Mg). All three designs allowed us to measure input and output water flows and concentrations, change in biomass and on soil-exchangeable cation sites. Microscopic investigation of microbe-mineral interface and mineral surface changes were carried out to understand weathering and denudation mechanisms on small scales.

Both geochemical and ecosystem-ecological perspectives were employed to better understand temporal dynamics of the effect of red pine on weathering and denudation fluxes of the sandboxes. Three periods were distinguished during the ecosystem development and

disturbance: *weathering-driven* (large weathering and retarded denudation); *biocycling-driven* (tree regulated weathering and denudation); and *denudation-driven* (after tree-harvest with lost regulation on processes) nutrient dynamics.

In liquid-cultures direct surface attachment of fungal hyphae to mineral surfaces did not prove to be important and the fungi did not directly transport K and Mg into biomass and did not leave dissolution channels behind, as it was hypothesized from previous microscopic results of sandbox minerals. Fungi indirectly induced weathering by lowering the solution pH via production of complex forming organic acids. In addition, most of the weathered mass came from the edges.

The column experiment demonstrated that bacteria and ectomycorrhizal fungi had large potential to weather Ca-bearing minerals, but microbes could not regulate denudation losses without a vascular host. In the second half of the experiment highest weathering and lowest denudation were observed in ectomycorrhizal tree-treatments, but non-ectomycorrhizal seedlings also retarded denudation. This was linked to biofilm formation on mineral surfaces in both treatments. These findings support the idea that biofilm not only accelerates the weathering process, but also regulates denudation losses by acting as an inhibiting layer around the mycorrhizosphere and rhizosphere.

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CHAPTER ONE

CHANGES IN CHEMICAL WEATHERING AND DENUDATION DYNAMICS THROUGH ECOSYSTEM DEVELOPMENT AND DISTURBANCE

INTRODUCTION

Chemical weathering and chemical denudation play major roles in many Earth system processes. Chemical *weathering* is the process by which chemical reactions decompose primary minerals and rocks, and transfer the products to other phases such as soil water, clays, and biomass (Drever, 1997). Chemical *denudation* (or chemical *erosion*) is defined as dissolved mineral mass loss from watersheds and continents, with associated transport via groundwater and rivers to the oceans (Bormann et al, 1998). There are several important reasons for studying chemical weathering and denudation processes. These processes drive soil development (Stallard and Edmond, 1987; Vitousek et al, 1997), soil nutrient availability to vegetation (Bormann and Likens, 1979; Likens and Bormann, 1995) and regulate erosion of landscapes and continents (Schlesinger, 1997). Silicate mineral weathering in particular influences the chemistry of the oceans and atmosphere, by moving dissolved Ca and Mg to the oceans where they precipitate as carbonates thereby sequestering CO_2 and buffering atmospheric CO_2 levels on geologic time scales (Holland et al, 1986; Berner 1997).

Chemical weathering and denudation have been studied from two relatively distinct perspectives in the Earth and environmental sciences. In the geochemical perspective weathering and denudation occur essentially together and at the same rate, functioning to “tear down” continents as one leg in planetary-scale rock cycles. In this view, biota and soils function as mediating agents for water-rock interactions; rock materials pass briefly through soil on their way to the oceans. Many studies have been conducted on dissolution kinetics and thermodynamics of weathering reactions and their responses to environmental variables, which change over geologic time (e.g. White and Brantley, 1995). It is generally understood that rooted plants should increase weathering efficiency via organic acid production and by physically altering soils (Drever, 1994; 1997). Many studies have been conducted on chemical weathering in watersheds, chemical weathering rates of different environmental settings (e.g. April et al, 1986; Hyman et al, 1998; Aghamiri and Schwartzman, 2002), and plant influence on chemical weathering (Basu, 1981; Knoll and James, 1987; Drever, 1994; Berner and Cochran, 1998; Kelly et al, 1998), but less attention has been paid to denudation as such, or to weathering and denudation as distinct processes (however see Moulton et al, 2000; Berner 1992, 1997; van Breemen et al, 2000).

From an ecosystem-ecology perspective, chemical weathering generates mineral based nutrients for growth. Thus weathering is a key to sustainability in most ecosystems (e.g. Bormann and Likens, 1979; Likens and Bormann, 1995) and is a “building” process in biocycles operating at the ecosystem scale rather than the planetary scale. In this view, biota and soils function as both mediating agents of weathering, and as pools where nutrients are stored. Chemical denudation is, on the other hand, a distinct process which transports nutrients out of ecosystems in runoff, i.e. causes nutrient loss; and this ecosystem function is controlled in order that nutrient pools may be accumulated and sustained. Many studies are focused on limiting nutrients such as nitrogen and phosphorous (e.g. Bormann and Likens, 1979; Bormann et al, 1993), but considerable work has been done on base cations (Ca, K, Mg and Na) (Johnson et al, 1985; Likens et al, 1994; 1998; Watmough and Dillon, 2004). The acid rain problem drew attention to calcium depletion in the Northern temperate forest of Europe and America (Federer et al, 1989; Johnson et al, 1994; 2000; Sverdrup and Rosen, 1998) and calcium dynamics continues to be an interest in forested ecosystems (Likens et al, 1998; Blum et al, 2002; Bailey et al, 1996; 2003). In ecology, there is a long standing interest in the effects of disturbance on chemical weathering and denudation fluxes (e.g. Bormann and Likens, 1979; Gorham et al, 1979; Romanowicz et al, 1996; Johnson et al, 1997, Wang et al, 2006). Several studies have presented models explaining how disturbance affects weathering and denudation, depending on successional phase of an ecosystem (e.g. Vitousek and Reiners, 1975; Bormann and Likens, 1979; Gorham, 1979). In general, these models have been hard to support; and review of the existing literature yields strikingly variable results independent of the age of the vegetation and landscape (e.g. Bain et al, 1994; Hornbeck et al, 1997; Land et al, 1999; Moulton et al, 2000; Aghamiri and Schwartzman, 2002).

The purpose of this study is to employ both geochemical and ecosystem-ecological perspectives to better understand the effects of plant growth on chemical weathering and denudation processes. Our objective was to investigate the temporal dynamics of the effect of red pine and associated fungi on mineral weathering and other biogeochemical fluxes, particularly denudation fluxes, in experimental ecosystems. The "sandbox" study (Bormann et al. 1987; 1993; 1998; Berner et al. 1998; Kauffman et al, 2003; O'Brien et al. 2004; Keller et al, 2006) allowed us to distinguish weathering from denudation by monitoring input and output fluxes of base cations, and changes in biomass and soil exchangeable pools in two simple mesocosm ecosystems. Then using our measurements we were able to determine chemical weathering and denudation fluxes by mass balance. Our specific questions were: 1.) How does tree growth affect weathering and denudation fluxes compared to a system with non-vascular vegetation? 2.) How does the weathering-denudation relationship change over the course of ecosystem development and disturbance? We hypothesized that chemical weathering and denudation would be accelerated by tree growth and they would be further accelerated by a harvest disturbance.

METHODS AND MATERIALS

Site description

The Hubbard Brook Experimental Forest (HBEF) is located in the White Mountains of North - Central New Hampshire, USA. Outdoor “sandbox” lysimeters were constructed in 1982-83 (Bormann et al, 1987) to study primarily nitrogen cycling and fixation (Bormann et al, 1993). For this study two large sandboxes (7.5 x 7.5 m wide x 1.5 m deep) were monitored that are fully lined with industrial grade Hypalon membrane and filled with local homogenized glacial-outwash deposits. Five cm of the original topsoil was rototilled into the upper 20 cm of the sand to promote seedling growth (Ingersoll et al, 1987). One sandbox was planted with three-year old Pinus resinosa Ait. (red pine) seedlings in May 1983 (Ingersoll et al, 1987) and the other was kept free of vascular plants and it developed a non-vascular plant cover of Cladonia cristatella (a lichen) and Polytricum spp. (a moss) (O’Brien, 2000).

Drainage pipes were installed in the bottom gravel layer of each sandbox and were connected to an all-weather subsurface chamber, which allowed collecting and monitoring drainage water volume and cation concentrations all year around (Ingersoll et al, 1987; O’Brien et al, 2004). Porewater samplers were also installed at depths of 15, 35 and 95 cm in 1995 to monitor soil water chemistry. These samplers consist of a glass porous plate affixed to a glass collection chamber, under ¼ of a bar suction. Three replicated samplers were installed at each depth in boreholes, which were laterally hand-augered from the side of the sandboxes to minimize disturbance (O’Brien et al, 2004).

The red pine trees were harvested and carried away without physically disturbing the soil in May 1998 (Keller et al, 2006). The red pine sandbox was prevented from revegetation by hand weeding since the harvest occurred.

Sample collection

Samples were collected over a 20-year period, from 1983 to 2003 water years (June 1, 1983 to May 31, 2004). The water year at HBEF starts on June 1st and ends on May 31st of the next calendar year, in which period the precipitation and stream flow correlate the best (Likens and Bormann, 1995). Data collection lapsed between 1988 and 1992 water years due to lack of financial support.

Drainage water samples were collected from both sandboxes; volume weighted and analyzed for base cation concentrations (O'Brien, 2000; Keller et al, 2006) at University of Vermont. The samples for chemical analysis were collected daily, weekly, biweekly, and triweekly along the years of study (dependent on the objectives of the researchers). The discharge was measured instantaneously with proportional sampling until August 11, 1998 and with tip counting (by data loggers) since (O'Brien et al, 2004). Soil water was collected periodically between 1996 and 2004 (O'Brien et al, 2004; Keller et al, 2006).

Precipitation was measured at HBEF weather station 22, which is 200 m northwest of the study area. Federer et al (1990) determined precipitation values by taking weekly readings from a standard rain gage and this routine has been continued since. Bulk precipitation samples were analyzed for major elements (Likens, 2004).

Aboveground (foliage, stem, live branches, dead branches, and litter) and belowground (stumps, fine and coarse roots) biomass was sampled in 1983, 1988 (Bormann et al, 1998), and 1998 (Havig, 2002; Keller et al, 2006), and was analyzed for total carbon, nitrogen and cation compositions. After oven drying at 65°C the biomass materials were ground, digested then analyzed using ICP - AES (Bormann et al, 1998).

Soil cores were collected at multiple locations in 1984-85, 1988, 1998 and 2002 in each sandbox and oven dried to a constant weight at 65°C and stored for further chemical analyses. Conventional ammonium acetate extraction procedure (adapted from McIntosh, 1969) was used on all archived subsamples to determine the soil-exchangeable cation pool. The solutions were analyzed for cation composition on an Inductively Coupled Argon Plasma Spectrometer in the Crop and Soils Department, at Washington State University. All soil core subsamples were extracted and analyzed at once to minimize analytical uncertainties.

Calculations

Chemical denudation (D) was computed by taking the difference of drainage water (Dr) losses and precipitation (P) input:

$$D = Dr - P \qquad \text{eq 1.}$$

where the terms of the equation are defined as the sum of Ca^{2+}, Mg^{2+} and K^{+} fluxes in and out from the sandboxes (mol m^{-2} yr^{-1}), these fluxes are normalized to ground surface area similarly to watershed studies. These elements are the most important essential base-cation nutrients for plant growth (Gorham et al, 1979). The Na was not included because data collection was uneven over the entire period and Na is a conservative element, which is not taken up by vegetation in large amounts (Bailey et al, 2003).

Chemical weathering fluxes were estimated using a modified form of mass balance approach of Bormann et al (1998):

$$W = D + \Delta B + \Delta S \qquad \text{eq 2.}$$

where W is the chemical weathering, D is the chemical denudation, ΔB is change in biomass, and ΔS is change in the products of weathering left in the soil, which is here defined as exchangeable cations (Markewitz and Richter, 2000). The biomass and soil sampling times determined three intervals of chemical weathering estimations (1983-1988, 1988-1998, 1998-2002).

Statistical analyses

The variance of each term in equations 1 and 2 can be determined and combined for an error estimate of weathering rates. The available data did not have any standard distribution, so potential error can be estimated instead of standard error. The total error is the sum of the error of the individual terms assuming each term is statistically independent and the errors are random.

Variance estimates for each term are as follows. In bulk precipitation inputs the measurement errors are smaller than the sampling errors (Bormann et al, 1998), but the single station measurements do not allow sample variance estimation. In drainage outputs and denudation fluxes the water flow measurements and cation concentration analyses each count for 5% errors in the values (Berner et al, 1998). Biomass samples were randomly collected with replication, which allows calculating standard deviation, and the dried biomass composition was estimated, which together generated about 8% error in the values. Soil samples were randomly cored, because the boxes were filled with homogeneous sand material at the construction. This technique also allows us to calculate standard deviation, which in average for all cations gives about 10% error including measurement errors. The total (weathering) error was estimated around 22% of the weathering values.

SAS program was used for Analysis of Variance (ANOVA) on the denudation results for detection of differences among years and between the two boxes (Dean and Voss, 1999). The analysis was divided for two periods - before and after harvest.

RESULTS

Hydrochemistry

Concentration of calcium (Ca^{2+}) and potassium (K^+) in drainage and soil water varied through time in both the non-vascular (NV) and red pine (RP) dominated sandboxes (Fig. 1-1). Magnesium concentrations were about one-forth as large and tracked Ca^{2+} very closely, and therefore are not shown.

Cation concentration in drainage water (solid symbols) in both boxes generally decreased over time, but some notable differences developed between the two systems. By 1993, in NV, the concentration of both cations exhibited a seasonal pattern (Figs. 1-1A, C). The lack of evident seasonal pattern in RP is attributed to the trees evapotranspiring nearly all incoming rainfall during the growing season (Figs. 1-1B, D). After tree-harvest (1998) in the RP box, Ca^{2+} and K^+ spiked and then gradually started declining. The K^+ spike was nearly immediate, but the Ca^{2+} spike was delayed until the second growing season after harvest (Keller et al, 2006). The concentrations in RP, although decreasing after this spike, remained 2 to 4 times higher than in the NV box after 6 years (Fig 1-1).

Ca^{2+} and K^+ in soil water, sampled at 15, 35 and 95 cm, varied between the boxes (open symbols, Fig. 1-1). Ca^{2+} concentrations were lower in 15 and 35 cm RP soil waters than in NV soil water ($p=0.013$) and also lower than the drainage waters of both boxes (Fig 1-1A, B), but only before tree-harvest. On the other hand, K^+ in soil water was always higher in RP compared to NV (p=0.005) (Figs. 1-1C, D). Concentrations in soil water, like drainage, spiked after tree-harvest immediately with K^+ and after delay with Ca^{2+} (Figs. 1-1B, D). In NV the soil and drainage water concentrations were not different during the study period (Figs. 1-1A, C).

Changes in soil exchangeable cation pool

Soil-exchangeable Ca^{2+} was depleted from upper layers in both RP and NV boxes (Figs. 1-2A, B). Depletion was evident after 5 years in RP and after 15 years in NV sandboxes. Although slower, depletion was greater by 2002 in NV, even at the deepest layers measured. Depletion of exchangeable Ca^{2+} at the surface of RP box soil was fast, but then reversed itself by year 15, perhaps as litter decomposed. In contrast, soil-exchangeable K^+ was initially enriched at the surface in NV then became more depleted with time at all depths (Fig. 1-2C). In RP the surface layer enrichment continued until tree-harvest in 1998; then the top soil layer lost a large amount of exchangeable K^+, which might have contributed to the deeper enrichment (Fig. 1-2D). By 2002, the soil-exchangeable K^+ depth profile in RP tracked the profile in NV, but the concentrations were higher.

The concentration changes were used to calculate aggregate extractable cation mass changes. Table 1-1 shows that these changes were substantial after 15 and even larger after 20 years in both RP and NV boxes.

Changes in biological uptake and storage

Red pine trees grew rapidly accumulating about 16 Mg ha^{-1} yr^{-1} of biomass in the first 5 years of the study (Bormann et al, 1993). Base cation uptake and storage in biomass made a large contribution (more than half) to the weathering fluxes during this period (Table 1-1). Between 1988 and 1998 growth fell back to less than 1/3rd of the initial rate, to about 6 Mg ha^{-1} yr^{-1} of biomass. ΔB, which includes both living and dead biomass, fell much more to 3% of the previous period (Table 1-1). After tree harvest the changes of the decaying belowground biomass were only indirectly monitored by measuring soil respiration (Keller et al, in press). The estimated respired carbon mass was used to estimate cation releases from biomass with the assumption of stoichiometric decomposition (Table 1-1). However, this is an upper-limit estimate of change in biomass pool of cations, because soil respiration counts for the CO_2 release by both the belowground biomass decay and soil organic matter decomposition (Keller et al, in press).

Chemical denudation

The two sandboxes showed distinctive patterns in chemical denudation rates over 20 years of the study period (Fig. 1-3). In the NV box, the flux declined for several years and dropped to 0.06 mol m^{-2} yr^{-1} by the end of the 1993-94 water-year, and it followed precipitation variations, aside from the first year (Fig. 1-3A, top). Before tree-harvest, in RP, the denudation fluxes followed a pattern similar to NV, but the magnitudes were smaller and the proportional declines were larger. In the first year the net cation loss was 0.15 mol m^{-2} yr^{-1} in RP and it declined to about 0.03 mol m^{-2} yr^{-1} by the time of tree-harvest with some fluctuations (Fig. 1-3A). Significant differences (α=0.05) were detected in denudation among the years (p=0.004) and also between the two boxes (p=0.014) excluding water year 1996 (Dean and Voss, 1999) before the harvest. The 1995-96 water-year “spike” (0.12 mol m^{-2} yr^{-1}) may be partly explained by a minor disturbance of the system by the installation of the soil water samplers at the beginning of the water year and it also likely reflects the drastic switch from one of the driest to the wettest years in the study period (Fig. 1-3A, top).

After the harvest, the RP chemical denudation fluxes demonstrate the predicted pattern after a major disturbance (e.g. Vitousek and Reiners, 1975; Bormann and Likens, 1979). The disturbance caused a big increase in denudation rates, which reached the highest flux value of 0.22 mol m^{-2} yr^{-1} two years after tree-harvest. Then it declined rapidly and followed precipitation fluctuations (Fig. 1-3A), but at substantially higher rates than before and than NV. Significant differences (α=0.05) were found between the denudation fluxes of the two boxes (p=0.02) in the after-cut period, but ANOVA was not able to detect differences among the years (p=0.17) (Dean and Voss, 1999).

Prior to the disturbance the denudation was always higher in NV than in RP (Fig. 1-3A). In addition, the cumulative denudation values were higher in NV than in RP, and the difference between the boxes increased until the harvest, after which the high RP denudation fluxes decreased this difference (Fig. 1-3B). The denudation fluxes were nearly equal by 2004, considering the uncertainties (Fig. 1-3B). There was no data collection between 1988 and 1992 water-years and we estimated denudation for that interval based on the average concentration and flow values of 1988 and 1992 water-years, assuming that the fluxes were identical in each of those 5 years. This method may over-estimate denudation from both boxes.

Chemical weathering

Chemical weathering rates varied between and within boxes during the monitored years (Table 1-1, Fig. 1-4). Weathering was initially high in both ecosystems and then it decreased significantly. These results emphasize the first 5 years rapid growth and weathering stage in RP as reported by Bormann et al (1998), where with our more conservative weathering estimates the fluxes were still large. Between 1988 and 1998 biomass accumulation slowed down (Table 1-1), which decreased weathering in RP by about 50 times, from 0.5 to 0.01 mol m^{-2} yr^{-1}. Weathering also declined in NV about 7.5 times, from 0.3 to 0.04 mol m^{-2} yr^{-1} (Table 1-1).

After harvest, weathering became close to zero in RP as the source of cations in drainage was attributed to rapidly decaying belowground biomass (eq.2). The reported weathering value (Table 1-1) is a minimum for reasons explained above. It also appears that weathering dropped to zero in NV, which was attributable to the decreased denudation component and loss from the exchangeable cation pool (Fig. 1-2, Table 1-1).

Cumulative weathering fluxes were about 1.2 to 1.3 times higher than cumulative denudation fluxes in RP after 15 years growth, while NV showed the opposite relationship (Fig. 1-3B). In addition, the cumulative denudation in RP was still lower than cumulative weathering in RP after 6 years of prevented revegetation of the box (Fig. 1-3B). Overall, RP mined its primary mineral resources and retained them, while NV lost its resources.

DISCUSSION

Ecosystem development and disturbance appear to influence and be influenced by weathering and denudation processes in more complex ways than previously thought. The kind of vegetation (vascular and non-vascular) interacts strongly and differently with weathering and denudation, and weathering and denudation are often decoupled. These interactions are best understood as they play out across three subjectively defined periods (Fig. 1-4).

Exploitive ecosystem development with *weathering-driven* nutrient dynamics (phase 1)

The first phase (1983 to 1988) was characterized by weathering-driven nutrient dynamics and exploitation of available organic and mineral soil resources by biota, and rates of weathering that exceeded denudation in both vascular and non-vascular systems (Fig. 1-4, phase1). Rates of weathering in both systems were higher than observed in other studies (Table 1-2), or in the subsequent phases described below. In part, higher rates can be explained by more active sites and weatherable surfaces in the freshly disturbed sand (Drever, 1997).

Rapid weathering in RP was associated with the rapidly developing leaf and root structures, averaging about 16 Mg ha^{-1} yr^{-1} of biomass (Bormann et al. 1993) with 80 kg ha^{-1} yr^{-1} of N (Bormann et al. 2002). Rapid biomass and N accumulation in pines had to be accompanied by rapid uptake of base cations (about 0.5 mol m^{-2} yr^{-1}; Table 1) derived mostly from weathering. RP may be driving weathering in several ways. Primary productivity is the likely source of organic acids needed to speed weathering (through roots and via mycorrhizae), vascular extension of roots throughout the rooting zone gains access to minerals, and then uptake and storage of nutrients in accumulating biomass add to the weathering mass-balance. RP initiated about 1.5 times higher weathering rate than NV, while keeping the denudation twice as low as the NV. Lower denudation in RP compared to NV can only be explained by the biological regulation of water flow and cation concentration of the water (Bormann and Likens, 1979). However the smaller difference between weathering and denudation in NV than in RP is an indication of high abiotic weathering component and the fact that the primitive vegetation did not build up a measurable amount of biomass (Table 1-1). The rapidly growing trees had large evapotranspiration especially during the growing season, so the drainage flow was suppressed and cations were taken up by the vegetation (Table 1-1).

Parallels are seen in studies of primary succession with early successional species that appear to exploit nutrient poor soils with fresh, “active” mineral surfaces, with the aid of added N from symbiotic N_2-fixing plant or other sources (Bormann et al, 1987; 1993). The decoupling of weathering and denudation leads to major nutrient transfers from primary mineral phases to biomass and to soil exchangeable pools (Vitousek et al, 1997) with relatively small losses. It is hard to reconcile the rapid rates of de facto soil development and the rapid growth in our pine systems as compared to rates reported in the primary succession literature.

In contrast to RP, the NV sandbox had little photosynthesis or apparent biomass accumulation and a net loss of about 90 kg ha^{-1} yr^{-1} of N (Bormann et al, 2002). A smaller-scale exploitation of resources, however, also occurred in the non-vascular system. Several factors could contribute to higher weathering than denudation in NV sandbox during this period. The 5 cm of A-horizon soil, added initially and rototilled into the sandboxes, was probably used as an energy source by microbes to accelerate weathering and increase microbial biomass (not measured). Microbial growth, along with enriching exchange sites, in turn kept some of the weathered nutrients from being lost. Observed cation losses were likely associated with the net N loss as nitrate (Keller et al, 2006) and flushing the freshly disturbed mineral assemblage.

Consolidation with *biocycling-driven* nutrient dynamics (phase 2)

The second phase (1988 to 1998) was characterized by major declines in weathering, to rates that were not significantly different from the decreased denudation, indicating that there was no change in the sum of the biomass and soil pools (Fig. 1-4, phase 2). Weathering declined more in RP (by 50 fold to 0.01 mol m^{-2} yr^{-1}) than in NV (by 7.5 fold to 0.04 mol m^{-2} yr^{-1}), while denudation only halved compare to the previous period and it remained about 2 times higher in NV (0.09 mol m^{-2} yr^{-1}) than in RP (0.05 mol m^{-2} yr^{-1}). Associated with the decline in weathering, pine productivity dropped from about 16 to 6 Mg ha^{-1} yr^{-1}. Uptake and storage of cations continued at a slower pace but sharply out of proportion to the much larger drop in weathering. This means that, cations that continue to accumulate in pines must be biocycled from bioavailable forms returned to the soil through decomposition. The enrichment of exchangeable Ca^{2+} and K^{+} in the upper 10 cm during this period supports this conclusion (Fig. 1-2B, D). Nitrogen supply is likely intertwined with weathering and growth rates. Wang and Hawley (unpublished data) found signs of decreasing N content in soil during the second period, which also could be related to slower growth and biocycling of nutrients.

The weathering decrease in NV probably occurred as labile carbon was depleted by microbial activity and easily weatherable mineral surfaces decreased. Despite slower tree growth, the hydrology of the RP sandbox continued to be regulated by evapotranspiration, which was 73% of precipitation in RP compared to 28% in NV (O'Brien et al, 2004). Clearly less biotic regulation and lack of bio-cycling, by non-vascular vegetation as compared to the vascular pine, leads to greater nutrient-loss (denudation) and soil depletion over time.

Our periods are not easy to connect to the ecosystem development phases - reorganization, aggradation, transition, and steady state - described for the northern hardwood forests (Bormann and Likens 1979). We see aspects of aggradation in both the exploitation and consolidation periods, including the minimum loss of nutrients in drainage. Bormann and Likens (1979) estimated about 150-180 years to reach the maximum of forest aggradation when the output of limiting (N, P) and essential (base cations) nutrients is at the minimum in a hypothetical model of ecosystem succession (Vitousek and Reiners, 1975; Gorham et al, 1979). The sandbox ecosystem might have reached this hypothetical stage after 15 years. The rapidity of this development may have been due to the overcrowded tree structure in the box and the associated intensity of biocycling. On the other hand, natural soil development is supposed to slow chemical weathering, because the parent material is sealed from weathering processes by thickening soil, and in addition fresh surfaces are covered by organic and secondary substrates (e.g. Stallard and Edmond, 1987). In our case, little typical soil horizon formation was detected, but there was chemical (O'Brien et al, 2004) and microscopic (Balogh et al, 2004) evidence of soil development in RP, which could be an important factor in lower weathering rates besides the overcrowded condition. The estimated weathering rate (0.01 mol m^{-2} yr^{-1}) during this biocycling-driven interval is within the range estimated in watershed studies (0.005-0.08 mol m^{-2} yr^{-1}) where chemical weathering is taken as equal to chemical denudation (Table 1-2).

Disturbance with *denudation-driven* nutrient dynamics (phase 3)

The last phase (1998 to 2004) was characterized by loss of biotic regulation following harvest of pine and loss of labile organic matter, and presumably much of the microbial biomass in NV sandbox (Fig 1-4, phase 3). The harvest treatment was imposed to eliminate live vascular plant influences, without physically disturbing the soil and belowground system (Keller et al, 2006). Thus, this treatment does not represent normal harvest operations, fire, or many other possible disturbance scenarios. The harvest resulted in a high nutrient loss, which was expected (e.g. Vitousek and Reiners, 1975; Bormann and Likens, 1979; Likens et al, 1994, 1998). The high leaching rate of decaying biomass and depletion of soil-exchangeable cation sites caused a large denudation flux (0.14 mol m^{-2} yr^{-1}). Our measurements and assumptions do not support the occurrence of a concomitant surge in the weathering flux, as we had hypothesized. Rather, the nutrient dynamics became denudation-driven (Fig. 1-4C), where the vascular vegetation lost its influence on nutrient-cycling processes (Fig. 1-3A). In systems with natural regrowth the duration and amplitude of this stage could be smaller (Romanowicz et al, 1996; Likens et al, 1998); here the regrowth of vascular vegetation was prevented and artificially retarded the recovery stage of ecosystem succession.

The NV system was not disturbed during this period. However, as in the RP system, weathering became significantly smaller than denudation i.e. nutrient “capital” was depleted. The decline in weathering was probably due to collapse of the microbial community due to ongoing loss of bioavailable carbon and nitrogen as freshness of weatherable surfaces also declined. It might be argued that this period was simply further progression of the “running down” of the NV ecosystem as its initial input of detritus (soil organic matter), essentially unreplenished by photosynthesis, was used up. In this view, the conceptual imposition of the RP developmental phases onto the NV box (as implied in Fig. 1-4) is strained; and the whole history of the NV box might better be understood as deregulated and denudation-driven. While reasonable, this view neglects the shift from nutrient accumulation to depletion in the NV box after phase 1, and in particular the shift from gain to loss in the soil-exchangeable pool.

If the traditional geochemical method [(stream outputs)–(precipitation inputs)] had been employed to estimate weathering fluxes from the denudation fluxes we would not have detected the biological regulation and decoupling of these processes. We would have greatly underestimated the weathering flux in the first interval and greatly overestimated it after disturbance (Table 1-1; Fig 1-4). We would have been correct only in the consolidation - biocycling-driven interval, when the fluxes were equal. Neglecting the biological and soil pools in transient systems might explain why the Ca-weathering fluxes are so variable among watershed studies even on similar timescales (Table 1-2).

SUMMARY AND CONCLUSIONS

Chemical weathering and denudation fluxes differed between experimental “sandbox” ecosystems and over time during a 20-year study period. This study shows that on this timeframe, the weathering and denudation fluxes of base-cation nutrients are biologically regulated and decoupled in time. In the first five years, rapidly growing red pine trees caused a large weathering pulse while denudation was limited to one-fifth of the weathering flux and, contrary to our hypothesis, less than one-half of the denudation flux from the nonvascular system. This first phase was characterized by *exploitation* of available organic and mineral soil resources by biota, and *weathering-driven* nutrient dynamics i.e. rates of weathering that exceeded denudation in both RP and NV systems. Over the next *consolidation* phase, tree growth slowed and there was no change in the sum of the biomass and soil pools. In both sandboxes weathering and denudation rates were small and not significantly different, i.e. nutrient dynamics were *biocycling-driven*. After tree-harvest, in phase 3, the red pine system experienced biotic deregulation. Denudation fluxes became large and (contrary to our hypothesis) weathering remained small, i.e. nutrient dynamics were *denudation driven*. Denudation also became larger than weathering in the nonvascular system during this period. However, as in phase 1, the decoupling of weathering and denudation was less dramatic than in the red pine system

Over the study period in the nonvascular box, cumulative denudation of base cations was greater than weathering, while the reverse was true for the red pine sandbox. Thus the nonvascular box lost its "nutrient capital", while the pine system transferred nutrients to various ecosystem pools and sequestered them there, even for a substantial period after a harvest disturbance with suppression of revegetation.

The long-term geochemical implications are not directly predictable from our findings, but the magnitude of chemical weathering and denudation from real ecosystems, landscapes, and continents may depend strongly on the frequency and the severity of disturbances. Vascular vegetation accelerated chemical weathering in the sandbox experiments, but also accelerated chemical denudation and lithospheric carbon sequestration when it was disturbed. These findings suggest that base cation and carbon cycles might mainly be influenced or accelerated by disturbances on geological time scales.

Table 1-1. Components of the mass balance chemical weathering and denudation calculations for three time intervals in both NV and RP boxes. The values are the sum of calcium, magnesium and potassium fluxes in mol m^{-2} yr^{-1} and the standard errors are in parentheses.

	1984-1988		**1988-1998**		**1998-2002**	
	RP	**NV**	**RP**	**NV**	**RP**	**NV**
Precipitation (P)	0.005 (0.0005)	0.005 (0.0005)	0.005 (0.0005)	0.005 (0.0005)	0.005 (0.0005)	0.005 (0.0005)
Drainage (Dr)	0.114 (0.015)	0.206 (0.020)	0.054 (0.003)	0.090 (0.007)	0.143 (0.012)	0.064 (0.004)
Change in soil (ΔS)	0.092 (0.014)	0.100 (0.020)	-0.051 (0.021)	-0.049 (0.012)	-0.082 (0.011)	-0.099 (0.031)
Change in biomass (ΔB)	0.290 (0.058)	N/A	0.010 (0.002)	N/A	-0.120 * (0.022)	N/A
***Denudation (D)* (eq.1)**	**0.11 (0.015)**	**0.20 (0.020)**	**0.05 (0.003)**	**0.09 (0.007)**	**0.14 (0.012)**	**0.06 (0.004)**
***Weathering (W)* (eq.2)**	**0.50 (0.103)**	**0.30 (0.061)**	**0.01 (0.030)**	**0.04 (0.027)**	**-0.07 (0.035)**	**-0.04 (0.040)**

* Estimated from cumulative soil respiration for the post-harvest period, see text.

Table1-2: A few comparable studies using mass-balance approach to calculate Ca-weathering fluxes under non-vascular (NV), conifer and hardwood vegetation. All units in literature converted to mol m^{-2} yr^{-1} to allow comparison. * In-(out+bio+soil) counts atmospheric inputs, drainage/stream outputs, change in vegetation and soil pools; In-(out+bio) counts all, but soil pool changes; In-Out only counts atmospheric inputs and stream outputs. Our study's Ca-weathering estimations are higher than any other comparable studies for the same vegetation type.

Type of Vegetation	**Ca-weathering flux**	**Age stated (yr)**	**Type of calculation ***	**Study area**	**Reference**
NV	***0.076***	***15***	***In-(out+bio+soil)***	***Hubbard B. Sandbox, NH, USA***	***This study***
NV	0.056	10000	In-Out	Loch Vale, CO, USA	Clow & Drever 1996
NV	0.005	5	In-Out	Cone Pond, NH, USA	Aghamiri & Schwartman 2002
NV	0.013	10000	In-Out	Upland granitic catchment, Scotland	Bain et al, 1994
Bare soil	0.013	60	In-(out+bio+soil)	Iceland	Moulton et al, 2000
Red pine	***0.121***	***15***	***In-(out+bio+soil)***	***Hubbard B. Sandbox, NH, USA***	***This study***
Conifer	0.030	50	In-(out+bio+soil)	Iceland	Moulton et al, 2000
Conifer	0.061	150	In-Out	Kalix River, N. Sweden	Land et al, 1999
Conifer	0.005	200	In-(out+bio+soil)	Cone Pond, NH, USA	Hyman et al, 1998
Mixed	0.007	260	In-Out in water	Cone Pond, NH, USA	Hornbeck et al, 1997
South Birch	0.032	300	In-(out+bio+soil)	Iceland	Moulton et al, 2000
North Birch	0.028	100	In-(out+bio+soil)	Iceland	Moulton et al, 2000
N. hardwood	0.045	90	In-Out in water	Hubbard Brook	Hornbeck et al, 1997
Hardwood	0.057	80	In-Out	Panther Lake, Adirondack, NY, USA	April et al, 1986
Hardwood	0.008	80	In-Out	Woods Lake, Adirondack, NY, USA	April et al, 1986
N. hardwood	0.013	11600	In-(out+bio)	Cloquet EF, NE MN, USA	Kolka et al, 1996
N. hardwood	0.008	11600	In-(out+bio)	Cloquet EF, NE MN, USA	Kolka et al, 1996
N. hardwood	0.035	11600	In-(out+bio)	Pike Bay EF, NC MN, USA	Kolka et al, 1996
N. hardwood	0.020	11600	In-(out+bio)	Brule River State F, NW, WI, USA	Kolka et al, 1996
N. hardwood	0.062	9500	In-(out+bio)	Brule River State F, NW, WI, USA	Kolka et al, 1996

A)

B)

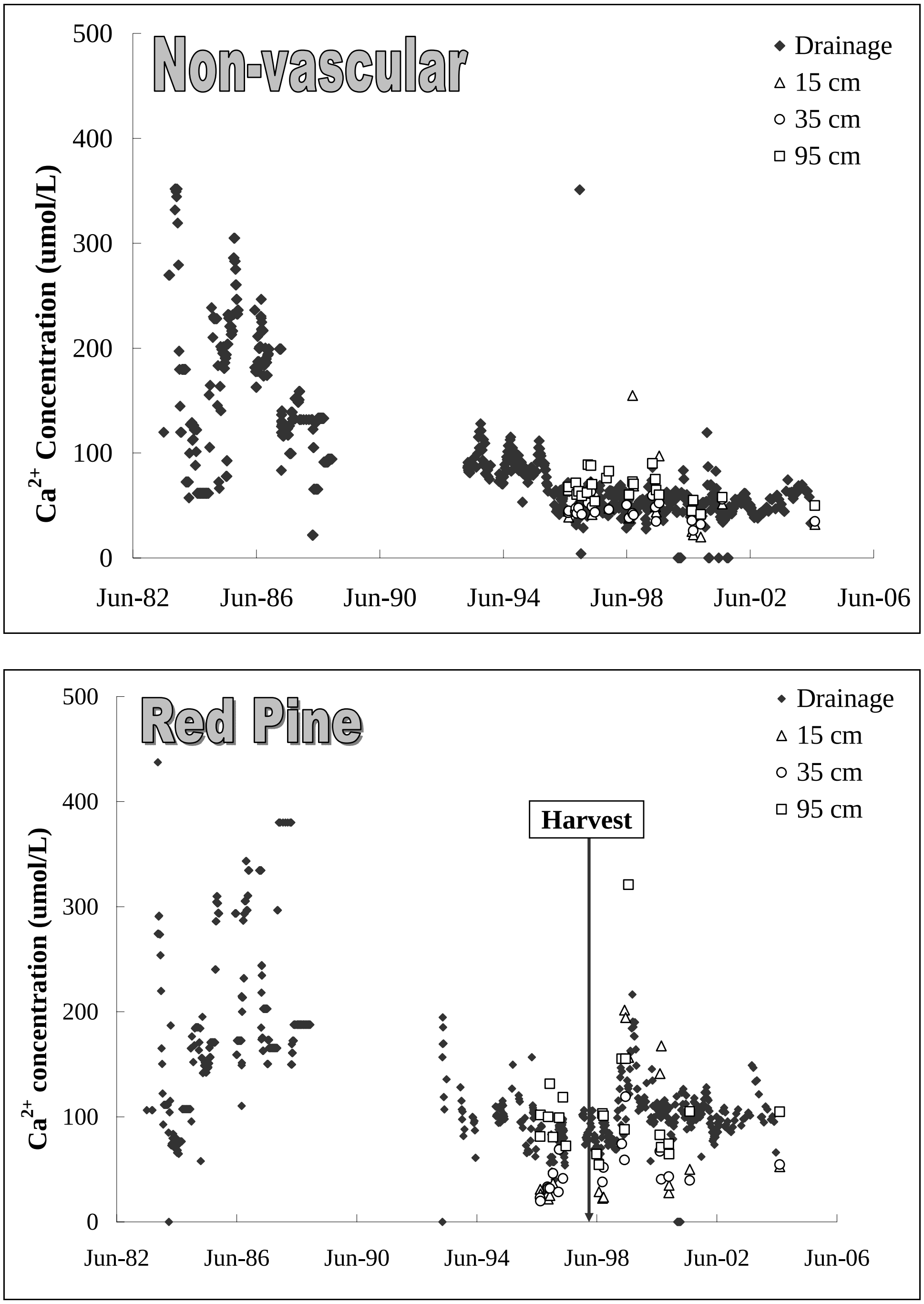
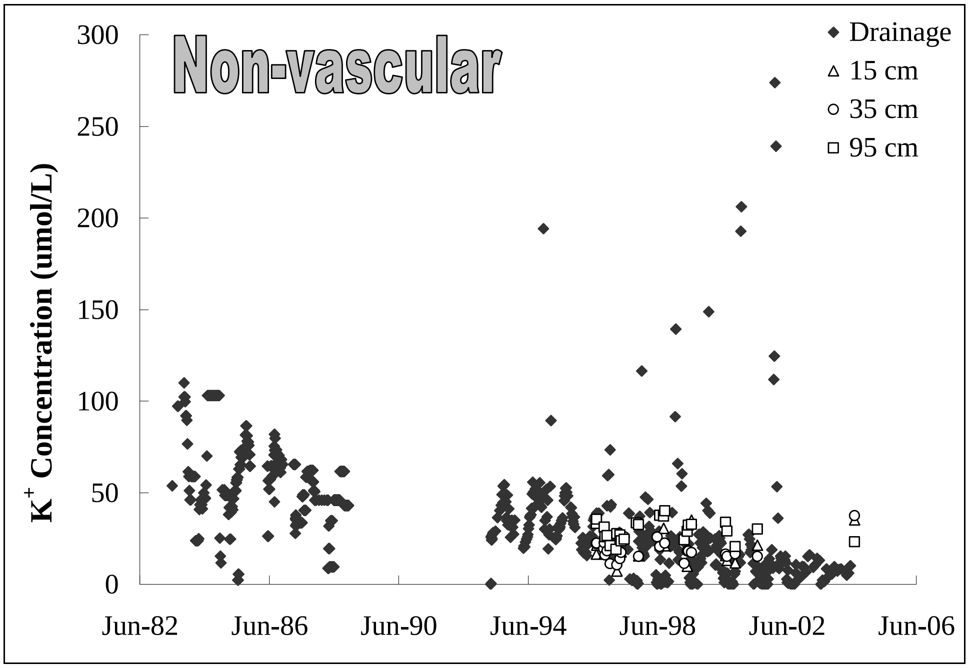


Figure 1-1: A) Time series of drainage and soil-water Ca^{2+} concentration in non-vascular (NV) sandbox. **B)** Time series of drainage and soil-water Ca^{2+} concentrations in red pine (RP) sandbox. Note relatively low Ca^{2+} concentrations in shallow RP samplers before and one season after the tree harvest, and large increases thereafter. The standard error is about 5% for the concentration values.

C)



D)

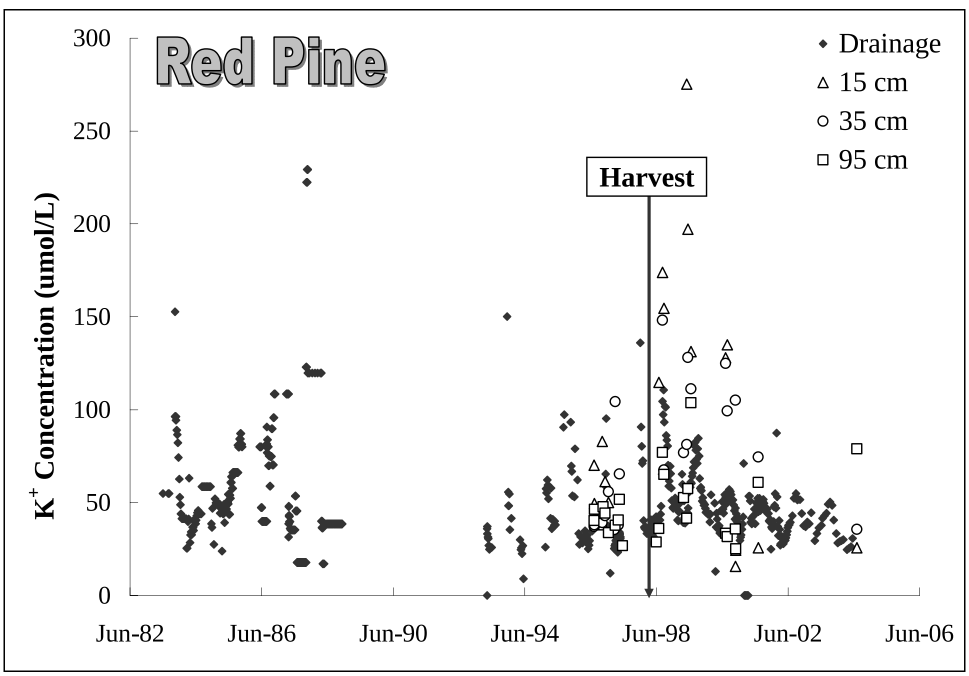


Figure 1-1: (cont.) C) Time series of drainage and soil-water K^+ concentration in non-vascular (NV) sandbox. **B)** Time series of drainage and soil-water K^+ concentrations in red pine (RP) sandbox. K^+ concentrations of RP at shallow depth are higher than drainage before and after cut. The drainage water concentrations also increase after the tree harvest. The standard error is about 5% for the concentration values.

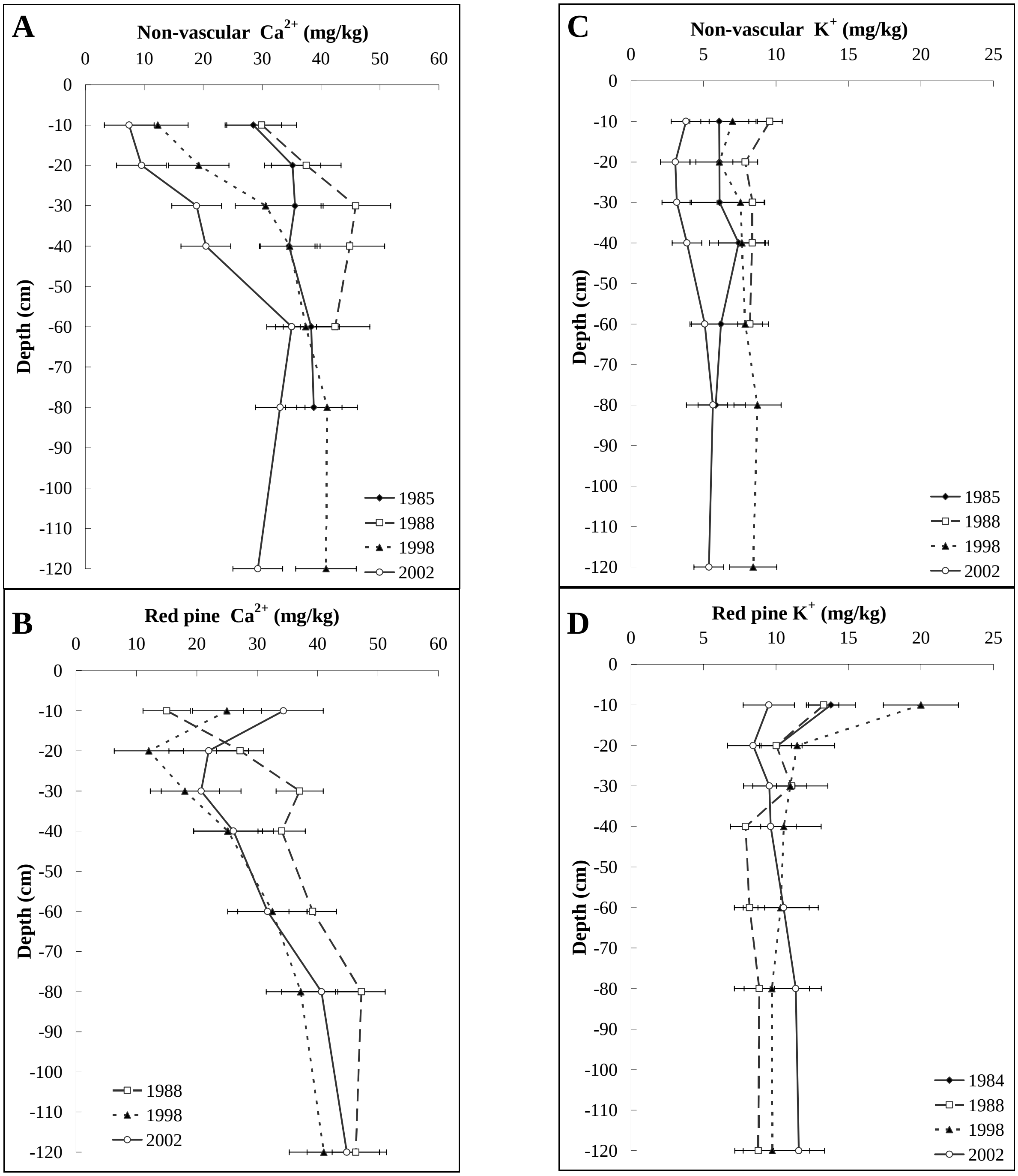


Figure 1-2: Exchangeable Ca^{2+} and K^+ depth profiles in NV and RP sandboxes for four times. **A**. Ca^{2+} depleted on top 40cm in NV then constant. **B**. Ca^{2+} depleted in top 30cm in RP, but top 10cm show some enrichment compare to 20 to 40cm depth. **C**. K^+ show very little change in time and with depth in NV. **D**. K^+ enriched in the top, and same as NV below 40cm. Every point represents an average of 5-6 (1984-1988) and 10-12 (1998-2002) replicated core samples, and error-bars count for standard deviation of replicates and the analytical errors.

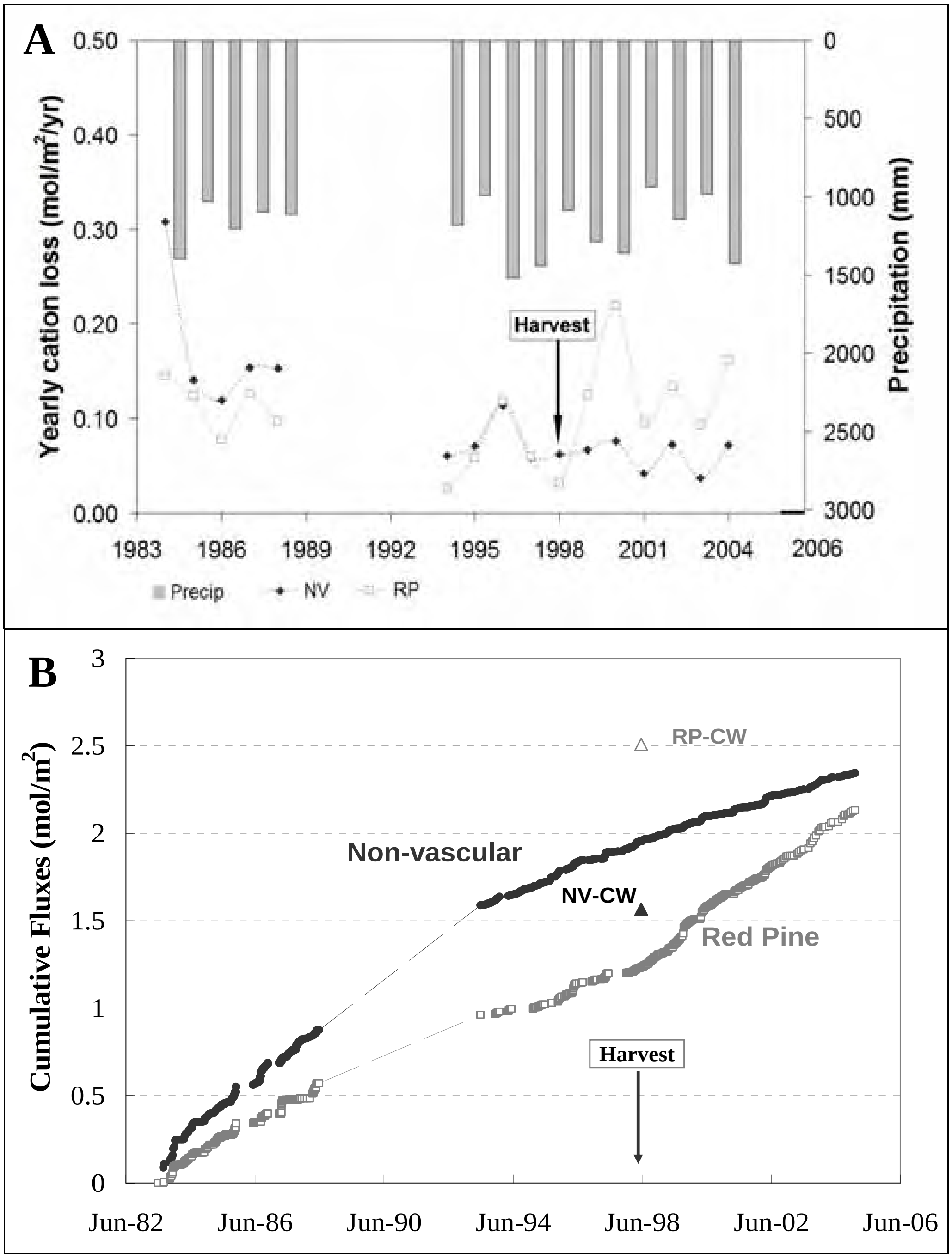


Figure 1-3: Chemical denudation fluxes (Ca + K + Mg) per year basis (A) and cumulative (B) in red pine and non-vascular sandboxes. **A.** Yearly fluxes follow precipitation fluctuations in both boxes; in RP with lower magnitude before tree-cut, after cut RP lost a huge amount of base cations, but three years later it follows the precipitation fluctuations with higher magnitudes than NV. **B**. Cumulative flux of NV is always higher than in RP; the difference increased until the tree harvest, but by 2004 RP caught up to NV (including the standard errors, 5%). Note that 15 yrs cumulative weathering flux is 1.5 times larger in RP than in NV (triangle symbols). Dashed interval represents estimated rates during period of no data collection.

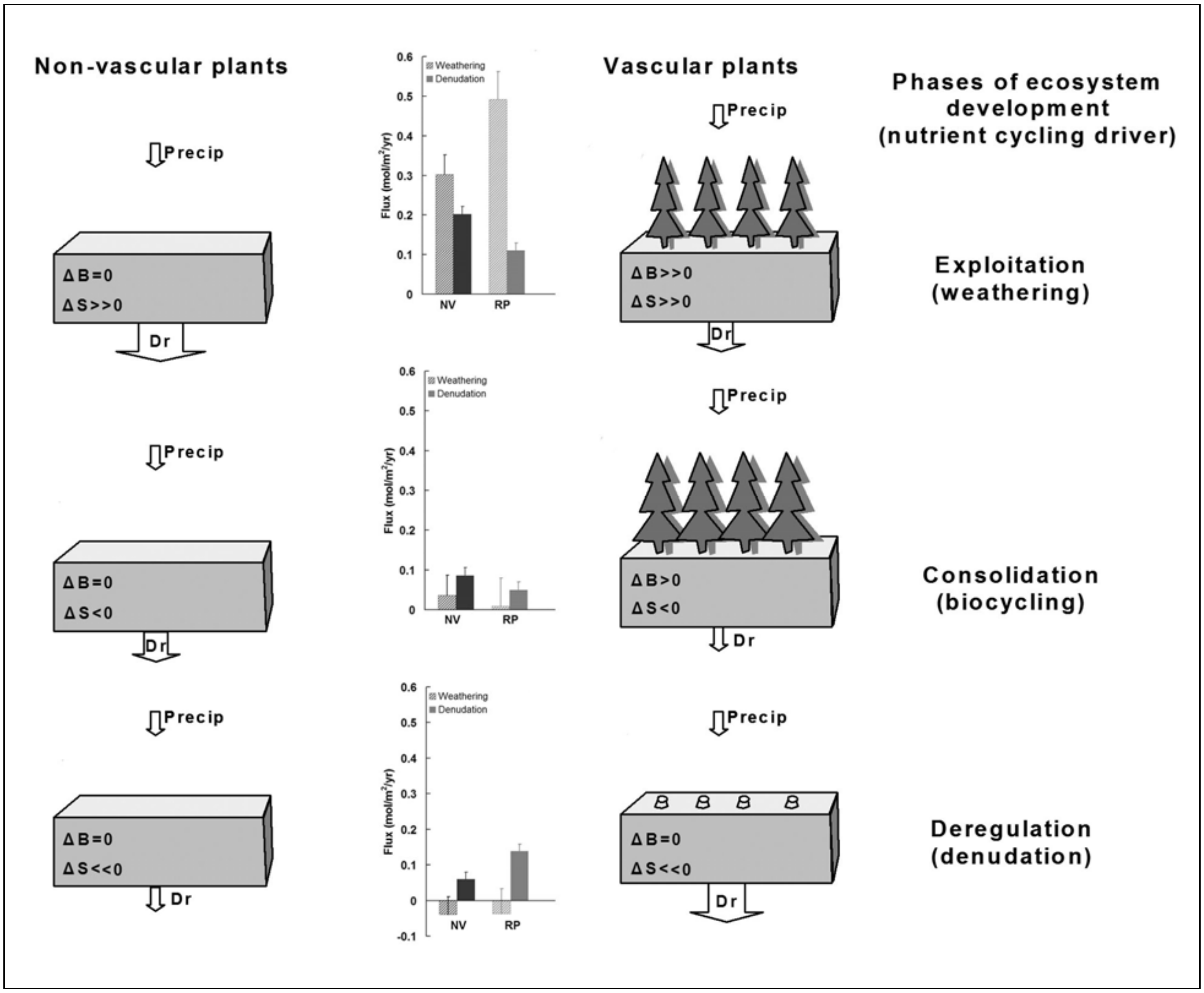


Figure 1-4: Model of ecosystem development and disturbance at Hubbard Brook sandbox experiment. Bar charts in the middle show chemical weathering and denudation fluxes (mol m^{-2} yr^{-1}) for three time intervals of both red pine and non-vascular sandboxes. Error bars represent standard deviation of all components and analytical error. **Phase 1:** Rapid growth stage of red pine system with large weathering and five times smaller denudation fluxes, while non-vascular system shows higher fluxes for both weathering and denudation. Non-vascular denudation is twice than red pine denudation. **Phase 2:** Suppressed growth stage of red pine system with low and equal weathering and denudation fluxes in both sandboxes, but non-vascular denudation is still higher than red pine denudation. **Phase 3:** After harvest stage of red pine system with high denudation and low weathering (W≈0) fluxes in both boxes, but red pine denudation is higher than non-vascular at the first time in the history of the sandboxes.

CHAPTER TWO

BIOTITE WEATHERING AND NUTRIENT UPTAKE BY ECTOMYCORRHIZAL FUNGUS, *SUILLUS TOMENTOSUS*, IN LIQUID – CULTURE EXPERIMENTS

INTRODUCTION

Weathering of silicate minerals plays an important role in soil formation and chemical evolution of natural waters; it represents a major sink for atmospheric CO_2 and is also a source of nutrients to environments (Berner and Berner, 1996). Quantifying mineral weathering rates gives us more understanding to elemental cycles and to chemical evolution of watersheds, continents, atmosphere and oceans (Holland et al, 1986; Berner 1997). Weathering of biotite is important for supplying an essential nutrient, potassium, to forest plants and to the associated microbial community (Velbel, 1984) and also biotite is a source of magnesium and iron in groundwater (Drever, 1997).

Several laboratory and field studies provided evidence of that ectomycorrhizae forming fungi and ectomycorrhizal plants are able to increase weathering of silicate minerals and to extract nutrients such as P, K, Ca, Mg and Fe from soil minerals, including biotite under nutrient limitations (Boyle and Voigt, 1973; Leyval and Berthelin, 1991; Paris et al, 1995, 1996; Jongsmans et al, 1997; Wallander and Wickman, 1999; Crawford et al, 2000; Blum et al, 2002; Yuan et al, 2004, Rosling et al, 2004). Ectomycorrhizal fungi along with bacteria could increase weathering of soil minerals by producing inorganic and organic acids and lowering the pH in their environments, they are also able to exude complex forming organic ligands and extracellular polymers and absorb and accumulate cations, which decreases the saturation state of those elements locally (Welch and Vandevivere, 1994; Barker and Banfield, 1996; Barker et al, 1997, Banfield et al 1999). Few studies have examined the role of organic acids as cation complexing agents (e.g. Paris et al, 1995, 1996) and found that the weathering power of organic acids are 3-5 times higher than inorganic acids at the same pH, which partly due to the complex forming ability and lowered saturation state (Banfield et al 1999). However, Drever (1994) based on laboratory studies, argued that biological production of acids and ligands only could have a little effect on mineral weathering, not more than a factor of two and weathering rates are primarily dependent on pH. The pH effect on biotite dissolution was studied intensively with continuous eluent flow and inorganic acids mostly in flow-through reactors (Acker and Bricker, 1992, Turpault and Trotignon, 1994, Kalinowski and Schweda, 1996, Malmström and Banwart, 1997). These studies were like an analog to bulk soil solution processes, but localized microbial effect on mineral dissolution might be equally or more important (Jongsmans et al, 1997; Barker et al, 1997; Banfield et al 1999; Rosling et al, 2004). Bacterial and fungal attachment and biofilm formation on mineral surfaces had been shown from rhizospheric soil samples or from laboratory experiments (e.g. Bennett et al, 1996; Barker et al, 1998; Rosling, 2003; Calvaruso et al, 2006). Distinct weathering features (bacteria size etch-pits, fungal hyphae size dissolution channels) were detected, using scanning electron microscope (SEM), on surfaces of several soil minerals in the red pine sandbox at Hubbard Brook (Balogh et al, 2003; 2004), which indicated that the physical attachment of microbes to mineral surfaces possibly important in the mechanisms of nutrient acquisition. Therefore the role and importance of ectomycorrhizae initiated weathering of silicate minerals is still under debate (Landeweert et al, 2001; Hoffland et al, 2004; Wallander and Hagerberg, 2004).

Microscopic techniques are commonly used in mineral weathering studies to document size and surface changes of minerals, microbial attachment and etch pit formation by microbes or inorganic processes (e.g. Boyle and Voigt, 1973; Leyval and Berthelin, 1991; Hochella and

Banfield, 1995). SEM is a useful tool to characterize changes on surfaces and it has an excellent resolution in lateral 2 dimensions, but it is restricted in its height resolution to observe changes in couple of 100s nanometers (Goldstein et al, 1984). On the other hand, atomic force microscopy (AFM) is a powerful tool for detecting surface changes on the scale of atomic layers (Binnig et al, 1986; Hartman et al, 1990; Hochella et al, 1990), so it could be used to investigate small scale and short term weathering processes. The AFM method has been used to study mineral dissolution rates (e.g. Dove and Platt, 1996; Grantham et al, 1997; Teng et al, 2001), to examine bacterial-mineral interactions mostly on iron-oxides and -hydroxides (Maurice et al, 1996; Grantham and Dove, 1996; Grantham et al, 1997) and also to determine mineral structures (Fenter et al, 2000; Kuwahara, 2001). Reviewing the literature we have not found AFM studies conducted on fungal weathering of silicate minerals.

The purpose of this work was to better understand the mechanisms of ectomycorrhizal fungal weathering and nutrient uptake processes. We were interested in how fungal weathering rates compared to simple inorganic and organic acids; how the different experimental conditions – shaken and nonshaken – altered weathering rates; whether the physical attachment of hyphae to biotite surfaces affected weathering rates or the partitioning of nutrients into biomass; and the relative contributions of basal surfaces and flake edges to fungal weathering fluxes.

For this study we selected *Suillus tomentosus*, an ectomycorrhizal forming fungus, which grows well in liquid-culture conditions and has weathering ability of silicate minerals. We combined a mass-balance approach with SEM and AFM. We measured pre- and post-experimental concentrations of potassium (K^{+}), magnesium (Mg^{2+}), and iron (Fe^{2+}) of the fungal biomass and the liquid medium. This closed system allowed us to estimate elemental fluxes of biotite weathering by solving simple mass-balances on the cations. We used SEM to characterize the pre- and post-experimental biotite basal and edge surfaces of the flakes and AFM to study small scale changes on basal surfaces in 3 dimensions.

We hypothesized that *S. tomentosus* would weather biotite surfaces by strong physical attachment and direct translocation of K^{+}, Mg^{2+}, and Fe^{2+} into fungal tissue leaving localized dissolution channels behind on the basal surfaces of biotite. However, the results of this study showed a different mechanism.

METHODS AND MATERIALS

Mineral and fungus preparation

Biotite minerals were obtained from Ward's Natural Science Est., Inc. (Rochester, NY) as classroom minerals. The composition of biotite was determined with X-ray fluorescence spectrometer (XRF; Thermo Electron ARL Advant'XP+ sequential, Germany) following a recalculation method (Klein and Hurlbut, 1993). The biotite formula is $(K_{0.908}Na_{0.079}Ca_{0.012}P_{0.001})(Mg_{0.566}Fe_{0.413}Mn_{0.021})_3((Al_{0.887}Ti_{0.113})Si_3O_{10})(OH)_2$. The biotite books were cut into 1- by 1-cm squares with a dry diamond saw. The 1 cm^2 books were hand separated and cleaved with an adhesive tape to about 100-200 μm thickness for use in three liquid-culture experiments (see below).

Biotite edges were manufactured for a separate experiment to compare the contribution of edges and basal surfaces (from other three experiments) to chemical weathering fluxes. The biotite books were imbedded in epoxy and glass sheets were glued to the basal surfaces to eliminate the exposure to solutions. Then these "sandwiches" were cut up with a diamond saw to smaller size exposing about 0.15 cm^2 of total edge area. The exposed edge surfaces were polished down with ¼ micron diamond paste, which decreased the surface roughness.

Suillus tomentosus fruiting bodies were collected during the early summer of 2003 on the White Pine National Recreation Trail (St Joe National Forest), about 15 miles North-East of Potlatch, ID. Pure cultures were isolated at the microbiology laboratory of U.S. Forest Service, Corvallis, OR. Pure cultures were maintained in the soil microbiology laboratory at WSU following Molina and Palmer (1982) and Heinonen and Holopainen (1991) methods. The fungus was tested for weatherability with 0.25% ground biotite (<100 μm) on the agar medium (Henderson and Duff 1963). Halo zones produced around the fungal colonies indicating solubilization of minerals by the fungus (Crawford et al, 2000). Then fungal mats were grown for 4-8 weeks to reach the desired size in Modified Melin-Norkrans (MMN) solution (Marx, 1969) as follows: 10 g glucose L^{-1}, 3 g malt extract L^{-1}, (mgL^{-1}) $(NH_4)_2HPO_4$ (250), KH_2PO_4 (500), $MgSO_4x7H_2O$ (150), $CaCl_2x2H_2O$ (66), NaCl (25), Thiamine HCl (0.1), and Sequestrene 10ml (2 gL^{-1}).

Fungal weathering experiments

Four liquid-culture experiments were conducted to determine the weathering action of *Suillus tomentosus* on biotite flakes by methods modified from Crawford et al (2000) and from Welch et al (2002). The fungal mats were washed in deionized water (DIW) and filtered with 0.45 μm filter paper three times prior to each experiment. Biotite flakes and edges were sterilized in 95% ethanol then rinsed with autoclaved DIW in a sterile hood. The 8% glucose solution was mixed and pH controls were prepared with inorganic or organic compounds (see below) then autoclaved. Treatments were replicated 3 times, incubated for 12 weeks at room temperature. Ten ml of liquid and one biotite flake were sampled at 4, 6, 9 and 12 weeks in a sterile hood and the fungal biomass was harvested at 12 weeks. After harvest the fungus was rinsed and filtered on the same way as prior to the experiment, and then oven dried at 65^oC. Glucose was replenished after every liquid sampling to maintain 8% concentration and the volume of the solution. The 8% glucose solution pH was initially adjusted to pH 6 and it dropped to pH 3 in the fungal treatment of the preliminary experiment (data is not shown), so we selected pH controls in this range.

The four experiments were:

Shaken-inorganic: The washed fungal mats were suspended in 50 ml of 8% glucose solution in Pyrex Erlenmeyer flasks containing 5 cleaved biotite flakes and were incubated on an 800 rpm elliptical shaker table (+flakes, +glucose, +fungus = BGF). The controls were shaken cultures with fungus but without flakes (–flakes, +glucose, +fungi = GF), without fungus but with flakes (+flakes, +glucose, –fungi = BG), and without fungi and glucose but with flakes in pH-adjusted DIW (+flakes, –glucose, –fungi at pH 4, 5, or 6 = pH 4, pH 5, or pH 6). This last control had 3 subtreatments adjusting and maintaining the pH at 4, 5, and 6 weekly with diluted HCL and NaOH.

Nonshaken-inorganic: The experimental setup was identical to shaken-inorganic, but the flasks were incubated without shaking on a bench top and the volumes of the solutions were 100 ml.

Nonshaken-organic: The experimental setup was the same as the nonshaken-inorganic, but with organic-acid controls in 8% glucose instead. Here, the pH was set with organic buffers - oxalic and citric acids (most common acids exuded by fungi) and Sodium-acetate - to pH 3, 4, 5, and 6. The control without fungus but with flakes (+flakes, +glucose, –fungi = BG) was substituted for pH 3 control.

Edge: The edge experiment used the same organic buffers for controls as in nonshaken-organic. Here the washed fungal mats were suspended in 50 ml of 8% glucose solution in Erlenmeyer flasks containing two manufactured biotite edges. There were two controls: two biotite edges in glucose solution with organic buffers setting the pH to 3 and 5. These were replicated only twice and sampled after 6 and 12 weeks of incubation at room temperature.

Analyses

The liquids were filtered through 0.2 μm nylon filters and acidified to below pH 2 with HCl after collection. The elemental concentration (in ppm) of the clear supernatants was determined with Thermo Jarrell Ash, Inductively Coupled Argon Plasma spectrometer (ICAP), model 61 at WSU, Pullman. Solution pH was measured before acidification of each sample. The dried fungal biomass was weighed and digested with concentrated hot nitric acid and hydrogen-peroxide (SW-846 EPA; 1995), and then the diluted solutions were analyzed on the same ICAP as the liquid samples.

We used SEM (Hitachi, Ltd., Tokyo, Japan) and high resolution field emission (FE) SEM (Zeiss Leo 982) to analyze biotite flakes and edges. Prior to the analyses the mineral samples were rinsed with DIW three times then freeze dried in liquid nitrogen and lyophilized to preserve the fungal structures adhered to the surfaces. After drying the samples were mounted on stubs with a double sticky carbon tape. Flake edge surfaces were investigated with SEM, at WSU, Pullman, after they were gold coated with a sputter coater (Techniques Hummer V, Anatech, USA). Basal surface areas were analyzed with FE-SEM, at Pacific Northwest National Laboratory (PNNL), Environmental Microbiological Science Laboratory (EMSL), Richland, WA, after they were carbon coated with a sputter coater (Edwards Sputter Coater S150B). Other set of samples were rinsed with DIW three times then placed under Environmental Scanning Electron Microscopy (ESEM) (FEI-XL30ESEM-FEG) at PNNL, EMSL, Richland, WA, to eliminate artifacts caused by sample preparation.

We used AFM (NanoScope III., Digital Instruments) to analyze basal surfaces of biotite flakes and the manufactured edges, at WSU, Pullman. The samples were rinsed with DIW three times then gently blow dried with a hand air drier and placed in the chamber of AFM. The operation of AFM has been described in elsewhere (Binnig et al, 1986; Hartman et al, 1990; Hochella et al, 1990). On each sample, 100 µm by 100 µm areas were scanned at 10 locations and smaller scans were taken to image specific features using contact mode in air. Some samples with fungal hyphal cover were imaged in air then a commercially available multi-enzyme formula (GNC) solution was added to detach the hyphae from the biotite surface, and then the biotite surface was gently wiped with a damp Kimwipe to remove hyphae. The same surface area was imaged after hyphal removal.

Calculations

Weathering rates were estimated by using a simple mass-balance approach for Fe^{2+}, Mg^{2+} and K^{+}. The sum of inputs was subtracted from the sum of outputs for each element separately. The measured inputs and outputs included the elemental composition of liquids and fungal biomass before and after the experiments, respectively. The control without biotite in glucose solution provided information on contamination by the Pyrex Erlenmeyer flasks. These values were subtracted from net concentration changes to correct for the effect of the flasks. Then we used the corrected values to estimate weathering fluxes of K^{+}, Mg^{2+} and Fe^{+} based on geometric surface areas of biotite flakes and edges. The fluxes were expressed in mol $m^{-2}\,s^{-1}$.

We also calculated whole biotite weathering flux using the stoichiometry of our biotite mineral based on the Fe loss from the structure. We expressed our values in mol of biotite $m^{-2}\,s^{-1}$, so it would be comparable to reported biotite dissolution rates.

In shaken-inorganic experiment we estimated weathering rates of biotite basal surfaces using 3 dimensional AFM images, where we measured the geometry of dissolution features appeared on the surfaces. We analyzed all of the 100 µm by 100 µm images taken about each biotite flakes in every treatment of shaken-inorganic. The geometric area of dissolution channels were measured with ImageJ software and the cross-section of dissolution channels were measured multiple times with NanoScope III. We combined the area and cross-section measurements to calculate the volume of lost biotite per unit area ($\mu m^3\ \mu m^{-2}$). The average volume of dissolution channels was used to estimate dissolution rates (mol of biotite $m^{-2}\ s^{-1}$).

RESULTS

Mass-balance chemistry

Fungal addition (+fungi) significantly increased dissolution rates by 2-3 orders of magnitude ($p=0.02$) compared to inorganic acid pH and glucose controls in the shaken-inorganic experiment for both Mg^{2+} and Fe^{2+} (Fig. 2-1). Fungal addition also increased weathering fluxes in the nonshaken-inorganic experiment (Fig. 2-1), where the Mg^{2+} flux was somewhat higher and the Fe^{2+} flux was significantly higher ($p=0.05$) than the inorganic acid pH and glucose controls. When using organic acids as buffers in the nonshaken-organic and the edge experiments, the fungal treatment did not significantly differ ($p>0.05$) from the controls (Fig. 2-1), i.e. the fungus had the same effect on dissolution rates as the organic acids.

The fungi quickly acidified the liquid-culture, stabilizing it at pH 3 after 6 weeks. The Mg^{2+} and Fe^{2+} dissolution dynamics were the same for all experiments, which suggested that these ions were released together from the mineral lattice (Maslova et al, 2005). The K^+ dissolution rates were not shown because the inorganic controls were contaminated by the pH meter in shaken-inorganic and nonshaken-inorganic experiments, so those values are not comparable. The K^+ fluxes of BGF and organic acid pH controls were not statistically significantly different ($p>0.05$) from each other in nonshaken-organic and edge experiments similarly to Fe^{2+} and Mg^{2+} fluxes (Fig. 2-1).

The concentrations of K^+, Mg^{2+} and Fe^{2+} changed both in the liquid phase and the biomass during the 12 weeks of BGF incubation (Table 2-1). The fungus accumulated a substantial amount of all three elements in its tissue in shaken-inorganic experiment and K^+ and Mg^{2+} built up in the liquid phase as well. The other three experiments without shaking behaved differently. In all 3 cases K^+ and Mg^{2+} accumulated in the liquid, leaching from the fungal tissue and the biotite flakes. Fe accumulated in the fungal tissue in all experiments. There was some increased Fe measured in solution in both nonshaken fungal treatments at the end of 12 weeks.

Scanning Electron Microscopy (SEM/ESEM)

Fungal hyphae attached to flake edges and basal surfaces in all +fungi treatments to various extents (Figs. 2-2 to 2-4). Flakes in the shaken experiment exhibited rough, but cleaner flake-edge surfaces compared to untreated flakes (Figs. 2-2A and B). Extensive fungal hyphal cover and biofilm formation was detected on flake edges both in nonshaken-inorganic (Fig. 2-2C) and in nonshaken-organic (Fig. 2-2D) experiments. Hyphae also attached to the cleaved basal surfaces in the nonshaken experiments (Figs. 2-3A and B) and, in the latter, spore formation was observed on hyphal strains (Fig. 2-3B). Small particles dissolved from the surface of polished biotite edges in the edge experiment and some areas were densely covered by fungal hyphae (Fig. 2-4). Biotite basal surfaces did not show dissolution features (etch pits and/or channels) detectable by SEM or ESEM. The resolution of these instruments is not small enough to detect 1-10 nm deep features (Goldstein et al, 1984). The controls did not exhibit fungal attachments or biofilm covers on any surfaces in any of the experiments. In the nonshaken-inorganic experiment salt crystal formation was observed on basal surfaces of biotite, but no dissolution channels were seen in any of the inorganic pH controls (Fig. 2-5A). On the other hand, large dissolution features were found in the organic acid controls of nonshaken-organic experiment (Fig. 2-5B). These observations are supporting the chemistry results, where the weathering rates of inorganic acid pH controls were significantly lower than the fungal treatment and organic acid pH controls were not different from the fungal treatment.

Atomic Force Microscopy (AFM)

Small scale basal surface changes were investigated using AFM (Fig. 2-6 to 2-9). Prior to the experiments the freshly cleaved biotite flakes were imaged to characterize initial conditions. These flakes showed smooth surfaces with small particles adhered to them and with some layer step edges (Figs. 2-6A and B). High numbers of shallow dissolution channels were observed in BGF of the shaken-inorganic experiment (Figs. 2-6C and D) without detection of attached fungal hyphae. The channel volume based weathering rate of basal surfaces, assuming stoichiometric Fe loss from biotite, was 2 orders of magnitude smaller (3.71×10^{-12} mol of biotite m^{-2} s^{-1}) than the total rate estimation using mass-balance (2.07×10^{-10} mol of biotite m^{-2} s^{-1}). These results indicated the importance of the edges in dissolution processes and agreed with previous studies (e.g. Turpault and Trotignon, 1994; Bickmore, 2001).

The nonshaken experiments did not have as extensive dissolution channel formation (<5% area) as the shaken-inorganic experiment, but some curved channels were found on basal areas (Fig. 2-7A) and some etch pits following linear lines (Fig. 2-7B) in fungal treatments. Fungal hyphal attachments on basal surfaces were also detected with AFM in the nonshaken setups as we have seen it on the SEM images of Figs. 2-3A and B. The preliminary roughness measurements of AFM images showed that overall basal surfaces become rougher compared to the initial freshly cleaved surfaces in these experiments (data not shown). The polished edges in the edge experiment showed extensive hyphal cover, but we were not able to detect surface morphology changes. In general, we did not detect dissolution features in the controls of these experiments with AFM, but the organic acid buffered pH 3 control in the nonshaken-organic experiment showed some etch pits (Fig. 2-8A) and long linear single channels (Fig. 2-8B). However, these features covered about 1% of the total surface area and they were not observed in other organic or inorganic acid buffered controls of the nonshaken experiments.

Curved dissolution channels were found on basal surfaces, but we did not find supporting evidence of channel formation mediated by the ectomycorrhizal fungus. After imaging the hyphal attachment on the biotite surface (Fig. 2-9A) we removed the hyphae from the flakes and then imaged the same area again, but no dissolution channels were seen where the hyphae had been (Fig. 2-9B). The same crystallographic steps can be seen before and after removal of the hyphae, which shows that the biotite surface was not damaged by the removal of hyphae. The shown images (Figs. 2-9A and B) had a 2 μm z-scale, which is larger than on other images, but zooming in on places where the hyphae had been still had not discovered traces of dissolution channels.

DISCUSSION

Fungal effect on biotite dissolution and nutrient uptake

Fungus promoted higher weathering rates than inorganic acid buffered controls in shaken- and nonshaken-inorganic experiments (Fig. 2-1). The weathering rates of the inorganic acid buffered controls were very small, as it was expected above pH 4.5, but the dissolution rates of our pH 4 control was also in the lower range of previous studies (Acker and Bricker, 1992; Kalinowski and Schweda, 1996; Malmström and Banwart, 1997, Maslova et al, 2005). Our setup was different, because biotite flakes were exposed to the same solutions during the course of the experiment and reactive surface area must have been smaller due to the large and thin flakes. Despite the larger weathering rate mediated by the fungus than inorganic pH controls, our rate was in the range of the inorganic acid weathering rates reported in the literature (Table 2-2).

The fungus was not able to produce higher weathering rates than the organic acid buffered controls in nonshaken-organic and edge experiments (Fig. 2-1). These findings suggest that the fungus indirectly influenced weathering by exuding organic acids and lowering the pH of the solution. Acker and Bricker (1992) showed that biotite dissolution was pH dependent at room temperature and Bickmore (2001) found very high edge-normalized dissolution rates below pH 2 (Table 2-2). Some organic acids (e.g. oxalic and citric) have the ability to chelate Fe^{2+}, Fe^{3+}, Al^{3+}, Ca^{2+} and other cations compared to inorganic acids, and by doing this lower the saturation state of cations in solution, so therefore increase dissolution of minerals (Drever and Vance, 1994, Paris et al, 1996, Barker et al, 1997; Banfield et al, 1999). Paris et al (1996) reported that the complex-forming acids such as oxalate and citrate have a 3-5 times higher weathering potential than non-complexing organic and inorganic acids. This chelating ability of organic acids must be responsible for the higher release of Mg^{2+} and Fe^{2+} from biotite ($p=0.05$) in the nonshaken-organic than in the nonshaken-inorganic experiments at pH 3 and 4 (Fig. 2-1). In our nonshaken-organic and edge experiments the fungal BGF, and the pH 3 and 5 organic acid controls had similar weathering rates, which indicated that the exuded organic acids mediated the weathering in fungal BGF treatments and so the fungus only had indirect effect on the rates.

The distribution of elements changed both in the liquid phase and in the fungal biomass during the course of the experiments (Table 2-1). We expected to see immobilization of elements in fungal tissue and indeed the fungal biomass increased about 2-3 fold (dry weight) compared to the input after 12 weeks of incubation in all experiments. In the shaken experiment the fungus preferentially accumulated Mg^{2+} and Fe^{2+} in its tissue. In this experiment K^{+} also accumulated in the tissue, but increased similarly in the liquid phase (Table 2-1). In the other three experiments without shaking, K^{+} and Mg^{2+} accumulated in the liquid, leaching from the fungal tissue and the biotite flakes. The fungi scavenged the weathered Fe^{2+}, especially when shaken and this was the only case where fungi gained Mg^{2+} in biomass (Table 2-1). This partitioning was not evidently due to attachment. The finding that biomass lost K^{+} and Mg^{2+} while it grew tissue in the nonshaken experiments was different from previous *in vitro* studies, where the weathering and elemental immobilization in fungal biomass were occurring simultaneously (Paris et al, 1995; 1996; Crawford et al, 2000; Yuan et al, 2004). The decreased concentration might be due to other limitations.

Effect of shaking on biotite dissolution rates

The fungal weathering rate was an order of magnitude higher in shaken-inorganic ($2.1\pm1.2\times10^{-10}$ mol of biotite $m^{-2}\,s^{-1}$) than in nonshaken-inorganic experiments ($3.0\pm1.7\times10^{-11}$ mol of biotite $m^{-2}\,s^{-1}$). This difference might be caused by the fact that the diffusion limited boundary layer around the biotite flakes could not form in shaken-inorganic experiment due to continuous liquid movement, which supported higher dissolution rates in these well-mixed solutions. Biotite dissolution rates of fungal treatments were still high in both shaken- and nonshaken-inorganic experiments, and the difference between them was lower than compared them to field investigations (e.g. White and Brantley, 2003). Most of the batch or liquid-culture studies were carried out on a slow motion shaker table (e.g. Watteau and Berthelin, 1990; Welch and Vandevivere, 1994; Crawford et al, 2000) because the motion helps to distribute the particles evenly in the liquid and promote microbial and mineral contact, and also help with oxygen availability to microbes (Li personal communication). However, few studies were carried out under nonshaken conditions with the goal of measuring acidity and concentration gradients on liquid-microbe-mineral interface (Liermann et al, 2000; Kalinowski et al, 2000).

In the shaken fungal treatment, physical contact between hyphae and mineral surface and biofilm formation were prevented by the continuous motion; however, extensive dissolution channel formation was detected along the large dissolution rates as discussed in the next section. On the other hand, biofilm coatings (Fig. 2-2D) formed in the nonshaken fungal treatments which could have prevented mass-transfer from the mineral-microbe interface to the bulk solution and could have decreased the measured bulk solution dissolution rates compared to the shaken experiment.

Fungus-driven surface changes

Numerous, mostly straight channels formed on basal surfaces of biotite flakes within 6 to 12 weeks in fungal BGF treatment of the shaken-inorganic experiment (Figs. 2-6C and D). Flakes from the controls did not show these channels, indicating that the channels did not form by abrasion with the flasks and suggesting that the fungus is responsible for dissolution channel formation. However, no hyphae were detected on basal biotite flake surfaces in the shaken-inorganic experiment, so fungal effects on surfaces would have to occur without prolonged fungal contact. Flakes in nonshaken experiments had few dissolution channels (Fig. 2-7) even with massive fungal cover in places (Fig. 2-2C, Figs. 2-3A and B). Using AFM, we imaged the fungus covered areas before and after fungal removal, but we did not observe dissolution channels underneath hyphae (Fig. 2-9), and we also did not see dissolution features next to fungal hyphae cover. These findings did not support our hypothesis, which proposed the importance of dissolution channel formation during fungal weathering due to direct attachment.

Grantham and Dove (1996) found bacterial imprints on iron-oxide coatings after the bacteria were removed, but the bacteria shaped pits were limited to the coating thickness (Grantham et al, 1997). Iron reducing bacteria might be more effective in mass removal under liquid-culture conditions than fungus, because the fungus did not have water or nutrient availability limitations in liquid-culture, which suggest that attachment was not as important in the nutrient uptake or in the weathering of biotite as in soil environments.

Rapid channel formation in the shaken-inorganic experiment was consistent with the higher weathering rates on biotite flakes in BGF treatment; and the minor appearance of dissolution channels paralleled the order of magnitude lower rates in the nonshaken experiments (Figs. 2-1, 2-6, and 2-7). The fungus probably selectively takes up nutrients (Paris et al, 1995; Yuan et al, 2004), which would weaken defect and inclusion lines in the crystal lattice and this coupled with shaking, could initiate the channel development (Figs. 2-6C and D). If this is true, nonshaken flakes probably did not show extensive channel formation partly because elemental transport would have been lowered by diffusion limitations due to the stable concentration gradients around flake surface (Drever, 1994). On the other hand, liquid-culture conditions did not promote strong surface connection even in the nonshaken experiments between biotite and fungus, so contact exchange processes might be not as important in these conditions as on solid medium under limited moisture potential. Shaking also promoted the smaller particle dissolution (Figs. 2-2A and B), where the initial flake edges were covered with small adhered particles, but after 12 weeks shaking the surface is cleared. Both the channel formation and small particle dissolution contributed to the higher weathering rates of the shaken-inorganic experiment, but direct fungal attachment was not important in these experimental conditions.

Contribution of basal surfaces and edges to fungal weathering

Edges generally have larger relative reactive surface area than basal surfaces (Turpault and Trotignon, 1994; Bickmore, 2001). Laboratory studies have shown that small biotite particles start to dissolve at the edges then progress inward (Rufe and Hochella, 1999; Murakami et al, 2003). Here we tried to reduce the importance of edge surfaces by using biotite books of 100-200 μm thickness, where most of the sample area was basal surface. The edges still played a major role in the weathering process.

In the edge experiment, where the basal surfaces were sealed from exposure to the solution, the fluxes were similar to shaken-inorganic experiment (Fig. 2-1 and Table 2-2). Here the geometric edge area was larger than in shaken-inorganic experiment but the roughness was reduced by polishing the edges. Fungus still attached extensively to the polished surfaces (Fig. 2-4). The edge and nonshaken-organic experiments had the same experimental conditions, but the edge had an order of magnitude higher weathering rate than nonshaken-organic (Fig. 2-1), which showed that the edges are more susceptible to weathering. All of these findings agree with previous studies which emphasize the importance of edges in contribution to weathering (Turpault and Trotignon, 1994; Rufe and Hochella, 1999; Bickmore, 2001; Murakami et al, 2003).

These results also support the finding that fungal attachment and direct dissolution channel formation had a minor influence on the weathering rates of biotite, and that reactive edge surface dissolution was the dominant process (Bickmore, 2001). From a crystal physics point of view, relative to the smooth cleavage surface, the edges of these crystals expose extremely high densities of defects; such structures are vulnerable to local chemical attack; pit formation (nucleated at dislocations) and step dominated dissolution on cleavage surfaces of single crystals such as calcite are classic examples (Hillner et al. 1992a, 1992b; Liang et al. 1996; Jordan and Rammensee 1998). Thus, the biotite edges would be expected to weather at much higher rates.

SUMMARY AND CONCLUSIONS

The estimated biotite weathering rates by ectomycorrhizal fungus in liquid culture are within the range of literature values for inorganic acid weathering. The direct surface attachment of fungal hyphae did not prove to be important in liquid-culture experimental conditions. The fungus did not generally mediate dissolution channel formation on basal surfaces of biotite nor cause direct translocation of nutrients into tissue. Despite increase of biomass in all experiments Mg^{2+} and Fe^{2+} preferentially partitioned into fungal biomass only in the shaken-inorganic experiment. However, a small amount of Fe^{2+} bioaccumulated in all nonshaken experiments. These findings did not support our hypothesis of that *S. tomentosus* directly weather biotite surfaces by strong attachment and by direct translocation of K^{+}, Mg^{2+}, and Fe^{2+} into fungal tissue leaving localized dissolution channels behind on the basal surfaces of biotite.

The fungal treatments and the organic-acid buffered controls did not differ significantly. Our organic acid controls contained oxalic and citric acids, the most common exudates of ectomycorrhizal fungus, and the effect of the fungus and organic acids were similar. These results support the finding that under these conditions, *S. tomentosus* indirectly weather biotite surfaces by lowering the solution pH via production of low molecular weight organic acids (oxalic, citric, malic) and accelerating the dissolution of the mineral without forming dissolution features on basal surfaces.

Most of the weathered mass comes from the edges of the flakes, which is consistent with inorganic acid leached studies. In liquid-culture experiments the water and nutrient availability to fungus was not limited and the fungus had altered hyphal morphology and equilibrium with the solution, while in soil environments the attachment might be more important to nutrient mobilization and physical support.

More studies are required with organic acids and microbial community to fully understand weathering of minerals in natural soil environments and to determine weathering rates of silicate minerals more realistically.

Table 2-1: Potassium, magnesium and iron gains and losses in liquid phase and in fungal biomass after 12 weeks incubation with *Suillus tomentosus*. Fungus accumulated all three elements in substantial amount in its tissue and allowed the build up of K and Mg in the liquid phase during the shaken-inorganic experiment. The other three experiments show K and Mg loss from biomass and only Fe accumulation. Standard errors are in parentheses.

12 weeks	K μg		Mg μg		Fe μg	
BGF	Biomass	Liquid	Biomass	Liquid	Biomass	Liquid
Shaken-inorganic	137 (135)	121 (128)	113 (93)	21 (10)	107 (61)	-3 (2)
Nonshaken-inorganic	-42 (5)	273 (37)	-11 (12)	31 (58)	19 (13)	19 (9)
Nonshaken-organic	-121 (9)	276 (49)	-8 (1)	31 (8)	20 (17)	2 (1)
Edge	-121 (120)	211 (115)	-8 (4)	17 (4)	13 (11)	-5 (1)

Table 2-2: Dissolution rates of biotite after 12 weeks incubation from our study were in the range of previous laboratory studies conducted with inorganic acids. The rates are in mol of biotite per geometric area of biotite per seconds (mol m^{-2} s^{-1}). However, in our study the shaken (+fungus) and edge (+fungus or –fungus) cultures supported an order of magnitude higher rates than our nonshaken-inorganic and organic cultures. The dissolution rates in pH 5 and pH 6 controls were nearly zero or zero in all experiments (not listed in table), but in edge pH 5 was about equal to pH 3 or BGF. * The rate was normalized to edge surface area only.

Solution pH	**Acid**	**Rate (mol/m^2/s)**	**Reference**
2	Inorganic	$8.2\pm4.4\times10^{-9\,*}$	Bickmore, 2000.
1	Inorganic	$6.1\pm3.0\times10^{-9\,*}$	
1-4	Inorganic	3.4×10^{-11}	Maslova et al, 2005
3	Inorganic	2.5×10^{-12}	Taylor et al, 2000
2.8	Inorganic	7.9×10^{-12}	Acker and Bricker, 1992
2.8	Inorganic	4.0 to 6.3×10^{-10}	Trotignon and Turpault, 1992
2.8	Inorganic	4.0 to 7.9×10^{-11}	Malmström and Banwart, 1997
1-4	Inorganic	2.2 to 3.2×10^{-10}	Kalinowski and Schweda, 1996
Dissolution rates of this study			
2.8	*Organic (by fungus)*	$2.1\pm1.2\times10^{-10}$	*Shaken-inorganic (BGF)*
3	*Organic (by fungus)*	4.4 ± 1.1 to $7.6\pm4.2\times10^{-11}$	*Nonshaken-inorganic (BGF) and nonshaken-organic (BGF)*
3	*Organic (by fungus)*	$5.3\pm2.8\times10^{-10}$	*Edge (BGF)*
4	*Inorganic*	$3.0\pm1.7\times10^{-11}$	*Nonshaken-inorganic (pH 4)*
3-4	*Organic*	5.8 ± 1.5 to $6.6\pm1.7\times10^{-11}$	*Nonshaken-organic (pH 3, pH 4)*
3, 5	*Organic*	6.6 ± 4.9 to $8.6\pm6.4\times10^{-10}$	*Edge (pH 3, pH 5)*

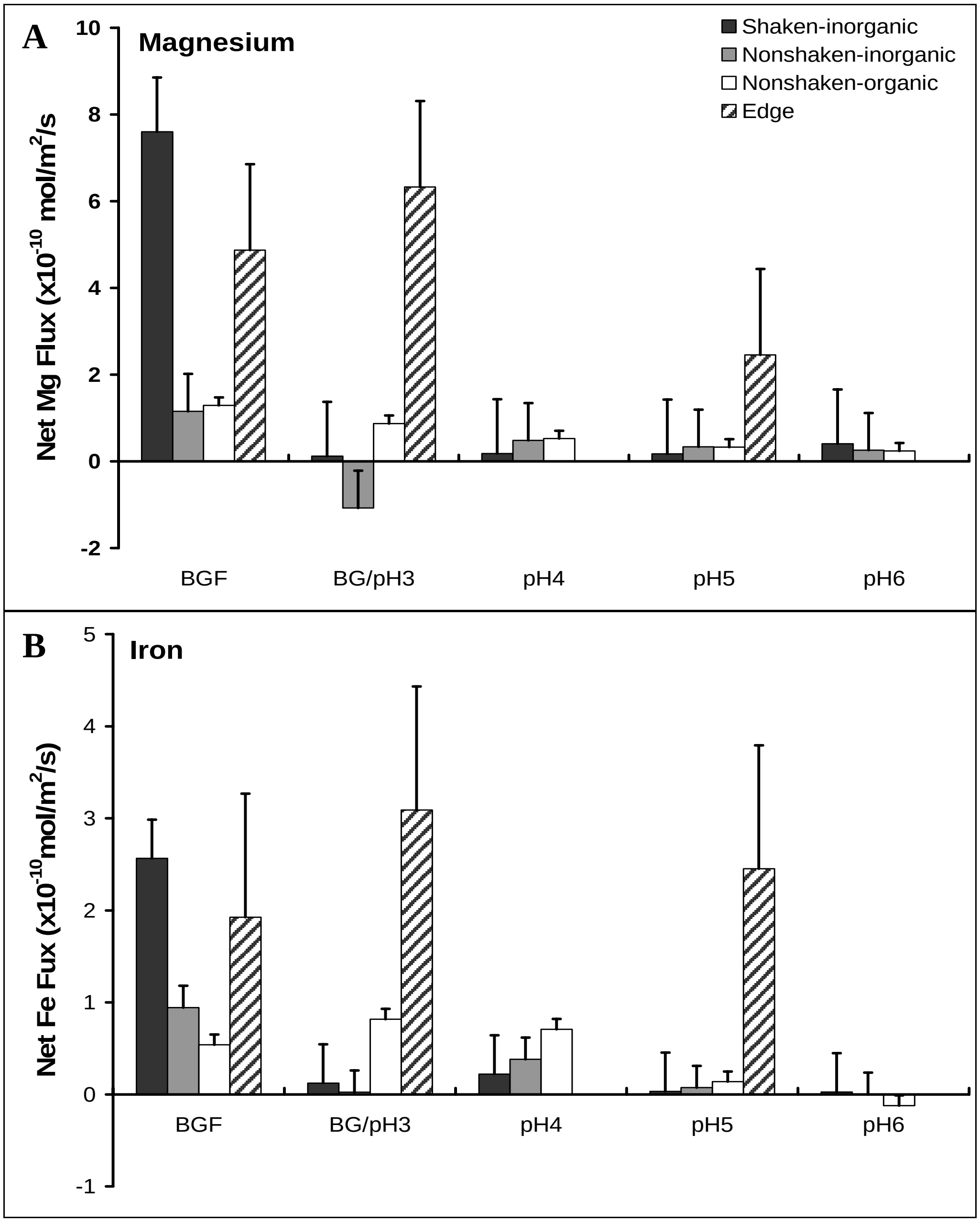


Figure 2-1: Magnesium (**A**) and iron (**B**) weathering fluxes (mol/m^2/s) after 12 weeks incubation in all four experiments. BGF is +fungus, +glucose; BG is a control, –fungus, +glucose in shaken and nonshaken-inorganic; pH 3 is –fungus, +glucose in nonshaken-organic and edge; pH 4, pH 5 and pH 6 are –fungus, –glucose in shaken and non-shaken inorganic; and they are –fungus, +glucose in nonshaken-organic and edge. The pH was adjusted with HCl, and NaOH in inorganic, and with oxalic and citric acids, and Na-acetate in organic pH controls. Biotite flakes were present in all graphed treatments. Fungal effect was significant in shaken and nonshaken-inorganic ($p<0.001$), but similar to controls in nonshaken-organic and edge. Standard errors are represented by the error bars.

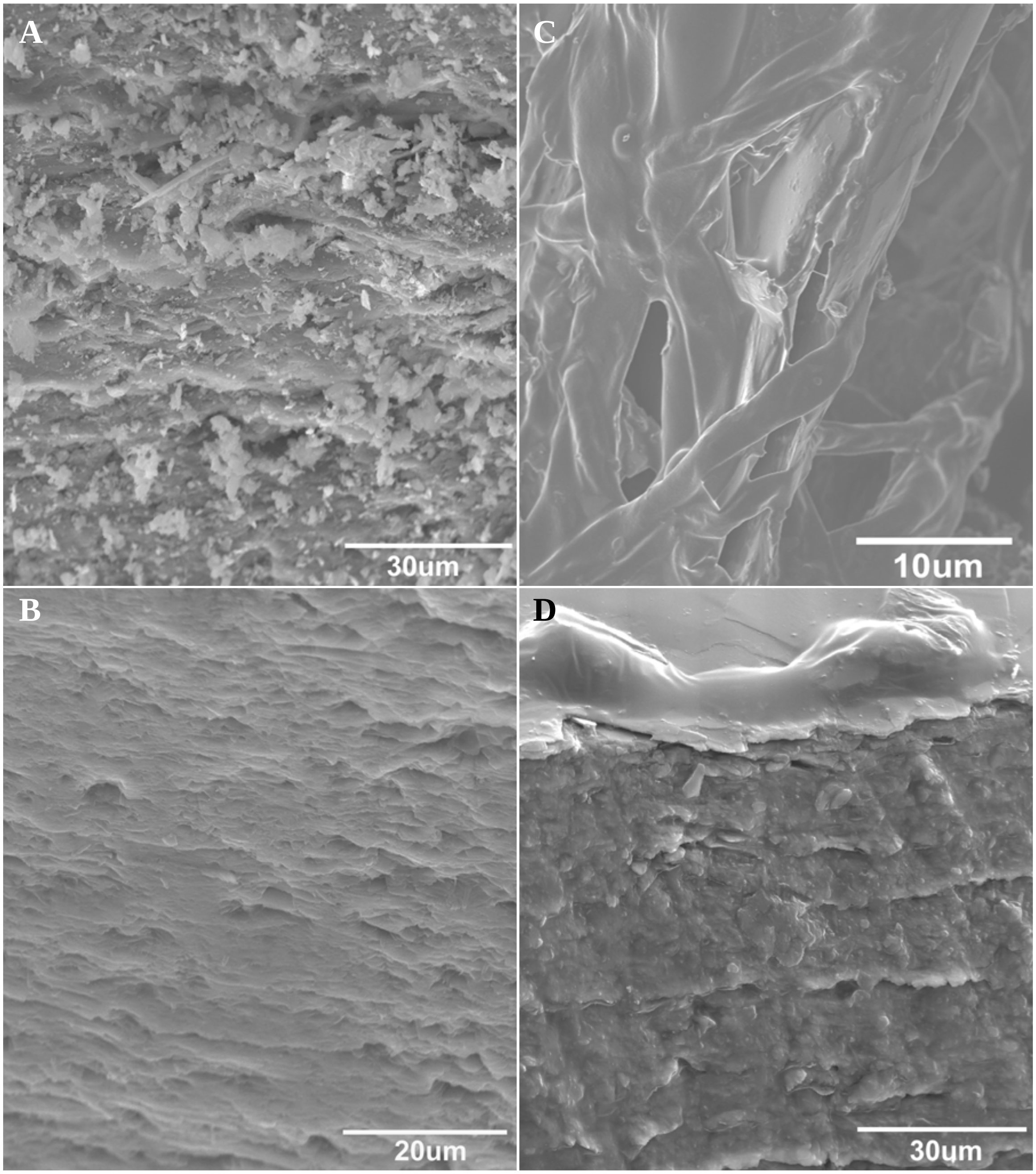


Figure 2-2: SEM images of biotite flake edges **A**) **–** initially and **B-D** after 12 weeks incubation with fungus. **A**) Initial biotite flake edge surface was covered with small adhered particles and looked rough. **B**) Flake edge surface showed rough, but clear surface in shaken-inorganic. **C**) Fungal hyphae covered flake edge in nonshaken-inorganic. **D**) Biofilm covered flake edge in nonshaken-organic.

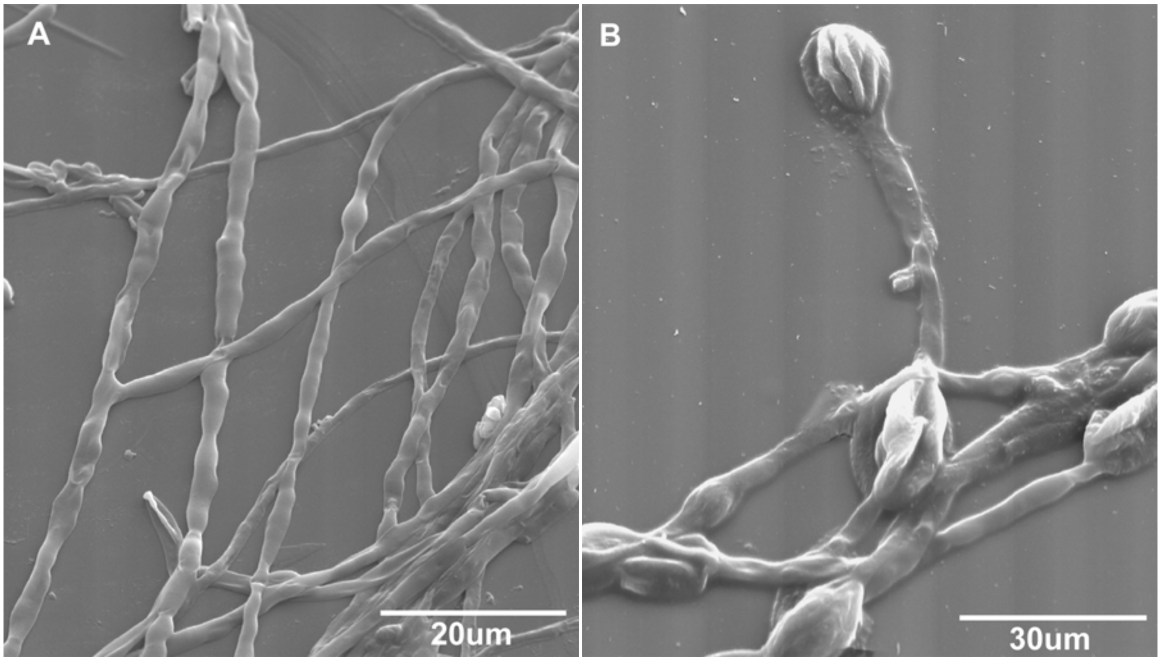
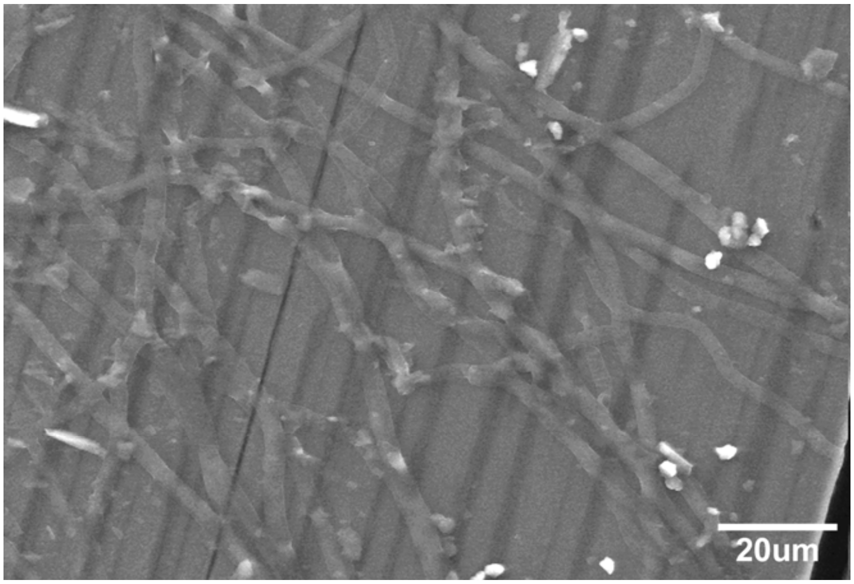


Figure 2-3: Fungal hyphae attachment to basal biotite surfaces was observed with SEM **A**) in nonshaken-inorganic fungal treatment and **B**) in nonshaken-organic fungal treatment. Note the spore formation on attached hyphae on B.

Figure 2-4: ESEM image of the polished edge showed extensive hyphal attachment in the fungal treatment of edge experiment.



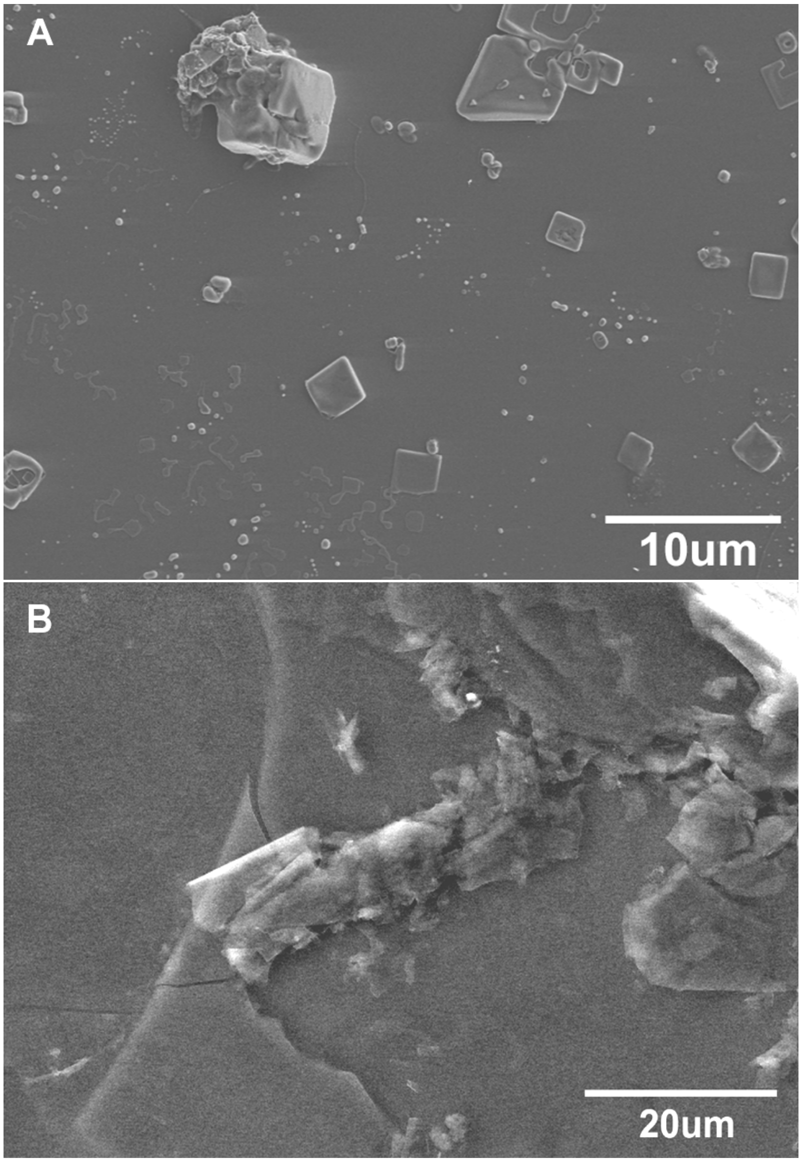


Figure 2-5: Fungal hyphae attachment and/or biofilm cover were not detected in controls of any of the experiments. **A**) Salt crystal formation, but no dissolution was observed on basal surfaces of pH controls in nonshaken-inorganic with SEM. **B**) Biotite basal surfaces were dissolved in pH controls of nonshaken-organic as imaged with ESEM.

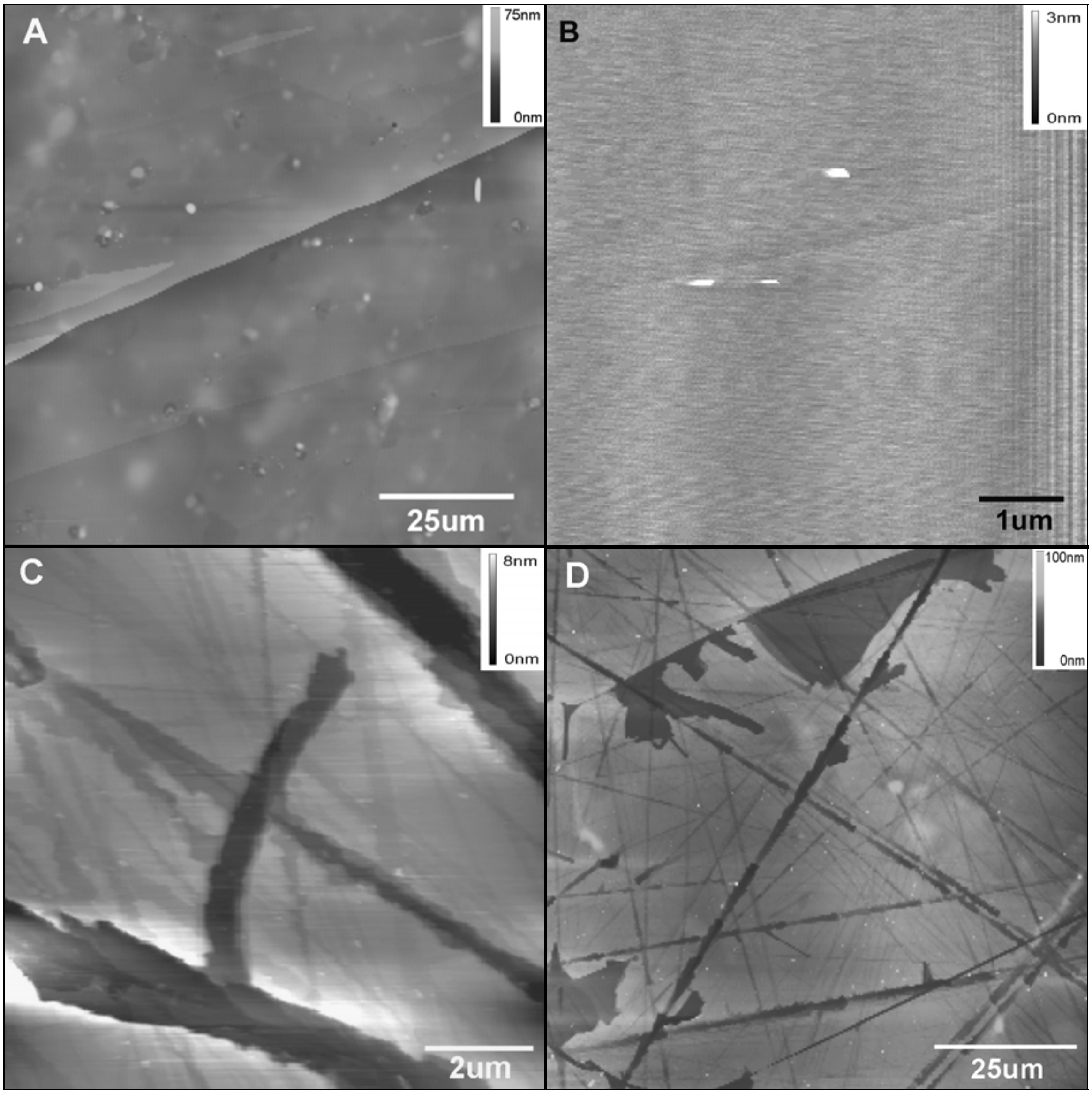


Figure 2-6: Atomic force microscopy images of basal surfaces of biotite flakes before incubation (A, B) and after incubation with *Suillus tomentosus* for 6 weeks (C) and for 12 weeks (D) in shaken-inorganic experiment. The freshly cleaved surfaces were smooth with some layer steps (A) and few particles adhered to the surface (A, B). After incubation shallow (5-10 nm deep) curved and straight channels were observed with AFM.

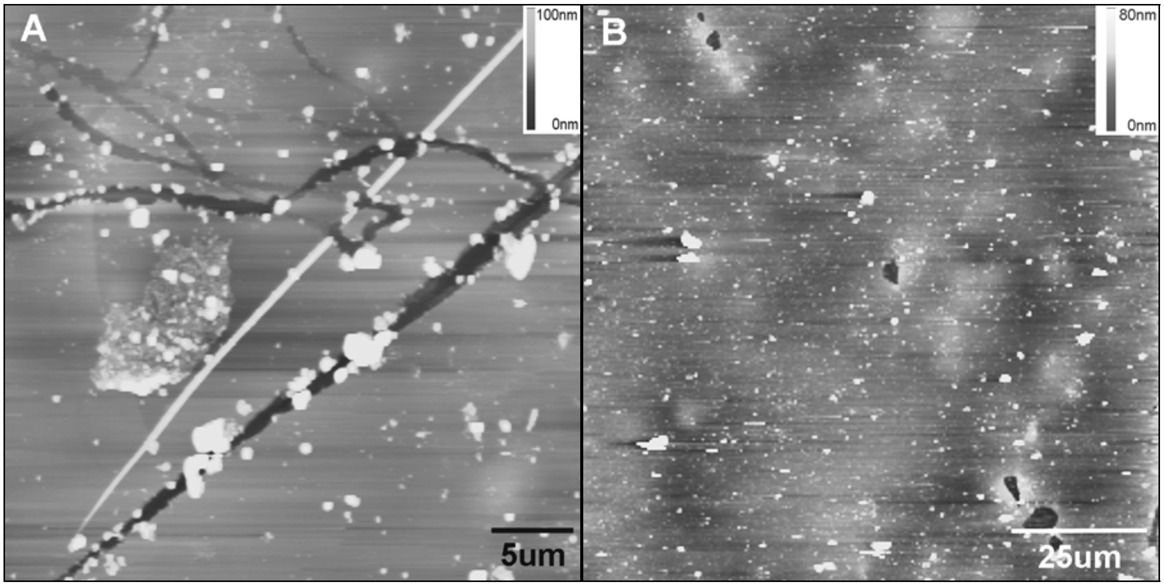


Figure 2-7: AFM images of basal biotite surfaces after incubation with *Suillus tomentosus* in nonshaken experiments. **A**) A few representative curved dissolution channel network (1-3 μm wide and 10-30 nm deep) were found in both nonshaken-inorganic BGF and nonshaken-organic BGF after 12 weeks incubation. **B**) Etch pits formation along a linear line in nonshaken-inorganic after 9 weeks incubation.

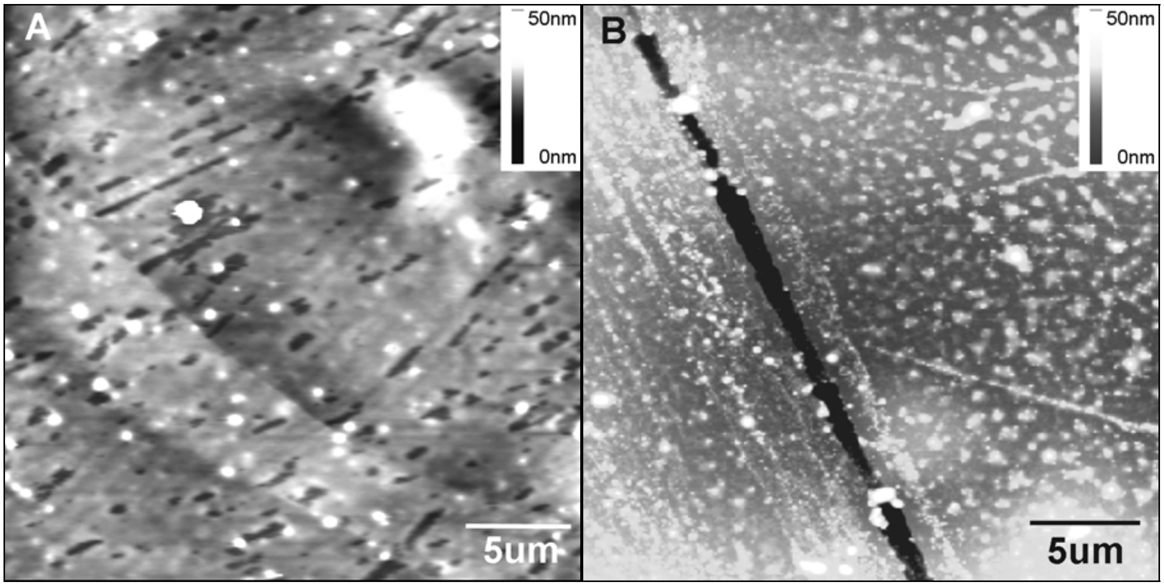


Figure 2-8: Some dissolution features were observed in pH 3 control of nonshaken-organic with AFM. **A**) In some basal areas, 5 nm deep dissolution pits formed after 12 weeks incubation. **B**) Few dissolving cracks were found on basal surfaces after 9 weeks. These features covered about 1% of the total area in pH 3 control of nonshaken-organic and they were not observed in the nonshaken-inorganic pH controls.

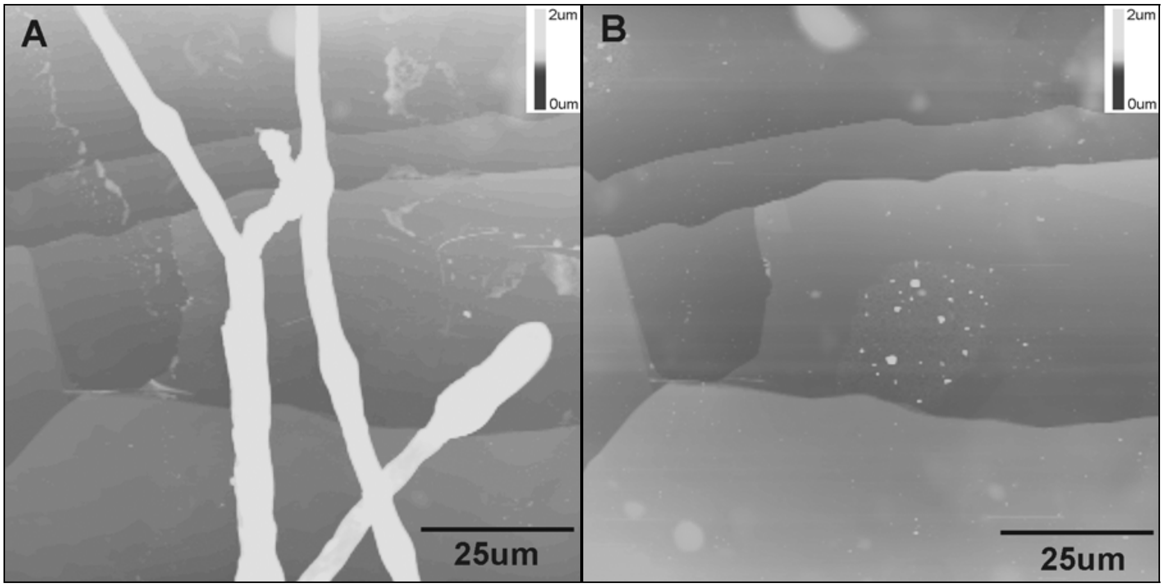


Figure 2-9: The same basal biotite surface area was imaged with AFM in nonshaken-organic fungal treatment before (**A**) and after (**B**) hyphal removal. The same steps can be seen before and after removal of hyphae, which shows that the biotite surface was not damaged by the removal. There were no dissolution channels detected after hyphal removal on large (2 μm) z-scale, but zooming in to areas where hyphae had been still did not show dissolution channels.

CHAPTER THREE

BIOFILM SUPPORTED INCREASE OF CHEMICAL WEATHERING AND DECREASE OF CHEMICAL DENUDATION IN PINE GROWTH EXPERIMENTS

INTRODUCTION

Mineral weathering, along with atmospheric deposition, supplies non-nitrogen nutrients (P, Ca, K, Mg, Fe etc.) in natural ecosystems. It is well known that vascular plants and associated microbial community promote weathering of soil minerals to obtain these nutrients, especially by influencing rhizosphere processes (Hinsinger and Gilkes, 1997; Hinsinger et al, 2001; Kelly et al, 1998; Bormann et al, 1998; Landeweert et al, 2001; Marschner, 2002). These processes include physical disaggregation by mycorrhizal hyphae along grain boundaries and cleavage planes increasing contact surface area, production of inorganic and organic acids and lowering the pH, exudation of complex forming organic ligands and extracellular polymers, and absorption and accumulation of elements, which decreases the saturation state locally (Welch and Vandevivere, 1994; Barker and Banfield, 1996; Barker et al, 1997, Banfield et al 1999).

Plant-driven mineral weathering cannot maintain ecosystem sustainability and healthy plant growth unless it is accompanied by uptake and sequestration mechanisms which prevent loss of the weathered nutrient mass in drainage or runoff; in other words, sustainable ecosystems must exercise control on chemical denudation. Regulation of local hydrology has been widely recognized as a key means by which ecosystems prevent nutrients from being “washed away” (e.g. Bormann and Likens 1979). However, rhizospheric processes may also play a key role in this regulation, where rhizosphere defined as the immediate surroundings of roots in soil environments (Marschner, 2002). It is understood that the rhizospheric soil solution has lower pH and more available cations than the bulk soil solution (e.g. Wang and Zabowski, 1998;

Arocena and Glowa, 2000; Marschner, 2002), and Rosling et al. (2004) suggested that mycorrhizal plants can weather minerals and take up nutrients independent of bulk soil solution chemistry. Both laboratory and field studies provided evidence that ectomycorrhizal fungi are able to extract nutrients (such as P, K, Ca, Mg and Fe) from apatite, biotite, feldspars and other silicates and promote plant growth under nutrient limited conditions (Boyle and Voigt, 1973; Leyval and Berthelin, 1991; Paris et al, 1995, 1996; Jongmans et al, 1997; Wallander and Wickman, 1999; Wallander, 2000; Crawford et al, 2000; Augusto et al, 2000; 2001; Hoffland et al, 2002, 2003; Yuan et al, 2004, Rosling et al, 2004; Nezat et al, 2004). These findings imply that there may be existing bio-physico-chemical processes, involving root-microbe associations operating at mineral surfaces, which both enhance weathering and isolate weathered nutrients from flowing soil water.

The purpose of this study is to test these ideas of simultaneously occurring enhanced weathering and isolated nutrient lost at root-microbe-mineral interface. We propose that mycorrhizal hyphae growth and accompanying biofilm (organic coating) development on mineral surfaces can both promote mineral weathering and isolate mineral-to-root mass transfers from bulk soil solution and denudation loss. Our idea is that the mineral-microbe interface is covered by biofilm which both enhances dissolution and keeps transport of the solutes under control. A host (plant) is essential, both as supplier of carbon to the microbes and as destination for and sequester of the weathered nutrient mass (Keller et al, 2006; Chapter 1; Chapter 2).

We carried out an experiment to isolate the effect of ectomycorrhiza forming (EMF) fungi and ectomycorrhiza helper (EMH) bacteria (Garbaye, 1994) on chemical weathering and denudation, and their effect on these fluxes in association with a red pine (*Pinus resinosa* Ait.) host. We imitated the Hubbard Brook sandbox study in scaled-down fashion, by using a sandy growth medium in replicated flow-through columns in a growth chamber. Ca, Mg and K were supplied in primary mineral phases only, and concentrations of these cations were measured in input and output solutions, in tree biomass and on exchangeable cation sites of the growth medium. This enabled estimation of weathering and denudation fluxes by mass-balance.

We hypothesized that (a) EMF fungi and EMH bacteria without their host increases both total weathering and chemical denudation (elemental loss in solution) in contact with minerals relative to abiotic controls; (b) ectomycorrhizal seedling growth strongly increases the rate of mineral weathering, while reducing base-cation concentrations in drainage output and suppressing denudation relative to non-ectomycorrhizal systems.

METHODS AND MATERIALS

Growth medium

Biotite and anorthite were obtained from WARD'S (Rochester, NY) and silica sand from Lane Mountain Company (Valley, WA), compositions are shown in Table 3-1. Biotite was ground in a coffee grinder and anorthite was crushed in a jaw crusher then the 250-500 μm size fraction was separated out by dry sieving. The sand was coarser than 500 μm in 95% and it was not sieved. The silica sand was acid washed with 20% HCl and rinsed 10-15 times with de-ionized water (DIW) before drying at 90^{o}C. Biotite and anorthite were washed in DIW to remove small particles and they were also pasteurized at 90^{o}C. The growth medium prepared in 164-ml plastic Ray Leach tubes (3.8 cm inside diameter, 21 cm depth; Stuewe & Sons Inc., OR) and consisted of a mixture of 200 g acid-washed silica sand amended with 3% anorthite and 1.5% biotite by weight. The bottom of the tubes were cut and sealed with a 100-μm mesh nylon screen to prevent the particles from dropping out of the tubes. One control contained only silica sand. The terms "growth medium" and "soil" are used interchangeably later on in the text.

Organisms and inoculums

Red pine seeds were obtained at Sheffield's Seed Co, Inc., Locke, NY. Seeds were surface sterilized with 30% hydrogen-peroxide containing a drop of Tween 20 (a surfactant) for 30 minutes and then rinsed several times with sterilized DIW (Yamanaka et al, 2003). Five seeds were sown in each tree-treatment tube; then 1-month-old seedlings were thinned to one per growth tube. The choice of red pine was based on the hardiness of this species on base-poor soils and it was used in our Hubbard Brook sandbox experiment (Chapter 1).

For the present study *Suillus tomentosus* and *Pisolithus tinctorius* were selected as mycorrhizae, because they are able to colonize red pine roots (Appendix I). *S. tomentosus* sporocarps were collected on the White Pine National Recreation Trail (St Joe National Forest), about 15 miles North-East of Potlatch, ID, and *P. tinctorius* sporocarps were collected in Corvallis, OR. Pure cultures were obtained by placing small pieces of inner tissue onto plates of modified Melin-Norkran's medium (MMN) (Marx, 1969) and incubated at room temperature. Discs of mycelium were cut from the plates and blended in DI water for use as EMF fungi inocula.

The bacterium *Ewingella americana* was isolated from the *S. tomentosus* sporocarps and two bacteria, *Bacillus megaterium* and *Pantoea agglomerans* were isolated from the *P. tinctorius* sporocarps. The bacteria isolates were identified based on 16S rRNA gene sequence similarity in MIDI labs (Newark, DE, USA) (Appendix J). Bacteria were grown on TSA agar medium (DIFCO, Detroit, MI, USA) for 3 days at room temperature then suspended in DI water and used as EMH bacteria inocula (4×10^{7} CFU ml^{-1}). Further in the text *Ewingella americana* will be referred to as StBacteria, *Bacillus megaterium* and *Pantoea agglomerans* will be referred to as PtBacteria.

Applied solutions

During the experiment all columns received 20 ml of DI water 3 times a week. A ¼ strength modified Hoagland's solution (pH 4.5; see composition in Table 3-2) was applied once a month to each treatment. The microbial treatments received 1 ml of 8% glucose solution (pH 4.0) as a carbon source once a week. Antibiotics (pH 3.6), Penicillin G (500 μg/ml) and Rifampicin (50 μg/ml) (Sigma Chemical Company, St. Louis, MO, USA), were applied to non-bacterial treatments once in two months. Fungicides (pH 5.5), Steptomycin Sulfate (100 μg/ml) and Nystatin (40 μg/ml) (Sigma Chemical Company, St. Louis, MO, USA) were applied to non-fungal treatments once in two months. Abiotic control received both antibiotics and fungicides. Unfortunately, algae growth was not eliminated by these chemicals and 10% $CuSO_4$ solution was used occasionally in non-fungal treatments to fight back algae growth (it contained 27 ppm Cu, 1.7 ppm Ca; pH 5.5) (Bruneau and Lewis, 1995).

Experimental setting and conditions

The experiment was designed and set up following Colpaert et al (1999) and Yamanaka et al (2003) with some modifications. 11 treatments were prepared with 15 replicates for each as listed in Table 3-3. The tubes were placed in a growth chamber for 12 months with 24-16 ^{o}C (day-night) regime and under 16-8 h photoperiod. The tubes were randomly arranged on the holding rack and the arrangement was reorganized every 2 months to minimize differences due to the location in the chamber. The tubes were inoculated 6 weeks after sowing with one of the assigned EMF fungi and EMH bacteria or both. One treatment was left abiotic; see Table 3-3.

Sample collection and analyses

Drainage water was collected from each growth tube with a funnel to a 125 ml plastic bottle. The volume of drainage water was measured every two weeks and three aliquots of each treatment were saved for cation, anion and silica analyses. Here we only report the cation results. Calcium (Ca^{2+}), potassium (K^{+}) and magnesium (Mg^{2+}) contents of all solutions were analyzed with inductively coupled argon plasma (ICAP) spectrometer (Thermo Jarrell Ash, model 61).

Five tubes of each treatment were destructively sampled at 6, 9 and 12 months. After removing the mineral particles by shaking from the pine seedlings the above-ground and below-ground parts were separated and oven dried (65^{o}C) for three days. The tree biomass was ground after recording the dry weight. The largest and the smallest ground root samples of each tree-treatment were combusted to correct for the minerals sticking to the roots. All other tree biomass was digested in concentrated hot nitric acid over night then 30% hydrogen-peroxide was added to it and heated for 30 minutes on a block heater; hydrogen-peroxide addition and heating was repeated three times (SW-846 EPA; 1995). The diluted solutions were analyzed by ICAP. The bacterial and fungal biomass was not measured because it was not separable from mineral surfaces.

The bulk and rhizospheric growth medium were collected separately during the tree removal. They were sub-sampled for exchangeable cation measurements and various microscopic analyses. The rhizospheric sub-samples were very small, so they had to be mixed in to the bulk sub-sample for exchangeable cation analyses. These samples were oven dried at 65^{o}C then conventional ammonium acetate extraction procedure was used (McIntosh, 1969). The solutions were analyzed for cation composition on ICAP.

To observe weathering features and surface changes on biotite and anorthite surfaces biofilm needed to be removed. All rhizospheric and bulk soil samples were washed in 30% hydrogen-peroxide for 10 minutes without heating then rinsed with DI water about 10 times and air dried. This treatment successfully removed biofilm and did not destroy or alter the mineral surfaces notably. We treated a blank growth medium (not used in the experiment) and it did not show any changes on the surfaces. To see bacterial and/or fungal morphology on mineral surfaces the sub-samples were freeze dried. The dried minerals were separated from the growth medium by hand-separation, mounted on stubs with a double sticky carbon tape and carbon or gold coated. A Hitachi S-570 Scanning electron microscope (SEM) (at WSU) and a Zeiss Leo 982 field emission SEM (at Pacific Northwest National Laboratory (PNNL), Environmental Microbiological Science Laboratory (EMSL), Richland, WA) were used for imaging microbial attachments to surfaces and weathering features of minerals. All treatments and replicates were investigated under SEM. Samples with observed contaminations by non-designated microbes were omitted from all analyses.

Calculations and Statistics

Chemical denudation (D) was computed by taking the difference of drainage water losses (Dr) and input solutions (I): D = Dr-I for Ca^{2+}, Mg^{2+} and K^{+}. These elements were not applied in modified Hoagland's nutrient solution. Chemical weathering fluxes were estimated using a modified form of the mass balance approach of Bormann et al (1998): $W = D+\Delta B+\Delta S$, where W is chemical weathering, D is chemical denudation, ΔB is change in tree-biomass, and ΔS is change in the exchangeable cation pool. Both fluxes are reported in mol m^{-2} yr^{-1}, and computed for two time intervals: 0-6 months and 6-12 months. The biomass and soil exchangeable cation measurements at 9 months were similar to the measurements at the 12 months, so we combined 6-9 and 9-12 month intervals for flux calculations. The effect of the treatments on concentration, on cumulative cations, on changes in pools, on weathering and denudation fluxes, and differences between weathering and denudation were determined using a paired Student t-test at $\alpha=0.05$ (Dean and Voss, 1999) (Appendix K).

RESULTS

Drainage water chemistry

Concentration of calcium (Ca^{2+}) and potassium (K^{+}) in drainage water varied through time and among the treatments (Fig. 3-1). Magnesium concentrations were about one-third as high and changes tracked Ca^{2+} closely, and therefore are not shown. Also only *Suillus tomentosus* related St-red pine-treatments are shown here, because *Pisolithus tinctorius* related Pt-red pine-treatments behaved almost identically to StRP –treatments. We did not observe species specific difference on water chemistry between the St-tree-treatments and the Pt-tree-treatments.

Cation concentrations in drainage water generally decreased over time in all treatments, but notable differences developed among the systems. After inoculation large pulses of Ca^{2+} were lost from the microbe-only treatments for about 3-4 months (Fig. 3-1A), while in abiotic and in all RP-treatments Ca^{2+} concentrations were 10 times lower and continuously decreased with time (Fig. 3-1B). Among microbe-only treatments StBacteria showed the highest concentrations, about 2 times higher than PtBacteria, while StFungi and PtFungi followed PtBacteria more closely. Ca^{2+} concentrations were always higher in the abiotic drainage than in the RP treatments and the no-mineral control was always close to zero or to the detection limit (Fig. 3-1B). The peaks later on resulted from the 10% $CuSO_4$ (1.7 ppm Ca) application to eliminate algae growth.

By contrast, K^{+} concentrations were much lower and reached detection limit (0.4 ppm) much faster in all treatments than Ca^{2+} concentrations (Fig. 3-1C). The microbial treatments were also elevated in K^{+} compared to the RP treatments, but only twice as high and all four behaved similarly.

Cation uptake by red pine seedlings

During the first 6 months StRPBact and PtRPBactFung immobilized the most Ca^{2+}, K^+ and Mg^{2+}: about 80, 100 and 130 μmol g^{-1} of dry tree-biomass, respectively. PtRPBact and StRPBactFung also accumulated a significant amount of all three cations (Table 3-4). The cation concentrations were very low in the no-mineral treatments in both time periods (Table 3-4), and they substituted sodium into the biomass to keep charge balance.

The concentrations generally were slightly higher or did not change during the 6-12 months growth period. PtRPBactFung increased its cation uptake somewhat ($p>0.05$), while StRPBactFung was the only treatment that increased its Ca^{2+} and Mg^{2+} concentrations significantly ($p=0.005$) (Table 3-4). The cation concentration increased in StRPBact and PtRPBact treatments during 6-12 months, but the change in the tree-biomass pool stayed the same or decreased at the same time. Both ectomycorrhizal seedlings generated larger changes in the tree-biomass pool during 6-12 months compared to other treatments and to the previous time period (Table 3-4).

Exchangeable cation pool dynamics

The exchangeable cation pool was measured on the initial growth medium after two weeks of leaching with DI water and it contained high amount of Ca^{2+} (0.38 μmol g^{-1} of soil) and Mg^{2+} (0.10 μmol g^{-1} of soil), but no K^+. There was a negligible amount of Ca^{2+} and Mg^{2+} on the no-mineral control exchange-sites, and that did not change over time (Table 3-5). During the first 6 months Ca^{2+} and Mg^{2+} concentrations on the exchange sites decreased dramatically and caused large negative changes in the total soil exchangeable cation pool in every treatment, while K^+ accumulated (Table 3-5). The smallest Ca^{2+} decreases occurred in the StRPBactFung and PtRPBactFung treatments (-25 to -29 μmol Ca^{2+}) and the largest in the microbe-only treatments (about -55 μmol Ca^{2+}). The Mg^{2+} losses and K^+ gains were about the same for every treatment; only StFungi and the abiotic treatment gained more K^+ than the rest of the treatments (Table 3-5).

During 6-12 months most of the changes were positive in the total soil exchangeable cation pool. The values did not reach the initial condition for Ca^{2+} and Mg^{2+}, and K^+ kept accumulating on the exchange-sites. The largest gains for all three cations occurred in StBacteria, StFungi and PtFungi treatments, but StRPBactFung and PtRPBactFung treatments also gained significant amounts of base cations ($p=0.001$) (Table 3-5). The abiotic, StRPBact and PtRPBact continued to lose Ca^{2+} from their exchange sites.

Mineral surface features

The investigation of biotite and anorthite with SEM confirmed colonization of bacteria and fungi on the surfaces (Figs. 3-2A and B). In treatments with microbes, the degree of biofilm coverage was similar on biotite and anorthite surfaces. Bacteria and fungal hyphae were part of the biofilm and/or covered by the biofilm in tree-treatments although only PtRPBactFung (Fig. 3-2A) and StRPBactFung (Figs. 3-2B) treatments are shown.

Removal of biofilm uncovered dissolution features on both mineral surfaces, but the features were more distinguishable on the biotite particles due to the initial smooth cleavage surfaces (Figs. 3-2C and D). Curved and/or branched, fungal hyphae size (2-6 μm in diameter) dissolution channels were observed on biotite surfaces in StFungi, PtFungi, and both ectomycorrhizal tree-treatments with higher abundance in the ectomycorrhizal tree-treatments. The curved channels were often accompanied by smaller dissolution features (Fig. 3-2C, arrowheads) and despite the removal of organic coatings few bacteria and a fungal hypha remained in the vicinity of a branched dissolution channel network (Fig. 3-2D). In all tree-treatments, some larger (>10μm in diameter) dissolution channels were observed that probably formed by root hairs and small root tips. Some dissolution and precipitation of secondary phases occurred on a biotite surface in the abiotic control treatment, but no distinct dissolution channel formation was observed (Fig. 3-2E). The anorthite feldspar surfaces also underwent dissolution and precipitation of secondary phases during the course of the experiment, but the changes were hard to detect because the initial surfaces were uneven and rougher than in the case of biotite. However, some areas of anorthite grains were extensively etched as shown on an example from StFungi treatment (Fig. 3-2F).

Chemical weathering and denudation mass-balance

Chemical weathering and denudation varied among treatments and between the two time intervals of the experiments (Table 3-6). In general, the fluxes were significantly higher in 0-6 months than in 6-12 months periods for all treatments ($p=0.01$). The fluxes were 10 to 20 times higher in StBacteria, StFungi, PtBacteria and PtFungi treatments during 0-6 months than in the other treatments (Table 3-6). On the other hand, chemical weathering was not significantly different from chemical denudation in any of the treatments ($p=0.30$) during 0-6 months. Weathering fluxes were driven by drainage losses of cations, i.e. by denudation, in every treatment. Abiotic, StRPBact, StRPBactFung, PtRPBact and PtRPBactFung treatments had equal fluxes ($p=0.35$), so treatment effect was not detectable (Table 3-6). Both fluxes were nearly zero in StRPBFNOMin and PtRPBFNOMin controls, which indicated that the base cations were weathered from biotite and anorthite minerals.

Chemical weathering and denudation fluxes dramatically changed during 6-12 months and treatment effects became significant (Table 3-6 and Fig. 3-3). In general, the fluxes decreased between 5 to 50 times during this time period, but the differences among treatments and between weathering and denudation fluxes grew larger (Table 3-6). Treatments without trees had the most dramatic decrease in both fluxes, but their denudation still remained significantly larger than the ectomycorrhizal and non-ectomycorrhizal tree-treatments ($p<0.0001$). The tree-treatments regulated nutrient losses equally, exhibiting equal denudation fluxes. The ectomycorrhizal tree-treatments were somewhat larger in weathering fluxes ($p=0.07$) while abiotic was lower ($p=0.001$). Both fluxes remained nearly zero in StRPBFNOMin and PtRPBFNOMin controls (Table 3-6).

The treatment effects became clearer, when weathering and denudation fluxes were compared in 6-12 months period (Fig. 3-3). Weathering fluxes were somewhat higher than denudation in every treatment, but abiotic and the no-mineral controls. This difference was caused by base cation gain on the soil exchangeable cation-sites in Stbacteria, StFungi, PtBacteria and PtFungi treatments (Table 3-5 and Fig. 3-3). The significantly higher weathering than denudation flux in StRPBact ($p=0.03$) and PtRPBact ($p=0.02$) treatments was the combination of base cation gain on exchange-sites and in biomass. StRPBactFung and PtRPBactFung had the largest difference between weathering and denudation fluxes ($p=0.002$), because these facilitated the largest weathering, by biomass gain, among the treatments (Table 3-4 and Fig. 3-3).

DISCUSSION

Microbial weathering and denudation dynamics without vascular plant host

In the microbe-only treatments, the observed 6-10 mol m^{-2} yr^{-1} fluxes early in the experiment were 2 orders of magnitude higher than the weathering flux of the non-vascular sandbox at Hubbard Brook Study (Bormann et al, 1998; Chapter 1), and 2-4 orders of magnitude higher than other moss, lichens or bare rock covered watershed estimates (Bain et al, 1994; Clow and Drever, 1996; Moulton et al, 2000; Aghamiri and Schwartzman, 2002). These large discrepancies between our laboratory study and field studies were similar to reported lab-field differences in previous studies (Vebel, 1990; Swoboda-Colberg and Drever, 1993; White and Brantley, 2003).

The tested microbes indicated large weathering potential for Ca-bearing minerals (Table 3-6). By contrast to natural environments, we supplied labile carbon in form of glucose, fresh mineral surfaces for colonization and nutrient sources, and the individual species could flourish without competition for resources. These conditions could have mediated very high reproduction rates while the microbial population (not measured) might have declined after the initial burst or the reproduction rate might have stabilized over time (Sylvia et al, 1999), as the cation concentrations in drainage dramatically decreased after the 5th month and continuously declined until the end of the experiment (Fig 3-1). The large Ca^{2+} losses might be partially explained by phosphorus limitations caused by the readily available labile carbon supply. Microbes preferentially colonized and weathered minerals with limiting phosphorus (Rogers et al, 1998), but the adjacent minerals could also be weathered during the target mineral dissolution and ions could be released to solution (Banfield et al, 1999). This also supported by the fact that drainage losses did not contain phosphorus (data is not shown), so all input had been used up by the microbial community or precipitated in insoluble forms (Drever, 1997).

Soil exchangeable Ca^{2+} and Mg^{2+} concentrations also decreased in 0-6 months, but this decrease only could account for 1-2 % of the denudation flux and the sites started to recover in 6-12 months (Table 3-5). By contrast, K^+ accumulated on the soil exchange sites of all treatments during the course of the experiment with the largest increase in the microbe-only treatments (Table 3-5), and K^+ drainage losses were under detection limit by the 5th month (Fig 3-1). This observation contrasts with the finding that K^+ was continuously depleted on soil exchange sites in the non-vascular sandbox at Hubbard Brook (Bormann et al, 1998; Keller et al, in press; Chapter 1). Here the initial growth medium did not have K^+ on the exchange-site, which might provide a preference for it.

The other contributor to large Ca^{2+} losses could be the dissolution of calcite inclusions due to increased acidity by bacteria and fungi. Inorganic and organic acids and extracellular polymers can be produced by both bacteria and fungi (Barker et al, 1998; Rosling et al, 2004) and these compounds are able to decrease the acidity by 1-3 pH units on the microbe-mineral interface (Banfield et al, 1999; Liermann et al, 2000), which first could dissolve calcite inclusions easily then attack the feldspar. In addition, the average pH of the input solutions were about 4.5, but all drainage water pH values were buffered to 6-7 by the cation loss.

Biofilm and polymer coatings were observed microscopically in all biological treatments and thus appear to have promoted higher weathering rates (Fig 3-2). A large mass percentage of these coatings is water such that the mineral-water interactions might effectively last longer and causes higher weathering rates (Barker et al, 1997; Banfield et al, 1999). On the whole, weathering and denudation fluxes were equal or nearly equal in microbe-only treatments, which support the idea that bacteria and fungi, like non-vascular vegetation (moss and lichens), are not able to regulate chemical denudation compared to vascular systems (Bormann et al, 1998; Moulton et al, 2000; Chapter 1), because of the lack of vegetative biomass pool for cation uptake and storage.

Microbial weathering and denudation dynamics with red pine seedlings

In the first 6 months high weathering fluxes (0.6-0.7 mol m^{-2} yr^{-1}) and equally high denudation fluxes characterized both ectomycorrhizal and non-ectomycorrhizal bacterial tree-treatments and the abiotic treatment as well (Table 3-6). The high weathering rate could be attributed to preferential weathering of smaller particles and easily weatherable phases (calcite and apatite inclusions), or simply the fresh and highly active mineral surfaces and edges, or both (Welch and Ullman, 1993; White and Brantley, 1995; Bakker et al, 2004), and the acidic input solutions compounded those effects. Denudation also stayed high during 0-6 months, which was caused partly by depletion of Ca^{2+} and Mg^{2+} from the exchange-sites (7-10% of leachates) and partly because the small trees did not take up large quantities of the weathering products. Thus the high weathering flux was driven by the high denudation flux, with biology playing a minor role. The ectomycorrhizal seedlings were not able to regulate or influence weathering more than non-ectomycorrhizal seedlings and could not increase nutrient uptake in this early growth stage, which was different from some earlier studies (Wallander and Wickman, 1999; Colpaert et al, 1999) but these previous studies did not focus on cation losses in drainage water, i.e. in denudation from the systems, so their hydrological set-up prevented nutrient loss, while our allowed it.

In the second part of the experiment, the presence of ectomycorrhizal fungi in the system increased the weathering flux 1.8-2.0 folds compared to non-ectomycorrhizal bacterial tree-treatments. Similarly Calvaruso et al (2006) showed that root-associated bacteria were able to increase the weathering rates of biotite, neglecting changes on exchangeable cation-sites, by a factor of 1.5 compared to the pine alone. Our second-6-months results agreed with findings that ectomycorrhizal seedlings are able to take up base cation nutrient elements from primary mineral sources in larger amounts than their non-ectomycorrhizal counterparts if the sources are limited (Leyval and Berthelin, 1991; Wallander and Wickman, 1999; Jentschke et al, 2000; 2001). The larger increase on soil exchangeable cation-sites of ectomycorrhizal than non-ectomycorrhizal soils also contributed to the higher weathering fluxes of the ectomycorrhizal treatments during 6-12 months (Table 3-5.)

The regulation of denudation losses in both ectomycorrhizal and non-ectomycorrhizal treatments indicated that the tree + bacteria association alone could control the losses as effectively as the tree + fungus + bacteria association (Fig 3-3). SEM investigation of bacterial and fungal attachment to mineral surfaces confirmed that both bacterial association and bacteria + fungus association produced biofilm coatings (Figs. 3-2A, and B) (see also e.g. Barker et al, 1998). The non-ectomycorrhizal tree-treatment grew a larger root system with more abundant root hairs (similarly to Calvaruso et al, 2006) which may have substituted for the hyphal system in transporting mass from biofilms to the tree without allowing interaction between bulk and mycorrhizospheric and rhizospheric solutions and reducing chemical denudation (Fig. 3-3). The smaller 6-12 month weathering flux for the tree + bacteria treatment may be due to the recognized fact that hyphal mycelia are more effective than root hairs for increasing the absorptive and plant-mineral contact area of the root system (Smith and Read, 1997).

SUMMARY AND CONCLUSIONS

The experiment allowed us to separately study bacterial and ectomycorrhiza-forming fungal effect on chemical weathering and denudation processes with and without a vascular plant host. Our experiment demonstrated that bacteria and ectomycorrhiza-forming fungi had a large weathering potential for Ca-bearing minerals, such as anorthite, but the microbial communities were not able to regulate denudation losses without vascular host in any part of the experiment. The chemical weathering and denudation were about equal in each microbe-only treatment.

In the first 6 months of the experiment in all tree + microbe treatments, both fluxes were quite high (0.6-0.7 mol m^{-2} yr^{-1}) and weathering was equal to denudation. The processes here were driven by the acidic flushing of the fresh growth medium (pH effect) and weathering was much higher than the plant nutrient demands. However, in the second 6 months of the experiment, the treatment effect became clear and significant. The ectomycorrhizal treatments produced the highest weathering and low denudation among the treatments, but non-ectomycorrhizal seedlings retarded denudation as well. The differences between the fluxes were significant in both ectomycorrhizal and non-ectomycorrhizal treatments, but ectomycorrhizal treatment difference was larger, while abiotic weathering was lower and equaled the abiotic denudation flux.

The ability to retard denudation in both ectomycorrhizal and non-ectomycorrhizal treatment was linked to biofilm formation on mineral surfaces. An ectomycorrhizal hyphal network, as part of the biofilm or covered by the biofilm, was able to transport nutrients to the plant without allowing loss to the bulk soil solution. On the other hand, the non-ectomycorrhizal treatment produced more root hairs and fine roots, stimulated by the associated bacteria, which partially compensated for hyphal absorbing surfaces. The present study supports our proposition that biofilm not only accelerates the weathering process, but also regulate the denudation losses by acting as an inhibiting/protecting layer covering the mineral-water-hyphal/root hair interface in the mycorrhizosphere and rhizosphere of higher plants. Further studies are needed to fully elucidate the role of such biofilms in ecosystem processes.

Table 3-1: Chemical composition of minerals (wt%), which was obtained by X-ray fluorescence analyses at WSU, WA.

	Anorthite	**Biotite**	**Silica sand**
Na_2O	0.72	0.53	0.00
K_2O	*0.12*	*9.31*	*0.09*
MgO	*11.28*	*13.86*	*0.04*
CaO	*12.92*	*0.15*	*0.01*
Al_2O_3	19.67	11.17	0.36
SiO_2	43.75	39.29	98.39
FeO*	9.12	18.01	0.14
TiO_2	0.47	2.22	0.08
MnO	0.14	0.91	0.00
P_2O_5	0.04	0.01	0.01
Total	98.25	95.46	99.12

Table 3-2: The composition of modified Hoagland's solution.

Chemicals	**mg/L**
$NaNO_3$	510
NH_4NO_3	320
$NH_4H_2PO_4$	115
Na_2SO_4	284
$MnCl_2$*$4H_2O$	1.802
H_3BO_3	2.863
$ZnSO_4$*$7H_2O$	0.220
$CuSO_4$*$5H_2O$	0.079
H_2MoO_4*H_2O	0.107
Mix of 0.5% $FeSO_4$	2.989
DI H_2O	1 liter

Table 3-3: Experimental design and treatment setting

Treatment ID	Silica Sand	Biotite and Anorthite	*Ewingella americana*	*Suillus tomentosus*	*Bacillus megaterium* and *Pantoea agglomerans*	*Pisolithus tinctorius*	Red Pine
Abiotic	✔	✔	—	—	—	—	—
StBacteria	✔	✔	✔	—	—	—	—
StFungi	✔	✔	—	✔	—	—	—
StRPBact	✔	✔	✔	—	—	—	✔
StRPBactFung	✔	✔	✔	✔	—	—	✔
StRPBFNOMin	✔	—	✔	✔	—	—	✔
PtBacteria	✔	✔	—	—	✔	—	—
PtFungi	✔	✔	—	—	—	✔	—
PtRPBact	✔	✔	—	—	✔	—	✔
PtRPBactFung	✔	✔	—	—	✔	✔	✔
PtRPBFNOMin	✔	—	—	—	✔	✔	✔

Table 3-4: Ca, K and Mg concentrations in tree-biomass at 6 months and at 12 months growth period are shown in the first panel. Changes in tree-biomass cation pool is calculated for two time intervals (0-6 and 6-12 months) and shown in the 2nd panel. Note that the ectomycorrhizal treatments have the largest change in 6-12 months. Standard errors are in parentheses.

Treatment ID	Concentration of cations in tree-biomass (μmol/g of tree-biomass)						Change in the tree-biomass pool (μmol)					
	At 6 months			At 12 months			0-6 months			6-12 months		
	Ca	K	Mg	Ca	K	Mg	Ca	K	Mg	Ca	K	Mg
StRPBact	88 (7)	105 (8)	138 (18)	105 (32)	122 (24)	132 (50)	23 (1.8)	27 (2.0)	35 (4.5)	18 (10.4)	20 (7.4)	16 (15)
StRPBactFung	69 (11)	74 (8)	84 (9)	122 (22)	91 (18)	115 (17)	16 (2.6)	18 (2.0)	20 (2.1)	43 (8.1)	27 (6.7)	36 (6.4)
StRPBFNoMin	9 (1)	30 (3)	17 (3)	12 (3)	23 (5)	17 (2)	1 (0.1)	3 (0.3)	2 (0.3)	1 (0.3)	0 (0.8)	1 (0.4)
PtRPBact	59 (7)	75 (8)	109 (25)	83 (14)	102 (12)	88 (12)	17 (1.9)	21 (2.3)	31 (7.2)	17 (3.8)	21 (2.7)	5 (7.2)
PtRPBactFung	82 (7)	104 (11)	127 (20)	81 (24)	121 (26)	125 (42)	22 (2.0)	28 (3.0)	34 (5.5)	25 (12.0)	40 (12.3)	38 (18.9)
PtRPBFNoMin	5 (0)	26 (3)	11 (1)	9 (2)	27 (5)	13 (2)	1 (0.1)	3 (0.4)	1 (0.1)	1 (0.3)	3 (0.8)	2 (0.4)

Table 3-5: Changes in the exchangeable cation pool are calculated for two time intervals (0-6 and 6-12 months) for Ca, K and Mg. Note that the Ca and Mg exchangeable sites were depleted in all treatments in 0-6 months, but K was accumulating on the exchange sites. In general there is a gain on the exchangeable sites in 6-12 months. Standard errors are in parentheses.

Treatment ID	Change on the soil exchangeable cation sites (μmol)					
	0-6 months			6-12 months		
	Ca	K	Mg	Ca	K	Mg
Initial	---	---	---	---	---	---
Abiotic	-30.2 (9.2)	12.6 (2.2)	-14.2 (0.3)	-7.3 (10.7)	2.0 (7.1)	6.5 (0.5)
StBacteria	-55.8 (2.6)	11.0 (0.8)	-12.8 (0.8)	13.9 (6.5)	23.1 (1.5)	8.4 (1.4)
StFungi	-57.0 (0.5)	14.2 (2.1)	-13.6 (0.9)	17.5 (1.1)	15.1 (2.4)	3.1 (1.3)
StRPBact	-36.4 (4.2)	10.6 (0.2)	-14.1 (0.2)	-1.3 (9.6)	8.1 (0.4)	4.5 (0.6)
StRPBactFung	-24.8 (4.5)	10.5 (0.2)	-13.3 (1.2)	11.2 (7.3)	8.3 (13.1)	8.0 (1.8)
StRPBFNoMin	0.2 (0.6)	0.0 (0.0)	0.2 (0.1)	0.3 (0.6)	0.0 (0.0)	0.7 (0.1)
PtBacteria	-55.1 (1.1)	10.9 (0.0)	-13.5 (0.6)	1.5 (4.1)	13.0 (1.9)	2.8 (1.3)
PtFungi	-56.4 (2.7)	10.8 (0.2)	-13. (1.1)	20.0 (9.5)	18.0 (3.1)	9.7 (2.3)
PtRPBact	-35.5 (8.7)	11.5 (1.3)	-13.2 (1.3)	-6.7 (11.8)	9.8 (1.4)	2.0 (1.9)
PtRPBactFung	-28.7 (10.2)	10.7 (0.2)	-13.0 (0.4)	13.3 (12.7)	9.2 (0.3)	4.6 (0.8)
PtRPBFNoMin	0.2 (0.5)	0.0 (0.0)	0.2 (0.0)	-0.4 (0.5)	0.0 (0.0)	0.7 (0.0)

Table 3-6: Chemical denudation and weathering fluxes (mol m^{-2} yr^{-1}) were estimated for two time intervals (0-6 and 6-12 months). The values are the sum of Ca, K and Mg in drainage water, change in biomass pool and change on the soil exchangeable cation pool, and the input values are subtracted. Standard errors (STE) are presented next to the flux values. The fluxes are very high in the microbial treatments and weathering and denudation is close to equal in all treatments in the first 6 months.

Treatment ID	0-6 months				6-12 months			
	Denudation		Weathering		Denudation		Weathering	
	Flux	STE	Flux	STE	Flux	STE	Flux	STE
Abiotic	0.72	0.12	0.67	0.14	0.06	0.01	0.06	0.04
StBacteria	9.65	0.63	9.55	0.63	0.06	0.01	0.13	0.03
StFungus	6.05	0.56	5.95	0.57	0.11	0.04	0.17	0.04
StRPBact	0.59	0.15	0.67	0.17	0.02	0.01	0.14	0.08
StRPBactFung	0.55	0.09	0.60	0.11	0.02	0.01	0.26	0.08
StRPBFNoMin	0.08	0.03	-0.08	0.06	0.01	0.00	0.01	0.00
PtBacteria	5.74	0.30	5.64	0.31	0.11	0.03	0.14	0.04
PtFungus	6.86	0.47	6.75	0.48	0.09	0.02	0.18	0.05
PtRPBact	0.59	0.15	0.65	0.19	0.02	0.00	0.11	0.06
PtRPBactFung	0.59	0.11	0.68	0.15	0.01	0.00	0.24	0.10
PtRPBFNoMin	0.05	0.01	0.06	0.02	0.01	0.00	0.02	0.01

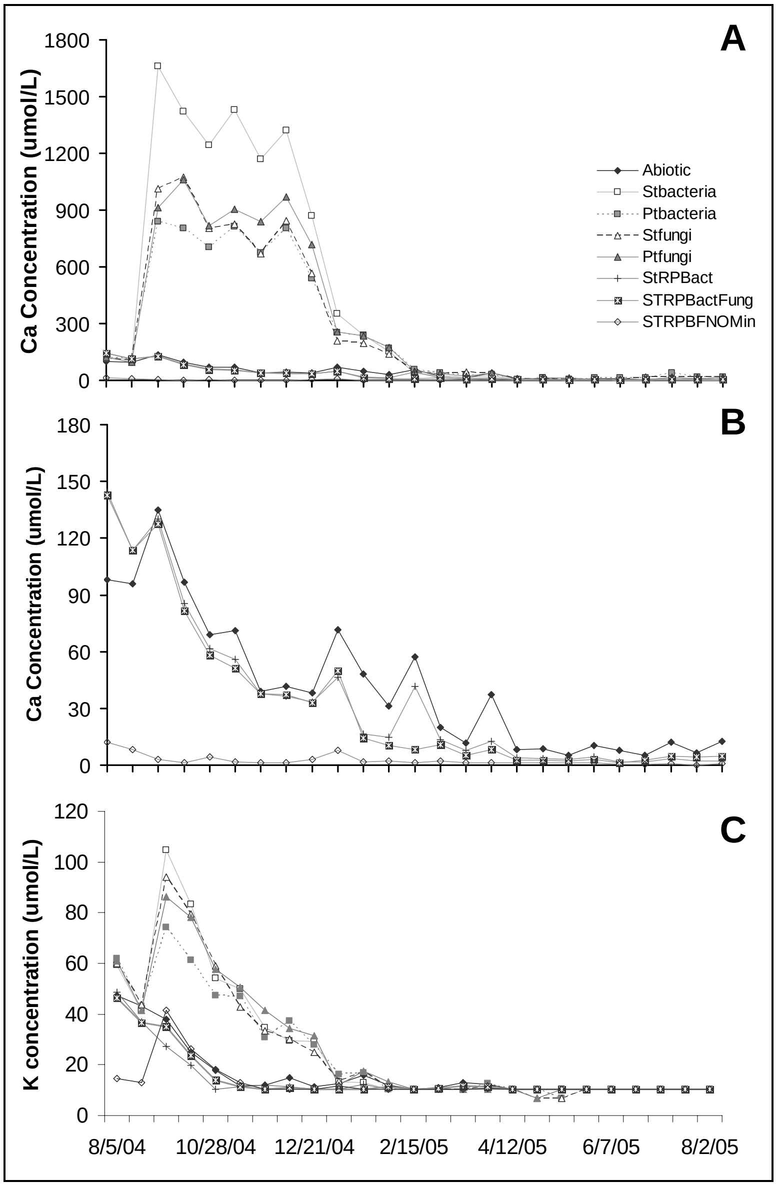


Figure 3-1: Time series of Ca (**A** and **B**) and K (**C**) concentrations (μmol L^{-1}) are shown in drainage water. Both bacteria and both fungi treatments along with abiotic and St-tree treatments are shown on **A** and **C**, but **B** is only the Ca concentration of St-trees and abiotic. Note that the bacteria and fungi treatments lose 10 times more Ca than the tree treatment and the concentration of all treatments decline with time. Much less K is lost in drainage even in the microbial treatments and it reaches the detection limit in 5 months. Pt-tree treatments behave the same as St-tree treatments and Mg follows the same trend than Ca with about half as high concentrations, so they are not shown.

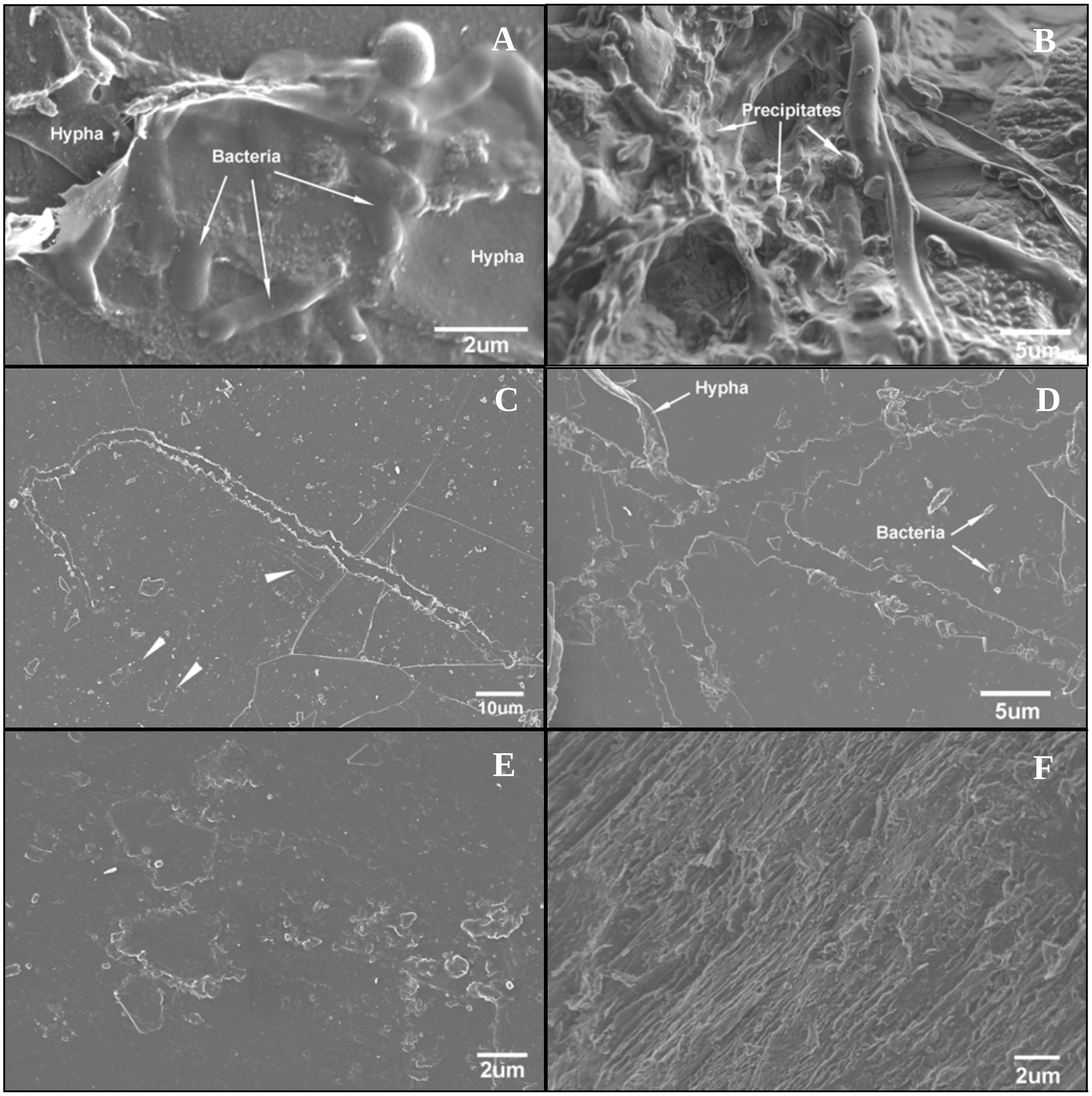


Figure 3-2: Examples of SEM images of biotite and anorthite surfaces. **A)** A biotite surface covered with biofilm containing both bacteria and fungal hypha in PtRPBactFung treatment. **B)** An anorthite surface covered with biofilm containing fungal hyphae and secondary precipitates both on the mineral and on the hyphae in StRPBactFung treatment. **C)** Curved dissolution channel on a biotite surface, the size of the channel is comparable with a size of a hypha in PtRPBactFung treatment. **D)** Multiple branching dissolution channels on a biotite surface, note the remained hypha and bacteria on the surface after hydrogen-peroxide application in StRPBactFung treatment. **E)** Biotite surface in Abiotic treatment, some secondary precipitates cover the surface. **F)** Anorthite surface in StFungi treatment, the whole surface etched and no distinct features were detectable. Anorthite surface changes are harder to detect due to original roughness of the surface.

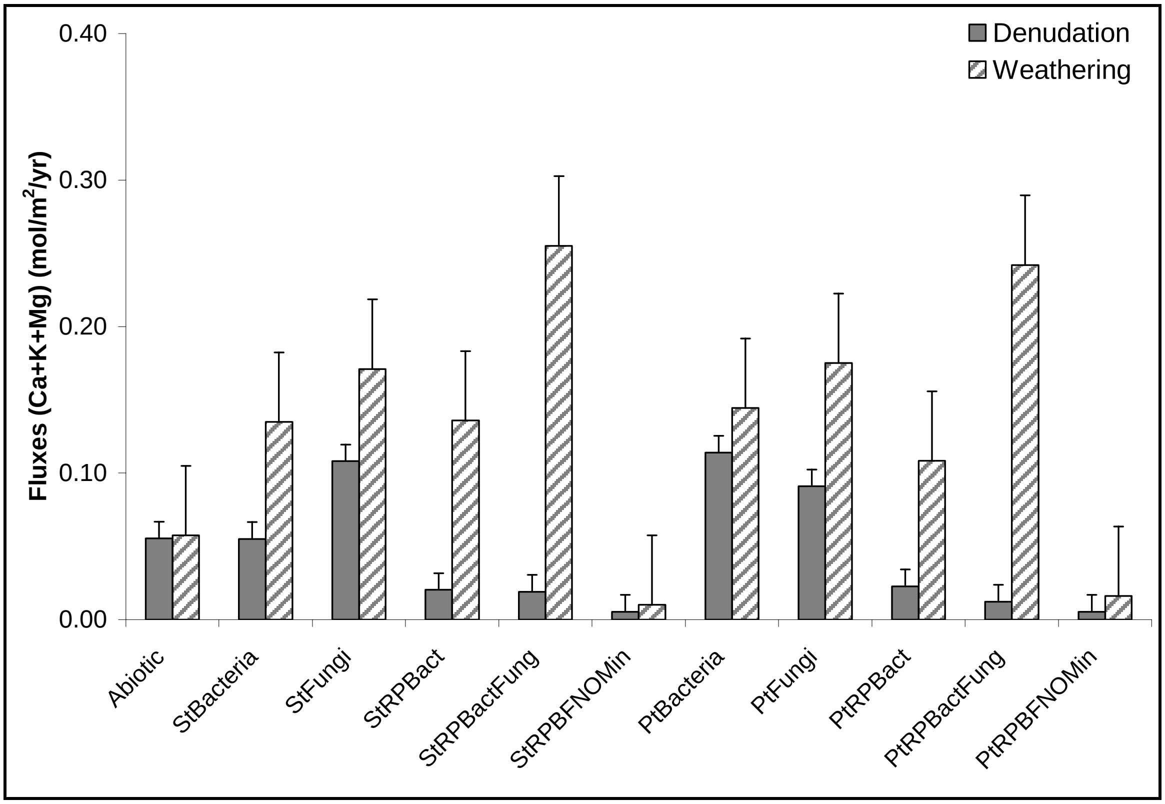


Figure 3-3: Chemical denudation and weathering fluxes (mol m^{-2} yr^{-1}) are shown for the 6-12 months time interval. Both fluxes are the sum of Ca, K and Mg. Highest weathering observed in both ectomycorrhizal red pine treatments and these treatments exhibit the largest difference between weathering and denudation fluxes. The non-ectomycorrhizal red pine treatments also retard denudation, but they weathering rate is smaller than the ectomycorrhizal red pine treatments. The non-tree treatments weathering fluxes are high, but denudation also remained high. Error bars represent standard errors.

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APPENDIX A

Site maps and sandbox cross-section schematics

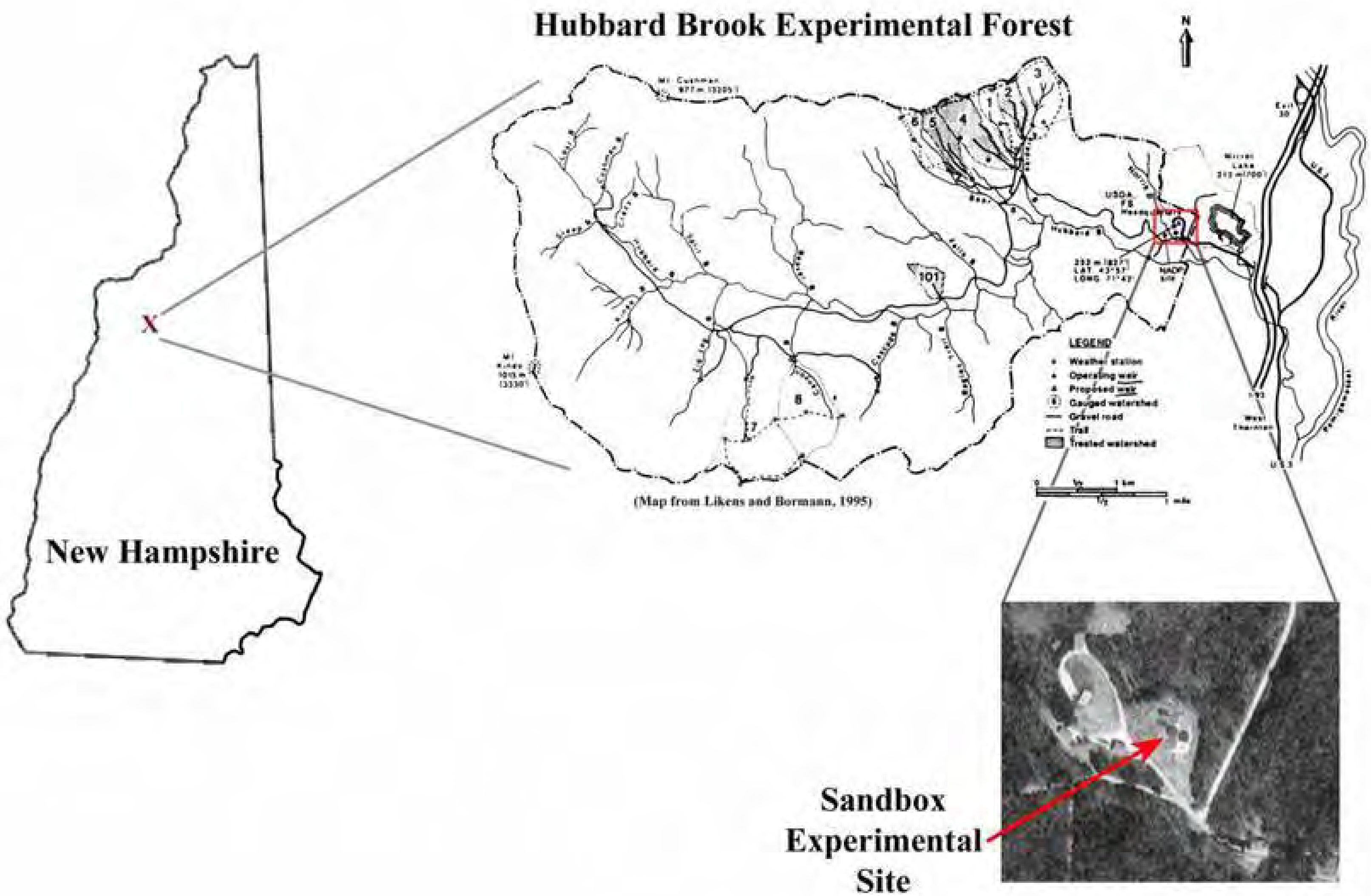


Figure A-1: Location of the Hubbard Brook sandbox experiment

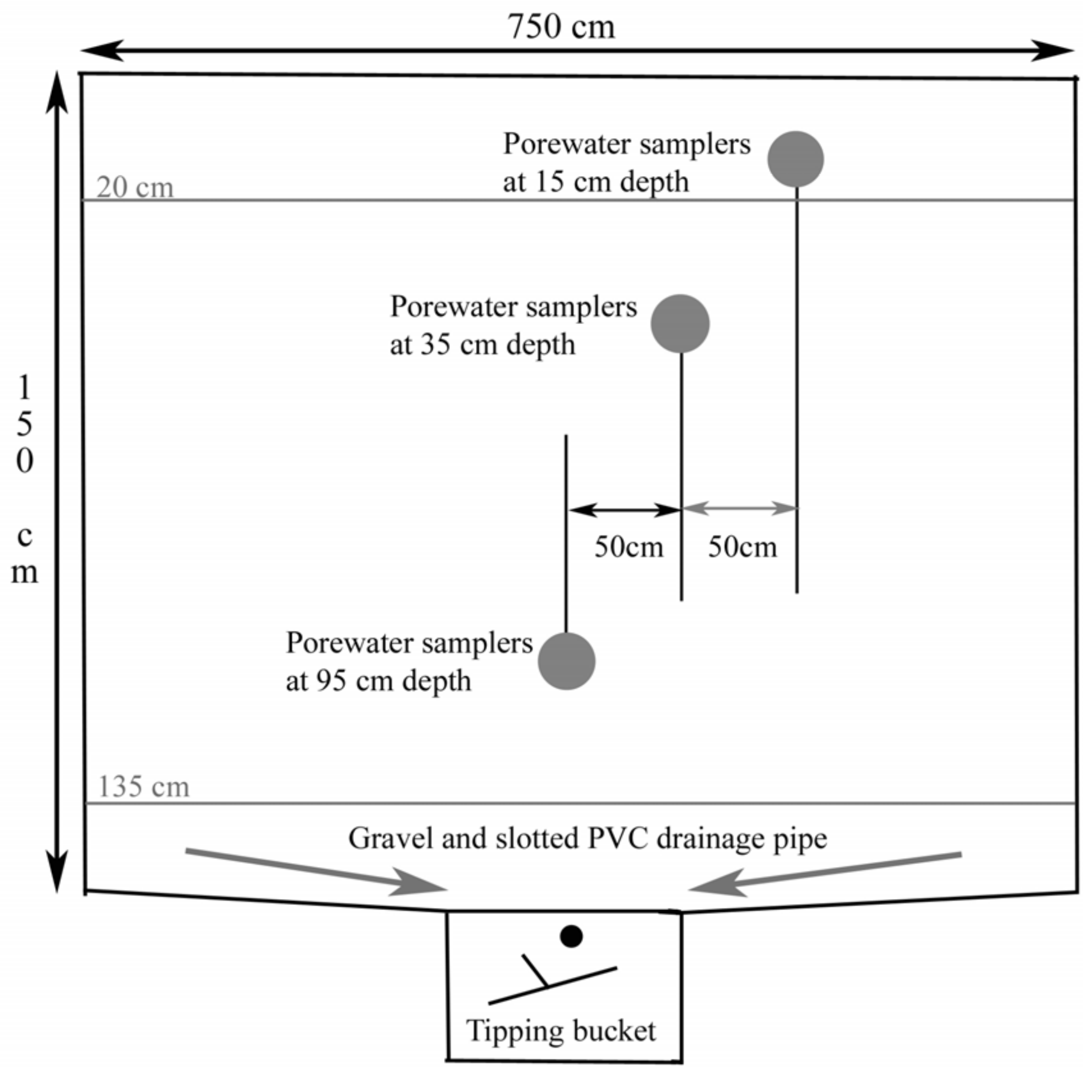


Figure A-2: Schematic cross-section of large fully lined sandboxes, modified from O'Brien 2000; and O'Brien et al, 2004.

APPENDIX B

Sandbox water, soil, biomass and mass-balance data

The following **Table B-1** and **B-2** contains data collected by the Hubbard Brook Sandbox work group 1983-2004. The water chemistry data supersedes O'Brien, 2000 and Havig, 2002. Water volume and cation concentration data from O'Brien, 2000 and Havig, 2002 were compared to original data files and corrections made where it was necessary. Dates are not continuous; the tables only contain dates, when samples were collected at least in one of the sandboxes. My 2002-2004 data were incorporated into the corrected data-tables and cumulative fluxes were estimated for the entire study period of the sandboxes.

Table B-1: Cation concentrations of Non-vascular drainage water and cumulative fluxes 1983 to 2004 water years.

	Discharge	Concentration	Cumulative	Concentration	Cumulative	Concentration	Cumulative	Cumulative
Date	Volume	Ca	Ca	K	K	Mg	Mg	Ca+K+Mg
Non-Vascular	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
6/1/1983	45608	119.76	0.0971	53.71	0.0435	23.04	0.0187	0.1593
8/2/1983	11178	269.46	0.1507	97.19	0.0629	57.59	0.0301	0.2436
8/9/1983	2592	269.46	0.1631	97.19	0.0673	57.59	0.0328	0.2632
10/13/1983	1426	331.84	0.1715	109.97	0.0701	69.93	0.0345	0.2762
10/14/1983	380	351.80	0.1739	102.30	0.0708	69.93	0.0350	0.2797
10/16/1983	576	351.80	0.1775	102.30	0.0719	69.93	0.0357	0.2851
10/18/1983	274	351.80	0.1792	102.30	0.0724	69.93	0.0361	0.2876
10/20/1983	170	351.80	0.1802	102.30	0.0727	69.93	0.0363	0.2892
10/22/1983	107	351.80	0.1809	102.30	0.0729	69.93	0.0364	0.2902
10/24/1983	58	351.80	0.1813	102.30	0.0730	69.93	0.0365	0.2907
10/25/1983	132	349.30	0.1821	99.74	0.0732	69.93	0.0367	0.2919
11/1/1983	302	344.31	0.1839	92.07	0.0737	69.93	0.0370	0.2947
11/8/1983	1310	351.80	0.1921	92.07	0.0758	69.93	0.0387	0.3066
11/15/1983	1189	319.36	0.1989	89.51	0.0777	61.70	0.0400	0.3166
11/22/1983	4899	279.44	0.2232	76.73	0.0844	53.48	0.0446	0.3523
11/29/1983	1331	197.11	0.2279	61.38	0.0859	37.84	0.0455	0.3593
12/6/1983	655	179.64	0.2300	58.82	0.0866	35.38	0.0459	0.3625
12/13/1983	9193	144.71	0.2536	51.15	0.0949	27.97	0.0505	0.3990
12/20/1983	1080	119.76	0.2559	46.04	0.0958	23.86	0.0510	0.4027
12/28/1983	194	119.76	0.2563	46.04	0.0960	23.86	0.0510	0.4033
1/4/1984	84	179.64	0.2566	58.82	0.0960	35.79	0.0511	0.4038
1/10/1984	47	179.64	0.2568	58.82	0.0961	35.79	0.0511	0.4040
1/17/1984	30	179.64	0.2569	58.82	0.0961	35.79	0.0511	0.4041
1/24/1984	0	179.64	0.2569	58.82	0.0961	35.79	0.0511	0.4041
1/31/1984	0	179.64	0.2569	58.82	0.0961	35.79	0.0511	0.4041
2/7/1984	0	179.64	0.2569	58.82	0.0961	35.79	0.0511	0.4041
2/14/1984	0	179.64	0.2569	58.82	0.0961	35.79	0.0511	0.4041
2/21/1984	234	72.36	0.2572	23.79	0.0962	13.99	0.0512	0.4046
2/27/1984	141	72.36	0.2573	23.79	0.0963	13.99	0.0512	0.4049
3/6/1984	54	72.36	0.2574	23.79	0.0963	13.99	0.0513	0.4050
3/13/1984	0	72.36	0.2574	23.79	0.0963	13.99	0.0513	0.4050
3/20/1984	0	72.36	0.2574	23.79	0.0963	13.99	0.0513	0.4050
3/27/1984	8951	57.39	0.2665	24.81	0.1003	11.11	0.0530	0.4198
4/3/1984	3145	99.80	0.2721	40.92	0.1025	19.33	0.0541	0.4288
4/10/1984	2056	127.25	0.2768	43.48	0.1041	25.09	0.0550	0.4359
4/17/1984	474	127.25	0.2778	46.04	0.1045	27.97	0.0553	0.4376
4/24/1984	1026	127.25	0.2802	46.04	0.1054	27.97	0.0558	0.4413
5/1/1984	363	129.14	0.2810	43.48	0.1056	24.52	0.0559	0.4426
5/8/1984	1179	112.18	0.2833	41.18	0.1065	22.09	0.0564	0.4462
5/15/1984	3427	113.20	0.2902	46.29	0.1093	21.93	0.0577	0.4573
5/22/1984	383	126.52	0.2911	49.87	0.1097	24.72	0.0579	0.4587
5/29/1984	1452	122.16	0.2943	47.37	0.1109	23.65	0.0585	0.4636
6/5/1984	1089	122.16	0.2966	47.37	0.1118	23.65	0.0590	0.4674
6/12/1984	756	88.40	0.2978	46.80	0.1124	17.11	0.0592	0.4694
6/19/1984	292	101.27	0.2983	54.22	0.1127	19.95	0.0593	0.4703
6/26/1984	5846	122.01	0.3110	70.08	0.1200	23.28	0.0617	0.4927
7/3/1984	554	61.60	0.3116	103.12	0.1210	19.17	0.0619	0.4945
7/10/1984	1411	61.60	0.3132	103.12	0.1236	19.17	0.0624	0.4992
7/17/1984	615	61.60	0.3138	103.12	0.1247	19.17	0.0626	0.5012
7/24/1984	554	61.60	0.3145	103.12	0.1257	19.17	0.0628	0.5030
7/31/1984	181	61.60	0.3147	103.12	0.1261	19.17	0.0628	0.5036
8/7/1984	101	61.60	0.3148	103.12	0.1263	19.17	0.0629	0.5039
8/14/1984	56	61.60	0.3148	103.12	0.1264	19.17	0.0629	0.5041
8/20/1984	30	61.60	0.3149	103.12	0.1264	19.17	0.0629	0.5042
8/28/1984	0	61.60	0.3149	103.12	0.1264	19.17	0.0629	0.5042
9/4/1984	0	61.60	0.3149	103.12	0.1264	19.17	0.0629	0.5042
9/10/1984	0	61.60	0.3149	103.12	0.1264	19.17	0.0629	0.5042
9/18/1984	0	61.60	0.3149	103.12	0.1264	19.17	0.0629	0.5042
9/25/1984	0	61.60	0.3149	103.12	0.1264	19.17	0.0629	0.5042

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

	Discharge	Concentration	Cumulative	Concentration	Cumulative	Concentration	Cumulative	Cumulative
Date	Volume	Ca	Ca	K	K	Mg	Mg	Ca+K+Mg
Non-Vascular	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
10/2/1984	0	61.60	0.3149	103.12	0.1264	19.17	0.0629	0.5042
10/9/1984	524	61.60	0.3154	103.12	0.1274	19.17	0.0631	0.5059
10/16/1984	202	61.60	0.3156	103.12	0.1278	19.17	0.0632	0.5066
10/23/1984	30	61.60	0.3157	103.12	0.1278	19.17	0.0632	0.5067
10/30/1984	22	61.60	0.3157	103.12	0.1278	19.17	0.0632	0.5067
11/7/1984	575	61.60	0.3163	103.12	0.1289	19.17	0.0634	0.5086
11/13/1984	5746	61.60	0.3226	103.12	0.1394	19.17	0.0653	0.5274
11/21/1984	413	155.39	0.3238	25.17	0.1396	20.28	0.0655	0.5289
11/27/1984	187	105.56	0.3241	15.29	0.1397	10.28	0.0655	0.5293
12/4/1984	1058	164.67	0.3272	11.71	0.1399	7.98	0.0657	0.5328
12/18/1984	898	238.50	0.3310	51.66	0.1407	47.84	0.0664	0.5382
1/2/1985	2471	210.20	0.3403	51.20	0.1430	41.55	0.0682	0.5515
1/9/1985	346	229.94	0.3417	51.66	0.1433	46.19	0.0685	0.5535
1/17/1985	121	228.04	0.3422	48.59	0.1434	46.19	0.0686	0.5542
1/23/1985	37	228.04	0.3423	48.59	0.1434	46.19	0.0687	0.5544
1/30/1985	20	228.04	0.3424	48.59	0.1434	46.19	0.0687	0.5545
2/6/1985	0	228.04	0.3424	48.59	0.1434	46.19	0.0687	0.5545
2/13/1985	0	228.04	0.3424	48.59	0.1434	46.19	0.0687	0.5545
2/20/1985	0	228.04	0.3424	48.59	0.1434	46.19	0.0687	0.5545
2/27/1985	1230	145.36	0.3456	38.08	0.1443	29.95	0.0693	0.5592
3/6/1985	343	183.23	0.3467	41.94	0.1445	34.76	0.0695	0.5608
3/13/1985	4476	72.43	0.3525	24.53	0.1465	14.52	0.0707	0.5696
3/20/1985	2074	66.22	0.3549	24.73	0.1474	13.08	0.0712	0.5735
3/29/1985	668	163.70	0.3568	39.39	0.1479	32.74	0.0716	0.5763
4/5/1985	752	201.60	0.3595	46.55	0.1485	38.13	0.0721	0.5801
4/10/1985	1486	140.34	0.3632	42.46	0.1496	26.49	0.0728	0.5856
4/17/1985	380	198.63	0.3646	40.74	0.1499	38.05	0.0730	0.5875
4/26/1985	444	199.20	0.3662	46.62	0.1502	40.07	0.0734	0.5898
5/1/1985	108	195.16	0.3665	50.64	0.1503	40.07	0.0734	0.5903
5/2/1985	31	195.16	0.3666	50.64	0.1504	40.07	0.0735	0.5905
5/3/1985	42	195.16	0.3668	50.64	0.1504	40.07	0.0735	0.5907
5/5/1985	33	195.16	0.3669	50.64	0.1504	40.07	0.0735	0.5908
5/6/1985	20	195.16	0.3670	50.64	0.1505	40.07	0.0735	0.5909
5/7/1985	17	195.16	0.3670	50.64	0.1505	40.07	0.0735	0.5910
5/8/1985	21	201.35	0.3671	50.90	0.1505	40.48	0.0735	0.5911
5/9/1985	133	201.35	0.3676	50.90	0.1506	40.48	0.0736	0.5918
5/10/1985	360	201.35	0.3689	50.90	0.1509	40.48	0.0739	0.5937
5/13/1985	162	201.35	0.3695	50.90	0.1511	40.48	0.0740	0.5946
5/14/1985	72	201.35	0.3697	50.90	0.1511	40.48	0.0741	0.5949
5/15/1985	60	180.86	0.3699	51.15	0.1512	36.98	0.0741	0.5952
5/16/1985	51	180.86	0.3701	51.15	0.1512	36.98	0.0741	0.5955
5/17/1985	91	180.86	0.3704	51.15	0.1513	36.98	0.0742	0.5959
5/20/1985	753	180.86	0.3728	51.15	0.1520	36.98	0.0747	0.5995
5/21/1985	234	180.86	0.3735	51.15	0.1522	36.98	0.0749	0.6006
5/22/1985	162	186.10	0.3741	55.50	0.1524	36.16	0.0750	0.6014
5/23/1985	118	186.10	0.3745	55.50	0.1525	36.16	0.0750	0.6020
5/24/1985	243	186.10	0.3753	55.50	0.1527	36.16	0.0752	0.6032
5/28/1985	119	186.10	0.3757	55.50	0.1529	36.16	0.0753	0.6038
5/29/1985	41	190.47	0.3758	56.96	0.1529	38.63	0.0753	0.6040
5/30/1985	37	190.47	0.3759	56.96	0.1529	38.63	0.0753	0.6042
5/31/1985	72	190.47	0.3762	56.96	0.1530	38.63	0.0754	0.6045
6/3/1985	69	190.47	0.3764	56.96	0.1531	38.63	0.0754	0.6049
6/4/1985	33	190.47	0.3765	56.96	0.1531	38.63	0.0754	0.6051
6/5/1985	31	193.74	0.3766	58.31	0.1531	37.76	0.0755	0.6052
6/6/1985	28	193.74	0.3767	58.31	0.1532	37.76	0.0755	0.6054
6/7/1985	51	193.74	0.3769	58.31	0.1532	37.76	0.0755	0.6056
6/10/1985	48	193.74	0.3771	58.31	0.1533	37.76	0.0755	0.6059
6/11/1985	25	193.74	0.3771	58.31	0.1533	37.76	0.0756	0.6060
6/12/1985	26	77.92	0.3772	2.35	0.1533	2.39	0.0756	0.6060

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Non-Vascular	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
6/13/1985	26	77.92	0.3772	2.35	0.1533	2.39	0.0756	0.6061
6/14/1985	50	77.92	0.3773	2.35	0.1533	2.39	0.0756	0.6062
6/17/1985	72	77.92	0.3774	2.35	0.1533	2.39	0.0756	0.6063
6/18/1985	40	92.79	0.3774	5.55	0.1533	3.62	0.0756	0.6063
6/19/1985	68	92.79	0.3776	5.55	0.1533	3.62	0.0756	0.6065
6/21/1985	121	92.79	0.3778	5.55	0.1533	3.62	0.0756	0.6067
6/24/1985	91	203.74	0.3781	62.92	0.1534	40.48	0.0756	0.6072
6/25/1985	39	203.74	0.3782	62.92	0.1535	40.48	0.0757	0.6074
6/26/1985	42	203.74	0.3784	62.92	0.1535	40.48	0.0757	0.6076
6/27/1985	49	203.74	0.3786	62.92	0.1536	40.48	0.0757	0.6079
6/28/1985	135	203.74	0.3790	62.92	0.1537	40.48	0.0758	0.6086
7/1/1985	513	203.74	0.3809	62.92	0.1543	40.48	0.0762	0.6114
7/2/1985	158	231.86	0.3816	72.38	0.1545	44.67	0.0763	0.6124
7/3/1985	176	231.86	0.3823	72.38	0.1547	44.67	0.0765	0.6135
7/5/1985	185	231.86	0.3830	72.38	0.1550	44.67	0.0766	0.6146
7/8/1985	108	231.86	0.3835	72.38	0.1551	44.67	0.0767	0.6153
7/10/1985	48	228.52	0.3837	65.24	0.1552	42.53	0.0767	0.6156
7/11/1985	30	228.52	0.3838	65.24	0.1552	42.53	0.0768	0.6158
7/12/1985	48	228.52	0.3840	65.24	0.1553	42.53	0.0768	0.6161
7/15/1985	36	228.52	0.3841	65.24	0.1553	42.53	0.0768	0.6163
7/16/1985	17	228.52	0.3842	65.24	0.1553	42.53	0.0768	0.6164
7/17/1985	25	231.39	0.3843	73.15	0.1554	45.82	0.0769	0.6165
7/19/1985	37	231.39	0.3845	73.15	0.1554	45.82	0.0769	0.6168
7/22/1985	24	220.66	0.3846	69.31	0.1554	43.89	0.0769	0.6169
7/23/1985	11	220.66	0.3846	69.31	0.1554	43.89	0.0769	0.6170
7/24/1985	11	220.66	0.3847	69.31	0.1555	43.89	0.0769	0.6170
7/25/1985	9	220.66	0.3847	69.31	0.1555	43.89	0.0769	0.6171
7/26/1985	21	220.66	0.3848	69.31	0.1555	43.89	0.0770	0.6172
7/30/1985	7	220.66	0.3848	69.31	0.1555	43.89	0.0770	0.6173
7/31/1985	6	220.66	0.3848	69.31	0.1555	43.89	0.0770	0.6173
8/2/1985	13	220.66	0.3849	69.31	0.1555	43.89	0.0770	0.6174
8/6/1985	20	220.66	0.3849	69.31	0.1556	43.89	0.0770	0.6175
8/7/1985	9	220.66	0.3850	69.31	0.1556	43.89	0.0770	0.6175
8/8/1985	11	220.66	0.3850	69.31	0.1556	43.89	0.0770	0.6176
8/9/1985	22	213.02	0.3851	72.38	0.1556	42.37	0.0770	0.6177
8/12/1985	20	213.02	0.3852	72.38	0.1556	42.37	0.0770	0.6179
8/13/1985	9	213.02	0.3852	72.38	0.1556	42.37	0.0770	0.6179
8/14/1985	9	213.02	0.3853	72.38	0.1557	42.37	0.0770	0.6180
8/15/1985	9	216.37	0.3853	70.59	0.1557	43.15	0.0771	0.6180
8/16/1985	14	216.37	0.3853	70.59	0.1557	43.15	0.0771	0.6181
8/19/1985	13	216.37	0.3854	70.59	0.1557	43.15	0.0771	0.6182
8/22/1985	12	216.37	0.3854	70.59	0.1557	43.15	0.0771	0.6182
8/27/1985	4	216.37	0.3855	70.59	0.1557	43.15	0.0771	0.6183
8/28/1985	1	231.86	0.3855	74.68	0.1557	46.57	0.0771	0.6183
8/29/1985	60	231.86	0.3857	74.68	0.1558	46.57	0.0771	0.6187
8/30/1985	216	231.86	0.3866	74.68	0.1561	46.57	0.0773	0.6200
9/3/1985	311	231.86	0.3879	74.68	0.1565	46.57	0.0776	0.6220
9/4/1985	109	231.86	0.3883	74.68	0.1566	46.57	0.0777	0.6226
9/5/1985	90	285.95	0.3888	81.59	0.1568	56.11	0.0778	0.6233
9/6/1985	158	285.95	0.3896	81.59	0.1570	56.11	0.0779	0.6245
9/9/1985	459	285.95	0.3919	81.59	0.1577	56.11	0.0784	0.6280
9/10/1985	153	285.95	0.3927	81.59	0.1579	56.11	0.0785	0.6291
9/11/1985	283	285.95	0.3942	81.59	0.1583	56.11	0.0788	0.6313
9/12/1985	276	305.01	0.3956	86.42	0.1587	58.29	0.0791	0.6335
9/13/1985	369	305.01	0.3976	86.42	0.1593	58.29	0.0795	0.6364
9/16/1985	144	305.01	0.3984	86.42	0.1595	58.29	0.0796	0.6376
9/17/1985	61	305.01	0.3988	86.42	0.1596	58.29	0.0797	0.6381
9/18/1985	52	305.01	0.3990	86.42	0.1597	58.29	0.0797	0.6385
9/19/1985	46	282.86	0.3993	81.07	0.1598	54.96	0.0798	0.6388

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

	Discharge	Concentration	Cumulative	Concentration	Cumulative	Concentration	Cumulative	Cumulative
Date	Volume	Ca	Ca	K	K	Mg	Mg	Ca+K+Mg
Non-Vascular	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
9/20/1985	78	282.86	0.3997	81.07	0.1599	54.96	0.0799	0.6394
9/23/1985	67	282.86	0.4000	81.07	0.1600	54.96	0.0799	0.6399
9/25/1985	30	282.86	0.4001	81.07	0.1600	54.96	0.0800	0.6401
9/26/1985	46	275.22	0.4004	78.26	0.1601	54.22	0.0800	0.6404
9/30/1985	643	275.22	0.4035	78.26	0.1610	54.22	0.0806	0.6451
10/1/1985	166	260.35	0.4043	77.72	0.1612	48.83	0.0808	0.6462
10/2/1985	112	260.35	0.4048	77.72	0.1614	48.83	0.0809	0.6470
10/3/1985	92	260.35	0.4052	77.72	0.1615	48.83	0.0809	0.6477
10/4/1985	144	260.35	0.4059	77.72	0.1617	48.83	0.0811	0.6486
10/7/1985	622	260.35	0.4088	77.72	0.1625	48.83	0.0816	0.6529
10/8/1985	346	260.35	0.4104	77.72	0.1630	48.83	0.0819	0.6553
10/10/1985	173	246.63	0.4111	75.96	0.1632	47.72	0.0821	0.6564
10/11/1985	184	246.63	0.4119	75.96	0.1635	47.72	0.0822	0.6576
10/14/1985	145	246.63	0.4126	75.96	0.1637	47.72	0.0823	0.6586
10/15/1985	482	246.63	0.4147	75.96	0.1643	47.72	0.0827	0.6618
10/17/1985	646	232.56	0.4174	70.84	0.1652	60.30	0.0834	0.6660
10/18/1985	518	232.56	0.4195	70.84	0.1658	60.30	0.0840	0.6693
10/21/1985	449	232.56	0.4214	70.84	0.1664	60.30	0.0845	0.6722
10/22/1985	187	232.56	0.4221	70.84	0.1666	60.30	0.0847	0.6734
10/23/1985	137	232.56	0.4227	70.84	0.1668	60.30	0.0848	0.6743
10/24/1985	99	232.56	0.4231	70.84	0.1669	60.30	0.0849	0.6749
10/25/1985	167	236.35	0.4238	64.48	0.1671	45.62	0.0851	0.6760
10/28/1985	104	236.35	0.4242	64.48	0.1672	45.62	0.0851	0.6766
10/29/1985	4681	236.35	0.4439	64.48	0.1726	45.62	0.0889	0.7054
5/13/1986	1915	236.35	0.4520	64.48	0.1748	45.62	0.0905	0.7172
5/14/1986	19	236.35	0.4520	64.48	0.1748	45.62	0.0905	0.7174
5/15/1986	49	181.59	0.4522	26.34	0.1748	36.03	0.0905	0.7176
5/19/1986	56	181.59	0.4524	26.34	0.1749	36.03	0.0906	0.7178
5/21/1986	25	181.59	0.4525	26.34	0.1749	36.03	0.0906	0.7179
5/22/1986	16	181.59	0.4525	26.34	0.1749	36.03	0.0906	0.7180
5/23/1986	310	177.77	0.4535	56.52	0.1752	35.09	0.0908	0.7195
5/27/1986	578	177.77	0.4553	56.52	0.1758	35.09	0.0912	0.7222
5/28/1986	154	177.77	0.4558	56.52	0.1759	35.09	0.0913	0.7230
5/29/1986	102	162.72	0.4561	51.97	0.1760	30.85	0.0913	0.7234
5/30/1986	176	162.72	0.4566	51.97	0.1762	30.85	0.0914	0.7242
6/2/1986	97	162.72	0.4569	51.97	0.1763	30.85	0.0915	0.7246
6/3/1986	41	162.72	0.4570	51.97	0.1763	30.85	0.0915	0.7248
6/4/1986	36	162.72	0.4571	51.97	0.1763	30.85	0.0915	0.7249
6/5/1986	31	177.84	0.4572	57.31	0.1764	35.05	0.0915	0.7251
6/6/1986	56	177.84	0.4574	57.31	0.1764	35.05	0.0916	0.7254
6/9/1986	44	177.84	0.4575	57.31	0.1765	35.05	0.0916	0.7256
6/10/1986	21	177.84	0.4576	57.31	0.1765	35.05	0.0916	0.7257
6/11/1986	18	177.84	0.4576	57.31	0.1765	35.05	0.0916	0.7258
6/12/1986	16	177.84	0.4577	57.31	0.1765	35.05	0.0916	0.7258
6/13/1986	32	177.84	0.4578	57.31	0.1766	35.05	0.0916	0.7260
6/16/1986	228	177.99	0.4585	57.80	0.1768	34.72	0.0918	0.7271
6/17/1986	122	177.99	0.4589	57.80	0.1769	34.72	0.0919	0.7277
6/18/1986	106	211.13	0.4593	64.45	0.1770	42.00	0.0919	0.7283
6/19/1986	99	211.13	0.4597	64.45	0.1771	42.00	0.0920	0.7288
6/20/1986	187	187.05	0.4603	64.45	0.1774	36.40	0.0921	0.7298
6/23/1986	115	187.05	0.4607	64.45	0.1775	36.40	0.0922	0.7304
6/24/1986	45	187.05	0.4608	64.45	0.1775	36.40	0.0922	0.7306
6/25/1986	44	187.05	0.4610	64.45	0.1776	36.40	0.0923	0.7308
6/26/1986	38	187.05	0.4611	64.45	0.1776	36.40	0.0923	0.7310
6/27/1986	83	187.05	0.4614	64.45	0.1777	36.40	0.0923	0.7314
7/1/1986	54	187.05	0.4616	64.45	0.1778	36.40	0.0924	0.7317
7/2/1986	19	187.05	0.4616	64.45	0.1778	36.40	0.0924	0.7318
7/3/1986	18	187.05	0.4617	64.45	0.1778	36.40	0.0924	0.7319
7/4/1986	33	199.68	0.4618	59.08	0.1779	38.96	0.0924	0.7321

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

Date	Discharge Volume	Concentration Ca	Cumulative Ca	Concentration K	Cumulative K	Concentration Mg	Cumulative Mg	Cumulative Ca+K+Mg
Non-Vascular	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
7/7/1986	42	199.68	0.4619	59.08	0.1779	38.96	0.0924	0.7323
7/10/1986	84	199.68	0.4622	59.08	0.1780	38.96	0.0925	0.7328
7/11/1986	96	201.35	0.4626	63.43	0.1781	40.85	0.0926	0.7333
7/14/1986	79	201.35	0.4629	63.43	0.1782	40.85	0.0926	0.7337
7/15/1986	34	201.35	0.4630	63.43	0.1782	40.85	0.0927	0.7339
7/16/1986	40	201.35	0.4631	63.43	0.1783	40.85	0.0927	0.7341
7/17/1986	77	201.35	0.4634	63.43	0.1784	40.85	0.0927	0.7345
7/18/1986	187	201.35	0.4641	63.43	0.1786	40.85	0.0929	0.7356
7/21/1986	125	201.35	0.4645	63.43	0.1787	40.85	0.0930	0.7362
7/22/1986	52	201.35	0.4647	63.43	0.1788	40.85	0.0930	0.7365
7/23/1986	45	201.35	0.4649	63.43	0.1788	40.85	0.0930	0.7368
7/24/1986	40	201.35	0.4650	63.43	0.1789	40.85	0.0931	0.7370
7/25/1986	71	230.41	0.4653	70.59	0.1790	44.26	0.0931	0.7374
7/28/1986	189	230.41	0.4661	70.59	0.1792	44.26	0.0933	0.7386
7/29/1986	1454	228.52	0.4720	75.45	0.1812	45.04	0.0944	0.7476
7/30/1986	1156	246.48	0.4771	81.84	0.1828	45.62	0.0954	0.7553
7/31/1986	450	246.48	0.4790	81.84	0.1835	45.62	0.0957	0.7583
8/1/1986	432	183.43	0.4804	45.01	0.1838	29.21	0.0960	0.7602
8/3/1986	605	218.06	0.4828	73.04	0.1846	38.67	0.0964	0.7638
8/4/1986	243	218.06	0.4837	73.04	0.1849	38.67	0.0965	0.7652
8/5/1986	161	224.70	0.4844	79.80	0.1852	42.74	0.0967	0.7662
8/6/1986	115	224.70	0.4848	79.80	0.1853	42.74	0.0968	0.7669
8/7/1986	84	216.97	0.4852	73.35	0.1854	41.46	0.0968	0.7674
8/8/1986	4000	216.97	0.5006	73.35	0.1907	41.46	0.0998	0.7910
8/13/1986	406	216.97	0.5022	73.35	0.1912	41.46	0.1001	0.7934
8/14/1986	107	216.97	0.5026	73.35	0.1913	41.46	0.1001	0.7940
8/15/1986	173	216.97	0.5032	73.35	0.1916	41.46	0.1003	0.7951
8/18/1986	98	216.97	0.5036	73.35	0.1917	41.46	0.1003	0.7956
8/19/1986	43	216.97	0.5038	73.35	0.1917	41.46	0.1004	0.7959
8/20/1986	37	216.97	0.5039	73.35	0.1918	41.46	0.1004	0.7961
8/21/1986	32	216.97	0.5040	73.35	0.1918	41.46	0.1004	0.7963
8/22/1986	58	216.97	0.5043	73.35	0.1919	41.46	0.1005	0.7966
8/25/1986	1120	173.48	0.5077	71.61	0.1933	32.62	0.1011	0.8022
8/26/1986	279	173.48	0.5086	71.61	0.1937	32.62	0.1013	0.8036
8/27/1986	257	173.48	0.5094	71.61	0.1940	32.62	0.1014	0.8048
8/29/1986	611	173.48	0.5113	71.61	0.1948	32.62	0.1018	0.8078
9/2/1986	187	183.56	0.5119	66.65	0.1950	35.95	0.1019	0.8088
9/3/1986	63	183.56	0.5121	66.65	0.1951	35.95	0.1019	0.8091
9/4/1986	53	183.56	0.5123	66.65	0.1952	35.95	0.1020	0.8094
9/5/1986	89	183.56	0.5125	66.65	0.1953	35.95	0.1020	0.8098
9/8/1986	130	189.22	0.5130	66.52	0.1954	37.31	0.1021	0.8105
9/9/1986	107	189.22	0.5133	66.52	0.1955	37.31	0.1022	0.8111
9/10/1986	99	189.22	0.5137	66.52	0.1957	37.31	0.1023	0.8116
9/11/1986	82	189.22	0.5139	66.52	0.1958	37.31	0.1023	0.8120
9/12/1986	138	189.22	0.5144	66.52	0.1959	37.31	0.1024	0.8127
9/15/1986	105	199.93	0.5148	70.33	0.1960	38.54	0.1025	0.8133
9/16/1986	53	199.93	0.5150	70.33	0.1961	38.54	0.1025	0.8136
9/17/1986	67	199.93	0.5152	70.33	0.1962	38.54	0.1026	0.8140
9/18/1986	190	199.93	0.5159	70.33	0.1964	38.54	0.1027	0.8150
9/19/1986	366	199.93	0.5172	70.33	0.1969	38.54	0.1029	0.8170
9/22/1986	232	189.67	0.5180	65.47	0.1972	34.31	0.1031	0.8182
9/24/1986	403	189.67	0.5193	65.47	0.1976	34.31	0.1033	0.8203
9/26/1986	576	189.67	0.5213	65.47	0.1983	34.31	0.1037	0.8233
9/29/1986	187	189.67	0.5219	65.47	0.1985	34.31	0.1038	0.8242
9/30/1986	75	186.35	0.5222	63.43	0.1986	35.83	0.1038	0.8246
10/1/1986	62	186.35	0.5224	63.43	0.1987	35.83	0.1039	0.8249
10/2/1986	133	186.35	0.5228	63.43	0.1988	35.83	0.1040	0.8256
10/6/1986	630	173.98	0.5247	61.18	0.1995	34.02	0.1043	0.8286
10/7/1986	200	173.98	0.5254	61.18	0.1997	34.02	0.1045	0.8296

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Non-Vascular	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
10/8/1986	160	173.98	0.5259	61.18	0.1999	34.02	0.1046	0.8303
10/9/1986	317	173.98	0.5268	61.18	0.2002	34.02	0.1048	0.8318
10/13/1986	148	193.26	0.5273	68.03	0.2004	37.35	0.1049	0.8326
10/14/1986	51	193.26	0.5275	68.03	0.2005	37.35	0.1049	0.8329
10/15/1986	43	193.26	0.5277	68.03	0.2005	37.35	0.1049	0.8331
10/16/1986	40	193.26	0.5278	68.03	0.2006	37.35	0.1049	0.8333
10/17/1986	83	193.26	0.5281	68.03	0.2007	37.35	0.1050	0.8338
10/20/1986	104	194.69	0.5285	65.47	0.2008	37.97	0.1051	0.8343
10/21/1986	49	194.69	0.5286	65.47	0.2009	37.97	0.1051	0.8346
10/22/1986	45	194.69	0.5288	65.47	0.2009	37.97	0.1051	0.8348
10/23/1986	104	194.69	0.5291	65.47	0.2010	37.97	0.1052	0.8354
10/27/1986	73	199.20	0.5294	65.47	0.2011	38.96	0.1053	0.8358
10/28/1986	27	199.20	0.5295	65.47	0.2012	38.96	0.1053	0.8359
10/29/1986	24	199.20	0.5296	65.47	0.2012	38.96	0.1053	0.8361
10/30/1986	1452	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/4/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/5/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/6/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/9/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/10/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/11/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/12/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/13/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/16/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/17/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/18/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/19/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/20/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/23/1987	0	199.20	0.5347	65.47	0.2029	38.96	0.1063	0.8439
3/24/1987	1003	83.41	0.5362	27.88	0.2034	16.25	0.1066	0.8462
3/25/1987	178	119.61	0.5366	31.97	0.2035	23.57	0.1067	0.8467
3/26/1987	233	125.35	0.5371	36.06	0.2036	26.66	0.1068	0.8475
3/27/1987	244	130.59	0.5377	36.06	0.2038	25.67	0.1069	0.8483
3/28/1987	200	136.50	0.5382	35.32	0.2039	27.40	0.1070	0.8490
3/29/1987	183	136.50	0.5386	35.32	0.2040	27.40	0.1071	0.8497
3/30/1987	197	140.12	0.5391	37.60	0.2042	29.91	0.1072	0.8504
3/31/1987	1616	140.34	0.5431	37.85	0.2052	27.64	0.1080	0.8563
4/1/1987	1884	130.11	0.5475	36.32	0.2065	25.50	0.1088	0.8628
4/2/1987	655	129.67	0.5490	31.94	0.2068	25.01	0.1091	0.8649
4/3/1987	727	127.17	0.5506	32.61	0.2072	24.31	0.1094	0.8673
4/6/1987	418	127.17	0.5516	32.61	0.2075	24.31	0.1096	0.8687
4/7/1987	297	127.17	0.5523	32.61	0.2077	24.31	0.1097	0.8696
4/8/1987	248	116.69	0.5528	32.99	0.2078	23.41	0.1098	0.8704
4/9/1987	191	116.69	0.5532	32.99	0.2079	23.41	0.1099	0.8710
4/10/1987	302	116.69	0.5538	32.99	0.2081	23.41	0.1100	0.8719
4/13/1987	164	116.69	0.5541	32.99	0.2082	23.41	0.1101	0.8724
4/14/1987	73	116.69	0.5543	32.99	0.2082	23.41	0.1101	0.8727
4/15/1987	61	116.22	0.5544	32.97	0.2083	23.69	0.1102	0.8728
4/16/1987	53	116.22	0.5545	32.97	0.2083	23.69	0.1102	0.8730
4/17/1987	94	116.22	0.5547	32.97	0.2084	23.69	0.1102	0.8733
4/20/1987	68	116.22	0.5549	32.97	0.2084	23.69	0.1103	0.8735
4/21/1987	32	116.22	0.5549	32.97	0.2084	23.69	0.1103	0.8736
4/22/1987	29	123.33	0.5550	33.68	0.2084	23.24	0.1103	0.8737
4/23/1987	25	123.33	0.5550	33.68	0.2084	23.24	0.1103	0.8738
4/24/1987	47	123.33	0.5551	33.68	0.2085	23.24	0.1103	0.8739
4/27/1987	36	123.33	0.5552	33.68	0.2085	23.24	0.1103	0.8740
4/28/1987	15	123.33	0.5553	33.68	0.2085	23.24	0.1103	0.8741
4/29/1987	14	123.33	0.5553	33.68	0.2085	23.24	0.1103	0.8741
4/30/1987	13	123.33	0.5553	33.68	0.2085	23.24	0.1103	0.8742

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

	Discharge	Concentration	Cumulative	Concentration	Cumulative	Concentration	Cumulative	Cumulative
Date	Volume	Ca	Ca	K	K	Mg	Mg	Ca+K+Mg
Non-Vascular	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
5/1/1987	24	123.33	0.5554	33.68	0.2085	23.24	0.1104	0.8743
5/4/1987	94	123.33	0.5556	33.68	0.2086	23.24	0.1104	0.8746
5/5/1987	58	123.33	0.5557	33.68	0.2086	23.24	0.1104	0.8747
5/6/1987	62	123.33	0.5558	33.68	0.2087	23.24	0.1104	0.8749
5/7/1987	184	123.33	0.5562	33.68	0.2088	23.24	0.1105	0.8755
5/12/1987	238	123.33	0.5568	33.68	0.2089	23.24	0.1106	0.8763
5/13/1987	69	123.33	0.5569	33.68	0.2090	23.24	0.1106	0.8765
5/14/1987	58	123.33	0.5570	33.68	0.2090	23.24	0.1107	0.8767
5/15/1987	98	123.33	0.5572	33.68	0.2091	23.24	0.1107	0.8770
5/18/1987	64	123.33	0.5574	33.68	0.2091	23.24	0.1107	0.8772
5/19/1987	30	123.33	0.5575	33.68	0.2091	23.24	0.1107	0.8773
5/20/1987	26	123.33	0.5575	33.68	0.2091	23.24	0.1108	0.8774
5/21/1987	23	123.33	0.5576	33.68	0.2091	23.24	0.1108	0.8775
5/22/1987	52	123.33	0.5577	33.68	0.2092	23.24	0.1108	0.8776
5/26/1987	36	123.33	0.5578	33.68	0.2092	23.24	0.1108	0.8778
5/27/1987	14	123.33	0.5578	33.68	0.2092	23.24	0.1108	0.8778
5/28/1987	17	123.33	0.5578	33.68	0.2092	23.24	0.1108	0.8778
5/29/1987	20	123.33	0.5579	33.68	0.2092	23.24	0.1108	0.8779
5/30/1987	35	123.33	0.5579	33.68	0.2092	23.24	0.1108	0.8780
6/1/1987	287	123.33	0.5586	33.68	0.2094	23.24	0.1110	0.8789
6/2/1987	274	123.33	0.5592	33.68	0.2096	23.24	0.1111	0.8798
6/3/1987	288	123.33	0.5598	33.68	0.2097	23.24	0.1112	0.8807
6/4/1987	332	123.33	0.5605	33.68	0.2099	23.24	0.1113	0.8818
6/5/1987	1261	123.33	0.5633	33.68	0.2107	23.24	0.1119	0.8858
6/9/1987	359	123.33	0.5641	33.68	0.2109	23.24	0.1120	0.8870
6/10/1987	330	117.32	0.5648	47.95	0.2112	22.95	0.1121	0.8881
6/11/1987	237	117.32	0.5653	47.95	0.2114	22.95	0.1122	0.8889
6/12/1987	334	117.32	0.5660	47.95	0.2117	22.95	0.1124	0.8900
6/15/1987	476	117.32	0.5670	47.95	0.2121	22.95	0.1126	0.8916
6/16/1987	200	117.32	0.5674	47.95	0.2123	22.95	0.1126	0.8923
6/17/1987	143	126.00	0.5677	48.90	0.2124	24.56	0.1127	0.8928
6/18/1987	106	126.00	0.5679	48.90	0.2125	24.56	0.1128	0.8932
6/19/1987	169	126.00	0.5683	48.90	0.2126	24.56	0.1128	0.8938
6/22/1987	101	126.00	0.5685	48.90	0.2127	24.56	0.1129	0.8941
6/23/1987	45	126.00	0.5686	48.90	0.2128	24.56	0.1129	0.8943
6/24/1987	710	126.00	0.5702	48.90	0.2134	24.56	0.1132	0.8968
6/25/1987	313	126.00	0.5709	48.90	0.2136	24.56	0.1133	0.8979
6/26/1987	373	126.00	0.5718	48.90	0.2140	24.56	0.1135	0.8992
6/29/1987	836	126.00	0.5736	48.90	0.2147	24.56	0.1139	0.9022
6/30/1987	223	126.00	0.5741	48.90	0.2149	24.56	0.1140	0.9030
7/1/1987	148	99.70	0.5744	40.33	0.2150	21.39	0.1140	0.9034
7/2/1987	111	99.70	0.5746	40.33	0.2151	21.39	0.1141	0.9037
7/3/1987	84	99.70	0.5747	40.33	0.2151	21.39	0.1141	0.9040
7/4/1987	64	99.70	0.5749	40.33	0.2152	21.39	0.1141	0.9042
7/5/1987	64	99.70	0.5750	40.33	0.2152	21.39	0.1141	0.9043
7/6/1987	74	99.70	0.5751	40.33	0.2153	21.39	0.1142	0.9045
7/7/1987	94	99.70	0.5753	40.33	0.2153	21.39	0.1142	0.9048
7/8/1987	94	99.70	0.5754	40.33	0.2154	21.39	0.1142	0.9051
7/9/1987	75	99.70	0.5756	40.33	0.2155	21.39	0.1143	0.9053
7/10/1987	138	99.70	0.5758	40.33	0.2156	21.39	0.1143	0.9057
7/13/1987	92	99.70	0.5760	40.33	0.2156	21.39	0.1144	0.9060
7/14/1987	42	99.70	0.5760	40.33	0.2157	21.39	0.1144	0.9061
7/15/1987	38	99.70	0.5761	40.33	0.2157	21.39	0.1144	0.9062
7/16/1987	37	99.70	0.5762	40.33	0.2157	21.39	0.1144	0.9063
7/17/1987	68	99.70	0.5763	40.33	0.2158	21.39	0.1144	0.9065
7/20/1987	55	99.70	0.5764	40.33	0.2158	21.39	0.1144	0.9067
7/21/1987	53	138.92	0.5765	58.52	0.2159	26.45	0.1145	0.9069
7/22/1987	154	138.92	0.5769	58.52	0.2160	26.45	0.1145	0.9075
7/23/1987	182	138.92	0.5774	58.52	0.2162	26.45	0.1146	0.9082

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Non-Vascular	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
7/24/1987	301	138.92	0.5781	58.52	0.2165	26.45	0.1148	0.9094
7/27/1987	139	138.92	0.5784	58.52	0.2167	26.45	0.1148	0.9099
7/28/1987	56	138.92	0.5786	58.52	0.2167	26.45	0.1149	0.9102
7/29/1987	164	138.92	0.5790	58.52	0.2169	26.45	0.1149	0.9108
8/4/1987	785	138.92	0.5809	58.52	0.2177	26.45	0.1153	0.9140
8/5/1987	251	132.63	0.5815	61.61	0.2180	24.93	0.1154	0.9149
8/6/1987	185	132.63	0.5820	61.61	0.2182	24.93	0.1155	0.9156
8/7/1987	249	132.63	0.5825	61.61	0.2185	24.93	0.1156	0.9166
8/10/1987	115	132.63	0.5828	61.61	0.2186	24.93	0.1157	0.9171
8/11/1987	48	132.63	0.5829	61.61	0.2186	24.93	0.1157	0.9173
8/12/1987	41	132.63	0.5830	61.61	0.2187	24.93	0.1157	0.9174
8/13/1987	34	132.63	0.5831	61.61	0.2187	24.93	0.1157	0.9175
8/14/1987	58	132.63	0.5832	61.61	0.2188	24.93	0.1157	0.9178
8/17/1987	46	132.63	0.5833	61.61	0.2188	24.93	0.1158	0.9179
8/18/1987	32	132.63	0.5834	61.61	0.2189	24.93	0.1158	0.9181
8/20/1987	26	132.63	0.5835	61.61	0.2189	24.93	0.1158	0.9182
8/21/1987	33	132.63	0.5836	61.61	0.2189	24.93	0.1158	0.9183
8/24/1987	22	132.63	0.5836	61.61	0.2190	24.93	0.1158	0.9184
8/25/1987	9	132.63	0.5836	61.61	0.2190	24.93	0.1158	0.9184
8/26/1987	8	132.63	0.5837	61.61	0.2190	24.93	0.1158	0.9184
8/27/1987	6	132.63	0.5837	61.61	0.2190	24.93	0.1158	0.9185
8/28/1987	6	132.63	0.5837	61.61	0.2190	24.93	0.1158	0.9185
8/29/1987	9	132.63	0.5837	61.61	0.2190	24.93	0.1158	0.9185
9/1/1987	6	132.63	0.5837	61.61	0.2190	24.93	0.1158	0.9186
9/2/1987	3	132.63	0.5837	61.61	0.2190	24.93	0.1158	0.9186
9/3/1987	4	132.63	0.5837	61.61	0.2190	24.93	0.1158	0.9186
9/4/1987	9	152.20	0.5838	62.25	0.2190	29.58	0.1158	0.9186
9/7/1987	13	152.20	0.5838	62.25	0.2190	29.58	0.1158	0.9187
9/8/1987	7	152.20	0.5838	62.25	0.2190	29.58	0.1159	0.9187
9/9/1987	8	152.20	0.5838	62.25	0.2191	29.58	0.1159	0.9187
9/10/1987	1066	152.20	0.5867	62.25	0.2202	29.58	0.1164	0.9234
9/13/1987	3679	152.20	0.5967	62.25	0.2243	29.58	0.1183	0.9393
9/14/1987	494	152.20	0.5980	62.25	0.2249	29.58	0.1186	0.9415
9/15/1987	240	152.20	0.5987	62.25	0.2251	29.58	0.1187	0.9425
9/16/1987	308	152.20	0.5995	62.25	0.2255	29.58	0.1189	0.9438
9/17/1987	216	152.20	0.6001	62.25	0.2257	29.58	0.1190	0.9448
9/20/1987	109	152.20	0.6004	62.25	0.2258	29.58	0.1191	0.9453
9/21/1987	49	152.20	0.6005	62.25	0.2259	29.58	0.1191	0.9455
9/22/1987	56	152.20	0.6007	62.25	0.2259	29.58	0.1191	0.9457
9/23/1987	189	152.20	0.6012	62.25	0.2261	29.58	0.1192	0.9465
9/28/1987	123	152.20	0.6015	62.25	0.2263	29.58	0.1193	0.9471
9/29/1987	37	152.20	0.6016	62.25	0.2263	29.58	0.1193	0.9472
9/30/1987	33	152.20	0.6017	62.25	0.2264	29.58	0.1193	0.9474
10/1/1987	75	152.20	0.6019	62.25	0.2264	29.58	0.1194	0.9477
10/4/1987	1751	152.20	0.6066	62.25	0.2284	29.58	0.1203	0.9553
10/5/1987	401	152.20	0.6077	62.25	0.2288	29.58	0.1205	0.9570
10/6/1987	234	152.20	0.6083	62.25	0.2291	29.58	0.1206	0.9580
10/7/1987	160	152.20	0.6088	62.25	0.2293	29.58	0.1207	0.9587
10/8/1987	259	148.60	0.6095	55.91	0.2295	29.04	0.1208	0.9598
10/11/1987	177	148.60	0.6099	55.91	0.2297	29.04	0.1209	0.9605
10/12/1987	82	148.60	0.6101	55.91	0.2298	29.04	0.1210	0.9609
10/13/1987	90	148.60	0.6104	55.91	0.2299	29.04	0.1210	0.9613
10/14/1987	90	148.60	0.6106	55.91	0.2300	29.04	0.1211	0.9616
10/15/1987	246	150.87	0.6113	51.20	0.2302	28.22	0.1212	0.9626
10/20/1987	127	150.87	0.6116	51.20	0.2303	28.22	0.1212	0.9632
10/21/1987	37	150.87	0.6117	51.20	0.2303	28.22	0.1213	0.9633
10/22/1987	70	158.61	0.6119	50.61	0.2304	30.73	0.1213	0.9636
10/25/1987	102	158.61	0.6122	50.61	0.2305	30.73	0.1214	0.9640
10/26/1987	58	158.61	0.6124	50.61	0.2305	30.73	0.1214	0.9643

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Non-Vascular	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
10/27/1987	65	158.61	0.6126	50.61	0.2306	30.73	0.1214	0.9646
10/28/1987	483	158.61	0.6139	50.61	0.2310	30.73	0.1217	0.9666
10/29/1987	572	131.74	0.6153	45.96	0.2315	25.75	0.1220	0.9687
10/31/1987	72	131.74	0.6154	45.96	0.2316	25.75	0.1220	0.9690
11/15/1987	2160	131.74	0.6205	45.96	0.2333	25.75	0.1230	0.9768
12/15/1987	878	131.74	0.6225	45.96	0.2340	25.75	0.1234	0.9799
1/15/1988	893	131.74	0.6246	45.96	0.2348	25.75	0.1238	0.9832
2/15/1988	2160	131.74	0.6297	45.96	0.2365	25.75	0.1248	0.9910
3/15/1988	1881	131.74	0.6341	45.96	0.2381	25.75	0.1256	0.9978
3/25/1988	829	131.74	0.6360	45.96	0.2387	25.75	0.1260	1.0008
3/26/1988	209	131.74	0.6365	45.96	0.2389	25.75	0.1261	1.0015
3/27/1988	282	21.83	0.6366	8.75	0.2390	4.69	0.1261	1.0017
3/28/1988	557	21.83	0.6368	8.75	0.2390	4.69	0.1262	1.0021
3/29/1988	1895	21.83	0.6376	8.75	0.2393	4.69	0.1263	1.0033
3/30/1988	4734	21.83	0.6394	8.75	0.2401	4.69	0.1267	1.0062
3/31/1988	151	21.83	0.6395	8.75	0.2401	4.69	0.1267	1.0063
4/1/1988	120	21.83	0.6395	8.75	0.2401	4.69	0.1268	1.0064
4/2/1988	118	21.83	0.6396	8.75	0.2401	4.69	0.1268	1.0065
4/3/1988	157	21.83	0.6396	8.75	0.2402	4.69	0.1268	1.0066
4/4/1988	233	122.65	0.6401	31.74	0.2403	23.61	0.1269	1.0073
4/5/1988	268	105.29	0.6406	19.44	0.2404	15.10	0.1270	1.0080
4/6/1988	433	105.29	0.6415	19.44	0.2405	15.10	0.1271	1.0091
4/7/1988	990	105.29	0.6433	19.44	0.2409	15.10	0.1273	1.0115
4/11/1988	242	105.29	0.6438	19.44	0.2410	15.10	0.1274	1.0121
4/12/1988	82	105.29	0.6439	19.44	0.2410	15.10	0.1274	1.0123
4/13/1988	69	65.64	0.6440	9.49	0.2410	6.83	0.1274	1.0124
4/14/1988	59	65.64	0.6441	9.49	0.2410	6.83	0.1274	1.0125
4/15/1988	280	65.64	0.6444	9.49	0.2411	6.83	0.1275	1.0129
4/25/1988	253	65.64	0.6447	9.49	0.2411	6.83	0.1275	1.0133
4/26/1988	43	65.64	0.6447	9.49	0.2411	6.83	0.1275	1.0133
4/27/1988	41	129.27	0.6448	34.76	0.2411	27.35	0.1275	1.0135
4/28/1988	43	129.27	0.6449	34.76	0.2412	27.35	0.1275	1.0136
4/29/1988	3434	129.27	0.6528	34.76	0.2433	27.35	0.1292	1.0253
5/2/1988	527	129.27	0.6540	34.76	0.2436	27.35	0.1295	1.0271
5/3/1988	177	129.27	0.6544	34.76	0.2437	27.35	0.1296	1.0277
5/4/1988	129	129.27	0.6547	34.76	0.2438	27.35	0.1296	1.0282
5/5/1988	102	129.27	0.6550	34.76	0.2439	27.35	0.1297	1.0285
5/6/1988	171	129.27	0.6554	34.76	0.2440	27.35	0.1298	1.0291
5/9/1988	109	129.27	0.6556	34.76	0.2440	27.35	0.1298	1.0295
5/10/1988	47	129.27	0.6557	34.76	0.2441	27.35	0.1298	1.0296
5/11/1988	41	129.27	0.6558	34.76	0.2441	27.35	0.1299	1.0298
5/12/1988	38	129.27	0.6559	34.76	0.2441	27.35	0.1299	1.0299
5/13/1988	53	65.64	0.6560	9.49	0.2441	6.83	0.1299	1.0300
5/15/1988	88	65.64	0.6561	9.49	0.2441	6.83	0.1299	1.0301
5/16/1988	30	65.64	0.6561	9.49	0.2441	6.83	0.1299	1.0301
5/17/1988	32	65.64	0.6561	9.49	0.2441	6.83	0.1299	1.0302
5/18/1988	237	65.64	0.6564	9.49	0.2442	6.83	0.1299	1.0305
5/31/1988	660	65.64	0.6572	9.49	0.2443	6.83	0.1300	1.0315
6/1/1988	76	133.11	0.6574	45.98	0.2444	24.31	0.1300	1.0318
6/2/1988	61	133.11	0.6575	45.98	0.2444	24.31	0.1301	1.0320
6/3/1988	107	133.11	0.6578	45.98	0.2445	24.31	0.1301	1.0324
6/6/1988	73	133.11	0.6579	45.98	0.2446	24.31	0.1301	1.0326
6/7/1988	31	133.11	0.6580	45.98	0.2446	24.31	0.1302	1.0327
6/8/1988	28	133.11	0.6581	45.98	0.2446	24.31	0.1302	1.0328
6/9/1988	24	133.11	0.6581	45.98	0.2446	24.31	0.1302	1.0329
6/10/1988	46	133.11	0.6582	45.98	0.2447	24.31	0.1302	1.0331
6/13/1988	35	133.11	0.6583	45.98	0.2447	24.31	0.1302	1.0332
6/14/1988	16	133.11	0.6584	45.98	0.2447	24.31	0.1302	1.0333
6/15/1988	145	133.11	0.6587	45.98	0.2448	24.31	0.1303	1.0338

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

Date	Discharge Volume	Concentration Ca	Cumulative Ca	Concentration K	Cumulative K	Concentration Mg	Cumulative Mg	Cumulative Ca+K+Mg
Non-Vascular	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
6/16/1988	14	133.11	0.6587	45.98	0.2448	24.31	0.1303	1.0339
6/17/1988	27	133.11	0.6588	45.98	0.2449	24.31	0.1303	1.0340
6/20/1988	22	133.11	0.6589	45.98	0.2449	24.31	0.1303	1.0340
6/21/1988	9	133.11	0.6589	45.98	0.2449	24.31	0.1303	1.0341
6/22/1988	9	133.11	0.6589	45.98	0.2449	24.31	0.1303	1.0341
6/23/1988	8	133.11	0.6589	45.98	0.2449	24.31	0.1303	1.0341
6/24/1988	14	133.11	0.6589	45.98	0.2449	24.31	0.1303	1.0342
6/27/1988	32	133.11	0.6590	45.98	0.2449	24.31	0.1303	1.0343
6/28/1988	20	133.11	0.6591	45.98	0.2449	24.31	0.1303	1.0344
6/29/1988	27	133.11	0.6591	45.98	0.2450	24.31	0.1304	1.0345
6/30/1988	30	133.11	0.6592	45.98	0.2450	24.31	0.1304	1.0346
7/1/1988	50	133.11	0.6593	45.98	0.2450	24.31	0.1304	1.0347
7/3/1988	59	133.11	0.6595	45.98	0.2451	24.31	0.1304	1.0350
7/4/1988	45	133.11	0.6596	45.98	0.2451	24.31	0.1304	1.0351
7/5/1988	46	133.11	0.6597	45.98	0.2452	24.31	0.1305	1.0353
7/6/1988	69	133.11	0.6598	45.98	0.2452	24.31	0.1305	1.0355
7/8/1988	99	133.11	0.6601	45.98	0.2453	24.31	0.1305	1.0359
7/11/1988	65	133.11	0.6602	45.98	0.2453	24.31	0.1306	1.0361
7/12/1988	29	133.11	0.6603	45.98	0.2454	24.31	0.1306	1.0362
7/13/1988	24	133.11	0.6604	45.98	0.2454	24.31	0.1306	1.0363
7/14/1988	22	133.11	0.6604	45.98	0.2454	24.31	0.1306	1.0364
7/15/1988	19	133.11	0.6605	45.98	0.2454	24.31	0.1306	1.0365
7/16/1988	25	133.11	0.6605	45.98	0.2454	24.31	0.1306	1.0366
7/18/1988	21	133.11	0.6606	45.98	0.2455	24.31	0.1306	1.0366
7/19/1988	12	133.11	0.6606	45.98	0.2455	24.31	0.1306	1.0367
7/20/1988	11	133.11	0.6606	45.98	0.2455	24.31	0.1306	1.0367
7/21/1988	12	133.11	0.6606	45.98	0.2455	24.31	0.1306	1.0368
7/22/1988	3268	133.11	0.6684	45.98	0.2482	24.31	0.1320	1.0486
7/25/1988	323	133.11	0.6691	45.98	0.2484	24.31	0.1322	1.0497
7/26/1988	124	133.11	0.6694	45.98	0.2485	24.31	0.1322	1.0502
7/27/1988	107	133.11	0.6697	45.98	0.2486	24.31	0.1323	1.0506
7/28/1988	110	133.11	0.6699	45.98	0.2487	24.31	0.1323	1.0510
7/29/1988	228	133.11	0.6705	45.98	0.2489	24.31	0.1324	1.0518
8/1/1988	141	133.11	0.6708	45.98	0.2490	24.31	0.1325	1.0523
8/2/1988	60	133.11	0.6710	45.98	0.2491	24.31	0.1325	1.0525
8/3/1988	51	133.11	0.6711	45.98	0.2491	24.31	0.1325	1.0527
8/4/1988	108	133.11	0.6713	45.98	0.2492	24.31	0.1326	1.0531
8/8/1988	63	133.11	0.6715	45.98	0.2492	24.31	0.1326	1.0533
8/9/1988	33	91.52	0.6715	61.64	0.2493	30.93	0.1326	1.0534
8/11/1988	56	91.52	0.6716	61.64	0.2493	30.93	0.1327	1.0536
8/15/1988	27	91.52	0.6717	61.64	0.2494	30.93	0.1327	1.0537
8/16/1988	15	91.52	0.6717	61.64	0.2494	30.93	0.1327	1.0538
8/18/1988	12	91.52	0.6717	61.64	0.2494	30.93	0.1327	1.0538
8/19/1988	11	91.52	0.6717	61.64	0.2494	30.93	0.1327	1.0538
8/21/1988	6	91.52	0.6717	61.64	0.2494	30.93	0.1327	1.0539
8/22/1988	4	91.52	0.6718	61.64	0.2494	30.93	0.1327	1.0539
8/23/1988	3	91.52	0.6718	61.64	0.2494	30.93	0.1327	1.0539
8/24/1988	3	91.52	0.6718	61.64	0.2494	30.93	0.1327	1.0539
8/25/1988	6	91.52	0.6718	61.64	0.2494	30.93	0.1327	1.0539
8/26/1988	9	91.52	0.6718	61.64	0.2494	30.93	0.1327	1.0539
8/27/1988	18	91.52	0.6718	61.64	0.2495	30.93	0.1327	1.0540
8/29/1988	65	91.52	0.6719	61.64	0.2495	30.93	0.1328	1.0542
8/30/1988	1944	91.52	0.6751	61.64	0.2517	30.93	0.1338	1.0606
8/31/1988	475	91.52	0.6759	61.64	0.2522	30.93	0.1341	1.0621
9/1/1988	259	91.52	0.6763	61.64	0.2525	30.93	0.1342	1.0630
9/2/1988	374	91.52	0.6769	61.64	0.2529	30.93	0.1344	1.0642
9/6/1988	990	91.52	0.6785	61.64	0.2540	30.93	0.1350	1.0674
9/7/1988	259	91.52	0.6789	61.64	0.2542	30.93	0.1351	1.0683
9/8/1988	403	91.52	0.6796	61.64	0.2547	30.93	0.1353	1.0696

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

	Discharge	Concentration	Cumulative	Concentration	Cumulative	Concentration	Cumulative	Cumulative
Date	Volume	Ca	Ca	K	K	Mg	Mg	Ca+K+Mg
Non-Vascular	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
9/12/1988	158	91.52	0.6798	61.64	0.2549	30.93	0.1354	1.0701
9/13/1988	51	91.52	0.6799	61.64	0.2549	30.93	0.1355	1.0703
9/14/1988	44	91.52	0.6800	61.64	0.2550	30.93	0.1355	1.0704
9/15/1988	37	91.52	0.6801	61.64	0.2550	30.93	0.1355	1.0706
9/16/1988	59	91.52	0.6801	61.64	0.2551	30.93	0.1355	1.0708
9/19/1988	42	91.52	0.6802	61.64	0.2551	30.93	0.1356	1.0709
9/20/1988	19	91.52	0.6802	61.64	0.2551	30.93	0.1356	1.0710
9/21/1988	43	91.52	0.6803	61.64	0.2552	30.93	0.1356	1.0711
9/22/1988	83	91.52	0.6805	61.64	0.2553	30.93	0.1356	1.0714
9/26/1988	112	91.52	0.6806	61.64	0.2554	30.93	0.1357	1.0717
9/27/1988	45	91.52	0.6807	61.64	0.2554	30.93	0.1357	1.0719
9/28/1988	42	94.16	0.6808	42.94	0.2555	17.73	0.1357	1.0720
9/29/1988	97	94.16	0.6809	42.94	0.2555	17.73	0.1358	1.0723
10/3/1988	61	94.16	0.6810	42.94	0.2556	17.73	0.1358	1.0724
10/4/1988	23	94.16	0.6811	42.94	0.2556	17.73	0.1358	1.0725
10/5/1988	22	94.16	0.6811	42.94	0.2556	17.73	0.1358	1.0726
10/6/1988	19	94.16	0.6811	42.94	0.2556	17.73	0.1358	1.0726
10/7/1988	43	94.16	0.6812	42.94	0.2557	17.73	0.1358	1.0727
10/11/1988	23	94.16	0.6813	42.94	0.2557	17.73	0.1358	1.0728
10/12/1988	17	94.16	0.6813	42.94	0.2557	17.73	0.1358	1.0728
10/14/1988	29	94.16	0.6813	42.94	0.2557	17.73	0.1358	1.0729
10/17/1988	26	94.16	0.6814	42.94	0.2557	17.73	0.1359	1.0730
10/18/1988	14	94.16	0.6814	42.94	0.2558	17.73	0.1359	1.0730
10/19/1988	14	94.16	0.6814	42.94	0.2558	17.73	0.1359	1.0731
10/20/1988	40	94.16	0.6815	42.94	0.2558	17.73	0.1359	1.0732
10/21/1988	72	94.16	0.6816	42.94	0.2559	17.73	0.1359	1.0734
10/22/1988	125	94.16	0.6818	42.94	0.2560	17.73	0.1359	1.0737
10/24/1988	108	94.16	0.6820	42.94	0.2560	17.73	0.1360	1.0740
10/25/1988	68	94.16	0.6821	42.94	0.2561	17.73	0.1360	1.0742
10/26/1988	72	94.16	0.6822	42.94	0.2561	17.73	0.1360	1.0744
10/27/1988	292	94.16	0.6827	42.94	0.2564	17.73	0.1361	1.0752
11/2/1988	212	94.16	0.6831	42.94	0.2565	17.73	0.1362	1.0758
11/3/1988	806	94.16	0.6844	42.94	0.2571	17.73	0.1364	1.0780
11/4/1988	446	94.16	0.6852	42.94	0.2575	17.73	0.1366	1.0792
11/5/1988	378	94.16	0.6858	42.94	0.2578	17.73	0.1367	1.0803
11/7/1988	292	94.16	0.6863	42.94	0.2580	17.73	0.1368	1.0811
11/8/1988	238	94.16	0.6867	42.94	0.2582	17.73	0.1369	1.0817
11/9/1988	252	94.16	0.6871	42.94	0.2584	17.73	0.1369	1.0824
11/10/1988	194	94.16	0.6874	42.94	0.2585	17.73	0.1370	1.0830
11/11/1988	166	94.16	0.6877	42.94	0.2586	17.73	0.1371	1.0834
11/12/1988	160	94.16	0.6880	42.94	0.2588	17.73	0.1371	1.0839
11/13/1988	0	94.16	0.6880	42.94	0.2588	17.73	0.1371	1.0839
Missing 5 yrs estimates			0.4549		0.1688		0.0883	
4/10/1993	0	85.99	1.1429	0.00	0.4275	21.37	0.2254	1.7957
4/12/1993	6630	87.63	1.1532	0.40	0.4276	16.49	0.2273	1.8080
4/13/1993	7741	91.13	1.1657	26.12	0.4312	17.96	0.2298	1.8267
4/15/1993	323	90.60	1.1662	25.46	0.4313	18.11	0.2299	1.8274
4/19/1993	472	83.60	1.1669	24.11	0.4315	16.52	0.2300	1.8285
4/23/1993	92	81.94	1.1671	24.92	0.4316	16.51	0.2300	1.8287
4/29/1993	176	82.14	1.1673	27.41	0.4316	15.95	0.2301	1.8291
5/5/1993	328	81.26	1.1678	28.29	0.4318	15.93	0.2302	1.8298
6/1/1993	233	89.69	1.1682	28.96	0.4319	16.70	0.2303	1.8304
6/23/1993	644	95.58	1.1693	36.46	0.4323	18.50	0.2305	1.8321
7/20/1993	250	86.62	1.1697	40.32	0.4325	17.50	0.2305	1.8327
8/5/1993	1517	99.47	1.1723	43.23	0.4337	18.80	0.2310	1.8371
8/13/1993	250	115.17	1.1729	49.00	0.4339	21.89	0.2311	1.8379
8/23/1993	57	105.05	1.1730	44.62	0.4339	19.96	0.2312	1.8381
8/26/1993	768	120.47	1.1746	53.60	0.4347	22.70	0.2315	1.8408
9/8/1993	195	128.03	1.1750	54.35	0.4349	24.42	0.2316	1.8415

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

	Discharge	Concentration	Cumulative	Concentration	Cumulative	Concentration	Cumulative	Cumulative
Date	Volume	Ca	Ca	K	K	Mg	Mg	Ca+K+Mg
Non-Vascular	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
9/14/1993	208	121.37	1.1755	49.83	0.4351	23.28	0.2316	1.8422
9/28/1993	722	103.02	1.1768	44.96	0.4356	19.88	0.2319	1.8443
10/4/1993	1265	93.07	1.1789	36.59	0.4365	16.80	0.2323	1.8476
10/8/1993	341	89.12	1.1795	34.68	0.4367	16.60	0.2324	1.8485
10/13/1993	391	112.84	1.1802	48.76	0.4370	22.09	0.2325	1.8498
10/19/1993	637	90.23	1.1813	32.40	0.4374	16.56	0.2327	1.8513
10/29/1993	803	109.43	1.1828	41.18	0.4380	21.05	0.2330	1.8538
11/5/1993	815	80.26	1.1840	34.66	0.4385	14.55	0.2332	1.8557
11/18/1993	1431	79.32	1.1860	25.58	0.4391	12.57	0.2336	1.8587
11/30/1993	3242	85.67	1.1909	31.24	0.4409	16.61	0.2345	1.8664
12/3/1993	482	84.03	1.1917	35.10	0.4412	16.45	0.2347	1.8675
12/7/1993	263	77.62	1.1920	33.93	0.4414	15.09	0.2347	1.8681
12/13/1993	1161	87.77	1.1938	31.15	0.4420	17.02	0.2351	1.8709
12/21/1993	1746	75.08	1.1962	27.34	0.4429	14.22	0.2355	1.8745
1/4/1994	1746	88.38	1.1989	35.04	0.4439	17.32	0.2361	1.8789
4/13/1994	2331	73.08	1.2019	19.64	0.4448	14.61	0.2367	1.8834
4/20/1994	1945	80.17	1.2047	20.94	0.4455	14.57	0.2372	1.8874
4/28/1994	274	74.08	1.2051	20.45	0.4456	13.76	0.2372	1.8879
5/5/1994	415	76.63	1.2056	23.09	0.4458	14.73	0.2373	1.8887
5/19/1994	486	70.65	1.2062	24.64	0.4460	12.74	0.2374	1.8897
5/26/1994	470	70.49	1.2068	25.77	0.4462	12.74	0.2376	1.8906
6/3/1994	381	71.38	1.2073	27.18	0.4464	13.85	0.2376	1.8913
6/9/1994	181	77.38	1.2076	30.48	0.4465	14.56	0.2377	1.8917
6/15/1994	203	80.31	1.2079	32.41	0.4466	14.97	0.2377	1.8922
6/23/1994	1013	89.08	1.2095	36.51	0.4472	15.84	0.2380	1.8947
6/29/1994	271	85.71	1.2099	37.28	0.4474	15.41	0.2381	1.8954
7/7/1994	50	82.06	1.2099	37.99	0.4475	17.00	0.2381	1.8955
7/13/1994	483	96.31	1.2108	41.43	0.4478	16.86	0.2383	1.8969
7/21/1994	595	93.62	1.2118	49.36	0.4483	18.06	0.2385	1.8986
7/28/1994	432	101.42	1.2125	55.70	0.4488	19.36	0.2386	1.8999
8/3/1994	797	107.11	1.2141	50.41	0.4495	20.73	0.2389	1.9024
8/11/1994	433	107.37	1.2149	48.54	0.4498	20.96	0.2391	1.9038
8/17/1994	113	100.44	1.2151	42.30	0.4499	19.47	0.2391	1.9041
8/25/1994	1895	112.54	1.2189	52.12	0.4517	21.53	0.2398	1.9104
8/31/1994	391	115.19	1.2197	51.74	0.4520	21.92	0.2400	1.9117
9/7/1994	132	82.74	1.2199	48.43	0.4522	17.01	0.2400	1.9121
9/15/1994	92	96.19	1.2200	43.82	0.4522	19.38	0.2401	1.9123
9/22/1994	783	104.88	1.2215	50.04	0.4529	20.87	0.2403	1.9148
9/29/1994	1550	102.51	1.2243	47.70	0.4542	20.44	0.2409	1.9195
10/5/1994	1062	97.97	1.2262	50.48	0.4552	19.73	0.2413	1.9226
10/13/1994	280	90.00	1.2266	55.48	0.4555	18.38	0.2414	1.9235
10/19/1994	88	88.50	1.2268	45.95	0.4555	18.00	0.2414	1.9237
10/27/1994	72	93.60	1.2269	42.72	0.4556	19.00	0.2414	1.9239
11/2/1994	45	89.76	1.2269	42.12	0.4556	17.89	0.2414	1.9240
11/10/1994	136	94.25	1.2272	46.37	0.4557	19.38	0.2415	1.9244
11/16/1994	169	89.94	1.2274	47.63	0.4559	18.50	0.2415	1.9249
11/23/1994	106	92.95	1.2276	194.19	0.4563	19.10	0.2416	1.9254
12/1/1994	146	97.78	1.2279	50.45	0.4564	20.27	0.2416	1.9259
12/8/1994	1498	83.17	1.2301	30.04	0.4572	17.29	0.2421	1.9294
12/15/1994	706	89.19	1.2312	34.82	0.4576	18.12	0.2423	1.9311
12/28/1994	81	91.54	1.2313	51.85	0.4577	19.52	0.2423	1.9314
1/5/1995	191	91.26	1.2316	36.83	0.4578	19.03	0.2424	1.9319
1/11/1995	52	88.52	1.2317	45.91	0.4579	18.02	0.2424	1.9320
1/18/1995	1996	53.38	1.2336	19.28	0.4585	10.42	0.2428	1.9350
1/26/1995	1738	80.12	1.2361	27.10	0.4594	16.61	0.2433	1.9388
2/1/1995	411	86.95	1.2367	30.18	0.4596	18.06	0.2434	1.9398
2/9/1995	101	86.58	1.2369	53.41	0.4597	18.36	0.2435	1.9401
2/17/1995	13	78.63	1.2369	89.37	0.4597	17.25	0.2435	1.9401
3/22/1995	2620	71.87	1.2403	25.36	0.4609	15.09	0.2442	1.9453

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Non-Vascular	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
3/30/1995	2626	80.79	1.2440	25.36	0.4621	17.03	0.2450	1.9511
4/6/1995	1374	80.93	1.2460	25.43	0.4627	17.00	0.2454	1.9541
4/13/1995	698	79.80	1.2470	24.48	0.4630	16.75	0.2456	1.9556
4/20/1995	433	78.44	1.2476	25.23	0.4632	16.34	0.2457	1.9565
4/23/1995	394	80.94	1.2482	26.24	0.4634	16.71	0.2458	1.9574
4/27/1995	355	80.55	1.2487	26.47	0.4636	16.62	0.2459	1.9582
5/3/1995	232	86.45	1.2490	30.54	0.4637	17.86	0.2460	1.9587
5/11/1995	197	83.84	1.2493	31.52	0.4638	17.27	0.2461	1.9592
5/18/1995	116	82.03	1.2495	29.95	0.4639	16.81	0.2461	1.9595
5/24/1995	722	78.85	1.2505	30.63	0.4643	16.44	0.2463	1.9611
6/1/1995	345	80.61	1.2510	31.28	0.4644	16.55	0.2464	1.9619
6/8/1995	480	81.55	1.2517	33.10	0.4647	16.72	0.2466	1.9630
6/15/1995	179	82.50	1.2520	34.81	0.4648	16.81	0.2466	1.9634
6/22/1995	272	81.91	1.2524	34.93	0.4650	16.70	0.2467	1.9641
6/28/1995	163	82.35	1.2526	36.24	0.4651	16.77	0.2468	1.9645
7/18/1995	823	91.52	1.2539	45.55	0.4658	18.35	0.2470	1.9667
7/20/1995	929	98.50	1.2556	48.24	0.4666	19.63	0.2473	1.9695
7/27/1995	677	105.26	1.2568	49.87	0.4672	21.03	0.2476	1.9716
8/3/1995	1644	111.51	1.2601	52.34	0.4687	20.70	0.2482	1.9770
8/8/1995	3541	104.27	1.2667	52.67	0.4720	19.29	0.2494	1.9881
8/17/1995	992	99.59	1.2684	50.25	0.4729	18.32	0.2497	1.9911
8/24/1995	289	97.22	1.2689	48.25	0.4732	17.83	0.2498	1.9919
9/28/1995	766	88.01	1.2701	42.15	0.4737	16.22	0.2501	1.9939
10/5/1995	1348	89.99	1.2723	41.74	0.4747	16.55	0.2504	1.9974
10/12/1995	1933	84.04	1.2752	38.50	0.4761	17.35	0.2510	2.0023
10/19/1995	633	84.13	1.2761	36.91	0.4765	17.24	0.2512	2.0038
10/26/1995	3643	77.00	1.2811	34.48	0.4787	15.87	0.2523	2.0121
11/1/1995	2725	71.24	1.2845	32.93	0.4803	14.74	0.2530	2.0178
11/9/1995	1393	69.45	1.2863	36.67	0.4812	14.47	0.2533	2.0208
11/16/1995	3045	63.86	1.2897	31.05	0.4829	13.41	0.2541	2.0267
1/24/1996	3244	60.33	1.2932	22.38	0.4842	12.79	0.2548	2.0322
2/1/1996	3851	50.51	1.2967	18.88	0.4855	10.33	0.2555	2.0376
2/14/1996	336	64.63	1.2970	25.54	0.4856	14.14	0.2556	2.0383
2/22/1996	898	44.34	1.2977	17.14	0.4859	9.38	0.2557	2.0394
3/7/1996	2425	46.30	1.2997	17.80	0.4867	9.86	0.2562	2.0426
3/20/1996	1482	44.92	1.3009	17.34	0.4871	9.44	0.2564	2.0445
3/27/1996	1440	41.40	1.3020	15.69	0.4875	12.46	0.2567	2.0462
4/3/1996	1403	60.77	1.3035	21.44	0.4881	12.61	0.2571	2.0486
4/11/1996	936	64.71	1.3046	22.62	0.4884	13.43	0.2573	2.0503
4/15/1996	607	45.34	1.3051	22.96	0.4887	13.52	0.2574	2.0512
4/16/1996	1404	56.13	1.3065	23.46	0.4893	13.68	0.2578	2.0535
4/17/1996	2202	48.31	1.3084	23.47	0.4902	14.08	0.2583	2.0569
4/18/1996	3001	46.27	1.3108	23.59	0.4914	13.67	0.2590	2.0613
4/24/1996	2350	48.14	1.3128	23.80	0.4924	13.46	0.2596	2.0649
4/25/1996	1702	46.68	1.3143	24.76	0.4932	13.69	0.2600	2.0675
5/2/1996	1369	54.30	1.3156	26.25	0.4938	13.16	0.2603	2.0697
5/9/1996	832	56.36	1.3164	24.01	0.4942	11.55	0.2605	2.0711
5/16/1996	1869	46.15	1.3179	25.80	0.4950	11.40	0.2609	2.0739
5/23/1996	407	47.79	1.3183	25.71	0.4952	11.78	0.2610	2.0745
5/30/1996	242	48.19	1.3185	26.14	0.4953	12.00	0.2610	2.0749
6/6/1996	151	60.62	1.3187	31.48	0.4954	12.93	0.2611	2.0751
6/12/1996	1372	66.75	1.3203	34.95	0.4963	14.05	0.2614	2.0780
6/20/1996	2115	69.41	1.3229	36.14	0.4976	14.42	0.2619	2.0825
6/27/1996	651	69.39	1.3237	36.54	0.4981	14.30	0.2621	2.0839
7/3/1996	525	71.54	1.3244	37.53	0.4984	14.71	0.2622	2.0850
7/11/1996	518	71.84	1.3250	37.81	0.4988	14.93	0.2624	2.0862
7/19/1996	117	63.97	1.3252	38.87	0.4988	13.98	0.2624	2.0864
7/27/1996	591	63.33	1.3258	37.98	0.4992	13.76	0.2626	2.0876
8/2/1996	70	66.01	1.3259	38.52	0.4993	14.28	0.2626	2.0878

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Non-Vascular	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
8/12/1996	24	69.66	1.3259	38.86	0.4993	14.66	0.2626	2.0878
10/7/1996	102	33.92	1.3260	25.58	0.4993	13.22	0.2626	2.0879
10/15/1996	264	31.40	1.3261	28.70	0.4995	13.31	0.2627	2.0883
11/11/1996	1307	37.20	1.3270	42.81	0.5005	13.15	0.2630	2.0905
11/18/1996	46	52.16	1.3271	59.30	0.5005	13.40	0.2630	2.0906
11/25/1996	19	351.05	1.3272	428.43	0.5007	20.08	0.2630	2.0908
12/2/1996	690	54.08	1.3278	59.90	0.5014	12.87	0.2632	2.0924
12/9/1996	255	4.15	1.3279	2.32	0.5014	0.90	0.2632	2.0924
12/16/1996	134	53.10	1.3280	73.44	0.5016	14.69	0.2632	2.0928
12/22/1996	592	50.89	1.3285	42.21	0.5020	13.55	0.2633	2.0939
12/30/1996	1355	49.18	1.3297	43.51	0.5031	13.28	0.2637	2.0964
1/6/1997	62	28.55	1.3297	15.44	0.5031	5.06	0.2637	2.0965
2/21/1997	41	39.77	1.3298	20.16	0.5031	8.87	0.2637	2.0965
2/27/1997	17	55.86	1.3298	22.41	0.5031	12.32	0.2637	2.0966
2/28/1997	30	46.82	1.3298	20.05	0.5031	10.16	0.2637	2.0966
3/3/1997	51	60.41	1.3299	21.88	0.5031	13.46	0.2637	2.0967
3/5/1997	105	68.33	1.3300	23.97	0.5032	15.51	0.2637	2.0969
3/9/1997	76	70.94	1.3301	24.88	0.5032	15.91	0.2637	2.0970
3/10/1997	75	70.76	1.3302	24.67	0.5033	15.86	0.2638	2.0972
3/11/1997	62	70.49	1.3303	25.56	0.5033	15.80	0.2638	2.0973
3/25/1997	27	68.73	1.3303	23.98	0.5033	15.43	0.2638	2.0974
3/26/1997	19	70.78	1.3303	26.93	0.5033	15.83	0.2638	2.0974
3/27/1997	24	68.07	1.3303	27.29	0.5033	15.58	0.2638	2.0975
3/28/1997	25	68.68	1.3304	26.51	0.5033	15.52	0.2638	2.0975
3/30/1997	129	55.54	1.3305	22.06	0.5034	12.55	0.2638	2.0977
3/31/1997	401	64.90	1.3310	23.47	0.5035	14.50	0.2639	2.0984
4/1/1997	673	70.38	1.3318	28.47	0.5039	15.91	0.2641	2.0998
4/2/1997	282	71.02	1.3322	25.20	0.5040	16.04	0.2642	2.1004
4/3/1997	231	69.68	1.3324	25.41	0.5041	15.93	0.2643	2.1008
4/4/1997	550	72.43	1.3332	26.30	0.5044	16.39	0.2644	2.1020
4/5/1997	344	72.77	1.3336	25.43	0.5045	16.53	0.2645	2.1027
4/6/1997	951	63.52	1.3347	23.46	0.5049	14.07	0.2648	2.1044
4/7/1997	1540	48.81	1.3360	19.61	0.5055	10.81	0.2651	2.1065
4/8/1997	1449	72.24	1.3379	25.66	0.5061	16.39	0.2655	2.1095
4/10/1997	843	67.78	1.3389	25.67	0.5065	16.07	0.2657	2.1111
4/13/1997	900	70.89	1.3400	25.85	0.5069	16.68	0.2660	2.1129
4/14/1997	320	70.65	1.3404	25.37	0.5071	16.54	0.2661	2.1136
4/15/1997	864	71.32	1.3415	26.48	0.5075	16.66	0.2663	2.1153
4/16/1997	802	70.37	1.3425	26.00	0.5078	16.37	0.2666	2.1169
4/17/1997	912	69.27	1.3436	24.68	0.5082	16.01	0.2668	2.1187
4/18/1997	1022	47.86	1.3445	26.47	0.5087	15.43	0.2671	2.1204
4/19/1997	2114	51.96	1.3465	25.00	0.5097	14.01	0.2676	2.1238
4/21/1997	2189	56.99	1.3487	26.08	0.5107	15.03	0.2682	2.1276
4/22/1997	1265	54.16	1.3499	24.94	0.5112	14.59	0.2686	2.1297
4/23/1997	459	53.40	1.3503	24.51	0.5114	14.31	0.2687	2.1305
4/24/1997	213	49.63	1.3505	24.51	0.5115	13.96	0.2687	2.1308
4/28/1997	548	53.05	1.3510	26.43	0.5118	14.04	0.2689	2.1317
4/29/1997	76	54.35	1.3511	24.40	0.5118	14.41	0.2689	2.1318
4/30/1997	66	51.34	1.3512	25.70	0.5119	13.67	0.2689	2.1319
5/1/1997	108	51.97	1.3513	25.78	0.5119	13.67	0.2689	2.1321
5/2/1997	230	51.01	1.3515	25.20	0.5120	13.63	0.2690	2.1325
5/5/1997	354	42.09	1.3517	25.00	0.5122	12.24	0.2691	2.1330
5/6/1997	111	44.60	1.3518	25.28	0.5122	12.38	0.2691	2.1331
5/7/1997	138	43.97	1.3519	25.40	0.5123	12.17	0.2691	2.1333
5/13/1997	195	45.06	1.3521	22.82	0.5124	10.95	0.2692	2.1336
5/21/1997	464	48.48	1.3525	23.71	0.5126	11.34	0.2692	2.1343
5/27/1997	44	49.24	1.3525	25.65	0.5126	11.53	0.2693	2.1344
6/24/1997	124	51.61	1.3527	19.52	0.5126	11.23	0.2693	2.1345
7/7/1997	114	53.08	1.3528	19.06	0.5127	11.41	0.2693	2.1347

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

Date	Discharge Volume	Concentration Ca	Cumulative Ca	Concentration K	Cumulative K	Concentration Mg	Cumulative Mg	Cumulative Ca+K+Mg
Non-Vascular	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
7/15/1997	246	64.79	1.3530	38.88	0.5128	14.95	0.2694	2.1352
7/22/1997	190	69.23	1.3533	38.60	0.5130	15.23	0.2694	2.1356
7/29/1997	47	57.12	1.3533	2.99	0.5130	9.56	0.2694	2.1357
8/19/1997	646	47.04	1.3539	2.10	0.5130	6.24	0.2695	2.1363
8/26/1997	504	42.76	1.3542	2.13	0.5130	7.26	0.2696	2.1368
9/2/1997	1041	50.29	1.3552	2.76	0.5131	10.50	0.2698	2.1380
9/9/1997	459	43.51	1.3555	3.30	0.5131	8.55	0.2698	2.1384
10/15/1997	688	46.75	1.3561	2.05	0.5131	9.17	0.2699	2.1391
10/21/1997	184	47.09	1.3563	0.05	0.5131	8.66	0.2700	2.1393
10/28/1997	91	40.24	1.3563	0.49	0.5131	9.08	0.2700	2.1394
11/4/1997	1139	60.19	1.3575	23.58	0.5136	12.51	0.2702	2.1414
11/11/1997	1736	63.97	1.3595	28.88	0.5145	13.53	0.2707	2.1446
11/18/1997	2334	64.25	1.3622	37.12	0.5160	13.50	0.2712	2.1494
11/25/1997	222	63.66	1.3624	23.64	0.5161	13.01	0.2713	2.1498
12/2/1997	269	64.06	1.3627	22.92	0.5162	13.29	0.2713	2.1503
12/9/1997	398	50.13	1.3631	116.37	0.5170	12.13	0.2714	2.1515
12/16/1997	282	63.49	1.3634	20.04	0.5171	12.47	0.2715	2.1520
12/23/1997	161	60.97	1.3636	17.43	0.5172	11.83	0.2715	2.1523
12/30/1997	89	61.08	1.3637	16.50	0.5172	11.92	0.2715	2.1524
1/6/1998	1514	45.63	1.3649	15.35	0.5176	10.98	0.2718	2.1544
1/13/1998	2940	56.67	1.3679	26.33	0.5190	12.57	0.2725	2.1594
1/20/1998	668	60.52	1.3686	47.67	0.5196	13.20	0.2726	2.1608
1/27/1998	223	64.55	1.3688	20.47	0.5197	13.49	0.2727	2.1612
2/3/1998	112	61.44	1.3690	22.01	0.5197	13.79	0.2727	2.1614
2/10/1998	73	62.78	1.3691	23.62	0.5197	13.85	0.2727	2.1615
2/17/1998	401	49.47	1.3694	46.40	0.5201	11.39	0.2728	2.1623
2/24/1998	357	59.46	1.3698	23.41	0.5202	13.25	0.2729	2.1629
3/3/1998	2769	47.26	1.3721	31.67	0.5218	10.37	0.2734	2.1673
3/10/1998	2499	58.93	1.3747	39.18	0.5235	13.01	0.2740	2.1722
3/17/1998	2439	60.75	1.3774	29.34	0.5248	13.45	0.2746	2.1767
3/24/1998	341	69.27	1.3778	25.04	0.5249	15.30	0.2747	2.1774
3/31/1998	4771	37.52	1.3810	24.40	0.5270	7.99	0.2753	2.1833
4/7/1998	4387	51.72	1.3850	23.68	0.5288	11.40	0.2762	2.1901
4/14/1998	645	61.73	1.3857	26.06	0.5291	13.57	0.2764	2.1912
4/21/1998	254	65.52	1.3860	25.80	0.5293	14.22	0.2765	2.1917
4/28/1998	628	58.72	1.3867	25.89	0.5296	12.75	0.2766	2.1928
5/5/1998	317	52.32	1.3870	23.55	0.5297	11.72	0.2767	2.1933
5/12/1998	1669	62.14	1.3888	25.38	0.5304	12.87	0.2770	2.1963
5/19/1998	435	55.90	1.3892	5.25	0.5305	10.68	0.2771	2.1968
5/26/1998	209	43.37	1.3894	1.01	0.5305	5.88	0.2771	2.1970
6/2/1998	213	28.29	1.3895	0.00	0.5305	2.16	0.2772	2.1971
6/9/1998	123	33.99	1.3896	2.55	0.5305	2.67	0.2772	2.1972
6/16/1998	2038	52.15	1.3915	24.13	0.5314	11.25	0.2776	2.2004
6/23/1998	2086	54.88	1.3935	29.08	0.5324	12.56	0.2780	2.2040
6/30/1998	2020	43.11	1.3950	18.73	0.5331	9.89	0.2784	2.2065
7/7/1998	1686	42.58	1.3963	13.57	0.5335	9.86	0.2787	2.2085
7/14/1998	527	37.01	1.3967	0.00	0.5335	7.65	0.2788	2.2089
7/21/1998	286	33.35	1.3968	0.18	0.5335	5.56	0.2788	2.2091
7/28/1998	345	43.35	1.3971	1.74	0.5335	7.71	0.2788	2.2095
8/4/1998	405	41.03	1.3974	1.23	0.5335	7.38	0.2789	2.2098
8/11/1998	161	38.40	1.3975	1.35	0.5335	5.26	0.2789	2.2100
8/18/1998	654	43.20	1.3980	1.26	0.5336	7.00	0.2790	2.2106
8/25/1998	260	42.10	1.3982	1.60	0.5336	6.83	0.2790	2.2108
9/1/1998	1268	47.83	1.3993	4.90	0.5337	9.44	0.2792	2.2122
9/8/1998	240	44.00	1.3995	1.27	0.5337	8.07	0.2793	2.2124
9/15/1998	129	43.36	1.3996	1.23	0.5337	7.26	0.2793	2.2125
9/22/1998	817	43.44	1.4002	2.13	0.5337	7.42	0.2794	2.2133
9/29/1998	230	43.13	1.4004	0.85	0.5337	8.39	0.2794	2.2135
10/6/1998	136	43.54	1.4005	1.57	0.5337	8.00	0.2794	2.2136

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Non-Vascular	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
10/13/1998	815	47.75	1.4012	11.50	0.5339	9.75	0.2796	2.2146
10/20/1998	2453	51.85	1.4034	23.34	0.5349	11.60	0.2801	2.2184
10/27/1998	1473	53.61	1.4048	20.63	0.5354	11.49	0.2804	2.2207
11/4/1998	493	53.86	1.4053	26.47	0.5357	11.41	0.2805	2.2215
11/10/1998	124	54.73	1.4054	20.86	0.5357	11.41	0.2805	2.2217
11/17/1998	929	50.46	1.4063	39.13	0.5364	10.89	0.2807	2.2233
11/24/1998	1138	53.28	1.4073	24.31	0.5369	11.41	0.2809	2.2251
12/1/1998	2081	55.51	1.4094	22.69	0.5377	12.00	0.2814	2.2285
12/8/1998	486	55.99	1.4099	23.53	0.5379	12.09	0.2815	2.2293
12/15/1998	238	55.17	1.4101	22.63	0.5380	11.98	0.2815	2.2296
12/22/1998	173	50.18	1.4103	91.48	0.5383	11.45	0.2816	2.2301
12/29/1998	154	49.82	1.4104	139.38	0.5387	11.51	0.2816	2.2307
1/5/1999	116	49.92	1.4105	520.29	0.5397	13.11	0.2816	2.2319
1/12/1999	53	37.06	1.4105	823.33	0.5405	12.58	0.2816	2.2327
1/19/1999	797	27.66	1.4109	65.85	0.5414	6.19	0.2817	2.2341
1/26/1999	805	32.87	1.4114	13.40	0.5416	6.74	0.2818	2.2349
2/2/1999	488	56.37	1.4119	18.44	0.5418	12.69	0.2819	2.2356
2/9/1999	520	45.37	1.4123	17.46	0.5420	10.03	0.2820	2.2363
2/16/1999	319	67.92	1.4127	26.02	0.5421	13.55	0.2821	2.2369
3/2/1999	357	48.91	1.4130	53.58	0.5424	9.22	0.2822	2.2376
3/9/1999	396	54.74	1.4134	60.31	0.5429	9.69	0.2822	2.2385
3/30/1999	4482	74.04	1.4193	24.80	0.5448	15.31	0.2834	2.2476
4/6/1999	4462	86.27	1.4261	25.03	0.5468	18.51	0.2849	2.2579
4/13/1999	930	70.45	1.4273	22.30	0.5472	15.28	0.2852	2.2597
4/27/1999	153	60.53	1.4275	22.59	0.5473	12.65	0.2852	2.2599
5/25/1999	2501	60.28	1.4301	22.03	0.5482	11.90	0.2857	2.2641
6/1/1999	458	51.03	1.4306	3.50	0.5483	10.11	0.2858	2.2646
6/8/1999	307	49.44	1.4308	1.14	0.5483	9.03	0.2859	2.2650
6/15/1999	341	47.13	1.4311	0.00	0.5483	6.94	0.2859	2.2653
6/22/1999	688	50.63	1.4317	14.11	0.5484	9.37	0.2860	2.2662
6/29/1999	219	48.44	1.4319	12.28	0.5485	8.08	0.2860	2.2665
7/6/1999	138	42.07	1.4320	0.00	0.5485	5.27	0.2861	2.2666
7/13/1999	1198	47.42	1.4330	5.69	0.5486	7.59	0.2862	2.2679
7/20/1999	223	43.14	1.4332	9.19	0.5487	6.74	0.2862	2.2681
7/27/1999	139	43.00	1.4333	0.98	0.5487	5.24	0.2863	2.2682
8/3/1999	299	42.43	1.4335	0.88	0.5487	5.66	0.2863	2.2685
8/10/1999	175	35.61	1.4337	0.74	0.5487	3.99	0.2863	2.2686
8/17/1999	560	42.16	1.4341	10.01	0.5488	6.42	0.2864	2.2692
8/24/1999	435	44.46	1.4344	9.75	0.5488	7.55	0.2864	2.2697
8/31/1999	153	44.15	1.4345	0.00	0.5488	7.72	0.2864	2.2698
9/7/1999	84	44.12	1.4346	9.41	0.5489	6.78	0.2865	2.2699
9/14/1999	2073	59.06	1.4368	27.15	0.5499	11.48	0.2869	2.2735
9/21/1999	6028	62.84	1.4435	27.31	0.5528	11.91	0.2882	2.2844
9/28/1999	950	57.71	1.4445	22.52	0.5532	11.47	0.2883	2.2860
10/5/1999	1272	53.82	1.4457	13.96	0.5535	10.44	0.2886	2.2878
10/12/1999	355	53.94	1.4460	15.71	0.5536	10.02	0.2886	2.2883
10/19/1999	401	47.46	1.4464	11.86	0.5537	9.19	0.2887	2.2888
10/26/1999	1464	52.11	1.4477	19.98	0.5542	9.86	0.2890	2.2909
11/2/1999	702	55.06	1.4484	28.54	0.5545	11.15	0.2891	2.2921
11/9/1999	1056	53.95	1.4494	26.73	0.5550	11.41	0.2893	2.2938
11/16/1999	448	54.89	1.4499	21.04	0.5552	10.84	0.2894	2.2945
11/23/1999	764	54.28	1.4506	20.95	0.5555	11.34	0.2896	2.2957
11/30/1999	1694	58.31	1.4524	27.34	0.5563	12.21	0.2899	2.2986
12/7/1999	799	53.98	1.4531	44.22	0.5569	10.91	0.2901	2.3002
12/14/1999	311	56.94	1.4535	23.74	0.5571	10.95	0.2901	2.3007
12/21/1999	407	55.10	1.4539	17.77	0.5572	11.11	0.2902	2.3013
12/28/1999	494	55.51	1.4543	40.32	0.5576	11.31	0.2903	2.3022
1/4/2000	168	64.12	1.4545	148.85	0.5580	12.13	0.2904	2.3029
1/11/2000	791	46.15	1.4552	18.21	0.5583	8.83	0.2905	2.3039

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Non-Vascular	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
1/18/2000	575	43.37	1.4556	38.83	0.5587	9.94	0.2906	2.3049
1/25/2000	46	59.90	1.4557	25.14	0.5587	12.07	0.2906	2.3049
2/1/2000	5	0.00	1.4557		0.5587	0.00	0.2906	2.3049
2/8/2000	1	0.00	1.4557		0.5587	0.00	0.2906	2.3049
2/15/2000	0	0.00	1.4557		0.5587	0.00	0.2906	2.3049
2/22/2000	0	0.00	1.4557		0.5587	0.00	0.2906	2.3049
2/29/2000	0	0.00	1.4557		0.5587	0.00	0.2906	2.3049
3/7/2000	0	0.00	1.4557		0.5587	0.00	0.2906	2.3049
3/14/2000	1220	62.54	1.4570	24.80	0.5592	12.77	0.2909	2.3071
3/21/2000	518	59.03	1.4576	10.40	0.5593	10.64	0.2910	2.3079
3/28/2000	1087	43.74	1.4584	11.03	0.5595	8.55	0.2911	2.3091
4/4/2000	3417	83.35	1.4635	21.05	0.5608	17.78	0.2922	2.3165
4/11/2000	6111	75.32	1.4717	20.22	0.5630	15.65	0.2939	2.3286
4/18/2000	1223	60.06	1.4730	18.21	0.5634	12.68	0.2942	2.3306
4/25/2000	895	56.78	1.4739	23.27	0.5638	11.31	0.2944	2.3320
5/2/2000	1186	57.98	1.4751	26.65	0.5643	12.40	0.2946	2.3341
5/9/2000	371	59.26	1.4755	25.24	0.5645	12.11	0.2947	2.3347
5/16/2000	2014	60.43	1.4776	23.30	0.5653	12.61	0.2952	2.3381
5/23/2000	683	54.06	1.4783	22.39	0.5656	11.43	0.2953	2.3392
5/30/2000	977	51.21	1.4792	16.08	0.5659	10.01	0.2955	2.3406
6/6/2000	335	50.87	1.4795	7.81	0.5659	10.28	0.2955	2.3410
6/13/2000	401	45.40	1.4798	6.24	0.5660	8.90	0.2956	2.3414
6/20/2000	246	43.70	1.4800	3.24	0.5660	8.07	0.2956	2.3416
6/27/2000	150	39.22	1.4801	0.93	0.5660	7.14	0.2957	2.3418
7/4/2000	116	40.97	1.4802	4.20	0.5660	5.77	0.2957	2.3419
7/11/2000	92	37.96	1.4803	6.51	0.5660	5.34	0.2957	2.3419
7/18/2000	62	41.30	1.4803	3.32	0.5660	5.41	0.2957	2.3420
7/25/2000	60	40.54	1.4804	2.33	0.5660	5.56	0.2957	2.3421
8/1/2000	538	41.62	1.4808	6.17	0.5661	6.85	0.2958	2.3426
8/8/2000	571	44.26	1.4812	2.53	0.5661	7.92	0.2958	2.3431
8/15/2000	546	42.20	1.4816	0.00	0.5661	6.98	0.2959	2.3436
8/22/2000	685	44.53	1.4822	0.00	0.5661	7.90	0.2960	2.3442
8/29/2000	482	42.62	1.4825	0.00	0.5661	6.99	0.2961	2.3447
9/5/2000	240	42.16	1.4827	0.00	0.5661	6.81	0.2961	2.3449
9/12/2000	88	46.16	1.4828	0.59	0.5661	7.09	0.2961	2.3450
9/19/2000	1942	51.54	1.4845	15.54	0.5666	9.62	0.2964	2.3476
9/26/2000	392	49.90	1.4849	1.31	0.5666	9.06	0.2965	2.3480
10/3/2000	132	49.64	1.4850	0.00	0.5666	9.28	0.2965	2.3482
10/10/2000	193	47.46	1.4852	0.00	0.5666	7.94	0.2965	2.3484
10/17/2000	321	37.79	1.4854		0.5666	6.57	0.2966	2.3486
10/24/2000	1118	41.19	1.4862	5.72	0.5668	6.37	0.2967	2.3497
10/31/2000	301	38.51	1.4864	7.07	0.5668	6.75	0.2967	2.3500
11/7/2000	120	42.79	1.4865	16.91	0.5668	7.15	0.2968	2.3501
11/14/2000	645	40.06	1.4870	12.14	0.5670	7.49	0.2968	2.3508
11/21/2000	1222	52.88	1.4881	16.08	0.5673	10.86	0.2971	2.3525
11/28/2000	290	52.99	1.4884	17.43	0.5674	10.49	0.2971	2.3529
12/4/2000	251	51.15	1.4886	15.10	0.5675	10.80	0.2972	2.3533
12/12/2000	259	52.62	1.4889	12.59	0.5675	10.66	0.2972	2.3536
12/19/2000	1991	29.50	1.4899	16.25	0.5681	5.66	0.2974	2.3554
12/26/2000	578	52.20	1.4904	11.84	0.5682	9.57	0.2975	2.3562
1/2/2001	168	54.04	1.4906	192.85	0.5688	12.24	0.2976	2.3570
1/9/2001	49	119.51	1.4907	206.19	0.5690	24.77	0.2976	2.3573
1/16/2001	16	69.66	1.4907	1534.50	0.5694	19.81	0.2976	2.3577
1/23/2001	4	87.13	1.4907	3706.44	0.5697	34.55	0.2976	2.3580
1/30/2001	1	0.00	1.4907	0.00	0.5697	0.00	0.2976	2.3580
2/6/2001	1	0.00	1.4907	0.00	0.5697	0.00	0.2976	2.3580
2/13/2001	10	69.24	1.4907	3394.93	0.5703	32.92	0.2976	2.3586
2/20/2001	4	45.29	1.4907	599.31	0.5703	12.84	0.2976	2.3587
2/27/2001	5	69.77	1.4908	3587.17	0.5706	28.34	0.2976	2.3590

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Non-Vascular	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
3/6/2001	6	45.76	1.4908	2298.95	0.5709	18.79	0.2976	2.3593
3/13/2001	4	60.42	1.4908	906.02	0.5710	16.26	0.2976	2.3593
3/20/2001	3	58.56	1.4908	635.00	0.5710	14.50	0.2976	2.3594
3/27/2001	1177	48.25	1.4918	26.96	0.5716	9.88	0.2978	2.3611
4/3/2001	206	60.66	1.4920	27.40	0.5717	12.65	0.2979	2.3615
4/10/2001	2078	50.64	1.4939	24.67	0.5726	10.27	0.2982	2.3647
4/17/2001	7131	53.60	1.5007	17.31	0.5748	10.78	0.2996	2.3750
4/24/2001	2370	82.79	1.5041	21.75	0.5757	18.43	0.3004	2.3802
5/1/2001	696	66.40	1.5050	18.75	0.5759	15.60	0.3006	2.3815
5/8/2001	200	60.09	1.5052	20.21	0.5760	13.43	0.3006	2.3818
5/15/2001	110	60.14	1.5053	17.82	0.5760	13.80	0.3007	2.3820
5/22/2001	63	51.97	1.5054	11.39	0.5760	11.07	0.3007	2.3821
5/29/2001	37	0.00	1.5054	0.00	0.5760	0.00	0.3007	2.3821
6/5/2001	3173	45.42	1.5079	19.70	0.5771	8.81	0.3012	2.3862
6/12/2001	945	44.07	1.5087	11.25	0.5773	8.81	0.3013	2.3873
6/19/2001	243	39.25	1.5088	7.05	0.5774	6.90	0.3013	2.3875
6/26/2001	357	36.71	1.5091	6.63	0.5774	6.15	0.3014	2.3878
7/3/2001	146	36.63	1.5092	7.42	0.5774	6.06	0.3014	2.3880
7/10/2001	210	35.86	1.5093	1.69	0.5774	5.05	0.3014	2.3881
7/17/2001	299	34.08	1.5095	6.74	0.5775	5.06	0.3014	2.3884
7/24/2001	1173	35.05	1.5102	8.31	0.5776	6.00	0.3016	2.3894
7/31/2001	220	35.74	1.5103	0.97	0.5776	5.52	0.3016	2.3896
8/7/2001	110	36.48	1.5104	0.69	0.5776	5.13	0.3016	2.3897
8/14/2001	57	37.79	1.5105	1.69	0.5776	5.88	0.3016	2.3897
8/21/2001	25	38.35	1.5105	2.31	0.5776	6.00	0.3016	2.3897
8/28/2001	8	43.57	1.5105	0.00	0.5776	6.09	0.3016	2.3897
9/4/2001	1	0.00	1.5105	0.00	0.5776	0.00	0.3016	2.3897
9/11/2001	1	0.00	1.5105	0.00	0.5776	0.00	0.3016	2.3897
9/18/2001	0	0.00	1.5105	0.00	0.5776	0.00	0.3016	2.3897
9/25/2001	1352	41.21	1.5115	6.46	0.5778	4.55	0.3017	2.3910
10/2/2001	3369	48.95	1.5144	10.78	0.5784	8.74	0.3022	2.3951
10/9/2001	243	47.07	1.5146	0.00	0.5784	7.24	0.3023	2.3953
10/16/2001	104	47.97	1.5147	0.00	0.5784	7.23	0.3023	2.3954
10/23/2001	128	45.28	1.5148	0.00	0.5784	6.53	0.3023	2.3955
10/30/2001	409	42.05	1.5151	0.00	0.5784	5.76	0.3023	2.3959
11/6/2001	610	44.30	1.5156	2.87	0.5785	7.77	0.3024	2.3965
11/13/2001	824	47.53	1.5163	10.98	0.5786	7.76	0.3025	2.3975
11/20/2001	327	47.46	1.5166	13.99	0.5787	7.42	0.3026	2.3979
11/27/2001	178	49.19	1.5167	8.10	0.5787	7.47	0.3026	2.3981
12/4/2001	1788	50.40	1.5183	9.16	0.5790	8.38	0.3029	2.4002
12/11/2001	770	56.02	1.5191	10.59	0.5792	10.17	0.3030	2.4013
12/18/2001	754	52.65	1.5198	18.84	0.5794	10.47	0.3032	2.4024
12/25/2001	565	54.30	1.5203	10.27	0.5795	10.32	0.3033	2.4031
1/1/2002	192	55.34	1.5205	8.68	0.5796	9.57	0.3033	2.4034
1/8/2002	116	54.20	1.5206	111.82	0.5798	9.33	0.3033	2.4037
1/15/2002	73	55.29	1.5207	124.52	0.5800	10.57	0.3033	2.4040
1/22/2002	45	53.64	1.5207	273.95	0.5802	10.51	0.3033	2.4042
1/29/2002	34	53.38	1.5208	379.85	0.5804	10.01	0.3033	2.4045
2/5/2002	53	57.19	1.5208	239.24	0.5806	11.31	0.3033	2.4048
2/12/2002	285	53.95	1.5211	53.33	0.5809	9.19	0.3034	2.4054
2/19/2002	837	51.70	1.5219	9.36	0.5810	9.58	0.3035	2.4065
2/26/2002	518	55.30	1.5224	36.12	0.5814	9.46	0.3036	2.4074
3/5/2002	2524	55.46	1.5249	11.25	0.5819	9.99	0.3041	2.4108
3/12/2002	3269	54.15	1.5280	8.61	0.5824	9.46	0.3046	2.4150
3/19/2002	2609	56.23	1.5306	10.73	0.5829	10.64	0.3051	2.4186
3/26/2002	1143	61.71	1.5319	15.39	0.5832	12.50	0.3054	2.4204
4/2/2002	3304	61.05	1.5355	14.09	0.5840	12.57	0.3061	2.4256
4/9/2002	7948	61.46	1.5442	14.15	0.5860	11.87	0.3078	2.4379
4/16/2002	5412	56.20	1.5496	12.88	0.5873	9.99	0.3087	2.4456

Table B-1 (cont.): Cation concentrations of **Non-vascular drainage** water and cumulative fluxes 1983 to 2004 water years.

	Discharge	Concentration	Cumulative	Concentration	Cumulative	Concentration	Cumulative	Cumulative
Date	Volume	Ca	Ca	K	K	Mg	Mg	Ca+K+Mg
Non-Vascular	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
4/23/2002	1942	55.95	1.5515	14.22	0.5877	12.35	0.3092	2.4484
4/30/2002	342	51.91	1.5518	12.73	0.5878	9.91	0.3092	2.4489
5/7/2002	1990	48.33	1.5535	13.10	0.5883	9.83	0.3096	2.4514
5/14/2002	548	52.27	1.5540	13.25	0.5884	10.00	0.3097	2.4521
5/21/2002	1105	50.36	1.5550	15.34	0.5887	9.95	0.3099	2.4536
5/28/2002	569	51.21	1.5555	11.67	0.5888	11.13	0.3100	2.4543
6/4/2002	258	50.35	1.5558	2.76	0.5888	10.03	0.3100	2.4546
6/11/2002	399	46.88	1.5561	0.85	0.5888	8.73	0.3101	2.4550
6/18/2002	2370	47.95	1.5581	7.72	0.5892	9.40	0.3105	2.4578
6/25/2002	449	44.06	1.5585	0.53	0.5892	7.26	0.3105	2.4582
7/2/2002	899	41.87	1.5591	-0.11	0.5892	7.90	0.3107	2.4590
7/23/2002	859	38.31	1.5597	0.00	0.5892	5.75	0.3108	2.4597
8/13/2002	261	41.03	1.5599	0.00	0.5892	5.71	0.3108	2.4599
9/3/2002	67	37.98	1.5600	0.14	0.5892	4.53	0.3108	2.4599
9/15/2002	3	41.03	1.5600	6.19	0.5892	3.79	0.3108	2.4599
9/17/2002	1489	40.47	1.5610	10.68	0.5895	8.09	0.3110	2.4615
9/24/2002	1039	42.42	1.5618	5.80	0.5896	5.44	0.3111	2.4625
10/15/2002	1962	43.52	1.5633	3.01	0.5897	3.34	0.3112	2.4642
11/5/2002	2987	42.69	1.5656	3.72	0.5899	13.39	0.3119	2.4674
11/26/2002	4510	46.02	1.5693	9.89	0.5907	7.18	0.3125	2.4725
12/17/2002	1021	48.38	1.5702	9.46	0.5908	12.02	0.3127	2.4737
1/7/2003	572	44.63	1.5706	6.65	0.5909	6.63	0.3128	2.4743
1/28/2003	150	56.55	1.5708	15.23	0.5909	31.82	0.3129	2.4746
2/18/2003	26	55.44	1.5708	16.20	0.5910	12.94	0.3129	2.4746
4/1/2003	7093	46.85	1.5767	9.29	0.5921	8.41	0.3139	2.4828
4/21/2003	3681	59.88	1.5806	10.60	0.5928	10.19	0.3146	2.4881
5/13/2003	2180	55.72	1.5828	14.12	0.5934	9.83	0.3150	2.4911
6/10/2003	1970	51.29	1.5846	13.04	0.5938	8.50	0.3153	2.4937
6/24/2003		45.74	1.5846	0.00	0.5938	9.19	0.3153	2.4937
7/15/2003		44.36	1.5846	2.36	0.5938	9.14	0.3153	2.4937
8/5/2003	1530	63.76	1.5863	1.48	0.5939	8.18	0.3155	2.4957
8/26/2003	6551	74.57	1.5950	8.38	0.5948	8.23	0.3165	2.5063
9/16/2003	2230	62.10	1.5975	4.09	0.5950	6.95	0.3168	2.5092
10/7/2003	4752	62.65	1.6028	5.26	0.5954	7.59	0.3174	2.5156
10/28/2003	4023	56.55	1.6068	5.46	0.5958	7.27	0.3179	2.5205
11/25/2003	9642	60.99	1.6173	9.72	0.5975	6.54	0.3190	2.5338
12/9/2003	2502	65.98	1.6202	7.70	0.5978	9.78	0.3195	2.5375
12/30/2003	6122	68.86	1.6277	7.16	0.5986	6.17	0.3201	2.5464
1/20/2004	848	65.42	1.6287	8.16	0.5987	7.59	0.3203	2.5477
2/10/2004	75	69.86	1.6288	8.50	0.5988	7.36	0.3203	2.5478
3/23/2004	2969	63.87	1.6321	7.16	0.5991	6.99	0.3206	2.5519
4/13/2004	6587	63.76	1.6396	4.86	0.5997	8.71	0.3217	2.5610
5/4/2004	1623	58.08	1.6413	6.13	0.5999	11.06	0.3220	2.5631
5/25/2004		32.96	1.6413	10.13	0.5999	5.79	0.3220	2.5631

Table B-2: Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
6/1/1983	0	106.24	0.0000	54.86	0.0000	24.19	0.0000	0.0000
8/2/1983	0	106.24	0.0000	54.86	0.0000	24.19	0.0000	0.0000
8/9/1983	2074	106.24	0.0039	54.86	0.0020	24.19	0.0009	0.0068
10/13/1983	1473	437.50	0.0154	152.69	0.0060	91.24	0.0033	0.0247
10/14/1983	415	274.23	0.0174	96.32	0.0067	57.05	0.0037	0.0278
10/16/1983	619	274.23	0.0204	96.32	0.0078	57.05	0.0043	0.0325
10/18/1983	276	274.23	0.0218	96.32	0.0083	57.05	0.0046	0.0346
10/20/1983	164	274.23	0.0226	96.32	0.0085	57.05	0.0048	0.0359
10/22/1983	109	274.23	0.0231	96.32	0.0087	57.05	0.0049	0.0367
10/24/1983	63	274.23	0.0234	96.32	0.0088	57.05	0.0050	0.0372
10/25/1983	141	290.72	0.0241	94.37	0.0091	57.26	0.0051	0.0383
11/1/1983	353	291.42	0.0260	89.00	0.0096	59.56	0.0055	0.0411
11/8/1983	1411	273.68	0.0328	86.60	0.0118	53.85	0.0068	0.0514
11/15/1983	1371	253.77	0.0390	82.10	0.0138	49.61	0.0080	0.0608
11/22/1983	4657	219.71	0.0572	74.17	0.0199	42.74	0.0116	0.0887
11/29/1983	1260	165.14	0.0609	62.66	0.0214	32.04	0.0123	0.0945
12/6/1983	655	150.35	0.0626	52.94	0.0220	29.41	0.0126	0.0972
12/13/1983	706	122.28	0.0642	48.77	0.0226	23.86	0.0129	0.0997
12/20/1983	1037	92.69	0.0659	43.99	0.0234	18.22	0.0133	0.1025
12/28/1983	259	111.53	0.0664	41.43	0.0236	22.25	0.0134	0.1033
1/4/1984	122	111.53	0.0666	41.43	0.0237	22.25	0.0134	0.1037
1/10/1984	66	111.53	0.0668	41.43	0.0237	22.25	0.0134	0.1039
1/17/1984	45	111.53	0.0669	41.43	0.0238	22.25	0.0135	0.1041
1/24/1984	25	111.53	0.0669	41.43	0.0238	22.25	0.0135	0.1042
1/31/1984	0	111.53	0.0669	41.43	0.0238	22.25	0.0135	0.1042
2/7/1984	0	111.53	0.0669	41.43	0.0238	22.25	0.0135	0.1042
2/14/1984	0	111.53	0.0669	41.43	0.0238	22.25	0.0135	0.1042
2/21/1984	1460	84.98	0.0691	25.42	0.0244	14.27	0.0138	0.1074
2/27/1984	2419	0.00	0.0691	25.42	0.0255	14.27	0.0145	0.1091
3/6/1984	443	104.37	0.0699	39.64	0.0258	21.06	0.0146	0.1104
3/13/1984	161	115.34	0.0703	41.18	0.0260	23.57	0.0147	0.1109
3/20/1984	111	187.05	0.0706	63.17	0.0261	38.54	0.0148	0.1115
3/27/1984	4959	72.68	0.0770	28.39	0.0286	14.44	0.0160	0.1217
4/3/1984	1492	74.58	0.0790	32.48	0.0294	14.89	0.0164	0.1249
4/10/1984	1613	79.59	0.0813	34.27	0.0304	16.08	0.0169	0.1286
4/17/1984	474	83.73	0.0820	32.66	0.0307	16.78	0.0170	0.1297
4/24/1984	1088	79.12	0.0835	36.83	0.0314	15.96	0.0173	0.1323
5/1/1984	444	79.12	0.0842	36.57	0.0317	15.38	0.0175	0.1333
5/8/1984	1189	72.98	0.0857	34.94	0.0324	13.74	0.0178	0.1359
5/15/1984	3548	69.81	0.0901	40.15	0.0350	13.53	0.0186	0.1437
5/22/1984	459	77.92	0.0908	41.18	0.0353	15.22	0.0187	0.1448
5/29/1984	423	79.14	0.0913	38.67	0.0356	14.97	0.0188	0.1458
6/5/1984	1159	65.77	0.0927	40.41	0.0364	12.75	0.0191	0.1482
6/12/1984	776	68.14	0.0936	42.97	0.0370	13.16	0.0193	0.1500
6/19/1984	514	73.40	0.0943	44.50	0.0374	14.32	0.0194	0.1512
6/26/1984	6300	64.82	0.1016	45.78	0.0426	12.46	0.0208	0.1649
7/3/1984	675	76.65	0.1025	43.96	0.0431	15.14	0.0210	0.1666
7/10/1984	1431	76.65	0.1044	43.96	0.0442	15.14	0.0214	0.1700
7/17/1984	504	76.65	0.1051	43.96	0.0446	15.14	0.0215	0.1712
7/24/1984	605	76.65	0.1060	43.96	0.0451	15.14	0.0217	0.1727
7/31/1984	111	76.65	0.1061	43.96	0.0452	15.14	0.0217	0.1730
8/7/1984	71	107.24	0.1062	58.57	0.0452	21.23	0.0217	0.1732
8/14/1984	0	107.24	0.1062	58.57	0.0452	21.23	0.0217	0.1732
8/20/1984	0	107.24	0.1062	58.57	0.0452	21.23	0.0217	0.1732
8/28/1984	0	107.24	0.1062	58.57	0.0452	21.23	0.0217	0.1732
9/4/1984	0	107.24	0.1062	58.57	0.0452	21.23	0.0217	0.1732

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
9/10/1984	0	107.24	0.1062	58.57	0.0452	21.23	0.0217	0.1732
9/18/1984	0	107.24	0.1062	58.57	0.0452	21.23	0.0217	0.1732
9/25/1984	0	107.24	0.1062	58.57	0.0452	21.23	0.0217	0.1732
10/2/1984	0	107.24	0.1062	58.57	0.0452	21.23	0.0217	0.1732
10/9/1984	0	107.24	0.1062	58.57	0.0452	21.23	0.0217	0.1732
10/16/1984	0	107.24	0.1062	58.57	0.0452	21.23	0.0217	0.1732
10/23/1984	10	107.24	0.1063	58.57	0.0452	21.23	0.0217	0.1732
10/30/1984	0	107.24	0.1063	58.57	0.0452	21.23	0.0217	0.1732
11/7/1984	706	107.24	0.1076	58.57	0.0460	21.23	0.0220	0.1756
11/13/1984	5322	107.24	0.1178	58.57	0.0515	21.23	0.0240	0.1933
11/21/1984	353	165.09	0.1188	38.57	0.0518	24.19	0.0242	0.1947
11/27/1984	197	95.56	0.1191	36.70	0.0519	18.96	0.0242	0.1952
12/4/1984	1225	176.57	0.1230	46.80	0.0529	32.21	0.0249	0.2008
12/18/1984	1274	152.12	0.1264	27.57	0.0535	21.14	0.0254	0.2054
1/2/1985	2598	168.01	0.1342	52.07	0.0559	34.51	0.0270	0.2171
1/9/1985	378	184.21	0.1354	49.87	0.0563	36.82	0.0273	0.2189
1/17/1985	121	185.15	0.1358	49.36	0.0564	37.89	0.0273	0.2195
1/23/1985	56	185.15	0.1360	49.36	0.0564	37.89	0.0274	0.2198
1/30/1985	10	185.15	0.1360	49.36	0.0564	37.89	0.0274	0.2198
2/6/1985	10	185.15	0.1361	49.36	0.0564	37.89	0.0274	0.2199
2/13/1985	0	185.15	0.1361	49.36	0.0564	37.89	0.0274	0.2199
2/20/1985	0	185.15	0.1361	49.36	0.0564	37.89	0.0274	0.2199
2/27/1985	2076	163.52	0.1421	44.27	0.0581	33.85	0.0286	0.2288
3/6/1985	665	170.86	0.1441	46.80	0.0586	32.46	0.0290	0.2318
3/13/1985	212	184.21	0.1448	47.83	0.0588	37.35	0.0292	0.2328
3/20/1985	2304	57.88	0.1472	23.81	0.0598	10.98	0.0296	0.2366
3/29/1985	2673	156.09	0.1546	43.99	0.0619	31.26	0.0311	0.2476
4/5/1985	864	156.09	0.1570	43.99	0.0626	31.26	0.0316	0.2511
4/10/1985	1210	195.16	0.1612	49.10	0.0636	36.65	0.0324	0.2572
4/17/1985	380	141.67	0.1621	39.26	0.0639	27.27	0.0325	0.2586
4/26/1985	423	142.74	0.1632	45.27	0.0642	29.49	0.0328	0.2602
5/1/1985	95	148.93	0.1635	46.55	0.0643	29.95	0.0328	0.2606
5/2/1985	25	148.93	0.1635	46.55	0.0643	29.95	0.0328	0.2607
5/3/1985	38	148.93	0.1636	46.55	0.0643	29.95	0.0329	0.2608
5/5/1985	29	148.93	0.1637	46.55	0.0644	29.95	0.0329	0.2610
5/6/1985	16	148.93	0.1638	46.55	0.0644	29.95	0.0329	0.2610
5/7/1985	15	148.93	0.1638	46.55	0.0644	29.95	0.0329	0.2611
5/8/1985	14	151.55	0.1638	49.62	0.0644	30.48	0.0329	0.2611
5/9/1985	43	151.55	0.1640	49.62	0.0644	30.48	0.0329	0.2613
5/10/1985	202	151.55	0.1645	49.62	0.0646	30.48	0.0330	0.2622
5/13/1985	154	151.55	0.1649	50.13	0.0648	29.66	0.0331	0.2628
5/14/1985	67	151.55	0.1651	50.13	0.0648	29.66	0.0331	0.2631
5/15/1985	55	149.88	0.1652	50.13	0.0649	29.66	0.0332	0.2633
5/16/1985	46	149.88	0.1654	50.13	0.0649	29.66	0.0332	0.2635
5/17/1985	78	149.88	0.1656	50.13	0.0650	29.66	0.0332	0.2638
5/20/1985	505	149.88	0.1669	50.13	0.0654	29.66	0.0335	0.2659
5/21/1985	224	149.88	0.1675	50.13	0.0656	29.66	0.0336	0.2668
5/22/1985	157	142.27	0.1679	49.36	0.0658	27.85	0.0337	0.2674
5/23/1985	115	142.27	0.1682	49.36	0.0659	27.85	0.0338	0.2678
5/24/1985	227	142.27	0.1688	49.36	0.0661	27.85	0.0339	0.2687
5/28/1985	98	142.27	0.1690	49.36	0.0662	27.85	0.0339	0.2691
5/29/1985	32	148.10	0.1691	54.50	0.0662	30.44	0.0339	0.2692
5/30/1985	26	148.10	0.1692	54.50	0.0662	30.44	0.0339	0.2693
5/31/1985	49	148.10	0.1693	54.50	0.0663	30.44	0.0340	0.2695
6/3/1985	39	148.10	0.1694	54.50	0.0663	30.44	0.0340	0.2697
6/4/1985	17	148.10	0.1695	54.50	0.0663	30.44	0.0340	0.2698

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
6/5/1985	15	152.50	0.1695	43.73	0.0663	30.28	0.0340	0.2698
6/6/1985	14	152.50	0.1695	43.73	0.0663	30.28	0.0340	0.2699
6/7/1985	26	152.50	0.1696	43.73	0.0664	30.28	0.0340	0.2700
6/10/1985	18	152.50	0.1696	43.73	0.0664	30.28	0.0340	0.2701
6/11/1985	8	152.50	0.1697	43.73	0.0664	30.28	0.0340	0.2701
6/12/1985	9	146.56	0.1697	53.96	0.0664	29.41	0.0341	0.2701
6/13/1985	8	146.56	0.1697	53.96	0.0664	29.41	0.0341	0.2702
6/14/1985	14	146.56	0.1698	53.96	0.0664	29.41	0.0341	0.2702
6/17/1985	13	146.56	0.1698	53.96	0.0664	29.41	0.0341	0.2703
6/18/1985	6	147.21	0.1698	52.35	0.0664	28.92	0.0341	0.2703
6/19/1985	11	147.21	0.1698	52.35	0.0664	28.92	0.0341	0.2703
6/21/1985	19	147.21	0.1699	52.35	0.0665	28.92	0.0341	0.2704
6/24/1985	17	150.85	0.1699	60.87	0.0665	31.67	0.0341	0.2705
6/25/1985	8	150.85	0.1699	60.87	0.0665	31.67	0.0341	0.2705
6/26/1985	8	150.85	0.1700	60.87	0.0665	31.67	0.0341	0.2706
6/27/1985	8	150.85	0.1700	60.87	0.0665	31.67	0.0341	0.2706
6/28/1985	20	150.85	0.1700	60.87	0.0665	31.67	0.0341	0.2707
7/1/1985	492	150.85	0.1714	60.87	0.0671	31.67	0.0344	0.2728
7/2/1985	145	165.62	0.1718	63.94	0.0672	32.33	0.0345	0.2735
7/3/1985	151	165.62	0.1722	63.94	0.0674	32.33	0.0346	0.2742
7/5/1985	135	165.62	0.1726	63.94	0.0675	32.33	0.0346	0.2748
7/8/1985	61	165.62	0.1728	63.94	0.0676	32.33	0.0347	0.2751
7/10/1985	23	156.86	0.1729	57.67	0.0676	30.52	0.0347	0.2752
7/11/1985	13	156.86	0.1729	57.67	0.0676	30.52	0.0347	0.2753
7/12/1985	19	156.86	0.1730	57.67	0.0677	30.52	0.0347	0.2753
7/15/1985	7	156.86	0.1730	57.67	0.0677	30.52	0.0347	0.2754
7/16/1985	2	156.86	0.1730	57.67	0.0677	30.52	0.0347	0.2754
7/17/1985	2	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
7/19/1985	1	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
7/22/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
7/23/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
7/24/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
7/25/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
7/26/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
7/30/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
7/31/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/2/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/6/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/7/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/8/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/9/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/12/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/13/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/14/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/15/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/16/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/19/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/22/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/27/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/28/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/29/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
8/30/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
9/3/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
9/4/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
9/5/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754
9/6/1985	0	170.86	0.1730	66.24	0.0677	34.22	0.0347	0.2754

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date	Discharge Volume	Concentration Ca	Cumulative Ca	Concentration K	Cumulative K	Concentration Mg	Cumulative Mg	Cumulative Ca+K+Mg
Red Pine	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
9/9/1985	37	170.86	0.1731	66.24	0.0677	34.22	0.0347	0.2756
9/10/1985	17	170.86	0.1732	66.24	0.0677	34.22	0.0348	0.2757
9/11/1985	65	170.86	0.1734	66.24	0.0678	34.22	0.0348	0.2760
9/12/1985	135	240.14	0.1739	80.97	0.0680	47.26	0.0349	0.2769
9/13/1985	204	240.14	0.1748	80.97	0.0683	47.26	0.0351	0.2782
9/16/1985	78	240.14	0.1751	80.97	0.0684	47.26	0.0351	0.2787
9/17/1985	30	240.14	0.1753	80.97	0.0685	47.26	0.0352	0.2789
9/18/1985	24	240.14	0.1754	80.97	0.0685	47.26	0.0352	0.2791
9/19/1985	18	286.18	0.1755	79.80	0.0685	57.63	0.0352	0.2792
9/20/1985	27	286.18	0.1756	79.80	0.0686	57.63	0.0352	0.2794
9/23/1985	14	286.18	0.1757	79.80	0.0686	57.63	0.0352	0.2795
9/25/1985	5	286.18	0.1757	79.80	0.0686	57.63	0.0353	0.2795
9/26/1985	5	304.54	0.1757	81.59	0.0686	61.83	0.0353	0.2796
9/30/1985	562	304.54	0.1788	81.59	0.0694	61.83	0.0359	0.2841
10/1/1985	138	309.88	0.1795	84.25	0.0696	60.59	0.0360	0.2852
10/2/1985	92	309.88	0.1800	84.25	0.0698	60.59	0.0361	0.2859
10/3/1985	78	309.88	0.1805	84.25	0.0699	60.59	0.0362	0.2865
10/4/1985	122	309.88	0.1811	84.25	0.0701	60.59	0.0363	0.2875
10/7/1985	556	309.88	0.1842	84.25	0.0709	60.59	0.0369	0.2920
10/8/1985	313	309.88	0.1859	84.25	0.0714	60.59	0.0373	0.2946
10/10/1985	136	303.34	0.1867	87.21	0.0716	59.56	0.0374	0.2956
10/11/1985	144	303.34	0.1874	87.21	0.0718	59.56	0.0376	0.2968
10/14/1985	108	303.34	0.1880	87.21	0.0720	59.56	0.0377	0.2977
10/15/1985	432	303.34	0.1903	87.21	0.0726	59.56	0.0381	0.3011
10/17/1985	624	294.06	0.1936	81.33	0.0735	56.48	0.0388	0.3059
10/18/1985	472	294.06	0.1961	81.33	0.0742	56.48	0.0392	0.3095
10/21/1985	444	294.06	0.1984	81.33	0.0749	56.48	0.0397	0.3129
10/22/1985	174	294.06	0.1993	81.33	0.0751	56.48	0.0399	0.3143
10/23/1985	124	294.06	0.2000	81.33	0.0753	56.48	0.0400	0.3152
10/24/1985	84	294.06	0.2004	81.33	0.0754	56.48	0.0401	0.3159
10/25/1985	144	293.51	0.2011	79.95	0.0756	58.00	0.0402	0.3170
10/28/1985	72	293.51	0.2015	79.95	0.0757	58.00	0.0403	0.3175
10/29/1985	3120	293.51	0.2178	79.95	0.0802	58.00	0.0435	0.3415
5/13/1986	269	293.51	0.2192	79.95	0.0805	58.00	0.0438	0.3435
5/14/1986	2	293.51	0.2192	79.95	0.0805	58.00	0.0438	0.3435
5/15/1986	4	293.51	0.2192	79.95	0.0805	58.00	0.0438	0.3436
5/19/1986	0	293.51	0.2192	79.95	0.0805	58.00	0.0438	0.3436
5/21/1986	0	293.51	0.2192	79.95	0.0805	58.00	0.0438	0.3436
5/22/1986	0	293.51	0.2192	79.95	0.0805	58.00	0.0438	0.3436
5/23/1986	0	293.51	0.2192	79.95	0.0805	58.00	0.0438	0.3436
5/27/1986	338	293.51	0.2210	79.95	0.0810	58.00	0.0441	0.3462
5/28/1986	90	293.51	0.2215	79.95	0.0811	58.00	0.0442	0.3469
5/29/1986	56	159.18	0.2216	47.29	0.0812	28.14	0.0443	0.3471
5/30/1986	76	159.18	0.2218	47.29	0.0813	28.14	0.0443	0.3474
6/2/1986	28	159.18	0.2219	47.29	0.0813	28.14	0.0443	0.3475
6/3/1986	8	159.18	0.2219	47.29	0.0813	28.14	0.0443	0.3476
6/4/1986	5	159.18	0.2220	47.29	0.0813	28.14	0.0443	0.3476
6/5/1986	4	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/6/1986	5	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/9/1986	2	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/10/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/11/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/12/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/13/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/16/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/17/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
6/18/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/19/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/20/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/23/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/24/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/25/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/26/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
6/27/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/1/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/2/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/3/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/4/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/7/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/10/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/11/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/14/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/15/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/16/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/17/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/18/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/21/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/22/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/23/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/24/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/25/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/28/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/29/1986	0	172.58	0.2220	39.92	0.0813	30.77	0.0443	0.3476
7/30/1986	30	110.35	0.2220	90.66	0.0814	23.12	0.0443	0.3477
7/31/1986	28	214.95	0.2222	81.59	0.0814	40.48	0.0444	0.3479
8/1/1986	28	149.00	0.2222	76.78	0.0814	28.92	0.0444	0.3480
8/3/1986	121	151.35	0.2226	79.54	0.0816	29.62	0.0444	0.3486
8/4/1986	63	151.35	0.2227	79.54	0.0817	29.62	0.0445	0.3489
8/5/1986	30	200.17	0.2228	83.89	0.0817	38.17	0.0445	0.3491
8/6/1986	20	200.17	0.2229	83.89	0.0818	38.17	0.0445	0.3492
8/7/1986	32	213.62	0.2230	80.05	0.0818	40.11	0.0445	0.3494
8/8/1986	3698	213.62	0.2371	80.05	0.0871	40.11	0.0472	0.3713
8/13/1986	149	213.62	0.2376	80.05	0.0873	40.11	0.0473	0.3722
8/14/1986	30	213.62	0.2377	80.05	0.0873	40.11	0.0473	0.3724
8/15/1986	52	213.62	0.2379	80.05	0.0874	40.11	0.0473	0.3727
8/18/1986	16	286.90	0.2380	69.82	0.0874	53.06	0.0473	0.3728
8/19/1986	11	286.90	0.2381	69.82	0.0874	53.06	0.0474	0.3729
8/20/1986	7	286.90	0.2381	69.82	0.0874	53.06	0.0474	0.3729
8/21/1986	2	286.90	0.2381	69.82	0.0874	53.06	0.0474	0.3729
8/22/1986	1	286.90	0.2381	69.82	0.0874	53.06	0.0474	0.3730
8/25/1986	804	231.86	0.2414	75.19	0.0885	44.26	0.0480	0.3780
8/26/1986	181	231.86	0.2422	75.19	0.0888	44.26	0.0481	0.3791
8/27/1986	160	231.86	0.2429	75.19	0.0890	44.26	0.0483	0.3801
8/29/1986	292	231.86	0.2441	75.19	0.0894	44.26	0.0485	0.3819
9/2/1986	43	293.41	0.2443	58.82	0.0894	54.92	0.0485	0.3822
9/3/1986	19	293.41	0.2444	58.82	0.0894	54.92	0.0486	0.3824
9/4/1986	15	293.41	0.2445	58.82	0.0894	54.92	0.0486	0.3825
9/5/1986	30	293.41	0.2446	58.82	0.0895	54.92	0.0486	0.3827
9/8/1986	7	305.29	0.2447	74.86	0.0895	57.42	0.0486	0.3828
9/9/1986	3	305.29	0.2447	74.86	0.0895	57.42	0.0486	0.3828
9/10/1986	5	305.29	0.2447	74.86	0.0895	57.42	0.0486	0.3828
9/11/1986	9	305.29	0.2447	74.86	0.0895	57.42	0.0486	0.3829

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
9/12/1986	29	305.29	0.2449	74.86	0.0896	57.42	0.0487	0.3831
9/15/1986	3	305.29	0.2449	74.86	0.0896	57.42	0.0487	0.3831
9/16/1986	1	305.29	0.2449	74.86	0.0896	57.42	0.0487	0.3831
9/17/1986	1	305.29	0.2449	74.86	0.0896	57.42	0.0487	0.3832
9/18/1986	0	305.29	0.2449	74.86	0.0896	57.42	0.0487	0.3832
9/19/1986	35	305.29	0.2451	74.86	0.0896	57.42	0.0487	0.3834
9/22/1986	81	343.61	0.2456	89.77	0.0897	60.72	0.0488	0.3841
9/24/1986	199	343.61	0.2468	89.77	0.0901	60.72	0.0490	0.3859
9/26/1986	373	343.61	0.2491	89.77	0.0906	60.72	0.0494	0.3892
9/29/1986	115	343.61	0.2498	89.77	0.0908	60.72	0.0495	0.3902
9/30/1986	45	296.68	0.2501	70.33	0.0909	48.87	0.0496	0.3905
10/1/1986	11	296.68	0.2501	70.33	0.0909	48.87	0.0496	0.3906
10/2/1986	45	296.68	0.2503	70.33	0.0910	48.87	0.0496	0.3909
10/6/1986	234	296.68	0.2516	70.33	0.0912	48.87	0.0498	0.3926
10/7/1986	95	296.68	0.2521	70.33	0.0914	48.87	0.0499	0.3934
10/8/1986	114	296.68	0.2527	70.33	0.0915	48.87	0.0500	0.3942
10/9/1986	227	296.68	0.2539	70.33	0.0918	48.87	0.0502	0.3959
10/13/1986	79	310.50	0.2543	95.65	0.0919	59.93	0.0503	0.3965
10/14/1986	32	310.50	0.2545	95.65	0.0920	59.93	0.0503	0.3968
10/15/1986	13	310.50	0.2546	95.65	0.0920	59.93	0.0503	0.3969
10/16/1986	17	310.50	0.2547	95.65	0.0920	59.93	0.0503	0.3970
10/17/1986	19	310.50	0.2548	95.65	0.0921	59.93	0.0504	0.3972
10/20/1986	12	334.56	0.2548	108.44	0.0921	64.50	0.0504	0.3973
10/21/1986	8	334.56	0.2549	108.44	0.0921	64.50	0.0504	0.3974
10/22/1986	4	334.56	0.2549	108.44	0.0921	64.50	0.0504	0.3974
10/23/1986	13	334.56	0.2550	108.44	0.0921	64.50	0.0504	0.3975
10/27/1986	11	334.56	0.2550	108.44	0.0922	64.50	0.0504	0.3976
10/28/1986	4	334.56	0.2551	108.44	0.0922	64.50	0.0504	0.3977
10/29/1986	2	334.56	0.2551	108.44	0.0922	64.50	0.0504	0.3977
10/30/1986	91	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/4/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/5/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/6/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/9/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/10/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/11/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/12/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/13/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/16/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/17/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/18/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/19/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/20/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/23/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/24/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/25/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/26/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/27/1987	0	334.56	0.2556	108.44	0.0923	64.50	0.0505	0.3985
3/28/1987	15	185.03	0.2557	31.56	0.0924	39.78	0.0505	0.3986
3/29/1987	929	173.70	0.2585	38.62	0.0930	35.46	0.0511	0.4027
3/30/1987	450	218.26	0.2603	38.62	0.0933	45.41	0.0515	0.4051
3/31/1987	6208	244.24	0.2872	47.83	0.0986	48.50	0.0568	0.4427
4/1/1987	1378	244.49	0.2932	48.01	0.0998	49.12	0.0581	0.4510
4/2/1987	527	243.66	0.2955	43.20	0.1002	48.42	0.0585	0.4542
4/3/1987	593	234.76	0.2980	42.63	0.1006	48.00	0.0590	0.4576
4/6/1987	1382	234.76	0.3038	42.63	0.1017	48.00	0.0602	0.4656

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
4/7/1987	481	234.76	0.3058	42.63	0.1020	48.00	0.0606	0.4684
4/8/1987	341	175.27	0.3068	39.72	0.1023	36.57	0.0608	0.4699
4/9/1987	242	175.27	0.3076	39.72	0.1024	36.57	0.0610	0.4710
4/10/1987	340	175.27	0.3086	39.72	0.1027	36.57	0.0612	0.4725
4/13/1987	137	175.27	0.3091	39.72	0.1028	36.57	0.0613	0.4731
4/14/1987	52	175.27	0.3092	39.72	0.1028	36.57	0.0613	0.4734
4/15/1987	39	162.87	0.3093	36.04	0.1028	32.95	0.0613	0.4735
4/16/1987	31	162.87	0.3094	36.04	0.1029	32.95	0.0614	0.4736
4/17/1987	57	162.87	0.3096	36.04	0.1029	32.95	0.0614	0.4739
4/20/1987	18	162.87	0.3097	36.04	0.1029	32.95	0.0614	0.4740
4/21/1987	5	162.87	0.3097	36.04	0.1029	32.95	0.0614	0.4740
4/22/1987	2	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
4/23/1987	1	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
4/24/1987	2	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
4/27/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
4/28/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
4/29/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
4/30/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/1/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/4/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/5/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/6/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/7/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/12/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/13/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/14/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/15/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/18/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/19/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/20/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/21/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/22/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/26/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/27/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/28/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/29/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
5/30/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
6/1/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
6/2/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
6/3/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
6/4/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
6/5/1987	0	202.87	0.3097	35.32	0.1029	37.31	0.0614	0.4740
6/9/1987	25	202.87	0.3098	35.32	0.1029	37.31	0.0614	0.4741
6/10/1987	24	150.25	0.3098	53.48	0.1029	26.70	0.0614	0.4742
6/11/1987	20	150.25	0.3099	53.48	0.1030	26.70	0.0615	0.4743
6/12/1987	59	150.25	0.3100	53.48	0.1030	26.70	0.0615	0.4745
6/15/1987	19	150.25	0.3101	53.48	0.1030	26.70	0.0615	0.4746
6/16/1987	11	150.25	0.3101	53.48	0.1030	26.70	0.0615	0.4747
6/17/1987	11	173.13	0.3102	45.52	0.1031	30.36	0.0615	0.4747
6/18/1987	6	173.13	0.3102	45.52	0.1031	30.36	0.0615	0.4747
6/19/1987	3	173.13	0.3102	45.52	0.1031	30.36	0.0615	0.4748
6/22/1987	0	173.13	0.3102	45.52	0.1031	30.36	0.0615	0.4748
6/23/1987	0	173.13	0.3102	45.52	0.1031	30.36	0.0615	0.4748
6/24/1987	0	173.13	0.3102	45.52	0.1031	30.36	0.0615	0.4748
6/25/1987	5	173.13	0.3102	45.52	0.1031	30.36	0.0615	0.4748
6/26/1987	33	173.13	0.3103	45.52	0.1031	30.36	0.0615	0.4749

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
6/29/1987	588	173.13	0.3121	45.52	0.1036	30.36	0.0618	0.4775
6/30/1987	143	173.13	0.3126	45.52	0.1037	30.36	0.0619	0.4782
7/1/1987	77	165.47	0.3128	17.72	0.1037	16.87	0.0619	0.4784
7/2/1987	42	165.47	0.3129	17.72	0.1037	16.87	0.0620	0.4786
7/3/1987	37	165.47	0.3130	17.72	0.1037	16.87	0.0620	0.4787
7/4/1987	30	165.47	0.3131	17.72	0.1037	16.87	0.0620	0.4788
7/5/1987	9	165.47	0.3131	17.72	0.1037	16.87	0.0620	0.4789
7/6/1987	4	165.47	0.3131	17.72	0.1037	16.87	0.0620	0.4789
7/7/1987	3	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/8/1987	1	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/9/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/10/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/13/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/14/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/15/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/16/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/17/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/20/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/21/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/22/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/23/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/24/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/27/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/28/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
7/29/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/4/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/5/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/6/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/7/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/10/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/11/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/12/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/13/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/14/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/17/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/18/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/20/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/21/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/24/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/25/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/26/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/27/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/28/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
8/29/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/1/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/2/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/3/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/4/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/7/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/8/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/9/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/10/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/13/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/14/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/15/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/16/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
9/17/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/20/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/21/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/22/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/23/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/28/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/29/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
9/30/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
10/1/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
10/4/1987	0	165.47	0.3132	17.72	0.1037	16.87	0.0620	0.4789
10/5/1987	7	165.47	0.3132	17.72	0.1038	16.87	0.0620	0.4789
10/6/1987	17	165.47	0.3132	17.72	0.1038	16.87	0.0620	0.4790
10/7/1987	14	165.47	0.3133	17.72	0.1038	16.87	0.0620	0.4790
10/8/1987	25	296.61	0.3134	122.86	0.1038	52.28	0.0620	0.4792
10/11/1987	33	296.61	0.3136	122.86	0.1039	52.28	0.0620	0.4795
10/12/1987	12	296.61	0.3136	122.86	0.1039	52.28	0.0621	0.4796
10/13/1987	12	296.61	0.3137	122.86	0.1039	52.28	0.0621	0.4797
10/14/1987	12	296.61	0.3138	122.86	0.1040	52.28	0.0621	0.4798
10/15/1987	35	485.88	0.3141	222.38	0.1041	89.96	0.0621	0.4803
10/20/1987	9	485.88	0.3141	222.38	0.1041	89.96	0.0621	0.4804
10/21/1987	2	485.88	0.3142	222.38	0.1041	89.96	0.0622	0.4805
10/22/1987	4	655.16	0.3142	229.28	0.1042	120.65	0.0622	0.4805
10/25/1987	1	655.16	0.3142	229.28	0.1042	120.65	0.0622	0.4806
10/26/1987	1	655.16	0.3142	229.28	0.1042	120.65	0.0622	0.4806
10/27/1987	1	655.16	0.3142	229.28	0.1042	120.65	0.0622	0.4806
10/28/1987	1	655.16	0.3143	229.28	0.1042	120.65	0.0622	0.4806
10/29/1987	267	380.16	0.3161	119.67	0.1047	72.27	0.0625	0.4833
10/31/1987	0	380.16	0.3161	119.67	0.1047	72.27	0.0625	0.4833
11/15/1987	0	380.16	0.3161	119.67	0.1047	72.27	0.0625	0.4833
12/15/1987	0	380.16	0.3161	119.67	0.1047	72.27	0.0625	0.4833
1/15/1988	0	380.16	0.3161	119.67	0.1047	72.27	0.0625	0.4833
2/15/1988	0	380.16	0.3161	119.67	0.1047	72.27	0.0625	0.4833
3/15/1988	2808	380.16	0.3350	119.67	0.1107	72.27	0.0661	0.5119
3/25/1988	223	380.16	0.3365	119.67	0.1112	72.27	0.0664	0.5142
3/26/1988	477	380.16	0.3398	119.67	0.1122	72.27	0.0670	0.5190
3/27/1988	496	149.83	0.3411	39.97	0.1126	29.29	0.0673	0.5209
3/28/1988	72	149.83	0.3413	39.97	0.1126	29.29	0.0673	0.5212
3/29/1988	68	149.83	0.3415	39.97	0.1127	29.29	0.0674	0.5215
3/30/1988	139	149.83	0.3418	39.97	0.1128	29.29	0.0674	0.5220
3/31/1988	478	149.83	0.3431	39.97	0.1131	29.29	0.0677	0.5239
4/1/1988	154	149.83	0.3435	39.97	0.1132	29.29	0.0678	0.5245
4/2/1988	833	149.83	0.3457	39.97	0.1138	29.29	0.0682	0.5277
4/3/1988	144	149.83	0.3461	39.97	0.1139	29.29	0.0683	0.5283
4/4/1988	173	169.06	0.3466	36.60	0.1140	32.95	0.0684	0.5290
4/5/1988	1222	160.80	0.3501	36.39	0.1148	31.18	0.0690	0.5340
4/6/1988	322	160.80	0.3511	36.39	0.1150	31.18	0.0692	0.5353
4/7/1988	651	160.80	0.3529	36.39	0.1154	31.18	0.0696	0.5379
4/11/1988	391	160.80	0.3540	36.39	0.1157	31.18	0.0698	0.5395
4/12/1988	155	160.80	0.3545	36.39	0.1158	31.18	0.0699	0.5401
4/13/1988	147	172.28	0.3549	16.98	0.1158	17.11	0.0699	0.5407
4/14/1988	122	172.28	0.3553	16.98	0.1159	17.11	0.0700	0.5411
4/15/1988	622	172.28	0.3572	16.98	0.1161	17.11	0.0702	0.5434
4/25/1988	467	172.28	0.3586	16.98	0.1162	17.11	0.0703	0.5451
4/26/1988	76	172.28	0.3589	16.98	0.1162	17.11	0.0703	0.5454
4/27/1988	83	187.77	0.3591	38.47	0.1163	35.87	0.0704	0.5458
4/28/1988	106	187.77	0.3595	38.47	0.1164	35.87	0.0704	0.5463

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
4/29/1988	4110	187.77	0.3732	38.47	0.1192	35.87	0.0731	0.5654
5/2/1988	520	187.77	0.3749	38.47	0.1195	35.87	0.0734	0.5679
5/3/1988	153	187.77	0.3755	38.47	0.1196	35.87	0.0735	0.5686
5/4/1988	79	187.77	0.3757	38.47	0.1197	35.87	0.0735	0.5689
5/5/1988	48	187.77	0.3759	38.47	0.1197	35.87	0.0736	0.5692
5/6/1988	79	187.77	0.3761	38.47	0.1198	35.87	0.0736	0.5695
5/9/1988	9	187.77	0.3762	38.47	0.1198	35.87	0.0736	0.5696
5/10/1988	4	187.77	0.3762	38.47	0.1198	35.87	0.0736	0.5696
5/11/1988	5	187.77	0.3762	38.47	0.1198	35.87	0.0736	0.5696
5/12/1988	3	187.77	0.3762	38.47	0.1198	35.87	0.0736	0.5696
5/13/1988	1	187.77	0.3762	38.47	0.1198	35.87	0.0736	0.5696
5/15/1988	183	187.77	0.3768	38.47	0.1199	35.87	0.0738	0.5705
5/16/1988	21	187.77	0.3769	38.47	0.1199	35.87	0.0738	0.5706
5/17/1988	22	187.77	0.3770	38.47	0.1199	35.87	0.0738	0.5707
5/18/1988	23	187.77	0.3770	38.47	0.1200	35.87	0.0738	0.5708
5/31/1988	66	187.77	0.3773	38.47	0.1200	35.87	0.0738	0.5711
6/1/1988	52	187.77	0.3774	38.47	0.1200	35.87	0.0739	0.5713
6/2/1988	43	187.77	0.3776	38.47	0.1201	35.87	0.0739	0.5715
6/3/1988	37	187.77	0.3777	38.47	0.1201	35.87	0.0739	0.5717
6/6/1988	25	187.77	0.3778	38.47	0.1201	35.87	0.0739	0.5718
6/7/1988	21	187.77	0.3779	38.47	0.1201	35.87	0.0739	0.5719
6/8/1988	19	187.77	0.3779	38.47	0.1201	35.87	0.0740	0.5720
6/9/1988	17	187.77	0.3780	38.47	0.1201	35.87	0.0740	0.5721
6/10/1988	16	187.77	0.3780	38.47	0.1202	35.87	0.0740	0.5722
6/13/1988	12	187.77	0.3781	38.47	0.1202	35.87	0.0740	0.5722
6/14/1988	11	187.77	0.3781	38.47	0.1202	35.87	0.0740	0.5723
6/15/1988	45	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
6/16/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
6/17/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
6/20/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
6/21/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
6/22/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
6/23/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
6/24/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
6/27/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
6/28/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
6/29/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
6/30/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/1/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/3/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/4/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/5/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/6/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/8/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/11/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/12/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/13/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/14/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/15/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/16/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/18/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/19/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/20/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/21/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/22/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/25/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date	Discharge Volume	Concentration Ca	Cumulative Ca	Concentration K	Cumulative K	Concentration Mg	Cumulative Mg	Cumulative Ca+K+Mg
Red Pine	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
7/26/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/27/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/28/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
7/29/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/1/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/2/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/3/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/4/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/8/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/9/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/11/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/15/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/16/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/18/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/19/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/21/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/22/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/23/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/24/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/25/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/26/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/27/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/29/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/30/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
8/31/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/1/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/2/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/6/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/7/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/8/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/12/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/13/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/14/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/15/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/16/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/19/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/20/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/21/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/22/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/26/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/27/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/28/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
9/29/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/3/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/4/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/5/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/6/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/7/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/11/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/12/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/14/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/17/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/18/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/19/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/20/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/21/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date	Discharge Volume	Concentration Ca	Cumulative Ca	Concentration K	Cumulative K	Concentration Mg	Cumulative Mg	Cumulative Ca+K+Mg
Red Pine	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
10/22/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/24/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/25/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/26/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
10/27/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
11/2/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
11/3/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
11/4/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
11/5/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
11/7/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
11/8/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
11/9/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
11/10/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
11/11/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
11/12/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
11/13/1988	0	187.77	0.3783	38.47	0.1202	35.87	0.0740	0.5725
Missing 5 yrs estimates			0.2603		0.0820		0.0488	
4/10/1993	1809	0.00	0.6386	0.00	0.2022	0.00	0.1228	0.9636
4/12/1993	4522	156.76	0.6512	35.85	0.2051	26.53	0.1250	0.9812
4/13/1993	1461	169.37	0.6556	33.21	0.2059	30.07	0.1257	0.9873
4/15/1993	143	194.78	0.6561	37.06	0.2060	34.51	0.1258	0.9879
4/19/1993	570	185.22	0.6580	31.50	0.2063	33.85	0.1262	0.9905
4/23/1993	521	169.85	0.6595	30.54	0.2066	32.23	0.1265	0.9926
4/29/1993	603	118.77	0.6608	26.88	0.2069	23.20	0.1267	0.9944
5/5/1993	187	107.06	0.6612	24.82	0.2070	21.14	0.1268	0.9950
6/1/1993	26	135.69	0.6612	25.83	0.2070	27.58	0.1268	0.9950
11/18/1993	652	128.10	0.6627	150.17	0.2087	25.92	0.1271	0.9986
11/30/1993	885	115.31	0.6645	55.69	0.2096	21.86	0.1275	1.0016
12/3/1993	606	106.97	0.6657	48.45	0.2101	20.61	0.1277	1.0035
12/7/1993	536	97.52	0.6666	48.23	0.2106	19.25	0.1279	1.0051
12/13/1993	1152	104.93	0.6688	54.67	0.2117	20.37	0.1283	1.0088
12/21/1993	839	81.83	0.6700	35.44	0.2122	15.09	0.1285	1.0107
1/4/1994	1056	88.18	0.6716	41.58	0.2130	17.46	0.1288	1.0135
4/13/1994	488	99.84	0.6725	29.90	0.2133	17.67	0.1290	1.0148
4/20/1994	3690	99.30	0.6790	24.69	0.2149	17.39	0.1301	1.0240
4/28/1994	816	94.26	0.6804	25.64	0.2153	17.25	0.1304	1.0260
5/5/1994	703	95.96	0.6816	22.49	0.2156	15.33	0.1306	1.0277
5/12/1994	107	86.99	0.6818	26.83	0.2156	15.32	0.1306	1.0280
5/19/1994	6	60.91	0.6818	9.05	0.2156	13.54	0.1306	1.0280
1/18/1995	621	109.78	0.6830	26.00	0.2159	22.69	0.1308	1.0297
1/26/1995	1787	100.56	0.6862	57.45	0.2177	20.73	0.1315	1.0354
2/1/1995	497	102.07	0.6871	55.18	0.2182	21.06	0.1317	1.0370
2/9/1995	193	109.18	0.6874	62.17	0.2184	22.57	0.1318	1.0376
2/17/1995	59	100.41	0.6876	59.54	0.2185	21.60	0.1318	1.0378
2/23/1995	17	94.21	0.6876	52.06	0.2185	20.25	0.1318	1.0379
3/16/1995	102	94.56	0.6878	41.49	0.2186	19.77	0.1318	1.0382
3/22/1995	1342	106.59	0.6903	57.82	0.2200	22.88	0.1324	1.0426
3/30/1995	1275	99.32	0.6925	35.90	0.2208	20.31	0.1328	1.0461
4/6/1995	436	112.08	0.6934	40.92	0.2211	23.18	0.1330	1.0475
4/13/1995	313	115.20	0.6941	40.85	0.2213	23.84	0.1331	1.0485
4/20/1995	300	110.54	0.6946	40.15	0.2215	22.65	0.1333	1.0494
4/23/1995	504	101.45	0.6956	37.08	0.2219	20.60	0.1335	1.0509
4/27/1995	709	102.63	0.6968	37.86	0.2223	20.88	0.1337	1.0529
5/3/1995	321	100.53	0.6974	39.96	0.2226	20.55	0.1338	1.0538
5/11/1995	177	97.85	0.6977	38.00	0.2227	20.03	0.1339	1.0543
8/8/1995	1899	126.77	0.7020	90.47	0.2257	23.39	0.1347	1.0624

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
8/17/1995	180	149.69	0.7025	97.35	0.2260	27.20	0.1348	1.0633
10/26/1995	1782	120.29	0.7063	93.22	0.2290	27.11	0.1356	1.0709
11/1/1995	2591	117.10	0.7117	69.63	0.2322	24.90	0.1368	1.0807
11/9/1995	1218	114.56	0.7142	66.76	0.2337	24.21	0.1373	1.0851
11/16/1995	2457	94.98	0.7183	53.69	0.2360	20.15	0.1382	1.0925
12/6/1995	1890	95.62	0.7215	53.14	0.2378	20.04	0.1389	1.0982
12/14/1995	202	89.71	0.7219	78.96	0.2381	19.53	0.1389	1.0989
1/10/1996	238	98.87	0.7223	62.30	0.2383	21.36	0.1390	1.0996
1/24/1996	2859	72.62	0.7260	33.25	0.2400	15.72	0.1398	1.1058
2/1/1996	2966	65.47	0.7294	27.57	0.2415	13.81	0.1405	1.1114
2/14/1996	456	68.20	0.7300	31.63	0.2417	14.95	0.1407	1.1124
3/7/1996	2009	66.86	0.7324	28.28	0.2427	14.72	0.1412	1.1163
3/20/1996	349	77.25	0.7328	29.35	0.2429	16.83	0.1413	1.1171
3/27/1996	490	88.52	0.7336	31.26	0.2432	19.25	0.1415	1.1183
4/3/1996	561	156.89	0.7352	34.85	0.2435	19.45	0.1417	1.1204
4/15/1996	1076	110.98	0.7373	30.38	0.2441	12.71	0.1419	1.1233
4/16/1996	1760	108.50	0.7407	30.91	0.2451	14.11	0.1423	1.1281
4/17/1996	2442	103.66	0.7452	32.58	0.2465	20.08	0.1432	1.1349
4/18/1996	3128	104.20	0.7510	32.59	0.2483	18.02	0.1442	1.1435
4/24/1996	3110	106.54	0.7569	32.25	0.2501	20.87	0.1454	1.1523
4/25/1996	3095	98.56	0.7623	32.60	0.2519	21.48	0.1466	1.1607
5/2/1996	1246	102.80	0.7646	27.84	0.2525	14.87	0.1469	1.1640
5/9/1996	980	102.56	0.7664	25.09	0.2529	12.72	0.1471	1.1664
5/16/1996	2225	62.35	0.7688	27.08	0.2540	12.47	0.1476	1.1704
5/23/1996	191	69.18	0.7691	29.57	0.2541	13.78	0.1476	1.1708
6/20/1996	367	86.98	0.7696	34.72	0.2543	17.62	0.1478	1.1717
7/19/1996	51	80.07	0.7697	41.26	0.2544	16.69	0.1478	1.1719
7/27/1996	215	91.59	0.7701	42.43	0.2545	18.12	0.1478	1.1724
8/2/1996	31	90.56	0.7701	41.70	0.2546	17.87	0.1479	1.1725
11/11/1996	548	56.01	0.7707	59.10	0.2551	18.65	0.1480	1.1738
11/18/1996	38	61.85	0.7707	65.41	0.2552	19.15	0.1480	1.1739
11/25/1996	11	83.15	0.7707	95.18	0.2552	20.86	0.1481	1.1740
12/2/1996	808	48.03	0.7714	48.51	0.2559	16.31	0.1483	1.1756
12/9/1996	153	61.82	0.7716	36.97	0.2560	15.13	0.1483	1.1759
12/16/1996	119	56.85	0.7717	37.44	0.2561	13.89	0.1484	1.1761
12/22/1996	494	57.23	0.7722	35.97	0.2564	14.12	0.1485	1.1771
12/30/1996	630	56.79	0.7728	34.62	0.2568	14.11	0.1486	1.1783
1/6/1997	78	40.18	0.7729	12.03	0.2568	6.81	0.1486	1.1783
2/21/1997	4	87.95	0.7729	25.33	0.2568	19.13	0.1486	1.1783
2/27/1997	3	91.98	0.7729	26.82	0.2568	19.73	0.1487	1.1784
2/28/1997	5	90.53	0.7729	25.22	0.2568	19.58	0.1487	1.1784
3/3/1997	75	72.58	0.7730	24.75	0.2568	16.14	0.1487	1.1785
3/5/1997	150	75.85	0.7732	27.69	0.2569	16.71	0.1487	1.1788
3/9/1997	192	75.56	0.7735	27.77	0.2570	16.70	0.1488	1.1792
3/10/1997	87	81.04	0.7736	29.52	0.2571	17.84	0.1488	1.1794
3/11/1997	60	77.74	0.7737	29.67	0.2571	17.29	0.1488	1.1796
3/25/1997	19	83.86	0.7737	29.44	0.2571	18.52	0.1488	1.1796
3/26/1997	2	88.25	0.7737	30.78	0.2571	19.38	0.1488	1.1796
3/27/1997	15	84.83	0.7737	28.59	0.2571	19.06	0.1488	1.1797
3/28/1997	8	88.49	0.7737	29.91	0.2571	19.63	0.1488	1.1797
3/30/1997	23	91.56	0.7738	29.01	0.2571	20.17	0.1488	1.1797
3/31/1997	169	65.81	0.7740	23.30	0.2572	14.76	0.1489	1.1801
4/1/1997	316	85.47	0.7745	29.96	0.2574	18.76	0.1490	1.1808
4/2/1997	276	85.60	0.7749	30.01	0.2575	18.72	0.1491	1.1815
4/3/1997	175	88.23	0.7751	30.39	0.2576	19.29	0.1491	1.1819
4/4/1997	220	88.39	0.7755	29.82	0.2577	19.32	0.1492	1.1824

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
4/5/1997	113	92.83	0.7757	32.56	0.2578	20.13	0.1493	1.1827
4/6/1997	148	95.50	0.7759	31.95	0.2579	20.94	0.1493	1.1831
4/7/1997	557	92.83	0.7768	31.58	0.2582	19.93	0.1495	1.1845
4/8/1997	653	92.11	0.7779	30.92	0.2585	19.78	0.1497	1.1862
4/10/1997	540	82.67	0.7787	31.21	0.2588	18.06	0.1499	1.1875
4/13/1997	608	96.88	0.7798	32.75	0.2592	20.92	0.1501	1.1891
4/14/1997	86	94.57	0.7799	31.82	0.2592	20.62	0.1502	1.1893
4/15/1997	135	97.53	0.7801	33.92	0.2593	20.97	0.1502	1.1897
4/16/1997	73	97.79	0.7803	32.75	0.2594	21.16	0.1503	1.1899
4/18/1997	190	98.00	0.7806	32.45	0.2595	20.92	0.1503	1.1904
4/19/1997	832	85.74	0.7819	33.42	0.2600	20.78	0.1506	1.1925
4/20/1997	1402	85.48	0.7840	32.22	0.2608	19.70	0.1511	1.1959
4/21/1997	970	88.38	0.7855	34.14	0.2614	20.13	0.1515	1.1984
4/22/1997	587	88.48	0.7864	32.85	0.2617	19.86	0.1517	1.1998
4/23/1997	344	88.40	0.7870	33.22	0.2619	20.04	0.1518	1.2007
4/24/1997	329	86.74	0.7875	31.40	0.2621	19.49	0.1519	1.2015
4/28/1997	1498	86.85	0.7898	31.68	0.2629	19.42	0.1524	1.2052
4/29/1997	513	79.54	0.7905	31.10	0.2632	17.91	0.1526	1.2063
4/30/1997	492	80.49	0.7912	30.58	0.2635	18.09	0.1528	1.2075
5/5/1997	966	64.98	0.7923	28.34	0.2640	14.80	0.1530	1.2093
5/6/1997	132	61.46	0.7925	27.69	0.2640	14.12	0.1530	1.2096
5/7/1997	175	56.37	0.7927	26.75	0.2641	13.21	0.1531	1.2099
5/13/1997	83	53.72	0.7927	25.96	0.2642	12.26	0.1531	1.2100
5/21/1997	50		0.7927		0.2642		0.1531	1.2100
12/9/1997	11	101.88	0.7928	136.00	0.2642	19.72	0.1531	1.2101
12/16/1997	24	100.31	0.7928	90.60	0.2642	18.43	0.1531	1.2102
12/23/1997	2	102.73	0.7928	80.35	0.2642	19.28	0.1531	1.2102
12/30/1997	1	106.37	0.7928	71.11	0.2642	19.63	0.1531	1.2102
1/6/1998	8	99.16	0.7928	72.59	0.2642	20.45	0.1531	1.2102
1/13/1998	170	73.63	0.7931	40.25	0.2644	15.12	0.1532	1.2106
1/20/1998	42	80.18	0.7931	36.85	0.2644	16.11	0.1532	1.2107
1/27/1998	15	78.23	0.7931	36.01	0.2644	16.33	0.1532	1.2107
2/3/1998	13	82.72	0.7932	37.04	0.2644	17.53	0.1532	1.2107
2/10/1998	7	84.79	0.7932	36.65	0.2644	17.59	0.1532	1.2108
2/17/1998	30	77.35	0.7932	33.36	0.2644	16.24	0.1532	1.2108
2/24/1998	41	83.91	0.7933	33.43	0.2645	17.78	0.1532	1.2109
3/3/1998	164	78.13	0.7935	35.33	0.2646	16.62	0.1533	1.2113
3/10/1998	340	87.80	0.7940	35.73	0.2648	18.47	0.1534	1.2122
3/17/1998	58	93.79	0.7941	34.01	0.2648	19.23	0.1534	1.2123
3/24/1998	19	105.59	0.7942	35.48	0.2648	21.49	0.1534	1.2124
3/31/1998	421	90.32	0.7948	40.75	0.2651	17.13	0.1535	1.2135
4/7/1998	69	99.23	0.7950	40.76	0.2652	18.48	0.1535	1.2137
4/14/1998	21	105.93	0.7950	38.53	0.2652	20.48	0.1536	1.2137
4/21/1998	60	78.41	0.7951	31.52	0.2652	15.18	0.1536	1.2139
4/28/1998	37	68.74	0.7951	28.23	0.2652	13.68	0.1536	1.2139
5/5/1998	5	82.54	0.7951	31.67	0.2652	15.32	0.1536	1.2140
5/12/1998	142	80.23	0.7953	34.18	0.2653	15.39	0.1536	1.2143
5/19/1998	61	79.82	0.7954	36.73	0.2654	14.88	0.1536	1.2144
5/26/1998	191	76.46	0.7957	38.54	0.2655	14.23	0.1537	1.2149
6/2/1998	211	72.25	0.7959	42.45	0.2657	14.40	0.1537	1.2153
6/9/1998	576	63.04	0.7966	39.68	0.2661	13.11	0.1539	1.2165
6/16/1998	1430	65.37	0.7983	37.58	0.2670	13.61	0.1542	1.2195
6/23/1998	1432	61.87	0.7998	36.30	0.2679	13.02	0.1545	1.2223
6/30/1998	1445	59.05	0.8013	37.42	0.2689	12.14	0.1549	1.2251
7/7/1998	1020	56.60	0.8024	37.63	0.2696	11.68	0.1551	1.2270
7/14/1998	745	58.80	0.8032	40.64	0.2701	12.56	0.1552	1.2285

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date	Discharge Volume	Concentration Ca	Cumulative Ca	Concentration K	Cumulative K	Concentration Mg	Cumulative Mg	Cumulative Ca+K+Mg
Red Pine	(L)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(umol/L)	(mol/m^2)	(mol/m^2)
7/21/1998	542	64.88	0.8038	43.78	0.2706	13.79	0.1554	1.2297
7/28/1998	1278	70.32	0.8054	48.10	0.2716	14.14	0.1557	1.2327
8/4/1998	544	80.26	0.8062	65.20	0.2723	16.11	0.1558	1.2343
8/11/1998	278	94.33	0.8066	104.53	0.2728	20.19	0.1559	1.2354
8/18/1998	1418	85.87	0.8088	97.41	0.2752	20.14	0.1565	1.2405
8/25/1998	404	90.18	0.8094	110.52	0.2760	23.05	0.1566	1.2421
9/1/1998	1890	90.39	0.8125	93.23	0.2792	23.74	0.1574	1.2491
9/8/1998	478	98.80	0.8133	101.71	0.2800	27.22	0.1576	1.2510
9/15/1998	377	94.64	0.8139	101.28	0.2807	26.77	0.1578	1.2525
9/22/1998	1577	92.00	0.8165	86.11	0.2831	26.67	0.1586	1.2582
9/29/1998	371	86.28	0.8171	83.66	0.2837	25.85	0.1587	1.2595
10/6/1998	450	81.24	0.8177	80.47	0.2843	25.02	0.1589	1.2610
10/13/1998	1412	76.70	0.8197	70.14	0.2861	23.87	0.1595	1.2653
10/20/1998	2780	72.49	0.8232	58.87	0.2890	21.51	0.1606	1.2729
10/27/1998	483	81.07	0.8239	61.65	0.2895	21.60	0.1608	1.2743
11/3/1998	237	84.63	0.8243	69.58	0.2898	23.19	0.1609	1.2750
11/10/1998	348	81.72	0.8248	65.50	0.2902	22.54	0.1610	1.2761
11/17/1998	1162	75.01	0.8264	57.87	0.2914	21.29	0.1615	1.2792
11/24/1998	1155	74.74	0.8279	51.17	0.2925	20.72	0.1619	1.2823
12/1/1998	2289	73.30	0.8309	47.33	0.2944	19.88	0.1627	1.2880
12/8/1998	566	77.38	0.8317	46.81	0.2949	20.20	0.1629	1.2894
12/15/1998	293	77.54	0.8321	50.50	0.2951	20.38	0.1630	1.2902
12/22/1998	189	78.74	0.8323	51.28	0.2953	20.89	0.1631	1.2907
12/29/1998	367	78.49	0.8328	52.46	0.2956	20.92	0.1632	1.2917
1/5/1999	257	75.53	0.8332	47.60	0.2959	20.26	0.1633	1.2924
1/12/1999	106	69.14	0.8333	51.11	0.2960	19.58	0.1634	1.2926
1/26/1999	1258	68.84	0.8348	40.54	0.2969	19.41	0.1638	1.2955
2/2/1999	898	77.50	0.8361	40.13	0.2975	21.06	0.1641	1.2977
2/9/1999	500	99.18	0.8370	44.92	0.2979	24.89	0.1643	1.2992
2/16/1999	364	105.86	0.8377	45.40	0.2982	26.12	0.1645	1.3004
2/23/1999	235	115.48	0.8381	49.79	0.2984	28.38	0.1646	1.3012
3/9/1999	366	126.66	0.8390	51.19	0.2987	29.98	0.1648	1.3025
3/16/1999	94	137.45	0.8392	65.31	0.2988	33.42	0.1649	1.3029
3/23/1999	221	146.85	0.8398	59.85	0.2991	35.99	0.1650	1.3039
3/30/1999	2743	92.32	0.8443	39.18	0.3010	19.96	0.1660	1.3113
4/6/1999	2068	143.24	0.8495	50.91	0.3029	33.15	0.1672	1.3196
4/13/1999	1403	108.92	0.8523	42.05	0.3039	25.25	0.1678	1.3240
4/20/1999	531	84.50	0.8531	38.97	0.3043	19.45	0.1680	1.3254
4/27/1999	304	82.54	0.8535	39.85	0.3045	18.65	0.1681	1.3261
5/4/1999	225	83.64	0.8538	42.71	0.3047	18.85	0.1682	1.3267
5/11/1999	213	87.95	0.8542	44.65	0.3048	19.55	0.1683	1.3273
5/18/1999	420	85.32	0.8548	44.47	0.3052	19.06	0.1684	1.3284
5/25/1999	3411	97.57	0.8607	47.08	0.3080	21.41	0.1697	1.3385
6/1/1999	924	121.09	0.8627	55.61	0.3089	25.76	0.1701	1.3418
6/8/1999	652	134.71	0.8643	59.51	0.3096	27.38	0.1705	1.3444
6/15/1999	949	129.40	0.8665	58.26	0.3106	26.83	0.1709	1.3480
6/22/1999	1380	126.74	0.8696	61.02	0.3121	26.50	0.1716	1.3532
6/29/1999	428	129.51	0.8705	60.39	0.3126	25.92	0.1718	1.3549
7/6/1999	294	121.76	0.8712	64.17	0.3129	25.02	0.1719	1.3560
7/13/1999	2145	145.38	0.8767	65.92	0.3154	29.32	0.1730	1.3652
7/20/1999	400	162.96	0.8779	68.81	0.3159	32.03	0.1732	1.3670
7/27/1999	434	161.62	0.8791	71.90	0.3165	32.49	0.1735	1.3691
8/3/1999	823	184.11	0.8818	80.43	0.3176	36.89	0.1740	1.3735
8/10/1999	415	216.41	0.8834	82.41	0.3182	45.28	0.1744	1.3760
8/17/1999	1415	190.63	0.8882	78.23	0.3202	38.90	0.1753	1.3838
8/24/1999	681	185.33	0.8905	73.36	0.3211	36.70	0.1758	1.3873

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
8/31/1999	366	176.96	0.8916	71.04	0.3216	34.80	0.1760	1.3892
9/7/1999	257	176.45	0.8924	79.00	0.3219	35.03	0.1762	1.3905
9/14/1999	2994	190.02	0.9025	84.54	0.3264	38.94	0.1782	1.4072
9/21/1999	6806	164.13	0.9224	74.99	0.3355	32.28	0.1821	1.4400
9/28/1999	1328	148.81	0.9259	62.97	0.3370	28.14	0.1828	1.4457
10/5/1999	1750	126.66	0.9298	57.62	0.3388	24.39	0.1836	1.4522
10/12/1999	504	126.49	0.9310	58.22	0.3393	24.37	0.1838	1.4541
10/19/1999	680	117.72	0.9324	56.42	0.3400	23.30	0.1841	1.4564
10/26/1999	1780	105.91	0.9357	50.81	0.3416	21.05	0.1847	1.4621
11/2/1999	761	117.17	0.9373	52.68	0.3423	23.52	0.1851	1.4647
11/9/1999	1084	114.09	0.9395	50.09	0.3433	22.54	0.1855	1.4683
11/16/1999	403	109.58	0.9403	48.59	0.3436	21.83	0.1856	1.4696
11/23/1999	664	114.30	0.9417	49.06	0.3442	22.45	0.1859	1.4718
11/30/1999	1668	115.31	0.9451	46.84	0.3456	22.91	0.1866	1.4772
12/7/1999	730	108.63	0.9465	44.74	0.3462	21.46	0.1869	1.4795
12/14/1999	315	115.25	0.9471	45.02	0.3464	21.86	0.1870	1.4805
12/21/1999	562	113.09	0.9483	44.37	0.3469	21.36	0.1872	1.4823
12/28/1999	836	112.23	0.9499	43.64	0.3475	22.46	0.1875	1.4850
1/4/2000	293	118.70	0.9506	44.50	0.3477	23.18	0.1877	1.4859
1/11/2000	262	115.01	0.9511	43.44	0.3479	22.72	0.1878	1.4868
1/18/2000	625	108.87	0.9523	39.54	0.3484	20.62	0.1880	1.4887
1/25/2000	110	114.59	0.9525	43.76	0.3485	23.56	0.1880	1.4890
2/1/2000	17	132.22	0.9526	54.15	0.3485	26.36	0.1880	1.4891
2/8/2000	1		0.9526		0.3485		0.1880	1.4891
2/15/2000	0		0.9526		0.3485		0.1880	1.4891
2/22/2000	0		0.9526		0.3485		0.1880	1.4891
2/29/2000	0		0.9526		0.3485		0.1880	1.4891
3/7/2000	0		0.9526		0.3485		0.1880	1.4891
3/14/2000	115	95.66	0.9528	49.76	0.3486	12.86	0.1881	1.4894
3/21/2000	123	57.79	0.9529	12.95	0.3486	7.77	0.1881	1.4896
3/28/2000	807	99.54	0.9543	36.88	0.3491	18.92	0.1884	1.4918
4/4/2000	2419	145.41	0.9606	44.22	0.3510	29.99	0.1897	1.5013
4/11/2000	6999	134.53	0.9773	41.05	0.3561	27.51	0.1931	1.5265
4/18/2000	1706	110.48	0.9807	35.73	0.3572	22.62	0.1938	1.5316
4/25/2000	1517	93.25	0.9832	37.04	0.3582	18.54	0.1943	1.5357
5/2/2000	1447	99.58	0.9857	37.58	0.3592	19.47	0.1948	1.5397
5/9/2000	667	95.28	0.9869	33.56	0.3596	17.96	0.1950	1.5414
5/16/2000	2891	109.04	0.9925	45.43	0.3619	20.70	0.1960	1.5504
5/23/2000	1215	110.56	0.9949	45.62	0.3629	20.46	0.1965	1.5542
5/30/2000	1312	107.60	0.9974	46.07	0.3640	19.38	0.1969	1.5583
6/6/2000	490	113.56	0.9983	50.45	0.3644	21.29	0.1971	1.5599
6/13/2000	821	102.01	0.9998	46.51	0.3651	18.90	0.1974	1.5623
6/20/2000	512	107.15	1.0008	44.32	0.3655	19.74	0.1976	1.5639
6/27/2000	378	105.19	1.0015	50.64	0.3659	19.79	0.1977	1.5651
7/4/2000	558	105.37	1.0026	54.34	0.3664	18.99	0.1979	1.5668
7/11/2000	414	100.49	1.0033	52.92	0.3668	17.85	0.1980	1.5681
7/18/2000	344	101.01	1.0039	49.30	0.3671	17.37	0.1981	1.5691
7/25/2000	517	99.20	1.0048	50.53	0.3675	17.44	0.1983	1.5707
8/1/2000	1408	104.22	1.0074	51.50	0.3688	19.61	0.1988	1.5751
8/8/2000	768	110.29	1.0089	54.89	0.3696	20.19	0.1991	1.5776
8/15/2000	1181	113.94	1.0113	56.09	0.3708	20.99	0.1995	1.5816
8/22/2000	1093	110.28	1.0135	57.09	0.3719	20.70	0.1999	1.5853
8/29/2000	975	108.81	1.0154	55.35	0.3728	20.24	0.2003	1.5885
9/5/2000	403	115.66	1.0162	55.96	0.3732	21.11	0.2004	1.5898
9/12/2000	185	112.90	1.0166	54.28	0.3734	19.49	0.2005	1.5904
9/19/2000	2736	101.28	1.0215	50.90	0.3759	18.13	0.2013	1.5987

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
9/26/2000	536	109.13	1.0225	51.42	0.3764	19.11	0.2015	1.6004
10/3/2000	247	110.37	1.0230	51.45	0.3766	19.62	0.2016	1.6012
10/10/2000	508	105.87	1.0240	48.68	0.3770	19.63	0.2018	1.6028
10/17/2000	495	99.38	1.0249	45.65	0.3774	18.47	0.2020	1.6043
10/24/2000	1501	94.73	1.0274	41.12	0.3785	18.35	0.2024	1.6084
10/31/2000	401	94.55	1.0281	47.08	0.3789	16.61	0.2026	1.6095
11/7/2000	195	108.93	1.0284	43.93	0.3790	18.81	0.2026	1.6101
11/14/2000	1108	95.23	1.0303	39.77	0.3798	17.02	0.2030	1.6131
11/21/2000	1663	83.13	1.0328	35.87	0.3809	14.44	0.2034	1.6170
11/28/2000	381	82.88	1.0333	38.18	0.3811	14.48	0.2035	1.6179
12/5/2000	381	95.66	1.0340	41.47	0.3814	17.76	0.2036	1.6190
12/12/2000	345	78.34	1.0345	35.41	0.3816	14.30	0.2037	1.6198
12/19/2000	3232	78.84	1.0390	29.68	0.3833	14.63	0.2045	1.6269
12/26/2000	1201	91.02	1.0409	31.32	0.3840	17.76	0.2049	1.6299
1/2/2001	277	98.44	1.0414	32.49	0.3842	18.92	0.2050	1.6306
1/9/2001	110	94.47	1.0416	35.57	0.3842	16.79	0.2050	1.6309
1/16/2001	45	111.78	1.0417	38.47	0.3843	21.04	0.2051	1.6310
1/23/2001	19	99.89	1.0417	42.24	0.3843	18.83	0.2051	1.6311
1/30/2001	8	119.43	1.0417	71.12	0.3843	22.22	0.2051	1.6311
2/6/2001	2	0.00	1.0417	0.00	0.3843	0.00	0.2051	1.6311
2/13/2001	1	0.00	1.0417	0.00	0.3843	0.00	0.2051	1.6311
2/20/2001	1	0.00	1.0417	0.00	0.3843	0.00	0.2051	1.6311
2/27/2001	0	0.00	1.0417	0.00	0.3843	0.00	0.2051	1.6311
3/6/2001	0	0.00	1.0417	0.00	0.3843	0.00	0.2051	1.6311
3/13/2001	0	0.00	1.0417	0.00	0.3843	0.00	0.2051	1.6311
3/20/2001	0	0.00	1.0417	0.00	0.3843	0.00	0.2051	1.6311
3/27/2001	185	106.65	1.0421	53.39	0.3845	23.17	0.2051	1.6317
4/3/2001	121	123.05	1.0424	53.49	0.3846	25.69	0.2052	1.6321
4/10/2001	617	123.91	1.0437	51.03	0.3851	23.48	0.2055	1.6343
4/17/2001	3098	112.13	1.0499	39.40	0.3873	22.58	0.2067	1.6439
4/24/2001	1368	126.63	1.0530	41.46	0.3883	25.32	0.2073	1.6486
5/1/2001	1191	102.87	1.0551	38.51	0.3891	20.94	0.2078	1.6520
5/8/2001	337	99.13	1.0557	38.97	0.3894	20.95	0.2079	1.6530
5/15/2001	182	105.03	1.0561	42.76	0.3895	21.70	0.2080	1.6535
5/22/2001	114	112.47	1.0563	43.09	0.3896	21.99	0.2080	1.6539
5/29/2001	84	120.34	1.0565	46.48	0.3897	22.71	0.2080	1.6542
6/5/2001	3620	88.12	1.0622	38.64	0.3921	16.88	0.2091	1.6634
6/12/2001	1084	100.58	1.0641	46.58	0.3930	18.52	0.2095	1.6666
6/19/2001	388	103.73	1.0648	49.82	0.3934	18.23	0.2096	1.6678
6/26/2001	610	101.58	1.0659	45.01	0.3939	37.71	0.2100	1.6698
7/3/2001	251	99.71	1.0664	52.31	0.3941	16.82	0.2101	1.6706
7/10/2001	441	97.13	1.0671	45.00	0.3945	16.73	0.2102	1.6718
7/17/2001	600	94.32	1.0681	50.38	0.3950	16.79	0.2104	1.6735
7/24/2001	1630	90.46	1.0707	52.35	0.3965	15.77	0.2109	1.6781
7/31/2001	394	89.79	1.0714	45.66	0.3968	15.22	0.2110	1.6792
8/7/2001	310	95.05	1.0719	46.65	0.3971	16.42	0.2111	1.6800
8/14/2001	206	96.27	1.0723	48.01	0.3973	16.57	0.2111	1.6806
8/21/2001	128	100.71	1.0725	49.70	0.3974	17.54	0.2112	1.6810
8/28/2001	87	114.26	1.0727	50.54	0.3975	17.86	0.2112	1.6813
9/4/2001	83	117.74	1.0728	51.75	0.3975	18.93	0.2112	1.6816
9/11/2001	205	112.66	1.0732	49.63	0.3977	17.96	0.2113	1.6822
9/18/2001	189	104.56	1.0736	46.29	0.3979	16.98	0.2113	1.6828
9/25/2001	2245	97.13	1.0775	45.66	0.3997	17.01	0.2120	1.6892
10/2/2001	3487	97.94	1.0835	46.71	0.4026	16.89	0.2131	1.6992
10/9/2001	329	104.11	1.0841	47.06	0.4029	17.88	0.2132	1.7002
10/16/2001	176	110.36	1.0845	46.33	0.4030	18.55	0.2132	1.7007

Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
10/23/2001	395	106.98	1.0852	44.05	0.4033	17.65	0.2133	1.7019
10/30/2001	581	103.05	1.0863	44.08	0.4038	17.06	0.2135	1.7036
11/6/2001	709	100.67	1.0876	40.10	0.4043	16.73	0.2137	1.7056
11/13/2001	928	99.53	1.0892	39.66	0.4049	17.77	0.2140	1.7082
11/20/2001	380	105.90	1.0899	40.94	0.4052	18.06	0.2141	1.7093
11/27/2001	215	61.93	1.0902	24.97	0.4053	12.40	0.2142	1.7097
12/4/2001	1748	102.81	1.0934	36.84	0.4065	18.28	0.2148	1.7146
12/11/2001	790	107.79	1.0949	36.09	0.4070	19.02	0.2150	1.7169
12/18/2001	838	107.78	1.0965	38.69	0.4075	19.03	0.2153	1.7193
12/25/2001	611	111.84	1.0977	39.90	0.4080	20.48	0.2155	1.7212
1/1/2002	261	116.68	1.0982	47.69	0.4082	18.46	0.2156	1.7221
1/8/2002	168	123.29	1.0986	48.49	0.4083	20.06	0.2157	1.7226
1/15/2002	98	123.01	1.0988	54.79	0.4084	21.19	0.2157	1.7230
1/22/2002	63	124.14	1.0990	46.99	0.4085	21.59	0.2157	1.7232
1/29/2002	50	128.10	1.0991	87.49	0.4086	21.95	0.2158	1.7234
2/5/2002	119	123.03	1.0993	53.03	0.4087	22.11	0.2158	1.7238
2/12/2002	277	117.67	1.0999	37.07	0.4089	21.59	0.2159	1.7247
2/19/2002	691	108.27	1.1012	32.30	0.4093	19.87	0.2162	1.7267
2/26/2002	410	115.79	1.1021	40.37	0.4095	19.28	0.2163	1.7279
3/5/2002	1598	105.57	1.1051	35.60	0.4106	17.65	0.2168	1.7324
3/12/2002	2015	93.78	1.1085	27.11	0.4115	17.19	0.2174	1.7374
3/19/2002	1815	93.71	1.1115	27.85	0.4124	16.54	0.2179	1.7419
3/26/2002	858	98.47	1.1130	31.85	0.4129	18.29	0.2182	1.7441
4/2/2002	2518	90.53	1.1170	30.59	0.4143	17.11	0.2190	1.7503
4/9/2002	5759	85.25	1.1258	28.78	0.4172	14.91	0.2205	1.7635
4/16/2002	3786	77.03	1.1309	27.90	0.4191	14.55	0.2215	1.7715
4/23/2002	1429	79.15	1.1330	29.93	0.4199	13.57	0.2218	1.7747
4/30/2002	353	81.58	1.1335	32.19	0.4201	12.79	0.2219	1.7755
5/7/2002	1830	73.50	1.1359	29.72	0.4210	13.59	0.2224	1.7793
5/14/2002	601	82.57	1.1367	31.01	0.4214	14.23	0.2225	1.7806
5/21/2002	2518	80.70	1.1404	32.71	0.4228	14.50	0.2232	1.7864
5/28/2002	687	88.78	1.1414	34.55	0.4233	15.84	0.2234	1.7881
6/4/2002	411	100.10	1.1422	36.54	0.4235	15.95	0.2235	1.7892
6/11/2002	527	94.10	1.1430	37.74	0.4239	16.24	0.2236	1.7906
6/18/2002	2519	85.51	1.1469	37.97	0.4256	13.75	0.2242	1.7967
6/25/2002	571	92.65	1.1478	39.20	0.4260	14.90	0.2244	1.7982
7/2/2002	1078	91.10	1.1496	39.37	0.4267	15.51	0.2247	1.8010
7/23/2002	1236	97.01	1.1517	42.84	0.4277	14.57	0.2250	1.8044
8/13/2002	840	105.62	1.1533	52.29	0.4285	14.54	0.2252	1.8070
9/3/2002	497	108.67	1.1542	54.85	0.4289	18.33	0.2254	1.8086
9/15/2002	167	104.24	1.1545	52.00	0.4291	19.79	0.2255	1.8091
9/17/2002	2177	90.37	1.1580	51.44	0.4311	20.30	0.2262	1.8154
9/24/2002	1197	92.59	1.1600	51.72	0.4322	15.91	0.2266	1.8188
10/15/2002	2722	95.64	1.1646	51.58	0.4347	17.14	0.2274	1.8267
11/5/2002	3173	87.05	1.1695	44.05	0.4372	17.46	0.2284	1.8351
11/26/2002	4684	85.66	1.1767	37.51	0.4403	17.55	0.2299	1.8468
12/17/2002	1074	90.10	1.1784	36.94	0.4410	16.37	0.2302	1.8496
1/7/2003	570	96.47	1.1794	39.50	0.4414	20.11	0.2304	1.8511
1/28/2003	259	102.85	1.1799	38.65	0.4416	17.01	0.2304	1.8519
2/18/2003	68	107.01	1.1800	44.61	0.4416	22.77	0.2305	1.8521
4/1/2003	3930	91.76	1.1864	29.55	0.4437	18.51	0.2318	1.8618
4/21/2003	3713	97.86	1.1929	33.25	0.4459	17.19	0.2329	1.8716
5/13/2003	3478	98.69	1.1990	36.37	0.4481	16.32	0.2339	1.8810
6/10/2003	2238	101.46	1.2030	37.79	0.4496	18.65	0.2347	1.8873
6/24/2003		103.96	1.2030	41.49	0.4496	17.42	0.2347	1.8873
7/15/2003		101.19	1.2030	42.91	0.4496	15.63	0.2347	1.8873

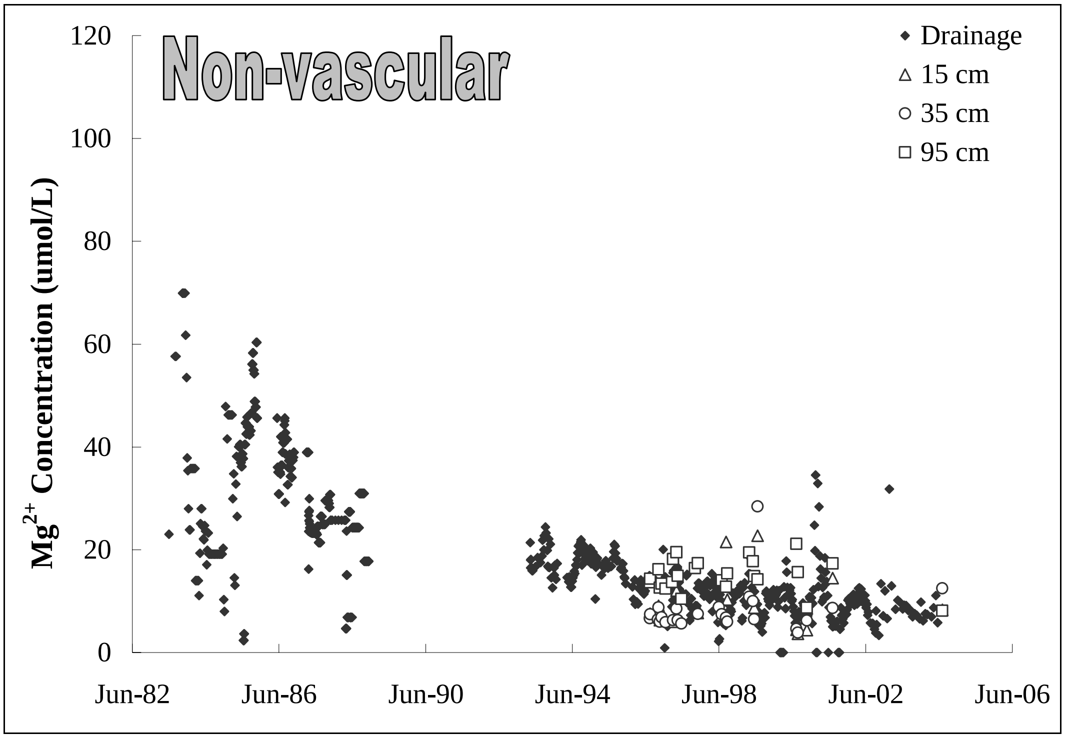
Table B-2 (cont.): Cation concentrations of **Red Pine drainage** water and cumulative fluxes 1983 to 2004 water years.

Date Red Pine	Discharge Volume (L)	Concentration Ca (umol/L)	Cumulative Ca (mol/m^2)	Concentration K (umol/L)	Cumulative K (mol/m^2)	Concentration Mg (umol/L)	Cumulative Mg (mol/m^2)	Cumulative Ca+K+Mg (mol/m^2)
8/5/2003	1988	149.15	1.2083	44.33	0.4512	14.81	0.2352	1.8946
8/26/2003	7217	146.65	1.2271	49.16	0.4575	14.13	0.2370	1.9216
9/16/2003	3080	133.34	1.2344	50.30	0.4603	16.32	0.2379	1.9325
10/7/2003	5446	134.73	1.2474	48.59	0.4650	14.99	0.2393	1.9517
10/28/2003	4425	121.42	1.2570	40.64	0.4682	13.99	0.2404	1.9656
11/25/2003	9614	99.52	1.2740	33.25	0.4738	14.81	0.2430	1.9908
12/9/2003	2537	100.08	1.2785	28.28	0.4751	11.02	0.2435	1.9971
12/30/2003	6174	94.81	1.2889	28.99	0.4783	11.20	0.2447	2.0119
1/20/2004	1000	109.78	1.2908	29.55	0.4788	15.22	0.2450	2.0146
2/10/2004	116	107.01	1.2911	30.12	0.4789	12.57	0.2450	2.0149
3/23/2004	1821	97.31	1.2942	24.64	0.4797	11.75	0.2454	2.0193
4/13/2004	7233	100.35	1.3071	25.39	0.4829	12.87	0.2470	2.0371
5/4/2004	2218	95.23	1.3109	26.26	0.4840	13.03	0.2475	2.0424
5/25/2004		66.12	1.3109	30.70	0.4840	10.70	0.2475	2.0424

Table B-3: Cation concentrations of Red Pine and Non-vascular soil water at 15, 35 and 95 cm depth. Table modified from O’Brien, 2000.

Average Values:		umol/L														
Ca	**NV (cm)**	**7/14/96**	**7/17/96**	**10/4/96**	**10/11/96**	**10/22/96**	**11/11/96**	**12/19/96**	**2/22/97**	**3/3/97**	**4/7/97**	**4/8/97**	**4/19/97**	**5/25/97**	**10/8/97**	**11/5/97**
	15	45	39		45	49	46			57	72		42			47
	35	43	45	44	47	42	48	42		53	63		49	44		46
	95	64	68		71	61	64	59	62	89	88		70	54	76	83
	RP (cm)															
	15	31	27		32	22	25	37								
	35	23	20		33	32	32	46	29	69			41			
	95	81	102			100	132	81		99			119	72		
Mg	**NV (cm)**															
	15	14	8		9	6	7			6	12		7			8
	35	7	7	6	9	6	7	6		6	9		6	6		8
	95	14	14		16	13	13	12	14	18	20		15	10	16	17
	RP (cm)															
	15	12	13		18	5	9	21								
	35	6	4		9	7	6	21	5	12		13	12			
	95	15	19			19	22	15		19		23	21	12		
K	**NV (cm)**															
	15	17	21		17	20	19			7	19		18			15
	35	22	23	19	23	16	18	11		11	14		17	26		15
	95	33	36		31	26	27	21	19	28	27		24	25	34	33
	RP (cm)															
	15	70	50		83	38	61	50								
	35	37	38		39	44	43	56	36	104		38	65			
	95	40	46			48	44	34		38		41	52	27		
Average Values:		**umol/L**														
Ca	**NV (cm)**	**6/3/98**	**7/2/98**	**8/13/98**	**8/27/98**	**4/4/99**	**5/9/99**	**5/21/99**	**6/25/99**	**7/14/00**	**7/30/00**	**10/29/00**	**11/1/00**	**7/10/01**	**7/10/04**	
	15		38	155	69		49	44	97	25	22	20		52	32	
	35	50	38	42	41	59	48	35	52	36	26	32		56	35	
	95		60	73	71	90	75	65	60	45	55	41		58	50	
	RP (cm)															
	15		29	23	24		202	194	157	141	168	28	35	50	53	
	35			38	52	74	59	119		67	40	43		40	55	
	95	65	54	103	101	155	88	155	321	83	71	74	65	105	105	
Mg	**NV (cm)**															
	15		7	22	10		11	9	23	4	4	4		14	8	
	35	9	7	7	6	11	10	7	28	5	4	6		9	13	
	95		14	13	15	19	18	15	14	21	16	9		17	8	
	RP (cm)															
	15		11	7	6		91	55	38	41	39	6	11	20	8	
	35			12	9	24	14	32		24	16	15		18	16	
	95	12	12	19	19	35	22	30	56	13	11	11	10	22	12	
K	**NV (cm)**															
	15		23	31	21		10	20	35	16	13	12		21	35	
	35	26	21	39	23	11	18	18	17	16	15	17		15	38	
	95		38	37	40	24	29	32	33	34	29	21		30	23	
	RP (cm)															
	15		115	174	155		275	197	131	128	135	16	24	26	26	
	35			148	68	77	81	128	111	125	99	105		75	36	
	95	29	36	77	65	53	42	57	104	34	32	36	25	61	79	

Figure B-1: Time series of magnesium concentrations in drainage water (solid symbols) and in soil water (open symbols) in Non-vascular and in Red Pine sandboxes.



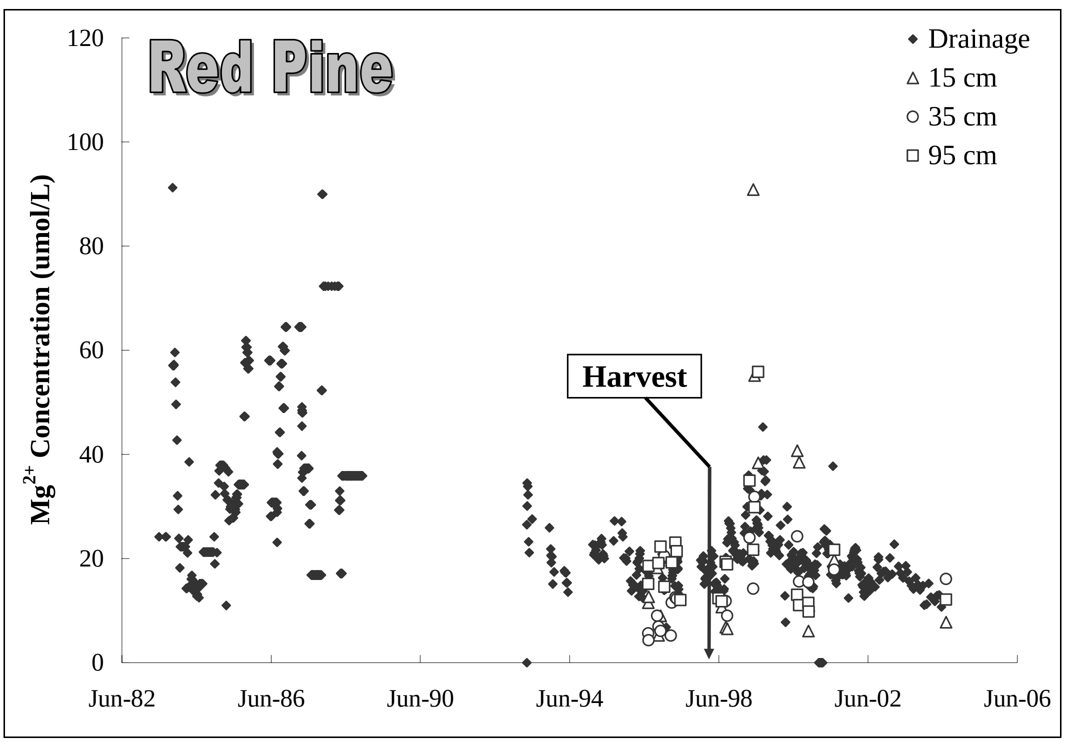


Table B-4: Yearly denudation fluxes of Non-vascular and in Red Pine sandboxes. Yearly precipitation is a sum of daily measurements at rain gauge 22 at Hubbard Brook Experimental Forest (Likens, 2004 - http://www.hubbardbrook.org/research/data/atmos/psd/psd_all.txt).

	Non-vascular				Red pine				
Denudation Fluxes	**Ca**	**Mg**	**K**	**Ca+Mg+K**	**Ca**	**Mg**	**K**	**Ca+Mg+K**	**Precipitation**
Water Years	**mol/m^2/yr**	**mol/m^2/yr**	**mol/m^2/yr**	**mol/m^2/yr**	**mol/m^2/yr**	**mol/m^2/yr**	**mol/m^2/yr**	**mol/m^2/yr**	**mm**
1983-84	0.1993	0.0402	0.0683	0.3079	0.0913	0.0188	0.0356	0.1458	1399
1984-85	0.0819	0.0169	0.0421	0.1409	0.0780	0.0151	0.0307	0.1238	1030
1985-86	0.0804	0.0160	0.0232	0.1196	0.0525	0.0103	0.0150	0.0779	1208
1986-87	0.1013	0.0194	0.0331	0.1538	0.0878	0.0171	0.0216	0.1266	1097
1987-88	0.0992	0.0192	0.0351	0.1535	0.0676	0.0124	0.0171	0.0971	1115
Missing years									
1993-94	0.0390	0.0074	0.0144	0.0608	0.0166	0.0030	0.0057	0.0253	1185
1994-95	0.0437	0.0088	0.0181	0.0705	0.0366	0.0071	0.0157	0.0594	995
1995-96	0.0680	0.0147	0.0311	0.1138	0.0728	0.0139	0.0319	0.1186	1518
1996-97	0.0340	0.0082	0.0172	0.0595	0.0351	0.0082	0.0169	0.0601	1439
1997-98	0.0369	0.0079	0.0179	0.0627	0.0196	0.0039	0.0092	0.0326	1086
1998-99	0.0408	0.0086	0.0178	0.0671	0.0661	0.0163	0.0430	0.1254	1286
1999-00	0.0490	0.0098	0.0176	0.0764	0.1366	0.0272	0.0560	0.2198	1362
2000-01	0.0262	0.0052	0.0102	0.0416	0.0592	0.0111	0.0257	0.0960	936
2001-02	0.0502	0.0094	0.0128	0.0724	0.0851	0.0154	0.0337	0.1342	1143
2002-03	0.0273	0.0050	0.0045	0.0368	0.0575	0.0106	0.0249	0.0929	982
2003-04	0.0585	0.0070	0.0065	0.0720	0.1119	0.0136	0.0359	0.1614	1427

Table B-5: Soil-exchangeable cation concentrations by depth in Non-vascular and Red Pine sandboxes, standard deviation also listed. Locations of 1998 cores are listed in Havig, 2002).

Non-vascular									
mg/kg	Ca	Ca	Ca	Ca	STD (mg/kg)	Ca	Ca	Ca	Ca
Depth (cm)	1985	1988	1998	2002	Depth (cm)	1984	1988	1998	2002
-10	28.50	29.93	12.29	7.44	-10	4.20	8.83	4.32	2.17
-20	35.18	37.50	19.24	9.54	-20	5.36	3.02	5.27	2.92
-30	35.57	45.89	30.59	18.88	-30	4.95	9.79	3.99	3.66
-40	34.55	44.88	34.69	20.46	-40	4.99	3.82	4.58	3.58
-60	38.35	42.37	37.41	35.01	-60	6.00	4.09	6.58	3.36
-80	38.76		41.03	33.06	-80	3.16		5.22	5.56
-120			40.84	29.27	-120			6.00	8.29
mg/kg	Mg	Mg	Mg	Mg	STD (mg/kg)	Mg	Mg	Mg	Mg
Depth (cm)	1985	1988	1998	2002	Depth (cm)	1984	1988	1998	2002
-10	1.39	1.61	0.94	0.67	-10	0.28	0.22	0.24	0.13
-20	1.75	1.72	1.11	0.65	-20	0.35	0.15	0.15	0.19
-30	2.17	2.51	1.44	0.84	-30	0.32	0.37	0.23	0.12
-40	2.28	2.69	1.67	0.81	-40	0.22	0.27	0.12	0.18
-60	2.55	2.54	1.96	1.13	-60	0.36	0.25	0.49	0.13
-80	2.61		2.36	1.18	-80	0.32		0.39	0.20
-120			2.46	1.40	-120			0.24	0.51
mg/kg	K	K	K	K	STD (mg/kg)	K	K	K	K
Depth (cm)	1985	1988	1998	2002	Depth (cm)	1984	1988	1998	2002
-10	6.09	9.57	7.01	3.79	-10	2.19	1.12	2.10	1.30
-20	6.09	7.88	6.10	3.07	-20	1.44	0.66	1.60	1.19
-30	6.11	8.38	7.56	3.16	-30	2.31	0.71	1.28	0.58
-40	7.43	8.37	7.65	3.86	-40	2.26	0.86	1.43	0.66
-60	6.20	8.20	7.87	5.09	-60	1.34	0.93	2.19	0.50
-80	5.85		8.73	5.65	-80	2.67		1.42	0.94
-120			8.43	5.37	-120			1.33	1.98
Red Pine									
mg/kg	Ca	Ca	Ca	Ca	STD (mg/kg)	Ca	Ca	Ca	Ca
Depth (cm)	1984	1988	1998	2002	Depth (cm)	1984	1988	1998	2002
-10	60.35	15.03	24.98	34.35	-10	5.40	1.67	6.66	12.53
-20	51.73	27.16	12.05	21.97	-20	2.98	4.45	1.70	5.36
-30	35.57	37.03	18.04	20.72	-30	4.95	2.24	3.82	4.64
-40	34.55	34.05	25.15	26.08	-40	4.99	2.64	5.95	5.01
-60	38.35	39.20	32.52	31.71	-60	6.00	4.86	6.48	6.39
-80	38.76	47.26	37.21	40.65	-80	3.16	3.86	7.84	5.05
-120		46.32	41.03	44.84	-120		7.69	7.58	7.19
mg/kg	Mg	Mg	Mg	Mg	STD (mg/kg)	Mg	Mg	Mg	Mg
Depth (cm)	1984	1988	1998	2002	Depth (cm)	1984	1988	1998	2002
-10	3.58	1.29	2.23	1.84	-10	0.45	0.20	0.34	0.51
-20	2.58	1.27	1.45	1.57	-20	0.16	0.28	0.19	0.51
-30	2.17	2.04	1.72	1.78	-30	0.32	0.59	0.19	0.48
-40	2.28	1.68	1.79	2.12	-40	0.22	0.23	0.30	0.36
-60	2.55	2.06	1.73	2.25	-60	0.36	0.25	0.26	0.29
-80	2.61	2.82	1.83	2.39	-80	0.32	0.34	0.38	0.28
-120		2.88	2.59	2.25	-120		0.40	1.07	0.15
mg/kg	K	K	K	K	STD (mg/kg)	K	K	K	K
Depth (cm)	1984	1988	1998	2002	Depth (cm)	1984	1988	1998	2002
-10	13.78	13.29	19.99	9.51	-10	1.20	1.33	6.52	3.00
-20	10.10	10.02	11.46	8.43	-20	0.37	1.31	2.03	2.56
-30	6.11	11.08	10.99	9.54	-30	2.31	1.42	2.32	1.77
-40	7.43	7.90	10.53	9.63	-40	2.26	0.93	2.02	1.68
-60	6.20	8.18	10.32	10.53	-60	1.34	0.45	2.05	1.60
-80	5.85	8.85	9.72	11.36	-80	2.67	1.31	1.50	1.11
-120		8.78	9.74	11.58	-120		0.54	1.67	0.67

Table B-6: Base cation concentration in biomass in 1988 (Bormann et al, 1998) and 1998 (Havig, 2002) and rate of change.

1988		Ca	K	Mg	Ca	K	Mg	Ca+Mg+K
Red Pine Biomass	**kg/ha**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**mol/m^2**	**mol/m^2**	**mol/m^2**	**mol/m^2**
Total Biomass	80700	2597	4131	219	0.52	0.85	0.07	1.45
1998		**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**	**Ca+Mg+K**
Red Pine Biomass	**kg/ha**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**mol/m^2**	**mol/m^2**	**mol/m^2**	**mol/m^2**
Foliage	12500	3466	4019	297	0.11	0.13	0.02	0.25
(error)		162	163	25	0.01	0.01	0.00	0.01
Stem	49000	1667	684	41	0.20	0.09	0.01	0.30
(error)		63	28	8	0.01	0.00	0.00	0.01
Live Branch	12800	2485	1817	131	0.08	0.06	0.01	0.15
(error)		81	62	13	0.00	0.00	0.00	0.01
Fine Roots	750	2648	2324	242	0.00	0.00	0.00	0.01
(error)		188	293	69	0.00	0.00	0.00	0.00
Large Roots	6600	1178	710	18	0.02	0.01	0.00	0.03
(error)		96	207	7	0.00	0.00	0.00	0.01
Root Collar	10800	1172	505	24	0.03	0.01	0.00	0.05
(error)		254	246	7	0.01	0.01	0.00	0.01
Dead	15000	2772	536	98	0.10	0.02	0.01	0.13
(error)		99	174	26	0.00	0.01	0.00	0.01
Litter	32915	4639	2324	425	0.38	0.20	0.06	0.63
(error)		117	103	26	0.01	0.01	0.00	0.02
Total Biomass	140365	20026	12917	1276	0.93	0.52	0.10	1.55
(error)		1061	1276	182	0.04	0.04	0.01	0.08
Rate of Change					**mol/m^2/yr**	**mol/m^2/yr**	**mol/m^2/yr**	**mol/m^2/yr**
1983-1988					0.10	0.17	0.01	0.29
1988-1998					0.04	-0.03	0.00	0.01

Table B-7: For the after harvest period (1998-2002) change in biomass cation (Ca + Mg + K) pool was estimated using soil respiration (CO_2) measurements, belowground biomass cation concentrations and biomass carbon content from 1998. We converted the carbon content of biomass to moles of carbon and also the carbon equivalent of the respired CO_2 was converted to moles of carbon. The cation content of biomass was known (Table B-6) then we estimated the cation proportion of biomass expressed as mol of C (0.35%). Using this proportion we calculated how much cation could be equivalent to CO_2 respiration and determined the change in biomass during these 4 years, i.e. the decay of belowground biomass. We used this value in our weathering flux estimation for the after harvest period. Carbon content of biomass and soil respiration CO_2 data was used from White, 2001.

Belowground estimation between 1998-2002								
	Biomass	Biomass	C content	C content	C content	CO^2 release	CO^2 release	CO^2 release
1998	(kg/ha)	(kg)	(gC/m^2)	(gC)	(molC)	($gC/m^2/yr$)	(gC)	(molC)
Fine roots	750	4.22						
Large roots	6600	37.13	876	49275	4106			
Root collar	10800	60.75						
Litter	32915	185.15	1584	89100	7425			
Total		287		138375	11531	1271	71494	5958

	Cations in biomass	Cation% in biomass	Cations = CO^2 release	Cations = CO^2 release
1998	molCa+K+Mg	molC	molCa+K+Mg	$mol/m^2/yr$
Fine roots	0.55			
Large roots	1.77			
Root collar	2.58			
Litter	35.64			
Total	40.54	0.35%	20.95	-0.12

Table B-8: Chemical weathering and denudation calculations for Ca, Mg and K.

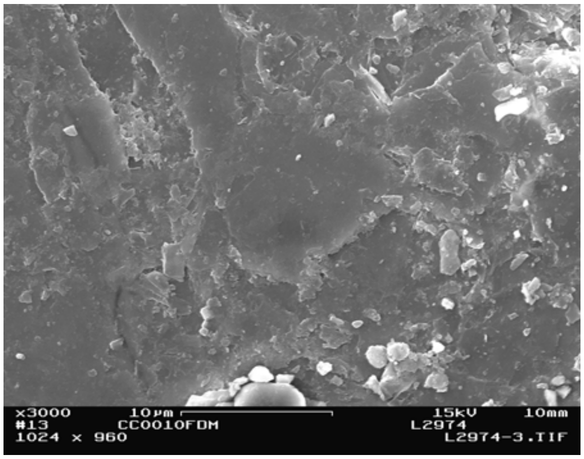
Weathering = Drainage - Precip + delta soil + delta biomass
Denudation = Drainage - Precip

NV	Ca	K	Mg	Total	RP	Ca	K	Mg	Total
1985-1988	mol/m^2/yr	mol/m^2/yr	mol/m^2/yr	mol/m^2/yr	**1985-1988**	mol/m^2/yr	mol/m^2/yr	mol/m^2/yr	mol/m^2/yr
Drainage	0.13	0.05	0.03	0.21	**Drainage**	0.08	0.02	0.01	0.11
Precip	0.00	0.00	0.00	0.00	**Precip**	0.00	0.00	0.00	0.00
Delta soil	0.07	0.02	0.01	0.10	**Delta soil**	0.06	0.03	0.00	0.09
Delta biomass	0.00	0.00	0.00	0.00	**Delta biomass**	0.10	0.17	0.01	0.29
Denudation	**0.13**	**0.05**	**0.02**	**0.20**	**Denudation**	**0.07**	**0.02**	**0.01**	**0.11**
Weathering	**0.20**	**0.07**	**0.03**	**0.30**	**Weathering**	**0.24**	**0.23**	**0.03**	**0.49**
NV	**Ca**	**K**	**Mg**	**Total**	**RP**	**Ca**	**K**	**Mg**	**Total**
1988-1998	mol/m^2/yr	mol/m^2/yr	mol/m^2/yr	mol/m^2/yr	**1988-1998**	mol/m^2/yr	mol/m^2/yr	mol/m^2/yr	mol/m^2/yr
Drainage	0.06	0.02	0.01	0.09	**Drainage**	0.04	0.01	0.01	0.05
Precip	0.00	0.00	0.00	0.00	**Precip**	0.00	0.00	0.00	0.00
Delta soil	-0.04	0.00	-0.01	-0.05	**Delta soil**	-0.06	0.02	0.00	-0.05
Delta biomass	0.00	0.00	0.00	0.00	**Delta biomass**	0.04	-0.03	0.00	0.01
Denudation	**0.05**	**0.02**	**0.01**	**0.09**	**Denudation**	**0.03**	**0.01**	**0.01**	**0.05**
Weathering	**0.01**	**0.02**	**0.00**	**0.04**	**Weathering**	**0.01**	**-0.01**	**0.00**	**0.01**
NV	**Ca**	**K**	**Mg**	**Total**	**RP**	**Ca**	**K**	**Mg**	**Total**
1998-2002	mol/m^2/yr	mol/m^2/yr	mol/m^2/yr	mol/m^2/yr	**1998-2002**	mol/m^2/yr	mol/m^2/yr	mol/m^2/yr	mol/m^2/yr
Drainage	0.04	0.01	0.01	0.06	**Drainage**	0.09	0.04	0.02	0.14
Precip	0.00	0.00	0.00	0.00	**Precip**	0.00	0.00	0.00	0.00
Delta soil	-0.09	0.00	-0.01	-0.10	**Delta soil**	-0.05	-0.06	0.02	-0.08
Delta biomass	0.00	0.00	0.00	0.00	**Delta biomass**	0.00	0.00	0.00	-0.12
Denudation	**0.04**	**0.01**	**0.01**	**0.06**	**Denudation**	**0.08**	**0.04**	**0.02**	**0.14**
Weathering	**-0.05**	**0.01**	**-0.01**	**-0.04**	**Weathering**	**0.04**	**-0.02**	**0.04**	**-0.07**

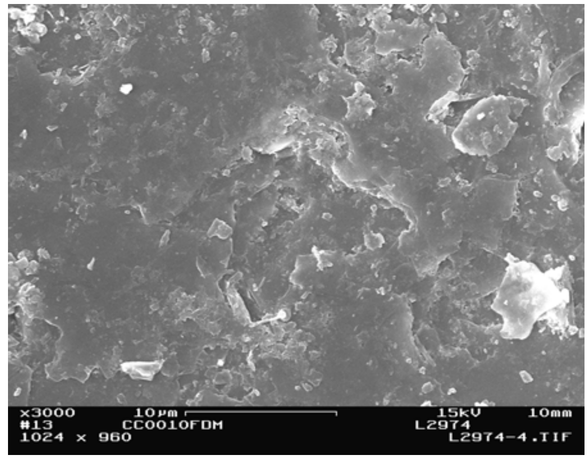
APPENDIX C

Representative sandbox SEM images of shallow (0-30 cm) soil minerals

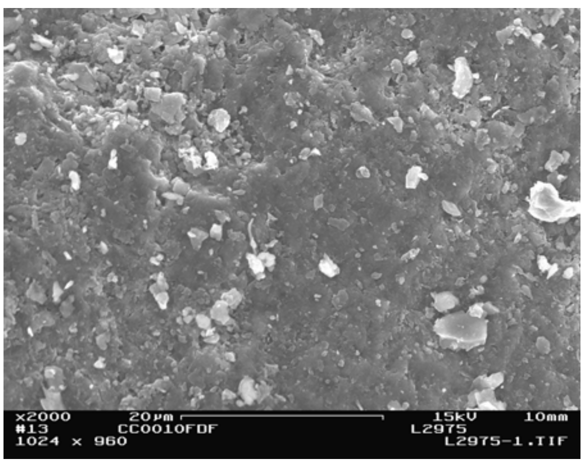
Figure C-1: SEM investigation of the **control sandbox** (O'Brien, 2000) material (no organic layer was rototilled into the sediment). A portion of the samples were freeze dried to preserve residues on the surface.



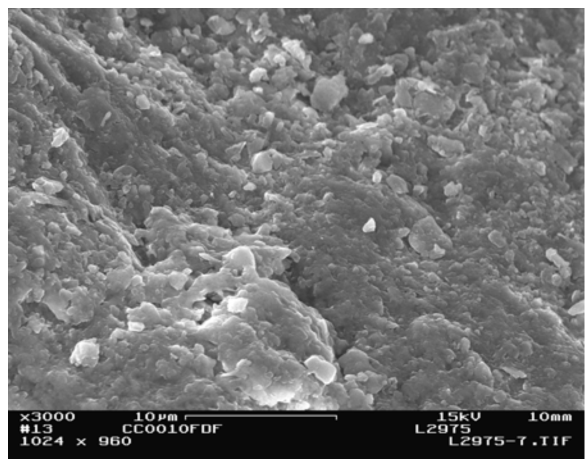
Biotite mica surface



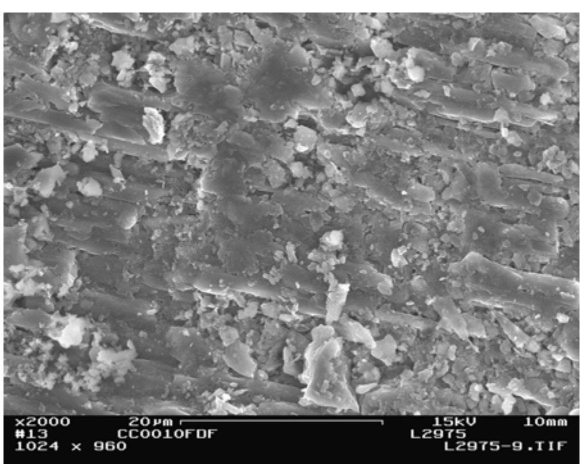
Biotite mica surface



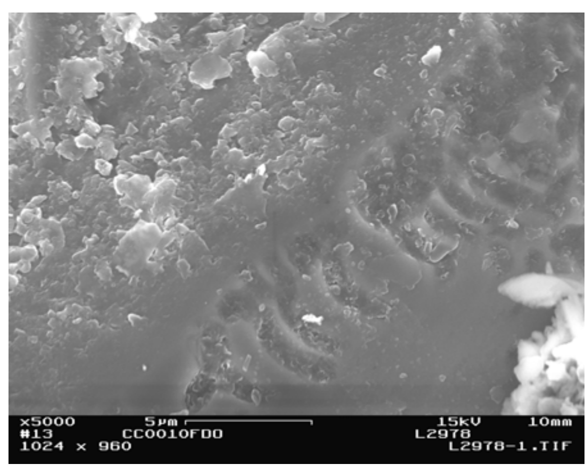
Feldspar surface



Feldspar surface

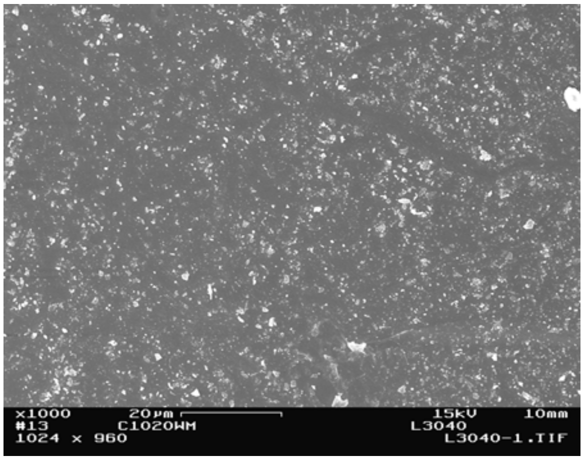


Feldspar surface

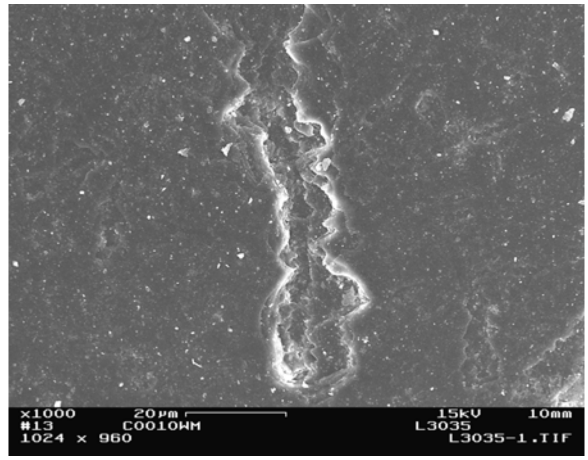


Garnet surface

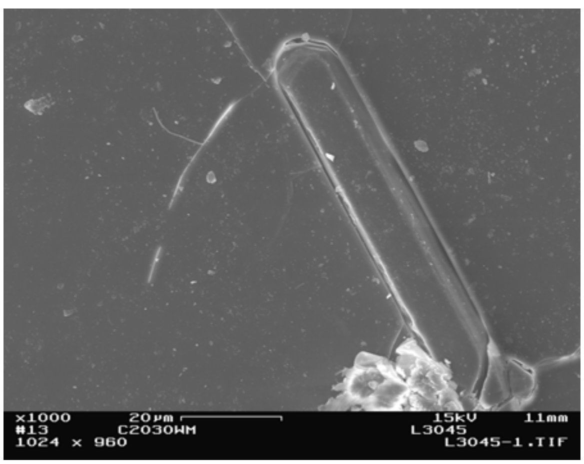
Figure C-1 (cont.): SEM investigation of the **control sandbox** (O'Brien, 2000) material (no organic layer was rototilled into the sediment). A portion of the samples were treated with hydrogen peroxide to remove any organic residue or coatings.



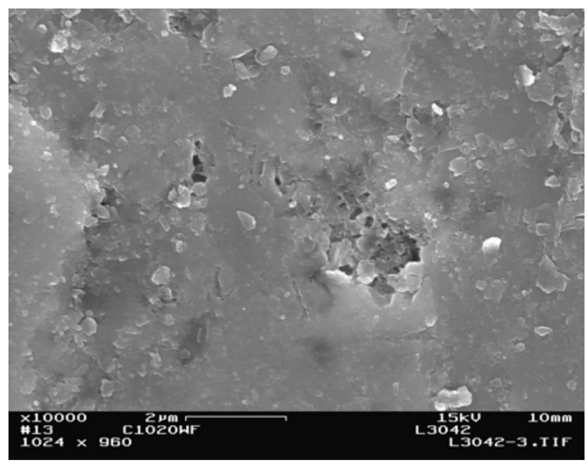
Biotite surface



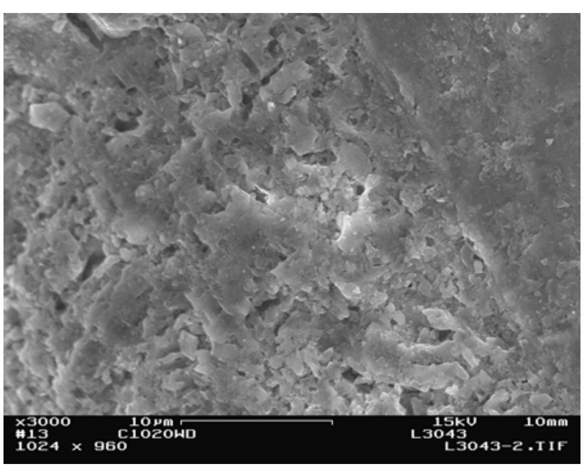
Biotite surface with large dissolution channel



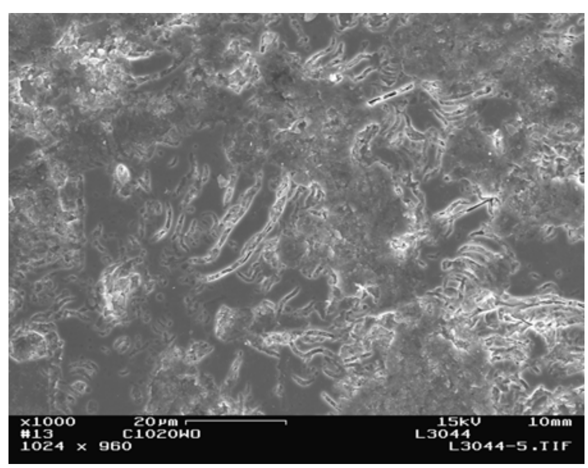
Biotite with inclusion



Feldspar surface

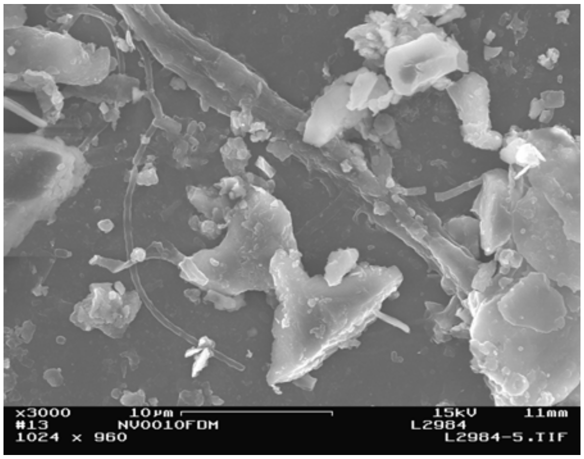


Dark mineral (amphibole or pyroxene) surface

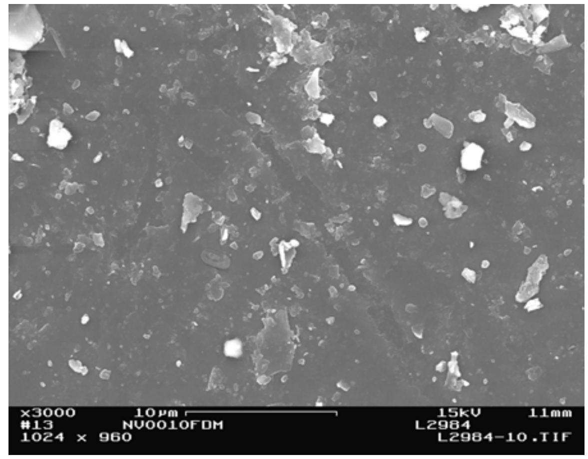


Garnet surface

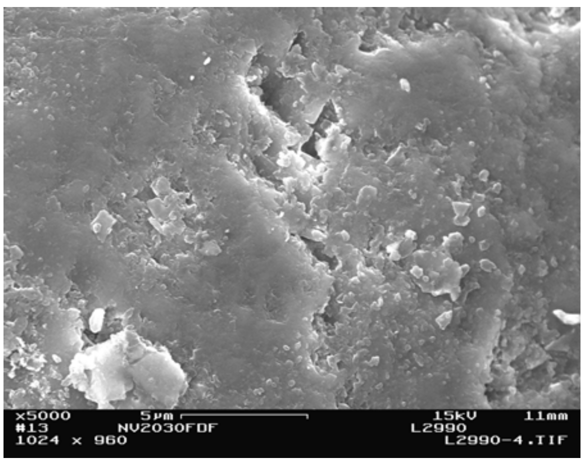
Figure C-2: SEM investigation of the **Non-vascular sandbox** material. A portion of the samples were freeze dried to preserve residues on the surface.



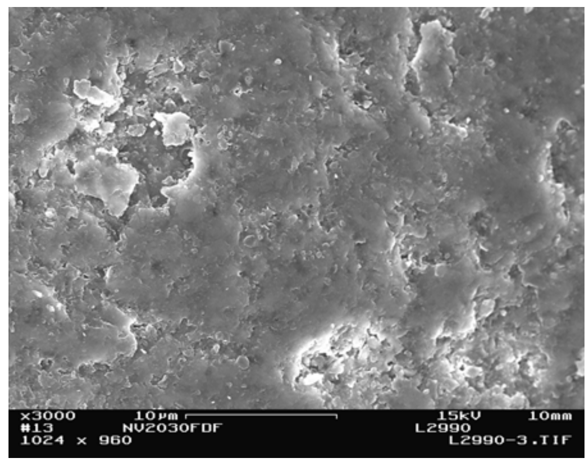
Biotite surface - filamentous organism



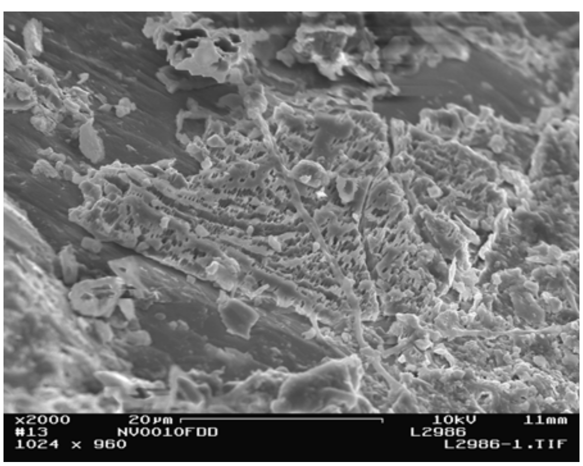
Biotite surface - small dissolution channel



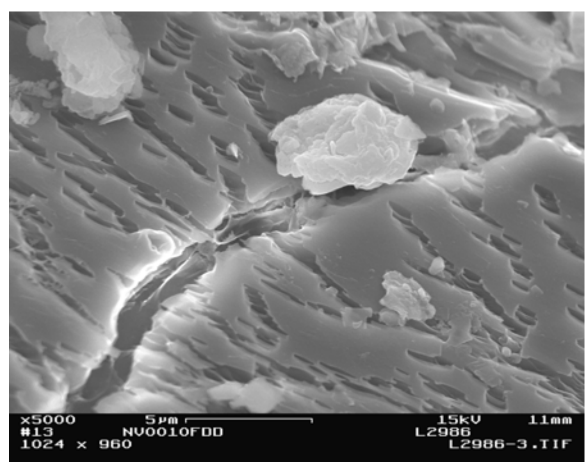
Feldspar surface



Feldspar surface

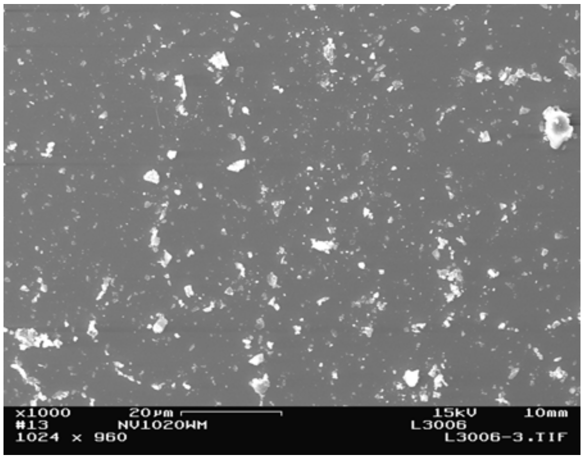


Amphibole surface

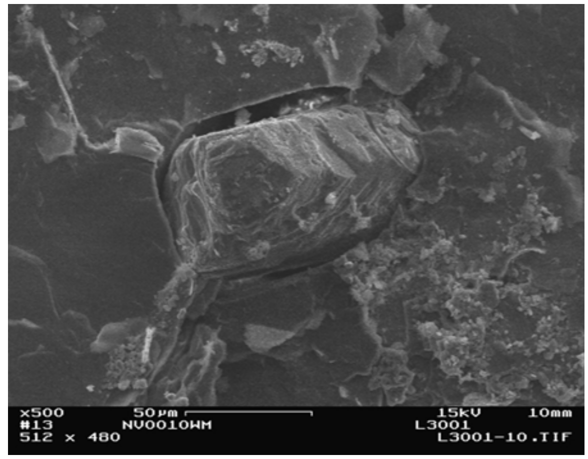


Amphibole surface

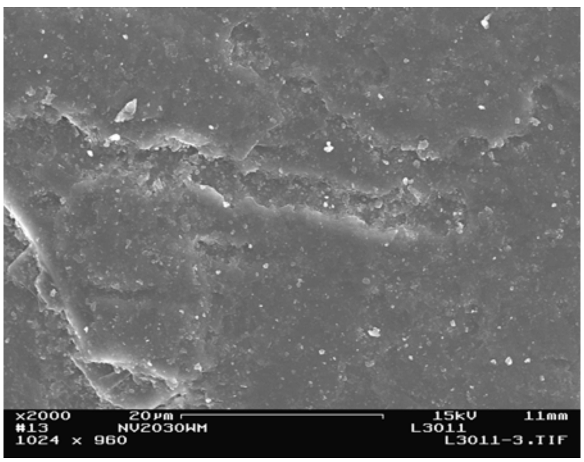
Figure C-2 (cont.): SEM investigation of the **Non-vascular sandbox** material. A portion of the samples were treated with hydrogen peroxide to remove any organic residue or coatings.



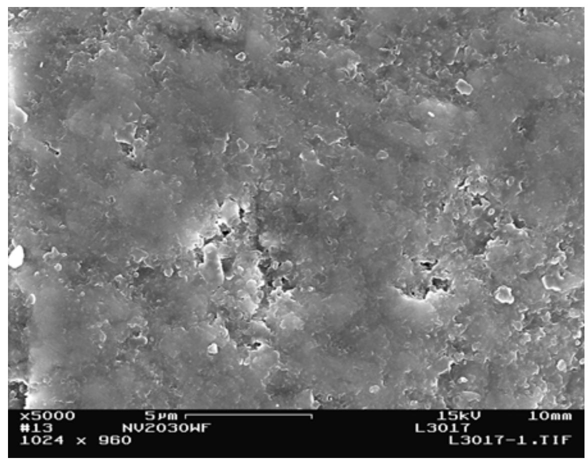
Biotite surface



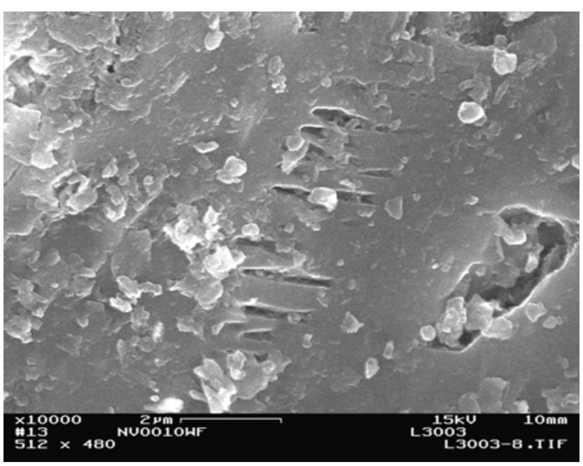
Biotite surface



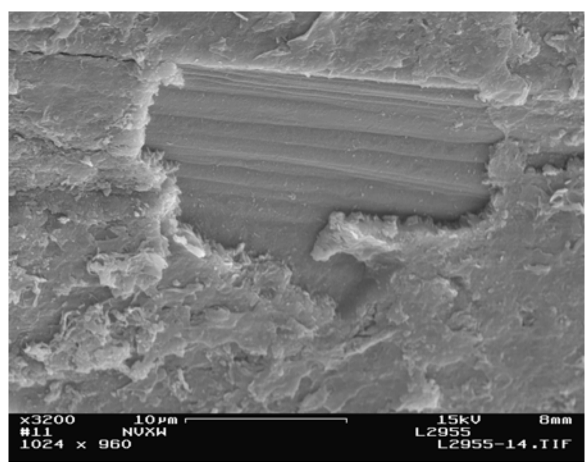
Biotite surface



Feldspar surface

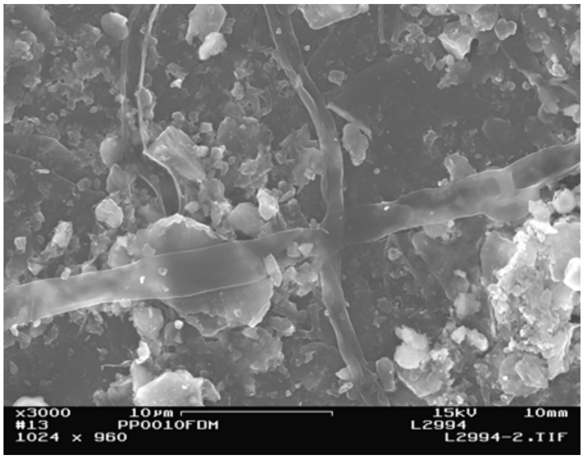


Feldspar surface

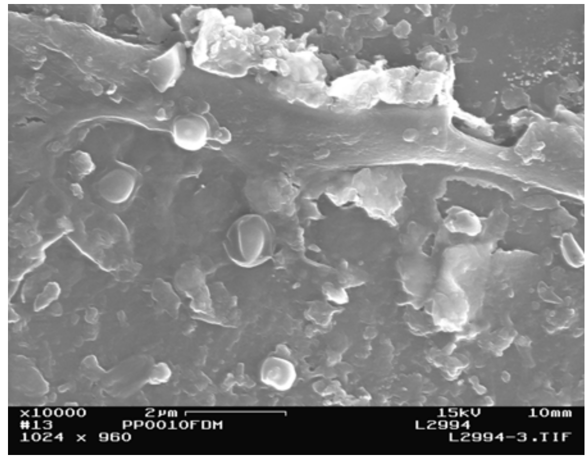


Feldspar surface

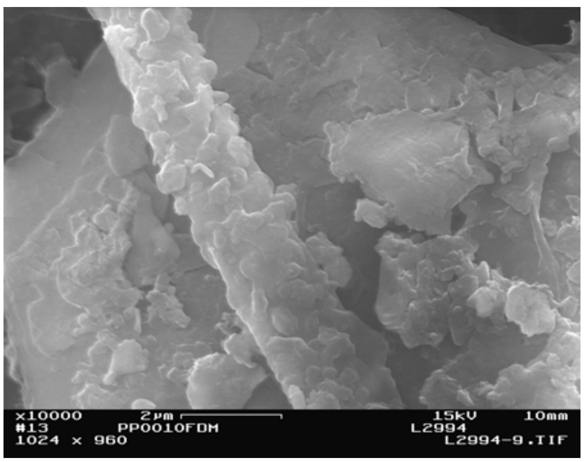
Figure C-3: SEM investigation of the **Pitch pine sandbox** material (analog to red pine). A portion of the samples were freeze dried to preserve residues on the surface.



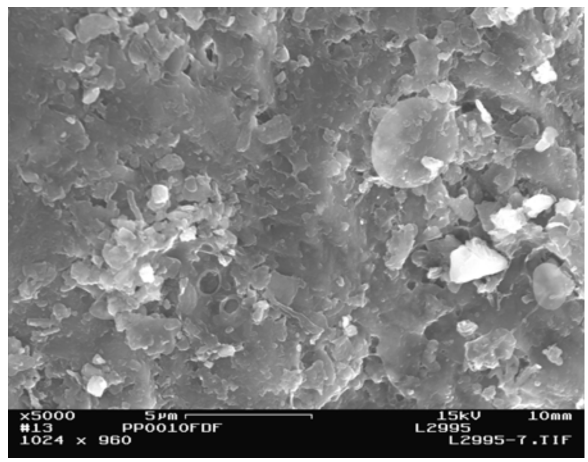
Biotite surface – hyphae



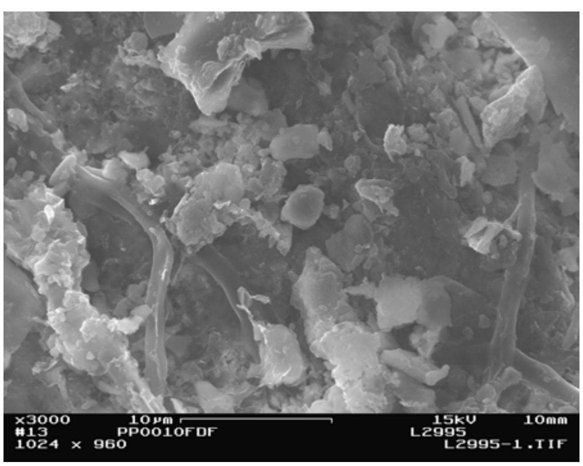
Biotite surface – bacteria in biofim



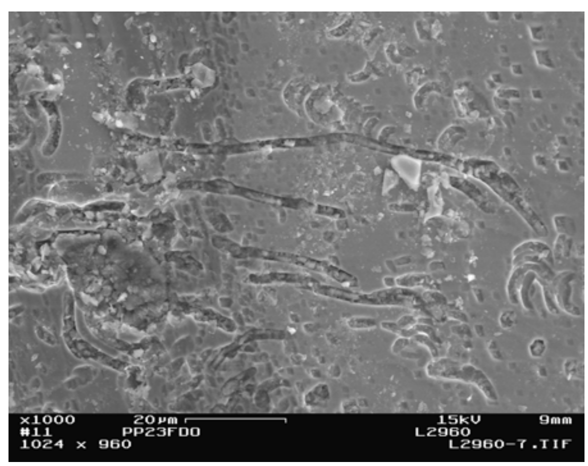
Biotite surface – bumpy hypha



Feldspar surface – bacterial cells

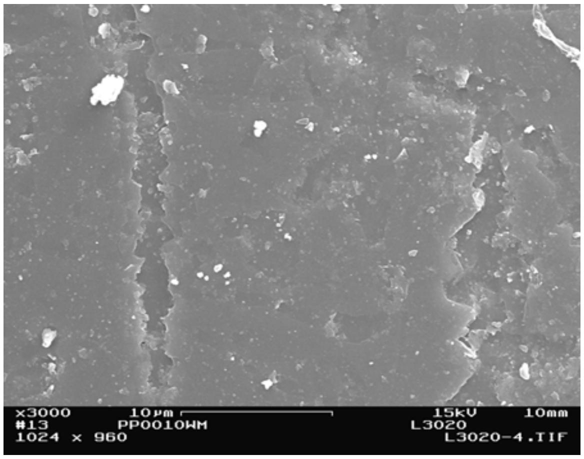


Feldspar surface – hyphae

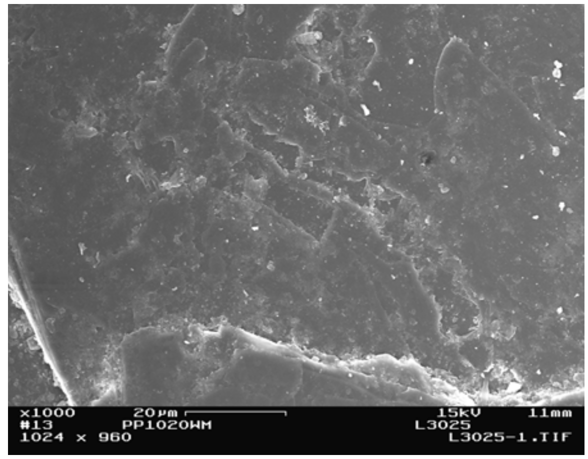


Garnet surface – curved dissolution channels

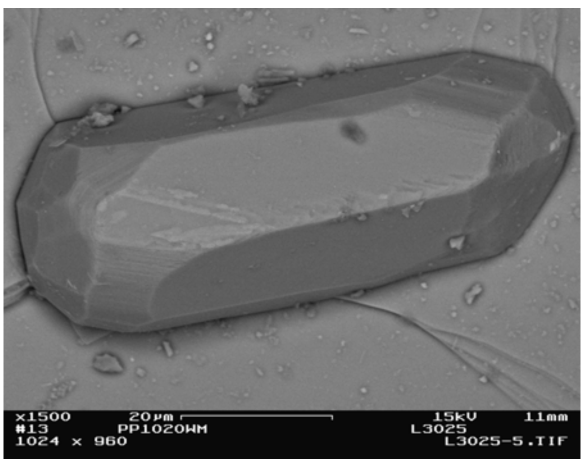
Figure C-3 (cont.): SEM investigation of the **Pitch pine sandbox** material (analog to red pine). A portion of the samples were treated with hydrogen peroxide to remove any organic residue or coatings.



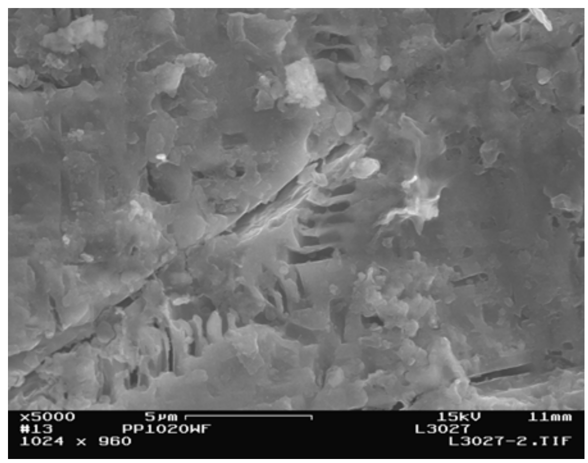
Biotite surface – dissolution channels



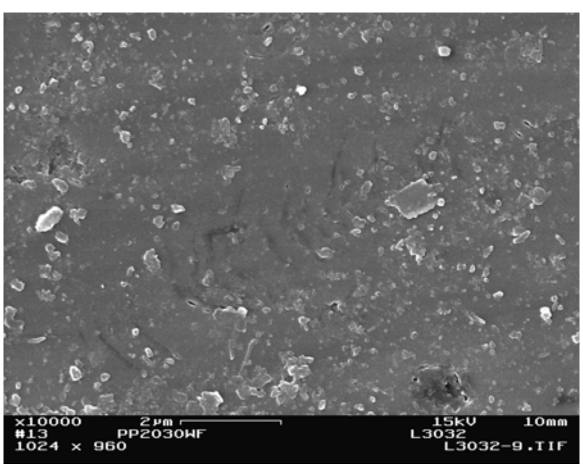
Biotite surface – dissolution channels



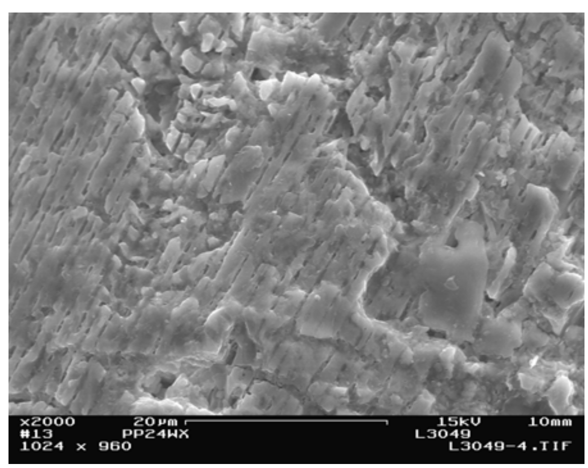
Biotite surface – apatite inclusion



Feldspar surface – dissolution feature



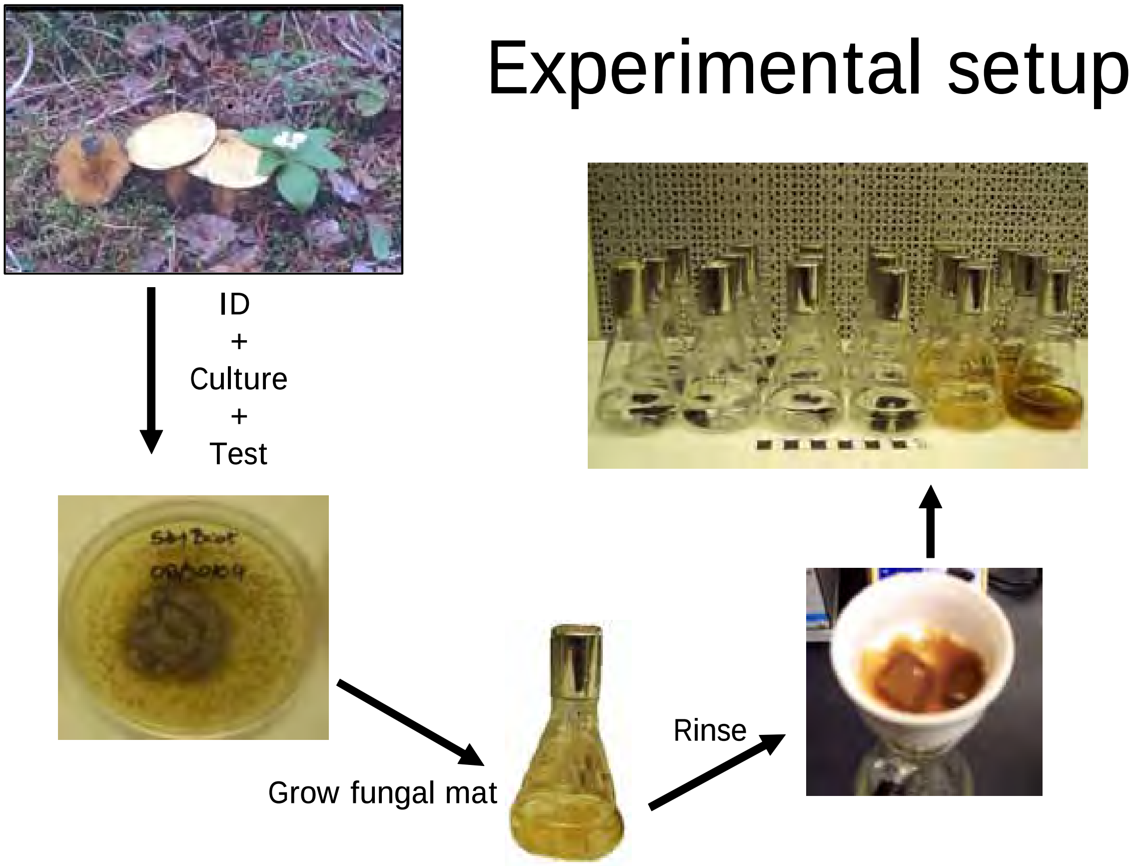
Feldspar surface – dissolution feature



Feldspar surface – dissolution feature

APPENDIX D

Liquid-culture experimental set-up schematics



Shaken-inorganic on a shaker table

Nonshaken-inorganic on the bench top (nonshaken-organic had the same set-up; edge also but with fewer treatments and replicates)

APPENDIX E

Liquid, fungal biomass and mass-balance data in four liquid-culture experiments

Table E-1: Potassium and magnesium concentrations in liquid of **the shaken-inorganic** liquid-culture experiment, all replicates, averages and standard deviations are listed in mg/L for 4, 6, 9 and 12 weeks. 10 ml of liquid was sampled at each sampling time. At 4 weeks all sampled aliquots were contaminated with potassium by the pH meter, and inorganic pH controls were also contaminated.

Unit (mg/L)	Volume	K	K	K	K	Mg	Mg	Mg	Mg
Sample ID	(ml)	4 weeks	6 weeks	9 weeks	12 weeks	4 weeks	6 weeks	9 weeks	12 weeks
Detection limits		0.70				0.04			
BGF-A	10		19.23	30.07	24.77	0.46	0.61	0.52	0.69
BGF-B	10		20.13	22.02	17.18	0.41	0.56	0.38	0.45
BGF-C	10		19.69	21.71	16.62	0.36	0.58	0.25	0.29
GF-A	10		19.60	26.04	21.10	0.19	0.31	0.11	0.13
GF-B	10		20.67	29.69	17.63	0.33	0.35	0.18	0.22
GF-C	10		21.81	34.59	15.87	0.33	0.34	0.20	0.22
BG-A	10		23.17	39.65	21.44	0.12	0.12	0.08	0.08
BG-B	10		24.73	42.93	19.16	0.10	0.10	0.08	0.06
BG-C	10		22.94	31.30	18.84	0.06	0.05	0.09	0.14
pH4-A	10	81	292	179	248	0.28	0.10	0.08	0.09
pH4-B	10	111	210	102	171	0.09	0.08	0.06	0.05
pH4-C	10	134	250	111	141	0.11	0.13	0.05	0.05
pH5-A	10	122	240	106	158	0.12	0.13	0.04	0.06
pH5-B	10	119	282	218	252	0.09	0.12	0.06	0.05
pH5-C	10	492	419	393	485	0.06	0.04	0.04	0.07
pH6-A	10	382	774	502	842	0.10	0.13	0.05	0.07
pH6-B	10	362	595	444	649	0.26	0.26	0.18	0.18
pH6-C	10	678	1000	664	733	0.31	0.31	0.16	0.17
Glucose	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Johnson DIW	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average									
BGF			19.68	24.60	19.52	0.41	0.58	0.38	0.48
GF			20.69	30.11	18.20	0.28	0.34	0.16	0.19
BG			23.61	37.96	19.81	0.10	0.09	0.08	0.09
pH4		108	251	131	187	0.16	0.10	0.06	0.06
pH5		245	313	239	298	0.09	0.10	0.04	0.06
pH6		474	790	536	741	0.22	0.24	0.13	0.14
Standard Dev									
BGF			0.45	4.74	4.55	0.05	0.02	0.14	0.20
GF			1.11	4.29	2.66	0.08	0.02	0.05	0.05
BG			0.97	6.00	1.42	0.03	0.04	0.01	0.04
pH4		27	41	42	55	0.10	0.02	0.02	0.03
pH5		215	93	145	169	0.03	0.05	0.01	0.01
pH6		176	203	114	97	0.11	0.09	0.07	0.06

Table E-1 (cont.): Iron concentrations and pH in liquid of **the shaken-inorganic** liquid-culture experiment, all replicates, averages and standard deviations are listed in mg/L for 4, 6, 9 and 12 weeks. 10 ml of liquid was sampled at each sampling time. At 4 weeks the pH measurements were not accurate due to the potassium contamination.

Unit (mg/L)	Fe	Fe	Fe	Fe	pH	pH	pH	pH	pH
Sample ID	4 weeks	6 weeks	9 weeks	12 weeks	Initial	4 weeks	6 weeks	9 weeks	12 weeks
Detection limits	0.03								
BGF-A	0.09	0.16	0.36	0.11	6		3.3	2.6	2.6
BGF-B	0.04	0.17	0.17	0.11	6		3.7	3.0	3.0
BGF-C	0.10	0.34	0.26	0.17	6		3.9	3.8	3.7
GF-A	0.03	0.02	0.00	0.02	6		4.2	3.6	3.4
GF-B	0.00	0.02	0.00	0.02	6		4.0	2.9	2.9
GF-C	0.00	0.04	0.03	0.04	6		4.1	2.9	2.9
BG-A	0.07	0.15	0.19	0.16	6		5.2	4.7	4.6
BG-B	0.23	0.36	0.32	0.27	6		4.7	4.2	4.2
BG-C	0.14	0.24	0.47	0.72	6		4.6		
pH4-A	0.06	0.21	0.22	0.22	4		4.4	4.0	4.0
pH4-B	0.14	0.21	0.12	0.19	4		4.3	4.0	4.1
pH4-C	0.13	0.19	0.10	0.13	4		4.2	4.0	4.1
pH5-A	0.02	0.03	0.03	0.00	5		6.0	5.0	4.6
pH5-B	0.03	0.09	0.05	0.00	5		5.1	5.1	4.9
pH5-C	0.02	0.00	0.05	0.08	5			5.1	4.7
pH6-A	0.06	0.14	0.07	0.06	6		4.9	7.0	4.9
pH6-B	0.00	0.00	0.02	0.00	6		6.3	6.0	5.7
pH6-C	0.05	0.05	0.02	0.00	6		5.9	6.1	5.9
Glucose	0.00	0.00	0.00	0.00					
Johnson DIW	0.00	0.00	0.00	0.00					
Average									
BGF	0.08	0.22	0.26	0.13	6.00		3.63	3.16	3.12
GF	0.01	0.00	0.00	0.02	6.00		4.10	3.15	3.08
BG	0.15	0.25	0.33	0.38	6.00		4.83	4.44	4.42
pH4	0.11	0.20	0.15	0.18	4.00		4.00	4.00	4.00
pH5	0.02	0.04	0.04	0.03	5.00		5.00	5.00	5.00
pH6	0.04	0.06	0.04	0.02	6.00		6.00	6.00	6.00
Standard Dev									
BGF	0.03	0.10	0.09	0.03	0.00		0.31	0.61	0.52
GF	0.02	0.01	0.02	0.01	0.00		0.10	0.41	0.32
BG	0.08	0.10	0.14	0.30	0.00		0.32	0.32	0.28
pH4	0.04	0.01	0.06	0.05	0.00		0.00	0.00	0.00
pH5	0.00	0.05	0.01	0.05	0.00		0.00	0.00	0.00
pH6	0.03	0.07	0.03	0.04	0.00		0.00	0.00	0.00

Table E-2: Potassium and magnesium concentrations in liquid of **the nonshaken-inorganic** liquid-culture experiment, all replicates, averages and standard deviations are listed in mg/L for 4, 6, 9 and 12 weeks. 10 ml of liquid was sampled at each sampling time. Inorganic pH controls were contaminated with potassium by the pH meter.

Unit (mg/L)	Volume	K	K	K	K	Mg	Mg	Mg	Mg
Sample ID	(ml)	4 weeks	6 weeks	9 weeks	12 weeks	4 weeks	6 weeks	9 weeks	12 weeks
Detection limits		**0.70**				**0.04**			
BGF-A	10	63.53	30.89	17.25	12.83	0.33	0.21	0.34	0.40
BGF-B	10	39.26	27.42	18.75	13.36	0.96	0.62	1.03	1.22
BGF-C	10								
GF-A	10	42.61	28.33	22.41	17.66	1.14	0.76	1.10	1.75
GF-B	10	51.82	30.39	20.89	15.57	0.74	0.51	1.28	0.79
GF-C	10								
BG-A	10	53.37	41.82	19.21	7.91	0.04	0.00	0.07	0.06
BG-B	10	47.79	44.09	14.79	7.67	0.04	0.02	0.04	0.06
BG-C	10			11.80	6.99	0.05	0.01	0.04	0.06
pH4-A	10	54.18	74.70	99.67	108.60	0.05	0.05	0.07	0.11
pH4-B	10	54.71	67.44	86.41	88.22	0.00	0.04	0.05	0.07
pH4-C	10	72.06	80.83		104.30	0.05	0.04		0.08
pH5-A	10	48.68	59.56	119.30	126.30	0.00	0.00	0.05	0.06
pH5-B	10	46.08	71.73	98.86	136.70	0.00	0.00	0.03	0.06
pH5-C	10	52.93	64.81	89.99	123.80	0.00	0.00	0.04	0.05
pH6-A	10	89.57	160.30	269.80	260.70	0.04	0.05	0.04	0.07
pH6-B	10	58.33	115.89	235.80	239.50	0.00	0.00	0.03	0.06
pH6-C	10	54.20	88.11	171.20	187.70	0.09	0.00	0.00	0.00
Glucose	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Johnson DIW	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average									
BGF		51.40	29.16	18.00	13.10	0.64	0.42	0.68	0.81
GF		47.22	29.36	21.65	16.62	0.94	0.64	1.19	1.27
BG		50.58	42.96	15.27	7.52	0.04	0.01	0.05	0.06
pH4		60.32	74.32	93.04	100.37	0.03	0.04	0.06	0.09
pH5		49.23	65.37	102.72	128.93	0.00	0.00	0.04	0.06
pH6		67.37	121.43	225.60	229.30	0.04	0.02	0.02	0.04
Standard Dev									
BGF		17.16	2.45	1.06	0.37	0.45	0.29	0.48	0.58
GF		6.51	1.46	1.07	1.48	0.28	0.18	0.13	0.68
BG		3.95	1.61	3.73	0.48	0.00	0.01	0.02	0.00
pH4		10.17	6.70	9.38	10.74	0.03	0.01	0.01	0.02
pH5		3.46	6.10	15.03	6.84	0.00	0.00	0.01	0.00
pH6		19.34	36.41	50.09	37.55	0.05	0.03	0.02	0.04

Table E-2 (cont.): Iron concentrations and pH in liquid of **the nonshaken-inorganic** liquid-culture experiment, all replicates, averages and standard deviations are listed in mg/L for 4, 6, 9 and 12 weeks. 10 ml of liquid was sampled at each sampling time.

Unit (mg/L)	Fe	Fe	Fe	Fe	pH	pH	pH	pH	pH
Sample ID	4 weeks	6 weeks	9 weeks	12 weeks	Initial	4 weeks	6 weeks	9 weeks	12 weeks
Detection limits	0.03								
BGF-A	0.06	0.02	0.20	0.13	6	3.56	3.33	3.28	3.70
BGF-B	0.13	0.08	0.57	0.39	6	2.69	2.69	2.69	3.28
BGF-C									
GF-A	0.06	0.02	0.15	0.05	6	3.55	3.41	3.41	3.57
GF-B	0.14	0.14	0.21	0.39	6	2.58	2.50	2.41	2.20
GF-C									
BG-A	0.10	0.05	0.15	0.16	6	4.65	4.32	3.95	4.07
BG-B	0.07	0.02	0.12	0.16	6	4.98	4.50	4.14	4.14
BG-C	0.08	0.02	0.10	0.13	6	4.56	4.33	4.15	3.71
pH4-A	0.14	0.05	0.14	0.16	4	4.01	3.99	4.02	4.07
pH4-B	0.10	0.06	0.11	0.14	4	4.02	4.00	4.05	4.19
pH4-C	0.13	0.09		0.17	4	4.03	4.00		4.19
pH5-A	0.00	0.00	0.00	0.02	5	5.02	5.11	5.00	5.18
pH5-B	0.04	0.00	0.00	0.04	5	5.00	4.99	4.97	4.74
pH5-C	0.00	0.00	0.02	0.04	5	5.05	5.07	5.21	4.66
pH6-A	0.00	0.00	0.00	0.00	6	6.07	6.05	6.12	5.08
pH6-B	0.00	0.00	0.00	0.00	6	5.88	5.87	5.88	5.51
pH6-C	0.07	0.00	0.00	0.00	6	6.08	5.92	5.86	5.73
Glucose	0.00	0.00	0.00	0.00					
Johnson DIW	0.00	0.00	0.00	0.00					
Average									
BGF	0.10	0.05	0.39	0.26	6	3.13	3.01	2.98	3.49
GF	0.10	0.08	0.18	0.22	6	3.06	2.95	2.91	2.88
BG	0.08	0.03	0.12	0.15	6	4.73	4.38	4.08	3.97
pH4	0.12	0.06	0.12	0.15	4	4.02	3.99	4.03	4.15
pH5	0.01	0.00	0.01	0.03	5	5.02	5.05	5.06	4.86
pH6	0.02	0.00	0.00	0.00	6	6.01	5.95	5.95	5.44
Standard Dev									
BGF	0.05	0.04	0.27	0.19		0.61	0.46	0.42	0.30
GF	0.06	0.09	0.05	0.24		0.69	0.64	0.71	0.97
BG	0.01	0.01	0.02	0.02		0.23	0.10	0.11	0.23
pH4	0.02	0.02	0.02	0.02		0.01	0.01	0.02	0.07
pH5	0.02	0.00	0.01	0.01		0.03	0.06	0.13	0.28
pH6	0.04	0.00	0.00	0.00		0.11	0.09	0.14	0.33

Table E-3: Potassium and magnesium concentrations in liquid of **the nonshaken-organic** liquid-culture experiment, all replicates, averages and standard deviations are listed in mg/L for 6, 9 and 12 weeks. 10 ml of liquid was sampled at each sampling time.

Unit (mg/L)	Volume	K	K	K	Mg	Mg	Mg
Sample ID	(ml)	6 weeks	9 weeks	12 weeks	6 weeks	9 weeks	12 weeks
Detection limits		0.70			0.04		
BGF-A	10	1.86	1.95	3.15	0.10	0.13	0.29
BGF-B	10	2.85	3.27	2.39	0.15	0.19	0.25
BGF-C	10	4.76	5.88	3.39	0.38	0.44	0.41
GF-A	10	5.85	6.83	2.58	0.24	0.29	0.23
GF-B	10	0.62	3.91	0.62	0.07	0.10	0.08
GF-C	10	0.36		3.00	0.06		0.13
pH3-A	10	0.00	0.00	0.00	0.02	0.04	0.19
pH3-B	10	0.00	0.00	0.00	0.01	0.02	0.14
pH3-C	10	0.00	0.00	0.00	0.01	0.03	0.16
pH4-A	10	0.17	0.00	1.00	0.02	0.01	0.11
pH4-B	10	0.32	0.00	1.12	0.00	0.00	0.07
pH4-C	10	0.32	0.00	1.07	0.02	0.01	0.12
pH5-A	10	0.00	0.00	2.64	0.00	0.00	0.06
pH5-B	10	0.00	0.00	2.55	0.01	0.00	0.09
pH5-C	10	0.00	0.87	2.52	0.00	0.01	0.05
pH6-A	10	0.00	0.00	0.83	0.00	0.02	0.04
pH6-B	10	0.00	0.00	1.12	0.00	0.01	0.05
pH6-C	10	0.22	0.00	0.91	0.00	0.01	0.06
Glucose	20	0.00	0.00	0.00	0.00	0.00	0.00
Johnson DIW	20	0.00	0.00	0.00	0.00	0.00	0.00
Average							
BGF		3.16	3.70	2.98	0.21	0.25	0.32
GF		2.28	5.37	2.07	0.13	0.20	0.15
BG		0.00	0.00	0.00	0.01	0.03	0.16
pH4		0.27	0.00	1.06	0.01	0.01	0.10
pH5		0.00	0.29	2.57	0.00	0.00	0.07
pH6		0.07	0.00	0.95	0.00	0.02	0.05
Standard Dev							
BGF		1.47	2.00	0.52	0.15	0.17	0.08
GF		3.10	2.07	1.27	0.10	0.13	0.08
BG		0.00	0.00	0.00	0.00	0.01	0.02
pH4		0.08	0.00	0.06	0.01	0.01	0.02
pH5		0.00	0.51	0.07	0.00	0.01	0.02
pH6		0.13	0.00	0.15	0.00	0.01	0.01

Table E-3 (cont.): Iron concentrations and pH in liquid of **the nonshaken-organic** liquid-culture experiment, all replicates, averages and standard deviations are listed in mg/L for 6, 9 and 12 weeks. 10 ml of liquid was sampled at each sampling time.

Unit (mg/L)	Fe	Fe	Fe	pH	pH	pH	pH
Sample ID	6 weeks	9 weeks	12 weeks	Initial	6 weeks	9 weeks	12 weeks
Detection limits	0.03						
BGF-A	0.01	0.00	0.17	4.68	4.33	4.04	2.78
BGF-B	0.00	0.03	0.07	4.68	3.84	3.29	2.85
BGF-C	0.33	0.28	0.22	4.80	2.37	2.17	2.51
GF-A	0.05	0.09	0.07	4.83	2.28	2.14	2.41
GF-B	0.04	0.08	0.05	4.78	2.53	2.41	2.63
GF-C	0.00		0.04	4.83	4.07		2.82
BG-A	0.17	0.22	0.47	3.02	3.10	3.07	3.08
BG-B	0.12	0.16	0.42	3.02	3.05	3.02	3.02
BG-C	0.13	0.16	0.49	3.02	3.01	3.00	3.03
pH4-A	0.09	0.14	0.44	3.96	4.02	4.01	4.06
pH4-B	0.04	0.08	0.49	3.96	4.03	4.00	4.05
pH4-C	0.10	0.11	0.32	3.96	4.03	4.00	4.05
pH5-A	0.06	0.09	0.21	4.96	5.04	5.00	5.06
pH5-B	0.07	0.10	0.21	4.96	5.04	5.01	5.07
pH5-C	0.05	0.08	0.13	4.96	5.04	5.01	5.08
pH6-A	0.03	0.09	0.09	5.68	5.71	5.66	5.70
pH6-B	0.01	0.04	0.07	5.68	5.74	5.70	5.74
pH6-C	0.00	0.03	0.08	5.69	5.74	5.70	5.73
Glucose	0.00	0.00	0.00				
Johnson DIW	0.00	0.00	0.00				
Average							
BGF	0.11	0.10	0.15	4.72	3.51	3.17	2.71
GF	0.03	0.08	0.05	4.81	2.96	2.28	2.62
BG	0.14	0.18	0.46	3.02	3.05	3.03	3.04
pH4	0.08	0.11	0.42	3.96	4.03	4.00	4.05
pH5	0.06	0.09	0.18	4.96	5.04	5.01	5.07
pH6	0.01	0.05	0.08	5.68	5.73	5.69	5.72
Standard Dev							
BGF	0.19	0.15	0.07	0.07	1.02	0.94	0.18
GF	0.02	0.01	0.02	0.03	0.97	0.19	0.21
BG	0.03	0.03	0.04	0.00	0.05	0.04	0.03
pH4	0.03	0.03	0.09	0.00	0.01	0.01	0.01
pH5	0.01	0.01	0.05	0.00	0.00	0.01	0.01
pH6	0.01	0.03	0.01	0.01	0.02	0.02	0.02

Table E-4: Potassium, magnesium and iron concentrations and pH in liquid of **the edge** liquid-culture experiment, all replicates, averages and standard deviations are listed in mg/L for 6and 12 weeks. 10 ml of liquid was sampled at each sampling time.

Unit (mg/L)	Volume	K	K	Mg	Mg	Fe	Fe	pH	pH	pH
Sample ID	(ml)	6 weeks	12 weeks	6 weeks	12 weeks	6 weeks	12 weeks	Initial	6 weeks	12 weeks
Detection limits		**0.70**		**0.04**		**0.03**				
BGF-A	10	6.76	6.27	0.33	0.41	0.03	0.04	4.80	4.23	4.10
BGF-B	10	3.74	3.03	0.26	0.29	0.05	0.01	4.80	4.01	4.43
pH3-A	10	0.00	0.00	0.01	0.16	0.16	0.46	3.00	3.05	3.05
pH3-B	10	0.00	2.99	0.05	0.30	0.32	0.64	4.96	5.03	5.07
pH5-A	10	0.03	2.34	0.01	0.11	0.09	0.24	4.96	5.03	5.07
pH5-B	10	0.11	2.83	0.01	0.08	0.06	0.16	3.02	3.03	3.03
Glucose	20	0.00	0.00	0.00	0.00	0.00	0.00			
Johnson DIW	20	0.00	0.00	0.00	0.00	0.00	0.00			
Average										
BGF		5.25	4.65	0.30	0.35	0.04	0.02	4.80	4.12	4.27
pH3		0.00	1.50	0.03	0.23	0.24	0.55	3.98	4.04	4.06
pH5		0.07	2.59	0.01	0.10	0.08	0.20	3.99	4.03	4.05
Standard Dev										
BGF		2.14	2.30	0.05	0.09	0.01	0.02	0.00	0.16	0.23
pH3		0.00	2.12	0.03	0.10	0.11	0.12	1.39	1.40	1.43
pH5		0.06	0.35	0.00	0.02	0.03	0.06	1.37	1.41	1.44

Table E-5: Cation composition in fungal biomass is shown in all four liquid-culture experiments, all replicates, averages and standard deviations are listed in µg/g of fungal biomass at 12 weeks sampling.

Shaken-inorganic Experiment						
Sample ID	**Dry Weight (g)**	**Ca ug/g**	**K ug/g**	**Mg ug/g**	**P ug/g**	**Fe ug/g**
GF-A	0.1473	91	1630	283	1469	454
GF-B	0.1573	36	812	174	1005	345
GF-C	0.0980	50	999	108	1475	192
BGF-A	0.1040	38	431	209	2644	3874
BGF-B	0.1235	36	1115	602	1440	1448
BGF-C	0.1830	58	1792	1126	1016	503
Average						
GF	0.1342	59	1147	188	1316	330
BGF	0.1368	44	1113	645	1700	1942
Standard Dev						
GF	0.0317	29	428	88	270	132
BGF	0.0412	12	681	460	845	1739
Nonshaken-inorganic Experiment						
Sample ID	**Dry Weight (g)**	**Ca ug/g**	**K ug/g**	**Mg ug/g**	**P ug/g**	**Fe ug/g**
GF-A	0.6254	36	193	45	307	24
GF-C	0.3048	4	66	5	191	27
BGF-A	0.2238	24	222	36	647	120
BGF-B	0.2448	20	230	100	374	259
Average						
GF	0.4651	20	129	25	249	25
BGF	0.2343	22	226	68	510	190
Input	0.10	375	546	82	2010	150
Standard Dev						
GF	0.2267	23	90	28	82	2
BGF	0.0148	3	5	45	193	98
Nonshaken-organic Experiment						
Sample ID	**Dry Weight (g)**	**Ca ug/g**	**K ug/g**	**Mg ug/g**	**P ug/g**	**Fe ug/g**
GF-A	0.2032	5	2	5	716	139
GF-B	0.1422	19	0	10	1434	443
GF-C	0.0773	66	0	26	2852	744
BGF-A	0.1815	16	0	19	1099	330
BGF-B	0.2287	19	29	13	908	298
BGF-C	0.2528	13	0	12	825	212
Average						
GF	0.1409	30	1	14	1667	442
BGF	0.2210	16	10	15	944	280
Standard Dev						
GF	0.0630	32	1	11	1087	302
BGF	0.0363	3	17	3	141	61
Edge experiment						
Sample ID	**Dry Weight (g)**	**Ca ug/g**	**K ug/g**	**Mg ug/g**	**P ug/g**	**Fe ug/g**
BGF-A	0.1752	113	587	131	1387	451
BGF-B	0.1067	151	240	98	1158	412
Average						
BGF	0.1410	132	414	115	1273	432
Standard Dev						
BGF	0.0484	27	246	23	162	28

Table E-6: Mass-balances were estimated for potassium, magnesium and iron at 12 weeks, because these elements only could came from biotite minerals. The inputs (liquid and fungus) were subtracted from outputs (liquid and fungus) then fluxes were estimated for unit biotite area. The steps of calculations were the following:

1. The total K, Mg and Fe were estimated in all input and output liquids and solids in µg.
2. Net totals (µg) were estimated by subtracting inputs from outputs.
3. Using the –flake +glucose +fungus treatments, the contamination of Erlenmeyer flasks were determined in µg and corrected for.
4. The net totals were divided by the geometric area of the flakes in m^2 and by the time in seconds, which gave a dissolution rate or flux.

Edge experiment		Concentration			Standard Deviation		
Sample ID	**Volume**	**K**	**Mg**	**Fe**	**K**	**Mg**	**Fe**
Inputs	**ml**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
Glucose	100	0.00	0.00	0.00			
Input Fungus	25	7.41	0.99	1.68	0.19	0.01	0.41
Outputs							
BGF	50	4.65	0.35	0.02	2.30	0.09	0.02
pH3	50	1.50	0.23	0.25	2.12	0.10	0.12
pH5	50	2.59	0.10	0.20	0.35	0.02	0.06
BGF Fungus	25	2.57	0.67	2.46	2.19	0.35	0.99
Total elements		**K**	**Mg**	**Fe**	**K**	**Mg**	**Fe**
Inputs		**ug**	**ug**	**ug**	**ug**	**ug**	**ug**
Glucose		0.00	0.00	0.00			
Input Fungus		185.25	24.79	41.98	4.74	0.13	10.15
Outputs							
BGF		232.48	17.53	1.07	114.87	4.35	1.04
pH3		74.85	11.60	12.52	105.85	4.90	6.13
pH5		129.38	4.77	9.93	17.43	1.10	3.06
BGF Fungus		64.28	16.73	61.51	54.66	8.83	24.80
Net Total		**K**	**Mg**	**Fe**			
		ug	**ug**	**ug**			
BGF		111.51	9.47	20.60			
pH3		74.85	11.60	12.52			
pH5		129.38	4.77	9.93			
Net Total		**K**	**Mg**	**Fe**	**K**	**Mg**	**Fe**
Corrected		**ug**	**ug**	**ug**	**ug**	**ug**	**ug**
BGF		90	9	8	174	13	36
pH3		64	11	13	106	5	6
pH5		119	4	10	17	1	3
Liquid Flux	**$mol/m^2/s$**	**K**	**Mg**	**Fe**	**K**	**Mg**	**Fe**
BGF		3.17E-10	4.87E-11	1.93E-11	6.14E-10	7.54E-11	8.88E-11
pH3		2.26E-10	6.33E-11	3.09E-11	3.73E-10	2.78E-11	1.51E-11
pH5		4.18E-10	2.46E-11	2.45E-11	6.14E-11	6.25E-12	7.54E-12

Table E-6 (cont.): Mass-balances were estimated for potassium, magnesium and iron at 12 weeks, because these elements only could came from biotite minerals. The inputs (liquid and fungus) were subtracted from outputs (liquid and fungus) then fluxes were estimated for unit biotite area.

Shaken-inorganic experiment		Concentration			Standard Deviation		
Sample ID	**Volume**	**K**	**Mg**	**Fe**	**K**	**Mg**	**Fe**
Inputs	**ml**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
Glucose	50	0.00	0.00	0.00			
Johnson DIW	50	0.00	0.00	0.00			
Input Fungus	9	10.60	3.03	2.01			
Outputs							
BGF	50	19.52	0.48	0.13	4.55	0.20	0.03
GF	50	16.75	0.22	0.03	1.24	0.00	0.01
BG	50	19.00	0.10	0.50	0.23	0.05	0.32
pH4	50	186.60	0.06	0.18	55.39	0.03	0.05
pH5	50	298.27	0.06	0.03	168.66	0.01	0.05
pH6	50	741.40	0.14	0.02	96.76	0.06	0.04
GF Fungus	9	12.54	2.11	4.06	2.35	1.32	2.79
BGF Fungus	9	25.87	15.57	15.05	14.95	10.35	6.82
Total elements		**K**	**Mg**	**Fe**	**K**	**Mg**	**Fe**
Inputs		**ug**	**ug**	**ug**	**ug**	**ug**	**ug**
Glucose		0.00	0.00	0.00			
Johnson DIW		0.00	0.00	0.00			
Input Fungus		95.40	27.23	18.13			
Outputs							
BGF		976.17	23.87	6.47	227.62	10.11	1.70
GF		837.50	11.03	1.40	62.23	0.18	0.69
BG		950.00	4.92	24.79	11.31	2.68	15.97
pH4			3.13	8.96		1.38	2.36
pH5			3.01	1.33		0.38	2.30
pH6			7.15	1.08		2.97	1.86
GF Fungus		112.85	19.01	36.55	21.14	11.89	25.14
BGF Fungus		232.83	140.15	135.41	134.53	93.14	61.41
Net Total		**K**	**Mg**	**Fe**			
		ug	**ug**	**ug**			
BGF		1113.60	136.78	123.75			
GF		854.95	2.80	19.82			
BG		950.00	4.92	24.79			
pH4			3.13	8.96			
pH5			3.01	1.33			
pH6			7.15	1.08			
Net Total		**K**	**Mg**	**Fe**	**K**	**Mg**	**Fe**
Corrected		**ug**	**ug**	**ug**	**ug**	**ug**	**ug**
BGF		259	134	104	362.15	103.26	63.11
GF		0	0	0	83.37	12.07	25.83
BG		95	2	5	11.31	2.68	15.97
pH4			3	9		1.38	2.36
pH5			3	1		0.38	2.30
pH6			7	1		2.97	1.86
Liquid Flux	**$mol/m^2/s$**	**K**	**Mg**	**Fe**	**K**	**Mg**	**Fe**
BGF		9.11E-10	7.60E-10	2.56E-10	1.28E-09	5.85E-10	1.56E-10
GF		0.00E+00	0.00E+00	0.00E+00	2.94E-10	6.84E-11	6.37E-11
BG/pH3		3.35E-10	1.20E-11	1.23E-11	3.99E-11	1.52E-11	3.94E-11
pH4			1.78E-11	2.21E-11	0.00E+00	7.85E-12	5.82E-12
pH5			1.71E-11	3.27E-12	0.00E+00	2.14E-12	5.67E-12
pH6			4.05E-11	2.66E-12	0.00E+00	1.68E-11	4.60E-12

Table E-6 (cont.): Mass-balances were estimated for potassium, magnesium and iron at 12 weeks, because these elements only could came from biotite minerals. The inputs (liquid and fungus) were subtracted from outputs (liquid and fungus) then fluxes were estimated for unit biotite area.

Nonshaken-inorganic experiment		Concentration			Standard Deviation		
Sample ID	**Volume**	**K**	**Mg**	**Fe**	**K**	**Mg**	**Fe**
Inputs	**ml**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
Glucose	30	0.00	0.00	0.00			
Johnson DIW	30	0.00	0.00	0.00			
Input Fungus	9	10.60	3.03	2.01			
Outputs							
BGF	100	19.10	0.96	0.26	0.37	0.04	0.06
GF	100	16.62	0.77	0.22	1.48	0.02	0.24
BG	100	17.00	0.06	0.16	3.13	0.00	0.00
pH4	100	44.12	0.09	0.15	10.74	0.02	0.02
pH5	100	58.62	0.06	0.03	6.84	0.00	0.01
pH6	100	144.93	0.04	0.00	37.55	0.04	0.00
GF Fungus	9	7.81	1.65	1.27	7.89	2.09	0.51
BGF Fungus	9	5.89	1.81	5.02	0.51	1.28	2.88
Total elements		**K**	**Mg**	**Fe**	**K**	**Mg**	**Fe**
Inputs		**ug**	**ug**	**ug**	**ug**	**ug**	**ug**
Glucose		0.00	0.00	0.00			
Johnson DIW		0.00	0.00	0.00			
Input Fungus		95.40	27.23	18.13			
Outputs							
BGF		1909.50	96.08	26.33	37.48	3.78	5.76
GF		1661.50	77.15	21.79	147.79	2.47	23.70
BG		1700.00	6.34	16.06	312.54	0.01	0.48
pH4			8.50	15.40		2.15	1.66
pH5			5.85	2.99		0.50	1.30
pH6			4.49	0.00		3.92	0.00
GF Fungus		70.28	14.84	11.45	71.03	18.85	4.62
BGF Fungus		53.00	16.28	45.14	4.58	11.55	25.88
Net Total		**K**	**Mg**	**Fe**			
		ug	**ug**	**ug**			
BGF		1867.10	85.12	53.34			
GF		1636.38	64.76	15.10			
BG		1700.00	6.34	16.06			
pH4			8.50	15.40			
pH5			5.85	2.99			
pH6			4.49	0.00			
Net Total		**K**	**Mg**	**Fe**	**K**	**Mg**	**Fe**
Corrected		**ug**	**ug**	**ug**	**ug**	**ug**	**ug**
BGF		231	20	38	42.05	15.33	31.64
GF		0	0	0	218.82	21.32	28.32
BG		64	-26	1	312.54	0.01	0.48
pH4			9	15		2.15	1.66
pH5			6	3		0.50	1.30
pH6			4	0		3.92	0.00
Liquid Flux	**mol/m^2/s**	**K**	**Mg**	**Fe**	**K**	**Mg**	**Fe**
BGF		8.13E-10	1.15E-10	9.43E-11	1.48E-10	8.69E-11	7.81E-11
GF		0.00E+00	0.00E+00	0.00E+00	7.71E-10	1.21E-10	6.99E-11
BG/pH3		2.24E-10	-1.48E-10	2.36E-12	1.10E-09	4.01E-14	1.19E-12
pH4			4.82E-11	3.80E-11	0.00E+00	1.22E-11	4.10E-12
pH5			3.32E-11	7.38E-12	0.00E+00	2.82E-12	3.20E-12
pH6			2.54E-11	0.00E+00	0.00E+00	2.22E-11	0.00E+00

Table E-6 (cont.): Mass-balances were estimated for potassium, magnesium and iron at 12 weeks, because these elements only could came from biotite minerals. The inputs (liquid and fungus) were subtracted from outputs (liquid and fungus) then fluxes were estimated for unit biotite area.

Nonshaken-organic experiment		Concentration			Standard Deviation		
Sample ID	Volume	K	Mg	Fe	K	Mg	Fe
Inputs	ml	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Glucose	100	0.00	0.00	0.00			
Input Fungus	25	7.41	0.99	1.68	0.19	0.01	0.41
Outputs							
BGF	100	2.98	0.32	0.15	0.52	0.08	0.07
GF	100	2.07	0.15	0.05	1.27	0.08	0.02
pH3	100	0.00	0.16	0.46	0.00	0.02	0.04
pH4	100	1.06	0.10	0.42	0.06	0.02	0.09
pH5	100	2.57	0.07	0.18	0.07	0.02	0.05
pH5.8	100	0.95	0.05	0.08	0.15	0.01	0.01
GF Fungus	25	0.01	0.43	1.98	2.19	0.35	0.99
BGF Fungus	25	2.57	0.67	2.46	0.15	0.01	0.29
Total elements		K	Mg	Fe	K	Mg	Fe
Inputs		ug	ug	ug	ug	ug	ug
Glucose		0.00	0.00	0.00			
Input Fungus		185.25	24.79	41.98			
Outputs							
BGF		297.80	31.72	15.13	52.39	8.46	7.27
GF		206.70	14.88	5.19	127.09	7.80	1.70
pH3		0.00	16.27	45.92	0.00	2.42	3.52
pH4		106.17	10.10	41.51		2.49	9.07
pH5		256.90	6.65	18.39		1.93	4.67
pH5.8		95.02	5.08	7.85		0.81	0.98
GF Fungus		0.13	10.78	49.58	54.66	8.83	24.80
BGF Fungus		64.28	16.73	61.51	3.87	0.20	7.20
Net Total		K	Mg	Fe			
		ug	ug	ug			
BGF		176.83	23.67	34.66			
GF		21.59	0.88	12.79			
pH3		0.00	16.27	45.92			
pH4		106.17	10.10	41.51			
pH5		256.90	6.65	18.39			
pH5.8		95.02	5.08	7.85			
Net Total		K	Mg	Fe	K	Mg	Fe
Corrected		ug	ug	ug	ug	ug	ug
BGF		155	23	22	56.26	8.66	14.47
GF		0	0	0	181.75	16.63	26.51
pH3		0	15	33	0.00	2.42	3.52
pH4		85	9	29		2.49	9.07
pH5		235	6	6		1.93	4.67
pH5.8		73	4	-5		0.81	0.98
Liquid Flux	mol/m^2/s	K	Mg	Fe	K	Mg	Fe
BGF		5.47E-10	1.29E-10	5.39E-11	1.98E-10	4.91E-11	3.57E-11
GF		0.00E+00	0.00E+00	0.00E+00	6.40E-10	9.43E-11	6.54E-11
pH3		0.00E+00	8.73E-11	8.17E-11	0.00E+00	1.37E-11	8.68E-12
pH4		2.98E-10	5.23E-11	7.08E-11	0.00E+00	1.41E-11	2.24E-11
pH5		8.29E-10	3.27E-11	1.38E-11	0.00E+00	1.10E-11	1.15E-11
pH5.8		2.59E-10	2.38E-11	-1.22E-11	0.00E+00	4.62E-12	2.42E-12

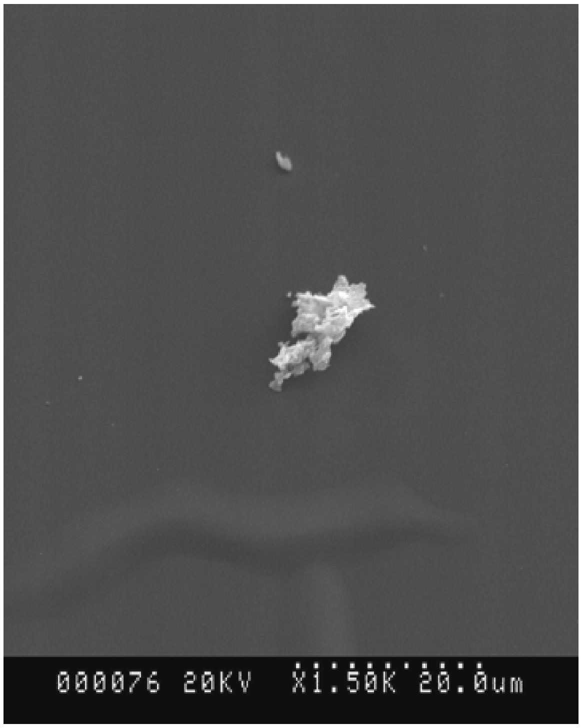
Table E-7: Biotite weathering rates were estimated as the following based on chemical formula and mass-balance Fe weathering rates.
- The biotite formula is $(K_{0.908}Na_{0.079}Ca_{0.012}P_{0.001})(Mg_{0.566}Fe_{0.413}Mn_{0.021})_3((Al_{0.887}Ti_{0.113})Si_3O_{10})(OH)_2$.
- The total net weathered Fe (µg) of each treatment was estimated in all experiments by mass-balance.
- These values were converted to moles of iron (55.85 g/mol).
- Based on that there is 1.239 mol of iron in each mol of biotite, the moles of iron were converted to moles of biotite.
- The rates were normalized to geometric basal surface areas (10^{-3} m^2) in shaken-inorganic, nonshaken-inorganic and nonshaken-organic experiments and to geometric edge areas (3×10^{-5} m^2) in edge experiment for a 12-week interval (mol m^{-2} s^{-1}).

Treatment ID	**Shaken-inorganic**	**Nonshaken-inorganic**	**Nonshaken-organic**	**Edge**
Fe	**µg**	**µg**	**µg**	**µg**
BGF	104	38	22	8
BG/pH3	5	1	33	13
pH4	9	15	29	N/A
pH5	1	3	6	1
pH6	1	0	0	N/A
Fe	**mol**	**mol**	**mol**	**mol**
BGF	1.9×10^{-6}	6.8×10^{-7}	3.9×10^{-7}	1.4×10^{-7}
BG/pH3	9.0×10^{-8}	1.8×10^{-8}	5.9×10^{-7}	2.3×10^{-7}
pH4	1.6×10^{-7}	2.7×10^{-7}	5.2×10^{-7}	N/A
pH5	1.8×10^{-8}	5.4×10^{-8}	1.1×10^{-7}	1.8×10^{-7}
pH6	1.8×10^{-8}	0	0	N/A
Biotite	**mol**	**mol**	**mol**	**mol**
BGF	1.5×10^{-6}	5.5×10^{-7}	3.2×10^{-7}	1.2×10^{-7}
BG/pH3	7.2×10^{-8}	1.4×10^{-8}	4.8×10^{-7}	1.9×10^{-7}
pH4	1.3×10^{-7}	2.2×10^{-7}	4.2×10^{-7}	N/A
pH5	1.4×10^{-8}	4.3×10^{-8}	8.7×10^{-8}	1.4×10^{-7}
pH6	1.4×10^{-8}	0	0	N/A
Biotite	**mol m^{-2} s^{-1}**	**mol m^{-2} s^{-1}**	**mol m^{-2} s^{-1}**	**mol m^{-2} s^{-1}**
BGF	2.1×10^{-10}	7.6×10^{-11}	4.4×10^{-11}	5.3×10^{-10}
BG/pH3	1.0×10^{-11}	2.0×10^{-12}	6.6×10^{-11}	8.6×10^{-10}
pH4	1.8×10^{-11}	3.0×10^{-11}	5.8×10^{-11}	N/A
pH5	2.0×10^{-12}	6.0×10^{-12}	1.2×10^{-11}	6.6×10^{-10}
pH6	2.0×10^{-12}	0	0	N/A

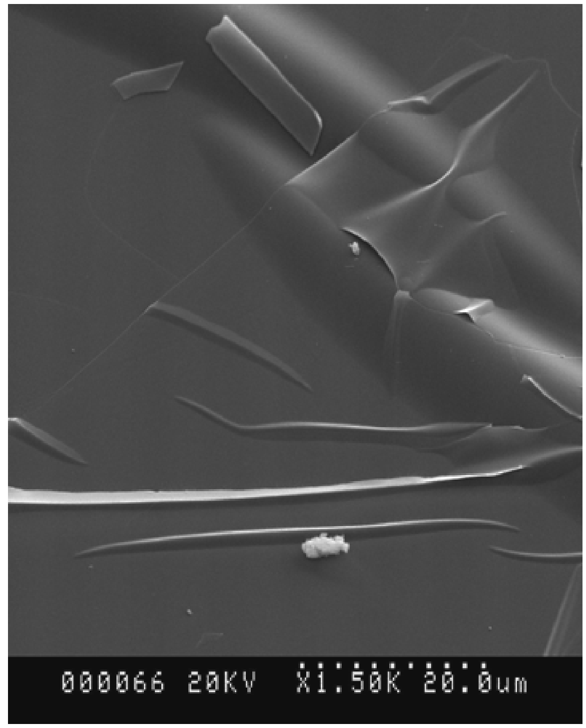
APPENDIX F

Biotite SEM images in liquid-culture experiment

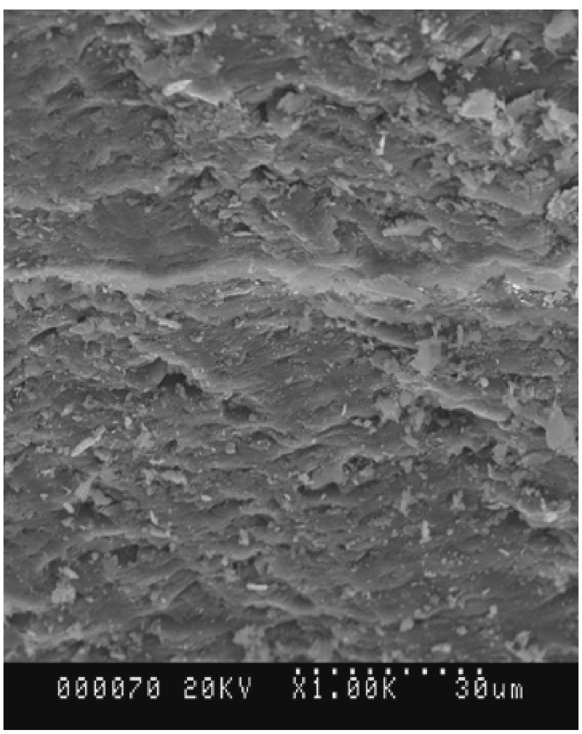
Figure F-1: Initial biotite flake basal and edge surfaces - SEM.



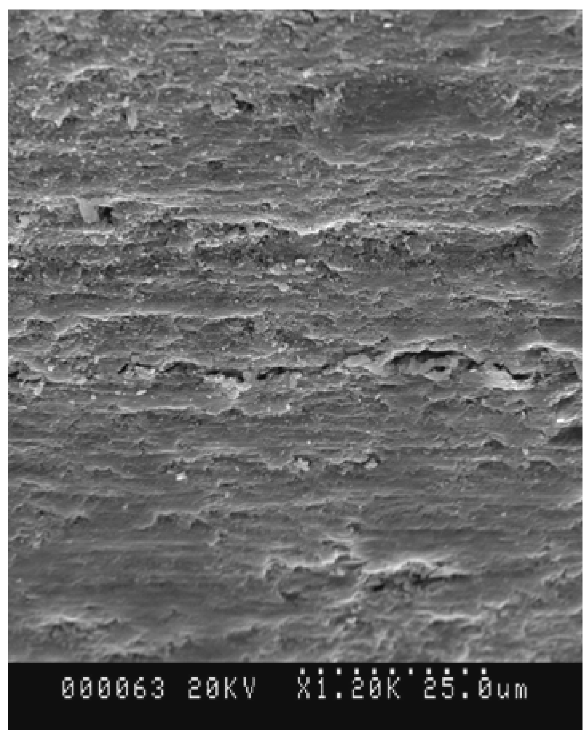
Basal surface



Basal surface

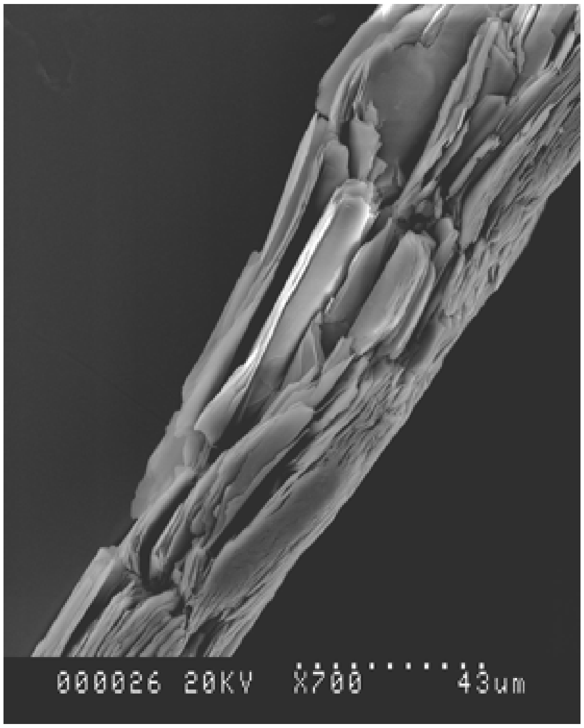


Edge surface

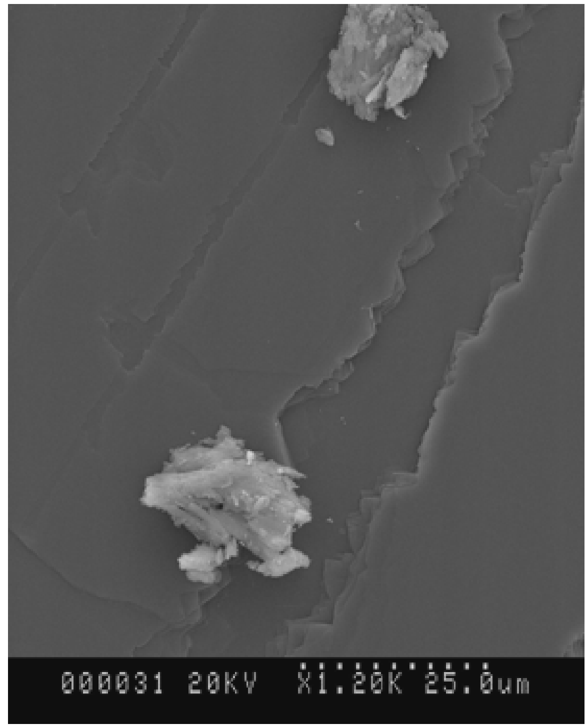


Edge surface

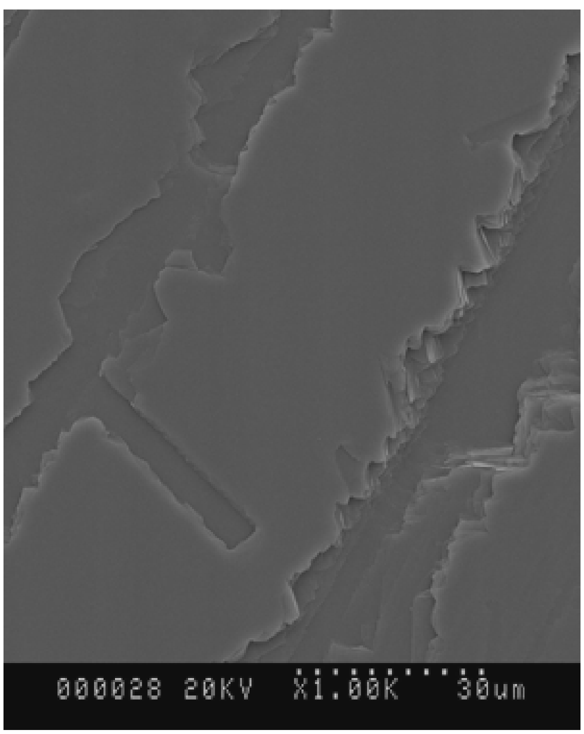
Figure F-2: Shaken-inorganic experiment biotite edges and surfaces in BGF (+flake +glucose +fungus) - SEM



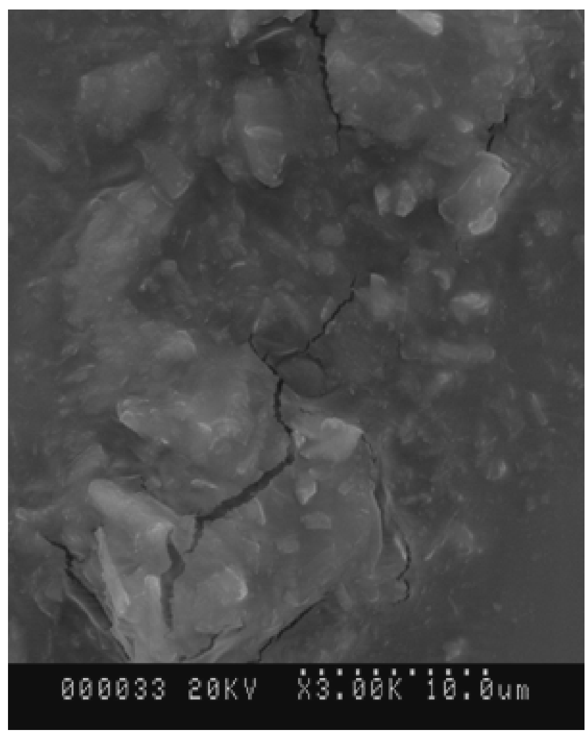
Edge surface



Basal surface

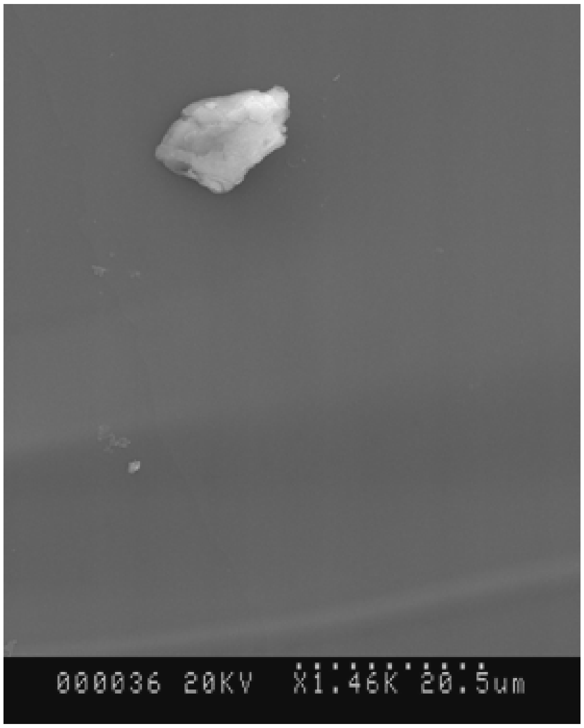


Basal surface

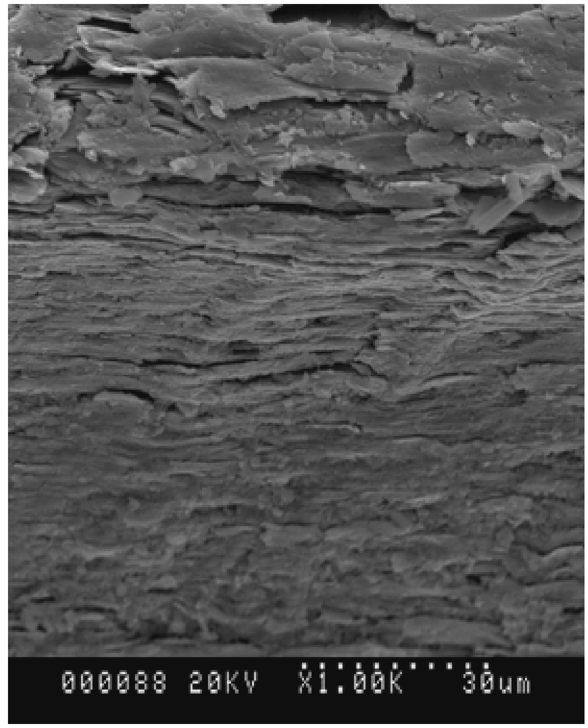


Basal surface

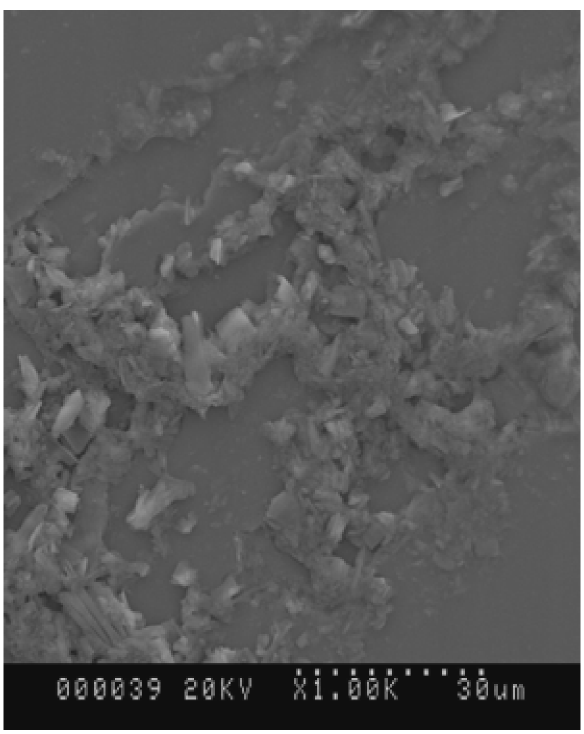
Figure F-2 (cont.): Shaken-inorganic experiment biotite edges and surfaces in BG (+flake +glucose –fungus) - SEM



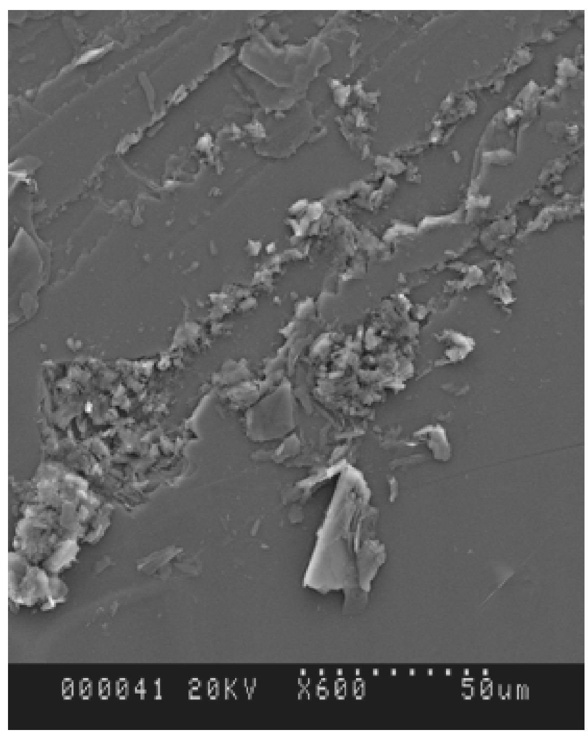
Basal surface



Edge surface

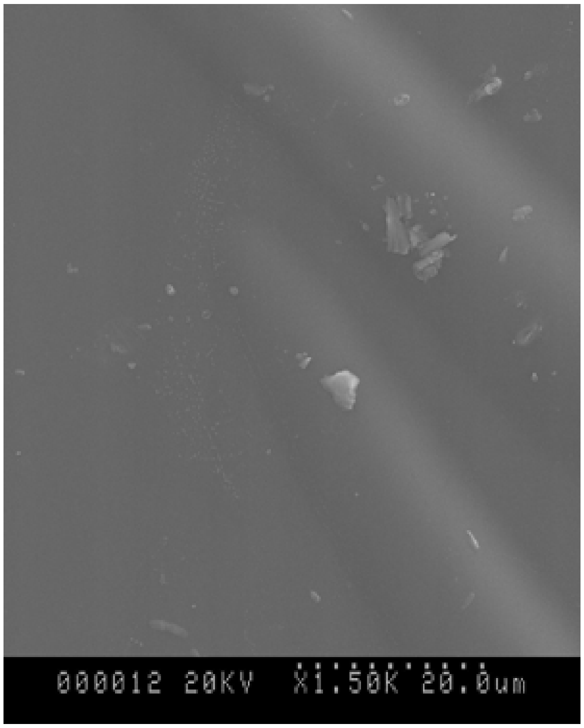


Basal surface

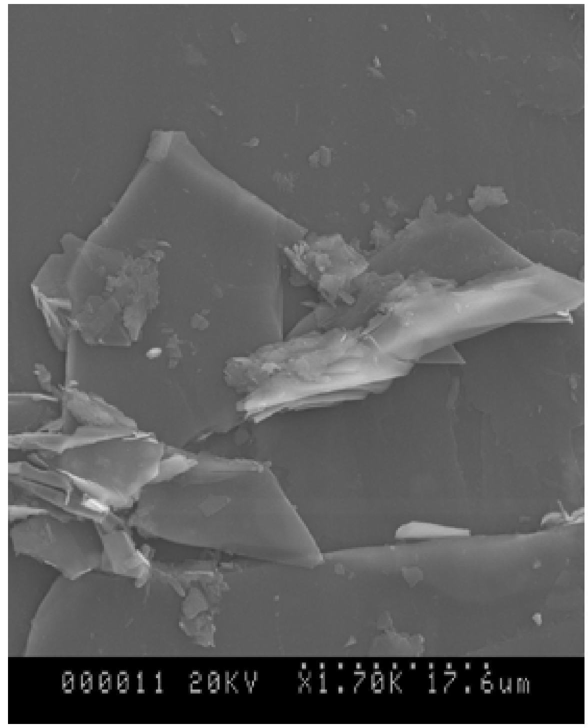


Basal surface

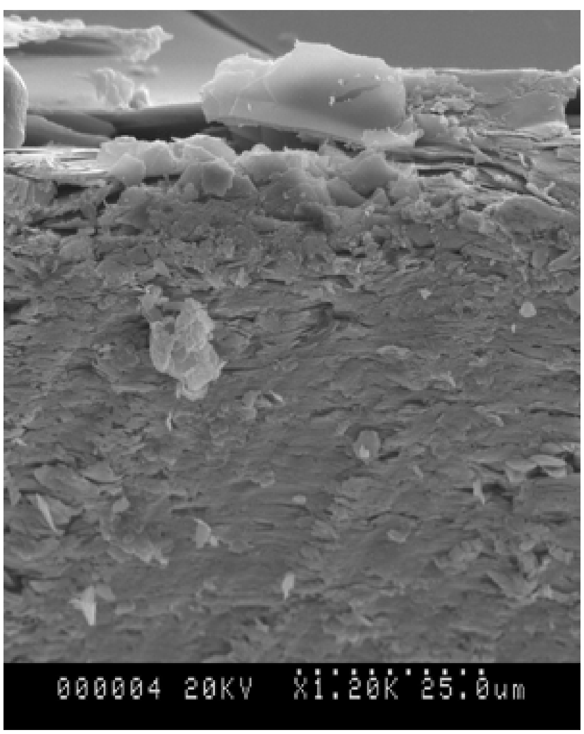
Figure F-2 (cont.): Shaken-inorganic experiment biotite edges and surfaces in pH 4 control (+flake +deionized water –fungus) - SEM



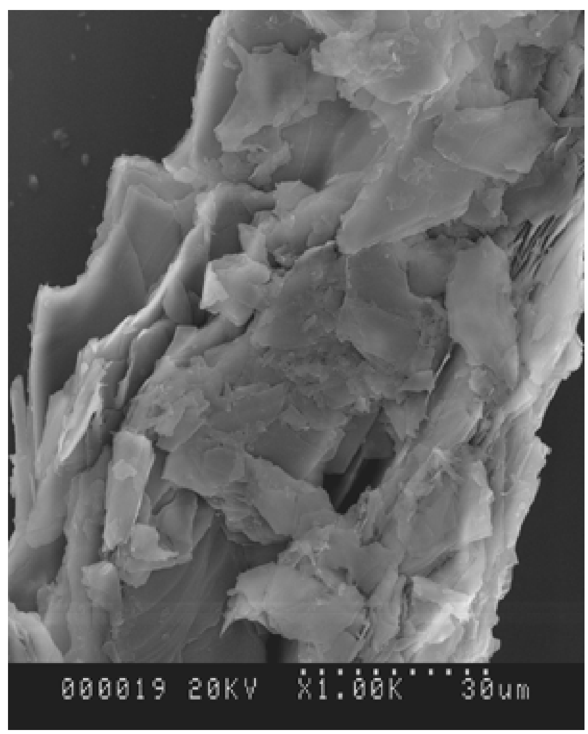
Basal surface



Basal surface

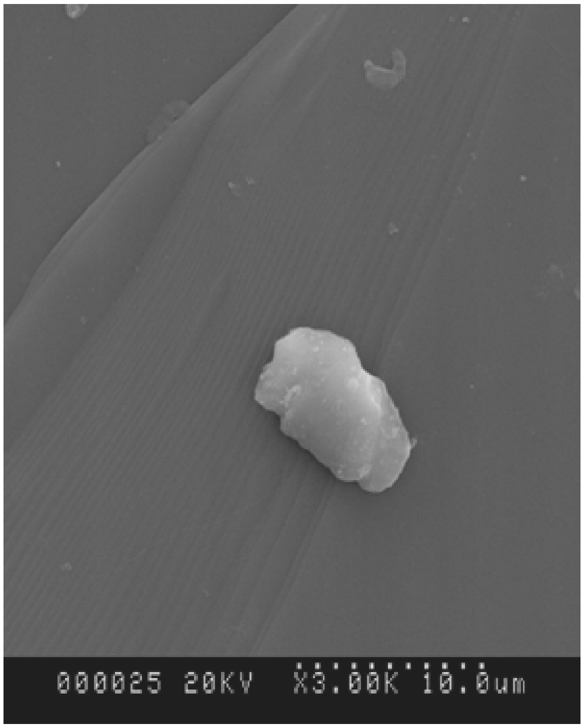


Edge surface

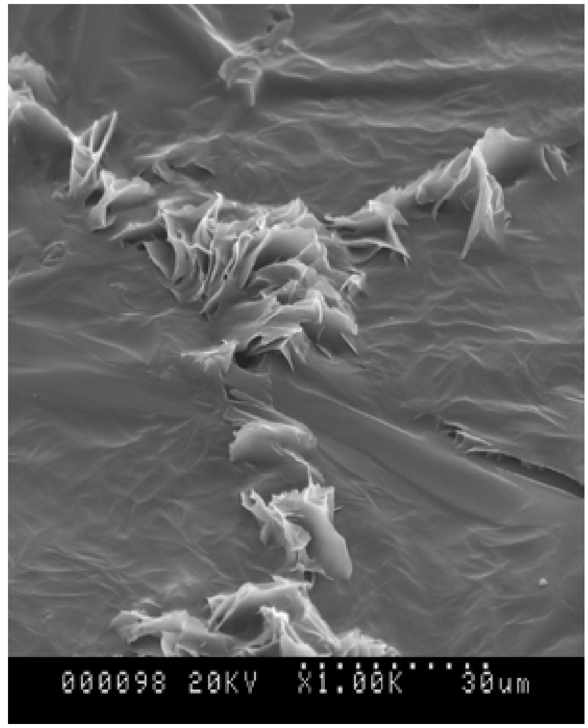


Edge surface

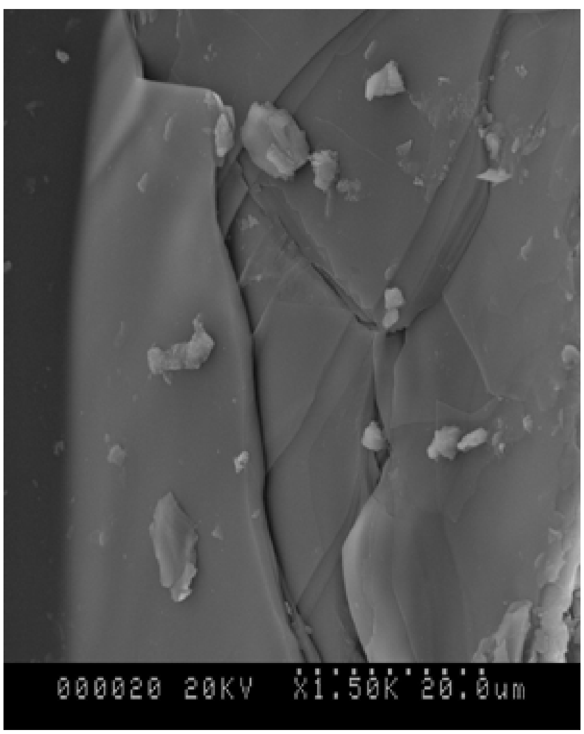
Figure F-2 (cont.): Shaken-inorganic experiment biotite edges and surfaces in pH 5 control (+flake +deionized water –fungus) - SEM



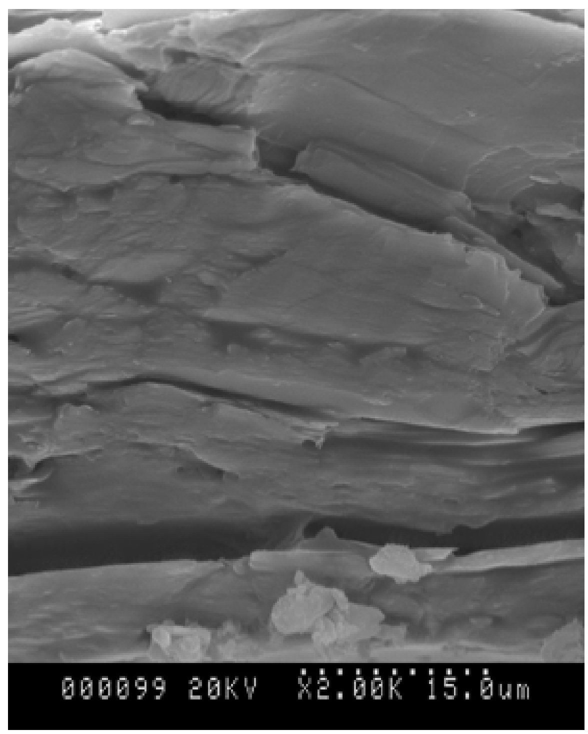
Basal surface



Basal surface

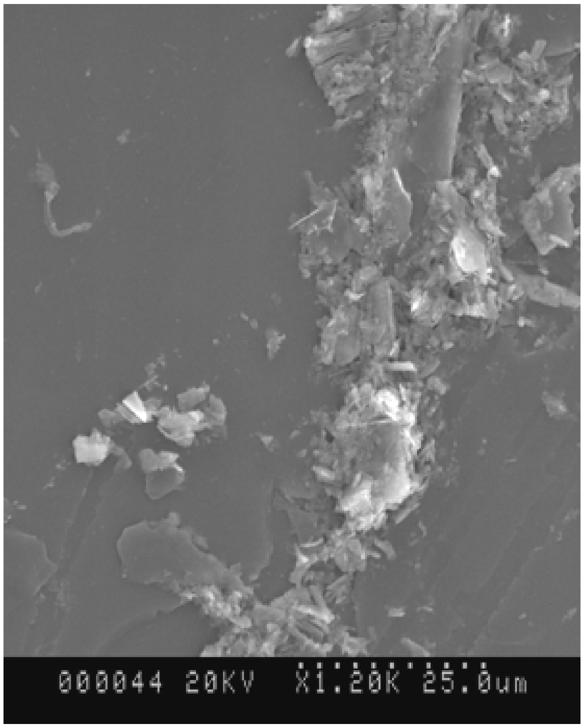


Edge surface

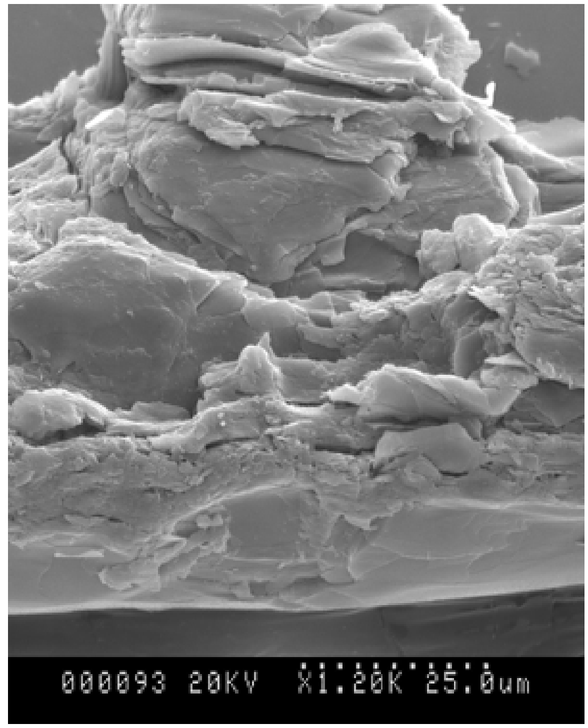


Edge surface

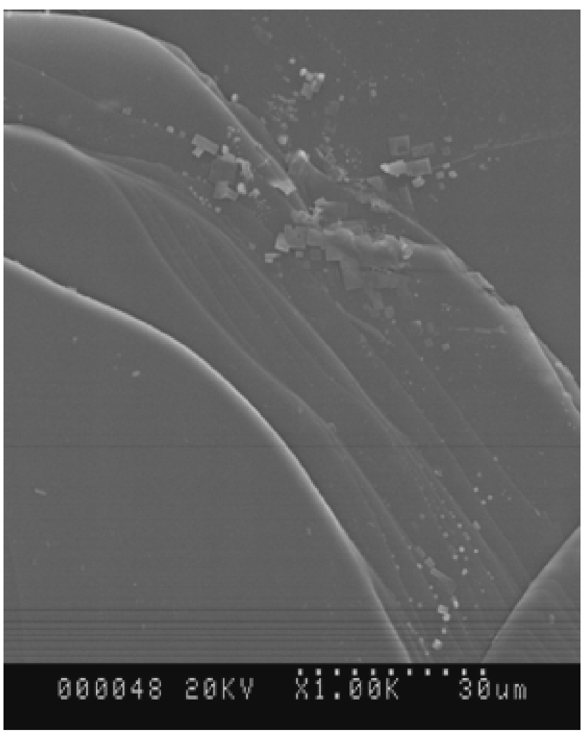
Figure F-2 (cont.): Shaken-inorganic experiment biotite edges and surfaces in pH 6 control (+flake +deionized water –fungus) - SEM



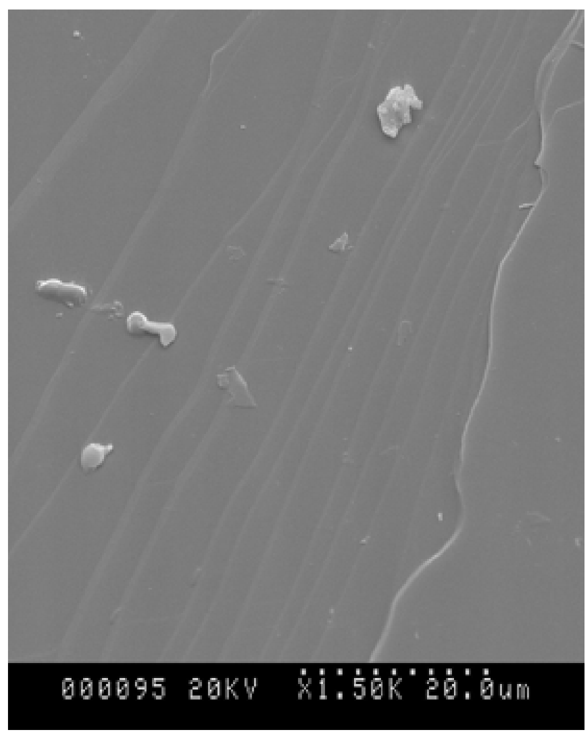
Basal surface



Edge surface

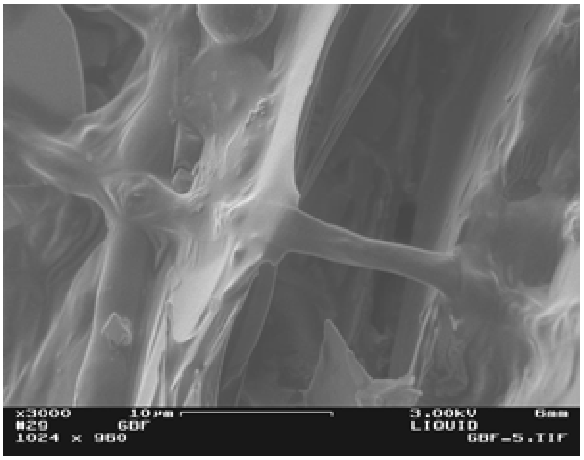


Basal surface – layer steps

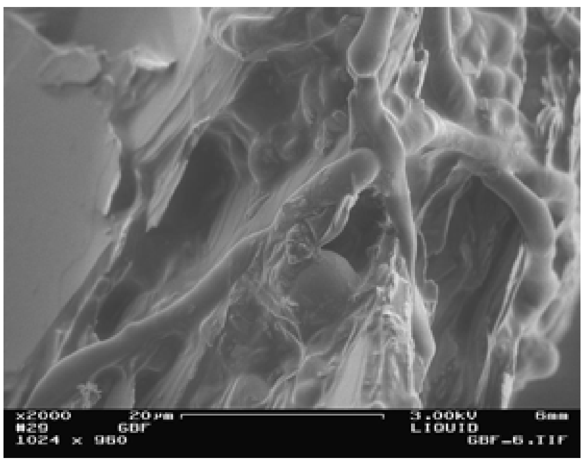


Basal surface – layer steps

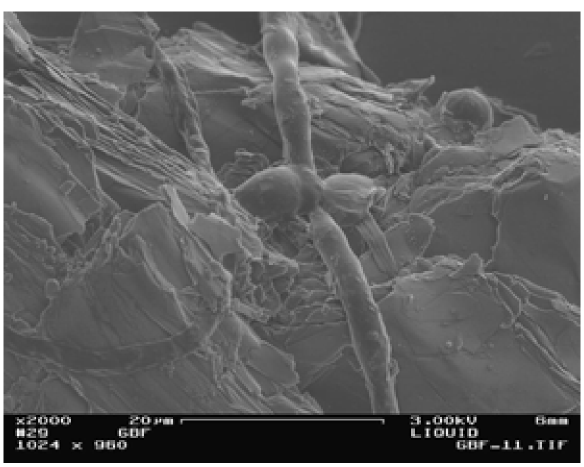
Figure F-3: Nonshaken-inorganic experiment biotite edges and surfaces in BGF (+flake +glucose +fungus) – SEM.



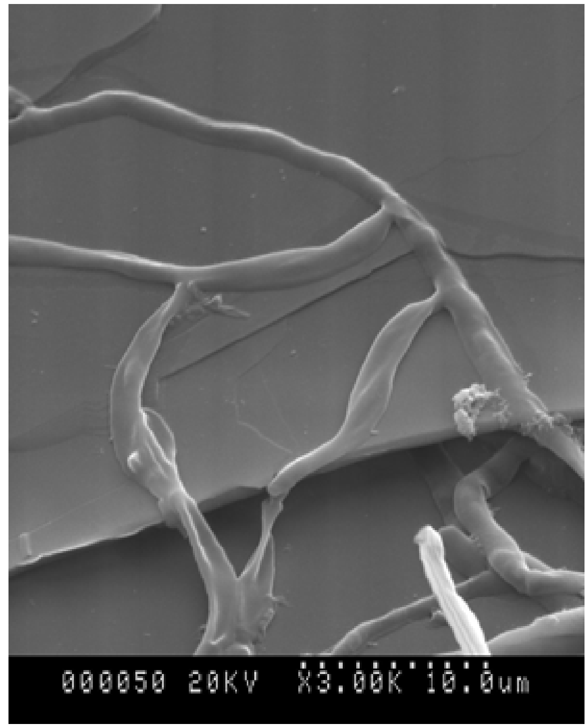
Edge surface



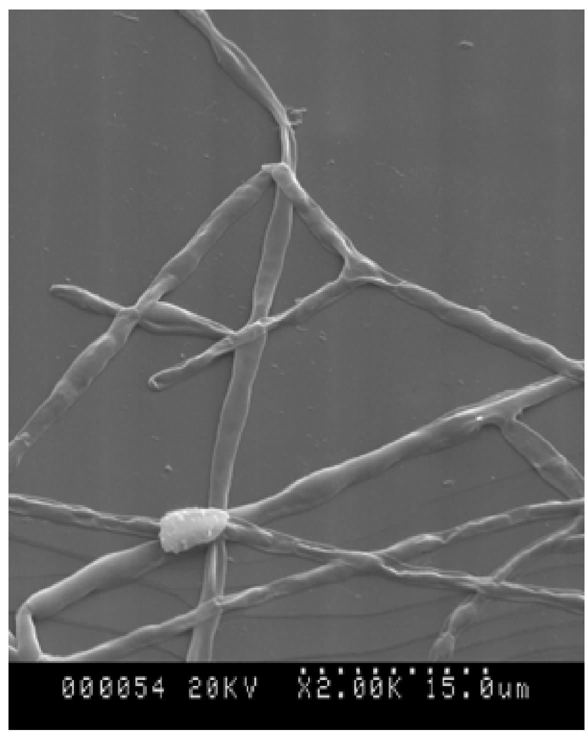
Edge surface



Edge surface

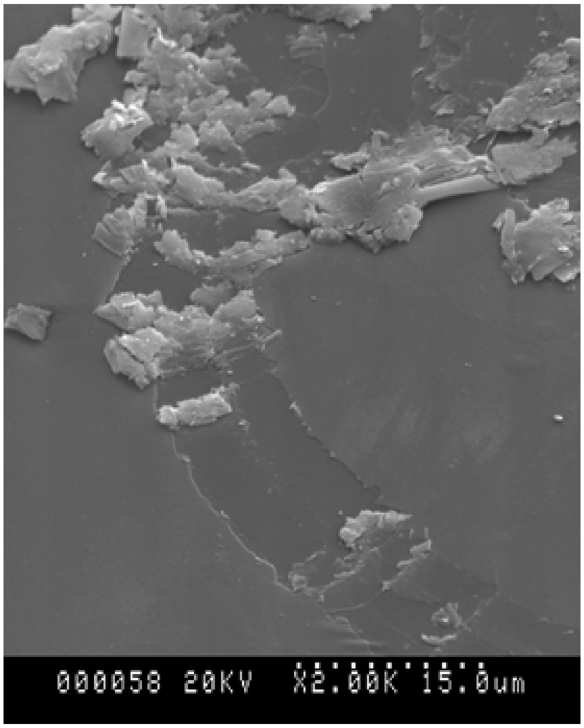


Basal surface

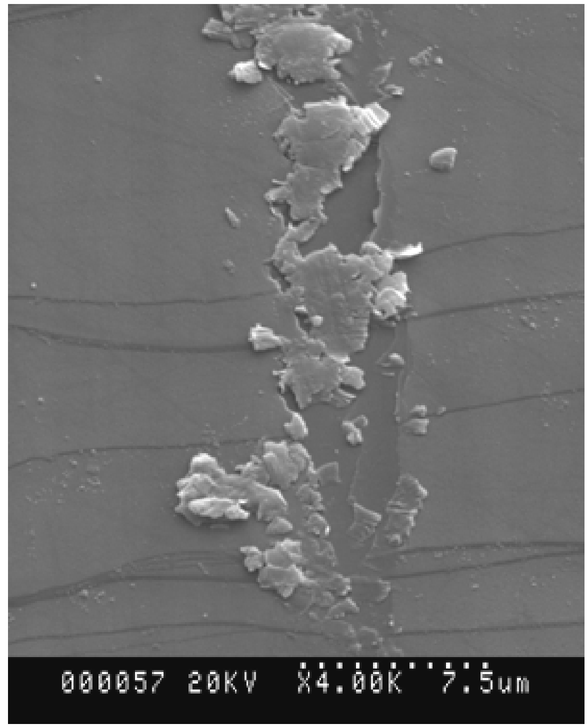


Basal surface

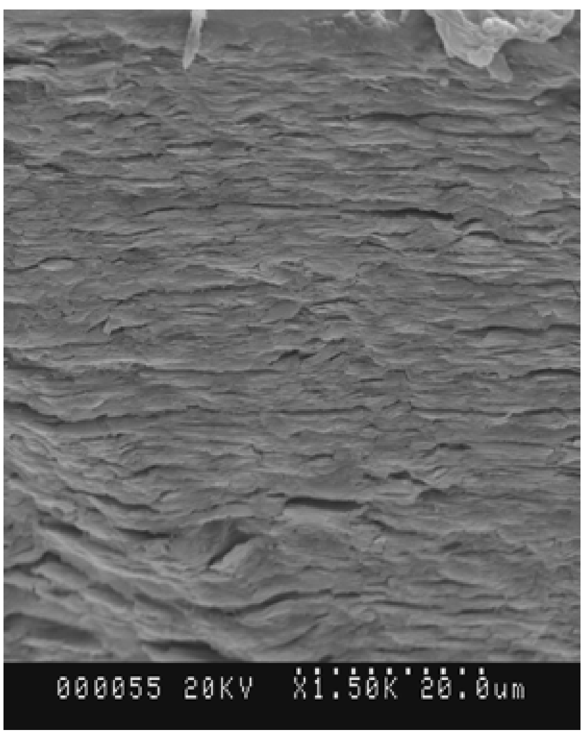
Figure F-3 (cont.): Nonshaken-inorganic experiment biotite edges and surfaces in BGF (+flake +glucose +fungus) – SEM.



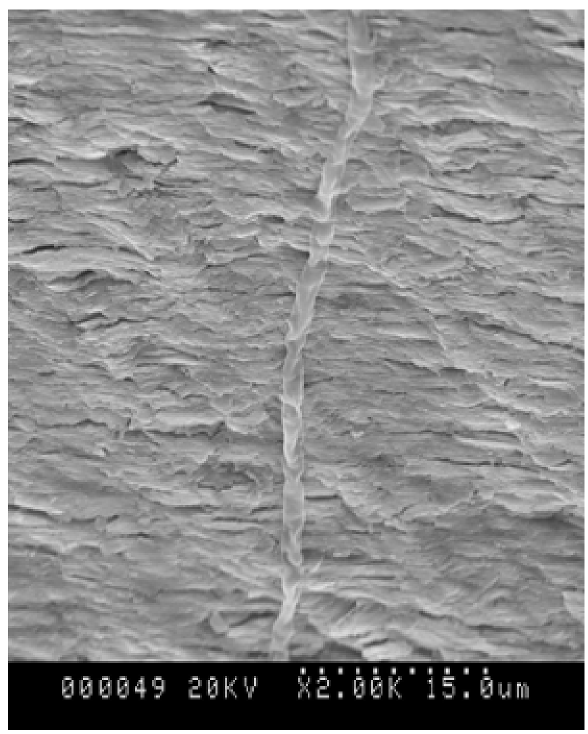
Basal surface



Basal surface

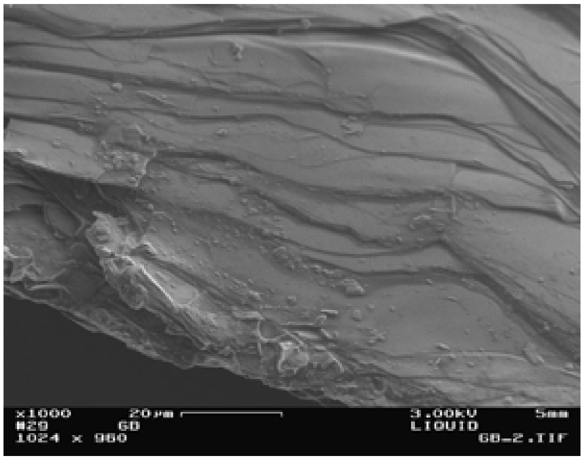


Edge surface

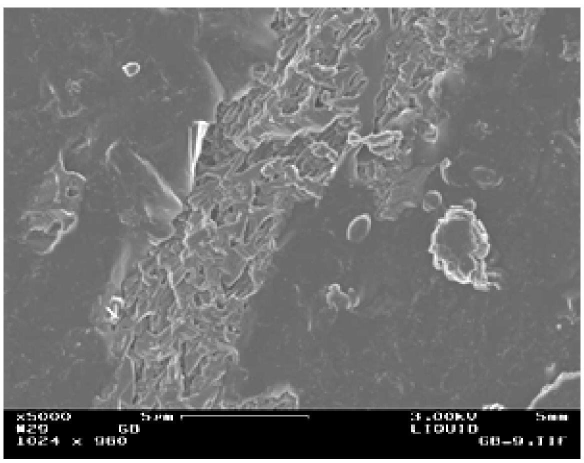


Edge surface

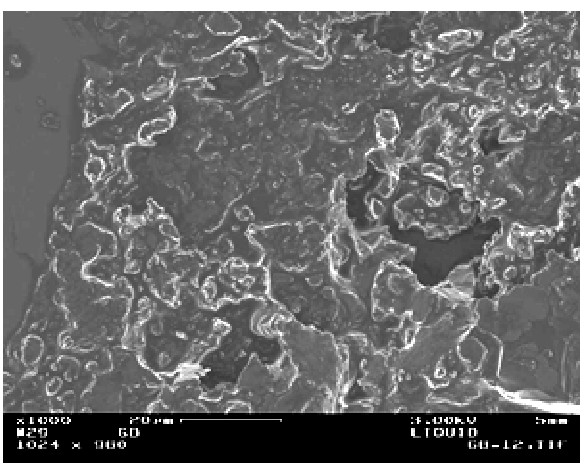
Figure F-3 (cont.): Nonshaken-inorganic experiment biotite edges and surfaces in BG (+flake +glucose –fungus) – SEM.



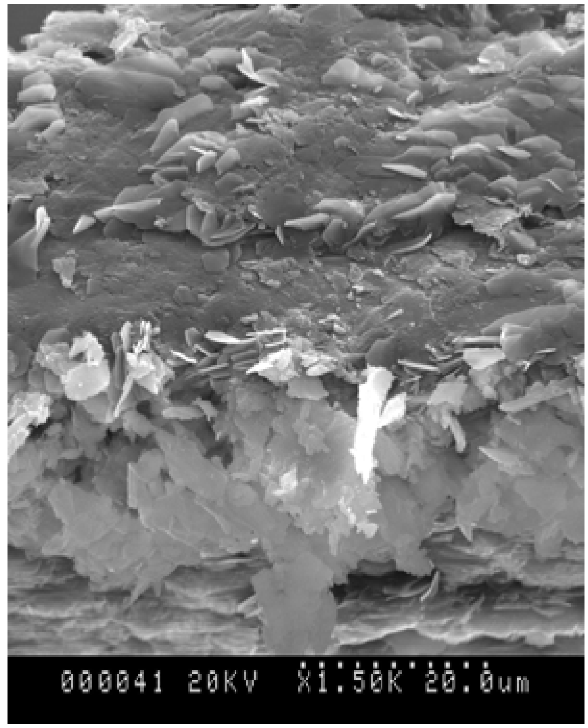
Edge surface



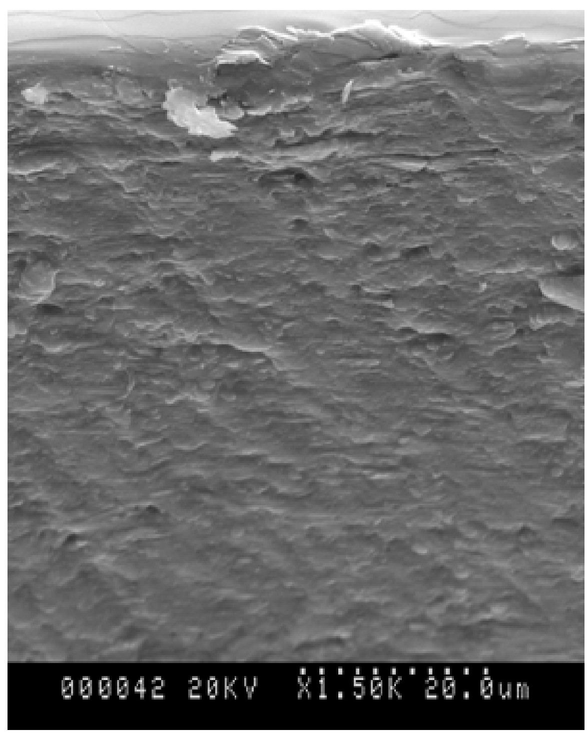
Basal surface



Basal surface

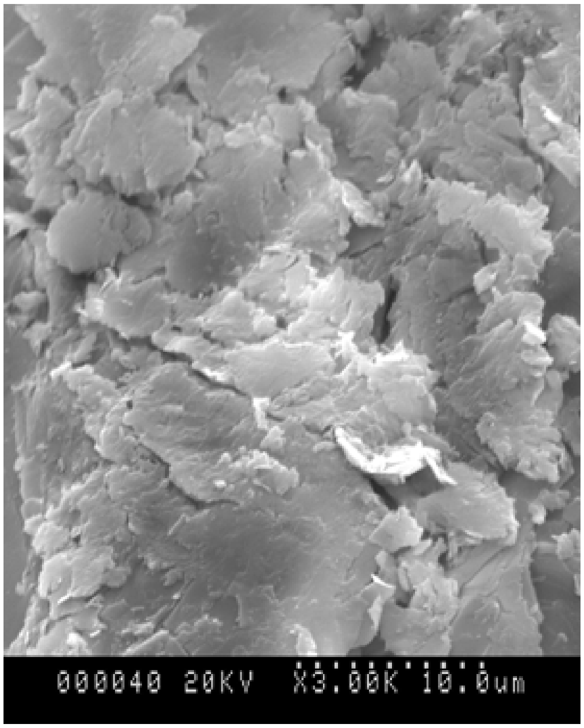


Edge surface

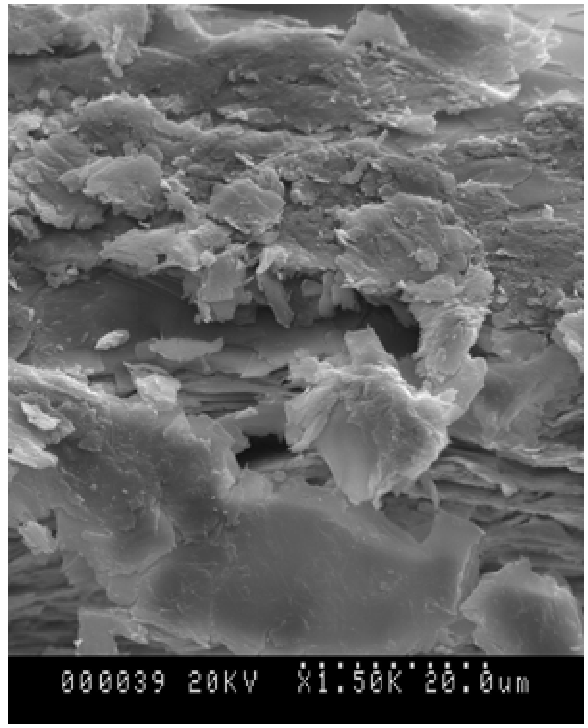


Edge surface

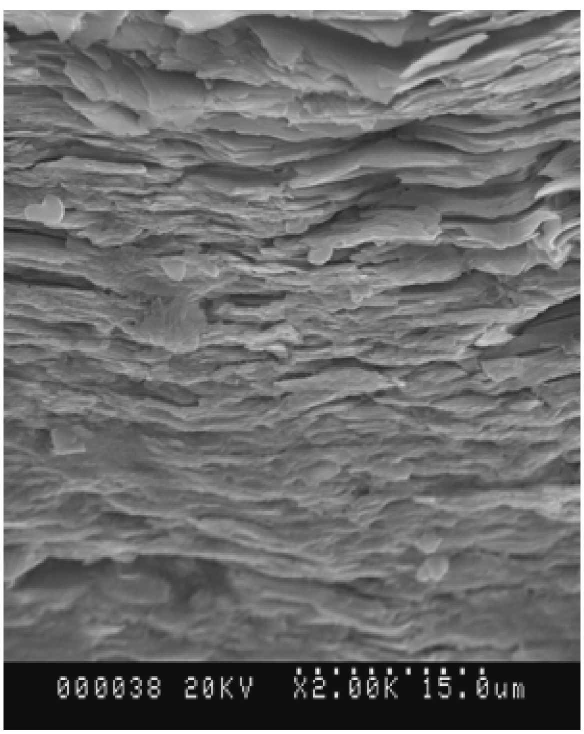
Figure F-3 (cont.): Nonshaken-inorganic experiment biotite edges and surfaces in pH 4 control (+flake +deionized water –fungus) – SEM.



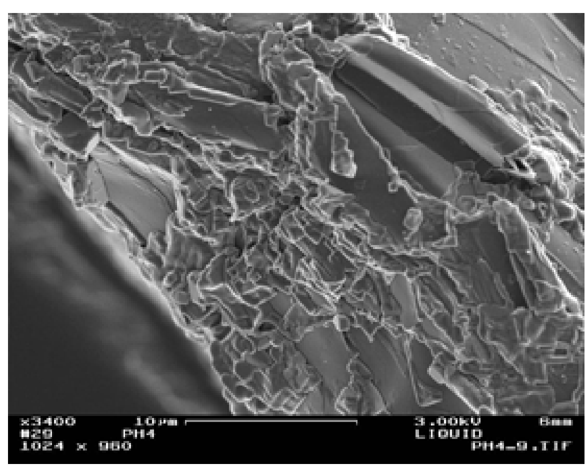
Basal surface



Edge and basal surfaces

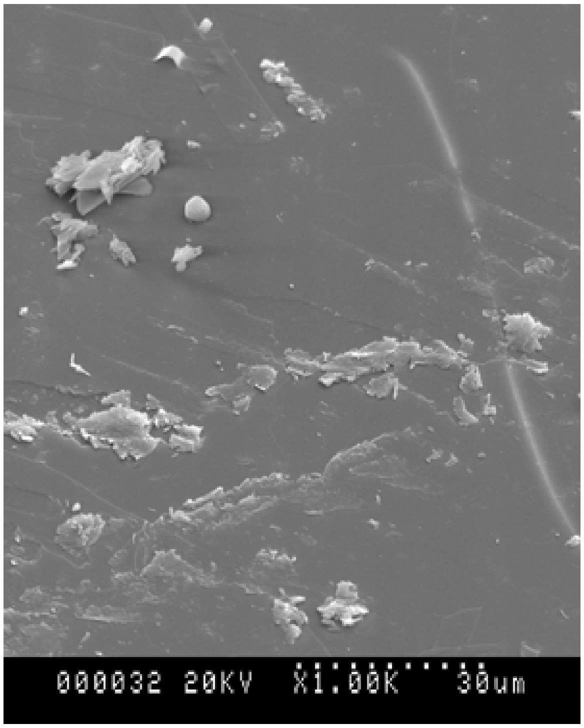


Edge surface

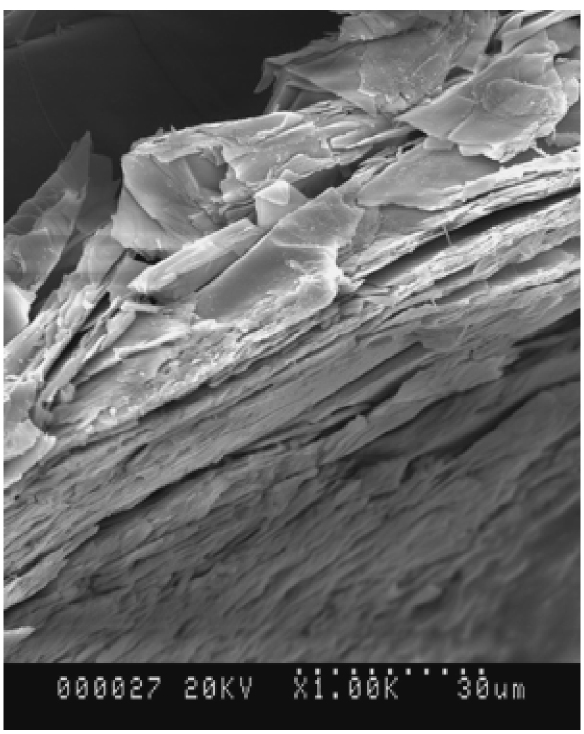


Edge surface

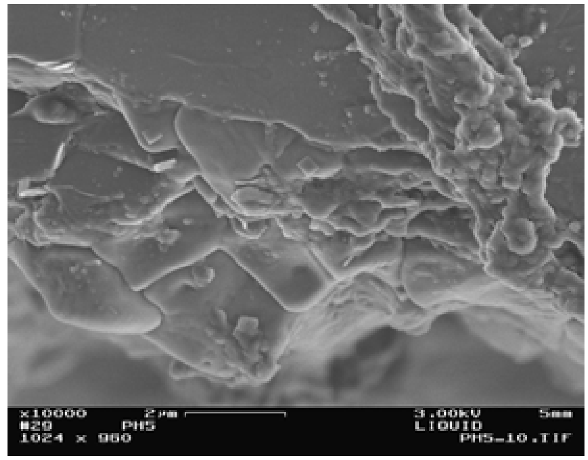
Figure F-3 (cont.): Nonshaken-inorganic experiment biotite edges and surfaces in pH 5 control (+flake +deionized water –fungus) – SEM.



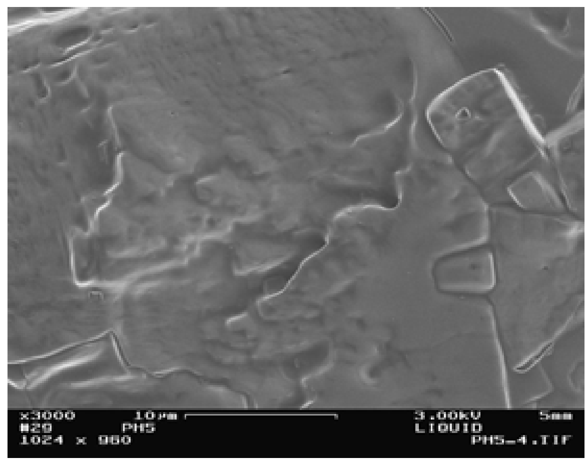
Basal surface



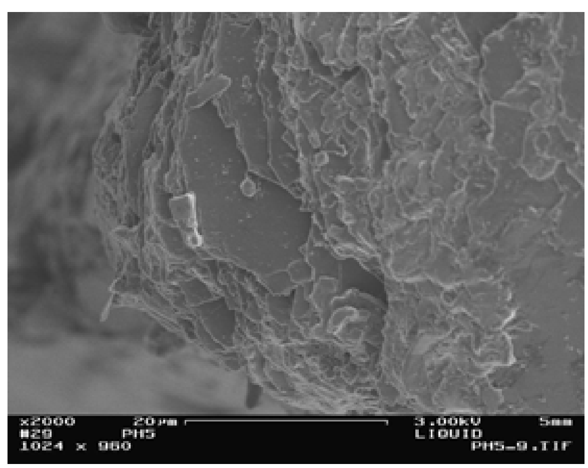
Edge surface



Edge surface

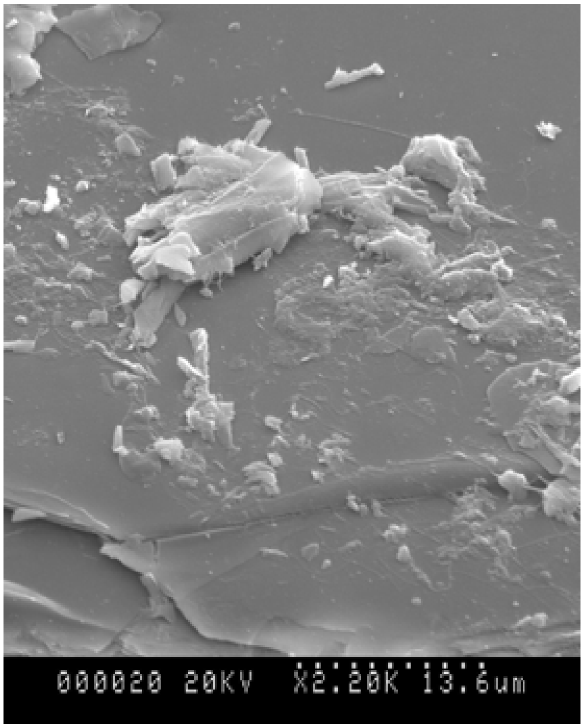


Basal surface

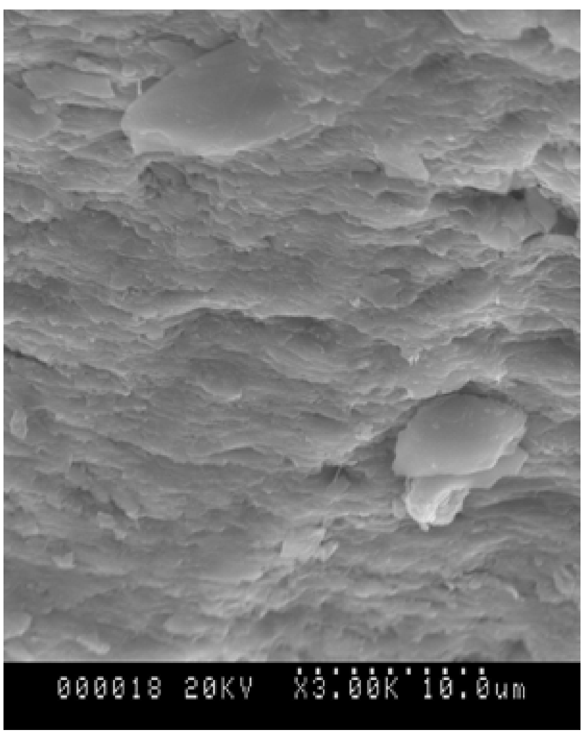


Edge surface

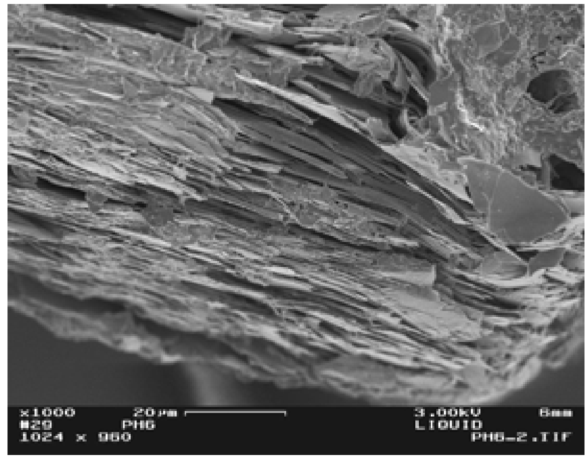
Figure F-3 (cont.): Nonshaken-inorganic experiment biotite edges and surfaces in pH 6 control (+flake +deionized water –fungus) – SEM.



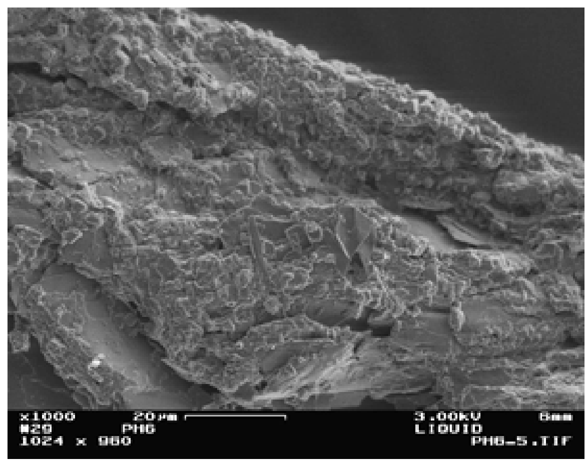
Basal surface



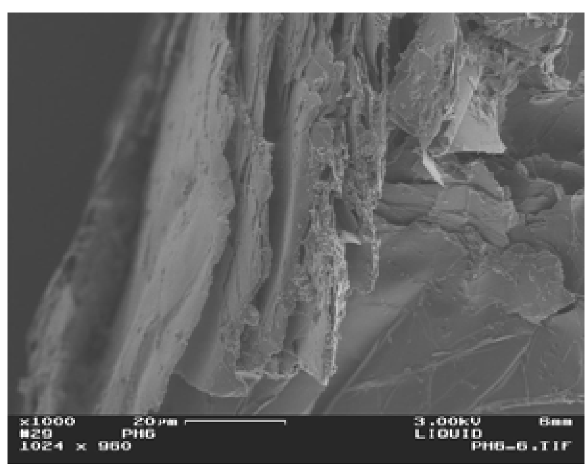
Edge surface



Edge surface

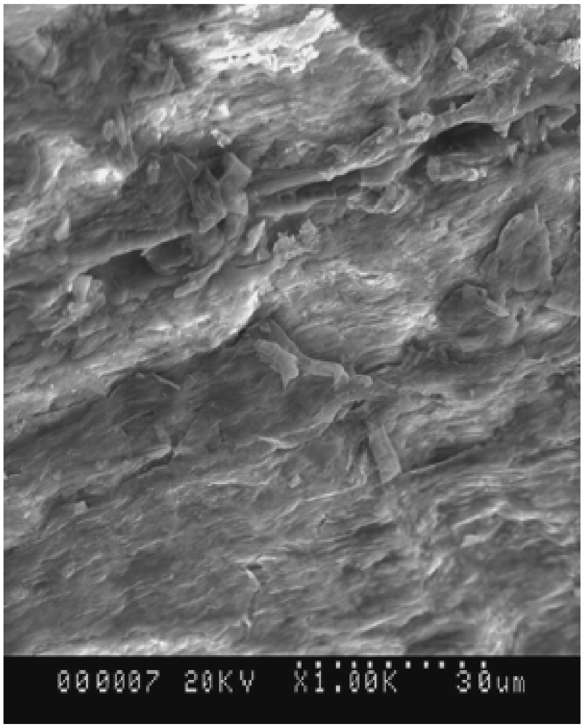


Edge surface

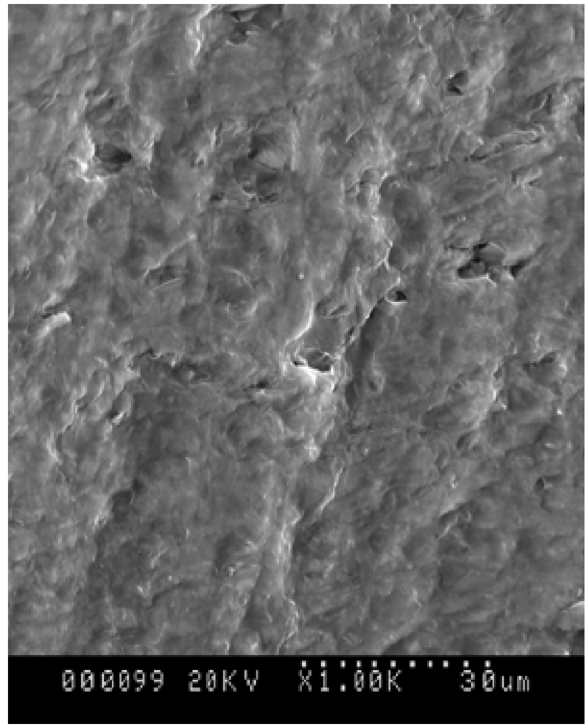


Edge surface

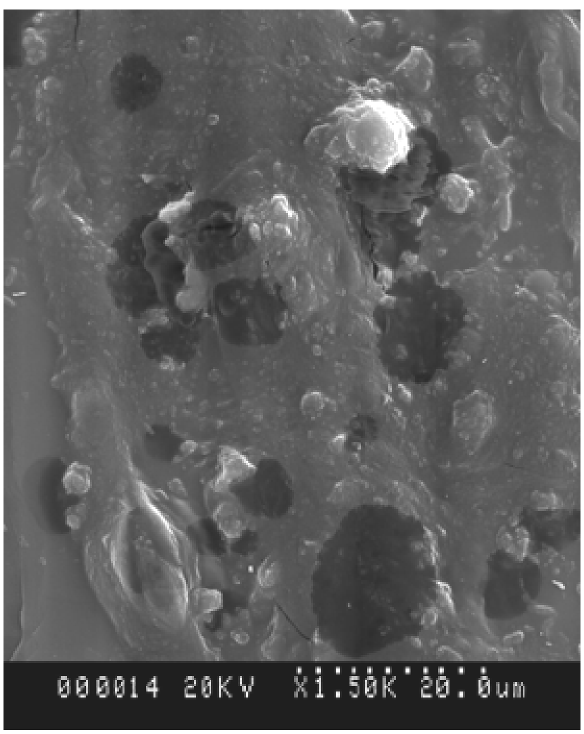
Figure F-4: Nonshaken-organic experiment biotite edges and surfaces in BGF (+flake +glucose +fungus) – SEM.



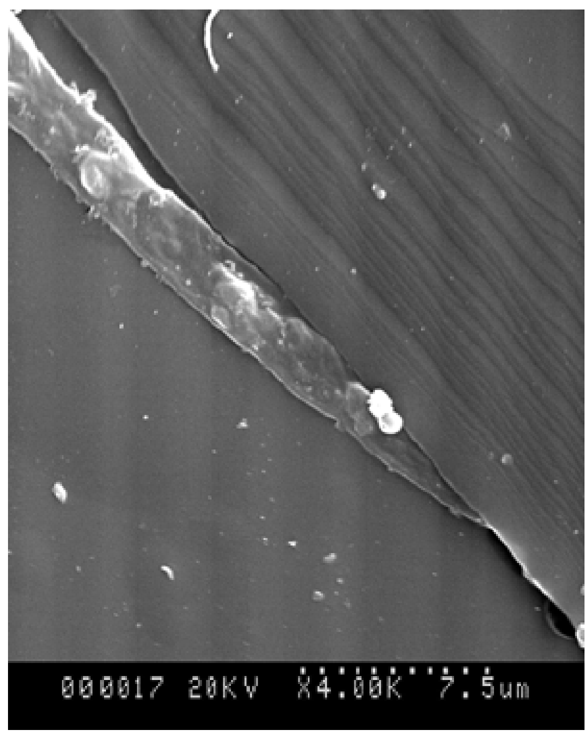
Edge surface



Edge surface

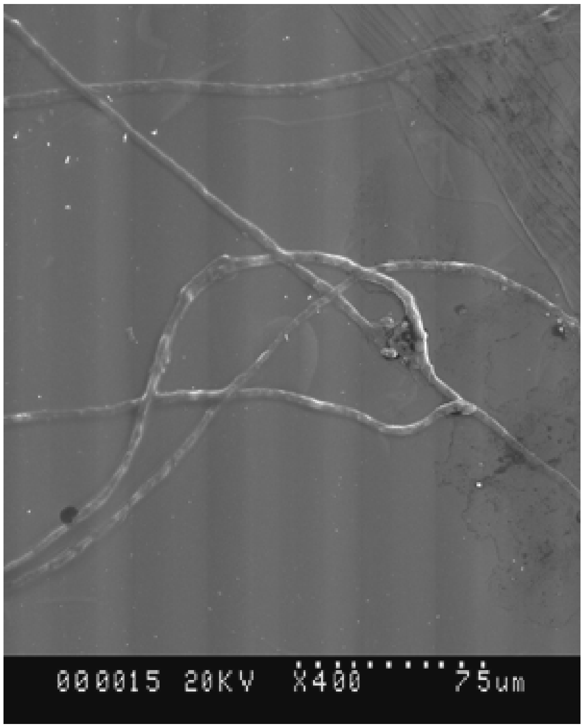


Basal surface

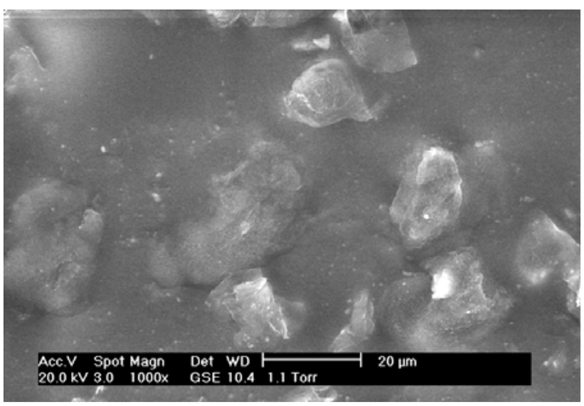


Basal surface

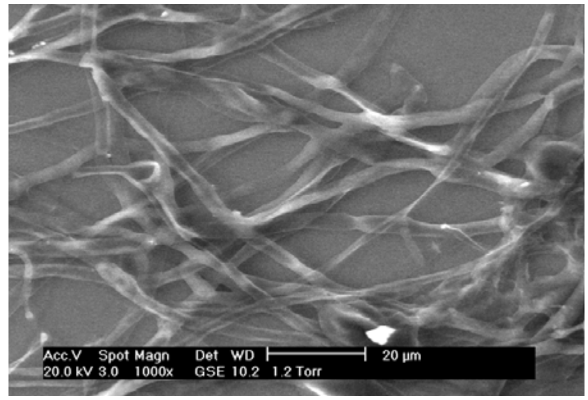
Figure F-4 (cont.): Nonshaken-organic experiment biotite edges and surfaces in BGF (+flake +glucose +fungus) – SEM and ESEM.



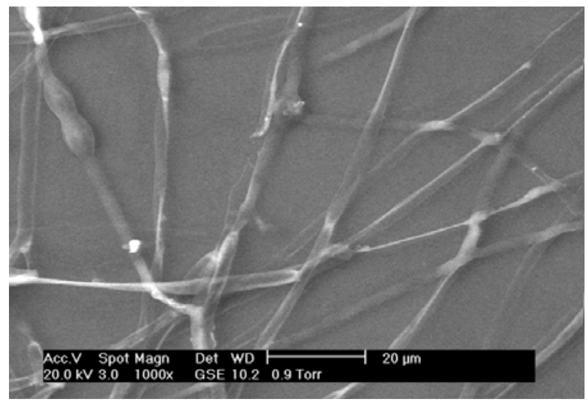
Basal surface



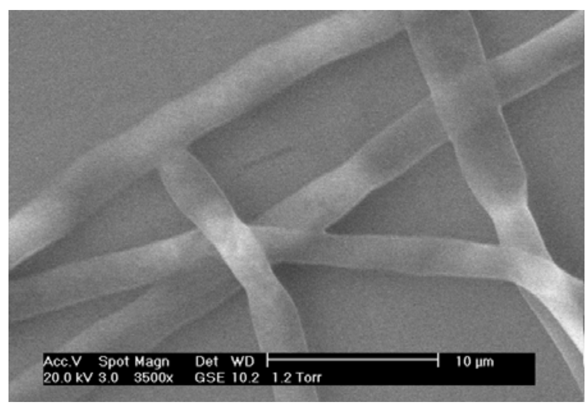
Basal surface



Basal surface

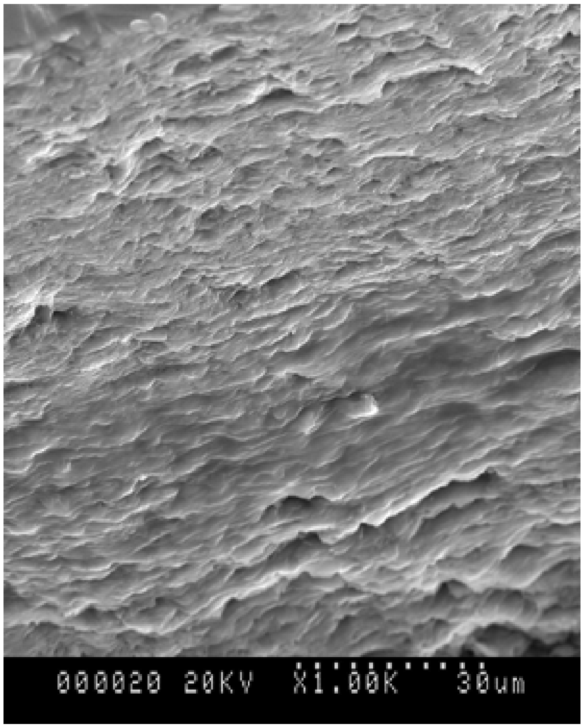


Basal surface

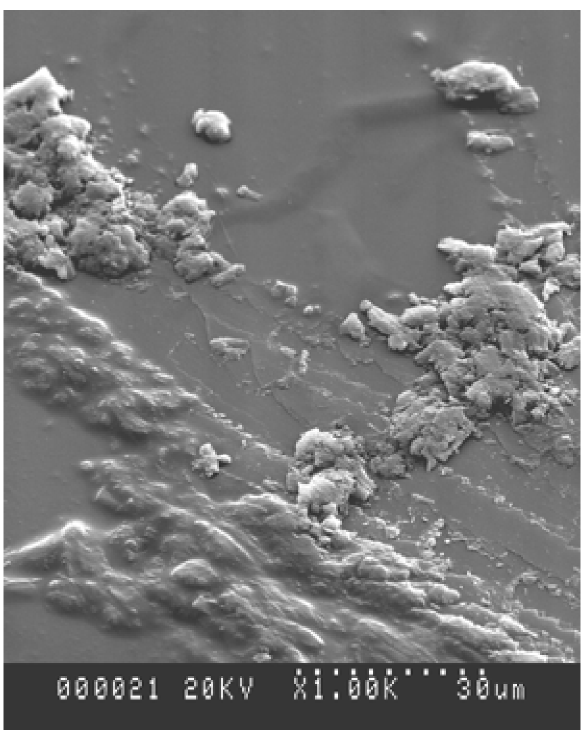


Basal surface

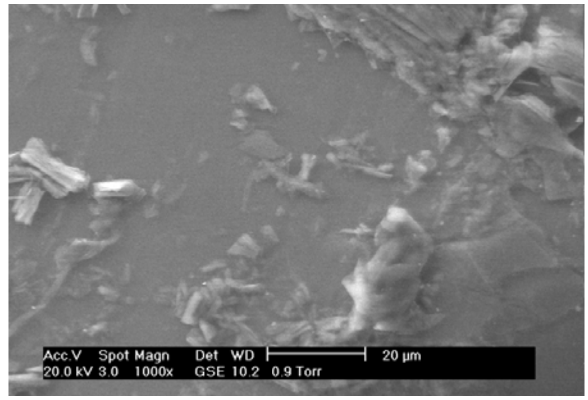
Figure F-4 (cont.): Nonshaken-organic experiment biotite edges and surfaces in pH 3 control (+flake +glucose −fungus) – SEM and ESEM.



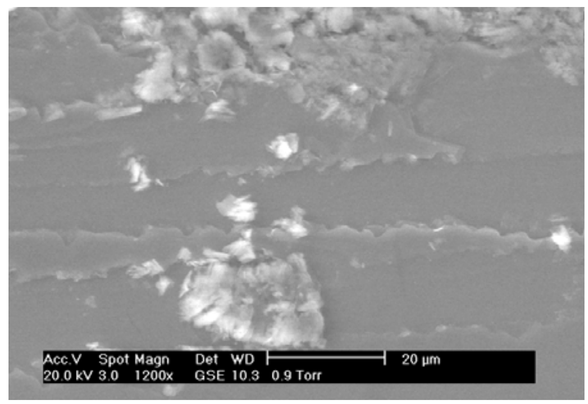
Edge surface



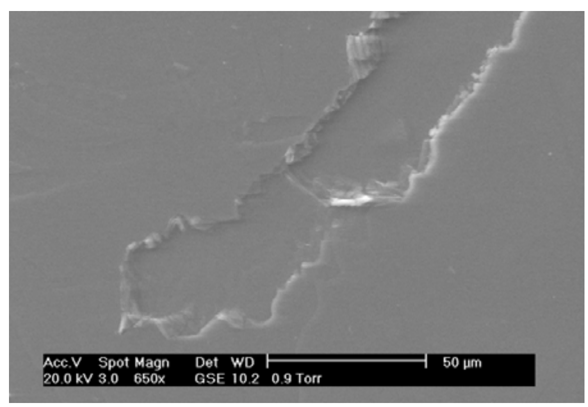
Basal surface



Basal surface

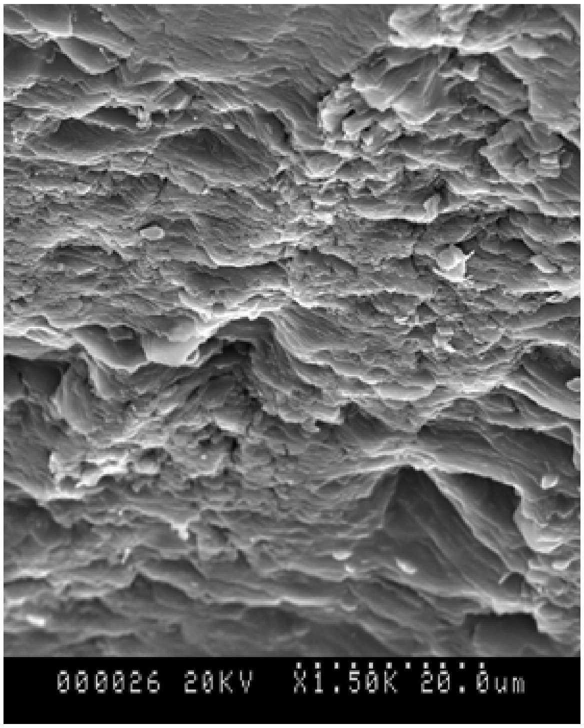


Basal surface

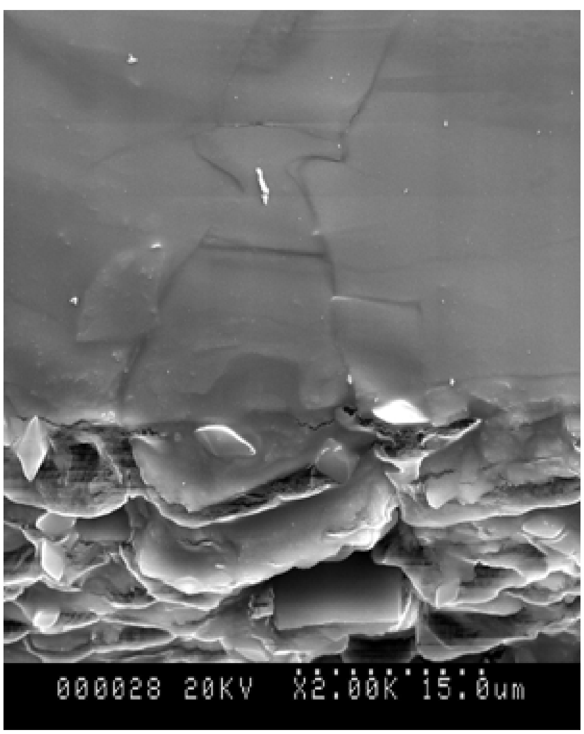


Basal surface

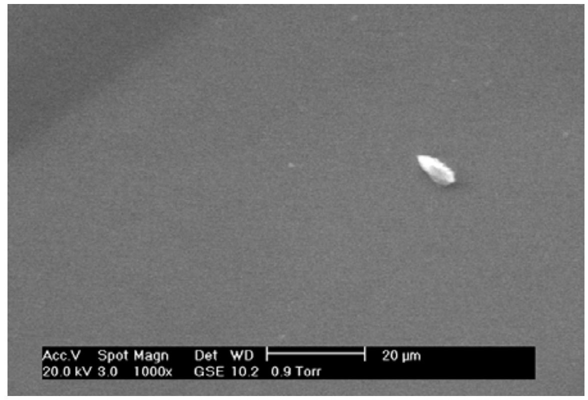
Figure F-4 (cont.): Nonshaken-organic experiment biotite edges and surfaces in pH 4 control (+flake +glucose −fungus) – SEM and ESEM.



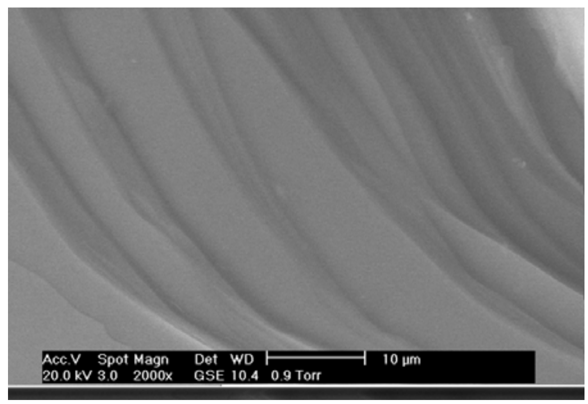
Edge surface



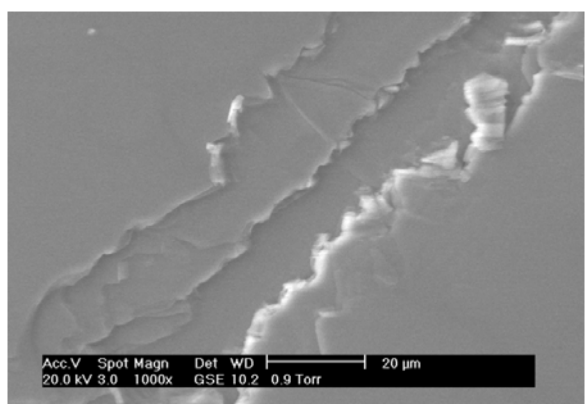
Basal and edge surfaces



Basal surface

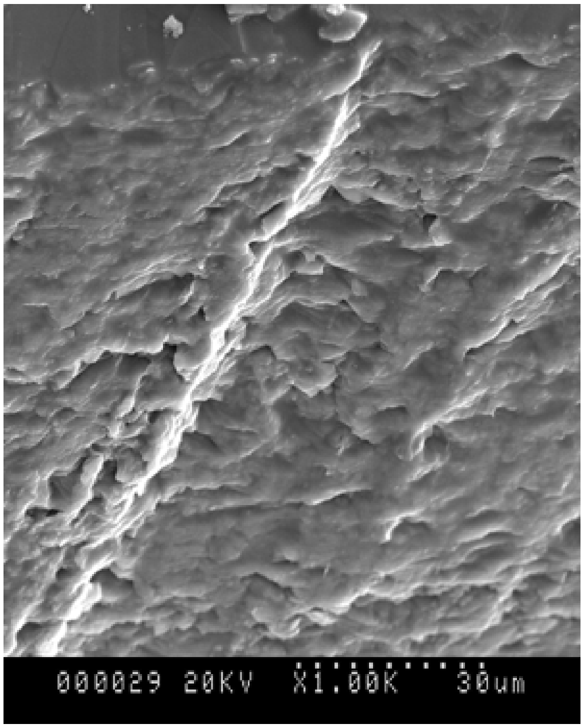


Basal surface – step edges

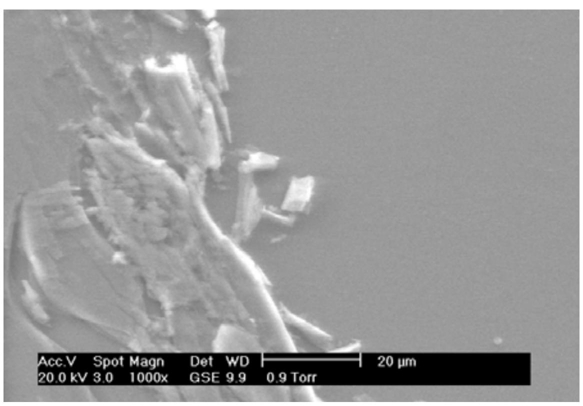


Basal surface

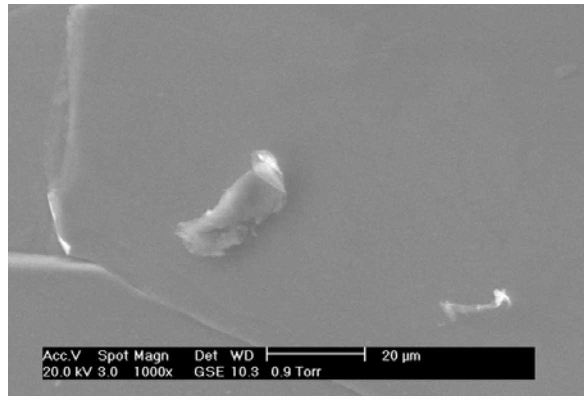
Figure F-4 (cont.): Nonshaken-organic experiment biotite edges and surfaces in pH 5 control (+flake +glucose −fungus) – SEM and ESEM.



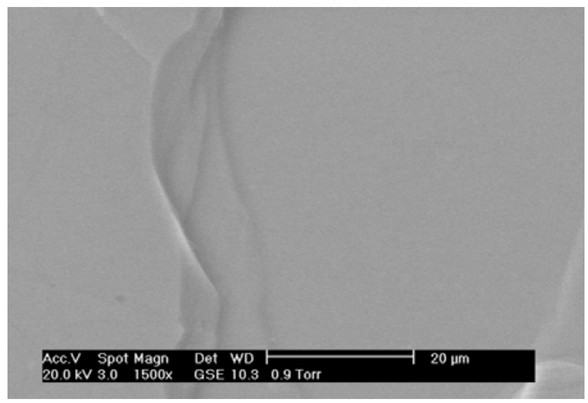
Edge surface



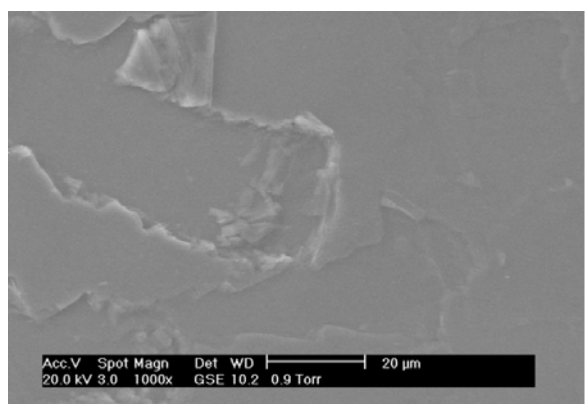
Basal surface



Basal surface

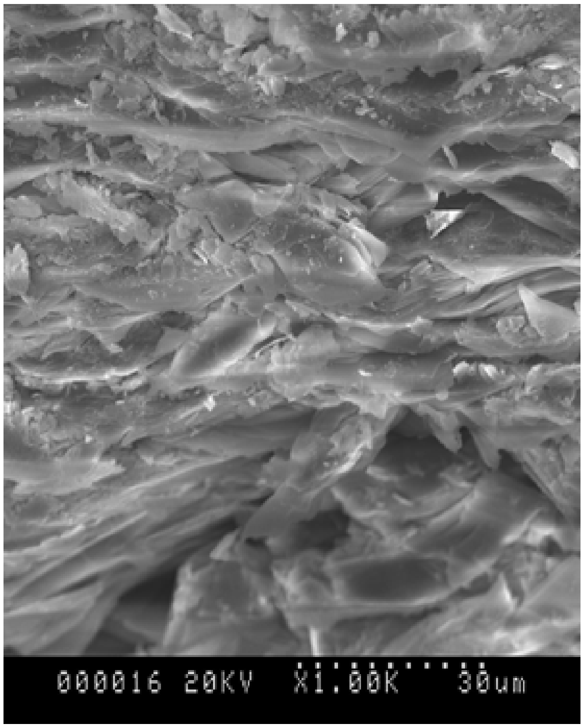


Basal surface – step edges

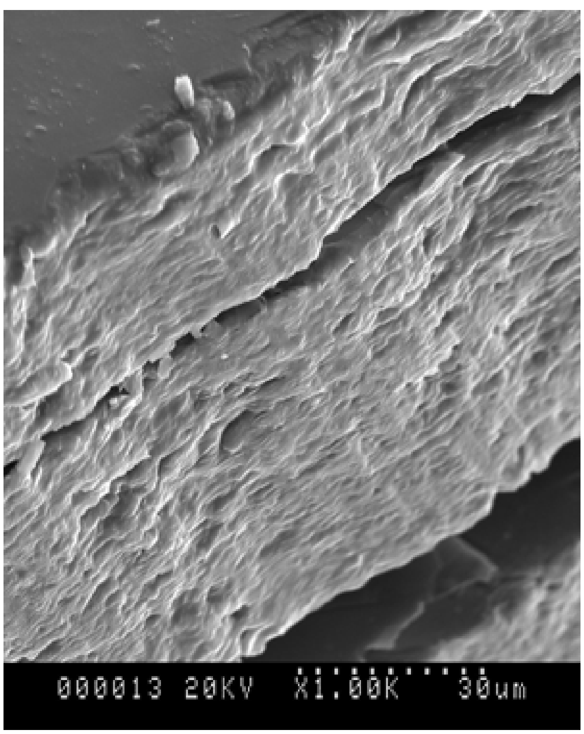


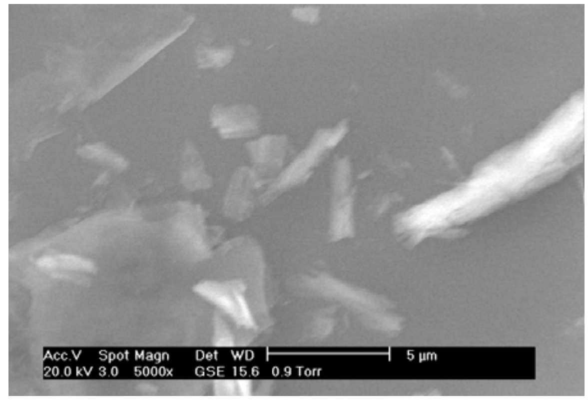
Basal surface

Figure F-4 (cont.): Nonshaken-organic experiment biotite edges and surfaces in pH 6 control (+flake +glucose −fungus) – SEM and ESEM.

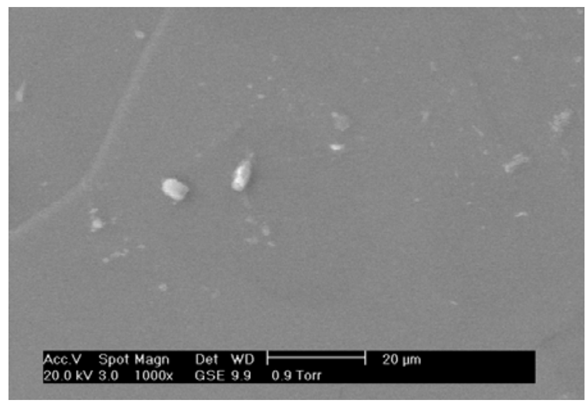


Edge surface

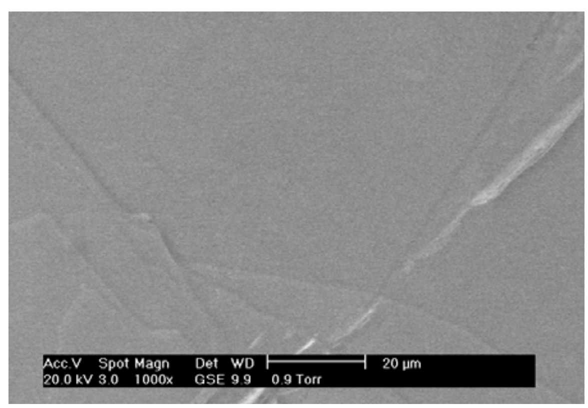




Basal surface



Basal surface



Basal surface

Figure F-5: Edge experiment – initial polished manufactures biotite edges (before exposure to treatments) – ESEM.

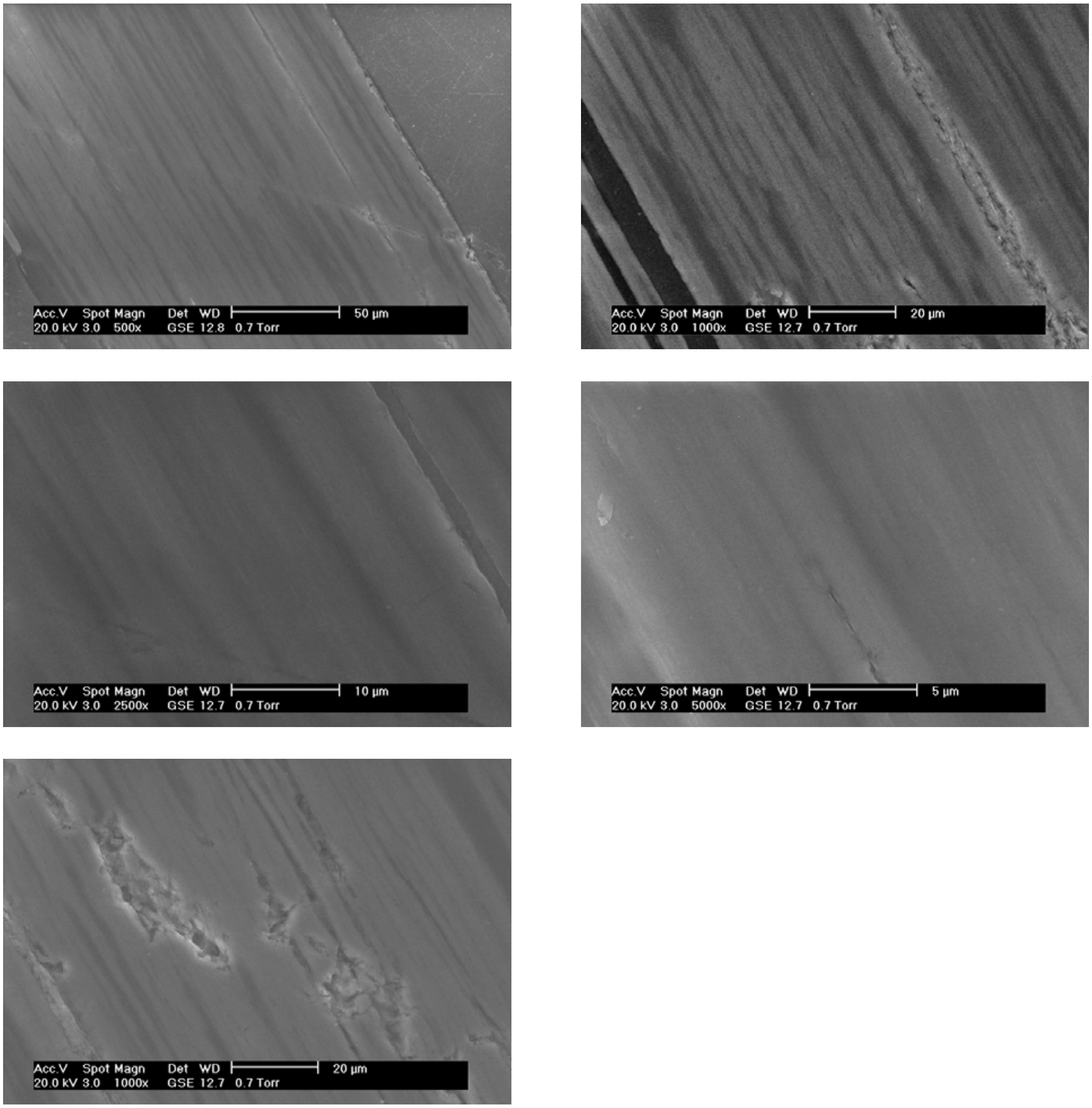


Figure F-5 (cont.): Edge experiment – polished manufactured biotite edges in BGF (+edge +glucose +fungus) – ESEM.

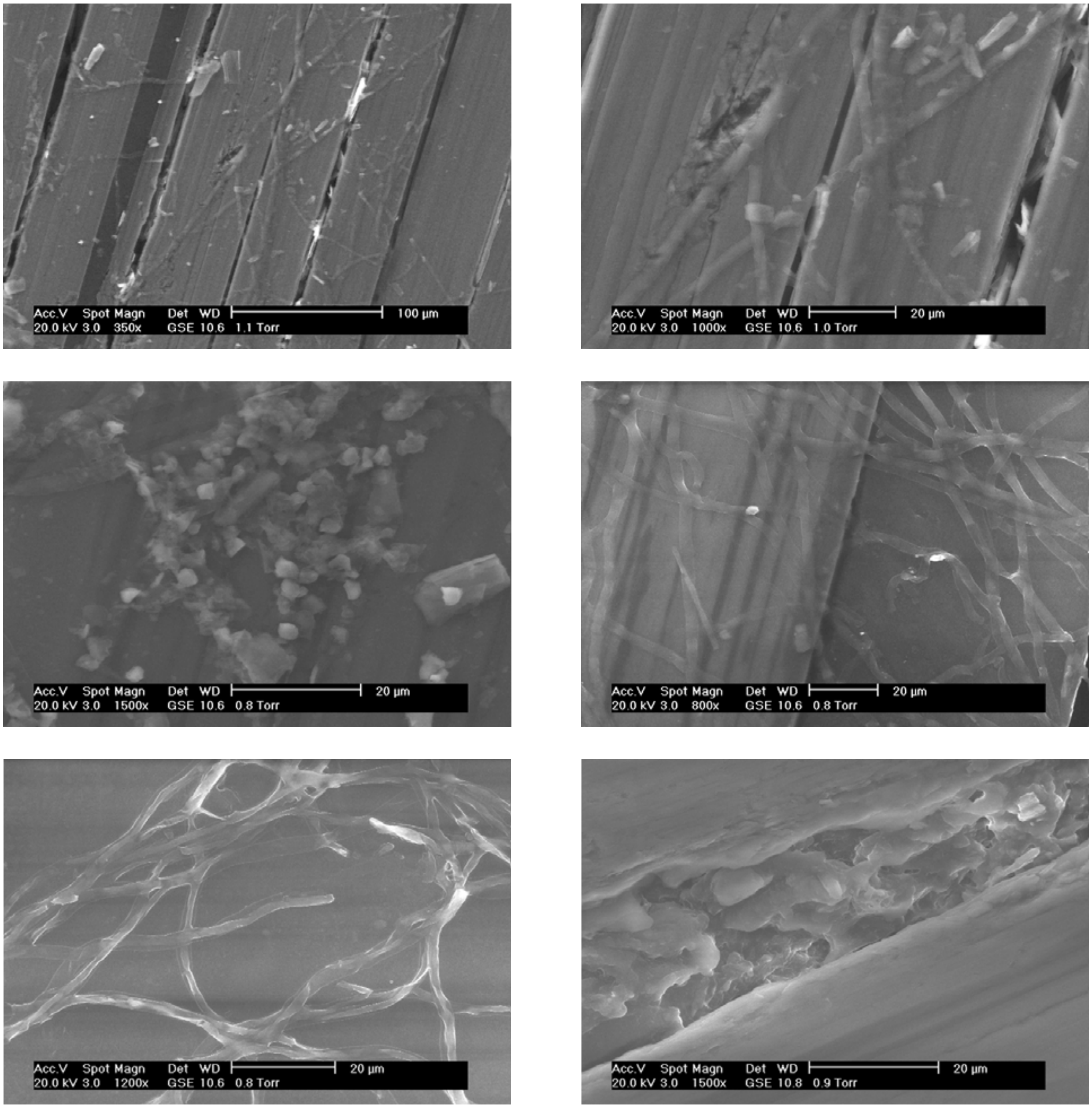


Figure F-5 (cont.): Edge experiment - polished manufactured biotite edges in pH 3 controls (+edge +glucose –fungus) – ESEM.

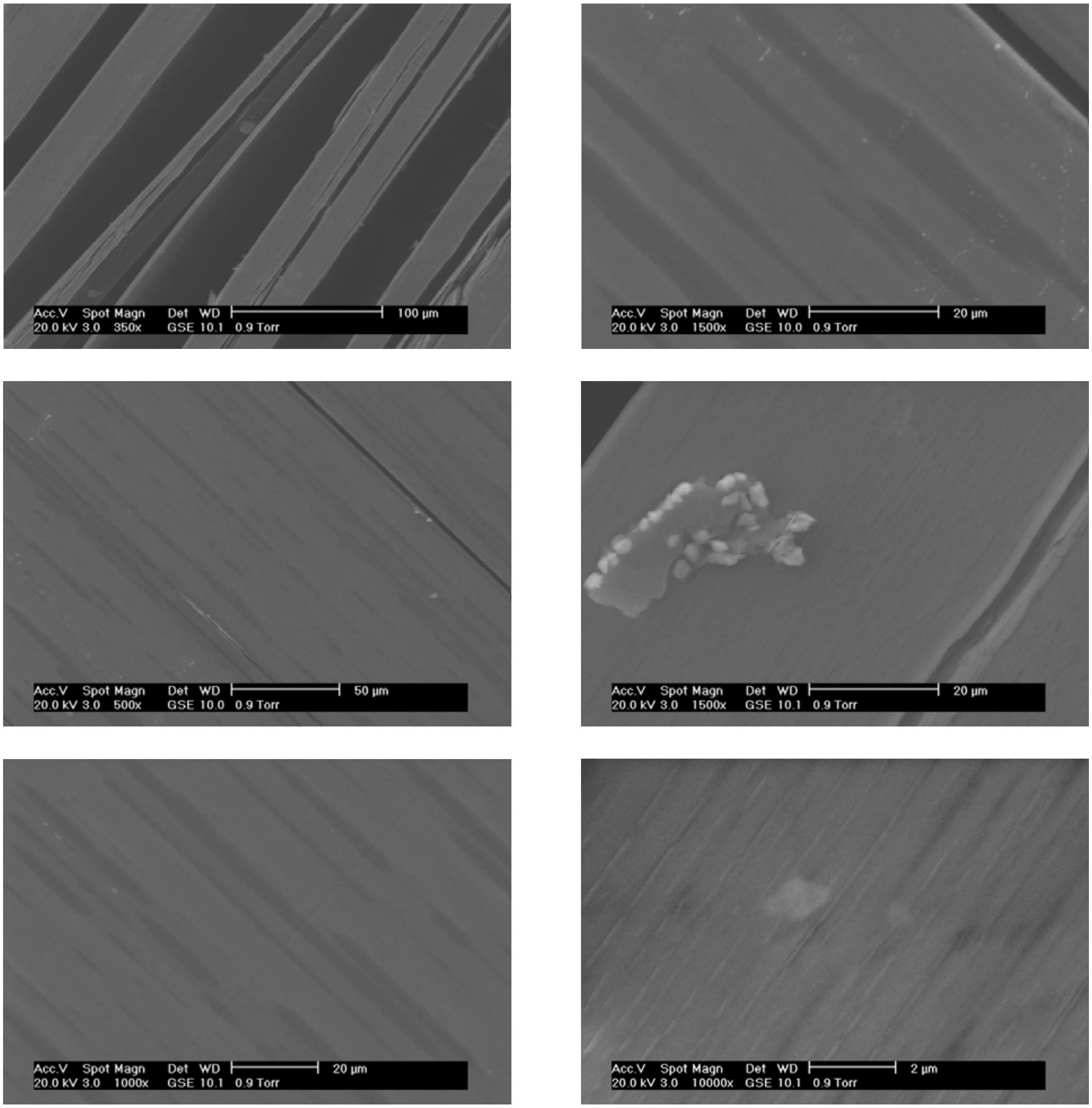
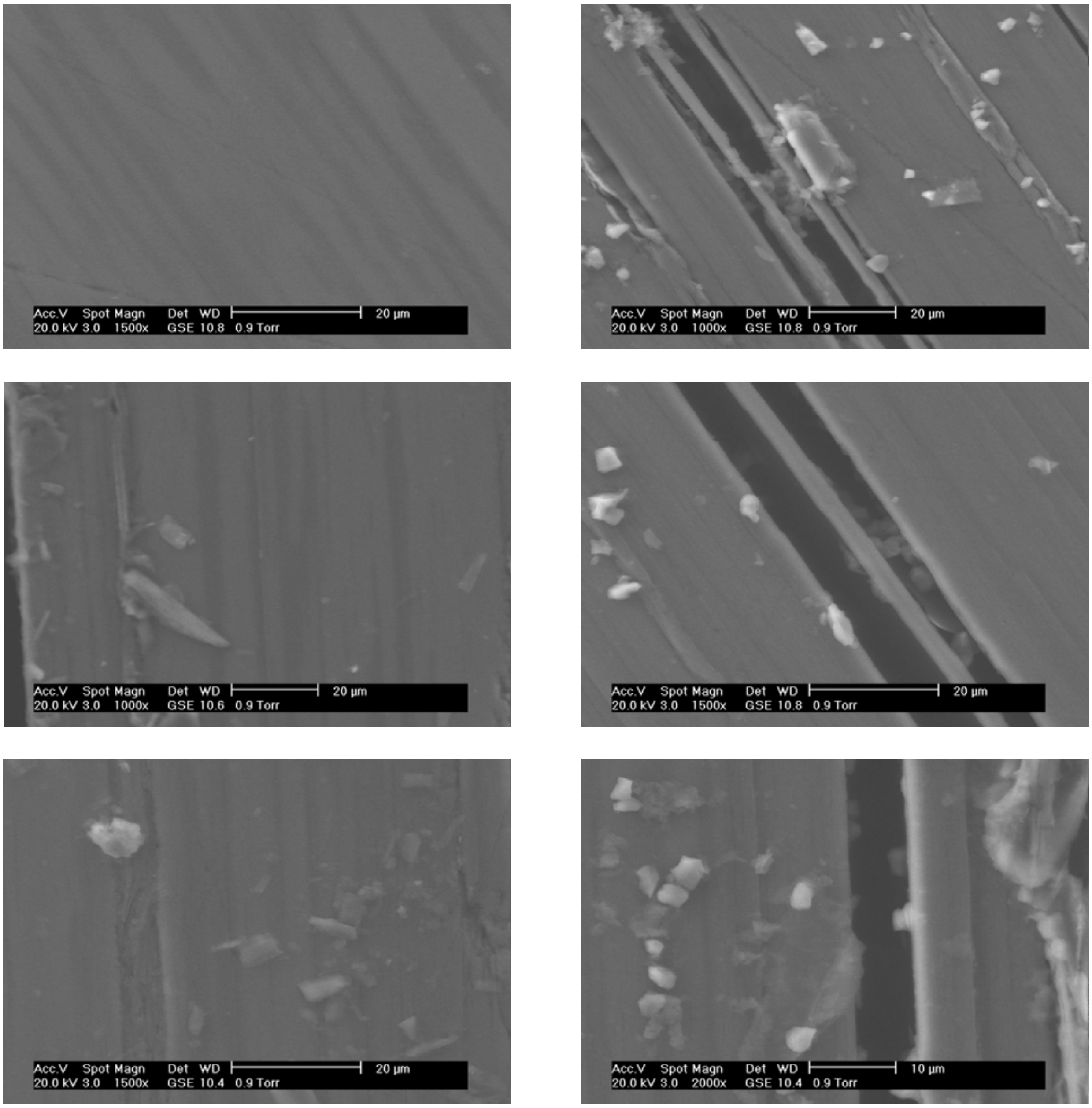


Figure F-5 (cont.): Edge experiment - polished manufactured biotite edges in pH 5 controls (+edge +glucose –fungus) – ESEM.



APPENDIX G

Representative biotite AFM images, analyzing technique and flux estimations

Figure G-1: Initial biotite flake basal surfaces - AFM.

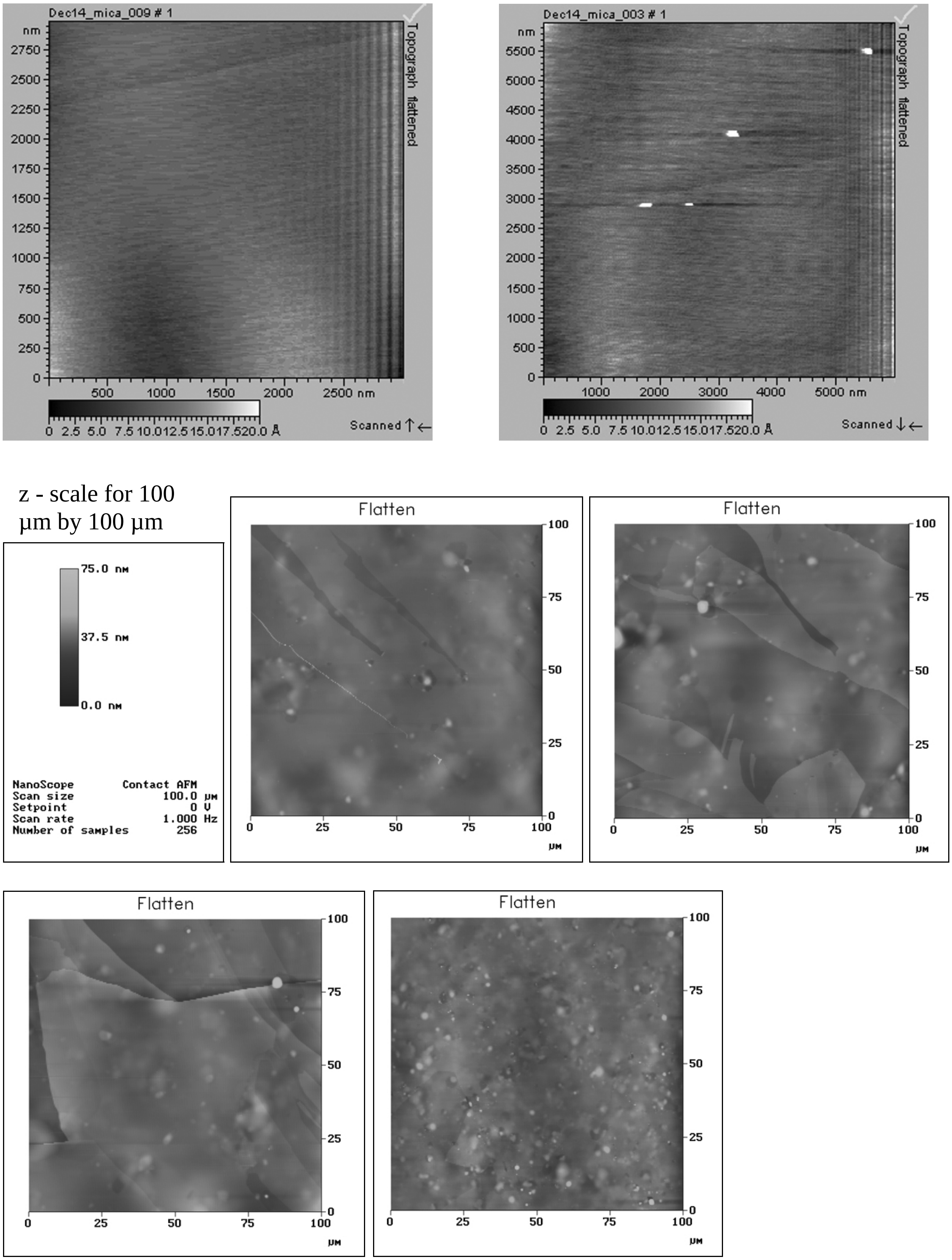


Figure G-2: Shaken-inorganic experiment – biotite flake basal surfaces in BGF (+flakes +glucose +fungus) - AFM.

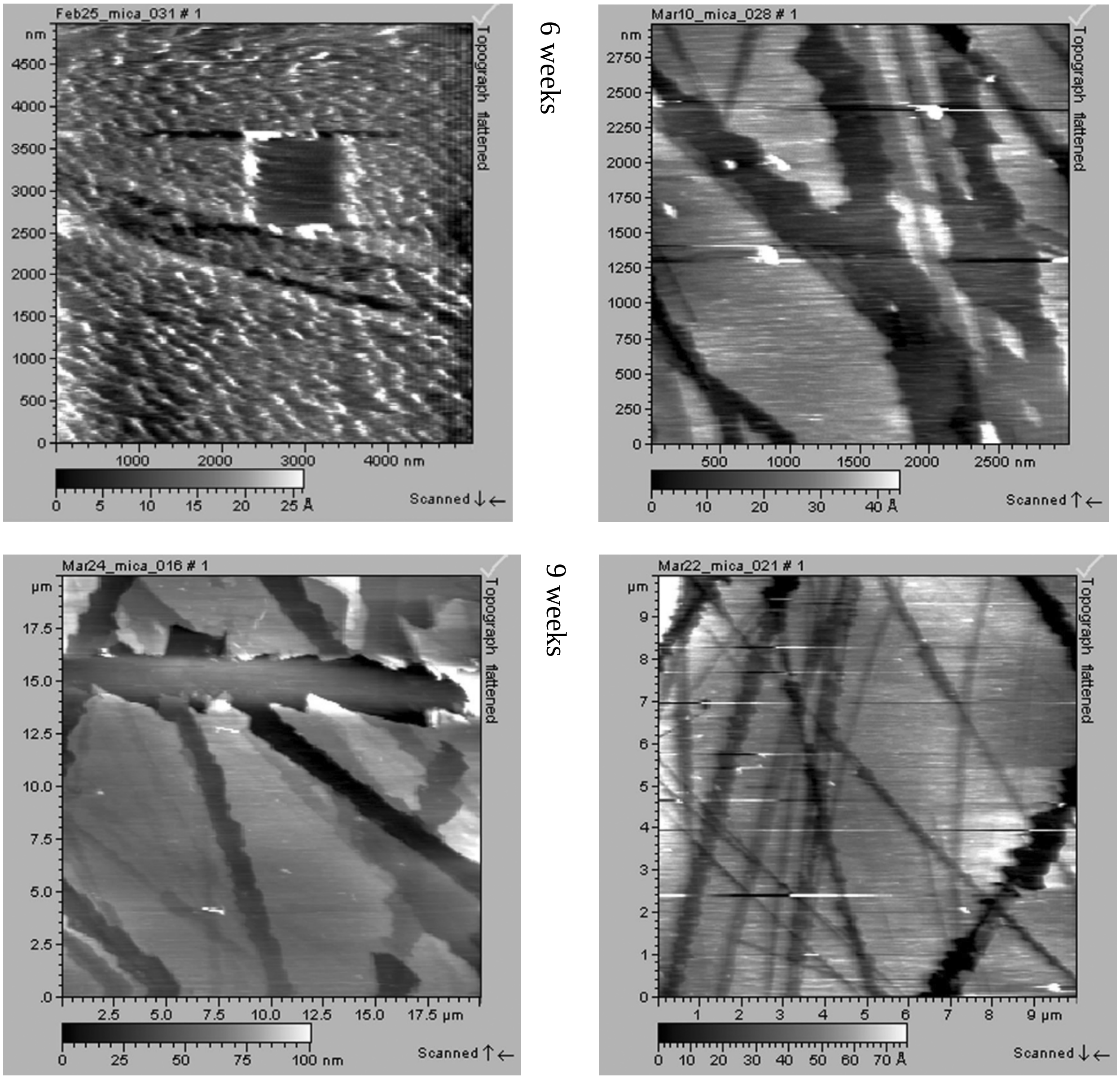
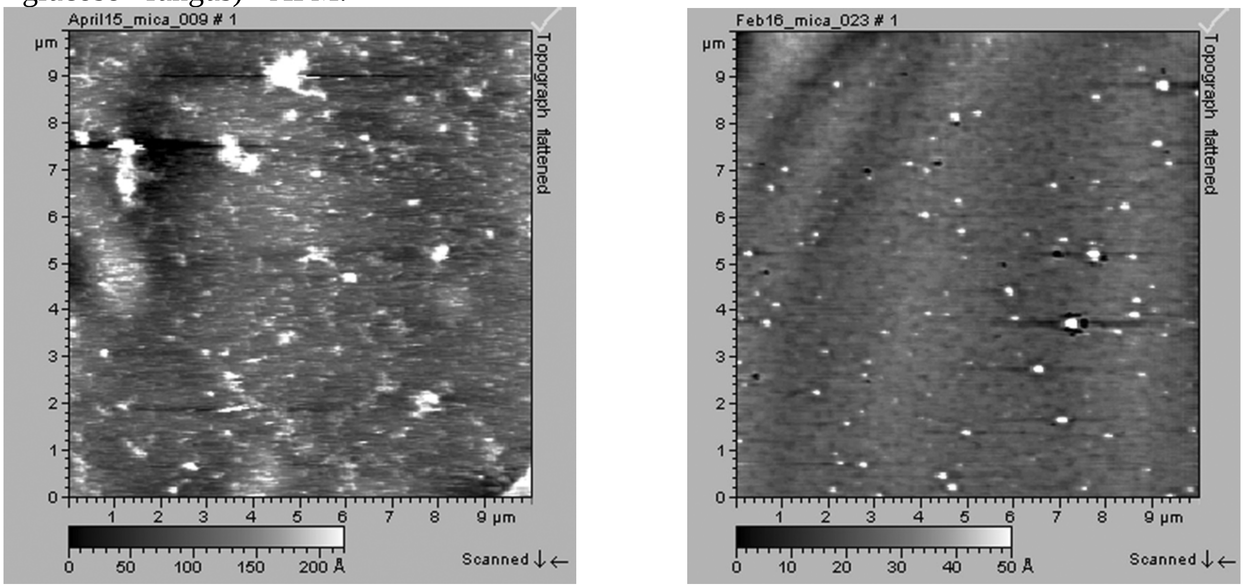


Figure G-2 (cont.): Shaken-inorganic experiment – biotite flake basal surfaces in BG (+flakes +glucose –fungus) - AFM.



z - scale for 100 µm by 100 µm images

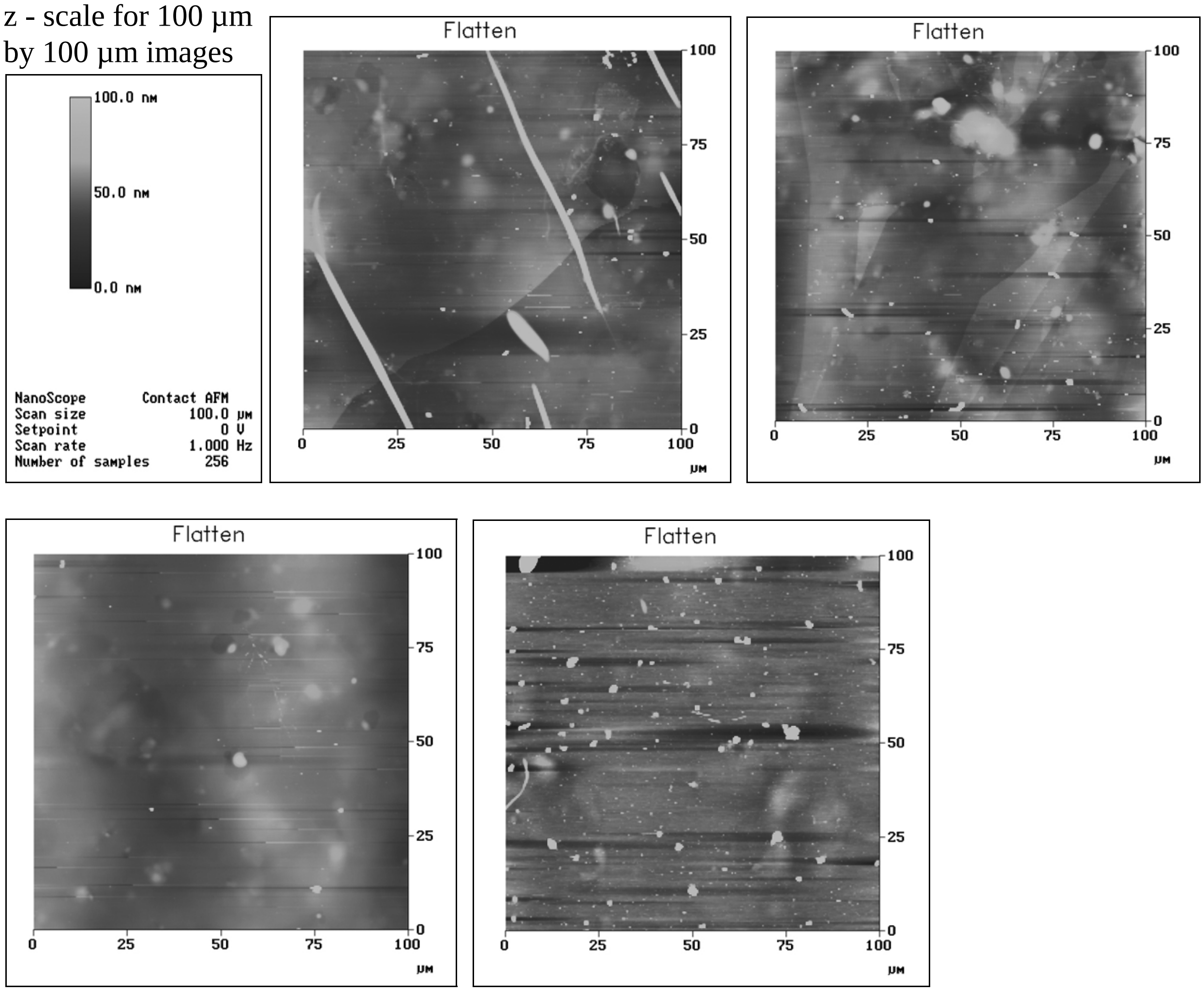
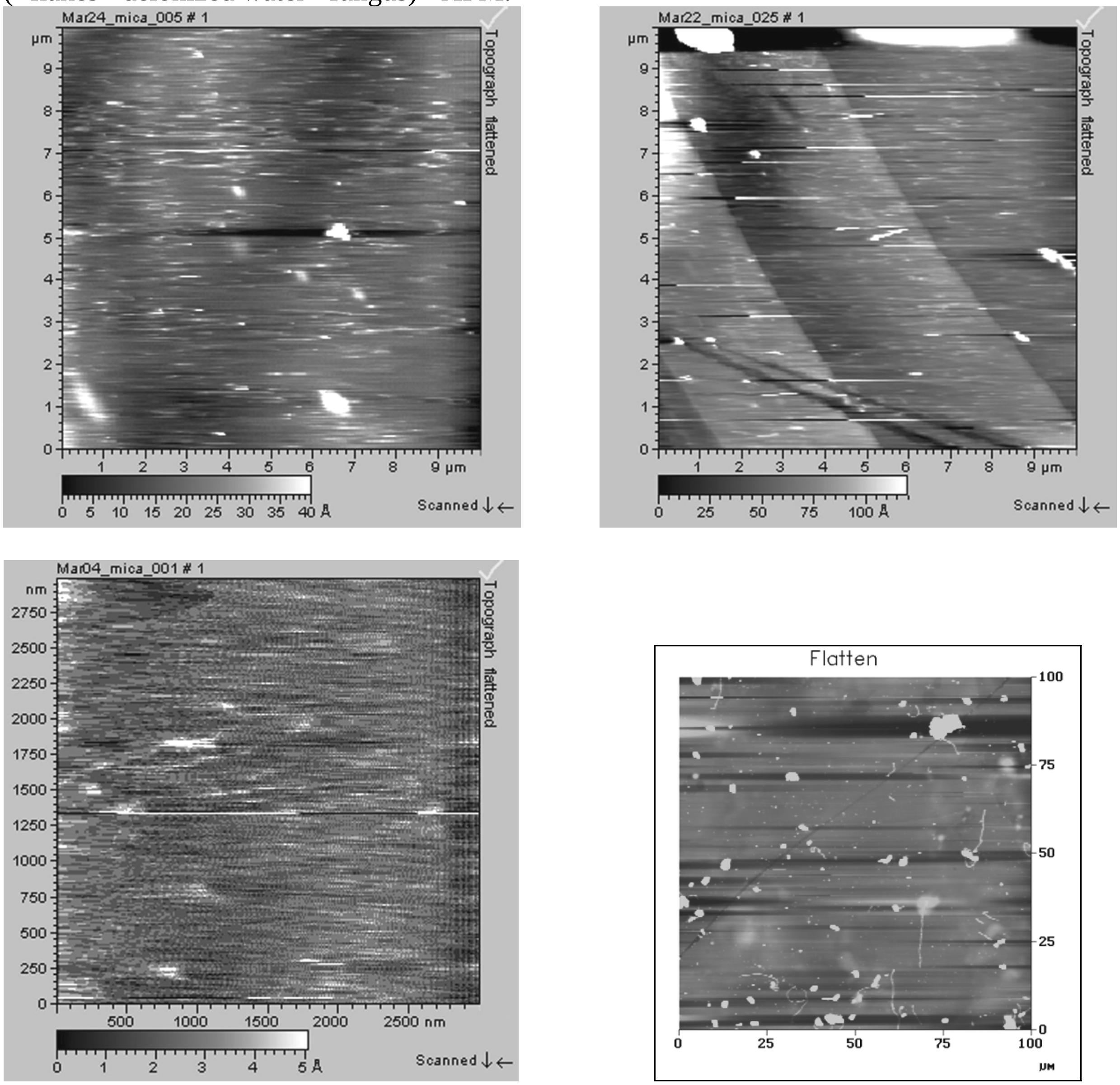


Figure G-2 (cont.): Shaken-inorganic experiment – biotite flake basal surfaces in pH 4 controls (+flakes +deionized water –fungus) - AFM.



z - scale for 100 µm
by 100 µm images

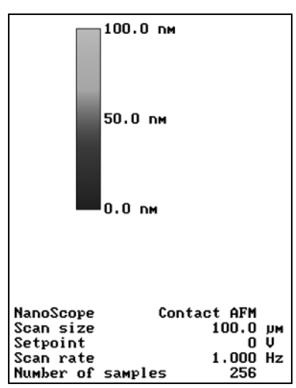
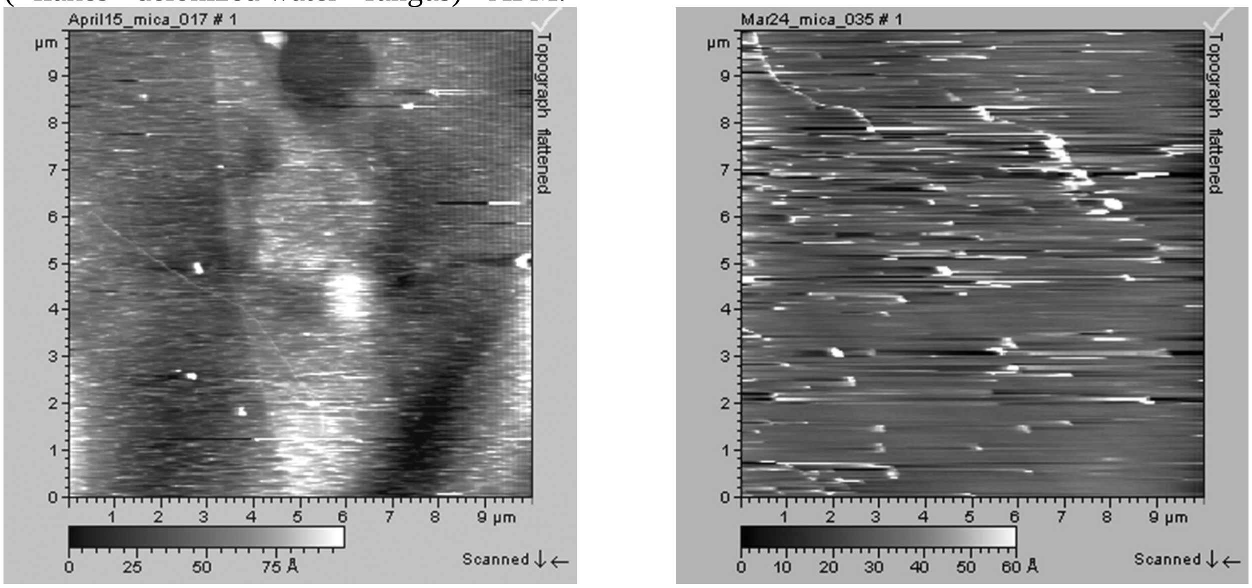


Figure G-2 (cont.): Shaken-inorganic experiment – biotite flake basal surfaces in pH 5 controls (+flakes +deionized water –fungus) - AFM.



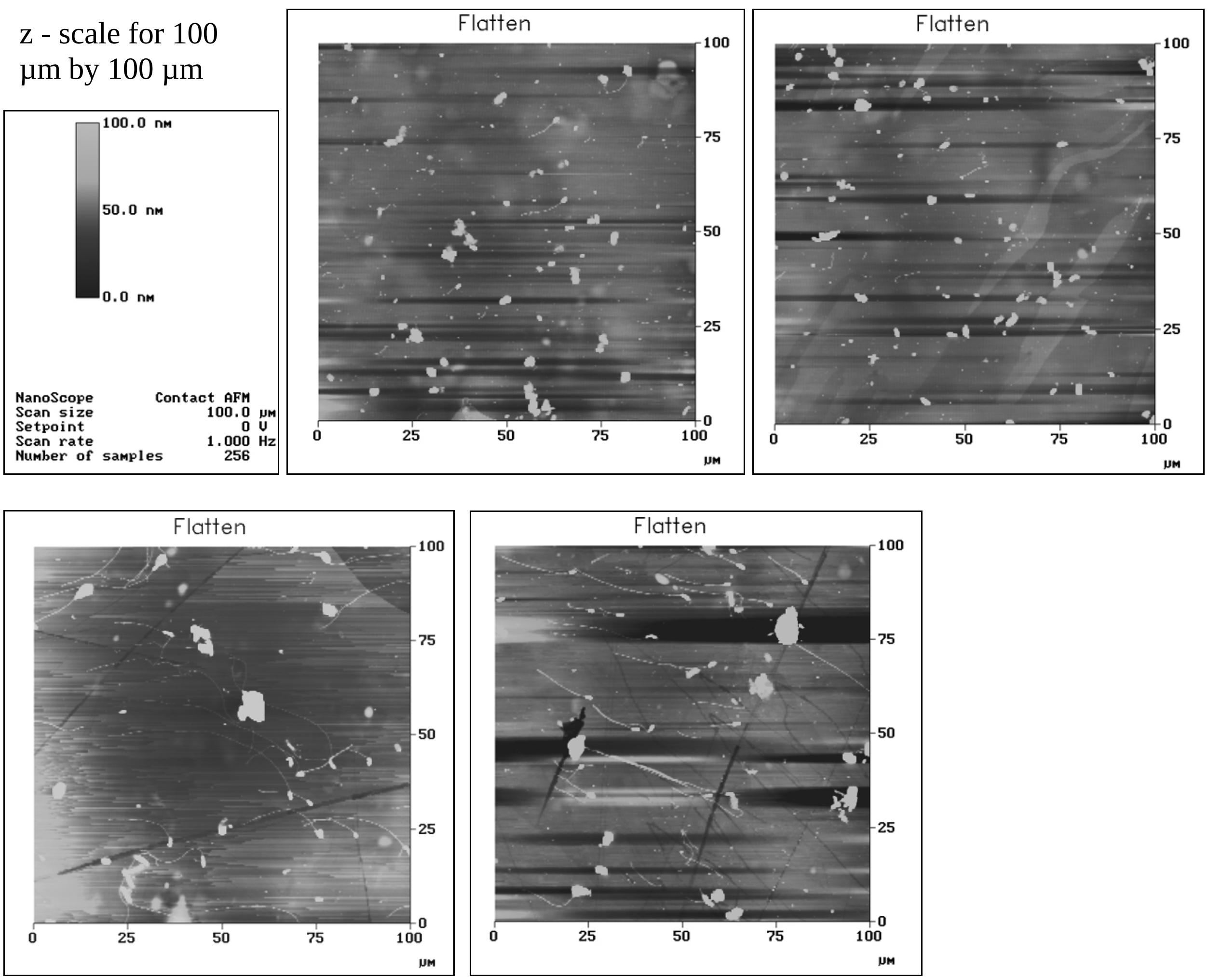
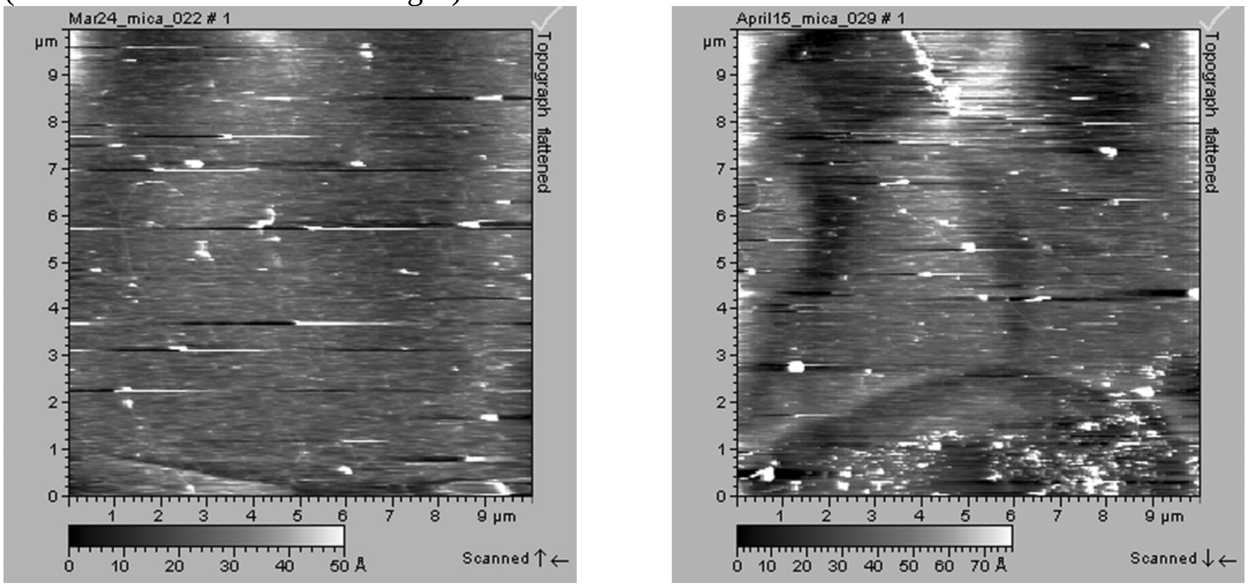


Figure G-2 (cont.): Shaken-inorganic experiment – biotite flake basal surfaces in pH 6 controls (+flakes +deionized water –fungus) - AFM.



z - scale for 100 µm by 100 µm images

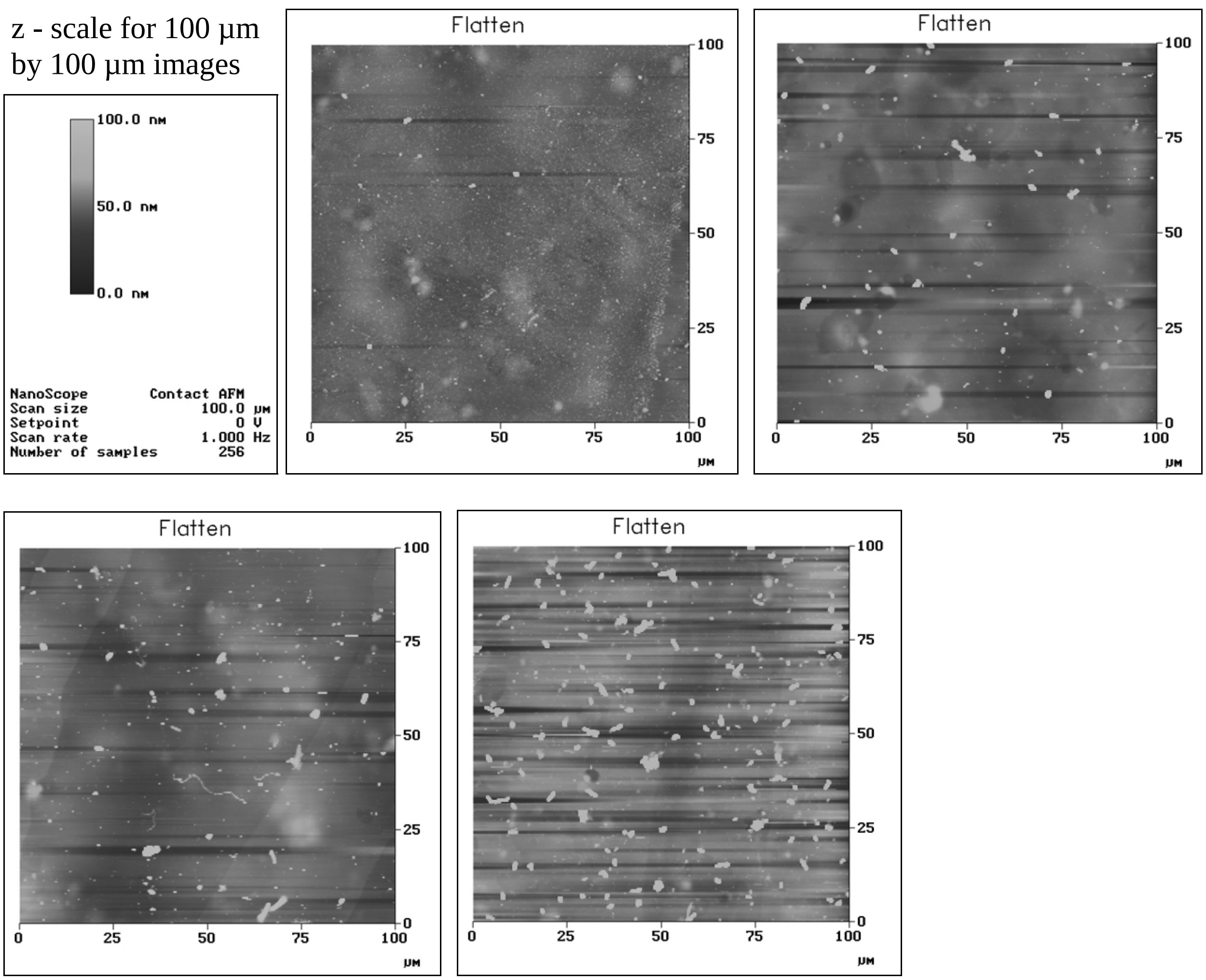
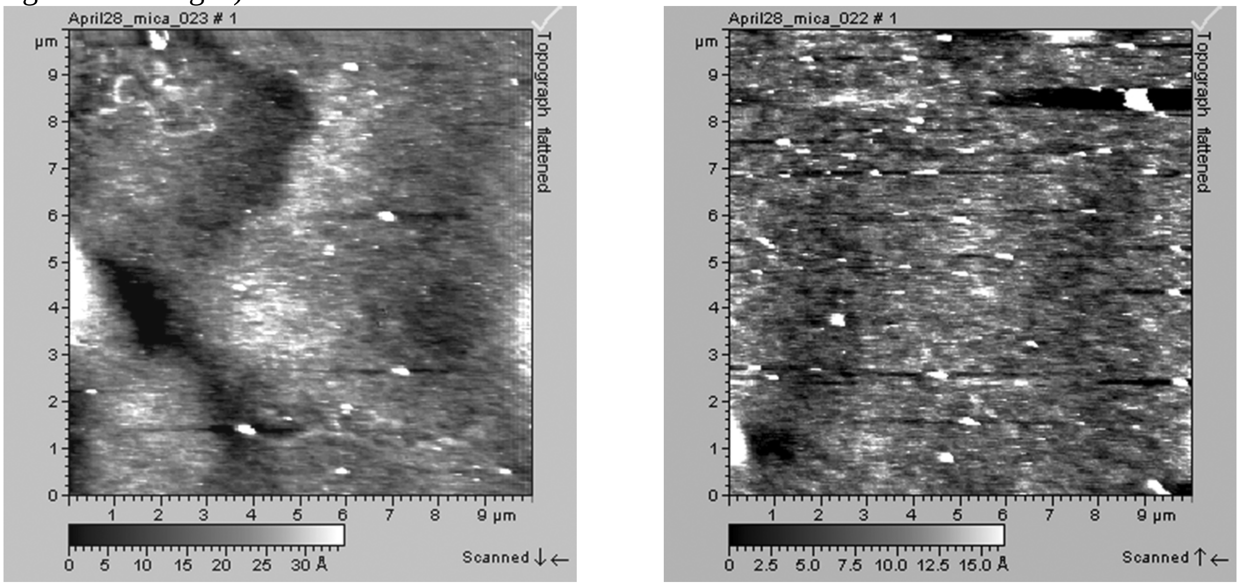


Figure G-3: Nonshaken-inorganic experiment – biotite flake basal surfaces in BGF (+flakes +glucose +fungus) - AFM.



z - scale for 100 µm by 100 µm images

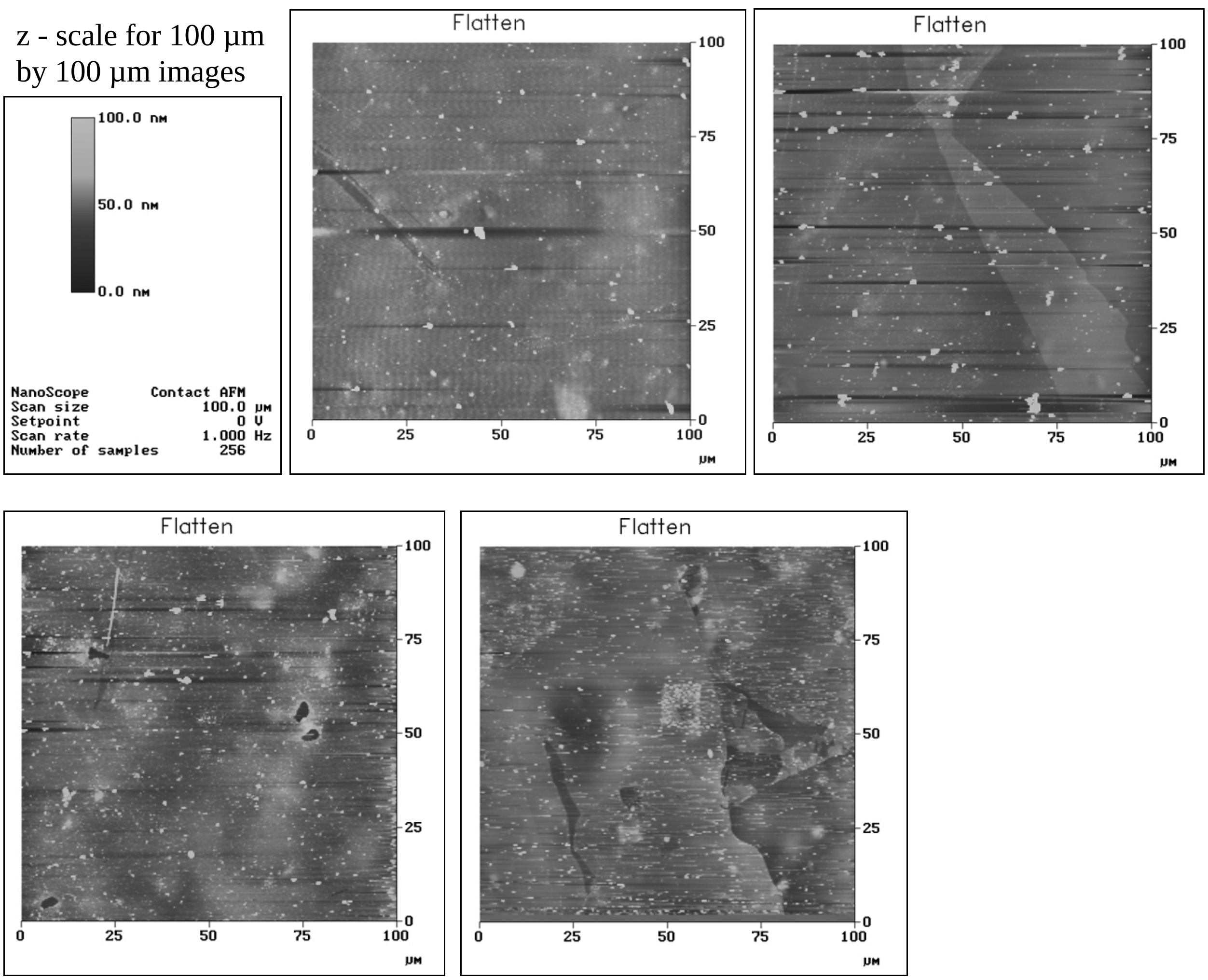
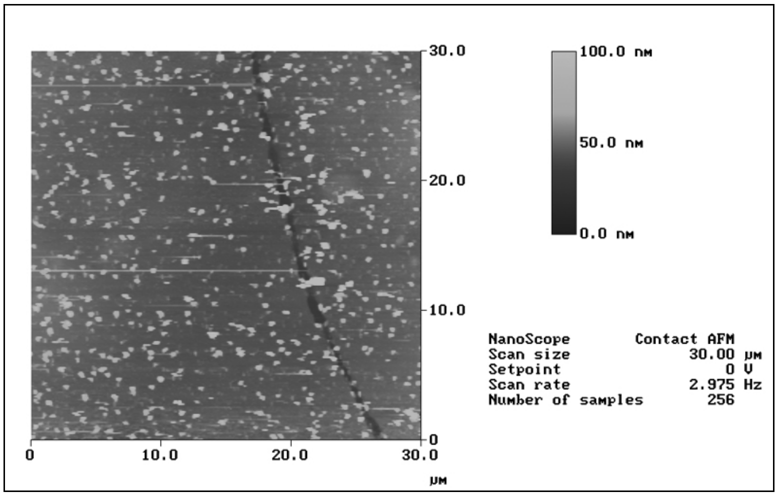
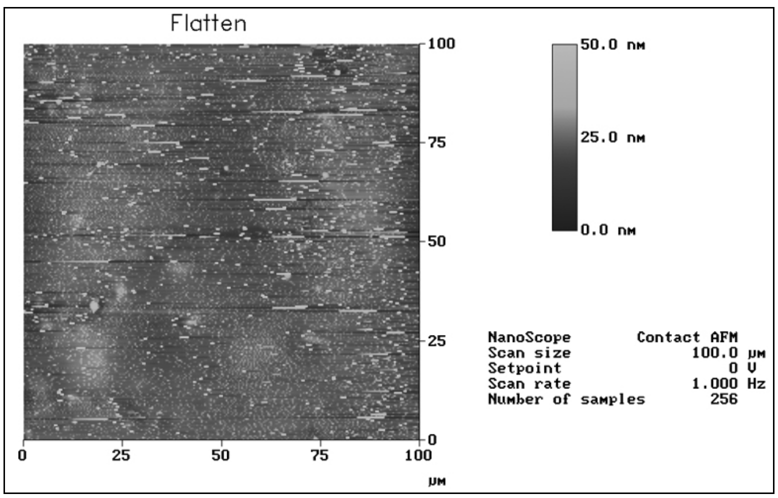


Figure G-3 (cont.): Nonshaken-inorganic experiment – biotite flake basal surfaces in BGF (+flakes +glucose +fungus) - AFM.





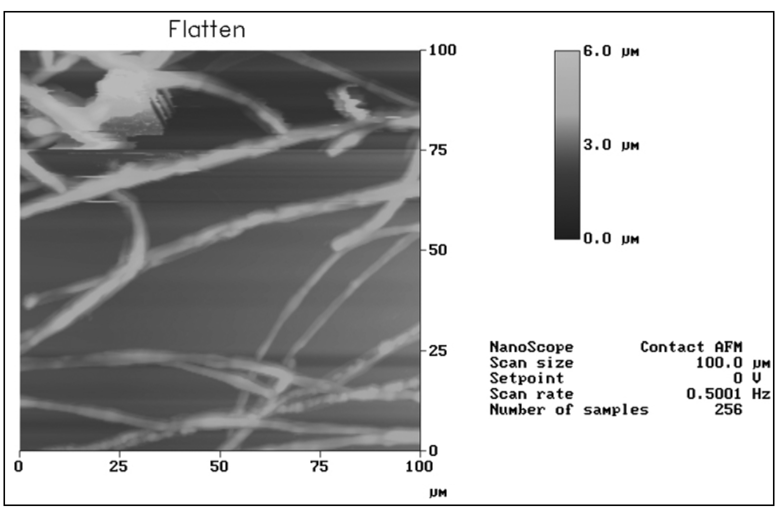


Figure G-3 (cont.): Nonshaken-inorganic experiment – biotite flake basal surfaces in BG (+flakes +glucose –fungus) - AFM.

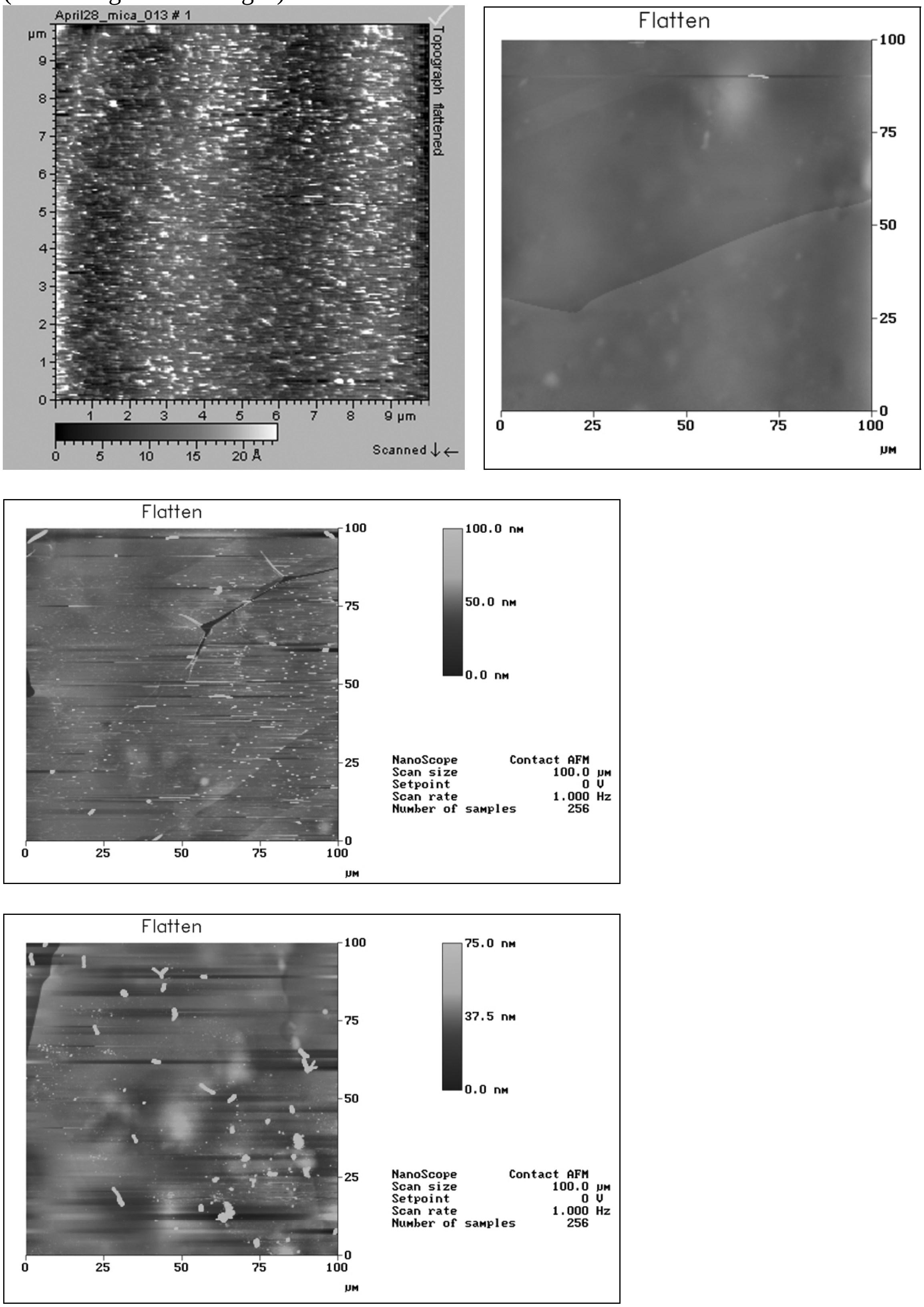


Figure G-3 (cont.): Nonshaken-inorganic experiment – biotite flake basal surfaces in pH 4 controls (+flakes +deionized water –fungus) - AFM.

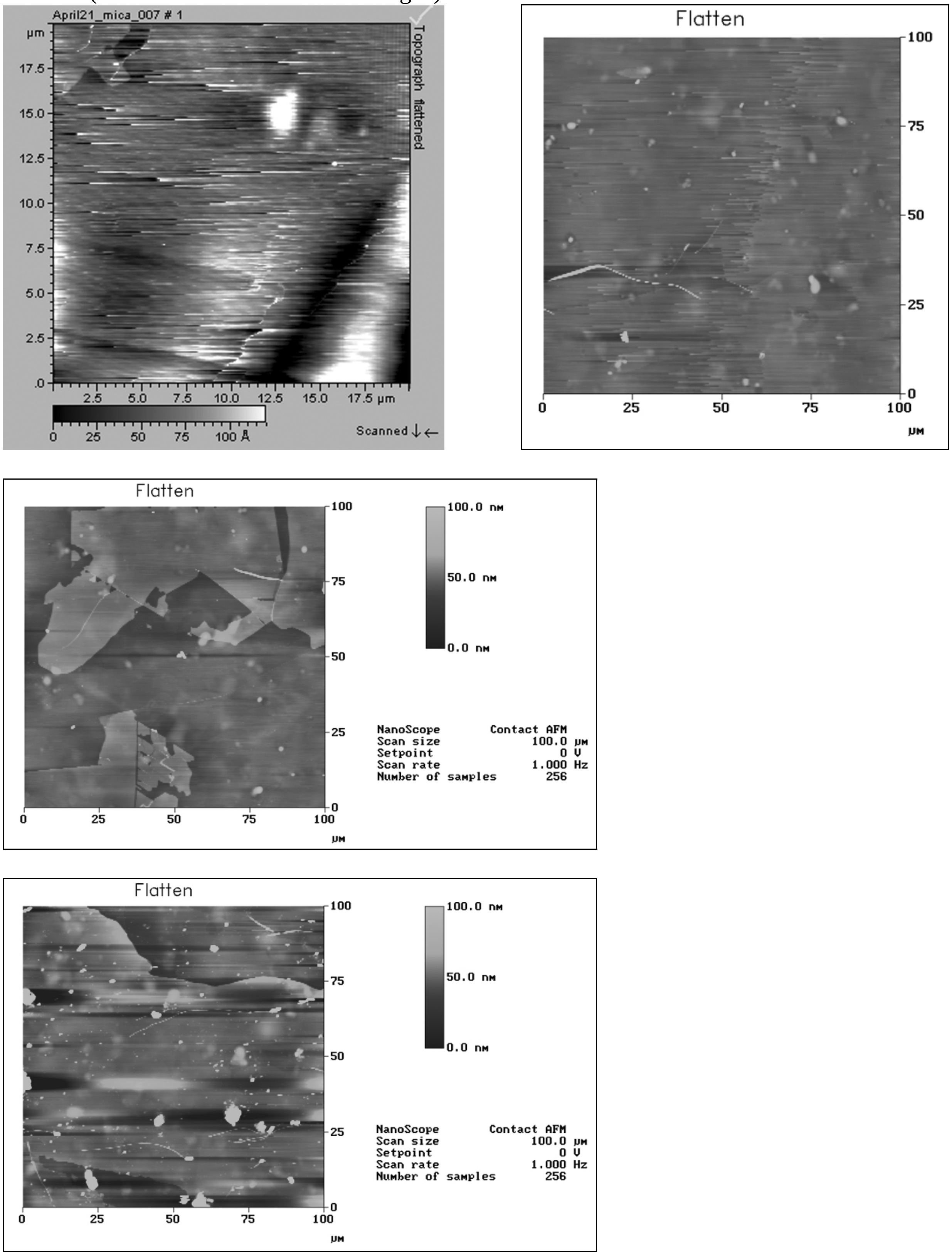
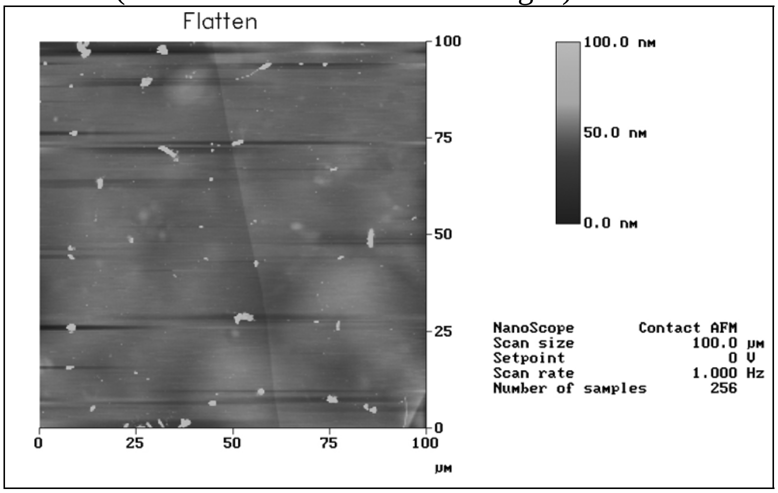
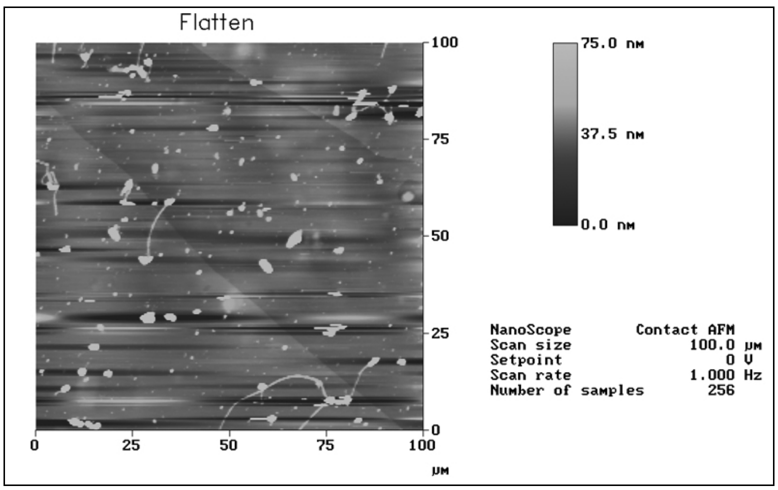


Figure G-3 (cont.): Nonshaken-inorganic experiment – biotite flake basal surfaces in pH 5 controls (+flakes +deionized water –fungus) - AFM.





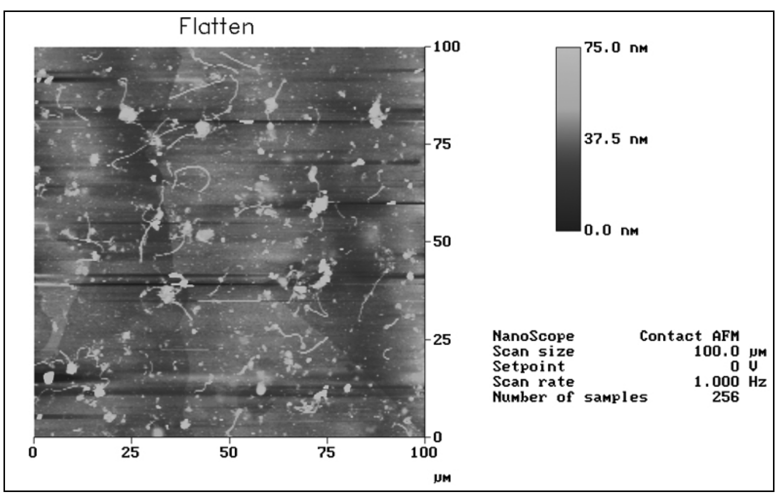
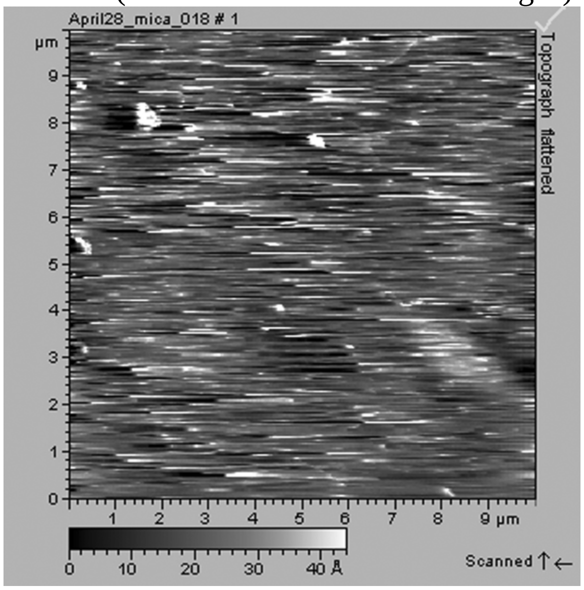
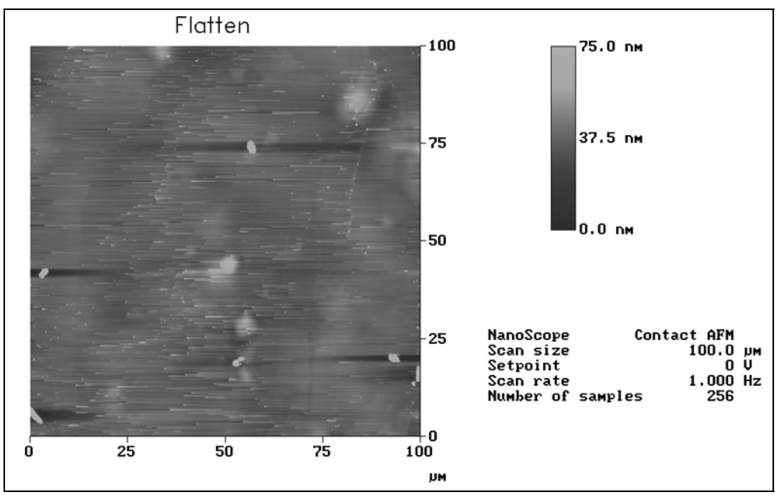


Figure G-3 (cont.): Nonshaken-inorganic experiment – biotite flake basal surfaces in pH 6 controls (+flakes +deionized water –fungus) - AFM.





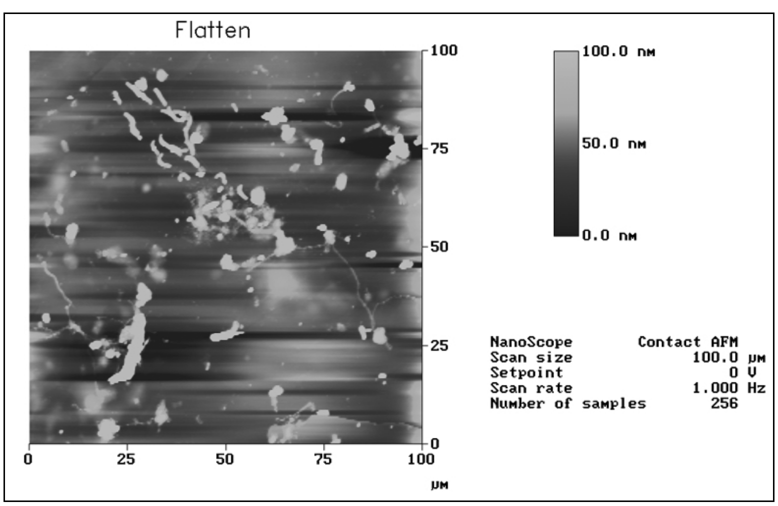


Figure G-4: Nonshaken-organic experiment – biotite flake basal surfaces in BGF (+flakes +glucose +fungus) - AFM.

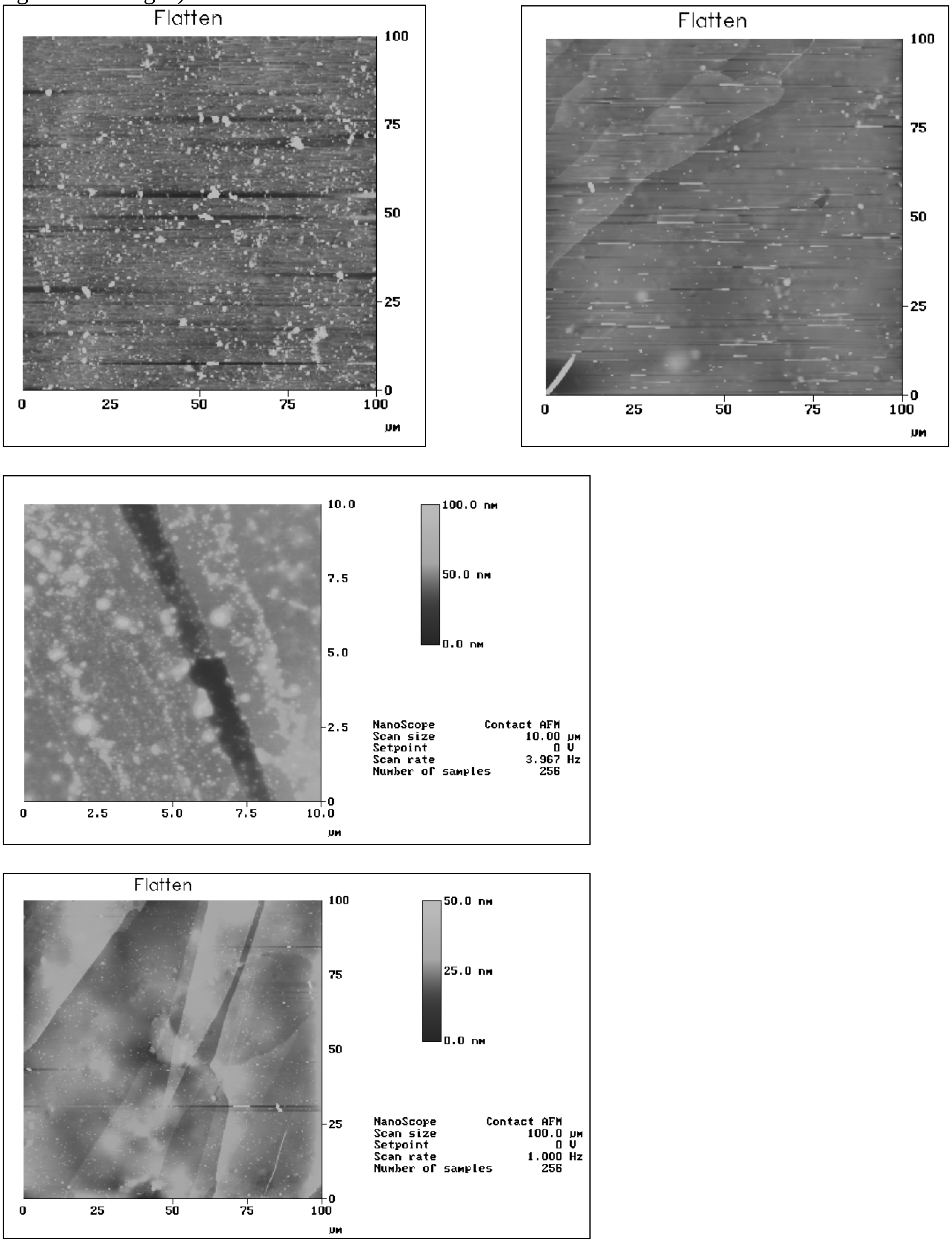
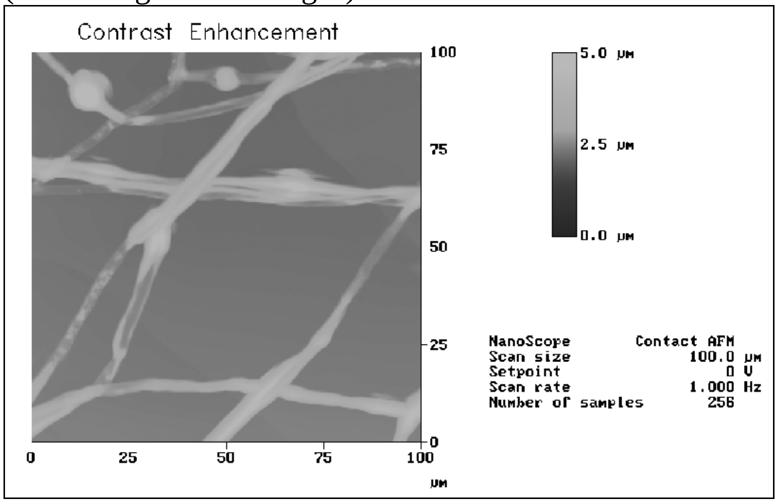
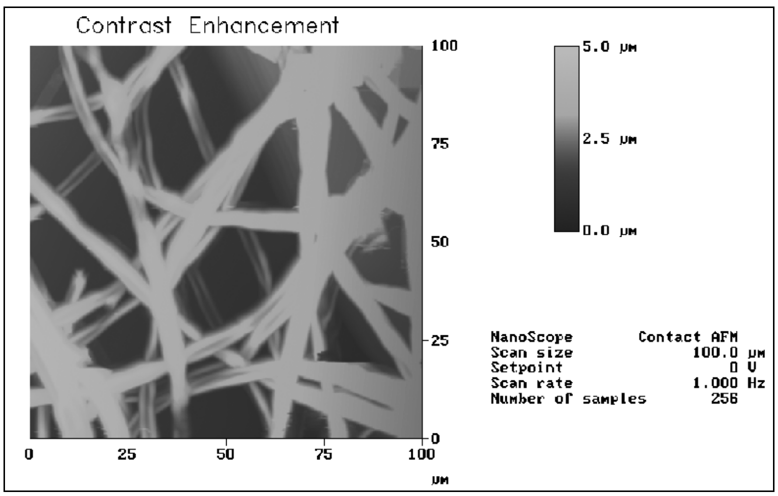


Figure G-4 (cont.): Nonshaken-organic experiment – biotite flake basal surfaces in BGF (+flakes +glucose +fungus) - AFM.





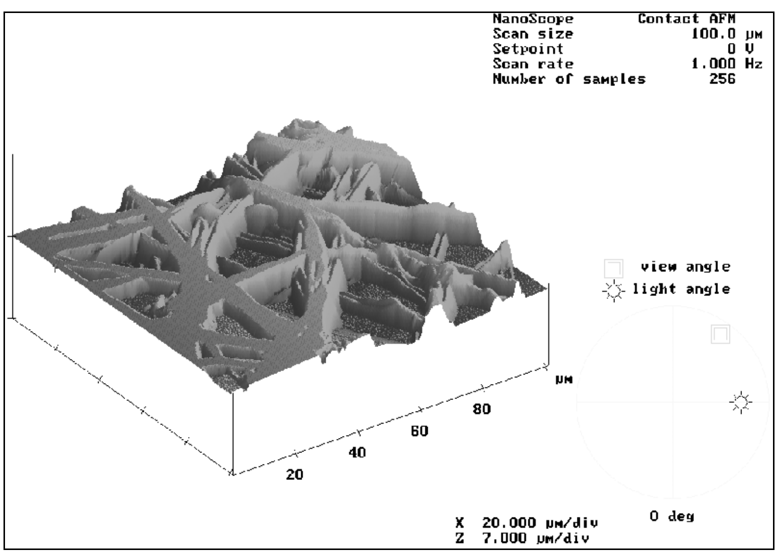
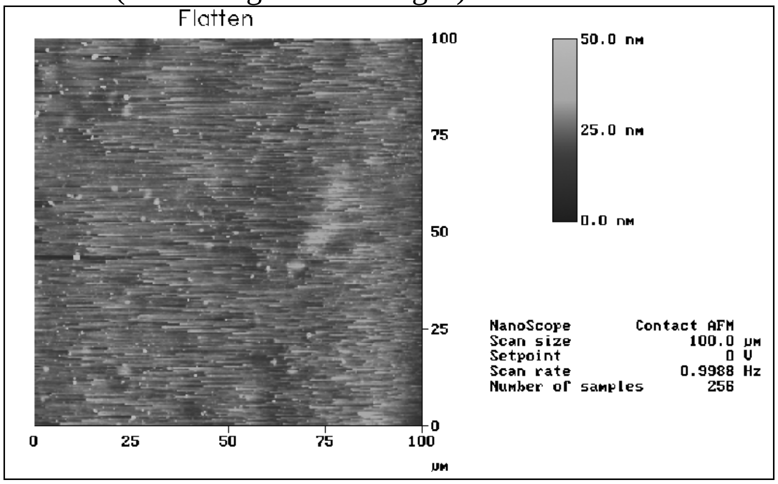
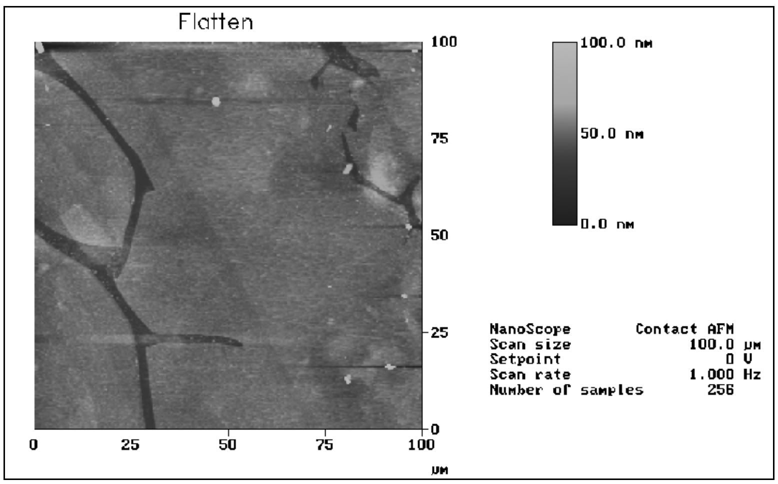


Figure G-4 (cont.): Nonshaken-organic experiment – biotite flake basal surfaces in pH 3 controls (+flakes +glucose –fungus) - AFM.





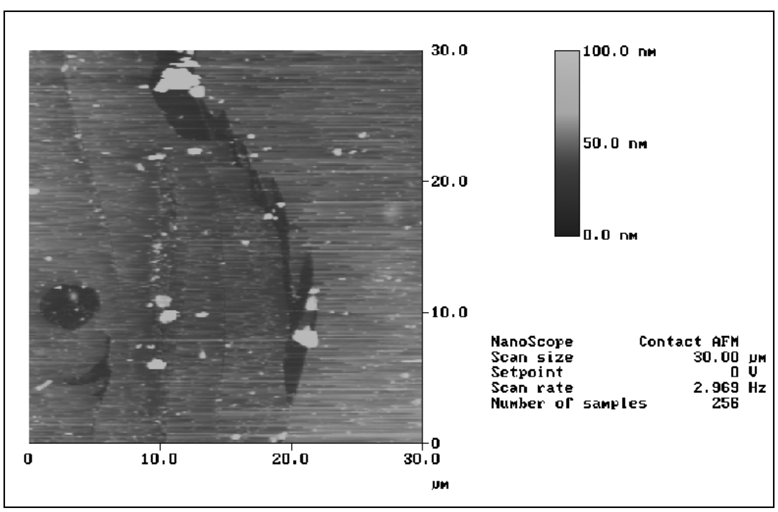
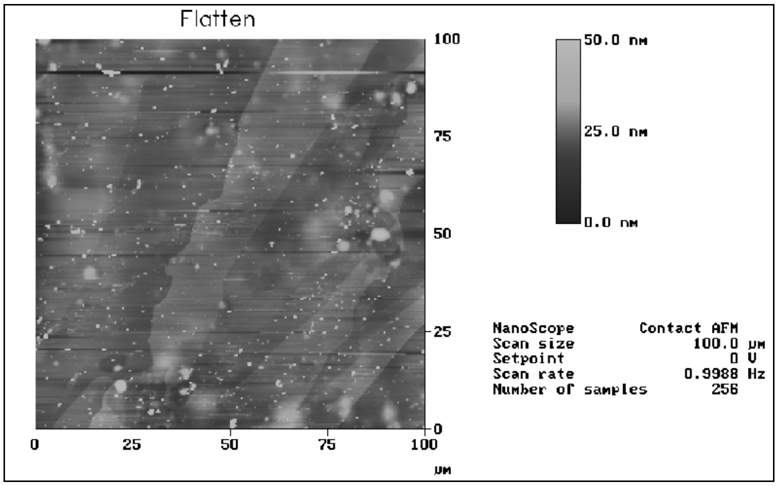
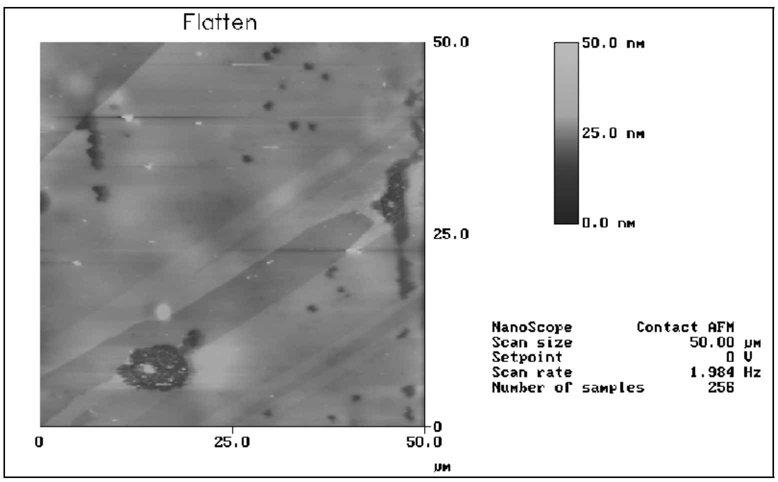


Figure G-4 (cont.): Nonshaken-organic experiment – biotite flake basal surfaces in pH 4 controls (+flakes +glucose –fungus) - AFM.





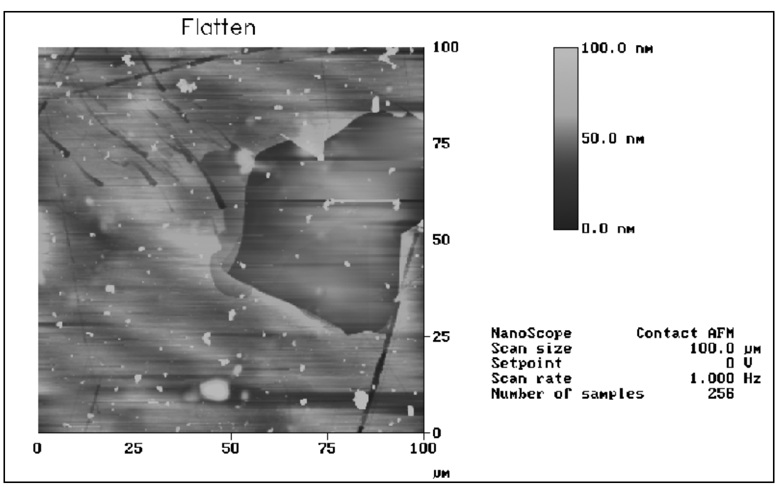
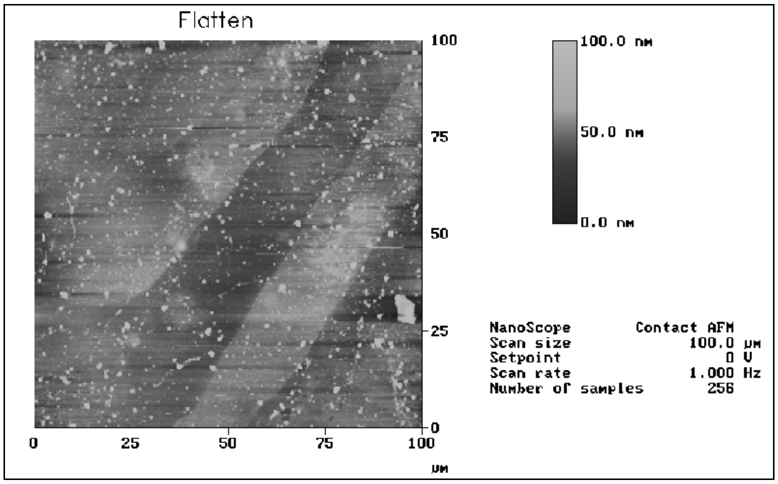
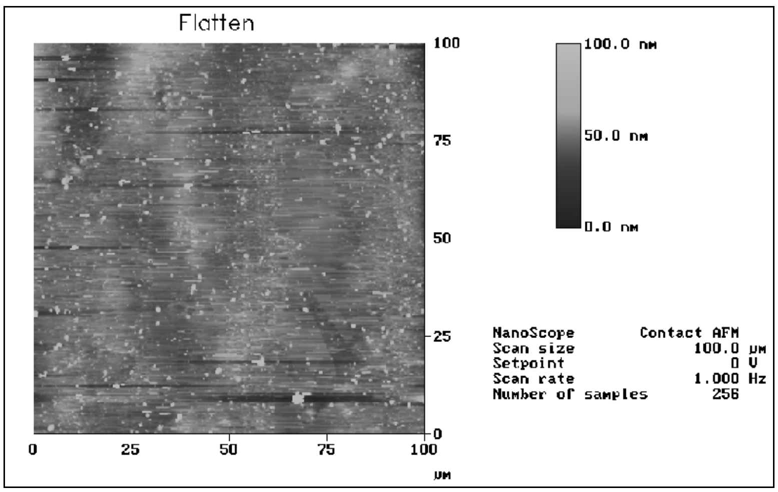


Figure G-4 (cont.): Nonshaken-organic experiment – biotite flake basal surfaces in pH 5 controls (+flakes +glucose –fungus) - AFM.





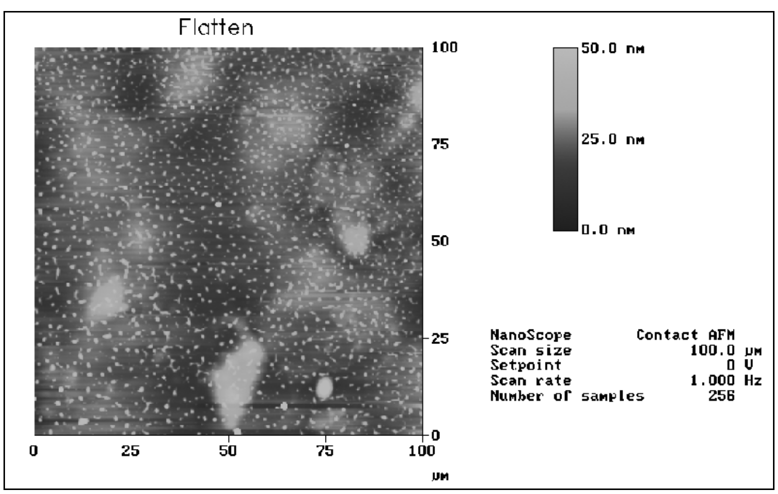
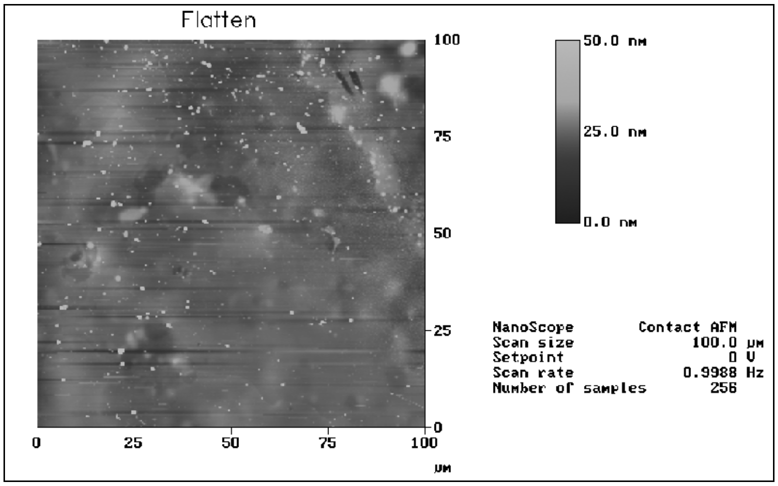
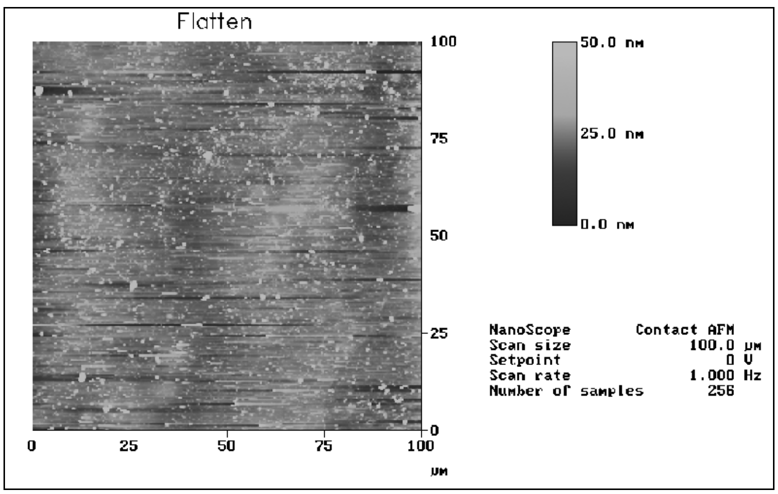


Figure G-4 (cont.): Nonshaken-organic experiment – biotite flake basal surfaces in pH 6 controls (+flakes +glucose –fungus) - AFM.





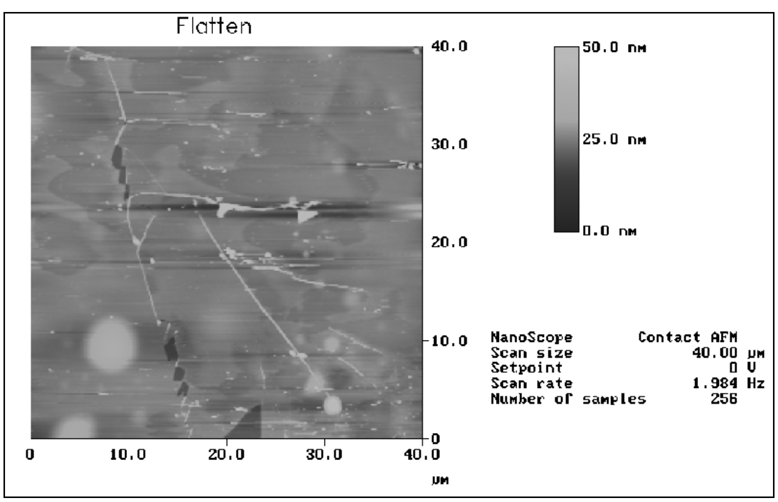


Figure G-5: Edge experiment – initial manufactured biotite edge surfaces - AFM.

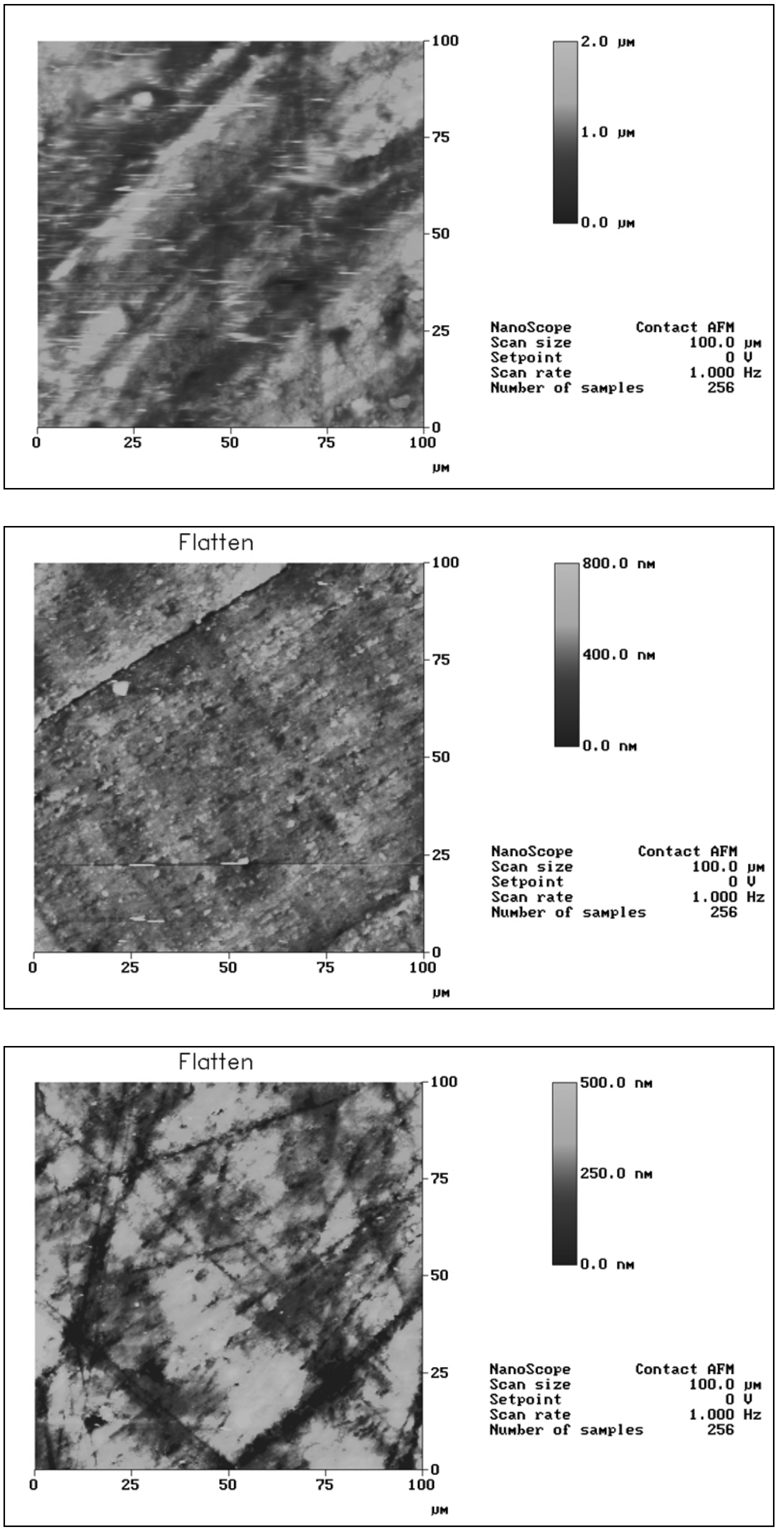
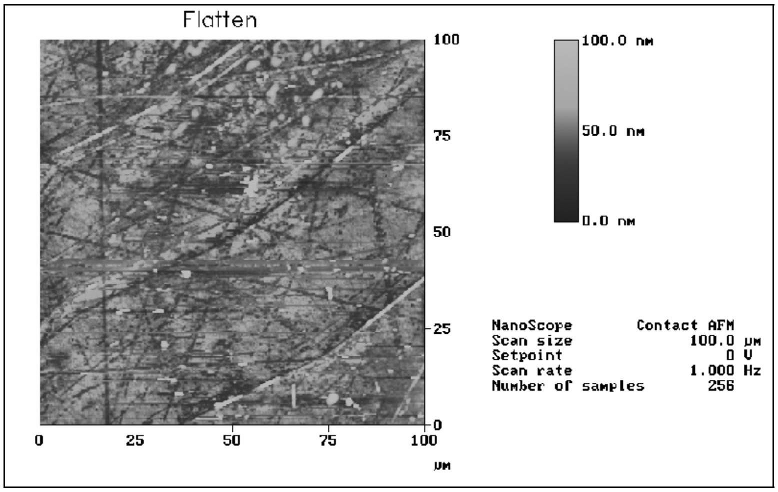
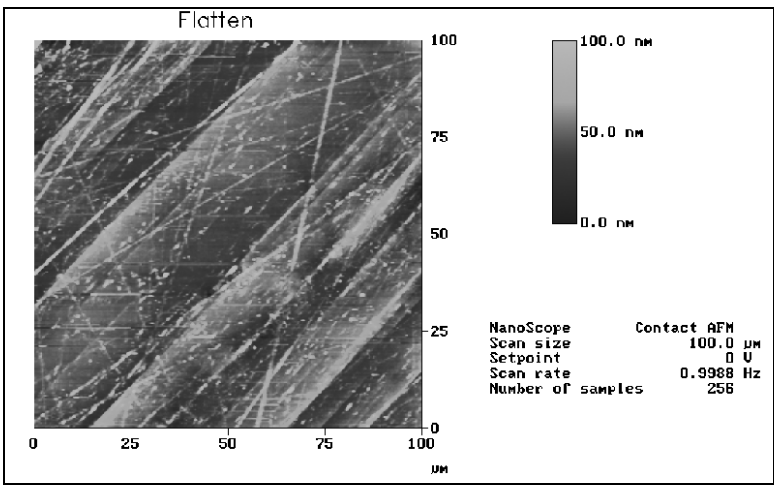


Figure G-5 (cont.): Edge experiment – manufactured biotite edge surfaces in BGF (+flakes +glucose +fungus) - AFM.





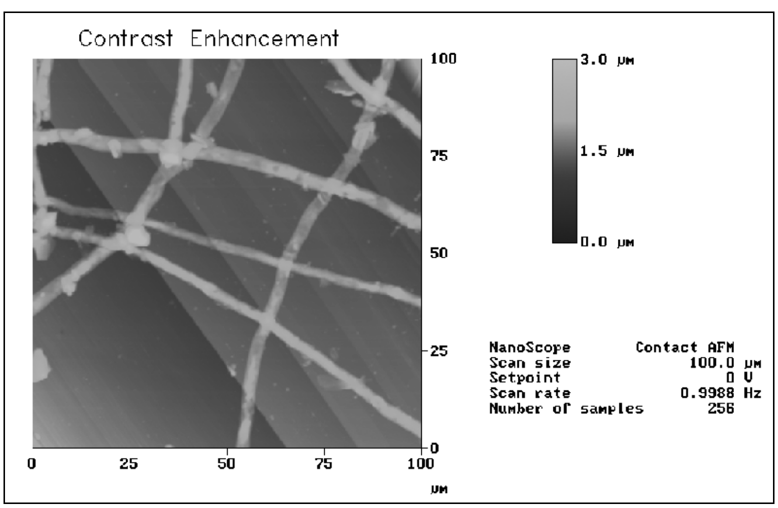
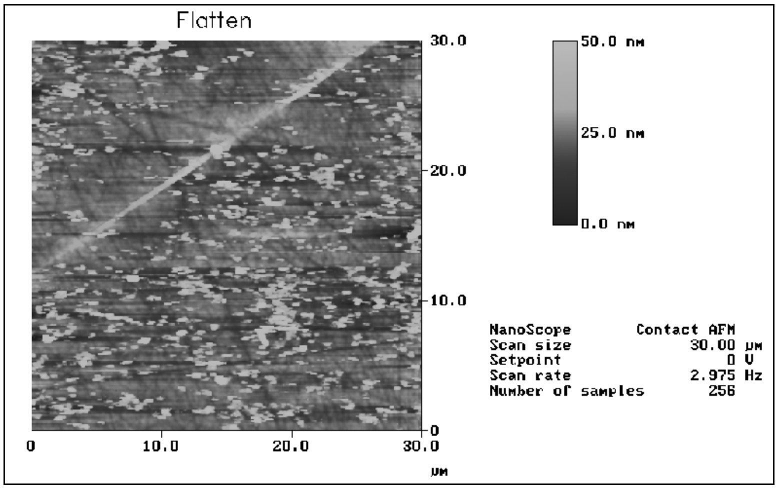
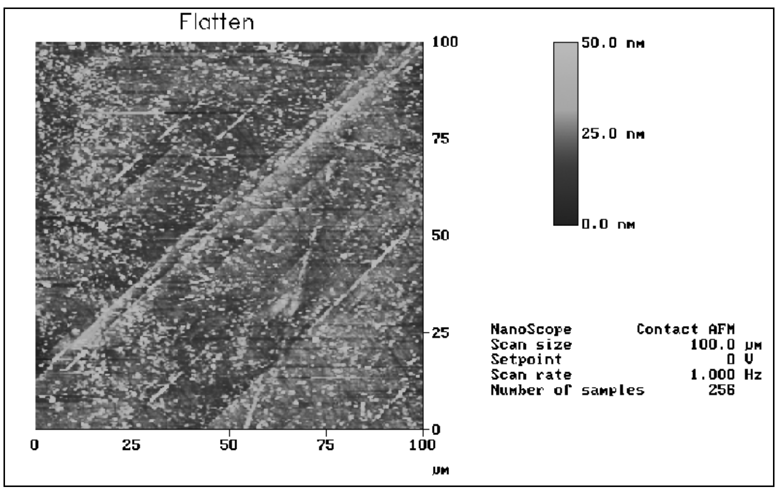


Figure G-5 (cont.): Edge experiment – manufactured biotite edge surfaces in pH 3 controls (+flakes +glucose –fungus) - AFM.





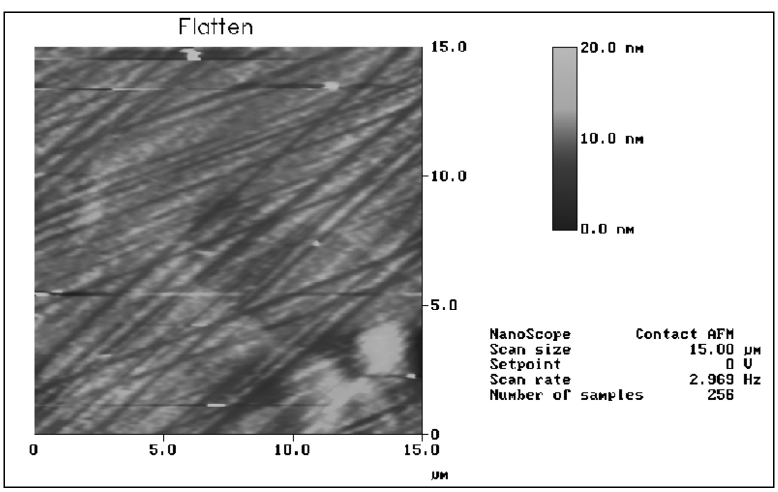
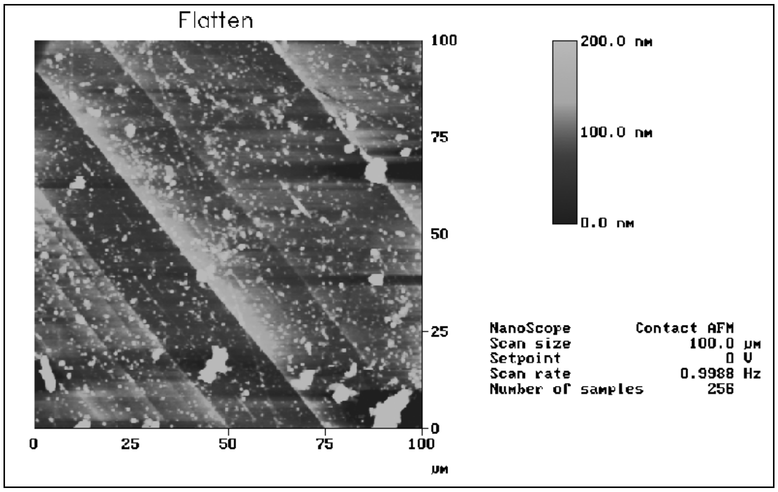
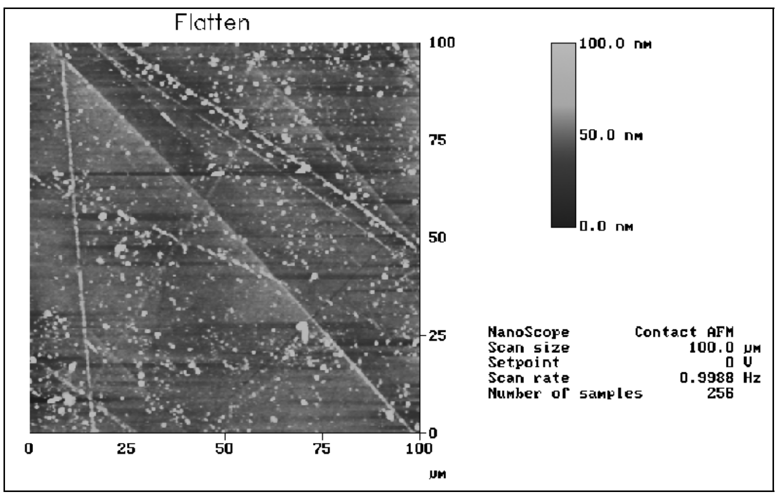


Figure G-5 (cont.): Edge experiment – manufactured biotite edge surfaces in pH 5 controls (+flakes +glucose –fungus) - AFM.





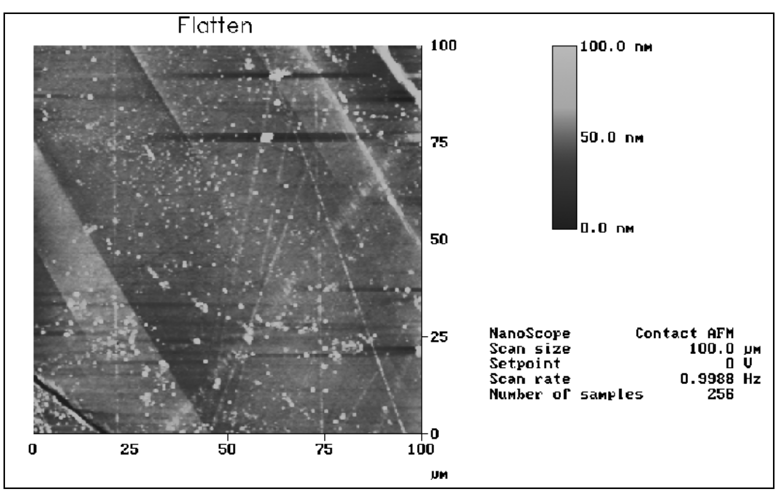
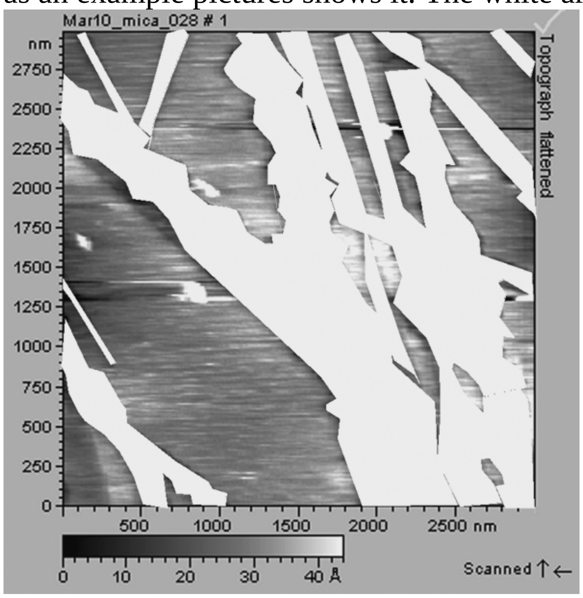
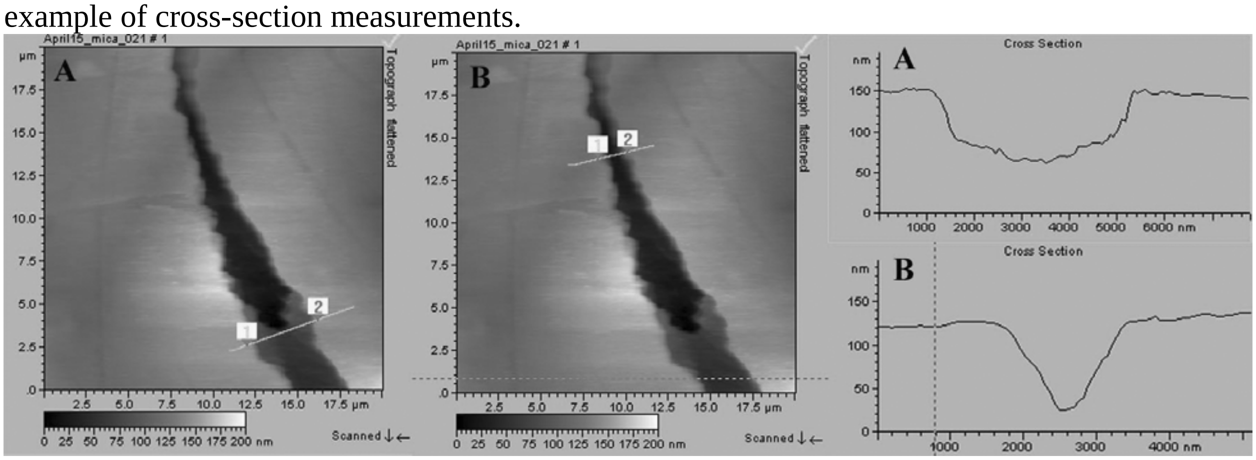


Figure G-6: Biotite weathering rates were estimated based on the AFM images of basal surfaces in BGF and pH 5 treatments of shaken-inorganic experiment. These two treatments were selected, because extensive dissolution channel formation was detected in BGF and some channels were detected in pH 5, but no or very few channels were detected in any other treatments and experiments. The following steps were taken to estimate rates of weathering:
1. Weathered areas and total imaged areas were measured on AFM images with ImageJ software, as an example pictures shows it. The white areas were dissolution channels or etch pits.



2. The depth of the channels was estimated by multiple cross-section measurements on each channel with Nano Scope III AFM software. It was assumed the channels are symmetrical and the cross-sections are rectangular, because they were much wider than deep. The image shows an example of cross-section measurements.



3. The area and depth measurements were combined and lost volume was calculated.
4. Erosion rate was determined = "lost volume (μm^3)" / imaged surface area (μm^2).
5. Using molar volume 6.7×10^{-15} mol μm^{-3} the lost biotite was determined as mol μm^{-2}.
6. Taking the 12 weeks incubation time and convert the area to m^2, the rate was determined in mol m^{-2} s^{-1}.

APPENDIX H

Column experimental set-up schematics

Figure H-1: Small column experiment schematics. The tubes were filled with 200 g silica sand only or with 1.5 w% biotite and 3 w% anorthite mixed in the silica sand. The bottom of the tubes were sealed with 100 um mesh to keep the soil in the tube. Funnels were duck-taped to the bottom and plastic straws were used as an extension to direct water to the 125 ml plastic bottles.

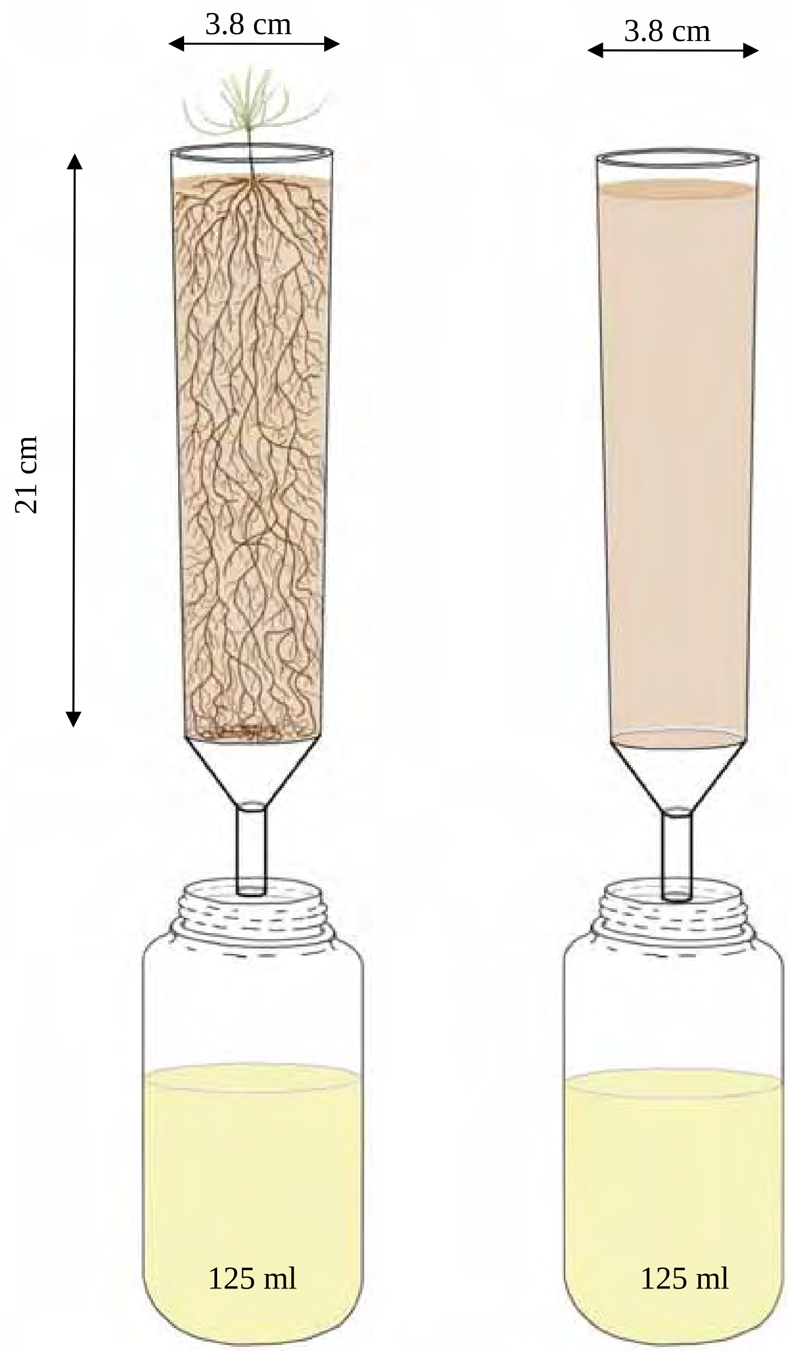
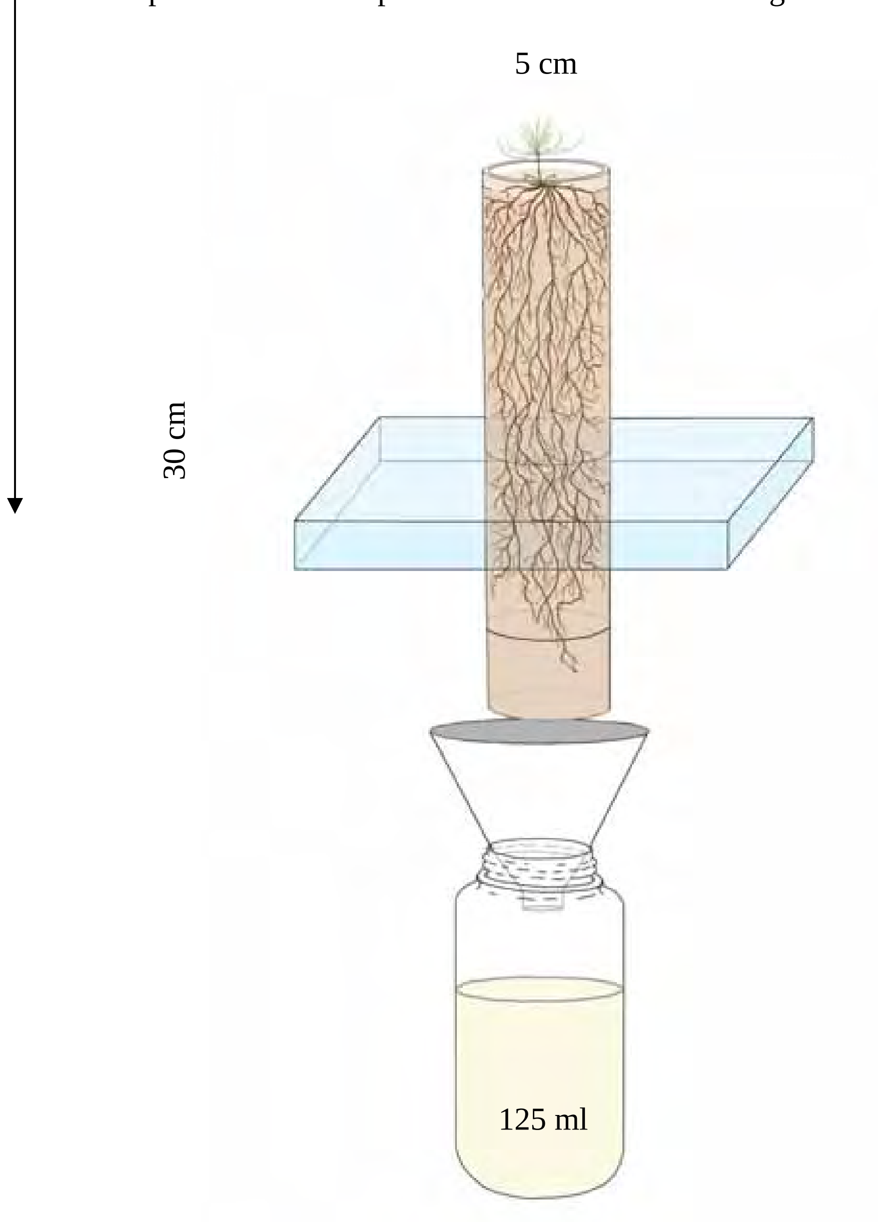


Figure H-1: Large column experiment schematics. This experiment was designed in a similar way than the small column experiment described in the third chapter. The differences were the following a) the tubes were larger and filled with 825 g (few thicker walled with 710 g) silica sand only or with 3 g biotite (= 1.5 w% in small columns) and 6 g anorthite (= 3 w% in small columns) mixed in with the silica sand; b) only *Suillus tomentosus* and the associated *Ewingella americana* were used as inoculums; c) there were only 5 treatments (abiotic, RP + bacteria (RPBact), RP + bacteria and fungi (RPBactFung), RP + bacteria + fungi – minerals (RPBFNoMin), and RP + bacteria + fungi – Hoagland's solution (RPBFNoHoag); d) there were only 5 replicates of each treatment; e) the columns were sampled after 1 year incubation; f) $^{13}CO_2$ pulse-labeling study was conducted on them before destructive sampling (see Appendix N). Funnels were placed on 125 ml plastic bottles to collect drainage water.



APPENDIX I

Preliminary column experiment results

Preliminary experiment

A preliminary experiment was carried out before the design and set-up of the column experiment study. Biotite and anorthite were selected as the K, Mg and Ca sources available to the trees in an otherwise nutrient free medium. Red pine (*Pinus resinosa* Ait.) as the vascular plant was selected for the weathering experiment, because this species is hardy and grow quite well in nutrient poor environments and also this species was used in the Hubbard Brook sandboxes. Three ectomycorrhiza forming mushroom species (*Suillus luteus, Suillus tomentosus and Pisolithus* tinctorius) were collected and cultured for fungal inoculum and bacteria species were also isolated from the mushrooms to test the effect of "helper bacteria" in the above processes. These fungi were tested for weathering potential on agar medium mixed with powered biotite and anorthite. All three species of fungus formed clear zones on the agar plates around the mycelia (Henderson and Duff, 1963), so all of them had great weathering power since they dissolved the minerals from the agar medium. This growth experiment tested 1) growth medium, 2) mineral size classes, 3) amount of nutrient solution and 4) associations between red pine and three fungi separately. Treatments were 3 mineral classes, 3 fungi, and 2 solutions combined and had 4 replicates of each ($3\times3\times2\times4 = 72$ tubes) and also 4 controls (+sand, +fungus, -minerals, +solution; +sand, -fungus, +minerals, +solution; +sand, -fungus, +minerals, -solution; non-acid washed sand without fungus and minerals) with 4 replicates each (16 tubes). The preliminary experiments were run for about 6 months.

1) Silica sand, perlite, glass beads (Potters Industries Inc.), and a 50-50 mixture of silica sand and perlite (all mixed with biotite and anorthite) were tested for water flow properties and possible nutrient content. We found that glass beads were holding back water and water logged the columns due to the small size, 200 μm, and also contained 8.7 w% Ca and 3.7 w% Mg,

which can leach out and modify the mineral weathering balance. Perlite and sand had good water flow properties, but perlite was hard to separate from the minerals after the experiment, which would make microscopic investigations difficult. Silica sand was the best candidate for our purposes.

2) Three mineral size classes were tested: 100-250 µm, 250-500 µm, and 500-1200 µm. Biotite and anorthite were mixed into 500 µm size class acid washed silica sand, 3% based on weight. The mineral classes did not make a difference in flow properties and in growth response of red pine. We chose 250-500 µm, because it was easier to separate out from the 500 µm sand.

3) Two nutrient solution concentrations were tested: ¼ strength modified Hoagland's solution applied once a month (C. Y. Li personal communication) and 1/16 strength modified Hoagland's solution twice a week (University of Idaho tree nursery recommendation). The ¼ strength solution once a month supported healthier tree growth and better ectomycorrhizal colonization on the roots.

4) *Suillus tomentosus* formed the most intense fungal hyphal network on the roots as observed with light microscopy; *Pisolithus tinctorius* formed a good association with less external hyphae than *Suillus tomentosus*; and *Suillus luteus* did not form mycorrhiza with red pine. We chose both *Suillus tomentosus and Pisolithus tinctorius* for our further study.

The following paper is resulted from the preliminary study and it is under corrections for resubmission:

Title:

New ectomycorrhizal synthesis: *Suillus tomentosus* with *Pinus resinosa* Ait.

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Abstract:

Mycorrhizal associations are essential relationships to healthy plant growth, especially under poor nutrient conditions. We tested ectomycorrhiza formation between red pine (*Pinus resinosa*) and *Suillus tomentosus* for further use in a mineral weathering study under nutrient-poor laboratory conditions. We used multiple microscopic approaches and molecular techniques to observe the association. Five months after inoculation typical dichotomous and coralloid forms of ectomycorrhizal roots were found on 30 to 40% of the seedling roots. Root cross-sections also showed the typical anatomy of Hartig net and mantle. None of these features was observed on the control seedlings. PCR-RFLPs and DNA-sequencing confirmed that the formed ectomycorrhizae and the inoculum were *S. tomentosus.* This study is the first report of *S. tomentosus* and red pine ectomycorrhizae formation under laboratory conditions.

Key words: ectomycorrhizae, *Suillus tomentosus*, red pine

Introduction:

Ectomycorrhizae form symbiotic associations between plant roots and soil fungi. Fungal colonization generates a compact fungal tissue known as the mantle on the host root surface. Hyphae extend from the mantle into the root resulting in the intercellular network known as the Hartig net. There are approximately 6000 species of ectomycorrhizal fungi forming highly complex associations, mostly with trees and woody perennials (Taylor, 2002). These associations are essential to healthy tree growth especially under poor nutrient conditions (Smith and Read, 1997). Extensive exchange takes place between the plant and the fungus in these associations, where the host plant supplies carbohydrates and the fungus returns essential elements such as N, P, Ca, and K (Marschner, 2002).

Suillus tomentosus (Kauffman) Singer has been reported to form ectomycorrhiza with *Pinus contorta* Dougl. ex Loud (Burns and Honkala, 1990; Kropp and Albee, 1996) and *Pinus banksiana* Lamb (Danielson, 1984). The genus *Suillus* exhibits high host specificity in nature, but may allow a broader host range in laboratory conditions (Molina et al, 1992). *S. tomentosus* fruiting bodies are found under 2- and 3-needle pine trees in forests of the Pacific Northwest, California, and the Rocky Mountains and under *P. banksiana* in Michigan, Nova Scotia, and Saskatchewan (Lincoff, 1981).

Past literature contains scant information on mycorrhizal fungi of red pine. This study was designed to find an ectomycorrhizal associate for potential use in inoculation of red pine for performing a mineral weathering study under nutrient-poor laboratory conditions.

Methods and Materials:

Fungal, plant materials and inoculation

Suillus tomentosus sporocarps were collected on the White Pine National Recreation Trail, about 15 miles North-East of Potlatch, ID, USA. The forest is mixed pine-fir dominated by *Pinus monticola* (Dougl. ex D. Don) Rydberg. Sporocarps were identified by Dr. Daniel L. Luoma at Oregon State University, Corvallis, OR. Pure cultures were obtained by placing small pieces of inner tissue onto plates of modified Melin-Norkran's medium (MMN) (Marx, 1969) and incubated at room temperature. Discs of mycelium were cut from the plates and blended in de-ionized (DI) water for use as inoculum.

Red pine seeds were obtained at Sheffield's Seed Co, Inc., Locke, NY. Seeds were surface sterilized with 30% hydrogen-peroxide for 30 minutes and then rinsed with sterilized DI water (Richter and Bruhn, 1986). Five seeds were sown in 200 g acid-washed silica sand (Lane Mountain Company, Valley, WA) amended with 1.5% anorthite and 3% biotite (WARD'S, Rochester, NY) by weight in 164-ml plastic tubes (3.8cm inside diameter, 21cm depth). The minerals were 250-500μm size class particles and the sand was mostly coarser than 500μm. The growth medium was pasteurized at 90^{o}C before seeding.

The 1-month-old seedlings were thinned to one per growth tube. Five seedlings were inoculated with 1ml of mycelia solution and 5 of them were left uninoculated to serve as controls. The inoculation was repeated 2 weeks later to insure successful colonization by the fungus. Seedlings were watered with DI water every other day and with ¼ strength modified Hoagland's solution (which does not contain Ca, Mg and K) every 2 weeks. The seedlings were harvested 5 months after inoculation to investigate how roots and microbes developed.

Microscopy and morphology

The root system was rinsed in DI water after harvest. A binocular dissecting light microscope (Leica MZ6) was used to observe the external morphology of the mycorrhizae in a tray of water.

Several mycorrhizal tips were clipped off and fixed in 2% glutaraldehyde and phosphate buffer for further fixation. Ten tips were embedded with SPURRs; thick sections were cut with a glass knife, mounted on glass slides and stained with Stevenels blue. A compound light photomicroscope (Olympus Optical Co. Ltd. Tokyo, Japan) in bright field mode was used for studying the internal morphology of the mycorrhizal roots.

Ten other mycorrhizal tips were post fixed with Osmium tetroxide, dehydrated with ethanol and critical point dried following the methods of Massicotte et al (1985). These tips were mounted on aluminum stubs, with double sticky carbon tape, gold coated and examined with an S-570 Hitachi Scanning Electron Microscope (Hitachi Ltd. Tokyo, Japan).

Molecular techniques

Two ectomycorrhizal root tips of each seedling and two tissue samples from *Suillus tomentosus* were stored in 300µl CTAB at 5°C until the DNA could be extracted. DNA was extracted according to the method used by Gardes and Bruns (1993) with the addition of using GENECLEAN.

The DNA was amplified using the polymerase chain reaction (PCR) (Mullis and Faloona, 1987). The internal transcribed spacer (ITS) region located between the nuclear small and nuclear large rDNA was amplified using primers ITS-1f and ITS-4 (White et al., 1990; Gardes et al., 1991). PCR was carried out at a denaturing temperature of 94°C and an annealing temperature of 55°C over the course of 35 cycles. To check for successful amplification, each sample was run in an electrophoresis gel.

Successful PCR amplification of the ITS was followed by applying Restriction Fragment Length Polymorphism (RFLP) to the product using the methods described in Horton and Bruns (2001). The PCR product was digested with the enzymes Hinf1 and DpnII and HaeIII (Promega). Digested samples were run in a 1% agarose/ 2% NuSeive (GT Technologies) electrophoresis gel. ITS-RFLP gels were stained with ethidium bromide and visualized using Gel Analyzer.

To provide taxonomic information about the amplified DNA, the ITS region was sequenced using the ITS-1f and ITS-4 primers. Samples were purified using GENECLEAN and the PCR product was run on an agarose gel to quantify the DNA. Samples were then sent to the Central Services Lab at Oregon State University, where they were sequenced using an ABI 3100 capillary sequence machine. DNA sequences were edited using Sequence Editor and entered into the National Center for Biotechnology Information (NCBI) BLAST search program.

Results:

The inoculated seedlings were 6.5 to 8.0 cm tall after 6 months of growth and the root system extended through the entire 21cm length of the growth tubes. Typical dichotomous and coralloid ectomycorrhizal forms were observed on the seedling roots. Extensive light to dark brown extramatrical hyphae surrounded 30 to 40% of the roots (Figure1A). Loose mantle hyphae developed on the surface (Figure1B) which was underlain by a more compacted mantle (Figure1C). The root cross-sections show typical ectomycorrhizal anatomy of Hartig net formation around epidermal and cortical cells shown by the arrowheads (Figure1C&D). Mycorrhizae were not formed on the uninoculated control seedlings.

Five pine root tips and two cultured *Suillus tomentosus* samples were successfully amplified and run on electrophoresis gel (Figure2). The PCR-RFLP gels revealed clear bands in all samples for Hinf1, DpnII and HaeIII enzymes. Two or three restriction enzyme matches reliably distinguish species (Horton and Bruns, 2001), and in this case all three enzymes matched perfectly. These patterns confirmed that the fungus from the root tips and the pure culture (inoculum) was the same (Figure2). The DNA-sequencing molecular identification technique and BLAST search program showed that the best match (92%) for the ectomycorrhizae was *S. tomentosus*, the fungus with which the seedlings were inoculated.

Discussion:

It has been reported that red pine forms symbiotic association with 16 fungal species, including 7 in the genus *Suillus* (e.g. Singer, 1959; 1965; Richard 1975; Thiers 1975a; Wilcox 1978). However an association of *Suillus tomentosus* and red pine has not been reported in the literature (Agerer, 1990, 1991, 1993, 1994, 1995; Melczko personal communication). Formation of ectomycorrhizae by *S. tomentosus* isolates on red pine roots in our experiment demonstrates that symbiotic relationship between these two species can be formed.

Red pine is native to the northern forest region and the southern part of boreal forest region where cool-to-warm summers, cold winters, and low to moderate precipitation are found (Burns and Honkala, 1990). Red pine lives on sandy and rocky terrains, and adapts well to nutrient-poor conditions (www.domtar.com/arbre/english/p_pinr.htm). *S. tomentosus* is found under *Pinus contorta* throughout the Rocky Mountain and Pacific Coast regions from Yukon to California, but in Saskatchewan also associates with *Pinus banksiana* in areas where its distribution overlaps with red pine areas (Burns and Honkala, 1990). This suggests that the *S. tomentosus* association with red pine might be able to form in nature because of the similar climatic requirements of the tree and the fungus. Danielson (1984) found that *S. tomentosus* fruiting bodies are abundant around *P. baksiana* stands, but only 5% of the pine roots are colonized by the fungus. In our experiments 30 to 40% of the red pine seedling roots were colonized by mycelia, which indicate an ability to form an association at an early stage of tree growth.

This association could be important in restoration and rehabilitation of devastated sites, in reforestation of nutrient-poor soils and in the bioremediation of polluted soils, because red pine adapts well to these conditions (Burns and Honkala, 1990). *S. tomentosus* forms a robust, well differentiated mycelial system and it is easy to culture and grow well on agar plates, so it has the potential to produce good inoculum for field applications. The extensive hyphal system which developed in the red pine and *S. tomentosus* association also suggests a potential ability to weather primary minerals and take up nutrients more efficiently than non-rhizomorphic ectomycorrhizal types (e.g. Bormann et al. 1998; Keller et al. in press).

This study is the first report of *Suillus tomentosus* and red pine ectomycorrhiza formation in laboratory conditions.

Acknowledgements:

This work was supported by NSF grant EAR-03-12011 to CKK. We also acknowledge the financial and logistical support by the Departments of Geology and Crop and Soil Sciences at Washington State University and the Forestry Science Laboratories in Corvallis. We especially thank Mary Fauci for assistance and help setting up and maintaining the experiment; and Valerie Lynch-Holm and Chris Davitt at the Electron Microscopy Center of WSU for helping with sample preparation and microscopy. We also thank Dr. Daniel L. Luoma for identifying our sporocarps at Oregon State University. We thank Dr. Dana L. Richter, Dr. Reinhard Agerer and Dr. Piotr Mleczko for consultation and sharing information on ectomycorrhizal associations.

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Figures to the above paper:

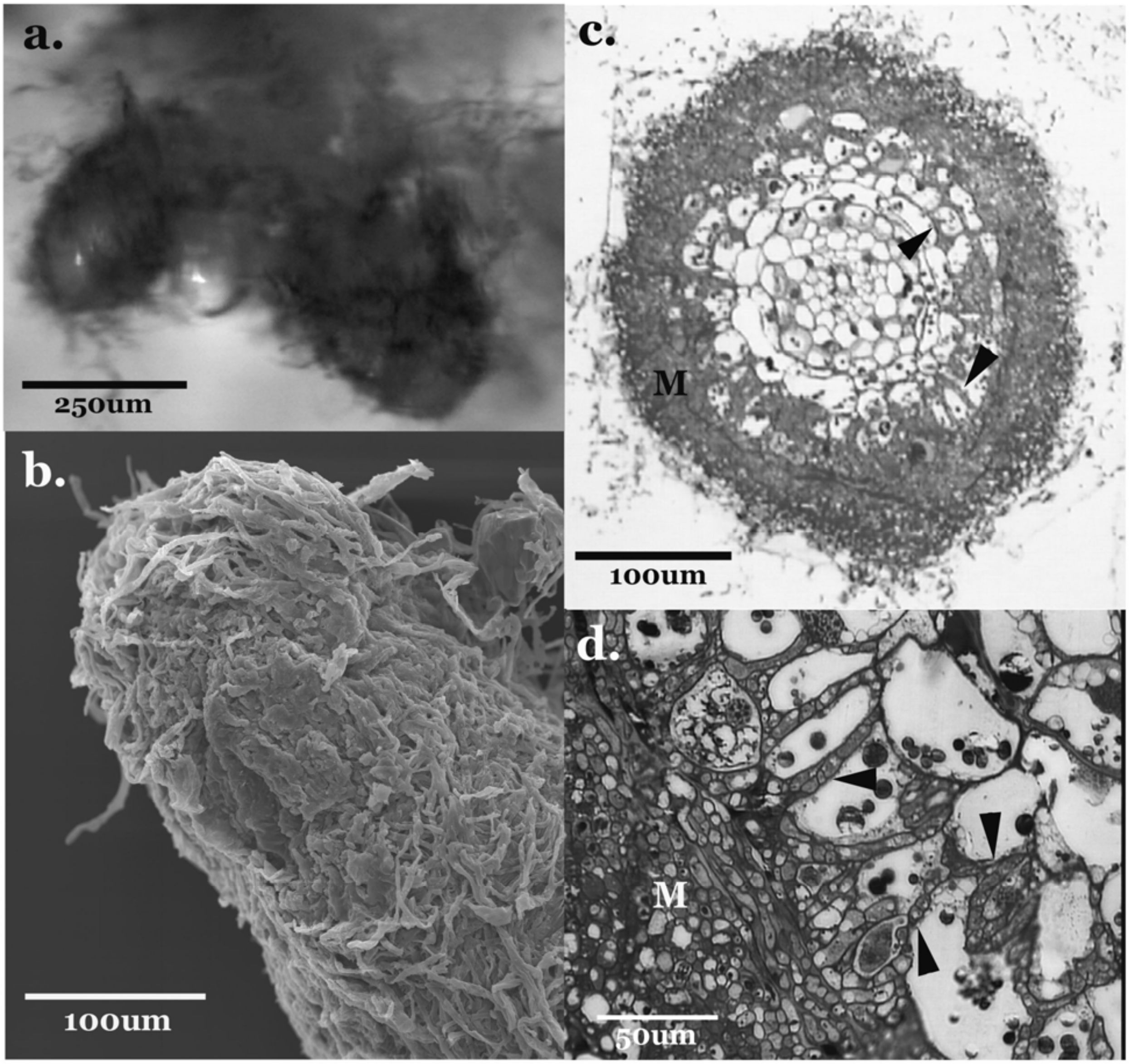

Figure I-1: Colonization of fine roots of *Pinus resinosa* Ait. (red pine) seedlings by the ectomycorrhizal fungus, *Suillus tomentosus*. **a.** Dichotomous system of *S. tomentosus-P. resinosa* root tips (light microscopy); **b.** Mantle formation on fine root tips (Scanning Electron Micrograph); **c.** Transverse section of *S. tomentosus-P. resinosa* ectomycorrhiza with a mantle (M) and Hartig net hyphae (arrows); **d.** Close-up of the transverse section [mantle (M) and Hartig net hyphae (arrows)].

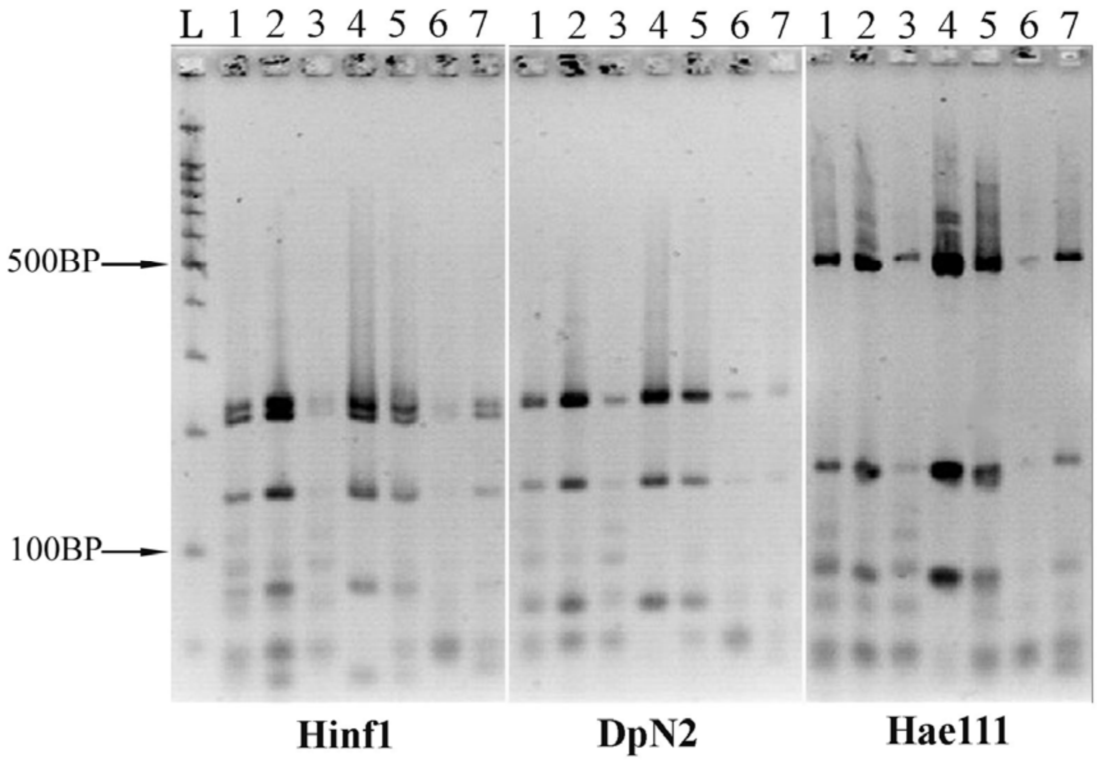

Figure I-2: Restriction (Enzyme) Fragment Length Polymorphism (RFLPs) gel results, which show that the analyzed mycorrhizal roots (Lane 1-5) are all the same fungus, and are the same fungus as the *Suillus tomentosus* culture (Lane 6-7). L is the 100BP ladder standard. DNA sequence of this mycorrhiza matches with the North American *S. tomentosus*.

APPENDIX J

Bacteria DNA identification results

Table J-1: Bacterial DNA analyses results

Report Summary

Customer: Li

MIDI LABS

1/7/2005

500 bp Identification Summary MicroSeq Database

C code	sample	closest match	% difference	confidence level
N327LI	C15199 ST con	Ewingella americana	0.19 %	Species
N327LI	C15200 PT white con	Bacillus megaterium	0.19 %	Species
N327LI	C15201 PT yellow con	Pantoea agglomerans	1.18 %	Genus

Key:

* - See report for additional comments concerning this field.

Species^ - This sample is closely related to one or more species within the Genus by 16S rRNA gene sequencing (first 500bp).

C code - Customer number assigned by MIDI Labs.

sample - Sample number assigned by MIDI Labs, followed by name assigned by customer.

closest match - Closest match to sample when aligned in a pairwise manner against the MicroSeq Database.

% difference - Percent difference between the sample and the closest match. Mismatched basepairs, gaps, and ambiguity codes are all accounted for in this percentage.

confidence level - This indicates the level of identification; see Identification Report Summary for additional information.

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Table J-1 (cont.): Bacterial DNA analyses results

Alignment Report

Customer: Li

1/7/2005

MIDI LABS

Partial 16S rRNA Gene Alignment with GenBank

sample #	closest GenBank match	% ID
C15199 ST con	NA	NA
C15200 PT white con	NA	NA
C15201 PT yellow con	Pantoea sp. AY336554	98%

C# - Customer number assigned by MIDI Labs.

sample # - Sample number assigned by MIDI Labs, followed by name assigned by customer.

closest GenBank match - Results from blast search of GenBank database.

The number after the organism name is the **GenBank accession number.**

% ID - percent identity; this is essentially the percent similarity.

See GenBank web page (www.ncbi.nlm.nih.gov/BLAST/blast_help.html) for more detailed information.

MIDI Labs claims no responsibility for the validity of sequences found in GenBank.

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Table J-1 (cont.): Bacterial DNA analyses results

MIDI LABS

Alignment Report - 500 BP Identification

Customer: Li

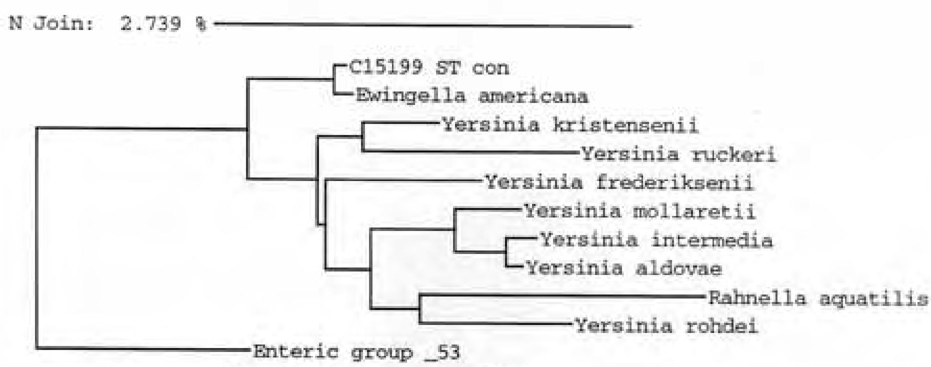
Sample: C15199 ST con

Date: Friday, January 7, 2005 7:43 AM

Alignment: 528 C15199 ST con

0.19 %	528	Ewingella americana
2.18 %	528	Yersinia mollaretii
2.37 %	528	Yersinia frederiksenii
2.37 %	528	Rahnella aquatilis
2.37 %	528	Yersinia kristensenii
2.65 %	528	Yersinia rohdei
2.75 %	528	Yersinia intermedia
2.84 %	528	Yersinia aldovae
2.94 %	528	Yersinia ruckeri
3.50 %	528	Enteric group _53

Neighbor Joining Tree



Concise Alignment - 500 bp

	44
	57
	22
C15199 ST con	RY
Ewingella americana	GC

Reviewer's signature

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Table J-1 (cont.): Bacterial DNA analyses results

MIDI LABS

Alignment Report - 500 BP Identification

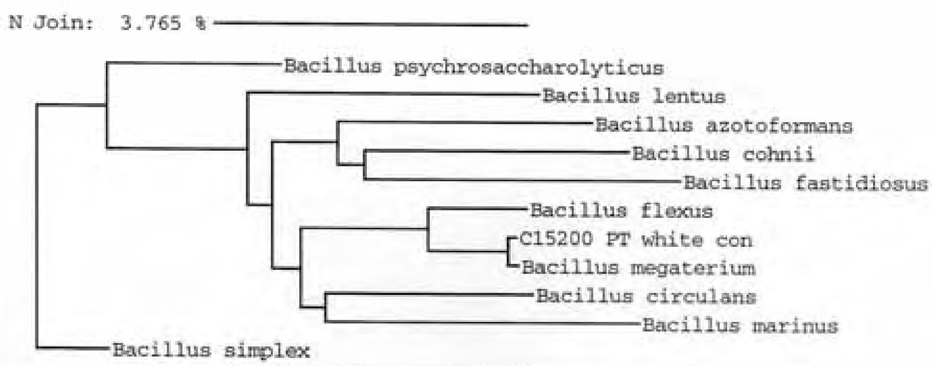
Customer: Li

Sample: C15200 PT white con

Date: Friday, January 7, 2005 7:44 AM

```
Alignment:  536 C15200 PT white con
 0.19 % 536 Bacillus megaterium
 2.33 % 536 Bacillus flexus
 5.73 % 532 Bacillus circulans
 6.06 % 536 Bacillus cohnii
 6.60 % 530 Bacillus psychrosaccharolyticus
 6.84 % 534 Bacillus marinus
 6.92 % 535 Bacillus azotoformans
 6.93 % 534 Bacillus lentus
 7.30 % 534 Bacillus fastidiosus
 7.30 % 534 Bacillus simplex
```

Neighbor Joining Tree



Concise Alignment - 500 bp

```
                  44
                  67
                  47
C15200 PT white con GY
Bacillus megaterium RT
```

Reviewer's signature

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Table J-1 (cont.): Bacterial DNA analyses results

MIDI LABS

Alignment Report - 500 BP Identification

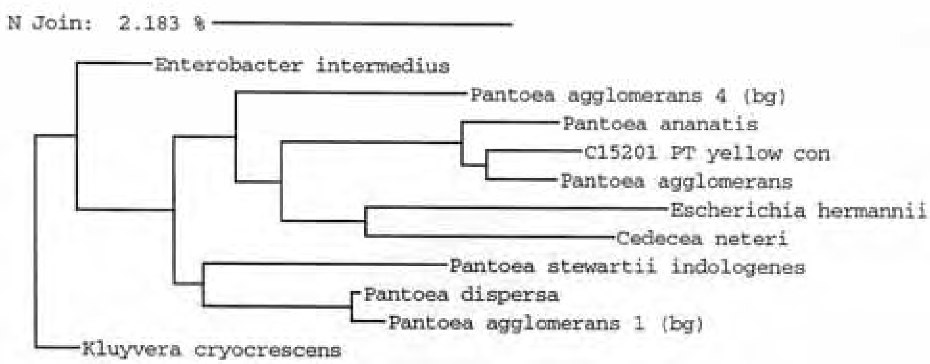
Customer: Li

Sample: C15201 PT yellow con

Date: Friday, January 7, 2005 7:48 AM

```
Alignment:  528 C15201 PT yellow con
 1.18 % 528 Pantoea agglomerans
 1.47 % 526 Pantoea ananatis
 4.36 % 528 Pantoea agglomerans 4 (bg)
 4.45 % 528 Pantoea dispersa
 4.55 % 528 Pantoea stewartii indologenes
 4.55 % 528 Pantoea agglomerans 1 (bg)
 4.56 % 526 Enterobacter intermedius
 4.64 % 528 Escherichia hermannii
 4.83 % 528 Cedecea neteri
 4.85 % 526 Kluyvera cryocrescens
```

Neighbor Joining Tree



Concise Alignment - 500 bp

```
                       4444
                   77885567
                   67674680
C15201 PT yellow con AGTCYSSG
Pantoea agglomerans  GACTTGYR
```

Reviewer's signature

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APPENDIX K

Small column experiment water, soil, biomass and mass-balance data

Table K-1: Input cation concentrations in liquids, in seed and in inoculums (A). Table B shows the application distribution among treatments in the small column experiment.

A)

	Volume	Volume	Volume	Concentration						
	0-6 months	6-9 months	9-12 months	Ca	K	Mg	Na	P	Fe	Al
Sample ID	**ml**	**ml**	**ml**	**umol/L**	**umol/L**	**umol/L**	**umol/L**	**umol/L**	**umol/L**	**umol/L**
glucose	21	6	6	3	0	0	55	0	0	0
Fungicides	3	2	1	2	12	5	20	0	0	0
Antibiotics	3	2	1	16	0	0	1637	0	0	0
Fungicide+Antibiotic	3	2	1	4	0	6	1528	0	0	0
Pt.Fungus	4			191	484	215	1030	976	31	5
St.Fungus	4			230	1094	446	1500	1916	147	84
Pt.Fungus	3			191	484	215	1030	976	31	5
St.Fungus	3			230	1094	446	1500	1916	147	84
St.Spore	5			2	91	11	5	43	7	3
Pt.Spore	5			60	2338	135	9	180	2	0
RPSeeds	15			978	13599	13400	53	30990	248	176
RPSeeds real	**0.02 grams a seed**		**umol**	**0.29**	**4.08**	**4.02**	**0.02**	**9.30**	**0.07**	**0.05**
Pt. Bacteria	3			84	24	206	296	318	3	7
St. Bacteria	3			37	14	37	288	170	2	1
Hoagland's	40	35	30	0	0	0	5159	544	0	0
CuSO4	40	20	20	42	6	14	133	67	0	0
Troy DI water				0	0	0	0	0	0	0

B)

Sample ID	Applied to
glucose	Bacteria, Fungus
Fungicides	Bacteria, RPBact
Antibiotics	Fungus
Fungicide+Antibiotic	Abiotic
Pt.Fungus	Pt Fungus
St.Fungus	St Fungus
Pt.Fungus	StRPBF, StRPBFNH, StRPBFNM
St.Fungus	PtRPBF, PtRPBFNH, PtRPBFNM
St.Spore	StRPBF, StRPBFNH, StRPBFNM
Pt.Spore	PtRPBF, PtRPBFNH, PtRPBFNM
RPSeeds	StRPB, StRPBF, StRPBFNH, StRPBFNM
RPSeeds real	PtRPB, PtRPBF, PtRPBFNH, PtRPBFNM
Pt. Bacteria	StBacteria, StRPB, StRPBF, StRPBFNH, StRPBFNM
St. Bacteria	PtBacteria, PtRPB, PtRPBF, PtRPBFNH, PtRPBFNM
Hoagland's	All but RPBFNH
CuSO4	Abiotic, RPBact, Bacteria
Troy DI water	All

Table K-1 (cont.): Total input of cations in all treatments for three time intervals in µmol.

	Ca	K	Mg	Ca+K+Mg	Na	P	Fe	Al
0-6 months	**umol**	**umol**	**umol**	**umol**	**umol**	**umol**	**umol**	**umol**
Abiotic	1.68	0.24	0.58	2.50	216.26	24.44	0.00	0.00
StBacteria	1.84	0.32	0.69	2.85	213.76	24.95	0.01	0.00
StFungi	1.02	4.38	1.79	7.18	218.42	29.44	0.59	0.33
StRPBact	2.08	4.40	4.71	11.19	212.62	34.25	0.08	0.06
StRPBactFung	1.11	7.86	5.53	14.49	211.76	37.55	0.56	0.32
StRPBFNOHoag	1.11	7.86	5.53	14.49	5.41	15.77	0.56	0.32
StRPBFNOMin	1.11	7.86	5.53	14.49	211.76	37.55	0.56	0.32
PtBacteria	1.98	0.35	1.19	3.52	213.78	25.40	0.01	0.02
PtFungi	0.87	1.93	0.86	3.66	216.54	25.68	0.13	0.02
PtRPBact	2.22	4.43	5.21	11.86	212.64	34.69	0.08	0.07
PtRPBactFung	1.42	17.29	5.96	24.67	210.38	35.86	0.19	0.09
PtRPBFNOHoag	1.42	17.29	5.96	24.67	4.04	14.08	0.19	0.09
PtRPBFNOMin	1.42	17.29	5.96	24.67	210.38	35.86	0.19	0.09
	Ca	**K**	**Mg**	**Ca+K+Mg**	**Na**	**P**	**Fe**	**Al**
6-9 months	**umol**	**umol**	**umol**	**umol**	**umol**	**umol**	**umol**	**umol**
Abiotic	0.84	0.12	0.29	1.26	186.27	20.39	0.00	0.00
StBacteria	0.86	0.14	0.29	1.29	183.59	20.39	0.00	0.00
StFungi	0.05	0.00	0.00	0.05	184.16	19.06	0.00	0.00
StRPBact	0.83	0.12	0.28	1.24	183.22	20.39	0.00	0.00
StRPBactFung	0.00	0.00	0.00	0.00	180.55	19.06	0.00	0.00
StRPBFNOHoag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
StRPBFNOMin	0.00	0.00	0.00	0.00	180.55	19.06	0.00	0.00
PtBacteria	0.86	0.14	0.29	1.29	183.59	20.39	0.00	0.00
PtFungi	0.05	0.00	0.00	0.05	5.76	1.33	0.00	0.00
PtRPBact	0.83	0.12	0.28	1.24	183.22	20.39	0.00	0.00
PtRPBactFung	0.00	0.00	0.00	0.00	180.55	19.06	0.00	0.00
PtRPBFNOHoag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PtRPBFNOMin	0.00	0.00	0.00	0.00	180.55	19.06	0.00	0.00
	Ca	**K**	**Mg**	**Ca+K+Mg**	**Na**	**P**	**Fe**	**Al**
9-12 months	**umol**	**umol**	**umol**	**umol**	**umol**	**umol**	**umol**	**umol**
Abiotic	0.84	0.12	0.29	1.25	158.95	17.67	0.00	0.00
StBacteria	0.85	0.13	0.29	1.27	157.78	17.67	0.00	0.00
StFungi	0.03	0.00	0.00	0.03	156.73	16.33	0.00	0.00
StRPBact	0.84	0.13	0.29	1.26	157.44	17.67	0.00	0.00
StRPBactFung	0.00	0.00	0.00	0.00	154.76	16.33	0.00	0.00
StRPBFNOHoag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
StRPBFNOMin	0.00	0.00	0.00	0.00	154.76	16.33	0.00	0.00
PtBacteria	0.85	0.13	0.29	1.27	157.78	17.67	0.00	0.00
PtFungi	0.03	0.00	0.00	0.03	156.73	16.33	0.00	0.00
PtRPBact	0.84	0.13	0.29	1.26	157.44	17.67	0.00	0.00
PtRPBactFung	0.00	0.00	0.00	0.00	154.76	16.33	0.00	0.00
PtRPBFNOHoag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PtRPBFNOMin	0.00	0.00	0.00	0.00	154.76	16.33	0.00	0.00

Table K-2: Calcium in drainage water, averages and standard error.

0.05 mg/L	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*
Sample Date	***8/5/04***	***8/5/04***	***8/5/04***	***8/5/04***	***8/19/04***	***8/19/04***	***8/19/04***	***8/19/04***	***9/30/04***	***9/30/04***	***9/30/04***	***9/30/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank												
AbioticSA	258	5.30	34.1	132.3	375	4.39	41.0	109.4	267	5.88	39.2	146.6
AbioticSB	299	3.74	27.9	93.3	367	3.34	30.6	83.4	182	4.96	22.5	123.8
AbioticSC	278	2.75	19.1	68.6	198	3.79	18.7	94.6	227	5.40	30.6	134.7
STBacteriaSA	225	4.98	27.9	124.3	273	5.17	35.2	129.1	285	61.00	433.7	1521.9
STBacteriaSB	206	5.02	25.8	125.3	317	3.90	30.8	97.2	293	68.28	499.2	1703.7
STBacteriaSC	320	4.76	38.0	118.8	312	4.10	31.9	102.4	277	70.62	488.1	1762.0
PTBacteriaSA	270	5.34	35.9	133.1	312	5.38	41.9	134.3	206	34.83	179.0	869.0
PTBacteriaSB	268	5.03	33.6	125.5	268	3.80	25.4	94.9	192	32.31	154.8	806.1
PTBacteriaSC	327	4.12	33.6	102.7	286	4.27	30.5	106.6	217	33.57	181.8	837.6
STFungiSA	264	5.28	34.8	131.6	272	5.28	35.9	131.8	249	37.36	232.1	932.0
STFungiSB	265	4.75	31.4	118.6	310	4.20	32.5	104.9	227	44.37	251.3	1106.9
STFungiSC	313	4.23	32.9	105.4	313	3.10	24.2	77.3	246	40.13	246.3	1001.3
PTFungiSA	200	5.18	25.8	129.1	367	4.05	37.1	101.0	226	30.75	173.4	767.3
PTFungiSB	296	4.97	36.7	124.0	356	3.84	34.1	95.7	306	41.16	314.2	1026.9
PTFungiSC	272	4.25	28.9	106.1	258	3.47	22.3	86.6	180	37.76	169.6	942.0
STRPBactSA	336	6.97	58.3	173.9	265	6.24	41.3	155.8	222	7.22	40.0	180.2
STRPBactSB	163	5.94	24.2	148.2	310	3.67	28.4	91.5	204	4.42	22.5	110.3
STRPBactSC	258	4.46	28.7	111.3	368	3.76	34.5	93.9	202	4.01	20.2	100.0
PTRPBactSA	222	6.29	34.8	157.0	254	6.82	43.2	170.1	271	7.01	47.4	174.9
PTRPBactSB	172	5.66	24.3	141.1	263	4.60	30.2	114.7	224	5.26	29.4	131.2
PTRPBactSC	253	4.71	29.7	117.4	288	3.54	25.4	88.2	226	3.56	20.1	88.7
STRPBactFungSA	326	5.69	46.3	142.0	292	5.67	41.3	141.6	223	6.20	34.5	154.7
STRPBactFungSB	206	6.15	31.5	153.3	321	4.20	33.6	104.8	252	4.68	29.4	116.7
STRPBactFungSC	340	5.30	45.0	132.2	330	3.81	31.4	95.1	238	4.46	26.5	111.3
PTRPBactFungSA	246	5.64	34.6	140.7	272	5.99	40.7	149.5	212	7.26	38.4	181.2
PTRPBactFungSB	217	6.79	36.7	169.3	298	4.53	33.7	113.1	206	5.01	25.8	125.1
PTRPBactFungSC	315	4.83	37.9	120.4	216	3.42	18.4	85.2	269	4.34	29.1	108.2
STRPBFNOHoagSA	296	6.06	44.7	151.1	373	7.21	67.1	180.0	222	6.19	34.3	154.4
STRPBFNOHoagSB	193	6.82	32.8	170.2	342	4.22	36.0	105.2	223	3.96	22.0	98.9
STRPBFNOHoagSC	241	4.52	27.2	112.7	245	3.68	22.5	91.8	316	3.41	26.9	85.1
PTRPBFNOHoagSA	340	6.01	51.0	149.9	358	5.34	47.7	133.2	320	8.71	69.6	217.3
PTRPBFNOHoagSB	220	5.27	28.9	131.4	323	4.13	33.3	103.1	317	3.18	25.1	79.3
PTRPBFNOHoagSC	346	4.29	37.0	107.0	348	3.36	29.2	83.9	260	4.11	26.6	102.5
STRPBFNOMinSA	381	0.14	1.3	3.4	452	0.85	9.6	21.3	201	0.18	0.9	4.4
STRPBFNOMinSB	396	0.13	1.3	3.2	367	0.08	0.7	2.0	308	0.08	0.6	2.1
STRPBFNOMinSC	329	1.18	9.7	29.5	340	0.05	0.4	1.2	244	0.09	0.6	2.3
PTRPBFNOMinSA	351	0.12	1.1	3.1	471	0.06	0.6	1.4	294	0.15	1.1	3.9
PTRPBFNOMinSB	300	0.19	1.5	4.8	333	0.05	0.4	1.2	268	0.14	0.9	3.4
PTRPBFNOMinSC	422	0.11	1.2	2.8	515	0.08	1.0	2.0	268	0.13	0.9	3.2
	8/5/04	*8/5/04*	*8/5/04*	*8/5/04*	*8/19/04*	*8/19/04*	*8/19/04*	*8/19/04*	*9/30/04*	*9/30/04*	*9/30/04*	*9/30/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	278.33	3.93	27.04	98.09	313.33	3.84	30.13	95.84	225.33	5.41	30.76	135.07
Stbacteria	249.83	4.92	30.54	122.82	300.67	4.39	32.67	109.56	285.00	66.63	473.66	1662.51
Ptbacteria	288.33	4.83	34.39	120.46	288.67	4.49	32.61	111.94	205.00	33.57	171.85	837.57
Stfungi	280.50	4.75	33.04	118.53	298.33	4.19	30.85	104.66	240.67	40.62	243.22	1013.41
Ptfungi	256.00	4.80	30.47	119.77	327.00	3.79	31.16	94.44	237.33	36.56	219.07	912.07
StRPBact	252.17	5.79	37.07	144.45	314.33	4.56	34.73	113.72	209.33	5.22	27.57	130.16
PtRPBact	215.67	5.55	29.61	138.49	268.33	4.98	32.93	124.36	240.33	5.27	32.28	131.61
STRPBactFung	290.50	5.71	40.92	142.52	314.33	4.56	35.45	113.83	237.67	5.11	30.14	127.60
PTRPBactFung	259.17	5.75	36.41	143.47	262.00	4.65	30.92	115.94	229.00	5.54	31.09	138.15
STRPBFNOHoag	243.33	5.80	34.91	144.65	320.00	5.04	41.87	125.68	253.67	4.52	27.74	112.81
PTRPBFNOHoag	301.83	5.19	38.95	129.44	343.00	4.28	36.72	106.71	299.00	5.33	40.44	133.04
STRPBFNOMin	368.67	0.48	4.10	12.06	386.33	0.33	3.59	8.17	251.00	0.12	0.70	2.94
PTRPBFNOMin	357.67	0.14	1.24	3.57	439.67	0.06	0.69	1.52	276.67	0.14	0.97	3.48
	8/5/04	*8/5/04*	*8/5/04*	*8/5/04*	*8/19/04*	*8/19/04*	*8/19/04*	*8/19/04*	*9/30/04*	*9/30/04*	*9/30/04*	*9/30/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	11.84	0.74	4.37	18.54	57.71	0.30	6.44	7.53	24.55	0.26	4.80	6.58
Stbacteria	35.26	0.08	3.76	2.03	13.91	0.40	1.33	9.88	4.62	2.90	20.22	72.29
Ptbacteria	19.34	0.37	0.78	9.13	12.77	0.47	4.87	11.69	7.23	0.73	8.57	18.15
Stfungi	16.00	0.30	0.96	7.57	13.20	0.63	3.47	15.74	6.89	2.04	5.75	50.85
Ptfungi	28.84	0.28	3.24	6.99	34.65	0.17	4.49	4.19	36.81	3.06	47.60	76.44
StRPBact	49.88	0.73	10.72	18.17	29.81	0.84	3.73	21.06	6.36	1.01	6.25	25.18
PtRPBact	23.60	0.46	3.05	11.50	10.17	0.97	5.32	24.13	15.34	1.00	8.03	24.88
STRPBactFung	42.69	0.24	4.72	6.10	11.46	0.57	3.01	14.16	8.37	0.55	2.34	13.66
PTRPBactFung	28.91	0.57	0.96	14.19	24.19	0.75	6.57	18.61	20.07	0.88	3.78	22.05
STRPBFNOHoag	29.76	0.68	5.18	16.91	38.55	1.10	13.22	27.42	31.17	0.85	3.55	21.17
PTRPBFNOHoag	40.95	0.50	6.44	12.40	10.41	0.57	5.60	14.34	19.52	1.71	14.56	42.68

Table K-2 (cont.): Calcium in drainage water, averages and standard error.

0.05 mg/L	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*
Sample Date	***10/14/04***	***10/14/04***	***10/14/04***	***10/14/04***	***10/28/04***	***10/28/04***	***10/28/04***	***10/28/04***	***11/11/04***	***11/11/04***	***11/11/04***	***11/11/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank									20	0.00		
AbioticSA	361	4.42	39.8	110.3	333	3.20	26.6	79.7	344	3.34	28.7	83.4
AbioticSB	278	3.44	23.9	85.8	310	2.85	22.0	71.1	411	2.18	22.3	54.3
AbioticSC	190	3.76	17.8	93.8	266	2.26	15.0	56.4	374	3.06	28.6	76.4
STBacteriaSA	375	57.01	533.4	1422.3	345	46.34	398.9	1156.1	427	50.50	538.0	1259.9
STBacteriaSB	341	54.87	466.8	1368.9	335	49.44	413.3	1233.6	428	58.86	628.5	1468.6
STBacteriaSC	385	58.91	565.9	1469.9	330	53.84	443.3	1343.4	423	62.56	660.3	1560.9
PTBacteriaSA	418	34.21	356.8	853.5	347	30.78	266.5	768.0	487	34.11	414.4	851.0
PTBacteriaSB	402	32.55	326.5	812.2	365	27.56	251.0	687.6	492	34.22	420.0	853.7
PTBacteriaSC	403	30.18	303.4	752.9	342	26.38	225.1	658.3	464	29.67	343.5	740.3
STFungiSA	382	43.84	417.9	1093.9	335	29.77	248.8	742.8	444	29.60	327.9	738.5
STFungiSB	373	38.48	358.1	960.1	353	29.61	260.8	738.9	437	31.67	345.3	790.2
STFungiSC	328	46.69	382.1	1165.0	303	37.49	283.4	935.4	426	38.01	403.9	948.2
PTFungiSA	395	46.03	453.7	1148.5	340	33.37	283.1	832.6	453	38.14	431.1	951.7
PTFungiSB	390	41.27	401.5	1029.6	351	30.47	266.8	760.2	462	31.39	361.8	783.2
PTFungiSC	381	40.50	385.0	1010.5	317	34.52	273.0	861.2	449	39.25	439.7	979.3
STRPBactSA	360	4.98	44.7	124.2	314	3.83	30.0	95.6	416	3.62	37.6	90.4
STRPBactSB	331	2.58	21.3	64.3	292	1.79	13.0	44.6	313	1.48	11.5	36.8
STRPBactSC	336	2.72	22.8	67.9	293	1.81	13.2	45.0	385	1.64	15.8	41.0
PTRPBactSA	349	5.33	46.4	133.0	296	4.27	31.5	106.4	389	4.54	44.0	113.2
PTRPBactSB	244	3.13	19.1	78.2	248	2.11	13.0	52.6	335	1.83	15.3	45.7
PTRPBactSC	354	2.57	22.7	64.0	296	1.56	11.5	38.9	414	1.42	14.7	35.5
STRPBactFungSA	336	4.39	36.8	109.4	269	3.42	23.0	85.4	411	3.27	33.5	81.6
STRPBactFungSB	314	2.92	22.9	73.0	259	1.90	12.2	47.3	400	1.48	14.8	36.9
STRPBactFungSC	344	2.50	21.5	62.4	301	1.67	12.5	41.6	408	1.43	14.5	35.6
PTRPBactFungSA	295	5.02	37.0	125.3	247	4.44	27.3	110.7	325	4.77	38.6	118.9
PTRPBactFungSB	334	2.55	21.3	63.7	285	1.93	13.7	48.1	398	1.74	17.2	43.3
PTRPBactFungSC	355	2.35	20.8	58.5	276	1.66	11.5	41.5	279	1.61	11.2	40.2
STRPBFNOHoagSA	348	5.24	45.5	130.8	301	4.73	35.5	118.1	450	4.60	51.7	114.8
STRPBFNOHoagSB	305	2.43	18.5	60.5	262	2.42	15.8	60.5	485	2.28	27.6	56.8
STRPBFNOHoagSC	352	2.99	26.2	74.5	295	2.24	16.5	55.8	505	2.10	26.4	52.3
PTRPBFNOHoagSA	316	3.02	23.8	75.4	293	3.40	24.9	84.8	508	3.34	42.4	83.4
PTRPBFNOHoagSB	308	2.10	16.1	52.4	294	1.81	13.2	45.1	486	1.91	23.2	47.7
PTRPBFNOHoagSC	304	2.67	20.2	66.5	320	2.56	20.4	63.9	456	2.43	27.6	60.6
STRPBFNOMinSA	429	0.07	0.7	1.7	372	0.33	3.1	8.2	390	0.09	0.8	2.2
STRPBFNOMinSB	443	0.05	0.6	1.2	376	0.10	0.9	2.4	391	0.06	0.6	1.6
STRPBFNOMinSC	441	0.05	0.6	1.2	314	0.09	0.7	2.2	400	0.07	0.7	1.6
PTRPBFNOMinSA	451	0.09	1.0	2.3	306	0.09	0.7	2.3	391	0.09	0.8	2.2
PTRPBFNOMinSB	394	0.05	0.5	1.1	373	0.09	0.9	2.3	398	0.07	0.7	1.8
PTRPBFNOMinSC	442	0.05	0.5	1.2	391	0.10	0.9	2.4	420	0.08	0.8	1.9
	10/14/04	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	276.33	3.87	27.16	96.63	303.00	2.77	21.20	69.08	376.33	2.86	26.52	71.34
Stbacteria	367.00	56.93	522.02	1420.35	336.67	49.87	418.48	1244.37	426.00	57.31	608.93	1429.79
Ptbacteria	407.67	32.31	328.90	806.21	351.33	28.24	247.53	704.62	481.00	32.67	392.65	815.00
Stfungi	361.00	43.01	386.04	1073.00	330.33	32.29	264.35	805.67	435.67	33.09	359.05	825.64
Ptfungi	388.67	42.60	413.40	1062.87	336.00	32.79	274.30	817.99	454.67	36.26	410.88	904.71
StRPBact	342.33	3.43	29.61	85.50	299.67	2.48	18.75	61.75	371.33	2.25	21.64	56.07
PtRPBact	315.67	3.68	29.39	91.76	280.00	2.64	18.68	65.96	379.33	2.60	24.69	64.81
STRPBactFung	331.33	3.27	27.05	81.59	276.33	2.33	15.91	58.09	406.33	2.06	20.94	51.37
PTRPBactFung	328.00	3.31	26.33	82.49	269.33	2.68	17.51	66.78	334.00	2.70	22.37	67.49
STRPBFNOHoag	335.00	3.55	30.07	88.61	286.00	3.13	22.61	78.10	480.00	2.99	35.21	74.65
PTRPBFNOHoag	309.33	2.59	20.05	64.74	302.33	2.59	19.52	64.60	483.33	2.56	31.05	63.89
STRPBFNOMin	437.67	0.06	0.61	1.40	354.00	0.17	1.55	4.26	393.67	0.07	0.71	1.81
PTRPBFNOMin	429.00	0.06	0.67	1.54	356.67	0.09	0.83	2.33	403.00	0.08	0.79	1.96
	10/14/04	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
STDev	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	49.37	0.29	6.56	7.20	19.66	0.27	3.36	6.80	19.38	0.35	2.10	8.75
Stbacteria	13.32	1.17	29.17	29.17	4.41	2.18	13.10	54.33	1.53	3.57	36.63	89.02
Ptbacteria	5.17	1.17	15.45	29.20	6.98	1.31	12.06	32.79	8.62	1.50	24.64	37.37
Stfungi	16.70	2.41	17.35	60.05	14.62	2.60	10.14	64.87	5.24	2.53	23.00	63.08
Ptfungi	4.10	1.73	20.69	43.17	10.02	1.21	4.74	30.07	3.84	2.46	24.65	61.29
StRPBact	8.95	0.78	7.57	19.40	7.17	0.68	5.64	16.95	30.51	0.69	8.08	17.22
PtRPBact	35.86	0.84	8.58	21.04	16.00	0.83	6.42	20.62	23.31	0.98	9.68	24.37
STRPBactFung	8.97	0.57	4.88	14.24	12.67	0.55	3.53	13.75	3.28	0.61	6.30	15.12
PTRPBactFung	17.58	0.86	5.32	21.45	11.46	0.88	4.96	22.04	34.65	1.03	8.32	25.73
STRPBFNOHoag	15.04	0.86	8.04	21.48	12.12	0.80	6.47	20.03	16.07	0.81	8.23	20.12
PTRPBFNOHoag	3.53	0.27	2.22	6.70	8.84	0.46	3.38	11.49	15.07	0.42	5.80	10.44

Table K-2 (cont.): Calcium in drainage water, averages and standard error.

0.05 mg/L	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*
Sample Date	***11/29/04***	***11/29/04***	***11/29/04***	***11/29/04***	***12/9/04***	***12/9/04***	***12/9/04***	***12/9/04***	***12/21/04***	***12/21/04***	***12/21/04***	***12/21/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank					20	0.00			20	0.00		
AbioticSA	489	2.02	24.6	50.3	265	2.10	13.9	52.3	289	2.10	15.2	52.5
AbioticSB	456	1.09	12.4	27.1	230	1.22	7.0	30.5	288	1.09	7.8	27.1
AbioticSC	450	1.57	17.6	39.1	208	1.69	8.8	42.2	273	1.42	9.7	35.5
STBacteriaSA	519	42.05	544.4	1049.0	306	50.73	387.3	1265.7	333	32.31	268.4	806.0
STBacteriaSB	500	50.86	634.4	1268.8	288	52.40	376.5	1307.3	329	35.12	288.3	876.3
STBacteriaSC	522	47.87	623.4	1194.2	320	55.73	444.9	1390.3	328	37.02	302.9	923.6
PTBacteriaSA	489	27.60	336.7	688.5	338	32.49	274.0	810.7	372	21.62	200.6	539.3
PTBacteriaSB	511	27.94	356.2	697.0	323	31.98	257.7	797.8	372	22.32	207.2	557.0
PTBacteriaSC	521	25.69	333.9	641.0	310	32.08	248.1	800.3	343	20.98	179.5	523.4
STFungiSA	450	22.29	250.3	556.2	315	32.70	257.0	815.9	354	19.16	169.2	478.1
STFungiSB	534	28.45	379.0	709.7	295	37.19	273.7	927.8	270	22.97	154.7	573.0
STFungiSC	532	29.97	397.8	747.7	314	31.45	246.4	784.7	335	25.89	216.4	645.9
PTFungiSA	509	33.57	426.4	837.6	298	41.34	307.3	1031.3	329	26.81	220.1	668.8
PTFungiSB	507	32.57	412.0	812.6	325	35.53	288.1	886.5	351	25.62	224.3	639.1
PTFungiSC	537	34.85	466.9	869.4	319	39.84	317.1	994.0	339	33.71	285.1	841.1
STRPBactSA	468	2.64	30.8	65.8	270	2.60	17.5	64.8	302	2.18	16.4	54.3
STRPBactSB	423	0.89	9.4	22.1	244	0.89	5.4	22.1	283	1.03	7.3	25.7
STRPBactSC	424	1.00	10.5	24.8	256	0.88	5.6	22.0	285	0.82	5.8	20.5
PTRPBactSA	458	3.28	37.4	81.7	253	3.16	19.9	78.8	291	2.39	17.3	59.6
PTRPBactSB	390	1.19	11.6	29.8	266	1.10	7.3	27.5	222	0.84	4.7	21.1
PTRPBactSC	435	0.85	9.2	21.2	261	0.74	4.8	18.6	276	0.71	4.9	17.6
STRPBactFungSA	468	2.54	29.7	63.4	249	2.44	15.1	60.8	285	2.09	14.9	52.1
STRPBactFungSB	465	1.09	12.7	27.3	256	1.12	7.1	27.9	267	1.02	6.8	25.5
STRPBactFungSC	459	0.90	10.3	22.3	273	0.94	6.4	23.5	291	0.86	6.3	21.5
PTRPBactFungSA	334	3.98	33.1	99.2	204	3.48	17.7	86.9	253	2.81	17.8	70.2
PTRPBactFungSB	417	1.57	16.3	39.1	256	1.24	7.9	31.1	287	1.17	8.4	29.1
PTRPBactFungSC	433	1.38	14.9	34.5	260	1.07	7.0	26.8	230	0.97	5.6	24.2
STRPBFNOHoagSA	555	3.68	51.0	91.9	274	3.30	22.5	82.3	315	2.69	21.1	67.0
STRPBFNOHoagSB	563	1.80	25.3	44.9	297	1.45	10.8	36.2	339	1.26	10.7	31.5
STRPBFNOHoagSC	595	1.72	25.5	42.9	316	1.30	10.2	32.4	395	1.16	11.4	28.8
PTRPBFNOHoagSA	589	3.08	45.2	76.8	332	2.51	20.8	62.7	396	2.05	20.2	51.1
PTRPBFNOHoagSB	555	1.80	25.0	45.0	321	1.14	9.1	28.4	307	1.08	8.3	27.0
PTRPBFNOHoagSC	527	2.24	29.4	55.9	335	1.47	12.3	36.8	312	1.34	10.5	33.5
STRPBFNOMinSA	452	0.08	0.9	2.0	246	0.05	0.3	1.2	286	0.14	1.0	3.5
STRPBFNOMinSB	440	0.05	0.5	1.2	243	0.05	0.3	1.2	278	0.15	1.1	3.8
STRPBFNOMinSC	428	0.05	0.5	1.2	195	0.05	0.2	1.2	302	0.09	0.7	2.3
PTRPBFNOMinSA	433	0.05	0.5	1.2	259	0.05	0.3	1.2	310	0.09	0.7	2.3
PTRPBFNOMinSB	443	0.05	0.6	1.2	211	0.05	0.3	1.2	297	0.09	0.6	2.1
PTRPBFNOMinSC	493	0.05	0.6	1.2	271	0.05	0.3	1.2	311	0.07	0.5	1.7
	11/29/04	*11/29/04*	*11/29/04*	*11/29/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	465.00	1.56	18.18	38.83	234.33	1.67	9.88	41.66	283.33	1.54	10.89	38.37
Stbacteria	513.67	46.92	600.75	1170.70	304.67	52.95	402.91	1321.13	330.00	34.82	286.55	868.64
Ptbacteria	507.00	27.07	342.27	675.50	323.67	32.18	259.93	802.94	362.33	21.64	195.78	539.90
Stfungi	505.33	26.90	342.35	671.20	308.00	33.78	259.03	842.79	319.67	22.67	180.11	565.66
Ptfungi	517.67	33.66	435.06	839.86	314.00	38.90	304.18	970.60	339.67	28.71	243.18	716.37
StRPBact	438.33	1.51	16.89	37.58	256.67	1.45	9.50	36.28	290.00	1.34	9.84	33.50
PtRPBact	427.67	1.77	19.43	44.26	260.00	1.67	10.70	41.62	263.00	1.31	8.96	32.77
STRPBactFung	464.00	1.51	17.54	37.67	259.33	1.50	9.57	37.40	281.00	1.33	9.31	33.06
PTRPBactFung	394.67	2.31	21.45	57.58	240.00	1.93	10.88	48.24	256.67	1.65	10.56	41.16
STRPBFNOHoag	571.00	2.40	33.96	59.94	295.67	2.02	14.51	50.30	349.67	1.70	14.39	42.44
PTRPBFNOHoag	557.00	2.37	33.22	59.23	329.33	1.71	14.08	42.61	338.33	1.49	13.00	37.22
STRPBFNOMin	440.00	0.06	0.66	1.50	228.00	0.05	0.28	1.25	288.67	0.13	0.92	3.21
PTRPBFNOMin	456.33	0.05	0.57	1.25	247.00	0.05	0.31	1.25	306.00	0.08	0.63	2.05
	11/29/04	*11/29/04*	*11/29/04*	*11/29/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
STDev	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	12.12	0.27	3.54	6.69	16.60	0.25	2.06	6.32	5.17	0.30	2.21	7.47
Stbacteria	6.89	2.59	28.33	64.54	9.26	1.47	21.23	36.63	1.53	1.37	10.01	34.15
Ptbacteria	9.45	0.70	7.00	17.44	8.09	0.16	7.57	3.94	9.67	0.39	8.35	9.70
Stfungi	27.67	2.35	46.35	58.54	6.51	1.74	7.95	43.44	25.43	1.95	18.61	48.57
Ptfungi	9.68	0.66	16.43	16.44	8.19	1.74	8.51	43.42	6.36	2.52	21.02	62.97
StRPBact	14.84	0.57	6.95	14.11	7.51	0.57	4.00	14.25	6.03	0.42	3.31	10.51
PtRPBact	19.97	0.76	9.03	18.90	3.79	0.75	4.68	18.78	20.95	0.54	4.19	13.46
STRPBactFung	2.65	0.52	6.11	12.95	7.13	0.47	2.80	11.77	7.21	0.38	2.78	9.60
PTRPBactFung	30.68	0.84	5.86	20.86	18.04	0.78	3.43	19.36	16.56	0.58	3.69	14.57
STRPBFNOHoag	12.22	0.64	8.53	16.01	12.14	0.64	4.02	16.02	23.70	0.49	3.37	12.32
PTRPBFNOHoag	17.93	0.37	6.15	9.33	4.26	0.41	3.49	10.32	28.87	0.29	3.67	7.19

Table K-2 (cont.): Calcium in drainage water, averages and standard error.

0.05 mg/L	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*
Sample Date	***1/4/05***	***1/4/05***	***1/4/05***	***1/4/05***	***1/18/05***	***1/18/05***	***1/18/05***	***1/18/05***	***2/1/05***	***2/1/05***	***2/1/05***	***2/1/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.00			20	0.00			20	0.00		
AbioticSA	227	3.28	18.6	81.7	396	2.13	21.0	53.1	480	1.55	18.5	38.6
AbioticSB	228	1.58	9.0	39.4	360	1.76	15.8	43.9	457	0.92	10.5	23.0
AbioticSC	214	3.75	20.0	93.5	325	1.91	15.5	47.6	412	1.31	13.5	32.7
STBacteriaSA	242	11.74	70.9	293.0	404	11.77	118.6	293.5	490	6.37	77.9	159.0
STBacteriaSB	237	10.39	61.5	259.3	390	7.95	77.4	198.4	457	3.09	35.2	77.1
STBacteriaSC	204	19.96	101.6	498.1	393	9.09	89.2	226.9	462	8.91	102.7	222.4
PTBacteriaSA	292	8.07	58.8	201.5	444	8.90	98.6	222.0	505	6.34	79.8	158.1
PTBacteriaSB	295	9.98	73.5	249.1	414	9.03	93.3	225.3	498	6.13	76.2	153.0
PTBacteriaSC	273	12.34	84.1	307.9	421	10.21	107.2	254.7	492	7.79	95.6	194.4
STFungiSA	299	8.39	62.6	209.4	365	10.13	92.2	252.6	382	7.52	71.6	187.5
STFungiSB	276	8.44	58.1	210.5	398	8.59	85.3	214.3	484	5.89	71.2	147.1
STFungiSC	269	8.22	55.1	205.0	416	4.65	48.2	115.9	501	3.50	43.7	87.3
PTFungiSA	255	10.80	68.7	269.5	399	10.37	103.2	258.7	479	6.79	81.1	169.3
PTFungiSB	227	10.07	57.0	251.2	409	9.91	101.2	247.4	492	7.08	86.9	176.7
PTFungiSC	282	9.85	69.3	245.7	407	8.20	83.3	204.7	516	7.07	91.0	176.3
STRPBactSA	245	3.10	19.0	77.4	325	1.19	9.6	29.7	492	1.03	12.7	25.8
STRPBactSB	220	1.31	7.2	32.7	364	0.38	3.4	9.5	455	0.24	2.7	5.9
STRPBactSC	227	1.15	6.5	28.8	369	0.44	4.0	11.0	434	0.48	5.2	11.9
PTRPBactSA	219	4.14	22.6	103.3	392	1.27	12.5	31.8	461	1.19	13.6	29.6
PTRPBactSB	241	1.52	9.1	37.9	288	0.52	3.8	13.1	454	0.39	4.4	9.6
PTRPBactSC	227	1.28	7.3	31.9	380	0.33	3.1	8.2	461	0.30	3.5	7.6
STRPBactFungSA	211	3.36	17.7	83.9	381	0.84	8.0	21.1	454	0.63	7.2	15.8
STRPBactFungSB	219	1.47	8.1	36.8	340	0.44	3.7	11.0	452	0.28	3.2	7.0
STRPBactFungSC	223	1.16	6.5	29.0	376	0.44	4.1	11.0	461	0.32	3.6	7.9
PTRPBactFungSA	128	4.58	14.6	114.4	311	1.49	11.5	37.1	330	1.26	10.4	31.4
PTRPBactFungSB	203	1.85	9.3	46.0	367	0.49	4.5	12.2	427	0.35	3.7	8.7
PTRPBactFungSC	212	1.48	7.8	36.9	368	0.48	4.4	11.9	438	0.37	4.1	9.3
STRPBFNOHoagSA	307	2.66	20.4	66.4	434	2.50	27.1	62.4	483	1.87	22.6	46.7
STRPBFNOHoagSB	327	1.26	10.3	31.4	442	1.13	12.5	28.3	512	0.91	11.7	22.8
STRPBFNOHoagSC	322	1.08	8.7	27.0	463	1.07	12.4	26.7	533	0.85	11.3	21.2
PTRPBFNOHoagSA	318	1.86	14.8	46.4	448	1.66	18.6	41.4	543	1.39	18.9	34.7
PTRPBFNOHoagSB	308	1.14	8.8	28.5	446	0.95	10.5	23.6	530	0.80	10.5	19.9
PTRPBFNOHoagSC	313	1.28	10.0	32.0	464	1.23	14.3	30.7	561	0.97	13.6	24.3
STRPBFNOMinSA	177	0.33	1.5	8.2	356	0.07	0.7	1.8	442	0.10	1.1	2.5
STRPBFNOMinSB	201	0.31	1.5	7.7	351	0.05	0.5	1.3	417	0.07	0.7	1.6
STRPBFNOMinSC	153	0.32	1.2	8.0	342	0.06	0.5	1.4	425	0.08	0.9	2.0
PTRPBFNOMinSA	193	0.27	1.3	6.8	353	0.06	0.5	1.4	410	0.07	0.8	1.9
PTRPBFNOMinSB	201	0.18	0.9	4.5	351	0.05	0.4	1.2	431	0.05	0.5	1.2
PTRPBFNOMinSC	190	0.18	0.9	4.5	293	0.05	0.4	1.2	367	0.05	0.5	1.3
	1/4/05	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	223.00	2.87	15.85	71.54	360.33	1.93	17.43	48.20	449.67	1.26	14.16	31.42
Stbacteria	227.67	14.03	77.99	350.11	395.67	9.60	95.05	239.61	469.67	6.13	71.96	152.82
Ptbacteria	286.67	10.13	72.12	252.81	426.33	9.38	99.68	233.97	498.33	6.75	83.89	168.49
Stfungi	281.33	8.35	58.62	208.29	393.00	7.79	75.24	194.28	455.67	5.64	62.18	140.62
Ptfungi	254.67	10.24	65.01	255.45	405.00	9.50	95.90	236.91	495.67	6.98	86.34	174.11
StRPBact	230.67	1.86	10.90	46.30	352.67	0.67	5.71	16.70	460.33	0.58	6.85	14.54
PtRPBact	229.00	2.31	13.01	57.73	353.33	0.71	6.45	17.69	458.67	0.62	7.16	15.58
STRPBactFung	217.67	2.00	10.74	49.90	365.67	0.58	5.30	14.35	455.67	0.41	4.66	10.23
PTRPBactFung	181.00	2.64	10.61	65.79	348.67	0.82	6.79	20.37	398.33	0.66	6.05	16.47
STRPBFNOHoag	318.67	1.67	13.12	41.61	446.33	1.57	17.31	39.13	509.33	1.21	15.17	30.21
PTRPBFNOHoag	313.00	1.43	11.18	35.64	452.67	1.28	14.45	31.92	544.67	1.05	14.34	26.29
STRPBFNOMin	177.00	0.32	1.40	7.94	349.67	0.06	0.54	1.53	428.00	0.08	0.88	2.06
PTRPBFNOMin	194.67	0.21	1.02	5.26	332.33	0.05	0.44	1.31	402.67	0.06	0.59	1.45
	1/4/05	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
STDev	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	4.51	0.66	3.46	16.43	20.50	0.11	1.80	2.67	19.97	0.18	2.34	4.54
Stbacteria	11.92	2.99	12.12	74.61	4.26	1.13	12.25	28.18	10.27	1.69	19.72	42.07
Ptbacteria	6.89	1.23	7.31	30.78	9.06	0.42	4.07	10.40	3.76	0.52	5.97	13.04
Stfungi	9.06	0.07	2.17	1.70	14.93	1.63	13.65	40.70	37.16	1.17	9.23	29.11
Ptfungi	15.88	0.29	4.00	7.22	3.06	0.66	6.32	16.43	10.84	0.10	2.87	2.41
StRPBact	7.45	0.62	4.04	15.59	13.91	0.26	1.97	6.50	16.95	0.24	3.01	5.88
PtRPBact	6.43	0.92	4.84	22.86	32.85	0.29	3.01	7.18	2.33	0.28	3.25	7.02
STRPBactFung	3.53	0.69	3.51	17.14	12.91	0.13	1.37	3.36	2.73	0.11	1.27	2.81
PTRPBactFung	26.63	0.98	2.06	24.44	18.84	0.34	2.38	8.36	34.31	0.30	2.16	7.48
STRPBFNOHoag	6.01	0.50	3.67	12.48	8.65	0.47	4.89	11.65	14.50	0.33	3.70	8.26
PTRPBFNOHoag	2.89	0.22	1.82	5.47	5.70	0.21	2.32	5.18	8.99	0.18	2.43	4.41

Table K-2 (cont.): Calcium in drainage water, averages and standard error.

0.05 mg/L	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*
Sample Date	***2/15/05***	***2/15/05***	***2/15/05***	***2/15/05***	***3/1/05***	***3/1/05***	***3/1/05***	***3/1/05***	***3/16/05***	***3/16/05***	***3/16/05***	***3/16/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.00			20	0.00			20	0.00		
AbioticSA	395	2.59	25.5	64.6	247	0.82	5.1	20.5	169	0.49	2.1	12.3
AbioticSB	361	2.11	19.0	52.7	224	0.76	4.2	18.9	152	0.36	1.4	9.0
AbioticSC	349	2.19	19.1	54.7	239	0.84	5.0	21.0	178	0.53	2.4	13.3
STBacteriaSA	397	1.68	16.6	41.8	255	0.74	4.7	18.6	197	0.57	2.8	14.3
STBacteriaSB	457	0.96	11.0	24.0	255	0.50	3.2	12.5	195	0.73	3.5	18.1
STBacteriaSC	365	2.28	20.8	57.0	286	1.31	9.3	32.7	202	0.45	2.3	11.2
PTBacteriaSA	489	0.84	10.2	20.9	301	0.68	5.1	17.0	213	0.85	4.5	21.3
PTBacteriaSB	389	2.24	21.7	55.9	275	2.21	15.2	55.2	180	1.46	6.6	36.5
PTBacteriaSC	412	3.70	38.1	92.4	261	2.07	13.5	51.6	178	0.90	4.0	22.6
STFungiSA	400	1.31	13.0	32.6	302	2.22	16.8	55.5	247	0.87	5.4	21.7
STFungiSB	358	2.91	26.0	72.7	281	1.59	11.2	39.8	209	2.46	12.8	61.3
STFungiSC	407	0.82	8.3	20.3	286	0.46	3.3	11.4	221	2.08	11.5	51.9
PTFungiSA	421	2.13	22.3	53.1	249	1.11	6.9	27.8	141	1.66	5.8	41.3
PTFungiSB	382	1.39	13.2	34.7	287	1.41	10.1	35.3	212	0.26	1.4	6.5
PTFungiSC	448	2.09	23.3	52.0	289	1.80	13.0	45.0	247	0.79	4.9	19.8
STRPBactSA	407	2.14	21.7	53.4	273	0.93	6.3	23.2	153	0.20	0.8	5.0
STRPBactSB	380	1.31	12.4	32.7	264	0.30	2.0	7.4	185	0.17	0.8	4.3
STRPBactSC	409	1.56	15.9	38.9	258	0.41	2.6	10.2	192	0.54	2.6	13.6
PTRPBactSA	407	2.51	25.5	62.6	271	0.95	6.4	23.8	177	0.30	1.3	7.5
PTRPBactSB	371	1.45	13.5	36.3	260	0.35	2.3	8.8	172	0.30	1.3	7.5
PTRPBactSC	387	1.32	12.7	32.9	270	0.38	2.6	9.5	185	0.27	1.2	6.6
STRPBactFungSA	375	0.52	4.8	12.9	235	0.66	3.9	16.6	167	0.15	0.6	3.6
STRPBactFungSB	404	0.20	2.0	5.0	255	0.45	2.9	11.2	205	0.30	1.5	7.4
STRPBactFungSC	372	0.26	2.4	6.5	232	0.20	1.2	5.0	169	0.19	0.8	4.7
PTRPBactFungSA	210	0.94	5.0	23.6	162	0.27	1.1	6.7	114	0.25	0.7	6.3
PTRPBactFungSB	377	0.26	2.5	6.6	249	0.27	1.7	6.8	185	0.27	1.3	6.8
PTRPBactFungSC	310	0.29	2.2	7.2	244	0.12	0.7	2.9	173	0.36	1.5	8.9
STRPBFNOHoagSA	434	1.79	19.4	44.8	231	0.93	5.3	23.1	161	0.63	2.5	15.8
STRPBFNOHoagSB	436	0.91	9.9	22.8	209	0.60	3.1	14.9	155	0.89	3.4	22.1
STRPBFNOHoagSC	486	0.89	10.8	22.3	227	0.56	3.2	14.0	166	0.76	3.1	18.9
PTRPBFNOHoagSA	523	1.52	19.9	38.0	215	0.97	5.2	24.1	164	0.68	2.8	17.0
PTRPBFNOHoagSB	469	0.78	9.1	19.5	209	0.51	2.7	12.8	151	1.09	4.1	27.3
PTRPBFNOHoagSC	389	0.96	9.4	24.1	242	0.65	3.9	16.2	183	0.83	3.8	20.7
STRPBFNOMinSA	380	0.05	0.5	1.2	288	0.08	0.6	2.1	213	0.05	0.3	1.2
STRPBFNOMinSB	360	0.05	0.4	1.2	321	0.08	0.6	2.0	229	0.05	0.3	1.2
STRPBFNOMinSC	327	0.05	0.4	1.2	329	0.09	0.8	2.3	248	0.05	0.3	1.2
PTRPBFNOMinSA	325	0.05	0.4	1.2	355	0.08	0.7	2.0	243	0.05	0.3	1.2
PTRPBFNOMinSB	348	0.05	0.4	1.2	302	0.05	0.4	1.2	232	0.05	0.3	1.2
PTRPBFNOMinSC	388	0.05	0.5	1.2	364	0.09	0.8	2.2	258	0.05	0.3	1.2
	2/15/05	*2/15/05*	*2/15/05*	*2/15/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/16/05*	*3/16/05*	*3/16/05*	*3/16/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	368.33	2.30	21.21	57.34	236.33	0.81	4.77	20.16	166.67	0.46	1.94	11.51
Stbacteria	406.33	1.64	16.12	40.92	265.33	0.85	5.75	21.24	198.00	0.58	2.87	14.54
Ptbacteria	430.00	2.26	23.35	56.41	279.00	1.65	11.25	41.24	190.67	1.07	5.05	26.77
Stfungi	388.33	1.68	15.77	41.85	290.00	1.43	10.41	35.56	225.67	1.80	9.88	44.96
Ptfungi	417.00	1.87	19.63	46.59	274.67	1.44	10.00	36.02	200.00	0.90	4.03	22.56
StRPBact	398.67	1.67	16.68	41.64	265.33	0.55	3.65	13.62	176.33	0.31	1.39	7.63
PtRPBact	388.33	1.76	17.23	43.93	267.33	0.56	3.77	14.01	178.00	0.29	1.28	7.19
STRPBactFung	383.67	0.33	3.09	8.13	240.33	0.44	2.64	10.94	180.33	0.21	0.98	5.27
PTRPBactFung	299.00	0.50	3.22	12.45	218.67	0.22	1.17	5.51	157.33	0.29	1.18	7.35
STRPBFNOHoag	452.00	1.20	13.39	29.92	222.00	0.69	3.87	17.33	160.33	0.76	3.03	18.94
PTRPBFNOHoag	460.33	1.09	12.79	27.17	222.33	0.71	3.93	17.71	165.67	0.87	3.55	21.64
STRPBFNOMin	355.67	0.05	0.44	1.25	313.00	0.09	0.67	2.15	229.67	0.05	0.29	1.25
PTRPBFNOMin	353.67	0.05	0.44	1.25	340.00	0.07	0.63	1.81	244.67	0.05	0.31	1.25
	2/15/05	*2/15/05*	*2/15/05*	*2/15/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/16/05*	*3/16/05*	*3/16/05*	*3/16/05*
STDev	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	13.78	0.15	2.16	3.70	6.74	0.03	0.27	0.65	7.62	0.05	0.30	1.29
Stbacteria	26.96	0.38	2.85	9.53	10.33	0.24	1.85	5.99	2.08	0.08	0.37	2.00
Ptbacteria	30.24	0.83	8.07	20.62	11.72	0.49	3.11	12.18	11.35	0.19	0.78	4.86
Stfungi	15.30	0.63	5.30	15.80	6.33	0.52	3.92	12.89	11.22	0.48	2.29	11.92
Ptfungi	19.16	0.24	3.21	5.97	13.01	0.20	1.76	4.99	31.18	0.41	1.35	10.15
StRPBact	9.35	0.25	2.72	6.15	4.36	0.19	1.36	4.85	12.00	0.12	0.61	2.98
PtRPBact	10.41	0.38	4.14	9.41	3.51	0.20	1.34	4.87	3.79	0.01	0.03	0.28
STRPBactFung	10.20	0.10	0.87	2.40	7.22	0.13	0.80	3.34	12.35	0.05	0.28	1.13
PTRPBactFung	48.52	0.22	0.87	5.56	28.20	0.05	0.29	1.28	21.94	0.03	0.24	0.81
STRPBFNOHoag	17.01	0.30	3.03	7.42	6.77	0.12	0.73	2.89	3.18	0.07	0.26	1.83
PTRPBFNOHoag	38.92	0.22	3.54	5.57	10.15	0.13	0.72	3.34	9.29	0.12	0.40	3.00

Table K-2 (cont.): Calcium in drainage water, averages and standard error.

0.05 mg/L	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*
Sample Date	***3/29/05***	***3/29/05***	***3/29/05***	***3/29/05***	***4/12/05***	***4/12/05***	***4/12/05***	***4/12/05***	***4/26/05***	***4/26/05***	***4/26/05***	***4/26/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.03			20	0.00			20	0.00		
AbioticSA	175	1.60	7.0	39.9	116	0.41	1.2	10.2	253	0.35	2.2	8.8
AbioticSB	158	1.34	5.3	33.5	94	0.23	0.5	5.6	181	0.19	0.9	4.8
AbioticSC	170	1.54	6.5	38.4	106	0.35	0.9	8.8	271	0.51	3.5	12.8
STBacteriaSA	208	1.51	7.9	37.8	139	0.05	0.2	1.2	297	0.46	3.4	11.5
STBacteriaSB	200	1.02	5.1	25.4	135	0.07	0.2	1.8	263	0.30	2.0	7.5
STBacteriaSC	202	0.75	3.8	18.8	148	0.11	0.4	2.7	291	0.56	4.1	14.0
PTBacteriaSA	196	1.59	7.8	39.7	146	0.09	0.3	2.2	232	0.46	2.7	11.5
PTBacteriaSB	197	1.46	7.2	36.4	146	0.13	0.5	3.1	302	0.34	2.5	8.4
PTBacteriaSC	169	0.86	3.6	21.4	132	0.30	1.0	7.5	272	0.84	5.7	20.9
STFungiSA	237	0.67	3.9	16.7	169	0.03	0.1	0.8	331	0.20	1.6	4.9
STFungiSB	195	1.29	6.3	32.1	152	0.38	1.4	9.4			0.0	0.0
STFungiSC	207	2.47	12.7	61.6	170	0.55	2.3	13.8	326	0.95	7.7	23.6
PTFungiSA	187	2.03	9.5	50.6	136	0.26	0.9	6.5	290	1.13	8.2	28.3
PTFungiSB	215	1.25	6.7	31.1	142	0.20	0.7	5.1			0.0	0.0
PTFungiSC	246	1.29	7.9	32.2	181	0.23	1.1	5.8	330	0.50	4.2	12.6
STRPBactSA	186	0.36	1.7	9.0	121	0.06	0.2	1.5	291	0.16	1.2	4.0
STRPBactSB	186	0.24	1.1	5.9	125	0.06	0.2	1.6	271	0.05	0.4	1.3
STRPBactSC	184	0.92	4.2	22.9	131	0.33	1.1	8.3	273	0.22	1.5	5.6
PTRPBactSA	178	0.67	3.0	16.7	128	0.21	0.7	5.2	276	0.19	1.3	4.8
PTRPBactSB	187	0.41	1.9	10.1	114	0.10	0.3	2.5	257	0.11	0.7	2.8
PTRPBactSC	197	0.43	2.1	10.6	118	0.13	0.4	3.3	285	0.07	0.5	1.8
STRPBactFungSA	161	0.19	0.8	4.8	103	0.08	0.2	2.0	260	0.09	0.6	2.2
STRPBactFungSB	216	0.40	2.2	10.0	144	0.14	0.5	3.5	297	0.14	1.0	3.5
STRPBactFungSC	173	0.39	1.7	9.6	119	0.12	0.3	2.9	262	0.09	0.6	2.4
PTRPBactFungSA	117	0.30	0.9	7.6	75	0.09	0.2	2.3	185	0.09	0.4	2.1
PTRPBactFungSB	181	0.33	1.5	8.2	129	0.13	0.4	3.3	272	0.12	0.8	3.0
PTRPBactFungSC	171	0.60	2.5	14.9	123	0.24	0.7	5.9	275	0.17	1.2	4.3
STRPBFNOHoagSA	153	0.64	2.4	15.9	82	0.73	1.5	18.2	238	0.62	3.7	15.4
STRPBFNOHoagSB	157	0.86	3.4	21.5	95	1.06	2.5	26.5	242	0.78	4.7	19.5
STRPBFNOHoagSC	194	0.84	4.1	20.9	107	0.27	0.7	6.8	256	0.74	4.7	18.5
PTRPBFNOHoagSA	147	0.68	2.5	17.0	96	0.81	1.9	20.3	184	0.66	3.0	16.4
PTRPBFNOHoagSB	159	1.05	4.2	26.3	107	0.82	2.2	20.5	253	0.89	5.6	22.3
PTRPBFNOHoagSC	200	0.79	3.9	19.7	120	1.01	3.0	25.1	287	0.77	5.5	19.2
STRPBFNOMinSA	233	0.05	0.3	1.2	173	0.05	0.2	1.2	320	0.05	0.4	1.2
STRPBFNOMinSB	259	0.05	0.3	1.2	191	0.05	0.2	1.2	333	0.05	0.4	1.2
STRPBFNOMinSC	266	0.05	0.3	1.2	186	0.05	0.2	1.2	334	0.05	0.4	1.2
PTRPBFNOMinSA	256	0.05	0.3	1.2	177	0.05	0.2	1.2	356	0.05	0.4	1.2
PTRPBFNOMinSB	208	0.05	0.3	1.2	164	0.05	0.2	1.2	318	0.05	0.4	1.2
PTRPBFNOMinSC	255	0.05	0.3	1.2	187	0.05	0.2	1.2	358	0.05	0.4	1.2
	3/29/05	*3/29/05*	*3/29/05*	*3/29/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/26/05*	*4/26/05*	*4/26/05*	*4/26/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	167.33	1.49	6.26	37.28	105.67	0.33	0.88	8.20	235.00	0.35	2.20	8.83
Stbacteria	203.33	1.09	5.58	27.31	140.67	0.08	0.27	1.91	283.67	0.44	3.16	11.02
Ptbacteria	187.67	1.30	6.20	32.49	141.67	0.17	0.59	4.27	268.33	0.54	3.62	13.60
Stfungi	212.67	1.47	7.64	36.78	163.67	0.32	1.30	8.01	328.83	0.57	3.11	9.51
Ptfungi	216.33	1.52	8.04	37.98	153.00	0.23	0.89	5.80	310.00	0.82	4.12	13.62
StRPBact	185.00	0.51	2.32	12.60	126.00	0.15	0.49	3.79	278.67	0.15	1.02	3.66
PtRPBact	187.67	0.50	2.32	12.48	119.67	0.15	0.44	3.65	272.67	0.13	0.86	3.14
STRPBactFung	183.33	0.33	1.53	8.13	122.33	0.11	0.35	2.79	273.00	0.11	0.74	2.68
PTRPBactFung	156.67	0.41	1.64	10.23	108.67	0.15	0.44	3.84	243.67	0.13	0.80	3.14
STRPBFNOHoag	168.33	0.78	3.30	19.45	94.33	0.69	1.57	17.14	245.00	0.71	4.37	17.83
PTRPBFNOHoag	168.67	0.84	3.54	20.99	107.67	0.88	2.38	21.96	241.33	0.77	4.73	19.31
STRPBFNOMin	252.33	0.05	0.31	1.25	183.67	0.05	0.23	1.25	329.33	0.05	0.41	1.25
PTRPBFNOMin	240.00	0.05	0.30	1.25	176.00	0.05	0.22	1.25	343.67	0.05	0.43	1.25
	3/29/05	*3/29/05*	*3/29/05*	*3/29/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/26/05*	*4/26/05*	*4/26/05*	*4/26/05*
STDev	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	5.04	0.08	0.51	1.96	6.36	0.05	0.19	1.35	27.50	0.09	0.75	2.30
Stbacteria	2.40	0.22	1.20	5.57	3.84	0.02	0.07	0.42	10.48	0.08	0.63	1.91
Ptbacteria	9.17	0.23	1.30	5.64	4.67	0.07	0.21	1.65	20.28	0.15	1.03	3.76
Stfungi	12.49	0.53	2.63	13.16	5.84	0.15	0.64	3.81	2.04	0.31	2.34	7.18
Ptfungi	17.04	0.25	0.80	6.32	14.11	0.02	0.10	0.41	16.33	0.26	2.37	8.18
StRPBact	0.67	0.21	0.96	5.24	2.91	0.09	0.30	2.25	6.36	0.05	0.35	1.25
PtRPBact	5.49	0.08	0.33	2.11	4.16	0.03	0.11	0.79	8.25	0.04	0.24	0.88
STRPBactFung	16.70	0.07	0.40	1.67	11.93	0.02	0.09	0.43	12.01	0.02	0.15	0.41
PTRPBactFung	19.88	0.09	0.48	2.33	17.09	0.04	0.16	1.09	29.51	0.03	0.23	0.64
STRPBFNOHoag	13.05	0.07	0.47	1.79	7.22	0.23	0.52	5.71	5.46	0.05	0.35	1.22
PTRPBFNOHoag	16.05	0.11	0.52	2.75	6.94	0.06	0.32	1.56	30.30	0.07	0.86	1.71

Table K-2 (cont.): Calcium in drainage water, averages and standard error.

0.05 mg/L	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*
Sample Date	***5/10/05***	***5/10/05***	***5/10/05***	***5/10/05***	***5/24/05***	***5/24/05***	***5/24/05***	***5/24/05***	***6/7/05***	***6/7/05***	***6/7/05***	***6/7/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.00			20	0.00			20	0.01		
AbioticSA	249	0.20	1.2	4.9	131	0.40	1.3	10.0	129	0.28	0.9	7.1
AbioticSB	246	0.13	0.8	3.2	114	0.43	1.2	10.6	112	0.35	1.0	8.7
AbioticSC	253	0.27	1.7	6.9	112	0.44	1.2	11.0	110	0.30	0.8	7.6
STBacteriaSA	269	0.10	0.7	2.5	148	0.10	0.4	2.6	142	0.06	0.2	1.4
STBacteriaSB	197	0.23	1.1	5.8	136	0.07	0.2	1.8	141	0.04	0.1	0.9
STBacteriaSC	260	0.19	1.2	4.6	166	0.13	0.5	3.2	157	0.04	0.2	1.0
PTBacteriaSA	235	0.23	1.4	5.8	148	1.08	4.0	26.9	136	0.24	0.8	5.9
PTBacteriaSB	273	0.22	1.5	5.5	93	0.17	0.4	4.2	92	1.20	2.8	29.9
PTBacteriaSC	181		0.0	0.0	149	0.52	1.9	12.9	155	0.33	1.3	8.2
STFungiSA	275		0.0	0.0	164	0.29	1.2	7.3	145	0.17	0.6	4.2
STFungiSB	256	0.19	1.2	4.7	148	0.18	0.7	4.6	144	0.17	0.6	4.2
STFungiSC	287	0.34	2.4	8.5	142	0.17	0.6	4.2	140	0.13	0.5	3.3
PTFungiSA	264	0.70	4.6	17.5	155	0.17	0.6	4.1	153	0.19	0.7	4.8
PTFungiSB	265	0.50	3.3	12.4	150	0.28	1.0	6.9	154	0.05	0.2	1.3
PTFungiSC	282	0.19	1.3	4.7	131	0.21	0.7	5.3	157	0.08	0.3	2.1
STRPBactSA	264	0.09	0.6	2.2	135	0.24	0.8	6.1	126	0.11	0.3	2.7
STRPBactSB	262	0.03	0.2	0.8	144	0.11	0.4	2.8	129	0.06	0.2	1.4
STRPBactSC	256	0.23	1.5	5.8	117	0.17	0.5	4.2	112	0.06	0.2	1.5
PTRPBactSA	251	0.12	0.8	3.1	144	0.09	0.3	2.1	134	0.04	0.1	0.9
PTRPBactSB	258	0.08	0.5	1.9	125	0.07	0.2	1.7	113	0.03	0.1	0.7
PTRPBactSC	254	0.05	0.3	1.3	137	0.07	0.2	1.8	128	0.01	0.0	0.3
STRPBactFungSA	232	0.08	0.5	2.0	131	0.12	0.4	3.0	132	0.05	0.2	1.3
STRPBactFungSB	276	0.10	0.7	2.5	149	0.10	0.4	2.4	139	0.05	0.2	1.3
STRPBactFungSC	255	0.06	0.4	1.4	130	0.12	0.4	3.1	127	0.03	0.1	0.8
PTRPBactFungSA	170	0.06	0.3	1.6	100	0.05	0.1	1.2	87	0.07	0.1	1.7
PTRPBactFungSB	261	0.08	0.5	2.1	117	0.08	0.2	2.1	108	0.05	0.1	1.2
PTRPBactFungSC	266	0.17	1.1	4.2	93	0.08	0.2	2.1	87	0.04	0.1	0.9
STRPBFNOHoagSA	286	0.59	4.2	14.8	99	0.64	1.6	16.0	100	0.64	1.6	15.9
STRPBFNOHoagSB	306	0.75	5.7	18.7	122	0.58	1.8	14.5	113	0.58	1.6	14.4
STRPBFNOHoagSC	290	0.67	4.8	16.6	126	0.70	2.2	17.5	117	0.52	1.5	12.9
PTRPBFNOHoagSA	315	0.67	5.3	16.7	112	0.55	1.5	13.7	103	0.50	1.3	12.5
PTRPBFNOHoagSB	269	0.80	5.4	20.0	113	0.60	1.7	15.0	95	0.54	1.3	13.5
PTRPBFNOHoagSC	295	0.70	5.1	17.4	115	0.63	1.8	15.8	111	0.58	1.6	14.4
STRPBFNOMinSA	224	0.05	0.3	1.2	177	0.05	0.2	1.2	162	0.01	0.1	0.4
STRPBFNOMinSB	229	0.05	0.3	1.2	174	0.05	0.2	1.2	174	0.01	0.0	0.1
STRPBFNOMinSC	239	0.05	0.3	1.2	170	0.05	0.2	1.2	168	0.01	0.0	0.2
PTRPBFNOMinSA	244	0.05	0.3	1.2	170	0.05	0.2	1.2	158	0.00	0.0	0.0
PTRPBFNOMinSB	229	0.05	0.3	1.2	185	0.05	0.2	1.2	162	0.02	0.1	0.4
PTRPBFNOMinSC	259	0.05	0.3	1.2	153	0.05	0.2	1.2	145	0.00	0.0	0.0
	5/10/05	*5/10/05*	*5/10/05*	*5/10/05*	*5/24/05*	*5/24/05*	*5/24/05*	*5/24/05*	*6/7/05*	*6/7/05*	*6/7/05*	*6/7/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	249.00	0.20	1.25	5.00	119.33	0.42	1.26	10.55	117.00	0.31	0.91	7.79
Stbacteria	242.33	0.17	1.00	4.30	150.33	0.10	0.39	2.55	147.00	0.05	0.17	1.13
Ptbacteria	229.33	0.23	0.95	3.77	130.33	0.59	2.10	14.65	128.00	0.59	1.61	14.68
Stfungi	272.33	0.26	1.21	4.38	151.67	0.21	0.83	5.36	143.33	0.16	0.56	3.91
Ptfungi	270.00	0.46	3.08	11.54	145.67	0.22	0.79	5.45	154.33	0.11	0.42	2.71
StRPBact	260.67	0.12	0.77	2.96	131.67	0.17	0.57	4.36	122.33	0.08	0.23	1.88
PtRPBact	254.67	0.08	0.53	2.10	135.33	0.08	0.25	1.87	125.33	0.03	0.08	0.66
STRPBactFung	254.00	0.08	0.51	1.99	136.33	0.11	0.38	2.84	133.00	0.05	0.15	1.14
PTRPBactFung	232.33	0.10	0.64	2.62	103.67	0.07	0.19	1.78	94.33	0.05	0.12	1.25
STRPBFNOHoag	294.00	0.67	4.92	16.70	115.33	0.64	1.85	16.02	110.33	0.58	1.58	14.36
PTRPBFNOHoag	293.00	0.72	5.26	18.05	113.00	0.60	1.68	14.85	103.33	0.54	1.39	13.44
STRPBFNOMin	231.00	0.05	0.29	1.25	173.33	0.05	0.22	1.25	167.67	0.01	0.04	0.25
PTRPBFNOMin	244.33	0.05	0.30	1.25	169.67	0.05	0.21	1.25	155.00	0.01	0.02	0.14
	5/10/05	*5/10/05*	*5/10/05*	*5/10/05*	*5/24/05*	*5/24/05*	*5/24/05*	*5/24/05*	*6/7/05*	*6/7/05*	*6/7/05*	*6/7/05*
STDev	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	2.03	0.04	0.27	1.05	6.03	0.01	0.03	0.30	6.03	0.02	0.04	0.47
Stbacteria	22.65	0.04	0.17	0.98	8.72	0.02	0.08	0.41	5.17	0.01	0.02	0.16
Ptbacteria	26.69	0.01	0.48	1.89	18.50	0.27	1.04	6.61	18.66	0.31	0.59	7.66
Stfungi	9.02	0.06	0.70	2.45	6.57	0.04	0.19	0.98	1.53	0.01	0.05	0.30
Ptfungi	5.84	0.15	0.96	3.74	7.31	0.03	0.12	0.79	1.20	0.04	0.16	1.05
StRPBact	2.40	0.06	0.38	1.49	7.94	0.04	0.13	0.96	5.24	0.02	0.06	0.43
PtRPBact	2.03	0.02	0.13	0.52	5.55	0.01	0.03	0.14	6.24	0.01	0.02	0.17
STRPBactFung	12.71	0.01	0.10	0.32	6.17	0.01	0.01	0.20	3.48	0.01	0.03	0.18
PTRPBactFung	31.20	0.03	0.25	0.82	7.13	0.01	0.04	0.30	7.00	0.01	0.02	0.24
STRPBFNOHoag	6.11	0.04	0.43	1.12	8.41	0.04	0.19	0.88	5.13	0.03	0.03	0.86
PTRPBFNOHoag	13.32	0.04	0.08	1.01	0.88	0.02	0.08	0.61	4.62	0.02	0.10	0.55

Table K-2 (cont.): Calcium in drainage water, averages and standard error.

0.05 mg/L	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca
Sample Date	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
Sample ID	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Troy Method Blank	20	0.01			20	0.02			20	0.01			20	0.03		
AbioticSA	129	0.13	0.4	3.3	144	0.38	1.4	9.5	151	0.27	1.0	6.7	138	0.53	1.8	13.2
AbioticSB	109	0.23	0.6	5.8	126	0.52	1.6	12.9	132	0.20	0.7	5.1	117	0.55	1.6	13.7
AbioticSC	109	0.26	0.7	6.5	117	0.58	1.7	14.6	131	0.34	1.1	8.4	109	0.41	1.1	10.2
STBacteriaSA	155	0.05	0.2	1.3	168	0.30	1.3	7.5	160	0.11	0.4	2.8	157	0.21	0.8	5.4
STBacteriaSB	154	0.08	0.3	1.9	154	0.23	0.9	5.8	156	0.14	0.6	3.6	64	0.30	0.5	7.4
STBacteriaSC	160	0.25	1.0	6.3	142	0.23	0.8	5.7	169	0.15	0.6	3.7	137	0.22	0.8	5.6
PTBacteriaSA	151	1.07	4.1	26.8	147	1.61	5.9	40.1	152	0.83	3.1	20.7	139	0.57	2.0	14.2
PTBacteriaSB	80	0.28	0.6	7.0	99	1.69	4.2	42.3	115	0.68	2.0	17.0	92	0.95	2.2	23.6
PTBacteriaSC	163	0.24	1.0	5.9	161	1.22	4.9	30.5	186	0.80	3.7	19.9	147	0.73	2.7	18.3
STFungiSA	168	0.67	2.8	16.6	165	0.20	0.8	5.0	173	0.57	2.4	14.2	149	0.21	0.8	5.3
STFungiSB	153	0.58	2.2	14.5	151	1.32	5.0	33.0	164	0.78	3.2	19.6	152	0.78	3.0	19.4
STFungiSC	153	0.61	2.3	15.2	150	0.62	2.3	15.5	112	0.82	2.3	20.3	141	1.29	4.5	32.2
PTFungiSA	163	0.17	0.7	4.2	161	0.60	2.4	15.0	174	0.29	1.3	7.3	150	0.58	2.2	14.4
PTFungiSB	163	0.34	1.4	8.6	160	0.37	1.5	9.3	164	0.37	1.5	9.2	150	0.68	2.5	16.9
PTFungiSC	167	0.20	0.8	5.0	170	0.53	2.3	13.3	181	0.28	1.3	7.0	155	0.46	1.8	11.6
STRPBactSA	130	0.09	0.3	2.4	142	0.15	0.5	3.7	153	0.11	0.4	2.8	132	0.11	0.4	2.8
STRPBactSB	127	0.04	0.1	1.0	142	0.18	0.6	4.4	152	0.05	0.2	1.3	129	0.09	0.3	2.2
STRPBactSC	118	0.05	0.2	1.3	125	0.10	0.3	2.5	140	0.07	0.3	1.8	115	0.04	0.1	1.0
PTRPBactSA	136	0.04	0.1	0.9	147	0.07	0.2	1.6	159	0.07	0.3	1.7	143	0.09	0.3	2.2
PTRPBactSB	120	0.02	0.1	0.5	140	0.07	0.2	1.6	147	0.04	0.1	1.0	128	0.09	0.3	2.3
PTRPBactSC	131	0.01	0.0	0.3	135	0.07	0.2	1.6	151	0.01	0.0	0.2	142	0.05	0.2	1.3
STRPBactFungSA	148	0.12	0.5	3.1	134	0.19	0.6	4.8	152	0.16	0.6	4.1	142	0.21	0.7	5.3
STRPBactFungSB	147	0.12	0.4	3.0	145	0.14	0.5	3.5	167	0.14	0.6	3.5	144	0.16	0.6	4.0
STRPBactFungSC	138	0.09	0.3	2.3	140	0.22	0.8	5.5	147	0.20	0.7	5.0	140	0.22	0.8	5.5
PTRPBactFungSA	90	0.08	0.2	2.0	97	0.05	0.1	1.2	122	0.08	0.2	2.0	91	0.07	0.2	1.7
PTRPBactFungSB	106	0.02	0.0	0.4	106	0.09	0.2	2.2	123	0.05	0.1	1.2	115	0.05	0.1	1.2
PTRPBactFungSC	93	0.02	0.0	0.4	95	0.10	0.2	2.5	107	0.05	0.1	1.3	98	0.05	0.1	1.3
STRPBFNOHoagSA	104	0.36	0.9	8.9	102	0.46	1.2	11.6	108	0.33	0.9	8.3	110	0.45	1.2	11.2
STRPBFNOHoagSB	120	0.52	1.6	12.9	123	0.47	1.4	11.7	125	0.56	1.7	13.9	126	0.42	1.3	10.5
STRPBFNOHoagSC	128	0.53	1.7	13.3	124	0.53	1.6	13.2	131	0.46	1.5	11.6	135	0.56	1.9	14.0
PTRPBFNOHoagSA	125	0.51	1.6	12.8	130	0.54	1.7	13.4	143	0.54	1.9	13.6	75	0.48	0.9	11.9
PTRPBFNOHoagSB	113	0.53	1.5	13.2	121	0.50	1.5	12.4	145	0.55	2.0	13.6	124	0.49	1.5	12.2
PTRPBFNOHoagSC	119	0.55	1.6	13.7	125	0.54	1.7	13.4	144	0.50	1.8	12.4	128	0.52	1.7	12.9
STRPBFNOMinSA	163	0.03	0.1	0.7	169	0.02	0.1	0.6	174	0.01	0.1	0.3	178	0.03	0.1	0.8
STRPBFNOMinSB	175	0.01	0.1	0.4	182	0.02	0.1	0.4	193	0.01	0.0	0.2	180	0.02	0.1	0.5
STRPBFNOMinSC	170	0.00	0.0	0.0	172	0.04	0.2	1.0	190	0.01	0.0	0.2	174	0.05	0.2	1.3
PTRPBFNOMinSA	175	0.00	0.0	0.0	174	0.01	0.0	0.3	184	0.01	0.0	0.2	178	0.02	0.1	0.4
PTRPBFNOMinSB	177	0.00	0.0	0.0	185	0.03	0.1	0.7	187	0.00	0.0	0.1	187	0.04	0.2	0.9
PTRPBFNOMinSC	151	0.00	0.0	0.0	156	0.00	0.0	0.1	166	0.01	0.0	0.2	160	0.01	0.0	0.3
	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
Average	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Abiotic	116.00	0.21	0.59	5.20	128.67	0.50	1.57	12.35	138.00	0.27	0.92	6.71	121.33	0.50	1.51	12.37
Stbacteria	156.67	0.13	0.50	3.18	155.00	0.25	0.99	6.33	161.33	0.13	0.54	3.35	119.00	0.24	0.69	6.09
Ptbacteria	131.67	0.53	1.86	13.23	136.00	1.51	5.01	37.64	151.00	0.77	2.94	19.21	126.33	0.75	2.28	18.70
Stfungi	158.00	0.62	2.44	15.43	155.67	0.72	2.72	17.86	149.33	0.72	2.64	18.02	147.33	0.76	2.76	18.97
Ptfungi	164.67	0.24	0.97	5.92	163.67	0.50	2.05	12.52	173.00	0.31	1.35	7.83	151.67	0.57	2.16	14.28
StRPBact	125.00	0.06	0.20	1.55	136.00	0.14	0.49	3.53	148.33	0.08	0.29	1.95	125.67	0.08	0.25	1.97
PtRPBact	129.33	0.02	0.07	0.56	141.00	0.07	0.23	1.64	152.67	0.04	0.15	0.97	138.00	0.08	0.26	1.92
STRPBactFung	144.33	0.11	0.40	2.78	140.00	0.18	0.64	4.59	155.33	0.17	0.64	4.16	142.33	0.20	0.70	4.89
PTRPBactFung	96.33	0.04	0.09	0.92	99.33	0.08	0.20	1.97	117.00	0.06	0.17	1.47	101.33	0.05	0.14	1.37
STRPBFNOHoag	117.67	0.47	1.40	11.72	116.33	0.49	1.42	12.15	121.33	0.45	1.38	11.25	123.33	0.48	1.48	11.89
PTRPBFNOHoag	118.67	0.53	1.57	13.25	125.00	0.52	1.63	13.05	143.67	0.53	1.90	13.19	109.33	0.49	1.35	12.31
STRPBFNOMin	169.00	0.02	0.06	0.38	174.00	0.03	0.12	0.69	186.00	0.01	0.04	0.21	177.00	0.03	0.15	0.83
PTRPBFNOMin	167.67	0.00	0.00	0.03	171.67	0.01	0.06	0.35	179.33	0.01	0.03	0.18	175.00	0.02	0.09	0.52
	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
STDev	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Abiotic	6.67	0.04	0.08	0.96	7.94	0.06	0.10	1.49	6.51	0.04	0.13	0.95	8.65	0.04	0.21	1.11
Stbacteria	1.86	0.06	0.26	1.59	7.51	0.02	0.14	0.56	3.84	0.01	0.05	0.28	28.26	0.03	0.11	0.64
Ptbacteria	25.90	0.27	1.10	6.80	18.77	0.14	0.50	3.61	20.50	0.05	0.52	1.13	17.16	0.11	0.21	2.74
Stfungi	5.00	0.03	0.18	0.63	4.84	0.33	1.22	8.16	19.01	0.08	0.29	1.95	3.28	0.31	1.09	7.75
Ptfungi	1.33	0.05	0.22	1.35	3.18	0.07	0.29	1.69	4.93	0.03	0.08	0.71	1.67	0.06	0.21	1.53
StRPBact	3.61	0.02	0.06	0.41	5.67	0.02	0.09	0.57	4.18	0.02	0.07	0.43	5.24	0.02	0.07	0.51
PtRPBact	4.73	0.01	0.03	0.18	3.48	0.00	0.01	0.00	3.53	0.02	0.07	0.42	4.84	0.01	0.04	0.34
STRPBactFung	3.18	0.01	0.05	0.26	3.18	0.02	0.08	0.60	6.01	0.02	0.05	0.44	1.15	0.02	0.06	0.47
PTRPBactFung	4.91	0.02	0.05	0.52	3.38	0.02	0.04	0.39	5.17	0.01	0.03	0.25	7.13	0.01	0.01	0.14
STRPBFNOHoag	7.06	0.06	0.24	1.40	7.17	0.02	0.13	0.53	6.89	0.06	0.25	1.61	7.31	0.04	0.20	1.06
PTRPBFNOHoag	3.46	0.01	0.04	0.27	2.60	0.01	0.07	0.33	0.58	0.02	0.06	0.41	17.04	0.01	0.23	0.30

Table K-3: Potassium in drainage water, averages and standard error.

0.04 mg/L	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*
Sample Date	***8/5/04***	***8/5/04***	***8/5/04***	***8/5/04***	***8/19/04***	***8/19/04***	***8/19/04***	***8/19/04***	***9/30/04***	***9/30/04***	***9/30/04***	***9/30/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank			0.00	0.00			0.00	0.00	20	0.25	0.13	6.47
AbioticSA	258	1.78	11.71	45.40	375	1.80	17.28	46.08	267	1.51	10.28	38.50
AbioticSB	299	2.61	19.96	66.76	367	1.82	17.12	46.65	182	1.65	7.68	42.21
AbioticSC	278	1.17	8.34	30.01	198	1.43	7.26	36.66	227	1.31	7.62	33.57
STBacteriaSA	225	2.08	11.95	53.24	273	1.45	10.13	37.12	285	3.31	24.10	84.56
STBacteriaSB	206	2.45	12.90	62.77	317	1.75	14.21	44.81	293	4.39	32.86	112.16
STBacteriaSC	320	2.41	19.70	61.66	312	1.61	12.88	41.28	277	4.60	32.61	117.71
PTBacteriaSA	270	2.46	16.97	62.85	312	1.55	12.40	39.73	206	2.65	13.97	67.84
PTBacteriaSB	268	2.59	17.77	66.32	268	1.99	13.62	50.83	192	3.30	16.19	84.32
PTBacteriaSC	327	2.21	18.52	56.64	286	1.53	11.19	39.11	217	2.78	15.42	71.05
STFungiSA	264	2.35	15.89	60.20	272	1.54	10.68	39.27	249	3.47	22.11	88.79
STFungiSB	265	2.23	15.09	56.94	310	1.75	13.85	44.67	227	3.49	20.26	89.25
STFungiSC	313	2.46	19.64	62.85	313	1.86	14.90	47.59	246	4.07	25.59	104.01
PTFungiSA	200	2.10	10.74	53.68	367	1.39	13.06	35.58	226	2.78	16.06	71.05
PTFungiSB	296	2.52	19.04	64.32	356	1.72	15.68	44.05	306	3.56	27.84	90.97
PTFungiSC	272	2.53	17.62	64.78	258	1.76	11.60	44.97	180	3.79	17.42	96.80
STRPBactSA	336	1.92	16.45	49.02	265	1.34	9.06	34.19	222	1.26	7.13	32.12
STRPBactSB	163	1.99	8.32	51.02	310	1.46	11.55	37.27	204	0.90	4.71	23.10
STRPBactSC	258	1.80	11.90	46.14	368	1.53	14.40	39.12	202	1.02	5.29	26.18
PTRPBactSA	222	1.78	10.08	45.40	254	1.34	8.69	34.19	271	1.24	8.60	31.73
PTRPBactSB	172	1.93	8.47	49.24	263	1.36	9.18	34.89	224	1.39	7.93	35.42
PTRPBactSC	253	2.07	13.41	53.01	288	1.60	11.80	40.97	226	1.10	6.33	28.03
STRPBactFungSA	326	1.63	13.55	41.56	292	1.51	11.27	38.58	223	1.20	6.87	30.80
STRPBactFungSB	206	2.11	11.09	53.97	321	1.31	10.78	33.58	252	1.38	8.91	35.34
STRPBactFungSC	340	1.69	14.73	43.33	330	1.46	12.35	37.42	238	1.52	9.22	38.75
PTRPBactFungSA	246	1.73	10.86	44.14	272	1.51	10.47	38.51	212	4.81	26.06	122.91
PTRPBactFungSB	217	1.92	10.64	49.02	298	1.27	9.71	32.58	206	4.83	25.46	123.61
PTRPBactFungSC	315	2.02	16.26	51.69	216	1.40	7.72	35.74	269	4.05	27.84	103.50
STRPBFNOHoagSA	296	1.70	12.87	43.48	373	1.25	11.95	32.04	222	1.13	6.43	28.96
STRPBFNOHoagSB	193	2.15	10.62	55.01	342	1.63	14.22	41.59	223	1.22	6.96	31.19
STRPBFNOHoagSC	241	1.93	11.87	49.24	245	1.37	8.57	34.96	316	1.25	10.07	31.88
PTRPBFNOHoagSA	340	1.67	14.55	42.81	358	1.71	15.66	43.75	320	3.87	31.64	98.88
PTRPBFNOHoagSB	220	2.03	11.42	51.90	323	1.23	10.15	31.42	317	2.57	20.87	65.84
PTRPBFNOHoagSC	346	1.87	16.50	47.76	348	1.36	12.14	34.88	260	3.33	22.16	85.25
STRPBFNOMinSA	381	0.43	4.14	10.88	452	0.70	8.14	18.00	201	1.64	8.40	41.82
STRPBFNOMinSB	396	0.40	4.05	10.23	367	0.40	3.75	10.23	308	1.66	13.09	42.51
STRPBFNOMinSC	329	0.89	7.47	22.71	340	0.41	3.53	10.37	244	1.57	9.81	40.20
PTRPBFNOMinSA	351	0.40	3.59	10.23	471	0.48	5.72	12.15	294	2.30	17.30	58.84
PTRPBFNOMinSB	300	0.40	3.07	10.23	333	0.40	3.41	10.23	268	2.66	18.24	68.07
PTRPBFNOMinSC	422	0.54	5.88	13.93	515	0.66	8.75	16.99	268	1.78	12.20	45.52
	8/5/04	*8/5/04*	*8/5/04*	*8/5/04*	*8/19/04*	*8/19/04*	*8/19/04*	*8/19/04*	*9/30/04*	*9/30/04*	*9/30/04*	*9/30/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	278.33	1.85	13.34	47.39	313.33	1.69	13.89	43.13	225.33	1.49	8.53	38.09
Stbacteria	249.83	2.32	14.85	59.22	300.67	1.61	12.41	41.07	285.00	4.10	29.86	104.81
Ptbacteria	288.33	2.42	17.76	61.94	288.67	1.69	12.40	43.22	205.00	2.91	15.19	74.41
Stfungi	280.50	2.35	16.87	59.99	298.33	1.71	13.14	43.84	240.67	3.68	22.65	94.01
Ptfungi	256.00	2.38	15.80	60.92	327.00	1.62	13.45	41.53	237.33	3.37	20.44	86.27
StRPBact	252.17	1.91	12.22	48.73	314.33	1.44	11.67	36.86	209.33	1.06	5.71	27.13
PtRPBact	215.67	1.92	10.65	49.22	268.33	1.43	9.89	36.69	240.33	1.24	7.62	31.73
STRPBactFung	290.50	1.81	13.12	46.29	314.33	1.43	11.46	36.53	237.67	1.37	8.33	34.96
PTRPBactFung	259.17	1.89	12.58	48.28	262.00	1.39	9.30	35.61	229.00	4.56	26.45	116.67
STRPBFNOHoag	243.33	1.93	11.78	49.24	320.00	1.42	11.58	36.19	253.67	1.20	7.82	30.68
PTRPBFNOHoag	301.83	1.86	14.16	47.49	343.00	1.43	12.65	36.68	299.00	3.26	24.89	83.32
STRPBFNOMin	368.67	0.57	5.22	14.61	386.33	0.50	5.14	12.87	251.00	1.62	10.44	41.51
PTRPBFNOMin	357.67	0.45	4.18	11.46	439.67	0.51	5.96	13.12	276.67	2.25	15.91	57.48
	8/5/04	*8/5/04*	*8/5/04*	*8/5/04*	*8/19/04*	*8/19/04*	*8/19/04*	*8/19/04*	*9/30/04*	*9/30/04*	*9/30/04*	*9/30/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	11.84	0.42	3.45	10.66	57.71	0.13	3.31	3.24	24.55	0.10	0.88	2.50
Stbacteria	35.26	0.12	2.44	3.01	13.91	0.09	1.20	2.22	4.62	0.40	2.88	10.25
Ptbacteria	19.34	0.11	0.45	2.83	12.77	0.15	0.70	3.81	7.23	0.20	0.65	5.04
Stfungi	16.00	0.07	1.40	1.71	13.20	0.10	1.27	2.44	6.89	0.20	1.56	5.00
Ptfungi	28.84	0.14	2.56	3.63	34.65	0.12	1.19	2.99	36.81	0.30	3.72	7.79
StRPBact	49.88	0.06	2.35	1.42	29.81	0.06	1.54	1.44	6.36	0.10	0.73	2.64
PtRPBact	23.60	0.09	1.46	2.20	10.17	0.08	0.97	2.15	15.34	0.08	0.67	2.13
STRPBactFung	42.69	0.15	1.07	3.88	11.46	0.06	0.46	1.51	8.37	0.09	0.74	2.30
PTRPBactFung	28.91	0.09	1.84	2.21	24.19	0.07	0.82	1.71	20.07	0.26	0.72	6.59
STRPBFNOHoag	29.76	0.13	0.65	3.33	38.55	0.11	1.64	2.82	31.17	0.03	1.14	0.88
PTRPBFNOHoag	40.95	0.10	1.48	2.63	10.41	0.14	1.61	3.67	19.52	0.37	3.39	9.59

Table K-3 (cont.): Potassium in drainage water, averages and standard error.

0.04 mg/L	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*
Sample Date	***10/14/04***	***10/14/04***	***10/14/04***	***10/14/04***	***10/28/04***	***10/28/04***	***10/28/04***	***10/28/04***	***11/11/04***	***11/11/04***	***11/11/04***	***11/11/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.00	0.00	0.00	20	0.00	0.00	0.00	20	0.00	0.00	0.00
AbioticSA	361	0.87	8.03	22.25	333	0.57	4.89	14.70	344	0.21	1.82	5.29
AbioticSB	278	0.98	6.99	25.14	310	0.56	4.46	14.39	411	0.71	7.44	18.11
AbioticSC	190	1.09	5.29	27.83	266	0.97	6.57	24.68	374	0.46	4.37	11.70
STBacteriaSA	375	2.56	24.52	65.38	345	1.71	15.05	43.63	427	1.52	16.63	38.94
STBacteriaSB	341	3.58	31.23	91.57	335	2.29	19.65	58.67	428	2.11	23.15	54.08
STBacteriaSC	385	3.64	35.88	93.20	330	2.36	19.96	60.47	423	2.22	23.99	56.72
PTBacteriaSA	418	2.15	23.01	55.06	347	1.74	15.44	44.51	487	1.52	18.97	38.95
PTBacteriaSB	402	2.71	27.88	69.36	365	2.11	19.72	54.04	492	2.21	27.83	56.57
PTBacteriaSC	403	2.32	23.88	59.25	342	1.71	14.92	43.63	464	1.77	20.97	45.19
STFungiSA	382	2.70	26.41	69.14	335	1.85	15.82	47.22	444	1.24	14.09	31.73
STFungiSB	373	2.77	26.43	70.87	353	2.22	20.00	56.65	437	1.69	18.84	43.11
STFungiSC	328	3.86	32.35	98.63	303	2.86	22.17	73.16	426	2.10	22.84	53.61
PTFungiSA	395	2.63	26.54	67.20	340	2.04	17.71	52.08	453	1.73	20.03	44.23
PTFungiSB	390	3.15	31.45	80.63	351	2.47	22.16	63.13	462	2.01	23.76	51.43
PTFungiSC	381	3.38	32.95	86.48	317	2.25	18.25	57.56	449	2.21	25.40	56.57
STRPBactSA	360	0.90	8.27	22.97	314	0.42	3.41	10.84	416	0.43	4.60	11.06
STRPBactSB	331	0.81	6.89	20.81	292	0.40	2.99	10.23	313	0.40	3.20	10.23
STRPBactSC	336	0.60	5.15	15.32	293	0.40	3.00	10.23	385	0.48	4.75	12.34
PTRPBactSA	349	0.90	8.07	23.12	296	0.33	2.48	8.39	389	0.47	4.67	12.01
PTRPBactSB	244	0.60	3.73	15.27	248	0.63	4.00	16.12	335	0.40	3.43	10.23
PTRPBactSC	354	0.73	6.62	18.69	296	0.43	3.25	10.99	414	0.40	4.24	10.23
STRPBactFungSA	336	0.94	8.10	24.11	269	0.78	5.34	19.83	411	0.40	4.20	10.23
STRPBactFungSB	314	0.98	7.84	24.97	259	0.40	2.65	10.23	400	0.40	4.09	10.23
STRPBactFungSC	344	0.87	7.66	22.25	301	0.46	3.51	11.66	408	0.52	5.39	13.22
PTRPBactFungSA	295	1.81	13.64	46.24	247	0.40	2.53	10.23	325	0.70	5.78	17.79
PTRPBactFungSB	334	2.27	19.40	58.09	285	0.58	4.26	14.94	398	0.40	4.07	10.23
PTRPBactFungSC	355	2.01	18.29	51.51	276	0.75	5.32	19.26	279	0.40	2.85	10.23
STRPBFNOHoagSA	348	0.93	8.29	23.83	301	0.78	5.97	19.85	450	0.62	7.14	15.86
STRPBFNOHoagSB	305	0.84	6.57	21.54	262	0.76	5.10	19.48	485	0.40	4.96	10.23
STRPBFNOHoagSC	352	0.78	6.98	19.83	295	0.71	5.37	18.19	505	0.40	5.17	10.23
PTRPBFNOHoagSA	316	1.70	13.70	43.35	293	0.92	6.90	23.54	508	0.40	5.20	10.23
PTRPBFNOHoagSB	308	1.58	12.44	40.38	294	0.77	5.77	19.64	486	0.40	4.97	10.23
PTRPBFNOHoagSC	304	1.71	13.27	43.64	320	0.99	8.08	25.26	456	0.58	6.80	14.90
STRPBFNOMinSA	429	1.10	12.09	28.18	372	0.75	7.17	19.28	390	0.42	4.14	10.62
STRPBFNOMinSB	443	1.04	11.81	26.66	376	0.66	6.39	16.99	391	0.53	5.35	13.68
STRPBFNOMinSC	441	0.94	10.63	24.11	314	0.70	5.65	18.00	400	0.58	5.98	14.95
PTRPBFNOMinSA	451	0.63	7.32	16.22	306	0.57	4.50	14.70	391	0.40	4.00	10.23
PTRPBFNOMinSB	394	0.87	8.80	22.33	373	0.75	7.19	19.28	398	0.48	4.84	12.15
PTRPBFNOMinSC	442	0.65	7.40	16.73	391	0.61	6.12	15.65	420	0.53	5.74	13.68
	10/14/04	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	276.33	0.98	6.77	25.07	303.00	0.70	5.31	17.92	376.33	0.46	4.55	11.70
Stbacteria	367.00	3.26	30.54	83.38	336.67	2.12	18.22	54.26	426.00	1.95	21.26	49.91
Ptbacteria	407.67	2.39	24.92	61.22	351.33	1.85	16.70	47.39	481.00	1.83	22.59	46.90
Stfungi	361.00	3.11	28.40	79.54	330.33	2.31	19.33	59.01	435.67	1.67	18.59	42.81
Ptfungi	388.67	3.05	30.31	78.10	336.00	2.25	19.37	57.59	454.67	1.98	23.07	50.74
StRPBact	342.33	0.77	6.77	19.70	299.67	0.41	3.13	10.43	371.33	0.44	4.18	11.21
PtRPBact	315.67	0.74	6.14	19.03	280.00	0.46	3.24	11.83	379.33	0.42	4.11	10.82
STRPBactFung	331.33	0.93	7.87	23.78	276.33	0.54	3.83	13.91	406.33	0.44	4.56	11.23
PTRPBactFung	328.00	2.03	17.11	51.95	269.33	0.58	4.03	14.81	334.00	0.50	4.24	12.75
STRPBFNOHoag	335.00	0.85	7.28	21.74	286.00	0.75	5.48	19.17	480.00	0.47	5.76	12.11
PTRPBFNOHoag	309.33	1.66	13.13	42.46	302.33	0.89	6.92	22.81	483.33	0.46	5.65	11.79
STRPBFNOMin	437.67	1.03	11.51	26.32	354.00	0.71	6.40	18.09	393.67	0.51	5.16	13.08
PTRPBFNOMin	429.00	0.72	7.84	18.43	356.67	0.65	5.94	16.54	403.00	0.47	4.86	12.02
	10/14/04	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	49.37	0.06	0.80	1.61	19.66	0.13	0.64	3.38	19.38	0.14	1.63	3.70
Stbacteria	13.32	0.35	3.30	9.01	4.41	0.21	1.59	5.34	1.53	0.22	2.33	5.54
Ptbacteria	5.17	0.17	1.50	4.25	6.98	0.13	1.52	3.33	8.62	0.20	2.69	5.16
Stfungi	16.70	0.37	1.98	9.55	14.62	0.30	1.86	7.58	5.24	0.25	2.53	6.32
Ptfungi	4.10	0.22	1.93	5.71	10.02	0.12	1.40	3.19	3.84	0.14	1.59	3.58
StRPBact	8.95	0.09	0.90	2.28	7.17	0.01	0.14	0.20	30.51	0.02	0.49	0.61
PtRPBact	35.86	0.09	1.28	2.27	16.00	0.09	0.44	2.27	23.31	0.02	0.36	0.59
STRPBactFung	8.97	0.03	0.13	0.80	12.67	0.12	0.79	2.99	3.28	0.04	0.42	1.00
PTRPBactFung	17.58	0.13	1.76	3.43	11.46	0.10	0.81	2.61	34.65	0.10	0.85	2.52
STRPBFNOHoag	15.04	0.05	0.52	1.16	12.12	0.02	0.26	0.50	16.07	0.07	0.69	1.88
PTRPBFNOHoag	3.53	0.04	0.37	1.04	8.84	0.06	0.67	1.66	15.07	0.06	0.57	1.56

Table K-3 (cont.): Potassium in drainage water, averages and standard error.

0.04 mg/L	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*
Sample Date	***11/29/04***	***11/29/04***	***11/29/04***	***11/29/04***	***12/9/04***	***12/9/04***	***12/9/04***	***12/9/04***	***12/21/04***	***12/21/04***	***12/21/04***	***12/21/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank			0.00	0.00	20	0.27	0.14	6.88	20	0.21	0.11	5.33
AbioticSA	489	0.44	5.50	11.24	265	0.53	3.59	13.55	289	0.55	4.05	14.02
AbioticSB	456	0.58	6.81	14.94	230	0.58	3.43	14.92	288	0.40	2.95	10.23
AbioticSC	450	0.40	4.60	10.23	208	0.65	3.44	16.56	273	0.40	2.79	10.23
STBacteriaSA	519	1.19	15.75	30.34	306	1.19	9.34	30.51	333	0.99	8.46	25.39
STBacteriaSB	500	1.51	19.34	38.68	288	1.07	7.86	27.30	329	1.21	10.20	30.99
STBacteriaSC	522	1.36	18.22	34.90	320	1.20	9.85	30.79	328	1.21	10.16	30.99
PTBacteriaSA	489	1.00	12.47	25.50	338	1.44	12.44	36.80	372	1.11	10.51	28.26
PTBacteriaSB	511	1.40	18.27	35.75	323	1.61	13.26	41.05	372	1.38	13.10	35.22
PTBacteriaSC	521	1.23	16.44	31.55	310	1.34	10.63	34.28	343	0.79	6.89	20.09
STFungiSA	450	1.14	13.06	29.03	315	1.20	9.70	30.79	354	0.85	7.71	21.77
STFungiSB	534	1.09	14.83	27.77	295	0.93	6.98	23.67	270	0.86	5.93	21.98
STFungiSC	532	1.71	23.24	43.69	314	1.40	11.22	35.72	335	1.22	10.49	31.32
PTFungiSA	509	1.24	16.19	31.81	298	1.03	7.87	26.41	329	0.97	8.19	24.90
PTFungiSB	507	1.92	24.90	49.10	325	1.43	11.87	36.53	351	1.50	13.44	38.30
PTFungiSC	537	1.72	23.62	43.98	319	1.59	12.96	40.64	339	1.24	10.71	31.59
STRPBactSA	468	0.55	6.59	14.09	270	0.40	2.76	10.23	302	0.40	3.09	10.23
STRPBactSB	423	0.47	5.06	11.96	244	0.53	3.31	13.55	283	0.40	2.90	10.23
STRPBactSC	424	0.40	4.34	10.23	256	0.40	2.62	10.23	285	0.40	2.92	10.23
PTRPBactSA	458	0.40	4.69	10.23	253	0.40	2.59	10.23	291	0.54	4.00	13.74
PTRPBactSB	390	0.40	3.99	10.23	266	0.40	2.72	10.23	222	0.43	2.43	10.95
PTRPBactSC	435	0.40	4.45	10.23	261	0.45	3.00	11.49	276	0.40	2.82	10.23
STRPBactFungSA	468	0.42	5.00	10.67	249	0.40	2.55	10.23	285	0.40	2.92	10.23
STRPBactFungSB	465	0.40	4.76	10.23	256	0.48	3.12	12.18	267	0.40	2.73	10.23
STRPBactFungSC	459	0.40	4.70	10.23	273	0.43	3.03	11.08	291	0.40	2.98	10.23
PTRPBactFungSA	334	0.62	5.28	15.80	204	0.53	2.76	13.55	253	0.40	2.59	10.23
PTRPBactFungSB	417	0.41	4.33	10.39	256	0.68	4.45	17.38	287	0.40	2.94	10.23
PTRPBactFungSC	433	0.40	4.43	10.23	260	0.40	2.66	10.23	230	0.40	2.35	10.23
STRPBFNOHoagSA	555	0.78	11.14	20.07	274	0.51	3.60	13.14	315	0.52	4.15	13.18
STRPBFNOHoagSB	563	0.47	6.73	11.96	297	0.50	3.78	12.73	339	0.40	3.47	10.23
STRPBFNOHoagSC	595	0.63	9.65	16.23	316	0.40	3.23	10.23	395	0.50	5.04	12.77
PTRPBFNOHoagSA	589	0.50	7.46	12.67	332	0.80	6.81	20.53	396	0.46	4.67	11.79
PTRPBFNOHoagSB	555	0.66	9.35	16.85	321	0.50	4.09	12.73	307	0.54	4.22	13.74
PTRPBFNOHoagSC	527	0.88	11.93	22.63	335	0.60	5.18	15.46	312	0.48	3.85	12.35
STRPBFNOMinSA	452	0.40	4.62	10.23	246	0.40	2.52	10.23	286	0.40	2.93	10.23
STRPBFNOMinSB	440	0.40	4.50	10.23	243	0.40	2.49	10.23	278	0.40	2.84	10.23
STRPBFNOMinSC	428	0.40	4.38	10.23	195	0.40	1.99	10.23	302	0.40	3.09	10.23
PTRPBFNOMinSA	433	0.56	6.22	14.37	259	0.40	2.65	10.23	310	0.40	3.17	10.23
PTRPBFNOMinSB	443	0.40	4.53	10.23	211	0.40	2.16	10.23	297	0.55	4.16	14.02
PTRPBFNOMinSC	493	0.43	5.46	11.08	271	0.40	2.77	10.23	311	0.40	3.18	10.23
	11/29/04	*11/29/04*	*11/29/04*	*11/29/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	465.00	0.47	5.64	12.14	234.33	0.59	3.49	15.01	283.33	0.45	3.26	11.49
Stbacteria	513.67	1.35	17.77	34.64	304.67	1.15	9.02	29.53	330.00	1.14	9.61	29.12
Ptbacteria	507.00	1.21	15.72	30.93	323.67	1.46	12.11	37.38	362.33	1.09	10.17	27.86
Stfungi	505.33	1.31	17.04	33.50	308.00	1.18	9.30	30.06	319.67	0.98	8.04	25.02
Ptfungi	517.67	1.63	21.57	41.63	314.00	1.35	10.90	34.53	339.67	1.24	10.78	31.60
StRPBact	438.33	0.47	5.33	12.09	256.67	0.44	2.90	11.34	290.00	0.40	2.97	10.23
PtRPBact	427.67	0.40	4.38	10.23	260.00	0.42	2.77	10.65	263.00	0.46	3.08	11.64
STRPBactFung	464.00	0.41	4.82	10.38	259.33	0.44	2.90	11.16	281.00	0.40	2.87	10.23
PTRPBactFung	394.67	0.47	4.68	12.14	240.00	0.54	3.29	13.72	256.67	0.40	2.63	10.23
STRPBFNOHoag	571.00	0.63	9.17	16.08	295.67	0.47	3.54	12.03	349.67	0.47	4.22	12.06
PTRPBFNOHoag	557.00	0.68	9.58	17.38	329.33	0.63	5.36	16.24	338.33	0.49	4.25	12.63
STRPBFNOMin	440.00	0.40	4.50	10.23	228.00	0.40	2.33	10.23	288.67	0.40	2.95	10.23
PTRPBFNOMin	456.33	0.47	5.41	11.89	247.00	0.40	2.53	10.23	306.00	0.45	3.51	11.49
	11/29/04	*11/29/04*	*11/29/04*	*11/29/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	12.12	0.06	0.64	1.43	16.60	0.03	0.05	0.87	5.17	0.05	0.40	1.26
Stbacteria	6.89	0.09	1.06	2.41	9.26	0.04	0.60	1.12	1.53	0.07	0.57	1.87
Ptbacteria	9.45	0.12	1.71	2.97	8.09	0.08	0.78	1.97	9.67	0.17	1.80	4.37
Stfungi	27.67	0.20	3.14	5.11	6.51	0.14	1.24	3.50	25.43	0.12	1.33	3.15
Ptfungi	9.68	0.20	2.71	5.13	8.19	0.17	1.55	4.23	6.36	0.15	1.52	3.87
StRPBact	14.84	0.04	0.67	1.12	7.51	0.04	0.21	1.11	6.03	0.00	0.06	0.00
PtRPBact	19.97	0.00	0.20	0.00	3.79	0.02	0.12	0.42	20.95	0.04	0.47	1.07
STRPBactFung	2.65	0.01	0.09	0.15	7.13	0.02	0.18	0.56	7.21	0.00	0.07	0.00
PTRPBactFung	30.68	0.07	0.30	1.83	18.04	0.08	0.58	2.07	16.56	0.00	0.17	0.00
STRPBFNOHoag	12.22	0.09	1.29	2.34	12.14	0.04	0.16	0.91	23.70	0.04	0.46	0.92
PTRPBFNOHoag	17.93	0.11	1.29	2.89	4.26	0.09	0.79	2.28	28.87	0.02	0.24	0.58

Table K-3 (cont.): Potassium in drainage water, averages and standard error.

0.04 mg/L	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*
Sample Date	*1/4/05*	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
Sample ID	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Troy Method Blank	20	0.22	0.11	5.59	20	0.00	0.00	0.00	20	0.14	0.07	3.69
AbioticSA	227	0.40	2.32	10.23	396	0.68	6.86	17.32	480	0.40	4.91	10.23
AbioticSB	228	0.40	2.33	10.23	360	0.46	4.20	11.68	457	0.62	7.27	15.90
AbioticSC	214	0.70	3.84	17.94	325	0.73	6.04	18.57	412	0.40	4.21	10.23
STBacteriaSA	242	0.40	2.48	10.23	404	0.47	4.84	11.99	490	0.40	5.01	10.23
STBacteriaSB	237	0.60	3.64	15.37	390	0.47	4.68	11.99	457	0.40	4.68	10.23
STBacteriaSC	204	0.55	2.85	13.98	393	0.59	5.94	15.12	462	0.40	4.73	10.23
PTBacteriaSA	292	0.40	2.99	10.23	444	0.73	8.25	18.57	505	0.40	5.17	10.23
PTBacteriaSB	295	0.58	4.40	14.91	414	0.78	8.21	19.82	498	0.40	5.09	10.23
PTBacteriaSC	273	0.93	6.53	23.91	421	0.47	5.05	11.99	492	0.40	5.03	10.23
STFungiSA	299	0.46	3.53	11.80	365	0.75	7.01	19.20	382	0.40	3.91	10.23
STFungiSB	276	0.75	5.27	19.10	398	0.51	5.15	12.93	484	0.52	6.43	13.28
STFungiSC	269	0.40	2.75	10.23	416	0.75	7.99	19.20	501	0.40	5.13	10.23
PTFungiSA	255	0.53	3.45	13.51	399	0.64	6.53	16.38	479	0.67	8.25	17.21
PTFungiSB	227	0.48	2.80	12.35	409	0.75	7.85	19.20	492	0.40	5.03	10.23
PTFungiSC	282	0.40	2.88	10.23	407	0.68	7.05	17.32	516	0.48	6.34	12.30
STRPBactSA	245	0.43	2.66	10.87	325	0.40	3.32	10.23	492	0.40	5.03	10.23
STRPBactSB	220	0.40	2.25	10.23	364	0.40	3.72	10.23	455	0.40	4.65	10.23
STRPBactSC	227	0.40	2.32	10.23	369	0.64	6.04	16.38	434	0.40	4.44	10.23
PTRPBactSA	219	0.40	2.24	10.23	392	0.40	4.01	10.23	461	0.40	4.72	10.23
PTRPBactSB	241	0.58	3.59	14.91	288	0.66	4.90	17.00	454	0.40	4.64	10.23
PTRPBactSC	227	0.40	2.32	10.23	380	0.46	4.44	11.68	461	0.40	4.72	10.23
STRPBactFungSA	211	0.40	2.16	10.23	381	0.40	3.90	10.23	454	0.40	4.64	10.23
STRPBactFungSB	219	0.40	2.24	10.23	340	0.40	3.48	10.23	452	0.40	4.62	10.23
STRPBactFungSC	223	0.40	2.28	10.23	376	0.40	3.85	10.23	461	0.53	6.22	13.49
PTRPBactFungSA	128	0.57	1.87	14.60	311	0.40	3.18	10.23	330	0.43	3.64	11.04
PTRPBactFungSB	203	0.40	2.08	10.23	367	0.40	3.75	10.23	427	0.40	4.37	10.23
PTRPBactFungSC	212	0.40	2.17	10.23	368	0.40	3.76	10.23	438	0.40	4.48	10.23
STRPBFNOHoagSA	307	0.40	3.14	10.23	434	0.54	6.02	13.87	483	0.58	7.19	14.90
STRPBFNOHoagSB	327	0.55	4.57	13.98	442	0.47	5.30	11.99	512	0.64	8.34	16.30
STRPBFNOHoagSC	322	0.40	3.29	10.23	463	0.44	5.26	11.36	533	0.40	5.45	10.23
PTRPBFNOHoagSA	318	0.52	4.25	13.35	448	0.51	5.79	12.93	543	0.64	8.85	16.30
PTRPBFNOHoagSB	308	0.76	6.03	19.56	446	0.74	8.42	18.88	530	0.72	9.75	18.40
PTRPBFNOHoagSC	313	0.66	5.25	16.77	464	0.53	6.29	13.55	561	0.43	6.19	11.04
STRPBFNOMinSA	177	0.40	1.81	10.23	356	0.40	3.64	10.23	442	0.40	4.52	10.23
STRPBFNOMinSB	201	0.40	2.06	10.23	351	0.40	3.59	10.23	417	0.40	4.27	10.23
STRPBFNOMinSC	153	0.58	2.28	14.91	342	0.40	3.50	10.23	425	0.40	4.35	10.23
PTRPBFNOMinSA	193	0.40	1.97	10.23	353	0.40	3.61	10.23	410	0.40	4.19	10.23
PTRPBFNOMinSB	201	0.40	2.06	10.23	351	0.40	3.59	10.23	431	0.40	4.41	10.23
PTRPBFNOMinSC	190	0.40	1.94	10.23	293	0.40	3.00	10.23	367	0.40	3.75	10.23
	1/4/05	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	223.00	0.50	2.83	12.80	360.33	0.62	5.70	15.85	449.67	0.47	5.46	12.12
Stbacteria	227.67	0.52	2.99	13.19	395.67	0.51	5.15	13.03	469.67	0.40	4.80	10.23
Ptbacteria	286.67	0.64	4.64	16.35	426.33	0.66	7.17	16.79	498.33	0.40	5.10	10.23
Stfungi	281.33	0.54	3.85	13.71	393.00	0.67	6.71	17.11	455.67	0.44	5.15	11.25
Ptfungi	254.67	0.47	3.04	12.03	405.00	0.69	7.14	17.63	495.67	0.52	6.54	13.25
StRPBact	230.67	0.41	2.41	10.44	352.67	0.48	4.36	12.28	460.33	0.40	4.71	10.23
PtRPBact	229.00	0.46	2.72	11.79	353.33	0.51	4.45	12.97	458.67	0.40	4.69	10.23
STRPBactFung	217.67	0.40	2.23	10.23	365.67	0.40	3.74	10.23	455.67	0.44	5.16	11.32
PTRPBactFung	181.00	0.46	2.04	11.69	348.67	0.40	3.57	10.23	398.33	0.41	4.16	10.50
STRPBFNOHoag	318.67	0.45	3.67	11.48	446.33	0.49	5.53	12.41	509.33	0.54	7.00	13.81
PTRPBFNOHoag	313.00	0.65	5.17	16.56	452.67	0.59	6.83	15.12	544.67	0.60	8.26	15.25
STRPBFNOMin	177.00	0.46	2.05	11.79	349.67	0.40	3.58	10.23	428.00	0.40	4.38	10.23
PTRPBFNOMin	194.67	0.40	1.99	10.23	332.33	0.40	3.40	10.23	402.67	0.40	4.12	10.23
	1/4/05	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	4.51	0.10	0.50	2.57	20.50	0.08	0.78	2.12	19.97	0.07	0.92	1.89
Stbacteria	11.92	0.06	0.34	1.54	4.26	0.04	0.40	1.04	10.27	0.00	0.11	0.00
Ptbacteria	6.89	0.16	1.03	4.01	9.06	0.10	1.06	2.43	3.76	0.00	0.04	0.00
Stfungi	9.06	0.11	0.74	2.73	14.93	0.08	0.83	2.09	37.16	0.04	0.73	1.02
Ptfungi	15.88	0.04	0.20	0.96	3.06	0.03	0.38	0.83	10.84	0.08	0.93	2.07
StRPBact	7.45	0.01	0.13	0.21	13.91	0.08	0.85	2.05	16.95	0.00	0.17	0.00
PtRPBact	6.43	0.06	0.44	1.56	32.85	0.08	0.26	2.06	2.33	0.00	0.02	0.00
STRPBactFung	3.53	0.00	0.04	0.00	12.91	0.00	0.13	0.00	2.73	0.04	0.53	1.09
PTRPBactFung	26.63	0.06	0.09	1.46	18.84	0.00	0.19	0.00	34.31	0.01	0.26	0.27
STRPBFNOHoag	6.01	0.05	0.45	1.25	8.65	0.03	0.25	0.75	14.50	0.07	0.84	1.83
PTRPBFNOHoag	2.89	0.07	0.51	1.79	5.70	0.07	0.81	1.89	8.99	0.09	1.07	2.19

Table K-3 (cont.): Potassium in drainage water, averages and standard error.

0.04 mg/L	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*
Sample Date	***2/15/05***	***2/15/05***	***2/15/05***	***2/15/05***	***3/1/05***	***3/1/05***	***3/1/05***	***3/1/05***	***3/16/05***	***3/16/05***	***3/16/05***	***3/16/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.01	0.00	0.22	20	0.17	0.09	4.37	20	0.29	0.15	7.35
AbioticSA	395	0.44	4.40	11.13	247	0.40	2.52	10.23	169	0.60	2.62	15.47
AbioticSB	361	0.40	3.69	10.23	224	0.40	2.29	10.23	152	0.40	1.56	10.23
AbioticSC	349	0.40	3.57	10.23	239	0.50	3.06	12.80	178	0.53	2.41	13.50
STBacteriaSA	397	0.40	4.06	10.23	255	0.40	2.61	10.23	197	0.40	2.02	10.23
STBacteriaSB	457	0.40	4.68	10.23	255	0.40	2.61	10.23	195	0.40	1.99	10.23
STBacteriaSC	365	0.40	3.73	10.23	286	0.40	2.93	10.23	202	0.40	2.07	10.23
PTBacteriaSA	489	0.40	5.00	10.23	301	0.40	3.08	10.23	213	0.40	2.18	10.23
PTBacteriaSB	389	0.40	3.98	10.23	275	0.40	2.81	10.23	180	0.40	1.84	10.23
PTBacteriaSC	412	0.40	4.21	10.23	261	0.40	2.67	10.23	178	0.40	1.82	10.23
STFungiSA	400	0.40	4.09	10.23	302	0.40	3.09	10.23	247	0.40	2.53	10.23
STFungiSB	358	0.40	3.66	10.23	281	0.40	2.88	10.23	209	0.40	2.14	10.23
STFungiSC	407	0.40	4.16	10.23	286	0.40	2.93	10.23	221	0.40	2.26	10.23
PTFungiSA	421	0.40	4.31	10.23	249	0.40	2.54	10.23	141	0.40	1.44	10.23
PTFungiSB	382	0.40	3.91	10.23	287	0.40	2.93	10.23	212	0.40	2.17	10.23
PTFungiSC	448	0.40	4.58	10.23	289	0.40	2.95	10.23	247	0.40	2.53	10.23
STRPBactSA	407	0.40	4.16	10.23	273	0.40	2.80	10.23	153	0.40	1.56	10.23
STRPBactSB	380	0.40	3.89	10.23	264	0.40	2.70	10.23	185	0.40	1.89	10.23
STRPBactSC	409	0.40	4.18	10.23	258	0.40	2.64	10.23	192	0.40	1.96	10.23
PTRPBactSA	407	0.40	4.16	10.23	271	0.50	3.47	12.80	177	0.55	2.51	14.15
PTRPBactSB	371	0.40	3.80	10.23	260	0.40	2.66	10.23	172	0.49	2.15	12.51
PTRPBactSC	387	0.40	3.96	10.23	270	0.40	2.77	10.23	185	0.48	2.25	12.18
STRPBactFungSA	375	0.40	3.84	10.23	235	0.40	2.40	10.23	167	0.40	1.71	10.23
STRPBactFungSB	404	0.40	4.13	10.23	255	0.40	2.61	10.23	205	0.58	3.04	14.81
STRPBactFungSC	372	0.40	3.81	10.23	232	0.44	2.60	11.24	169	0.40	1.73	10.23
PTRPBactFungSA	210	0.40	2.15	10.23	162	0.40	1.66	10.23	114	0.40	1.17	10.23
PTRPBactFungSB	377	0.40	3.86	10.23	249	0.40	2.55	10.23	185	0.40	1.89	10.23
PTRPBactFungSC	310	0.40	3.17	10.23	244	0.50	3.13	12.80	173	0.40	1.77	10.23
STRPBFNOHoagSA	434	0.40	4.44	10.23	231	0.40	2.36	10.23	161	0.43	1.77	11.03
STRPBFNOHoagSB	436	0.48	5.39	12.37	209	0.53	2.80	13.43	155	0.62	2.47	15.96
STRPBFNOHoagSC	486	0.40	4.97	10.23	227	0.40	2.32	10.23	166	0.64	2.73	16.46
PTRPBFNOHoagSA	523	0.40	5.35	10.23	215	0.53	2.89	13.43	164	0.40	1.67	10.23
PTRPBFNOHoagSB	469	0.40	4.80	10.23	209	0.41	2.19	10.46	151	0.72	2.78	18.43
PTRPBFNOHoagSC	389	0.40	3.98	10.23	242	0.52	3.22	13.27	183	0.40	1.87	10.23
STRPBFNOMinSA	380	0.40	3.89	10.23	288	0.40	2.95	10.23	213	0.40	2.18	10.23
STRPBFNOMinSB	360	0.40	3.68	10.23	321	0.40	3.29	10.23	229	0.40	2.34	10.23
STRPBFNOMinSC	327	0.40	3.35	10.23	329	0.40	3.37	10.23	248	0.40	2.53	10.23
PTRPBFNOMinSA	325	0.40	3.32	10.23	355	0.40	3.63	10.23	243	0.49	3.05	12.52
PTRPBFNOMinSB	348	0.40	3.56	10.23	302	0.40	3.09	10.23	232	0.40	2.38	10.23
PTRPBFNOMinSC	388	0.40	3.97	10.23	364	0.40	3.72	10.23	258	0.62	4.11	15.90
	2/15/05	*2/15/05*	*2/15/05*	*2/15/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/16/05*	*3/16/05*	*3/16/05*	*3/16/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	368.33	0.41	3.89	10.53	236.33	0.43	2.62	11.09	166.67	0.51	2.19	13.07
Stbacteria	406.33	0.40	4.16	10.23	265.33	0.40	2.71	10.23	198.00	0.40	2.03	10.23
Ptbacteria	430.00	0.40	4.40	10.23	279.00	0.40	2.85	10.23	190.67	0.40	1.95	10.23
Stfungi	388.33	0.40	3.97	10.23	290.00	0.40	2.97	10.23	225.67	0.40	2.31	10.23
Ptfungi	417.00	0.40	4.27	10.23	274.67	0.40	2.81	10.23	200.00	0.40	2.05	10.23
StRPBact	398.67	0.40	4.08	10.23	265.33	0.40	2.71	10.23	176.33	0.40	1.80	10.23
PtRPBact	388.33	0.40	3.97	10.23	267.33	0.43	2.97	11.09	178.00	0.51	2.30	12.95
STRPBactFung	383.67	0.40	3.92	10.23	240.33	0.41	2.54	10.57	180.33	0.46	2.16	11.76
PTRPBactFung	299.00	0.40	3.06	10.23	218.67	0.43	2.45	11.09	157.33	0.40	1.61	10.23
STRPBFNOHoag	452.00	0.43	4.94	10.94	222.00	0.44	2.49	11.30	160.33	0.57	2.32	14.48
PTRPBFNOHoag	460.33	0.40	4.71	10.23	222.33	0.48	2.77	12.39	165.67	0.51	2.11	12.96
STRPBFNOMin	355.67	0.40	3.64	10.23	313.00	0.40	3.20	10.23	229.67	0.40	2.35	10.23
PTRPBFNOMin	353.67	0.40	3.62	10.23	340.00	0.40	3.48	10.23	244.67	0.50	3.18	12.88
	2/15/05	*2/15/05*	*2/15/05*	*2/15/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/16/05*	*3/16/05*	*3/16/05*	*3/16/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	13.78	0.01	0.26	0.30	6.74	0.03	0.23	0.86	7.62	0.06	0.32	1.53
Stbacteria	26.96	0.00	0.28	0.00	10.33	0.00	0.11	0.00	2.08	0.00	0.02	0.00
Ptbacteria	30.24	0.00	0.31	0.00	11.72	0.00	0.12	0.00	11.35	0.00	0.12	0.00
Stfungi	15.30	0.00	0.16	0.00	6.33	0.00	0.06	0.00	11.22	0.00	0.11	0.00
Ptfungi	19.16	0.00	0.20	0.00	13.01	0.00	0.13	0.00	31.18	0.00	0.32	0.00
StRPBact	9.35	0.00	0.10	0.00	4.36	0.00	0.04	0.00	12.00	0.00	0.12	0.00
PtRPBact	10.41	0.00	0.11	0.00	3.51	0.03	0.25	0.86	3.79	0.02	0.11	0.61
STRPBactFung	10.20	0.00	0.10	0.00	7.22	0.01	0.07	0.34	12.35	0.06	0.44	1.53
PTRPBactFung	48.52	0.00	0.50	0.00	28.20	0.03	0.43	0.86	21.94	0.00	0.22	0.00
STRPBFNOHoag	17.01	0.03	0.28	0.71	6.77	0.04	0.15	1.07	3.18	0.07	0.29	1.73
PTRPBFNOHoag	38.92	0.00	0.40	0.00	10.15	0.04	0.30	0.96	9.29	0.11	0.34	2.73

Table K-3 (cont.): Potassium in drainage water, averages and standard error.

0.04 mg/L	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*
Sample Date	*3/29/05*	*3/29/05*	*3/29/05*	*3/29/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/26/05*	*4/26/05*	*4/26/05*	*4/26/05*
Sample ID	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Troy Method Blank	20	0.70	0.36	17.93	20	1.81	0.92	46.24	20	0.07	0.03	1.68
AbioticSA	175	0.40	1.79	10.23	116	0.40	1.19	10.23	253	0.40	2.59	10.23
AbioticSB	158	0.58	2.35	14.89	94	0.40	0.97	10.23	181	0.40	1.85	10.23
AbioticSC	170	0.47	2.03	11.96	106	0.40	1.09	10.23	271	0.40	2.77	10.23
STBacteriaSA	208	0.44	2.32	11.16	139	0.40	1.42	10.23	297	0.40	3.04	10.23
STBacteriaSB	200	0.40	2.05	10.23	135	0.40	1.38	10.23	263	0.40	2.69	10.23
STBacteriaSC	202	0.40	2.07	10.23	148	0.40	1.51	10.23	291	0.40	2.98	10.23
PTBacteriaSA	196	0.49	2.46	12.52	146	0.40	1.50	10.23	232	0.40	2.37	10.23
PTBacteriaSB	197	0.40	2.02	10.23	146	0.40	1.50	10.23	302	0.40	3.09	10.23
PTBacteriaSC	169	0.61	2.64	15.56	132	0.40	1.35	10.23	272	0.40	2.78	10.23
STFungiSA	237	0.57	3.44	14.55	169	0.40	1.73	10.23	331	0.40	3.39	10.23
STFungiSB	195	0.40	1.99	10.23	152	0.40	1.55	10.23			0.00	0.00
STFungiSC	207	0.40	2.11	10.23	170	0.40	1.74	10.23	326	0.40	3.34	10.23
PTFungiSA	187	0.40	1.92	10.23	136	0.40	1.39	10.23	290	0.40	2.97	10.23
PTFungiSB	215	0.40	2.20	10.23	142	0.40	1.45	10.23			0.00	0.00
PTFungiSC	246	0.40	2.52	10.23	181	0.40	1.85	10.23	330	0.40	3.38	10.23
STRPBactSA	186	0.40	1.90	10.23	121	0.40	1.24	10.23	291	0.40	2.98	10.23
STRPBactSB	186	0.44	2.07	11.16	125	0.40	1.28	10.23	271	0.40	2.78	10.23
STRPBactSC	184	0.40	1.88	10.23	131	0.40	1.34	10.23	273	0.40	2.80	10.23
PTRPBactSA	178	0.40	1.82	10.23	128	0.40	1.31	10.23	276	0.40	2.82	10.23
PTRPBactSB	187	0.40	1.92	10.23	114	0.40	1.16	10.23	257	0.40	2.63	10.23
PTRPBactSC	197	0.40	2.02	10.23	118	0.40	1.20	10.23	285	0.40	2.92	10.23
STRPBactFungSA	161	0.53	2.18	13.53	103	0.40	1.06	10.23	260	0.40	2.66	10.23
STRPBactFungSB	216	0.41	2.27	10.49	144	0.40	1.48	10.23	297	0.40	3.04	10.23
STRPBactFungSC	173	0.40	1.77	10.23	119	0.40	1.22	10.23	262	0.40	2.68	10.23
PTRPBactFungSA	117	0.40	1.20	10.23	75	0.40	0.76	10.23	185	0.40	1.89	10.23
PTRPBactFungSB	181	0.40	1.86	10.23	129	0.40	1.32	10.23	272	0.40	2.78	10.23
PTRPBactFungSC	171	0.40	1.75	10.23	123	0.40	1.25	10.23	275	0.40	2.81	10.23
STRPBFNOHoagSA	153	0.56	2.18	14.21	82	0.40	0.84	10.23	238	0.40	2.43	10.23
STRPBFNOHoagSB	157	0.45	1.81	11.50	95	0.40	0.97	10.23	242	0.40	2.47	10.23
STRPBFNOHoagSC	194	0.57	2.83	14.55	107	0.40	1.09	10.23	256	0.40	2.62	10.23
PTRPBFNOHoagSA	147	0.63	2.39	16.24	96	0.40	0.98	10.23	184	0.40	1.88	10.23
PTRPBFNOHoagSB	159	0.69	2.80	17.59	107	0.45	1.22	11.43	253	0.40	2.59	10.23
PTRPBFNOHoagSC	200	0.44	2.23	11.16	120	0.40	1.23	10.23	287	0.40	2.94	10.23
STRPBFNOMinSA	233	0.44	2.60	11.16	173	0.40	1.77	10.23	320	0.40	3.28	10.23
STRPBFNOMinSB	259	0.40	2.65	10.23	191	0.40	1.96	10.23	333	0.40	3.41	10.23
STRPBFNOMinSC	266	0.44	2.97	11.16	186	0.40	1.91	10.23	334	0.40	3.42	10.23
PTRPBFNOMinSA	256	0.40	2.62	10.23	177	0.40	1.81	10.23	356	0.40	3.64	10.23
PTRPBFNOMinSB	208	0.40	2.13	10.23	164	0.40	1.68	10.23	318	0.40	3.25	10.23
PTRPBFNOMinSC	255	0.40	2.61	10.23	187	0.40	1.91	10.23	358	0.40	3.66	10.23
	3/29/05	*3/29/05*	*3/29/05*	*3/29/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/26/05*	*4/26/05*	*4/26/05*	*4/26/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	167.33	0.48	2.05	12.36	105.67	0.40	1.08	10.23	235.00	0.40	2.40	10.23
Stbacteria	203.33	0.41	2.14	10.54	140.67	0.40	1.44	10.23	283.67	0.40	2.90	10.23
Ptbacteria	187.67	0.50	2.37	12.77	141.67	0.40	1.45	10.23	268.33	0.40	2.75	10.23
Stfungi	212.67	0.46	2.52	11.67	163.67	0.40	1.67	10.23	328.83	0.40	2.24	6.82
Ptfungi	216.33	0.40	2.21	10.23	153.00	0.40	1.57	10.23	310.00	0.40	2.11	6.82
StRPBact	185.00	0.41	1.95	10.54	126.00	0.40	1.29	10.23	278.67	0.40	2.85	10.23
PtRPBact	187.67	0.40	1.92	10.23	119.67	0.40	1.22	10.23	272.67	0.40	2.79	10.23
STRPBactFung	183.33	0.45	2.07	11.42	122.33	0.40	1.25	10.23	273.00	0.40	2.79	10.23
PTRPBactFung	156.67	0.40	1.60	10.23	108.67	0.40	1.11	10.23	243.67	0.40	2.49	10.23
STRPBFNOHoag	168.33	0.52	2.27	13.42	94.33	0.40	0.97	10.23	245.00	0.40	2.51	10.23
PTRPBFNOHoag	168.67	0.59	2.47	15.00	107.67	0.42	1.14	10.63	241.33	0.40	2.47	10.23
STRPBFNOMin	252.33	0.42	2.74	10.85	183.67	0.40	1.88	10.23	329.33	0.40	3.37	10.23
PTRPBFNOMin	240.00	0.40	2.46	10.23	176.00	0.40	1.80	10.23	343.67	0.40	3.52	10.23
	3/29/05	*3/29/05*	*3/29/05*	*3/29/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/26/05*	*4/26/05*	*4/26/05*	*4/26/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	5.04	0.05	0.16	1.36	6.36	0.00	0.07	0.00	27.50	0.00	0.28	0.00
Stbacteria	2.40	0.01	0.09	0.31	3.84	0.00	0.04	0.00	10.48	0.00	0.11	0.00
Ptbacteria	9.17	0.06	0.18	1.54	4.67	0.00	0.05	0.00	20.28	0.00	0.21	0.00
Stfungi	12.49	0.06	0.46	1.44	5.84	0.00	0.06	0.00	2.04	0.00	1.12	3.41
Ptfungi	17.04	0.00	0.17	0.00	14.11	0.00	0.14	0.00	16.33	0.00	1.06	3.41
StRPBact	0.67	0.01	0.06	0.31	2.91	0.00	0.03	0.00	6.36	0.00	0.07	0.00
PtRPBact	5.49	0.00	0.06	0.00	4.16	0.00	0.04	0.00	8.25	0.00	0.08	0.00
STRPBactFung	16.70	0.04	0.15	1.06	11.93	0.00	0.12	0.00	12.01	0.00	0.12	0.00
PTRPBactFung	19.88	0.00	0.20	0.00	17.09	0.00	0.17	0.00	29.51	0.00	0.30	0.00
STRPBFNOHoag	13.05	0.04	0.30	0.96	7.22	0.00	0.07	0.00	5.46	0.00	0.06	0.00
PTRPBFNOHoag	16.05	0.08	0.17	1.96	6.94	0.02	0.08	0.40	30.30	0.00	0.31	0.00

Table K-3 (cont.): Potassium in drainage water, averages and standard error.

0.04 mg/L	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*
Sample Date	***5/10/05***	***5/10/05***	***5/10/05***	***5/10/05***	***5/24/05***	***5/24/05***	***5/24/05***	***5/24/05***	***6/7/05***	***6/7/05***	***6/7/05***	***6/7/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.13	0.07	3.34	20	0.20	0.10	5.03	20	0.00	0.00	0.00
AbioticSA	249	0.40	2.54	10.23	131	0.40	1.34	10.23	129	0.40	1.32	10.23
AbioticSB	246	0.40	2.51	10.23	114	0.40	1.17	10.23	112	0.40	1.15	10.23
AbioticSC	253	0.40	2.58	10.23	112	0.40	1.15	10.23	110	0.40	1.13	10.23
STBacteriaSA	269	0.40	2.76	10.23	148	0.40	1.52	10.23	142	0.40	1.46	10.23
STBacteriaSB	197	0.40	2.02	10.23	136	0.40	1.39	10.23	141	0.40	1.45	10.23
STBacteriaSC	260	0.40	2.66	10.23	166	0.40	1.70	10.23	157	0.40	1.61	10.23
PTBacteriaSA	235	0.40	2.40	10.23	148	0.40	1.52	10.23	136	0.40	1.39	10.23
PTBacteriaSB	273	0.40	2.79	10.23	93	0.40	0.95	10.23	92	0.40	0.94	10.23
PTBacteriaSC	181		0.00	0.00	149	0.40	1.53	10.23	155	0.40	1.59	10.23
STFungiSA	275		0.00	0.00	164	0.40	1.68	10.23	145	0.40	1.49	10.23
STFungiSB	256	0.40	2.62	10.23	148	0.40	1.52	10.23	144	0.40	1.48	10.23
STFungiSC	287	0.40	2.93	10.23	142	0.40	1.46	10.23	140	0.40	1.44	10.23
PTFungiSA	264	0.40	2.70	10.23	155	0.40	1.59	10.23	153	0.40	1.56	10.23
PTFungiSB	265	0.40	2.71	10.23	150	0.40	1.54	10.23	154	0.40	1.57	10.23
PTFungiSC	282	0.40	2.88	10.23	131	0.40	1.34	10.23	157	0.40	1.60	10.23
STRPBactSA	264	0.40	2.70	10.23	135	0.40	1.38	10.23	126	0.40	1.29	10.23
STRPBactSB	262	0.40	2.68	10.23	144	0.40	1.47	10.23	129	0.40	1.32	10.23
STRPBactSC	256	0.40	2.62	10.23	117	0.41	1.23	10.51	112	0.40	1.15	10.23
PTRPBactSA	251	0.40	2.57	10.23	144	0.54	1.99	13.79	134	0.40	1.37	10.23
PTRPBactSB	258	0.40	2.64	10.23	125	0.40	1.28	10.23	113	0.40	1.16	10.23
PTRPBactSC	254	0.40	2.60	10.23	137	0.40	1.40	10.23	128	0.40	1.31	10.23
STRPBactFungSA	232	0.40	2.37	10.23	131	0.40	1.34	10.23	132	0.40	1.35	10.23
STRPBactFungSB	276	0.40	2.82	10.23	149	0.40	1.52	10.23	139	0.40	1.43	10.23
STRPBactFungSC	255	0.40	2.61	10.23	130	0.40	1.33	10.23	127	0.40	1.30	10.23
PTRPBactFungSA	170	0.40	1.74	10.23	100	0.42	1.09	10.83	87	0.40	0.89	10.23
PTRPBactFungSB	261	0.40	2.67	10.23	117	0.41	1.23	10.51	108	0.40	1.11	10.23
PTRPBactFungSC	266	0.40	2.72	10.23	93	0.40	0.95	10.23	87	0.40	0.89	10.23
STRPBFNOHoagSA	286	0.40	2.93	10.23	99	0.40	1.01	10.23	100	0.40	1.03	10.23
STRPBFNOHoagSB	306	0.40	3.13	10.23	122	0.40	1.24	10.23	113	0.40	1.16	10.23
STRPBFNOHoagSC	290	0.40	2.97	10.23	126	0.40	1.29	10.23	117	0.40	1.20	10.23
PTRPBFNOHoagSA	315	0.40	3.22	10.23	112	0.40	1.14	10.23	103	0.40	1.06	10.23
PTRPBFNOHoagSB	269	0.40	2.75	10.23	113	0.40	1.15	10.23	95	0.40	0.98	10.23
PTRPBFNOHoagSC	295	0.40	3.02	10.23	115	0.49	1.45	12.61	111	0.40	1.14	10.23
STRPBFNOMinSA	224	0.40	2.29	10.23	177	0.40	1.81	10.23	162	0.40	1.65	10.23
STRPBFNOMinSB	229	0.40	2.35	10.23	174	0.40	1.78	10.23	174	0.40	1.78	10.23
STRPBFNOMinSC	239	0.40	2.45	10.23	170	0.40	1.74	10.23	168	0.40	1.72	10.23
PTRPBFNOMinSA	244	0.40	2.50	10.23	170	0.40	1.74	10.23	158	0.40	1.62	10.23
PTRPBFNOMinSB	229	0.40	2.35	10.23	185	0.40	1.90	10.23	162	0.40	1.66	10.23
PTRPBFNOMinSC	259	0.40	2.65	10.23	153	0.40	1.57	10.23	145	0.40	1.48	10.23
	5/10/05	*5/10/05*	*5/10/05*	*5/10/05*	*5/24/05*	*5/24/05*	*5/24/05*	*5/24/05*	*6/7/05*	*6/7/05*	*6/7/05*	*6/7/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	249.00	0.40	2.55	10.23	119.33	0.40	1.22	10.23	117.00	0.40	1.20	10.23
Stbacteria	242.33	0.40	2.48	10.23	150.33	0.40	1.54	10.23	147.00	0.40	1.50	10.23
Ptbacteria	229.33	0.40	1.73	6.82	130.33	0.40	1.33	10.23	128.00	0.40	1.31	10.23
Stfungi	272.33	0.40	1.85	6.82	151.67	0.40	1.55	10.23	143.33	0.40	1.47	10.23
Ptfungi	270.00	0.40	2.76	10.23	145.67	0.40	1.49	10.23	154.33	0.40	1.58	10.23
StRPBact	260.67	0.40	2.67	10.23	131.67	0.40	1.36	10.32	122.33	0.40	1.25	10.23
PtRPBact	254.67	0.40	2.61	10.23	135.33	0.45	1.56	11.42	125.33	0.40	1.28	10.23
STRPBactFung	254.00	0.40	2.60	10.23	136.33	0.40	1.39	10.23	133.00	0.40	1.36	10.23
PTRPBactFung	232.33	0.40	2.38	10.23	103.67	0.41	1.09	10.52	94.33	0.40	0.97	10.23
STRPBFNOHoag	294.00	0.40	3.01	10.23	115.33	0.40	1.18	10.23	110.33	0.40	1.13	10.23
PTRPBFNOHoag	293.00	0.40	3.00	10.23	113.00	0.43	1.25	11.02	103.33	0.40	1.06	10.23
STRPBFNOMin	231.00	0.40	2.36	10.23	173.33	0.40	1.77	10.23	167.67	0.40	1.72	10.23
PTRPBFNOMin	244.33	0.40	2.50	10.23	169.67	0.40	1.74	10.23	155.00	0.40	1.59	10.23
	5/10/05	*5/10/05*	*5/10/05*	*5/10/05*	*5/24/05*	*5/24/05*	*5/24/05*	*5/24/05*	*6/7/05*	*6/7/05*	*6/7/05*	*6/7/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	2.03	0.00	0.02	0.00	6.03	0.00	0.06	0.00	6.03	0.00	0.06	0.00
Stbacteria	22.65	0.00	0.23	0.00	8.72	0.00	0.09	0.00	5.17	0.00	0.05	0.00
Ptbacteria	26.69	0.00	0.87	3.41	18.50	0.00	0.19	0.00	18.66	0.00	0.19	0.00
Stfungi	9.02	0.00	0.93	3.41	6.57	0.00	0.07	0.00	1.53	0.00	0.02	0.00
Ptfungi	5.84	0.00	0.06	0.00	7.31	0.00	0.07	0.00	1.20	0.00	0.01	0.00
StRPBact	2.40	0.00	0.02	0.00	7.94	0.00	0.07	0.09	5.24	0.00	0.05	0.00
PtRPBact	2.03	0.00	0.02	0.00	5.55	0.05	0.22	1.19	6.24	0.00	0.06	0.00
STRPBactFung	12.71	0.00	0.13	0.00	6.17	0.00	0.06	0.00	3.48	0.00	0.04	0.00
PTRPBactFung	31.20	0.00	0.32	0.00	7.13	0.01	0.08	0.17	7.00	0.00	0.07	0.00
STRPBFNOHoag	6.11	0.00	0.06	0.00	8.41	0.00	0.09	0.00	5.13	0.00	0.05	0.00
PTRPBFNOHoag	13.32	0.00	0.14	0.00	0.88	0.03	0.10	0.79	4.62	0.00	0.05	0.00

Table K-3 (cont.): Potassium in drainage water, averages and standard error.

0.04 mg/L	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
Sample Date	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
Sample ID	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Troy Method Blank	20		0.00	0.00	20		0.00	0.00	20		0.00	0.00	20		0.00	0.00
AbioticSA	129	0.40	1.32	10.23	144	0.40	1.47	10.23	151	0.40	1.54	10.23	138	0.40	1.41	10.23
AbioticSB	109	0.40	1.12	10.23	126	0.40	1.29	10.23	132	0.40	1.35	10.23	117	0.40	1.20	10.23
AbioticSC	109	0.40	1.12	10.23	117	0.40	1.19	10.23	131	0.40	1.34	10.23	109	0.40	1.12	10.23
STBacteriaSA	155	0.40	1.59	10.23	168	0.40	1.72	10.23	160	0.40	1.63	10.23	157	0.40	1.60	10.23
STBacteriaSB	154	0.40	1.58	10.23	154	0.40	1.58	10.23	156	0.40	1.59	10.23	64	0.40	0.65	10.23
STBacteriaSC	160	0.40	1.64	10.23	142	0.40	1.46	10.23	169	0.40	1.73	10.23	137	0.40	1.40	10.23
PTBacteriaSA	151	0.40	1.55	10.23	147	0.40	1.51	10.23	152	0.40	1.55	10.23	139	0.40	1.43	10.23
PTBacteriaSB	80	0.40	0.82	10.23	99	0.40	1.02	10.23	115	0.40	1.18	10.23	92	0.40	0.94	10.23
PTBacteriaSC	163	0.40	1.67	10.23	161	0.40	1.65	10.23	186	0.40	1.90	10.23	147	0.40	1.51	10.23
STFungiSA	168	0.40	1.72	10.23	165	0.40	1.69	10.23	173	0.40	1.77	10.23	149	0.40	1.52	10.23
STFungiSB	153	0.40	1.57	10.23	151	0.40	1.55	10.23	164	0.40	1.67	10.23	152	0.40	1.55	10.23
STFungiSC	153	0.40	1.57	10.23	150	0.40	1.54	10.23	112	0.40	1.14	10.23	141	0.40	1.44	10.23
PTFungiSA	163	0.40	1.67	10.23	161	0.40	1.65	10.23	174	0.40	1.78	10.23	150	0.40	1.53	10.23
PTFungiSB	163	0.40	1.67	10.23	160	0.40	1.64	10.23	164	0.40	1.68	10.23	150	0.40	1.53	10.23
PTFungiSC	167	0.40	1.71	10.23	170	0.40	1.74	10.23	181	0.40	1.85	10.23	155	0.40	1.59	10.23
STRPBactSA	130	0.40	1.33	10.23	142	0.40	1.45	10.23	153	0.40	1.57	10.23	132	0.40	1.35	10.23
STRPBactSB	127	0.40	1.30	10.23	142	0.40	1.45	10.23	152	0.40	1.55	10.23	129	0.40	1.32	10.23
STRPBactSC	118	0.40	1.21	10.23	125	0.40	1.28	10.23	140	0.40	1.43	10.23	115	0.40	1.18	10.23
PTRPBactSA	136	0.40	1.39	10.23	147	0.40	1.51	10.23	159	0.40	1.63	10.23	143	0.40	1.47	10.23
PTRPBactSB	120	0.40	1.23	10.23	140	0.40	1.44	10.23	147	0.40	1.51	10.23	128	0.40	1.31	10.23
PTRPBactSC	131	0.40	1.34	10.23	135	0.40	1.38	10.23	151	0.40	1.55	10.23	142	0.40	1.46	10.23
STRPBactFungSA	148	0.40	1.51	10.23	134	0.40	1.37	10.23	152	0.40	1.55	10.23	142	0.40	1.46	10.23
STRPBactFungSB	147	0.40	1.50	10.23	145	0.40	1.49	10.23	167	0.40	1.71	10.23	144	0.40	1.48	10.23
STRPBactFungSC	138	0.40	1.41	10.23	140	0.40	1.44	10.23	147	0.40	1.50	10.23	140	0.40	1.44	10.23
PTRPBactFungSA	90	0.40	0.92	10.23	97	0.40	0.99	10.23	122	0.40	1.24	10.23	91	0.40	0.93	10.23
PTRPBactFungSB	106	0.40	1.08	10.23	106	0.40	1.08	10.23	123	0.40	1.25	10.23	115	0.40	1.18	10.23
PTRPBactFungSC	93	0.40	0.95	10.23	95	0.40	0.97	10.23	107	0.40	1.09	10.23	98	0.40	1.00	10.23
STRPBFNOHoagSA	104	0.40	1.07	10.23	102	0.40	1.04	10.23	108	0.40	1.10	10.23	110	0.40	1.12	10.23
STRPBFNOHoagSB	120	0.40	1.23	10.23	123	0.40	1.26	10.23	125	0.40	1.28	10.23	126	0.40	1.29	10.23
STRPBFNOHoagSC	128	0.40	1.31	10.23	124	0.40	1.27	10.23	131	0.40	1.34	10.23	135	0.40	1.38	10.23
PTRPBFNOHoagSA	125	0.40	1.28	10.23	130	0.40	1.33	10.23	143	0.40	1.46	10.23	75	0.40	0.77	10.23
PTRPBFNOHoagSB	113	0.40	1.15	10.23	121	0.40	1.23	10.23	145	0.40	1.48	10.23	124	0.40	1.27	10.23
PTRPBFNOHoagSC	119	0.40	1.21	10.23	125	0.40	1.28	10.23	144	0.40	1.47	10.23	128	0.40	1.31	10.23
STRPBFNOMinSA	163	0.40	1.66	10.23	169	0.40	1.73	10.23	174	0.40	1.78	10.23	178	0.40	1.82	10.23
STRPBFNOMinSB	175	0.40	1.79	10.23	182	0.40	1.86	10.23	193	0.40	1.98	10.23	180	0.40	1.84	10.23
STRPBFNOMinSC	170	0.40	1.74	10.23	172	0.40	1.76	10.23	190	0.40	1.95	10.23	174	0.40	1.78	10.23
PTRPBFNOMinSA	175	0.40	1.79	10.23	174	0.40	1.78	10.23	184	0.40	1.89	10.23	178	0.40	1.82	10.23
PTRPBFNOMinSB	177	0.40	1.81	10.23	185	0.40	1.89	10.23	187	0.40	1.92	10.23	187	0.40	1.91	10.23
PTRPBFNOMinSC	151	0.40	1.54	10.23	156	0.40	1.60	10.23	166	0.40	1.70	10.23	160	0.40	1.64	10.23
	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
Average	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Abiotic	116.00	0.40	1.19	10.23	128.67	0.40	1.32	10.23	138.00	0.40	1.41	10.23	121.33	0.40	1.24	10.23
Stbacteria	156.67	0.40	1.60	10.23	155.00	0.40	1.59	10.23	161.33	0.40	1.65	10.23	119.00	0.40	1.22	10.23
Ptbacteria	131.67	0.40	1.35	10.23	136.00	0.40	1.39	10.23	151.00	0.40	1.54	10.23	126.33	0.40	1.29	10.23
Stfungi	158.00	0.40	1.62	10.23	155.67	0.40	1.59	10.23	149.33	0.40	1.53	10.23	147.33	0.40	1.51	10.23
Ptfungi	164.67	0.40	1.68	10.23	163.67	0.40	1.67	10.23	173.00	0.40	1.77	10.23	151.67	0.40	1.55	10.23
StRPBact	125.00	0.40	1.28	10.23	136.00	0.40	1.39	10.23	148.33	0.40	1.52	10.23	125.67	0.40	1.29	10.23
PtRPBact	129.33	0.40	1.32	10.23	141.00	0.40	1.44	10.23	152.67	0.40	1.56	10.23	138.00	0.40	1.41	10.23
STRPBactFung	144.33	0.40	1.48	10.23	140.00	0.40	1.43	10.23	155.33	0.40	1.59	10.23	142.33	0.40	1.46	10.23
PTRPBactFung	96.33	0.40	0.99	10.23	99.33	0.40	1.02	10.23	117.00	0.40	1.20	10.23	101.33	0.40	1.04	10.23
STRPBFNOHoag	117.67	0.40	1.20	10.23	116.33	0.40	1.19	10.23	121.33	0.40	1.24	10.23	123.33	0.40	1.26	10.23
PTRPBFNOHoag	118.67	0.40	1.21	10.23	125.00	0.40	1.28	10.23	143.67	0.40	1.47	10.23	109.33	0.40	1.12	10.23
STRPBFNOMin	169.00	0.40	1.73	10.23	174.00	0.40	1.78	10.23	186.00	0.40	1.90	10.23	177.00	0.40	1.81	10.23
PTRPBFNOMin	167.67	0.40	1.72	10.23	171.67	0.40	1.76	10.23	179.33	0.40	1.83	10.23	175.00	0.40	1.79	10.23
	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
STE	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Abiotic	6.67	0.00	0.07	0.00	7.94	0.00	0.08	0.00	6.51	0.00	0.07	0.00	8.65	0.00	0.09	0.00
Stbacteria	1.86	0.00	0.02	0.00	7.51	0.00	0.08	0.00	3.84	0.00	0.04	0.00	28.26	0.00	0.29	0.00
Ptbacteria	25.90	0.00	0.26	0.00	18.77	0.00	0.19	0.00	20.50	0.00	0.21	0.00	17.16	0.00	0.18	0.00
Stfungi	5.00	0.00	0.05	0.00	4.84	0.00	0.05	0.00	19.01	0.00	0.19	0.00	3.28	0.00	0.03	0.00
Ptfungi	1.33	0.00	0.01	0.00	3.18	0.00	0.03	0.00	4.93	0.00	0.05	0.00	1.67	0.00	0.02	0.00
StRPBact	3.61	0.00	0.04	0.00	5.67	0.00	0.06	0.00	4.18	0.00	0.04	0.00	5.24	0.00	0.05	0.00
PtRPBact	4.73	0.00	0.05	0.00	3.48	0.00	0.04	0.00	3.53	0.00	0.04	0.00	4.84	0.00	0.05	0.00
STRPBactFung	3.18	0.00	0.03	0.00	3.18	0.00	0.03	0.00	6.01	0.00	0.06	0.00	1.15	0.00	0.01	0.00
PTRPBactFung	4.91	0.00	0.05	0.00	3.38	0.00	0.03	0.00	5.17	0.00	0.05	0.00	7.13	0.00	0.07	0.00
STRPBFNOHoag	7.06	0.00	0.07	0.00	7.17	0.00	0.07	0.00	6.89	0.00	0.07	0.00	7.31	0.00	0.07	0.00
PTRPBFNOHoag	3.46	0.00	0.04	0.00	2.60	0.00	0.03	0.00	0.58	0.00	0.01	0.00	17.04	0.00	0.17	0.00

Table K-4: Magnesium in drainage water, averages and standard error.

0.04 mg/L	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*
Sample Date	***8/5/04***	***8/5/04***	***8/5/04***	***8/5/04***	***8/19/04***	***8/19/04***	***8/19/04***	***8/19/04***	***9/30/04***	***9/30/04***	***9/30/04***	***9/30/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank			0.00	0.00			0.00	0.00	20	0.00	0.00	0.00
AbioticSA	258	1.13	11.97	46.39	375	0.82	12.72	33.91	267	0.88	9.62	36.03
AbioticSB	299	1.00	12.34	41.27	367	0.71	10.77	29.36	182	0.90	6.74	37.01
AbioticSC	278	0.63	7.21	25.92	198	0.68	5.52	27.87	227	0.75	7.05	31.06
STBacteriaSA	225	1.05	9.69	43.18	273	0.81	9.08	33.25	285	10.61	124.38	436.42
STBacteriaSB	206	1.13	9.56	46.53	317	0.75	9.81	30.94	293	14.34	172.85	589.92
STBacteriaSC	320	1.06	13.97	43.72	312	0.69	8.83	28.30	277	14.69	167.48	604.63
PTBacteriaSA	270	1.08	12.01	44.50	312	0.83	10.60	33.98	206	4.68	39.69	192.66
PTBacteriaSB	268	1.20	13.26	49.48	268	0.74	8.16	30.45	192	5.73	45.25	235.68
PTBacteriaSC	327	0.91	12.22	37.36	286	0.74	8.73	30.53	217	5.18	46.22	212.98
STFungiSA	264	1.10	11.99	45.40	272	0.85	9.47	34.80	249	4.97	50.89	204.37
STFungiSB	265	1.04	11.32	42.73	310	0.77	9.78	31.54	227	6.96	64.98	286.28
STFungiSC	313	1.04	13.33	42.67	313	0.72	9.22	29.47	246	7.38	74.69	303.63
PTFungiSA	200	1.03	8.46	42.31	367	0.69	10.36	28.23	226	4.28	39.79	176.06
PTFungiSB	296	1.09	13.31	44.97	356	0.76	11.15	31.31	306	6.74	84.91	277.49
PTFungiSC	272	1.04	11.59	42.60	258	0.74	7.84	30.39	180	6.70	49.62	275.67
STRPBactSA	336	1.15	15.88	47.34	265	0.83	9.01	34.01	222	0.71	6.52	29.38
STRPBactSB	163	1.11	7.43	45.58	310	0.62	7.92	25.55	204	0.62	5.24	25.67
STRPBactSC	258	0.90	9.57	37.10	368	0.66	9.92	26.96	202	0.65	5.40	26.72
PTRPBactSA	222	1.09	9.96	44.87	254	0.96	10.02	39.46	271	0.68	7.54	27.82
PTRPBactSB	172	1.11	7.86	45.67	263	0.74	8.05	30.62	224	0.71	6.54	29.19
PTRPBactSC	253	1.04	10.87	42.98	288	0.74	8.72	30.27	226	0.65	6.05	26.77
STRPBactFungSA	326	0.93	12.47	38.24	292	0.81	9.69	33.20	223	0.63	5.82	26.10
STRPBactFungSB	206	1.08	9.13	44.44	321	0.65	8.56	26.65	252	0.66	6.87	27.27
STRPBactFungSC	340	1.07	14.93	43.92	330	0.68	9.28	28.14	238	0.71	6.95	29.18
PTRPBactFungSA	246	0.98	9.91	40.28	272	0.75	8.42	30.94	212	0.62	5.37	25.34
PTRPBactFungSB	217	1.26	11.29	52.03	298	0.80	9.82	32.96	206	0.69	5.86	28.47
PTRPBactFungSC	315	0.96	12.49	39.71	216	0.66	5.90	27.33	269	0.72	7.92	29.43
STRPBFNOHoagSA	296	1.03	12.51	42.26	373	0.95	14.56	39.03	222	0.59	5.36	24.14
STRPBFNOHoagSB	193	1.26	9.99	51.74	342	0.77	10.80	31.58	223	0.58	5.34	23.95
STRPBFNOHoagSC	241	0.92	9.08	37.67	245	0.73	7.34	29.97	316	0.54	7.00	22.16
PTRPBFNOHoagSA	340	0.94	13.13	38.62	358	0.73	10.70	29.90	320	0.97	12.79	39.96
PTRPBFNOHoagSB	220	1.02	9.21	41.85	323	0.68	9.00	27.88	317	0.53	6.94	21.89
PTRPBFNOHoagSC	346	0.84	11.99	34.70	348	0.64	9.17	26.34	260	0.53	5.67	21.80
STRPBFNOMinSA	381	0.08	1.26	3.31	452	0.18	3.34	7.40	201	0.10	0.84	4.18
STRPBFNOMinSB	396	0.07	1.20	3.04	367	0.08	1.21	3.29	308	0.08	1.01	3.29
STRPBFNOMinSC	329	0.30	4.02	12.22	340	0.08	1.12	3.29	244	0.08	0.80	3.29
PTRPBFNOMinSA	351	0.08	1.10	3.15	471	0.08	1.55	3.29	294	0.13	1.55	5.26
PTRPBFNOMinSB	300	0.10	1.21	4.02	333	0.08	1.10	3.29	268	0.10	1.05	3.91
PTRPBFNOMinSC	422	0.08	1.37	3.26	515	0.08	1.70	3.29	268	0.13	1.39	5.20
	8/5/04	*8/5/04*	*8/5/04*	*8/5/04*	*8/19/04*	*8/19/04*	*8/19/04*	*8/19/04*	*9/30/04*	*9/30/04*	*9/30/04*	*9/30/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	278.33	0.92	10.50	37.86	313.33	0.74	9.67	30.38	225.33	0.84	7.80	34.70
Stbacteria	249.83	1.08	11.08	44.48	300.67	0.75	9.24	30.83	285.00	13.21	154.90	543.66
Ptbacteria	288.33	1.06	12.50	43.78	288.67	0.77	9.16	31.65	205.00	5.19	43.72	213.78
Stfungi	280.50	1.06	12.21	43.60	298.33	0.78	9.49	31.94	240.67	6.43	63.52	264.76
Ptfungi	256.00	1.05	11.12	43.29	327.00	0.73	9.78	29.98	237.33	5.91	58.11	243.07
StRPBact	252.17	1.05	10.96	43.34	314.33	0.70	8.95	28.84	209.33	0.66	5.72	27.26
PtRPBact	215.67	1.08	9.56	44.51	268.33	0.81	8.93	33.45	240.33	0.68	6.71	27.93
STRPBactFung	290.50	1.03	12.18	42.20	314.33	0.71	9.18	29.33	237.67	0.67	6.55	27.52
PTRPBactFung	259.17	1.07	11.23	44.00	262.00	0.74	8.05	30.41	229.00	0.67	6.38	27.74
STRPBFNOHoag	243.33	1.07	10.52	43.89	320.00	0.81	10.90	33.53	253.67	0.57	5.90	23.42
PTRPBFNOHoag	301.83	0.93	11.44	38.39	343.00	0.68	9.63	28.04	299.00	0.68	8.46	27.88
STRPBFNOMin	368.67	0.15	2.16	6.19	386.33	0.11	1.89	4.66	251.00	0.09	0.89	3.59
PTRPBFNOMin	357.67	0.08	1.23	3.47	439.67	0.08	1.45	3.29	276.67	0.12	1.33	4.79
	8/5/04	*8/5/04*	*8/5/04*	*8/5/04*	*8/19/04*	*8/19/04*	*8/19/04*	*8/19/04*	*9/30/04*	*9/30/04*	*9/30/04*	*9/30/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	11.84	0.15	1.65	6.15	57.71	0.04	2.15	1.82	24.55	0.04	0.91	1.84
Stbacteria	35.26	0.03	1.45	1.04	13.91	0.03	0.29	1.43	4.62	1.31	15.34	53.79
Ptbacteria	19.34	0.09	0.39	3.52	12.77	0.03	0.74	1.16	7.23	0.30	2.03	12.42
Stfungi	16.00	0.02	0.59	0.90	13.20	0.04	0.16	1.55	6.89	0.74	6.91	30.61
Ptfungi	28.84	0.02	1.42	0.84	34.65	0.02	1.00	0.91	36.81	0.81	13.70	33.51
StRPBact	49.88	0.08	2.54	3.16	29.81	0.06	0.58	2.62	6.36	0.03	0.40	1.10
PtRPBact	23.60	0.02	0.89	0.80	10.17	0.07	0.58	3.01	15.34	0.02	0.44	0.70
STRPBactFung	42.69	0.05	1.68	1.99	11.46	0.05	0.33	1.98	8.37	0.02	0.36	0.90
PTRPBactFung	28.91	0.10	0.75	4.01	24.19	0.04	1.15	1.65	20.07	0.03	0.78	1.23
STRPBFNOHoag	29.76	0.10	1.03	4.14	38.55	0.07	2.08	2.79	31.17	0.02	0.55	0.63
PTRPBFNOHoag	40.95	0.05	1.17	2.07	10.41	0.03	0.54	1.03	19.52	0.15	2.19	6.04

Table K-4 (cont.): Magnesium in drainage water, averages and standard error.

0.04 mg/L	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*
Sample Date	*10/14/04*	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
Sample ID	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Troy Method Blank	20	0.00	0.00	0.00	20	0.00	0.00	0.00	20	0.00	0.00	0.00
AbioticSA	361	0.56	8.39	23.23	333	0.45	6.16	18.50	344	0.39	5.58	16.23
AbioticSB	278	0.63	7.24	26.05	310	0.41	5.18	16.72	411	0.37	6.18	15.04
AbioticSC	190	0.55	4.33	22.81	266	0.45	4.95	18.62	374	0.41	6.27	16.77
STBacteriaSA	375	13.03	201.08	536.21	345	12.31	174.72	506.45	427	12.89	226.46	530.35
STBacteriaSB	341	15.19	213.16	625.10	335	14.71	202.79	605.35	428	16.43	289.38	676.13
STBacteriaSC	385	16.21	256.75	666.87	330	14.92	202.55	613.79	423	17.62	306.76	725.21
PTBacteriaSA	418	4.33	74.50	178.24	347	4.25	60.69	174.91	487	6.33	126.91	260.60
PTBacteriaSB	402	6.62	109.47	272.30	365	5.27	79.22	217.04	492	6.73	136.24	276.91
PTBacteriaSC	403	5.77	95.73	237.54	342	5.62	79.04	231.11	464	6.83	130.45	281.14
STFungiSA	382	6.66	104.70	274.08	335	5.98	82.50	246.26	444	6.47	118.21	266.23
STFungiSB	373	8.18	125.60	336.73	353	7.79	113.19	320.64	437	7.68	138.15	316.14
STFungiSC	328	12.73	171.80	523.77	303	12.03	149.96	494.92	426	11.88	208.18	488.68
PTFungiSA	395	7.97	129.49	327.83	340	8.28	115.88	340.81	453	9.72	181.21	400.02
PTFungiSB	390	8.18	131.27	336.58	351	7.43	107.30	305.69	462	7.89	149.92	324.50
PTFungiSC	381	8.88	139.23	365.43	317	9.50	123.98	391.09	449	10.73	198.31	441.67
STRPBactSA	360	0.49	7.25	20.15	314	0.34	4.35	13.85	416	0.25	4.24	10.19
STRPBactSB	331	0.38	5.17	15.60	292	0.25	2.96	10.15	313	0.18	2.35	7.52
STRPBactSC	336	0.42	5.86	17.43	293	0.29	3.51	11.98	385	0.24	3.75	9.75
PTRPBactSA	349	0.53	7.60	21.78	296	0.39	4.71	15.92	389	0.33	5.22	13.42
PTRPBactSB	244	0.42	4.25	17.41	248	0.31	3.11	12.56	335	0.23	3.21	9.60
PTRPBactSC	354	0.47	6.92	19.54	296	0.29	3.48	11.77	414	0.24	4.02	9.70
STRPBactFungSA	336	0.45	6.20	18.45	269	0.32	3.56	13.23	411	0.22	3.81	9.26
STRPBactFungSB	314	0.40	5.14	16.38	259	0.24	2.57	9.90	400	0.16	2.63	6.58
STRPBactFungSC	344	0.41	5.79	16.84	301	0.25	3.14	10.43	408	0.18	3.05	7.47
PTRPBactFungSA	295	0.45	5.40	18.32	247	0.33	3.35	13.57	325	0.30	3.96	12.18
PTRPBactFungSB	334	0.38	5.15	15.43	285	0.26	3.05	10.72	398	0.19	3.09	7.77
PTRPBactFungSC	355	0.41	6.03	16.99	276	0.25	2.85	10.32	279	0.21	2.36	8.46
STRPBFNOHoagSA	348	0.49	7.05	20.27	301	0.41	5.13	17.06	450	0.36	6.62	14.71
STRPBFNOHoagSB	305	0.42	5.27	17.29	262	0.36	3.93	15.02	485	0.32	6.36	13.11
STRPBFNOHoagSC	352	0.44	6.43	18.26	295	0.33	3.96	13.43	505	0.30	6.15	12.17
PTRPBFNOHoagSA	316	0.41	5.32	16.85	293	0.35	4.23	14.45	508	0.31	6.42	12.63
PTRPBFNOHoagSB	308	0.36	4.62	14.99	294	0.28	3.43	11.65	486	0.31	6.18	12.72
PTRPBFNOHoagSC	304	0.36	4.44	14.61	320	0.35	4.56	14.26	456	0.32	5.96	13.07
STRPBFNOMinSA	429	0.08	1.41	3.29	372	0.08	1.22	3.29	390	0.08	1.28	3.29
STRPBFNOMinSB	443	0.08	1.46	3.29	376	0.08	1.24	3.29	391	0.08	1.29	3.29
STRPBFNOMinSC	441	0.08	1.45	3.29	314	0.08	1.03	3.29	400	0.08	1.32	3.29
PTRPBFNOMinSA	451	0.08	1.48	3.29	306	0.08	1.01	3.29	391	0.08	1.29	3.29
PTRPBFNOMinSB	394	0.08	1.30	3.29	373	0.08	1.23	3.29	398	0.08	1.31	3.29
PTRPBFNOMinSC	442	0.08	1.46	3.29	391	0.08	1.29	3.29	420	0.08	1.38	3.29
	10/14/04	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	276.33	0.58	6.65	24.03	303.00	0.44	5.43	17.95	376.33	0.39	6.01	16.01
Stbacteria	367.00	14.81	223.66	609.40	336.67	13.98	193.36	575.19	426.00	15.65	274.20	643.90
Ptbacteria	407.67	5.57	93.23	229.36	351.33	5.05	72.98	207.69	481.00	6.63	131.20	272.88
Stfungi	361.00	9.19	134.03	378.19	330.33	8.60	115.22	353.94	435.67	8.68	154.85	357.02
Ptfungi	388.67	8.34	133.33	343.28	336.00	8.40	115.72	345.86	454.67	9.45	176.48	388.73
StRPBact	342.33	0.43	6.09	17.73	299.67	0.29	3.61	11.99	371.33	0.22	3.45	9.16
PtRPBact	315.67	0.48	6.25	19.57	280.00	0.33	3.77	13.42	379.33	0.27	4.15	10.91
STRPBactFung	331.33	0.42	5.71	17.22	276.33	0.27	3.09	11.19	406.33	0.19	3.16	7.77
PTRPBactFung	328.00	0.41	5.53	16.91	269.33	0.28	3.08	11.53	334.00	0.23	3.14	9.47
STRPBFNOHoag	335.00	0.45	6.25	18.61	286.00	0.37	4.34	15.17	480.00	0.32	6.38	13.33
PTRPBFNOHoag	309.33	0.38	4.79	15.48	302.33	0.33	4.07	13.46	483.33	0.31	6.19	12.81
STRPBFNOMin	437.67	0.08	1.44	3.29	354.00	0.08	1.17	3.29	393.67	0.08	1.30	3.29
PTRPBFNOMin	429.00	0.08	1.41	3.29	356.67	0.08	1.17	3.29	403.00	0.08	1.33	3.29
	10/14/04	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	49.37	0.02	1.21	1.02	19.66	0.01	0.37	0.61	19.38	0.01	0.22	0.51
Stbacteria	13.32	0.94	16.91	38.53	4.41	0.84	9.32	34.46	1.53	1.42	24.39	58.51
Ptbacteria	5.17	0.67	10.17	27.46	6.98	0.41	6.15	16.88	8.62	0.15	2.72	6.26
Stfungi	16.70	1.82	19.82	75.00	14.62	1.79	19.50	73.69	5.24	1.64	27.28	67.39
Ptfungi	4.10	0.28	2.99	11.36	10.02	0.60	4.82	24.78	3.84	0.83	14.17	34.29
StRPBact	8.95	0.03	0.61	1.32	7.17	0.03	0.40	1.07	30.51	0.02	0.57	0.83
PtRPBact	35.86	0.03	1.02	1.26	16.00	0.03	0.48	1.27	23.31	0.03	0.58	1.26
STRPBactFung	8.97	0.02	0.31	0.63	12.67	0.03	0.29	1.03	3.28	0.02	0.34	0.79
PTRPBactFung	17.58	0.02	0.26	0.83	11.46	0.02	0.15	1.02	34.65	0.03	0.46	1.37
STRPBFNOHoag	15.04	0.02	0.52	0.88	12.12	0.03	0.40	1.05	16.07	0.02	0.14	0.74
PTRPBFNOHoag	3.53	0.02	0.27	0.69	8.84	0.02	0.34	0.90	15.07	0.00	0.13	0.13

Table K-4 (cont.): Magnesium in drainage water, averages and standard error.

0.04 mg/L	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*
Sample Date	***11/29/04***	***11/29/04***	***11/29/04***	***11/29/04***	***12/9/04***	***12/9/04***	***12/9/04***	***12/9/04***	***12/21/04***	***12/21/04***	***12/21/04***	***12/21/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank			0.00	0.00	20	0.01	0.01	0.26	20	0.01	0.01	0.56
AbioticSA	489	0.27	5.43	11.09	265	0.28	3.08	11.61	289	0.29	3.46	11.98
AbioticSB	456	0.20	3.69	8.10	230	0.23	2.22	9.64	288	0.22	2.63	9.12
AbioticSC	450	0.23	4.23	9.39	208	0.26	2.26	10.85	273	0.24	2.67	9.77
STBacteriaSA	519	11.17	238.62	459.77	306	15.94	200.76	656.07	333	10.90	149.40	448.66
STBacteriaSB	500	14.88	306.07	612.14	288	17.53	207.70	721.19	329	12.68	171.72	521.95
STBacteriaSC	522	13.45	288.93	553.50	320	17.92	236.02	737.55	328	12.91	174.21	531.14
PTBacteriaSA	489	6.49	130.62	267.12	338	7.94	110.47	326.84	372	5.87	89.82	241.45
PTBacteriaSB	511	6.40	134.51	263.22	323	7.85	104.33	323.00	372	5.69	87.04	233.98
PTBacteriaSC	521	6.62	141.85	272.26	310	8.82	112.49	362.86	343	6.54	92.25	268.94
STFungiSA	450	5.52	102.20	227.12	315	8.15	105.70	335.55	354	5.50	80.07	226.17
STFungiSB	534	7.67	168.62	315.77	295	10.71	129.96	440.53	270	7.29	80.96	299.86
STFungiSC	532	9.08	198.82	373.71	314	9.92	128.19	408.26	335	9.35	128.94	384.90
PTFungiSA	509	9.36	196.04	385.14	298	12.00	147.19	493.93	329	8.66	117.30	356.54
PTFungiSB	507	8.20	171.00	337.28	325	9.42	126.00	387.71	351	7.29	105.29	299.96
PTFungiSC	537	9.73	215.00	400.37	319	11.65	152.90	479.32	339	10.04	140.01	413.01
STRPBactSA	468	0.21	4.11	8.78	270	0.21	2.31	8.54	302	0.19	2.35	7.79
STRPBactSB	423	0.12	2.02	4.77	244	0.15	1.53	6.26	283	0.12	1.45	5.11
STRPBactSC	424	0.15	2.60	6.13	256	0.17	1.78	6.94	285	0.16	1.86	6.53
PTRPBactSA	458	0.23	4.30	9.40	253	0.26	2.71	10.71	291	0.23	2.70	9.27
PTRPBactSB	390	0.16	2.60	6.66	266	0.16	1.76	6.61	222	0.13	1.22	5.51
PTRPBactSC	435	0.14	2.44	5.61	261	0.14	1.55	5.95	276	0.15	1.69	6.12
STRPBactFungSA	468	0.18	3.56	7.60	249	0.21	2.13	8.55	285	0.20	2.35	8.25
STRPBactFungSB	465	0.12	2.29	4.92	256	0.15	1.54	6.03	267	0.14	1.54	5.77
STRPBactFungSC	459	0.13	2.42	5.27	273	0.16	1.79	6.54	291	0.13	1.57	5.40
PTRPBactFungSA	334	0.24	3.28	9.83	204	0.24	2.00	9.83	253	0.20	2.11	8.33
PTRPBactFungSB	417	0.21	3.57	8.56	256	0.18	1.88	7.33	287	0.17	2.04	7.11
PTRPBactFungSC	433	0.20	3.54	8.18	260	0.17	1.77	6.79	230	0.17	1.62	7.04
STRPBFNOHoagSA	555	0.30	6.79	12.24	274	0.28	3.20	11.69	315	0.24	3.06	9.73
STRPBFNOHoagSB	563	0.26	6.08	10.79	297	0.20	2.48	8.36	339	0.18	2.50	7.38
STRPBFNOHoagSC	595	0.24	5.91	9.93	316	0.21	2.71	8.58	395	0.17	2.70	6.85
PTRPBFNOHoagSA	589	0.28	6.83	11.60	332	0.22	2.97	8.95	396	0.20	3.19	8.06
PTRPBFNOHoagSB	555	0.29	6.56	11.82	321	0.22	2.97	9.24	307	0.20	2.57	8.37
PTRPBFNOHoagSC	527	0.31	6.67	12.65	335	0.22	3.07	9.18	312	0.20	2.59	8.30
STRPBFNOMinSA	452	0.08	1.49	3.29	246	0.08	0.81	3.29	286	0.10	1.23	4.30
STRPBFNOMinSB	440	0.08	1.45	3.29	243	0.08	0.80	3.29	278	0.11	1.23	4.41
STRPBFNOMinSC	428	0.08	1.41	3.29	195	0.08	0.64	3.29	302	0.08	0.99	3.29
PTRPBFNOMinSA	433	0.08	1.43	3.29	259	0.08	0.85	3.29	310	0.12	1.55	5.01
PTRPBFNOMinSB	443	0.08	1.46	3.29	211	0.08	0.69	3.29	297	0.08	0.98	3.29
PTRPBFNOMinSC	493	0.08	1.62	3.29	271	0.08	0.89	3.29	311	0.08	1.02	3.29
	11/29/04	*11/29/04*	*11/29/04*	*11/29/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	465.00	0.23	4.45	9.53	234.33	0.26	2.52	10.70	283.33	0.25	2.92	10.29
Stbacteria	513.67	13.17	277.87	541.80	304.67	17.13	214.83	704.94	330.00	12.16	165.11	500.58
Ptbacteria	507.00	6.50	135.66	267.53	323.67	8.20	109.10	337.57	362.33	6.03	89.70	248.12
Stfungi	505.33	7.42	156.55	305.53	308.00	9.59	121.28	394.78	319.67	7.38	96.66	303.64
Ptfungi	517.67	9.09	194.01	374.27	314.00	11.02	142.03	453.65	339.67	8.66	120.87	356.51
StRPBact	438.33	0.16	2.91	6.56	256.67	0.18	1.87	7.25	290.00	0.16	1.89	6.48
PtRPBact	427.67	0.18	3.11	7.22	260.00	0.19	2.01	7.76	263.00	0.17	1.87	6.97
STRPBactFung	464.00	0.14	2.76	5.93	259.33	0.17	1.82	7.04	281.00	0.16	1.82	6.47
PTRPBactFung	394.67	0.22	3.47	8.86	240.00	0.19	1.88	7.98	256.67	0.18	1.92	7.49
STRPBFNOHoag	571.00	0.27	6.26	10.99	295.67	0.23	2.80	9.55	349.67	0.19	2.76	7.98
PTRPBFNOHoag	557.00	0.29	6.69	12.02	329.33	0.22	3.00	9.12	338.33	0.20	2.78	8.24
STRPBFNOMin	440.00	0.08	1.45	3.29	228.00	0.08	0.75	3.29	288.67	0.10	1.15	4.00
PTRPBFNOMin	456.33	0.08	1.50	3.29	247.00	0.08	0.81	3.29	306.00	0.09	1.18	3.86
	11/29/04	*11/29/04*	*11/29/04*	*11/29/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	12.12	0.02	0.51	0.87	16.60	0.01	0.28	0.57	5.17	0.02	0.27	0.86
Stbacteria	6.89	1.08	20.24	44.37	9.26	0.60	10.78	24.89	1.53	0.63	7.89	26.10
Ptbacteria	9.45	0.06	3.29	2.62	8.09	0.31	2.45	12.69	9.67	0.26	1.50	10.63
Stfungi	27.67	1.04	28.54	42.63	6.51	0.75	7.81	31.05	25.43	1.11	16.14	45.86
Ptfungi	9.68	0.46	12.74	19.01	8.19	0.81	8.18	33.24	6.36	0.79	10.18	32.64
StRPBact	14.84	0.03	0.62	1.18	7.51	0.02	0.23	0.68	6.03	0.02	0.26	0.78
PtRPBact	19.97	0.03	0.60	1.13	3.79	0.04	0.36	1.49	20.95	0.03	0.43	1.16
STRPBactFung	2.65	0.02	0.40	0.84	7.13	0.02	0.17	0.77	7.21	0.02	0.27	0.90
PTRPBactFung	30.68	0.01	0.09	0.50	18.04	0.02	0.07	0.93	16.56	0.01	0.15	0.42
STRPBFNOHoag	12.22	0.02	0.27	0.68	12.14	0.03	0.21	1.07	23.70	0.02	0.17	0.89
PTRPBFNOHoag	17.93	0.01	0.08	0.32	4.26	0.00	0.04	0.09	28.87	0.00	0.20	0.09

Table K-4 (cont.): Magnesium in drainage water, averages and standard error.

0.04 mg/L	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*
Sample Date	*1/4/05*	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
Sample ID	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Troy Method Blank	20	0.00	0.00	0.11	20	0.00	0.00	0.00	20	0.01	0.01	0.38
AbioticSA	227	0.46	4.27	18.83	396	0.28	4.60	11.63	480	0.18	3.65	7.60
AbioticSB	228	0.29	2.74	12.02	360	0.31	4.63	12.86	457	0.17	3.22	7.04
AbioticSC	214	0.56	4.97	23.23	325	0.29	3.83	11.79	412	0.20	3.46	8.40
STBacteriaSA	242	4.35	43.27	178.81	404	3.20	53.12	131.48	490	1.83	37.00	75.50
STBacteriaSB	237	4.16	40.54	171.07	390	2.57	41.25	105.76	457	1.01	18.95	41.46
STBacteriaSC	204	7.50	62.97	308.66	393	2.81	45.48	115.72	462	2.72	51.64	111.78
PTBacteriaSA	292	2.48	29.85	102.24	444	2.10	38.37	86.42	505	1.47	30.56	60.52
PTBacteriaSB	295	2.82	34.21	115.98	414	2.12	36.20	87.44	498	1.42	29.18	58.60
PTBacteriaSC	273	3.91	43.94	160.95	421	2.54	44.02	104.56	492	2.06	41.79	84.94
STFungiSA	299	2.51	30.84	103.15	365	2.43	36.55	100.12	382	1.82	28.57	74.79
STFungiSB	276	2.84	32.23	116.77	398	2.18	35.77	89.88	484	1.43	28.46	58.80
STFungiSC	269	3.06	33.92	126.10	416	1.54	26.28	63.18	501	1.03	21.13	42.18
PTFungiSA	255	3.73	39.16	153.56	399	2.70	44.39	111.24	479	1.78	35.17	73.42
PTFungiSB	227	3.05	28.48	125.46	409	2.36	39.67	97.00	492	1.69	34.24	69.60
PTFungiSC	282	3.62	41.99	148.91	407	2.36	39.59	97.28	516	1.99	42.35	82.07
STRPBactSA	245	0.25	2.56	10.43	325	0.09	1.17	3.60	492	0.09	1.86	3.78
STRPBactSB	220	0.17	1.55	7.02	364	0.08	1.20	3.29	455	0.08	1.50	3.29
STRPBactSC	227	0.21	1.95	8.58	369	0.08	1.21	3.29	434	0.10	1.76	4.05
PTRPBactSA	219	0.29	2.64	12.04	392	0.08	1.29	3.29	461	0.10	1.83	3.97
PTRPBactSB	241	0.20	2.01	8.32	288	0.08	0.95	3.29	454	0.08	1.49	3.29
PTRPBactSC	227	0.23	2.15	9.48	380	0.08	1.25	3.29	461	0.08	1.52	3.29
STRPBactFungSA	211	0.31	2.66	12.60	381	0.08	1.25	3.29	454	0.08	1.49	3.29
STRPBactFungSB	219	0.17	1.58	7.20	340	0.08	1.12	3.29	452	0.08	1.49	3.29
STRPBactFungSC	223	0.16	1.44	6.45	376	0.08	1.24	3.29	461	0.08	1.52	3.29
PTRPBactFungSA	128	0.31	1.63	12.73	311	0.09	1.15	3.69	330	0.09	1.16	3.51
PTRPBactFungSB	203	0.25	2.11	10.39	367	0.08	1.21	3.29	427	0.08	1.41	3.29
PTRPBactFungSC	212	0.20	1.76	8.29	368	0.08	1.21	3.29	438	0.08	1.44	3.29
STRPBFNOHoagSA	307	0.23	2.86	9.31	434	0.22	3.86	8.89	483	0.18	3.58	7.40
STRPBFNOHoagSB	327	0.23	3.03	9.27	442	0.17	3.17	7.17	512	0.16	3.47	6.78
STRPBFNOHoagSC	322	0.18	2.35	7.28	463	0.18	3.43	7.41	533	0.15	3.22	6.04
PTRPBFNOHoagSA	318	0.19	2.49	7.83	448	0.20	3.60	8.03	543	0.20	4.51	8.31
PTRPBFNOHoagSB	308	0.19	2.38	7.71	446	0.16	3.00	6.72	530	0.14	3.11	5.87
PTRPBFNOHoagSC	313	0.18	2.37	7.59	464	0.18	3.38	7.29	561	0.15	3.43	6.12
STRPBFNOMinSA	177	0.23	1.68	9.49	356	0.08	1.17	3.29	442	0.08	1.46	3.29
STRPBFNOMinSB	201	0.27	2.23	11.08	351	0.08	1.16	3.29	417	0.08	1.37	3.29
STRPBFNOMinSC	153	0.28	1.73	11.34	342	0.08	1.13	3.29	425	0.08	1.40	3.29
PTRPBFNOMinSA	193	0.27	2.15	11.13	353	0.08	1.16	3.29	410	0.08	1.35	3.29
PTRPBFNOMinSB	201	0.16	1.32	6.57	351	0.08	1.16	3.29	431	0.08	1.42	3.29
PTRPBFNOMinSC	190	0.15	1.16	6.11	293	0.08	0.96	3.29	367	0.08	1.21	3.29
	1/4/05	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	223.00	0.44	4.00	18.03	360.33	0.29	4.36	12.09	449.67	0.19	3.44	7.68
Stbacteria	227.67	5.33	48.93	219.51	395.67	2.86	46.61	117.65	469.67	1.85	35.86	76.25
Ptbacteria	286.67	3.07	36.00	126.39	426.33	2.26	39.53	92.81	498.33	1.65	33.85	68.02
Stfungi	281.33	2.80	32.33	115.34	393.00	2.05	32.87	84.39	455.67	1.42	26.05	58.59
Ptfungi	254.67	3.47	36.54	142.64	405.00	2.47	41.22	101.84	495.67	1.82	37.25	75.03
StRPBact	230.67	0.21	2.02	8.68	352.67	0.08	1.19	3.40	460.33	0.09	1.70	3.71
PtRPBact	229.00	0.24	2.26	9.95	353.33	0.08	1.16	3.29	458.67	0.09	1.61	3.52
STRPBactFung	217.67	0.21	1.89	8.75	365.67	0.08	1.20	3.29	455.67	0.08	1.50	3.29
PTRPBactFung	181.00	0.25	1.83	10.47	348.67	0.08	1.19	3.42	398.33	0.08	1.34	3.37
STRPBFNOHoag	318.67	0.21	2.74	8.62	446.33	0.19	3.49	7.82	509.33	0.16	3.42	6.74
PTRPBFNOHoag	313.00	0.19	2.41	7.71	452.67	0.18	3.32	7.34	544.67	0.16	3.69	6.77
STRPBFNOMin	177.00	0.26	1.88	10.64	349.67	0.08	1.15	3.29	428.00	0.08	1.41	3.29
PTRPBFNOMin	194.67	0.19	1.54	7.94	332.33	0.08	1.09	3.29	402.67	0.08	1.33	3.29
	1/4/05	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	4.51	0.08	0.66	3.26	20.50	0.01	0.26	0.39	19.97	0.01	0.12	0.40
Stbacteria	11.92	1.08	7.06	44.63	4.26	0.18	3.47	7.49	10.27	0.49	9.46	20.30
Ptbacteria	6.89	0.43	4.16	17.73	9.06	0.14	2.33	5.88	3.76	0.21	3.99	8.48
Stfungi	9.06	0.16	0.89	6.66	14.93	0.27	3.30	11.01	37.16	0.23	2.46	9.42
Ptfungi	15.88	0.21	4.11	8.69	3.06	0.11	1.58	4.70	10.84	0.09	2.56	3.69
StRPBact	7.45	0.02	0.29	0.98	13.91	0.00	0.01	0.10	16.95	0.01	0.11	0.22
PtRPBact	6.43	0.03	0.19	1.10	32.85	0.00	0.11	0.00	2.33	0.01	0.11	0.23
STRPBactFung	3.53	0.05	0.39	1.94	12.91	0.00	0.04	0.00	2.73	0.00	0.01	0.00
PTRPBactFung	26.63	0.03	0.14	1.28	18.84	0.00	0.02	0.13	34.31	0.00	0.09	0.07
STRPBFNOHoag	6.01	0.02	0.21	0.67	8.65	0.01	0.20	0.54	14.50	0.01	0.11	0.39
PTRPBFNOHoag	2.89	0.00	0.04	0.07	5.70	0.01	0.18	0.38	8.99	0.02	0.42	0.78

Table K-4 (cont.): Magnesium in drainage water, averages and standard error.

0.04 mg/L	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*
Sample Date	***2/15/05***	***2/15/05***	***2/15/05***	***2/15/05***	***3/1/05***	***3/1/05***	***3/1/05***	***3/1/05***	***3/16/05***	***3/16/05***	***3/16/05***	***3/16/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.00	0.00	0.00	20	0.03	0.02	1.16	20	0.01	0.01	0.31
AbioticSA	395	0.37	6.00	15.18	247	0.13	1.28	5.20	169	0.10	0.69	4.05
AbioticSB	361	0.43	6.38	17.68	224	0.15	1.37	6.14	152	0.08	0.50	3.29
AbioticSC	349	0.34	4.93	14.12	239	0.15	1.45	6.06	178	0.08	0.59	3.29
STBacteriaSA	397	0.49	8.01	20.17	255	0.24	2.47	9.70	197	0.19	1.53	7.77
STBacteriaSB	457	0.32	5.96	13.03	255	0.18	1.89	7.43	195	0.25	2.02	10.36
STBacteriaSC	365	0.68	10.28	28.16	286	0.41	4.80	16.77	202	0.13	1.06	5.23
PTBacteriaSA	489	0.20	4.12	8.43	301	0.18	2.21	7.33	213	0.17	1.47	6.88
PTBacteriaSB	389	0.50	8.08	20.78	275	0.54	6.14	22.33	180	0.37	2.77	15.39
PTBacteriaSC	412	0.82	13.85	33.61	261	0.45	4.85	18.60	178	0.27	1.97	11.02
STFungiSA	400	0.33	5.39	13.48	302	0.53	6.63	21.93	247	0.26	2.63	10.67
STFungiSB	358	0.69	10.10	28.21	281	0.35	4.07	14.45	209	0.55	4.77	22.83
STFungiSC	407	0.26	4.41	10.84	286	0.17	2.00	6.97	221	0.43	3.88	17.54
PTFungiSA	421	0.53	9.15	21.74	249	0.31	3.15	12.68	141	0.41	2.35	16.67
PTFungiSB	382	0.35	5.46	14.29	287	0.37	4.33	15.10	212	0.08	0.70	3.29
PTFungiSC	448	0.54	10.04	22.41	289	0.46	5.50	19.05	247	0.20	2.04	8.26
STRPBactSA	407	0.19	3.10	7.62	273	0.08	0.90	3.29	153	0.08	0.50	3.29
STRPBactSB	380	0.21	3.36	8.84	264	0.08	0.87	3.29	185	0.08	0.61	3.29
STRPBactSC	409	0.27	4.57	11.18	258	0.08	0.85	3.29	192	0.08	0.63	3.29
PTRPBactSA	407	0.20	3.42	8.40	271	0.08	0.89	3.29	177	0.08	0.58	3.29
PTRPBactSB	371	0.22	3.32	8.95	260	0.08	0.86	3.29	172	0.08	0.57	3.29
PTRPBactSC	387	0.25	4.02	10.40	270	0.08	0.89	3.29	185	0.08	0.61	3.29
STRPBactFungSA	375	0.08	1.23	3.29	235	0.08	0.77	3.29	167	0.10	0.72	4.29
STRPBactFungSB	404	0.08	1.33	3.29	255	0.08	0.84	3.29	205	0.08	0.67	3.29
STRPBactFungSC	372	0.08	1.22	3.29	232	0.08	0.76	3.29	169	0.08	0.56	3.29
PTRPBactFungSA	210	0.08	0.69	3.29	162	0.08	0.53	3.29	114	0.08	0.38	3.29
PTRPBactFungSB	377	0.08	1.24	3.29	249	0.08	0.82	3.29	185	0.08	0.61	3.29
PTRPBactFungSC	310	0.08	1.02	3.29	244	0.08	0.80	3.29	173	0.08	0.57	3.29
STRPBFNOHoagSA	434	0.16	2.90	6.67	231	0.13	1.23	5.35	161	0.16	1.04	6.46
STRPBFNOHoagSB	436	0.14	2.60	5.95	209	0.12	1.05	5.05	155	0.13	0.85	5.49
STRPBFNOHoagSC	486	0.15	3.03	6.23	227	0.11	1.06	4.70	166	0.15	1.02	6.15
PTRPBFNOHoagSA	523	0.18	3.81	7.29	215	0.13	1.15	5.36	164	0.13	0.85	5.18
PTRPBFNOHoagSB	469	0.13	2.56	5.45	209	0.09	0.76	3.64	151	0.18	1.10	7.31
PTRPBFNOHoagSC	389	0.12	1.93	4.95	242	0.08	0.80	3.29	183	0.12	0.89	4.87
STRPBFNOMinSA	380	0.08	1.25	3.29	288	0.08	0.95	3.29	213	0.08	0.70	3.29
STRPBFNOMinSB	360	0.08	1.19	3.29	321	0.08	1.06	3.29	229	0.08	0.75	3.29
STRPBFNOMinSC	327	0.08	1.08	3.29	329	0.08	1.08	3.29	248	0.08	0.82	3.29
PTRPBFNOMinSA	325	0.08	1.07	3.29	355	0.08	1.17	3.29	243	0.08	0.80	3.29
PTRPBFNOMinSB	348	0.08	1.15	3.29	302	0.08	0.99	3.29	232	0.08	0.76	3.29
PTRPBFNOMinSC	388	0.08	1.28	3.29	364	0.08	1.20	3.29	258	0.08	0.85	3.29
	2/15/05	*2/15/05*	*2/15/05*	*2/15/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/16/05*	*3/16/05*	*3/16/05*	*3/16/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	368.33	0.38	5.77	15.66	236.33	0.14	1.37	5.80	166.67	0.09	0.59	3.55
Stbacteria	406.33	0.50	8.08	20.46	265.33	0.27	3.05	11.30	198.00	0.19	1.54	7.79
Ptbacteria	430.00	0.51	8.69	20.94	279.00	0.39	4.40	16.08	190.67	0.27	2.07	11.10
Stfungi	388.33	0.43	6.63	17.51	290.00	0.35	4.23	14.45	225.67	0.41	3.76	17.01
Ptfungi	417.00	0.47	8.22	19.48	274.67	0.38	4.33	15.61	200.00	0.23	1.70	9.41
StRPBact	398.67	0.22	3.68	9.21	265.33	0.08	0.87	3.29	176.33	0.08	0.58	3.29
PtRPBact	388.33	0.22	3.59	9.25	267.33	0.08	0.88	3.29	178.00	0.08	0.59	3.29
STRPBactFung	383.67	0.08	1.26	3.29	240.33	0.08	0.79	3.29	180.33	0.09	0.65	3.63
PTRPBactFung	299.00	0.08	0.98	3.29	218.67	0.08	0.72	3.29	157.33	0.08	0.52	3.29
STRPBFNOHoag	452.00	0.15	2.84	6.29	222.00	0.12	1.12	5.03	160.33	0.15	0.97	6.03
PTRPBFNOHoag	460.33	0.14	2.76	5.90	222.33	0.10	0.90	4.10	165.67	0.14	0.95	5.79
STRPBFNOMin	355.67	0.08	1.17	3.29	313.00	0.08	1.03	3.29	229.67	0.08	0.76	3.29
PTRPBFNOMin	353.67	0.08	1.16	3.29	340.00	0.08	1.12	3.29	244.67	0.08	0.81	3.29
	2/15/05	*2/15/05*	*2/15/05*	*2/15/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/16/05*	*3/16/05*	*3/16/05*	*3/16/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	13.78	0.03	0.43	1.06	6.74	0.01	0.05	0.30	7.62	0.01	0.05	0.25
Stbacteria	26.96	0.11	1.25	4.37	10.33	0.07	0.89	2.81	2.08	0.04	0.28	1.48
Ptbacteria	30.24	0.18	2.82	7.27	11.72	0.11	1.16	4.51	11.35	0.06	0.38	2.46
Stfungi	15.30	0.13	1.75	5.40	6.33	0.10	1.34	4.32	11.22	0.09	0.62	3.52
Ptfungi	19.16	0.06	1.40	2.60	13.01	0.05	0.68	1.86	31.18	0.09	0.51	3.90
StRPBact	9.35	0.03	0.45	1.04	4.36	0.00	0.01	0.00	12.00	0.00	0.04	0.00
PtRPBact	10.41	0.01	0.22	0.60	3.51	0.00	0.01	0.00	3.79	0.00	0.01	0.00
STRPBactFung	10.20	0.00	0.03	0.00	7.22	0.00	0.02	0.00	12.35	0.01	0.05	0.33
PTRPBactFung	48.52	0.00	0.16	0.00	28.20	0.00	0.09	0.00	21.94	0.00	0.07	0.00
STRPBFNOHoag	17.01	0.01	0.13	0.21	6.77	0.00	0.06	0.19	3.18	0.01	0.06	0.29
PTRPBFNOHoag	38.92	0.02	0.55	0.71	10.15	0.02	0.12	0.64	9.29	0.02	0.08	0.77

Table K-4 (cont.): Magnesium in drainage water, averages and standard error.

0.04 mg/L	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*
Sample Date	***3/29/05***	***3/29/05***	***3/29/05***	***3/29/05***	***4/12/05***	***4/12/05***	***4/12/05***	***4/12/05***	***4/26/05***	***4/26/05***	***4/26/05***	***4/26/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.00	0.00	0.10	20	0.01	0.01	0.52	20	0.00	0.00	0.17
AbioticSA	175	0.24	1.69	9.70	116	0.08	0.38	3.29	253	0.08	0.83	3.29
AbioticSB	158	0.25	1.62	10.28	94	0.08	0.31	3.29	181	0.08	0.60	3.29
AbioticSC	170	0.27	1.89	11.15	106	0.08	0.35	3.29	271	0.08	0.89	3.29
STBacteriaSA	208	0.43	3.70	17.79	139	0.08	0.46	3.29	297	0.13	1.53	5.16
STBacteriaSB	200	0.34	2.83	14.16	135	0.08	0.44	3.29	263	0.10	1.06	4.02
STBacteriaSC	202	0.25	2.06	10.22	148	0.08	0.49	3.29	291	0.18	2.16	7.43
PTBacteriaSA	196	0.34	2.74	13.96	146	0.08	0.48	3.29	232	0.11	1.06	4.57
PTBacteriaSB	197	0.37	3.03	15.35	146	0.08	0.48	3.29	302	0.10	1.23	4.09
PTBacteriaSC	169	0.21	1.44	8.51	132	0.10	0.53	4.02	272	0.24	2.65	9.77
STFungiSA	237	0.19	1.81	7.63	169	0.08	0.56	3.29	331	0.08	1.09	3.29
STFungiSB	195	0.31	2.45	12.61	152	0.10	0.62	4.07			0.00	0.00
STFungiSC	207	0.49	4.16	20.13	170	0.13	0.94	5.53	326	0.25	3.41	10.45
PTFungiSA	187	0.56	4.29	22.88	136	0.09	0.49	3.57	290	0.26	3.10	10.70
PTFungiSB	215	0.35	3.06	14.21	142	0.08	0.47	3.29			0.00	0.00
PTFungiSC	246	0.29	2.99	12.14	181	0.08	0.60	3.29	330	0.14	1.88	5.69
STRPBactSA	186	0.08	0.61	3.29	121	0.08	0.40	3.29	291	0.08	0.96	3.29
STRPBactSB	186	0.08	0.61	3.29	125	0.08	0.41	3.29	271	0.08	0.89	3.29
STRPBactSC	184	0.08	0.60	3.29	131	0.08	0.43	3.29	273	0.08	0.90	3.29
PTRPBactSA	178	0.08	0.59	3.29	128	0.08	0.42	3.29	276	0.08	0.91	3.29
PTRPBactSB	187	0.08	0.62	3.29	114	0.08	0.37	3.29	257	0.08	0.85	3.29
PTRPBactSC	197	0.08	0.65	3.29	118	0.08	0.39	3.29	285	0.08	0.94	3.29
STRPBactFungSA	161	0.08	0.53	3.29	103	0.08	0.34	3.29	260	0.08	0.86	3.29
STRPBactFungSB	216	0.08	0.71	3.29	144	0.08	0.48	3.29	297	0.08	0.98	3.29
STRPBactFungSC	173	0.08	0.57	3.29	119	0.08	0.39	3.29	262	0.08	0.86	3.29
PTRPBactFungSA	117	0.08	0.39	3.29	75	0.08	0.25	3.29	185	0.08	0.61	3.29
PTRPBactFungSB	181	0.08	0.60	3.29	129	0.08	0.42	3.29	272	0.08	0.89	3.29
PTRPBactFungSC	171	0.08	0.56	3.29	123	0.08	0.40	3.29	275	0.08	0.90	3.29
STRPBFNOHoagSA	153	0.15	0.94	6.12	82	0.18	0.61	7.44	238	0.13	1.32	5.54
STRPBFNOHoagSB	157	0.15	1.00	6.33	95	0.19	0.73	7.69	242	0.16	1.55	6.42
STRPBFNOHoagSC	194	0.16	1.24	6.38	107	0.17	0.73	6.83	256	0.13	1.37	5.35
PTRPBFNOHoagSA	147	0.12	0.75	5.08	96	0.16	0.64	6.69	184	0.14	1.09	5.93
PTRPBFNOHoagSB	159	0.17	1.09	6.85	107	0.14	0.61	5.70	253	0.15	1.61	6.37
PTRPBFNOHoagSC	200	0.13	1.05	5.24	120	0.16	0.80	6.64	287	0.13	1.53	5.35
STRPBFNOMinSA	233	0.16	1.49	6.38	173	0.08	0.57	3.29	320	0.08	1.05	3.29
STRPBFNOMinSB	259	0.13	1.40	5.40	191	0.08	0.63	3.29	333	0.08	1.10	3.29
STRPBFNOMinSC	266	0.12	1.35	5.09	186	0.08	0.61	3.29	334	0.08	1.10	3.29
PTRPBFNOMinSA	256	0.13	1.32	5.14	177	0.08	0.58	3.29	356	0.08	1.17	3.29
PTRPBFNOMinSB	208	0.10	0.89	4.26	164	0.08	0.54	3.29	318	0.08	1.05	3.29
PTRPBFNOMinSC	255	0.09	0.96	3.74	187	0.08	0.62	3.29	358	0.08	1.18	3.29
	3/29/05	*3/29/05*	*3/29/05*	*3/29/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/26/05*	*4/26/05*	*4/26/05*	*4/26/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	167.33	0.25	1.74	10.38	105.67	0.08	0.35	3.29	235.00	0.08	0.77	3.29
Stbacteria	203.33	0.34	2.87	14.06	140.67	0.08	0.46	3.29	283.67	0.13	1.58	5.54
Ptbacteria	187.67	0.31	2.40	12.61	141.67	0.09	0.50	3.53	268.33	0.15	1.65	6.14
Stfungi	212.67	0.33	2.81	13.45	163.67	0.10	0.70	4.30	328.83	0.17	1.50	4.58
Ptfungi	216.33	0.40	3.45	16.41	153.00	0.08	0.52	3.38	310.00	0.20	1.66	5.46
StRPBact	185.00	0.08	0.61	3.29	126.00	0.08	0.41	3.29	278.67	0.08	0.92	3.29
PtRPBact	187.67	0.08	0.62	3.29	119.67	0.08	0.39	3.29	272.67	0.08	0.90	3.29
STRPBactFung	183.33	0.08	0.60	3.29	122.33	0.08	0.40	3.29	273.00	0.08	0.90	3.29
PTRPBactFung	156.67	0.08	0.52	3.29	108.67	0.08	0.36	3.29	243.67	0.08	0.80	3.29
STRPBFNOHoag	168.33	0.15	1.06	6.28	94.33	0.18	0.69	7.32	245.00	0.14	1.41	5.77
PTRPBFNOHoag	168.67	0.14	0.96	5.72	107.67	0.15	0.68	6.34	241.33	0.14	1.41	5.88
STRPBFNOMin	252.33	0.14	1.41	5.62	183.67	0.08	0.60	3.29	329.33	0.08	1.08	3.29
PTRPBFNOMin	240.00	0.11	1.05	4.38	176.00	0.08	0.58	3.29	343.67	0.08	1.13	3.29
	3/29/05	*3/29/05*	*3/29/05*	*3/29/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/26/05*	*4/26/05*	*4/26/05*	*4/26/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	5.04	0.01	0.08	0.42	6.36	0.00	0.02	0.00	27.50	0.00	0.09	0.00
Stbacteria	2.40	0.05	0.47	2.19	3.84	0.00	0.01	0.00	10.48	0.02	0.32	1.00
Ptbacteria	9.17	0.05	0.49	2.09	4.67	0.01	0.02	0.24	20.28	0.04	0.51	1.82
Stfungi	12.49	0.09	0.70	3.63	5.84	0.02	0.12	0.65	2.04	0.07	1.01	3.09
Ptfungi	17.04	0.08	0.42	3.29	14.11	0.00	0.04	0.09	16.33	0.05	0.90	3.09
StRPBact	0.67	0.00	0.00	0.00	2.91	0.00	0.01	0.00	6.36	0.00	0.02	0.00
PtRPBact	5.49	0.00	0.02	0.00	4.16	0.00	0.01	0.00	8.25	0.00	0.03	0.00
STRPBactFung	16.70	0.00	0.05	0.00	11.93	0.00	0.04	0.00	12.01	0.00	0.04	0.00
PTRPBactFung	19.88	0.00	0.07	0.00	17.09	0.00	0.06	0.00	29.51	0.00	0.10	0.00
STRPBFNOHoag	13.05	0.00	0.09	0.08	7.22	0.01	0.04	0.25	5.46	0.01	0.07	0.33
PTRPBFNOHoag	16.05	0.01	0.11	0.56	6.94	0.01	0.06	0.32	30.30	0.01	0.16	0.30

Table K-4 (cont.): Magnesium in drainage water, averages and standard error.

0.04 mg/L	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*
Sample Date	***5/10/05***	***5/10/05***	***5/10/05***	***5/10/05***	***5/24/05***	***5/24/05***	***5/24/05***	***5/24/05***	***6/7/05***	***6/7/05***	***6/7/05***	***6/7/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.00	0.00	0.09	20	0.00	0.00	0.16	20	0.00	0.00	0.00
AbioticSA	249	0.08	0.82	3.29	131	0.08	0.43	3.29	129	0.08	0.42	3.29
AbioticSB	246	0.08	0.81	3.29	114	0.09	0.41	3.58	112	0.08	0.37	3.29
AbioticSC	253	0.08	0.83	3.29	112	0.09	0.43	3.80	110	0.08	0.36	3.29
STBacteriaSA	269	0.08	0.89	3.29	148	0.08	0.49	3.29	142	0.08	0.47	3.29
STBacteriaSB	197	0.08	0.65	3.29	136	0.08	0.45	3.29	141	0.08	0.47	3.29
STBacteriaSC	260	0.08	0.86	3.29	166	0.08	0.55	3.29	157	0.08	0.52	3.29
PTBacteriaSA	235	0.08	0.77	3.29	148	0.51	3.14	21.17	136	0.08	0.45	3.29
PTBacteriaSB	273	0.08	0.90	3.29	93	0.09	0.33	3.52	92	0.29	1.10	11.87
PTBacteriaSC	181	0.08	0.59	3.29	149	0.11	0.69	4.60	155	0.11	0.71	4.58
STFungiSA	275	0.08	0.90	3.29	164	0.08	0.54	3.29	145	0.08	0.48	3.29
STFungiSB	256	0.08	0.84	3.29	148	0.08	0.49	3.29	144	0.08	0.48	3.29
STFungiSC	287	0.08	0.94	3.29	142	0.08	0.47	3.29	140	0.08	0.46	3.29
PTFungiSA	264	0.13	1.45	5.50	155	0.08	0.51	3.29	153	0.08	0.50	3.29
PTFungiSB	265	0.13	1.39	5.24	150	0.08	0.49	3.29	154	0.08	0.51	3.29
PTFungiSC	282	0.08	0.93	3.29	131	0.08	0.43	3.29	157	0.08	0.52	3.29
STRPBactSA	264	0.08	0.87	3.29	135	0.08	0.44	3.29	126	0.08	0.41	3.29
STRPBactSB	262	0.08	0.86	3.29	144	0.08	0.47	3.29	129	0.08	0.42	3.29
STRPBactSC	256	0.08	0.84	3.29	117	0.08	0.38	3.29	112	0.08	0.37	3.29
PTRPBactSA	251	0.08	0.83	3.29	144	0.08	0.47	3.29	134	0.08	0.44	3.29
PTRPBactSB	258	0.08	0.85	3.29	125	0.08	0.41	3.29	113	0.08	0.37	3.29
PTRPBactSC	254	0.08	0.84	3.29	137	0.08	0.45	3.29	128	0.08	0.42	3.29
STRPBactFungSA	232	0.08	0.76	3.29	131	0.08	0.43	3.29	132	0.08	0.44	3.29
STRPBactFungSB	276	0.08	0.91	3.29	149	0.08	0.49	3.29	139	0.08	0.46	3.29
STRPBactFungSC	255	0.08	0.84	3.29	130	0.08	0.43	3.29	127	0.08	0.42	3.29
PTRPBactFungSA	170	0.08	0.56	3.29	100	0.08	0.33	3.29	87	0.08	0.29	3.29
PTRPBactFungSB	261	0.08	0.86	3.29	117	0.08	0.39	3.29	108	0.08	0.36	3.29
PTRPBactFungSC	266	0.08	0.88	3.29	93	0.08	0.31	3.29	87	0.08	0.29	3.29
STRPBFNOHoagSA	286	0.12	1.43	5.01	99	0.15	0.62	6.26	100	0.15	0.62	6.16
STRPBFNOHoagSB	306	0.11	1.43	4.69	122	0.13	0.65	5.30	113	0.12	0.57	5.01
STRPBFNOHoagSC	290	0.13	1.53	5.28	126	0.16	0.82	6.53	117	0.13	0.61	5.17
PTRPBFNOHoagSA	315	0.12	1.58	5.01	112	0.09	0.43	3.87	103	0.12	0.51	4.91
PTRPBFNOHoagSB	269	0.12	1.28	4.74	113	0.12	0.57	5.09	95	0.09	0.35	3.71
PTRPBFNOHoagSC	295	0.11	1.32	4.47	115	0.12	0.55	4.77	111	0.10	0.46	4.12
STRPBFNOMinSA	224	0.08	0.74	3.29	177	0.08	0.58	3.29	162	0.08	0.53	3.29
STRPBFNOMinSB	229	0.08	0.76	3.29	174	0.08	0.57	3.29	174	0.08	0.57	3.29
STRPBFNOMinSC	239	0.08	0.79	3.29	170	0.08	0.56	3.29	168	0.08	0.55	3.29
PTRPBFNOMinSA	244	0.08	0.80	3.29	170	0.08	0.56	3.29	158	0.08	0.52	3.29
PTRPBFNOMinSB	229	0.08	0.76	3.29	185	0.08	0.61	3.29	162	0.08	0.53	3.29
PTRPBFNOMinSC	259	0.08	0.85	3.29	153	0.08	0.50	3.29	145	0.08	0.48	3.29
	5/10/05	*5/10/05*	*5/10/05*	*5/10/05*	*5/24/05*	*5/24/05*	*5/24/05*	*5/24/05*	*6/7/05*	*6/7/05*	*6/7/05*	*6/7/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	249.00	0.08	0.82	3.29	119.33	0.09	0.42	3.56	117.00	0.08	0.39	3.29
Stbacteria	242.33	0.08	0.80	3.29	150.33	0.08	0.49	3.29	147.00	0.08	0.48	3.29
Ptbacteria	229.33	0.08	0.76	3.29	130.33	0.24	1.39	9.76	128.00	0.16	0.75	6.58
Stfungi	272.33	0.08	0.90	3.29	151.67	0.08	0.50	3.29	143.33	0.08	0.47	3.29
Ptfungi	270.00	0.11	1.25	4.68	145.67	0.08	0.48	3.29	154.33	0.08	0.51	3.29
StRPBact	260.67	0.08	0.86	3.29	131.67	0.08	0.43	3.29	122.33	0.08	0.40	3.29
PtRPBact	254.67	0.08	0.84	3.29	135.33	0.08	0.45	3.29	125.33	0.08	0.41	3.29
STRPBactFung	254.00	0.08	0.84	3.29	136.33	0.08	0.45	3.29	133.00	0.08	0.44	3.29
PTRPBactFung	232.33	0.08	0.76	3.29	103.67	0.08	0.34	3.29	94.33	0.08	0.31	3.29
STRPBFNOHoag	294.00	0.12	1.47	4.99	115.33	0.15	0.69	6.03	110.33	0.13	0.60	5.45
PTRPBFNOHoag	293.00	0.12	1.39	4.74	113.00	0.11	0.52	4.58	103.33	0.10	0.44	4.25
STRPBFNOMin	231.00	0.08	0.76	3.29	173.33	0.08	0.57	3.29	167.67	0.08	0.55	3.29
PTRPBFNOMin	244.33	0.08	0.80	3.29	169.67	0.08	0.56	3.29	155.00	0.08	0.51	3.29
	5/10/05	*5/10/05*	*5/10/05*	*5/10/05*	*5/24/05*	*5/24/05*	*5/24/05*	*5/24/05*	*6/7/05*	*6/7/05*	*6/7/05*	*6/7/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	2.03	0.00	0.01	0.00	6.03	0.00	0.01	0.15	6.03	0.00	0.02	0.00
Stbacteria	22.65	0.00	0.07	0.00	8.72	0.00	0.03	0.00	5.17	0.00	0.02	0.00
Ptbacteria	26.69	0.00	0.09	0.00	18.50	0.14	0.88	5.71	18.66	0.06	0.19	2.67
Stfungi	9.02	0.00	0.03	0.00	6.57	0.00	0.02	0.00	1.53	0.00	0.01	0.00
Ptfungi	5.84	0.02	0.16	0.70	7.31	0.00	0.02	0.00	1.20	0.00	0.00	0.00
StRPBact	2.40	0.00	0.01	0.00	7.94	0.00	0.03	0.00	5.24	0.00	0.02	0.00
PtRPBact	2.03	0.00	0.01	0.00	5.55	0.00	0.02	0.00	6.24	0.00	0.02	0.00
STRPBactFung	12.71	0.00	0.04	0.00	6.17	0.00	0.02	0.00	3.48	0.00	0.01	0.00
PTRPBactFung	31.20	0.00	0.10	0.00	7.13	0.00	0.02	0.00	7.00	0.00	0.02	0.00
STRPBFNOHoag	6.11	0.00	0.03	0.17	8.41	0.01	0.06	0.37	5.13	0.01	0.02	0.36
PTRPBFNOHoag	13.32	0.00	0.09	0.16	0.88	0.01	0.04	0.37	4.62	0.01	0.05	0.35

Table K-4 (cont.): Magnesium in drainage water, averages and standard error.

0.04 mg/L	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg
Sample Date	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
Sample ID	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Troy Method Blank	20	0.00	0.00	0.00	20	0.00	0.00	0.00	20	0.00	0.00	0.00	20	0.01	0.01	0.31
AbioticSA	129	0.08	0.43	3.29	144	0.08	0.47	3.27	151	0.08	0.50	3.29	138	0.08	0.45	3.29
AbioticSB	109	0.08	0.36	3.29	126	0.08	0.44	3.48	132	0.08	0.43	3.29	117	0.08	0.39	3.29
AbioticSC	109	0.08	0.36	3.29	117	0.10	0.48	4.11	131	0.08	0.43	3.29	109	0.08	0.36	3.29
STBacteriaSA	155	0.08	0.51	3.29	168	0.09	0.60	3.55	160	0.09	0.59	3.72	157	0.08	0.52	3.29
STBacteriaSB	154	0.08	0.51	3.29	154	0.08	0.54	3.48	156	0.08	0.51	3.29	64	0.08	0.21	3.29
STBacteriaSC	160	0.08	0.53	3.29	142	0.08	0.47	3.29	169	0.11	0.73	4.35	137	0.08	0.45	3.29
PTBacteriaSA	151	0.08	0.50	3.29	147	0.75	4.56	30.97	152	0.98	6.14	40.37	139	0.24	1.35	9.71
PTBacteriaSB	80	0.09	0.29	3.62	99	0.73	2.97	29.85	115	0.24	1.14	9.90	92	0.27	1.04	11.27
PTBacteriaSC	163	0.08	0.54	3.29	161	0.47	3.09	19.18	186	0.18	1.34	7.23	147	0.21	1.25	8.50
STFungiSA	168	0.09	0.62	3.68	165	0.08	0.54	3.29	173	0.14	0.99	5.76	149	0.08	0.49	3.29
STFungiSB	153	0.09	0.58	3.82	151	0.24	1.48	9.76	164	0.15	1.02	6.25	152	0.14	0.90	5.95
STFungiSC	153	0.09	0.57	3.75	150	0.13	0.83	5.51	112	0.15	0.71	6.32	141	0.29	1.66	11.76
PTFungiSA	163	0.08	0.54	3.29	161	0.23	1.50	9.35	174	0.15	1.10	6.32	150	0.13	0.78	5.17
PTFungiSB	163	0.12	0.82	5.04	160	0.10	0.64	3.97	164	0.12	0.83	5.05	150	0.15	0.96	6.38
PTFungiSC	167	0.08	0.55	3.29	170	0.18	1.23	7.25	181	0.08	0.60	3.29	155	0.08	0.51	3.29
STRPBactSA	130	0.08	0.43	3.29	142	0.08	0.47	3.29	153	0.08	0.50	3.29	132	0.08	0.44	3.29
STRPBactSB	127	0.08	0.42	3.29	142	0.08	0.47	3.29	152	0.08	0.50	3.29	129	0.08	0.43	3.29
STRPBactSC	118	0.08	0.39	3.29	125	0.08	0.41	3.29	140	0.08	0.46	3.29	115	0.08	0.38	3.29
PTRPBactSA	136	0.08	0.45	3.29	147	0.08	0.49	3.29	159	0.08	0.52	3.29	143	0.08	0.47	3.29
PTRPBactSB	120	0.08	0.40	3.29	140	0.08	0.46	3.29	147	0.08	0.49	3.29	128	0.08	0.42	3.29
PTRPBactSC	131	0.08	0.43	3.29	135	0.08	0.45	3.29	151	0.08	0.50	3.29	142	0.08	0.47	3.29
STRPBactFungSA	148	0.08	0.49	3.29	134	0.08	0.44	3.29	152	0.08	0.50	3.29	142	0.08	0.47	3.29
STRPBactFungSB	147	0.08	0.48	3.29	145	0.08	0.48	3.29	167	0.08	0.55	3.29	144	0.08	0.48	3.29
STRPBactFungSC	138	0.08	0.45	3.29	140	0.08	0.46	3.29	147	0.08	0.48	3.29	140	0.08	0.46	3.29
PTRPBactFungSA	90	0.08	0.30	3.29	97	0.08	0.32	3.29	122	0.08	0.40	3.29	91	0.08	0.30	3.29
PTRPBactFungSB	106	0.08	0.35	3.29	106	0.08	0.35	3.29	123	0.08	0.40	3.29	115	0.08	0.38	3.29
PTRPBactFungSC	93	0.08	0.31	3.29	95	0.08	0.31	3.29	107	0.08	0.35	3.29	98	0.08	0.32	3.29
STRPBFNOHoagSA	104	0.08	0.34	3.29	102	0.14	0.58	5.72	108	0.09	0.41	3.83	110	0.08	0.36	3.26
STRPBFNOHoagSB	120	0.10	0.47	3.94	123	0.14	0.72	5.86	125	0.12	0.64	5.10	126	0.08	0.39	3.12
STRPBFNOHoagSC	128	0.12	0.64	4.97	124	0.12	0.62	5.02	131	0.12	0.66	5.03	135	0.08	0.43	3.19
PTRPBFNOHoagSA	125	0.10	0.53	4.23	130	0.12	0.61	4.74	143	0.08	0.48	3.40	75	0.09	0.27	3.54
PTRPBFNOHoagSB	113	0.13	0.62	5.50	121	0.11	0.56	4.60	145	0.08	0.48	3.29	124	0.08	0.41	3.29
PTRPBFNOHoagSC	119	0.10	0.51	4.30	125	0.12	0.59	4.74	144	0.08	0.47	3.29	128	0.09	0.49	3.83
STRPBFNOMinSA	163	0.08	0.54	3.29	169	0.08	0.56	3.29	174	0.08	0.57	3.29	178	0.08	0.58	3.29
STRPBFNOMinSB	175	0.08	0.58	3.29	182	0.08	0.60	3.29	193	0.08	0.64	3.29	180	0.08	0.59	3.29
STRPBFNOMinSC	170	0.08	0.56	3.29	172	0.08	0.57	3.29	190	0.08	0.63	3.29	174	0.08	0.57	3.29
PTRPBFNOMinSA	175	0.08	0.58	3.29	174	0.08	0.57	3.29	184	0.08	0.61	3.29	178	0.08	0.59	3.29
PTRPBFNOMinSB	177	0.08	0.58	3.29	185	0.08	0.61	3.29	187	0.08	0.62	3.29	187	0.08	0.62	3.29
PTRPBFNOMinSC	151	0.08	0.50	3.29	156	0.08	0.51	3.29	166	0.08	0.55	3.29	160	0.08	0.53	3.29
	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
Average	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Abiotic	116.00	0.08	0.38	3.29	128.67	0.09	0.46	3.62	138.00	0.08	0.45	3.29	121.33	0.08	0.40	3.29
Stbacteria	156.67	0.08	0.52	3.29	155.00	0.08	0.53	3.44	161.33	0.09	0.61	3.79	119.00	0.08	0.39	3.29
Ptbacteria	131.67	0.08	0.44	3.40	136.00	0.65	3.54	26.66	151.00	0.47	2.87	19.17	126.33	0.24	1.21	9.82
Stfungi	158.00	0.09	0.59	3.75	155.67	0.15	0.95	6.19	149.33	0.15	0.91	6.11	147.33	0.17	1.02	7.00
Ptfungi	164.67	0.09	0.64	3.88	163.67	0.17	1.12	6.86	173.00	0.12	0.84	4.89	151.67	0.12	0.75	4.95
StRPBact	125.00	0.08	0.41	3.29	136.00	0.08	0.45	3.29	148.33	0.08	0.49	3.29	125.67	0.08	0.41	3.29
PtRPBact	129.33	0.08	0.43	3.29	141.00	0.08	0.46	3.29	152.67	0.08	0.50	3.29	138.00	0.08	0.45	3.29
STRPBactFung	144.33	0.08	0.48	3.29	140.00	0.08	0.46	3.29	155.33	0.08	0.51	3.29	142.33	0.08	0.47	3.29
PTRPBactFung	96.33	0.08	0.32	3.29	99.33	0.08	0.33	3.29	117.00	0.08	0.39	3.29	101.33	0.08	0.33	3.29
STRPBFNOHoag	117.67	0.10	0.49	4.07	116.33	0.13	0.64	5.53	121.33	0.11	0.57	4.65	123.33	0.08	0.39	3.19
PTRPBFNOHoag	118.67	0.11	0.55	4.68	125.00	0.11	0.59	4.69	143.67	0.08	0.48	3.33	109.33	0.09	0.39	3.55
STRPBFNOMin	169.00	0.08	0.56	3.29	174.00	0.08	0.57	3.29	186.00	0.08	0.61	3.29	177.00	0.08	0.58	3.29
PTRPBFNOMin	167.67	0.08	0.55	3.29	171.67	0.08	0.57	3.29	179.33	0.08	0.59	3.29	175.00	0.08	0.58	3.29
	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
STE	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Abiotic	6.67	0.00	0.02	0.00	7.94	0.01	0.01	0.25	6.51	0.00	0.02	0.00	8.65	0.00	0.03	0.00
Stbacteria	1.86	0.00	0.01	0.00	7.51	0.00	0.04	0.08	3.84	0.01	0.06	0.31	28.26	0.00	0.09	0.00
Ptbacteria	25.90	0.00	0.08	0.11	18.77	0.09	0.51	3.76	20.50	0.26	1.63	10.63	17.16	0.02	0.09	0.80
Stfungi	5.00	0.00	0.01	0.04	4.84	0.05	0.28	1.90	19.01	0.00	0.10	0.18	3.28	0.06	0.34	2.50
Ptfungi	1.33	0.01	0.09	0.58	3.18	0.04	0.26	1.56	4.93	0.02	0.15	0.88	1.67	0.02	0.13	0.90
StRPBact	3.61	0.00	0.01	0.00	5.67	0.00	0.02	0.00	4.18	0.00	0.01	0.00	5.24	0.00	0.02	0.00
PtRPBact	4.73	0.00	0.02	0.00	3.48	0.00	0.01	0.00	3.53	0.00	0.01	0.00	4.84	0.00	0.02	0.00
STRPBactFung	3.18	0.00	0.01	0.00	3.18	0.00	0.01	0.00	6.01	0.00	0.02	0.00	1.15	0.00	0.00	0.00
PTRPBactFung	4.91	0.00	0.02	0.00	3.38	0.00	0.01	0.00	5.17	0.00	0.02	0.00	7.13	0.00	0.02	0.00
STRPBFNOHoag	7.06	0.01	0.09	0.49	7.17	0.01	0.04	0.26	6.89	0.01	0.08	0.41	7.31	0.00	0.02	0.04
PTRPBFNOHoag	3.46	0.01	0.03	0.41	2.60	0.00	0.02	0.05	0.58	0.00	0.00	0.04	17.04	0.00	0.07	0.15

Table K-5: Iron in drainage water, averages and standard error.

0.03 mg/L	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*
Sample Date	***8/5/04***	***8/5/04***	***8/5/04***	***8/5/04***	***8/19/04***	***8/19/04***	***8/19/04***	***8/19/04***	***9/30/04***	***9/30/04***	***9/30/04***	***9/30/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.0	0.0	0.0	20	0.0	0.0	0.0	20	0.0	0.0	0.0
AbioticSA	258	0.03	0.1	0.5	375	0.03	0.2	0.5	267	0.03	0.1	0.5
AbioticSB	299	0.03	0.2	0.5	367	0.03	0.2	0.5	182	0.03	0.1	0.5
AbioticSC	278	0.03	0.1	0.5	198	0.03	0.1	0.5	227	0.03	0.1	0.5
STBacteriaSA	225	0.03	0.1	0.5	273	0.03	0.1	0.5	285	9.02	45.9	161.1
STBacteriaSB	206	0.03	0.1	0.5	317	0.03	0.2	0.5	293	12.10	63.3	216.1
STBacteriaSC	320	0.03	0.2	0.5	312	0.03	0.2	0.5	277	11.84	58.6	211.4
PTBacteriaSA	270	0.03	0.1	0.5	312	0.03	0.2	0.5	206	2.16	7.9	38.5
PTBacteriaSB	268	0.03	0.1	0.5	268	0.03	0.1	0.5	192	1.57	5.4	28.1
PTBacteriaSC	327	0.03	0.2	0.5	286	0.03	0.2	0.5	217	2.40	9.3	42.9
STFungiSA	264	0.03	0.1	0.5	272	0.03	0.1	0.5	249	1.39	6.2	24.8
STFungiSB	265	0.03	0.1	0.5	310	0.03	0.2	0.5	227	3.16	12.8	56.4
STFungiSC	313	0.03	0.2	0.5	313	0.03	0.2	0.5	246	2.62	11.5	46.7
PTFungiSA	200	0.03	0.1	0.5	367	0.03	0.2	0.5	226	1.40	5.6	24.9
PTFungiSB	296	0.03	0.2	0.5	356	0.03	0.2	0.5	306	2.74	15.0	48.9
PTFungiSC	272	0.03	0.1	0.5	258	0.03	0.1	0.5	180	2.49	8.0	44.5
STRPBactSA	336	0.03	0.2	0.5	265	0.03	0.1	0.5	222	0.03	0.1	0.5
STRPBactSB	163	0.03	0.1	0.5	310	0.03	0.2	0.5	204	0.03	0.1	0.5
STRPBactSC	258	0.03	0.1	0.5	368	0.03	0.2	0.5	202	0.03	0.1	0.5
PTRPBactSA	222	0.03	0.1	0.5	254	0.03	0.1	0.5	271	0.03	0.1	0.5
PTRPBactSB	172	0.03	0.1	0.5	263	0.03	0.1	0.5	224	0.03	0.1	0.5
PTRPBactSC	253	0.03	0.1	0.5	288	0.03	0.2	0.5	226	0.03	0.1	0.5
STRPBactFungSA	326	0.03	0.2	0.5	292	0.03	0.2	0.5	223	0.03	0.1	0.5
STRPBactFungSB	206	0.03	0.1	0.5	321	0.03	0.2	0.5	252	0.03	0.1	0.5
STRPBactFungSC	340	0.03	0.2	0.5	330	0.03	0.2	0.5	238	0.03	0.1	0.5
PTRPBactFungSA	246	0.03	0.1	0.5	272	0.03	0.1	0.5	212	0.03	0.1	0.5
PTRPBactFungSB	217	0.03	0.1	0.5	298	0.03	0.2	0.5	206	0.03	0.1	0.5
PTRPBactFungSC	315	0.03	0.2	0.5	216	0.03	0.1	0.5	269	0.03	0.1	0.5
STRPBFNOHoagSA	296	0.03	0.2	0.5	373	0.03	0.2	0.5	222	0.03	0.1	0.5
STRPBFNOHoagSB	193	0.03	0.1	0.5	342	0.03	0.2	0.5	223	0.03	0.1	0.5
STRPBFNOHoagSC	241	0.03	0.1	0.5	245	0.03	0.1	0.5	316	0.03	0.2	0.5
PTRPBFNOHoagSA	340	0.03	0.2	0.5	358	0.03	0.2	0.5	320	0.06	0.3	1.0
PTRPBFNOHoagSB	220	0.03	0.1	0.5	323	0.03	0.2	0.5	317	0.03	0.2	0.5
PTRPBFNOHoagSC	346	0.03	0.2	0.5	348	0.03	0.2	0.5	260	0.03	0.1	0.5
STRPBFNOMinSA	381	0.03	0.2	0.5	452	0.03	0.2	0.5	201	0.03	0.1	0.5
STRPBFNOMinSB	396	0.03	0.2	0.5	367	0.03	0.2	0.5	308	0.03	0.2	0.5
STRPBFNOMinSC	329	0.03	0.2	0.5	340	0.03	0.2	0.5	244	0.03	0.1	0.5
PTRPBFNOMinSA	351	0.03	0.2	0.5	471	0.03	0.3	0.5	294	0.03	0.2	0.5
PTRPBFNOMinSB	300	0.03	0.2	0.5	333	0.03	0.2	0.5	268	0.03	0.1	0.5
PTRPBFNOMinSC	422	0.03	0.2	0.5	515	0.03	0.3	0.5	268	0.03	0.1	0.5
	8/5/04	*8/5/04*	*8/5/04*	*8/5/04*	*8/19/04*	*8/19/04*	*8/19/04*	*8/19/04*	*9/30/04*	*9/30/04*	*9/30/04*	*9/30/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	278.33	0.03	0.15	0.54	313.33	0.03	0.17	0.54	225.33	0.03	0.12	0.54
Stbacteria	249.83	0.03	0.13	0.54	300.67	0.03	0.16	0.54	285.00	10.99	55.93	196.19
Ptbacteria	288.33	0.03	0.15	0.54	288.67	0.03	0.15	0.54	205.00	2.04	7.55	36.51
Stfungi	280.50	0.03	0.15	0.54	298.33	0.03	0.16	0.54	240.67	2.39	10.15	42.62
Ptfungi	256.00	0.03	0.14	0.54	327.00	0.03	0.18	0.54	237.33	2.21	9.54	39.45
StRPBact	252.17	0.03	0.14	0.54	314.33	0.03	0.17	0.54	209.33	0.03	0.11	0.54
PtRPBact	215.67	0.03	0.12	0.54	268.33	0.03	0.14	0.54	240.33	0.03	0.13	0.54
STRPBactFung	290.50	0.03	0.16	0.54	314.33	0.03	0.17	0.54	237.67	0.03	0.13	0.54
PTRPBactFung	259.17	0.03	0.14	0.54	262.00	0.03	0.14	0.54	229.00	0.03	0.12	0.54
STRPBFNOHoag	243.33	0.03	0.13	0.54	320.00	0.03	0.17	0.54	253.67	0.03	0.14	0.54
PTRPBFNOHoag	301.83	0.03	0.16	0.54	343.00	0.03	0.18	0.54	299.00	0.04	0.21	0.69
STRPBFNOMin	368.67	0.03	0.20	0.54	386.33	0.03	0.21	0.54	251.00	0.03	0.13	0.54
PTRPBFNOMin	357.67	0.03	0.19	0.54	439.67	0.03	0.24	0.54	276.67	0.03	0.15	0.54
	8/5/04	*8/5/04*	*8/5/04*	*8/5/04*	*8/19/04*	*8/19/04*	*8/19/04*	*8/19/04*	*9/30/04*	*9/30/04*	*9/30/04*	*9/30/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	11.84	0.00	0.01	0.00	57.71	0.00	0.03	0.00	24.55	0.00	0.01	0.00
Stbacteria	35.26	0.00	0.02	0.00	13.91	0.00	0.01	0.00	4.62	0.98	5.19	17.59
Ptbacteria	19.34	0.00	0.01	0.00	12.77	0.00	0.01	0.00	7.23	0.25	1.15	4.39
Stfungi	16.00	0.00	0.01	0.00	13.20	0.00	0.01	0.00	6.89	0.52	2.03	9.35
Ptfungi	28.84	0.00	0.02	0.00	34.65	0.00	0.02	0.00	36.81	0.41	2.80	7.38
StRPBact	49.88	0.00	0.03	0.00	29.81	0.00	0.02	0.00	6.36	0.00	0.00	0.00
PtRPBact	23.60	0.00	0.01	0.00	10.17	0.00	0.01	0.00	15.34	0.00	0.01	0.00
STRPBactFung	42.69	0.00	0.02	0.00	11.46	0.00	0.01	0.00	8.37	0.00	0.00	0.00
PTRPBactFung	28.91	0.00	0.02	0.00	24.19	0.00	0.01	0.00	20.07	0.00	0.01	0.00
STRPBFNOHoag	29.76	0.00	0.02	0.00	38.55	0.00	0.02	0.00	31.17	0.00	0.02	0.00
PTRPBFNOHoag	40.95	0.00	0.02	0.00	10.41	0.00	0.01	0.00	19.52	0.01	0.06	0.15

Table K-5 (cont.): Iron in drainage water, averages and standard error.

0.03 mg/L	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*
Sample Date	***10/14/04***	***10/14/04***	***10/14/04***	***10/14/04***	***10/28/04***	***10/28/04***	***10/28/04***	***10/28/04***	***11/11/04***	***11/11/04***	***11/11/04***	***11/11/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.0	0.0	0.0	20	0.0	0.0	0.0	20	0.00	0.0	0.0
AbioticSA	361	0.03	0.2	0.5	333	0.03	0.2	0.5	344	0.03	0.2	0.5
AbioticSB	278	0.03	0.1	0.5	310	0.03	0.2	0.5	411	0.03	0.2	0.5
AbioticSC	190	0.03	0.1	0.5	266	0.03	0.1	0.5	374	0.03	0.2	0.5
STBacteriaSA	375	15.39	103.0	274.7	345	13.01	80.2	232.4	427	13.62	103.8	243.1
STBacteriaSB	341	15.29	93.1	272.9	335	13.73	82.1	245.2	428	15.90	121.5	283.8
STBacteriaSC	385	17.05	117.2	304.4	330	14.46	85.2	258.2	423	16.83	127.1	300.6
PTBacteriaSA	418	3.66	27.3	65.4	347	4.21	26.1	75.2	487	7.70	66.9	137.5
PTBacteriaSB	402	5.72	41.0	102.1	365	4.69	30.6	83.8	492	7.93	69.7	141.7
PTBacteriaSC	403	5.48	39.4	97.9	342	5.06	30.9	90.3	464	7.06	58.5	126.1
STFungiSA	382	6.71	45.8	119.9	335	4.91	29.4	87.7	444	6.70	53.1	119.7
STFungiSB	373	8.77	58.4	156.5	353	6.83	43.0	121.9	437	8.07	63.0	144.1
STFungiSC	328	12.76	74.7	227.8	303	9.78	52.9	174.6	426	10.80	82.2	192.9
PTFungiSA	395	9.21	65.0	164.5	340	7.36	44.7	131.4	453	10.04	81.2	179.2
PTFungiSB	390	8.77	61.1	156.6	351	6.34	39.8	113.3	462	7.92	65.3	141.4
PTFungiSC	381	9.26	63.0	165.4	317	8.06	45.6	144.0	449	10.82	86.7	193.2
STRPBactSA	360	0.03	0.2	0.5	314	0.03	0.2	0.5	416	0.03	0.2	0.5
STRPBactSB	331	0.03	0.2	0.5	292	0.03	0.2	0.5	313	0.03	0.2	0.5
STRPBactSC	336	0.03	0.2	0.5	293	0.03	0.2	0.5	385	0.03	0.2	0.5
PTRPBactSA	349	0.03	0.2	0.5	296	0.03	0.2	0.5	389	0.03	0.2	0.5
PTRPBactSB	244	0.03	0.1	0.5	248	0.03	0.1	0.5	335	0.03	0.2	0.5
PTRPBactSC	354	0.03	0.2	0.5	296	0.03	0.2	0.5	414	0.03	0.2	0.5
STRPBactFungSA	336	0.03	0.2	0.5	269	0.03	0.1	0.5	411	0.03	0.2	0.5
STRPBactFungSB	314	0.03	0.2	0.5	259	0.03	0.1	0.5	400	0.03	0.2	0.5
STRPBactFungSC	344	0.03	0.2	0.5	301	0.03	0.2	0.5	408	0.03	0.2	0.5
PTRPBactFungSA	295	0.03	0.2	0.5	247	0.03	0.1	0.5	325	0.03	0.2	0.5
PTRPBactFungSB	334	0.03	0.2	0.5	285	0.03	0.2	0.5	398	0.03	0.2	0.5
PTRPBactFungSC	355	0.03	0.2	0.5	276	0.03	0.1	0.5	279	0.03	0.1	0.5
STRPBFNOHoagSA	348	0.03	0.2	0.5	301	0.03	0.2	0.5	450	0.03	0.2	0.5
STRPBFNOHoagSB	305	0.03	0.2	0.5	262	0.03	0.1	0.5	485	0.03	0.3	0.5
STRPBFNOHoagSC	352	0.03	0.2	0.5	295	0.03	0.2	0.5	505	0.03	0.3	0.5
PTRPBFNOHoagSA	316	0.03	0.2	0.5	293	0.03	0.2	0.5	508	0.03	0.3	0.5
PTRPBFNOHoagSB	308	0.03	0.2	0.5	294	0.03	0.2	0.5	486	0.03	0.3	0.5
PTRPBFNOHoagSC	304	0.03	0.2	0.5	320	0.03	0.2	0.5	456	0.03	0.2	0.5
STRPBFNOMinSA	429	0.03	0.2	0.5	372	0.03	0.2	0.5	390	0.03	0.2	0.5
STRPBFNOMinSB	443	0.03	0.2	0.5	376	0.03	0.2	0.5	391	0.03	0.2	0.5
STRPBFNOMinSC	441	0.03	0.2	0.5	314	0.03	0.2	0.5	400	0.03	0.2	0.5
PTRPBFNOMinSA	451	0.03	0.2	0.5	306	0.03	0.2	0.5	391	0.03	0.2	0.5
PTRPBFNOMinSB	394	0.03	0.2	0.5	373	0.03	0.2	0.5	398	0.03	0.2	0.5
PTRPBFNOMinSC	442	0.03	0.2	0.5	391	0.03	0.2	0.5	420	0.03	0.2	0.5
	10/14/04	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	276.33	0.03	0.15	0.54	303.00	0.03	0.16	0.54	376.33	0.03	0.20	0.54
Stbacteria	367.00	15.91	104.43	284.03	336.67	13.73	82.51	245.26	426.00	15.45	117.48	275.85
Ptbacteria	407.67	4.95	35.94	88.46	351.33	4.65	29.18	83.09	481.00	7.56	65.05	135.07
Stfungi	361.00	9.41	59.64	168.08	330.33	7.17	41.76	128.03	435.67	8.52	66.09	152.21
Ptfungi	388.67	9.08	63.04	162.21	336.00	7.25	43.36	129.55	454.67	9.59	77.75	171.26
StRPBact	342.33	0.03	0.18	0.54	299.67	0.03	0.16	0.54	371.33	0.03	0.20	0.54
PtRPBact	315.67	0.03	0.17	0.54	280.00	0.03	0.15	0.54	379.33	0.03	0.20	0.54
STRPBactFung	331.33	0.03	0.18	0.54	276.33	0.03	0.15	0.54	406.33	0.03	0.22	0.54
PTRPBactFung	328.00	0.03	0.18	0.54	269.33	0.03	0.14	0.54	334.00	0.03	0.18	0.54
STRPBFNOHoag	335.00	0.03	0.18	0.54	286.00	0.03	0.15	0.54	480.00	0.03	0.26	0.54
PTRPBFNOHoag	309.33	0.03	0.17	0.54	302.33	0.03	0.16	0.54	483.33	0.03	0.26	0.54
STRPBFNOMin	437.67	0.03	0.23	0.54	354.00	0.03	0.19	0.54	393.67	0.03	0.21	0.54
PTRPBFNOMin	429.00	0.03	0.23	0.54	356.67	0.03	0.19	0.54	403.00	0.03	0.22	0.54
	10/14/04	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	49.37	0.00	0.03	0.00	19.66	0.00	0.01	0.00	19.38	0.00	0.01	0.00
Stbacteria	13.32	0.57	7.00	10.21	4.41	0.42	1.47	7.46	1.53	0.96	7.03	17.06
Ptbacteria	5.17	0.65	4.33	11.60	6.98	0.25	1.55	4.38	8.62	0.26	3.37	4.66
Stfungi	16.70	1.77	8.37	31.68	14.62	1.42	6.82	25.27	5.24	1.21	8.53	21.53
Ptfungi	4.10	0.16	1.13	2.79	10.02	0.50	1.82	8.91	3.84	0.87	6.42	15.47
StRPBact	8.95	0.00	0.00	0.00	7.17	0.00	0.00	0.00	30.51	0.00	0.02	0.00
PtRPBact	35.86	0.00	0.02	0.00	16.00	0.00	0.01	0.00	23.31	0.00	0.01	0.00
STRPBactFung	8.97	0.00	0.00	0.00	12.67	0.00	0.01	0.00	3.28	0.00	0.00	0.00
PTRPBactFung	17.58	0.00	0.01	0.00	11.46	0.00	0.01	0.00	34.65	0.00	0.02	0.00
STRPBFNOHoag	15.04	0.00	0.01	0.00	12.12	0.00	0.01	0.00	16.07	0.00	0.01	0.00
PTRPBFNOHoag	3.53	0.00	0.00	0.00	8.84	0.00	0.00	0.00	15.07	0.00	0.01	0.00

Table K-5 (cont.): Iron in drainage water, averages and standard error.

0.03 mg/L	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*
Sample Date	***11/29/04***	***11/29/04***	***11/29/04***	***11/29/04***	***12/9/04***	***12/9/04***	***12/9/04***	***12/9/04***	***12/21/04***	***12/21/04***	***12/21/04***	***12/21/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.0	0.0	0.0	20	0.00	0.0	0.0	20	0.00	0.0	0.0
AbioticSA	489	0.03	0.3	0.5	265	0.03	0.1	0.5	289	0.03	0.2	0.5
AbioticSB	456	0.03	0.2	0.5	230	0.03	0.1	0.5	288	0.03	0.2	0.5
AbioticSC	450	0.03	0.2	0.5	208	0.03	0.1	0.5	273	0.03	0.1	0.5
STBacteriaSA	519	11.70	108.4	208.9	306	16.17	88.4	288.8	333	9.19	54.6	164.1
STBacteriaSB	500	13.79	123.1	246.2	288	16.36	84.2	292.2	329	10.13	59.5	181.0
STBacteriaSC	522	12.50	116.5	223.2	320	17.32	98.9	309.2	328	10.23	59.9	182.7
PTBacteriaSA	489	6.73	58.8	120.2	338	8.84	53.3	157.8	372	5.22	34.7	93.2
PTBacteriaSB	511	6.76	61.7	120.7	323	8.24	47.5	147.1	372	4.85	32.2	86.5
PTBacteriaSC	521	5.94	55.2	106.0	310	9.07	50.2	162.0	343	5.68	34.8	101.5
STFungiSA	450	5.02	40.3	89.6	315	9.00	50.6	160.8	354	4.90	30.9	87.4
STFungiSB	534	7.06	67.3	126.1	295	11.11	58.5	198.3	270	6.30	30.4	112.4
STFungiSC	532	7.69	73.0	137.3	314	9.49	53.2	169.5	335	7.89	47.2	140.9
PTFungiSA	509	8.79	79.9	156.9	298	12.44	66.2	222.1	329	7.87	46.2	140.5
PTFungiSB	507	7.81	70.7	139.5	325	9.51	55.2	169.9	351	6.58	41.2	117.5
PTFungiSC	537	8.97	86.0	160.1	319	11.74	66.9	209.7	339	9.45	57.2	168.7
STRPBactSA	468	0.03	0.3	0.5	270	0.03	0.1	0.5	302	0.03	0.2	0.5
STRPBactSB	423	0.03	0.2	0.5	244	0.03	0.1	0.5	283	0.03	0.2	0.5
STRPBactSC	424	0.03	0.2	0.5	256	0.03	0.1	0.5	285	0.03	0.2	0.5
PTRPBactSA	458	0.03	0.2	0.5	253	0.03	0.1	0.5	291	0.03	0.2	0.5
PTRPBactSB	390	0.03	0.2	0.5	266	0.03	0.1	0.5	222	0.03	0.1	0.5
PTRPBactSC	435	0.03	0.2	0.5	261	0.03	0.1	0.5	276	0.03	0.1	0.5
STRPBactFungSA	468	0.03	0.3	0.5	249	0.03	0.1	0.5	285	0.03	0.2	0.5
STRPBactFungSB	465	0.03	0.2	0.5	256	0.03	0.1	0.5	267	0.03	0.1	0.5
STRPBactFungSC	459	0.03	0.2	0.5	273	0.03	0.1	0.5	291	0.03	0.2	0.5
PTRPBactFungSA	334	0.03	0.2	0.5	204	0.03	0.1	0.5	253	0.03	0.1	0.5
PTRPBactFungSB	417	0.03	0.2	0.5	256	0.03	0.1	0.5	287	0.03	0.2	0.5
PTRPBactFungSC	433	0.03	0.2	0.5	260	0.03	0.1	0.5	230	0.03	0.1	0.5
STRPBFNOHoagSA	555	0.03	0.3	0.5	274	0.03	0.1	0.5	315	0.03	0.2	0.5
STRPBFNOHoagSB	563	0.03	0.3	0.5	297	0.03	0.2	0.5	339	0.03	0.2	0.5
STRPBFNOHoagSC	595	0.03	0.3	0.5	316	0.03	0.2	0.5	395	0.03	0.2	0.5
PTRPBFNOHoagSA	589	0.03	0.3	0.5	332	0.03	0.2	0.5	396	0.03	0.2	0.5
PTRPBFNOHoagSB	555	0.03	0.3	0.5	321	0.03	0.2	0.5	307	0.03	0.2	0.5
PTRPBFNOHoagSC	527	0.03	0.3	0.5	335	0.03	0.2	0.5	312	0.03	0.2	0.5
STRPBFNOMinSA	452	0.03	0.2	0.5	246	0.03	0.1	0.5	286	0.03	0.2	0.5
STRPBFNOMinSB	440	0.03	0.2	0.5	243	0.03	0.1	0.5	278	0.03	0.1	0.5
STRPBFNOMinSC	428	0.03	0.2	0.5	195	0.03	0.1	0.5	302	0.03	0.2	0.5
PTRPBFNOMinSA	433	0.03	0.2	0.5	259	0.03	0.1	0.5	310	0.03	0.2	0.5
PTRPBFNOMinSB	443	0.03	0.2	0.5	211	0.03	0.1	0.5	297	0.03	0.2	0.5
PTRPBFNOMinSC	493	0.03	0.3	0.5	271	0.03	0.1	0.5	311	0.03	0.2	0.5
	11/29/04	*11/29/04*	*11/29/04*	*11/29/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	465.00	0.03	0.25	0.54	234.33	0.03	0.13	0.54	283.33	0.03	0.15	0.54
Stbacteria	513.67	12.66	116.00	226.09	304.67	16.62	90.49	296.73	330.00	9.85	58.03	175.91
Ptbacteria	507.00	6.48	58.57	115.65	323.67	8.72	50.36	155.65	362.33	5.25	33.89	93.73
Stfungi	505.33	6.59	60.23	117.66	308.00	9.87	54.13	176.21	319.67	6.36	36.17	113.58
Ptfungi	517.67	8.52	78.86	152.17	314.00	11.23	62.76	200.55	339.67	7.96	48.21	142.21
StRPBact	438.33	0.03	0.23	0.54	256.67	0.03	0.14	0.54	290.00	0.03	0.16	0.54
PtRPBact	427.67	0.03	0.23	0.54	260.00	0.03	0.14	0.54	263.00	0.03	0.14	0.54
STRPBactFung	464.00	0.03	0.25	0.54	259.33	0.03	0.14	0.54	281.00	0.03	0.15	0.54
PTRPBactFung	394.67	0.03	0.21	0.54	240.00	0.03	0.13	0.54	256.67	0.03	0.14	0.54
STRPBFNOHoag	571.00	0.03	0.31	0.54	295.67	0.03	0.16	0.54	349.67	0.03	0.19	0.54
PTRPBFNOHoag	557.00	0.03	0.30	0.54	329.33	0.03	0.18	0.54	338.33	0.03	0.18	0.54
STRPBFNOMin	440.00	0.03	0.24	0.54	228.00	0.03	0.12	0.54	288.67	0.03	0.15	0.54
PTRPBFNOMin	456.33	0.03	0.24	0.54	247.00	0.03	0.13	0.54	306.00	0.03	0.16	0.54
	11/29/04	*11/29/04*	*11/29/04*	*11/29/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	12.12	0.00	0.01	0.00	16.60	0.00	0.01	0.00	5.17	0.00	0.00	0.00
Stbacteria	6.89	0.61	4.25	10.87	9.26	0.35	4.40	6.31	1.53	0.33	1.70	5.92
Ptbacteria	9.45	0.27	1.87	4.82	8.09	0.25	1.68	4.42	9.67	0.24	0.85	4.33
Stfungi	27.67	0.81	10.09	14.40	6.51	0.64	2.32	11.35	25.43	0.86	5.52	15.44
Ptfungi	9.68	0.36	4.43	6.41	8.19	0.88	3.78	15.76	6.36	0.83	4.71	14.80
StRPBact	14.84	0.00	0.01	0.00	7.51	0.00	0.00	0.00	6.03	0.00	0.00	0.00
PtRPBact	19.97	0.00	0.01	0.00	3.79	0.00	0.00	0.00	20.95	0.00	0.01	0.00
STRPBactFung	2.65	0.00	0.00	0.00	7.13	0.00	0.00	0.00	7.21	0.00	0.00	0.00
PTRPBactFung	30.68	0.00	0.02	0.00	18.04	0.00	0.01	0.00	16.56	0.00	0.01	0.00
STRPBFNOHoag	12.22	0.00	0.01	0.00	12.14	0.00	0.01	0.00	23.70	0.00	0.01	0.00
PTRPBFNOHoag	17.93	0.00	0.01	0.00	4.26	0.00	0.00	0.00	28.87	0.00	0.02	0.00

Table K-5 (cont.): Iron in drainage water, averages and standard error.

0.03 mg/L	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*
Sample Date	***1/4/05***	***1/4/05***	***1/4/05***	***1/4/05***	***1/18/05***	***1/18/05***	***1/18/05***	***1/18/05***	***2/1/05***	***2/1/05***	***2/1/05***	***2/1/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.00	0.0	0.0	20	0.00	0.0	0.0	20	0.00	0.0	0.0
AbioticSA	227	0.03	0.1	0.5	396	0.03	0.2	0.5	480	0.03	0.3	0.5
AbioticSB	228	0.03	0.1	0.5	360	0.03	0.2	0.5	457	0.03	0.2	0.5
AbioticSC	214	0.03	0.1	0.5	325	0.03	0.2	0.5	412	0.03	0.2	0.5
STBacteriaSA	242	2.56	11.1	45.7	404	2.56	18.5	45.8	490	1.21	10.6	21.7
STBacteriaSB	237	2.31	9.8	41.3	390	1.57	10.9	28.0	457	0.46	3.8	8.3
STBacteriaSC	204	4.89	17.8	87.3	393	1.97	13.8	35.1	462	2.21	18.2	39.4
PTBacteriaSA	292	1.74	9.1	31.2	444	2.10	16.6	37.4	505	1.56	14.1	27.9
PTBacteriaSB	295	2.12	11.2	37.9	414	1.75	12.9	31.3	498	1.14	10.1	20.4
PTBacteriaSC	273	2.74	13.3	48.9	421	2.40	18.0	42.8	492	1.90	16.7	34.0
STFungiSA	299	1.86	9.9	33.3	365	2.42	15.8	43.3	382	1.78	12.1	31.7
STFungiSB	276	1.71	8.4	30.6	398	1.67	11.9	29.9	484	1.22	10.6	21.8
STFungiSC	269	1.97	9.5	35.2	416	0.71	5.3	12.7	501	0.56	5.0	10.0
PTFungiSA	255	2.53	11.5	45.1	399	2.30	16.4	41.1	479	1.50	12.9	26.8
PTFungiSB	227	2.21	9.0	39.5	409	1.91	14.0	34.1	492	1.45	12.8	25.9
PTFungiSC	282	2.33	11.7	41.6	407	1.57	11.4	28.0	516	1.62	14.9	28.9
STRPBactSA	245	0.03	0.1	0.5	325	0.03	0.2	0.5	492	0.03	0.3	0.5
STRPBactSB	220	0.03	0.1	0.5	364	0.03	0.2	0.5	455	0.03	0.2	0.5
STRPBactSC	227	0.03	0.1	0.5	369	0.04	0.3	0.7	434	0.03	0.2	0.5
PTRPBactSA	219	0.03	0.1	0.5	392	0.03	0.2	0.5	461	0.03	0.2	0.5
PTRPBactSB	241	0.03	0.1	0.5	288	0.03	0.2	0.5	454	0.03	0.2	0.5
PTRPBactSC	227	0.03	0.1	0.5	380	0.03	0.2	0.5	461	0.03	0.2	0.5
STRPBactFungSA	211	0.03	0.1	0.5	381	0.03	0.2	0.5	454	0.03	0.2	0.5
STRPBactFungSB	219	0.03	0.1	0.5	340	0.03	0.2	0.5	452	0.03	0.2	0.5
STRPBactFungSC	223	0.03	0.1	0.5	376	0.03	0.2	0.5	461	0.03	0.2	0.5
PTRPBactFungSA	128	0.03	0.1	0.5	311	0.03	0.2	0.5	330	0.03	0.2	0.5
PTRPBactFungSB	203	0.03	0.1	0.5	367	0.03	0.2	0.5	427	0.05	0.4	0.8
PTRPBactFungSC	212	0.03	0.1	0.5	368	0.04	0.3	0.7	438	0.03	0.2	0.5
STRPBFNOHoagSA	307	0.03	0.2	0.5	434	0.03	0.2	0.5	483	0.03	0.3	0.5
STRPBFNOHoagSB	327	0.03	0.2	0.5	442	0.03	0.2	0.5	512	0.03	0.3	0.5
STRPBFNOHoagSC	322	0.03	0.2	0.5	463	0.03	0.2	0.5	533	0.03	0.3	0.5
PTRPBFNOHoagSA	318	0.03	0.2	0.5	448	0.03	0.2	0.5	543	0.03	0.3	0.5
PTRPBFNOHoagSB	308	0.03	0.2	0.5	446	0.03	0.2	0.5	530	0.03	0.3	0.5
PTRPBFNOHoagSC	313	0.03	0.2	0.5	464	0.03	0.2	0.5	561	0.03	0.3	0.5
STRPBFNOMinSA	177	0.03	0.1	0.5	356	0.03	0.2	0.5	442	0.03	0.2	0.5
STRPBFNOMinSB	201	0.03	0.1	0.5	351	0.03	0.2	0.5	417	0.03	0.2	0.5
STRPBFNOMinSC	153	0.03	0.1	0.5	342	0.03	0.2	0.5	425	0.03	0.2	0.5
PTRPBFNOMinSA	193	0.03	0.1	0.5	353	0.03	0.2	0.5	410	0.03	0.2	0.5
PTRPBFNOMinSB	201	0.03	0.1	0.5	351	0.03	0.2	0.5	431	0.03	0.2	0.5
PTRPBFNOMinSC	190	0.03	0.1	0.5	293	0.03	0.2	0.5	367	0.03	0.2	0.5
	1/4/05	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	223.00	0.03	0.12	0.54	360.33	0.03	0.19	0.54	449.67	0.03	0.24	0.54
Stbacteria	227.67	3.25	12.89	58.10	395.67	2.03	14.40	36.30	469.67	1.29	10.87	23.11
Ptbacteria	286.67	2.20	11.20	39.30	426.33	2.08	15.87	37.18	498.33	1.54	13.66	27.43
Stfungi	281.33	1.85	9.29	33.03	393.00	1.60	10.99	28.62	455.67	1.19	9.23	21.18
Ptfungi	254.67	2.36	10.74	42.09	405.00	1.93	13.92	34.41	495.67	1.52	13.51	27.22
StRPBact	230.67	0.03	0.12	0.54	352.67	0.03	0.21	0.59	460.33	0.03	0.25	0.54
PtRPBact	229.00	0.03	0.12	0.54	353.33	0.03	0.19	0.54	458.67	0.03	0.25	0.54
STRPBactFung	217.67	0.03	0.12	0.54	365.67	0.03	0.20	0.54	455.67	0.03	0.24	0.54
PTRPBactFung	181.00	0.03	0.10	0.54	348.67	0.03	0.21	0.60	398.33	0.04	0.26	0.63
STRPBFNOHoag	318.67	0.03	0.17	0.54	446.33	0.03	0.24	0.54	509.33	0.03	0.27	0.54
PTRPBFNOHoag	313.00	0.03	0.17	0.54	452.67	0.03	0.24	0.54	544.67	0.03	0.29	0.54
STRPBFNOMin	177.00	0.03	0.09	0.54	349.67	0.03	0.19	0.54	428.00	0.03	0.23	0.54
PTRPBFNOMin	194.67	0.03	0.10	0.54	332.33	0.03	0.18	0.54	402.67	0.03	0.22	0.54
	1/4/05	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	4.51	0.00	0.00	0.00	20.50	0.00	0.01	0.00	19.97	0.00	0.01	0.00
Stbacteria	11.92	0.82	2.49	14.67	4.26	0.29	2.21	5.18	10.27	0.51	4.17	9.02
Ptbacteria	6.89	0.29	1.23	5.17	9.06	0.19	1.52	3.35	3.76	0.22	1.92	3.95
Stfungi	9.06	0.08	0.45	1.35	14.93	0.49	3.06	8.84	37.16	0.35	2.15	6.27
Ptfungi	15.88	0.09	0.88	1.62	3.06	0.21	1.45	3.80	10.84	0.05	0.70	0.88
StRPBact	7.45	0.00	0.00	0.00	13.91	0.00	0.02	0.05	16.95	0.00	0.01	0.00
PtRPBact	6.43	0.00	0.00	0.00	32.85	0.00	0.02	0.00	2.33	0.00	0.00	0.00
STRPBactFung	3.53	0.00	0.00	0.00	12.91	0.00	0.01	0.00	2.73	0.00	0.00	0.00
PTRPBactFung	26.63	0.00	0.01	0.00	18.84	0.00	0.03	0.06	34.31	0.01	0.05	0.10
STRPBFNOHoag	6.01	0.00	0.00	0.00	8.65	0.00	0.00	0.00	14.50	0.00	0.01	0.00
PTRPBFNOHoag	2.89	0.00	0.00	0.00	5.70	0.00	0.00	0.00	8.99	0.00	0.00	0.00

Table K-5 (cont.): Iron in drainage water, averages and standard error.

0.03 mg/L	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*
Sample Date	***2/15/05***	***2/15/05***	***2/15/05***	***2/15/05***	***3/1/05***	***3/1/05***	***3/1/05***	***3/1/05***	***3/16/05***	***3/16/05***	***3/16/05***	***3/16/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.00	0.0	0.0	20	0.0	0.0	0.0	20	0.0	0.0	0.0
AbioticSA	395	0.03	0.2	0.5	247	0.03	0.1	0.5	169	0.03	0.1	0.5
AbioticSB	361	0.03	0.2	0.5	224	0.03	0.1	0.5	152	0.03	0.1	0.5
AbioticSC	349	0.03	0.2	0.5	239	0.03	0.1	0.5	178	0.03	0.1	0.5
STBacteriaSA	397	0.11	0.8	1.9	255	0.03	0.1	0.5	197	0.03	0.1	0.5
STBacteriaSB	457	0.02	0.2	0.3	255	0.03	0.1	0.5	195	0.03	0.1	0.5
STBacteriaSC	365	0.21	1.4	3.8	286	0.03	0.2	0.5	202	0.03	0.1	0.5
PTBacteriaSA	489	0.05	0.4	0.9	301	0.03	0.2	0.5	213	0.03	0.1	0.5
PTBacteriaSB	389	0.14	1.0	2.5	275	0.15	0.7	2.6	180	0.03	0.1	0.5
PTBacteriaSC	412	0.51	3.8	9.1	261	0.07	0.3	1.3	178	0.03	0.1	0.5
STFungiSA	400	0.22	1.5	3.8	302	0.37	2.0	6.6	247	0.03	0.1	0.5
STFungiSB	358	0.40	2.6	7.2	281	0.14	0.7	2.4	209	0.43	1.6	7.7
STFungiSC	407	0.03	0.2	0.6	286	0.04	0.2	0.8	221	0.30	1.2	5.4
PTFungiSA	421	0.20	1.5	3.6	249	0.05	0.2	0.9	141	0.20	0.5	3.6
PTFungiSB	382	0.11	0.7	1.9	287	0.03	0.2	0.5	212	0.03	0.1	0.5
PTFungiSC	448	0.24	2.0	4.4	289	0.15	0.8	2.6	247	0.03	0.1	0.5
STRPBactSA	407	0.03	0.2	0.5	273	0.03	0.1	0.5	153	0.03	0.1	0.5
STRPBactSB	380	0.03	0.2	0.5	264	0.04	0.2	0.7	185	0.03	0.1	0.5
STRPBactSC	409	0.03	0.2	0.5	258	0.03	0.1	0.5	192	0.03	0.1	0.5
PTRPBactSA	407	0.03	0.2	0.5	271	0.03	0.1	0.5	177	0.03	0.1	0.5
PTRPBactSB	371	0.03	0.2	0.5	260	0.03	0.1	0.5	172	0.03	0.1	0.5
PTRPBactSC	387	0.03	0.2	0.5	270	0.03	0.1	0.5	185	0.03	0.1	0.5
STRPBactFungSA	375	0.03	0.2	0.5	235	0.04	0.2	0.7	167	0.03	0.1	0.5
STRPBactFungSB	404	0.03	0.2	0.5	255	0.04	0.2	0.6	205	0.03	0.1	0.5
STRPBactFungSC	372	0.03	0.2	0.5	232	0.03	0.1	0.5	169	0.03	0.1	0.5
PTRPBactFungSA	210	0.03	0.1	0.5	162	0.03	0.1	0.5	114	0.07	0.1	1.2
PTRPBactFungSB	377	0.03	0.2	0.5	249	0.03	0.1	0.5	185	0.05	0.2	0.9
PTRPBactFungSC	310	0.03	0.2	0.5	244	0.03	0.1	0.5	173	0.03	0.1	0.5
STRPBFNOHoagSA	434	0.03	0.2	0.5	231	0.03	0.1	0.5	161	0.03	0.1	0.5
STRPBFNOHoagSB	436	0.03	0.2	0.5	209	0.03	0.1	0.5	155	0.03	0.1	0.5
STRPBFNOHoagSC	486	0.03	0.3	0.5	227	0.03	0.1	0.5	166	0.03	0.1	0.5
PTRPBFNOHoagSA	523	0.03	0.3	0.5	215	0.03	0.1	0.5	164	0.03	0.1	0.5
PTRPBFNOHoagSB	469	0.03	0.3	0.5	209	0.03	0.1	0.5	151	0.03	0.1	0.5
PTRPBFNOHoagSC	389	0.03	0.2	0.5	242	0.03	0.1	0.5	183	0.03	0.1	0.5
STRPBFNOMinSA	380	0.03	0.2	0.5	288	0.03	0.2	0.5	213	0.03	0.1	0.5
STRPBFNOMinSB	360	0.03	0.2	0.5	321	0.03	0.2	0.5	229	0.03	0.1	0.5
STRPBFNOMinSC	327	0.03	0.2	0.5	329	0.03	0.2	0.5	248	0.03	0.1	0.5
PTRPBFNOMinSA	325	0.03	0.2	0.5	355	0.03	0.2	0.5	243	0.03	0.1	0.5
PTRPBFNOMinSB	348	0.03	0.2	0.5	302	0.03	0.2	0.5	232	0.03	0.1	0.5
PTRPBFNOMinSC	388	0.03	0.2	0.5	364	0.03	0.2	0.5	258	0.03	0.1	0.5
	2/15/05	*2/15/05*	*2/15/05*	*2/15/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/16/05*	*3/16/05*	*3/16/05*	*3/16/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	368.33	0.03	0.20	0.54	236.33	0.03	0.13	0.54	166.67	0.03	0.09	0.54
Stbacteria	406.33	0.11	0.77	2.02	265.33	0.03	0.14	0.54	198.00	0.03	0.11	0.54
Ptbacteria	430.00	0.23	1.72	4.17	279.00	0.08	0.40	1.47	190.67	0.03	0.10	0.54
Stfungi	388.33	0.22	1.46	3.89	290.00	0.18	0.97	3.28	225.67	0.25	0.98	4.55
Ptfungi	417.00	0.18	1.40	3.30	274.67	0.08	0.38	1.36	200.00	0.09	0.25	1.56
StRPBact	398.67	0.03	0.21	0.54	265.33	0.03	0.16	0.59	176.33	0.03	0.09	0.54
PtRPBact	388.33	0.03	0.21	0.54	267.33	0.03	0.14	0.54	178.00	0.03	0.10	0.54
STRPBactFung	383.67	0.03	0.21	0.54	240.33	0.04	0.15	0.63	180.33	0.03	0.10	0.54
PTRPBactFung	299.00	0.03	0.16	0.54	218.67	0.03	0.12	0.54	157.33	0.05	0.13	0.89
STRPBFNOHoag	452.00	0.03	0.24	0.54	222.00	0.03	0.12	0.54	160.33	0.03	0.09	0.54
PTRPBFNOHoag	460.33	0.03	0.25	0.54	222.33	0.03	0.12	0.54	165.67	0.03	0.09	0.54
STRPBFNOMin	355.67	0.03	0.19	0.54	313.00	0.03	0.17	0.54	229.67	0.03	0.12	0.54
PTRPBFNOMin	353.67	0.03	0.19	0.54	340.00	0.03	0.18	0.54	244.67	0.03	0.13	0.54
	2/15/05	*2/15/05*	*2/15/05*	*2/15/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/16/05*	*3/16/05*	*3/16/05*	*3/16/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	13.78	0.00	0.01	0.00	6.74	0.00	0.00	0.00	7.62	0.00	0.00	0.00
Stbacteria	26.96	0.06	0.36	1.01	10.33	0.00	0.01	0.00	2.08	0.00	0.00	0.00
Ptbacteria	30.24	0.14	1.03	2.52	11.72	0.03	0.16	0.60	11.35	0.00	0.01	0.00
Stfungi	15.30	0.11	0.67	1.91	6.33	0.10	0.54	1.75	11.22	0.12	0.44	2.11
Ptfungi	19.16	0.04	0.36	0.73	13.01	0.04	0.19	0.64	31.18	0.06	0.13	1.03
StRPBact	9.35	0.00	0.01	0.00	4.36	0.00	0.01	0.05	12.00	0.00	0.01	0.00
PtRPBact	10.41	0.00	0.01	0.00	3.51	0.00	0.00	0.00	3.79	0.00	0.00	0.00
STRPBactFung	10.20	0.00	0.01	0.00	7.22	0.00	0.01	0.05	12.35	0.00	0.01	0.00
PTRPBactFung	48.52	0.00	0.03	0.00	28.20	0.00	0.02	0.00	21.94	0.01	0.02	0.20
STRPBFNOHoag	17.01	0.00	0.01	0.00	6.77	0.00	0.00	0.00	3.18	0.00	0.00	0.00
PTRPBFNOHoag	38.92	0.00	0.02	0.00	10.15	0.00	0.01	0.00	9.29	0.00	0.00	0.00

Table K-5 (cont.): Iron in drainage water, averages and standard error.

0.03 mg/L	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*
Sample Date	***3/29/05***	***3/29/05***	***3/29/05***	***3/29/05***	***4/12/05***	***4/12/05***	***4/12/05***	***4/12/05***	***4/26/05***	***4/26/05***	***4/26/05***	***4/26/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.0	0.0	0.0	20	0.0	0.0	0.0	20	0.0	0.0	0.0
AbioticSA	175	0.03	0.1	0.5	116	0.03	0.1	0.5	253	0.03	0.1	0.5
AbioticSB	158	0.03	0.1	0.5	94	0.03	0.1	0.5	181	0.03	0.1	0.5
AbioticSC	170	0.03	0.1	0.5	106	0.03	0.1	0.5	271	0.03	0.1	0.5
STBacteriaSA	208	0.03	0.1	0.5	139	0.03	0.1	0.5	297	0.03	0.2	0.5
STBacteriaSB	200	0.03	0.1	0.5	135	0.03	0.1	0.5	263	0.03	0.1	0.5
STBacteriaSC	202	0.03	0.1	0.5	148	0.03	0.1	0.5	291	0.03	0.2	0.5
PTBacteriaSA	196	0.03	0.1	0.5	146	0.03	0.1	0.5	232	0.03	0.1	0.5
PTBacteriaSB	197	0.03	0.1	0.5	146	0.03	0.1	0.5	302	0.03	0.2	0.5
PTBacteriaSC	169	0.03	0.1	0.5	132	0.03	0.1	0.5	272	0.03	0.1	0.5
STFungiSA	237	0.03	0.1	0.5	169	0.03	0.1	0.5	331	0.03	0.2	0.5
STFungiSB	195	0.03	0.1	0.5	152	0.03	0.1	0.5		0.03	0.0	0.5
STFungiSC	207	0.05	0.2	0.8	170	0.03	0.1	0.5	326	0.03	0.2	0.5
PTFungiSA	187	0.03	0.1	0.5	136	0.03	0.1	0.5	290	0.03	0.2	0.5
PTFungiSB	215	0.03	0.1	0.5	142	0.03	0.1	0.5		0.03	0.0	0.5
PTFungiSC	246	0.05	0.2	0.9	181	0.03	0.1	0.5	330	0.03	0.2	0.5
STRPBactSA	186	0.03	0.1	0.5	121	0.03	0.1	0.5	291	0.05	0.3	0.9
STRPBactSB	186	0.03	0.1	0.5	125	0.03	0.1	0.5	271	0.03	0.1	0.5
STRPBactSC	184	0.04	0.1	0.7	131	0.03	0.1	0.5	273	0.03	0.1	0.5
PTRPBactSA	178	0.03	0.1	0.5	128	0.04	0.1	0.6	276	0.06	0.3	1.0
PTRPBactSB	187	0.05	0.2	0.8	114	0.04	0.1	0.6	257	0.03	0.1	0.5
PTRPBactSC	197	0.05	0.2	0.8	118	0.06	0.1	1.1	285	0.03	0.2	0.5
STRPBactFungSA	161	0.03	0.1	0.5	103	0.03	0.1	0.5	260	0.03	0.1	0.5
STRPBactFungSB	216	0.04	0.1	0.6	144	0.03	0.1	0.5	297	0.03	0.2	0.5
STRPBactFungSC	173	0.03	0.1	0.5	119	0.04	0.1	0.8	262	0.03	0.1	0.5
PTRPBactFungSA	117	0.03	0.1	0.5	75	0.05	0.1	0.8	185	0.04	0.1	0.8
PTRPBactFungSB	181	0.04	0.1	0.7	129	0.06	0.1	1.1	272	0.04	0.2	0.8
PTRPBactFungSC	171	0.03	0.1	0.5	123	0.07	0.2	1.3	275	0.03	0.1	0.5
STRPBFNOHoagSA	153	0.03	0.1	0.5	82	0.03	0.0	0.5	238	0.03	0.1	0.5
STRPBFNOHoagSB	157	0.03	0.1	0.5	95	0.03	0.1	0.5	242	0.03	0.1	0.5
STRPBFNOHoagSC	194	0.03	0.1	0.5	107	0.03	0.1	0.5	256	0.03	0.1	0.5
PTRPBFNOHoagSA	147	0.03	0.1	0.5	96	0.03	0.1	0.5	184	0.03	0.1	0.5
PTRPBFNOHoagSB	159	0.03	0.1	0.5	107	0.03	0.1	0.5	253	0.03	0.1	0.5
PTRPBFNOHoagSC	200	0.03	0.1	0.5	120	0.03	0.1	0.5	287	0.03	0.2	0.5
STRPBFNOMinSA	233	0.03	0.1	0.5	173	0.03	0.1	0.5	320	0.03	0.2	0.5
STRPBFNOMinSB	259	0.03	0.1	0.5	191	0.03	0.1	0.5	333	0.03	0.2	0.5
STRPBFNOMinSC	266	0.03	0.1	0.5	186	0.03	0.1	0.5	334	0.03	0.2	0.5
PTRPBFNOMinSA	256	0.03	0.1	0.5	177	0.03	0.1	0.5	356	0.03	0.2	0.5
PTRPBFNOMinSB	208	0.03	0.1	0.5	164	0.03	0.1	0.5	318	0.03	0.2	0.5
PTRPBFNOMinSC	255	0.03	0.1	0.5	187	0.03	0.1	0.5	358	0.03	0.2	0.5
	3/29/05	*3/29/05*	*3/29/05*	*3/29/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/26/05*	*4/26/05*	*4/26/05*	*4/26/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	167.33	0.03	0.09	0.54	105.67	0.03	0.06	0.54	235.00	0.03	0.13	0.54
Stbacteria	203.33	0.03	0.11	0.54	140.67	0.03	0.08	0.54	283.67	0.03	0.15	0.54
Ptbacteria	187.67	0.03	0.10	0.54	141.67	0.03	0.08	0.54	268.33	0.03	0.14	0.54
Stfungi	212.67	0.04	0.13	0.63	163.67	0.03	0.09	0.54	328.83	0.03	0.12	0.54
Ptfungi	216.33	0.04	0.15	0.66	153.00	0.03	0.08	0.54	310.00	0.03	0.11	0.54
StRPBact	185.00	0.03	0.11	0.58	126.00	0.03	0.07	0.54	278.67	0.04	0.18	0.65
PtRPBact	187.67	0.04	0.14	0.73	119.67	0.04	0.09	0.78	272.67	0.04	0.19	0.69
STRPBactFung	183.33	0.03	0.11	0.57	122.33	0.03	0.07	0.61	273.00	0.03	0.15	0.54
PTRPBactFung	156.67	0.03	0.10	0.60	108.67	0.06	0.12	1.09	243.67	0.04	0.17	0.69
STRPBFNOHoag	168.33	0.03	0.09	0.54	94.33	0.03	0.05	0.54	245.00	0.03	0.13	0.54
PTRPBFNOHoag	168.67	0.03	0.09	0.54	107.67	0.03	0.06	0.54	241.33	0.03	0.13	0.54
STRPBFNOMin	252.33	0.03	0.14	0.54	183.67	0.03	0.10	0.54	329.33	0.03	0.18	0.54
PTRPBFNOMin	240.00	0.03	0.13	0.54	176.00	0.03	0.09	0.54	343.67	0.03	0.18	0.54
	3/29/05	*3/29/05*	*3/29/05*	*3/29/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/26/05*	*4/26/05*	*4/26/05*	*4/26/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	5.04	0.00	0.00	0.00	6.36	0.00	0.00	0.00	27.50	0.00	0.01	0.00
Stbacteria	2.40	0.00	0.00	0.00	3.84	0.00	0.00	0.00	10.48	0.00	0.01	0.00
Ptbacteria	9.17	0.00	0.00	0.00	4.67	0.00	0.00	0.00	20.28	0.00	0.01	0.00
Stfungi	12.49	0.01	0.02	0.10	5.84	0.00	0.00	0.00	2.04	0.00	0.06	0.00
Ptfungi	17.04	0.01	0.04	0.12	14.11	0.00	0.01	0.00	16.33	0.00	0.06	0.00
StRPBact	0.67	0.00	0.01	0.04	2.91	0.00	0.00	0.00	6.36	0.01	0.04	0.11
PtRPBact	5.49	0.01	0.02	0.10	4.16	0.01	0.02	0.15	8.25	0.01	0.04	0.15
STRPBactFung	16.70	0.00	0.02	0.03	11.93	0.00	0.01	0.08	12.01	0.00	0.01	0.00
PTRPBactFung	19.88	0.00	0.02	0.07	17.09	0.01	0.03	0.13	29.51	0.00	0.02	0.08
STRPBFNOHoag	13.05	0.00	0.01	0.00	7.22	0.00	0.00	0.00	5.46	0.00	0.00	0.00
PTRPBFNOHoag	16.05	0.00	0.01	0.00	6.94	0.00	0.00	0.00	30.30	0.00	0.02	0.00

Table K-5 (cont.): Iron in drainage water, averages and standard error.

0.03 mg/L	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*	*Fe*
Sample Date	*5/10/05*	*5/10/05*	*5/10/05*	*5/10/05*	*5/24/05*	*5/24/05*	*5/24/05*	*5/24/05*	*6/7/05*	*6/7/05*	*6/7/05*	*6/7/05*
Sample ID	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Troy Method Blank	20	0.0	0.0	0.0	20	0.0	0.0	0.0	20	0.00	0.0	0.1
AbioticSA	249	0.03	0.1	0.5	131	0.03	0.1	0.5	129	0.03	0.1	0.5
AbioticSB	246	0.03	0.1	0.5	114	0.09	0.2	1.7	112	0.03	0.1	0.5
AbioticSC	253	0.03	0.1	0.5	112	0.03	0.1	0.5	110	0.03	0.1	0.5
STBacteriaSA	269	0.03	0.1	0.5	148	0.03	0.1	0.5	142	0.03	0.1	0.5
STBacteriaSB	197	0.03	0.1	0.5	136	0.03	0.1	0.5	141	0.03	0.1	0.5
STBacteriaSC	260	0.03	0.1	0.5	166	0.03	0.1	0.5	157	0.03	0.1	0.5
PTBacteriaSA	235	0.03	0.1	0.5	148	0.09	0.2	1.5	136	0.03	0.1	0.5
PTBacteriaSB	273	0.03	0.1	0.5	93	0.03	0.1	0.5	92	0.03	0.0	0.5
PTBacteriaSC	181		0.0	0.0	149	0.03	0.1	0.5	155	0.03	0.1	0.5
STFungiSA	275		0.0	0.0	164	0.03	0.1	0.5	145	0.03	0.1	0.5
STFungiSB	256	0.03	0.1	0.5	148	0.03	0.1	0.5	144	0.03	0.1	0.5
STFungiSC	287	0.03	0.2	0.5	142	0.03	0.1	0.5	140	0.03	0.1	0.5
PTFungiSA	264	0.03	0.1	0.5	155	0.03	0.1	0.5	153	0.03	0.1	0.5
PTFungiSB	265	0.03	0.1	0.5	150	0.03	0.1	0.5	154	0.03	0.1	0.5
PTFungiSC	282	0.03	0.2	0.5	131	0.03	0.1	0.5	157	0.03	0.1	0.5
STRPBactSA	264	0.05	0.2	0.9	135	0.03	0.1	0.5	126	0.03	0.1	0.5
STRPBactSB	262	0.03	0.1	0.5	144	0.03	0.1	0.5	129	0.03	0.1	0.5
STRPBactSC	256	0.03	0.1	0.5	117	0.03	0.1	0.5	112	0.03	0.1	0.5
PTRPBactSA	251	0.06	0.3	1.1	144	0.04	0.1	0.8	134	0.04	0.1	0.7
PTRPBactSB	258	0.03	0.1	0.5	125	0.03	0.1	0.5	113	0.04	0.1	0.6
PTRPBactSC	254	0.03	0.1	0.5	137	0.03	0.1	0.5	128	0.03	0.1	0.5
STRPBactFungSA	232	0.03	0.1	0.5	131	0.05	0.1	0.9	132	0.04	0.1	0.8
STRPBactFungSB	276	0.03	0.1	0.5	149	0.03	0.1	0.5	139	0.03	0.1	0.5
STRPBactFungSC	255	0.03	0.1	0.5	130	0.03	0.1	0.5	127	0.03	0.1	0.5
PTRPBactFungSA	170	0.04	0.1	0.8	100	0.03	0.1	0.5	87	0.04	0.1	0.8
PTRPBactFungSB	261	0.03	0.1	0.5	117	0.03	0.1	0.5	108	0.03	0.1	0.5
PTRPBactFungSC	266	0.04	0.2	0.6	93	0.03	0.1	0.5	87	0.03	0.0	0.5
STRPBFNOHoagSA	286	0.03	0.2	0.5	99	0.03	0.1	0.5	100	0.03	0.1	0.5
STRPBFNOHoagSB	306	0.03	0.2	0.5	122	0.03	0.1	0.5	113	0.03	0.1	0.5
STRPBFNOHoagSC	290	0.03	0.2	0.5	126	0.03	0.1	0.5	117	0.03	0.1	0.5
PTRPBFNOHoagSA	315	0.03	0.2	0.5	112	0.03	0.1	0.5	103	0.03	0.1	0.5
PTRPBFNOHoagSB	269	0.03	0.1	0.5	113	0.03	0.1	0.5	95	0.03	0.1	0.5
PTRPBFNOHoagSC	295	0.03	0.2	0.5	115	0.03	0.1	0.5	111	0.03	0.1	0.5
STRPBFNOMinSA	224	0.03	0.1	0.5	177	0.03	0.1	0.5	162	0.03	0.1	0.5
STRPBFNOMinSB	229	0.03	0.1	0.5	174	0.03	0.1	0.5	174	0.03	0.1	0.5
STRPBFNOMinSC	239	0.03	0.1	0.5	170	0.03	0.1	0.5	168	0.03	0.1	0.5
PTRPBFNOMinSA	244	0.03	0.1	0.5	170	0.03	0.1	0.5	158	0.03	0.1	0.5
PTRPBFNOMinSB	229	0.03	0.1	0.5	185	0.03	0.1	0.5	162	0.03	0.1	0.5
PTRPBFNOMinSC	259	0.03	0.1	0.5	153	0.03	0.1	0.5	145	0.03	0.1	0.5
	5/10/05	*5/10/05*	*5/10/05*	*5/10/05*	*5/24/05*	*5/24/05*	*5/24/05*	*5/24/05*	*6/7/05*	*6/7/05*	*6/7/05*	*6/7/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	249.00	0.03	0.13	0.54	119.33	0.05	0.11	0.92	117.00	0.03	0.06	0.54
Stbacteria	242.33	0.03	0.13	0.54	150.33	0.03	0.08	0.54	147.00	0.03	0.08	0.54
Ptbacteria	229.33	0.03	0.09	0.36	130.33	0.05	0.12	0.87	128.00	0.03	0.07	0.54
Stfungi	272.33	0.03	0.10	0.36	151.67	0.03	0.08	0.54	143.33	0.03	0.08	0.54
Ptfungi	270.00	0.03	0.14	0.54	145.67	0.03	0.08	0.54	154.33	0.03	0.08	0.54
StRPBact	260.67	0.04	0.17	0.65	131.67	0.03	0.07	0.54	122.33	0.03	0.07	0.54
PtRPBact	254.67	0.04	0.19	0.73	135.33	0.03	0.08	0.62	125.33	0.04	0.08	0.63
STRPBactFung	254.00	0.03	0.14	0.54	136.33	0.04	0.09	0.65	133.00	0.03	0.08	0.62
PTRPBactFung	232.33	0.04	0.15	0.64	103.67	0.03	0.06	0.54	94.33	0.03	0.06	0.61
STRPBFNOHoag	294.00	0.03	0.16	0.54	115.33	0.03	0.06	0.54	110.33	0.03	0.06	0.54
PTRPBFNOHoag	293.00	0.03	0.16	0.54	113.00	0.03	0.06	0.54	103.33	0.03	0.06	0.54
STRPBFNOMin	231.00	0.03	0.12	0.54	173.33	0.03	0.09	0.54	167.67	0.03	0.09	0.54
PTRPBFNOMin	244.33	0.03	0.13	0.54	169.67	0.03	0.09	0.54	155.00	0.03	0.08	0.54
	5/10/05	*5/10/05*	*5/10/05*	*5/10/05*	*5/24/05*	*5/24/05*	*5/24/05*	*5/24/05*	*6/7/05*	*6/7/05*	*6/7/05*	*6/7/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	2.03	0.00	0.00	0.00	6.03	0.02	0.04	0.39	6.03	0.00	0.00	0.00
Stbacteria	22.65	0.00	0.01	0.00	8.72	0.00	0.00	0.00	5.17	0.00	0.00	0.00
Ptbacteria	26.69	0.00	0.05	0.18	18.50	0.02	0.06	0.34	18.66	0.00	0.01	0.00
Stfungi	9.02	0.00	0.05	0.18	6.57	0.00	0.00	0.00	1.53	0.00	0.00	0.00
Ptfungi	5.84	0.00	0.00	0.00	7.31	0.00	0.00	0.00	1.20	0.00	0.00	0.00
StRPBact	2.40	0.01	0.03	0.11	7.94	0.00	0.00	0.00	5.24	0.00	0.00	0.00
PtRPBact	2.03	0.01	0.05	0.19	5.55	0.00	0.01	0.08	6.24	0.00	0.01	0.05
STRPBactFung	12.71	0.00	0.01	0.00	6.17	0.01	0.01	0.11	3.48	0.00	0.01	0.09
PTRPBactFung	31.20	0.00	0.01	0.06	7.13	0.00	0.00	0.00	7.00	0.00	0.01	0.08
STRPBFNOHoag	6.11	0.00	0.00	0.00	8.41	0.00	0.00	0.00	5.13	0.00	0.00	0.00
PTRPBFNOHoag	13.32	0.00	0.01	0.00	0.88	0.00	0.00	0.00	4.62	0.00	0.00	0.00

Table K-5 (cont.): Iron in drainage water, averages and standard error.

0.03 mg/L	Fe	Fe	Fe	Fe	Fe	Fe	Fe	Fe	Fe	Fe	Fe	Fe	Fe	Fe	Fe	Fe
Sample Date	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
Sample ID	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Troy Method Blank	20	0.00	0.0	0.0	20	0.00	0.0	0.0	20	0.00	0.0	0.0	20	0.00	0.0	0.0
AbioticSA	129	0.03	0.1	0.5	144	0.03	0.1	0.5	151	0.03	0.1	0.5	138	0.03	0.1	0.5
AbioticSB	109	0.03	0.1	0.5	126	0.03	0.1	0.5	132	0.03	0.1	0.5	117	0.03	0.1	0.5
AbioticSC	109	0.03	0.1	0.5	117	0.03	0.1	0.5	131	0.03	0.1	0.5	109	0.03	0.1	0.5
STBacteriaSA	155	0.03	0.1	0.5	168	0.03	0.1	0.5	160	0.03	0.1	0.5	157	0.03	0.1	0.5
STBacteriaSB	154	0.03	0.1	0.5	154	0.03	0.1	0.5	156	0.03	0.1	0.5	64	0.03	0.0	0.5
STBacteriaSC	160	0.03	0.1	0.5	142	0.03	0.1	0.5	169	0.03	0.1	0.5	137	0.03	0.1	0.5
PTBacteriaSA	151	0.03	0.1	0.5	147	0.18	0.5	3.2	152	0.20	0.5	3.5	139	0.03	0.1	0.5
PTBacteriaSB	80	0.03	0.0	0.5	99	0.14	0.2	2.5	115	0.03	0.1	0.5	92	0.03	0.0	0.5
PTBacteriaSC	163	0.03	0.1	0.5	161	0.05	0.1	0.9	186	0.03	0.1	0.5	147	0.03	0.1	0.5
STFungiSA	168	0.03	0.1	0.5	165	0.03	0.1	0.5	173	0.03	0.1	0.5	149	0.03	0.1	0.5
STFungiSB	153	0.03	0.1	0.5	151	0.03	0.1	0.5	164	0.03	0.1	0.5	152	0.03	0.1	0.5
STFungiSC	153	0.03	0.1	0.5	150	0.03	0.1	0.5	112	0.03	0.1	0.5	141	0.03	0.1	0.5
PTFungiSA	163	0.03	0.1	0.5	161	0.03	0.1	0.5	174	0.03	0.1	0.5	150	0.03	0.1	0.5
PTFungiSB	163	0.03	0.1	0.5	160	0.03	0.1	0.5	164	0.03	0.1	0.5	150	0.03	0.1	0.5
PTFungiSC	167	0.03	0.1	0.5	170	0.03	0.1	0.5	181	0.03	0.1	0.5	155	0.03	0.1	0.5
STRPBactSA	130	0.03	0.1	0.5	142	0.03	0.1	0.5	153	0.03	0.1	0.5	132	0.03	0.1	0.5
STRPBactSB	127	0.03	0.1	0.5	142	0.03	0.1	0.5	152	0.03	0.1	0.5	129	0.03	0.1	0.5
STRPBactSC	118	0.03	0.1	0.5	125	0.03	0.1	0.5	140	0.03	0.1	0.5	115	0.03	0.1	0.5
PTRPBactSA	136	0.03	0.1	0.5	147	0.05	0.1	0.8	159	0.03	0.1	0.5	143	0.03	0.1	0.5
PTRPBactSB	120	0.03	0.1	0.5	140	0.03	0.1	0.5	147	0.03	0.1	0.5	128	0.03	0.1	0.5
PTRPBactSC	131	0.03	0.1	0.5	135	0.03	0.1	0.5	151	0.03	0.1	0.5	142	0.03	0.1	0.5
STRPBactFungSA	148	0.03	0.1	0.5	134	0.03	0.1	0.5	152	0.03	0.1	0.5	142	0.03	0.1	0.5
STRPBactFungSB	147	0.03	0.1	0.5	145	0.03	0.1	0.5	167	0.03	0.1	0.5	144	0.03	0.1	0.5
STRPBactFungSC	138	0.03	0.1	0.5	140	0.03	0.1	0.5	147	0.03	0.1	0.5	140	0.03	0.1	0.5
PTRPBactFungSA	90	0.03	0.0	0.5	97	0.03	0.1	0.5	122	0.03	0.1	0.5	91	0.03	0.0	0.5
PTRPBactFungSB	106	0.03	0.1	0.5	106	0.03	0.1	0.5	123	0.03	0.1	0.5	115	0.03	0.1	0.5
PTRPBactFungSC	93	0.03	0.0	0.5	95	0.03	0.1	0.5	107	0.03	0.1	0.5	98	0.03	0.1	0.5
STRPBFNOHoagSA	104	0.03	0.1	0.5	102	0.03	0.1	0.5	108	0.03	0.1	0.5	110	0.03	0.1	0.5
STRPBFNOHoagSB	120	0.03	0.1	0.5	123	0.03	0.1	0.5	125	0.03	0.1	0.5	126	0.03	0.1	0.5
STRPBFNOHoagSC	128	0.03	0.1	0.5	124	0.03	0.1	0.5	131	0.03	0.1	0.5	135	0.03	0.1	0.5
PTRPBFNOHoagSA	125	0.03	0.1	0.5	130	0.03	0.1	0.5	143	0.03	0.1	0.5	75	0.03	0.0	0.5
PTRPBFNOHoagSB	113	0.03	0.1	0.5	121	0.03	0.1	0.5	145	0.03	0.1	0.5	124	0.03	0.1	0.5
PTRPBFNOHoagSC	119	0.03	0.1	0.5	125	0.03	0.1	0.5	144	0.03	0.1	0.5	128	0.03	0.1	0.5
STRPBFNOMinSA	163	0.03	0.1	0.5	169	0.03	0.1	0.5	174	0.03	0.1	0.5	178	0.03	0.1	0.5
STRPBFNOMinSB	175	0.03	0.1	0.5	182	0.03	0.1	0.5	193	0.03	0.1	0.5	180	0.03	0.1	0.5
STRPBFNOMinSC	170	0.03	0.1	0.5	172	0.03	0.1	0.5	190	0.03	0.1	0.5	174	0.03	0.1	0.5
PTRPBFNOMinSA	175	0.03	0.1	0.5	174	0.03	0.1	0.5	184	0.03	0.1	0.5	178	0.03	0.1	0.5
PTRPBFNOMinSB	177	0.03	0.1	0.5	185	0.03	0.1	0.5	187	0.03	0.1	0.5	187	0.03	0.1	0.5
PTRPBFNOMinSC	151	0.03	0.1	0.5	156	0.03	0.1	0.5	166	0.03	0.1	0.5	160	0.03	0.1	0.5
	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
Average	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Abiotic	116.00	0.03	0.06	0.54	128.67	0.03	0.07	0.54	138.00	0.03	0.07	0.54	121.33	0.03	0.07	0.54
Stbacteria	156.67	0.03	0.08	0.54	155.00	0.03	0.08	0.54	161.33	0.03	0.09	0.54	119.00	0.03	0.06	0.54
Ptbacteria	131.67	0.03	0.07	0.54	136.00	0.12	0.29	2.19	151.00	0.09	0.23	1.52	126.33	0.03	0.07	0.54
Stfungi	158.00	0.03	0.08	0.54	155.67	0.03	0.08	0.54	149.33	0.03	0.08	0.54	147.33	0.03	0.08	0.54
Ptfungi	164.67	0.03	0.09	0.54	163.67	0.03	0.09	0.54	173.00	0.03	0.09	0.54	151.67	0.03	0.08	0.54
StRPBact	125.00	0.03	0.07	0.54	136.00	0.03	0.07	0.54	148.33	0.03	0.08	0.54	125.67	0.03	0.07	0.54
PtRPBact	129.33	0.03	0.07	0.54	141.00	0.04	0.09	0.63	152.67	0.03	0.08	0.54	138.00	0.03	0.07	0.54
STRPBactFung	144.33	0.03	0.08	0.54	140.00	0.03	0.08	0.54	155.33	0.03	0.08	0.54	142.33	0.03	0.08	0.54
PTRPBactFung	96.33	0.03	0.05	0.54	99.33	0.03	0.05	0.54	117.00	0.03	0.06	0.54	101.33	0.03	0.05	0.54
STRPBFNOHoag	117.67	0.03	0.06	0.54	116.33	0.03	0.06	0.54	121.33	0.03	0.07	0.54	123.33	0.03	0.07	0.54
PTRPBFNOHoag	118.67	0.03	0.06	0.54	125.00	0.03	0.07	0.54	143.67	0.03	0.08	0.54	109.33	0.03	0.06	0.54
STRPBFNOMin	169.00	0.03	0.09	0.54	174.00	0.03	0.09	0.54	186.00	0.03	0.10	0.54	177.00	0.03	0.09	0.54
PTRPBFNOMin	167.67	0.03	0.09	0.54	171.67	0.03	0.09	0.54	179.33	0.03	0.10	0.54	175.00	0.03	0.09	0.54
	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
STE	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Abiotic	6.67	0.00	0.00	0.00	7.94	0.00	0.00	0.00	6.51	0.00	0.00	0.00	8.65	0.00	0.00	0.00
Stbacteria	1.86	0.00	0.00	0.00	7.51	0.00	0.00	0.00	3.84	0.00	0.00	0.00	28.26	0.00	0.02	0.00
Ptbacteria	25.90	0.00	0.01	0.00	18.77	0.04	0.09	0.67	20.50	0.06	0.15	0.98	17.16	0.00	0.01	0.00
Stfungi	5.00	0.00	0.00	0.00	4.84	0.00	0.00	0.00	19.01	0.00	0.01	0.00	3.28	0.00	0.00	0.00
Ptfungi	1.33	0.00	0.00	0.00	3.18	0.00	0.00	0.00	4.93	0.00	0.00	0.00	1.67	0.00	0.00	0.00
StRPBact	3.61	0.00	0.00	0.00	5.67	0.00	0.00	0.00	4.18	0.00	0.00	0.00	5.24	0.00	0.00	0.00
PtRPBact	4.73	0.00	0.00	0.00	3.48	0.01	0.02	0.10	3.53	0.00	0.00	0.00	4.84	0.00	0.00	0.00
STRPBactFung	3.18	0.00	0.00	0.00	3.18	0.00	0.00	0.00	6.01	0.00	0.00	0.00	1.15	0.00	0.00	0.00
PTRPBactFung	4.91	0.00	0.00	0.00	3.38	0.00	0.00	0.00	5.17	0.00	0.00	0.00	7.13	0.00	0.00	0.00
STRPBFNOHoag	7.06	0.00	0.00	0.00	7.17	0.00	0.00	0.00	6.89	0.00	0.00	0.00	7.31	0.00	0.00	0.00
PTRPBFNOHoag	3.46	0.00	0.00	0.00	2.60	0.00	0.00	0.00	0.58	0.00	0.00	0.00	17.04	0.00	0.01	0.00

Table K-6: Aluminum in drainage water, averages and standard error.

0.03 mg/L	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*
Sample Date	***8/5/04***	***8/5/04***	***8/5/04***	***8/5/04***	***8/19/04***	***8/19/04***	***8/19/04***	***8/19/04***	***9/30/04***	***9/30/04***	***9/30/04***	***9/30/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank												
AbioticSA	258	0.00	0.0	0.0	375	0.00	0.0	0.0	267	0.00	0.0	0.0
AbioticSB	299	0.00	0.0	0.0	367	0.00	0.0	0.0	182	0.00	0.0	0.0
AbioticSC	278	0.00	0.0	0.0	198	0.00	0.0	0.0	227	0.00	0.0	0.0
STBacteriaSA	225	0.00	0.0	0.0	273	0.03	0.3	1.3	285	28.20	297.6	1044.3
STBacteriaSB	206	0.00	0.0	0.0	317	0.00	0.0	0.0	293	42.25	458.4	1564.6
STBacteriaSC	320	0.00	0.0	0.0	312	0.00	0.0	0.0	277	43.23	443.5	1601.2
PTBacteriaSA	270	0.00	0.0	0.0	312	0.00	0.0	0.0	206	9.56	72.9	353.9
PTBacteriaSB	268	0.00	0.0	0.0	268	0.00	0.0	0.0	192	8.19	58.2	303.2
PTBacteriaSC	327	0.00	0.0	0.0	286	0.00	0.0	0.0	217	10.97	88.2	406.4
STFungiSA	264	0.00	0.0	0.0	272	0.00	0.0	0.0	249	5.49	50.6	203.3
STFungiSB	265	0.00	0.0	0.0	310	0.00	0.0	0.0	227	13.20	111.0	488.8
STFungiSC	313	0.00	0.0	0.0	313	0.00	0.0	0.0	246	11.77	107.2	435.7
PTFungiSA	200	0.00	0.0	0.0	367	0.00	0.0	0.0	226	5.16	43.2	191.2
PTFungiSB	296	0.00	0.0	0.0	356	0.00	0.0	0.0	306	12.26	138.9	454.0
PTFungiSC	272	0.00	0.0	0.0	258	0.00	0.0	0.0	180	11.62	77.5	430.5
STRPBactSA	336	0.00	0.0	0.0	265	0.00	0.0	0.0	222	0.00	0.0	0.0
STRPBactSB	163	0.00	0.0	0.0	310	0.00	0.0	0.0	204	0.00	0.0	0.0
STRPBactSC	258	0.00	0.0	0.0	368	0.00	0.0	0.0	202	0.00	0.0	0.0
PTRPBactSA	222	0.00	0.0	0.0	254	0.00	0.0	0.0	271	0.00	0.0	0.0
PTRPBactSB	172	0.00	0.0	0.0	263	0.00	0.0	0.0	224	0.00	0.0	0.0
PTRPBactSC	253	0.00	0.0	0.0	288	0.00	0.0	0.0	226	0.00	0.0	0.0
STRPBactFungSA	326	0.00	0.0	0.0	292	0.00	0.0	0.0	223	0.00	0.0	0.0
STRPBactFungSB	206	0.00	0.0	0.0	321	0.00	0.0	0.0	252	0.00	0.0	0.0
STRPBactFungSC	340	0.00	0.0	0.0	330	0.00	0.0	0.0	238	0.00	0.0	0.0
PTRPBactFungSA	246	0.00	0.0	0.0	272	0.00	0.0	0.0	212	0.00	0.0	0.0
PTRPBactFungSB	217	0.00	0.0	0.0	298	0.00	0.0	0.0	206	0.00	0.0	0.0
PTRPBactFungSC	315	0.00	0.0	0.0	216	0.00	0.0	0.0	269	0.00	0.0	0.0
STRPBFNOHoagSA	296	0.00	0.0	0.0	373	0.00	0.0	0.0	222	0.00	0.0	0.0
STRPBFNOHoagSB	193	0.00	0.0	0.0	342	0.00	0.0	0.0	223	0.00	0.0	0.0
STRPBFNOHoagSC	241	0.00	0.0	0.0	245	0.00	0.0	0.0	316	0.00	0.0	0.0
PTRPBFNOHoagSA	340	0.00	0.0	0.0	358	0.00	0.0	0.0	320	0.12	1.4	4.3
PTRPBFNOHoagSB	220	0.00	0.0	0.0	323	0.00	0.0	0.0	317	0.00	0.0	0.0
PTRPBFNOHoagSC	346	0.00	0.0	0.0	348	0.00	0.0	0.0	260	0.00	0.0	0.0
STRPBFNOMinSA	381	0.00	0.0	0.0	452	0.00	0.0	0.0	201	0.00	0.0	0.0
STRPBFNOMinSB	396	0.00	0.0	0.0	367	0.00	0.0	0.0	308	0.00	0.0	0.0
STRPBFNOMinSC	329	0.00	0.0	0.0	340	0.00	0.0	0.0	244	0.00	0.0	0.0
PTRPBFNOMinSA	351	0.00	0.0	0.0	471	0.00	0.0	0.0	294	0.00	0.0	0.0
PTRPBFNOMinSB	300	0.00	0.0	0.0	333	0.00	0.0	0.0	268	0.00	0.0	0.0
PTRPBFNOMinSC	422	0.00	0.0	0.0	515	0.00	0.0	0.0	268	0.00	0.0	0.0
	8/5/04	*8/5/04*	*8/5/04*	*8/5/04*	*8/19/04*	*8/19/04*	*8/19/04*	*8/19/04*	*9/30/04*	*9/30/04*	*9/30/04*	*9/30/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	278.33	0.00	0.00	0.00	313.33	0.00	0.00	0.00	225.33	0.00	0.00	0.00
Stbacteria	249.83	0.00	0.00	0.00	300.67	0.01	0.11	0.42	285.00	37.89	399.86	1403.36
Ptbacteria	288.33	0.00	0.00	0.00	288.67	0.00	0.00	0.00	205.00	9.57	73.10	354.50
Stfungi	280.50	0.00	0.00	0.00	298.33	0.00	0.00	0.00	240.67	10.15	89.59	375.94
Ptfungi	256.00	0.00	0.00	0.00	327.00	0.00	0.00	0.00	237.33	9.68	86.54	358.56
StRPBact	252.17	0.00	0.00	0.00	314.33	0.00	0.00	0.00	209.33	0.00	0.00	0.00
PtRPBact	215.67	0.00	0.00	0.00	268.33	0.00	0.00	0.00	240.33	0.00	0.00	0.00
STRPBactFung	290.50	0.00	0.00	0.00	314.33	0.00	0.00	0.00	237.67	0.00	0.00	0.00
PTRPBactFung	259.17	0.00	0.00	0.00	262.00	0.00	0.00	0.00	229.00	0.00	0.00	0.00
STRPBFNOHoag	243.33	0.00	0.00	0.00	320.00	0.00	0.00	0.00	253.67	0.00	0.00	0.00
PTRPBFNOHoag	301.83	0.00	0.00	0.00	343.00	0.00	0.00	0.00	299.00	0.04	0.46	1.44
STRPBFNOMin	368.67	0.00	0.00	0.00	386.33	0.00	0.00	0.00	251.00	0.00	0.00	0.00
PTRPBFNOMin	357.67	0.00	0.00	0.00	439.67	0.00	0.00	0.00	276.67	0.00	0.00	0.00
	8/5/04	*8/5/04*	*8/5/04*	*8/5/04*	*8/19/04*	*8/19/04*	*8/19/04*	*8/19/04*	*9/30/04*	*9/30/04*	*9/30/04*	*9/30/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	11.84	0.00	0.00	0.00	57.71	0.00	0.00	0.00	24.55	0.00	0.00	0.00
Stbacteria	35.26	0.00	0.00	0.00	13.91	0.01	0.11	0.42	4.62	4.86	51.30	179.86
Ptbacteria	19.34	0.00	0.00	0.00	12.77	0.00	0.00	0.00	7.23	0.80	8.65	29.78
Stfungi	16.00	0.00	0.00	0.00	13.20	0.00	0.00	0.00	6.89	2.37	19.52	87.68
Ptfungi	28.84	0.00	0.00	0.00	34.65	0.00	0.00	0.00	36.81	2.27	27.99	83.94
StRPBact	49.88	0.00	0.00	0.00	29.81	0.00	0.00	0.00	6.36	0.00	0.00	0.00
PtRPBact	23.60	0.00	0.00	0.00	10.17	0.00	0.00	0.00	15.34	0.00	0.00	0.00
STRPBactFung	42.69	0.00	0.00	0.00	11.46	0.00	0.00	0.00	8.37	0.00	0.00	0.00
PTRPBactFung	28.91	0.00	0.00	0.00	24.19	0.00	0.00	0.00	20.07	0.00	0.00	0.00
STRPBFNOHoag	29.76	0.00	0.00	0.00	38.55	0.00	0.00	0.00	31.17	0.00	0.00	0.00
PTRPBFNOHoag	40.95	0.00	0.00	0.00	10.41	0.00	0.00	0.00	19.52	0.04	0.46	1.44

Table K-6 (cont.): Aluminum in drainage water, averages and standard error.

0.03 mg/L	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*
Sample Date	***10/14/04***	***10/14/04***	***10/14/04***	***10/14/04***	***10/28/04***	***10/28/04***	***10/28/04***	***10/28/04***	***11/11/04***	***11/11/04***	***11/11/04***	***11/11/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank									20	0.00	0.0	0.0
AbioticSA	361	0.05	0.6	1.7	333	0.00	0.0	0.0	344	0.04	0.6	1.6
AbioticSB	278	0.00	0.0	0.0	310	0.04	0.5	1.6	411	0.04	0.6	1.5
AbioticSC	190	0.00	0.0	0.0	266	0.04	0.4	1.6	374	0.03	0.4	1.1
STBacteriaSA	375	56.29	781.7	2084.6	345	55.06	703.6	2039.4	427	60.18	951.7	2228.8
STBacteriaSB	341	62.23	786.0	2304.9	335	62.09	770.4	2299.6	428	73.42	1163.8	2719.3
STBacteriaSC	385	68.79	980.9	2547.7	330	66.51	812.9	2463.3	423	76.64	1200.7	2838.4
PTBacteriaSA	418	15.76	243.9	583.6	347	18.83	242.0	697.3	487	30.70	553.8	1137.1
PTBacteriaSB	402	25.12	374.0	930.4	365	22.36	302.3	828.1	492	35.73	651.1	1323.4
PTBacteriaSC	403	22.86	341.3	846.8	342	22.96	290.8	850.2	464	29.97	515.0	1109.8
STFungiSA	382	22.23	314.5	823.3	335	18.42	228.5	682.2	444	25.14	413.3	930.9
STFungiSB	373	29.45	406.8	1090.6	353	27.63	361.3	1023.5	437	34.42	557.1	1274.8
STFungiSC	328	42.97	522.0	1591.6	303	39.77	446.3	1472.8	426	43.36	684.1	1605.8
PTFungiSA	395	29.68	434.2	1099.3	340	27.10	341.3	1003.8	453	37.95	636.7	1405.5
PTFungiSB	390	32.20	465.1	1192.7	351	29.16	379.0	1079.8	462	34.12	583.8	1263.6
PTFungiSC	381	37.95	535.4	1405.4	317	36.76	431.5	1361.3	449	46.12	766.9	1708.0
STRPBactSA	360	0.00	0.0	0.0	314	0.03	0.3	1.0	416	0.05	0.8	2.0
STRPBactSB	331	0.00	0.0	0.0	292	0.05	0.5	1.7	313	0.04	0.5	1.5
STRPBactSC	336	0.00	0.0	0.0	293	0.00	0.0	0.0	385	0.04	0.5	1.4
PTRPBactSA	349	0.00	0.0	0.0	296	0.05	0.6	2.0	389	0.04	0.6	1.6
PTRPBactSB	244	0.00	0.0	0.0	248	0.04	0.4	1.4	335	0.06	0.7	2.2
PTRPBactSC	354	0.00	0.0	0.0	296	0.03	0.3	1.0	414	0.05	0.7	1.7
STRPBactFungSA	336	0.00	0.0	0.0	269	0.04	0.4	1.6	411	0.03	0.4	1.0
STRPBactFungSB	314	0.00	0.0	0.0	259	0.03	0.3	1.1	400	0.03	0.4	1.0
STRPBactFungSC	344	0.00	0.0	0.0	301	0.03	0.3	1.1	408	0.03	0.4	1.0
PTRPBactFungSA	295	0.00	0.0	0.0	247	0.03	0.3	1.0	325	0.03	0.4	1.2
PTRPBactFungSB	334	0.04	0.5	1.4	285	0.03	0.3	1.0	398	0.04	0.6	1.4
PTRPBactFungSC	355	0.00	0.0	0.0	276	0.00	0.0	0.0	279	0.03	0.3	1.0
STRPBFNOHoagSA	348	0.00	0.0	0.0	301	0.03	0.3	1.1	450	0.03	0.5	1.0
STRPBFNOHoagSB	305	0.00	0.0	0.0	262	0.03	0.3	1.2	485	0.03	0.5	1.0
STRPBFNOHoagSC	352	0.00	0.0	0.0	295	0.00	0.0	0.0	505	0.03	0.5	1.0
PTRPBFNOHoagSA	316	0.00	0.0	0.0	293	0.03	0.3	1.1	508	0.03	0.5	1.0
PTRPBFNOHoagSB	308	0.00	0.0	0.0	294	0.04	0.4	1.4	486	0.03	0.5	1.0
PTRPBFNOHoagSC	304	0.00	0.0	0.0	320	0.03	0.3	1.1	456	0.03	0.5	1.0
STRPBFNOMinSA	429	0.00	0.0	0.0	372	0.00	0.0	0.0	390	0.00	0.0	0.0
STRPBFNOMinSB	443	0.00	0.0	0.0	376	0.00	0.0	0.0	391	0.00	0.0	0.0
STRPBFNOMinSC	441	0.00	0.0	0.0	314	0.00	0.0	0.0	400	0.00	0.0	0.0
PTRPBFNOMinSA	451	0.00	0.0	0.0	306	0.00	0.0	0.0	391	0.00	0.0	0.0
PTRPBFNOMinSB	394	0.00	0.0	0.0	373	0.00	0.0	0.0	398	0.00	0.0	0.0
PTRPBFNOMinSC	442	0.00	0.0	0.0	391	0.00	0.0	0.0	420	0.00	0.0	0.0
	10/14/04	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	276.33	0.02	0.20	0.56	303.00	0.03	0.31	1.08	376.33	0.04	0.52	1.40
Stbacteria	367.00	62.44	849.52	2312.41	336.67	61.22	762.29	2267.45	426.00	70.08	1105.40	2595.49
Ptbacteria	407.67	21.25	319.74	786.92	351.33	21.38	278.34	791.89	481.00	32.13	573.29	1190.12
Stfungi	361.00	31.55	414.44	1168.49	330.33	28.61	345.37	1059.51	435.67	34.30	551.50	1270.52
Ptfungi	388.67	33.28	478.27	1232.44	336.00	31.00	383.95	1148.31	454.67	39.39	662.45	1459.01
StRPBact	342.33	0.00	0.00	0.00	299.67	0.02	0.27	0.91	371.33	0.04	0.61	1.63
PtRPBact	315.67	0.00	0.00	0.00	280.00	0.04	0.42	1.49	379.33	0.05	0.69	1.83
STRPBactFung	331.33	0.00	0.00	0.00	276.33	0.03	0.35	1.26	406.33	0.03	0.41	1.00
PTRPBactFung	328.00	0.01	0.15	0.46	269.33	0.02	0.19	0.70	334.00	0.03	0.41	1.20
STRPBFNOHoag	335.00	0.00	0.00	0.00	286.00	0.02	0.22	0.79	480.00	0.03	0.48	1.00
PTRPBFNOHoag	309.33	0.00	0.00	0.00	302.33	0.03	0.36	1.18	483.33	0.03	0.48	1.00
STRPBFNOMin	437.67	0.00	0.00	0.00	354.00	0.00	0.00	0.00	393.67	0.00	0.00	0.00
PTRPBFNOMin	429.00	0.00	0.00	0.00	356.67	0.00	0.00	0.00	403.00	0.00	0.00	0.00
	10/14/04	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	49.37	0.02	0.20	0.56	19.66	0.01	0.16	0.54	19.38	0.00	0.06	0.16
Stbacteria	13.32	3.61	65.68	133.73	4.41	3.33	31.81	123.44	1.53	5.04	77.58	186.55
Ptbacteria	5.17	2.82	39.06	104.48	6.98	1.29	18.49	47.73	8.62	1.81	40.50	67.12
Stfungi	16.70	6.08	60.03	225.17	14.62	6.18	63.35	228.94	5.24	5.26	78.21	194.84
Ptfungi	4.10	2.45	29.95	90.57	10.02	2.94	26.16	108.73	3.84	3.54	54.40	131.04
StRPBact	8.95	0.00	0.00	0.00	7.17	0.01	0.15	0.50	30.51	0.01	0.12	0.20
PtRPBact	35.86	0.00	0.00	0.00	16.00	0.01	0.09	0.30	23.31	0.00	0.03	0.18
STRPBactFung	8.97	0.00	0.00	0.00	12.67	0.00	0.04	0.16	3.28	0.00	0.00	0.00
PTRPBactFung	17.58	0.01	0.15	0.46	11.46	0.01	0.09	0.35	34.65	0.00	0.09	0.13
STRPBFNOHoag	15.04	0.00	0.00	0.00	12.12	0.01	0.11	0.40	16.07	0.00	0.02	0.00
PTRPBFNOHoag	3.53	0.00	0.00	0.00	8.84	0.00	0.03	0.10	15.07	0.00	0.02	0.00

Table K-6 (cont.): Aluminum in drainage water, averages and standard error.

0.03 mg/L	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*
Sample Date	*11/29/04*	*11/29/04*	*11/29/04*	*11/29/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
Sample ID	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Troy Method Blank					20	0.00	0.0	0.0	20	0.00	0.0	0.0
AbioticSA	489	0.00	0.0	0.0	265	0.03	0.3	1.3	289	0.03	0.3	1.1
AbioticSB	456	0.00	0.0	0.0	230	0.03	0.2	1.0	288	0.00	0.0	0.0
AbioticSC	450	0.00	0.0	0.0	208	0.00	0.0	0.0	273	0.00	0.0	0.0
STBacteriaSA	519	54.45	1046.7	2016.7	306	74.82	847.9	2770.9	333	39.28	484.4	1454.7
STBacteriaSB	500	66.69	1235.0	2470.1	288	78.04	832.4	2890.2	329	45.77	557.7	1695.1
STBacteriaSC	522	62.34	1205.3	2309.0	320	84.29	999.0	3121.9	328	46.10	560.0	1707.4
PTBacteriaSA	489	31.47	570.0	1165.6	338	44.77	560.5	1658.2	372	25.19	347.1	933.0
PTBacteriaSB	511	33.84	640.4	1253.1	323	45.31	542.0	1678.1	372	26.56	365.9	983.6
PTBacteriaSC	521	29.08	561.2	1077.1	310	45.33	520.4	1678.7	343	25.26	320.9	935.6
STFungiSA	450	23.96	399.3	887.3	315	44.55	519.8	1650.0	354	20.87	273.6	773.0
STFungiSB	534	36.12	714.4	1337.9	295	53.78	587.6	1991.9	270	28.04	280.4	1038.5
STFungiSC	532	37.54	739.6	1390.2	314	45.47	528.8	1684.0	335	33.50	415.7	1240.8
PTFungiSA	509	40.40	761.6	1496.3	298	59.15	652.8	2190.7	329	33.15	403.9	1227.7
PTFungiSB	507	41.27	775.0	1528.6	325	50.45	607.3	1868.5	351	31.73	412.5	1175.3
PTFungiSC	537	44.57	886.4	1650.7	319	58.13	686.8	2152.9	339	38.71	486.1	1433.8
STRPBactSA	468	0.00	0.0	0.0	270	0.00	0.0	0.0	302	0.00	0.0	0.0
STRPBactSB	423	0.00	0.0	0.0	244	0.03	0.3	1.2	283	0.00	0.0	0.0
STRPBactSC	424	0.00	0.0	0.0	256	0.03	0.3	1.2	285	0.00	0.0	0.0
PTRPBactSA	458	0.00	0.0	0.0	253	0.03	0.3	1.0	291	0.00	0.0	0.0
PTRPBactSB	390	0.00	0.0	0.0	266	0.03	0.3	0.9	222	0.00	0.0	0.0
PTRPBactSC	435	0.00	0.0	0.0	261	0.03	0.2	0.9	276	0.00	0.0	0.0
STRPBactFungSA	468	0.00	0.0	0.0	249	0.00	0.0	0.0	285	0.00	0.0	0.0
STRPBactFungSB	465	0.00	0.0	0.0	256	0.03	0.3	1.0	267	0.00	0.0	0.0
STRPBactFungSC	459	0.00	0.0	0.0	273	0.03	0.3	1.0	291	0.00	0.0	0.0
PTRPBactFungSA	334	0.02	0.2	0.6	204	0.03	0.2	1.0	253	0.00	0.0	0.0
PTRPBactFungSB	417	0.05	0.8	1.8	256	0.03	0.3	1.0	287	0.00	0.0	0.0
PTRPBactFungSC	433	0.04	0.7	1.5	260	0.00	0.0	0.0	230	0.00	0.0	0.0
STRPBFNOHoagSA	555	0.00	0.0	0.0	274	0.04	0.4	1.4	315	0.00	0.0	0.0
STRPBFNOHoagSB	563	0.00	0.0	0.0	297	0.03	0.3	1.1	339	0.00	0.0	0.0
STRPBFNOHoagSC	595	0.00	0.0	0.0	316	0.03	0.4	1.1	395	0.00	0.0	0.0
PTRPBFNOHoagSA	589	0.03	0.7	1.1	332	0.00	0.0	0.0	396	0.00	0.0	0.0
PTRPBFNOHoagSB	555	0.03	0.6	1.1	321	0.04	0.4	1.4	307	0.00	0.0	0.0
PTRPBFNOHoagSC	527	0.03	0.6	1.1	335	0.03	0.4	1.3	312	0.00	0.0	0.0
STRPBFNOMinSA	452	0.00	0.0	0.0	246	0.00	0.0	0.0	286	0.00	0.0	0.0
STRPBFNOMinSB	440	0.00	0.0	0.0	243	0.00	0.0	0.0	278	0.00	0.0	0.0
STRPBFNOMinSC	428	0.00	0.0	0.0	195	0.00	0.0	0.0	302	0.00	0.0	0.0
PTRPBFNOMinSA	433	0.00	0.0	0.0	259	0.00	0.0	0.0	310	0.00	0.0	0.0
PTRPBFNOMinSB	443	0.00	0.0	0.0	211	0.00	0.0	0.0	297	0.00	0.0	0.0
PTRPBFNOMinSC	493	0.00	0.0	0.0	271	0.00	0.0	0.0	311	0.00	0.0	0.0
	11/29/04	*11/29/04*	*11/29/04*	*11/29/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	465.00	0.00	0.00	0.00	234.33	0.02	0.19	0.76	283.33	0.01	0.11	0.37
Stbacteria	513.67	61.16	1162.33	2265.25	304.67	79.05	893.09	2927.65	330.00	43.71	534.04	1619.06
Ptbacteria	507.00	31.46	590.52	1165.31	323.67	45.14	540.97	1671.67	362.33	25.67	344.63	950.73
Stfungi	505.33	32.54	617.76	1205.12	308.00	47.93	545.38	1775.31	319.67	27.47	323.24	1017.44
Ptfungi	517.67	42.08	807.69	1558.55	314.00	55.91	648.96	2070.71	339.67	34.53	434.17	1278.93
StRPBact	438.33	0.00	0.00	0.00	256.67	0.02	0.20	0.78	290.00	0.00	0.00	0.00
PtRPBact	427.67	0.00	0.00	0.00	260.00	0.03	0.25	0.98	263.00	0.00	0.00	0.00
STRPBactFung	464.00	0.00	0.00	0.00	259.33	0.02	0.18	0.67	281.00	0.00	0.00	0.00
PTRPBactFung	394.67	0.04	0.54	1.31	240.00	0.02	0.16	0.70	256.67	0.00	0.00	0.00
STRPBFNOHoag	571.00	0.00	0.00	0.00	295.67	0.03	0.36	1.22	349.67	0.00	0.00	0.00
PTRPBFNOHoag	557.00	0.03	0.62	1.11	329.33	0.02	0.29	0.88	338.33	0.00	0.00	0.00
STRPBFNOMin	440.00	0.00	0.00	0.00	228.00	0.00	0.00	0.00	288.67	0.00	0.00	0.00
PTRPBFNOMin	456.33	0.00	0.00	0.00	247.00	0.00	0.00	0.00	306.00	0.00	0.00	0.00
	11/29/04	*11/29/04*	*11/29/04*	*11/29/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/9/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	12.12	0.00	0.00	0.00	16.60	0.01	0.10	0.38	5.17	0.01	0.11	0.37
Stbacteria	6.89	3.58	58.47	132.71	9.26	2.78	53.14	103.02	1.53	2.22	24.82	82.25
Ptbacteria	9.45	1.37	25.05	50.81	8.09	0.18	11.58	6.72	9.67	0.44	13.04	16.44
Stfungi	27.67	4.31	109.48	159.62	6.51	2.94	21.28	108.76	25.43	3.66	46.26	135.47
Ptfungi	9.68	1.27	39.57	47.03	8.19	2.75	23.03	101.69	6.36	2.13	26.06	78.90
StRPBact	14.84	0.00	0.00	0.00	7.51	0.01	0.10	0.39	6.03	0.00	0.00	0.00
PtRPBact	19.97	0.00	0.00	0.00	3.79	0.00	0.00	0.03	20.95	0.00	0.00	0.00
STRPBactFung	2.65	0.00	0.00	0.00	7.13	0.01	0.09	0.34	7.21	0.00	0.00	0.00
PTRPBactFung	30.68	0.01	0.18	0.38	18.04	0.01	0.08	0.35	16.56	0.00	0.00	0.00
STRPBFNOHoag	12.22	0.00	0.00	0.00	12.14	0.00	0.02	0.11	23.70	0.00	0.00	0.00
PTRPBFNOHoag	17.93	0.00	0.02	0.00	4.26	0.01	0.14	0.44	28.87	0.00	0.00	0.00

Table K-6 (cont.): Aluminum in drainage water, averages and standard error.

0.03 mg/L	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*
Sample Date	*1/4/05*	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
Sample ID	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Troy Method Blank	20	0.00	0.0	0.0	20	0.00	0.0	0.0	20	0.00	0.0	0.0
AbioticSA	227	0.00	0.0	0.0	396	0.03	0.4	1.0	480	0.00	0.0	0.1
AbioticSB	228	0.00	0.0	0.0	360	0.03	0.4	1.0	457	0.00	0.0	0.0
AbioticSC	214	0.00	0.0	0.0	325	0.03	0.3	1.0	412	0.00	0.0	0.0
STBacteriaSA	242	10.75	96.4	398.1	404	13.53	202.4	500.9	490	5.78	104.9	214.0
STBacteriaSB	237	9.51	83.5	352.3	390	6.79	98.1	251.6	457	1.70	28.7	62.8
STBacteriaSC	204	22.16	167.4	820.7	393	9.28	135.0	343.5	462	9.89	169.2	366.3
PTBacteriaSA	292	7.27	78.6	269.2	444	9.61	158.0	355.8	505	7.25	135.6	268.5
PTBacteriaSB	295	10.32	112.8	382.3	414	8.92	136.8	330.4	498	6.03	111.2	223.2
PTBacteriaSC	273	12.38	125.1	458.3	421	12.17	189.8	450.7	492	8.84	161.0	327.3
STFungiSA	299	8.28	91.7	306.8	365	11.49	155.3	425.5	382	9.06	128.2	335.7
STFungiSB	276	7.58	77.5	280.7	398	8.83	130.1	326.9	484	6.64	119.0	245.9
STFungiSC	269	8.18	81.5	303.1	416	2.77	42.6	102.5	501	2.66	49.3	98.4
PTFungiSA	255	10.36	97.8	383.5	399	11.17	165.1	413.8	479	7.33	130.0	271.4
PTFungiSB	227	10.37	87.2	384.1	409	10.03	151.9	371.4	492	7.65	139.4	283.4
PTFungiSC	282	9.64	100.7	357.0	407	7.33	110.5	271.4	516	7.69	146.9	284.7
STRPBactSA	245	0.00	0.0	0.0	325	0.03	0.3	1.0	492	0.00	0.0	0.0
STRPBactSB	220	0.00	0.0	0.0	364	0.03	0.4	1.0	455	0.00	0.0	0.0
STRPBactSC	227	0.00	0.0	0.0	369	0.03	0.4	1.0	434	0.00	0.0	0.0
PTRPBactSA	219	0.00	0.0	0.0	392	0.03	0.4	1.0	461	0.00	0.0	0.0
PTRPBactSB	241	0.00	0.0	0.0	288	0.03	0.3	1.1	454	0.00	0.0	0.0
PTRPBactSC	227	0.00	0.0	0.0	380	0.03	0.5	1.3	461	0.00	0.0	0.0
STRPBactFungSA	211	0.00	0.0	0.0	381	0.03	0.5	1.3	454	0.00	0.0	0.0
STRPBactFungSB	219	0.00	0.0	0.0	340	0.03	0.3	1.0	452	0.00	0.0	0.0
STRPBactFungSC	223	0.00	0.0	0.0	376	0.03	0.4	1.1	461	0.00	0.0	0.0
PTRPBactFungSA	128	0.00	0.0	0.0	311	0.04	0.4	1.3	330	0.00	0.0	0.0
PTRPBactFungSB	203	0.00	0.0	0.0	367	0.03	0.5	1.3	427	0.00	0.0	0.0
PTRPBactFungSC	212	0.00	0.0	0.0	368	0.03	0.5	1.3	438	0.00	0.0	0.0
STRPBFNOHoagSA	307	0.00	0.0	0.0	434	0.03	0.5	1.1	483	0.00	0.0	0.0
STRPBFNOHoagSB	327	0.00	0.0	0.0	442	0.03	0.4	1.0	512	0.00	0.0	0.0
STRPBFNOHoagSC	322	0.00	0.0	0.0	463	0.03	0.4	1.0	533	0.00	0.0	0.0
PTRPBFNOHoagSA	318	0.00	0.0	0.0	448	0.03	0.4	1.0	543	0.00	0.0	0.0
PTRPBFNOHoagSB	308	0.00	0.0	0.0	446	0.03	0.5	1.1	530	0.00	0.0	0.0
PTRPBFNOHoagSC	313	0.00	0.0	0.0	464	0.03	0.5	1.2	561	0.00	0.0	0.0
STRPBFNOMinSA	177	0.00	0.0	0.0	356	0.03	0.4	1.2	442	0.00	0.0	0.0
STRPBFNOMinSB	201	0.00	0.0	0.0	351	0.03	0.4	1.2	417	0.00	0.0	0.0
STRPBFNOMinSC	153	0.00	0.0	0.0	342	0.03	0.4	1.2	425	0.00	0.0	0.0
PTRPBFNOMinSA	193	0.00	0.0	0.0	353	0.03	0.4	1.2	410	0.00	0.0	0.0
PTRPBFNOMinSB	201	0.00	0.0	0.0	351	0.03	0.4	1.2	431	0.00	0.0	0.0
PTRPBFNOMinSC	190	0.00	0.0	0.0	293	0.03	0.3	1.2	367	0.00	0.0	0.0
	1/4/05	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	223.00	0.00	0.00	0.00	360.33	0.03	0.37	1.02	449.67	0.00	0.01	0.03
Stbacteria	227.67	14.14	115.76	523.73	395.67	9.86	145.17	365.36	469.67	5.79	100.94	214.38
Ptbacteria	286.67	9.99	105.50	369.94	426.33	10.23	161.52	379.00	498.33	7.37	135.93	273.01
Stfungi	281.33	8.02	83.58	296.88	393.00	7.69	109.35	284.97	455.67	6.12	98.85	226.66
Ptfungi	254.67	10.12	95.22	374.86	405.00	9.51	142.49	352.20	495.67	7.56	138.78	279.84
StRPBact	230.67	0.00	0.00	0.00	352.67	0.03	0.36	1.02	460.33	0.00	0.00	0.00
PtRPBact	229.00	0.00	0.00	0.00	353.33	0.03	0.40	1.13	458.67	0.00	0.00	0.00
STRPBactFung	217.67	0.00	0.00	0.00	365.67	0.03	0.42	1.13	455.67	0.00	0.00	0.00
PTRPBactFung	181.00	0.00	0.00	0.00	348.67	0.03	0.45	1.28	398.33	0.00	0.00	0.00
STRPBFNOHoag	318.67	0.00	0.00	0.00	446.33	0.03	0.45	1.00	509.33	0.00	0.00	0.00
PTRPBFNOHoag	313.00	0.00	0.00	0.00	452.67	0.03	0.49	1.08	544.67	0.00	0.00	0.00
STRPBFNOMin	177.00	0.00	0.00	0.00	349.67	0.03	0.41	1.18	428.00	0.00	0.00	0.00
PTRPBFNOMin	194.67	0.00	0.00	0.00	332.33	0.03	0.39	1.18	402.67	0.00	0.00	0.00
	1/4/05	*1/4/05*	*1/4/05*	*1/4/05*	*1/18/05*	*1/18/05*	*1/18/05*	*1/18/05*	*2/1/05*	*2/1/05*	*2/1/05*	*2/1/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	4.51	0.00	0.00	0.00	20.50	0.00	0.02	0.00	19.97	0.00	0.01	0.02
Stbacteria	11.92	4.03	26.10	149.10	4.26	1.97	30.52	72.79	10.27	2.37	40.61	87.61
Ptbacteria	6.89	1.48	13.92	54.96	9.06	0.99	15.39	36.61	3.76	0.81	14.39	30.11
Stfungi	9.06	0.22	4.24	8.15	14.93	2.58	34.14	95.56	37.16	1.87	24.91	69.16
Ptfungi	15.88	0.24	4.10	8.94	3.06	1.14	16.46	42.20	10.84	0.11	4.90	4.24
StRPBact	7.45	0.00	0.00	0.00	13.91	0.00	0.01	0.00	16.95	0.00	0.00	0.00
PtRPBact	6.43	0.00	0.00	0.00	32.85	0.00	0.05	0.08	2.33	0.00	0.00	0.00
STRPBactFung	3.53	0.00	0.00	0.00	12.91	0.00	0.05	0.09	2.73	0.00	0.00	0.00
PTRPBactFung	26.63	0.00	0.00	0.00	18.84	0.00	0.01	0.03	34.31	0.00	0.00	0.00
STRPBFNOHoag	6.01	0.00	0.00	0.00	8.65	0.00	0.01	0.04	14.50	0.00	0.00	0.00
PTRPBFNOHoag	2.89	0.00	0.00	0.00	5.70	0.00	0.03	0.06	8.99	0.00	0.00	0.00

Table K-6 (cont.): Aluminum in drainage water, averages and standard error.

0.03 mg/L	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*
Sample Date	***2/15/05***	***2/15/05***	***2/15/05***	***2/15/05***	***3/1/05***	***3/1/05***	***3/1/05***	***3/1/05***	***3/16/05***	***3/16/05***	***3/16/05***	***3/16/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.00	0.0	0.0	20	0.00	0.0	0.0	20	0.00	0.0	0.0
AbioticSA	395	0.03	0.4	1.1	247	0.03	0.3	1.3	169	0.03	0.2	1.1
AbioticSB	361	0.03	0.4	1.1	224	0.04	0.3	1.4	152	0.03	0.2	1.1
AbioticSC	349	0.03	0.4	1.1	239	0.03	0.2	1.0	178	0.00	0.0	0.0
STBacteriaSA	397	0.41	6.0	15.1	255	0.06	0.6	2.3	197	0.00	0.0	0.0
STBacteriaSB	457	0.08	1.4	3.0	255	0.04	0.4	1.5	195	0.00	0.0	0.0
STBacteriaSC	365	1.04	14.1	38.7	286	0.10	1.1	3.8	202	0.00	0.0	0.0
PTBacteriaSA	489	0.10	1.8	3.7	301	0.04	0.5	1.5	213	0.06	0.4	2.0
PTBacteriaSB	389	0.73	10.6	27.2	275	0.52	5.3	19.3	180	0.43	2.9	16.0
PTBacteriaSC	412	3.31	50.5	122.5	261	0.35	3.4	13.1	178	0.03	0.2	1.1
STFungiSA	400	0.91	13.4	33.6	302	1.12	12.6	41.5	247	0.28	2.6	10.4
STFungiSB	358	2.34	31.0	86.7	281	0.44	4.6	16.3	209	2.12	16.4	78.3
STFungiSC	407	0.09	1.4	3.5	286	0.11	1.2	4.1	221	1.81	14.8	67.2
PTFungiSA	421	0.85	13.3	31.5	249	0.10	1.0	3.8	141	0.60	3.1	22.2
PTFungiSB	382	0.40	5.7	14.9	287	0.08	0.9	3.1	212	0.03	0.2	1.1
PTFungiSC	448	1.28	21.2	47.3	289	0.38	4.1	14.2	247	0.03	0.3	1.1
STRPBactSA	407	0.03	0.5	1.1	273	0.06	0.6	2.1	153	0.00	0.0	0.0
STRPBactSB	380	0.03	0.4	1.1	264	0.03	0.3	1.1	185	0.00	0.0	0.0
STRPBactSC	409	0.03	0.5	1.1	258	0.03	0.3	1.2	192	0.00	0.0	0.0
PTRPBactSA	407	0.03	0.5	1.1	271	0.04	0.4	1.4	177	0.00	0.0	0.0
PTRPBactSB	371	0.03	0.4	1.1	260	0.04	0.4	1.4	172	0.00	0.0	0.0
PTRPBactSC	387	0.03	0.4	1.1	270	0.03	0.3	0.9	185	0.00	0.0	0.0
STRPBactFungSA	375	0.03	0.4	1.1	235	0.04	0.3	1.3	167	0.00	0.0	0.0
STRPBactFungSB	404	0.03	0.4	1.1	255	0.05	0.4	1.7	205	0.00	0.0	0.0
STRPBactFungSC	372	0.03	0.4	1.1	232	0.04	0.3	1.3	169	0.00	0.0	0.0
PTRPBactFungSA	210	0.03	0.2	1.1	162	0.03	0.2	1.1	114	0.00	0.0	0.0
PTRPBactFungSB	377	0.04	0.6	1.6	249	0.05	0.5	1.9	185	0.00	0.0	0.0
PTRPBactFungSC	310	0.04	0.5	1.6	244	0.03	0.3	1.1	173	0.00	0.0	0.0
STRPBFNOHoagSA	434	0.03	0.5	1.2	231	0.04	0.3	1.3	161	0.00	0.0	0.0
STRPBFNOHoagSB	436	0.03	0.5	1.2	209	0.04	0.3	1.3	155	0.00	0.0	0.0
STRPBFNOHoagSC	486	0.03	0.6	1.2	227	0.00	0.0	0.0	166	0.00	0.0	0.0
PTRPBFNOHoagSA	523	0.03	0.6	1.2	215	0.00	0.0	0.0	164	0.00	0.0	0.0
PTRPBFNOHoagSB	469	0.03	0.6	1.2	209	0.00	0.0	0.0	151	0.00	0.0	0.0
PTRPBFNOHoagSC	389	0.03	0.5	1.2	242	0.00	0.0	0.0	183	0.00	0.0	0.0
STRPBFNOMinSA	380	0.00	0.0	0.0	288	0.00	0.0	0.0	213	0.00	0.0	0.0
STRPBFNOMinSB	360	0.00	0.0	0.0	321	0.00	0.0	0.0	229	0.00	0.0	0.0
STRPBFNOMinSC	327	0.00	0.0	0.0	329	0.00	0.0	0.0	248	0.00	0.0	0.0
PTRPBFNOMinSA	325	0.00	0.0	0.0	355	0.00	0.0	0.0	243	0.00	0.0	0.0
PTRPBFNOMinSB	348	0.00	0.0	0.0	302	0.00	0.0	0.0	232	0.00	0.0	0.0
PTRPBFNOMinSC	388	0.00	0.0	0.0	364	0.00	0.0	0.0	258	0.00	0.0	0.0
	2/15/05	*2/15/05*	*2/15/05*	*2/15/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/16/05*	*3/16/05*	*3/16/05*	*3/16/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	368.33	0.03	0.41	1.11	236.33	0.03	0.29	1.23	166.67	0.02	0.12	0.74
Stbacteria	406.33	0.51	7.16	18.93	265.33	0.07	0.68	2.52	198.00	0.00	0.00	0.00
Ptbacteria	430.00	1.38	20.95	51.13	279.00	0.30	3.05	11.28	190.67	0.17	1.17	6.37
Stfungi	388.33	1.11	15.29	41.25	290.00	0.56	6.10	20.64	225.67	1.40	11.27	51.98
Ptfungi	417.00	0.84	13.37	31.21	274.67	0.19	1.98	7.04	200.00	0.22	1.22	8.16
StRPBact	398.67	0.03	0.44	1.11	265.33	0.04	0.40	1.48	176.33	0.00	0.00	0.00
PtRPBact	388.33	0.03	0.43	1.11	267.33	0.03	0.33	1.25	178.00	0.00	0.00	0.00
STRPBactFung	383.67	0.03	0.43	1.11	240.33	0.04	0.35	1.46	180.33	0.00	0.00	0.00
PTRPBactFung	299.00	0.04	0.44	1.41	218.67	0.04	0.30	1.34	157.33	0.00	0.00	0.00
STRPBFNOHoag	452.00	0.03	0.55	1.22	222.00	0.02	0.19	0.89	160.33	0.00	0.00	0.00
PTRPBFNOHoag	460.33	0.03	0.56	1.22	222.33	0.00	0.00	0.00	165.67	0.00	0.00	0.00
STRPBFNOMin	355.67	0.00	0.00	0.00	313.00	0.00	0.00	0.00	229.67	0.00	0.00	0.00
PTRPBFNOMin	353.67	0.00	0.00	0.00	340.00	0.00	0.00	0.00	244.67	0.00	0.00	0.00
	2/15/05	*2/15/05*	*2/15/05*	*2/15/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/1/05*	*3/16/05*	*3/16/05*	*3/16/05*	*3/16/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	13.78	0.00	0.02	0.00	6.74	0.00	0.03	0.12	7.62	0.01	0.06	0.37
Stbacteria	26.96	0.28	3.73	10.48	10.33	0.02	0.21	0.67	2.08	0.00	0.00	0.00
Ptbacteria	30.24	0.98	14.97	36.31	11.72	0.14	1.41	5.20	11.35	0.13	0.86	4.80
Stfungi	15.30	0.66	8.60	24.31	6.33	0.30	3.38	11.03	11.22	0.57	4.37	21.02
Ptfungi	19.16	0.25	4.47	9.36	13.01	0.10	1.06	3.57	31.18	0.19	0.96	7.04
StRPBact	9.35	0.00	0.01	0.00	4.36	0.01	0.09	0.32	12.00	0.00	0.00	0.00
PtRPBact	10.41	0.00	0.01	0.00	3.51	0.00	0.04	0.16	3.79	0.00	0.00	0.00
STRPBactFung	10.20	0.00	0.01	0.00	7.22	0.00	0.04	0.12	12.35	0.00	0.00	0.00
PTRPBactFung	48.52	0.00	0.11	0.15	28.20	0.01	0.09	0.27	21.94	0.00	0.00	0.00
STRPBFNOHoag	17.01	0.00	0.02	0.00	6.77	0.01	0.10	0.44	3.18	0.00	0.00	0.00
PTRPBFNOHoag	38.92	0.00	0.05	0.00	10.15	0.00	0.00	0.00	9.29	0.00	0.00	0.00

Table K-6 (cont.): Aluminum in drainage water, averages and standard error.

0.03 mg/L	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*
Sample Date	***3/29/05***	***3/29/05***	***3/29/05***	***3/29/05***	***4/12/05***	***4/12/05***	***4/12/05***	***4/12/05***	***4/26/05***	***4/26/05***	***4/26/05***	***4/26/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.00	0.0	0.0	20	0.00	0.0	0.0	20	0.00	0.0	0.0
AbioticSA	175	0.00	0.0	0.0	116	0.04	0.2	1.3	253	0.00	0.0	0.0
AbioticSB	158	0.00	0.0	0.0	94	0.04	0.1	1.5	181	0.00	0.0	0.0
AbioticSC	170	0.00	0.0	0.0	106	0.04	0.2	1.6	271	0.00	0.0	0.0
STBacteriaSA	208	0.00	0.0	0.0	139	0.03	0.2	1.1	297	0.00	0.0	0.0
STBacteriaSB	200	0.00	0.0	0.0	135	0.03	0.1	1.1	263	0.00	0.0	0.0
STBacteriaSC	202	0.00	0.0	0.0	148	0.03	0.2	1.1	291	0.00	0.0	0.0
PTBacteriaSA	196	0.00	0.0	0.0	146	0.03	0.2	1.1	232	0.00	0.0	0.0
PTBacteriaSB	197	0.00	0.0	0.0	146	0.04	0.2	1.4	302	0.00	0.0	0.0
PTBacteriaSC	169	0.00	0.0	0.0	132	0.03	0.1	1.1	272	0.00	0.0	0.0
STFungiSA	237	0.00	0.0	0.0	169	0.03	0.2	1.1	331	0.00	0.0	0.0
STFungiSB	195	0.00	0.0	0.0	152	0.03	0.2	1.1		0.00	0.0	0.0
STFungiSC	207	0.48	3.7	17.7	170	0.03	0.2	1.2	326	0.00	0.0	0.0
PTFungiSA	187	0.00	0.0	0.0	136	0.04	0.2	1.3	290	0.00	0.0	0.0
PTFungiSB	215	0.00	0.0	0.0	142	0.03	0.1	1.0		0.00	0.0	0.0
PTFungiSC	246	0.00	0.0	0.0	181	0.04	0.3	1.4	330	0.00	0.0	0.0
STRPBactSA	186	0.00	0.0	0.0	121	0.04	0.2	1.4	291	0.00	0.0	0.0
STRPBactSB	186	0.00	0.0	0.0	125	0.03	0.1	1.0	271	0.00	0.0	0.0
STRPBactSC	184	0.00	0.0	0.0	131	0.05	0.2	1.8	273	0.00	0.0	0.0
PTRPBactSA	178	0.00	0.0	0.0	128	0.04	0.2	1.5	276	0.00	0.0	0.0
PTRPBactSB	187	0.00	0.0	0.0	114	0.04	0.2	1.5	257	0.00	0.0	0.0
PTRPBactSC	197	0.00	0.0	0.0	118	0.06	0.3	2.2	285	0.00	0.0	0.0
STRPBactFungSA	161	0.00	0.0	0.0	103	0.05	0.2	1.9	260	0.00	0.0	0.0
STRPBactFungSB	216	0.00	0.0	0.0	144	0.05	0.3	1.9	297	0.00	0.0	0.0
STRPBactFungSC	173	0.00	0.0	0.0	119	0.05	0.2	1.7	262	0.00	0.0	0.0
PTRPBactFungSA	117	0.00	0.0	0.0	75	0.04	0.1	1.6	185	0.00	0.0	0.0
PTRPBactFungSB	181	0.00	0.0	0.0	129	0.07	0.3	2.7	272	0.00	0.0	0.0
PTRPBactFungSC	171	0.00	0.0	0.0	123	0.07	0.3	2.7	275	0.00	0.0	0.0
STRPBFNOHoagSA	153	0.00	0.0	0.0	82	0.04	0.1	1.3	238	0.00	0.0	0.0
STRPBFNOHoagSB	157	0.00	0.0	0.0	95	0.04	0.1	1.5	242	0.00	0.0	0.0
STRPBFNOHoagSC	194	0.00	0.0	0.0	107	0.04	0.2	1.4	256	0.00	0.0	0.0
PTRPBFNOHoagSA	147	0.00	0.0	0.0	96	0.00	0.0	0.0	184	0.00	0.0	0.0
PTRPBFNOHoagSB	159	0.00	0.0	0.0	107	0.00	0.0	0.0	253	0.00	0.0	0.0
PTRPBFNOHoagSC	200	0.00	0.0	0.0	120	0.00	0.0	0.0	287	0.00	0.0	0.0
STRPBFNOMinSA	233	0.00	0.0	0.0	173	0.00	0.0	0.0	320	0.00	0.0	0.0
STRPBFNOMinSB	259	0.00	0.0	0.0	191	0.00	0.0	0.0	333	0.00	0.0	0.0
STRPBFNOMinSC	266	0.00	0.0	0.0	186	0.00	0.0	0.0	334	0.00	0.0	0.0
PTRPBFNOMinSA	256	0.00	0.0	0.0	177	0.00	0.0	0.0	356	0.00	0.0	0.0
PTRPBFNOMinSB	208	0.00	0.0	0.0	164	0.00	0.0	0.0	318	0.00	0.0	0.0
PTRPBFNOMinSC	255	0.00	0.0	0.0	187	0.00	0.0	0.0	358	0.00	0.0	0.0
	3/29/05	*3/29/05*	*3/29/05*	*3/29/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/26/05*	*4/26/05*	*4/26/05*	*4/26/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	167.33	0.00	0.00	0.00	105.67	0.04	0.15	1.46	235.00	0.00	0.00	0.00
Stbacteria	203.33	0.00	0.00	0.00	140.67	0.03	0.15	1.10	283.67	0.00	0.00	0.01
Ptbacteria	187.67	0.00	0.00	0.00	141.67	0.03	0.17	1.21	268.33	0.00	0.00	0.00
Stfungi	212.67	0.16	1.22	5.91	163.67	0.03	0.18	1.13	328.83	0.00	0.00	0.00
Ptfungi	216.33	0.00	0.00	0.00	153.00	0.03	0.20	1.26	310.00	0.00	0.00	0.00
StRPBact	185.00	0.00	0.00	0.00	126.00	0.04	0.18	1.40	278.67	0.00	0.00	0.00
PtRPBact	187.67	0.00	0.00	0.00	119.67	0.05	0.21	1.72	272.67	0.00	0.00	0.00
STRPBactFung	183.33	0.00	0.00	0.00	122.33	0.05	0.22	1.80	273.00	0.00	0.00	0.00
PTRPBactFung	156.67	0.00	0.00	0.00	108.67	0.06	0.26	2.33	243.67	0.00	0.00	0.00
STRPBFNOHoag	168.33	0.00	0.00	0.00	94.33	0.04	0.13	1.41	245.00	0.00	0.00	0.00
PTRPBFNOHoag	168.67	0.00	0.00	0.00	107.67	0.00	0.00	0.00	241.33	0.00	0.00	0.00
STRPBFNOMin	252.33	0.00	0.00	0.00	183.67	0.00	0.00	0.00	329.33	0.00	0.01	0.02
PTRPBFNOMin	240.00	0.00	0.00	0.00	176.00	0.00	0.00	0.00	343.67	0.00	0.00	0.00
	3/29/05	*3/29/05*	*3/29/05*	*3/29/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/12/05*	*4/26/05*	*4/26/05*	*4/26/05*	*4/26/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	5.04	0.00	0.00	0.00	6.36	0.00	0.01	0.09	27.50	0.00	0.00	0.00
Stbacteria	2.40	0.00	0.00	0.00	3.84	0.00	0.00	0.00	10.48	0.00	0.00	0.01
Ptbacteria	9.17	0.00	0.00	0.00	4.67	0.00	0.02	0.11	20.28	0.00	0.00	0.00
Stfungi	12.49	0.16	1.22	5.91	5.84	0.00	0.01	0.03	2.04	0.00	0.00	0.00
Ptfungi	17.04	0.00	0.00	0.00	14.11	0.00	0.03	0.12	16.33	0.00	0.00	0.00
StRPBact	0.67	0.00	0.00	0.00	2.91	0.01	0.03	0.25	6.36	0.00	0.00	0.00
PtRPBact	5.49	0.00	0.00	0.00	4.16	0.01	0.03	0.24	8.25	0.00	0.00	0.00
STRPBactFung	16.70	0.00	0.00	0.00	11.93	0.00	0.02	0.06	12.01	0.00	0.00	0.00
PTRPBactFung	19.88	0.00	0.00	0.00	17.09	0.01	0.07	0.34	29.51	0.00	0.00	0.00
STRPBFNOHoag	13.05	0.00	0.00	0.00	7.22	0.00	0.01	0.05	5.46	0.00	0.00	0.00
PTRPBFNOHoag	16.05	0.00	0.00	0.00	6.94	0.00	0.00	0.00	30.30	0.00	0.00	0.00

Table K-6 (cont.): Aluminum in drainage water, averages and standard error.

0.03 mg/L	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*	*Al*
Sample Date	***5/10/05***	***5/10/05***	***5/10/05***	***5/10/05***	***5/24/05***	***5/24/05***	***5/24/05***	***5/24/05***	***6/7/05***	***6/7/05***	***6/7/05***	***6/7/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	0.00	0.0	0.0	20	0.00	0.0	0.0	20	0.00	0.0	0.0
AbioticSA	249	0.03	0.3	1.3	131	0.00	0.0	0.0	129	0.04	0.2	1.6
AbioticSB	246	0.03	0.3	1.3	114	0.00	0.0	0.0	112	0.06	0.2	2.1
AbioticSC	253	0.03	0.3	1.3	112	0.00	0.0	0.0	110	0.05	0.2	1.7
STBacteriaSA	269	0.03	0.3	1.0	148	0.00	0.0	0.0	142	0.03	0.2	1.1
STBacteriaSB	197	0.04	0.3	1.3	136	0.00	0.0	0.0	141	0.03	0.2	1.1
STBacteriaSC	260	0.03	0.2	0.9	166	0.00	0.0	0.0	157	0.03	0.2	1.1
PTBacteriaSA	235	0.04	0.3	1.4	148	0.00	0.0	0.0	136	0.03	0.1	1.1
PTBacteriaSB	273	0.03	0.3	0.9	93	0.00	0.0	0.0	92	0.03	0.1	1.1
PTBacteriaSC	181	0.03	0.2	0.9	149	0.00	0.0	0.0	155	0.03	0.2	1.1
STFungiSA	275	0.03	0.3	0.9	164	0.00	0.0	0.0	145	0.03	0.1	1.0
STFungiSB	256	0.03	0.2	0.9	148	0.00	0.0	0.0	144	0.04	0.2	1.3
STFungiSC	287	0.03	0.3	0.9	142	0.00	0.0	0.0	140	0.03	0.2	1.2
PTFungiSA	264	0.05	0.5	1.7	155	0.00	0.0	0.0	153	0.05	0.3	1.8
PTFungiSB	265	0.03	0.3	1.1	150	0.00	0.0	0.0	154	0.04	0.2	1.4
PTFungiSC	282	0.03	0.4	1.3	131	0.00	0.0	0.0	157	0.04	0.2	1.5
STRPBactSA	264	0.03	0.3	1.2	135	0.00	0.0	0.0	126	0.06	0.3	2.1
STRPBactSB	262	0.03	0.3	1.2	144	0.00	0.0	0.0	129	0.06	0.3	2.1
STRPBactSC	256	0.03	0.3	1.2	117	0.00	0.0	0.0	112	0.06	0.2	2.2
PTRPBactSA	251	0.03	0.3	1.1	144	0.00	0.0	0.0	134	0.06	0.3	2.1
PTRPBactSB	258	0.03	0.3	1.1	125	0.00	0.0	0.0	113	0.06	0.2	2.1
PTRPBactSC	254	0.03	0.3	1.1	137	0.00	0.0	0.0	128	0.05	0.3	2.0
STRPBactFungSA	232	0.03	0.3	1.1	131	0.04	0.2	1.5	132	0.08	0.4	3.1
STRPBactFungSB	276	0.03	0.3	1.0	149	0.03	0.2	1.1	139	0.06	0.3	2.3
STRPBactFungSC	255	0.03	0.3	1.0	130	0.03	0.1	1.1	127	0.07	0.3	2.5
PTRPBactFungSA	170	0.03	0.2	1.0	100	0.03	0.1	1.1	87	0.07	0.2	2.6
PTRPBactFungSB	261	0.05	0.4	1.7	117	0.03	0.1	1.1	108	0.06	0.2	2.1
PTRPBactFungSC	266	0.05	0.5	1.8	93	0.03	0.1	1.1	87	0.07	0.2	2.6
STRPBFNOHoagSA	286	0.03	0.3	1.0	99	0.04	0.2	1.6	100	0.06	0.2	2.2
STRPBFNOHoagSB	306	0.03	0.3	1.0	122	0.04	0.2	1.5	113	0.04	0.2	1.6
STRPBFNOHoagSC	290	0.03	0.3	1.0	126	0.04	0.2	1.4	117	0.06	0.2	2.1
PTRPBFNOHoagSA	315	0.03	0.3	1.0	112	0.04	0.2	1.4	103	0.05	0.2	1.8
PTRPBFNOHoagSB	269	0.03	0.3	1.0	113	0.04	0.2	1.6	95	0.06	0.2	2.1
PTRPBFNOHoagSC	295	0.03	0.3	1.0	115	0.05	0.2	1.7	111	0.06	0.2	2.2
STRPBFNOMinSA	224	0.03	0.2	1.0	177	0.04	0.3	1.4	162	0.05	0.3	2.0
STRPBFNOMinSB	229	0.03	0.2	1.0	174	0.04	0.3	1.5	174	0.04	0.3	1.5
STRPBFNOMinSC	239	0.03	0.2	1.0	170	0.03	0.2	1.3	168	0.07	0.5	2.7
PTRPBFNOMinSA	244	0.03	0.3	1.0	170	0.03	0.2	1.2	158	0.03	0.2	1.1
PTRPBFNOMinSB	229	0.03	0.2	1.0	185	0.05	0.3	1.8	162	0.06	0.4	2.2
PTRPBFNOMinSC	259	0.03	0.3	1.0	153	0.03	0.2	1.1	145	0.06	0.3	2.0
	5/10/05	*5/10/05*	*5/10/05*	*5/10/05*	*5/24/05*	*5/24/05*	*5/24/05*	*5/24/05*	*6/7/05*	*6/7/05*	*6/7/05*	*6/7/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	249.00	0.03	0.31	1.25	119.33	0.00	0.00	0.00	117.00	0.05	0.21	1.83
Stbacteria	242.33	0.03	0.26	1.09	150.33	0.00	0.00	0.00	147.00	0.03	0.16	1.09
Ptbacteria	229.33	0.03	0.25	1.10	130.33	0.00	0.00	0.00	128.00	0.03	0.14	1.09
Stfungi	272.33	0.03	0.25	0.93	151.67	0.00	0.00	0.00	143.33	0.03	0.17	1.16
Ptfungi	270.00	0.04	0.37	1.36	145.67	0.00	0.00	0.00	154.33	0.04	0.24	1.54
StRPBact	260.67	0.03	0.30	1.16	131.67	0.00	0.00	0.00	122.33	0.06	0.26	2.12
PtRPBact	254.67	0.03	0.28	1.11	135.33	0.00	0.00	0.00	125.33	0.06	0.26	2.04
STRPBactFung	254.00	0.03	0.27	1.06	136.33	0.03	0.16	1.21	133.00	0.07	0.35	2.62
PTRPBactFung	232.33	0.04	0.36	1.50	103.67	0.03	0.11	1.07	94.33	0.07	0.23	2.46
STRPBFNOHoag	294.00	0.03	0.31	1.04	115.33	0.04	0.17	1.50	110.33	0.05	0.21	1.95
PTRPBFNOHoag	293.00	0.03	0.30	1.04	113.00	0.04	0.17	1.55	103.33	0.06	0.21	2.04
STRPBFNOMin	231.00	0.03	0.24	1.04	173.33	0.04	0.24	1.41	167.67	0.05	0.34	2.03
PTRPBFNOMin	244.33	0.03	0.25	1.04	169.67	0.04	0.24	1.37	155.00	0.05	0.27	1.77
	5/10/05	*5/10/05*	*5/10/05*	*5/10/05*	*5/24/05*	*5/24/05*	*5/24/05*	*5/24/05*	*6/7/05*	*6/7/05*	*6/7/05*	*6/7/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	2.03	0.00	0.00	0.00	6.03	0.00	0.00	0.00	6.03	0.00	0.01	0.16
Stbacteria	22.65	0.00	0.01	0.13	8.72	0.00	0.00	0.00	5.17	0.00	0.01	0.00
Ptbacteria	26.69	0.00	0.05	0.17	18.50	0.00	0.00	0.00	18.66	0.00	0.02	0.00
Stfungi	9.02	0.00	0.01	0.00	6.57	0.00	0.00	0.00	1.53	0.00	0.01	0.11
Ptfungi	5.84	0.00	0.05	0.18	7.31	0.00	0.00	0.00	1.20	0.00	0.02	0.13
StRPBact	2.40	0.00	0.00	0.00	7.94	0.00	0.00	0.00	5.24	0.00	0.01	0.03
PtRPBact	2.03	0.00	0.00	0.00	5.55	0.00	0.00	0.00	6.24	0.00	0.01	0.05
STRPBactFung	12.71	0.00	0.01	0.02	6.17	0.00	0.02	0.14	3.48	0.01	0.03	0.23
PTRPBactFung	31.20	0.01	0.09	0.23	7.13	0.00	0.01	0.00	7.00	0.00	0.00	0.16
STRPBFNOHoag	6.11	0.00	0.01	0.00	8.41	0.00	0.01	0.06	5.13	0.01	0.02	0.20
PTRPBFNOHoag	13.32	0.00	0.01	0.00	0.88	0.00	0.01	0.09	4.62	0.00	0.02	0.11

Table K-6 (cont.): Aluminum in drainage water, averages and standard error.

0.03 mg/L	Al	Al	Al	Al	Al	Al	Al	Al	Al	Al	Al	Al	Al	Al	Al	Al
Sample Date	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
Sample ID	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Troy Method Blank	20	0.00	0.0	0.0	20	0.00	0.0	0.0	20	0.00	0.0	0.0	20	0.00	0.0	0.0
AbioticSA	129	0.00	0.0	0.0	144	0.00	0.0	0.0	151	0.00	0.0	0.0	138	0.00	0.0	0.0
AbioticSB	109	0.00	0.0	0.0	126	0.00	0.0	0.0	132	0.00	0.0	0.0	117	0.00	0.0	0.0
AbioticSC	109	0.00	0.0	0.0	117	0.00	0.0	0.0	131	0.00	0.0	0.0	109	0.00	0.0	0.0
STBacteriaSA	155	0.00	0.0	0.0	168	0.00	0.0	0.0	160	0.00	0.0	0.0	157	0.00	0.0	0.0
STBacteriaSB	154	0.00	0.0	0.0	154	0.00	0.0	0.0	156	0.00	0.0	0.0	64	0.00	0.0	0.0
STBacteriaSC	160	0.00	0.0	0.0	142	0.00	0.0	0.0	169	0.00	0.0	0.0	137	0.00	0.0	0.0
PTBacteriaSA	151	0.00	0.0	0.0	147	0.00	0.0	0.0	152	0.00	0.0	0.0	139	0.00	0.0	0.0
PTBacteriaSB	80	0.00	0.0	0.0	99	0.00	0.0	0.0	115	0.00	0.0	0.0	92	0.00	0.0	0.0
PTBacteriaSC	163	0.00	0.0	0.0	161	0.00	0.0	0.0	186	0.00	0.0	0.0	147	0.00	0.0	0.0
STFungiSA	168	0.00	0.0	0.0	165	0.00	0.0	0.0	173	0.00	0.0	0.0	149	0.00	0.0	0.0
STFungiSB	153	0.00	0.0	0.0	151	0.00	0.0	0.0	164	0.00	0.0	0.0	152	0.00	0.0	0.0
STFungiSC	153	0.00	0.0	0.0	150	0.00	0.0	0.0	112	0.00	0.0	0.0	141	0.00	0.0	0.0
PTFungiSA	163	0.00	0.0	0.0	161	0.00	0.0	0.0	174	0.00	0.0	0.0	150	0.00	0.0	0.0
PTFungiSB	163	0.00	0.0	0.0	160	0.00	0.0	0.0	164	0.00	0.0	0.0	150	0.00	0.0	0.0
PTFungiSC	167	0.00	0.0	0.0	170	0.00	0.0	0.0	181	0.00	0.0	0.0	155	0.00	0.0	0.0
STRPBactSA	130	0.00	0.0	0.0	142	0.00	0.0	0.0	153	0.00	0.0	0.0	132	0.00	0.0	0.0
STRPBactSB	127	0.00	0.0	0.0	142	0.00	0.0	0.0	152	0.00	0.0	0.0	129	0.00	0.0	0.0
STRPBactSC	118	0.00	0.0	0.0	125	0.00	0.0	0.0	140	0.00	0.0	0.0	115	0.00	0.0	0.0
PTRPBactSA	136	0.00	0.0	0.0	147	0.00	0.0	0.0	159	0.00	0.0	0.0	143	0.00	0.0	0.0
PTRPBactSB	120	0.00	0.0	0.0	140	0.00	0.0	0.0	147	0.00	0.0	0.0	128	0.00	0.0	0.0
PTRPBactSC	131	0.00	0.0	0.0	135	0.00	0.0	0.0	151	0.00	0.0	0.0	142	0.00	0.0	0.0
STRPBactFungSA	148	0.00	0.0	0.0	134	0.00	0.0	0.0	152	0.00	0.0	0.0	142	0.00	0.0	0.0
STRPBactFungSB	147	0.00	0.0	0.0	145	0.00	0.0	0.0	167	0.00	0.0	0.0	144	0.00	0.0	0.0
STRPBactFungSC	138	0.00	0.0	0.0	140	0.00	0.0	0.0	147	0.00	0.0	0.0	140	0.00	0.0	0.0
PTRPBactFungSA	90	0.00	0.0	0.0	97	0.00	0.0	0.0	122	0.00	0.0	0.0	91	0.00	0.0	0.0
PTRPBactFungSB	106	0.00	0.0	0.0	106	0.00	0.0	0.0	123	0.00	0.0	0.0	115	0.00	0.0	0.0
PTRPBactFungSC	93	0.00	0.0	0.0	95	0.00	0.0	0.0	107	0.00	0.0	0.0	98	0.00	0.0	0.0
STRPBFNOHoagSA	104	0.00	0.0	0.0	102	0.00	0.0	0.0	108	0.00	0.0	0.0	110	0.00	0.0	0.0
STRPBFNOHoagSB	120	0.00	0.0	0.0	123	0.00	0.0	0.0	125	0.00	0.0	0.0	126	0.00	0.0	0.0
STRPBFNOHoagSC	128	0.00	0.0	0.0	124	0.00	0.0	0.0	131	0.00	0.0	0.0	135	0.00	0.0	0.0
PTRPBFNOHoagSA	125	0.00	0.0	0.0	130	0.00	0.0	0.0	143	0.00	0.0	0.0	75	0.00	0.0	0.0
PTRPBFNOHoagSB	113	0.00	0.0	0.0	121	0.00	0.0	0.0	145	0.00	0.0	0.0	124	0.00	0.0	0.0
PTRPBFNOHoagSC	119	0.00	0.0	0.0	125	0.00	0.0	0.0	144	0.00	0.0	0.0	128	0.00	0.0	0.0
STRPBFNOMinSA	163	0.00	0.0	0.0	169	0.00	0.0	0.0	174	0.00	0.0	0.0	178	0.00	0.0	0.0
STRPBFNOMinSB	175	0.00	0.0	0.0	182	0.00	0.0	0.0	193	0.00	0.0	0.0	180	0.00	0.0	0.0
STRPBFNOMinSC	170	0.00	0.0	0.0	172	0.00	0.0	0.0	190	0.00	0.0	0.0	174	0.00	0.0	0.0
PTRPBFNOMinSA	175	0.00	0.0	0.0	174	0.00	0.0	0.0	184	0.00	0.0	0.0	178	0.00	0.0	0.0
PTRPBFNOMinSB	177	0.00	0.0	0.0	185	0.00	0.0	0.0	187	0.00	0.0	0.0	187	0.00	0.0	0.0
PTRPBFNOMinSC	151	0.00	0.0	0.0	156	0.00	0.0	0.0	166	0.00	0.0	0.0	160	0.00	0.0	0.0
	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
Average	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Abiotic	116.00	0.00	0.00	0.00	128.67	0.00	0.00	0.00	138.00	0.00	0.00	0.00	121.33	0.00	0.00	0.00
Stbacteria	156.67	0.00	0.00	0.00	155.00	0.00	0.00	0.00	161.33	0.00	0.00	0.00	119.00	0.00	0.00	0.00
Ptbacteria	131.67	0.00	0.00	0.00	136.00	0.00	0.00	0.00	151.00	0.00	0.00	0.00	126.33	0.00	0.00	0.00
Stfungi	158.00	0.00	0.00	0.00	155.67	0.00	0.00	0.00	149.33	0.00	0.00	0.00	147.33	0.00	0.00	0.00
Ptfungi	164.67	0.00	0.00	0.00	163.67	0.00	0.00	0.00	173.00	0.00	0.00	0.00	151.67	0.00	0.00	0.00
StRPBact	125.00	0.00	0.00	0.00	136.00	0.00	0.00	0.00	148.33	0.00	0.00	0.00	125.67	0.00	0.00	0.00
PtRPBact	129.33	0.00	0.00	0.00	141.00	0.00	0.00	0.00	152.67	0.00	0.00	0.00	138.00	0.00	0.00	0.00
STRPBactFung	144.33	0.00	0.00	0.00	140.00	0.00	0.00	0.00	155.33	0.00	0.00	0.00	142.33	0.00	0.00	0.00
PTRPBactFung	96.33	0.00	0.00	0.00	99.33	0.00	0.00	0.00	117.00	0.00	0.00	0.00	101.33	0.00	0.00	0.00
STRPBFNOHoag	117.67	0.00	0.00	0.00	116.33	0.00	0.00	0.00	121.33	0.00	0.00	0.00	123.33	0.00	0.00	0.00
PTRPBFNOHoag	118.67	0.00	0.00	0.00	125.00	0.00	0.00	0.00	143.67	0.00	0.00	0.00	109.33	0.00	0.00	0.00
STRPBFNOMin	169.00	0.00	0.00	0.00	174.00	0.00	0.00	0.00	186.00	0.00	0.00	0.00	177.00	0.00	0.00	0.00
PTRPBFNOMin	167.67	0.00	0.00	0.00	171.67	0.00	0.00	0.00	179.33	0.00	0.00	0.00	175.00	0.00	0.00	0.00
	6/21/05	6/21/05	6/21/05	6/21/05	7/5/05	7/5/05	7/5/05	7/5/05	7/19/05	7/19/05	7/19/05	7/19/05	8/2/05	8/2/05	8/2/05	8/2/05
STE	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Abiotic	6.67	0.00	0.00	0.00	7.94	0.00	0.00	0.00	6.51	0.00	0.00	0.00	8.65	0.00	0.00	0.00
Stbacteria	1.86	0.00	0.00	0.00	7.51	0.00	0.00	0.00	3.84	0.00	0.00	0.00	28.26	0.00	0.00	0.00
Ptbacteria	25.90	0.00	0.00	0.00	18.77	0.00	0.00	0.00	20.50	0.00	0.00	0.00	17.16	0.00	0.00	0.00
Stfungi	5.00	0.00	0.00	0.00	4.84	0.00	0.00	0.00	19.01	0.00	0.00	0.00	3.28	0.00	0.00	0.00
Ptfungi	1.33	0.00	0.00	0.00	3.18	0.00	0.00	0.00	4.93	0.00	0.00	0.00	1.67	0.00	0.00	0.00
StRPBact	3.61	0.00	0.00	0.00	5.67	0.00	0.00	0.00	4.18	0.00	0.00	0.00	5.24	0.00	0.00	0.00
PtRPBact	4.73	0.00	0.00	0.00	3.48	0.00	0.00	0.00	3.53	0.00	0.00	0.00	4.84	0.00	0.00	0.00
STRPBactFung	3.18	0.00	0.00	0.00	3.18	0.00	0.00	0.00	6.01	0.00	0.00	0.00	1.15	0.00	0.00	0.00
PTRPBactFung	4.91	0.00	0.00	0.00	3.38	0.00	0.00	0.00	5.17	0.00	0.00	0.00	7.13	0.00	0.00	0.00
STRPBFNOHoag	7.06	0.00	0.00	0.00	7.17	0.00	0.00	0.00	6.89	0.00	0.00	0.00	7.31	0.00	0.00	0.00
PTRPBFNOHoag	3.46	0.00	0.00	0.00	2.60	0.00	0.00	0.00	0.58	0.00	0.00	0.00	17.04	0.00	0.00	0.00

Table K-7: Silica in drainage water, averages and standard error.

	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si
Sample Date	***08/05/04***	***08/05/04***	***08/05/04***	***08/05/04***	***08/19/04***	***08/19/04***	***08/19/04***	***08/19/04***	***09/30/04***	***09/30/04***	***09/30/04***	***09/30/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank												
AbioticSA	225	10.98	87.77	390.96	273	4.85	47.10	172.53	285	5.97	60.59	212.60
AbioticSB	206	8.95	65.46	318.55	317	3.91	44.11	139.16	293	6.47	67.53	230.48
AbioticSC	320	5.55	63.18	197.74	312	4.87	54.14	173.51	277	5.16	50.91	183.79
STBacteriaSA	270	9.92	95.33	353.06	312	3.72	41.28	132.29	206	72.31	530.35	2574.52
STBacteriaSB	268	10.42	99.43	371.01	268	3.69	35.19	131.31	192	102.43	700.19	3646.85
STBacteriaSC	327	9.55	111.21	340.09	286	5.09	51.87	181.36	217	84.57	653.40	3011.05
PTBacteriaSA	264	11.18	105.06	397.94	272	5.12	49.60	182.34	249	34.73	307.89	1236.49
PTBacteriaSB	265	11.06	104.40	393.95	310	3.33	36.75	118.55	227	35.79	289.30	1274.45
PTBacteriaSC	313	6.91	76.90	246.06	313	3.94	43.86	140.14	246	40.59	355.53	1445.26
STFungiSA	200	9.11	64.87	324.35	367	5.56	72.68	198.05	226	27.53	221.54	980.27
STFungiSB	296	10.73	113.07	381.98	356	5.31	67.36	189.21	306	44.86	488.71	1597.10
STFungiSC	272	10.73	103.90	381.98	258	4.93	45.27	175.47	180	39.26	251.61	1397.82
PTFungiSA	258	9.86	90.57	351.06	375	4.63	61.75	164.68	267	42.72	406.16	1521.18
PTFungiSB	299	9.22	98.14	328.21	367	5.59	73.04	199.03	182	25.93	168.05	923.34
PTFungiSC	278	10.67	105.64	379.99	198	5.48	38.63	195.10	227	43.79	353.92	1559.14
STRPBactSA	336	11.36	135.73	404.57	265	5.23	49.32	186.11	222	6.08	48.08	216.57
STRPBactSB	163	12.80	74.29	455.78	310	4.59	50.67	163.44	204	5.02	36.48	178.82
STRPBactSC	258	9.92	91.09	353.06	368	4.81	63.05	171.32	202	5.36	38.53	190.74
PTRPBactSA	222	8.19	64.71	291.49	254	6.06	54.78	215.68	271	5.33	51.42	189.75
PTRPBactSB	172	12.04	73.74	428.73	263	5.70	53.35	202.87	224	5.33	42.50	189.75
PTRPBactSC	253	11.62	104.72	413.89	288	5.61	57.57	199.91	226	5.58	44.90	198.69
STRPBactFungSA	326	8.05	93.45	286.66	292	5.59	58.09	198.92	223	5.69	45.19	202.66
STRPBactFungSB	206	11.25	82.34	400.70	321	5.01	57.21	178.22	252	5.11	45.81	181.80
STRPBactFungSC	340	10.25	124.08	364.94	330	5.20	61.09	185.12	238	5.47	46.34	194.71
PTRPBactFungSA	246	8.77	76.79	312.17	272	4.53	43.92	161.46	212	6.14	46.33	218.56
PTRPBactFungSB	217	15.99	123.58	569.48	298	5.78	61.34	205.82	206	6.28	46.05	223.52
PTRPBactFungSC	315	11.26	126.09	400.93	216	5.09	39.13	181.18	269	6.31	60.40	224.52
STRPBFNOHoagSA	296	8.49	89.43	302.12	373	5.31	70.58	189.21	222	5.70	45.09	203.11
STRPBFNOHoagSB	193	15.24	104.71	542.55	342	5.01	61.02	178.42	223	6.07	48.19	216.11
STRPBFNOHoagSC	241	9.63	82.59	342.71	245	4.63	40.35	164.68	316	5.31	59.76	189.12
PTRPBFNOHoagSA	340	12.30	148.86	437.83	358	3.33	42.44	118.55	320	8.18	93.14	291.08
PTRPBFNOHoagSB	220	12.21	95.66	434.84	323	4.71	54.14	167.62	317	5.12	57.73	182.12
PTRPBFNOHoagSC	346	10.45	128.53	372.01	348	3.94	48.77	140.14	260	6.72	62.17	239.10
STRPBFNOMinSA	381	1.83	24.89	65.33	452	1.66	26.64	58.95	201	2.95	21.14	105.16
STRPBFNOMinSB	396	1.97	27.79	70.17	367	0.99	12.95	35.29	308	2.70	29.62	96.16
STRPBFNOMinSC	329	2.92	34.21	103.99	340	1.02	12.33	36.28	244	2.39	20.78	85.16
PTRPBFNOMinSA	351	2.18	27.31	77.79	471	1.01	17.01	36.12	294	2.22	23.27	79.17
PTRPBFNOMinSB	300	1.97	21.05	70.17	333	0.85	10.07	30.23	268	1.86	17.73	66.17
PTRPBFNOMinSC	422	1.32	19.78	46.87	515	1.10	20.20	39.23	268	1.61	15.32	57.18
	08/05/04	*08/05/04*	*08/05/04*	*08/05/04*	*08/19/04*	*08/19/04*	*08/19/04*	*08/19/04*	*09/30/04*	*09/30/04*	*09/30/04*	*09/30/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	249.83	8.49	72.14	302.42	300.67	4.54	48.45	161.73	285.00	5.87	59.68	208.95
Stbacteria	288.33	9.96	101.99	354.72	288.67	4.17	42.78	148.32	205.00	86.43	627.98	3077.47
Ptbacteria	280.50	9.72	95.45	345.98	298.33	4.13	43.40	147.01	240.67	37.04	317.57	1318.74
Stfungi	256.00	10.19	93.94	362.77	327.00	5.27	61.77	187.58	237.33	37.22	320.62	1325.06
Ptfungi	278.33	9.92	98.12	353.09	313.33	5.23	57.81	186.27	225.33	37.48	309.38	1334.55
StRPBact	252.17	11.36	100.37	404.47	314.33	4.88	54.34	173.62	209.33	5.49	41.03	195.38
PtRPBact	215.67	10.62	81.06	378.04	268.33	5.79	55.24	206.15	240.33	5.41	46.28	192.73
STRPBactFung	290.50	9.85	99.96	350.77	314.33	5.26	58.79	187.42	237.67	5.42	45.78	193.06
PTRPBactFung	259.17	12.01	108.82	427.53	262.00	5.13	48.13	182.82	229.00	6.24	50.93	222.20
STRPBFNOHoag	243.33	11.12	92.24	395.79	320.00	4.98	57.31	177.44	253.67	5.70	51.02	202.78
PTRPBFNOHoag	301.83	11.65	124.35	414.89	343.00	3.99	48.45	142.11	299.00	6.67	71.01	237.43
STRPBFNOMin	368.67	2.24	28.96	79.83	386.33	1.22	17.31	43.50	251.00	2.68	23.84	95.49
PTRPBFNOMin	357.67	1.82	22.71	64.94	439.67	0.99	15.76	35.19	276.67	1.90	18.78	67.50
	08/05/04	*08/05/04*	*08/05/04*	*08/05/04*	*08/19/04*	*08/19/04*	*08/19/04*	*08/19/04*	*09/30/04*	*09/30/04*	*09/30/04*	*09/30/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	35.26	1.58	7.84	56.36	13.91	0.32	2.97	11.29	4.62	0.38	4.82	13.60
Stbacteria	19.34	0.25	4.76	8.96	12.77	0.46	4.87	16.52	7.23	8.74	50.65	311.33
Ptbacteria	16.00	1.40	9.28	49.97	13.20	0.53	3.72	18.73	6.89	1.80	19.72	64.21
Stfungi	28.84	0.54	14.78	19.21	34.65	0.18	8.39	6.57	36.81	5.10	84.49	181.74
Ptfungi	11.84	0.42	4.35	14.98	57.71	0.30	10.13	10.85	24.55	5.78	72.25	205.90
StRPBact	49.88	0.83	18.33	29.65	29.81	0.19	4.37	6.65	6.36	0.31	3.57	11.14
PtRPBact	23.60	1.22	12.11	43.49	10.17	0.14	1.24	4.84	15.34	0.08	2.66	2.98
STRPBactFung	42.69	0.95	12.48	33.68	11.46	0.17	1.18	6.09	8.37	0.17	0.33	6.08
PTRPBactFung	28.91	2.12	16.03	75.46	24.19	0.36	6.75	12.83	20.07	0.05	4.74	1.84
STRPBFNOHoag	29.76	2.09	6.54	74.31	38.55	0.20	8.92	7.10	31.17	0.22	4.46	7.79
PTRPBFNOHoag	40.95	0.60	15.50	21.46	10.41	0.40	3.38	14.20	19.52	0.88	11.14	31.46
STRPBFNOMin	20.30	0.34	2.75	12.16	33.75	0.22	4.67	7.73	31.09	0.16	2.89	5.78

Table K-7 (cont.): Silica in drainage water, averages and standard error.

	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si
Sample Date	***10/14/04***	***10/14/04***	***10/14/04***	***10/14/04***	***10/28/04***	***10/28/04***	***10/28/04***	***10/28/04***	***11/11/04***	***11/11/04***	***11/11/04***	***11/11/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank									20	0.15	0.11	
AbioticSA	375	3.26	43.52	116.06	345	2.85	35.01	101.48	427	2.69	40.85	95.66
AbioticSB	341	3.21	38.93	114.16	335	2.58	30.75	91.78	428	2.74	41.77	97.60
AbioticSC	385	2.86	39.20	101.82	330	3.07	36.05	109.24	423	2.58	38.82	91.78
STBacteriaSA	418	106.69	1587.85	3798.68	347	94.70	1169.96	3371.65	487	122.41	2122.62	4358.57
STBacteriaSB	402	114.15	1633.88	4064.39	365	109.89	1428.08	3912.56	492	139.47	2443.22	4965.90
STBacteriaSC	403	146.14	2096.87	5203.14	342	130.41	1587.99	4643.25	464	154.40	2550.76	5497.32
PTBacteriaSA	382	47.52	646.34	1691.99	335	42.46	506.42	1511.69	444	52.59	831.30	1872.30
PTBacteriaSB	373	56.85	755.00	2024.13	353	52.85	664.27	1881.78	437	68.58	1067.01	2441.67
PTBacteriaSC	328	56.32	657.69	2005.15	303	57.12	616.19	2033.62	426	67.24	1019.94	2394.22
STFungiSA	395	46.72	657.09	1663.52	340	45.92	555.92	1635.06	453	56.32	908.33	2005.15
STFungiSB	390	65.64	911.54	2337.29	351	58.18	727.12	2071.58	462	69.91	1149.97	2489.12
STFungiSC	381	86.43	1172.52	3077.47	317	73.91	834.17	2631.46	449	74.97	1198.57	2669.42
PTFungiSA	361	65.91	847.19	2346.77	333	58.18	689.84	2071.58	344	68.58	839.93	2441.67
PTFungiSB	278	68.58	678.78	2441.67	310	43.26	477.45	1540.16	411	69.38	1015.23	2470.14
PTFungiSC	190	94.70	640.61	3371.65	266	80.84	765.60	2878.19	374	97.09	1292.94	3457.06
STRPBactSA	360	3.37	43.15	119.85	314	2.85	31.86	101.48	416	2.63	38.99	93.72
STRPBactSB	331	2.75	32.45	98.03	292	2.69	27.93	95.66	313	2.55	28.42	90.81
STRPBactSC	336	3.26	39.00	116.06	293	3.12	32.58	111.18	385	2.88	39.44	102.45
PTRPBactSA	349	3.55	44.15	126.50	296	2.93	30.90	104.39	389	2.82	39.10	100.51
PTRPBactSB	244	3.55	30.87	126.50	248	3.12	27.57	111.18	335	3.07	36.60	109.24
PTRPBactSC	354	3.53	44.44	125.55	296	3.23	34.06	115.06	414	3.29	48.44	117.00
STRPBactFungSA	336	3.26	39.00	116.06	269	2.77	26.51	98.57	411	2.69	39.32	95.66
STRPBactFungSB	314	3.26	36.44	116.06	259	2.66	24.52	94.69	400	1.98	28.17	70.43
STRPBactFungSC	344	3.50	42.86	124.60	301	3.12	33.47	111.18	408	2.88	41.80	102.45
PTRPBactFungSA	295	3.47	36.48	123.65	247	2.63	23.15	93.72	325	2.88	33.30	102.45
PTRPBactFungSB	334	3.69	43.83	131.24	285	3.18	32.24	113.12	398	3.12	44.25	111.18
PTRPBactFungSC	355	3.61	45.58	128.39	276	3.18	31.22	113.12	279	2.82	28.04	100.51
STRPBFNOHoagSA	348	3.07	38.08	109.41	301	2.82	30.25	100.51	450	2.52	40.43	89.84
STRPBFNOHoagSB	305	3.05	33.08	108.47	262	2.90	27.10	103.42	485	2.69	46.39	95.66
STRPBFNOHoagSC	352	3.53	44.19	125.55	295	2.96	31.08	105.36	505	2.60	46.84	92.75
PTRPBFNOHoagSA	316	3.05	34.28	108.47	293	2.82	29.45	100.51	508	3.67	66.34	130.58
PTRPBFNOHoagSB	308	2.78	30.48	98.98	294	2.74	28.69	97.60	486	2.60	45.08	92.75
PTRPBFNOHoagSC	304	2.94	31.82	104.67	320	2.88	32.78	102.45	456	2.71	44.06	96.63
STRPBFNOMinSA	429	0.67	10.30	24.01	372	0.64	8.52	22.90	390	1.68	23.31	59.76
STRPBFNOMinSB	443	0.54	8.53	19.26	376	0.72	9.70	25.81	391	0.56	7.81	19.99
STRPBFNOMinSC	441	1.05	16.45	37.29	314	0.62	6.88	21.93	400	0.53	7.61	19.02
PTRPBFNOMinSA	451	0.94	15.11	33.50	306	0.56	6.12	19.99	391	1.24	17.30	44.24
PTRPBFNOMinSB	394	0.86	12.08	30.65	373	0.59	7.82	20.96	398	0.72	10.27	25.81
PTRPBFNOMinSC	442	0.91	14.39	32.55	391	0.51	7.06	18.05	420	0.53	7.99	19.02
	10/14/04	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	367.00	3.11	40.55	110.68	336.67	2.83	33.93	100.83	426.00	2.67	40.48	95.01
Stbacteria	407.67	122.33	1772.87	4355.40	351.33	111.66	1395.35	3975.82	481.00	138.76	2372.20	4940.59
Ptbacteria	361.00	53.56	686.34	1907.09	330.33	50.81	595.62	1809.03	435.67	62.80	972.75	2236.06
Stfungi	388.67	66.27	913.72	2359.43	336.00	59.34	705.74	2112.70	454.67	67.07	1085.63	2387.90
Ptfungi	276.33	76.39	722.19	2720.03	303.00	60.76	644.29	2163.31	376.33	78.35	1049.37	2789.62
StRPBact	342.33	3.13	38.20	111.31	299.67	2.89	30.79	102.77	371.33	2.69	35.62	95.66
PtRPBact	315.67	3.54	39.82	126.18	280.00	3.10	30.84	110.21	379.33	3.06	41.38	108.92
STRPBactFung	331.33	3.34	39.43	118.90	276.33	2.85	28.17	101.48	406.33	2.51	36.43	89.51
PTRPBactFung	328.00	3.59	41.96	127.76	269.33	3.00	28.87	106.65	334.00	2.94	35.20	104.71
STRPBFNOHoag	335.00	3.22	38.45	114.48	286.00	2.90	29.48	103.10	480.00	2.60	44.55	92.75
PTRPBFNOHoag	309.33	2.92	32.19	104.04	302.33	2.81	30.31	100.19	483.33	3.00	51.82	106.65
STRPBFNOMin	437.67	0.75	11.76	26.86	354.00	0.66	8.37	23.54	393.67	0.92	12.91	32.92
PTRPBFNOMin	429.00	0.91	13.86	32.23	356.67	0.55	7.00	19.66	403.00	0.83	11.85	29.69
	10/14/04	*10/14/04*	*10/14/04*	*10/14/04*	*10/28/04*	*10/28/04*	*10/28/04*	*10/28/04*	*11/11/04*	*11/11/04*	*11/11/04*	*11/11/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	13.32	0.13	1.49	4.46	4.41	0.14	1.62	5.05	1.53	0.05	0.87	1.71
Stbacteria	5.17	12.10	162.54	430.75	6.98	10.35	121.78	368.44	8.62	9.24	128.59	328.97
Ptbacteria	16.70	3.02	34.48	107.69	14.62	4.35	46.71	155.00	5.24	5.12	72.02	182.40
Stfungi	4.10	11.47	148.79	408.32	10.02	8.10	81.03	288.37	3.84	5.57	89.75	198.33
Ptfungi	49.37	9.18	63.46	326.96	19.66	10.92	86.24	388.97	19.38	9.38	131.88	333.82
StRPBact	8.95	0.19	3.11	6.73	7.17	0.13	1.44	4.53	30.51	0.10	3.60	3.50
PtRPBact	35.86	0.01	4.48	0.32	16.00	0.09	1.87	3.12	23.31	0.13	3.60	4.76
STRPBactFung	8.97	0.08	1.87	2.85	12.67	0.14	2.71	4.98	3.28	0.27	4.19	9.74
PTRPBactFung	17.58	0.06	2.79	2.21	11.46	0.18	2.88	6.47	34.65	0.09	4.77	3.28
STRPBFNOHoag	15.04	0.16	3.21	5.54	12.12	0.04	1.21	1.41	16.07	0.05	2.07	1.68
PTRPBFNOHoag	3.53	0.08	1.11	2.76	8.84	0.04	1.26	1.41	15.07	0.34	7.26	12.02
STRPBFNOMin	4.37	0.15	2.40	5.40	20.03	0.03	0.82	1.17	3.18	0.38	5.20	13.42

Table K-7 (cont.): Silica in drainage water, averages and standard error.

	Si	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*
Sample Date	***11/29/04***	***11/29/04***	***11/29/04***	***11/29/04***	***12/09/04***	***12/09/04***	***12/09/04***	***12/09/04***	***12/21/04***	***12/21/04***	***12/21/04***	***12/21/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank			0.00		20	-0.01	-0.01		20	0.00	0.00	
AbioticSA	519	1.87	34.54	66.55	306	1.62	17.69	57.82	333	1.60	18.99	57.02
AbioticSB	500	1.62	28.91	57.82	288	1.84	18.89	65.58	329	1.76	20.67	62.83
AbioticSC	522	1.92	35.75	68.49	320	2.03	23.16	72.37	328	1.93	22.51	68.63
STBacteriaSA	489	114.06	1985.88	4061.10	338	121.69	1464.47	4332.74	372	76.79	1017.13	2734.21
STBacteriaSB	511	131.77	2397.46	4691.70	323	123.87	1424.54	4410.35	372	69.50	920.59	2474.70
STBacteriaSC	521	144.31	2676.89	5137.98	310	148.66	1640.89	5293.20	343	91.66	1119.42	3263.61
PTBacteriaSA	450	64.47	1032.93	2295.40	315	80.27	900.30	2858.10	354	49.39	622.49	1758.45
PTBacteriaSB	534	67.19	1277.55	2392.42	295	76.19	800.21	2712.57	270	47.35	455.16	1685.78
PTBacteriaSC	532	58.75	1112.77	2091.67	314	75.37	842.61	2683.47	335	47.06	561.26	1675.40
STFungiSA	509	47.03	852.32	1674.50	298	75.91	805.46	2702.87	329	40.06	469.24	1426.27
STFungiSB	507	68.28	1232.63	2431.22	325	96.62	1118.06	3440.19	351	46.76	584.42	1665.02
STFungiSC	537	63.38	1211.79	2256.60	319	70.74	803.41	2518.54	339	56.68	684.09	2017.96
PTFungiSA	489	69.65	1212.59	2479.73	265	93.35	880.80	3323.77	289	55.51	571.19	1976.44
PTFungiSB	456	67.74	1099.79	2411.82	230	76.73	628.35	2731.97	288	52.89	542.31	1883.01
PTFungiSC	450	81.09	1299.24	2887.20	208	101.53	751.88	3614.82	273	77.38	752.11	2754.97
STRPBactSA	468	2.01	33.42	71.40	270	1.49	14.30	52.97	302	1.74	18.68	61.86
STRPBactSB	423	1.87	28.15	66.55	244	1.98	17.19	70.43	283	1.71	17.23	60.89
STRPBactSC	424	2.20	33.15	78.20	256	2.69	24.49	95.66	285	2.06	20.94	73.48
PTRPBactSA	458	2.01	32.70	71.40	253	1.51	13.65	53.94	291	1.82	18.85	64.76
PTRPBactSB	390	1.51	21.04	53.94	266	2.22	21.06	79.17	222	2.04	16.10	72.51
PTRPBactSC	435	2.47	38.24	87.90	261	2.85	26.49	101.48	276	2.25	22.15	80.25
STRPBactFungSA	468	1.95	32.51	69.46	249	1.79	15.85	63.64	285	1.71	17.35	60.89
STRPBactFungSB	465	1.92	31.85	68.49	256	1.79	16.29	63.64	267	1.63	15.48	57.99
STRPBactFungSC	459	2.22	36.34	79.17	273	1.51	14.73	53.94	291	1.71	17.72	60.89
PTRPBactFungSA	334	2.31	27.41	82.08	204	1.38	10.01	49.09	253	1.76	15.90	62.83
PTRPBactFungSB	417	2.20	32.61	78.20	256	2.09	19.02	74.31	287	2.01	20.53	71.54
PTRPBactFungSC	433	2.41	37.22	85.96	260	2.11	19.57	75.28	230	1.93	15.79	68.63
STRPBFNOHoagSA	555	1.68	33.17	59.76	274	2.17	21.16	77.22	315	1.60	17.96	57.02
STRPBFNOHoagSB	563	2.41	48.39	85.96	297	1.71	18.04	60.73	339	1.76	21.30	62.83
STRPBFNOHoagSC	595	1.76	37.29	62.67	316	2.14	24.10	76.25	395	1.85	25.96	65.73
PTRPBFNOHoagSA	589	2.14	44.91	76.25	332	1.87	22.10	66.55	396	1.63	22.96	57.99
PTRPBFNOHoagSB	555	2.31	45.55	82.08	321	1.60	18.25	56.85	307	1.71	18.69	60.89
PTRPBFNOHoagSC	527	1.95	36.61	69.46	335	2.11	25.22	75.28	312	1.93	21.41	68.63
STRPBFNOMinSA	452	0.29	4.65	10.28	246	0.23	2.05	8.34	286	0.30	3.02	10.55
STRPBFNOMinSB	440	0.29	4.52	10.28	243	0.18	1.56	6.40	278	0.38	3.74	13.46
STRPBFNOMinSC	428	0.26	3.99	9.31	195	0.13	0.87	4.46	302	0.30	3.19	10.55
PTRPBFNOMinSA	433	0.13	1.93	4.46	259	0.18	1.66	6.40	310	0.13	1.47	4.74
PTRPBFNOMinSB	443	0.37	5.85	13.19	211	0.29	2.17	10.28	297	0.38	4.00	13.46
PTRPBFNOMinSC	493	0.26	4.59	9.31	271	0.15	1.47	5.43	311	0.30	3.28	10.55
	11/29/04	*11/29/04*	*11/29/04*	*11/29/04*	*12/09/04*	*12/09/04*	*12/09/04*	*12/09/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	513.67	1.81	33.07	64.29	304.67	1.83	19.91	65.26	330.00	1.76	20.72	62.83
Stbacteria	507.00	130.05	2353.41	4630.26	323.67	131.41	1509.97	4678.77	362.33	79.32	1019.04	2824.17
Ptbacteria	505.33	63.47	1141.08	2259.83	308.00	77.28	847.71	2751.38	319.67	47.93	546.30	1706.55
Stfungi	517.67	59.56	1098.91	2120.77	314.00	81.09	908.98	2887.20	339.67	47.83	579.25	1703.09
Ptfungi	465.00	72.82	1203.87	2592.92	234.33	90.54	753.68	3223.52	283.33	61.92	621.87	2204.81
StRPBact	438.33	2.02	31.57	72.05	256.67	2.05	18.66	73.02	290.00	1.84	18.95	65.41
PtRPBact	427.67	2.00	30.66	71.08	260.00	2.20	20.40	78.20	263.00	2.04	19.03	72.51
STRPBactFung	464.00	2.03	33.57	72.37	259.33	1.70	15.62	60.41	281.00	1.68	16.85	59.92
PTRPBactFung	394.67	2.31	32.41	82.08	240.00	1.86	16.20	66.23	256.67	1.90	17.40	67.67
STRPBFNOHoag	571.00	1.95	39.62	69.46	295.67	2.01	21.10	71.40	349.67	1.74	21.74	61.86
PTRPBFNOHoag	557.00	2.13	42.36	75.93	329.33	1.86	21.86	66.23	338.33	1.76	21.02	62.50
STRPBFNOMin	440.00	0.28	4.39	9.96	228.00	0.18	1.49	6.40	288.67	0.32	3.32	11.52
PTRPBFNOMin	456.33	0.25	4.12	8.99	247.00	0.21	1.77	7.37	306.00	0.27	2.92	9.58
	11/29/04	*11/29/04*	*11/29/04*	*11/29/04*	*12/09/04*	*12/09/04*	*12/09/04*	*12/09/04*	*12/21/04*	*12/21/04*	*12/21/04*	*12/21/04*
STDev	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	6.89	0.09	2.11	3.28	9.26	0.12	1.66	4.20	1.53	0.09	1.02	3.35
Stbacteria	9.45	8.77	200.69	312.38	8.09	8.65	66.47	308.03	9.67	6.52	57.41	232.14
Ptbacteria	27.67	2.49	72.02	88.62	6.51	1.52	29.01	54.02	25.43	0.73	48.88	26.12
Stfungi	9.68	6.42	123.44	228.76	8.19	7.91	104.54	281.57	6.36	4.83	62.07	171.86
Ptfungi	12.12	4.17	57.74	148.44	16.60	7.30	72.88	259.74	5.17	7.76	65.65	276.40
StRPBact	14.84	0.09	1.71	3.38	7.51	0.35	3.03	12.39	6.03	0.11	1.08	4.04
PtRPBact	19.97	0.28	5.07	9.80	3.79	0.39	3.72	13.73	20.95	0.13	1.75	4.47
STRPBactFung	2.65	0.10	1.40	3.41	7.13	0.09	0.47	3.23	7.21	0.03	0.69	0.97
PTRPBactFung	30.68	0.06	2.83	2.24	18.04	0.24	3.10	8.57	16.56	0.07	1.56	2.56
STRPBFNOHoag	12.22	0.23	4.55	8.29	12.14	0.15	1.75	5.34	23.70	0.07	2.32	2.56
PTRPBFNOHoag	17.93	0.10	2.88	3.64	4.26	0.15	2.02	5.32	28.87	0.09	1.25	3.18
STRPBFNOMin	6.93	0.01	0.20	0.32	16.52	0.03	0.34	1.12	7.06	0.03	0.22	0.97

Table K-7 (cont.): Silica in drainage water, averages and standard error.

	Si	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*
Sample Date	***01/04/05***	***01/04/05***	***01/04/05***	***01/04/05***	***01/18/05***	***01/18/05***	***01/18/05***	***01/18/05***	***02/01/05***	***02/01/05***	***02/01/05***	***02/01/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	-0.03	-0.02		20	0.07	0.05		20	-0.04	-0.03	
AbioticSA	242	2.15	18.48	76.38	404	2.51	36.14	89.45	490	2.35	40.95	83.58
AbioticSB	237	1.74	14.66	61.86	390	2.29	31.83	81.62	457	2.18	35.51	77.71
AbioticSC	204	2.25	16.37	80.25	393	2.84	39.77	101.20	462	2.59	42.68	92.39
STBacteriaSA	292	34.23	355.85	1218.66	444	40.35	637.87	1436.65	505	19.94	358.56	710.02
STBacteriaSB	295	30.15	316.63	1073.34	414	22.86	336.92	813.83	498	8.86	157.15	315.57
STBacteriaSC	273	57.26	556.57	2038.72	421	30.15	451.88	1073.34	492	29.56	517.87	1052.58
PTBacteriaSA	299	24.02	255.75	855.35	365	24.02	312.20	855.35	382	21.11	287.09	751.54
PTBacteriaSB	276	26.65	261.86	948.77	398	24.31	344.56	865.73	484	15.86	273.31	564.70
PTBacteriaSC	269	35.10	336.20	1249.81	416	29.56	437.87	1052.58	501	25.48	454.53	907.25
STFungiSA	255	24.90	226.05	886.49	399	29.27	415.84	1042.20	479	24.31	414.68	865.73
STFungiSB	227	22.86	184.74	813.83	409	23.73	345.59	844.97	492	20.52	359.55	730.78
STFungiSC	282	26.06	261.70	928.01	407	11.20	162.23	398.61	516	7.41	136.05	263.66
PTFungiSA	227	26.65	215.37	948.77	396	29.27	412.71	1042.20	480	21.40	365.72	761.92
PTFungiSB	228	21.11	171.35	751.54	360	25.77	330.35	917.63	457	20.23	329.22	720.40
PTFungiSC	214	21.40	163.05	761.92	325	19.36	224.01	689.26	412	19.65	288.25	699.64
STRPBactSA	245	2.72	23.69	96.71	325	2.10	24.30	74.77	492	2.37	41.60	84.56
STRPBactSB	220	2.25	17.66	80.25	364	1.80	23.30	64.01	455	2.10	34.02	74.77
STRPBactSC	227	2.50	20.19	88.96	369	2.16	28.31	76.73	434	2.48	38.40	88.47
PTRPBactSA	219	2.69	20.97	95.74	392	2.10	29.31	74.77	461	2.54	41.69	90.43
PTRPBactSB	241	2.34	20.04	83.16	288	1.74	17.87	62.05	454	2.02	32.61	71.84
PTRPBactSC	227	2.61	21.07	92.84	380	1.80	24.32	64.01	461	2.21	36.27	78.69
STRPBactFungSA	211	2.58	19.38	91.87	381	1.96	26.62	69.88	454	2.43	39.28	86.52
STRPBactFungSB	219	2.20	17.15	78.32	340	1.91	23.09	67.92	452	2.10	33.80	74.77
STRPBactFungSC	223	1.49	11.85	53.15	376	2.21	29.59	78.69	461	1.72	28.15	61.07
PTRPBactFungSA	128	2.77	12.63	98.64	311	2.79	30.86	99.24	330	2.62	30.81	93.37
PTRPBactFungSB	203	2.74	19.83	97.68	367	2.54	33.19	90.43	427	2.54	38.61	90.43
PTRPBactFungSC	212	2.15	16.19	76.38	368	2.68	35.08	95.32	438	1.99	31.04	70.86
STRPBFNOHoagSA	307	1.95	21.37	69.60	434	1.63	25.23	58.13	483	1.22	20.99	43.45
STRPBFNOHoagSB	327	2.15	24.98	76.38	442	1.74	27.43	62.05	512	1.41	25.76	50.30
STRPBFNOHoagSC	322	2.23	25.53	79.28	463	1.94	31.90	68.90	533	1.52	28.90	54.22
PTRPBFNOHoagSA	318	2.09	23.67	74.44	448	1.74	27.80	62.05	543	1.41	27.32	50.30
PTRPBFNOHoagSB	308	2.09	22.93	74.44	446	1.83	28.98	64.99	530	1.41	26.66	50.30
PTRPBFNOHoagSC	313	2.12	23.60	75.41	464	1.61	26.52	57.16	561	1.28	25.48	45.41
STRPBFNOMinSA	177	0.65	4.10	23.14	356	0.29	3.62	10.18	442	0.75	11.85	26.82
STRPBFNOMinSB	201	0.92	6.60	32.82	351	0.51	6.32	18.01	417	0.81	12.00	28.77
STRPBFNOMinSC	153	0.68	3.69	24.10	342	0.20	2.48	7.24	425	0.78	11.81	27.79
PTRPBFNOMinSA	193	0.65	4.47	23.14	353	0.29	3.59	10.18	410	0.75	10.99	26.82
PTRPBFNOMinSB	201	0.70	5.04	25.07	351	0.37	4.60	13.11	431	0.89	13.67	31.71
PTRPBFNOMinSC	190	1.00	6.79	35.72	293	0.18	1.84	6.26	367	0.73	9.48	25.84
	01/04/05	*01/04/05*	*01/04/05*	*01/04/05*	*01/18/05*	*01/18/05*	*01/18/05*	*01/18/05*	*02/01/05*	*02/01/05*	*02/01/05*	*02/01/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	227.67	2.05	16.51	72.83	395.67	2.55	35.91	90.76	469.67	2.37	39.72	84.56
Stbacteria	286.67	40.54	409.69	1443.57	426.33	31.12	475.56	1107.94	498.33	19.46	344.53	692.72
Ptbacteria	281.33	28.59	284.60	1017.98	393.00	25.97	364.88	924.55	455.67	20.82	338.31	741.16
Stfungi	254.67	24.61	224.16	876.11	405.00	21.40	307.89	761.92	495.67	17.41	303.43	620.06
Ptfungi	223.00	23.05	183.26	820.75	360.33	24.80	322.36	883.03	449.67	20.43	327.73	727.32
StRPBact	230.67	2.49	20.51	88.64	352.67	2.02	25.30	71.84	460.33	2.32	38.01	82.60
PtRPBact	229.00	2.54	20.69	90.58	353.33	1.88	23.83	66.94	458.67	2.26	36.86	80.32
STRPBactFung	217.67	2.09	16.13	74.44	365.67	2.03	26.43	72.16	455.67	2.08	33.74	74.12
PTRPBactFung	181.00	2.55	16.22	90.90	348.67	2.67	33.04	95.00	398.33	2.38	33.49	84.89
STRPBFNOHoag	318.67	2.11	23.96	75.09	446.33	1.77	28.19	63.03	509.33	1.39	25.21	49.33
PTRPBFNOHoag	313.00	2.10	23.40	74.77	452.67	1.72	27.77	61.40	544.67	1.37	26.48	48.67
STRPBFNOMin	177.00	0.75	4.79	26.69	349.67	0.33	4.14	11.81	428.00	0.78	11.89	27.79
PTRPBFNOMin	194.67	0.79	5.43	27.98	332.33	0.28	3.34	9.85	402.67	0.79	11.38	28.12
	01/04/05	*01/04/05*	*01/04/05*	*01/04/05*	*01/18/05*	*01/18/05*	*01/18/05*	*01/18/05*	*02/01/05*	*02/01/05*	*02/01/05*	*02/01/05*
STDev	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	11.92	0.16	1.11	5.60	4.26	0.16	2.29	5.69	10.27	0.12	2.16	4.27
Stbacteria	6.89	8.44	74.31	300.52	9.06	5.07	87.68	180.63	3.76	5.98	104.37	212.93
Ptbacteria	9.06	3.34	25.86	119.01	14.93	1.80	37.67	64.08	37.16	2.78	58.25	99.02
Stfungi	15.88	0.94	22.24	33.37	3.06	5.35	75.60	190.37	10.84	5.12	85.19	182.41
Ptfungi	4.51	1.80	16.23	64.08	20.50	2.90	54.62	103.34	19.97	0.51	22.38	18.31
StRPBact	7.45	0.13	1.75	4.75	13.91	0.11	1.53	3.96	16.95	0.11	2.20	4.07
PtRPBact	6.43	0.11	0.33	3.80	32.85	0.11	3.31	3.96	2.33	0.15	2.64	5.43
STRPBactFung	3.53	0.32	2.23	11.34	12.91	0.09	1.88	3.31	2.73	0.21	3.21	7.35
PTRPBactFung	26.63	0.20	2.08	7.27	18.84	0.07	1.22	2.55	34.31	0.20	2.56	7.07
STRPBFNOHoag	6.01	0.08	1.30	2.87	8.65	0.09	1.96	3.15	14.50	0.09	2.30	3.15
PTRPBFNOHoag	2.89	0.01	0.24	0.32	5.70	0.06	0.71	2.28	8.99	0.05	0.54	1.63
STRPBFNOMin	13.86	0.09	0.91	3.08	4.10	0.09	1.14	3.21	7.37	0.02	0.06	0.57

Table K-7 (cont.): Silica in drainage water, averages and standard error.

	Si	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*
Sample Date	***02/15/05***	***02/15/05***	***02/15/05***	***02/15/05***	***03/01/05***	***03/01/05***	***03/01/05***	***03/01/05***	***03/16/05***	***03/16/05***	***03/16/05***	***03/16/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	-0.05	-0.03		20	-0.03	-0.02		20	0.13	0.09	
AbioticSA	397	4.85	68.54	172.64	255	2.77	25.13	98.54	197	2.75	19.29	97.94
AbioticSB	457	4.00	65.03	142.30	255	2.97	26.96	105.72	195	2.58	17.93	91.96
AbioticSC	365	4.05	52.65	144.26	286	2.75	28.01	97.94	202	2.39	17.21	85.18
STBacteriaSA	489	8.21	142.86	292.14	301	7.11	76.15	252.99	213	5.18	39.36	184.48
STBacteriaSB	389	6.01	83.19	213.84	275	5.59	54.77	199.16	180	5.73	36.80	204.06
STBacteriaSC	412	12.19	178.83	434.05	261	10.13	94.13	360.65	178	5.18	32.90	184.48
PTBacteriaSA	400	7.38	105.11	262.78	302	5.32	57.26	189.38	247	5.59	49.19	199.16
PTBacteriaSB	358	8.21	104.59	292.14	281	11.09	111.10	394.90	209	8.34	62.08	297.03
PTBacteriaSC	407	13.57	196.58	482.99	286	9.72	99.06	345.97	221	4.63	36.45	164.91
STFungiSA	421	9.03	135.35	321.50	249	8.75	77.51	311.71	141	5.46	27.39	194.27
STFungiSB	382	11.64	158.33	414.48	287	9.72	99.18	345.97	212	9.99	75.42	355.76
STFungiSC	448	6.01	95.80	213.84	289	5.04	51.84	179.59	247	7.79	68.53	277.46
PTFungiSA	395	9.17	128.93	326.39	247	6.97	61.20	248.10	169	7.93	47.81	282.35
PTFungiSB	361	8.75	112.53	311.71	224	7.24	57.68	257.89	152	5.04	27.36	179.59
PTFungiSC	349	9.17	113.91	326.39	239	10.68	90.75	380.22	178	5.73	36.39	204.06
STRPBactSA	407	4.60	66.68	163.83	273		0.00	0.00	153	2.92	15.87	103.92
STRPBactSB	380	4.74	64.12	168.73	264	2.93	27.58	104.32	185	3.50	22.98	124.46
STRPBactSC	409	4.79	69.81	170.68	258	0.17	1.59	6.14	192	2.96	20.22	105.52
PTRPBactSA	407	4.68	67.88	166.77	271	3.30	31.88	117.48	177	3.35	21.11	119.27
PTRPBactSB	371	4.82	63.69	171.66	260	2.85	26.38	101.33	172	3.08	18.84	109.51
PTRPBactSC	387	5.04	69.46	179.49	270	3.43	33.05	122.26	185	2.89	19.00	102.73
STRPBactFungSA	375	2.29	30.61	81.62	235	2.94	24.53	104.52	167	2.55	15.16	90.77
STRPBactFungSB	404	1.74	25.07	62.05	255	2.17	19.71	77.41	205	2.35	17.18	83.79
STRPBactFungSC	372	1.85	24.54	65.96	232	2.65	21.86	94.36	169	3.04	18.27	108.11
PTRPBactFungSA	210	2.02	15.09	71.84	162	2.95	17.06	105.12	114	2.95	11.98	105.12
PTRPBactFungSB	377	1.77	23.76	63.03	249	2.33	20.64	82.79	185	2.54	16.75	90.57
PTRPBactFungSC	310	2.05	22.57	72.81	244	2.62	22.76	93.16	173	3.42	21.08	121.87
STRPBFNOHoagSA	434	1.36	20.98	48.35	231	1.73	14.22	61.66	161	2.16	12.34	76.81
STRPBFNOHoagSB	436	1.99	30.89	70.86	209	1.84	13.70	65.65	155	2.05	11.26	72.82
STRPBFNOHoagSC	486	1.47	25.40	52.26	227	2.00	16.15	71.23	166	1.83	10.81	65.25
PTRPBFNOHoagSA	523	1.72	31.94	61.07	215	1.72	13.19	61.26	164	2.22	12.93	79.00
PTRPBFNOHoagSB	469	1.47	24.51	52.26	209	1.93	14.37	68.64	151	2.28	12.23	81.20
PTRPBFNOHoagSC	389	1.55	21.47	55.20	242	1.86	16.05	66.25	183	2.50	16.29	89.17
STRPBFNOMinSA	380	0.01	0.15	0.39	288	1.33	13.64	47.31	213	0.44	3.32	15.61
STRPBFNOMinSB	360	0.07	0.85	2.35	321	1.56	17.89	55.68	229	1.04	8.49	37.14
STRPBFNOMinSC	327	0.01	0.13	0.39	329	1.19	13.94	42.32	248	0.34	2.98	12.02
PTRPBFNOMinSA	325	0.07	0.76	2.35	355	1.35	17.06	48.10	243	0.99	8.55	35.15
PTRPBFNOMinSB	348	0.12	1.50	4.31	302	1.23	13.19	43.72	232	0.40	3.30	14.21
PTRPBFNOMinSC	388	0.01	0.15	0.39	364	1.59	20.61	56.68	258	0.32	2.90	11.22
	02/15/05	*02/15/05*	*02/15/05*	*02/15/05*	*03/01/05*	*03/01/05*	*03/01/05*	*03/01/05*	*03/16/05*	*03/16/05*	*03/16/05*	*03/16/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	406.33	4.30	62.08	153.07	265.33	2.83	26.70	100.73	198.00	2.58	18.14	91.70
Stbacteria	430.00	8.80	134.96	313.35	279.00	7.61	75.02	270.94	190.67	5.36	36.35	191.01
Ptbacteria	388.33	9.72	135.42	345.97	290.00	8.71	89.14	310.08	225.67	6.19	49.24	220.37
Stfungi	417.00	8.89	129.83	316.61	274.67	7.84	76.18	279.09	200.00	7.75	57.12	275.83
Ptfungi	368.33	9.03	118.46	321.50	236.33	8.30	69.87	295.40	166.67	6.24	37.19	222.00
StRPBact	398.67	4.71	66.87	167.75	265.33	1.55	9.72	36.82	176.33	3.13	19.69	111.30
PtRPBact	388.33	4.85	67.01	172.64	267.33	3.19	30.44	113.69	178.00	3.10	19.65	110.50
STRPBactFung	383.67	1.96	26.74	69.88	240.33	2.59	22.03	92.10	180.33	2.65	16.87	94.22
PTRPBactFung	299.00	1.94	20.47	69.23	218.67	2.63	20.16	93.69	157.33	2.97	16.61	105.85
STRPBFNOHoag	452.00	1.61	25.76	57.16	222.00	1.86	14.69	66.18	160.33	2.01	11.47	71.63
PTRPBFNOHoag	460.33	1.58	25.97	56.18	222.33	1.84	14.54	65.38	165.67	2.33	13.82	83.12
STRPBFNOMin	355.67	0.03	0.37	1.04	313.00	1.36	15.16	48.44	229.67	0.61	4.93	21.59
PTRPBFNOMin	353.67	0.07	0.80	2.35	340.00	1.39	16.95	49.50	244.67	0.57	4.92	20.19
	02/15/05	*02/15/05*	*02/15/05*	*02/15/05*	*03/01/05*	*03/01/05*	*03/01/05*	*03/01/05*	*03/16/05*	*03/16/05*	*03/16/05*	*03/16/05*
STDev	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	26.96	0.28	4.82	9.80	10.33	0.07	0.84	2.50	2.08	0.10	0.61	3.69
Stbacteria	30.24	1.81	27.89	64.45	11.72	1.33	11.38	47.47	11.35	0.18	1.88	6.52
Ptbacteria	15.30	1.94	30.58	69.03	6.33	1.74	16.32	61.98	11.22	1.11	7.40	39.59
Stfungi	19.16	1.63	18.26	57.97	13.01	1.42	13.68	50.72	31.18	1.31	14.99	46.62
Ptfungi	13.78	0.14	5.25	4.89	6.74	1.19	10.49	42.50	7.62	0.87	5.92	30.99
StRPBact	9.35	0.06	1.65	2.04	4.36	1.13	8.94	33.80	12.00	0.19	2.07	6.59
PtRPBact	10.41	0.10	1.72	3.71	3.51	0.18	2.06	6.33	3.79	0.13	0.73	4.80
STRPBactFung	10.20	0.17	1.94	5.98	7.22	0.22	1.39	7.91	12.35	0.20	0.91	7.23
PTRPBactFung	48.52	0.09	2.72	3.11	28.20	0.18	1.66	6.45	21.94	0.25	2.63	9.04
STRPBFNOHoag	17.01	0.20	2.87	6.94	6.77	0.08	0.74	2.78	3.18	0.10	0.45	3.39
PTRPBFNOHoag	38.92	0.07	3.11	2.59	10.15	0.06	0.83	2.17	9.29	0.09	1.25	3.09
STRPBFNOMin	15.45	0.02	0.24	0.65	12.55	0.11	1.37	3.90	10.12	0.22	1.78	7.84

Table K-7 (cont.): Silica in drainage water, averages and standard error.

	Si	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*
Sample Date	***03/29/05***	***03/29/05***	***03/29/05***	***03/29/05***	***04/12/05***	***04/12/05***	***04/12/05***	***04/12/05***	***04/26/05***	***04/26/05***	***04/26/05***	***04/26/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	-0.02	-0.02		20	-0.04	-0.03		20	-0.06	-0.04	
AbioticSA	208	3.95	29.29	140.80	139	4.01	19.84	142.75	297	1.79	18.97	63.87
AbioticSB	200	3.82	27.19	135.93	135	3.98	19.14	141.78	263	2.01	18.86	71.70
AbioticSC	202	3.63	26.12	129.30	148				291	2.07	21.43	73.66
STBacteriaSA	196	7.93	55.44	282.35	146	4.91	25.56	174.70	232	3.82	31.54	136.14
STBacteriaSB	197	8.62	60.55	306.82	146	6.01	31.29	213.84	302	3.55	38.08	126.24
STBacteriaSC	169	6.28	37.87	223.63	132	5.46	25.71	194.27	272	3.02	29.18	107.43
PTBacteriaSA	237	7.52	63.35	267.67	169	4.22	25.39	150.23	331	2.91	34.28	103.47
PTBacteriaSB	195	9.17	63.54	326.39	152	5.32	28.79	189.38		7.19	0.00	255.95
PTBacteriaSC	207	5.87	43.18	208.95	170	5.18	31.36	184.48	326	3.66	42.49	130.20
STFungiSA	187	7.24	48.31	257.89	136	4.77	23.09	169.80	290	2.74	28.28	97.53
STFungiSB	215	8.48	65.02	301.93	142	6.56	33.15	233.42		2.74	0.00	97.53
STFungiSC	246	10.13	88.84	360.65	181	7.24	46.68	257.89	330	2.52	29.57	89.61
PTFungiSA	175	10.40	64.70	370.44	116	7.24	30.00	257.89	253	2.63	23.67	93.57
PTFungiSB	158	6.42	36.03	228.53	94	5.32	17.86	189.38	181	3.21	20.70	114.36
PTFungiSC	170	6.83	41.26	243.21	106	6.28	23.78	223.63	271	3.91	37.70	139.11
STRPBactSA	186	5.21	34.47	185.65	121	4.96	21.41	176.48	291	2.62	27.16	93.22
STRPBactSB	186	4.55	30.05	161.86	125				271	2.90	28.00	103.20
STRPBactSC	184	4.21	27.51	149.77	131				273	2.41	23.50	85.98
PTRPBactSA	178	5.41	34.36	192.67	128	5.15	23.40	183.31	276	2.89	28.37	102.80
PTRPBactSB	187	4.69	31.27	166.93	114				257	2.65	24.26	94.39
PTRPBactSC	197	4.49	31.56	159.91	118				285	2.65	26.90	94.39
STRPBactFungSA	161	4.27	24.46	151.92	103	4.59	16.89	163.42	260	2.43	22.51	86.57
STRPBactFungSB	216	3.86	29.70	137.49	144	3.97	20.38	141.19	297	2.36	24.96	84.02
STRPBactFungSC	173	4.90	30.19	174.53	119	4.94	20.99	175.90	262	3.20	29.86	113.96
PTRPBactFungSA	117	4.64	19.38	165.17	75	5.14	13.66	182.92	185	2.64	17.36	94.00
PTRPBactFungSB	181	3.58	23.13	127.54	129	3.06	14.00	108.82	272	2.00	19.37	71.31
PTRPBactFungSC	171	4.34	26.46	154.45	123	5.08	22.20	180.97	275	2.65	25.87	94.20
STRPBFNOHoagSA	153	2.44	13.31	86.79	82	2.95	8.57	104.92	238	1.78	15.09	63.48
STRPBFNOHoagSB	157	2.37	13.26	84.25	95	2.47	8.33	87.96	242	1.70	14.63	60.55
STRPBFNOHoagSC	194	2.17	15.05	77.43	107	2.69	10.24	95.95	256	1.57	14.28	55.85
PTRPBFNOHoagSA	147	2.56	13.39	91.08	96	2.83	9.66	100.63	184	1.74	11.43	62.11
PTRPBFNOHoagSB	159	2.15	12.19	76.65	107	2.77	10.54	98.49	253	1.67	15.02	59.37
PTRPBFNOHoagSC	200	2.10	14.94	74.70	120	2.50	10.70	89.13	287	1.65	16.82	58.59
STRPBFNOMinSA	233	3.55	29.45	126.57	173	0.76	4.70	27.12	320	0.38	4.29	13.40
STRPBFNOMinSB	259	3.01	27.69	107.07	191	0.64	4.33	22.64	333	0.29	3.42	10.27
STRPBFNOMinSC	266	3.21	30.36	114.28	186	0.49	3.27	17.57	334	0.22	2.65	7.92
PTRPBFNOMinSA	256	3.55	32.44	126.57	177	0.69	4.35	24.59	356	0.48	6.09	17.12
PTRPBFNOMinSB	208	3.21	23.81	114.28	164	1.04	6.08	37.07	318	0.52	5.87	18.49
PTRPBFNOMinSC	255	3.01	27.34	107.07	187	0.75	5.00	26.73	358	0.33	4.23	11.84
	03/29/05	*03/29/05*	*03/29/05*	*03/29/05*	*04/12/05*	*04/12/05*	*04/12/05*	*04/12/05*	*04/26/05*	*04/26/05*	*04/26/05*	*04/26/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	203.33	3.80	27.53	135.34	140.67	4.00	19.49	142.26	283.67	1.96	19.75	69.74
Stbacteria	187.67	7.61	51.28	270.94	141.67	5.46	27.52	194.27	268.33	3.46	32.94	123.27
Ptbacteria	212.67	7.52	56.69	267.67	163.67	4.91	28.51	174.70	328.83	4.58	25.59	163.21
Stfungi	216.33	8.62	67.39	306.82	153.00	6.19	34.31	220.37	310.00	2.66	19.28	94.89
Ptfungi	167.33	7.88	47.33	280.72	105.67	6.28	23.88	223.63	235.00	3.25	27.36	115.68
StRPBact	185.00	4.66	30.68	165.76	126.00	4.96	21.41	176.48	278.67	2.64	26.22	94.13
PtRPBact	187.67	4.86	32.40	173.17	119.67	5.15	23.40	183.31	272.67	2.73	26.51	97.20
STRPBactFung	183.33	4.34	28.12	154.65	122.33	4.50	19.42	160.17	273.00	2.66	25.77	94.85
PTRPBactFung	156.67	4.19	22.99	149.06	108.67	4.43	16.62	157.57	243.67	2.43	20.87	86.50
STRPBFNOHoag	168.33	2.33	13.87	82.82	94.33	2.70	9.04	96.28	245.00	1.68	14.67	59.96
PTRPBFNOHoag	168.67	2.27	13.51	80.81	107.67	2.70	10.30	96.08	241.33	1.69	14.42	60.03
STRPBFNOMin	252.33	3.26	29.17	115.97	183.67	0.63	4.10	22.44	329.33	0.30	3.46	10.53
PTRPBFNOMin	240.00	3.26	27.86	115.97	176.00	0.83	5.14	29.46	343.67	0.44	5.40	15.81
	03/29/05	*03/29/05*	*03/29/05*	*03/29/05*	*04/12/05*	*04/12/05*	*04/12/05*	*04/12/05*	*04/26/05*	*04/26/05*	*04/26/05*	*04/26/05*
STDev	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	2.40	0.09	0.93	3.33	3.84	0.01	0.29	0.40	10.48	0.08	0.84	2.99
Stbacteria	9.17	0.69	6.87	24.68	4.67	0.32	1.89	11.30	20.28	0.24	2.66	8.42
Ptbacteria	12.49	0.95	6.75	33.90	5.84	0.35	1.73	12.31	2.04	1.32	13.01	47.01
Stfungi	17.04	0.84	11.76	29.77	14.11	0.74	6.83	26.25	16.33	0.07	9.65	2.64
Ptfungi	5.04	1.27	8.82	45.06	6.36	0.56	3.50	19.78	27.50	0.37	5.24	13.16
StRPBact	0.67	0.30	2.03	10.54	2.91				6.36	0.14	1.38	4.99
PtRPBact	5.49	0.28	0.99	9.96	4.16				8.25	0.08	1.20	2.80
STRPBactFung	16.70	0.30	1.83	10.78	11.93	0.29	1.28	10.15	12.01	0.27	2.16	9.58
PTRPBactFung	19.88	0.31	2.05	11.19	17.09	0.68	2.79	24.38	29.51	0.21	2.57	7.60
STRPBFNOHoag	13.05	0.08	0.59	2.79	7.22	0.14	0.60	4.90	5.46	0.06	0.23	2.22
PTRPBFNOHoag	16.05	0.15	0.80	5.17	6.94	0.10	0.32	3.53	30.30	0.03	1.58	1.07
STRPBFNOMin	10.04	0.16	0.78	5.69	5.36	0.08	0.43	2.76	4.51	0.04	0.47	1.59

Table K-7 (cont.): Silica in drainage water, averages and standard error.

	Si	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*
Sample Date	***05/10/05***	***05/10/05***	***05/10/05***	***05/10/05***	***05/24/05***	***05/24/05***	***05/24/05***	***05/24/05***	***06/07/05***	***06/07/05***	***06/07/05***	***06/07/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Troy Method Blank	20	-0.06	-0.04		20	0.11	0.08		20	0.00	0.00	
AbioticSA	269	2.74	26.32	97.72	148	2.63	13.88	93.57	142	2.43	12.33	86.65
AbioticSB	197	2.74	19.24	97.52	136	3.35	16.27	119.31	141	2.48	12.50	88.44
AbioticSC	260	2.53	23.45	90.09	166	3.21	19.02	114.36	157	2.55	14.26	90.62
STBacteriaSA	235	4.63	38.69	164.86	148	2.74	14.47	97.53	136	5.27	25.58	187.63
STBacteriaSB	273	3.99	38.74	142.08	93	2.57	8.55	91.59	92	5.60	18.42	199.51
STBacteriaSC	181	3.46	22.27	123.27	149	6.30	33.49	224.26	155	5.52	30.53	196.54
PTBacteriaSA	275	7.58	74.11	269.81	164	2.24	13.10	79.71	145	4.80	24.82	170.80
PTBacteriaSB	256	3.02	27.47	107.43	148	2.54	13.44	90.60	144	4.55	23.37	161.89
PTBacteriaSC	287	3.30	33.63	117.33	142	3.13	15.85	111.39	140	4.35	21.75	154.95
STFungiSA	264	2.91	27.28	103.47	155	4.10	22.69	146.04	153	4.52	24.56	160.90
STFungiSB	265	3.41	32.10	121.29	150	3.30	17.64	117.33	154	5.13	28.07	182.68
STFungiSC	282	3.10	31.10	110.40	131	2.85	13.33	101.49	157	5.58	31.10	198.52
PTFungiSA	249	3.77	33.36	134.16	131	1.83	8.57	65.25	129		0.00	0.00
PTFungiSB	246	3.13	27.36	111.39	114	1.93	7.85	68.69	112	4.41	17.58	156.93
PTFungiSC	253	4.44	39.90	157.93	112	2.10	8.38	74.61	110	5.16	20.20	183.67
STRPBactSA	264	3.80	35.77	135.47	135	2.86	13.70	101.75	126	2.81	12.62	100.17
STRPBactSB	262	3.77	35.19	134.30	144	2.80	14.34	99.84	129	2.94	13.49	104.55
STRPBactSC	256	3.20	29.12	113.76	117	2.40	9.95	85.31	112	3.41	13.58	121.26
PTRPBactSA	251	4.18	37.39	148.78	144	2.94	15.06	104.62	134	3.52	16.85	125.43
PTRPBactSB	258	3.53	32.47	125.69	125	2.91	12.96	103.66	113	3.51	14.17	125.03
PTRPBactSC	254	3.56	32.22	126.67	137	3.10	15.14	110.54	128	3.58	16.35	127.42
STRPBactFungSA	232	3.48	28.71	123.93	131	3.06	14.24	109.01	132	4.29	20.23	152.88
STRPBactFungSB	276	2.99	29.31	106.33	149	2.89	15.30	102.90	139	4.13	20.47	146.92
STRPBactFungSC	255	4.17	37.79	148.39	130	3.56	16.44	126.79	127	3.53	16.02	125.83
PTRPBactFungSA	170	3.98	24.09	141.74	100	2.40	8.58	85.51	87	3.31	10.28	117.68
PTRPBactFungSB	261	2.55	23.72	90.87	117	3.04	12.70	108.25	108	3.87	14.92	137.77
PTRPBactFungSC	266	3.51	33.23	124.91	93	3.43	11.39	122.01	87	4.06	12.62	144.53
STRPBFNOHoagSA	286	2.22	22.63	79.13	99	2.43	8.53	86.46	100	2.57	9.17	91.42
STRPBFNOHoagSB	306	2.07	22.54	73.66	122	1.81	7.82	64.29	113	1.96	7.90	69.74
STRPBFNOHoagSC	290	1.87	19.32	66.61	126	1.90	8.51	67.73	117	2.22	9.28	79.09
PTRPBFNOHoagSA	315	2.26	25.36	80.50	112	1.69	6.71	60.09	103	2.08	7.64	73.92
PTRPBFNOHoagSB	269	1.90	18.24	67.81	113	1.66	6.66	59.13	95	2.61	8.87	93.01
PTRPBFNOHoagSC	295	2.15	22.59	76.59	115	1.82	7.42	64.67	111	2.31	9.14	82.07
STRPBFNOMinSA	224	1.67	13.36	59.57	177	1.05	6.60	37.34	162	0.75	4.33	26.77
STRPBFNOMinSB	229	1.37	11.15	48.61	174	1.29	7.95	45.75	174	0.84	5.17	29.76
STRPBFNOMinSC	239	1.46	12.43	51.94	170	1.17	7.05	41.55	168	0.82	4.92	29.36
PTRPBFNOMinSA	244	1.82	15.85	64.85	170	1.16	7.01	41.17	158	0.81	4.54	28.76
PTRPBFNOMinSB	229	1.84	15.05	65.63	185	1.18	7.81	42.12	162	1.40	8.08	49.85
PTRPBFNOMinSC	259	1.75	16.16	62.31	153	1.04	5.70	37.15	145	1.10	5.67	39.11
	05/10/05	*05/10/05*	*05/10/05*	*05/10/05*	*05/24/05*	*05/24/05*	*05/24/05*	*05/24/05*	*06/07/05*	*06/07/05*	*06/07/05*	*06/07/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	242.33	2.67	23.01	95.11	150.33	3.06	16.39	109.08	147.00	2.49	13.03	88.57
Stbacteria	229.33	4.03	33.23	143.40	130.33	3.87	18.83	137.79	128.00	5.46	24.84	194.56
Ptbacteria	272.33	4.63	45.07	164.86	151.67	2.64	14.13	93.90	143.33	4.57	23.31	162.55
Stfungi	270.00	3.14	30.16	111.72	145.67	3.42	17.88	121.62	154.33	5.08	27.91	180.70
Ptfungi	249.00	3.78	33.54	134.49	119.33	1.95	8.27	69.52	117.00	4.78	12.59	113.53
StRPBact	260.67	3.59	33.36	127.85	131.67	2.69	12.67	95.63	122.33	3.05	13.23	108.66
PtRPBact	254.67	3.76	34.03	133.71	135.33	2.98	14.39	106.27	125.33	3.54	15.79	125.96
STRPBactFung	254.00	3.54	31.94	126.21	136.33	3.17	15.33	112.90	133.00	3.98	18.91	141.88
PTRPBactFung	232.33	3.35	27.01	119.17	103.67	2.96	10.89	105.25	94.33	3.74	12.61	133.32
STRPBFNOHoag	294.00	2.05	21.50	73.13	115.33	2.05	8.29	72.83	110.33	2.25	8.79	80.08
PTRPBFNOHoag	293.00	2.11	22.06	74.97	113.00	1.72	6.93	61.30	103.33	2.33	8.55	83.00
STRPBFNOMin	231.00	1.50	12.31	53.37	173.33	1.17	7.20	41.55	167.67	0.80	4.81	28.63
PTRPBFNOMin	244.33	1.80	15.69	64.26	169.67	1.13	6.84	40.15	155.00	1.10	6.10	39.24
	05/10/05	*05/10/05*	*05/10/05*	*05/10/05*	*05/24/05*	*05/24/05*	*05/24/05*	*05/24/05*	*06/07/05*	*06/07/05*	*06/07/05*	*06/07/05*
STDev	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	22.65	0.07	2.05	2.51	8.72	0.22	1.49	7.89	5.17	0.03	0.62	1.15
Stbacteria	26.69	0.34	5.48	12.02	18.50	1.22	7.52	43.27	18.66	0.10	3.51	3.57
Ptbacteria	9.02	1.48	14.63	52.55	6.57	0.26	0.87	9.29	1.53	0.13	0.89	4.59
Stfungi	5.84	0.15	1.47	5.19	7.31	0.37	2.70	13.04	1.20	0.31	1.89	10.91
Ptfungi	2.03	0.38	3.62	13.43	6.03	0.08	0.21	2.73	6.03	0.31	6.34	57.29
StRPBact	2.40	0.20	2.12	7.05	7.94	0.15	1.37	5.19	5.24	0.18	0.31	6.42
PtRPBact	2.03	0.21	1.68	7.54	5.55	0.06	0.72	2.15	6.24	0.02	0.82	0.74
STRPBactFung	12.71	0.34	2.93	12.20	6.17	0.20	0.63	7.16	3.48	0.23	1.44	8.21
PTRPBactFung	31.20	0.42	3.11	14.96	7.13	0.30	1.22	10.64	7.00	0.23	1.34	8.06
STRPBFNOHoag	6.11	0.10	1.09	3.62	8.41	0.19	0.23	6.89	5.13	0.18	0.44	6.28
PTRPBFNOHoag	13.32	0.11	2.07	3.75	0.88	0.05	0.24	1.71	4.62	0.16	0.46	5.53
STRPBFNOMin	4.41	0.09	0.64	3.24	2.03	0.07	0.40	2.43	3.46	0.03	0.25	0.94

Table K-7 (cont.): Silica in drainage water, averages and standard error.

	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si
Sample Date	*06/21/05*	*06/21/05*	*06/21/05*	*06/21/05*	*07/05/05*	*07/05/05*	*07/05/05*	*07/05/05*	*07/19/05*	*07/19/05*	*07/19/05*	*07/19/05*	*08/02/05*	*08/02/05*	*08/02/05*	*08/02/05*
Sample ID	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Troy Method Blank	20	0.19	0.14		20	-0.13	-0.09		20	0.05	0.04		20	0.02	0.01	
AbioticSA	155	3.12	17.28	111.23	168	4.01	24.03	142.76	160	2.67	15.17	94.98	20	3.45	2.45	122.70
AbioticSB	154	4.28	23.51	152.32	154	3.15	17.31	112.19	156	3.47	19.25	123.65	157	3.58	19.97	127.47
AbioticSC	160	3.10	17.68	110.27	142	3.42	17.33	121.74	169	2.13	12.80	75.87	64	3.37	7.63	119.83
STBacteriaSA	151	6.16	33.17	219.21	147	5.54	29.06	197.23	152	7.50	40.58	266.99	137	4.01	19.51	142.76
STBacteriaSB	80	2.40	6.86	85.43	99	6.10	21.59	217.30	115	2.32	9.49	82.56	139	4.28	21.22	152.32
STBacteriaSC	163	2.40	13.95	85.43	161	4.47	25.65	159.01	186	2.86	18.91	101.67	92	3.93	12.92	139.90
PTBacteriaSA	168	2.64	15.80	94.03	165	2.83	16.65	100.72	173	2.05	12.61	73.01	147	2.80	14.70	99.76
PTBacteriaSB	153	2.21	12.05	78.74	151	2.59	13.94	92.12	164	2.91	16.95	103.58	149	2.72	14.44	96.90
PTBacteriaSC	153	2.40	13.07	85.43	150	3.18	17.01	113.14	112	2.96	11.78	105.50	152	4.30	23.30	153.28
STFungiSA	163	2.27	13.17	80.65	161	2.67	15.29	94.98	174	2.69	16.69	95.94	141	3.07	15.41	109.32
STFungiSB	163	2.53	14.73	90.21	160	2.99	17.03	106.45	164	3.37	19.65	119.83	150	3.37	17.97	119.83
STFungiSC	167	2.53	15.09	90.21	170	3.23	19.56	115.05	181	2.53	16.33	90.21	150	2.91	15.54	103.58
PTFungiSA	129	3.46	15.94	123.24	144	2.08	10.62	73.92	151	2.08	11.21	74.23	155	2.06	11.36	73.27
PTFungiSB	109	1.94	7.56	69.14	126	2.16	9.66	76.90	132	1.81	8.49	64.29	138	2.34	11.48	83.21
PTFungiSC	109	2.80	10.91	99.77	117	2.54	10.55	90.42	131	1.61	7.52	57.41	117	2.21	9.22	78.82
STRPBactSA	130	2.61	12.07	92.81	142	2.61	13.18	93.01	153	1.86	10.16	66.39	109	2.74	10.63	97.55
STRPBactSB	127	2.35	10.63	83.66	142	2.85	14.39	101.56	152	2.31	12.50	82.26	132	2.50	11.77	88.95
STRPBactSC	118	2.35	9.87	83.66	125	3.20	14.20	113.90	140	2.25	11.19	79.96	129	2.73	12.57	97.16
PTRPBactSA	136	2.82	13.71	100.57	147	3.71	19.48	132.20	159	2.51	14.23	89.33	115	2.74	11.25	97.55
PTRPBactSB	120	2.83	12.13	100.77	140	3.51	17.55	125.03	147	2.17	11.39	77.29	143	3.37	17.19	119.91
PTRPBactSC	131	3.08	14.38	109.52	135	2.93	14.09	104.15	151	2.56	13.78	91.05	128	3.01	13.74	107.10
STRPBactFungSA	148	3.74	19.71	133.19	134	4.48	21.45	159.65	152	3.08	16.69	109.78	142	4.27	21.64	152.01
STRPBactFungSB	147	4.30	22.50	153.08	145	3.61	18.69	128.62	167	2.90	17.22	103.09	142	3.37	17.09	120.10
STRPBactFungSC	138	3.37	16.54	119.86	140	5.05	25.25	179.93	147	4.52	23.67	161.00	144	5.17	26.57	184.12
PTRPBactFungSA	90	5.18	16.61	184.51	97	2.65	9.14	94.20	122	2.37	10.26	84.36	140	3.66	18.28	130.23
PTRPBactFungSB	106	2.40	9.06	85.45	106	3.71	14.01	132.20	123	2.62	11.45	93.34	91	3.76	12.20	134.05
PTRPBactFungSC	93	3.40	11.26	121.06	95	3.92	13.26	139.56	107	3.08	11.71	109.78	115	4.10	16.80	146.09
STRPBFNOHoagSA	104	2.26	8.40	80.48	102	1.86	6.77	66.36	108	1.61	6.20	57.41	98	1.97	6.86	70.02
STRPBFNOHoagSB	120	1.85	7.91	65.76	123	1.76	7.70	62.58	125	1.43	6.36	50.91	110	1.67	6.51	59.32
STRPBFNOHoagSC	128	1.85	8.44	65.76	124	1.73	7.64	61.58	131	1.39	6.49	49.58	126	1.73	7.72	61.42
PTRPBFNOHoagSA	125	1.84	8.17	65.56	130	1.80	8.32	64.17	143	1.71	8.71	61.04	135	1.75	8.37	62.19
PTRPBFNOHoagSB	113	2.44	9.78	86.84	121	1.57	6.73	55.81	145	1.70	8.75	60.47	75	1.70	4.57	60.66
PTRPBFNOHoagSC	119	2.47	10.45	88.04	125	1.74	7.70	61.78	144	1.40	7.15	49.77	124	1.85	8.18	65.82
STRPBFNOMinSA	163	0.20	1.18	7.28	169	0.99	5.92	35.13	174	0.48	2.98	17.09	128	1.09	4.99	38.87
STRPBFNOMinSB	175	0.20	1.27	7.28	182	1.05	6.82	37.51	193	0.27	1.83	9.44	178	1.31	8.26	46.52
STRPBFNOMinSC	170	0.17	1.03	6.09	172	1.09	6.64	38.71	190	0.35	2.38	12.50	180	1.16	7.43	41.36
PTRPBFNOMinSA	175	0.27	1.69	9.67	174	0.97	6.01	34.53	184	0.38	2.52	13.65	174	1.27	7.88	45.37
PTRPBFNOMinSB	177	0.31	1.96	11.06	185	1.08	7.09	38.31	187	0.59	3.92	20.91	178	1.23	7.80	43.84
PTRPBFNOMinSC	151	0.41	2.18	14.44	156	1.16	6.44	41.29	166	0.43	2.56	15.37	187	1.25	8.31	44.42
	06/21/05	*06/21/05*	*06/21/05*	*06/21/05*	*07/05/05*	*07/05/05*	*07/05/05*	*07/05/05*	*07/19/05*	*07/19/05*	*07/19/05*	*07/19/05*	*08/02/05*	*08/02/05*	*08/02/05*	*08/02/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	156.67	3.50	19.49	124.61	155.00	3.53	19.56	125.56	161.33	2.76	15.74	98.17	80.11	3.46	10.02	123.33
Stbacteria	131.67	3.65	18.00	130.02	136.00	5.37	25.43	191.18	151.00	4.22	23.00	150.41	122.78	4.07	17.88	144.99
Ptbacteria	158.00	2.42	13.64	86.07	155.67	2.86	15.87	101.99	149.33	2.64	13.78	94.03	149.44	3.28	17.48	116.64
Stfungi	164.67	2.44	14.33	87.02	163.67	2.96	17.29	105.50	173.00	2.86	17.56	101.99	147.00	3.12	16.31	110.91
Ptfungi	116.00	2.74	11.47	97.39	128.67	2.26	10.28	80.41	138.00	1.83	9.07	65.31	136.67	2.20	10.69	78.43
StRPBact	125.00	2.44	10.85	86.71	136.00	2.89	13.92	102.82	148.33	2.14	11.29	76.20	123.56	2.66	11.66	94.55
PtRPBact	129.33	2.91	13.41	103.62	141.00	3.38	17.04	120.46	152.67	2.41	13.13	85.89	129.00	3.04	14.06	108.18
STRPBactFung	144.33	3.80	19.59	135.38	140.00	4.38	21.80	156.06	155.33	3.50	19.19	124.62	143.00	4.27	21.77	152.08
PTRPBactFung	96.33	3.66	12.31	130.34	99.33	3.43	12.14	121.99	117.00	2.69	11.14	95.83	115.44	3.84	15.76	136.79
STRPBFNOHoag	117.67	1.98	8.25	70.67	116.33	1.78	7.37	63.51	121.33	1.48	6.35	52.63	111.11	1.79	7.03	63.59
PTRPBFNOHoag	118.67	2.25	9.47	80.15	125.00	1.70	7.59	60.59	143.67	1.60	8.20	57.09	111.44	1.77	7.04	62.89
STRPBFNOMin	169.00	0.19	1.16	6.88	174.00	1.04	6.46	37.12	186.00	0.37	2.39	13.01	161.89	1.19	6.89	42.25
PTRPBFNOMin	167.67	0.33	1.94	11.72	171.67	1.07	6.51	38.04	179.33	0.47	3.00	16.64	179.56	1.25	8.00	44.54
	06/21/05	*06/21/05*	*06/21/05*	*06/21/05*	*07/05/05*	*07/05/05*	*07/05/05*	*07/05/05*	*07/19/05*	*07/19/05*	*07/19/05*	*07/19/05*	*08/02/05*	*08/02/05*	*08/02/05*	*08/02/05*
STDev	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Abiotic	1.86	0.39	2.01	13.86	7.51	0.25	2.24	9.03	3.84	0.39	1.88	13.88	40.30	0.06	5.20	2.23
Stbacteria	25.90	1.25	7.86	44.59	18.77	0.48	2.16	17.10	20.50	1.64	9.20	58.55	15.24	0.11	2.53	3.76
Ptbacteria	5.00	0.12	1.12	4.43	4.84	0.17	0.97	6.10	19.01	0.30	1.60	10.53	1.37	0.51	2.91	18.33
Stfungi	1.33	0.09	0.59	3.19	3.18	0.16	1.24	5.81	4.93	0.25	1.05	9.07	3.00	0.13	0.83	4.76
Ptfungi	6.67	0.44	2.44	15.66	7.94	0.14	0.31	5.08	6.51	0.14	1.10	4.88	10.99	0.08	0.73	2.88
StRPBact	3.61	0.09	0.64	3.05	5.67	0.17	0.38	6.06	4.18	0.14	0.68	4.95	7.33	0.08	0.56	2.81
PtRPBact	4.73	0.08	0.67	2.95	3.48	0.24	1.57	8.41	3.53	0.12	0.88	4.33	8.09	0.18	1.72	6.48
STRPBactFung	3.18	0.27	1.72	9.65	3.18	0.42	1.90	14.92	6.01	0.51	2.24	18.29	0.67	0.52	2.74	18.48
PTRPBactFung	4.91	0.81	2.24	28.97	3.38	0.39	1.51	14.05	5.17	0.21	0.45	7.44	14.24	0.13	1.83	4.78
STRPBFNOHoag	7.06	0.14	0.17	4.91	7.17	0.04	0.30	1.45	6.89	0.07	0.09	2.42	8.02	0.09	0.36	3.27
PTRPBFNOHoag	3.46	0.21	0.68	7.30	2.60	0.07	0.46	2.48	0.58	0.10	0.53	3.67	18.30	0.04	1.24	1.53
STRPBFNOMin	3.48	0.01	0.07	0.40	3.93	0.03	0.27	1.05	5.90	0.06	0.33	2.22	16.79	0.06	0.98	2.25

Table K-8: Cation concentration on soil-exchangeable sites (mg of cation/ g of soil) and the total cation amount on soil-exchangeable sites (μmol) at 6 months.

Cation Extraction	These values are corrected for filter effect												
Samples from 2-15-05	*** = repeat**												
	Extracted Weight	**Total Weight**	**Ca**	**Ca**	**K**	**K**	**Mg**	**Mg**	**Fe**	**Fe**	**Al**	**Al**
Sample	**g**	**g**	**mg/g**	**umol**	**mg/g**	**umol**	**mg/g**	**umol**	**mg/g**	**umol**	**mg/g**	**umol**
Abiotic S14	4.0070	214	0.0058	31.06	0.0020	10.93	0.0007	6.19	0.0008	3.15	0.0009	7.10
Abiotic S5	4.0060	200	0.0064	31.90	0.0020	10.21	0.0008	6.78	0.0013	4.69	0.0012	8.57
Abiotic S5*	4.0093	200	0.0112	55.89	0.0020	10.21	0.0007	5.63	0.0013	4.70	0.0010	7.72
Abiotic S8	4.0033	214	0.0128	68.22	0.0035	19.15	0.0008	7.08	0.0015	5.56	0.0011	8.89
StBacteria S12	4.0032	200	0.0037	18.51	0.0020	10.22	0.0008	6.86	0.0012	4.28	0.0024	18.03
StBacteria S15	4.0035	200	0.0053	26.36	0.0020	10.22	0.0011	9.30	0.0012	4.32	0.0027	20.23
StBacteria S5	4.0044	214	0.0035	18.78	0.0023	12.48	0.0008	7.23	0.0010	3.76	0.0018	14.27
PtBacteria S22	4.0049	214	0.0037	19.80	0.0020	10.93	0.0007	6.47	0.0011	4.24	0.0022	17.47
PtBacteria S22 *	4.0028	214	0.0046	24.69	0.0020	10.94	0.0010	8.44	0.0012	4.63	0.0025	19.69
PtBacteria S29	3.9974	214	0.0041	22.13	0.0020	10.95	0.0009	7.96	0.0011	4.39	0.0021	16.40
PtBacteria S27	4.0073	214	0.0039	20.72	0.0020	10.93	0.0007	5.73	0.0012	4.56	0.0022	17.27
StFungi S4	3.9979	214	0.0039	21.01	0.0032	17.50	0.0010	8.79	0.0010	3.84	0.0021	16.91
StFungi S14	4.0011	200	0.0039	19.54	0.0020	10.23	0.0007	6.09	0.0011	3.96	0.0019	13.94
StFungi S10	3.9974	214	0.0036	19.46	0.0027	15.00	0.0007	6.16	0.0011	4.07	0.0018	14.30
PtFungi S29	4.0048	200	0.0057	28.42	0.0020	10.22	0.0012	10.16	0.0016	5.59	0.0039	28.59
PtFungi S16	4.0052	214	0.0032	17.23	0.0020	10.93	0.0006	5.20	0.0012	4.58	0.0019	15.25
PtFungi S30	4.0064	214	0.0032	17.04	0.0020	10.93	0.0007	5.84	0.0010	4.00	0.0017	13.84
PtFungi S30 *	4.0077	214	0.0036	19.41	0.0020	10.93	0.0008	7.11	0.0011	4.06	0.0018	14.13
StRPBact S4	3.9971	214	0.0066	35.36	0.0020	10.95	0.0008	6.96	0.0011	4.34	0.0010	7.93
StRPBact S2	4.0067	200	0.0079	39.44	0.0020	10.21	0.0008	6.27	0.0015	5.50	0.0013	9.64
StRPBact S2*	4.0086	200	0.0106	52.72	0.0020	10.21	0.0008	6.72	0.0018	6.39	0.0012	8.62
StRPBact S15	4.0044	200	0.0069	34.63	0.0021	10.89	0.0008	6.26	0.0012	4.35	0.0012	9.22
PtRPBact S26	4.0012	200	0.0095	47.28	0.0020	10.23	0.0012	10.02	0.0020	7.17	0.0017	12.37
PtRPBact S27	4.0048	200	0.0049	24.33	0.0020	10.22	0.0007	5.89	0.0012	4.35	0.0011	8.02
PtRPBact S25	4.0029	200	0.0106	52.67	0.0027	14.00	0.0008	6.32	0.0014	4.94	0.0013	9.42
StRPBactFung S12	4.0085	200	0.0093	46.32	0.0020	10.21	0.0008	6.39	0.0015	5.35	0.0012	9.19
StRPBactFung S3	4.0074	214	0.0092	49.15	0.0020	10.93	0.0007	5.92	0.0012	4.58	0.0010	7.75
StRPBactFung S9	4.0017	200	0.0122	61.06	0.0020	10.23	0.0012	9.72	0.0012	4.13	0.0011	7.98
PtRPBactFung S26	4.0029	200	0.0128	63.81	0.0020	10.22	0.0009	7.76	0.0018	6.41	0.0014	10.06
PtRPBactFung S22	4.0005	200	0.0058	28.97	0.0021	10.82	0.0008	6.39	0.0013	4.62	0.0013	9.55
PtRPBactFung S27	4.0095	214	0.0097	51.97	0.0020	10.92	0.0009	7.66	0.0012	4.76	0.0013	10.55
StRPBFNOHoag S15	3.9983	200	0.0083	41.64	0.0020	10.23	0.0009	7.11	0.0013	4.63	0.0013	9.48
StRPBFNOHoag S9	4.0058	200	0.0100	49.76	0.0020	10.22	0.0009	7.66	0.0012	4.22	0.0012	8.91
StRPBFNOHoag S13	4.0061	200	0.0101	50.21	0.0020	10.21	0.0006	5.04	0.0012	4.42	0.0011	8.24
PtRPBFNOHoag S27	4.0035	214	0.0089	47.49	0.0020	10.94	0.0011	9.61	0.0013	4.86	0.0013	10.16
PtRPBFNOHoag S27*	4.0072	214	0.0084	44.62	0.0020	10.93	0.0010	8.44	0.0013	5.06	0.0012	9.65
PtRPBFNOHoag S17	4.0027	200	0.0060	29.81	0.0022	11.09	0.0008	6.43	0.0012	4.27	0.0013	9.42
PtRPBFNOHoag S19	4.0036	200	0.0058	28.75	0.0020	10.22	0.0007	6.06	0.0011	3.95	0.0012	9.14
StRPBFNOMin S8	4.0081	200	0.0007	3.44	0.0000	0.00	0.0002	1.64	0.0004	1.32	0.0004	3.01
StRPBFNOMin S5	4.0085	200	0.0004	1.86	0.0000	0.00	0.0002	1.89	0.0007	2.45	0.0006	4.54
StRPBGNOMin S14	3.9997	214	0.0003	1.50	0.0000	0.00	0.0002	1.74	0.0005	1.89	0.0005	3.61
PtRPBFNOMin S26	4.0038	214	0.0007	3.50	0.0000	0.00	0.0002	1.57	0.0006	2.15	0.0004	2.79
PtRPBFNOMin S29	3.9959	200	0.0005	2.38	0.0000	0.00	0.0002	1.65	0.0004	1.46	0.0004	3.21
PtRPBFNOmin S30	4.0067	200	0.0004	1.83	0.0000	0.00	0.0002	1.64	0.0005	1.73	0.0005	3.34

Table K-8 (cont.): The average total cation amount on soil-exchangeable sites (μmol) at 6 months and Standard error was also estimated.

	umol	umol	umol	umol	umol	umol
Average values	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	46.77	12.62	6.42	65.81	4.53	8.07
StBacteria	21.22	10.97	7.80	39.99	4.12	17.51
StFungus	20.00	14.24	7.01	41.26	3.95	15.05
StRPBact	40.53	10.57	6.55	57.65	5.14	8.85
StRPBactFung	52.18	10.45	7.34	69.97	4.69	8.31
StRPBFNOHoag	47.21	10.22	6.60	64.03	4.42	8.88
StRPBFNOMin	2.27	0.00	1.76	4.03	1.89	3.72
PtBacteria	21.83	10.94	7.15	39.92	4.46	17.71
PtFungus	20.53	10.75	7.08	38.35	4.56	17.95
PtRPBact	41.42	11.48	7.41	60.32	5.49	9.94
PtRPBactFung	48.25	10.65	7.27	66.18	5.26	10.05
PtRPBFNOHoag	37.67	10.79	7.63	56.09	4.54	9.59
PtRPBFNOMin	2.57	0.00	1.62	4.19	1.78	3.11
STE	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	9.18	2.18	0.32	11.68	0.50	0.41
StBacteria	2.57	0.75	0.76	4.08	0.18	1.74
StFungus	0.50	2.13	0.89	3.53	0.07	0.94
StRPBact	4.20	0.21	0.17	4.57	0.50	0.37
StRPBactFung	4.52	0.24	1.20	5.95	0.36	0.45
StRPBFNOHoag	2.78	0.01	0.80	3.59	0.12	0.36
StRPBFNOMin	0.60	0.00	0.07	0.67	0.33	0.45
PtBacteria	1.07	0.01	0.63	1.70	0.09	0.70
PtFungus	2.69	0.18	1.10	3.96	0.37	3.56
PtRPBact	8.69	1.26	1.31	11.26	0.86	1.28
PtRPBactFung	10.23	0.22	0.44	10.89	0.57	0.29
PtRPBFNOHoag	4.88	0.19	0.84	5.92	0.26	0.22
PtRPBFNOMin	0.49	0.00	0.03	0.52	0.20	0.16
Ave. STE	**4.03**	**0.57**	**0.66**	**5.26**	**0.34**	**0.84**

Table K-8 (cont): Cation concentration on soil-exchangeable sites (mg of cation/ g of soil) and the total cation amount on soil-exchangeable sites (µmol) at 9 months.

Cation Extraction	These values are corrected for filter effect											
Samples from 5-17-05	*** = repeat**											
	Extracted Weight	**Total Weight**	**Ca**	**Ca**	**K**	**K**	**Mg**	**Mg**	**Fe**	**Fe**	**Al**	**Al**
Sample	**g**	**g**	**mg/g**	**umol**	**mg/g**	**umol**	**mg/g**	**umol**	**mg/g**	**umol**	**mg/g**	**umol**
Abiotic S4	4.0085	200	0.0076	37.84	0.0020	10.21	0.0009	7.68	0.0011	4.03	0.0012	9.19
Abiotic S3	4.0059	200	0.0066	32.85	0.0049	25.26	0.0009	7.04	0.0009	3.30	0.0011	8.03
Abiotic S9	4.0017	214	0.0069	36.93	0.0020	10.94	0.0009	7.54	0.0010	3.84	0.0012	9.80
StBacteria S10	4.0047	200	0.0030	14.72	0.0024	12.48	0.0007	5.88	0.0007	2.35	0.0017	12.87
StBacteria S3	4.0015	200	0.0061	30.57	0.0025	12.80	0.0011	8.73	0.0006	2.12	0.0015	11.40
StBacteria S7	4.0009	200	0.0028	13.89	0.0020	10.23	0.0007	6.17	0.0007	2.65	0.0019	13.87
StBacteria S7*	4.0015	200	0.0033	16.65	0.0020	10.23	0.0008	6.64	0.0008	2.97	0.0022	16.50
PtBacteria S24	4.0014	200	0.0033	16.65	0.0032	16.15	0.0007	6.00	0.0005	1.93	0.0013	9.98
PtBacteria S19	4.0032	200	0.0039	19.44	0.0020	10.22	0.0008	6.87	0.0011	4.01	0.0027	20.27
PtBacteria S26	4.0023	214	0.0050	26.75	0.0020	10.94	0.0009	8.35	0.0009	3.45	0.0018	14.05
StFungus S7	4.0023	214	0.0018	9.58	0.0020	10.94	0.0005	4.36	0.0006	2.14	0.0010	7.86
StFungus S9	4.0025	200	0.0022	10.83	0.0020	10.22	0.0006	4.54	0.0008	2.91	0.0017	12.38
StFungus S3	4.0025	214	0.0022	11.63	0.0020	10.94	0.0006	5.67	0.0007	2.79	0.0015	12.13
PtFungus S20	4.0064	200	0.0028	13.83	0.0044	22.52	0.0005	4.43	0.0006	2.13	0.0010	7.68
PtFungus S26	4.0003	214	0.0034	18.37	0.0020	10.95	0.0008	6.92	0.0007	2.78	0.0012	9.49
PtFungus S22	4.0032	214	0.0061	32.56	0.0020	10.94	0.0010	8.59	0.0006	2.44	0.0024	19.33
PtFungus S22*	4.0052	214	0.0082	43.83	0.0020	10.93	0.0012	10.15	0.0007	2.67	0.0026	20.85
StRPBact S5	4.0005	214	0.0032	16.83	0.0020	10.94	0.0006	4.99	0.0005	1.81	0.0006	4.60
StRPBact S11	4.0040	200	0.0081	40.40	0.0020	10.22	0.0008	6.77	0.0011	4.04	0.0011	8.46
StRPBact S8	3.9993	200	0.0064	32.16	0.0020	10.23	0.0006	5.19	0.0008	2.91	0.0010	7.20
StRPBact S8*	4.0033	200	0.0079	39.31	0.0020	10.22	0.0007	5.37	0.0011	3.77	0.0012	8.61
PtRPBact S28	4.0016	200	0.0064	31.92	0.0020	10.23	0.0007	5.60	0.0009	3.23	0.0011	8.52
PtRPBact S23	4.0006	214	0.0051	27.49	0.0020	10.94	0.0008	7.17	0.0007	2.84	0.0009	7.12
PtRPBact S21	4.0014	200	0.0085	42.42	0.0020	10.23	0.0006	4.78	0.0009	3.04	0.0011	7.97
PtRPBact S21*	4.0007	200	0.0071	35.52	0.0020	10.23	0.0006	4.73	0.0008	2.91	0.0009	6.66
StRPBactFung S7	4.0019	214	0.0054	28.73	0.0092	50.22	0.0008	7.42	0.0007	2.51	0.0008	6.72
StRPBactFung S4	4.0018	214	0.0068	36.52	0.0020	10.94	0.0006	5.37	0.0005	1.98	0.0007	5.50
StRPBactFung S8	4.0020	214	0.0052	27.82	0.0022	12.06	0.0007	5.80	0.0006	2.34	0.0007	5.82
PtRPBactFung S23	4.0020	214	0.0084	44.63	0.0020	10.94	0.0009	8.36	0.0008	3.21	0.0012	9.48
PtRPBactFung S19	4.0048	214	0.0070	37.48	0.0020	10.93	0.0009	7.60	0.0008	3.03	0.0010	7.62
PtRPBactFung S21	4.0020	214	0.0069	37.00	0.0020	11.08	0.0008	6.98	0.0008	2.92	0.0011	8.90
StRPBFNOHoag S5	4.0048	214	0.0050	26.76	0.0000	0.00	0.0008	7.28	0.0005	2.05	0.0007	5.18
StRPBFNOHoag S10	4.0001	200	0.0072	35.85	0.0000	0.00	0.0007	5.49	0.0011	3.83	0.0012	8.67
StRPBFNOHoag S7	4.0025	214	0.0053	28.41	0.0000	0.00	0.0008	7.29	0.0008	3.24	0.0010	7.62
PtRPBFNOHoag S24	4.0035	200	0.0050	25.15	0.0000	0.00	0.0008	6.41	0.0009	3.17	0.0011	8.12
PtRPBFNOHoag S29	4.0025	200	0.0076	37.74	0.0000	0.00	0.0009	7.58	0.0013	4.65	0.0014	10.40
PtRPBFNOHoag S29*	4.0024	200	0.0082	40.79	0.0000	0.00	0.0008	6.88	0.0010	3.61	0.0013	9.88
PtRPBFNOHoag S26	4.0003	200	0.0063	31.65	0.0000	0.00	0.0006	5.25	0.0010	3.63	0.0013	9.71
StRPBFNOMin S7	4.0001	200	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0003	1.24	0.0003	2.29
StRPBFNOMin S10	4.0011	200	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0003	1.24	0.0004	3.08
StRPBFNOMin S4	4.0063	200	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0004	1.31	0.0004	3.32
PtRPBFNOMin S22	4.0029	200	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0004	1.49	0.0006	4.17
PtRPBFNOMin S24	4.0002	200	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0003	0.97	0.0005	3.90
PtRPBFNOMin S19	4.0025	214	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0003	0.98	0.0003	2.61

Table K-8 (cont.): The average total cation amount on soil-exchangeable sites (µmol) at 9 months and Standard error was also estimated.

	umol	umol	umol	umol	umol	umol
Average values	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	35.87	15.47	7.42	58.77	3.73	9.01
StBacteria	18.96	11.34	6.86	37.15	2.53	13.66
StFungus	10.68	10.70	4.86	26.24	2.61	10.79
StRPBact	32.17	10.40	5.58	48.16	3.13	7.22
StRPBactFung	31.03	24.41	6.20	61.63	2.28	6.01
StRPBFNOHoag	30.34	0.00	6.69	37.03	3.04	7.15
StRPBFNOMin	0.00	0.00	0.00	0.00	1.26	2.90
PtBacteria	20.95	12.44	7.07	40.46	3.13	14.77
PtFungus	27.15	13.83	7.52	48.50	2.50	14.34
PtRPBact	34.33	10.41	5.57	50.31	3.01	7.57
PtRPBactFung	39.71	10.99	7.65	58.34	3.06	8.66
PtRPBFNOHoag	33.83	0.00	6.53	40.36	3.76	9.52
PtRPBFNOMin	0.00	0.00	0.00	0.00	1.15	3.56
STE	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	1.53	4.90	0.19	6.63	0.22	0.52
StBacteria	3.91	0.70	0.65	5.26	0.18	1.08
StFungus	0.60	0.24	0.41	1.24	0.24	1.47
StRPBact	5.43	0.18	0.40	6.01	0.50	0.93
StRPBactFung	2.76	12.91	0.63	16.30	0.16	0.37
StRPBFNOHoag	2.79	0.00	0.60	3.39	0.52	1.03
StRPBFNOMin	0.00	0.00	0.00	0.00	0.02	0.31
PtBacteria	3.01	1.87	0.69	5.57	0.62	2.99
PtFungus	6.84	2.90	1.22	10.96	0.14	3.36
PtRPBact	3.16	0.18	0.57	3.90	0.08	0.42
PtRPBactFung	2.47	0.05	0.40	2.91	0.08	0.55
PtRPBFNOHoag	3.46	0.00	0.49	3.95	0.31	0.49
PtRPBFNOMin	0.00	0.00	0.00	0.00	0.17	0.48
Ave. STE	**2.87**	**1.59**	**0.50**	**4.96**	**0.25**	**1.12**

Table K-8 (cont): Cation concentration on soil-exchangeable sites (mg of cation/ g of soil) and the total cation amount on soil-exchangeable sites (µmol) at 12 months.

Cation Extraction	These values are corrected for filter effect											
Samples from 8-18-05	*** = repeat**											
Sample	**Extracted Weight g**	**Total Weight g**	**Ca mg/g**	**Ca umol**	**K mg/g**	**K umol**	**Mg mg/g**	**Mg umol**	**Fe mg/g**	**Fe umol**	**Al mg/g**	**Al umol**
AbioticS6	3.9982	200	0.0094	46.85	0.0045		0.0014	11.49	0.0012	4.23	0.0020	14.88
AbioticS10	4.0052	200	0.0062	30.99	0.0031	15.67	0.0024		0.0013	4.47	0.0026	19.36
AbioticS12	4.0030	200	0.0081	40.62	0.0027	13.63	0.0017	14.29	0.0011	4.00	0.0018	13.53
StBacteriaS6	4.0031	200	0.0065	32.58	0.0065	33.40	0.0019	15.99	0.0011	4.06	0.0036	26.65
StBacteriaS6*	4.0160	200	0.0060	29.97	0.0062	31.92	0.0018	14.61	0.0010	3.70	0.0032	23.90
StBacteriaS8	4.0041	200	0.0079	39.63	0.0072	36.79	0.0022	17.70	0.0011	4.05	0.0036	26.54
StBacteriaS13	4.0068	200	0.0076	38.13	0.0077		0.0020	16.36	0.0009	3.38	0.0045	33.63
PtBacteriaS18	3.9998	214	0.0038	20.10	0.0040	21.89	0.0013	11.22	0.0011	4.02	0.0039	31.01
PtBacteriaS20	4.0017	200	0.0056	27.93	0.0051	25.90	0.0019		0.0012	4.37	0.0038	28.34
PtBacteriaS28	4.0047	200	0.0044	22.10	0.0065		0.0010	8.59	0.0010	3.67	0.0028	20.99
STFungusS5	4.0055	214	0.0081	43.32	0.0089		0.0022		0.0012	4.60	0.0037	29.40
StFungusS15	4.0077	214	0.0063	33.84	0.0060	32.78	0.0011	9.36	0.0009	3.36	0.0032	25.44
StFungusS12	4.0003	200	0.0076	38.00	0.0056	28.64	0.0013	10.88	0.0010	3.66	0.0036	26.65
StFungusS12*	4.0083	200	0.0070	34.93	0.0052	26.54	0.0012	10.08	0.0011	4.08	0.0038	27.89
PtFungus S17	4.0034	200	0.0077	38.44	0.0081		0.0022	18.40	0.0011	3.81	0.0030	22.51
PtFungusS25	4.0120	214	0.0081	43.38	0.0052	28.73	0.0026		0.0011	4.05	0.0039	31.25
PtFungusS21	4.0052	214	0.0074	39.70	0.0053	28.78	0.0017	15.16	0.0011	4.05	0.0029	23.36
StRPBactS7	4.0043	200	0.0094	46.98	0.0039	20.17	0.0014	11.32	0.0013	4.76	0.0020	14.79
StRPBactS12	4.0044	200	0.0135		0.0053		0.0014	11.93	0.0012	4.40	0.0019	14.32
StRPBactS13	4.0059	200	0.0076	38.04	0.0035	17.92	0.0014	11.16	0.0012	4.23	0.0019	14.09
StRPBactS13*	4.0055	200	0.0065	32.54	0.0035	17.92	0.0012	9.66	0.0013	4.54	0.0019	14.10
PtRPBactS16	4.0072	200	0.0076	37.73	0.0045	22.95	0.0012	9.66	0.0014	4.98	0.0021	15.65
PtRPBactS17	4.0017	200	0.0064	31.80	0.0037	19.06	0.0011	9.21	0.0013	4.61	0.0018	13.09
PtRPBactS19	4.0028	200	0.0113		0.0043	21.86	0.0018		0.0014	4.98	0.0021	15.45
StRPBactFungS1	4.0068	200	0.0130	64.86	0.0031	15.68	0.0017	14.33	0.0012	4.41	0.0023	16.91
StRPBactFungS10	4.0033	200	0.0113	56.20	0.0043	21.86	0.0020	16.46	0.0011	3.99	0.0022	16.42
StRPBactFungS14	4.0042	214	0.0129	69.00	0.0056	30.62	0.0022	19.57	0.0013	4.78	0.0023	18.22
PtRPBactFungS20	4.0026	200	0.0113	56.20	0.0033	16.82	0.0014	11.33	0.0015	5.25	0.0022	16.23
PtRPBactFungS18	4.0073	200	0.0132	65.62	0.0051	26.32	0.0015	12.07	0.0014	4.99	0.0022	16.59
PtRPBactFungS18*	4.0041	200	0.0130	64.83	0.0077	39.22	0.0027	22.34	0.0013	4.50	0.0014	10.66
PtRPBactFungS24	4.0056	200	0.0119	59.49	0.0032	16.35	0.0015	12.18	0.0017	5.91	0.0029	21.59
StRPBFNOHoagS1	4.0060	200	0.0094	46.96	0.0028	14.56	0.0015	12.67	0.0013	4.63	0.0017	12.38
StRPBFNOHoagS8	4.0107	214	0.0087	46.51	0.0000	0.00	0.0019	17.09	0.0017	6.53	0.0029	22.90
StRPBFNOHOagS6	4.0018	214	0.0091	48.69	0.0028	15.32	0.0025		0.0016	6.03	0.0027	21.61
PtRPBFNOHoagS18	4.0036	200	0.0094	46.79	0.0032	16.25	0.0016	13.28	0.0016	5.75	0.0025	18.31
PtRPBFNOHoagS18*	4.0006	200	0.0059	29.64	0.0030	15.14	0.0010	8.46	0.0012	4.30	0.0019	14.12
PtRPBFNOHoagS20	4.0072	214	0.0109	58.25	0.0000	0.00	0.0016	14.51	0.0013	5.11	0.0023	17.94
PtRPBFNOHoagS23	4.0082	200	0.0089	44.47	0.0000	0.00	0.0020		0.0016	5.73	0.0029	21.13
StRPBFNOMinS6	4.0050	214	0.0006	2.94	0.0000	0.00	0.0006		0.0007	2.53	0.0005	4.36
StRPBFNOMinS11	4.0032	214	0.0006	3.02	0.0000	0.00	0.0003	2.91	0.0005	2.04	0.0007	5.40
StRPBFNOMinS13	4.0131	200	0.0002	1.11	0.0000	0.00	0.0003	2.11	0.0005	1.67	0.0006	4.37
PtRPBFNOMinS27	4.0053	200	0.0003	1.40	0.0000	0.00	0.0003	2.41	0.0005	1.71	0.0006	4.68
PtRPBFNOMinS18	4.0067	200	0.0003	1.40	0.0000	0.00	0.0003	2.26	0.0009	3.12	0.0007	5.01
PtRPBFNOMinS20	4.0065	214	0.0006	3.02	0.0000	0.00	0.0004		0.0004	1.55	0.0004	3.49
Initial1	4.0024	200	0.0122	61.01	0.0000	0.00	0.0024	19.91	0.0020	7.31	0.0018	13.40
Initial2	4.0083	200	0.0181	90.08	0.0000	0.00	0.0024	19.74	0.0019	6.79	0.0016	11.93
Initial3	4.0006	214	0.0149	79.81	0.0000	0.00	0.0025	22.19	0.0020	7.59	0.0017	13.40

Table K-8 (cont.): The average total cation amount on soil-exchangeable sites (µmol) at 12 months and Standard error was also estimated.

	umol	umol	umol	umol	umol	umol
Average values	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	39.49	14.65	12.89	67.03	4.23	15.93
StBacteria	35.08	34.04	16.17	85.28	3.80	27.68
StFungus	37.52	29.32	10.11	76.95	3.93	27.35
StRPBact	39.19	18.67	11.02	68.88	4.48	14.32
StRPBactFung	63.35	22.72	16.78	102.86	4.39	17.19
StRPBFNOHoag	47.39	9.96	14.88	72.23	5.73	18.97
StRPBFNOMin	2.36	0.00	2.51	4.87	2.08	4.71
PtBacteria	23.38	23.90	9.91	57.18	4.02	26.78
PtFungus	40.51	28.75	16.78	86.04	3.97	25.71
PtRPBact	34.76	21.29	9.43	65.49	4.86	14.73
PtRPBactFung	61.54	24.67	14.48	100.69	5.16	16.27
PtRPBFNOHoag	44.79	7.85	12.08	64.72	5.22	17.88
PtRPBFNOMin	1.94	0.00	2.34	4.28	2.13	4.39
Initial	76.97	0.00	20.61	97.58	7.23	12.91
STE	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	4.61	0.83	1.15	6.59	0.13	1.76
StBacteria	2.28	1.25	0.64	4.16	0.16	2.08
StFungus	2.12	1.59	0.38	4.09	0.27	0.85
StRPBact	3.64	0.65	0.48	4.78	0.11	0.16
StRPBactFung	3.77	4.33	1.52	9.63	0.23	0.54
StRPBFNOHoag	0.66	4.98	1.80	7.45	0.57	3.31
StRPBFNOMin	0.62	0.00	0.33	0.95	0.25	0.34
PtBacteria	2.35	1.63	1.07	5.05	0.20	3.00
PtFungus	1.48	0.02	1.32	2.82	0.08	2.78
PtRPBact	2.42	1.16	0.18	3.76	0.12	0.82
PtRPBactFung	2.24	5.36	2.63	10.23	0.29	2.23
PtRPBFNOHoag	5.88	4.54	1.60	12.02	0.34	1.44
PtRPBFNOMin	0.54	0.00	0.06	0.60	0.50	0.46
Initial	8.51	0.00	0.79	9.30	0.23	0.49
Ave. STE	**2.33**	**2.13**	**1.00**	**5.46**	**0.26**	**1.50**

Table K-9: Cation concentration of tree-biomass (mg of cation/ g of soil) and the total cation amount in tree-biomass (µmol) at 6 months. Above-ground and below-ground biomass were measured separately, dry weight and corrected dry weight are listed.

Aboveground Biomass 6 months (AGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBactS2	0.0899	0.0899	0.32	0.32	3.58	8.03	0.18	0.18	2.04	4.68
StRPBactS4	0.0740	0.0740	0.22	0.22	2.92	5.40	0.16	0.16	2.13	4.04
StRPBactS6	0.0718	0.0718	0.24	0.24	3.31	5.93	0.19	0.19	2.68	4.93
StRPBactS9	0.0747	0.0747	0.37	0.37	4.92	9.17	0.22	0.22	2.95	5.64
StRPBactS15	0.0686	0.0686	0.31	0.31	4.58	7.83	0.18	0.18	2.61	4.57
PtRPBactS18	0.0758	0.0758	0.29	0.29	3.89	7.35	0.13	0.13	1.73	3.36
PtRPBactS24	0.0965	0.0965	0.16	0.16	1.68	4.05	0.14	0.14	1.47	3.62
PtRPBactS25	0.0664	0.0664	0.23	0.23	3.42	5.67	0.10	0.10	1.43	2.44
PtRPBactS26	0.0932	0.0932	0.28	0.28	2.98	6.92	0.19	0.19	2.08	4.95
PtRPBactS27	0.0782	0.0782	0.23	0.23	2.96	5.78	0.15	0.15	1.95	3.91
StRPBactFungS3	0.0893	0.0893	0.31	0.31	3.47	7.72	0.26	0.26	2.91	6.65
StRPBactFungS5	0.0725	0.0725	0.22	0.22	3.03	5.47	0.20	0.20	2.72	5.04
StRPBactFungS9	0.1010	0.1010	0.23	0.23	2.30	5.80	0.27	0.27	2.63	6.80
StRPBactFungS12	0.1214	0.1214	0.46	0.46	3.76	11.40	0.31	0.31	2.54	7.89
StRPBactFungS15	0.0358	0.0358	0.10	0.10	2.92	2.61	0.13	0.13	3.55	3.25
PtRPBactFungS22	0.0752	0.0752	0.27	0.27	3.60	6.75	0.23	0.23	3.06	5.89
PtRPBactFungS26	0.0955	0.0955	0.44	0.44	4.65	11.08	0.27	0.27	2.80	6.84
PtRPBactFungS27	0.0709	0.0709	0.26	0.26	3.67	6.49	0.17	0.17	2.39	4.33
PtRPBactFungS28	0.0566	0.0566	0.34	0.34	6.09	8.60	0.14	0.14	2.41	3.49
PtRPBactFungS30	0.0862	0.0862	0.18	0.18	2.08	4.46	0.22	0.22	2.57	5.67
StRPBFNOHoagS3	0.0560	0.0560	0.20	0.20	3.53	4.93	0.14	0.14	2.49	3.57
StRPBFNOHoagS9	0.0574	0.0574	0.18	0.18	3.14	4.50	0.10	0.10	1.67	2.46
StRPBFNOHoagS11	0.0415	0.0415	0.12	0.12	2.99	3.09	0.09	0.09	2.26	2.40
StRPBFNOHoagS13	0.0429	0.0429	0.14	0.14	3.23	3.46	0.11	0.11	2.64	2.90
StRPBFNOHoagS15	0.0568	0.0568	0.15	0.15	2.60	3.68	0.14	0.14	2.39	3.47
PtRPBFNOHoagS16	0.0564	0.0564	0.20	0.20	3.60	5.06	0.10	0.10	1.82	2.62
PtRPBFNOHoagS17	0.0480	0.0480	0.17	0.17	3.50	4.19	0.13	0.13	2.64	3.24
PtRPBFNOHoagS19	0.0738	0.0738	0.15	0.15	2.08	3.83	0.12	0.12	1.58	2.99
PtRPBFNOHoagS25	0.0524	0.0524	0.21	0.21	4.09	5.35	0.10	0.10	1.94	2.60
PtRPBFNOHoagS27	0.0463	0.0463	0.15	0.15	3.29	3.80	0.10	0.10	2.15	2.55
StRPBFNOMinS2	0.0338	0.0338	0.01	0.01	0.44	0.37	0.04	0.04	1.23	1.06
StRPBFNOMinS5	0.0170	0.0170	0.01	0.01	0.34	0.14	0.03	0.03	1.82	0.79
StRPBFNOMinS8	0.0258	0.0258	0.01	0.01	0.51	0.33	0.04	0.04	1.49	0.98
StRPBFNOMinS9	0.0317	0.0317	0.02	0.02	0.50	0.39	0.05	0.05	1.49	1.20
StRPBFNOMinS14	0.0340	0.0340	0.02	0.02	0.47	0.40	0.04	0.04	1.23	1.07
PtRPBFNOMinS21	0.0416	0.0416	0.02	0.02	0.37	0.39	0.10	0.10	2.36	2.51
PtRPBFNOMinS26	0.0315	0.0315	0.01	0.01	0.43	0.33	0.05	0.05	1.52	1.22
PtRPBFNOMinS28	0.0343	0.0343	0.02	0.02	0.54	0.46	0.09	0.09	2.75	2.41
PtRPBFNOMinS29	0.0436	0.0436	0.02	0.02	0.43	0.47	0.05	0.05	1.21	1.35
PtRPBFNOMinS30	0.0354	0.0354	0.01	0.01	0.33	0.29	0.07	0.07	2.07	1.87
Belowground Biomass 6 months (BGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBactS4	0.1865	0.1430	0.80	0.62	4.31	15.39	1.13	0.87	6.05	22.13
StRPBactS6	0.1905	0.1461	0.90	0.69	4.72	17.20	1.29	0.99	6.76	25.26
StRPBactS9	0.1664	0.1276	0.69	0.53	4.18	13.30	0.97	0.75	5.85	19.10
PtRPBactS24	0.1933	0.1380	0.54	0.38	2.78	9.57	0.96	0.69	4.97	17.55
PtRPBactS25	0.2073	0.1480	0.69	0.49	3.31	12.22	0.79	0.56	3.80	14.37
PtRPBactS26	0.2104	0.1502	1.76	1.26	8.39	31.44	1.15	0.82	5.46	20.99
StRPBactFungS5	0.1223	0.0607	0.61	0.30	5.03	7.61	0.75	0.37	6.09	9.45
StRPBactFungS9	0.1582	0.0785	0.91	0.45	5.78	11.32	0.99	0.49	6.25	12.54
StRPBactFungS12	0.1851	0.0918	0.86	0.43	4.65	10.65	1.04	0.52	5.62	13.20
PtRPBactFungS22	0.2093	0.1530	0.90	0.66	4.31	16.46	1.48	1.08	7.07	27.66
PtRPBactFungS26	0.1738	0.1270	0.77	0.56	4.44	14.08	1.09	0.80	6.30	20.46
PtRPBactFungS27	0.1970	0.1440	0.75	0.55	3.79	13.61	1.10	0.81	5.59	20.60
StRPBFNOHoagS3	0.0958	0.0647	0.40	0.27	4.13	6.66	0.64	0.43	6.72	11.12
StRPBFNOHoagS9	0.0736	0.0497	0.38	0.26	5.22	6.48	0.57	0.38	7.74	9.83
StRPBFNOHoagS11	0.0763	0.0515	0.26	0.18	3.43	4.41	0.38	0.25	4.94	6.51
PtRPBFNOHoagS17	0.1103	0.0791	0.60	0.43	5.46	10.78	0.77	0.55	6.98	14.12
PtRPBFNOHoagS19	0.0950	0.0681	0.33	0.24	3.49	5.93	0.63	0.45	6.59	11.48
PtRPBFNOHoagS25	0.1096	0.0786	0.55	0.40	5.05	9.90	0.81	0.58	7.37	14.81
StRPBFNOMinS2	0.0745	0.0516	0.04	0.02	0.48	0.61	0.12	0.08	1.64	2.17
StRPBFNOMinS8	0.0501	0.0347	0.03	0.02	0.55	0.47	0.09	0.07	1.88	1.67
StRPBFNOMinS9	0.0748	0.0518	0.03	0.02	0.34	0.44	0.09	0.06	1.17	1.55
PtRPBFNOMinS21	0.0963	0.0377	0.03	0.01	0.30	0.28	0.15	0.06	1.58	1.52
PtRPBFNOMinS26	0.0800	0.0314	0.02	0.01	0.29	0.23	0.10	0.04	1.25	1.00
PtRPBFNOMinS30	0.0703	0.0276	0.02	0.01	0.30	0.21	0.12	0.05	1.76	1.24

Table K-9 (cont.): Cation concentration of tree-biomass (mg of cation/ g of soil) and the total cation amount in tree-biomass (µmol) at 6 months. Above-ground and below-ground biomass were measured separately.

Aboveground Biomass 6 months (AGB)	Mg mg	Corrected Mg mg	Mg mg/g	Mg umol	Fe mg	Corrected Fe mg	Fe mg/g	Fe umol
StRPBactS2	0.07	0.07	0.76	2.82	0.01	0.01	0.10	0.16
StRPBactS4	0.05	0.05	0.72	2.20	0.01	0.01	0.15	0.20
StRPBactS6	0.07	0.07	0.96	2.85	0.02	0.02	0.21	0.27
StRPBactS9	0.06	0.06	0.85	2.61	0.01	0.01	0.20	0.27
StRPBactS15	0.07	0.07	1.02	2.87	0.03	0.03	0.44	0.54
PtRPBactS18	0.05	0.05	0.66	2.04	0.00	0.00	0.05	0.07
PtRPBactS24	0.04	0.04	0.43	1.72	0.00	0.00	0.05	0.09
PtRPBactS25	0.03	0.03	0.51	1.38	0.00	0.00	0.07	0.08
PtRPBactS26	0.08	0.08	0.88	3.38	0.02	0.02	0.20	0.33
PtRPBactS27	0.06	0.06	0.80	2.58	0.01	0.01	0.08	0.11
StRPBactFungS3	0.07	0.07	0.82	3.03	0.01	0.01	0.09	0.15
StRPBactFungS5	0.05	0.05	0.66	1.98	0.01	0.01	0.10	0.13
StRPBactFungS9	0.07	0.07	0.70	2.90	0.01	0.01	0.07	0.13
StRPBactFungS12	0.07	0.07	0.60	2.99	0.01	0.01	0.07	0.16
StRPBactFungS15	0.03	0.03	0.71	1.05	0.00	0.00	0.10	0.07
PtRPBactFungS22	0.07	0.07	0.95	2.94	0.01	0.01	0.09	0.12
PtRPBactFungS26	0.07	0.07	0.69	2.73	0.01	0.01	0.07	0.12
PtRPBactFungS27	0.05	0.05	0.75	2.18	0.01	0.01	0.10	0.13
PtRPBactFungS28	0.05	0.05	0.80	1.85	0.01	0.01	0.13	0.13
PtRPBactFungS30	0.05	0.05	0.59	2.08	0.01	0.01	0.08	0.13
StRPBFNOHoagS3	0.05	0.05	0.81	1.88	0.01	0.01	0.10	0.10
StRPBFNOHoagS9	0.03	0.03	0.60	1.42	0.01	0.01	0.11	0.11
StRPBFNOHoagS11	0.03	0.03	0.60	1.03	0.01	0.01	0.12	0.09
StRPBFNOHoagS13	0.03	0.03	0.72	1.28	0.00	0.00	0.10	0.08
StRPBFNOHoagS15	0.04	0.04	0.64	1.49	0.00	0.00	0.08	0.09
PtRPBFNOHoagS16	0.05	0.05	0.89	2.06	0.00	0.00	0.08	0.08
PtRPBFNOHoagS17	0.04	0.04	0.91	1.80	0.01	0.01	0.14	0.12
PtRPBFNOHoagS19	0.05	0.05	0.62	1.88	0.00	0.00	0.05	0.07
PtRPBFNOHoagS25	0.03	0.03	0.66	1.43	0.01	0.01	0.15	0.14
PtRPBFNOHoagS27	0.04	0.04	0.83	1.57	0.00	0.00	0.09	0.07
StRPBFNOMinS2	0.02	0.02	0.60	0.83	0.01	0.01	0.24	0.14
StRPBFNOMinS5	0.01	0.01	0.81	0.56	0.00	0.00	0.13	0.04
StRPBFNOMinS8	0.01	0.01	0.55	0.58	0.00	0.00	0.10	0.05
StRPBFNOMinS9	0.02	0.02	0.61	0.80	0.00	0.00	0.06	0.03
StRPBFNOMinS14	0.03	0.03	0.83	1.16	0.00	0.00	0.08	0.05
PtRPBFNOMinS21	0.02	0.02	0.57	0.98	0.00	0.00	0.06	0.05
PtRPBFNOMinS26	0.02	0.02	0.58	0.75	0.00	0.00	0.08	0.04
PtRPBFNOMinS28	0.02	0.02	0.58	0.81	0.00	0.00	0.09	0.06
PtRPBFNOMinS29	0.02	0.02	0.52	0.94	0.00	0.00	0.11	0.08
PtRPBFNOMinS30	0.02	0.02	0.55	0.80	0.00	0.00	0.10	0.06
Belowground Biomass 6 months (BGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBactS4	1.00	0.77	5.35	31.51	1.31	1.01	7.03	17.95
StRPBactS6	1.29	0.99	6.79	40.82	1.73	1.33	9.08	23.68
StRPBactS9	0.82	0.63	4.90	25.72	1.05	0.81	6.33	14.43
PtRPBactS24	0.80	0.57	4.14	23.52	1.08	0.77	5.61	13.82
PtRPBactS25	0.70	0.50	3.37	20.50	0.93	0.67	4.50	11.89
PtRPBactS26	1.45	1.03	6.88	42.52	1.95	1.39	9.26	24.84
StRPBactFungS5	0.74	0.37	6.06	15.14	0.99	0.49	8.08	8.75
StRPBactFungS9	1.03	0.51	6.51	21.03	1.36	0.67	8.59	12.04
StRPBactFungS12	0.83	0.41	4.47	16.88	1.18	0.58	6.36	10.43
PtRPBactFungS22	1.41	1.03	6.75	42.47	1.85	1.35	8.86	24.19
PtRPBactFungS26	0.88	0.65	5.09	26.61	1.19	0.87	6.83	15.49
PtRPBactFungS27	0.89	0.65	4.51	26.72	1.14	0.83	5.79	14.88
StRPBFNOHoagS3	0.59	0.40	6.16	16.40	0.80	0.54	8.34	9.63
StRPBFNOHoagS9	0.52	0.35	7.11	14.54	0.72	0.48	9.72	8.62
StRPBFNOHoagS11	0.30	0.21	3.99	8.46	0.43	0.29	5.66	5.20
PtRPBFNOHoagS17	0.64	0.46	5.81	18.90	0.86	0.62	7.81	11.03
PtRPBFNOHoagS19	0.43	0.31	4.57	12.80	0.58	0.41	6.09	7.41
PtRPBFNOHoagS25	0.71	0.51	6.46	20.89	0.96	0.69	8.75	12.28
StRPBFNOMinS2	0.04	0.03	0.51	1.08	0.36	0.25	4.89	4.50
StRPBFNOMinS8	0.02	0.02	0.45	0.64	0.09	0.06	1.73	1.07
StRPBFNOMinS9	0.02	0.02	0.31	0.66	0.01	0.01	0.19	0.17
PtRPBFNOMinS21	0.03	0.01	0.31	0.49	0.07	0.03	0.75	0.51
PtRPBFNOMinS26	0.02	0.01	0.29	0.37	0.03	0.01	0.42	0.23
PtRPBFNOMinS30	0.02	0.01	0.31	0.35	0.01	0.01	0.19	0.10

Table K-9 (cont.): Cation concentration of tree-biomass (mg of cation/ g of soil) and the total cation amount in tree-biomass (μmol) at 6 months. Above-ground and below-ground biomass were measured separately.

Aboveground Biomass 6 months (AGB)	Al mg	Corrected Al mg	Al mg/g	Al umol	P mg	Corrected P mg	P mg/g	P umol
StRPBactS2	0.04	0.04	0.41	1.36	0.04	0.04	0.46	1.34
StRPBactS4	0.04	0.04	0.48	1.32	0.03	0.03	0.42	1.00
StRPBactS6	0.04	0.04	0.55	1.45	0.03	0.03	0.45	1.05
StRPBactS9	0.05	0.05	0.73	2.02	0.04	0.04	0.50	1.20
StRPBactS15	0.07	0.07	1.00	2.54	0.04	0.04	0.55	1.22
PtRPBactS18	0.01	0.01	0.07	0.20	0.02	0.02	0.32	0.78
PtRPBactS24	0.01	0.01	0.05	0.19	0.02	0.02	0.21	0.66
PtRPBactS25	0.00	0.00	0.05	0.13	0.02	0.02	0.37	0.78
PtRPBactS26	0.01	0.01	0.16	0.55	0.04	0.04	0.38	1.15
PtRPBactS27	0.01	0.01	0.09	0.27	0.03	0.03	0.39	0.98
StRPBactFungS3	0.02	0.02	0.23	0.77	0.04	0.04	0.49	1.40
StRPBactFungS5	0.02	0.02	0.28	0.75	0.04	0.04	0.49	1.14
StRPBactFungS9	0.03	0.03	0.28	1.04	0.04	0.04	0.43	1.41
StRPBactFungS12	0.02	0.02	0.16	0.74	0.06	0.06	0.52	2.03
StRPBactFungS15	0.01	0.01	0.39	0.51	0.03	0.03	0.87	1.01
PtRPBactFungS22	0.03	0.03	0.38	1.05	0.05	0.05	0.65	1.59
PtRPBactFungS26	0.02	0.02	0.24	0.83	0.07	0.07	0.76	2.33
PtRPBactFungS27	0.03	0.03	0.40	1.05	0.03	0.03	0.42	0.96
PtRPBactFungS28	0.02	0.02	0.44	0.92	0.03	0.03	0.54	0.99
PtRPBactFungS30	0.03	0.03	0.32	1.01	0.04	0.04	0.47	1.32
StRPBFNOHoagS3	0.01	0.01	0.22	0.45	0.03	0.03	0.52	0.95
StRPBFNOHoagS9	0.01	0.01	0.26	0.55	0.02	0.02	0.34	0.64
StRPBFNOHoagS11	0.01	0.01	0.19	0.29	0.01	0.01	0.34	0.46
StRPBFNOHoagS13	0.01	0.01	0.27	0.43	0.02	0.02	0.51	0.71
StRPBFNOHoagS15	0.01	0.01	0.13	0.28	0.02	0.02	0.40	0.74
PtRPBFNOHoagS16	0.02	0.02	0.38	0.79	0.02	0.02	0.42	0.76
PtRPBFNOHoagS17	0.02	0.02	0.47	0.83	0.03	0.03	0.52	0.81
PtRPBFNOHoagS19	0.02	0.02	0.23	0.62	0.03	0.03	0.35	0.82
PtRPBFNOHoagS25	0.02	0.02	0.29	0.57	0.02	0.02	0.36	0.61
PtRPBFNOHoagS27	0.02	0.02	0.36	0.62	0.02	0.02	0.50	0.74
StRPBFNOMinS2	0.02	0.02	0.48	0.60	0.02	0.02	0.63	0.69
StRPBFNOMinS5	0.01	0.01	0.31	0.19	0.02	0.02	1.33	0.73
StRPBFNOMinS8	0.01	0.01	0.32	0.30	0.02	0.02	0.76	0.63
StRPBFNOMinS9	0.01	0.01	0.27	0.31	0.03	0.03	0.86	0.88
StRPBFNOMinS14	0.01	0.01	0.25	0.31	0.03	0.03	0.84	0.92
PtRPBFNOMinS21	0.01	0.01	0.19	0.29	0.02	0.02	0.50	0.67
PtRPBFNOMinS26	0.01	0.01	0.16	0.19	0.02	0.02	0.64	0.65
PtRPBFNOMinS28	0.01	0.01	0.31	0.40	0.03	0.03	0.81	0.89
PtRPBFNOMinS29	0.02	0.02	0.37	0.60	0.03	0.03	0.74	1.03
PtRPBFNOMinS30	0.01	0.01	0.26	0.34	0.03	0.03	0.73	0.83
Belowground Biomass 6 months (BGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBactS4	1.34	1.02	7.16	37.96	0.07	0.06	0.38	1.78
StRPBactS6	1.54	1.18	8.07	43.67	0.08	0.06	0.40	1.86
StRPBactS9	1.05	0.80	6.30	29.79	0.06	0.05	0.39	1.59
PtRPBactS24	0.73	0.52	3.77	19.26	0.07	0.05	0.35	1.55
PtRPBactS25	1.02	0.73	4.91	26.93	0.07	0.05	0.36	1.72
PtRPBactS26	2.82	2.01	13.39	74.51	0.07	0.05	0.33	1.58
StRPBactFungS5	1.00	0.50	8.21	18.44	0.05	0.02	0.39	0.76
StRPBactFungS9	1.49	0.74	9.40	27.33	0.06	0.03	0.41	1.03
StRPBactFungS12	1.42	0.70	7.66	26.06	0.07	0.03	0.38	1.12
PtRPBactFungS22	1.68	1.23	8.05	45.60	0.11	0.08	0.54	2.66
PtRPBactFungS26	1.10	0.81	6.36	29.91	0.13	0.09	0.73	2.98
PtRPBactFungS27	1.19	0.87	6.04	32.21	0.10	0.07	0.50	2.33
StRPBFNOHoagS3	0.63	0.43	6.61	15.83	0.04	0.03	0.44	0.92
StRPBFNOHoagS9	0.64	0.43	8.73	16.06	0.03	0.02	0.43	0.69
StRPBFNOHoagS11	0.40	0.27	5.28	10.07	0.02	0.02	0.30	0.50
PtRPBFNOHoagS17	1.05	0.75	9.53	27.90	0.05	0.04	0.47	1.21
PtRPBFNOHoagS19	0.56	0.40	5.94	14.98	0.05	0.04	0.52	1.14
PtRPBFNOHoagS25	0.90	0.65	8.24	23.97	0.04	0.03	0.41	1.03
StRPBFNOMinS2	0.38	0.27	5.16	9.87	0.07	0.05	0.89	1.49
StRPBFNOMinS8	0.22	0.15	4.40	5.65	0.04	0.03	0.79	0.89
StRPBFNOMinS9	0.07	0.05	0.91	1.76	0.06	0.04	0.81	1.35
PtRPBFNOMinS21	0.45	0.18	4.71	6.59	0.07	0.03	0.73	0.88
PtRPBFNOMinS26	0.23	0.09	2.91	3.38	0.04	0.02	0.54	0.55
PtRPBFNOMinS30	0.16	0.06	2.30	2.35	0.06	0.02	0.86	0.76

Table K-9 (cont.): Average values for above- and below-ground and for whole biomass were computed and standard errors were estimated for all tree-treatments. This table shows the 6 months values.

Average 6 months (AGB)	Weight	Corrected Weight	Ca mg	Corrected Ca mg	Ca mg/g	Ca umol	K mg	Corrected K mg	Kmg/g	K umol
StRPBact	0.08	0.08	0.29	0.29	3.86	7.27	0.19	0.19	2.48	4.77
PtRPBact	0.08	0.08	0.24	0.24	2.98	5.95	0.14	0.14	1.73	3.66
StRPBactFung	0.08	0.08	0.26	0.26	3.10	6.60	0.23	0.23	2.87	5.93
PtRPBactFung	0.08	0.08	0.30	0.30	4.02	7.48	0.20	0.20	2.65	5.24
StRPBFNOHoag	0.05	0.05	0.16	0.16	3.10	3.93	0.12	0.12	2.29	2.96
PtRPBFNOHoag	0.06	0.06	0.18	0.18	3.31	4.45	0.11	0.11	2.03	2.80
StRPBFNOMin	0.03	0.03	0.01	0.01	0.45	0.33	0.04	0.04	1.45	1.02
PtRPBFNOMin	0.04	0.04	0.02	0.02	0.42	0.39	0.07	0.07	1.98	1.87
Average 6 months (BGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.18	0.14	0.80	0.61	4.40	15.29	1.13	0.87	6.22	22.17
PtRPBact	0.20	0.15	1.00	0.71	4.83	10.89	0.97	0.69	4.74	17.64
StRPBactFung	0.16	0.08	0.80	0.40	5.15	9.86	0.92	0.46	5.99	11.73
PtRPBactFung	0.19	0.14	0.81	0.59	4.18	14.72	1.23	0.90	6.32	22.91
StRPBFNOHoag	0.08	0.06	0.35	0.23	4.26	5.85	0.53	0.36	6.47	9.15
PtRPBFNOHoag	0.10	0.08	0.50	0.36	4.67	8.87	0.73	0.53	6.98	13.47
StRPBFNOMin	0.07	0.05	0.03	0.02	0.46	0.51	0.10	0.07	1.56	1.79
PtRPBFNOMin	0.08	0.03	0.02	0.01	0.30	0.24	0.13	0.05	1.53	1.25
Average Biomass 6 months Whole plant	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.26	0.21	1.09	0.90	8.26	22.57	1.32	1.05	8.70	26.94
PtRPBact	0.29	0.23	1.23	0.95	7.81	16.85	1.11	0.83	6.48	21.29
StRPBactFung	0.24	0.16	1.06	0.66	8.25	16.46	1.16	0.69	8.86	17.66
PtRPBactFung	0.27	0.22	1.11	0.89	8.20	22.19	1.43	1.10	8.97	28.15
StRPBFNOHoag	0.13	0.11	0.50	0.39	7.36	9.78	0.65	0.47	8.76	12.11
PtRPBFNOHoag	0.16	0.13	0.67	0.53	7.98	13.31	0.84	0.64	9.00	16.27
StRPBFNOMin	0.09	0.07	0.04	0.03	0.91	0.84	0.14	0.11	3.01	2.82
PtRPBFNOMin	0.12	0.07	0.04	0.03	0.72	0.63	0.20	0.12	3.51	3.13
STE 6 months (AGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.00	0.00	0.03	0.03	0.38	0.70	0.01	0.01	0.17	0.26
PtRPBact	0.01	0.01	0.02	0.02	0.37	0.58	0.02	0.02	0.13	0.41
StRPBactFung	0.01	0.01	0.06	0.06	0.25	1.45	0.03	0.03	0.18	0.81
PtRPBactFung	0.01	0.01	0.04	0.04	0.66	1.11	0.02	0.02	0.13	0.59
StRPBFNOHoag	0.00	0.00	0.01	0.01	0.15	0.34	0.01	0.01	0.17	0.24
PtRPBFNOHoag	0.00	0.00	0.01	0.01	0.33	0.32	0.01	0.01	0.18	0.13
StRPBFNOMin	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.00	0.11	0.07
PtRPBFNOMin	0.00	0.00	0.00	0.00	0.04	0.04	0.01	0.01	0.28	0.26
STE 6 months (BGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.01	0.01	0.06	0.05	0.16	1.13	0.09	0.07	0.28	1.78
PtRPBact	0.01	0.00	0.39	0.28	1.79	1.32	0.10	0.07	0.49	1.91
StRPBactFung	0.02	0.01	0.09	0.05	0.33	1.14	0.09	0.05	0.19	1.15
PtRPBactFung	0.01	0.01	0.05	0.04	0.20	0.88	0.13	0.09	0.43	2.38
StRPBFNOHoag	0.01	0.00	0.04	0.03	0.52	0.72	0.08	0.05	0.82	1.37
PtRPBFNOHoag	0.00	0.00	0.08	0.06	0.60	1.49	0.06	0.04	0.22	1.01
StRPBFNOMin	0.01	0.01	0.00	0.00	0.06	0.05	0.01	0.01	0.21	0.19
PtRPBFNOMin	0.01	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.15	0.15
STE 6 months whole plant	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.01	0.01	0.09	0.07	0.54	1.83	0.10	0.08	0.45	2.04
PtRPBact	0.01	0.01	0.41	0.30	2.16	1.90	0.12	0.09	0.62	2.32
StRPBactFung	0.03	0.02	0.15	0.10	0.58	2.59	0.12	0.08	0.37	1.96
PtRPBactFung	0.02	0.01	0.09	0.08	0.86	1.99	0.15	0.12	0.55	2.97
StRPBFNOHoag	0.01	0.01	0.06	0.04	0.68	1.06	0.09	0.06	0.98	1.62
PtRPBFNOHoag	0.01	0.01	0.10	0.07	0.94	1.81	0.06	0.04	0.40	1.15
StRPBFNOMin	0.01	0.01	0.00	0.00	0.09	0.10	0.01	0.01	0.32	0.26
PtRPBFNOMin	0.01	0.01	0.00	0.00	0.04	0.06	0.03	0.02	0.43	0.41

Table K-9 (cont.): Average values for above- and below-ground and for whole biomass were computed and standard errors were estimated for all tree-treatments. This table shows the 6 months values.

Average 6 months (AGB)	Mg mg	Corrected Mg mg	Mg mg/g	Mg umol	Fe mg	Corrected Fe mg	Fe mg/g	Fe umol
StRPBact	0.06	0.06	0.86	2.67	0.02	0.02	0.22	0.29
PtRPBact	0.05	0.05	0.66	2.22	0.01	0.01	0.09	0.13
StRPBactFung	0.06	0.06	0.70	2.39	0.01	0.01	0.09	0.13
PtRPBactFung	0.06	0.06	0.75	2.36	0.01	0.01	0.10	0.13
StRPBFNOHoag	0.03	0.03	0.68	1.42	0.01	0.01	0.10	0.09
PtRPBFNOHoag	0.04	0.04	0.78	1.75	0.01	0.01	0.10	0.10
StRPBFNOMin	0.02	0.02	0.68	0.79	0.00	0.00	0.12	0.06
PtRPBFNOMin	0.02	0.02	0.56	0.86	0.00	0.00	0.09	0.06
Average 6 months (BGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	1.04	0.79	5.68	32.69	1.36	1.05	7.48	18.69
PtRPBact	0.98	0.70	4.80	28.85	1.32	0.94	6.45	16.85
StRPBactFung	0.87	0.43	5.68	17.68	1.17	0.58	7.68	10.41
PtRPBactFung	1.06	0.78	5.45	31.94	1.39	1.02	7.16	18.19
StRPBFNOHoag	0.47	0.32	5.76	13.13	0.65	0.44	7.90	7.82
PtRPBFNOHoag	0.59	0.43	5.61	17.53	0.80	0.57	7.55	10.24
StRPBFNOMin	0.03	0.02	0.42	0.79	0.15	0.11	2.27	1.92
PtRPBFNOMin	0.03	0.01	0.30	0.40	0.04	0.02	0.45	0.28
Average Biomass 6 months Whole plant	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	1.10	0.86	6.54	35.36	1.38	1.06	7.70	18.98
PtRPBact	1.04	0.75	5.45	31.07	1.33	0.95	6.54	16.98
StRPBactFung	0.92	0.49	6.38	20.07	1.18	0.59	7.77	10.53
PtRPBactFung	1.12	0.83	6.20	34.29	1.40	1.03	7.25	18.32
StRPBFNOHoag	0.51	0.35	6.43	14.55	0.65	0.44	8.01	7.91
PtRPBFNOHoag	0.64	0.47	6.39	19.28	0.80	0.58	7.65	10.33
StRPBFNOMin	0.05	0.04	1.10	1.58	0.16	0.11	2.39	1.98
PtRPBFNOMin	0.05	0.03	0.86	1.26	0.04	0.02	0.54	0.34
STE 6 months (AGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	0.00	0.00	0.06	0.13	0.00	0.00	0.06	0.07
PtRPBact	0.01	0.01	0.08	0.35	0.00	0.00	0.03	0.05
StRPBactFung	0.01	0.01	0.04	0.39	0.00	0.00	0.01	0.02
PtRPBactFung	0.00	0.00	0.06	0.20	0.00	0.00	0.01	0.00
StRPBFNOHoag	0.00	0.00	0.04	0.14	0.00	0.00	0.01	0.01
PtRPBFNOHoag	0.00	0.00	0.06	0.11	0.00	0.00	0.02	0.01
StRPBFNOMin	0.00	0.00	0.06	0.11	0.00	0.00	0.03	0.02
PtRPBFNOMin	0.00	0.00	0.01	0.04	0.00	0.00	0.01	0.01
STE 6 months (BGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	0.14	0.11	0.57	4.40	0.20	0.15	0.82	2.70
PtRPBact	0.23	0.17	1.07	6.89	0.32	0.23	1.44	4.03
StRPBactFung	0.09	0.04	0.62	1.75	0.11	0.05	0.67	0.95
PtRPBactFung	0.18	0.13	0.67	5.27	0.23	0.17	0.90	3.01
StRPBFNOHoag	0.09	0.06	0.92	2.40	0.11	0.07	1.19	1.34
PtRPBFNOHoag	0.08	0.06	0.56	2.43	0.11	0.08	0.78	1.46
StRPBFNOMin	0.01	0.00	0.06	0.14	0.11	0.07	1.38	1.32
PtRPBFNOMin	0.00	0.00	0.01	0.04	0.02	0.01	0.16	0.12
STE 6 months whole plant	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	0.14	0.11	0.63	4.52	0.20	0.15	0.88	2.76
PtRPBact	0.24	0.18	1.15	7.24	0.32	0.23	1.47	4.08
StRPBactFung	0.09	0.05	0.66	2.13	0.11	0.05	0.68	0.96
PtRPBactFung	0.18	0.13	0.73	5.47	0.23	0.17	0.91	3.01
StRPBFNOHoag	0.09	0.06	0.96	2.54	0.11	0.08	1.20	1.34
PtRPBFNOHoag	0.09	0.06	0.61	2.54	0.11	0.08	0.80	1.47
StRPBFNOMin	0.01	0.01	0.12	0.25	0.11	0.08	1.41	1.34
PtRPBFNOMin	0.00	0.00	0.02	0.09	0.02	0.01	0.17	0.13

Table K-9 (cont.): Average values for above- and below-ground and for whole biomass were computed and standard errors were estimated for all tree-treatments. This table shows the 6 months values.

Average 6 months (AGB)	Al mg	Corrected Al mg	Al mg/g	Al umol	P mg	Corrected P mg	P mg/g	P umol
StRPBact	0.05	0.05	0.63	1.74	0.04	0.04	0.48	1.16
PtRPBact	0.01	0.01	0.09	0.27	0.03	0.03	0.33	0.87
StRPBactFung	0.02	0.02	0.27	0.76	0.04	0.04	0.56	1.40
PtRPBactFung	0.03	0.03	0.35	0.97	0.04	0.04	0.57	1.44
StRPBFNOHoag	0.01	0.01	0.21	0.40	0.02	0.02	0.42	0.70
PtRPBFNOHoag	0.02	0.02	0.35	0.69	0.02	0.02	0.43	0.75
StRPBFNOMin	0.01	0.01	0.32	0.34	0.02	0.02	0.88	0.77
PtRPBFNOMin	0.01	0.01	0.26	0.36	0.03	0.03	0.68	0.82
Average 6 months (BGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	1.31	1.00	7.18	37.14	0.07	0.05	0.39	1.74
PtRPBact	1.52	1.09	7.36	40.24	0.07	0.05	0.34	1.62
StRPBactFung	1.30	0.65	8.42	23.94	0.06	0.03	0.39	0.97
PtRPBactFung	1.33	0.97	6.81	35.91	0.11	0.08	0.59	2.66
StRPBFNOHoag	0.56	0.38	6.87	13.99	0.03	0.02	0.39	0.71
PtRPBFNOHoag	0.84	0.60	7.90	22.28	0.05	0.03	0.47	1.12
StRPBFNOMin	0.22	0.16	3.49	5.76	0.06	0.04	0.83	1.24
PtRPBFNOMin	0.28	0.11	3.31	4.11	0.06	0.02	0.71	0.73
Average Biomass 6 months Whole plant	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	1.35	1.05	7.81	38.88	0.11	0.09	0.87	2.91
PtRPBact	1.53	1.09	7.44	40.50	0.10	0.08	0.68	2.49
StRPBactFung	1.32	0.67	8.69	24.70	0.10	0.07	0.95	2.37
PtRPBactFung	1.35	1.00	7.17	36.88	0.16	0.13	1.16	4.09
StRPBFNOHoag	0.57	0.39	7.09	14.39	0.05	0.04	0.82	1.40
PtRPBFNOHoag	0.86	0.62	8.25	22.97	0.07	0.06	0.89	1.87
StRPBFNOMin	0.23	0.16	3.81	6.10	0.08	0.06	1.71	2.01
PtRPBFNOMin	0.29	0.12	3.57	4.47	0.08	0.05	1.39	1.55
STE 6 months (AGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	0.01	0.01	0.11	0.24	0.00	0.00	0.02	0.06
PtRPBact	0.00	0.00	0.02	0.07	0.00	0.00	0.03	0.09
StRPBactFung	0.00	0.00	0.04	0.08	0.01	0.01	0.08	0.18
PtRPBactFung	0.00	0.00	0.04	0.04	0.01	0.01	0.06	0.25
StRPBFNOHoag	0.00	0.00	0.02	0.05	0.00	0.00	0.04	0.08
PtRPBFNOHoag	0.00	0.00	0.04	0.05	0.00	0.00	0.04	0.04
StRPBFNOMin	0.00	0.00	0.04	0.07	0.00	0.00	0.12	0.05
PtRPBFNOMin	0.00	0.00	0.04	0.07	0.00	0.00	0.05	0.07
STE 6 months (BGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	0.14	0.11	0.51	4.03	0.00	0.00	0.00	0.08
PtRPBact	0.65	0.47	3.03	17.28	0.00	0.00	0.01	0.05
StRPBactFung	0.15	0.07	0.51	2.78	0.01	0.00	0.01	0.11
PtRPBactFung	0.18	0.13	0.62	4.89	0.01	0.01	0.07	0.19
StRPBFNOHoag	0.08	0.05	1.00	1.96	0.01	0.00	0.05	0.12
PtRPBFNOHoag	0.14	0.10	1.05	3.83	0.00	0.00	0.03	0.05
StRPBFNOMin	0.09	0.06	1.31	2.34	0.01	0.01	0.03	0.18
PtRPBFNOMin	0.09	0.03	0.73	1.28	0.01	0.00	0.09	0.10
STE 6 months whole plant	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	0.15	0.12	0.62	4.26	0.01	0.00	0.03	0.14
PtRPBact	0.66	0.47	3.05	17.35	0.00	0.00	0.04	0.14
StRPBactFung	0.15	0.08	0.55	2.86	0.01	0.01	0.09	0.28
PtRPBactFung	0.18	0.13	0.66	4.93	0.02	0.01	0.13	0.44
StRPBFNOHoag	0.08	0.05	1.03	2.01	0.01	0.01	0.08	0.20
PtRPBFNOHoag	0.15	0.10	1.09	3.88	0.00	0.00	0.07	0.09
StRPBFNOMin	0.09	0.07	1.35	2.41	0.01	0.01	0.15	0.24
PtRPBFNOMin	0.09	0.04	0.76	1.35	0.01	0.01	0.14	0.17

Table K-9 (cont.): Cation concentration of tree-biomass (mg of cation/ g of soil) and the total cation amount in tree-biomass (µmol) at 9 months. Above-ground and below-ground biomass were measured separately, dry weight and corrected dry weight are listed.

Aboveground Biomass 9 months (AGB)	Weight	Corrected Weight	Ca mg	Corrected Ca mg	Ca mg/g	Ca umol	K mg	Corrected K mg	Kmg/g	K umol
StRPBactS1	0.0927	0.0927	0.39	0.39	4.15	9.61	0.24	0.24	2.58	6.11
StRPBactS5	0.0762	0.0762	0.29	0.29	3.80	7.23	0.23	0.23	3.07	5.98
StRPBactS8	0.1410	0.1410	0.75	0.75	5.34	18.80	0.35	0.35	2.49	8.97
StRPBactS11	0.1283	0.1283	0.54	0.54	4.20	13.43	0.32	0.32	2.50	8.21
StRPBactS14	0.1405	0.1405	0.58	0.58	4.11	14.40	0.45	0.45	3.18	11.42
PtRPBactS20	0.1094	0.1094	0.37	0.37	3.36	9.18	0.23	0.23	2.06	5.77
PtRPBactS21	0.1415	0.1415	0.82	0.82	5.82	20.56	0.25	0.25	1.73	6.27
PtRPBactS23	0.0560	0.0560	0.20	0.20	3.66	5.11	0.12	0.12	2.13	3.06
PtRPBactS28	0.1320	0.1320	0.59	0.59	4.45	14.67	0.34	0.34	2.61	8.82
PtRPBactS30	0.0895	0.0895	0.51	0.51	5.66	12.64	0.24	0.24	2.73	6.26
StRPBactFungS2	0.1317	0.1317	0.45	0.45	3.42	11.23	0.48	0.48	3.63	12.22
StRPBactFungS4	0.0880	0.0880	0.30	0.30	3.40	7.48	0.34	0.34	3.83	8.62
StRPBactFungS7	0.0840	0.0840	0.28	0.28	3.39	7.11	0.21	0.21	2.54	5.45
StRPBactFungS8	0.0720	0.0720	0.26	0.26	3.60	6.46	0.20	0.20	2.82	5.19
StRPBactFungS11	0.0873	0.0873	0.27	0.27	3.06	6.66	0.38	0.38	4.39	9.81
PtRPBactFungS16	0.1260	0.1260	0.62	0.62	4.88	15.35	0.40	0.40	3.19	10.27
PtRPBactFungS19	0.1090	0.1090	0.42	0.42	3.82	10.39	0.30	0.30	2.80	7.79
PtRPBactFungS21	0.1068	0.1068	0.37	0.37	3.42	9.12	0.21	0.21	1.96	5.35
PtRPBactFungS23	0.0835	0.0835	0.43	0.43	5.15	10.72	0.28	0.28	3.30	7.05
PtRPBactFungS25	0.0980	0.0980	0.34	0.34	3.48	8.52	0.32	0.32	3.24	8.11
StRPBFNOHoagS4	0.0480	0.0480	0.11	0.11	2.23	2.67	0.06	0.06	1.31	1.61
StRPBFNOHoagS5	0.0550	0.0550	0.13	0.13	2.45	3.36	0.09	0.09	1.69	2.37
StRPBFNOHoagS7	0.0990	0.0990	0.30	0.30	3.07	7.57	0.15	0.15	1.52	3.86
StRPBFNOHoagS10	0.0640	0.0640	0.22	0.22	3.51	5.61	0.13	0.13	2.04	3.34
StRPBFNOHoagS12	0.0576	0.0576	0.18	0.18	3.12	4.48	0.09	0.09	1.53	2.26
PtRPBFNOHoagS21	0.0407	0.0407	0.12	0.12	3.04	3.09	0.07	0.07	1.71	1.78
PtRPBFNOHoagS24	0.0380	0.0380	0.10	0.10	2.66	2.52	0.04	0.04	1.01	0.98
PtRPBFNOHoagS26	0.0404	0.0404	0.15	0.15	3.83	3.86	0.04	0.04	1.11	1.15
PtRPBFNOHoagS29	0.0493	0.0493	0.17	0.17	3.40	4.18	0.05	0.05	0.97	1.23
PtRPBFNOHoagS30	0.0399	0.0399	0.19	0.19	4.77	4.75	0.05	0.05	1.16	1.18
StRPBFNOMinS1	0.0565	0.0565	0.01	0.01	0.24	0.34	0.03	0.03	0.56	0.81
StRPBFNOMinS4	0.0660	0.0660	0.03	0.03	0.50	0.82	0.07	0.07	1.10	1.85
StRPBFNOMinS7	0.0550	0.0550	0.02	0.02	0.30	0.41	0.06	0.06	1.10	1.55
StRPBFNOMinS10	0.0590	0.0590	0.03	0.03	0.44	0.65	0.06	0.06	1.03	1.56
StRPBFNOMinS12	0.0416	0.0416	0.02	0.02	0.42	0.44	0.04	0.04	0.86	0.91
PtRPBFNOMinS17	0.0503	0.0503	0.03	0.03	0.53	0.66	0.07	0.07	1.32	1.69
PtRPBFNOMinS19	0.0435	0.0435	0.02	0.02	0.41	0.45	0.04	0.04	0.93	1.03
PtRPBFNOMinS22	0.0814	0.0814	0.04	0.04	0.46	0.94	0.13	0.13	1.58	3.30
PtRPBFNOMinS24	0.0573	0.0573	0.02	0.02	0.31	0.44	0.07	0.07	1.23	1.80
PtRPBFNOMinS25	0.0409	0.0409	0.01	0.01	0.31	0.32	0.03	0.03	0.73	0.76
Belowground Biomass 9 months (BGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBactS1	0.2800	0.1660	5.43	3.22	19.40	80.37	3.38	2.01	12.09	51.32
StRPBactS11	0.3000	0.1779	0.72	0.42	2.39	10.60	1.47	0.87	4.90	22.27
StRPBactS14	0.3350	0.1987	5.24	3.11	15.63	77.47	3.32	1.97	9.92	50.42
PtRPBactS21	0.2750	0.1463	1.04	0.55	3.78	13.81	1.55	0.82	5.64	21.10
PtRPBactS28	0.3093	0.1645	0.52	0.28	1.69	6.93	0.96	0.51	3.11	13.11
PtRPBactS30	0.3150	0.1676	4.59	2.44	14.57	60.90	2.78	1.48	8.82	37.82
StRPBactFungS4	0.2550	0.1645	1.80	1.16	7.07	29.00	1.62	1.04	6.34	26.67
StRPBactFungS7	0.1950	0.1258	0.67	0.43	3.44	10.78	0.88	0.57	4.53	14.58
StRPBactFungS11	0.2180	0.1406	5.16	3.33	23.69	83.12	3.25	2.09	14.89	53.54
PtRPBactFungS19	0.2260	0.1370	0.78	0.48	3.47	11.86	0.98	0.59	4.32	15.12
PtRPBactFungS21	0.7210	0.4369	1.82	1.11	2.53	27.59	3.78	2.29	5.24	58.60
PtRPBactFungS25	0.2780	0.1685	6.05	3.66	21.75	91.43	2.78	1.68	9.99	43.04
StRPBFNOHoagS4	0.1016	0.0804	2.26	1.79	22.25	44.62	0.93	0.74	9.15	18.80
StRPBFNOHoagS5	0.1410	0.1115	0.64	0.51	4.54	12.65	0.73	0.58	5.18	14.79
StRPBFNOHoagS12	0.1360	0.1076	0.29	0.23	2.11	5.65	0.41	0.32	3.00	8.26
PtRPBFNOHoagS24	0.1065	0.0603	0.31	0.18	2.94	4.43	0.53	0.30	5.00	7.70
PtRPBFNOHoagS29	0.1266	0.0717	0.32	0.18	2.51	4.48	0.54	0.31	4.27	7.83
PtRPBFNOHoagS30	0.1189	0.0673	2.06	1.16	17.30	29.05	1.33	0.75	11.20	19.27
StRPBFNOMinS1	0.1625	0.1298	0.02	0.02	0.14	0.46	0.12	0.10	0.75	2.49
StRPBFNOMinS4	0.1504	0.1202	0.05	0.04	0.32	0.97	0.15	0.12	0.98	3.01
StRPBFNOMinS10	0.1290	0.1031	0.04	0.03	0.29	0.73	0.10	0.08	0.74	1.95
PtRPBFNOMinS17	0.2030	0.1500	0.03	0.02	0.16	0.59	0.13	0.10	0.64	2.44
PtRPBFNOMinS24	0.1580	0.1168	0.02	0.02	0.16	0.45	0.17	0.12	1.06	3.17
PtRPBFNOMinS25	0.1470	0.1086	0.03	0.02	0.22	0.61	0.18	0.13	1.20	3.34

Table K-9 (cont.): Cation concentration of tree-biomass (mg of cation/ g of soil) and the total cation amount in tree-biomass (μmol) at 9 months. Above-ground and below-ground biomass were measured separately.

Aboveground Biomass 9 months (AGB)	Mg mg	Corrected Mg mg	Mg mg/g	Mg umol	Fe mg	Corrected Fe mg	Fe mg/g	Fe umol
StRPBactS1	0.08	0.08	0.81	3.11	0.01	0.01	0.16	0.27
StRPBactS5	0.08	0.08	1.02	3.21	0.01	0.01	0.12	0.17
StRPBactS8	0.09	0.09	0.63	3.67	0.02	0.02	0.11	0.28
StRPBactS11	0.10	0.10	0.82	4.31	0.02	0.02	0.17	0.39
StRPBactS14	0.12	0.12	0.82	4.75	0.01	0.01	0.10	0.26
PtRPBactS20	0.08	0.08	0.69	3.10	0.02	0.02	0.23	0.45
PtRPBactS21	0.08	0.08	0.57	3.30	0.02	0.02	0.11	0.28
PtRPBactS23	0.05	0.05	0.91	2.09	0.02	0.02	0.40	0.40
PtRPBactS28	0.09	0.09	0.68	3.70	0.02	0.02	0.11	0.27
PtRPBactS30	0.08	0.08	0.87	3.22	0.04	0.04	0.44	0.71
StRPBactFungS2	0.12	0.12	0.92	4.98	0.02	0.02	0.11	0.27
StRPBactFungS4	0.09	0.09	1.05	3.82	0.04	0.04	0.41	0.64
StRPBactFungS7	0.06	0.06	0.74	2.55	0.03	0.03	0.40	0.60
StRPBactFungS8	0.06	0.06	0.89	2.63	0.02	0.02	0.25	0.33
StRPBactFungS11	0.10	0.10	1.09	3.91	0.05	0.05	0.62	0.97
PtRPBactFungS16	0.07	0.07	0.52	2.70	0.00	0.00	0.04	0.08
PtRPBactFungS19	0.07	0.07	0.61	2.73	0.02	0.02	0.21	0.41
PtRPBactFungS21	0.06	0.06	0.52	2.28	0.02	0.02	0.16	0.30
PtRPBactFungS23	0.07	0.07	0.78	2.69	0.02	0.02	0.20	0.30
PtRPBactFungS25	0.10	0.10	0.98	3.94	0.06	0.06	0.60	1.06
StRPBFNOHoagS4	0.03	0.03	0.71	1.40	0.00	0.00	0.03	0.03
StRPBFNOHoagS5	0.04	0.04	0.73	1.65	0.00	0.00	0.02	0.02
StRPBFNOHoagS7	0.07	0.07	0.69	2.83	0.01	0.01	0.07	0.13
StRPBFNOHoagS10	0.04	0.04	0.68	1.79	0.00	0.00	0.08	0.09
StRPBFNOHoagS12	0.04	0.04	0.69	1.63	0.00	0.00	0.04	0.04
PtRPBFNOHoagS21	0.03	0.03	0.82	1.37	0.01	0.01	0.13	0.10
PtRPBFNOHoagS24	0.03	0.03	0.78	1.23	0.00	0.00	0.07	0.05
PtRPBFNOHoagS26	0.02	0.02	0.59	0.98	0.00	0.00	0.07	0.05
PtRPBFNOHoagS29	0.03	0.03	0.59	1.20	0.00	0.00	0.06	0.06
PtRPBFNOHoagS30	0.03	0.03	0.67	1.09	0.00	0.00	0.06	0.04
StRPBFNOMinS1	0.02	0.02	0.34	0.80	0.00	0.00	0.01	0.01
StRPBFNOMinS4	0.03	0.03	0.40	1.08	0.00	0.00	0.03	0.03
StRPBFNOMinS7	0.03	0.03	0.46	1.05	0.00	0.00	0.03	0.03
StRPBFNOMinS10	0.03	0.03	0.55	1.33	0.00	0.00	0.03	0.03
StRPBFNOMinS12	0.02	0.02	0.42	0.72	0.00	0.00	0.02	0.01
PtRPBFNOMinS17	0.03	0.03	0.52	1.08	0.00	0.00	0.03	0.03
PtRPBFNOMinS19	0.02	0.02	0.42	0.74	0.00	0.00	0.02	0.02
PtRPBFNOMinS22	0.03	0.03	0.40	1.35	0.00	0.00	0.03	0.05
PtRPBFNOMinS24	0.03	0.03	0.48	1.13	0.00	0.00	0.03	0.03
PtRPBFNOMinS25	0.01	0.01	0.36	0.61	0.00	0.00	0.02	0.01
Belowground Biomass 9 months (BGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBactS1	4.60	2.73	16.43	112.24	5.09	3.02	18.19	53.93
StRPBactS11	0.87	0.52	2.91	21.30	0.94	0.56	3.14	9.98
StRPBactS14	4.43	2.63	13.21	108.03	4.73	2.80	14.11	50.06
PtRPBactS21	0.97	0.52	3.54	21.29	1.05	0.56	3.82	9.97
PtRPBactS28	0.47	0.25	1.51	10.25	0.52	0.27	1.67	4.90
PtRPBactS30	3.50	1.86	11.11	76.61	3.87	2.06	12.27	36.72
StRPBactFungS4	1.79	1.15	7.00	47.41	1.98	1.28	7.77	22.83
StRPBactFungS7	0.63	0.41	3.23	16.73	0.67	0.43	3.44	7.73
StRPBactFungS11	5.32	3.43	24.41	141.27	5.40	3.48	24.76	62.17
PtRPBactFungS19	0.74	0.45	3.28	18.51	0.79	0.48	3.48	8.52
PtRPBactFungS21	3.42	2.07	4.74	85.23	4.08	2.47	5.65	44.10
PtRPBactFungS25	4.10	2.49	14.76	102.29	4.18	2.53	15.04	45.26
StRPBFNOHoagS4	1.51	1.20	14.91	49.31	1.65	1.30	16.23	23.29
StRPBFNOHoagS5	0.67	0.53	4.78	21.93	0.76	0.60	5.41	10.78
StRPBFNOHoagS12	0.27	0.21	1.99	8.79	0.34	0.27	2.48	4.77
PtRPBFNOHoagS24	0.35	0.20	3.31	8.21	0.46	0.26	4.31	4.64
PtRPBFNOHoagS29	0.30	0.17	2.33	6.88	0.35	0.20	2.73	3.49
PtRPBFNOHoagS30	1.60	0.91	13.47	37.30	2.07	1.17	17.37	20.88
StRPBFNOMinS1	0.03	0.03	0.20	1.09	0.03	0.02	0.17	0.40
StRPBFNOMinS4	0.06	0.05	0.40	1.96	0.11	0.09	0.74	1.59
StRPBFNOMinS10	0.04	0.04	0.35	1.46	0.02	0.02	0.19	0.34
PtRPBFNOMinS17	0.04	0.03	0.20	1.25	0.03	0.02	0.14	0.37
PtRPBFNOMinS24	0.04	0.03	0.25	1.22	0.02	0.02	0.13	0.27
PtRPBFNOMinS25	0.04	0.03	0.26	1.14	0.03	0.02	0.18	0.35

Table K-9 (cont.): Cation concentration of tree-biomass (mg of cation/ g of soil) and the total cation amount in tree-biomass (µmol) at 9 months. Above-ground and below-ground biomass were measured separately.

Aboveground Biomass 9 months (AGB)	Al mg	Corrected Al mg	Al mg/g	Al umol	P mg	Corrected P mg	P mg/g	P umol
StRPBactS1	0.03	0.03	0.29	0.98	0.04	0.04	0.39	1.18
StRPBactS5	0.02	0.02	0.28	0.78	0.03	0.03	0.39	0.97
StRPBactS8	0.04	0.04	0.30	1.56	0.07	0.07	0.53	2.41
StRPBactS11	0.04	0.04	0.29	1.36	0.05	0.05	0.38	1.59
StRPBactS14	0.03	0.03	0.22	1.16	0.06	0.06	0.45	2.04
PtRPBactS20	0.04	0.04	0.38	1.54	0.05	0.05	0.41	1.45
PtRPBactS21	0.03	0.03	0.20	1.07	0.06	0.06	0.44	1.99
PtRPBactS23	0.04	0.04	0.69	1.42	0.02	0.02	0.33	0.59
PtRPBactS28	0.04	0.04	0.32	1.58	0.06	0.06	0.42	1.78
PtRPBactS30	0.06	0.06	0.71	2.37	0.03	0.03	0.37	1.06
StRPBactFungS2	0.06	0.06	0.49	2.38	0.08	0.08	0.59	2.50
StRPBactFungS4	0.12	0.12	1.39	4.53	0.06	0.06	0.68	1.92
StRPBactFungS7	0.12	0.12	1.39	4.34	0.04	0.04	0.43	1.15
StRPBactFungS8	0.05	0.05	0.63	1.69	0.03	0.03	0.47	1.08
StRPBactFungS11	0.15	0.15	1.69	5.48	0.05	0.05	0.58	1.62
PtRPBactFungS16	0.01	0.01	0.11	0.50	0.07	0.07	0.52	2.12
PtRPBactFungS19	0.04	0.04	0.35	1.42	0.05	0.05	0.45	1.57
PtRPBactFungS21	0.02	0.02	0.19	0.76	0.04	0.04	0.35	1.22
PtRPBactFungS23	0.07	0.07	0.84	2.61	0.04	0.04	0.48	1.30
PtRPBactFungS25	0.11	0.11	1.14	4.15	0.04	0.04	0.41	1.30
StRPBFNOHoagS4	0.01	0.01	0.18	0.32	0.01	0.01	0.25	0.39
StRPBFNOHoagS5	0.01	0.01	0.10	0.20	0.02	0.02	0.30	0.54
StRPBFNOHoagS7	0.01	0.01	0.08	0.29	0.04	0.04	0.38	1.22
StRPBFNOHoagS10	0.01	0.01	0.13	0.30	0.02	0.02	0.31	0.65
StRPBFNOHoagS12	0.01	0.01	0.09	0.19	0.01	0.01	0.23	0.44
PtRPBFNOHoagS21	0.01	0.01	0.32	0.48	0.01	0.01	0.34	0.45
PtRPBFNOHoagS24	0.01	0.01	0.20	0.28	0.01	0.01	0.30	0.36
PtRPBFNOHoagS26	0.01	0.01	0.14	0.21	0.01	0.01	0.24	0.31
PtRPBFNOHoagS29	0.01	0.01	0.13	0.24	0.01	0.01	0.25	0.40
PtRPBFNOHoagS30	0.01	0.01	0.17	0.25	0.01	0.01	0.28	0.35
StRPBFNOMinS1	0.01	0.01	0.10	0.20	0.02	0.02	0.36	0.65
StRPBFNOMinS4	0.01	0.01	0.14	0.35	0.03	0.03	0.47	1.00
StRPBFNOMinS7	0.01	0.01	0.16	0.34	0.02	0.02	0.42	0.75
StRPBFNOMinS10	0.01	0.01	0.12	0.25	0.04	0.04	0.59	1.13
StRPBFNOMinS12	0.01	0.01	0.12	0.19	0.02	0.02	0.53	0.71
PtRPBFNOMinS17	0.01	0.01	0.28	0.51	0.03	0.03	0.67	1.08
PtRPBFNOMinS19	0.01	0.01	0.25	0.40	0.02	0.02	0.44	0.61
PtRPBFNOMinS22	0.02	0.02	0.21	0.62	0.05	0.05	0.58	1.51
PtRPBFNOMinS24	0.01	0.01	0.14	0.30	0.03	0.03	0.53	0.98
PtRPBFNOMinS25	0.00	0.00	0.11	0.17	0.01	0.01	0.26	0.34
Belowground Biomass 9 months (BGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBactS1	8.90	5.28	31.79	195.53	0.12	0.07	0.41	2.22
StRPBactS11	0.89	0.53	2.97	19.56	0.12	0.07	0.42	2.38
StRPBactS14	7.85	4.66	23.43	172.41	0.13	0.07	0.38	2.41
PtRPBactS21	1.19	0.63	4.32	23.42	0.13	0.07	0.48	2.24
PtRPBactS28	0.47	0.25	1.51	9.22	0.11	0.06	0.34	1.81
PtRPBactS30	6.74	3.58	21.38	132.70	0.11	0.06	0.33	1.80
StRPBactFungS4	2.50	1.61	9.80	59.67	0.09	0.05	0.33	1.77
StRPBactFungS7	0.70	0.45	3.60	16.76	0.07	0.04	0.36	1.45
StRPBactFungS11	11.75	7.58	53.89	280.63	0.09	0.06	0.43	1.94
PtRPBactFungS19	0.94	0.57	4.18	21.18	0.09	0.05	0.40	1.76
PtRPBactFungS21	3.54	2.15	4.91	79.51	0.16	0.10	0.22	3.07
PtRPBactFungS25	8.95	5.42	32.19	200.82	0.14	0.09	0.51	2.76
StRPBFNOHoagS4	3.24	2.56	31.89	94.92	0.03	0.03	0.33	0.87
StRPBFNOHoagS5	0.82	0.65	5.82	24.06	0.04	0.03	0.31	1.11
StRPBFNOHoagS12	0.41	0.32	3.01	12.01	0.03	0.02	0.23	0.79
PtRPBFNOHoagS24	0.44	0.25	4.10	9.15	0.05	0.03	0.47	0.91
PtRPBFNOHoagS29	0.40	0.22	3.13	8.30	0.06	0.03	0.44	1.03
PtRPBFNOHoagS30	3.56	2.02	29.96	74.68	0.05	0.03	0.45	0.97
StRPBFNOMinS1	0.14	0.11	0.87	4.17	0.06	0.05	0.37	1.56
StRPBFNOMinS4	0.22	0.18	1.46	6.49	0.08	0.07	0.55	2.13
StRPBFNOMinS10	0.09	0.07	0.70	2.66	0.08	0.06	0.60	2.00
PtRPBFNOMinS17	0.10	0.08	0.51	2.85	0.10	0.08	0.51	2.48
PtRPBFNOMinS24	0.14	0.10	0.87	3.75	0.10	0.07	0.63	2.36
PtRPBFNOMinS25	0.09	0.07	0.64	2.58	0.07	0.05	0.46	1.63

Table K-9 (cont.): Average values for above- and below-ground and for whole biomass were computed and standard errors were estimated for all tree-treatments. This table shows the 9 months values.

Average 9 months (AGB)	Weight	Corrected Weight	Ca mg	Corrected Ca mg	Ca mg/g	Ca umol	K mg	Corrected K mg	Kmg/g	K umol
StRPBact	0.12	0.12	0.51	0.51	4.32	12.69	0.32	0.32	2.76	8.14
PtRPBact	0.11	0.11	0.50	0.50	4.59	12.43	0.24	0.24	2.25	6.03
StRPBactFung	0.09	0.09	0.31	0.31	3.37	7.79	0.32	0.32	3.44	8.26
PtRPBactFung	0.10	0.10	0.43	0.43	4.15	10.82	0.30	0.30	2.90	7.72
StRPBFNOHoag	0.06	0.06	0.19	0.19	2.88	4.74	0.11	0.11	1.62	2.69
PtRPBFNOHoag	0.04	0.04	0.15	0.15	3.54	3.68	0.05	0.05	1.19	1.27
StRPBFNOMin	0.06	0.06	0.02	0.02	0.38	0.53	0.05	0.05	0.93	1.34
PtRPBFNOMin	0.05	0.05	0.02	0.02	0.40	0.56	0.07	0.07	1.16	1.72
Average 9 months (BGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.31	0.18	3.79	2.25	12.47	78.92	2.73	1.62	8.97	41.34
PtRPBact	0.30	0.16	2.05	1.09	6.68	37.35	1.76	0.94	5.86	24.01
StRPBactFung	0.22	0.14	2.55	1.64	11.40	40.97	1.92	1.24	8.59	31.60
PtRPBactFung	0.41	0.25	2.89	1.75	9.25	43.63	2.51	1.52	6.52	38.92
StRPBFNOHoag	0.13	0.10	1.06	0.84	9.63	9.15	0.69	0.55	5.78	13.95
PtRPBFNOHoag	0.12	0.07	0.90	0.51	7.58	4.45	0.80	0.45	6.82	11.60
StRPBFNOMin	0.15	0.12	0.04	0.03	0.25	0.72	0.12	0.10	0.82	2.48
PtRPBFNOMin	0.17	0.13	0.03	0.02	0.18	0.55	0.16	0.12	0.97	2.98
Average 9 months Whole Plant	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.42	0.30	4.30	2.76	16.79	91.62	3.04	1.93	11.73	49.48
PtRPBact	0.41	0.27	2.55	1.59	11.27	49.79	2.00	1.17	8.11	30.04
StRPBactFung	0.32	0.24	2.86	1.95	14.77	48.75	2.24	1.56	12.03	39.86
PtRPBactFung	0.51	0.35	3.32	2.18	13.40	54.45	2.81	1.82	9.41	46.64
StRPBFNOHoag	0.19	0.16	1.25	1.03	12.51	13.89	0.79	0.65	7.40	16.64
PtRPBFNOHoag	0.16	0.11	1.04	0.65	11.12	8.13	0.85	0.50	8.02	12.87
StRPBFNOMin	0.20	0.17	0.06	0.05	0.63	1.25	0.17	0.15	1.75	3.82
PtRPBFNOMin	0.22	0.18	0.05	0.04	0.58	1.11	0.22	0.18	2.12	4.70
STE 9 months (AGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.01	0.01	0.08	0.08	0.26	2.00	0.04	0.04	0.15	1.01
PtRPBact	0.02	0.02	0.10	0.10	0.50	2.60	0.04	0.04	0.18	0.92
StRPBactFung	0.01	0.01	0.04	0.04	0.09	0.88	0.05	0.05	0.34	1.33
PtRPBactFung	0.01	0.01	0.05	0.05	0.36	1.20	0.03	0.03	0.25	0.80
StRPBFNOHoag	0.01	0.01	0.03	0.03	0.23	0.87	0.02	0.02	0.12	0.40
PtRPBFNOHoag	0.00	0.00	0.02	0.02	0.36	0.40	0.01	0.01	0.13	0.14
StRPBFNOMin	0.00	0.00	0.00	0.00	0.05	0.09	0.01	0.01	0.10	0.20
PtRPBFNOMin	0.01	0.01	0.00	0.00	0.04	0.11	0.02	0.02	0.15	0.44
STE 9 months (BGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.02	0.01	1.54	0.91	5.16	1.45	0.63	0.37	2.13	9.54
PtRPBact	0.01	0.01	1.28	0.68	3.99	23.55	0.54	0.28	1.65	7.28
StRPBactFung	0.02	0.01	1.35	0.87	6.24	21.72	0.70	0.45	3.19	11.51
PtRPBactFung	0.16	0.10	1.61	0.98	6.26	24.33	0.82	0.50	1.76	12.72
StRPBFNOHoag	0.01	0.01	0.61	0.48	6.35	3.50	0.15	0.12	1.80	3.07
PtRPBFNOHoag	0.01	0.00	0.58	0.33	4.86	0.03	0.27	0.15	2.20	3.84
StRPBFNOMin	0.01	0.01	0.01	0.01	0.06	0.15	0.02	0.01	0.08	0.31
PtRPBFNOMin	0.02	0.01	0.00	0.00	0.02	0.05	0.01	0.01	0.17	0.27
STE 9 months Whole Plant	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.03	0.02	1.62	0.99	5.42	3.45	0.67	0.41	2.28	10.54
PtRPBact	0.03	0.02	1.38	0.78	4.49	26.15	0.57	0.32	1.84	8.20
StRPBactFung	0.03	0.02	1.38	0.91	6.32	22.60	0.75	0.50	3.53	12.85
PtRPBactFung	0.16	0.10	1.66	1.02	6.62	25.53	0.85	0.53	2.01	13.52
StRPBFNOHoag	0.02	0.02	0.64	0.52	6.58	4.36	0.17	0.14	1.92	3.47
PtRPBFNOHoag	0.01	0.01	0.60	0.34	5.23	0.42	0.27	0.16	2.33	3.97
StRPBFNOMin	0.01	0.01	0.01	0.01	0.10	0.24	0.02	0.02	0.18	0.51
PtRPBFNOMin	0.02	0.02	0.01	0.01	0.07	0.16	0.03	0.03	0.32	0.72

Table K-9 (cont.): Average values for above- and below-ground and for whole biomass were computed and standard errors were estimated for all tree-treatments. This table shows the 9 months values.

Average 9 months (AGB)	Mg mg	Corrected Mg mg	Mg mg/g	Mg umol	Fe mg	Corrected Fe mg	Fe mg/g	Fe umol
StRPBact	0.09	0.09	0.82	3.81	0.02	0.02	0.13	0.27
PtRPBact	0.07	0.07	0.74	3.08	0.02	0.02	0.26	0.42
StRPBactFung	0.09	0.09	0.94	3.58	0.03	0.03	0.36	0.56
PtRPBactFung	0.07	0.07	0.68	2.87	0.02	0.02	0.24	0.43
StRPBFNOHoag	0.05	0.05	0.70	1.86	0.00	0.00	0.05	0.06
PtRPBFNOHoag	0.03	0.03	0.69	1.17	0.00	0.00	0.08	0.06
StRPBFNOMin	0.02	0.02	0.43	1.00	0.00	0.00	0.02	0.02
PtRPBFNOMin	0.02	0.02	0.44	0.98	0.00	0.00	0.03	0.03
Average 9 months (BGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	3.30	1.96	10.85	80.52	3.59	2.13	11.81	37.99
PtRPBact	1.65	0.88	5.39	36.05	1.81	0.96	5.92	17.20
StRPBactFung	2.58	1.66	11.55	68.47	2.68	1.73	11.99	30.91
PtRPBactFung	2.75	1.67	7.59	68.68	3.01	1.83	8.06	32.62
StRPBFNOHoag	0.82	0.65	7.22	26.67	0.92	0.72	8.04	12.95
PtRPBFNOHoag	0.75	0.42	6.37	17.46	0.96	0.54	8.14	9.67
StRPBFNOMin	0.05	0.04	0.32	1.50	0.05	0.04	0.37	0.78
PtRPBFNOMin	0.04	0.03	0.24	1.20	0.03	0.02	0.15	0.33
Average 9 months Whole Plant	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	3.39	2.05	11.67	84.33	3.60	2.14	11.95	38.26
PtRPBact	1.72	0.95	6.13	39.13	1.83	0.99	6.18	17.61
StRPBactFung	2.67	1.75	12.49	72.05	2.71	1.76	12.35	31.47
PtRPBactFung	2.82	1.74	8.27	71.55	3.04	1.85	8.30	33.05
StRPBFNOHoag	0.86	0.69	7.92	28.53	0.92	0.73	8.09	13.01
PtRPBFNOHoag	0.78	0.45	7.06	18.63	0.96	0.54	8.22	9.73
StRPBFNOMin	0.07	0.06	0.75	2.50	0.06	0.04	0.39	0.80
PtRPBFNOMin	0.06	0.05	0.67	2.19	0.03	0.02	0.18	0.36
STE 9 months (AGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	0.01	0.01	0.06	0.32	0.00	0.00	0.01	0.04
PtRPBact	0.01	0.01	0.06	0.27	0.00	0.00	0.07	0.08
StRPBactFung	0.01	0.01	0.06	0.45	0.01	0.01	0.08	0.13
PtRPBactFung	0.01	0.01	0.09	0.28	0.01	0.01	0.10	0.17
StRPBFNOHoag	0.01	0.01	0.01	0.25	0.00	0.00	0.01	0.02
PtRPBFNOHoag	0.00	0.00	0.05	0.07	0.00	0.00	0.01	0.01
StRPBFNOMin	0.00	0.00	0.03	0.11	0.00	0.00	0.00	0.00
PtRPBFNOMin	0.00	0.00	0.03	0.13	0.00	0.00	0.00	0.01
STE 9 months (BGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	1.21	0.72	4.08	29.64	1.33	0.79	4.49	14.05
PtRPBact	0.94	0.50	2.92	20.53	1.04	0.55	3.24	9.87
StRPBactFung	1.41	0.91	6.52	37.46	1.41	0.91	6.51	16.23
PtRPBactFung	1.03	0.62	3.61	25.56	1.11	0.68	3.55	12.06
StRPBFNOHoag	0.37	0.29	3.93	11.94	0.39	0.31	4.18	5.46
PtRPBFNOHoag	0.43	0.24	3.56	9.93	0.56	0.31	4.64	5.61
StRPBFNOMin	0.01	0.01	0.06	0.25	0.03	0.02	0.19	0.41
PtRPBFNOMin	0.00	0.00	0.02	0.03	0.00	0.00	0.02	0.03
STE 9 months Whole Plant	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	1.22	0.73	4.14	29.95	1.33	0.79	4.51	14.09
PtRPBact	0.94	0.51	2.98	20.80	1.04	0.56	3.31	9.95
StRPBactFung	1.42	0.92	6.59	37.91	1.42	0.92	6.59	16.35
PtRPBactFung	1.03	0.63	3.69	25.84	1.12	0.68	3.64	12.22
StRPBFNOHoag	0.37	0.30	3.94	12.19	0.39	0.31	4.19	5.48
PtRPBFNOHoag	0.43	0.24	3.61	9.99	0.56	0.31	4.65	5.62
StRPBFNOMin	0.01	0.01	0.09	0.36	0.03	0.02	0.19	0.41
PtRPBFNOMin	0.00	0.00	0.05	0.17	0.00	0.00	0.02	0.04

Table K-9 (cont.): Average values for above- and below-ground and for whole biomass were computed and standard errors were estimated for all tree-treatments. This table shows the 9 months values.

Average 9 months (AGB)	Al mg	Corrected Al mg	Al mg/g	Al umol	P mg	Corrected P mg	P mg/g	P umol
StRPBact	0.03	0.03	0.27	1.17	0.05	0.05	0.43	1.64
PtRPBact	0.04	0.04	0.46	1.59	0.04	0.04	0.39	1.37
StRPBactFung	0.10	0.10	1.12	3.68	0.05	0.05	0.55	1.65
PtRPBactFung	0.05	0.05	0.53	1.89	0.05	0.05	0.44	1.50
StRPBFNOHoag	0.01	0.01	0.11	0.26	0.02	0.02	0.30	0.65
PtRPBFNOHoag	0.01	0.01	0.19	0.29	0.01	0.01	0.28	0.37
StRPBFNOMin	0.01	0.01	0.13	0.27	0.03	0.03	0.47	0.85
PtRPBFNOMin	0.01	0.01	0.20	0.40	0.03	0.03	0.49	0.91
Average 9 months (BGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	5.88	3.49	19.40	129.17	0.12	0.07	0.40	2.33
PtRPBact	2.80	1.49	9.07	55.11	0.11	0.06	0.38	1.95
StRPBactFung	4.98	3.21	22.43	119.02	0.08	0.05	0.37	1.72
PtRPBactFung	4.48	2.71	13.76	100.50	0.13	0.08	0.37	2.53
StRPBFNOHoag	1.49	1.18	13.58	43.66	0.04	0.03	0.29	0.92
PtRPBFNOHoag	1.46	0.83	12.40	30.71	0.05	0.03	0.45	0.97
StRPBFNOMin	0.15	0.12	1.01	4.44	0.07	0.06	0.51	1.90
PtRPBFNOMin	0.11	0.08	0.67	3.06	0.09	0.07	0.53	2.15
Average 9 months Whole Plant	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	5.91	3.52	19.67	130.33	0.17	0.12	0.83	3.97
PtRPBact	2.84	1.53	9.53	56.71	0.16	0.10	0.78	3.33
StRPBactFung	5.08	3.31	23.55	122.71	0.13	0.10	0.92	3.37
PtRPBactFung	4.53	2.76	14.29	102.39	0.18	0.12	0.82	4.03
StRPBFNOHoag	1.50	1.19	13.69	43.92	0.06	0.05	0.59	1.57
PtRPBFNOHoag	1.47	0.84	12.59	31.00	0.06	0.04	0.73	1.34
StRPBFNOMin	0.16	0.13	1.14	4.71	0.10	0.09	0.98	2.74
PtRPBFNOMin	0.12	0.09	0.87	3.46	0.12	0.09	1.03	3.06
STE 9 months (AGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	0.00	0.00	0.01	0.14	0.01	0.01	0.03	0.27
PtRPBact	0.01	0.01	0.10	0.21	0.01	0.01	0.02	0.25
StRPBactFung	0.02	0.02	0.24	0.71	0.01	0.01	0.04	0.26
PtRPBactFung	0.02	0.02	0.20	0.67	0.01	0.01	0.03	0.17
StRPBFNOHoag	0.00	0.00	0.02	0.03	0.00	0.00	0.03	0.15
PtRPBFNOHoag	0.00	0.00	0.03	0.05	0.00	0.00	0.02	0.02
StRPBFNOMin	0.00	0.00	0.01	0.03	0.00	0.00	0.04	0.09
PtRPBFNOMin	0.00	0.00	0.03	0.08	0.01	0.01	0.07	0.20
STE 9 months (BGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	2.51	1.49	8.56	55.21	0.00	0.00	0.01	0.06
PtRPBact	1.98	1.05	6.21	39.01	0.01	0.00	0.05	0.15
StRPBactFung	3.42	2.21	15.83	81.75	0.01	0.00	0.03	0.14
PtRPBactFung	2.36	1.43	9.22	52.91	0.02	0.01	0.08	0.40
StRPBFNOHoag	0.88	0.70	9.19	25.86	0.00	0.00	0.03	0.10
PtRPBFNOHoag	1.05	0.59	8.79	21.99	0.00	0.00	0.01	0.04
StRPBFNOMin	0.04	0.03	0.23	1.11	0.01	0.01	0.07	0.17
PtRPBFNOMin	0.01	0.01	0.10	0.35	0.01	0.01	0.05	0.27
STE 9 months Whole Plant	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	2.52	1.49	8.58	55.34	0.01	0.01	0.04	0.33
PtRPBact	1.99	1.06	6.31	39.22	0.02	0.01	0.07	0.40
StRPBactFung	3.44	2.23	16.07	82.46	0.01	0.01	0.07	0.40
PtRPBactFung	2.38	1.45	9.42	53.58	0.03	0.02	0.11	0.56
StRPBFNOHoag	0.88	0.70	9.21	25.89	0.01	0.01	0.06	0.25
PtRPBFNOHoag	1.05	0.59	8.82	22.04	0.00	0.00	0.02	0.06
StRPBFNOMin	0.04	0.03	0.24	1.15	0.01	0.01	0.11	0.27
PtRPBFNOMin	0.02	0.01	0.13	0.43	0.02	0.01	0.12	0.47

Table K-9 (cont.): Cation concentration of tree-biomass (mg of cation/ g of soil) and the total cation amount in tree-biomass (µmol) at 12 months. Above-ground and below-ground biomass were measured separately, dry weight and corrected dry weight are listed.

Aboveground Biomass 12 months (AGB)	Weight	Corrected Weight	Ca mg	Corrected Ca mg	Ca mg/g	Ca umol	K mg	Corrected K mg	Kmg/g	K umol
StRPBactS3	0.0504	0.05	0.28	0.28	5.50	6.92	0.21	0.21	4.15	5.35
StRPBactS7	0.1334	0.13	0.65	0.65	4.85	16.15	0.57	0.57	4.25	14.49
StRPBactS10	0.1192	0.12	0.45	0.45	3.76	11.19	0.42	0.42	3.53	10.78
StRPBactS12	0.1431	0.14	0.60	0.60	4.18	14.91	0.94	0.94	6.55	23.98
StRPBactS13	0.2138	0.21	0.53	0.53	2.49	13.27	0.60	0.60	2.79	15.24
PtRPBactS16	0.1494	0.15	0.61	0.61	4.10	15.29	0.72	0.72	4.82	18.42
PtRPBactS17	0.1200	0.12	0.43	0.43	3.62	10.84	0.49	0.49	4.06	12.46
PtRPBactS19	0.1495	0.15	0.59	0.59	3.96	14.78	0.70	0.70	4.66	17.81
PtRPBactS22	0.1003	0.10	0.37	0.37	3.70	9.25	0.35	0.35	3.46	8.87
PtRPBactS29	0.1254	0.13	0.43	0.43	3.45	10.78	0.61	0.61	4.86	15.60
StRPBactFungS1	0.2323	0.23	0.77	0.77	3.32	19.27	1.25	1.25	5.40	32.08
StRPBactFungS6	0.1580	0.16	0.49	0.49	3.11	12.25	0.81	0.81	5.12	20.68
StRPBactFungS10	0.1848	0.18	0.57	0.57	3.06	14.11	1.02	1.02	5.51	26.05
StRPBactFungS13	0.1024	0.10	0.35	0.35	3.42	8.73	0.41	0.41	3.99	10.45
StRPBactFungS14	0.0691	0.07	0.27	0.27	3.88	6.69	0.27	0.27	3.97	7.01
PtRPBactFungS18	0.1935	0.19	1.03	1.03	5.34	25.80	0.83	0.83	4.31	21.31
PtRPBactFungS20	0.1676	0.17	1.02	1.02	6.07	25.39	0.77	0.77	4.58	19.63
PtRPBactFungS24	0.1393	0.14	0.59	0.59	4.22	14.66	0.80	0.80	5.74	20.46
PtRPBactFungS29	0.0862	0.09	0.38	0.38	4.39	9.44	0.48	0.48	5.56	12.25
StRPBFNOHoagS1	0.0429	0.04	0.21	0.21	4.85	5.20	0.21	0.21	4.88	5.35
StRPBFNOHoagS2	0.0594	0.06	0.16	0.16	2.70	4.00	0.07	0.07	1.16	1.77
StRPBFNOHoagS6	0.0495	0.05	0.16	0.16	3.19	3.94	0.05	0.05	1.08	1.36
StRPBFNOHoagS8	0.0312	0.03	0.15	0.15	4.70	3.66	0.05	0.05	1.61	1.28
StRPBFNOHoagS14	0.0508	0.05	0.16	0.16	3.10	3.92	0.08	0.08	1.61	2.10
PtRPBFNOHoagS18	0.0448	0.04	0.14	0.14	3.19	3.57	0.07	0.07	1.53	1.75
PtRPBFNOHoagS20	0.0616	0.06	0.29	0.29	4.64	7.13	0.08	0.08	1.32	2.08
PtRPBFNOHoagS22	0.0606	0.06	0.29	0.29	4.73	7.15	0.08	0.08	1.31	2.04
PtRPBFNOHoagS23	0.0415	0.04	0.14	0.14	3.39	3.52	0.05	0.05	1.12	1.19
PtRPBFNOHoagS28	0.0445	0.04	0.26	0.26	5.82	6.46	0.06	0.06	1.29	1.47
StRPBFNOMinS3	0.0338	0.03	0.02	0.02	0.63	0.53	0.00	0.00	0.00	0.00
StRPBFNOMinS6	0.0247	0.02	0.01	0.01	0.57	0.35	0.00	0.00	0.00	0.00
StRPBFNOMinS11	0.0149	0.01	0.01	0.01	0.67	0.25	0.11	0.11	7.15	2.72
StRPBFNOMinS13	0.0300	0.03	0.03	0.03	0.95	0.71	0.00	0.00	0.00	0.00
StRPBFNOMinS15	0.0623	0.06	0.06	0.06	0.95	1.48	0.04	0.04	0.68	1.08
PtRPBFNOMinS16	0.0865	0.09	0.06	0.06	0.70	1.50	0.13	0.13	1.48	3.27
PtRPBFNOMinS18	0.0503	0.05	0.02	0.02	0.46	0.57	0.08	0.08	1.64	2.11
PtRPBFNOMinS20	0.0374	0.04	0.03	0.03	0.81	0.76	0.00	0.00	0.00	0.00
PtRPBFNOMinS23	0.0478	0.05	0.03	0.03	0.56	0.67	0.17	0.17	3.58	4.37
PtRPBFNOMinS27	0.0471	0.05	0.03	0.03	0.72	0.85	0.07	0.07	1.52	1.83
Belowground Biomass 12 months (BGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBactS3	0.2000	0.2000	0.66	0.66	3.28	16.34	0.86	0.86	4.28	21.89
StRPBactS12	0.2617	0.2617	1.98	1.98	7.56	49.38	1.72	1.72	6.59	44.11
StRPBactS13	0.3051	0.3051	0.76	0.76	2.50	19.03	1.31	1.31	4.30	33.57
PtRPBactS16	0.2949	0.2949	0.67	0.67	2.27	16.67	1.12	1.12	3.81	28.75
PtRPBactS17	0.2330	0.2330	0.74	0.74	3.16	18.36	0.84	0.84	3.62	21.57
PtRPBactS22	0.3245	0.3245	1.24	1.24	3.81	30.84	1.27	1.27	3.92	32.55
StRPBactFungS6	0.3098	0.1162	2.05	2.05	17.61	51.04	3.32	1.25	10.72	31.85
StRPBactFungS10	0.4572	0.1715	2.41	2.41	14.05	60.10	2.70	1.01	5.90	25.85
StRPBactFungS13	0.2562	0.0961	1.25	1.25	13.04	31.27	1.89	0.71	7.38	18.14
PtRPBactFungS20	0.4035	0.4035	1.32	1.32	3.27	32.91	2.32	2.32	5.74	59.22
PtRPBactFungS24	0.7153	0.7153	2.32	2.32	3.25	58.00	2.79	2.79	3.90	71.34
PtRPBactFungS29	0.2377	0.2377	0.94	0.94	3.94	23.38	1.03	1.03	4.33	26.30
StRPBFNOHoagS1	0.1060	0.1060	0.52	0.52	4.90	12.96	0.47	0.47	4.43	12.00
StRPBFNOHoagS6	0.1412	0.1412	0.65	0.65	4.63	16.32	0.70	0.70	4.96	17.91
StRPBFNOHoagS14	0.1528	0.1528	0.85	0.85	5.56	21.21	1.08	1.08	7.05	27.54
PtRPBFNOHoagS22	0.1408	0.1408	0.54	0.54	3.83	13.44	0.98	0.98	6.97	25.10
PtRPBFNOHoagS23	0.1238	0.1238	0.45	0.45	3.60	11.12	0.60	0.60	4.82	15.26
PtRPBFNOHoagS28	0.1231	0.1231	0.34	0.34	2.73	8.40	0.66	0.66	5.39	16.96
StRPBFNOMinS3	0.1202	0.1202	0.05	0.05	0.42	1.25	0.10	0.10	0.86	2.63
StRPBFNOMinS6	0.0790	0.0790	0.03	0.03	0.35	0.68	0.06	0.06	0.77	1.56
StRPBFNOMinS13	0.0945	0.0945	0.03	0.03	0.37	0.87	0.10	0.10	1.02	2.46
PtRPBFNOMinS18	0.2007	0.2007	0.03	0.03	0.13	0.66	0.10	0.10	0.52	2.67
PtRPBFNOMinS23	0.1440	0.1440	0.06	0.06	0.39	1.38	0.16	0.16	1.11	4.10
PtRPBFNOMinS27	0.1493	0.1493	0.05	0.05	0.36	1.34	0.15	0.15	1.01	3.86

Table K-9 (cont.): Cation concentration of tree-biomass (mg of cation/ g of soil) and the total cation amount in tree-biomass (μmol) at 12 months. Above-ground and below-ground biomass were measured separately.

Aboveground Biomass 12 months (AGB)	Mg mg	Corrected Mg mg	Mg mg/g	Mg umol	Fe mg	Corrected Fe mg	Fe mg/g	Fe umol
StRPBactS3	0.04	0.04	0.72	1.50	0.01	0.01	0.10	0.09
StRPBactS7	0.11	0.11	0.79	4.33	0.01	0.01	0.06	0.14
StRPBactS10	0.10	0.10	0.86	4.21	0.02	0.02	0.20	0.43
StRPBactS12	0.13	0.13	0.91	5.39	0.04	0.04	0.26	0.68
StRPBactS13	0.11	0.11	0.53	4.70	0.02	0.02	0.08	0.32
PtRPBactS16	0.11	0.11	0.77	4.73	0.01	0.01	0.10	0.26
PtRPBactS17	0.11	0.11	0.90	4.47	0.04	0.04	0.37	0.80
PtRPBactS19	0.10	0.10	0.68	4.16	0.01	0.01	0.05	0.13
PtRPBactS22	0.08	0.08	0.81	3.34	0.01	0.01	0.10	0.17
PtRPBactS29	0.09	0.09	0.73	3.76	0.01	0.01	0.10	0.23
StRPBactFungS1	0.22	0.22	0.95	9.10	0.03	0.03	0.15	0.61
StRPBactFungS6	0.13	0.13	0.84	5.43	0.01	0.01	0.08	0.22
StRPBactFungS10	0.16	0.16	0.86	6.52	0.01	0.01	0.06	0.20
StRPBactFungS13	0.10	0.10	0.98	4.14	0.01	0.01	0.13	0.23
StRPBactFungS14	0.08	0.08	1.15	3.26	0.01	0.01	0.18	0.23
PtRPBactFungS18	0.11	0.11	0.58	4.66	0.02	0.02	0.08	0.29
PtRPBactFungS20	0.12	0.12	0.73	5.03	0.02	0.02	0.09	0.28
PtRPBactFungS24	0.13	0.13	0.94	5.38	0.01	0.01	0.06	0.14
PtRPBactFungS29	0.14	0.14	1.63	5.80	0.11	0.11	1.31	2.02
StRPBFNOHoagS1	0.05	0.05	1.05	1.86	0.01	0.01	0.13	0.10
StRPBFNOHoagS2	0.04	0.04	0.70	1.72	0.01	0.01	0.12	0.13
StRPBFNOHoagS6	0.04	0.04	0.84	1.70	0.01	0.01	0.23	0.21
StRPBFNOHoagS8	0.03	0.03	1.03	1.32	0.00	0.00	0.09	0.05
StRPBFNOHoagS14	0.04	0.04	0.79	1.66	0.00	0.00	0.08	0.07
PtRPBFNOHoagS18	0.03	0.03	0.72	1.32	0.01	0.01	0.17	0.14
PtRPBFNOHoagS20	0.05	0.05	0.79	2.00	0.01	0.01	0.12	0.14
PtRPBFNOHoagS22	0.05	0.05	0.90	2.25	0.01	0.01	0.15	0.16
PtRPBFNOHoagS23	0.04	0.04	0.88	1.51	0.00	0.00	0.11	0.08
PtRPBFNOHoagS28	0.07	0.07	1.48	2.70	0.02	0.02	0.43	0.34
StRPBFNOMinS3	0.02	0.02	0.54	0.76	0.00	0.00	0.06	0.04
StRPBFNOMinS6	0.02	0.02	0.62	0.64	0.01	0.01	0.23	0.10
StRPBFNOMinS11	0.01	0.01	0.99	0.61	0.00	0.00	0.12	0.03
StRPBFNOMinS13	0.02	0.02	0.65	0.80	0.00	0.00	0.15	0.08
StRPBFNOMinS15	0.03	0.03	0.52	1.34	0.00	0.00	0.06	0.07
PtRPBFNOMinS16	0.05	0.05	0.63	2.25	0.01	0.01	0.07	0.10
PtRPBFNOMinS18	0.02	0.02	0.46	0.96	0.00	0.00	0.06	0.06
PtRPBFNOMinS20	0.02	0.02	0.62	0.96	0.00	0.00	0.08	0.05
PtRPBFNOMinS23	0.02	0.02	0.40	0.78	0.01	0.01	0.11	0.09
PtRPBFNOMinS27	0.03	0.03	0.55	1.07	0.00	0.00	0.04	0.04
Belowground Biomass 12 months (BGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBactS3	0.62	0.62	3.08	25.37	0.83	0.83	4.16	14.84
StRPBactS12	2.06	2.06	7.88	84.86	3.15	3.15	12.03	56.21
StRPBactS13	0.76	0.76	2.51	31.46	1.03	1.03	3.37	18.34
PtRPBactS16	0.66	0.66	2.23	27.00	0.92	0.92	3.13	16.49
PtRPBactS17	0.68	0.68	2.94	28.17	0.83	0.83	3.55	14.75
PtRPBactS22	1.00	1.00	3.09	41.27	1.30	1.30	4.02	23.27
StRPBactFungS6	3.50	1.31	11.30	54.04	5.48	2.05	17.68	36.67
StRPBactFungS10	3.06	1.15	6.69	47.21	4.73	1.77	10.35	31.69
StRPBactFungS13	1.87	0.70	7.28	28.79	2.82	1.06	11.01	18.89
PtRPBactFungS20	1.58	1.58	3.93	65.22	2.34	2.34	5.81	41.86
PtRPBactFungS24	2.69	2.69	3.76	110.63	3.83	3.83	5.35	68.37
PtRPBactFungS29	0.66	0.66	2.77	27.14	0.89	0.89	3.72	15.81
StRPBFNOHoagS1	0.39	0.39	3.67	16.02	0.53	0.53	5.01	9.48
StRPBFNOHoagS6	0.64	0.64	4.56	26.48	0.92	0.92	6.52	16.45
StRPBFNOHoagS14	1.12	1.12	7.34	46.17	1.69	1.69	11.07	30.22
PtRPBFNOHoagS22	0.74	0.74	5.28	30.58	1.08	1.08	7.64	19.21
PtRPBFNOHoagS23	0.44	0.44	3.58	18.24	0.59	0.59	4.78	10.58
PtRPBFNOHoagS28	0.30	0.30	2.46	12.47	0.36	0.36	2.89	6.35
StRPBFNOMinS3	0.06	0.06	0.47	2.35	0.05	0.05	0.41	0.89
StRPBFNOMinS6	0.02	0.02	0.31	0.99	0.03	0.03	0.32	0.45
StRPBFNOMinS13	0.03	0.03	0.27	1.05	0.20	0.20	2.16	3.65
PtRPBFNOMinS18	0.03	0.03	0.16	1.36	0.80	0.80	4.00	14.35
PtRPBFNOMinS23	0.05	0.05	0.38	2.24	0.06	0.06	0.44	1.13
PtRPBFNOMinS27	0.04	0.04	0.26	1.59	0.02	0.02	0.15	0.39

Table K-9 (cont.): Cation concentration of tree-biomass (mg of cation/ g of soil) and the total cation amount in tree-biomass (µmol) at 12 months. Above-ground and below-ground biomass were measured separately.

Aboveground Biomass 12 months (AGB)	Al mg	Corrected Al mg	Al mg/g	Al umol	P mg	Corrected P mg	P mg/g	P umol
StRPBactS3	0.03	0.03	0.58	1.08	0.02	0.02	0.46	0.75
StRPBactS7	0.06	0.06	0.42	2.06	0.06	0.06	0.41	1.78
StRPBactS10	0.04	0.04	0.34	1.50	0.05	0.05	0.45	1.72
StRPBactS12	0.06	0.06	0.39	2.04	0.08	0.08	0.53	2.46
StRPBactS13	0.05	0.05	0.23	1.85	0.05	0.05	0.25	1.73
PtRPBactS16	0.08	0.08	0.51	2.81	0.06	0.06	0.42	2.02
PtRPBactS17	0.07	0.07	0.56	2.51	0.06	0.06	0.48	1.88
PtRPBactS19	0.04	0.04	0.26	1.44	0.05	0.05	0.35	1.67
PtRPBactS22	0.02	0.02	0.23	0.87	0.03	0.03	0.27	0.87
PtRPBactS29	0.05	0.05	0.39	1.80	0.05	0.05	0.37	1.48
StRPBactFungS1	0.09	0.09	0.38	3.26	0.13	0.13	0.57	4.28
StRPBactFungS6	0.08	0.08	0.51	2.98	0.09	0.09	0.58	2.97
StRPBactFungS10	0.06	0.06	0.33	2.26	0.12	0.12	0.63	3.77
StRPBactFungS13	0.06	0.06	0.59	2.25	0.08	0.08	0.74	2.44
StRPBactFungS14	0.05	0.05	0.69	1.77	0.04	0.04	0.57	1.27
PtRPBactFungS18	0.05	0.05	0.26	1.85	0.09	0.09	0.47	2.94
PtRPBactFungS20	0.05	0.05	0.27	1.68	0.08	0.08	0.46	2.49
PtRPBactFungS24	0.04	0.04	0.32	1.64	0.06	0.06	0.43	1.92
PtRPBactFungS29	0.09	0.09	1.08	3.44	0.03	0.03	0.36	0.99
StRPBFNOHoagS1	0.02	0.02	0.38	0.60	0.02	0.02	0.42	0.58
StRPBFNOHoagS2	0.03	0.03	0.45	1.00	0.02	0.02	0.40	0.77
StRPBFNOHoagS6	0.02	0.02	0.45	0.83	0.02	0.02	0.39	0.63
StRPBFNOHoagS8	0.02	0.02	0.56	0.65	0.02	0.02	0.63	0.63
StRPBFNOHoagS14	0.01	0.01	0.27	0.50	0.02	0.02	0.33	0.55
PtRPBFNOHoagS18	0.03	0.03	0.66	1.09	0.02	0.02	0.36	0.53
PtRPBFNOHoagS20	0.05	0.05	0.78	1.79	0.02	0.02	0.33	0.65
PtRPBFNOHoagS22	0.06	0.06	0.93	2.08	0.02	0.02	0.41	0.80
PtRPBFNOHoagS23	0.05	0.05	1.13	1.74	0.01	0.01	0.36	0.48
PtRPBFNOHoagS28	0.05	0.05	1.03	1.69	0.01	0.01	0.33	0.47
StRPBFNOMinS3	0.02	0.02	0.66	0.83	0.01	0.01	0.44	0.48
StRPBFNOMinS6	0.03	0.03	1.02	0.93	0.01	0.01	0.56	0.45
StRPBFNOMinS11	0.03	0.03	1.69	0.94	0.03	0.03	2.32	1.12
StRPBFNOMinS13	0.03	0.03	1.10	1.22	0.02	0.02	0.59	0.57
StRPBFNOMinS15	0.05	0.05	0.74	1.71	0.04	0.04	0.68	1.36
PtRPBFNOMinS16	0.06	0.06	0.69	2.22	0.05	0.05	0.61	1.71
PtRPBFNOMinS18	0.04	0.04	0.80	1.49	0.02	0.02	0.48	0.78
PtRPBFNOMinS20	0.05	0.05	1.26	1.75	0.02	0.02	0.48	0.58
PtRPBFNOMinS23	0.02	0.02	0.45	0.80	0.02	0.02	0.52	0.79
PtRPBFNOMinS27	0.04	0.04	0.95	1.65	0.02	0.02	0.52	0.80
Belowground Biomass 12 months (BGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBactS3	0.66	0.66	3.28	24.32	0.10	0.10	0.48	3.09
StRPBactS12	2.72	2.72	10.39	100.74	0.12	0.12	0.47	3.94
StRPBactS13	0.67	0.67	2.19	24.71	0.16	0.16	0.52	5.09
PtRPBactS16	0.73	0.73	2.49	27.20	0.17	0.17	0.56	5.37
PtRPBactS17	0.67	0.67	2.87	24.80	0.14	0.14	0.59	4.45
PtRPBactS22	1.29	1.29	3.97	47.73	0.14	0.14	0.42	4.44
StRPBactFungS6	3.47	1.30	11.20	48.18	0.18	0.07	0.59	2.23
StRPBactFungS10	3.98	1.49	8.71	55.31	0.19	0.07	0.41	2.27
StRPBactFungS13	1.85	0.70	7.24	25.76	0.19	0.07	0.74	2.30
PtRPBactFungS20	1.64	1.64	4.08	60.92	0.22	0.22	0.55	7.19
PtRPBactFungS24	3.83	3.83	5.35	141.76	0.20	0.20	0.28	6.52
PtRPBactFungS29	0.67	0.67	2.82	24.86	0.12	0.12	0.52	3.98
StRPBFNOHoagS1	0.40	0.40	3.77	14.81	0.04	0.04	0.34	1.16
StRPBFNOHoagS6	0.65	0.65	4.59	24.02	0.06	0.06	0.42	1.90
StRPBFNOHoagS14	1.29	1.29	8.42	47.67	0.05	0.05	0.30	1.47
PtRPBFNOHoagS22	0.72	0.72	5.09	26.53	0.05	0.05	0.37	1.67
PtRPBFNOHoagS23	0.50	0.50	4.07	18.66	0.05	0.05	0.41	1.64
PtRPBFNOHoagS28	0.26	0.26	2.12	9.66	0.06	0.06	0.45	1.80
StRPBFNOMinS3	0.07	0.07	0.58	2.58	0.08	0.08	0.67	2.61
StRPBFNOMinS6	0.07	0.07	0.87	2.54	0.05	0.05	0.57	1.46
StRPBFNOMinS13	0.07	0.07	0.74	2.58	0.06	0.06	0.66	2.02
PtRPBFNOMinS18	0.14	0.14	0.71	5.26	0.08	0.08	0.42	2.73
PtRPBFNOMinS23	0.10	0.10	0.68	3.65	0.07	0.07	0.51	2.37
PtRPBFNOMinS27	0.09	0.09	0.60	3.30	0.09	0.09	0.63	3.03

Table K-9 (cont.): Average values for above- and below-ground and for whole biomass were computed and standard errors were estimated for all tree-treatments. This table shows the 12 months values.

Average 12 months (AGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.13	0.13	0.50	0.50	4.16	12.49	0.55	0.55	4.25	13.97
PtRPBact	0.13	0.13	0.49	0.49	3.77	12.19	0.57	0.57	4.37	14.63
StRPBactFung	0.15	0.15	0.49	0.49	3.36	12.21	0.75	0.75	4.80	19.25
PtRPBactFung	0.15	0.15	0.75	0.75	5.01	18.82	0.72	0.72	5.05	18.41
StRPBFNOHoag	0.05	0.05	0.17	0.17	3.71	4.14	0.09	0.09	2.07	2.37
PtRPBFNOHoag	0.05	0.05	0.22	0.22	4.35	5.56	0.07	0.07	1.32	1.71
StRPBFNOMin	0.03	0.03	0.03	0.03	0.75	0.66	0.03	0.03	1.56	0.76
PtRPBFNOMin	0.05	0.05	0.03	0.03	0.65	0.87	0.09	0.09	1.64	2.32
Average 12 months (BGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.26	0.26	1.13	1.13	4.45	28.25	1.30	1.30	5.06	33.19
PtRPBact	0.28	0.28	0.88	0.88	3.08	21.96	1.08	1.08	3.78	27.62
StRPBactFung	0.34	0.13	1.90	1.90	14.90	47.47	2.64	0.99	8.00	25.28
PtRPBactFung	0.45	0.45	1.53	1.53	3.49	38.09	2.04	2.04	4.66	52.29
StRPBFNOHoag	0.13	0.13	0.67	0.67	5.03	16.83	0.75	0.75	5.48	19.15
PtRPBFNOHoag	0.13	0.13	0.44	0.44	3.39	10.99	0.75	0.75	5.73	19.11
StRPBFNOMin	0.10	0.10	0.04	0.04	0.38	0.94	0.09	0.09	0.88	2.22
PtRPBFNOMin	0.16	0.16	0.05	0.05	0.29	1.13	0.14	0.14	0.88	3.54
Average 12 months Whole Plant	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.39	0.39	1.63	1.63	8.60	40.74	1.84	1.84	9.31	47.16
PtRPBact	0.41	0.41	1.37	1.37	6.84	34.15	1.65	1.65	8.16	42.26
StRPBactFung	0.49	0.28	2.39	2.39	18.26	59.68	3.39	1.74	12.80	44.53
PtRPBactFung	0.58	0.58	2.18	2.18	8.27	54.49	2.68	2.68	9.49	68.42
StRPBFNOHoag	0.18	0.18	0.84	0.84	8.74	20.97	0.84	0.84	7.55	21.52
PtRPBFNOHoag	0.18	0.18	0.66	0.66	7.74	16.55	0.81	0.81	7.04	20.81
StRPBFNOMin	0.13	0.13	0.06	0.06	1.13	1.60	0.12	0.12	2.45	2.98
PtRPBFNOMin	0.22	0.22	0.08	0.08	0.94	2.00	0.23	0.23	2.53	5.86
STE 12 months (AGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.03	0.03	0.07	0.07	0.51	1.62	0.12	0.12	0.63	3.05
PtRPBact	0.01	0.01	0.05	0.05	0.12	1.20	0.07	0.07	0.27	1.78
StRPBactFung	0.03	0.03	0.09	0.09	0.15	2.19	0.18	0.18	0.34	4.69
PtRPBactFung	0.02	0.02	0.15	0.15	0.39	3.63	0.07	0.07	0.32	1.86
StRPBFNOHoag	0.00	0.00	0.01	0.01	0.45	0.27	0.03	0.03	0.71	0.76
PtRPBFNOHoag	0.00	0.00	0.03	0.03	0.48	0.83	0.01	0.01	0.06	0.17
StRPBFNOMin	0.01	0.01	0.01	0.01	0.08	0.22	0.02	0.02	1.40	0.53
PtRPBFNOMin	0.01	0.01	0.01	0.01	0.06	0.16	0.03	0.03	0.57	0.73
STE 12 months (BGB)	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.03	0.03	0.42	0.42	1.57	10.59	0.25	0.25	0.77	6.42
PtRPBact	0.03	0.03	0.18	0.18	0.45	4.47	0.13	0.13	0.09	3.22
StRPBactFung	0.06	0.02	0.34	0.34	1.38	8.51	0.41	0.16	1.43	3.97
PtRPBactFung	0.14	0.14	0.41	0.41	0.23	10.33	0.53	0.53	0.56	13.46
StRPBFNOHoag	0.01	0.01	0.10	0.10	0.28	2.40	0.18	0.18	0.80	4.53
PtRPBFNOHoag	0.01	0.01	0.06	0.06	0.33	1.46	0.12	0.12	0.64	3.04
StRPBFNOMin	0.01	0.01	0.01	0.01	0.02	0.17	0.01	0.01	0.07	0.33
PtRPBFNOMin	0.02	0.02	0.01	0.01	0.08	0.23	0.02	0.02	0.18	0.44
STE 12 months Whole Plant	**Weight**	**Corrected Weight**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**Kmg/g**	**K umol**
StRPBact	0.06	0.06	0.49	0.49	2.09	12.22	0.37	0.37	1.40	9.47
PtRPBact	0.04	0.04	0.23	0.23	0.57	5.66	0.20	0.20	0.36	5.00
StRPBactFung	0.09	0.05	0.43	0.43	1.53	10.70	0.60	0.34	1.77	8.66
PtRPBactFung	0.16	0.16	0.56	0.56	0.61	13.95	0.60	0.60	0.87	15.32
StRPBFNOHoag	0.02	0.02	0.11	0.11	0.72	2.67	0.21	0.21	1.51	5.29
PtRPBFNOHoag	0.01	0.01	0.09	0.09	0.81	2.29	0.13	0.13	0.71	3.21
StRPBFNOMin	0.02	0.02	0.02	0.02	0.10	0.39	0.03	0.03	1.47	0.86
PtRPBFNOMin	0.03	0.03	0.02	0.02	0.14	0.40	0.05	0.05	0.75	1.18

Table K-9 (cont.): Average values for above- and below-ground and for whole biomass were computed and standard errors were estimated for all tree-treatments. This table shows the 12 months values.

Average 12 months (AGB)	Mg mg	Corrected Mg mg	Mg mg/g	Mg umol	Fe mg	Corrected Fe mg	Fe mg/g	Fe umol
StRPBact	0.10	0.10	0.76	4.03	0.02	0.02	0.14	0.33
PtRPBact	0.10	0.10	0.78	4.09	0.02	0.02	0.14	0.32
StRPBactFung	0.14	0.14	0.95	5.69	0.02	0.02	0.12	0.30
PtRPBactFung	0.13	0.13	0.97	5.22	0.04	0.04	0.39	0.68
StRPBFNOHoag	0.04	0.04	0.88	1.65	0.01	0.01	0.13	0.11
PtRPBFNOHoag	0.05	0.05	0.95	1.96	0.01	0.01	0.20	0.17
StRPBFNOMin	0.02	0.02	0.67	0.83	0.00	0.00	0.12	0.06
PtRPBFNOMin	0.03	0.03	0.53	1.20	0.00	0.00	0.07	0.07
Average 12 months (BGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	1.15	1.15	4.49	47.23	1.67	1.67	6.52	29.80
PtRPBact	0.78	0.78	2.75	32.15	1.02	1.02	3.56	18.17
StRPBactFung	2.81	1.05	8.43	43.35	4.34	1.63	13.01	29.08
PtRPBactFung	1.64	1.64	3.49	67.67	2.35	2.35	4.96	42.01
StRPBFNOHoag	0.72	0.72	5.19	29.56	1.05	1.05	7.54	18.72
PtRPBFNOHoag	0.50	0.50	3.77	20.43	0.67	0.67	5.10	12.05
StRPBFNOMin	0.04	0.04	0.35	1.46	0.09	0.09	0.96	1.66
PtRPBFNOMin	0.04	0.04	0.27	1.73	0.30	0.30	1.53	5.29
Average 12 months Whole Plant	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	1.25	1.25	5.25	51.26	1.69	1.69	6.66	30.13
PtRPBact	0.88	0.88	3.53	36.24	1.04	1.04	3.71	18.49
StRPBactFung	2.95	1.19	9.38	43.69	4.36	1.65	13.13	29.38
PtRPBactFung	1.76	1.76	4.49	72.49	2.39	2.39	5.31	42.61
StRPBFNOHoag	0.76	0.76	6.07	31.21	1.05	1.05	7.67	18.83
PtRPBFNOHoag	0.54	0.54	4.73	22.39	0.68	0.68	5.30	12.22
StRPBFNOMin	0.06	0.06	1.02	2.29	0.10	0.10	1.09	1.72
PtRPBFNOMin	0.07	0.07	0.80	2.93	0.30	0.30	1.60	5.36
STE 12 months (AGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	0.02	0.02	0.07	0.66	0.01	0.01	0.04	0.10
PtRPBact	0.01	0.01	0.04	0.25	0.01	0.01	0.06	0.12
StRPBactFung	0.02	0.02	0.06	1.02	0.00	0.00	0.02	0.08
PtRPBactFung	0.01	0.01	0.21	0.22	0.02	0.02	0.28	0.40
StRPBFNOHoag	0.00	0.00	0.07	0.09	0.00	0.00	0.03	0.03
PtRPBFNOHoag	0.01	0.01	0.13	0.25	0.00	0.00	0.06	0.04
StRPBFNOMin	0.00	0.00	0.08	0.13	0.00	0.00	0.03	0.01
PtRPBFNOMin	0.01	0.01	0.05	0.26	0.00	0.00	0.01	0.01
STE 12 months (BGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	0.46	0.46	1.70	18.90	0.74	0.74	2.76	13.24
PtRPBact	0.11	0.11	0.27	4.57	0.15	0.15	0.26	2.60
StRPBactFung	0.49	0.18	1.45	7.54	0.79	0.30	2.34	5.29
PtRPBactFung	0.59	0.59	0.36	24.13	0.85	0.85	0.63	15.17
StRPBFNOHoag	0.21	0.21	1.11	8.84	0.34	0.34	1.82	6.09
PtRPBFNOHoag	0.13	0.13	0.82	5.34	0.21	0.21	1.38	3.78
StRPBFNOMin	0.01	0.01	0.06	0.44	0.06	0.06	0.60	1.00
PtRPBFNOMin	0.01	0.01	0.06	0.27	0.25	0.25	1.24	4.53
STE 12 months Whole Plant	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
StRPBact	0.48	0.48	1.77	19.56	0.75	0.75	2.80	13.35
PtRPBact	0.12	0.12	0.31	4.82	0.15	0.15	0.31	2.72
StRPBactFung	0.51	0.21	1.50	8.56	0.80	0.30	2.36	5.37
PtRPBactFung	0.59	0.59	0.57	24.35	0.87	0.87	0.91	15.57
StRPBFNOHoag	0.22	0.22	1.17	8.93	0.34	0.34	1.85	6.12
PtRPBFNOHoag	0.14	0.14	0.95	5.59	0.21	0.21	1.44	3.83
StRPBFNOMin	0.01	0.01	0.15	0.57	0.06	0.06	0.63	1.01
PtRPBFNOMin	0.01	0.01	0.11	0.53	0.25	0.25	1.25	4.55

Table K-9 (cont.): Average values for above- and below-ground and for whole biomass were computed and standard errors were estimated for all tree-treatments. This table shows the 12 months values.

Average 12 months (AGB)	Al mg	Corrected Al mg	Al mg/g	Al umol	P mg	Corrected P mg	P mg/g	P umol
StRPBact	0.05	0.05	0.39	1.71	0.05	0.05	0.42	1.69
PtRPBact	0.05	0.05	0.39	1.89	0.05	0.05	0.38	1.58
StRPBactFung	0.07	0.07	0.50	2.50	0.09	0.09	0.62	2.94
PtRPBactFung	0.06	0.06	0.48	2.15	0.06	0.06	0.43	2.08
StRPBFNOHoag	0.02	0.02	0.42	0.72	0.02	0.02	0.44	0.63
PtRPBFNOHoag	0.05	0.05	0.90	1.68	0.02	0.02	0.36	0.59
StRPBFNOMin	0.03	0.03	1.04	1.13	0.02	0.02	0.92	0.79
PtRPBFNOMin	0.04	0.04	0.83	1.58	0.03	0.03	0.52	0.93
Average 12 months (BGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	1.35	1.35	5.29	49.93	0.13	0.13	0.49	4.04
PtRPBact	0.90	0.90	3.11	33.24	0.15	0.15	0.53	4.76
StRPBactFung	3.10	1.16	9.05	43.08	0.19	0.07	0.58	2.26
PtRPBactFung	2.05	2.05	4.08	75.85	0.18	0.18	0.45	5.90
StRPBFNOHoag	0.78	0.78	5.60	28.83	0.05	0.05	0.35	1.51
PtRPBFNOHoag	0.49	0.49	3.76	18.28	0.05	0.05	0.41	1.70
StRPBFNOMin	0.07	0.07	0.73	2.57	0.06	0.06	0.64	2.03
PtRPBFNOMin	0.11	0.11	0.66	4.07	0.08	0.08	0.52	2.71
Average 12 months Whole Plant	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	1.39	1.39	5.68	51.63	0.18	0.18	0.91	5.73
PtRPBact	0.95	0.95	3.50	35.13	0.20	0.20	0.90	6.34
StRPBactFung	3.17	1.23	9.55	45.58	0.28	0.16	1.20	5.21
PtRPBactFung	2.10	2.10	4.61	77.92	0.24	0.24	0.91	7.82
StRPBFNOHoag	0.80	0.80	6.02	29.55	0.07	0.07	0.79	2.14
PtRPBFNOHoag	0.54	0.54	4.66	19.96	0.07	0.07	0.77	2.29
StRPBFNOMin	0.10	0.10	1.77	3.69	0.09	0.09	1.55	2.83
PtRPBFNOMin	0.15	0.15	1.49	5.65	0.11	0.11	1.04	3.64
STE 12 months (AGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	0.01	0.01	0.06	0.19	0.01	0.01	0.05	0.27
PtRPBact	0.01	0.01	0.07	0.35	0.01	0.01	0.04	0.20
StRPBactFung	0.01	0.01	0.07	0.27	0.02	0.02	0.03	0.53
PtRPBactFung	0.01	0.01	0.18	0.39	0.01	0.01	0.02	0.38
StRPBFNOHoag	0.00	0.00	0.05	0.09	0.00	0.00	0.05	0.04
PtRPBFNOHoag	0.00	0.00	0.08	0.16	0.00	0.00	0.01	0.06
StRPBFNOMin	0.00	0.00	0.18	0.16	0.01	0.01	0.35	0.19
PtRPBFNOMin	0.01	0.01	0.13	0.23	0.01	0.01	0.02	0.20
STE 12 months (BGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	0.69	0.69	2.57	25.41	0.02	0.02	0.02	0.58
PtRPBact	0.20	0.20	0.44	7.28	0.01	0.01	0.05	0.31
StRPBactFung	0.64	0.24	1.16	8.90	0.00	0.00	0.10	0.02
PtRPBactFung	0.93	0.93	0.73	34.56	0.03	0.03	0.08	0.98
StRPBFNOHoag	0.26	0.26	1.43	9.78	0.01	0.01	0.03	0.21
PtRPBFNOHoag	0.13	0.13	0.87	4.87	0.00	0.00	0.02	0.05
StRPBFNOMin	0.00	0.00	0.08	0.01	0.01	0.01	0.03	0.33
PtRPBFNOMin	0.02	0.02	0.03	0.60	0.01	0.01	0.06	0.19
STE 12 months Whole Plant	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
StRPBact	0.69	0.69	2.63	25.59	0.03	0.03	0.06	0.85
PtRPBact	0.21	0.21	0.51	7.63	0.02	0.02	0.09	0.51
StRPBactFung	0.65	0.25	1.22	9.17	0.02	0.02	0.13	0.55
PtRPBactFung	0.94	0.94	0.91	34.95	0.04	0.04	0.11	1.35
StRPBFNOHoag	0.27	0.27	1.48	9.87	0.01	0.01	0.09	0.25
PtRPBFNOHoag	0.14	0.14	0.96	5.04	0.00	0.00	0.04	0.11
StRPBFNOMin	0.00	0.00	0.27	0.17	0.02	0.02	0.38	0.52
PtRPBFNOMin	0.02	0.02	0.17	0.83	0.01	0.01	0.09	0.39

Table K-10: Average values of dry weight, carbon content, nitrogen content, root length, and ectomycorrhizal root length were computed for above- and below-ground as applied. Root:Shoot ratio was also reported. Standard errors were estimated for all, this table shows the 6 months values.

Average 6 months (AGB)					**Weight**	**C%**	**C (g)**	**N%**	**N (mg)**
StRPBact					0.08	49%	0.0375	0.8%	0.6026
StRPBactFung					0.08	50%	0.0416	0.9%	0.6458
StRPBFNOHoag					0.05	49%	0.0252	0.5%	0.2667
StRPBFNOMin					0.03	50%	0.0147	1.3%	0.3818
PtRPBact					0.08	48%	0.0429	0.7%	0.5750
PtRPBactFung					0.08	49%	0.0379	0.8%	0.6132
PtRPBFNOHoag					0.06	50%	0.0288	0.6%	0.3200
PtRPBFNOMin					0.04	51%	0.0190	1.0%	0.3636
Average 6 months (BGB)	**Root length (cm)**	**EM Root length (cm)**	**EM %**	**Root:Shoot ratio**	**Weight**	**C%**	**C (g)**	**N%**	**N (mg)**
StRPBact	338.6	-----	0	2.39	0.18	48%	0.0636	0.6%	0.7391
StRPBactFung	247.8	77.76	31	1.85	0.16	56%	0.0438	0.7%	0.5687
StRPBFNOHoag	136.1	30.58	22	1.61	0.08	49%	0.0277	0.5%	0.3012
StRPBFNOMin	125.1	11.81	9	2.34	0.07	40%	0.0162	0.8%	0.3033
PtRPBact	357.9	-----	0	2.48	0.20	47%	0.0654	0.7%	0.9105
PtRPBactFung	361.6	57.12	16	2.52	0.19	50%	0.0687	0.6%	0.8811
PtRPBFNOHoag	212.6	23.31	11	1.90	0.10	49%	0.0370	0.5%	0.3915
PtRPBFNOMin	119.9	14.28	12	2.20	0.08	50%	0.0158	0.8%	0.2585
STE 6 months (AGB)					**Weight**		**Stdev C**		**Stdev N**
StRPBact					0.00		0.0051		0.1416
StRPBactFung					0.01		0.0159		0.1255
StRPBFNOHoag					0.00		0.0040		0.0725
StRPBFNOMin					0.00		0.0041		0.1351
PtRPBact					0.01		0.0045		0.1579
PtRPBactFung					0.01		0.0075		0.1902
PtRPBFNOHoag					0.00		0.0057		0.0543
PtRPBFNOMin					0.00		0.0027		0.1560
STE 6 months (BGB)	**STE**	**STE**			**Weight**		**Stdev C**		**Stdev N**
StRPBact	14.5	-----	21.2		0.01		0.0053		0.0708
StRPBactFung	38.0	7.82			0.02		0.0136		0.1516
StRPBFNOHoag	5.3	3.16			0.01		0.0040		0.0447
StRPBFNOMin	19.0	1.78			0.01		0.0108		0.1772
PtRPBact	26.1	-----	4.45		0.01		0.0105		0.2037
PtRPBactFung	27.6	8.86			0.01		0.0107		0.2292
PtRPBFNOHoag	37.0	2.96			0.00		0.0029		0.0310
PtRPBFNOMin	2.4	2.13			0.01		0.0067		0.1097

Table K-10 (cont.): Average values of dry weight, carbon content, nitrogen content, root length, and ectomycorrhizal root length were computed for above- and below-ground as applied. Root:Shoot ratio was also reported. Standard errors were estimated for all, this table shows the 9 months values.

Average 9 months (AGB)					**Weight**	**C%**	**C (g)**	**N%**	**N (mg)**
StRPBact					0.12	47%	0.0523	0.8%	0.8777
StRPBactFung					0.09	48%	0.0449	0.7%	0.6630
StRPBFNOHoag					0.06	49%	0.0320	0.5%	0.2910
StRPBFNOMin					0.06	51%	0.0284	1.0%	0.5523
PtRPBact					0.11	50%	0.0533	0.9%	0.9437
PtRPBactFung					0.10	48%	0.0516	0.7%	0.7248
PtRPBFNOHoag					0.04	50%	0.0208	0.5%	0.2141
PtRPBFNOMin					0.05	51%	0.0280	1.1%	0.5896
Average 9 months (BGB)	**Ave. Root ler**	**AveEM Root**	**EM %**	**Root:Shoot r**	**Weight**	**C%**	**C (g)**	**N%**	**N (mg)**
StRPBact	602.6	-----	0	2.64	0.31	46%	0.0760	0.6%	0.9889
StRPBactFung	347.4	70.36	20	2.40	0.22	43%	0.0591	0.6%	0.8079
StRPBFNOHoag	165.8	32.29	19	1.95	0.13	39%	0.0413	0.4%	0.4687
StRPBFNOMin	147.6	15.70	11	2.65	0.15	42%	0.0482	0.8%	0.8708
PtRPBact	507.1	-----	0	2.84	0.30	59%	0.0822	0.8%	1.0858
PtRPBactFung	532.6	17.63	3	3.90	0.41	48%	0.0978	0.6%	1.3033
PtRPBFNOHoag	164.5	14.41	9	2.82	0.12	54%	0.0354	0.6%	0.3788
PtRPBFNOMin	188.7	14.49	8	3.10	0.17	51%	0.0647	0.9%	1.1031
STE 9 months (AGB)					**Weight**		**Stdev C**		**Stdev N**
StRPBact					0.01		0.0182		0.3667
StRPBactFung					0.01		0.0120		0.2088
StRPBFNOHoag					0.01		0.0105		0.0821
StRPBFNOMin					0.00		0.0046		0.1113
PtRPBact					0.02		0.0180		0.3649
PtRPBactFung					0.01		0.0099		0.1629
PtRPBFNOHoag					0.00		0.0023		0.0313
PtRPBFNOMin					0.01		0.0082		0.2069
STE 9 months (BGB)	**STE**	**STE**			**Weight**		**Stdev C**		**Stdev N**
StRPBact	54.4	-----	32.3		0.02		0.0372		0.4362
StRPBactFung	49.2	14.89			0.02		0.0247		0.2994
StRPBFNOHoag	15.5	3.70			0.01		0.0194		0.2108
StRPBFNOMin	12.9	2.34			0.01		0.0133		0.2327
PtRPBact	68.3	-----	4.93		0.01		0.0431		0.5742
PtRPBactFung	40.9	3.12			0.16		0.0551		0.7767
PtRPBFNOHoag	5.7	2.90			0.01		0.0143		0.1336
PtRPBFNOMin	11.2	2.66			0.02		0.0104		0.2349

Table K-10 (cont.): Average values of dry weight, carbon content, nitrogen content, root length, and ectomycorrhizal root length were computed for above- and below-ground as applied. Root:Shoot ratio was also reported. Standard errors were estimated for all, this table shows the 12 months values.

Average 12 months (AGB)					Weight	C%	C (g)	N%	N (mg)
StRPBact					0.13	49%	0.0695	0.7%	1.0216
StRPBactFung					0.15	48%	0.0741	0.7%	1.0290
StRPBFNOHoag					0.05	55%	0.0289	0.6%	0.3036
StRPBFNOMin					0.03	50%	0.0178	1.2%	0.4145
PtRPBact					0.13	51%	0.0626	0.7%	0.8659
PtRPBactFung					0.15	50%	0.0733	0.6%	0.9095
PtRPBFNOHoag					0.05	58%	0.0308	0.5%	0.2570
PtRPBFNOMin					0.05	58%	0.0351	1.0%	0.6487
Average 12 months (BGB)	**Ave. Root ler**	**AveEM Root**	**EM %**	**Root:Shoot r**	**Weight**	**C%**	**C (g)**	**N%**	**N (mg)**
StRPBact	537.9	-----	0	1.94	0.26	53%	0.1078	0.6%	1.2196
StRPBactFung	405.6	92.33	23	2.28	0.34	68%	0.0941	0.9%	1.3304
StRPBFNOHoag	181.3	37.71	21	2.85	0.13	48%	0.0484	0.5%	0.4918
StRPBFNOMin	133.11	12.04	9	2.95	0.10	56%	0.0436	1.0%	0.7669
PtRPBact	626.4	-----	0	2.20	0.28	55%	0.1236	0.6%	1.3723
PtRPBactFung	645.8	15.93	2	3.08	0.45	40%	0.1578	0.4%	1.6692
PtRPBFNOHoag	228.2	15.31	7	2.55	0.13	51%	0.0586	0.5%	0.5635
PtRPBFNOMin	197.6	7.85	4	3.06	0.16	54%	0.0548	0.8%	0.8149
STE 12 months (AGB)					**Weight**		**Stdev C**		**Stdev N**
StRPBact					0.03		0.0363		0.5640
StRPBactFung					0.03		0.0367		0.4467
StRPBFNOHoag					0.00		0.0129		0.1481
StRPBFNOMin					0.01		0.0104		0.2613
PtRPBact					0.01		0.0099		0.1791
PtRPBactFung					0.02		0.0226		0.2946
PtRPBFNOHoag					0.00		0.0191		0.1763
PtRPBFNOMin					0.01		0.0185		0.5339
STE 12 months (BGB)	**STE**	**STE**			**Weight**		**Stdev C**		**Stdev N**
StRPBact	99.8	-----	49.9		0.03		0.0474		0.4928
StRPBactFung	48.9	9.11			0.06		0.0222		0.4333
StRPBFNOHoag	6.9	8.25			0.01		0.0104		0.1019
StRPBFNOMin	16.48	3.95			0.01		0.0154		0.2889
PtRPBact	79.8	-----	5.39		0.03		0.0362		0.3439
PtRPBactFung	104.5	5.06			0.14		0.0246		0.2303
PtRPBFNOHoag	17.1	3.70			0.01		0.0124		0.1302
PtRPBFNOMin	25.9	2.27			0.02		0.0113		0.2354

Table K-11: Chemical denudation and weathering fluxes were estimated using the following data for 0-6, 6-9, 9-12 time intervals (all in mol). Standard error was estimated for all treatments.
A) Inputs

Input	mol	mol	mol	STE	STE	STE
0-6 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	2.22E-06	2.43E-07	5.78E-07	1.11E-07	1.22E-08	2.89E-08
StBacteria	7.04E-07	7.55E-08	1.27E-07	3.52E-08	3.78E-09	6.34E-09
StFungi	1.56E-06	4.38E-06	1.79E-06	7.78E-08	2.19E-07	8.93E-08
StRPBact	2.62E-06	4.40E-06	4.71E-06	1.31E-07	2.20E-07	2.35E-07
StRPBactFung	1.64E-06	7.86E-06	5.53E-06	8.19E-08	3.93E-07	2.76E-07
StRPBFNOHoag	1.11E-06	7.86E-06	5.53E-06	5.53E-08	3.93E-07	2.76E-07
StRPBFNOMin	1.64E-06	7.86E-06	5.53E-06	8.19E-08	3.93E-07	2.76E-07
PtBacteria	8.45E-07	1.06E-07	6.32E-07	4.22E-08	5.29E-09	3.16E-08
PtFungi	1.40E-06	1.93E-06	8.58E-07	7.00E-08	9.67E-08	4.29E-08
PtRPBact	2.76E-06	4.43E-06	5.21E-06	1.38E-07	2.21E-07	2.61E-07
PtRPBactFung	1.95E-06	1.73E-05	5.96E-06	9.75E-08	8.65E-07	2.98E-07
PtRPBFNOHoag	1.42E-06	1.73E-05	5.96E-06	7.09E-08	8.65E-07	2.98E-07
PtRPBFNOMin	1.95E-06	1.73E-05	5.96E-06	9.75E-08	8.65E-07	2.98E-07
6-9 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	4.74E-07	0.00E+00	1.18E-08	2.37E-08	0.00E+00	5.91E-10
StBacteria	4.86E-07	2.31E-08	9.83E-09	2.43E-08	1.16E-09	4.91E-10
StFungi	5.12E-07	0.00E+00	0.00E+00	2.56E-08	0.00E+00	0.00E+00
StRPBact	4.65E-07	0.00E+00	0.00E+00	2.33E-08	0.00E+00	0.00E+00
StRPBactFung	4.65E-07	0.00E+00	0.00E+00	2.33E-08	0.00E+00	0.00E+00
StRPBFNOHoag	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
StRPBFNOMin	4.65E-07	0.00E+00	0.00E+00	2.33E-08	0.00E+00	0.00E+00
PtBacteria	4.86E-07	2.31E-08	9.83E-09	2.43E-08	1.16E-09	4.91E-10
PtFungi	5.12E-07	0.00E+00	0.00E+00	2.56E-08	0.00E+00	0.00E+00
PtRPBact	4.65E-07	0.00E+00	0.00E+00	2.33E-08	0.00E+00	0.00E+00
PtRPBactFung	4.65E-07	0.00E+00	0.00E+00	2.33E-08	0.00E+00	0.00E+00
PtRPBFNOHoag	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PtRPBFNOMin	4.65E-07	0.00E+00	0.00E+00	2.33E-08	0.00E+00	0.00E+00
9-12 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	4.03E-07	0.00E+00	5.91E-09	2.02E-08	0.00E+00	2.96E-10
StBacteria	4.17E-07	1.16E-08	4.91E-09	2.08E-08	5.78E-10	2.46E-10
StFungi	4.30E-07	0.00E+00	0.00E+00	2.15E-08	0.00E+00	0.00E+00
StRPBact	4.01E-07	1.16E-08	4.91E-09	2.01E-08	5.78E-10	2.46E-10
StRPBactFung	3.99E-07	0.00E+00	0.00E+00	1.99E-08	0.00E+00	0.00E+00
StRPBFNOHoag	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
StRPBFNOMin	3.99E-07	0.00E+00	0.00E+00	1.99E-08	0.00E+00	0.00E+00
PtBacteria	4.17E-07	1.16E-08	4.91E-09	2.08E-08	5.78E-10	2.46E-10
PtFungi	4.30E-07	0.00E+00	0.00E+00	2.15E-08	0.00E+00	0.00E+00
PtRPBact	4.01E-07	1.16E-08	4.91E-09	2.01E-08	5.78E-10	2.46E-10
PtRPBactFung	3.99E-07	0.00E+00	0.00E+00	1.99E-08	0.00E+00	0.00E+00
PtRPBFNOHoag	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PtRPBFNOMin	3.99E-07	0.00E+00	0.00E+00	1.99E-08	0.00E+00	0.00E+00

Table K-11 (cont.): Chemical denudation and weathering fluxes were estimated using the following data for 6-12 and 1 year time intervals (all in mol). Standard error was estimated for all treatments.

A) Inputs

Input	**mol**	**mol**	**mol**	**STE**	**STE**	**STE**
6-12 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	8.77E-07	0.00E+00	1.77E-08	4.38E-08	0.00E+00	8.87E-10
StBacteria	9.02E-07	3.47E-08	1.47E-08	4.51E-08	1.73E-09	7.37E-10
StFungi	9.42E-07	0.00E+00	0.00E+00	4.71E-08	0.00E+00	0.00E+00
StRPBact	8.66E-07	1.16E-08	4.91E-09	4.33E-08	5.78E-10	2.46E-10
StRPBactFung	8.64E-07	0.00E+00	0.00E+00	4.32E-08	0.00E+00	0.00E+00
StRPBFNOHoag	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
StRPBFNOMin	8.64E-07	0.00E+00	0.00E+00	4.32E-08	0.00E+00	0.00E+00
PtBacteria	9.02E-07	3.47E-08	1.47E-08	4.51E-08	1.73E-09	7.37E-10
PtFungi	9.42E-07	0.00E+00	0.00E+00	4.71E-08	0.00E+00	0.00E+00
PtRPBact	8.66E-07	1.16E-08	4.91E-09	4.33E-08	5.78E-10	2.46E-10
PtRPBactFung	8.64E-07	0.00E+00	0.00E+00	4.32E-08	0.00E+00	0.00E+00
PtRPBFNOHoag	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PtRPBFNOMin	8.64E-07	0.00E+00	0.00E+00	4.32E-08	0.00E+00	0.00E+00
1 year	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	3.10E-06	2.43E-07	5.96E-07	1.55E-07	1.22E-08	2.98E-08
StBacteria	1.61E-06	1.10E-07	1.42E-07	8.03E-08	5.51E-09	7.08E-09
StFungi	2.50E-06	4.38E-06	1.79E-06	1.25E-07	2.19E-07	8.93E-08
StRPBact	3.49E-06	4.41E-06	4.71E-06	1.74E-07	2.21E-07	2.36E-07
StRPBactFung	2.50E-06	7.86E-06	5.53E-06	1.25E-07	3.93E-07	2.76E-07
StRPBFNOHoag	1.11E-06	7.86E-06	5.53E-06	5.53E-08	3.93E-07	2.76E-07
StRPBFNOMin	2.50E-06	7.86E-06	5.53E-06	1.25E-07	3.93E-07	2.76E-07
PtBacteria	1.75E-06	1.41E-07	6.47E-07	8.74E-08	7.03E-09	3.23E-08
PtFungi	2.34E-06	1.93E-06	8.58E-07	1.17E-07	9.67E-08	4.29E-08
PtRPBact	3.63E-06	4.44E-06	5.22E-06	1.81E-07	2.22E-07	2.61E-07
PtRPBactFung	2.81E-06	1.73E-05	5.96E-06	1.41E-07	8.65E-07	2.98E-07
PtRPBFNOHoag	1.42E-06	1.73E-05	5.96E-06	7.09E-08	8.65E-07	2.98E-07
PtRPBFNOMin	2.81E-06	1.73E-05	5.96E-06	1.41E-07	8.65E-07	2.98E-07

Table K-11 (cont.): Chemical denudation and weathering fluxes were estimated using the following data for 0-6, 6-9, 9-12 time intervals (all in mol). Standard error was estimated for all treatments.

B) Drainage

Drainage	**mol**	**mol**	**mol**	**STE**	**STE**	**STE**
0-6 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	2.7E-04	8.3E-05	7.4E-05	4.5E-05	1.4E-05	9.1E-06
StBacteria	3.6E-03	1.8E-04	1.7E-03	2.1E-04	1.7E-05	1.3E-04
StFungi	2.3E-03	1.7E-04	9.6E-04	1.6E-04	1.9E-05	1.4E-04
StRPBact	2.5E-04	7.0E-05	5.4E-05	6.8E-05	8.3E-06	7.1E-06
StRPBactFung	2.3E-04	7.5E-05	5.2E-05	4.3E-05	4.8E-06	4.6E-06
StRPBFNOHoag	3.1E-04	8.8E-05	6.9E-05	7.6E-05	8.6E-06	6.0E-06
StRPBFNOMin	1.6E-05	6.7E-05	1.8E-05	7.4E-06	6.2E-06	2.2E-06
PtBacteria	2.3E-03	1.7E-04	8.2E-04	1.1E-04	1.4E-05	4.3E-05
PtFungi	2.6E-03	1.9E-04	1.1E-03	1.7E-04	2.0E-05	7.9E-05
PtRPBact	2.5E-04	6.8E-05	5.5E-05	7.4E-05	6.8E-06	6.0E-06
PtRPBactFung	2.3E-04	9.7E-05	5.0E-05	5.0E-05	8.9E-06	4.3E-06
PtRPBFNOHoag	3.0E-04	1.2E-04	6.9E-05	6.1E-05	1.3E-05	6.1E-06
PtRPBFNOMin	9.2E-06	6.9E-05	1.7E-05	1.0E-06	7.7E-06	1.4E-06
6-9 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	1.7E-05	1.3E-05	5.6E-06	2.3E-06	1.1E-06	3.0E-07
StBacteria	1.9E-05	1.4E-05	1.0E-05	4.3E-06	5.9E-07	2.0E-06
StFungi	3.4E-05	1.4E-05	1.4E-05	1.3E-05	2.8E-06	3.8E-06
StRPBact	9.6E-06	1.3E-05	4.3E-06	4.0E-06	3.5E-07	9.4E-08
StRPBactFung	6.7E-06	1.3E-05	4.2E-06	1.8E-06	1.0E-06	2.5E-07
StRPBFNOHoag	2.1E-05	1.4E-05	6.7E-06	2.8E-06	9.3E-07	3.6E-07
StRPBFNOMin	2.2E-06	1.6E-05	5.6E-06	9.2E-08	4.9E-07	1.6E-07
PtBacteria	2.8E-05	1.3E-05	1.2E-05	6.9E-06	1.5E-06	2.6E-06
PtFungi	3.0E-05	1.4E-05	1.3E-05	7.3E-06	1.9E-06	2.7E-06
PtRPBact	9.2E-06	1.4E-05	4.2E-06	2.2E-06	5.6E-07	9.0E-08
PtRPBactFung	5.9E-06	1.2E-05	3.7E-06	1.7E-06	1.7E-06	4.9E-07
PtRPBFNOHoag	2.3E-05	1.4E-05	6.3E-06	2.9E-06	1.3E-06	6.3E-07
PtRPBFNOMin	2.2E-06	1.7E-05	5.5E-06	1.9E-07	1.2E-06	3.2E-07
9-12 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	6.8E-06	7.6E-06	2.5E-06	6.0E-07	4.3E-07	1.1E-07
StBacteria	3.3E-06	9.1E-06	3.0E-06	6.6E-07	5.7E-07	2.5E-07
StFungi	1.2E-05	9.3E-06	4.4E-06	3.0E-06	4.1E-07	7.6E-07
StRPBact	2.0E-06	8.1E-06	2.6E-06	4.8E-07	3.2E-07	1.0E-07
StRPBactFung	2.9E-06	8.7E-06	2.8E-06	2.7E-07	2.4E-07	7.6E-08
StRPBFNOHoag	9.1E-06	7.2E-06	3.4E-06	1.0E-06	4.3E-07	3.0E-07
StRPBFNOMin	6.3E-07	1.1E-05	3.4E-06	1.3E-07	2.1E-07	6.8E-08
PtBacteria	1.6E-05	8.2E-06	1.0E-05	4.0E-06	1.2E-06	3.4E-06
PtFungi	7.7E-06	9.7E-06	4.3E-06	1.1E-06	2.0E-07	6.5E-07
PtRPBact	1.1E-06	8.6E-06	2.7E-06	2.0E-07	4.5E-07	9.3E-08
PtRPBactFung	9.0E-07	6.3E-06	2.0E-06	1.8E-07	3.6E-07	1.1E-07
PtRPBFNOHoag	9.5E-06	7.4E-06	3.0E-06	5.9E-07	3.9E-07	2.1E-07
PtRPBFNOMin	4.3E-07	1.0E-05	3.4E-06	1.2E-07	4.7E-07	1.5E-07

Table K-11 (cont.): Chemical denudation and weathering fluxes were estimated using the following data for 6-12 and 1 year time intervals (all in mol). Standard error was estimated for all treatments.

B) Drainage

Drainage	**mol**	**mol**	**mol**	**STE**	**STE**	**STE**
6-12 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	2.41E-05	2.05E-05	8.14E-06	2.89E-06	1.51E-06	4.11E-07
StBacteria	2.19E-05	2.28E-05	1.33E-05	4.95E-06	1.16E-06	2.29E-06
StFungi	4.55E-05	2.28E-05	1.83E-05	1.55E-05	3.17E-06	4.58E-06
StRPBact	1.17E-05	2.14E-05	6.85E-06	4.43E-06	6.64E-07	1.99E-07
StRPBactFung	9.66E-06	2.21E-05	6.98E-06	2.08E-06	1.27E-06	3.24E-07
StRPBFNOHoag	3.02E-05	2.08E-05	1.01E-05	3.81E-06	1.36E-06	6.59E-07
StRPBFNOMin	2.83E-06	2.66E-05	9.09E-06	2.18E-07	7.04E-07	2.29E-07
PtBacteria	4.35E-05	2.13E-05	2.20E-05	1.09E-05	2.77E-06	6.02E-06
PtFungi	3.79E-05	2.33E-05	1.72E-05	8.42E-06	2.09E-06	3.36E-06
PtRPBact	1.03E-05	2.24E-05	6.92E-06	2.38E-06	1.02E-06	1.83E-07
PtRPBactFung	6.77E-06	1.79E-05	5.69E-06	1.84E-06	2.01E-06	6.01E-07
PtRPBFNOHoag	3.29E-05	2.13E-05	9.26E-06	3.49E-06	1.73E-06	8.35E-07
PtRPBFNOMin	2.61E-06	2.73E-05	8.85E-06	3.09E-07	1.62E-06	4.66E-07
1 year	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	2.94E-04	1.03E-04	8.17E-05	4.81E-05	1.58E-05	9.46E-06
StBacteria	3.66E-03	2.03E-04	1.68E-03	2.16E-04	1.82E-05	1.30E-04
StFungi	2.36E-03	1.96E-04	9.80E-04	1.79E-04	2.19E-05	1.40E-04
StRPBact	2.57E-04	9.18E-05	6.09E-05	7.24E-05	9.00E-06	7.29E-06
StRPBactFung	2.40E-04	9.69E-05	5.91E-05	4.56E-05	6.03E-06	4.95E-06
StRPBFNOHoag	3.44E-04	1.09E-04	7.87E-05	7.97E-05	9.99E-06	6.66E-06
StRPBFNOMin	1.92E-05	9.39E-05	2.69E-05	7.57E-06	6.87E-06	2.46E-06
PtBacteria	2.33E-03	1.90E-04	8.37E-04	1.26E-04	1.70E-05	4.88E-05
PtFungi	2.67E-03	2.10E-04	1.10E-03	1.76E-04	2.20E-05	8.22E-05
PtRPBact	2.61E-04	9.01E-05	6.19E-05	7.66E-05	7.81E-06	6.20E-06
PtRPBactFung	2.41E-04	1.15E-04	5.57E-05	5.22E-05	1.09E-05	4.87E-06
PtRPBFNOHoag	3.33E-04	1.43E-04	7.85E-05	6.49E-05	1.49E-05	6.98E-06
PtRPBFNOMin	1.18E-05	9.66E-05	2.54E-05	1.35E-06	9.30E-06	1.84E-06

Table K-11 (cont.): Chemical denudation and weathering fluxes were estimated using the following data for 0-6, 6-9, 9-12 time intervals (all in mol). Standard error was estimated for all treatments.

C) Change in tree-biomass pool

Change in Biomass	**mol**	**mol**	**mol**	**STE**	**STE**	**STE**
0-6 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
StBacteria	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
StFungi	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
StRPBact	2.26E-05	2.69E-05	3.54E-05	1.83E-06	2.04E-06	4.52E-06
StRPBactFung	1.65E-05	1.77E-05	2.01E-05	2.59E-06	1.96E-06	2.13E-06
StRPBFNOHoag	9.78E-06	1.21E-05	1.46E-05	1.06E-06	1.62E-06	2.54E-06
StRPBFNOMin	8.38E-07	2.82E-06	1.58E-06	1.00E-07	2.57E-07	2.50E-07
PtBacteria	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
PtFungi	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
PtRPBact	1.68E-05	2.13E-05	3.11E-05	1.90E-06	2.32E-06	7.24E-06
PtRPBactFung	2.22E-05	2.81E-05	3.43E-05	1.99E-06	2.97E-06	5.47E-06
PtRPBFNOHoag	1.33E-05	1.63E-05	1.93E-05	1.81E-06	1.15E-06	2.54E-06
PtRPBFNOMin	6.27E-07	3.13E-06	1.26E-06	5.70E-08	4.13E-07	8.56E-08
6-9 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
StBacteria	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
StFungi	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
StRPBact	6.90E-05	2.25E-05	4.90E-05	1.6E-06	8.5E-06	2.5E-05
StRPBactFung	3.23E-05	2.22E-05	1.56E-05	2.0E-05	1.1E-05	3.6E-05
StRPBFNOHoag	4.11E-06	4.52E-06	1.40E-05	3.3E-06	1.9E-06	9.7E-06
StRPBFNOMin	4.14E-07	1.00E-06	9.21E-07	1.4E-07	2.5E-07	1.1E-07
PtBacteria	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
PtFungi	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
PtRPBact	3.29E-05	8.75E-06	8.06E-06	2.4E-05	5.9E-06	1.4E-05
PtRPBactFung	8.92E-06	1.85E-05	3.73E-05	2.4E-05	1.1E-05	2.0E-05
PtRPBFNOHoag	-5.18E-06	-3.40E-06	-6.41E-07	4.2E-07	2.8E-06	7.4E-06
PtRPBFNOMin	4.85E-07	1.57E-06	9.25E-07	1.0E-07	3.0E-07	8.2E-08
9-12 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
StBacteria	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
StFungi	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
StRPBact	-5.09E-05	-2.32E-06	-3.31E-05	1.2E-05	9.5E-06	2.0E-05
StRPBactFung	1.09E-05	4.68E-06	2.07E-05	1.1E-05	8.7E-06	8.6E-06
StRPBFNOHoag	7.08E-06	4.89E-06	2.68E-06	2.7E-06	5.3E-06	8.9E-06
StRPBFNOMin	3.49E-07	-8.41E-07	-2.11E-07	3.9E-07	8.6E-07	5.7E-07
PtBacteria	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
PtFungi	0.00E+00	0.00E+00	0.00E+00	0.0E+00	0.0E+00	0.0E+00
PtRPBact	-1.56E-05	1.22E-05	-2.89E-06	5.7E-06	5.0E-06	4.8E-06
PtRPBactFung	1.58E-05	2.18E-05	9.44E-07	1.4E-05	1.5E-05	2.4E-05
PtRPBFNOHoag	8.42E-06	7.95E-06	3.75E-06	2.3E-06	3.2E-06	5.6E-06
PtRPBFNOMin	8.84E-07	1.16E-06	7.49E-07	4.0E-07	1.2E-06	5.3E-07

Table K-11 (cont.): Chemical denudation and weathering fluxes were estimated using the following data for 6-12 and 1 year time intervals (all in mol). Standard error was estimated for all treatments.

C) Change in tree-biomass pool

Change in Biomass	**mol**	**mol**	**mol**	**STE**	**STE**	**STE**
6-12 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
StBacteria	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
StFungi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
StRPBact	1.82E-05	2.02E-05	1.59E-05	1.04E-05	7.43E-06	1.50E-05
StRPBactFung	4.32E-05	2.69E-05	3.63E-05	8.11E-06	6.69E-06	6.43E-06
StRPBFNOHoag	1.12E-05	9.41E-06	1.67E-05	1.60E-06	3.67E-06	6.39E-06
StRPBFNOMin	7.63E-07	1.62E-07	7.10E-07	2.88E-07	6.07E-07	3.25E-07
PtBacteria	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PtFungi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PtRPBact	1.73E-05	2.10E-05	5.17E-06	3.77E-06	2.68E-06	7.24E-06
PtRPBactFung	2.48E-05	4.03E-05	3.82E-05	1.20E-05	1.23E-05	1.89E-05
PtRPBFNOHoag	3.24E-06	4.55E-06	3.11E-06	4.81E-07	2.06E-06	3.05E-06
PtRPBFNOMin	1.37E-06	2.73E-06	1.67E-06	3.41E-07	7.63E-07	4.44E-07
1 year	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
StBacteria	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
StFungi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
StRPBact	4.07E-05	4.72E-05	5.13E-05	1.22E-05	9.47E-06	1.96E-05
StRPBactFung	5.97E-05	4.45E-05	5.63E-05	1.07E-05	8.66E-06	8.56E-06
StRPBFNOHoag	2.10E-05	2.15E-05	3.12E-05	2.67E-06	5.29E-06	8.93E-06
StRPBFNOMin	1.60E-06	2.98E-06	2.29E-06	3.88E-07	8.64E-07	5.75E-07
PtBacteria	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PtFungi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PtRPBact	3.41E-05	4.23E-05	3.62E-05	5.66E-06	5.00E-06	4.82E-06
PtRPBactFung	4.70E-05	6.84E-05	7.25E-05	1.40E-05	1.53E-05	2.44E-05
PtRPBFNOHoag	1.66E-05	2.08E-05	2.24E-05	2.29E-06	3.21E-06	5.59E-06
PtRPBFNOMin	2.00E-06	5.86E-06	2.93E-06	3.98E-07	1.18E-06	5.30E-07

Table K-11 (cont.): Chemical denudation and weathering fluxes were estimated using the following data for 0-6, 6-9, 9-12 time intervals (all in mol). Standard error was estimated for all treatments.

D) Change on soil-exchangeable cation sites

Change on soil-exch.	**mol**	**mol**	**mol**	**STE**	**STE**	**STE**
0-6 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	-3.02E-05	1.26E-05	-1.42E-05	9.18E-06	2.18E-06	3.22E-07
StBacteria	-5.58E-05	1.10E-05	-1.28E-05	2.57E-06	7.53E-07	7.58E-07
StFungi	-5.70E-05	1.42E-05	-1.36E-05	5.02E-07	2.13E-06	8.90E-07
StRPBact	-3.64E-05	1.06E-05	-1.41E-05	4.20E-06	2.06E-07	1.71E-07
StRPBactFung	-2.48E-05	1.05E-05	-1.33E-05	4.52E-06	2.36E-07	1.20E-06
StRPBFNOHoag	-2.98E-05	0.00E+00	-1.40E-05	2.78E-06	6.52E-09	7.97E-07
StRPBFNOMin	-7.49E-05	0.00E+00	-1.89E-05	5.96E-07	0.00E+00	7.29E-08
PtBacteria	-5.51E-05	1.09E-05	-1.35E-05	1.07E-06	5.77E-09	6.33E-07
PtFungi	-5.64E-05	1.08E-05	-1.35E-05	2.69E-06	1.78E-07	1.10E-06
PtRPBact	-3.55E-05	1.15E-05	-1.32E-05	8.69E-06	1.26E-06	1.31E-06
PtRPBactFung	-2.87E-05	1.07E-05	-1.33E-05	1.02E-05	2.18E-07	4.42E-07
PtRPBFNOHoag	-3.09E-05	0.00E+00	-1.30E-05	4.88E-06	1.94E-07	8.42E-07
PtRPBFNOMin	2.39E-07	0.00E+00	1.62E-07	4.91E-07	0.00E+00	2.65E-08
6-9 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	-1.09E-05	2.85E-06	1.00E-06	1.53E-06	4.90E-06	1.94E-07
StBacteria	-2.26E-06	3.61E-07	-9.40E-07	3.91E-06	7.00E-07	6.45E-07
StFungi	-9.32E-06	-3.54E-06	-2.16E-06	5.96E-07	2.39E-07	4.09E-07
StRPBact	-8.36E-06	-1.61E-07	-9.75E-07	5.43E-06	1.80E-07	4.03E-07
StRPBactFung	-2.11E-05	1.40E-05	-1.15E-06	2.76E-06	1.29E-05	6.25E-07
StRPBFNOHoag	-1.69E-05	0.00E+00	8.71E-08	2.79E-06	0.00E+00	6.01E-07
StRPBFNOMin	-2.10E-06	0.00E+00	-1.76E-06	0.00E+00	0.00E+00	0.00E+00
PtBacteria	-8.85E-07	1.50E-06	-7.95E-08	3.01E-06	1.87E-06	6.86E-07
PtFungi	6.62E-06	3.08E-06	4.44E-07	6.84E-06	2.90E-06	1.22E-06
PtRPBact	-7.09E-06	-1.08E-06	-1.84E-06	3.16E-06	1.79E-07	5.69E-07
PtRPBactFung	-8.55E-06	3.32E-07	3.80E-07	2.47E-06	4.92E-08	3.97E-07
PtRPBFNOHoag	-9.33E-06	0.00E+00	-1.11E-06	3.46E-06	0.00E+00	4.89E-07
PtRPBFNOMin	-2.39E-06	0.00E+00	-1.62E-06	0.00E+00	0.00E+00	0.00E+00
9-12 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	3.62E-06	-8.24E-07	5.47E-06	1.68E-05	2.85E-06	2.44E-06
StBacteria	1.61E-05	2.27E-05	9.31E-06	2.28E-06	1.70E-06	6.35E-07
StFungi	2.68E-05	1.86E-05	5.25E-06	9.70E-06	4.97E-06	2.41E-06
StRPBact	7.01E-06	8.27E-06	5.44E-06	7.61E-06	2.12E-06	4.83E-07
StRPBactFung	3.23E-05	-5.64E-06	9.20E-06	2.53E-06	4.33E-06	1.52E-06
StRPBFNOHoag	1.71E-05	9.96E-06	8.20E-06	3.91E-06	1.60E-06	2.76E-06
StRPBFNOMin	2.36E-06	0.00E+00	2.51E-06	2.14E-06	2.41E-06	1.02E-06
PtBacteria	2.43E-06	1.15E-05	2.83E-06	5.63E-06	3.26E-06	1.99E-06
PtFungi	1.34E-05	1.49E-05	9.26E-06	9.11E-06	4.24E-06	2.23E-06
PtRPBact	4.30E-07	1.09E-05	3.86E-06	7.35E-06	1.16E-06	1.79E-06
PtRPBactFung	2.18E-05	8.84E-06	4.21E-06	5.10E-06	5.36E-06	2.63E-06
PtRPBFNOHoag	8.06E-06	7.85E-06	5.56E-06	6.67E-06	2.18E-06	1.69E-06
PtRPBFNOMin	1.94E-06	0.00E+00	2.34E-06	1.01E-06	1.15E-06	3.09E-07

Table K-11 (cont.): Chemical denudation and weathering fluxes were estimated using the following data for 6-12 and 1 year time intervals (all in mol). Standard error was estimated for all treatments.

D) Change on soil-exchangeable cation sites

Change in soil-exch.	**mol**	**mol**	**mol**	**STE**	**STE**	**STE**
6-12 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	-7.28E-06	2.02E-06	6.47E-06	1.07E-05	7.08E-06	5.17E-07
StBacteria	1.39E-05	2.31E-05	8.37E-06	6.49E-06	1.45E-06	1.40E-06
StFungi	1.75E-05	1.51E-05	3.09E-06	1.10E-06	2.37E-06	1.30E-06
StRPBact	-1.35E-06	8.11E-06	4.47E-06	9.63E-06	3.86E-07	5.75E-07
StRPBactFung	1.12E-05	8.31E-06	8.05E-06	7.28E-06	1.31E-05	1.82E-06
StRPBFNOHoag	1.84E-07	9.96E-06	8.28E-06	5.58E-06	6.52E-09	1.40E-06
StRPBFNOMin	2.56E-07	0.00E+00	7.50E-07	5.96E-07	0.00E+00	7.29E-08
PtBacteria	1.54E-06	1.30E-05	2.75E-06	4.08E-06	1.87E-06	1.32E-06
PtFungi	2.00E-05	1.80E-05	9.71E-06	9.53E-06	3.07E-06	2.32E-06
PtRPBact	-6.66E-06	9.81E-06	2.02E-06	1.18E-05	1.44E-06	1.88E-06
PtRPBactFung	1.33E-05	9.17E-06	4.59E-06	1.27E-05	2.67E-07	8.39E-07
PtRPBFNOHoag	-1.27E-06	7.85E-06	4.45E-06	8.35E-06	1.94E-07	1.33E-06
PtRPBFNOMin	-4.50E-07	0.00E+00	7.19E-07	4.91E-07	0.00E+00	2.65E-08
1 year	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	3.95E-05	1.46E-05	1.29E-05	1.68E-05	2.85E-06	2.44E-06
StBacteria	3.51E-05	3.40E-05	1.62E-05	2.28E-06	1.70E-06	6.35E-07
StFungi	3.75E-05	2.93E-05	1.01E-05	9.70E-06	4.97E-06	2.41E-06
StRPBact	3.92E-05	1.87E-05	1.10E-05	7.61E-06	2.12E-06	4.83E-07
StRPBactFung	6.34E-05	1.88E-05	1.54E-05	2.53E-06	4.33E-06	1.52E-06
StRPBFNOHoag	4.74E-05	9.96E-06	1.49E-05	3.91E-06	1.60E-06	2.76E-06
StRPBFNOMin	2.36E-06	0.00E+00	2.51E-06	2.14E-06	2.41E-06	1.02E-06
PtBacteria	2.34E-05	2.39E-05	9.91E-06	5.63E-06	3.26E-06	1.99E-06
PtFungi	4.05E-05	2.88E-05	1.68E-05	9.11E-06	4.24E-06	2.23E-06
PtRPBact	3.48E-05	2.13E-05	9.43E-06	7.35E-06	1.16E-06	1.79E-06
PtRPBactFung	6.15E-05	1.98E-05	1.19E-05	5.10E-06	5.36E-06	2.63E-06
PtRPBFNOHoag	4.48E-05	7.85E-06	1.21E-05	6.67E-06	2.18E-06	1.69E-06
PtRPBFNOMin	1.94E-06	0.00E+00	2.34E-06	1.01E-06	1.15E-06	3.09E-07

Table K-11 (cont.): Chemical denudation and weathering fluxes were estimated using the following data for 0-6, 6-9, 9-12 time intervals (all in mol). Standard error was estimated for all treatments.

E) Chemical denudation in mol; Denudation=Drainage – Inputs

Denudation	**mol**	**mol**	**mol**	**STE**	**STE**	**STE**
0-6 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	2.7E-04	8.2E-05	7.3E-05	4.5E-05	1.4E-05	9.0E-06
StBacteria	3.6E-03	1.8E-04	1.7E-03	2.1E-04	1.7E-05	1.3E-04
StFungi	2.3E-03	1.7E-04	9.6E-04	1.6E-04	1.9E-05	1.4E-04
StRPBact	2.4E-04	6.6E-05	4.9E-05	6.8E-05	8.1E-06	6.9E-06
StRPBactFung	2.3E-04	6.7E-05	4.7E-05	4.3E-05	4.4E-06	4.3E-06
StRPBFNOHoag	3.1E-04	8.0E-05	6.3E-05	7.6E-05	8.2E-06	5.7E-06
StRPBFNOMin	1.5E-05	5.9E-05	1.2E-05	7.3E-06	5.8E-06	2.0E-06
PtBacteria	2.3E-03	1.7E-04	8.1E-04	1.1E-04	1.4E-05	4.3E-05
PtFungi	2.6E-03	1.8E-04	1.1E-03	1.7E-04	2.0E-05	7.9E-05
PtRPBact	2.5E-04	6.3E-05	5.0E-05	7.4E-05	6.6E-06	5.8E-06
PtRPBactFung	2.3E-04	8.0E-05	4.4E-05	5.0E-05	8.0E-06	4.0E-06
PtRPBFNOHoag	3.0E-04	1.0E-04	6.3E-05	6.1E-05	1.2E-05	5.9E-06
PtRPBFNOMin	7.2E-06	5.2E-05	1.1E-05	9.5E-07	6.8E-06	1.1E-06
6-9 months	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	1.7E-05	1.3E-05	5.6E-06	2.3E-06	1.1E-06	3.0E-07
StBacteria	1.8E-05	1.4E-05	1.0E-05	4.3E-06	5.9E-07	2.0E-06
StFungi	3.3E-05	1.4E-05	1.4E-05	1.2E-05	2.8E-06	3.8E-06
StRPBact	9.2E-06	1.3E-05	4.3E-06	3.9E-06	3.5E-07	9.4E-08
StRPBactFung	6.3E-06	1.3E-05	4.2E-06	1.8E-06	1.0E-06	2.5E-07
StRPBFNOHoag	2.1E-05	1.4E-05	6.7E-06	2.8E-06	9.3E-07	3.6E-07
StRPBFNOMin	1.7E-06	1.6E-05	5.6E-06	6.9E-08	4.9E-07	1.6E-07
PtBacteria	2.7E-05	1.3E-05	1.2E-05	6.9E-06	1.5E-06	2.6E-06
PtFungi	3.0E-05	1.4E-05	1.3E-05	7.3E-06	1.9E-06	2.7E-06
PtRPBact	8.7E-06	1.4E-05	4.2E-06	2.2E-06	5.6E-07	9.0E-08
PtRPBactFung	5.4E-06	1.2E-05	3.7E-06	1.6E-06	1.7E-06	4.9E-07
PtRPBFNOHoag	2.3E-05	1.4E-05	6.3E-06	2.9E-06	1.3E-06	6.3E-07
PtRPBFNOMin	1.7E-06	1.7E-05	5.5E-06	1.7E-07	1.2E-06	3.2E-07
9-12 months	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	6.4E-06	7.6E-06	2.5E-06	5.8E-07	4.3E-07	1.1E-07
StBacteria	2.9E-06	9.1E-06	3.0E-06	6.4E-07	5.7E-07	2.5E-07
StFungi	1.2E-05	9.3E-06	4.4E-06	3.0E-06	4.1E-07	7.6E-07
StRPBact	1.6E-06	8.1E-06	2.6E-06	4.6E-07	3.2E-07	1.0E-07
StRPBactFung	2.5E-06	8.7E-06	2.8E-06	2.5E-07	2.4E-07	7.6E-08
StRPBFNOHoag	9.1E-06	7.2E-06	3.4E-06	1.0E-06	4.3E-07	3.0E-07
StRPBFNOMin	2.3E-07	1.1E-05	3.4E-06	1.1E-07	2.1E-07	6.8E-08
PtBacteria	1.5E-05	8.2E-06	1.0E-05	3.9E-06	1.2E-06	3.4E-06
PtFungi	7.3E-06	9.7E-06	4.3E-06	1.1E-06	2.0E-07	6.5E-07
PtRPBact	6.5E-07	8.6E-06	2.7E-06	1.8E-07	4.5E-07	9.3E-08
PtRPBactFung	5.0E-07	6.3E-06	2.0E-06	1.6E-07	3.6E-07	1.1E-07
PtRPBFNOHoag	9.5E-06	7.4E-06	3.0E-06	5.9E-07	3.9E-07	2.1E-07
PtRPBFNOMin	2.9E-08	1.0E-05	3.4E-06	9.7E-08	4.7E-07	1.5E-07

Table K-11 (cont.): Chemical denudation and weathering fluxes were estimated using the following data for 6-12 and 1 year time intervals (all in mol). Standard error was estimated for all treatments.

E) Chemical denudation in mol; Denudation=Drainage – Inputs

Denudation	**mol**	**mol**	**mol**	**STE**	**STE**	**STE**
6-12 months	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	2.3E-05	2.0E-05	8.1E-06	2.8E-06	1.5E-06	4.1E-07
StBacteria	2.1E-05	2.3E-05	1.3E-05	4.9E-06	1.2E-06	2.3E-06
StFungi	4.5E-05	2.3E-05	1.8E-05	1.5E-05	3.2E-06	4.6E-06
StRPBact	1.1E-05	2.1E-05	6.8E-06	4.4E-06	6.6E-07	2.0E-07
StRPBactFung	8.8E-06	2.2E-05	7.0E-06	2.0E-06	1.3E-06	3.2E-07
StRPBFNOHoag	3.0E-05	2.1E-05	1.0E-05	3.8E-06	1.4E-06	6.6E-07
StRPBFNOMin	2.0E-06	2.7E-05	9.1E-06	1.7E-07	7.0E-07	2.3E-07
PtBacteria	4.3E-05	2.1E-05	2.2E-05	1.1E-05	2.8E-06	6.0E-06
PtFungi	3.7E-05	2.3E-05	1.7E-05	8.4E-06	2.1E-06	3.4E-06
PtRPBact	9.4E-06	2.2E-05	6.9E-06	2.3E-06	1.0E-06	1.8E-07
PtRPBactFung	5.9E-06	1.8E-05	5.7E-06	1.8E-06	2.0E-06	6.0E-07
PtRPBFNOHoag	3.3E-05	2.1E-05	9.3E-06	3.5E-06	1.7E-06	8.3E-07
PtRPBFNOMin	1.7E-06	2.7E-05	8.8E-06	2.7E-07	1.6E-06	4.7E-07
1 year	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	2.9E-04	1.0E-04	8.1E-05	4.8E-05	1.6E-05	9.4E-06
StBacteria	3.7E-03	2.0E-04	1.7E-03	2.2E-04	1.8E-05	1.3E-04
StFungi	2.4E-03	1.9E-04	9.8E-04	1.8E-04	2.2E-05	1.4E-04
StRPBact	2.5E-04	8.7E-05	5.6E-05	7.2E-05	8.8E-06	7.0E-06
StRPBactFung	2.4E-04	8.9E-05	5.4E-05	4.5E-05	5.6E-06	4.7E-06
StRPBFNOHoag	3.4E-04	1.0E-04	7.3E-05	8.0E-05	9.6E-06	6.4E-06
StRPBFNOMin	1.7E-05	8.6E-05	2.1E-05	7.4E-06	6.5E-06	2.2E-06
PtBacteria	2.3E-03	1.9E-04	8.4E-04	1.3E-04	1.7E-05	4.9E-05
PtFungi	2.7E-03	2.1E-04	1.1E-03	1.8E-04	2.2E-05	8.2E-05
PtRPBact	2.6E-04	8.6E-05	5.7E-05	7.6E-05	7.6E-06	5.9E-06
PtRPBactFung	2.4E-04	9.8E-05	5.0E-05	5.2E-05	1.0E-05	4.6E-06
PtRPBFNOHoag	3.3E-04	1.3E-04	7.3E-05	6.5E-05	1.4E-05	6.7E-06
PtRPBFNOMin	9.0E-06	7.9E-05	1.9E-05	1.2E-06	8.4E-06	1.5E-06

Table K-11 (cont.): Chemical denudation and weathering fluxes were estimated using the following data for 0-6, 6-9, 9-12 time intervals (all in mol). Standard error was estimated for all treatments.

F) Chemical weathering in mol; Weathering=Denudation + Change in tree-biomass pool + Change on soil-exchangeable cation sites

Weathering	mol	mol	mol	STE	STE	STE
0-6 months	**Ca**	**K**	**Mg**	**Ca**	**K**	**Mg**
Abiotic	2.4E-04	9.5E-05	5.9E-05	5.4E-05	1.6E-05	9.3E-06
StBacteria	3.6E-03	1.9E-04	1.7E-03	2.1E-04	1.8E-05	1.3E-04
StFungi	2.3E-03	1.8E-04	9.5E-04	1.6E-04	2.1E-05	1.4E-04
StRPBact	2.3E-04	1.0E-04	7.1E-05	7.4E-05	1.0E-05	1.2E-05
StRPBactFung	2.2E-04	9.5E-05	5.3E-05	5.1E-05	6.6E-06	7.7E-06
StRPBFNOHoag	2.9E-04	9.2E-05	6.4E-05	8.0E-05	9.9E-06	9.1E-06
StRPBFNOMin	-5.9E-05	6.2E-05	-5.0E-06	8.0E-06	6.0E-06	2.3E-06
PtBacteria	2.2E-03	1.8E-04	8.0E-04	1.2E-04	1.4E-05	4.3E-05
PtFungi	2.6E-03	2.0E-04	1.1E-03	1.7E-04	2.0E-05	8.0E-05
PtRPBact	2.3E-04	9.6E-05	6.8E-05	8.5E-05	1.0E-05	1.4E-05
PtRPBactFung	2.3E-04	1.2E-04	6.5E-05	6.2E-05	1.1E-05	9.9E-06
PtRPBFNOHoag	2.8E-04	1.2E-04	7.0E-05	6.8E-05	1.4E-05	9.2E-06
PtRPBFNOMin	8.1E-06	5.5E-05	1.2E-05	1.5E-06	7.2E-06	1.2E-06
6-9 months	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	5.9E-06	1.6E-05	6.6E-06	3.8E-06	6.0E-06	4.9E-07
StBacteria	1.6E-05	1.4E-05	9.4E-06	8.2E-06	1.3E-06	2.7E-06
StFungi	2.4E-05	1.0E-05	1.2E-05	1.3E-05	3.0E-06	4.2E-06
StRPBact	7.0E-05	3.6E-05	5.2E-05	1.1E-05	9.0E-06	2.6E-05
StRPBactFung	1.7E-05	5.0E-05	1.9E-05	2.5E-05	2.5E-05	3.7E-05
StRPBFNOHoag	8.3E-06	1.8E-05	2.1E-05	8.9E-06	2.8E-06	1.1E-05
StRPBFNOMin	5.1E-08	1.7E-05	4.8E-06	2.0E-07	7.5E-07	2.7E-07
PtBacteria	2.6E-05	1.5E-05	1.2E-05	9.9E-06	3.4E-06	3.3E-06
PtFungi	3.6E-05	1.7E-05	1.3E-05	1.4E-05	4.8E-06	3.9E-06
PtRPBact	3.5E-05	2.1E-05	1.0E-05	3.0E-05	6.6E-06	1.4E-05
PtRPBactFung	5.8E-06	3.0E-05	4.1E-05	2.8E-05	1.2E-05	2.1E-05
PtRPBFNOHoag	8.9E-06	1.1E-05	4.6E-06	6.8E-06	4.2E-06	8.6E-06
PtRPBFNOMin	-1.9E-07	1.8E-05	4.8E-06	2.7E-07	1.5E-06	4.0E-07
9-12 months	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	1.0E-05	6.7E-06	8.0E-06	1.7E-05	3.3E-06	2.6E-06
StBacteria	1.9E-05	3.2E-05	1.2E-05	2.9E-06	2.3E-06	8.8E-07
StFungi	3.8E-05	2.8E-05	9.7E-06	1.3E-05	5.4E-06	3.2E-06
StRPBact	-4.2E-05	1.4E-05	-2.5E-05	2.0E-05	1.2E-05	2.0E-05
StRPBactFung	4.6E-05	7.7E-06	3.3E-05	1.3E-05	1.3E-05	1.0E-05
StRPBFNOHoag	3.3E-05	2.2E-05	1.4E-05	7.6E-06	7.3E-06	1.2E-05
StRPBFNOMin	2.9E-06	9.9E-06	5.7E-06	2.6E-06	3.5E-06	1.7E-06
PtBacteria	1.8E-05	2.0E-05	1.3E-05	9.6E-06	4.5E-06	5.4E-06
PtFungi	2.1E-05	2.5E-05	1.4E-05	1.0E-05	4.4E-06	2.9E-06
PtRPBact	-1.5E-05	3.2E-05	3.7E-06	1.3E-05	6.6E-06	6.7E-06
PtRPBactFung	3.8E-05	3.7E-05	7.2E-06	1.9E-05	2.1E-05	2.7E-05
PtRPBFNOHoag	2.6E-05	2.3E-05	1.2E-05	9.6E-06	5.8E-06	7.5E-06
PtRPBFNOMin	2.9E-06	1.2E-05	6.4E-06	1.5E-06	2.8E-06	9.9E-07

Table K-11 (cont.): Chemical denudation and weathering fluxes were estimated using the following data for 6-12 and 1 year time intervals (all in mol). Standard error was estimated for all treatments.

F) Chemical weathering in mol; Weathering=Denudation + Change in tree-biomass pool + Change on soil-exchangeable cation sites

Weathering	**mol**	**mol**	**mol**	**STE**	**STE**	**STE**
6-12 months	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	1.6E-05	2.3E-05	1.5E-05	1.4E-05	8.6E-06	9.3E-07
StBacteria	3.5E-05	4.6E-05	2.2E-05	1.1E-05	2.6E-06	3.7E-06
StFungi	6.2E-05	3.8E-05	2.1E-05	1.7E-05	5.5E-06	5.9E-06
StRPBact	2.8E-05	5.0E-05	2.7E-05	2.4E-05	8.5E-06	1.6E-05
StRPBactFung	6.3E-05	5.7E-05	5.1E-05	1.7E-05	2.1E-05	8.6E-06
StRPBFNOHoag	4.2E-05	4.0E-05	3.5E-05	1.1E-05	5.0E-06	8.4E-06
StRPBFNOMin	3.0E-06	2.7E-05	1.1E-05	1.1E-06	1.3E-06	6.3E-07
PtBacteria	4.4E-05	3.4E-05	2.5E-05	1.5E-05	4.6E-06	7.3E-06
PtFungi	5.7E-05	4.1E-05	2.7E-05	1.8E-05	5.2E-06	5.7E-06
PtRPBact	2.0E-05	5.3E-05	1.4E-05	1.8E-05	5.1E-06	9.3E-06
PtRPBactFung	4.4E-05	6.7E-05	4.8E-05	2.6E-05	1.5E-05	2.0E-05
PtRPBFNOHoag	3.5E-05	3.4E-05	1.7E-05	1.2E-05	4.0E-06	5.2E-06
PtRPBFNOMin	2.7E-06	3.0E-05	1.1E-05	1.1E-06	2.4E-06	9.4E-07
1 year	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Fe**	**Al**
Abiotic	3.3E-04	1.2E-04	9.4E-05	6.5E-05	1.9E-05	1.2E-05
StBacteria	3.7E-03	2.4E-04	1.7E-03	2.2E-04	2.0E-05	1.3E-04
StFungi	2.4E-03	2.2E-04	9.9E-04	1.9E-04	2.7E-05	1.4E-04
StRPBact	3.3E-04	1.5E-04	1.2E-04	9.2E-05	2.0E-05	2.7E-05
StRPBactFung	3.6E-04	1.5E-04	1.3E-04	5.9E-05	1.9E-05	1.5E-05
StRPBFNOHoag	4.1E-04	1.3E-04	1.2E-04	8.6E-05	1.6E-05	1.8E-05
StRPBFNOMin	2.1E-05	8.9E-05	2.6E-05	1.0E-05	9.7E-06	3.8E-06
PtBacteria	2.4E-03	2.1E-04	8.5E-04	1.3E-04	2.0E-05	5.1E-05
PtFungi	2.7E-03	2.4E-04	1.1E-03	1.9E-04	2.6E-05	8.4E-05
PtRPBact	3.3E-04	1.5E-04	1.0E-04	8.9E-05	1.4E-05	1.3E-05
PtRPBactFung	3.5E-04	1.9E-04	1.3E-04	7.1E-05	3.1E-05	3.2E-05
PtRPBFNOHoag	3.9E-04	1.5E-04	1.1E-04	7.4E-05	1.9E-05	1.4E-05
PtRPBFNOMin	1.3E-05	8.5E-05	2.5E-05	2.6E-06	1.1E-05	2.4E-06

Table K-12: Chemical denudation fluxes were estimated by mass-balance for 0-6, 6-12, and 1 year intervals (mol m^{-2} yr^{-1}). Standard error was estimated for all treatments. m^2 = "ground surface" in tube (11.34 cm^2), not mineral surface area.

Denudation	mol/m²/yr	mol/m²/yr	mol/m²/yr	mol/m²/yr	STE	STE	STE	STE
0-6 months	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Ca**	**K**	**Mg**	**Ca+K+Mg**
Abiotic	0.47	0.15	0.13	0.75	0.08	0.03	0.02	0.12
StBacteria	6.41	0.32	2.93	9.67	0.37	0.03	0.23	0.63
StFungi	4.07	0.30	1.69	6.06	0.29	0.03	0.24	0.56
StRPBact	0.43	0.12	0.09	0.63	0.12	0.01	0.01	0.15
StRPBactFung	0.40	0.12	0.08	0.60	0.08	0.01	0.01	0.09
StRPBFNOHoag	0.55	0.14	0.11	0.80	0.13	0.01	0.01	0.16
StRPBFNOMin	0.03	0.10	0.02	0.15	0.01	0.01	0.00	0.03
PtBacteria	4.03	0.30	1.44	5.76	0.20	0.03	0.08	0.30
PtFungi	4.63	0.33	1.91	6.87	0.30	0.03	0.14	0.47
PtRPBact	0.44	0.11	0.09	0.64	0.13	0.01	0.01	0.15
PtRPBactFung	0.41	0.14	0.08	0.63	0.09	0.01	0.01	0.11
PtRPBFNOHoag	0.53	0.18	0.11	0.82	0.11	0.02	0.01	0.14
PtRPBFNOMin	0.01	0.09	0.02	0.12	0.00	0.01	0.00	0.02
6-12 months	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Ca**	**K**	**Mg**	**Ca+K+Mg**
Abiotic	0.04	0.04	0.01	0.09	0.01	0.00	0.00	0.01
StBacteria	0.04	0.04	0.02	0.10	0.01	0.00	0.00	0.01
StFungi	0.08	0.04	0.03	0.15	0.03	0.01	0.01	0.04
StRPBact	0.02	0.04	0.01	0.07	0.01	0.00	0.00	0.01
StRPBactFung	0.02	0.04	0.01	0.07	0.00	0.00	0.00	0.01
StRPBFNOHoag	0.05	0.04	0.02	0.11	0.01	0.00	0.00	0.01
StRPBFNOMin	0.00	0.05	0.02	0.07	0.00	0.00	0.00	0.00
PtBacteria	0.08	0.04	0.04	0.15	0.02	0.00	0.01	0.03
PtFungi	0.07	0.04	0.03	0.14	0.01	0.00	0.01	0.02
PtRPBact	0.02	0.04	0.01	0.07	0.00	0.00	0.00	0.01
PtRPBactFung	0.01	0.03	0.01	0.05	0.00	0.00	0.00	0.01
PtRPBFNOHoag	0.06	0.04	0.02	0.11	0.01	0.00	0.00	0.01
PtRPBFNOMin	0.00	0.05	0.02	0.07	0.00	0.00	0.00	0.00
1 year	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Ca**	**K**	**Mg**	**Ca+K+Mg**
Abiotic	0.51	0.18	0.14	0.84	0.08	0.03	0.02	0.13
StBacteria	6.45	0.36	2.96	9.77	0.38	0.03	0.23	0.64
StFungi	4.15	0.34	1.73	6.21	0.32	0.04	0.25	0.60
StRPBact	0.45	0.15	0.10	0.70	0.13	0.02	0.01	0.16
StRPBactFung	0.42	0.16	0.09	0.67	0.08	0.01	0.01	0.10
StRPBFNOHoag	0.61	0.18	0.13	0.91	0.14	0.02	0.01	0.17
StRPBFNOMin	0.03	0.15	0.04	0.22	0.01	0.01	0.00	0.03
PtBacteria	4.10	0.34	1.48	5.91	0.22	0.03	0.09	0.34
PtFungi	4.70	0.37	1.94	7.01	0.31	0.04	0.14	0.49
PtRPBact	0.45	0.15	0.10	0.70	0.13	0.01	0.01	0.16
PtRPBactFung	0.42	0.17	0.09	0.68	0.09	0.02	0.01	0.12
PtRPBFNOHoag	0.58	0.22	0.13	0.93	0.11	0.02	0.01	0.15
PtRPBFNOMin	0.02	0.14	0.03	0.19	0.00	0.01	0.00	0.02

Table K-13: Chemical weathering fluxes were estimated by mass-balance for 0-6, 6-12, and 1 year intervals (mol m^{-2} yr^{-1}). Standard error was estimated for all treatments. m^2 = "ground surface" in tube (11.34 cm^2), not mineral surface area.

Weathering	mol/m²/yr	mol/m²/yr	mol/m²/yr	mol/m²/yr	STE	STE	STE	STE
0-6 months	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Ca**	**K**	**Mg**	**Ca+K+Mg**
Abiotic	0.42	0.17	0.10	0.69	0.10	0.03	0.02	0.14
StBacteria	6.32	0.34	2.91	9.57	0.38	0.03	0.23	0.63
StFungi	3.97	0.32	1.67	5.96	0.29	0.04	0.24	0.57
StRPBact	0.40	0.18	0.12	0.71	0.13	0.02	0.02	0.17
StRPBactFung	0.39	0.17	0.09	0.65	0.09	0.01	0.01	0.11
StRPBFNOHoag	0.52	0.16	0.11	0.79	0.14	0.02	0.02	0.17
StRPBFNOMin	-0.10	0.11	-0.01	0.00	0.01	0.01	0.00	0.03
PtBacteria	3.93	0.32	1.41	5.66	0.20	0.03	0.08	0.31
PtFungi	4.53	0.34	1.89	6.77	0.30	0.04	0.14	0.48
PtRPBact	0.40	0.17	0.12	0.69	0.15	0.02	0.03	0.19
PtRPBactFung	0.40	0.21	0.11	0.72	0.11	0.02	0.02	0.15
PtRPBFNOHoag	0.50	0.21	0.12	0.83	0.12	0.02	0.02	0.16
PtRPBFNOMin	0.01	0.10	0.02	0.13	0.00	0.01	0.00	0.02
6-12 months	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Ca**	**K**	**Mg**	**Ca+K+Mg**
Abiotic	0.03	0.04	0.03	0.09	0.02	0.02	0.00	0.04
StBacteria	0.06	0.08	0.04	0.18	0.02	0.00	0.01	0.03
StFungi	0.11	0.07	0.04	0.21	0.03	0.01	0.01	0.05
StRPBact	0.05	0.09	0.05	0.18	0.04	0.01	0.03	0.09
StRPBactFung	0.11	0.10	0.09	0.30	0.03	0.04	0.02	0.08
StRPBFNOHoag	0.07	0.07	0.06	0.21	0.02	0.01	0.01	0.04
StRPBFNOMin	0.01	0.05	0.02	0.07	0.00	0.00	0.00	0.01
PtBacteria	0.08	0.06	0.04	0.18	0.03	0.01	0.01	0.05
PtFungi	0.10	0.07	0.05	0.22	0.03	0.01	0.01	0.05
PtRPBact	0.04	0.09	0.02	0.15	0.03	0.01	0.02	0.06
PtRPBactFung	0.08	0.12	0.09	0.28	0.05	0.03	0.04	0.11
PtRPBFNOHoag	0.06	0.06	0.03	0.15	0.02	0.01	0.01	0.04
PtRPBFNOMin	0.00	0.05	0.02	0.08	0.00	0.00	0.00	0.01
1 year	**Ca**	**K**	**Mg**	**Ca+K+Mg**	**Ca**	**K**	**Mg**	**Ca+K+Mg**
Abiotic	0.58	0.21	0.17	0.96	0.11	0.03	0.02	0.17
StBacteria	6.51	0.42	2.99	9.92	0.38	0.04	0.23	0.65
StFungi	4.22	0.39	1.74	6.35	0.33	0.05	0.25	0.63
StRPBact	0.59	0.27	0.21	1.07	0.16	0.04	0.05	0.25
StRPBactFung	0.64	0.27	0.22	1.13	0.10	0.03	0.03	0.16
StRPBFNOHoag	0.73	0.23	0.21	1.17	0.15	0.03	0.03	0.21
StRPBFNOMin	0.04	0.16	0.05	0.24	0.02	0.02	0.01	0.04
PtBacteria	4.14	0.38	1.49	6.02	0.23	0.04	0.09	0.36
PtFungi	4.77	0.42	1.97	7.16	0.33	0.05	0.15	0.52
PtRPBact	0.58	0.26	0.18	1.02	0.16	0.02	0.02	0.20
PtRPBactFung	0.61	0.33	0.24	1.18	0.13	0.05	0.06	0.24
PtRPBFNOHoag	0.69	0.27	0.19	1.15	0.13	0.03	0.02	0.19
PtRPBFNOMin	0.02	0.15	0.04	0.22	0.00	0.02	0.00	0.03

Table K-14: Student t-test calculations – Differences between weathering and denudation for each treatment.

Df=4	D Flux (mol/m^2/yr)	W Flux (mol/m^2/yr)	Differences between W and D for each treatment		
0-6 months	Means	Means	Diff in means	t value	p value
Abiotic	0.72	0.67	-0.06	-0.52	0.319
StBacteria	9.65	9.55	-0.10	-0.20	0.429
StFungi	6.05	5.95	-0.10	-0.22	0.426
StRPBact	0.59	0.67	0.08	0.62	0.290
StRPBactFung	0.55	0.60	0.05	0.56	0.306
StRPBFNOMin	0.08	-0.08	0.01	0.46	0.341
PtBacteria	5.74	5.64	-0.10	-0.41	0.358
PtFungi	6.86	6.75	-0.10	-0.27	0.404
PtRPBact	0.59	0.65	0.06	0.40	0.358
PtRPBactFung	0.59	0.68	0.09	0.90	0.212
PtRPBFNOMin	0.05	0.06	0.01	0.78	0.248
	D Flux (mol/m^2/yr)	W Flux (mol/m^2/yr)	Differences between W and D for each treatment		
6-12 months	Means	Means	Diff in means	t value	p value
Abiotic	0.06	0.06	0.00	0.09	0.459
StBacteria	0.06	0.13	0.08	4.32	0.005
StFungi	0.11	0.17	0.06	1.90	0.068
StRPBact	0.02	0.14	0.12	2.35	0.027
StRPBactFung	0.02	0.26	0.24	4.99	0.002
StRPBFNOMin	0.01	0.01	0.01	4.49	0.003
PtBacteria	0.11	0.14	0.03	1.01	0.185
PtFungi	0.09	0.18	0.08	2.83	0.019
PtRPBact	0.02	0.11	0.09	2.65	0.019
PtRPBactFung	0.01	0.24	0.23	3.81	0.006
PtRPBFNOMin	0.01	0.02	0.01	3.37	0.010
	D Flux (mol/m^2/yr)	W Flux (mol/m^2/yr)	Differences between W and D for each treatment		
1 year	Means	Means	Diff in means	t value	p value
Abiotic	0.78	0.90	0.12	0.98	0.191
StBacteria	9.70	9.85	0.15	0.29	0.393
StFungi	6.16	6.29	0.14	0.27	0.400
StRPBact	0.61	0.97	0.37	2.21	0.046
StRPBactFung	0.57	1.03	0.46	4.22	0.007
StRPBFNOMin	0.08	0.10	0.01	0.37	0.365
PtBacteria	5.86	5.96	0.10	0.36	0.369
PtFungi	6.95	7.10	0.15	0.37	0.365
PtRPBact	0.61	0.93	0.31	2.13	0.050
PtRPBactFung	0.60	1.10	0.50	3.36	0.014
PtRPBFNOMin	0.05	0.08	0.03	1.62	0.090
	D STE (mol/m^2/yr)	W STE (mol/m^2/yr)			
0-6 months	STD	STD	Variance D	Variance W	SE
Abiotic	0.12	0.14	0.01	0.02	0.107
StBacteria	0.63	0.63	0.39	0.40	0.514
StFungi	0.56	0.57	0.31	0.32	0.459
StRPBact	0.15	0.17	0.02	0.03	0.128
StRPBactFung	0.09	0.11	0.01	0.01	0.084
StRPBFNOMin	0.03	0.03	0.00	0.00	0.022
PtBacteria	0.30	0.31	0.09	0.09	0.248
PtFungi	0.47	0.48	0.22	0.23	0.386
PtRPBact	0.15	0.19	0.02	0.04	0.141
PtRPBactFung	0.11	0.15	0.01	0.02	0.105
PtRPBFNOMin	0.01	0.02	0.00	0.00	0.012
	D STE (mol/m^2/yr)	W STE (mol/m^2/yr)			
6-12 months	STD	STD	Variance D	Variance W	SE
Abiotic	0.01	0.04	0.00	0.00	0.023
StBacteria	0.01	0.03	0.00	0.00	0.018
StFungi	0.04	0.04	0.00	0.00	0.033
StRPBact	0.01	0.08	0.00	0.01	0.049
StRPBactFung	0.01	0.08	0.00	0.01	0.047
StRPBFNOMin	0.00	0.00	0.00	0.00	0.002
PtBacteria	0.03	0.04	0.00	0.00	0.030
PtFungi	0.02	0.05	0.00	0.00	0.030
PtRPBact	0.00	0.06	0.00	0.00	0.032
PtRPBactFung	0.00	0.10	0.00	0.01	0.060
PtRPBFNOMin	0.00	0.01	0.00	0.00	0.003
	D STE (mol/m^2/yr)	W STE (mol/m^2/yr)			
1 year	STD	STD	Variance D	Variance W	SE
Abiotic	0.13	0.17	0.02	0.03	0.121
StBacteria	0.64	0.65	0.41	0.42	0.525
StFungi	0.60	0.63	0.36	0.39	0.499
StRPBact	0.15	0.24	0.02	0.06	0.166

Table K-14 (cont.): Student t-test calculations – Differences between 0-6 and 6-12 weathering for each treatment.

Df=4	0-6 months	6-12 months	Differences between 0-6 W and 6-12W		
W Flux (mol/m^2/yr)	Means	Means	Diff in means	t value	p value
Abiotic	0.67	0.06	-0.61	-7.21	0.001
StBacteria	9.55	0.13	-9.41	-25.70	<0.0001
StFungi	5.95	0.17	-5.78	-17.63	<0.0001
StRPBact	0.67	0.14	-0.53	-4.88	0.004
StRPBactFung	0.60	0.26	-0.34	-4.25	0.007
StRPBFNOHoag	0.77	0.18	-0.59	-5.71	0.002
StRPBFNOMin	-0.08	0.01	0.01	0.62	0.284
PtBacteria	5.64	0.14	-5.50	-30.91	<0.0001
PtFungi	6.75	0.18	-6.58	-23.81	<0.0001
PtRPBact	0.65	0.11	-0.54	-4.67	0.005
PtRPBactFung	0.68	0.24	-0.44	-4.24	0.007
PtRPBFNOHoag	0.82	0.12	-0.70	-7.35	0.001
PtRPBFNOMin	0.06	0.02	-0.04	-4.19	0.007
	0-6 months	6-12 months	Differences between 0-6D and 6-12D		
D Flux (mol/m^2/yr)	Means	Means	Diff in means	t value	p value
Abiotic	0.72	0.06	-0.67	-9.59	0.000
StBacteria	9.65	0.06	-9.59	-26.52	<0.0001
StFungi	6.05	0.11	-5.94	-18.34	<0.0001
StRPBact	0.59	0.02	-0.57	-6.74	0.001
StRPBactFung	0.55	0.02	-0.53	-10.09	0.000
StRPBFNOHoag	0.78	0.08	-0.70	-7.66	0.001
StRPBFNOMin	0.08	0.01	0.01	0.68	0.267
PtBacteria	5.74	0.11	-5.63	-32.13	<0.0001
PtFungi	6.86	0.09	-6.77	-24.95	<0.0001
PtRPBact	0.59	0.02	-0.57	-6.48	0.002
PtRPBactFung	0.59	0.01	-0.57	-9.19	0.000
PtRPBFNOHoag	0.81	0.08	-0.73	-8.98	0.000
PtRPBFNOMin	0.05	0.01	-0.04	-5.10	0.004
W STE (mol/m^2/yr)	STD	STD	Variance 0-6W	Variance 6-12W	SE
Abiotic	0.14	0.04	0.02	0.00	0.084
StBacteria	0.63	0.03	0.40	0.00	0.366
StFungi	0.57	0.04	0.32	0.00	0.328
StRPBact	0.17	0.08	0.03	0.01	0.109
StRPBactFung	0.11	0.08	0.01	0.01	0.081
StRPBFNOHoag	0.17	0.04	0.03	0.00	0.103
StRPBFNOMin	0.03	0.00	0.00	0.00	0.016
PtBacteria	0.31	0.04	0.09	0.00	0.178
PtFungi	0.48	0.05	0.23	0.00	0.276
PtRPBact	0.19	0.06	0.04	0.00	0.115
PtRPBactFung	0.15	0.10	0.02	0.01	0.104
PtRPBFNOHoag	0.16	0.04	0.03	0.00	0.095
PtRPBFNOMin	0.02	0.01	0.00	0.00	0.010
D STE (mol/m^2/yr)	STD	STD	Variance 0-6D	Variance 6-12D	SE
Abiotic	0.12	0.01	0.01	0.00	0.069
StBacteria	0.63	0.01	0.39	0.00	0.362
StFungi	0.56	0.04	0.31	0.00	0.324
StRPBact	0.15	0.01	0.02	0.00	0.084
StRPBactFung	0.09	0.01	0.01	0.00	0.053
StRPBFNOHoag	0.16	0.01	0.02	0.00	0.091
StRPBFNOMin	0.03	0.00	0.00	0.00	0.015
PtBacteria	0.30	0.03	0.09	0.00	0.175
PtFungi	0.47	0.02	0.22	0.00	0.271
PtRPBact	0.15	0.00	0.02	0.00	0.088
PtRPBactFung	0.11	0.00	0.01	0.00	0.063
PtRPBFNOHoag	0.14	0.01	0.02	0.00	0.081
PtRPBFNOMin	0.01	0.00	0.00	0.00	0.008

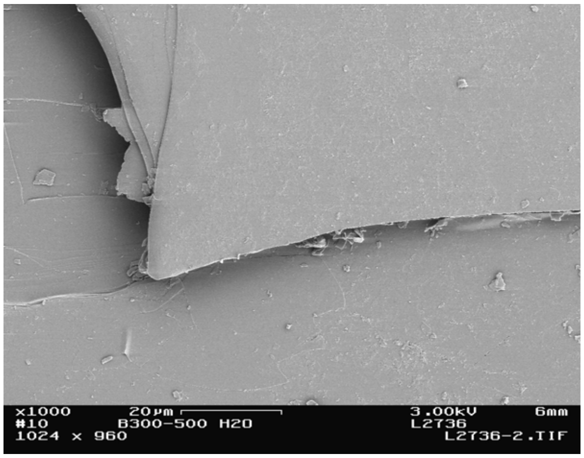
Table K-14 (cont.): Student t-test calculations – Differences for various pairs as listed in table.

T-test for detecting differences amoung treatments							
W Flux (mol/m^2/yr)	0-6 months	Diff microbe-only	6-12 months	Diff microbe-only and trees	Diff abiotic and microbe-only	Diff StRPBact and StRPBactFung	Diff PtRPBact and PtRPBactFung
	Means	and trees	Means				
StBacteria	9.55	6.42	0.13	0.02	-0.099	-0.119	-0.134
StFungi	5.95	t - value	0.17	t - value	t - value	t - value	t - value
Abiotic	0.67	41.93	0.06	1.00	-3.83	-1.76	-1.96
StRPBact	0.67	p - value	0.14	p - value	p - value	p - value	p - value
StRPBactFung	0.60	<.0001	0.26	0.163	0.001	0.077	0.061
StRPBFNOMin	-0.08		0.01				
PtBacteria	5.64		0.14				
PtFungi	6.75		0.18				
PtRPBact	0.65		0.11				
PtRPBactFung	0.68		0.24				
PtRPBFNOMin	0.06		0.02				
W STE (mol/m^2/yr)	0-6 months		6-12 months				
	STD	Variance microbe-only	STD	Variance microbe-only	Variance microbe-only	Variance RPBact	Variance RPBact
StBacteria	0.63	0.25	0.03	0.00	0.00	0.01	0.00
StFungi	0.57	Variance trees	0.04	Variance trees	Variance abiotic	Variance RPBactFung	Variance RPBactFung
Abiotic	0.14	0.02	0.04	0.01	0.002	0.007	0.011
StRPBact	0.17	SE	0.08	SE	SE	SE	SE
StRPBactFung	0.11	0.15	0.08	0.02	0.026	0.068	0.068
StRPBFNOMin	0.03	df = 25	0.00	df = 25	df=13	df=4	df=4
PtBacteria	0.31		0.04				
PtFungi	0.48		0.05				
PtRPBact	0.19		0.06				
PtRPBactFung	0.15		0.10				
PtRPBFNOMin	0.02		0.01				
D Flux (mol/m^2/yr)	0-6 months	Diff microbe-only	6-12 months	Diff microbe-only and trees	Diff abiotic and microbe-only	Diff StRPBact and StRPBactFung	Diff PtRPBact and PtRPBactFung
	Means	and trees	Means				
StBacteria	9.65	6.56	0.06	0.07	-0.037	0.001	0.010
StFungi	6.05	t - value	0.11	t - value	t - value	t - value	t - value
Abiotic	0.72	43.71	0.06	9.12	-4.08	0.23	2.88
StRPBact	0.59	p - value	0.02	p - value	p - value	p - value	p - value
StRPBactFung	0.55	<.0001	0.02	<.0001	0.001	0.415	0.023
StRPBFNOMin	0.08		0.01				
PtBacteria	5.74		0.11				
PtFungi	6.86		0.09				
PtRPBact	0.59		0.02				
PtRPBactFung	0.59		0.01				
PtRPBFNOMin	0.05		0.01				
D STE (mol/m^2/yr)	0-6 months		6-12 months				
	STD	Variance microbe-only	STD	Variance microbe-only	Variance microbe-only	Variance RPBact	Variance RPBact
StBacteria	0.63	0.24	0.01	0.00	0.00	0.00	0.00
StFungi	0.56	Variance trees	0.04	Variance trees	Variance abiotic	Variance RPBactFung	Variance RPBactFung
Abiotic	0.12	0.02	0.01	0.00	0.000	0.000	0.000
StRPBact	0.15	SE	0.01	SE	SE	SE	SE
StRPBactFung	0.09	0.15	0.01	0.01	0.009	0.005	0.004
StRPBFNOMin	0.03	df = 25	0.00	df = 25	df=13	df=4	df=4
PtBacteria	0.30		0.03				
PtFungi	0.47		0.02				
PtRPBact	0.15		0.00				
PtRPBactFung	0.11		0.00				
PtRPBFNOMin	0.01		0.00				

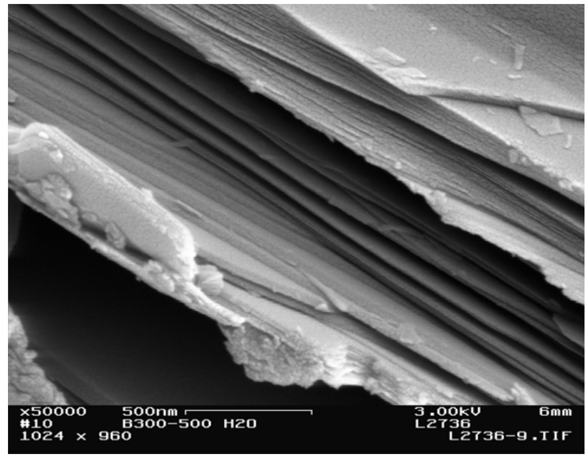
APPENDIX L

Representative small column SEM images and weathered area estimation

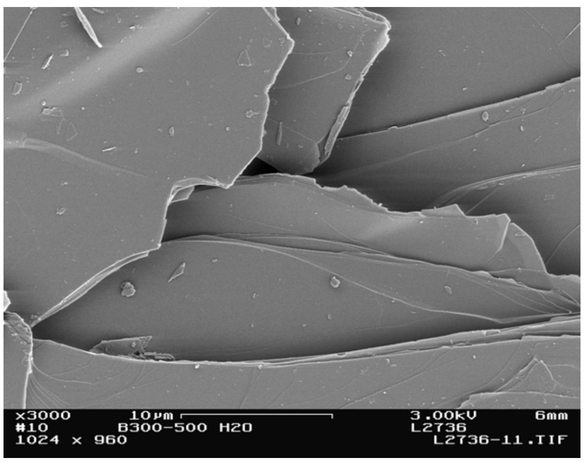
Figure L-1: Initial biotite and anorthite surfaces before exposure to the experiment.



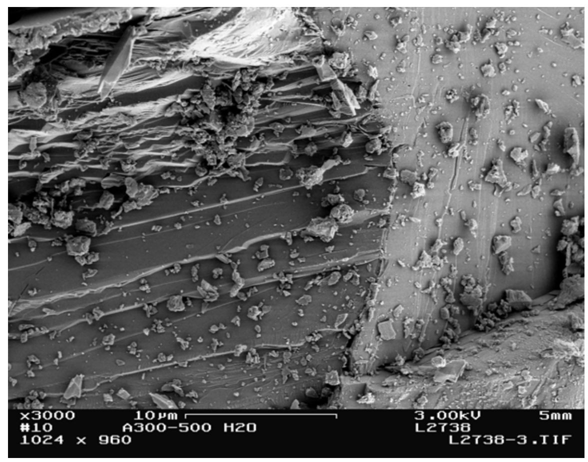
Biotite surface – adhered small particles



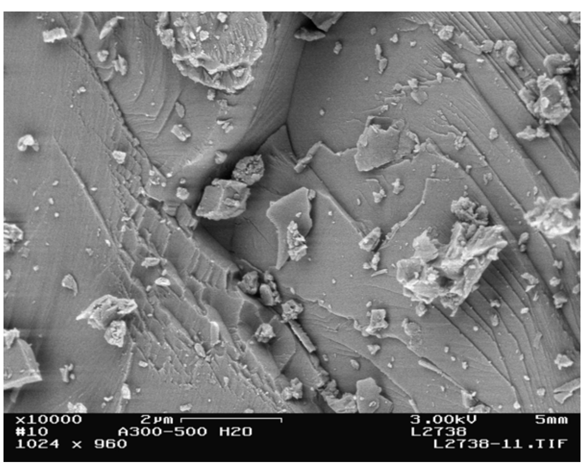
Biotite edge – rough, large surface area



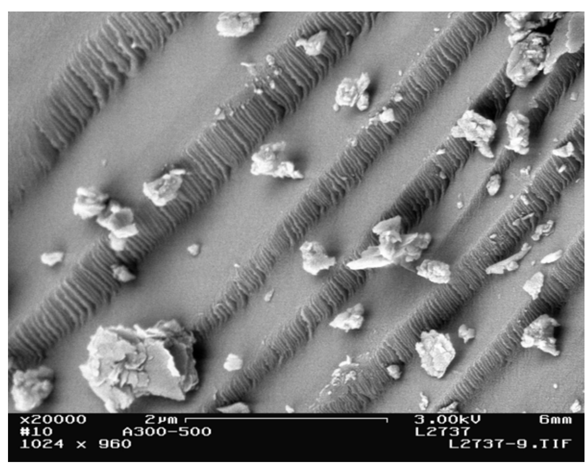
Biotite surface – smooth, but flaky



Anorthite surface – many adhered particles

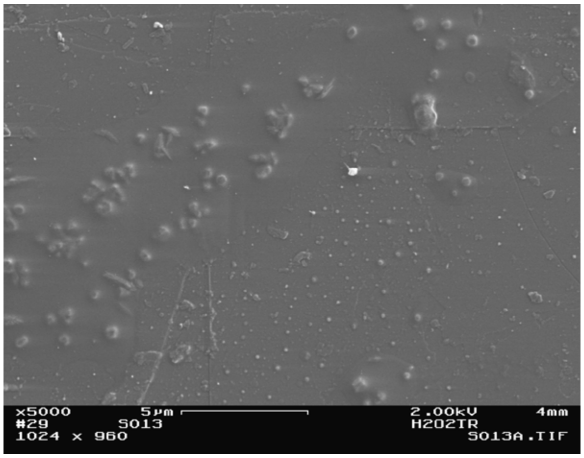


Anorthite surface – adhered particles

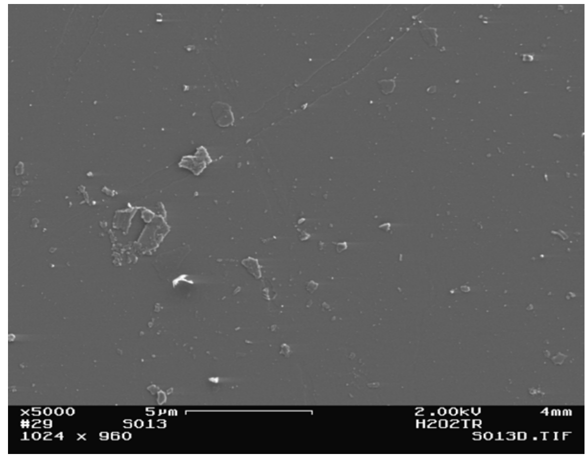


Anorthite surface – smooth, but particles

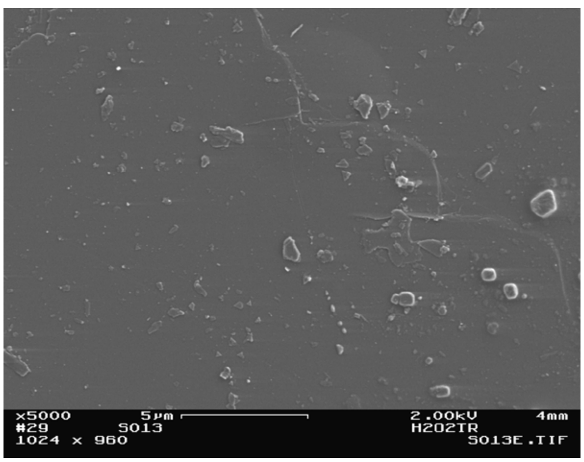
Figure L-2: Biotite and anorthite surfaces were examined for changes after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **Abiotic** treatment



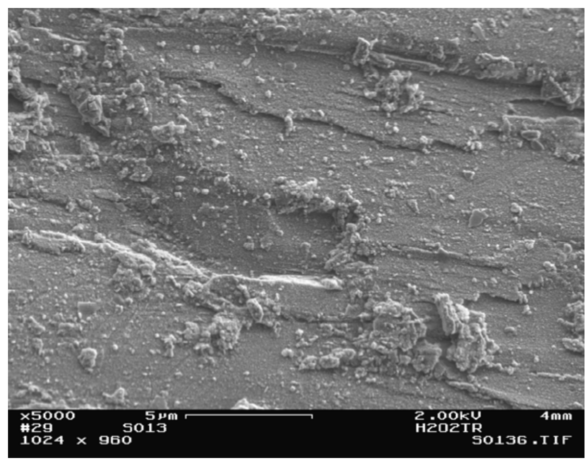
Biotite surface



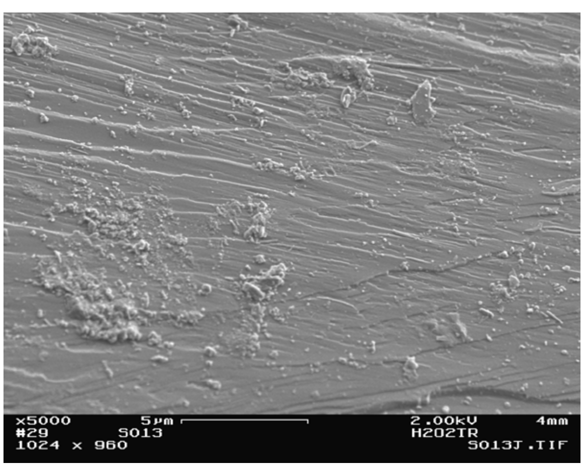
Biotite surface



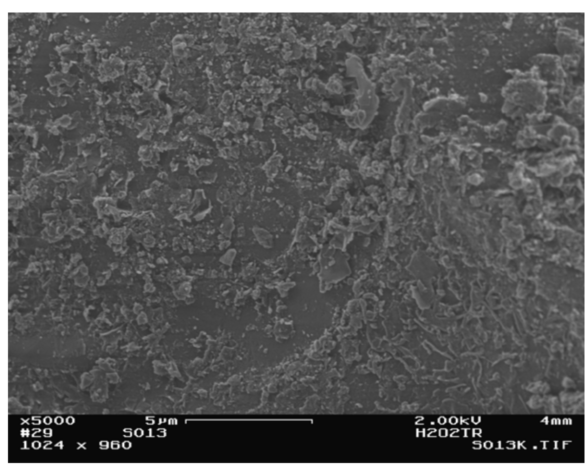
Biotite surface



Anorthite surface

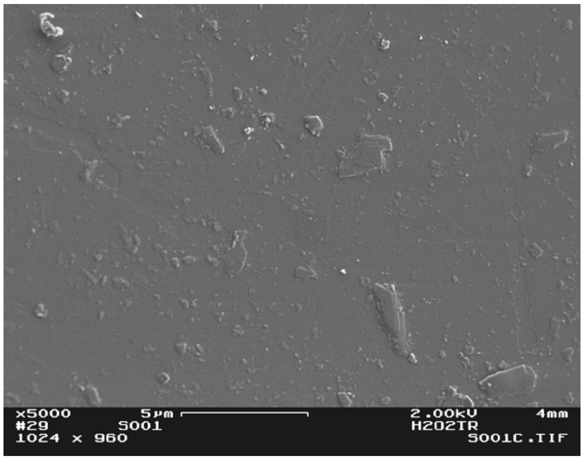


Anorthite surface

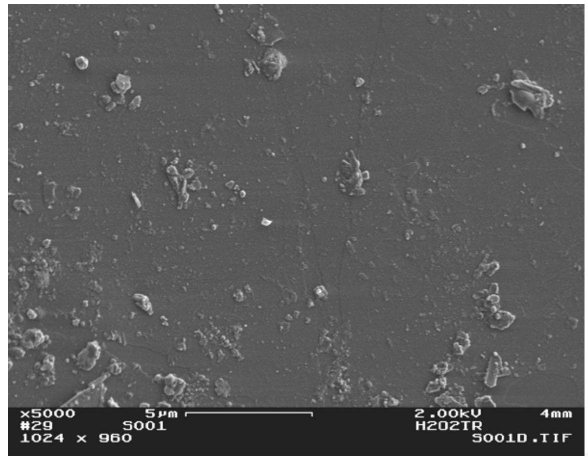


Anorthite surface

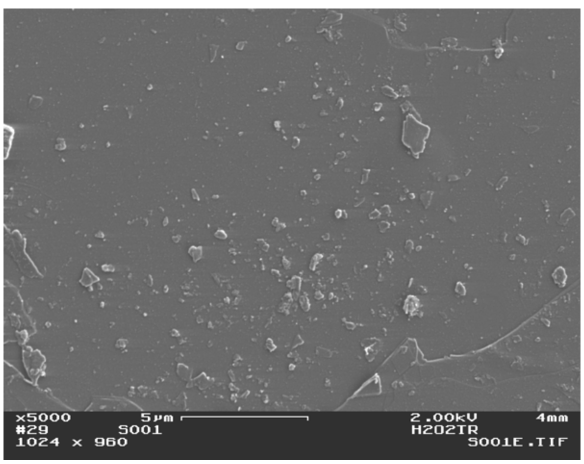
Figure L-2 (cont.): Biotite and anorthite surfaces were examined for changes after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **StBacteria** treatment.



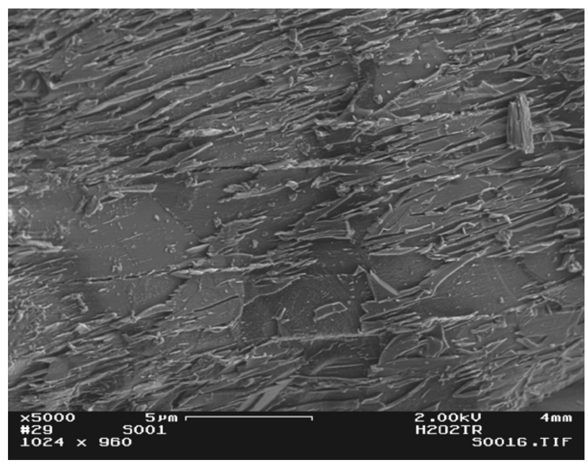
Biotite surface



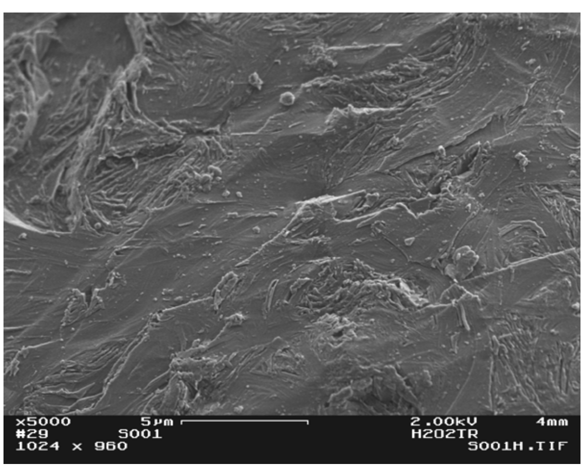
Biotite surface



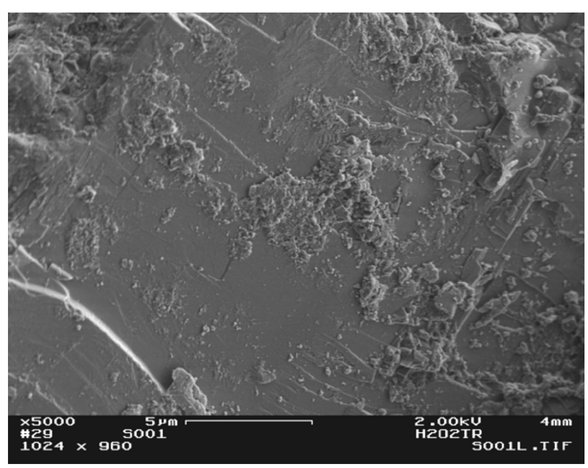
Biotite surface



Anorthite surface

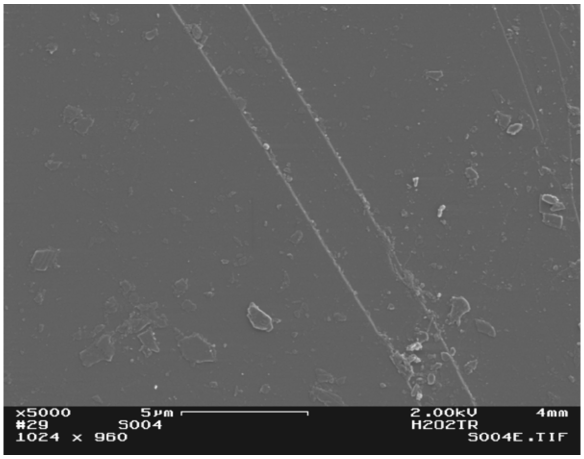


Anorthite surface

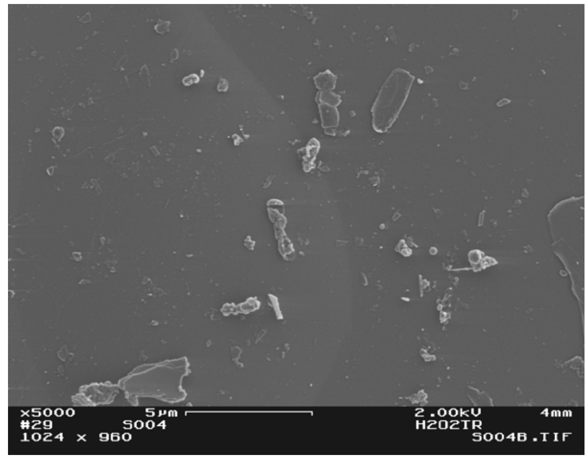


Anorthite surface

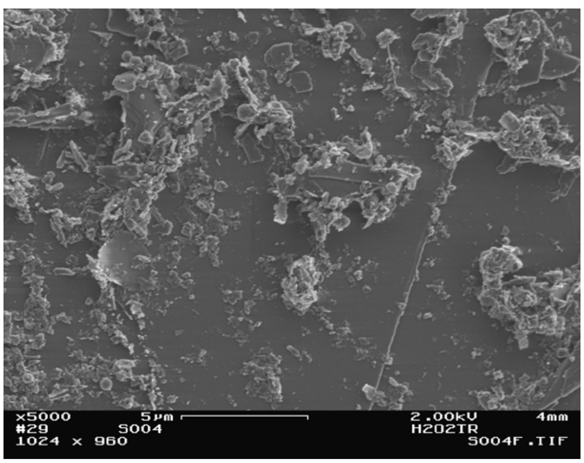
Figure L-2 (cont.): Biotite and anorthite surfaces were examined for changes after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. **– PtBacteria** treatment.



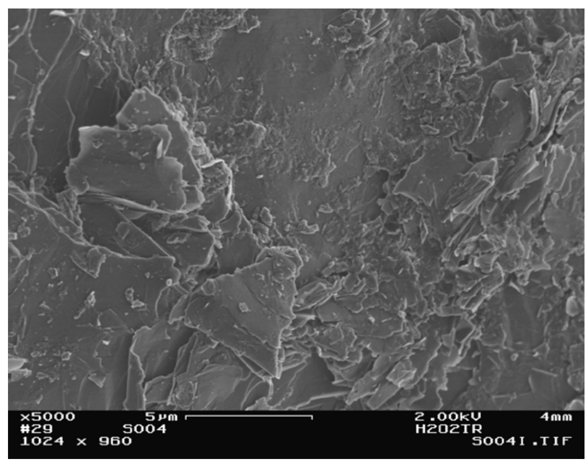
Biotite surface



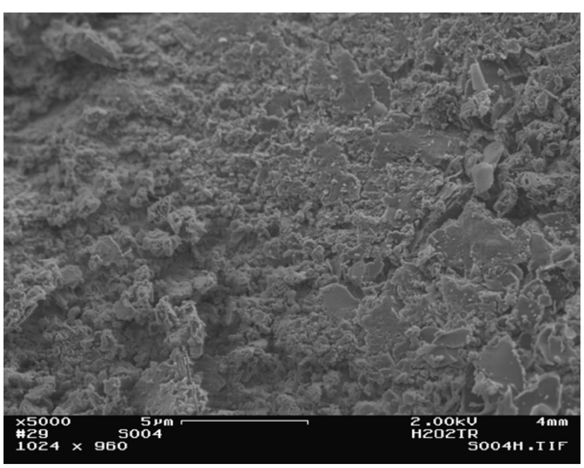
Biotite surface



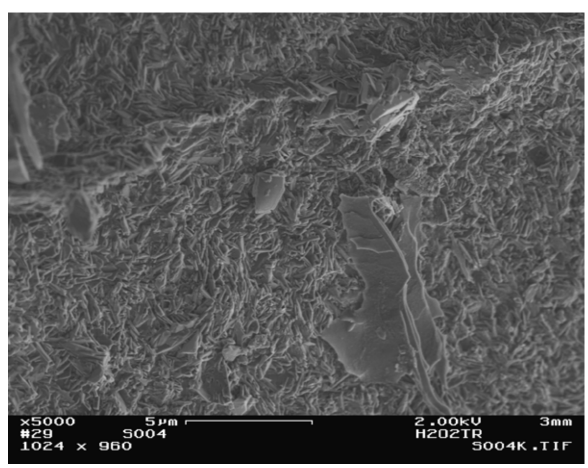
Biotite surface



Anorthite surface

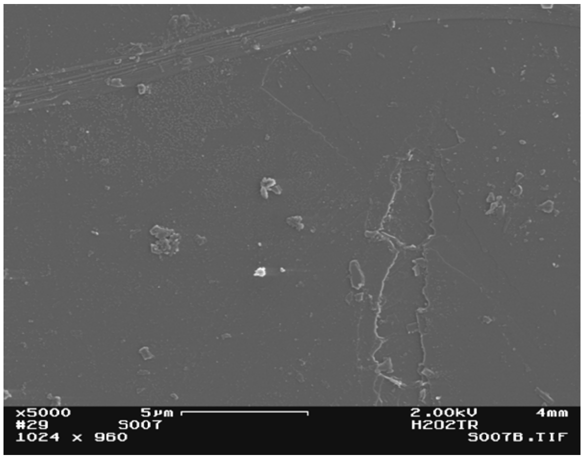


Anorthite surface

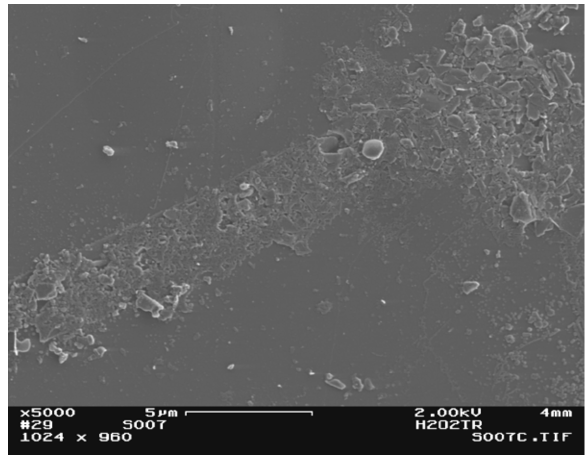


Anorthite surface

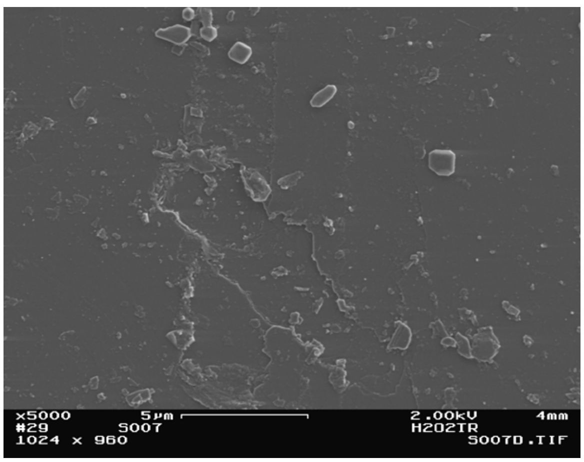
Figure L-2 (cont.): Biotite and anorthite surfaces were examined for changes after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **StFungi** treatment.



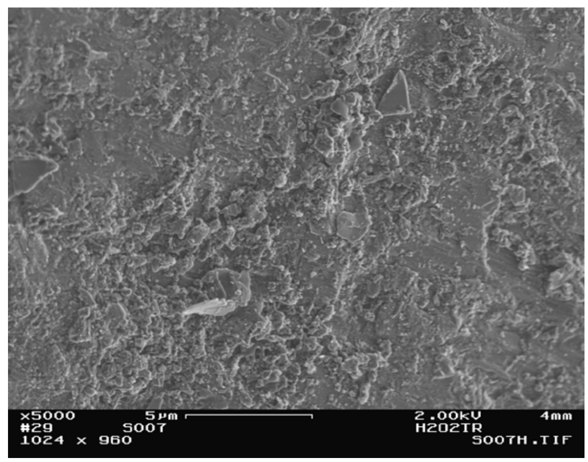
Biotite surface



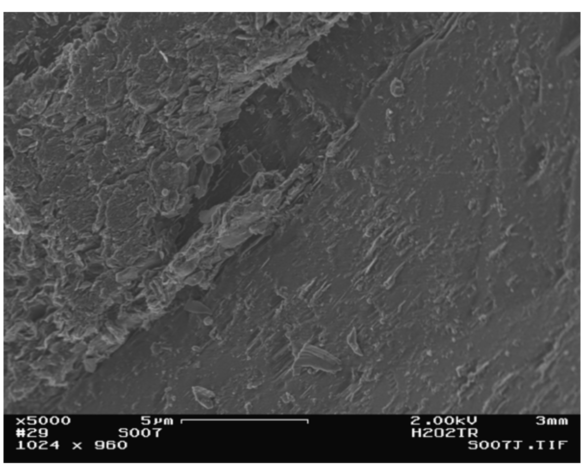
Biotite surface



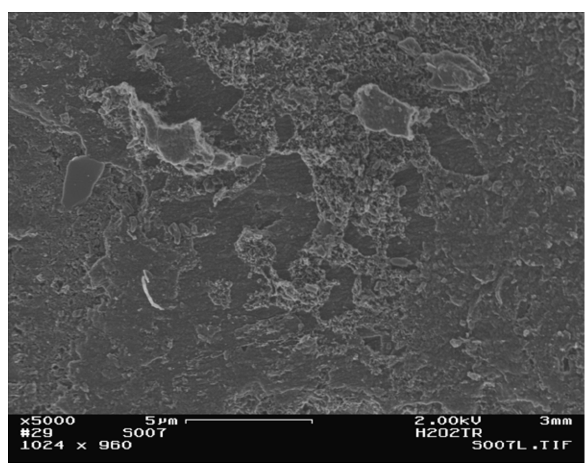
Biotite surface



Anorthite surface

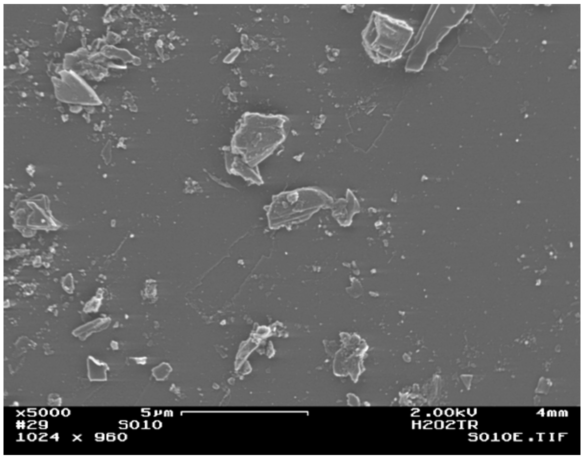


Anorthite surface

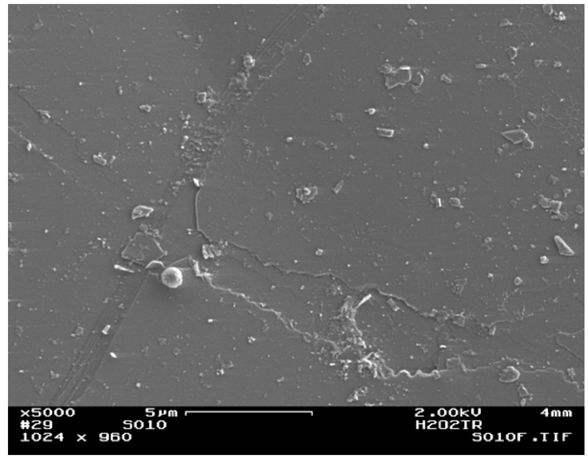


Anorthite surface

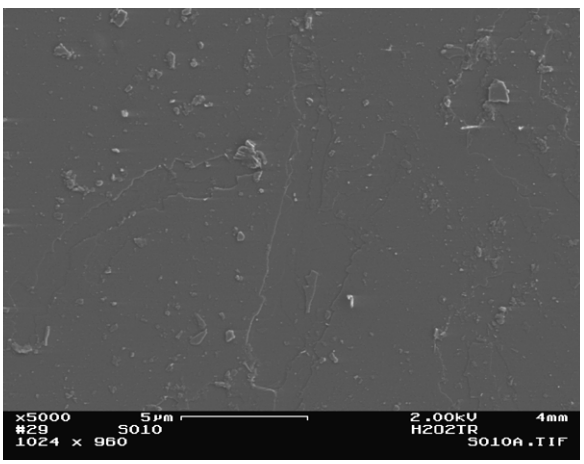
Figure L-2 (cont.): Biotite and anorthite surfaces were examined for changes after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. **– PtFungi** treatment.



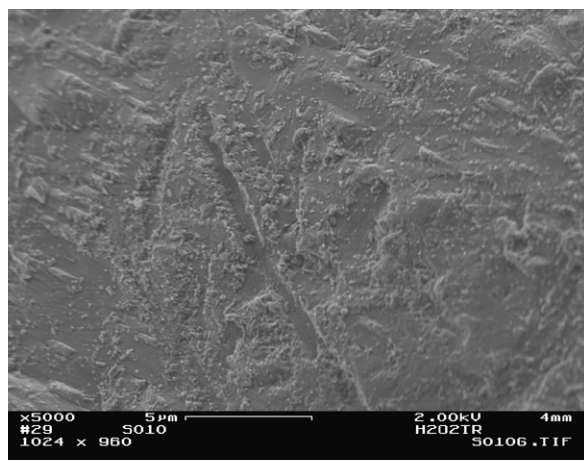
Biotite surface



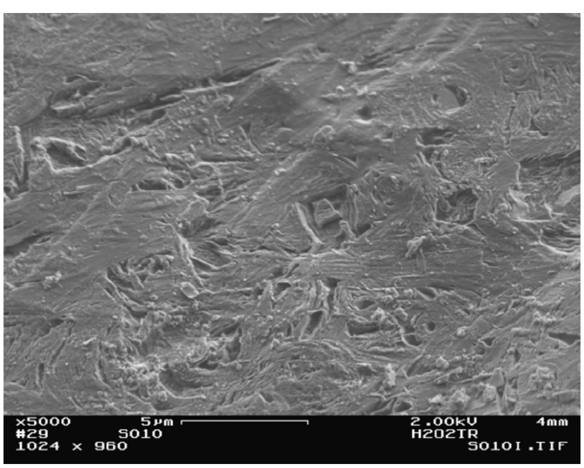
Biotite surface



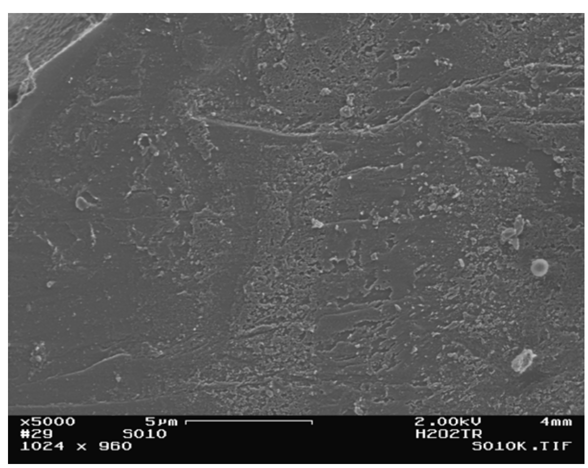
Biotite surface



Anorthite surface

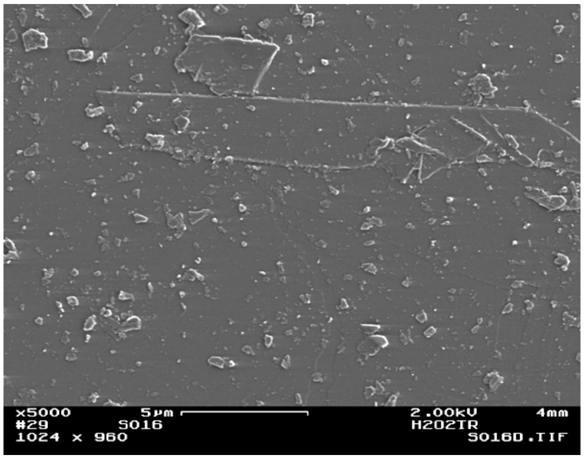


Anorthite surface

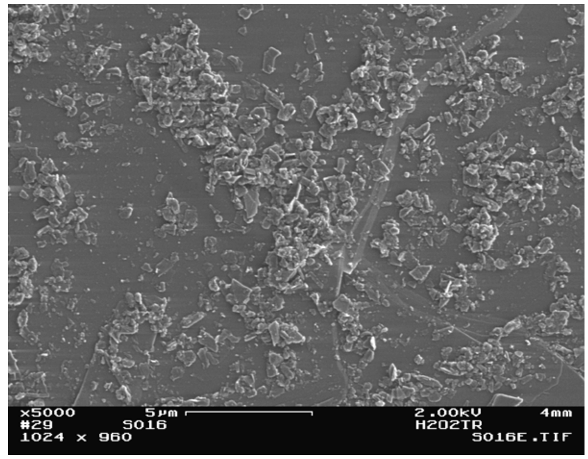


Anorthite surface

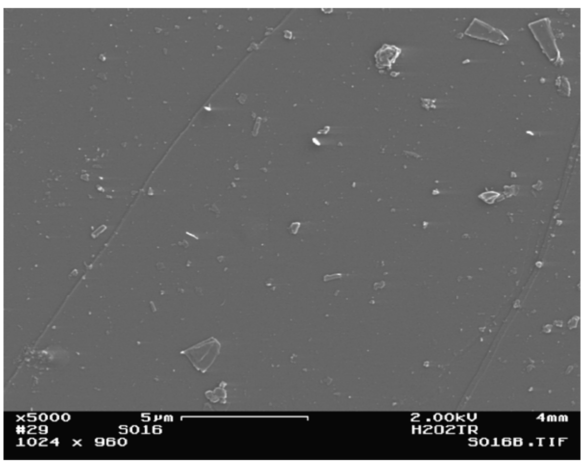
Figure L-2 (cont.): Biotite and anorthite surfaces were examined for changes after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **StRPBact** treatment.



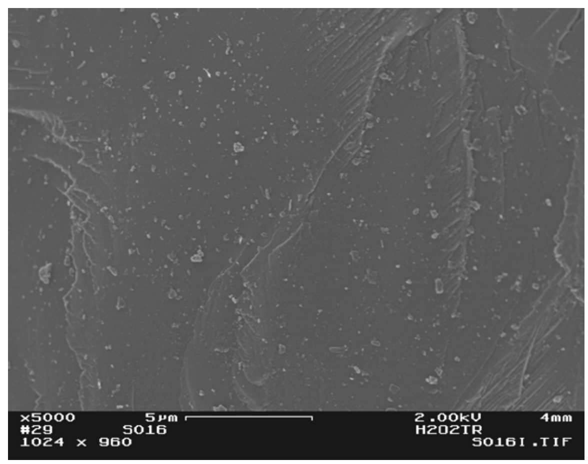
Biotite surface



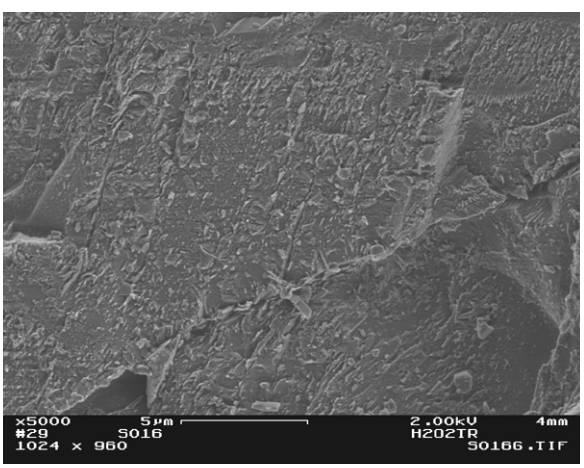
Biotite surface



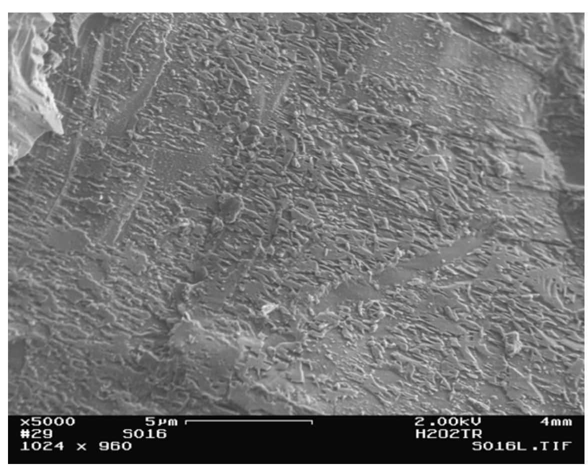
Biotite surface



Anorthite surface

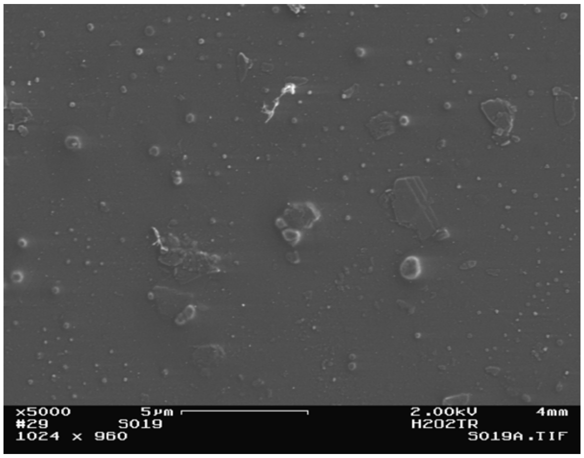


Anorthite surface

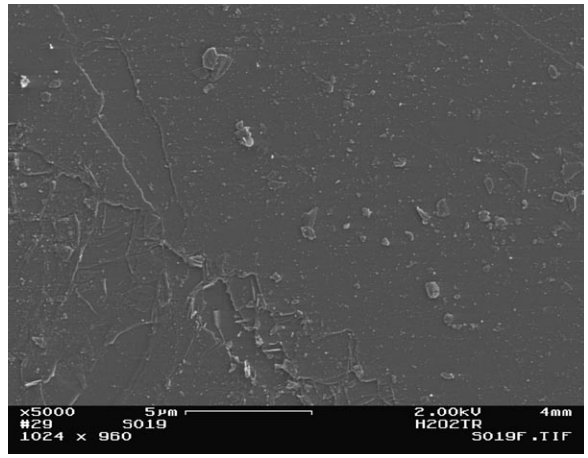


Anorthite surface

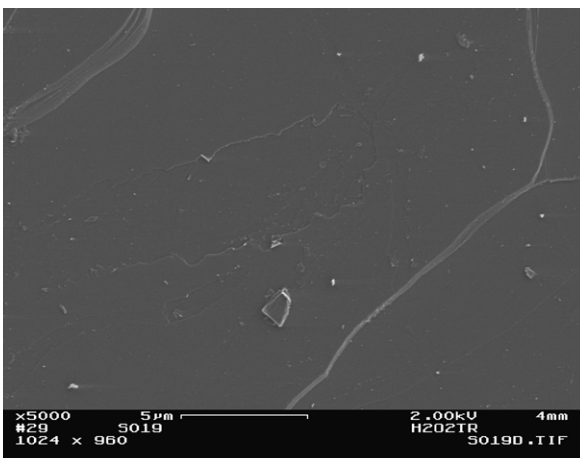
Figure L-2 (cont.): Biotite and anorthite surfaces were examined for changes after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. **– PtRPBact** treatment.



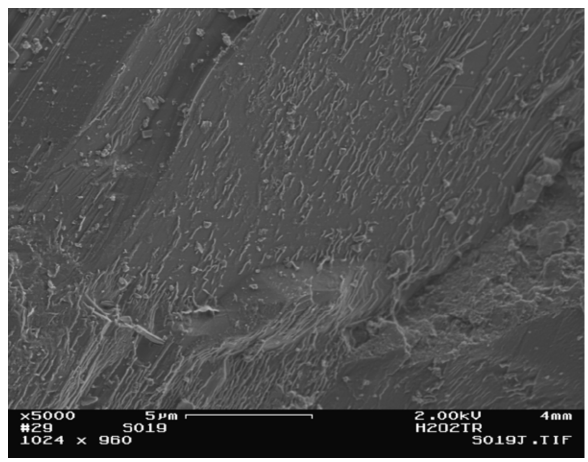
Biotite surface



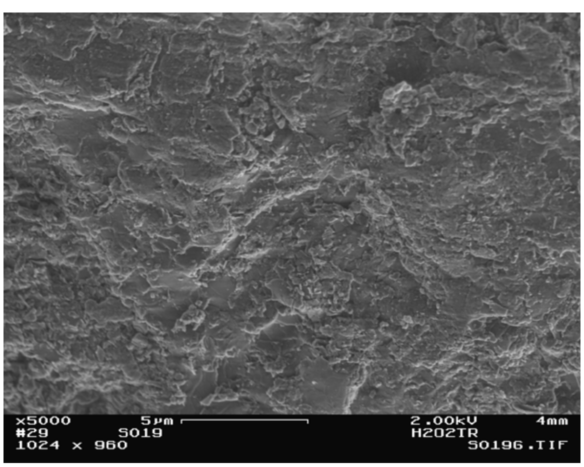
Biotite surface



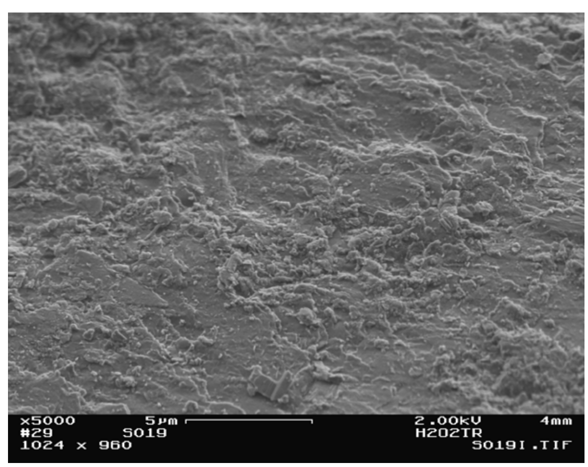
Biotite surface



Anorthite surface

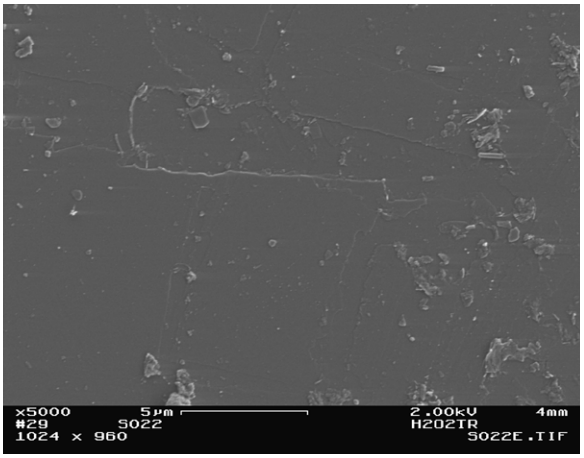


Anorthite surface

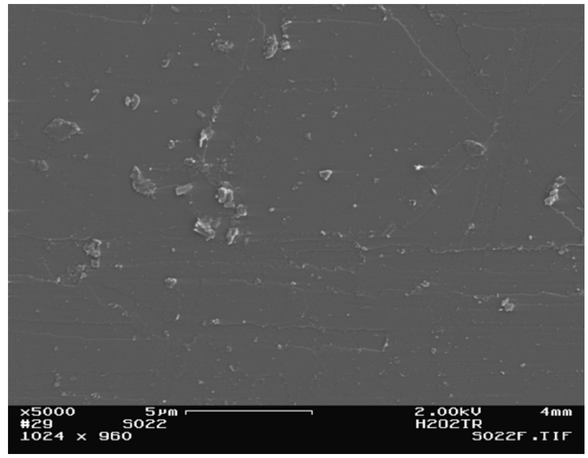


Anorthite surface

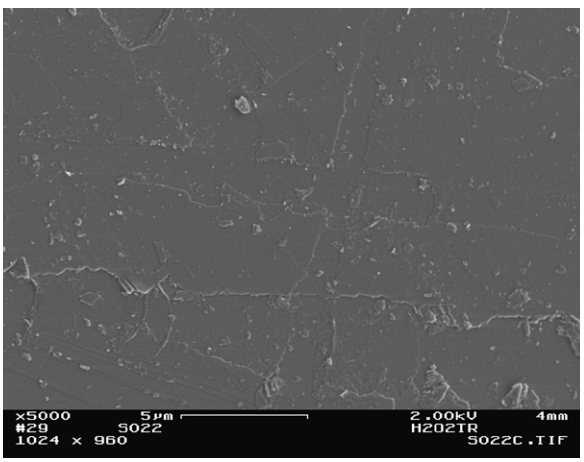
Figure L-2 (cont.): Biotite and anorthite surfaces were examined for changes after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. **– StRPBactFung** treatment.



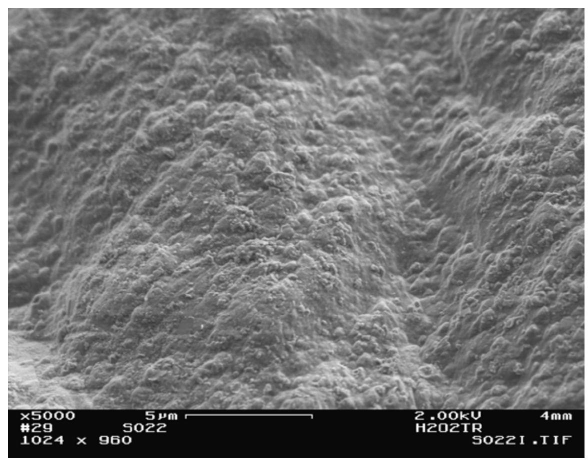
Biotite surface



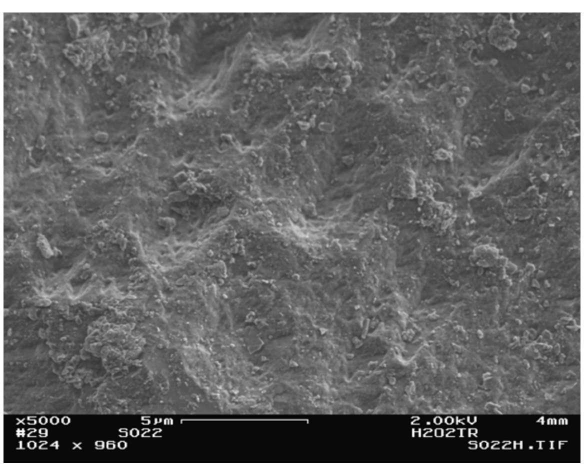
Biotite surface



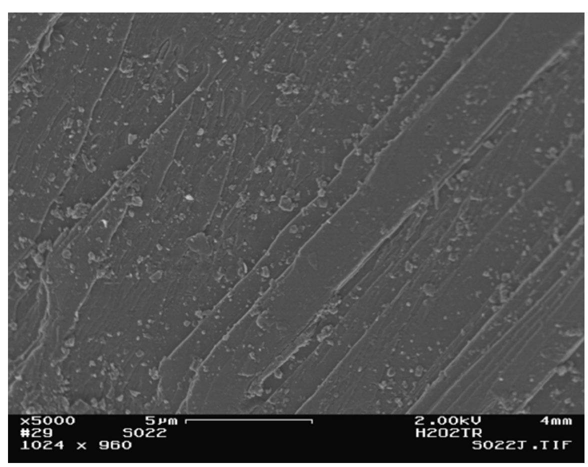
Biotite surface



Anorthite surface

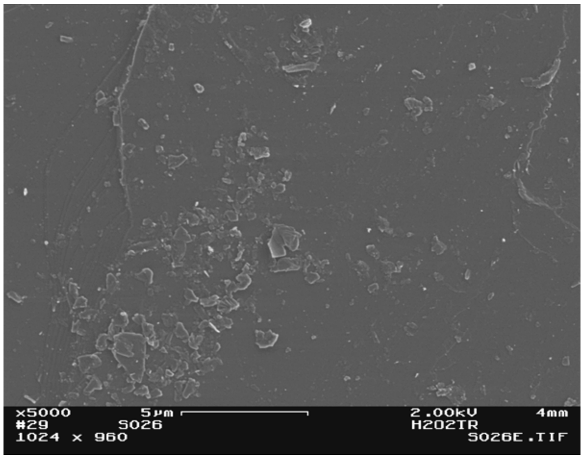


Anorthite surface

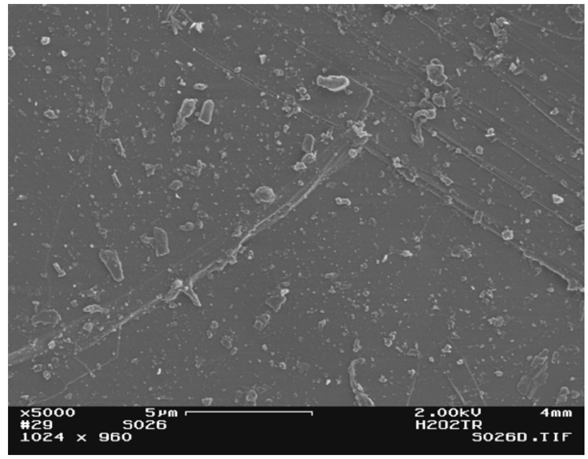


Anorthite surface

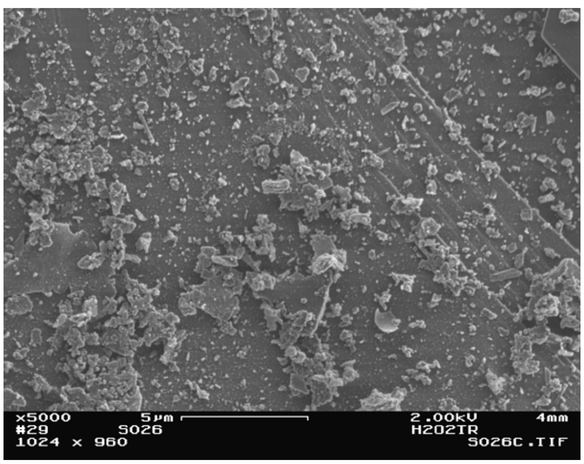
Figure L-2 (cont.): Biotite and anorthite surfaces were examined for changes after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **PtRPBactFung** treatment.



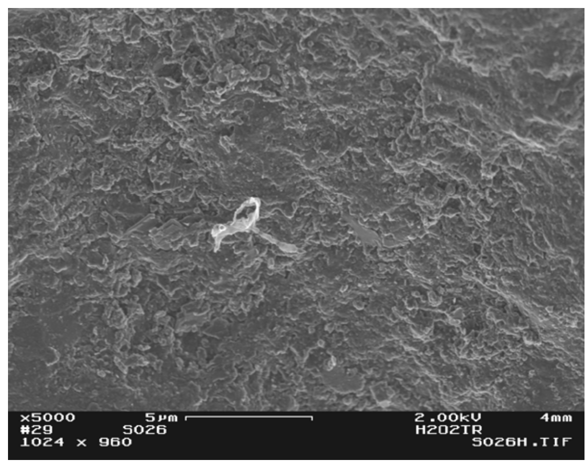
Biotite surface



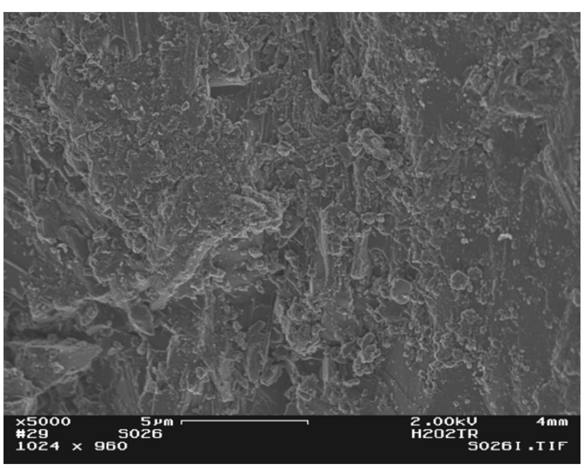
Biotite surface



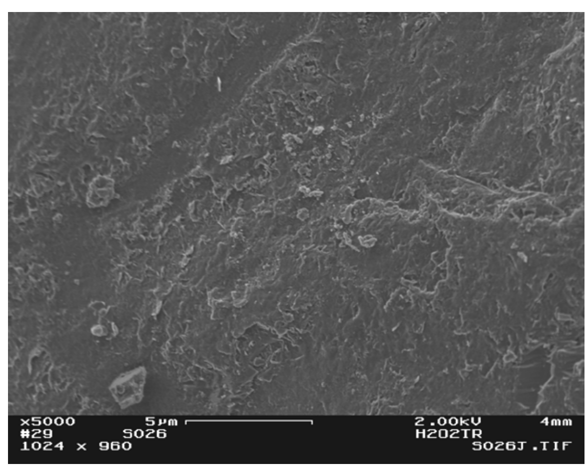
Biotite surface



Anorthite surface

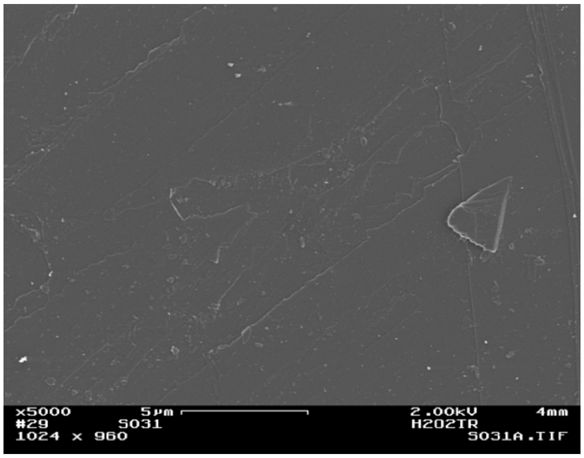


Anorthite surface

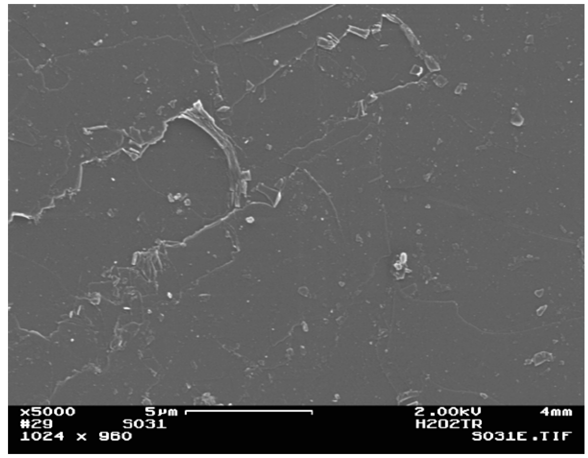


Anorthite surface

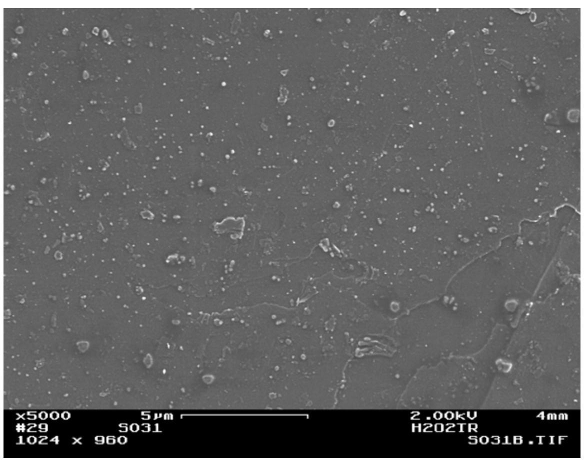
Figure L-2 (cont.): Biotite and anorthite surfaces were examined for changes after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. **– StRPBFNoHoag** treatment.



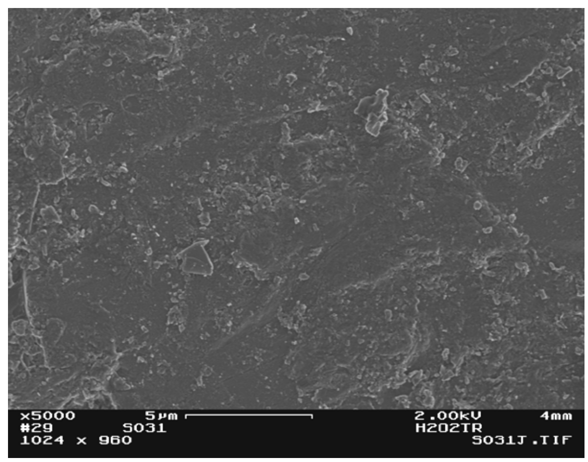
Biotite surface



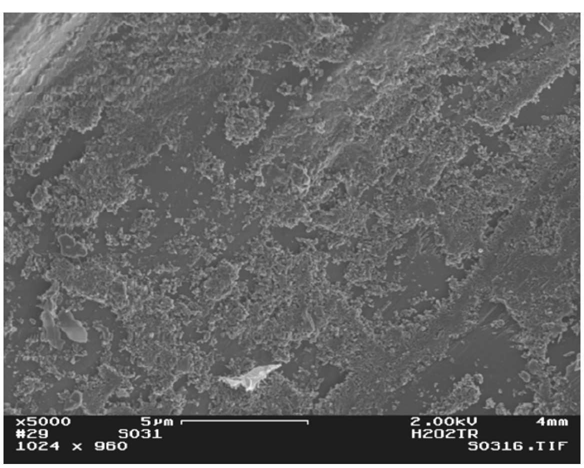
Biotite surface



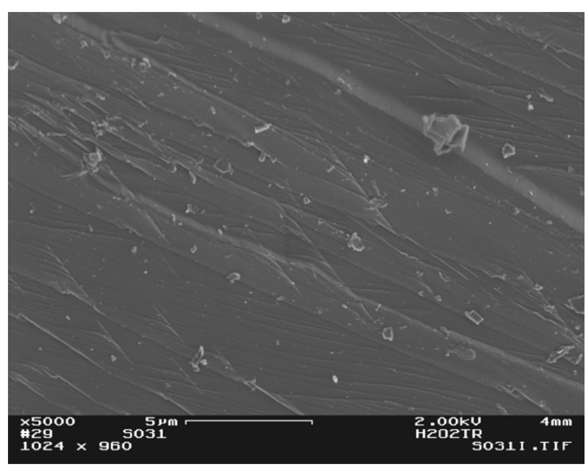
Biotite surface



Anorthite surface

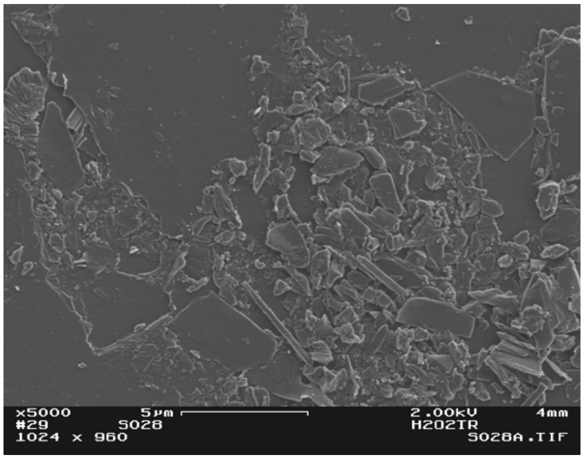


Anorthite surface

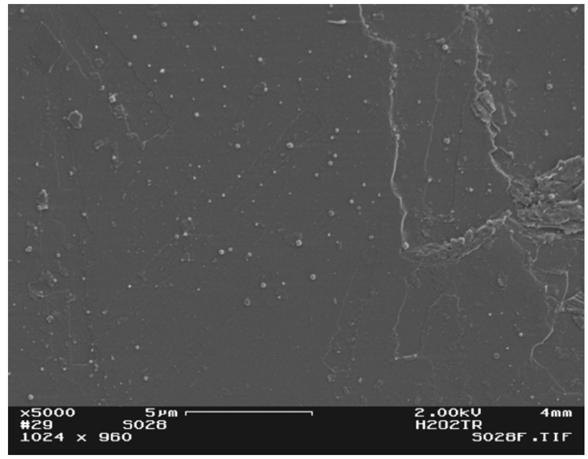


Anorthite surface

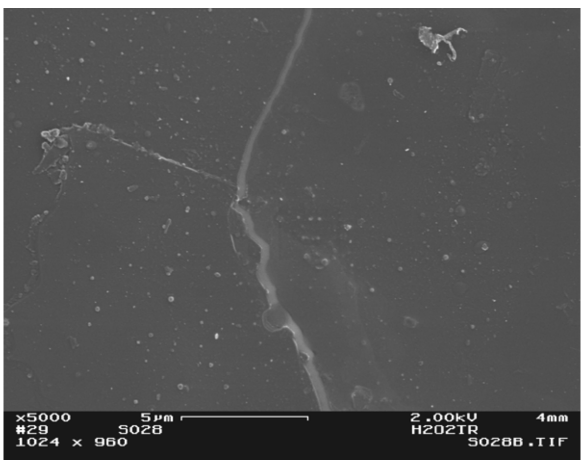
Figure L-2 (cont.): Biotite and anorthite surfaces were examined for changes after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. **– PtRPBFNoHoag** treatment.



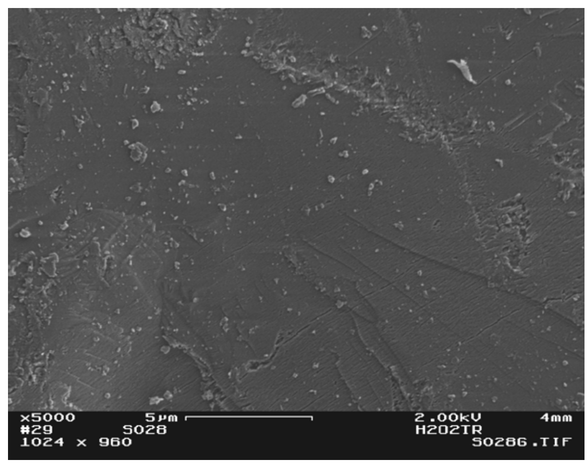
Biotite surface



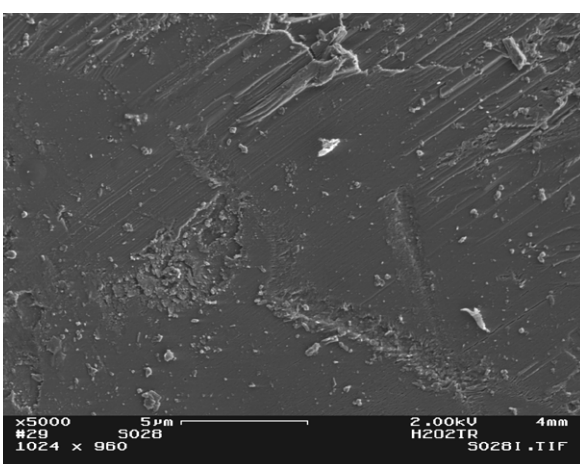
Biotite surface



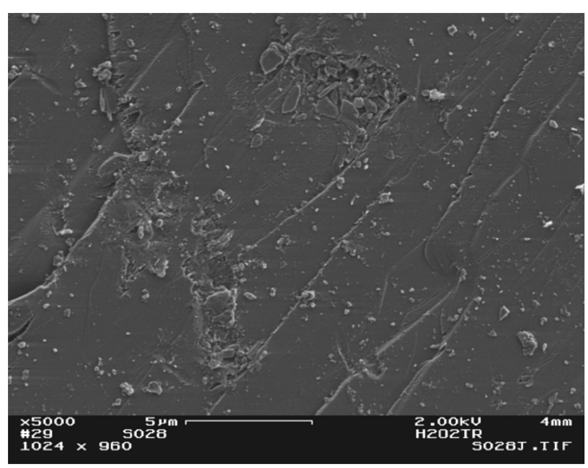
Biotite surface



Anorthite surface



Anorthite surface



Anorthite surface

Figure L-3: Biotite surfaces were also investigated in the rhizosphere of the tree- treatments after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. **– StRPBact** treatment.

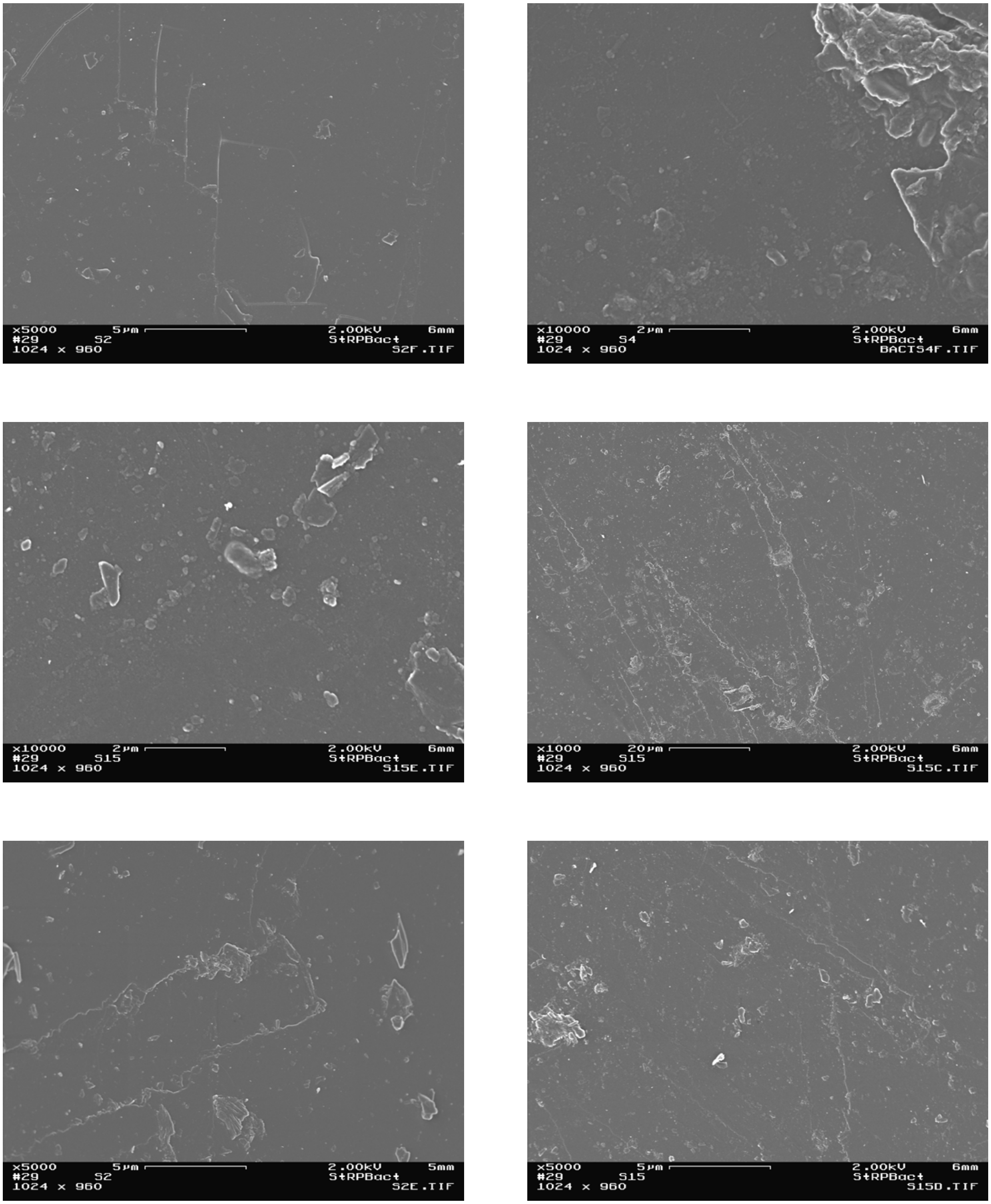


Figure L-3 (cont.): Biotite surfaces were also investigated in the rhizosphere of the tree-treatments after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **PtRPBact** treatment.

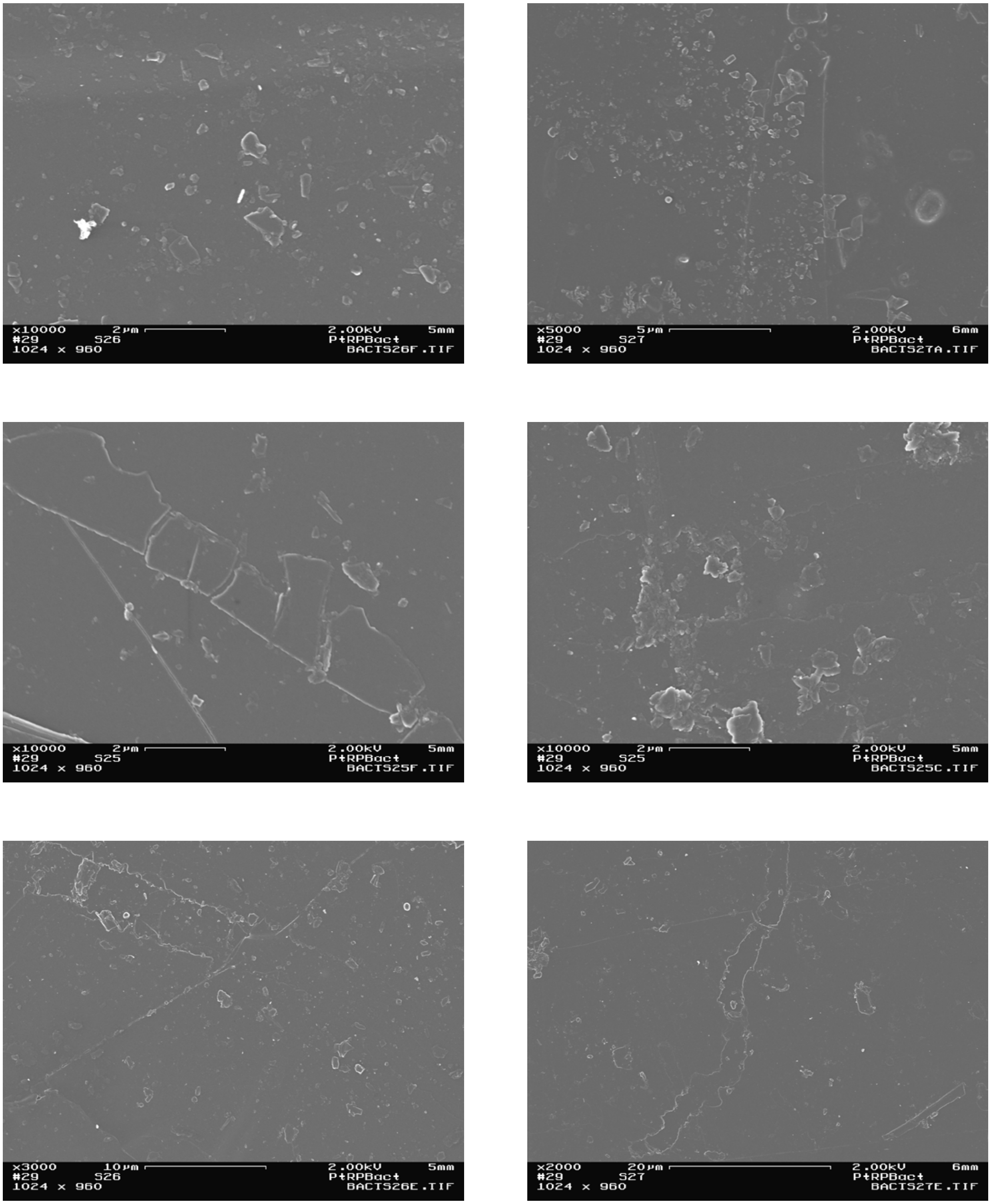


Figure L-3 (cont.): Biotite surfaces were also investigated in the rhizosphere of the tree-treatments after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **StRPBactFung** treatment.

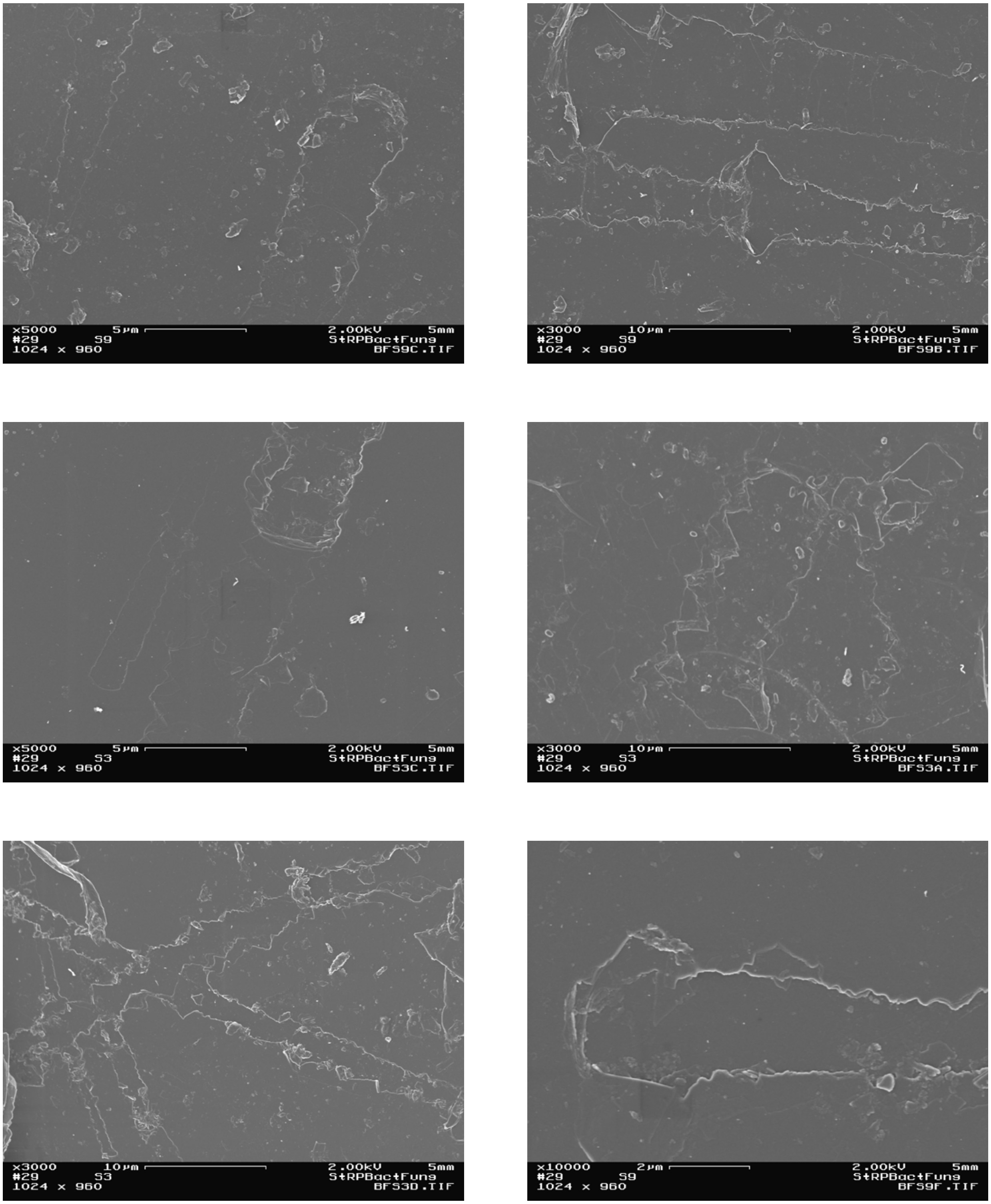


Figure L-3 (cont.): Biotite surfaces were also investigated in the rhizosphere of the tree-treatments after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **PtRPBactFung** treatment.

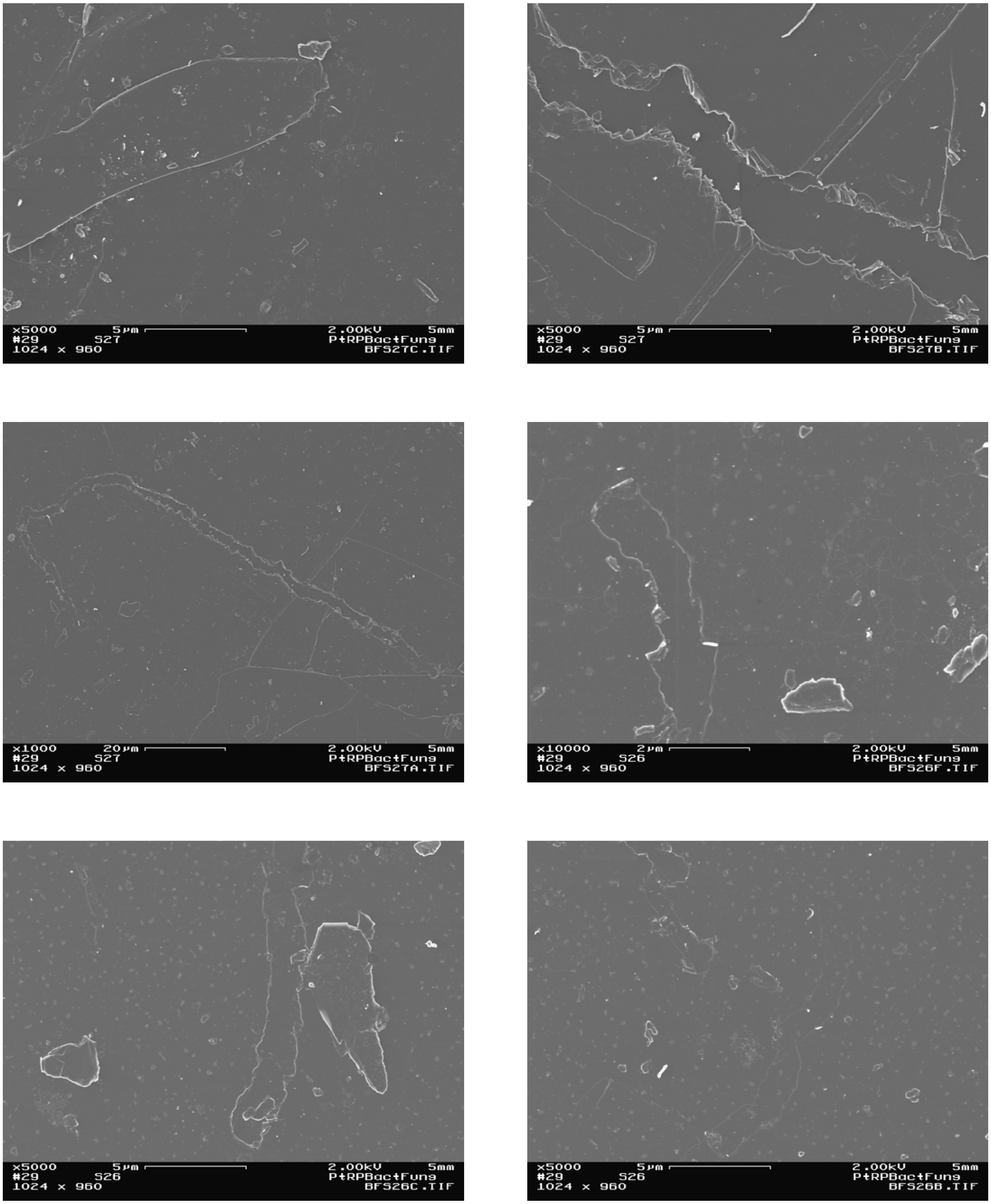


Figure L-3 (cont.): Biotite surfaces were also investigated in the rhizosphere of the tree-treatments after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **StRPBFNoHoag** treatment.

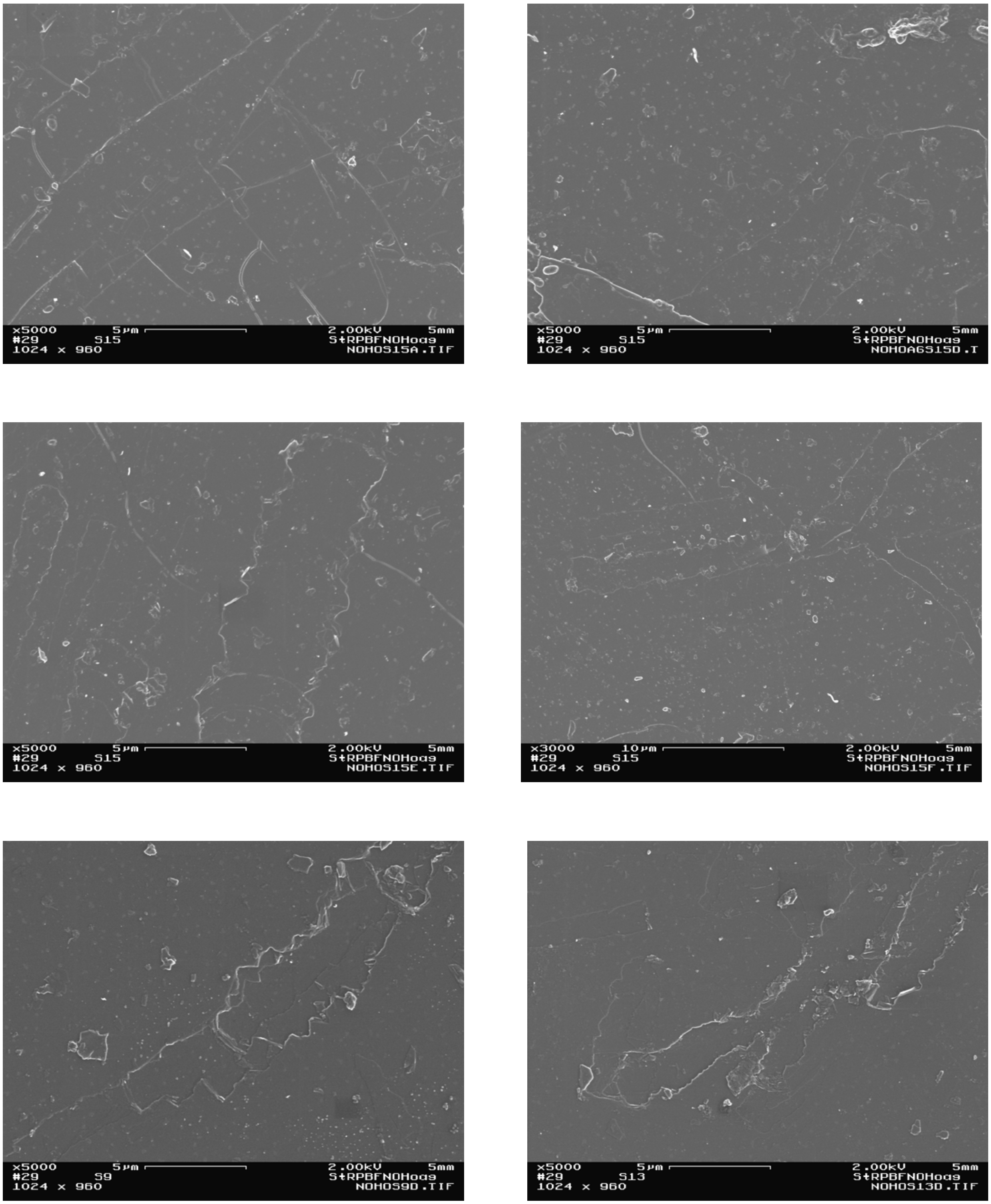


Figure L-3 (cont.): Biotite surfaces were also investigated in the rhizosphere of the tree-treatments after **6 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **PtRPBFNoHoag** treatment.

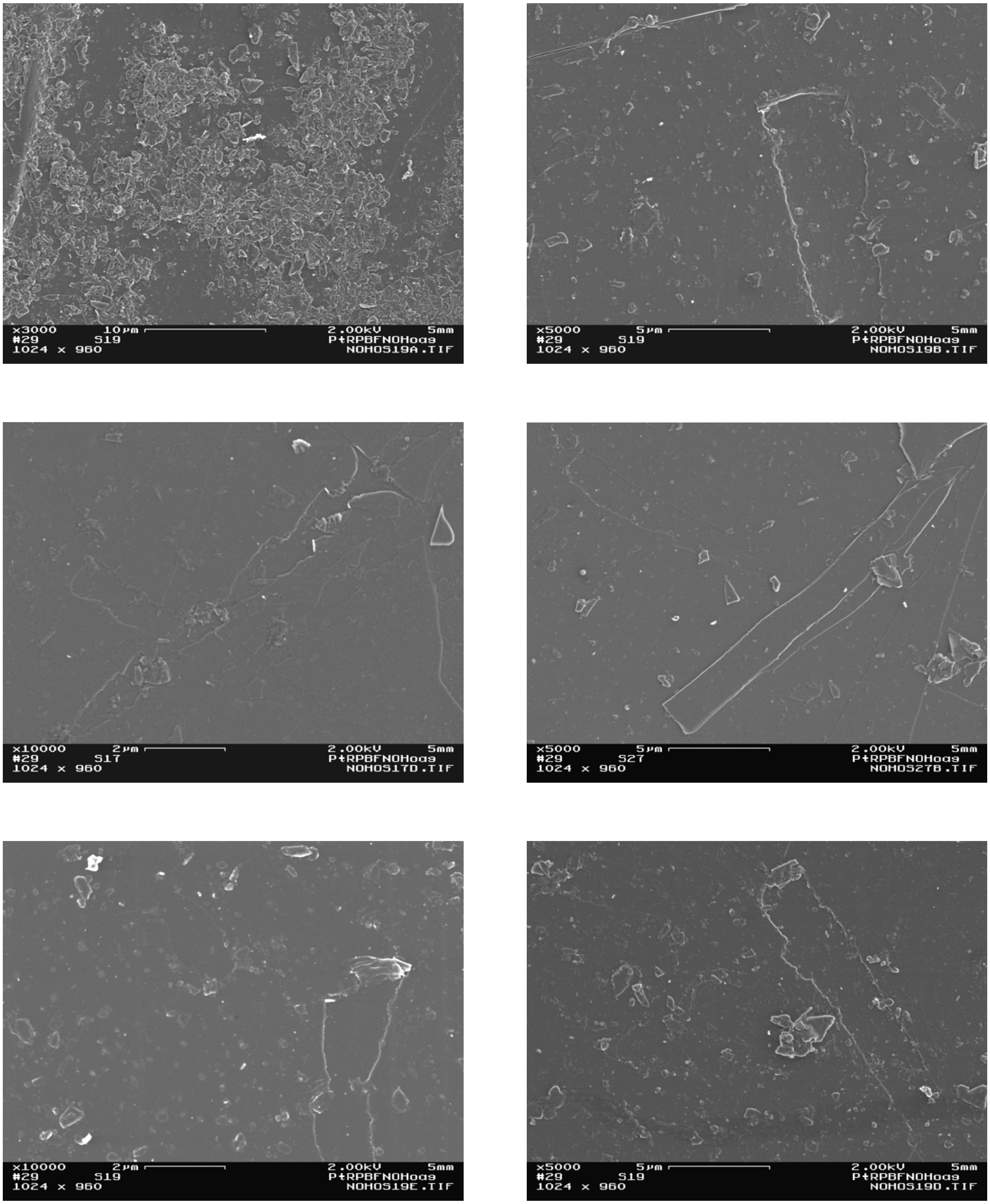


Table L-1: Using ImageJ software all bulk and rhizospheric biotite surface images were analyzed for weathered area and reported in % of total analyzed area. The third dimension could not been measured with SEM. See Appendix G for technical details.

Bulk Soil 6 months								
Sample ID	Weathered Area (um^2)	Total Analyzed Area (um^2)	Weathered %	Average Weathered	Average Total	Average %	Weathered STE	% STE
StBacteriaS5	47.54	362.024	13.1%					
StBacteriaS5	48.749	361.471	13.5%					
StBacteriaS5	135.918	357.956	38.0%					
StBacteriaS5	135.474	363.023	37.3%					
StBacteriaS5	95.175	364.563	26.1%					
StBacteriaS5	17.081	355.158	4.8%					
StBacteriaS5	24.347	358.762	6.8%					
StBacteriaS5	0	361.434	0.0%	504.3	2884.4	17.5%	18.7	5.2%
StBacteriaS5	31.733	362.153	8.8%					
PtBacteriaS22	30.262	363.58	8.3%					
PtBacteriaS22	16.781	361.596	4.6%					
PtBacteriaS22	59.284	360.165	16.5%					
PtBacteriaS22	48.709	366.608	13.3%					
PtBacteriaS22	235.511	362.857	64.9%					
PtBacteriaS22	17.17	361.177	4.8%					
PtBacteriaS22	0	361.729	0.0%	439.5	2899.9	15.2%	26.6	7.3%
StFungiS4	100.194	359.177	27.9%					
StFungiS4	2.712	360.716	0.8%					
StFungiS4	40.45	360.882	11.2%					
StFungiS4	2.441	356.918	0.7%					
StFungiS4	104.74	363.445	28.8%					
StFungiS4	144.959	359.219	40.4%					
StFungiS4	45.15	359.188	12.6%	440.6	2519.5	17.5%	20.7	5.7%
PtFungiS16	76.332	362.448	21.1%					
PtFungiS16	83.448	358.989	23.2%					
PtFungiS16	14.7	360.189	4.1%					
PtFungiS16	3.306	363.284	0.9%					
PtFungiS16	0	364.007	0.0%					
PtFungiS16	18.167	362.024	5.0%					
PtFungiS16	47.492	365.028	13.0%	243.4	2536.0	9.6%	13.0	3.6%
AbioticS5	34.215	361.267	9.5%					
AbioticS5	16.349	360.035	4.5%					
AbioticS5	88.073	360.882	24.4%					
AbioticS5	36.779	361.139	10.2%					
AbioticS5	27.414	365.028	7.5%					
AbioticS5	0	358.377	0.0%					
AbioticS5	273.104	361.839	75.5%	475.9	2528.6	18.8%	35.7	9.9%
StRPBactS2	210.871	364.601	57.8%					
StRPBactS2	77.556	368.029	21.1%					
StRPBactS2	0	359.47	0.0%					
StRPBactS2	1.475	352.551	0.4%					
StRPBactS2	0	364.434	0.0%					
StRPBactS2	20.439	358.085	5.7%					
StRPBactS2	0	359.219	0.0%					
StRPBactS2	31.887	360.716	8.8%	342.2	2887.1	11.9%	25.8	7.1%

Table L-1 (cont.): Using ImageJ software all bulk and rhizospheric biotite surface images were analyzed for weathered area and reported in % of total analyzed area. The third dimension could not been measured with SEM. See Appendix G for technical details.

Bulk Soil 6 months								
Sample ID	Weathered Area (um^2)	Total Analyzed Area (um^2)	Weathered %	Average Weathered	Average Total	Average %	Weathered STE	% STE
PtRPBactS25	33.099	358.506	9.2%					
PtRPBactS25	104.757	362.153	28.9%					
PtRPBactS25	0	361.177	0.0%					
PtRPBactS25	34.512	361.434	9.5%					
PtRPBactS25	40.202	361.839	11.1%					
PtRPBactS25	69.493	359.769	19.3%					
PtRPBactS25	35.435	356.241	9.9%					
PtRPBactS25	124.258	357.625	34.7%	441.8	2878.7	15.3%	14.6	4.1%
StRPBactFungS3	116.7	364.861	32.0%					
StRPBactFungS3	0	356.283	0.0%					
StRPBactFungS3	1067.102	2279.832	46.8%					
StRPBactFungS3	23.937	361.895	6.6%					
StRPBactFungS3	171.17	357.662	47.9%					
StRPBactFungS3	63.228	353.329	17.9%					
StRPBactFungS3	104.959	357.794	29.3%					
StRPBactFungS3	133.272	365.711	36.4%	1680.4	4797.4	35.0%	124.1	6.2%
PtRPBactFungS26	16.923	363.154	4.7%					
PtRPBactFungS26	0	355.575	0.0%					
PtRPBactFungS26	2.974	352.39	0.8%					
PtRPBactFungS26	9.853	355.988	2.8%					
PtRPBactFungS26	54.479	359.348	15.2%					
PtRPBactFungS26	4.109	367.038	1.1%	88.3	2153.5	4.1%	8.3	2.3%
StRPBFNOHoagS9	78.609	360.716	21.8%					
StRPBFNoHoagS9	48.157	362.448	13.3%					
StRPBFNOHoagS9	0	40.157						
StRPBFNOHoagS9	1.888	355.575	0.5%					
StRPBFNOHoagS9	2.346	92.052	2.5%					
StRPBFNOHoagS9	24.143	373.772	6.5%					
StRPBFNOHoagS9	129.716	358.506	36.2%	284.9	1943.2	14.7%	18.5	5.1%
PtRPBFNOHoagS17	45.59	360.882	12.6%					
PtRPBFNOHoagS17	89.712	365.277	24.6%					
PtRPBFNOHoagS17	147.633	357.337	41.3%					
PtRPBFNOHoagS17	65.341	358.372	18.2%					
PtRPBFNOHoagS17	92.938	355.285	26.2%					
PtRPBFNOHoagS17	33.621	360.165	9.3%					
PtRPBFNOHoagS17	140.927	363.116	38.8%					
PtRPBFNOHoagS17	49.775	362.872	13.7%	665.5	2883.3	23.1%	15.2	4.2%

Table L-1 (cont.): Using ImageJ software all bulk and rhizospheric biotite surface images were analyzed for weathered area and reported in % of total analyzed area. The third dimension could not been measured with SEM. See Appendix G for technical details.

Rhizo Soil 6 months								
Sample ID	Weathered Area (um^2)	Total Analyzed Area (um^2)	Weathered %	Average Weathered	Average Total	Average %	Weathered STE	% STE
StRPBactS2	0	90.282	0.0%					
StRPBactS2	0	92.275	0.0%					
StRPBactS2	0	92.416	0.0%					
StRPBactS2	37.33	90.536	41.2%					
StRPBactS2	94.059	364.434	25.8%					
StRPBactS2	36.431	361.89	10.1%					
StRPBactS4	0	93.325	0.0%					
StRPBactS4	0	89.94	0.0%					
StRPBactS4	0	122.18	0.0%					
StRPBactS4	0	92.494	0.0%					
StRPBactS4	0	24.764	0.0%					
StRPBactS4	0	93.226	0.0%					
StRPBactS15	18.223	90.855	20.1%					
StRPBactS15	8.402	92.277	9.1%					
StRPBactS15	1618.408	9144.938	17.7%					
StRPBactS15	69.938	358.049	19.5%					
StRPBactS15	5.542	90.947	6.1%					
StRPBactS15	11.329	92.343	12.3%	1899.7	11477.2	16.6%	89.2	2.8%
PtRPBactS25	84.867	360.483	23.5%					
PtRPBactS25	0	91.235	0.0%					
PtRPBactS25	144.421	92.352	156.4%					
PtRPBactS25	13.962	90.388	15.4%					
PtRPBactS25	0	1007.907	0.0%					
PtRPBactS25	0	89.837	0.0%					
PtRPBactS26	0	91.161	0.0%					
PtRPBactS26	237.843	1024.435	23.2%					
PtRPBactS26	0	90.991	0.0%					
PtRPBactS26	0	1005.555	0.0%					
PtRPBactS26	163.86	989.908	16.6%					
PtRPBactS26	0	90.462	0.0%					
PtRPBactS27	44.785	349.117	12.8%					
PtRPBactS27	3.574	88.689	4.0%					
PtRPBactS27	271.978	2261.322	12.0%					
PtRPBactS27	26.099	87.566	29.8%					
PtRPBactS27	164.486	2269.568	7.2%					
PtRPBactS27	5.813	89.343	6.5%	1161.7	10170.3	11.4%	21.4	8.5%
StRPBactFungS3	322.411	1004.614	32.1%					
StRPBactFungS3	52.739	90.633	58.2%					
StRPBactFungS3	98.318	364.265	27.0%					
StRPBactFungS3	257.854	1003.916	25.7%					
StRPBactFungS3	16.141	92.169	17.5%					
StRPBactFungS3	2.308	91.664	2.5%					
StRPBactFungS9	0	92.275	0.0%					
StRPBactFungS9	446.766	1010.145	44.2%					
StRPBactFungS9	91.433	367.768	24.9%					
StRPBactFungS9	0	92.526	0.0%					
StRPBactFungS9	313.647	1008.969	31.1%					
StRPBactFungS9	113.493	88.698	128.0%					
StRPBactFungS12	1385.59	2261.555	61.3%					
StRPBactFungS12	318.582	1006.616	31.6%					
StRPBactFungS12	93.027	357.922	26.0%					
StRPBactFungS12	12.309	986.604	1.2%					
StRPBactFungS12	84.586	361.306	23.4%					
StRPBactFungS12	0	22.632	0.0%	3609.2	10304.3	35.0%	77.0	7.3%

Table L-1 (cont.): Using ImageJ software all bulk and rhizospheric biotite surface images were analyzed for weathered area and reported in % of total analyzed area. The third dimension could not been measured with SEM. See Appendix G for technical details.

Rhizo Soil 6 months								
Sample ID	Weathered Area (um^2)	Total Analyzed Area (um^2)	Weathered %	Average Weathered	Average Total	Average %	Weathered STE	% STE
PtRPBactFungS26	49.064	357.502	13.7%					
PtRPBactFungS26	36.117	365.706	9.9%					
PtRPBactFungS26	26.104	356.991	7.3%					
PtRPBactFungS26	17.513	353.342	5.0%					
PtRPBactFungS26	29.286	355.285	8.2%					
PtRPBactFungS26	7.105	89.27	8.0%					
PtRPBactFungS27	430.017	9325.898	4.6%					
PtRPBactFungS27	79.213	355.954	22.3%					
PtRPBactFungS27	13.407	361.557	3.7%					
PtRPBactFungS27	15.428	1012.635	1.5%					
PtRPBactFungS27	3.544	355.285	1.0%					
PtRPBactFungS27	13.444	355.865	3.8%	720.2	13645.3	5.3%	34.2	1.7%
StRPBFNOHoagS9	0	1016.104	0.0%					
StRPBFNOHoagS9	5.696	92.604	6.2%					
StRPBFNOHoagS9	3.254	92.277	3.5%					
StRPBFNOHoagS9	70.435	358.342	19.7%					
StRPBFNOHoagS9	0	359.182	0.0%					
StRPBFNOHoagS9	68.428	362.153	18.9%					
StRPBFNOHoagS13	292.738	2263.399	12.9%					
StRPBFNOHoagS13	22.173	92.202	24.0%					
StRPBFNOHoagS13	26.452	91.491	28.9%					
StRPBFNOHoagS13	99.533	357.502	27.8%					
StRPBFNOHoagS13	46.94	94.176	49.8%					
StRPBFNOHoagS13	0	54.365	0.0%					
StRPBFNOHoagS15	0	358.922	0.0%					
StRPBFNOHoagS15	1064.601	2240.286	47.5%					
StRPBFNOHoagS15	2.525	364.434	0.7%					
StRPBFNOHoagS15	59.116	366.177	16.1%					
StRPBFNOHoagS15	161.357	361.429	44.6%					
StRPBFNOHoagS15	193.318	1016.933	19.0%	2116.6	9942.0	21.3%	58.9	4.0%
PtRPBFNOHoagS17	56.341	1026.832	5.5%					
PtRPBFNOHoagS17	42.035	361.434	11.6%					
PtRPBFNOHoagS17	8.471	22.393	37.8%					
PtRPBFNOHoagS17	27.305	89.27	30.6%					
PtRPBFNOHoagS17	5.529	359.313	1.5%					
PtRPBFNOHoagS17	0	22.953	0.0%					
PtRPBFNOHoagS19	0	1014.087	0.0%					
PtRPBFNOHoagS19	39.697	353.872	11.2%					
PtRPBFNOHoagS19	637.269	2271.294	28.1%					
PtRPBFNOHoagS19	87.11	357.497	24.4%					
PtRPBFNOHoagS19	10.936	89.512	12.2%					
PtRPBFNOHoagS19	27.809	1010.627	2.8%					
PtRPBFNOHoagS27	0	997.832	0.0%					
PtRPBFNOHoagS27	18.214	354.741	5.1%					
PtRPBFNOHoagS27	22.169	359.025	6.2%	982.9	8690.7	11.3%	41.3	3.2%

Figure L-4: The graph shows the weathered area percentage of bulk samples in all treatments and rhizospheric samples in tree treatments. An average standard error is represented by the error bars. Rhizospheric and bulk samples did not differ.

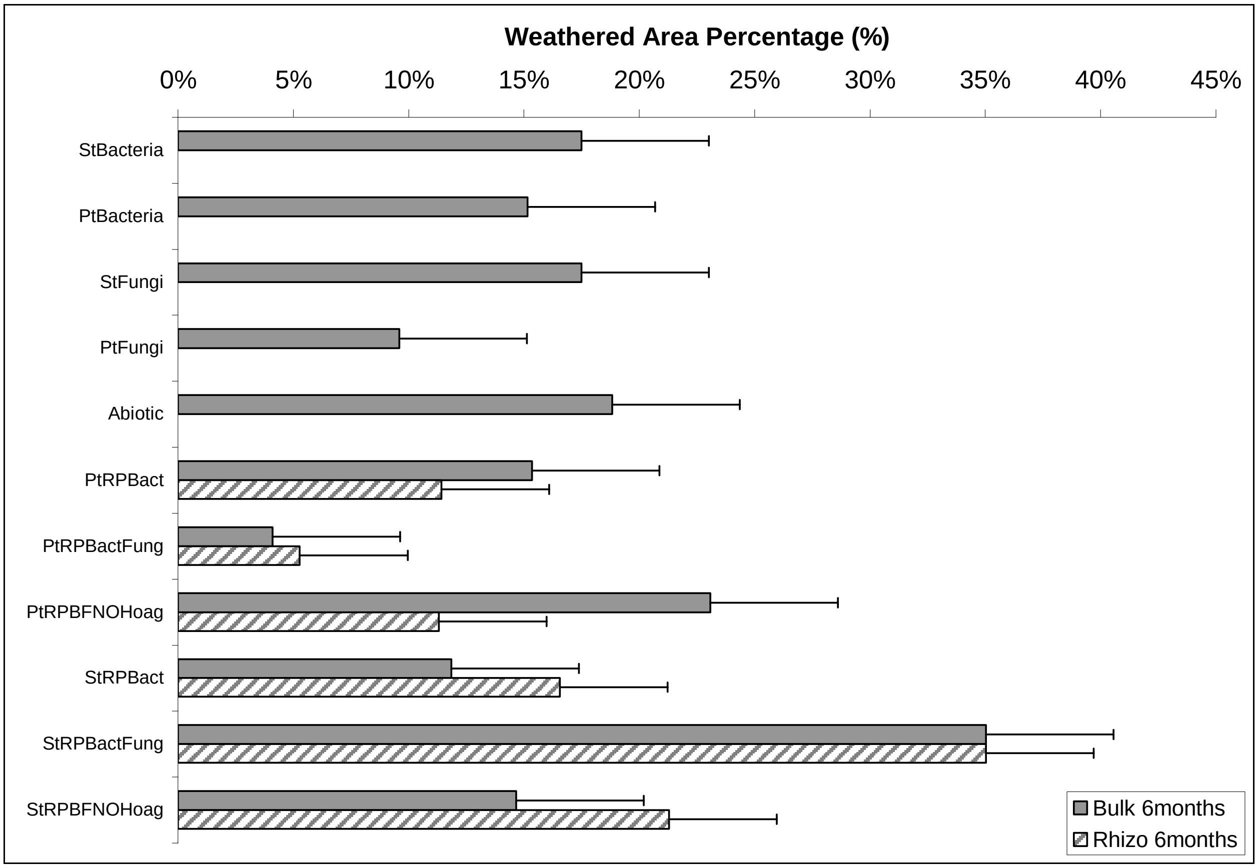


Figure L-5: Biotite surfaces were examined for changes after **12 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. Anorthite surfaces were not analyzed because changes were not easy to determine and quantitative measurements could not be done on those surfaces.

Abiotic treatment **StBacteria** treatment

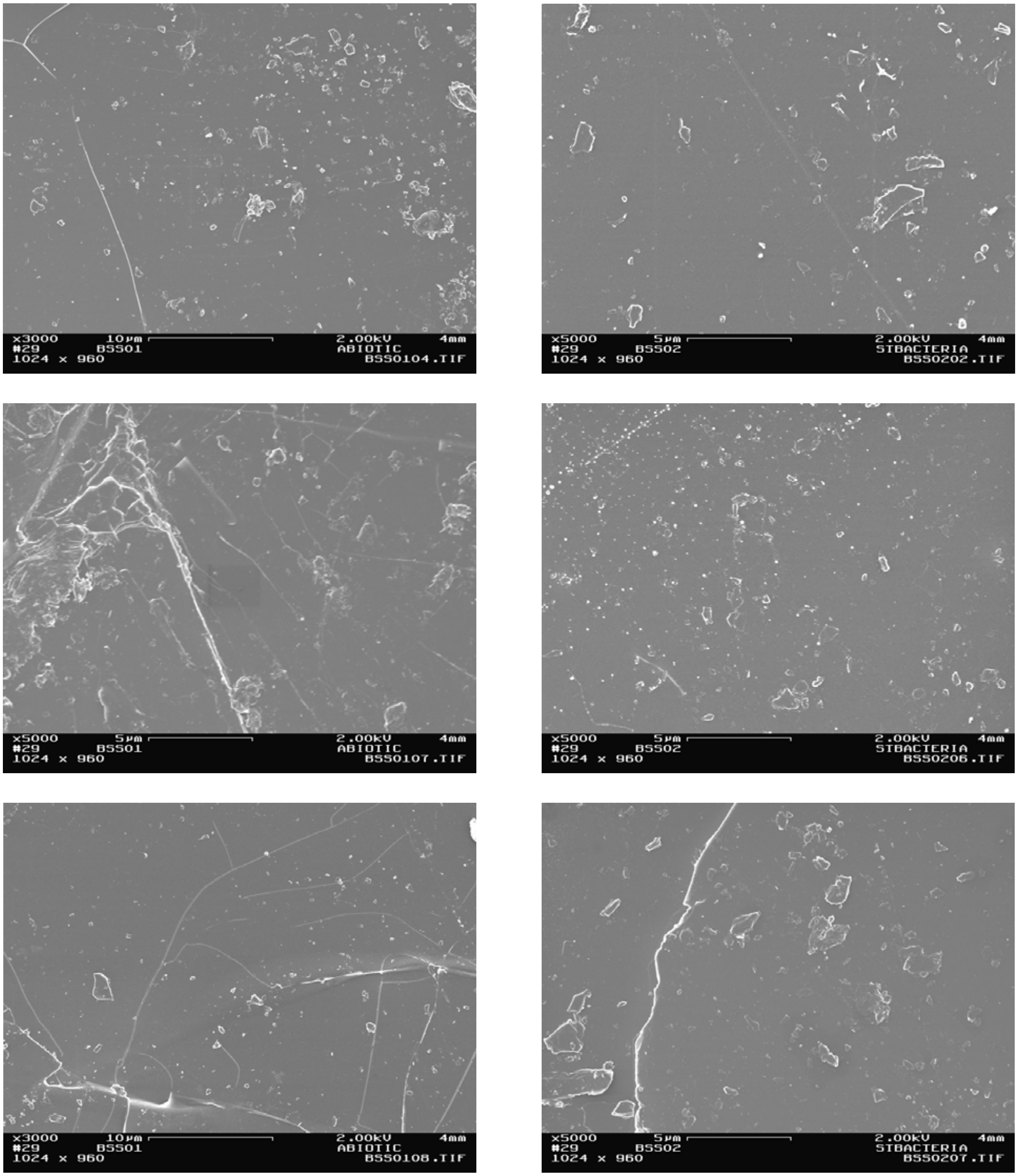
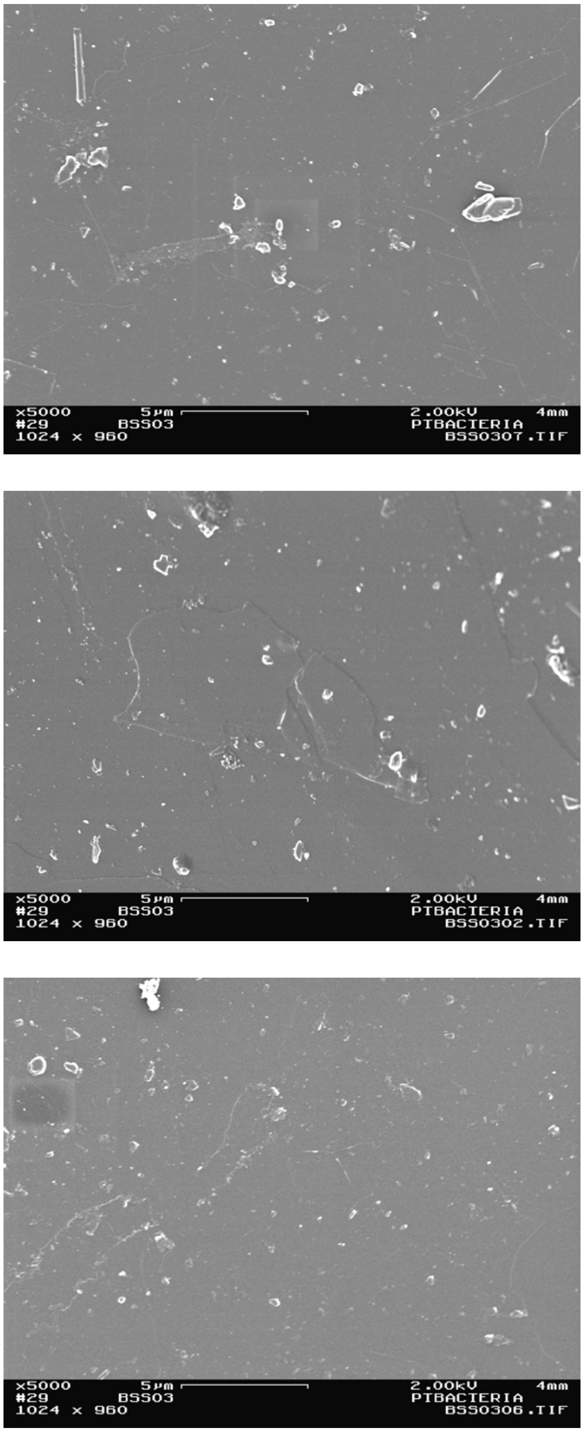


Figure L-5 (cont.): Biotite surfaces were examined for changes after **12 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. Anorthite surfaces were not analyzed because changes were not easy to determine and quantitative measurements could not be done on those surfaces.

PtBacteria treatment



StFungi treatment

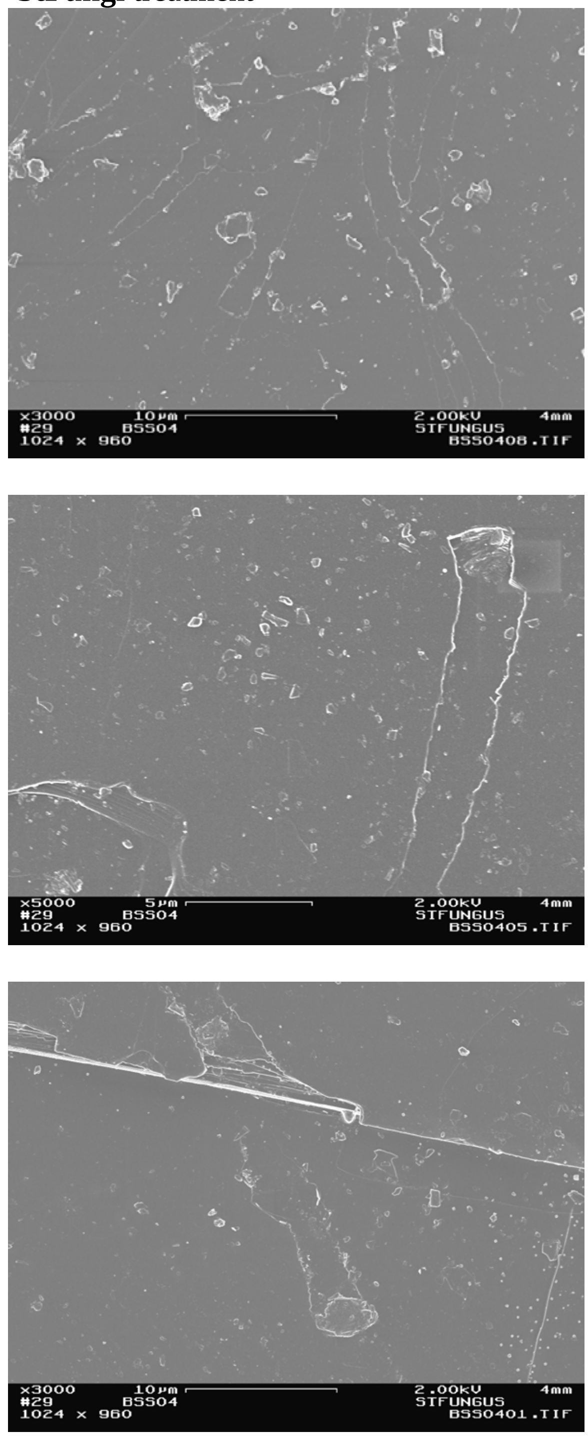
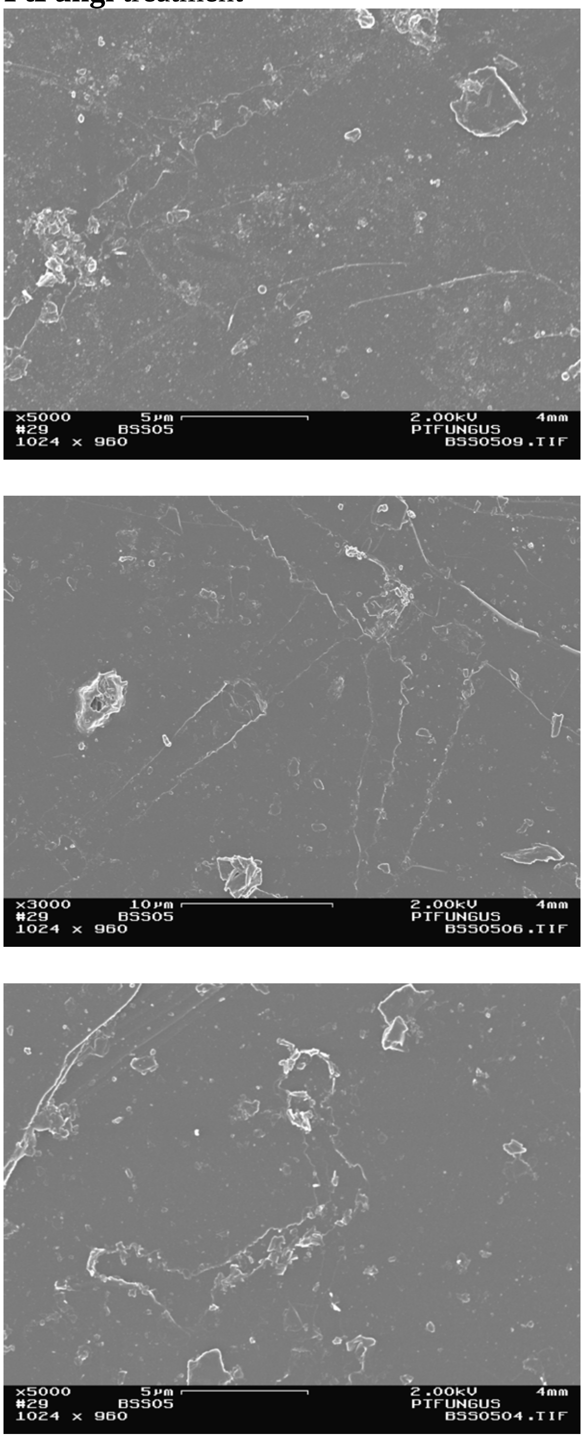


Figure L-5 (cont.): Biotite surfaces were examined for changes after **12 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. Anorthite surfaces were not analyzed because changes were not easy to determine and quantitative measurements could not be done on those surfaces.

PtFungi treatment



StRPBact treatment

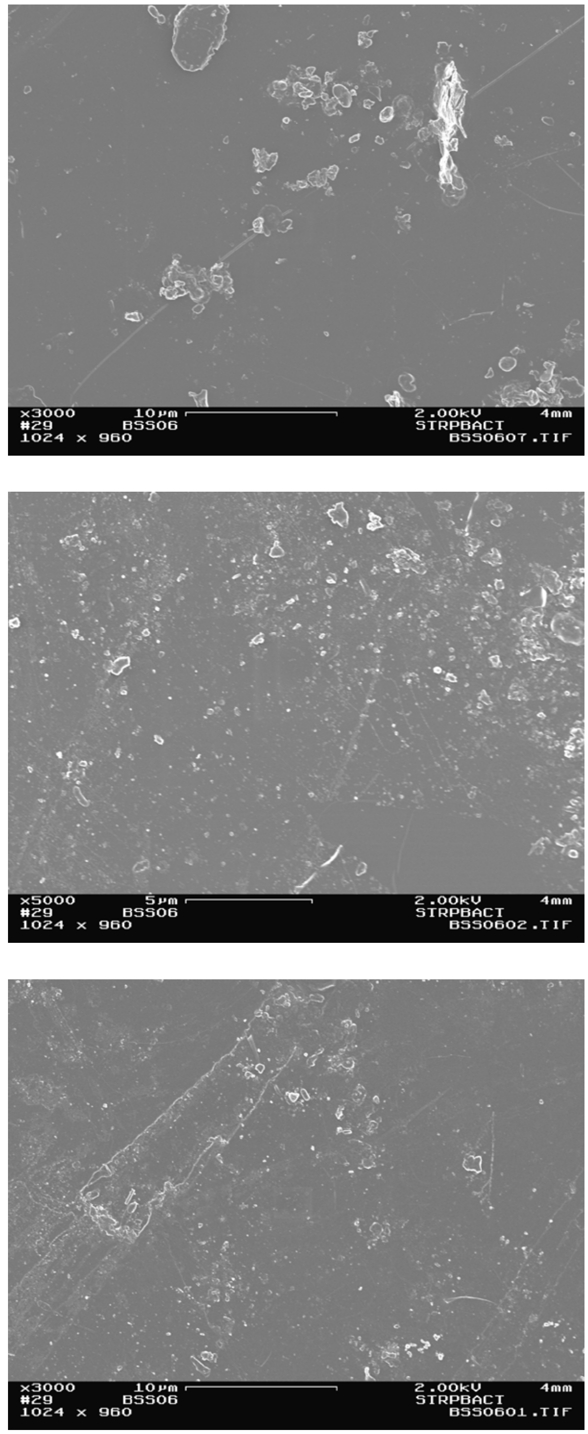


Figure L-5 (cont.): Biotite surfaces were examined for changes after **12 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. Anorthite surfaces were not analyzed because changes were not easy to determine and quantitative measurements could not be done on those surfaces.

PtRPBact treatment **StRPBactFung** treatment

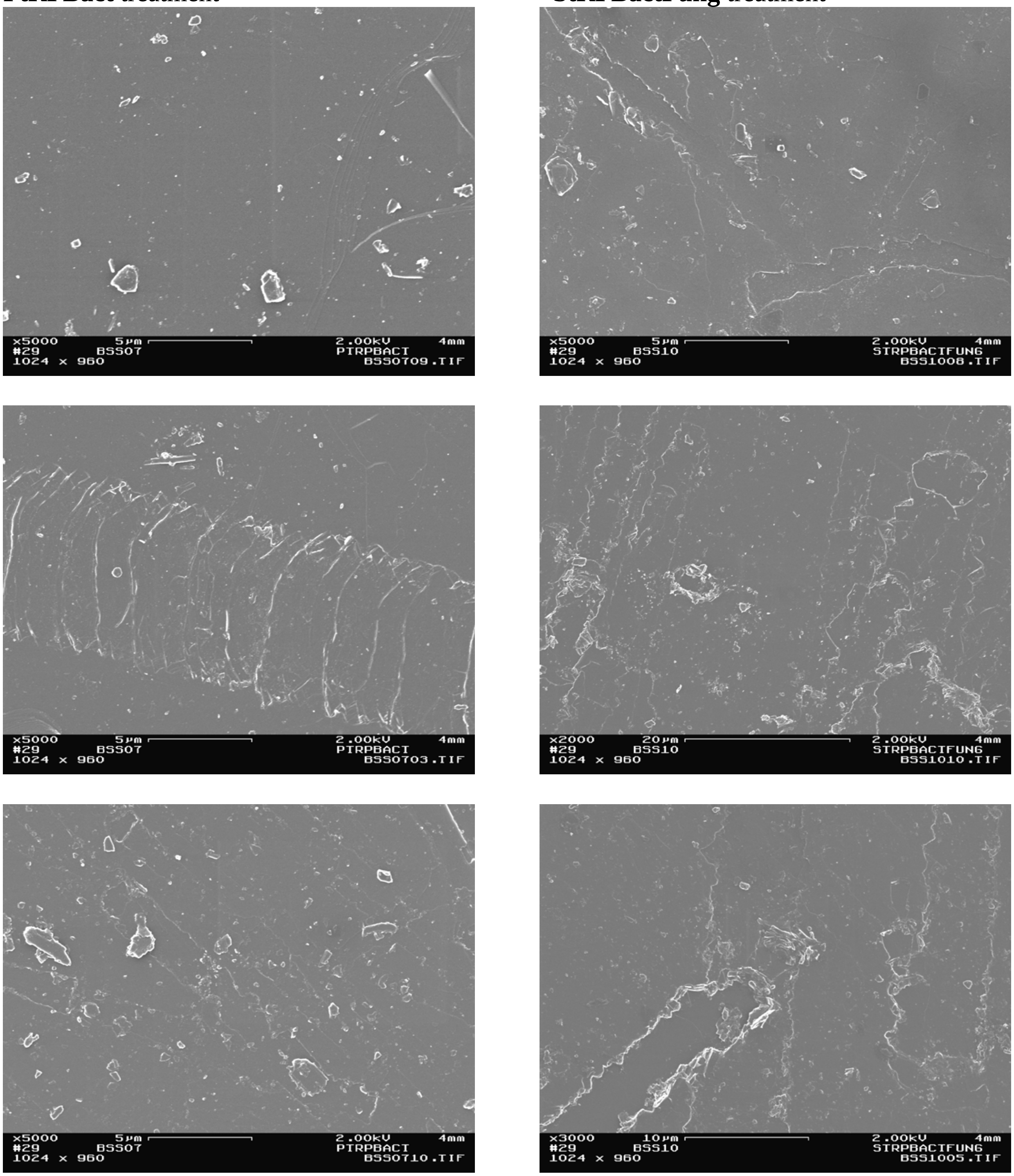


Figure L-5 (cont.): Biotite surfaces were examined for changes after **12 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. Anorthite surfaces were not analyzed because changes were not easy to determine and quantitative measurements could not be done on those surfaces.

PtRPBactFung treatment

StRPBFNoHoag treatment

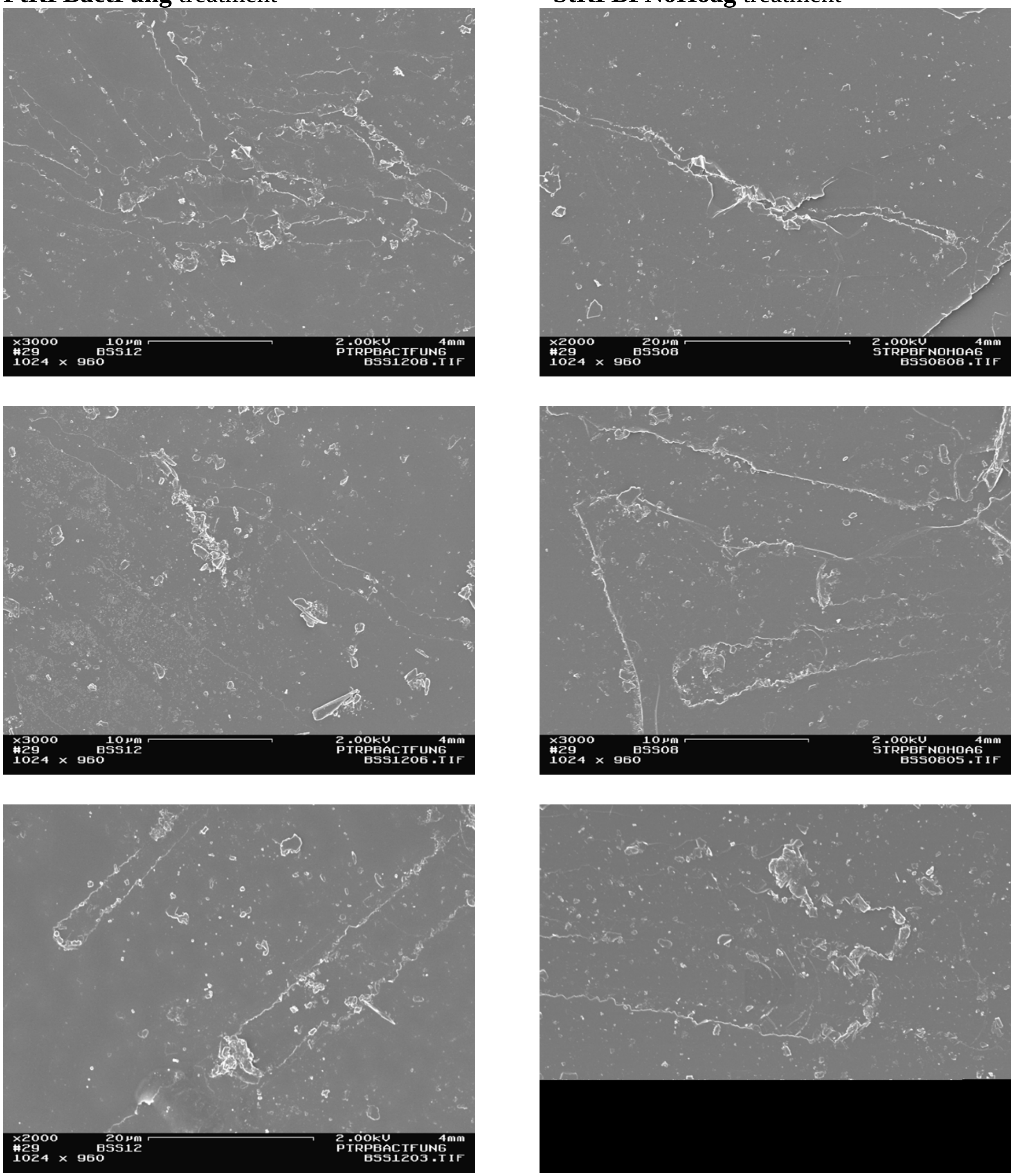
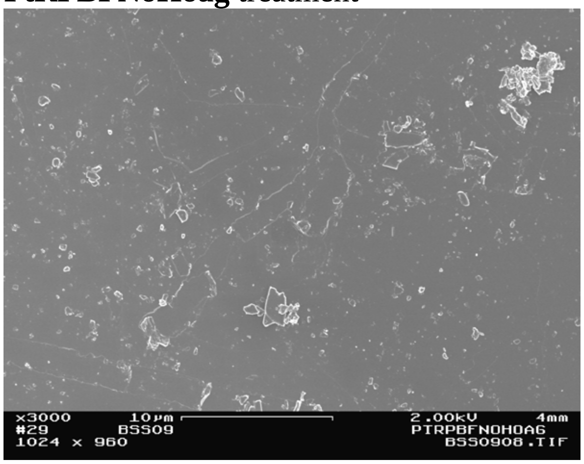
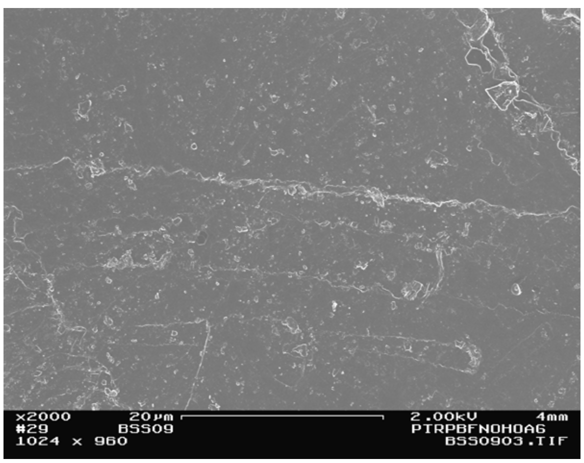


Figure L-5 (cont.): Biotite surfaces were examined for changes after **12 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. Anorthite surfaces were not analyzed because changes were not easy to determine and quantitative measurements could not be done on those surfaces.

PtRPBFNoHoag treatment





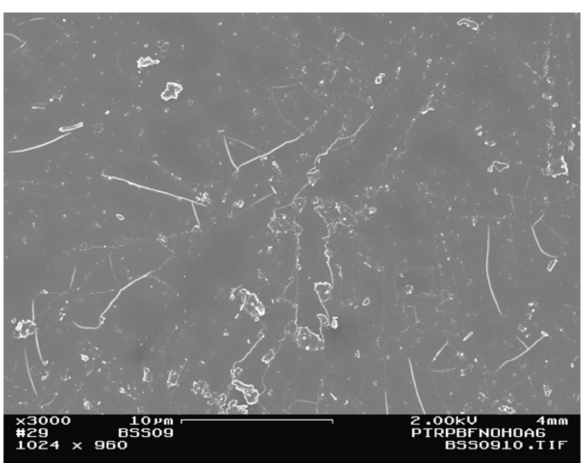


Figure L-6: Biotite surfaces were also investigated in the rhizosphere of the tree- treatments after **12 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. **– StRPBact** treatment.

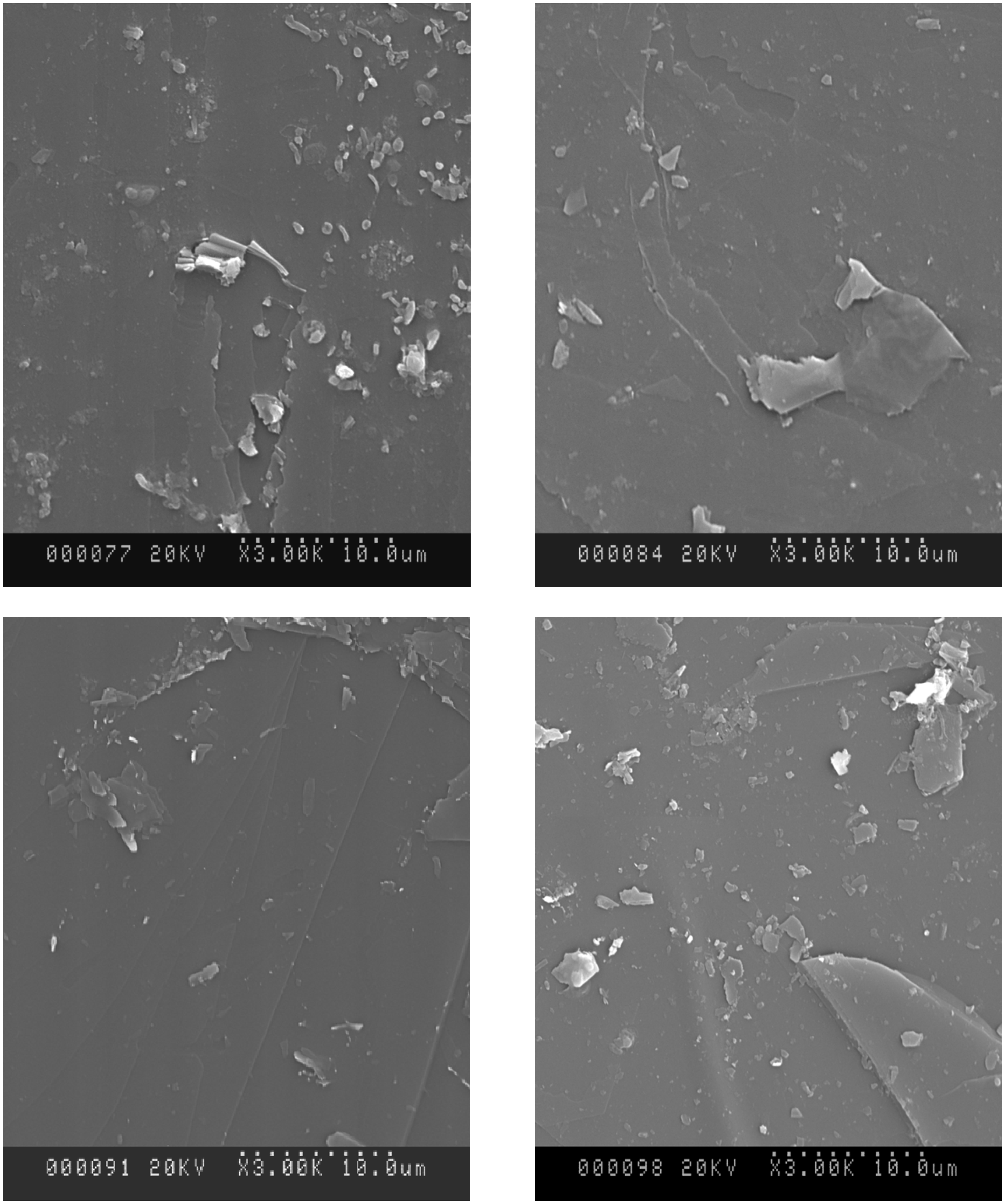


Figure L-6 (cont.): Biotite surfaces were also investigated in the rhizosphere of the tree-treatments after **12 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. **– PtRPBact** treatment.

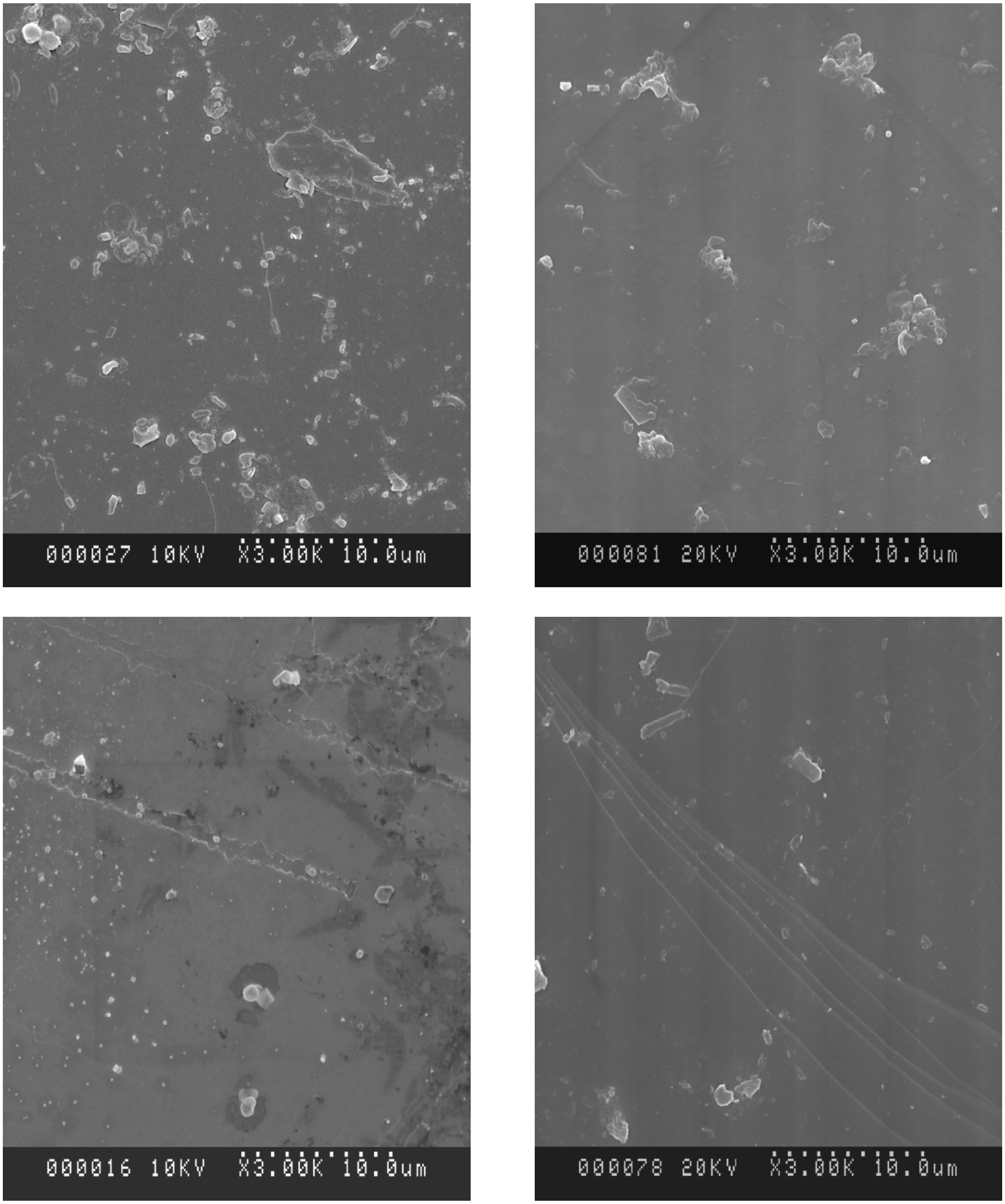


Figure L-6 (cont.): Biotite surfaces were also investigated in the rhizosphere of the tree-treatments after **12 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **StRPBactFung** treatment.

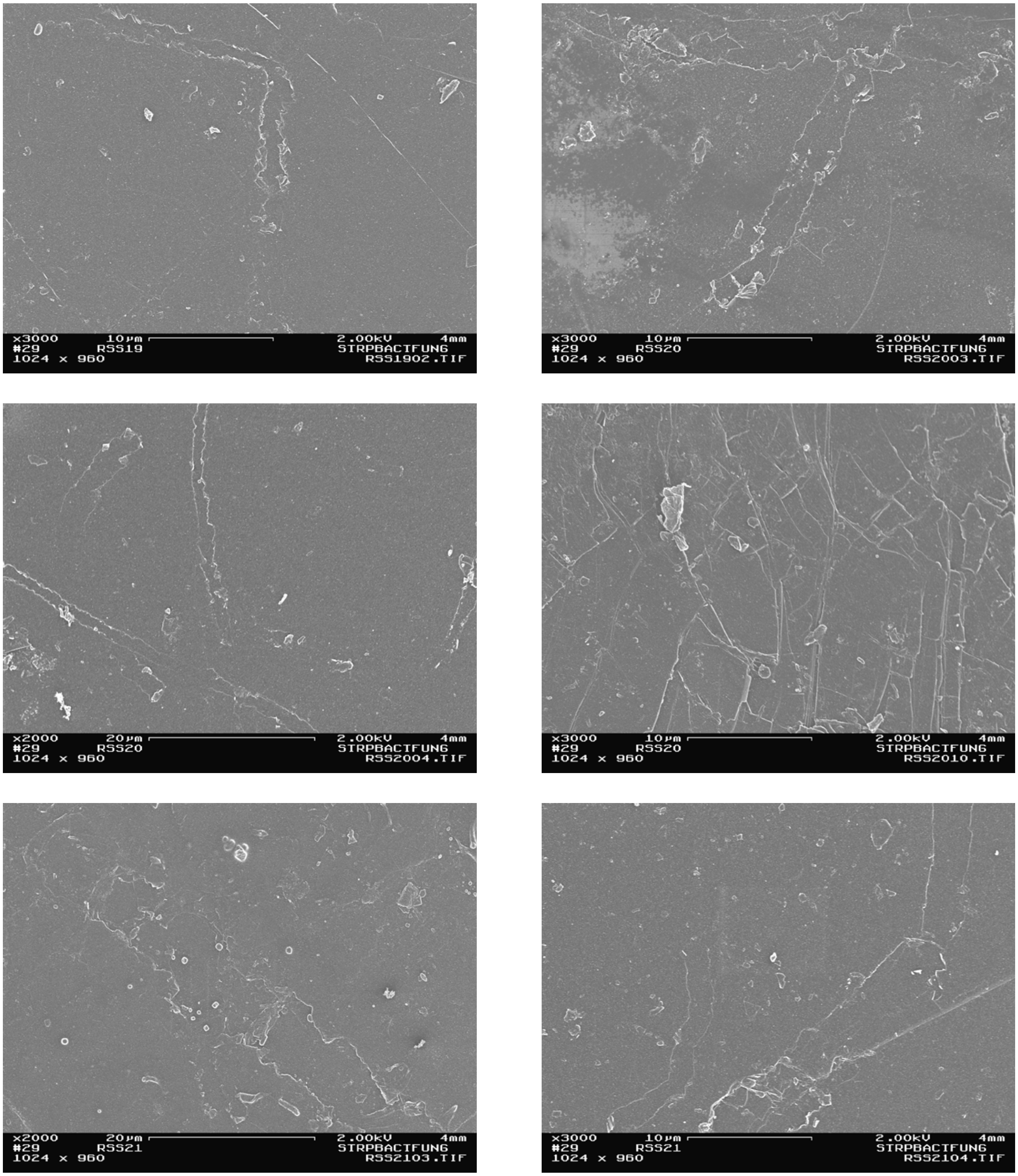


Figure L-6 (cont.): Biotite surfaces were also investigated in the rhizosphere of the tree-treatments after **12 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **PtRPBactFung** treatment.

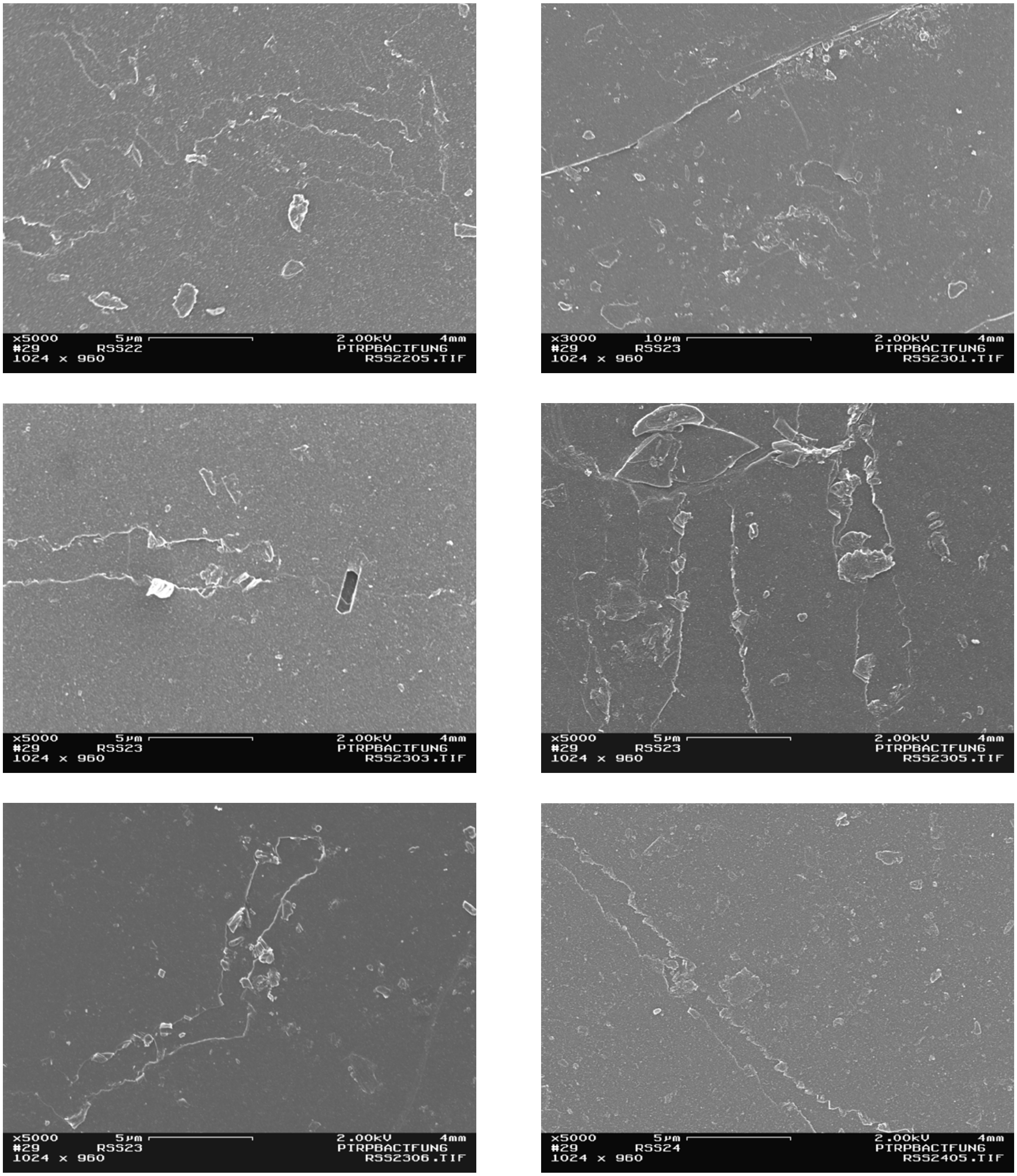


Figure L-6 (cont.): Biotite surfaces were also investigated in the rhizosphere of the tree-treatments after **12 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **StRPBFNoHoag** treatment.

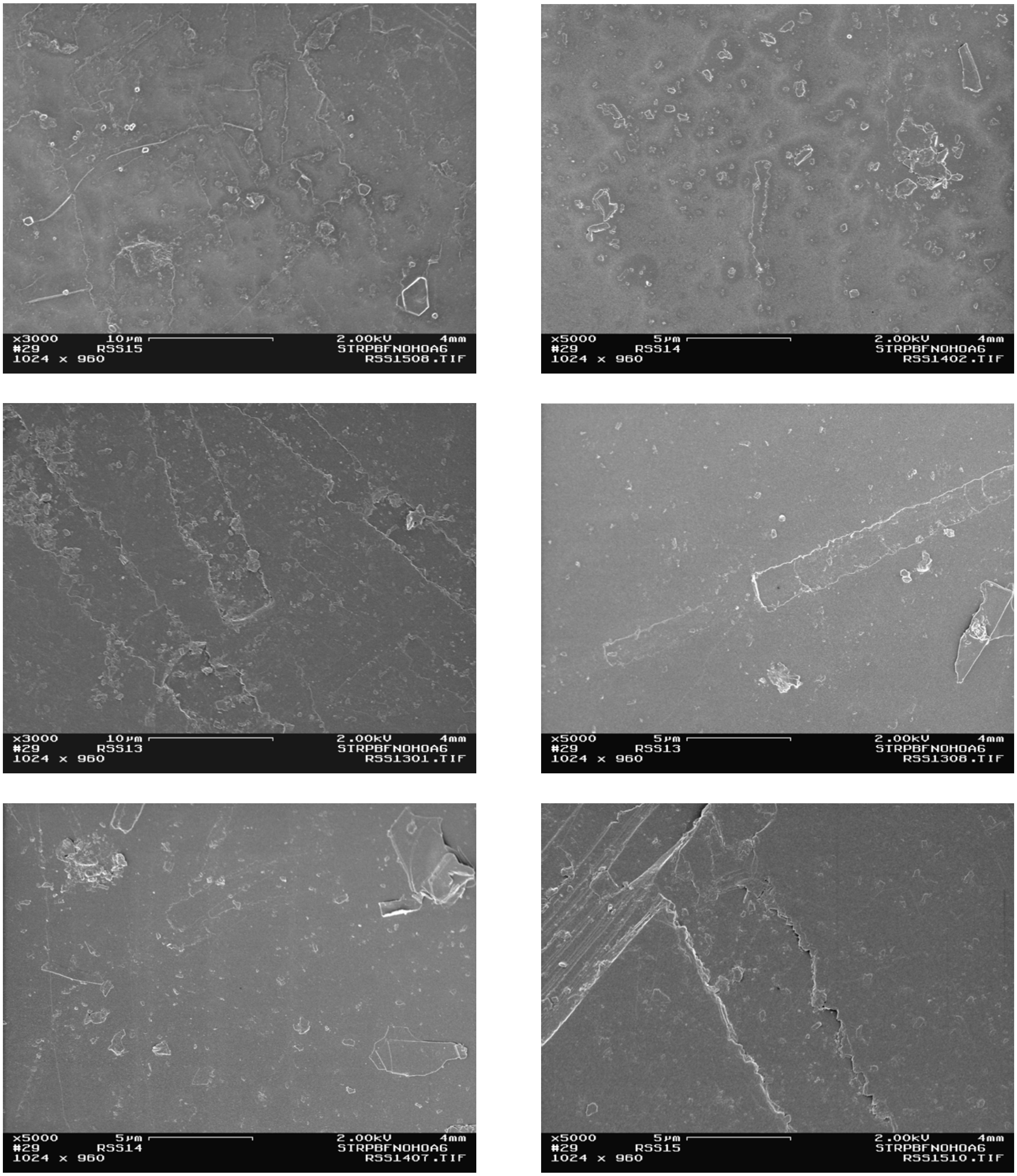


Figure L-6 (cont.): Biotite surfaces were also investigated in the rhizosphere of the tree-treatments after **12 months** exposure to the experimental conditions; the samples were washed with hydrogen-peroxide to remove organic matter and coating and rinsed with DIW. – **PtRPBFNoHoag** treatment.

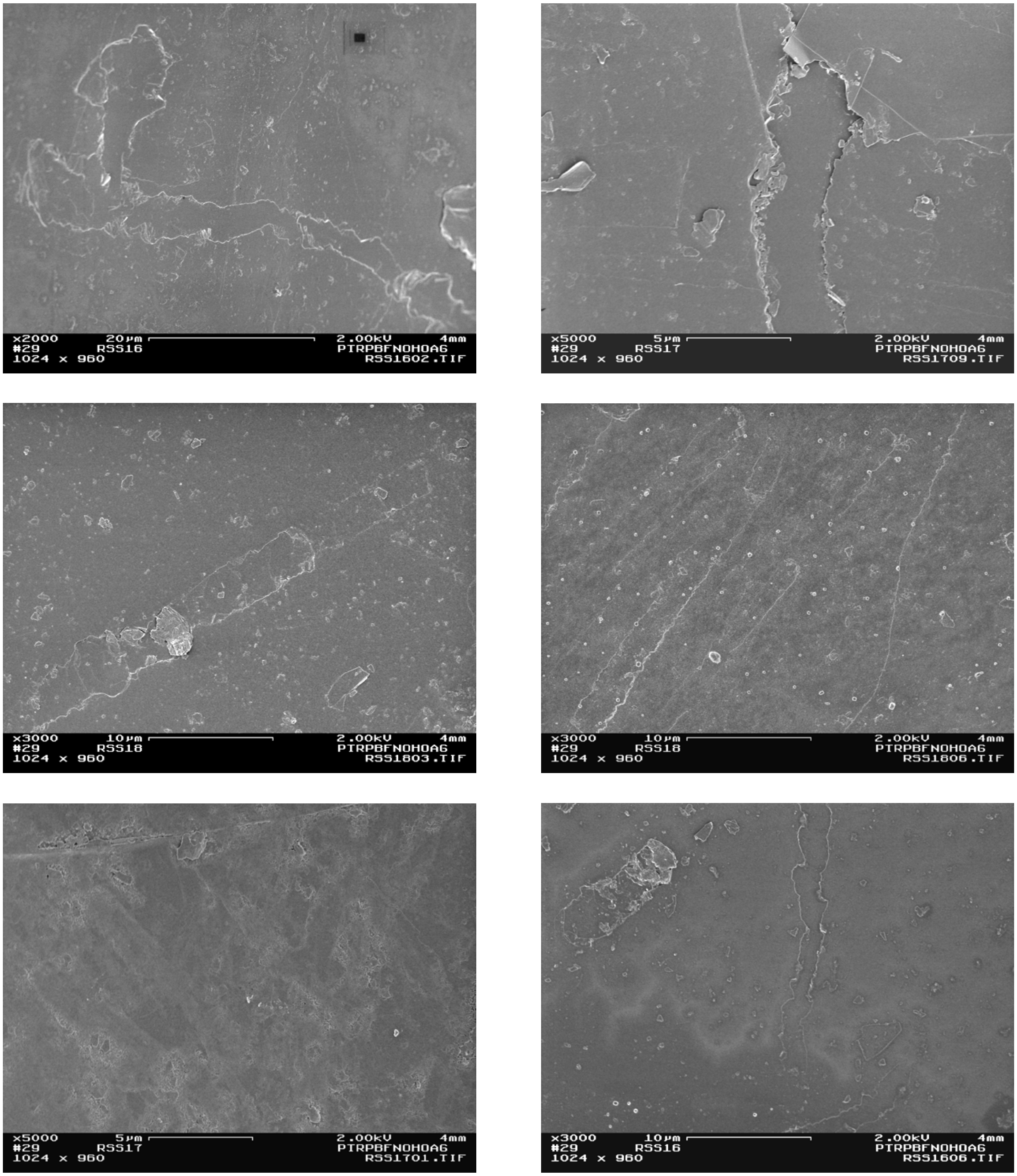


Table L-2: Using ImageJ software all bulk and rhizospheric biotite surface images were analyzed for weathered area and reported in % of total analyzed area. The third dimension could not been measured with SEM. See Appendix G for technical details. – **12 months**

Bulk Soil 12months								
Sample ID	Weathered Area (um^2)	Total Area (um^2)	Weathered %	Average Weathered	Average Total	Average %	Weathered STE	% STE
StBacteriaS8	52.36	357.08	14.7%					
StBacteriaS8	0.00	362.15	0.0%					
StBacteriaS8	191.87	1680.50	11.4%					
StBacteriaS8	93.28	361.31	25.8%					
StBacteriaS8	0.00	362.15	0.0%					
StBacteriaS8	22.02	364.30	6.0%					
StBacteriaS8	0.00	359.48	0.0%					
StBacteriaS8	15.82	368.03	4.3%					
StBacteriaS8	0.00	363.84	0.0%					
StBacteriaS8	168.15	1002.39	16.8%	543.5	5581.2	9.7%	23.0	2.8%
PtBacteriaS20	48.87	357.08	13.7%					
PtBacteriaS20	4.29	365.29	1.2%					
PtBacteriaS20	41.63	365.88	11.4%					
PtBacteriaS20	5.67	361.72	1.6%					
PtBacteriaS20	137.39	356.70	38.5%					
PtBacteriaS20	26.83	362.02	7.4%					
PtBacteriaS20	4.04	360.88	1.1%					
PtBacteriaS20	43.13	1002.38	4.3%					
PtBacteriaS20	34.38	354.21	9.7%					
PtBacteriaS20	51.49	362.32	14.2%	397.7	4248.5	9.4%	12.3	3.5%
StFungiS12	114.71	1011.81	11.3%					
StFungiS12	135.67	1008.62	13.5%					
StFungiS12	26.11	358.80	7.3%					
StFungiS12	51.06	365.03	14.0%					
StFungiS12	84.40	364.73	23.1%					
StFungiS12	11.67	359.64	3.2%					
StFungiS12	69.61	359.06	19.4%					
StFungiS12	223.67	1016.10	22.0%					
StFungiS12	63.47	360.75	17.6%					
StFungiS12	0.00	36789.86	0.0%	780.4	41994.4	1.9%	21.1	2.5%
PtFungiS21	107.48	364.86	29.5%					
PtFungiS21	422.95	2253.70	18.8%					
PtFungiS21	7.41	365.02	2.0%					
PtFungiS21	27.68	367.17	7.5%					
PtFungiS21	43.57	273.08	16.0%					
PtFungiS21	223.80	998.90	22.4%					
PtFungiS21	171.56	1001.20	17.1%					
PtFungiS21	53.97	364.43	14.8%					
PtFungiS21	24.06	361.18	6.7%					
PtFungiS21	69.60	359.48	19.4%	1152.1	6709.0	17.2%	40.6	2.6%
AbioticS10	374.25	1008.62	37.1%					
AbioticS10	150.23	358.76	41.9%					
AbioticS10	562.98	1008.26	55.8%					
AbioticS10	170.44	1004.38	17.0%					
AbioticS10	159.43	1011.81	15.8%					
AbioticS10	72.70	364.73	19.9%					
AbioticS10	6.87	356.41	1.9%					
AbioticS10	11.03	999.71	1.1%					
AbioticS10	104.00	356.70	29.2%					
AbioticS10	89.72	362.74	24.7%	1701.6	6832.1	24.9%	54.7	5.5%

Table L-2 (cont): Using ImageJ software all bulk and rhizospheric biotite surface images were analyzed for weathered area and reported in % of total analyzed area. The third dimension could not been measured with SEM. See Appendix G for technical details. – **12 months**

Bulk Soil 12months								
Sample ID	Weathered Area (um^2)	Total Area (um^2)	Weathered %	Average Weathered	Average Total	Average %	Weathered STE	% STE
StRPBactS12	151.79	1009.80	15.0%					
StRPBactS12	11.38	362.45	3.1%					
StRPBactS12	93.94	1018.12	9.2%					
StRPBactS12	22.20	362.45	6.1%					
StRPBactS12	6.26	364.43	1.7%					
StRPBactS12	13.54	358.47	3.8%					
StRPBactS12	8.50	1016.93	0.8%					
StRPBactS12	43.81	364.43	12.0%					
StRPBactS12	16.93	359.34	4.7%					
StRPBactS12	21.31	363.88	5.9%	389.6	5580.3	7.0%	15.0	1.4%
PtRPBactS17	5.87	365.28	1.6%					
PtRPBactS17	87.54	363.88	24.1%					
PtRPBactS17	174.15	367.89	47.3%					
PtRPBactS17	0.00	358.93	0.0%					
PtRPBactS17	118.44	362.15	32.7%					
PtRPBactS17	72.70	362.15	20.1%					
PtRPBactS17	0.00	359.77	0.0%					
PtRPBactS17	58.49	362.45	16.1%					
PtRPBactS17	6.92	364.86	1.9%					
PtRPBactS17	138.96	367.17	37.8%	663.1	3634.5	18.2%	20.0	5.5%
StRPBactFungS10	221.08	1016.93	21.7%					
StRPBactFungS10	91.14	2233.74	4.1%					
StRPBactFungS10	131.24	671.05	19.6%					
StRPBactFungS10	48.82	356.70	13.7%					
StRPBactFungS10	194.52	410.12	47.4%					
StRPBactFungS10	480.41	1018.12	47.2%					
StRPBactFungS10	38.16	359.35	10.6%					
StRPBactFungS10	123.65	359.77	34.4%					
StRPBactFungS10	7532.37	9159.86	82.2%					
StRPBactFungS10	1239.90	2278.25	54.4%	10101.3	17863.9	56.5%	733.6	7.7%
PtRPBactFungS20	120.28	360.06	33.4%					
PtRPBactFungS20	65.30	997.73	6.5%					
PtRPBactFungS20	439.05	2259.71	19.4%					
PtRPBactFungS20	309.32	1018.48	30.4%					
PtRPBactFungS20	106.12	1005.44	10.6%					
PtRPBactFungS20	91.35	1001.33	9.1%					
PtRPBactFungS20	116.35	1018.94	11.4%					
PtRPBactFungS20	330.73	1019.32	32.4%					
PtRPBactFungS20	32.73	1008.16	3.2%					
PtRPBactFungS20	86.98	364.73	23.8%	1698.2	10053.9	16.9%	43.5	3.6%
StRPBFNoHoagS6	35.15	359.48	9.8%					
StRPBFNoHoagS6	0.00	355.99	0.0%					
StRPBFNoHoagS6	62.79	1005.56	6.2%					
StRPBFNoHoagS6	161.60	1010.63	16.0%					
StRPBFNoHoagS6	308.75	1011.81	30.5%					
StRPBFNoHoagS6	131.76	365.59	36.0%					
StRPBFNoHoagS6	143.58	999.71	14.4%					
StRPBFNoHoagS6	130.60	2265.02	5.8%					
StRPBFNoHoagS6	9.35	363.17	2.6%					
StRPBFNoHoagS6	16.13	359.35	4.5%	999.7	8096.3	12.3%	30.2	3.8%
PtRPBFNoHoagS20	283.80	1017.76	27.9%					
PtRPBFNoHoagS20	0.00	359.48	0.0%					
PtRPBFNoHoagS20	939.84	2268.71	41.4%					
PtRPBFNoHoagS20	51.18	362.15	14.1%					
PtRPBFNoHoagS20	39.42	363.28	10.9%					
PtRPBFNoHoagS20	53.92	1009.80	5.3%					
PtRPBFNoHoagS20	0.00	1016.46	0.0%					
PtRPBFNoHoagS20	160.36	1004.74	16.0%					
PtRPBFNoHoagS20	167.04	1015.28	16.5%					
PtRPBFNoHoagS20	172.12	1005.91	17.1%	1867.7	9423.6	19.8%	88.5	4.0%

Table L-2 (cont): Using ImageJ software all bulk and rhizospheric biotite surface images were analyzed for weathered area and reported in % of total analyzed area. The third dimension could not been measured with SEM. See Appendix G for technical details. – **12 months**

Rhizo Soil 12months								
Sample ID	Weathered Area (um^2)	Total Area (um^2)	Weathered %	Average Weathered	Average Total	Average %	Weathered STE	% STE
StRPBactS7	0.00	4490.46	0.0%					
StRPBactS7	0.00	1106.55	0.0%					
StRPBactS7	0.00	1115.07	0.0%					
StRPBactS7	0.00	1108.49	0.0%					
StRPBactS7	225.68	1106.35	20.4%					
StRPBactS7	9.05	44.59	20.3%					
StRPBactS7	243.27	410.49	59.3%					
StRPBactS7	0.00	1114.88	0.0%					
StRPBactS7	294.42	1124.77	26.2%					
StRPBactS7	0.00	1103.05	0.0%					
StRPBactS12	159.09	1126.43	14.1%					
StRPBactS12	71.97	1104.93	6.5%					
StRPBactS12	114.54	1104.93	10.4%					
StRPBactS12	125.67	1103.27	11.4%					
StRPBactS12	23.24	1109.93	2.1%					
StRPBactS12	113.26	1099.84	10.3%					
StRPBactS12	0.00	1105.14	0.0%					
StRPBactS12	26.52	1082.23	2.5%					
StRPBactS12	14.40	1103.27	1.3%					
StRPBactS12	0.00	1118.27	0.0%					
StRPBactS13	128.41	1118.36	11.5%					
StRPBactS13	281.65	1128.50	25.0%					
StRPBactS13	25.11	1084.07	2.3%					
StRPBactS13	0.00	1114.85	0.0%					
StRPBactS13	0.00	1106.74	0.0%					
StRPBactS13	0.00	1103.05	0.0%					
StRPBactS13	12.83	1111.16	1.2%					
StRPBactS13	273.47	1114.88	24.5%					
StRPBactS13	0.00	1105.11	0.0%					
StRPBactS13	91.79	1149.24	8.0%	2234.4	34918.9	6.4%	18.1	2.4%
PtRPBactS16	0.00	1091.87	0.0%					
PtRPBactS16	22.79	359.90	6.3%					
PtRPBactS16	0.00	1103.05	0.0%					
PtRPBactS16	0.00	367.77	0.0%					
PtRPBactS16	112.53	1121.46	10.0%					
PtRPBactS16	150.60	1111.60	13.5%					
PtRPBactS16	95.24	1126.43	8.5%					
PtRPBactS16	0.00	1150.72	0.0%					
PtRPBactS16	0.00	1154.11	0.0%					
PtRPBactS16	0.00	1070.69	0.0%					
PtRPBactS16	38.54	1093.51	3.5%					
PtRPBactS17	109.25	1116.50	9.8%					
PtRPBactS17	224.20	1140.25	19.7%					
PtRPBactS17	154.85	1126.40	13.7%					
PtRPBactS17	94.13	1124.74	8.4%					
PtRPBactS17	169.07	1124.77	15.0%					
PtRPBactS17	0.00	1138.57	0.0%					
PtRPBactS17	0.00	1114.54	0.0%					
PtRPBactS17	0.00	1101.21	0.0%					
PtRPBactS17	0.00	1140.25	0.0%					
PtRPBactS19	0.00	1124.99	0.0%					
PtRPBactS19	0.00	1104.93	0.0%					
PtRPBactS19	0.00	1116.40	0.0%					
PtRPBactS19	106.95	1123.11	9.5%					
PtRPBactS19	0.00	1101.43	0.0%					
PtRPBactS19	180.96	1128.28	16.0%					
PtRPBactS19	0.00	1126.43	0.0%					
PtRPBactS19	0.00	1103.08	0.0%	1459.1	29807.0	4.9%	13.5	1.2%

Table L-2 (cont): Using ImageJ software all bulk and rhizospheric biotite surface images were analyzed for weathered area and reported in % of total analyzed area. The third dimension could not been measured with SEM. See Appendix G for technical details. – **12 months**

Rhizo Soil 12months								
Sample ID	Weathered Area (um^2)	Total Area (um^2)	Weathered %	Average Weathered	Average Total	Average %	Weathered STE	% STE
StRPBFNOHoagS1	341.43	1024.50	33.3%					
StRPBFNOHoagS1	297.22	1022.47	29.1%					
StRPBFNOHoagS1	1397.93	9238.33	15.1%					
StRPBFNOHoagS1	188.61	630.22	29.9%					
StRPBFNOHoagS1	0.00	359.05	0.0%					
StRPBFNOHoagS1	20.58	367.72	5.6%					
StRPBFNOHoagS1	12.41	359.48	3.5%					
StRPBFNOHoagS1	30.64	358.80	8.5%					
StRPBFNOHoagS1	0.00	362.87	0.0%					
StRPBFNOHoagS1	46.64	359.35	13.0%					
StRPBFNOHoagS6	0.00	362.28	0.0%					
StRPBFNOHoagS6	9.55	363.58	2.6%					
StRPBFNOHoagS6	0.00	364.73	0.0%					
StRPBFNOHoagS6	14.15	361.18	3.9%					
StRPBFNOHoagS6	28.93	360.88	8.0%					
StRPBFNOHoagS6	82.32	359.77	22.9%					
StRPBFNOHoagS6	11.44	361.73	3.2%					
StRPBFNOHoagS6	65.63	359.48	18.3%					
StRPBFNOHoagS6	34.04	366.70	9.3%					
StRPBFNOHoagS8	5.60	367.86	1.5%					
StRPBFNOHoagS8	245.47	362.28	67.8%					
StRPBFNOHoagS8	124.18	358.34	34.7%					
StRPBFNOHoagS8	201.96	998.53	20.2%					
StRPBFNOHoagS8	23.12	362.45	6.4%					
StRPBFNOHoagS8	0.00	356.28	0.0%					
StRPBFNOHoagS8	3069.15	9336.82	32.9%					
StRPBFNOHoagS8	332.61	1008.98	33.0%					
StRPBFNOHoagS8	0.00	361.43	0.0%					
StRPBFNOHoagS8	79.27	353.67	22.4%	6662.9	31209.7	21.3%	112.8	3.0%
PtRPBFNOHoagS18	17.68	364.73	4.8%					
PtRPBFNOHoagS18	339.74	2266.04	15.0%					
PtRPBFNOHoagS18	100.37	354.71	28.3%					
PtRPBFNOHoagS18	67.24	362.15	18.6%					
PtRPBFNOHoagS18	287.13	1014.45	28.3%					
PtRPBFNOHoagS18	87.84	1010.99	8.7%					
PtRPBFNOHoagS18	723.68	2264.21	32.0%					
PtRPBFNOHoagS18	378.94	997.73	38.0%					
PtRPBFNOHoagS18	0.00	1012.64	0.0%					
PtRPBFNOHoagS18	25.89	1010.16	2.6%					
PtRPBFNOHoagS20	0.00	362.02	0.0%					
PtRPBFNOHoagS20	88.29	1016.10	8.7%					
PtRPBFNOHoagS20	90.40	361.60	25.0%					
PtRPBFNOHoagS20	43.43	1016.93	4.3%					
PtRPBFNOHoagS20	174.67	367.34	47.6%					
PtRPBFNOHoagS20	128.86	356.82	36.1%					
PtRPBFNOHoagS20	124.59	357.12	34.9%					
PtRPBFNOHoagS20	8.76	362.02	2.4%					
PtRPBFNOHoagS20	98.84	361.43	27.3%					
PtRPBFNOHoagS20	23.92	90.50	26.4%					
PtRPBFNOHoagS23	1.25	359.35	0.3%					
PtRPBFNOHoagS23	79.27	358.76	22.1%					
PtRPBFNOHoagS23	123.33	1005.91	12.3%					
PtRPBFNOHoagS23	0.00	363.71	0.0%					
PtRPBFNOHoagS23	447.98	1017.29	44.0%					
PtRPBFNOHoagS23	200.33	1012.90	19.8%					
PtRPBFNOHoagS23	44.57	359.06	12.4%					
PtRPBFNOHoagS23	350.28	1003.19	34.9%					
PtRPBFNOHoagS23	27.45	365.03	7.5%					
PtRPBFNOHoagS23	59.17	362.44	16.3%	4143.9	21517.3	19.3%	30.3	2.6%

Table L-2 (cont): Using ImageJ software all bulk and rhizospheric biotite surface images were analyzed for weathered area and reported in % of total analyzed area. The third dimension could not been measured with SEM. See Appendix G for technical details. – **12 months**

Rhizo Soil 12months								
Sample ID	Weathered Area (um^2)	Total Area (um^2)	Weathered %	Average Weathered	Average Total	Average %	Weathered STE	% STE
StRPBactFungS1	19.58	362.15	5.4%					
StRPBactFungS1	96.28	1029.25	9.4%					
StRPBactFungS1	17.33	91.56	18.9%					
StRPBactFungS1	30.59	1004.73	3.0%					
StRPBactFungS1	125.44	1006.73	12.5%					
StRPBactFungS1	34.53	359.77	9.6%					
StRPBactFungS1	0.00	361.01	0.0%					
StRPBactFungS1	50.95	362.15	14.1%					
StRPBactFungS1	581.74	2280.11	25.5%					
StRPBactFungS1	109.20	1012.99	10.8%					
StRPBactFungS6	32.19	1010.63	3.2%					
StRPBactFungS6	101.09	1015.74	10.0%					
StRPBactFungS6	207.97	1019.32	20.4%					
StRPBactFungS6	262.70	2256.36	11.6%					
StRPBactFungS6	27.66	361.56	7.6%					
StRPBactFungS6	11.18	359.48	3.1%					
StRPBactFungS6	0.00	364.73	0.0%					
StRPBactFungS6	15.11	359.35	4.2%					
StRPBactFungS6	16.26	367.47	4.4%					
StRPBactFungS6	0.00	1006.37	0.0%					
StRPBactFungS8	309.46	1014.09	30.5%					
StRPBactFungS8	176.95	1003.56	17.6%					
StRPBactFungS8	480.28	2285.41	21.0%					
StRPBactFungS8	164.72	1010.63	16.3%					
StRPBactFungS8	115.47	365.45	31.6%					
StRPBactFungS8	0.00	364.86	0.0%					
StRPBactFungS8	0.00	24.44	0.0%					
StRPBactFungS8	147.50	1021.27	14.4%					
StRPBactFungS8	70.15	361.60	19.4%					
StRPBactFungS8	27.11	356.99	7.6%	3231.4	23799.7	13.6%	25.9	1.7%
PtRPBactFungS18	0.00	365.59	0.0%					
PtRPBactFungS18	21.92	362.02	6.1%					
PtRPBactFungS18	83.45	356.28	23.4%					
PtRPBactFungS18	152.51	1021.27	14.9%					
PtRPBactFungS18	67.37	364.73	18.5%					
PtRPBactFungS18	10.34	360.42	2.9%					
PtRPBactFungS18	176.02	999.22	17.6%					
PtRPBactFungS18	256.46	1009.80	25.4%					
PtRPBactFungS18	129.72	359.48	36.1%					
PtRPBactFungS18	129.90	364.00	35.7%					
PtRPBactFungS20	93.02	1022.82	9.1%					
PtRPBactFungS20	116.85	1003.92	11.6%					
PtRPBactFungS20	27.78	367.34	7.6%					
PtRPBactFungS20	401.97	1018.12	39.5%					
PtRPBactFungS20	81.08	361.73	22.4%					
PtRPBactFungS20	32.69	360.88	9.1%					
PtRPBactFungS20	53.54	367.47	14.6%					
PtRPBactFungS20	32.25	364.43	8.9%					
PtRPBactFungS20	48.24	360.58	13.4%					
PtRPBactFungS24	139.58	1012.89	13.8%					
PtRPBactFungS24	5.39	1010.63	0.5%					
PtRPBactFungS24	157.38	1010.98	15.6%					
PtRPBactFungS24	23.70	353.67	6.7%					
PtRPBactFungS24	47.75	992.06	4.8%					
PtRPBactFungS24	14.34	357.922	4.0%					
PtRPBactFungS24	302.804	1008.26	30.0%					
PtRPBactFungS24	282.36	1018.12	27.7%					
PtRPBactFungS24	124.17	361.43	34.4%	3012.6	17916.1	16.8%	19.1	2.2%

Figure L-7: The graph shows the weathered area percentage of bulk samples in all treatments and rhizospheric samples in tree treatments. An average standard error is represented by the error bars. Rhizospheric and bulk samples did not differ. **– 12 months**

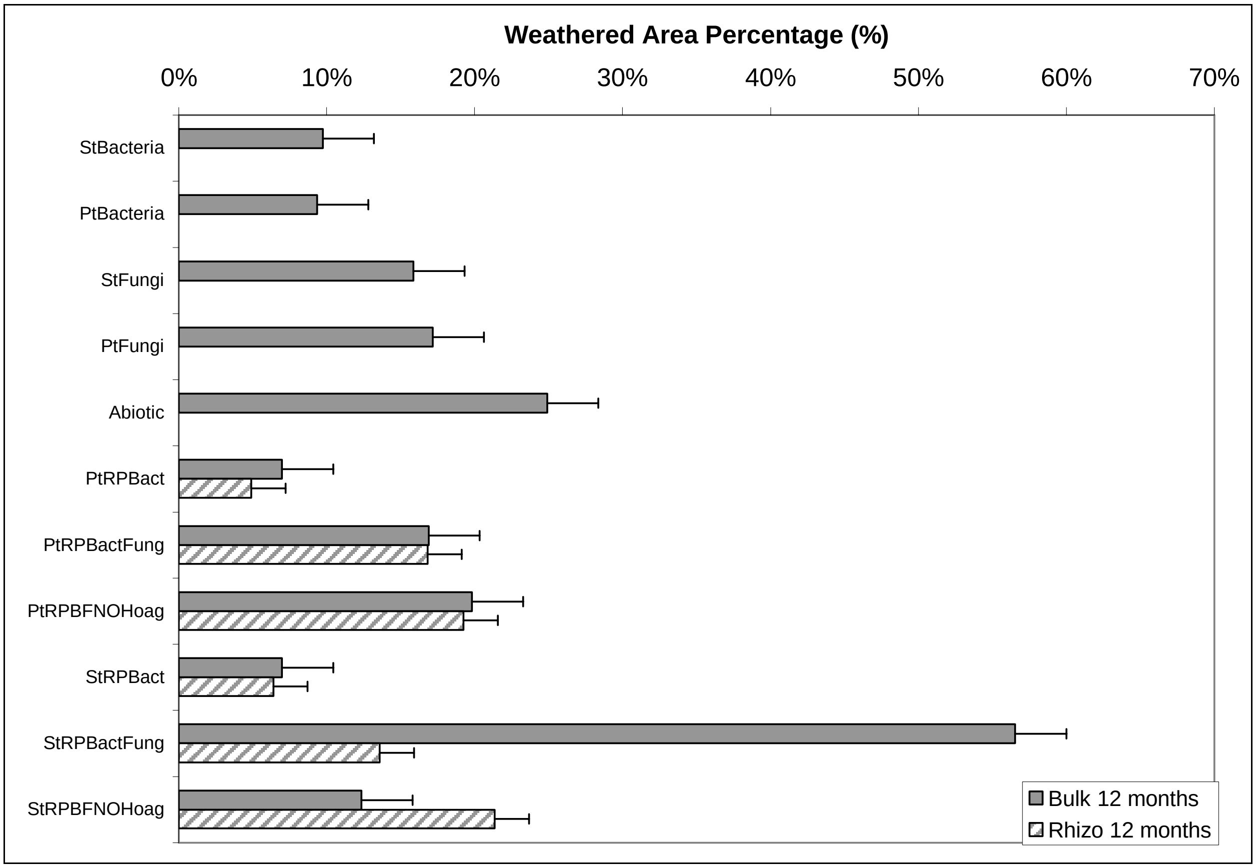
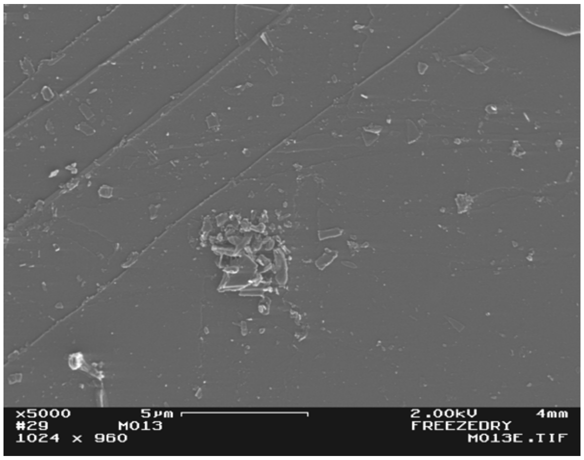
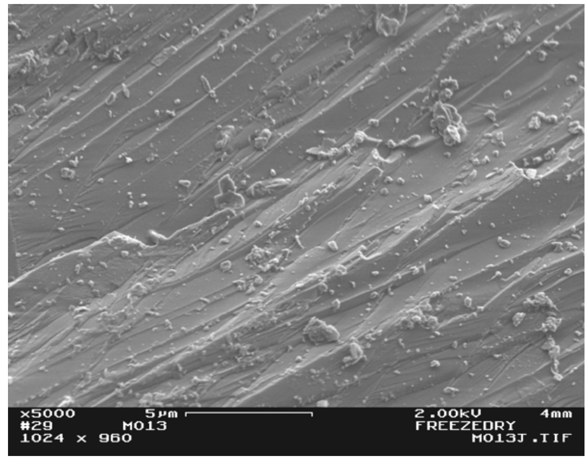


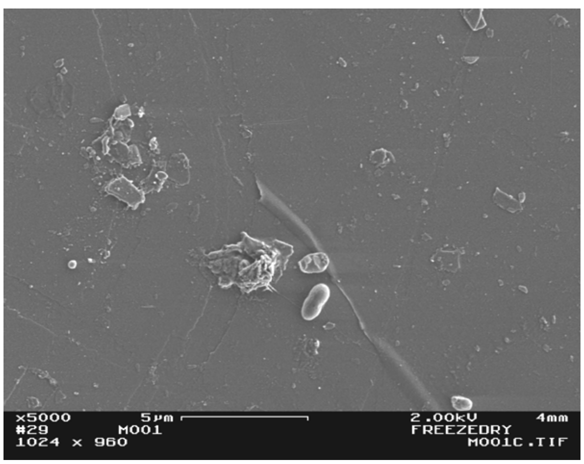
Figure L-8: Mineral surfaces were also investigated for microbial cover (morphology) in the small column experiment at **6 months**. These samples were freeze dried immediately after collection, so the microbial structures could have been preserved. Representative images are shown here for all treatments from the **bulk soil** medium.



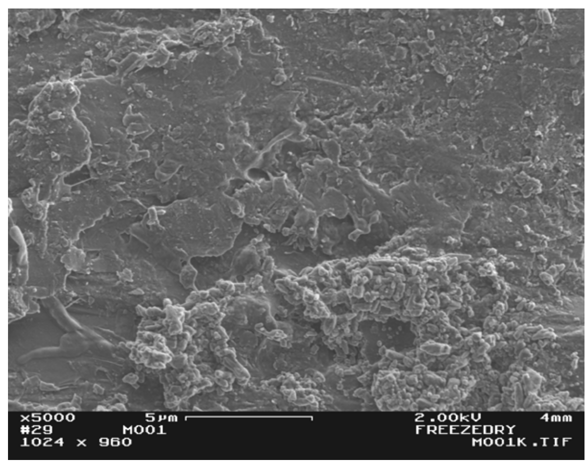
Abiotic biotite – 6 months



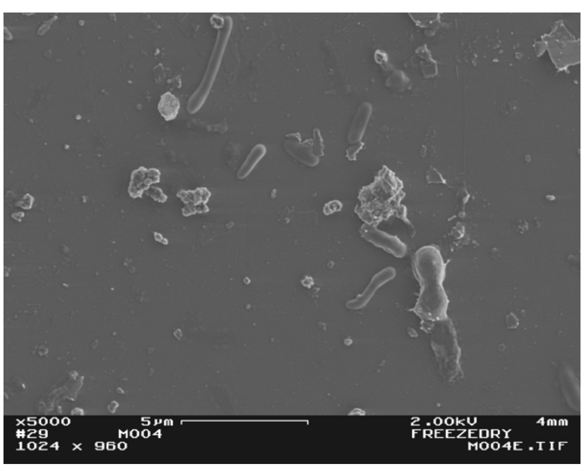
Abiotic anorthite – 6 months



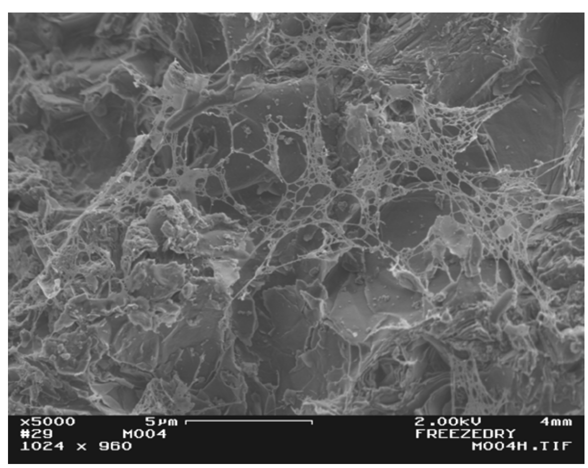
StBacteria biotite– 6 months



StBacteria anorthite – 6 months

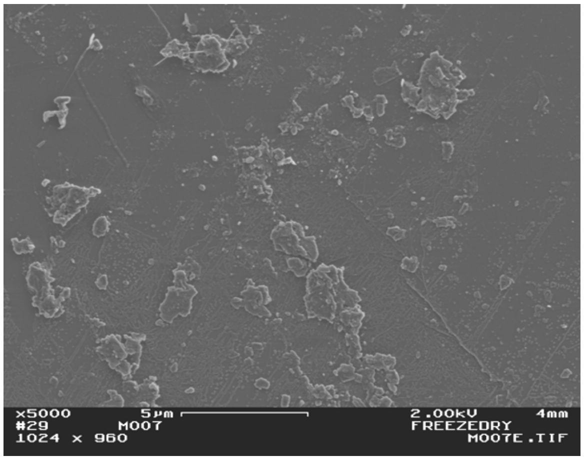


PtBacteria biotite – 6 months

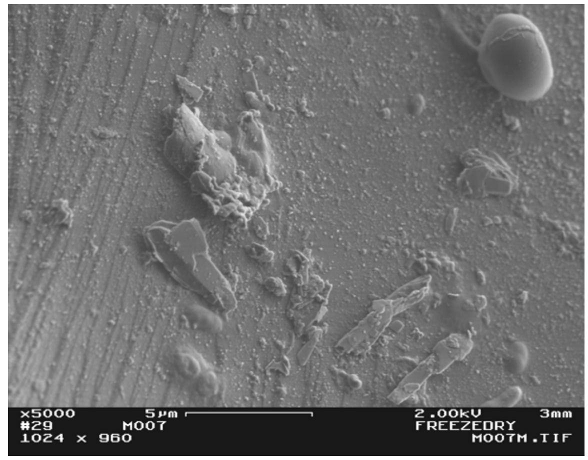


PtBacteria anorthite – 6 months

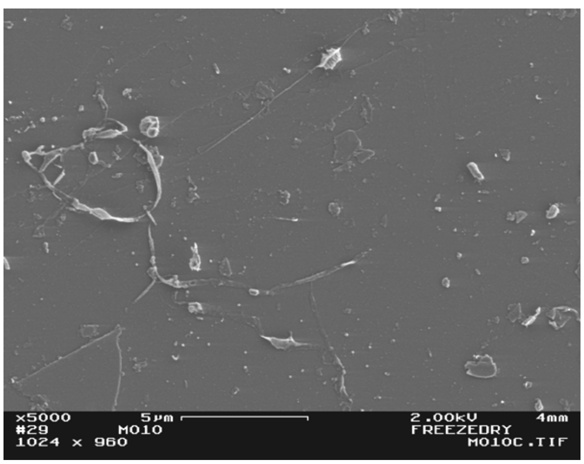
Figure L-8 (cont.): Mineral surfaces were also investigated for microbial cover (morphology) in the small column experiment at **6 months**. These samples were freeze dried immediately after collection, so the microbial structures could have been preserved. Representative images are shown here for all treatments from the **bulk soil** medium.



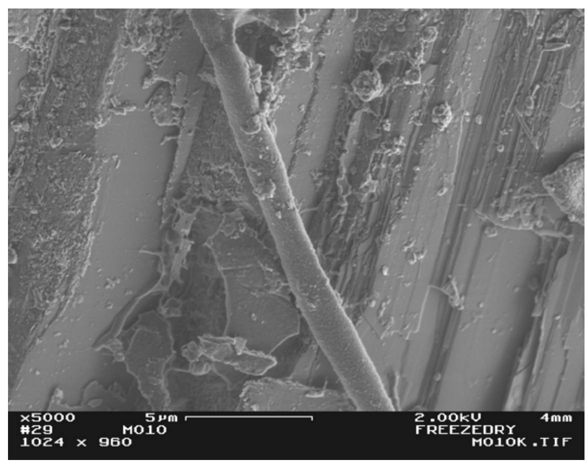
StFungi biotite – 6 months



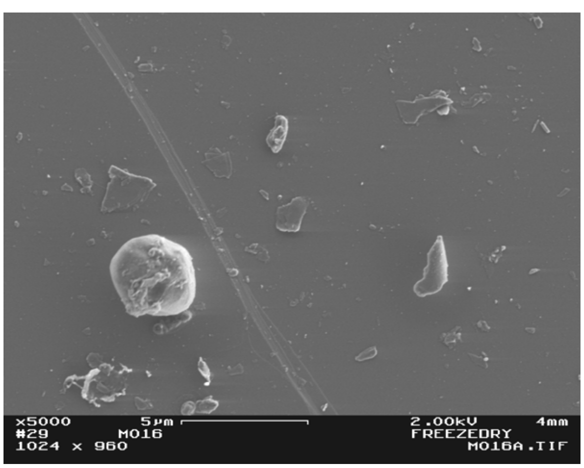
StFungi anorthite – 6 months



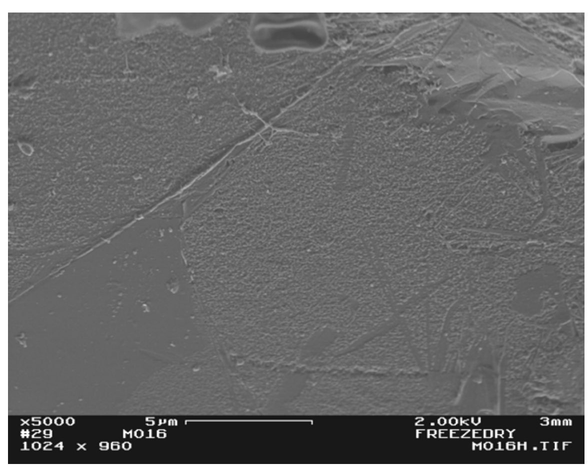
PtFungi biotite – 6 months



PtFungi anorthite – 6 months

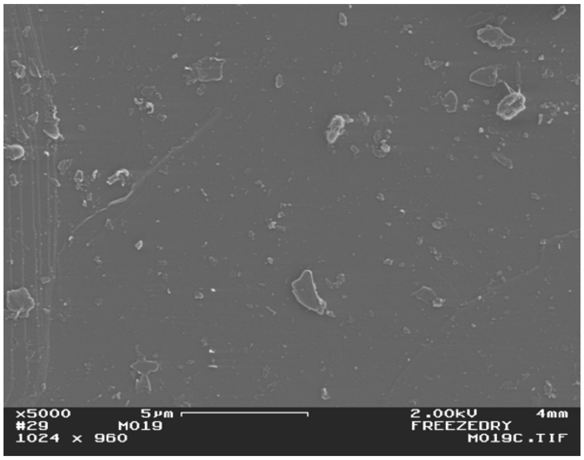


StRPBact biotite – 6 months

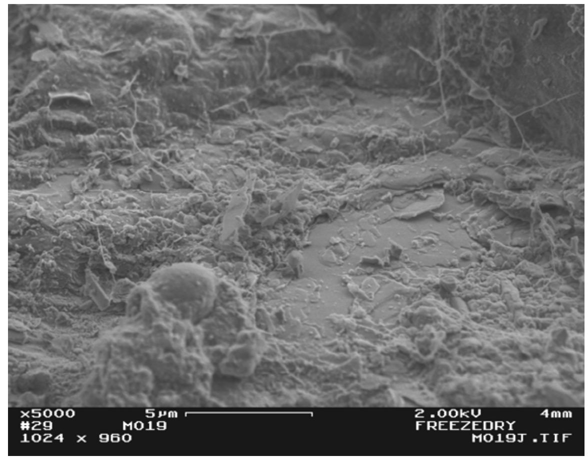


StRPBact anorthite – 6 months

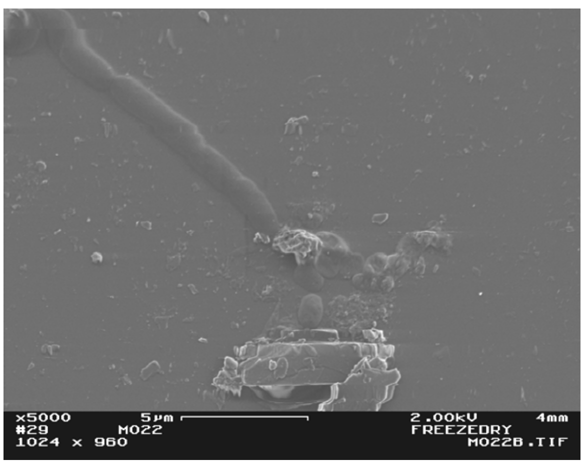
Figure L-8 (cont.): Mineral surfaces were also investigated for microbial cover (morphology) in the small column experiment at **6 months**. These samples were freeze dried immediately after collection, so the microbial structures could have been preserved. Representative images are shown here for all treatments from the **bulk soil** medium.



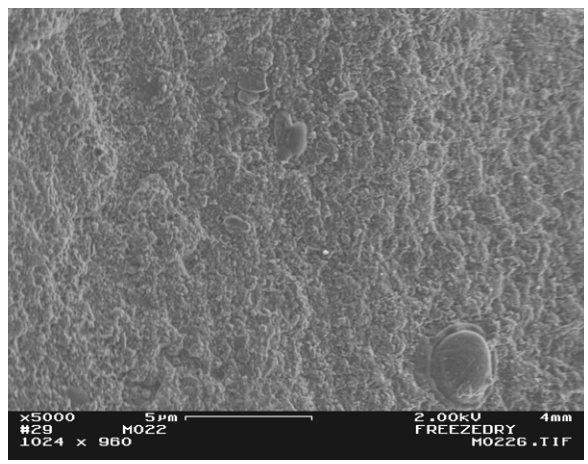
PtRPBact biotite – 6 months



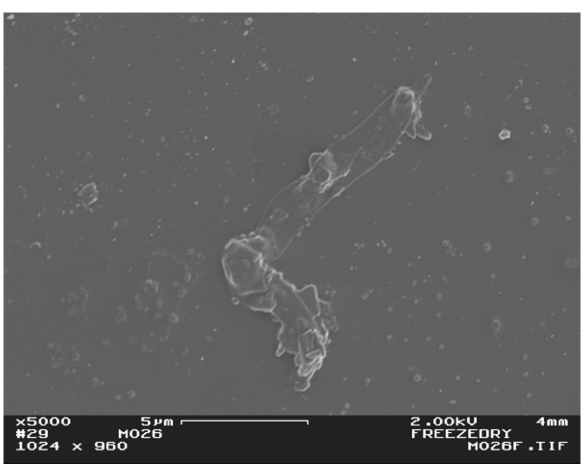
PtRPBact anorthite – 6 months



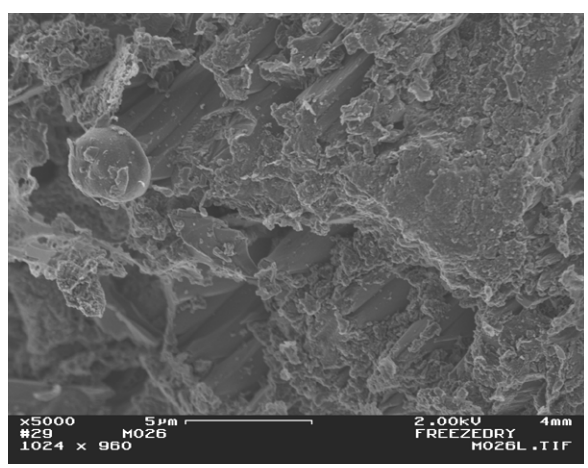
StRPBactFung biotite – 6 months



StRPBactFung anorthite – 6 months

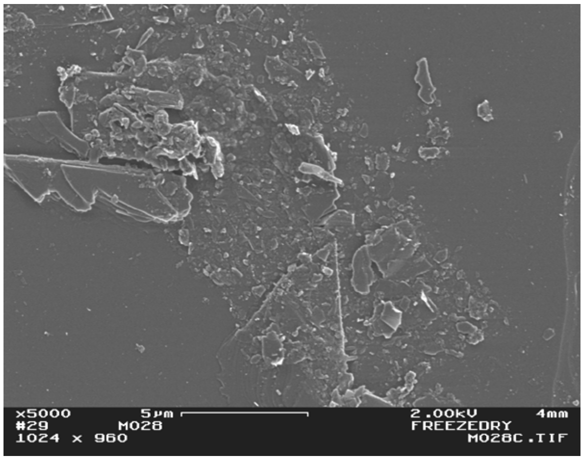


PtRPBactFung biotite – 6 months

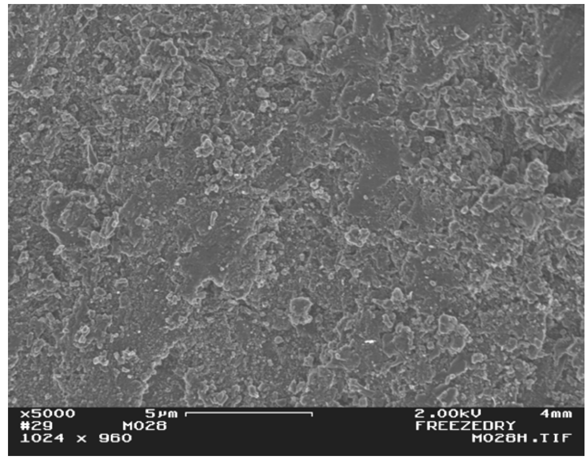


PtRPBactFung anorthite – 6 months

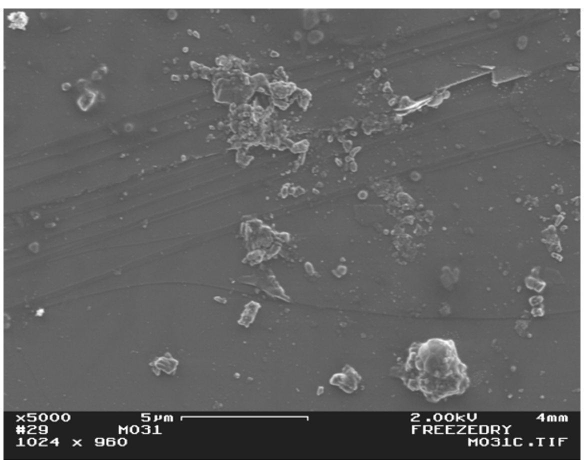
Figure L-8 (cont.): Mineral surfaces were also investigated for microbial cover (morphology) in the small column experiment at **6 months**. These samples were freeze dried immediately after collection, so the microbial structures could have been preserved. Representative images are shown here for all treatments from the **bulk soil** medium.



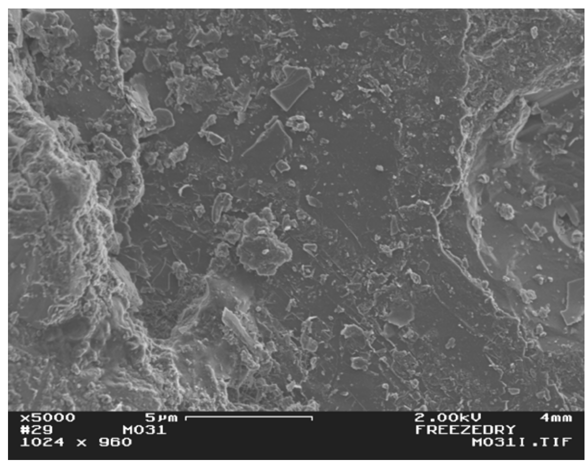
StRPBFNoHoag biotite – 6 months



StRPBFNoHoag anorthite – 6 months

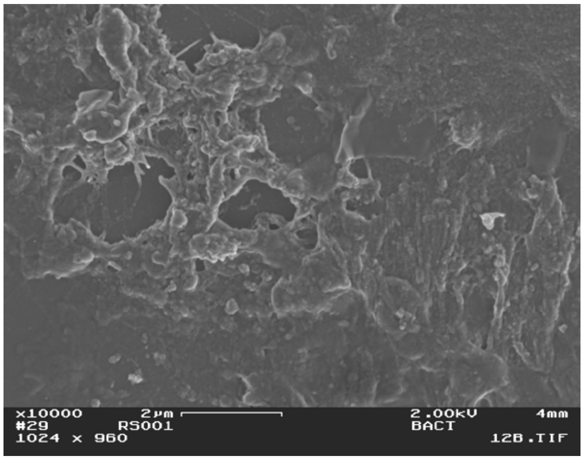


PtRPBFNoHoag biotite – 6 months

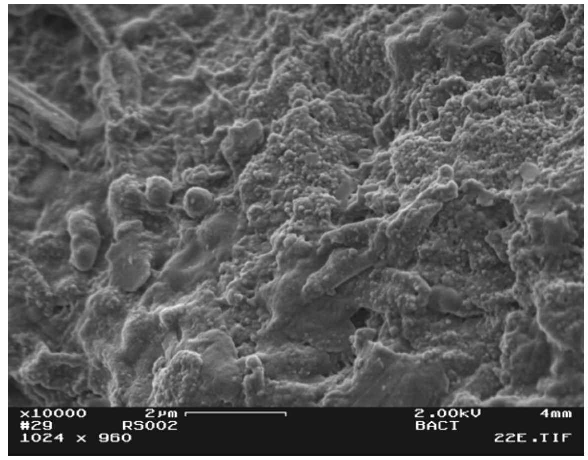


PtRPBFNoHoag anorthite – 6 months

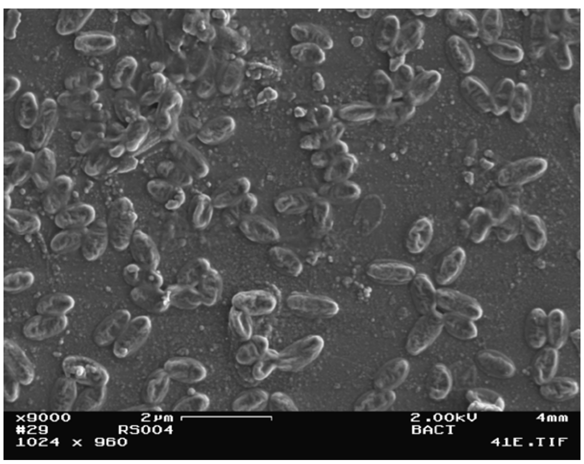
Figure L-9: Mineral surfaces were also investigated for microbial cover (morphology) in the small column experiment at **6 months**. These samples were freeze dried immediately after collection, so the microbial structures could have been preserved. Representative images are shown here for all treatments from the **rhizospheric soil** medium.



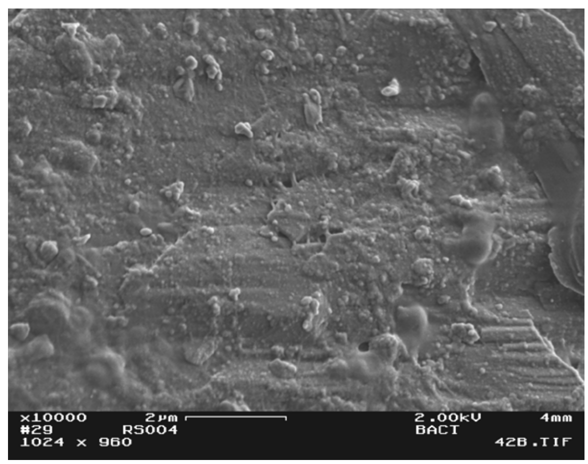
StRPBact biotite – 6 months



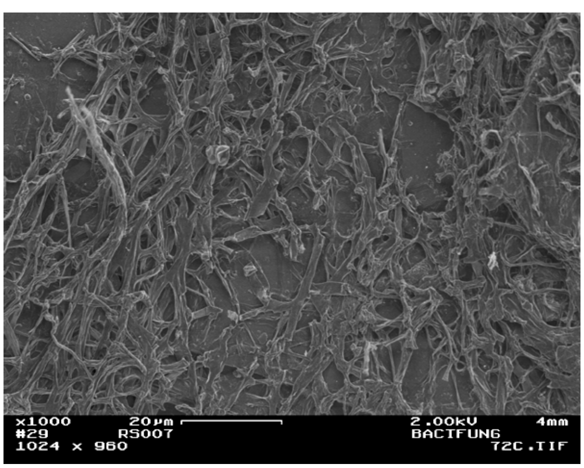
StRPBact anorthite – 6 months



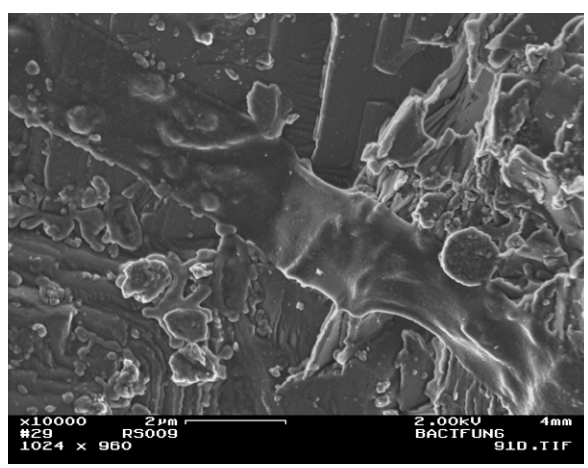
PtRPBact biotite – 6 months



PtRPBact anorthite – 6 months



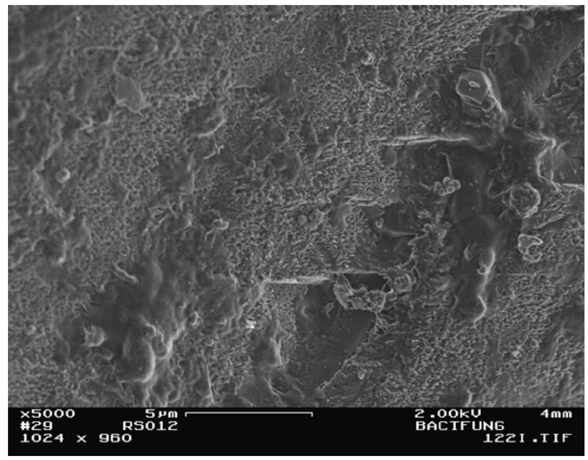
StRPBactFung biotite – 6 months



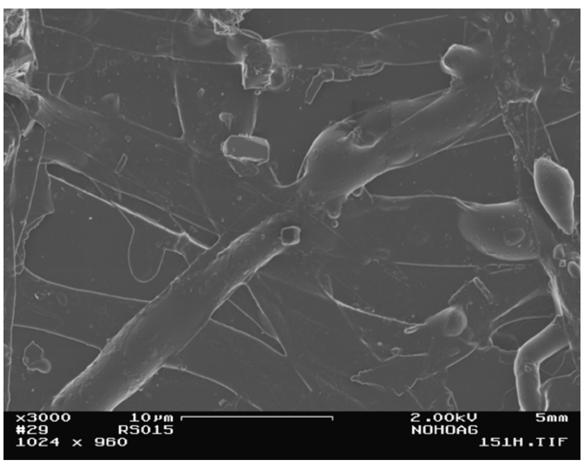
StRPBactFung anorthite – 6 months

Figure L-9 (cont.): Mineral surfaces were also investigated for microbial cover (morphology) in the small column experiment at **6 months**. These samples were freeze dried immediately after collection, so the microbial structures could have been preserved. Representative images are shown here for all treatments from the **rhizospheric soil** medium.

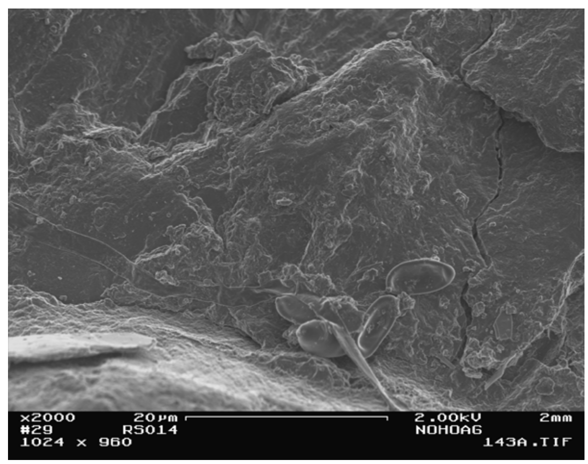
PtRPBactFung biotite – 6 months



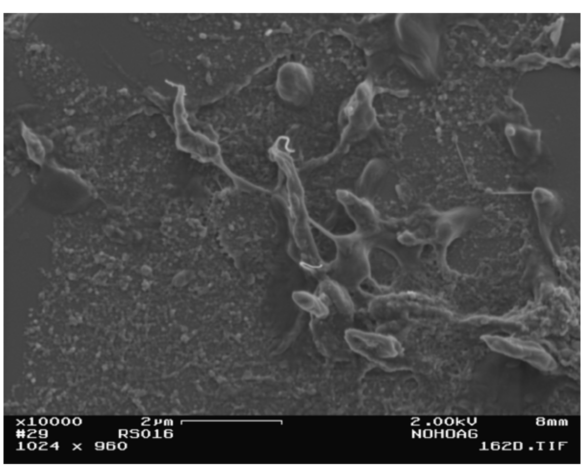
PtRPBactFung anorthite – 6 months



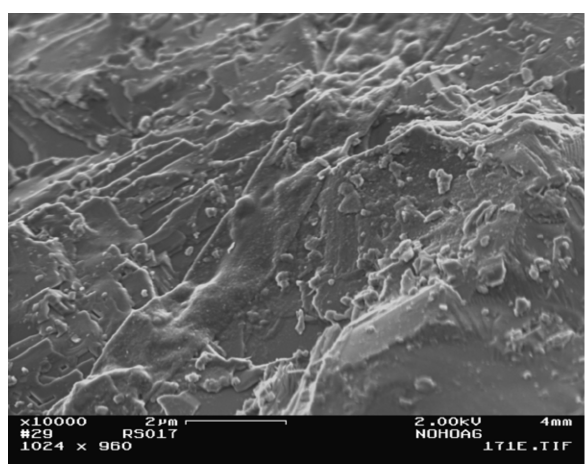
StRPBFNoHoag biotite – 6 months



StRPBFNoHoag anorthite – 6 months



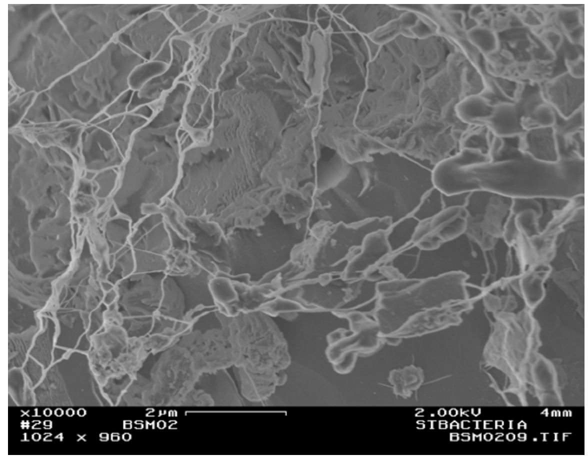
PtRPBFNoHoag biotite – 6 months



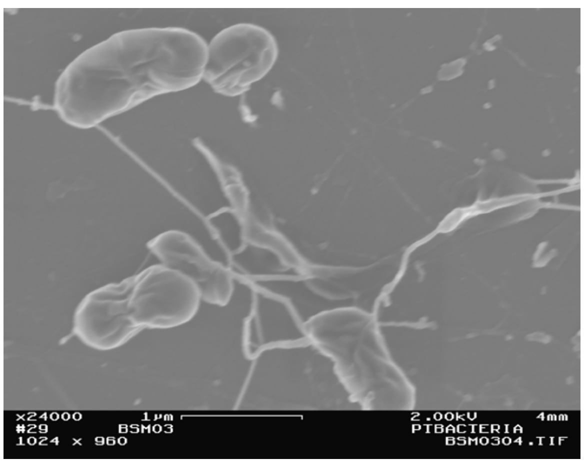
PtRPBFNoHoag anorthite – 6 months

Figure L-10: Mineral surfaces were also investigated for microbial cover (morphology) in the small column experiment at **12 months**. These samples were freeze dried immediately after collection, so the microbial structures could have been preserved. Representative images are shown here for all treatments from the **bulk soil** medium.

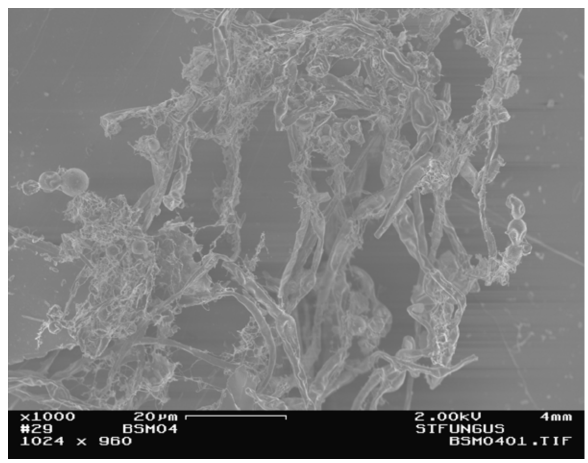
StBacteria biotite – 12 months



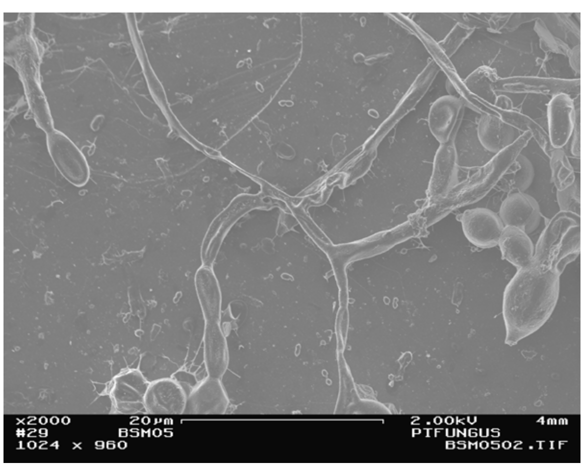
StBacteria anorthite – 12 months



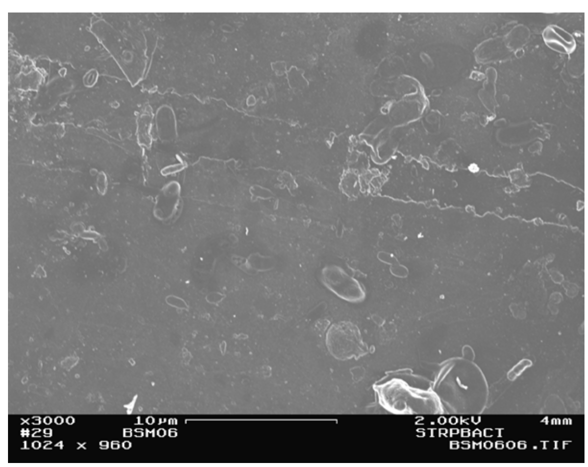
PtBacteria biotite – 12 months



StFungi biotite – 12 months

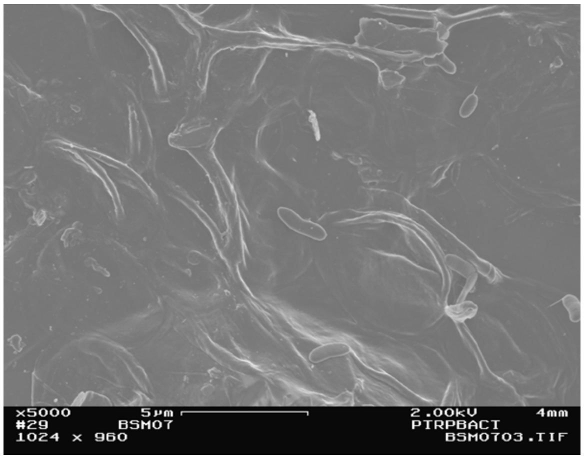


PtFungi biotite – 12 months

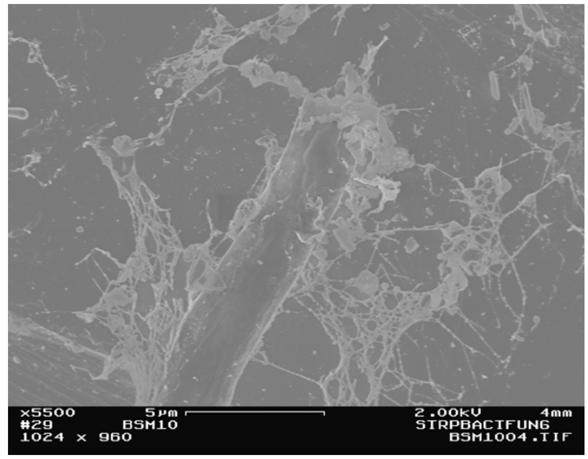


StRPBact biotite – 12 months

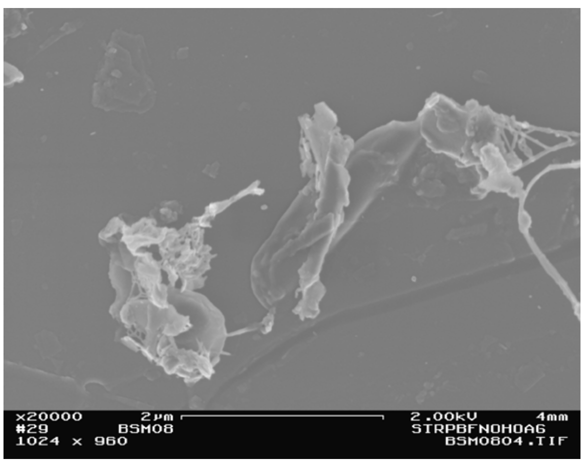
Figure L-10 (cont.): Mineral surfaces were also investigated for microbial cover (morphology) in the small column experiment at **12 months**. These samples were freeze dried immediately after collection, so the microbial structures could have been preserved. Representative images are shown here for all treatments from the **bulk soil** medium.



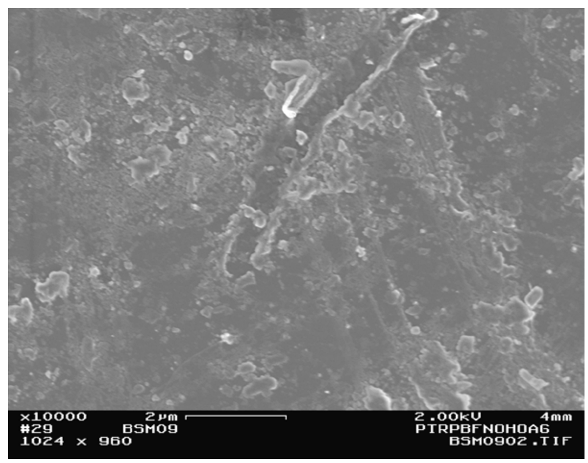
PtRPBact biotite – 12 months



StRPBactFung biotite – 12 months

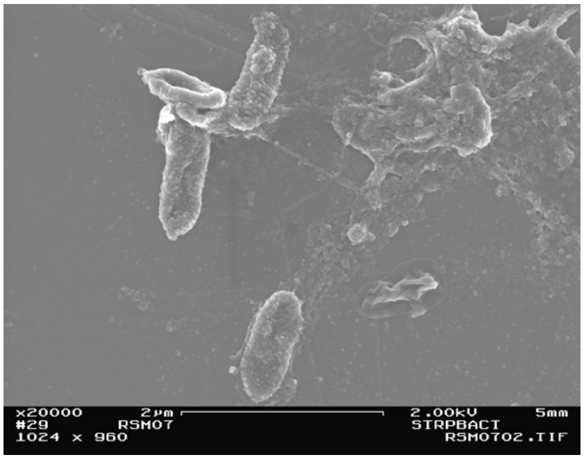


StRPBFNoHoag biotite – 12 months

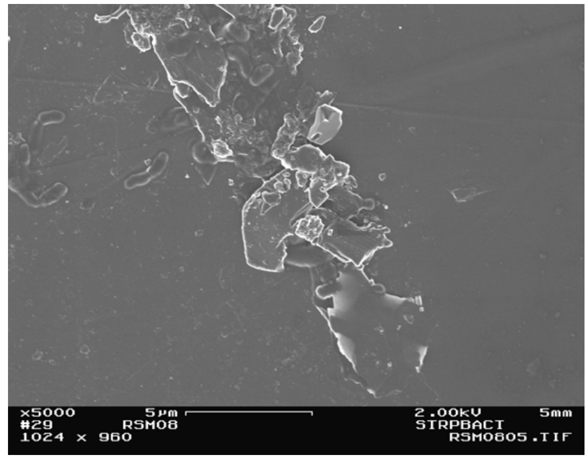


PtRPBFNoHoag biotite – 12 months

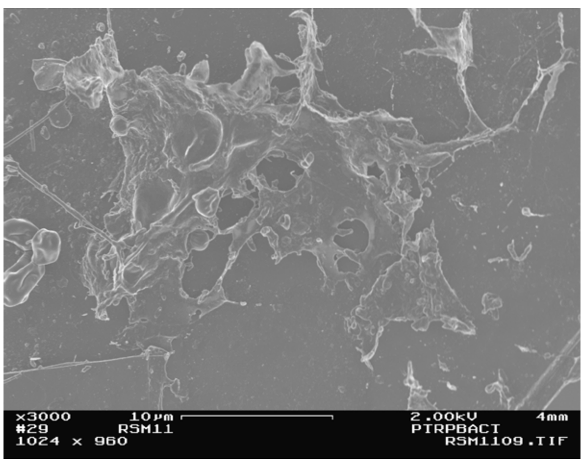
Figure L-11: Mineral surfaces were also investigated for microbial cover (morphology) in the small column experiment at **12 months**. These samples were freeze dried immediately after collection, so the microbial structures could have been preserved. Representative images are shown here for all treatments from the **rhizospheric soil** medium.



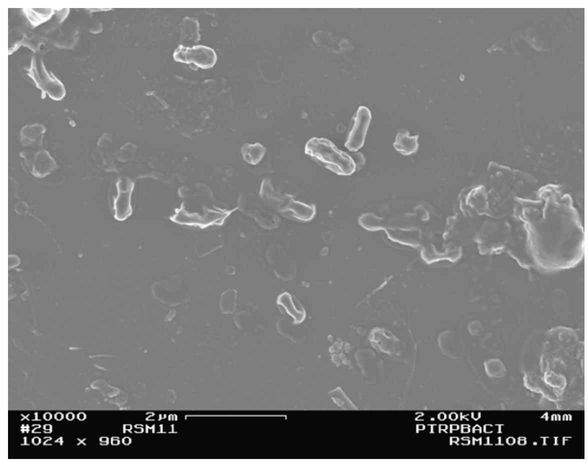
StRPBact biotite – 12 months



StRPBact biotite – 12 months

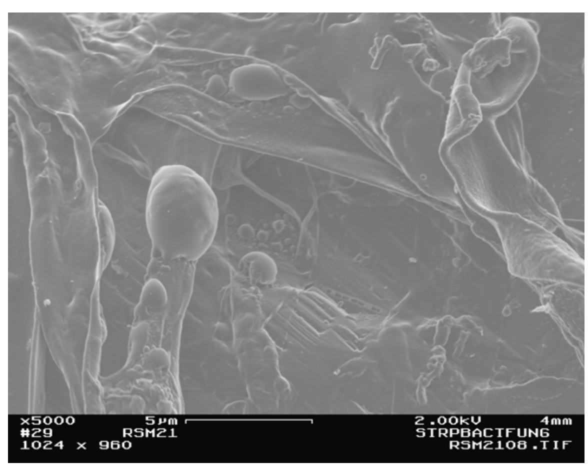


PtRPBact biotite – 12 months



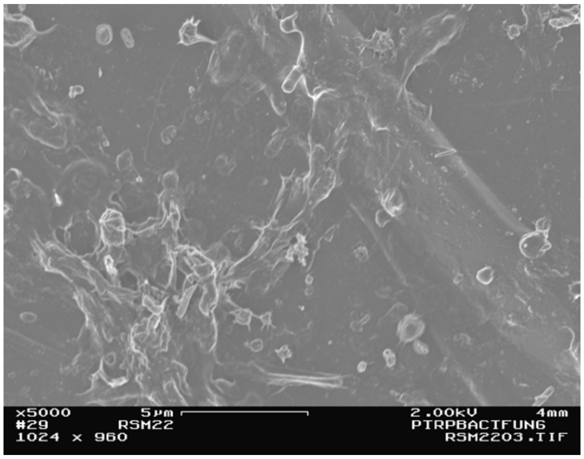
PtRPBact biotite – 12 months

StRPBactFung biotite – 12 months

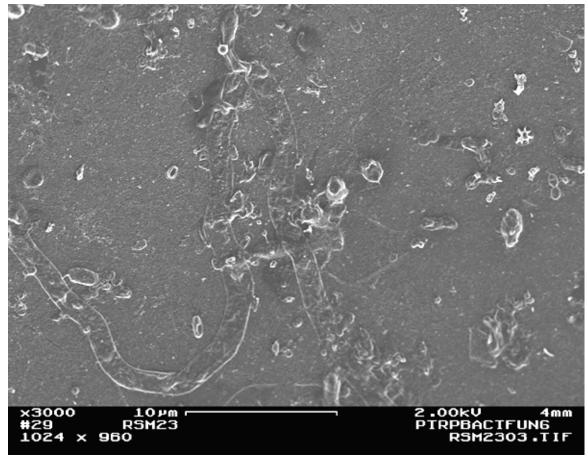


StRPBactFung biotite – 12 months

Figure L-11 (cont.): Mineral surfaces were also investigated for microbial cover (morphology) in the small column experiment at **12 months**. These samples were freeze dried immediately after collection, so the microbial structures could have been preserved. Representative images are shown here for all treatments from the **rhizospheric soil** medium.

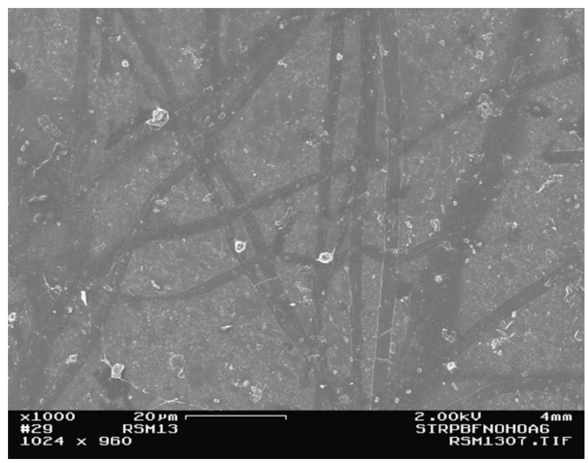


PtRPBactFung biotite – 12 months

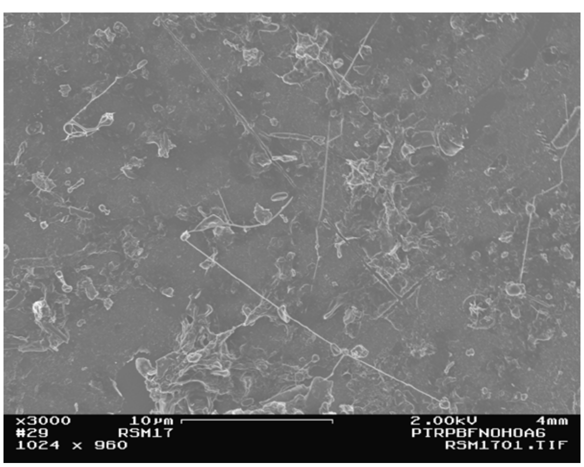


PtRPBactFung biotite – 12 months

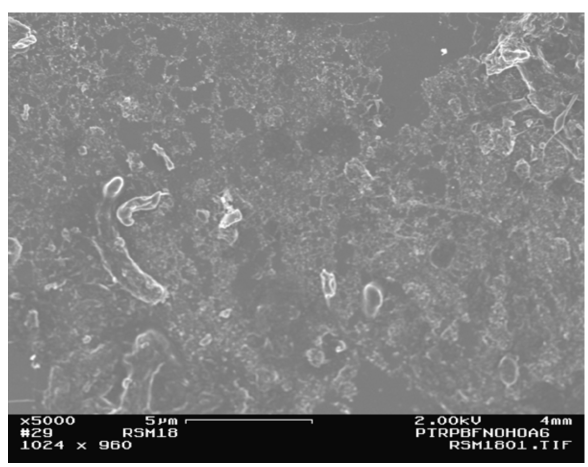
StRPBFNoHoag biotite – 12 months



StRPBFNoHoag biotite – 12 months



PtRPBFNoHoag biotite – 12 months



PtRPBFNoHoag biotite – 12 months

APPENDIX M

Large column experiment water, soil, biomass and mass-balance data

Table M-1: Input cation concentrations in liquids, in seed and in inoculums. Total input of cations in all treatments for the whole time interval in µmol (A). Table B shows the application distribution among treatments in the large column experiment.

A)

	Volume	Ca	K	Mg	Na	Fe	Al	P
Sample ID	**ml**	**umol/L**	**umol/L**	**umol/L**	**umol/L**	**umol/L**	**umol/L**	**umol/L**
Fungicide	10	2	12	5	20	0	0	0
Fungicide+Antibiotics	10	4	0	6	1528	0	0	0
St.Fungus	2	230	1094	446	1500	147	84	1916
RPSeeds	15	978	13599	13400	53	248	176	30990
RPSeeds real	0.02 grams a seed	0.29	4.08	4.02	0.02	0.07	0.05	9.30
St. Bacteria	2	37	14	37	288	2	1	170
Hoagland's	440	13	0	0	5159	0	0	544
CuSO4	80	42	0	0	0	0	0	67
CuSO4	60	42	0	0	0	0	0	67
Troy DI water		0	0	0	0	0	0	0
		umol	**umol**	**umol**	**umol**	**umol**	**umol**	**umol**
1yr		**Ca**	**K**	**Mg**	**Na**	**Fe**	**Al**	**P**
AbioticL		9.10	0.00	0.06	2285.11	0.00	0.00	244.88
RPBactL		8.62	4.22	4.14	2270.62	0.08	0.06	253.18
RPBactFungL		6.55	6.29	4.99	2273.42	0.37	0.22	253.02
RPBFNOHoagL		0.83	6.29	4.99	3.59	0.37	0.22	13.47
RPBFNOMinL		6.55	6.29	4.99	2273.42	0.37	0.22	253.02

B)

Sample ID	Go To
Fungicide	**RPBact**
Fungicide+Antibiotics	**Abiotic**
St.Fungus	**RPBactFung, RPBFNoHoag, RPBFNoMin**
RPSeeds	**RPBact, RPBactFung, RPBFNoHoag, RPBFNoMin**
RPSeeds real	**RPBact, RPBactFung, RPBFNoHoag, RPBFNoMin**
St. Bacteria	**RPBact, RPBactFung, RPBFNoHoag, RPBFNoMin**
Hoagland's	**Abiotic, RPBact, RPBactFung, RPBFNoMin**
CuSO4	**Abiotic**
CuSO4	**RPBact**
Troy DI water	**All**

Table M-2: Calcium in drainage water, averages and standard error – large column experiment.

	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca
Sample Date	***9/9/04***	***9/9/04***	***9/9/04***	***9/9/04***	***9/23/04***	***9/23/04***	***9/23/04***	***9/23/04***	***10/7/04***	***10/7/04***	***10/7/04***	***10/7/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	88	0.00	0.00	0	85	0.01	0.01	0.16	50	0.06	0.08	1.58
ABIOTICL-1	141	4.12	14.48	103	100	8.13	20.28	203	125	3.67	11.44	91
ABIOTICL-2	49	11.37	13.90		57	8.13	11.56	203				
ABIOTICL-3	73	6.33	11.53	158	68	6.55	11.11	163	45	10.91	12.25	272
ABIOTICL-4	90	5.48	12.31	137	55	7.18	9.85	179	90	5.53	12.42	138
ABIOTICL-5	59	6.70	9.86	167	36	9.58	8.60		28	15.86	11.08	
RPBACTL-1	90	5.24	11.76	131	91	4.50	10.21	112	110	3.74	10.26	93
RPBACTL-2	72	6.38	11.46	159					53	9.19	12.16	
RPBACTL-3	103	5.04	12.94	126	61	4.36	6.63	109	93	4.94	11.47	123
RPBACTL-5	115	5.70	16.35	142	101	2.60	6.55		123	2.65	8.12	66
RPBACTFUNGL-1	73	5.68	10.35	142	76	5.54	10.50	138	77	4.56	8.75	114
RPBACTFUNGL-2	67	5.24	8.77	131					92	5.24	12.03	131
RPBACTFUNGL-3	63	5.12	8.05	128	41	4.81	4.92	120	59	5.68	8.36	142
RPBACTFUNGL-4	146	2.63	9.59		134	2.45	8.20		143	2.52	9.01	
RPBACTFUNGL-5	109	7.82	21.27	195	78	6.41	12.48	160	94	5.31	12.45	132
RPBFNOHOAGL-1	136	3.59	12.19	90	123	3.52	10.82	88	133	3.25	10.79	81
RPBFNOHOAGL-2	132	4.21	13.88	105	111	2.21	6.13		120	3.14	9.39	78
RPBFNOHOAGL-3					62	3.72	5.76	93	103	3.36	8.63	84
RPBFNOHOAGL-4	125	4.36	13.59	109	115	3.62	10.39	90	125	3.32	10.35	83
RPBFNOMINL-1	119	0.92	2.73	23	108	0.72	1.94	18	101	0.70	1.76	17
RPBFNOMINL-3	109	0.65	1.76	16	78	0.44	0.86	11	83	0.54	1.12	14
RPBFNOMINL-4	93	0.57	1.32	14	121	0.30	0.92		71	0.48	0.86	12
RPBFNOMINL-5	127	1.24	3.94		109	0.65	1.77	16	113	0.56	1.57	14
	9/9/04	*9/9/04*	*9/9/04*	*9/9/04*	*9/23/04*	*9/23/04*	*9/23/04*	*9/23/04*	*10/7/04*	*10/7/04*	*10/7/04*	*10/7/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	82	7	12	141	63	8	12	187	72	9	12	167
RPBACTL	95	6	13	139	84	4	8	110	95	5	11	94
RPBACTFUNGL	92	5	12	149	82	5	9	139	93	5	10	130
RPBFNOHOAGL	131	4	13	101	103	3	8	90	120	3	10	81
RPBFNOMINL	112	1	2	18	104	1	1	15	92	1	1	14
	9/9/04	*9/9/04*	*9/9/04*	*9/9/04*	*9/23/04*	*9/23/04*	*9/23/04*	*9/23/04*	*10/7/04*	*10/7/04*	*10/7/04*	*10/7/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	16.19	1.23	0.83	12.80	10.54	0.51	2.07	8.65	19.66	2.47	0.29	41.98
RPBACTL	9.21	0.30	1.12	7.42	10.41	0.53	1.05	1.23	15.21	1.43	0.89	14.34
RPBACTFUNGL	15.86	0.83	2.45	14.06	17.20	0.76	1.45	8.94	13.99	0.56	0.87	5.21
RPBFNOHOAGL	2.78	0.20	0.45	5.08	13.81	0.35	1.35	1.23	6.34	0.05	0.49	1.21
RPBFNOMINL	7.33	0.15	0.58	2.30	9.16	0.10	0.28	1.81	9.33	0.05	0.21	1.13

Table M-2 (cont.): Calcium in drainage water, averages and standard error – large column experiment.

Sample Date	***10/21/04***	***10/21/04***	***10/21/04***	***10/21/04***	***11/4/04***	***11/4/04***	***11/4/04***	***11/4/04***	***11/18/04***	***11/18/04***	***11/18/04***	***11/18/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	52	0.01	0.01	0.24								
ABIOTICL-1	140	2.74	8.75		127	2.61	8.26	65	115	2.52	6.42	56
ABIOTICL-2	97	6.01	13.73	142	14	14.34	5.01		7	20.60	2.79	
ABIOTICL-3	82	5.11	9.63	117	46	6.45	7.40	161	23	11.71	5.91	
ABIOTICL-4	63	7.13	10.39	165	75	4.31	8.06	107	36	8.31	6.65	185
ABIOTICL-5	62	7.13	10.21	165	23	9.87	5.66		75	4.90	8.36	111
RPBACTL-1	101	3.57	8.17	81	80	3.16	6.30	79	13	11.92	3.06	
RPBACTL-2	101	4.01	9.27		40	5.19	5.18		8	20.23	2.97	
RPBACTL-3	145	2.60	8.59	59	67	3.62	6.05	90	96	3.47	7.49	78
RPBACTL-5	139	2.13	6.56	47	89	2.46	5.45	61	79	2.67	4.46	56
RPBACTFUNGL-1	104	3.39	7.96	77	78	3.59	6.99	90	20	8.16	3.26	
RPBACTFUNGL-2	90	3.41	6.84	76	35	4.03	3.51	100	20	7.67	3.02	151
RPBACTFUNGL-3	81	3.59	6.44	79	19	5.28	2.50					
RPBACTFUNGL-4	145	1.88	5.97	41	135	1.81	6.11	45	127	1.78	4.83	38
RPBACTFUNGL-5	96	4.14	9.08		70	4.17	7.29	104	110	3.07	7.63	69
RPBFNOHOAGL-1	145	2.33	8.41	58	137	2.30	7.87	57	97	2.33	5.64	58
RPBFNOHOAGL-2	134	2.36	7.86	59	108	2.33	6.28	58	95	2.28	5.41	57
RPBFNOHOAGL-3	49	2.57	3.13		16	3.70	1.48					
RPBFNOHOAGL-4	146	2.23	8.09	55	87	2.97	6.45	74	6	27.15	4.06	
RPBFNOMINL-1	142	0.33	0.34	2	109	0.41	1.10	10	77	0.61	0.36	5
RPBFNOMINL-3	96	0.27	0.00	0	38	0.49	0.47	12	12	1.51	0.00	0
RPBFNOMINL-4	75	0.25	0.00	0	47	0.27	0.31	7	69	0.54	0.12	2
RPBFNOMINL-5	133	0.38	0.45		91	0.47	1.07		48	1.11	0.52	
	10/21/04	*10/21/04*	*10/21/04*	*10/21/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/18/04*	*11/18/04*	*11/18/04*	*11/18/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	89	6	11	147	57	8	7	111	51	10	6	117
RPBACTL	122	3	8	62	69	4	6	77	49	10	4	67
RPBACTFUNGL	103	3	7	68	67	4	5	85	69	5	5	86
RPBFNOHOAGL	119	2	7	57	87	3	6	63	66	11	5	58
RPBFNOMINL	112	0	0	1	71	0	1	10	52	1	0	2
	10/21/04	*10/21/04*	*10/21/04*	*10/21/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/18/04*	*11/18/04*	*11/18/04*	*11/18/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	14.35	0.81	0.85	10.11	20.43	2.09	0.65	21.48	19.52	3.16	0.91	28.92
RPBACTL	11.90	0.43	0.58	8.55	10.67	0.58	0.26	7.30	22.60	4.12	1.06	7.63
RPBACTFUNGL	11.11	0.38	0.56	8.12	20.10	0.56	0.96	12.12	25.62	1.44	0.95	26.04
RPBFNOHOAGL	23.33	0.07	1.25	0.86	25.79	0.33	1.39	4.72	25.99	7.17	0.43	0.42
RPBFNOMINL	15.72	0.03	0.12	0.69	17.01	0.05	0.20	1.42	14.52	0.23	0.12	1.18

Table M-2 (cont.): Calcium in drainage water, averages and standard error – large column experiment.

	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca
Sample Date	***12/2/04***	***12/2/04***	***12/2/04***	***12/2/04***	***12/17/04***	***12/17/04***	***12/17/04***	***12/17/04***	***12/29/04***	***12/29/04***	***12/29/04***	***12/29/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank												
ABIOTICL-1	135	1.56	5.24	39	145	1.17	3.43	24	95	0.88	1.29	14
ABIOTICL-2	65	3.36	5.44		145	1.82	5.77		26	3.34	1.36	
ABIOTICL-3	92	2.43	5.58	61	145	1.70	5.32	37	45	1.96	1.39	31
ABIOTICL-4	97	2.17	5.25	54	145	1.29	3.87	27	57	1.49	1.30	23
ABIOTICL-5	87	2.30	5.00	57	145	1.61	5.01	35	61	1.43	1.37	22
RPBACTL-1	67	1.64	2.74	41	145	1.80	5.70		19	10.75	4.28	
RPBACTL-2	71	3.05	5.40		145	1.46	4.46	31	46	5.59	5.60	122
RPBACTL-3	95	1.73	4.11	43	145	1.08	3.10	21	86	2.73	5.05	59
RPBACTL-5	120	1.54	4.60	38	145	0.84	2.21	15	72	4.85	7.89	110
RPBACTFUNGL-1	59	2.45	3.61		145	1.54	4.74		43	5.43	5.02	117
RPBACTFUNGL-2	68	1.85	3.13	46	145	1.07	3.05	21	56	5.29	6.59	118
RPBACTFUNGL-3	78	1.57	3.05	39	145	1.50	4.61	32	44	7.24	7.14	
RPBACTFUNGL-4	130	1.08	3.50	27	145	0.80	2.10	14	100	2.43	5.26	53
RPBACTFUNGL-5	119	1.88	5.58	47	145	1.21	3.55	25	77	3.46	5.83	76
RPBFNOHOAGL-1	110	1.61	4.42	40	145	0.93	3.38	23	71	1.15	2.05	29
RPBFNOHOAGL-2	132	1.56	5.13	39	145	0.94	3.41	23	84	0.94	1.98	24
RPBFNOHOAGL-3	73	1.10	2.01	28	145	0.78	2.84	20				
RPBFNOHOAGL-4	77	2.39	4.60		145	1.62	5.86		55	3.11	4.27	
RPBFNOMINL-1	91	0.36	0.82	9	88	0.25	0.00	0	81	1.27	1.75	22
RPBFNOMINL-3	92	0.30	0.69	8	145	0.17	0.00	0	55	2.48	2.60	47
RPBFNOMINL-4	88	0.29	0.65	7	145	0.24	0.07	0	54	2.60	2.70	
RPBFNOMINL-5	109	0.62	1.70		145	0.26	0.14		77	1.90	2.83	37
	12/2/04	*12/2/04*	*12/2/04*	*12/2/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/29/04*	*12/29/04*	*12/29/04*	*12/29/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	95	2	5	53	145	2	5	30	57	2	1	22
RPBACTL	88	2	4	41	145	1	4	22	56	6	6	97
RPBACTFUNGL	91	2	4	40	145	1	4	23	64	5	6	91
RPBFNOHOAGL	98	2	4	36	145	1	4	22	70	2	3	26
RPBFNOMINL	95	0	1	8	131	0	0	0	67	2	2	35
	12/2/04	*12/2/04*	*12/2/04*	*12/2/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/29/04*	*12/29/04*	*12/29/04*	*12/29/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	11.35	0.29	0.10	4.31	0.00	0.12	0.44	2.78	11.32	0.42	0.02	3.18
RPBACTL	12.26	0.36	0.56	1.21	0.00	0.21	0.77	3.91	14.79	1.70	0.78	16.71
RPBACTFUNGL	14.19	0.22	0.46	4.13	0.00	0.14	0.49	3.23	10.89	0.84	0.40	14.31
RPBFNOHOAGL	14.04	0.27	0.69	3.47	0.00	0.19	0.68	1.11	7.26	0.60	0.65	1.86
RPBFNOMINL	4.74	0.08	0.25	0.46	14.25	0.02	0.03	0.13	7.12	0.31	0.25	6.45

Table M-2 (cont.): Calcium in drainage water, averages and standard error – large column experiment.

Sample Date	***1/11/05***	***1/11/05***	***1/11/05***	***1/11/05***	***1/25/05***	***1/25/05***	***1/25/05***	***1/25/05***	***2/8/05***	***2/8/05***	***2/8/05***	***2/8/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	69	0.05	0.09	1.27	82	0.05	0.11	1.29	105	0.01	0.03	0.27
ABIOTICL-1	90	5.46	12.18	135	182	7.71	29.24	161	131	0.02	0.00	0
ABIOTICL-2	43	5.91	6.26	146	117	14.63	36.93		117	0.09	0.24	2
ABIOTICL-3	77	3.54	6.71	87	130	12.84	35.86	276	82	0.12	0.22	3
ABIOTICL-4	72	7.08	12.63	175	116	13.08	32.06	276	93	0.08	0.15	2
ABIOTICL-5	77	7.39	14.11		136	11.01	31.58	232	98	0.06	0.13	1
RPBACTL-1					74	13.45	19.06		137	4.34	14.80	
RPBACTL-2	38	2.26	2.06		99	9.47	17.60	178	99	3.79	9.33	94
RPBACTL-3	89	1.20	2.57	29	186	4.17	13.58	73	154	2.96	11.34	74
RPBACTL-5	86	1.16	2.40	28	155	4.81	12.81	83	141	1.98	6.92	49
RPBACTFUNGL-1	14	2.07	0.63	45	163	5.39	16.13	99	116	0.16	0.42	4
RPBACTFUNGL-2	25	11.00	6.77		96	8.49	14.55	152	62	0.27	0.39	6
RPBACTFUNGL-3	39	1.89	1.75	45	114	9.22	20.45		93	0.28	0.62	7
RPBACTFUNGL-4	119	0.20	0.51	4	184	4.06	12.87	70	161	0.05	0.19	1
RPBACTFUNGL-5	107	1.03	2.66	25	168	5.55	17.46	104	111	0.88	2.42	
RPBFNOHOAGL-1	82	1.56	3.11	38	194	1.79	8.56	44	106	0.99	2.58	24
RPBFNOHOAGL-2	78	1.74	3.30	42	153	1.04	3.86	25	102	1.06	2.67	26
RPBFNOHOAGL-3	47	1.61	1.80	38	91	0.93	1.99	22	64	0.97	1.52	24
RPBFNOHOAGL-4	23	5.45	3.04		89	2.23	4.85		59	2.40	3.51	
RPBFNOMINL-1	73	0.03	0.00	0	157	2.35	3.43	22	143	0.03	0.07	1
RPBFNOMINL-3	81	0.08	0.06	1	102	3.47	3.05	30	82	0.06	0.10	1
RPBFNOMINL-4	83	0.04	0.00	0	129	4.19	7.71		65	0.09	0.12	
RPBFNOMINL-5	85	0.09	0.11		169	1.88	2.16	13	155	0.03	0.09	1
	1/11/05	*1/11/05*	*1/11/05*	*1/11/05*	*1/25/05*	*1/25/05*	*1/25/05*	*1/25/05*	*2/8/05*	*2/8/05*	*2/8/05*	*2/8/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	72	6	10	136	136	12	33	236	104	0	0	2
RPBACTL	71	2	2	28	129	8	16	111	133	3	11	72
RPBACTFUNGL	61	3	2	30	145	7	16	106	109	0	1	4
RPBFNOHOAGL	58	3	3	39	132	1	5	30	83	1	3	25
RPBFNOMINL	81	0	0	0	139	3	4	22	111	0	0	1
	1/11/05	*1/11/05*	*1/11/05*	*1/11/05*	*1/25/05*	*1/25/05*	*1/25/05*	*1/25/05*	*2/8/05*	*2/8/05*	*2/8/05*	*2/8/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	7.79	0.68	1.62	16.40	12.07	1.18	1.42	24.37	8.77	0.02	0.04	0.45
RPBACTL	14.31	0.31	0.13	0.34	25.58	2.17	1.52	28.94	11.82	0.51	1.67	11.30
RPBACTFUNGL	21.76	1.97	1.15	8.73	16.94	0.99	1.29	15.12	16.16	0.14	0.41	1.14
RPBFNOHOAGL	13.91	0.96	0.34	1.21	25.52	0.31	1.38	5.99	12.34	0.35	0.41	0.63
RPBFNOMINL	2.63	0.02	0.03	0.23	14.98	0.52	1.24	4.28	22.21	0.02	0.01	0.20

Table M-2 (cont.): Calcium in drainage water, averages and standard error – large column experiment.

	Ca	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*	*Ca*
Sample Date	***2/22/05***	***2/22/05***	***2/22/05***	***2/22/05***	***3/8/05***	***3/8/05***	***3/8/05***	***3/8/05***	***3/22/05***	***3/22/05***	***3/22/05***	***3/22/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	83	0.01	0.03	0.37	85	0.02	0.04	0.42	76	0.03	0.05	0.65
ABIOTICL-1	100	1.16	0.00	0	135	0.59	1.95	14	121	2.21	0.96	8
ABIOTICL-2	80	0.97	0.00	0	106	0.88	2.30	22	99	2.18	0.00	0
ABIOTICL-3	61	1.04	0.00	0	64	2.16	3.41		78	2.45	0.00	0
ABIOTICL-4	95	1.04	0.00	0	110	0.78	2.11	19	110	2.69	1.65	
ABIOTICL-5	50	2.22	0.00	0	102	1.10	2.75	27	89	2.70	0.28	3
RPBACTL-1	43	3.22	0.19	4	72	2.51	4.48	62	62	3.07	0.00	0
RPBACTL-2	45	4.68	1.98		48	4.00	4.75		70	2.64	0.00	0
RPBACTL-3	113	2.08	2.60	23	143	1.20	4.24	30	96	2.48	0.21	2
RPBACTL-5	122	2.15	3.28	27	108	1.20	3.19	30	128	2.61	2.61	
RPBACTFUNGL-1	102	1.91	1.59	16	110	1.40	3.81	35	109	2.60	1.34	12
RPBACTFUNGL-2	31	1.94	0.00	0	62	2.70	4.13		88	2.93	0.71	8
RPBACTFUNGL-3	78	1.76	0.16	2	89	2.00	4.40	49	76	3.86	1.60	21
RPBACTFUNGL-4	139	1.13	0.66	5	161	1.49	5.94	37	142	1.89	0.97	7
RPBACTFUNGL-5	110	1.95	2.08		119	2.35	6.95	58	115	3.80	5.16	
RPBFNOHOAGL-1	66	1.59	2.59	39	91	1.37	3.07	34	100	1.17	2.87	
RPBFNOHOAGL-2	76	2.45	4.61	61	76	3.13	5.90		98	0.54	1.28	13
RPBFNOHOAGL-3	31	3.61	2.76		53	1.80	2.34	44	74	0.58	1.03	14
RPBFNOHOAGL-4	31	3.33	2.55	82	43	2.35	2.48	58	60	0.54	0.77	13
RPBFNOMINL-1	112	0.51	0.00	0	125	0.35	1.04	8	108	1.00	0.00	0
RPBFNOMINL-3	78	0.81	0.00	0	97	0.41	0.97	10	110	1.03	0.00	0
RPBFNOMINL-4	35	1.59	0.00	0	35	1.21	1.02		59	2.21	0.00	0
RPBFNOMINL-5	137	0.57	0.00	0	144	0.25	0.87	6	139	1.11	0.00	0
	2/22/05	*2/22/05*	*2/22/05*	*2/22/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/22/05*	*3/22/05*	*3/22/05*	*3/22/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	77	1	0	0	103	1	3	21	99	2	1	3
RPBACTL	81	3	2	18	93	2	4	40	89	3	1	1
RPBACTFUNGL	92	2	1	6	108	2	5	45	106	3	2	12
RPBFNOHOAGL	51	3	3	61	66	2	3	45	83	1	1	13
RPBFNOMINL	91	1	0	0	100	1	1	8	104	1	0	0
	2/22/05	*2/22/05*	*2/22/05*	*2/22/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/22/05*	*3/22/05*	*3/22/05*	*3/22/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	9.61	0.23	0.00	0.00	11.41	0.28	0.26	2.34	7.57	0.11	0.32	1.67
RPBACTL	21.30	0.61	0.66	6.03	20.80	0.67	0.34	9.41	14.89	0.13	0.64	0.62
RPBACTFUNGL	18.10	0.15	0.41	3.10	16.45	0.25	0.60	4.99	11.42	0.37	0.82	2.88
RPBFNOHOAGL	11.73	0.46	0.50	10.73	10.89	0.38	0.83	6.02	9.68	0.15	0.47	0.29
RPBFNOMINL	22.10	0.25	0.00	0.00	23.80	0.22	0.04	1.00	16.59	0.29	0.00	0.00

Table M-2 (cont.): Calcium in drainage water, averages and standard error – large column experiment.

Sample Date	***4/5/05***	***4/5/05***	***4/5/05***	***4/5/05***	***4/19/05***	***4/19/05***	***4/19/05***	***4/19/05***	***5/4/05***	***5/4/05***	***5/4/05***	***5/4/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	70	0.01	0.01	0.20	74	0.01	0.02	0.22	70	0.00	0.00	0.01
ABIOTICL-1	109	0.01	0.02	0	142	1.81	2.32	16	133	0.02	0.06	0
ABIOTICL-2	106	0.05	0.11	1	124	1.45	0.42	3	132	0.07	0.23	2
ABIOTICL-3	92	0.11	0.23	2	68	3.12	1.23	18	107	0.12	0.33	
ABIOTICL-4	118	0.04	0.11	1	114	1.96	1.50	13	137	0.03	0.10	1
ABIOTICL-5	88	0.07	0.13	2	103	2.31	1.88		125	0.02	0.05	0
RPBACTL-1	53	0.26	0.33	6	58	2.85	0.05	1	77	0.47	0.89	
RPBACTL-2	70	0.25	0.42	6	66	2.93	0.76	11	98	0.16	0.38	4
RPBACTL-3	120	0.28	0.82		125	2.09	2.43		118	0.35	1.02	9
RPBACTL-5	125	0.13	0.39	3	132	1.84	2.00	15	141	0.08	0.28	2
RPBACTFUNGL-1	113	0.22	0.60	5	127	2.29	3.17	25	135	0.23	0.76	6
RPBACTFUNGL-2	72	0.39	0.68	9	85	3.25	2.82	33	87	0.30	0.64	7
RPBACTFUNGL-3	83	0.44	0.89		123	2.29	2.95	24	120	0.27	0.80	
RPBACTFUNGL-4	144	0.13	0.46	3	160	1.68	2.62	16	151	0.12	0.46	3
RPBACTFUNGL-5	124	0.29	0.89	7	100	3.13	3.74		136	0.10	0.33	2
RPBFNOHOAGL-1	89	1.23	2.71	30	113	0.92	2.57	23	105	0.93	2.44	23
RPBFNOHOAGL-2	93	0.75	1.72	18	96	0.70	1.67	17	132	0.55	1.80	14
RPBFNOHOAGL-3	53	0.72	0.94	18	63	0.40	0.61	10	81	0.43	0.86	11
RPBFNOHOAGL-4	61	2.09	3.17		65	1.69	2.73		90	1.36	3.06	
RPBFNOMINL-1	128	0.04	0.10	1	127	0.85	0.00	0	132	0.02	0.06	0
RPBFNOMINL-3	105	0.05	0.11	1	116	0.79	0.00	0	138	0.01	0.03	0
RPBFNOMINL-4	54	0.10	0.12		68	1.60	0.00	0	73	0.03	0.05	1
RPBFNOMINL-5	146	0.02	0.05	0	152	0.76	0.00	0	170	0.01	0.05	0
	4/5/05	*4/5/05*	*4/5/05*	*4/5/05*	*4/19/05*	*4/19/05*	*4/19/05*	*4/19/05*	*5/4/05*	*5/4/05*	*5/4/05*	*5/4/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	103	0	0	1	110	2	1	13	127	0	0	1
RPBACTL	92	0	0	5	95	2	1	9	109	0	1	5
RPBACTFUNGL	107	0	1	6	119	3	3	25	126	0	1	5
RPBFNOHOAGL	74	1	2	22	84	1	2	17	102	1	2	16
RPBFNOMINL	108	0	0	1	116	1	0	0	128	0	0	0
	4/5/05	*4/5/05*	*4/5/05*	*4/5/05*	*4/19/05*	*4/19/05*	*4/19/05*	*4/19/05*	*5/4/05*	*5/4/05*	*5/4/05*	*5/4/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	5.55	0.02	0.03	0.38	12.35	0.28	0.32	2.94	5.31	0.02	0.05	0.29
RPBACTL	17.98	0.03	0.11	0.87	19.32	0.27	0.55	3.69	13.69	0.09	0.18	1.71
RPBACTFUNGL	13.22	0.06	0.08	1.19	12.80	0.29	0.19	3.08	10.87	0.04	0.09	1.03
RPBFNOHOAGL	9.98	0.32	0.50	3.54	12.20	0.28	0.49	3.27	11.16	0.21	0.47	3.30
RPBFNOMINL	19.93	0.02	0.02	0.18	17.61	0.20	0.00	0.00	20.22	0.00	0.01	0.11

Table M-2 (cont.): Calcium in drainage water, averages and standard error – large column experiment.

	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca
Sample Date	***5/16/05***	***5/16/05***	***5/16/05***	***5/16/05***	***5/31/05***	***5/31/05***	***5/31/05***	***5/31/05***	***6/14/05***	***6/14/05***	***6/14/05***	***6/14/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	82	0.03	0.07	0.82	78	0.04	0.07	0.92	69	0.04	0.06	0.93
ABIOTICL-1	125	0.94	0.00	0	128	0.05	0.07	1	58	4.03	1.71	29
ABIOTICL-2	145	1.41	0.99	7	132	0.11	0.28	2	72	2.54	0.44	6
ABIOTICL-3	120	0.09	0.00	0	165	0.26	1.01		93	2.98	2.80	30
ABIOTICL-4	170	1.42	1.92	11	147	0.07	0.19	1	91	2.33	1.17	13
ABIOTICL-5	130	1.82	1.77		153	0.19	0.65	4	45	5.09	1.60	
RPBACTL-1	138	1.40	0.71	5	130	0.08	0.18	1	35	3.69	0.00	0
RPBACTL-2	161	1.63	2.42		166	0.15	0.53	3	90	2.33	1.11	12
RPBACTL-3	137	1.42	0.74	5	140	0.37	1.23		86	2.24	0.68	8
RPBACTL-5	93	0.32	0.00	0	113	0.19	0.45	4	39	5.28	1.02	
RPBACTFUNGL-1	128	2.36	3.41		107	0.20	0.46	4	26	5.98	0.00	0
RPBACTFUNGL-2	176	1.86	4.05	23	154	0.23	0.83	5	109	2.30	2.15	20
RPBACTFUNGL-3	184	1.45	2.54	14	156	0.23	0.83		106	2.08	1.38	13
RPBACTFUNGL-4	149	1.57	1.73	12	130	0.13	0.36	3	63	2.76	0.23	4
RPBACTFUNGL-5	129	2.31	3.30	26	102	0.04	0.04	0	33	6.16	0.95	
RPBFNOHOAGL-1					122	0.73	2.16		37	1.43	1.25	
RPBFNOHOAGL-2	159	0.45	1.71	11	145	0.39	1.35	9	87	0.43	0.88	10
RPBFNOHOAGL-3	109	0.37	0.94	9	84	0.48	0.93	11	30	0.42	0.25	8
RPBFNOHOAGL-4	157	0.83	3.17		131	0.57	1.79	14	56	1.09	1.45	26
RPBFNOMINL-1	152	0.74	0.00	0	164	0.04	0.11	1	71	1.20	0.00	0
RPBFNOMINL-3	115	0.06	0.00	0	146	0.01	0.00	0	102	1.05	0.00	0
RPBFNOMINL-4	147	0.71	0.00	0	119	0.08	0.16		108	1.36	0.00	0
RPBFNOMINL-5	172	0.46	0.00	0	170	0.01	0.00	0	111	0.79	0.00	0
	5/16/05	*5/16/05*	*5/16/05*	*5/16/05*	*5/31/05*	*5/31/05*	*5/31/05*	*5/31/05*	*6/14/05*	*6/14/05*	*6/14/05*	*6/14/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	138	1	1	5	145	0	0	2	72	3	2	20
RPBACTL	132	1	1	4	137	0	1	3	63	3	1	7
RPBACTFUNGL	153	2	3	19	130	0	1	3	67	4	1	9
RPBFNOHOAGL	142	1	2	10	121	1	2	11	53	1	1	15
RPBFNOMINL	147	0	0	0	150	0	0	0	98	1	0	0
	5/16/05	*5/16/05*	*5/16/05*	*5/16/05*	*5/31/05*	*5/31/05*	*5/31/05*	*5/31/05*	*6/14/05*	*6/14/05*	*6/14/05*	*6/14/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	9.03	0.30	0.41	2.48	6.80	0.04	0.17	0.71	9.29	0.52	0.39	5.39
RPBACTL	14.21	0.30	0.51	1.53	11.09	0.06	0.22	0.67	14.77	0.71	0.25	3.13
RPBACTFUNGL	11.63	0.18	0.40	3.05	11.32	0.04	0.15	0.97	17.52	0.91	0.39	4.01
RPBFNOHOAGL	14.15	0.12	0.57	0.75	13.05	0.07	0.27	1.10	12.74	0.25	0.26	4.84
RPBFNOMINL	11.81	0.16	0.00	0.00	11.45	0.02	0.04	0.19	9.19	0.12	0.00	0.00

Table M-2 (cont.): Calcium in drainage water, averages and standard error – large column experiment.

Sample Date	***6/28/05***	***6/28/05***	***6/28/05***	***6/28/05***	***7/12/05***	***7/12/05***	***7/12/05***	***7/12/05***	***7/28/05***	***7/28/05***	***7/28/05***	***7/28/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	115	0.02	0.07	0.61	125	0.03	0.10	0.82	129	0.18	0.57	4.41
ABIOTICL-1	105	0.38	0.92	9	133	3.39	7.09	53	96	0.62	0.93	
ABIOTICL-2	135	0.22	0.66	5	123	3.39	6.23	51	98	0.31	0.19	2
ABIOTICL-3	139	0.15	0.46	3	143	3.03	6.66	47	144	0.07	0.00	0
ABIOTICL-4	140	0.12	0.36	3	130	3.06	5.76	44	143	0.13	0.00	0
ABIOTICL-5	90	0.81	1.76		94	4.64	6.73		75	0.57	0.50	7
RPBACTL-1	80	0.64	1.20		110	2.88	3.74	34	87	0.54	0.60	7
RPBACTL-2	142	0.34	1.14	8	147	2.99	6.81		138	0.17	0.03	0
RPBACTL-3	129	0.58	1.81	14	118	2.78	4.02	34	123	0.49	0.93	
RPBACTL-5	85	0.57	1.15	13	94	3.88	4.93	52	77	0.25	0.00	0
RPBACTFUNGL-1					91	2.57	1.68	18	66	0.11	0.00	0
RPBACTFUNGL-2	139	0.30	0.96	7	124	2.08	2.27		126	0.19	0.04	0
RPBACTFUNGL-3	119	0.24	0.64	5	124	1.90	1.72	14	127	0.09	0.00	0
RPBACTFUNGL-4	103	0.23	0.52	5	110	1.72	0.58	5	98	0.07	0.00	0
RPBACTFUNGL-5	79	0.17	0.26	3	80	2.58	1.00	12	78	0.03	0.00	0
RPBFNOHOAGL-1	95	0.96	2.20		106	0.68	1.69	16	90	0.69	0.99	11
RPBFNOHOAGL-2	118	0.48	1.35	11	135	0.53	1.70	13	135	0.53	1.21	9
RPBFNOHOAGL-3	65	0.33	0.46	7	84	0.38	0.70	8	126	0.41	0.73	6
RPBFNOHOAGL-4	112	0.79	2.14	19	112	0.80	2.13		113	0.69	1.37	
RPBFNOMINL-1	115	0.14	0.32	3	146	0.66	0.00	0	98	0.09	0.00	0
RPBFNOMINL-3	126	0.05	0.10	1	144	0.69	0.00	0	124	0.05	0.00	0
RPBFNOMINL-4	92	0.09	0.13	1	119	0.92	0.00	0	99	0.04	0.00	0
RPBFNOMINL-5	146	0.03	0.03	0	147	0.49	0.00	0	142	0.01	0.00	0
	6/28/05	*6/28/05*	*6/28/05*	*6/28/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/28/05*	*7/28/05*	*7/28/05*	*7/28/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	122	0	1	5	125	4	6	49	111	0	0	2
RPBACTL	109	1	1	12	117	3	5	40	106	0	0	2
RPBACTFUNGL	110	0	1	5	106	2	1	13	99	0	0	0
RPBFNOHOAGL	98	1	2	13	109	1	2	12	116	1	1	9
RPBFNOMINL	120	0	0	1	139	1	0	0	116	0	0	0
	6/28/05	*6/28/05*	*6/28/05*	*6/28/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/28/05*	*7/28/05*	*7/28/05*	*7/28/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	10.23	0.13	0.25	1.22	8.30	0.30	0.23	1.82	13.79	0.11	0.18	1.41
RPBACTL	15.56	0.07	0.16	1.66	11.10	0.25	0.69	5.32	14.48	0.09	0.23	1.97
RPBACTFUNGL	11.35	0.02	0.13	0.66	8.85	0.17	0.30	2.45	12.34	0.03	0.01	0.07
RPBFNOHOAGL	11.88	0.14	0.41	3.05	10.48	0.09	0.30	1.90	9.77	0.07	0.14	1.30
RPBFNOMINL	11.26	0.02	0.06	0.55	6.70	0.09	0.00	0.00	10.62	0.02	0.00	0.00

Table M-2 (cont.): Calcium in drainage water, averages and standard error – large column experiment.

	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca	Ca
Sample Date	***8/9/05***	***8/9/05***	***8/9/05***	***8/9/05***	***8/23/05***	***8/23/05***	***8/23/05***	***8/23/05***	***9/6/05***	***9/6/05***	***9/6/05***	***9/6/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	121	0.55	1.65	13.63	132	0.15	0.48	3.64	120	0.17	0.51	4.21
ABIOTICL-1	82	0.85	0.10	1	37	4.55	0.00	0	71	0.11	0.00	0
ABIOTICL-2	90	0.49	0.00	0	92	0.92	0.00	0	123	0.08	0.00	0
ABIOTICL-3	135	1.04	1.85		115	1.79	0.61	5	143	0.07	0.00	0
ABIOTICL-4	102	0.56	0.00	0	108	1.47	0.00	0	143	0.14	0.00	0
ABIOTICL-5	63	0.72	0.00	0	50	4.74	1.38		78	0.28	0.05	
RPBACTL-1	64	0.33	0.00	0	47	3.72	0.00	0	134	0.15	0.00	0
RPBACTL-2	114	0.54	0.00	0	107	1.47	0.00	0	144	0.09	0.00	0
RPBACTL-3	102	0.61	0.00	0	74	2.01	0.00	0	130	0.36	0.65	
RPBACTL-5	67	0.46	0.00	0	40	4.34	0.00	0	72	0.15	0.00	0
RPBACTFUNGL-1	40	0.09	0.00	0	22	8.22	0.00	0	47	0.33	0.00	0
RPBACTFUNGL-2	117	0.64	0.21	2	98	1.64	0.00	0	143	0.16	0.06	0
RPBACTFUNGL-3	82	0.64	0.00	0	79	0.84	0.00	0	146	0.12	0.00	0
RPBACTFUNGL-4	89	0.80	0.12	1	55	1.75	0.00	0	91	0.04	0.00	0
RPBACTFUNGL-5	54	0.60	0.00	0	38	2.79	0.00	0	76	0.40	0.26	
RPBFNOHOAGL-1	82	0.99	0.37		61	1.17	1.30		76	0.88	1.16	15
RPBFNOHOAGL-2	112	0.52	0.00	0	88	0.59	0.81	9	93	0.69	1.09	12
RPBFNOHOAGL-3	42	0.39	0.00	0	21	0.57	0.00	0	65	0.37	0.09	1
RPBFNOHOAGL-4	87	0.89	0.29	3	65	1.03	1.19	18	100	0.80	1.49	
RPBFNOMINL-1	116	0.38	0.00	0	76	0.60	0.00	0	71	0.03	0.00	0
RPBFNOMINL-3	111	0.33	0.00	0	100	0.52	0.00	0	140	0.02	0.00	0
RPBFNOMINL-4	92	0.44	0.00	0	65	1.04	0.00	0	142	0.01	0.00	0
RPBFNOMINL-5	128	0.31	0.00	0	128	0.28	0.00	0	146	0.01	0.00	0
	8/9/05	*8/9/05*	*8/9/05*	*8/9/05*	*8/23/05*	*8/23/05*	*8/23/05*	*8/23/05*	*9/6/05*	*9/6/05*	*9/6/05*	*9/6/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	94	1	0	0	80	3	0	1	112	0	0	0
RPBACTL	87	0	0	0	67	3	0	0	120	0	0	0
RPBACTFUNGL	76	1	0	1	58	3	0	0	101	0	0	0
RPBFNOHOAGL	81	1	0	1	59	1	1	9	84	1	1	9
RPBFNOMINL	112	0	0	0	92	1	0	0	125	0	0	0
	8/9/05	*8/9/05*	*8/9/05*	*8/9/05*	*8/23/05*	*8/23/05*	*8/23/05*	*8/23/05*	*9/6/05*	*9/6/05*	*9/6/05*	*9/6/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	11.97	0.10	0.37	0.26	15.65	0.81	0.27	1.18	15.62	0.04	0.01	0.00
RPBACTL	12.53	0.06	0.00	0.00	15.22	0.68	0.00	0.00	16.27	0.06	0.16	0.00
RPBACTFUNGL	13.54	0.12	0.04	0.40	13.68	1.33	0.00	0.00	19.27	0.07	0.05	0.10
RPBFNOHOAGL	14.49	0.14	0.10	0.97	13.92	0.15	0.29	4.58	7.96	0.11	0.30	3.60
RPBFNOMINL	7.49	0.03	0.00	0.00	13.98	0.16	0.00	0.00	17.96	0.01	0.00	0.00

Table M-3: Potassium in drainage water, averages and standard error – large column experiment.

0.4 mg/L	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*
Sample Date	***9/9/04***	***9/9/04***	***9/9/04***	***9/9/04***	***9/23/04***	***9/23/04***	***9/23/04***	***9/23/04***	***10/7/04***	***10/7/04***	***10/7/04***	***10/7/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	88	0.00	0.00	0	85	0.00	0.00	0	50	0.00	0.00	0
ABIOTICL-1	141	1.12	4.04	29	100	2.16	5.51	55	125	0.00	0.00	0
ABIOTICL-2	49	3.83	4.80	98	57	2.16	3.14	55	3			0
ABIOTICL-3	73	2.37	4.43	61	68	1.80	3.14	46	45	2.12	2.44	54
ABIOTICL-4	90	2.07	4.76	53	55	1.86	2.62	48	90	1.09	2.51	28
ABIOTICL-5	59	2.56	3.86	65	36	2.87	2.64	73	28	3.00	2.15	77
RPBACTL-1	90	1.64	3.78	42	91	1.61	3.75	41	110	0.50	1.40	13
RPBACTL-2	72	1.65	3.04	42	12			0	53	1.89	2.56	48
RPBACTL-3	103	1.54	4.04	39	61	1.21	1.88	31	93	1.33	3.15	34
RPBACTL-5	115	3.23	9.50	83	101	1.83	4.72	47	123	1.40	4.39	36
RPBACTFUNGL-1	73	2.14	3.99	55	76	1.45	2.81	37	77	0.99	1.95	25
RPBACTFUNGL-2	67	2.09	3.58	53					92	1.76	4.15	45
RPBACTFUNGL-3	63	1.68	2.71	43	41	2.53	2.65	65	59	2.61	3.94	67
RPBACTFUNGL-4	146	1.45	5.40	37	134	0.76	2.60	19	143	0.97	3.53	25
RPBACTFUNGL-5	109	2.57	7.18	66	78	2.89	5.76	74	94	1.92	4.61	49
RPBFNOHOAGL-1	136	0.99	3.45	25	123	0.84	2.64	21	133	1.13	3.84	29
RPBFNOHOAGL-2	132	1.31	4.41	33	111	2.04	5.80	52	120	1.03	3.16	26
RPBFNOHOAGL-3					62	0.62	0.98	16	103	6.06	15.96	155
RPBFNOHOAGL-4	125	1.29	4.13	33	115	1.14	3.36	29	125	1.43	4.58	37
RPBFNOMINL-1	119	0.77	2.35	20	108	0.61	1.70	16	101	1.23	3.18	31
RPBFNOMINL-3	109	0.98	2.73	25	78	1.24	2.48	32	83	1.26	2.68	32
RPBFNOMINL-4	93	0.68	1.62	17	121	0.55	1.72	14	71	1.05	1.91	27
RPBFNOMINL-5	127	0.69	2.25	18	109	0.94	2.63	24	113	0.90	2.61	23
	9/9/04	*9/9/04*	*9/9/04*	*9/9/04*	*9/23/04*	*9/23/04*	*9/23/04*	*9/23/04*	*10/7/04*	*10/7/04*	*10/7/04*	*10/7/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	82.40	2.39	4.38	61	63.20	2.17	3.41	55	58.20	1.55	1.78	32
RPBACTL	95.00	2.01	5.09	52	66.25	1.55	3.45	30	94.75	1.28	2.88	33
RPBACTFUNGL	91.60	1.99	4.57	51	82.25	1.91	3.46	49	93.00	1.65	3.64	42
RPBFNOHOAGL	131.00	1.20	4.00	31	102.75	1.16	3.19	30	120.25	2.41	6.89	62
RPBFNOMINL	112.00	0.78	2.24	20	104.00	0.84	2.13	21	92.00	1.11	2.59	28
	9/9/04	*9/9/04*	*9/9/04*	*9/9/04*	*9/23/04*	*9/23/04*	*9/23/04*	*9/23/04*	*10/7/04*	*10/7/04*	*10/7/04*	*10/7/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	16.19	0.44	0.19	11.16	10.54	0.19	0.54	4.83	21.92	0.58	0.53	15.11
RPBACTL	9.21	0.41	1.49	10.40	19.98	0.16	0.72	10.43	15.21	0.29	0.62	7.39
RPBACTFUNGL	15.86	0.20	0.78	5.00	17.20	0.44	0.69	11.19	13.99	0.31	0.46	7.91
RPBFNOHOAGL	2.78	0.09	0.25	2.28	13.81	0.31	1.00	8.01	6.34	1.22	3.04	31.16
RPBFNOMINL	7.33	0.07	0.23	1.76	9.16	0.16	0.25	4.07	9.33	0.08	0.26	2.14

Table M-3 (cont.): Potassium in drainage water, averages and standard error – large column experiment.

0.4 mg/L	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*
Sample Date	***10/21/04***	***10/21/04***	***10/21/04***	***10/21/04***	***11/4/04***	***11/4/04***	***11/4/04***	***11/4/04***	***11/18/04***	***11/18/04***	***11/18/04***	***11/18/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	52	0.00	0.00	0								
ABIOTICL-1	140	0.45	1.59	11	127	0.00	0.00	0	115	0.62	1.82	16
ABIOTICL-2	97	1.54	3.81	39	14	2.53	0.91	65	7	6.33	1.13	162
ABIOTICL-3	82	1.74	3.64	44	46	1.14	1.35	29	23	2.25	1.32	57
ABIOTICL-4	63	1.71	2.75	44	75	0.79	1.51	20	36	1.35	1.25	35
ABIOTICL-5	62	1.71	2.71	44	23	1.90	1.12	48	75	0.85	1.62	22
RPBACTL-1	101	1.35	3.48	34	80	0.91	1.87	23	13	3.85	1.28	99
RPBACTL-2	101	0.90	2.33	23	40	0.93	0.95	24	8	4.53	0.87	116
RPBACTL-3	145	0.60	2.23	15	67	0.58	1.00	15	96	0.80	1.95	20
RPBACTL-5	139	1.09	3.88	28	89	0.46	1.04	12	79	0.55	1.10	14
RPBACTFUNGL-1	104	1.84	4.89	47	78	1.03	2.06	26	20	1.79	0.91	46
RPBACTFUNGL-2	90	1.86	4.29	48	35	1.29	1.15	33	20	3.36	1.72	86
RPBACTFUNGL-3	81	2.49	5.15	64	19	2.28	1.11	58				
RPBACTFUNGL-4	145	0.73	2.72	19	135	0.00	0.00	0	127	0.51	1.65	13
RPBACTFUNGL-5	96	1.74	4.27	44	70	0.46	0.82	12	110	0.56	1.57	14
RPBFNOHOAGL-1	145	0.71	2.64	18	137	0.00	0.00	0	97	0.68	1.68	17
RPBFNOHOAGL-2	134	0.61	2.07	15	108	0.58	1.61	15	95	0.61	1.48	16
RPBFNOHOAGL-3	49	1.50	1.87	38	16	1.28	0.52					
RPBFNOHOAGL-4	146	0.77	2.86	20	87	0.51	1.13	13	6	5.73	0.88	147
RPBFNOMINL-1	142	0.96	3.50	25	109	0.76	2.12	20	77	1.23	2.43	31
RPBFNOMINL-3	96	1.75	4.29	45	38	1.74	1.69	44	12	3.96	1.22	101
RPBFNOMINL-4	75	1.55	2.98	40	47	1.52	1.83	39	69	1.47	2.59	38
RPBFNOMINL-5	133	1.22	4.14	31	91	0.88	2.05	23	48	1.39	1.70	36
	10/21/04	*10/21/04*	*10/21/04*	*10/21/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/18/04*	*11/18/04*	*11/18/04*	*11/18/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	88.80	1.43	2.90	37	57.00	1.27	0.98	33	51.20	2.28	1.43	58
RPBACTL	121.50	0.98	2.98	25	69.00	0.72	1.21	18	48.88	2.43	1.30	62
RPBACTFUNGL	103.20	1.73	4.26	44	67.40	1.01	1.03	26	69.25	1.55	1.46	40
RPBFNOHOAGL	118.50	0.89	2.36	23	87.00	0.59	0.82	9	66.00	2.34	1.35	60
RPBFNOMINL	111.50	1.37	3.73	35	71.13	1.23	1.92	31	51.50	2.01	1.98	51
	10/21/04	*10/21/04*	*10/21/04*	*10/21/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/18/04*	*11/18/04*	*11/18/04*	*11/18/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	14.35	0.25	0.40	6.35	20.43	0.44	0.26	11.20	19.52	1.05	0.13	26.89
RPBACTL	11.90	0.16	0.41	4.02	10.67	0.12	0.22	3.03	22.60	1.03	0.23	26.27
RPBACTFUNGL	11.11	0.28	0.42	7.22	20.10	0.39	0.33	9.93	25.62	0.60	0.17	15.37
RPBFNOHOAGL	23.33	0.20	0.23	5.20	25.79	0.26	0.35	4.06	25.99	1.47	0.21	37.59
RPBFNOMINL	15.72	0.17	0.30	4.47	17.01	0.24	0.10	6.11	14.52	0.65	0.32	16.67

Table M-3 (cont.): Potassium in drainage water, averages and standard error – large column experiment.

0.4 mg/L	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*
Sample Date	***12/2/04***	***12/2/04***	***12/2/04***	***12/2/04***	***12/17/04***	***12/17/04***	***12/17/04***	***12/17/04***	***12/29/04***	***12/29/04***	***12/29/04***	***12/29/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank												
ABIOTICL-1	135	0.60	2.06	15	145	0.59	2.17	15	95	0.57	1.39	15
ABIOTICL-2	65	0.82	1.36	21	145	0.44	1.64	11	26	1.55	1.03	40
ABIOTICL-3	92	0.81	1.90	21	145	0.40	1.49	10	45	1.09	1.25	28
ABIOTICL-4	97	0.39	0.98	10	145	0.62	2.28	16	57	0.70	1.02	18
ABIOTICL-5	87	0.56	1.25	14	145	0.63	2.32	16	61	0.00	0.00	0
RPBACTL-1	67	0.81	1.39	21	145	0.39	1.43	10	19	1.69	0.82	43
RPBACTL-2	71	0.90	1.64	23	145	0.46	1.70	12	46	1.35	1.58	34
RPBACTL-3	95	0.46	1.11	12	145	0.54	2.00	14	86	0.45	0.99	12
RPBACTL-5	120	0.00	0.00	0	145	0.47	1.73	12	72	5.10	9.39	130
RPBACTFUNGL-1	59	1.27	1.92	33	145	0.85	3.15	22	43	1.29	1.42	33
RPBACTFUNGL-2	68	1.70	2.95	43	145	0.41	1.53	11	56	1.15	1.64	29
RPBACTFUNGL-3	78	2.58	5.14	66	145	0.59	2.20	15	44	1.40	1.57	36
RPBACTFUNGL-4	130	0.71	2.37	18	145	0.51	1.87	13	100	0.56	1.43	14
RPBACTFUNGL-5	119	0.44	1.35	11	145	0.48	1.78	12	77	0.80	1.58	20
RPBFNOHOAGL-1	110	1.07	3.01	27	145	0.60	2.21	15	71	0.00	0.00	0
RPBFNOHOAGL-2	132	0.66	2.22	17	145	0.67	2.48	17	84	0.62	1.33	16
RPBFNOHOAGL-3	73	0.58	1.09	15	145	0.86	3.18	22				
RPBFNOHOAGL-4	77	1.50	2.95	38	145	0.45	1.68	12	55	1.37	1.93	35
RPBFNOMINL-1	91	0.80	1.87	21	88	0.54	1.21	14	81	0.80	1.66	21
RPBFNOMINL-3	92	1.32	3.11	34	145	0.51	1.87	13	55	0.89	1.25	23
RPBFNOMINL-4	88	1.32	2.97	34	145	0.71	2.63	18	54	1.47	2.03	38
RPBFNOMINL-5	109	0.61	1.69	16	145	0.64	2.39	16	77	0.98	1.94	25
	12/2/04	*12/2/04*	*12/2/04*	*12/2/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/29/04*	*12/29/04*	*12/29/04*	*12/29/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	95.20	0.64	1.51	16	145.00	0.53	1.98	14	56.80	0.78	0.94	20
RPBACTL	88.25	0.54	1.03	14	145.00	0.46	1.71	12	55.75	2.15	3.20	55
RPBACTFUNGL	90.80	1.34	2.75	34	145.00	0.57	2.11	15	64.00	1.04	1.53	27
RPBFNOHOAGL	98.00	0.95	2.32	24	145.00	0.64	2.39	16	70.00	0.66	1.09	17
RPBFNOMINL	95.00	1.01	2.41	26	130.75	0.60	2.03	15	66.75	1.04	1.72	26
	12/2/04	*12/2/04*	*12/2/04*	*12/2/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/29/04*	*12/29/04*	*12/29/04*	*12/29/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	11.35	0.08	0.20	2.05	0.00	0.05	0.17	1.20	11.32	0.26	0.24	6.64
RPBACTL	12.26	0.20	0.36	5.23	0.00	0.03	0.12	0.81	14.79	1.02	2.07	26.04
RPBACTFUNGL	14.19	0.38	0.65	9.66	0.00	0.08	0.28	1.95	10.89	0.16	0.04	4.01
RPBFNOHOAGL	14.04	0.21	0.45	5.40	0.00	0.08	0.31	2.15	7.26	0.34	0.49	8.79
RPBFNOMINL	4.74	0.18	0.37	4.66	14.25	0.05	0.31	1.21	7.12	0.15	0.18	3.82

Table M-3 (cont.): Potassium in drainage water, averages and standard error – large column experiment.

0.4 mg/L	K	K	K	K	K	K	K	K	K	K	K	K
Sample Date	***1/11/05***	***1/11/05***	***1/11/05***	***1/11/05***	***1/25/05***	***1/25/05***	***1/25/05***	***1/25/05***	***2/8/05***	***2/8/05***	***2/8/05***	***2/8/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank					82	0.00	0.00	0	105	0.00	0.00	0
ABIOTICL-1	90	1.02	2.34	26	182	1.01	4.71	26	131	0.00	0.00	0
ABIOTICL-2	43	2.10	2.31	54	117	1.70	5.09	43	117	0.00	0.00	0
ABIOTICL-3	77	1.05	2.07	27	130	1.51	5.01	39	82	0.00	0.00	0
ABIOTICL-4	72	1.05	1.93	27	116	1.62	4.80	41	93	0.00	0.00	0
ABIOTICL-5	77	1.62	3.19	41	136	1.30	4.51	33	98	0.00	0.00	0
RPBACTL-1					74	1.53	2.89	39	137	0.00	0.00	0
RPBACTL-2	38	0.88	0.85	22	99	1.23	3.12	32	99	0.00	0.00	0
RPBACTL-3	89	0.00	0.00	0	186	0.64	3.06	16	154	0.00	0.00	0
RPBACTL-5	86	1.40	3.07	36	155	0.63	2.52	16	141	0.00	0.00	0
RPBACTFUNGL-1	14	0.66	0.24	17	163	0.73	3.05	19	116	0.00	0.00	0
RPBACTFUNGL-2					96	2.07	5.08	53	62	0.00	0.00	0
RPBACTFUNGL-3	39	1.34	1.34	34	114	1.31	3.81	33	93	0.00	0.00	0
RPBACTFUNGL-4	119	0.00	0.00	0	184	0.49	2.31	13	161	0.00	0.00	0
RPBACTFUNGL-5	107	0.00	0.00	0	168	1.13	4.83	29	111	0.48	1.36	12
RPBFNOHOAGL-1	82	0.90	1.90	23	194	0.98	4.87	25	106	0.41	1.11	11
RPBFNOHOAGL-2	78	0.77	1.54	20	153	0.00	0.00	0	102	0.00	0.00	0
RPBFNOHOAGL-3	47	1.64	1.97	42	91	0.62	1.43	16	64	0.48	0.78	12
RPBFNOHOAGL-4	23	2.94	1.73	75	89	1.08	2.45	28	59	0.44	0.66	11
RPBFNOMINL-1	73	0.00	0.00	0	157	0.76	3.05	19	143	0.00	0.00	0
RPBFNOMINL-3	81	0.00	0.00	0	102	0.62	1.61	16	82	0.00	0.00	0
RPBFNOMINL-4	83	0.81	1.72	21	129	1.06	3.49	27	65	0.00	0.00	0
RPBFNOMINL-5	85	0.00	0.00	0	169	0.00	0.00	0	155	0.00	0.00	0
	1/11/05	*1/11/05*	*1/11/05*	*1/11/05*	*1/25/05*	*1/25/05*	*1/25/05*	*1/25/05*	*2/8/05*	*2/8/05*	*2/8/05*	*2/8/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	71.80	1.37	2.37	35	136.20	1.43	4.82	36	104.20	0.00	0.00	0
RPBACTL	71.00	0.76	1.31	19	128.50	1.01	2.90	26	132.75	0.00	0.00	0
RPBACTFUNGL	69.75	0.50	0.39	13	145.00	1.14	3.82	29	108.60	0.10	0.27	2
RPBFNOHOAGL	57.50	1.56	1.78	40	131.75	0.67	2.19	17	82.75	0.33	0.64	8
RPBFNOMINL	80.50	0.20	0.43	5	139.25	0.61	2.04	16	111.25	0.00	0.00	0
	1/11/05	*1/11/05*	*1/11/05*	*1/11/05*	*1/25/05*	*1/25/05*	*1/25/05*	*1/25/05*	*2/8/05*	*2/8/05*	*2/8/05*	*2/8/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	7.79	0.22	0.22	5.50	12.07	0.12	0.10	3.17	8.77	0.00	0.00	0.00
RPBACTL	14.31	0.35	0.79	9.02	25.58	0.22	0.14	5.67	11.82	0.00	0.00	0.00
RPBACTFUNGL	22.90	0.29	0.29	7.35	16.94	0.27	0.52	6.95	16.16	0.10	0.27	2.45
RPBFNOHOAGL	13.91	0.50	0.10	12.69	25.52	0.24	1.02	6.24	12.34	0.11	0.23	2.85
RPBFNOMINL	2.63	0.20	0.43	5.18	14.98	0.22	0.79	5.69	22.21	0.00	0.00	0.00

Table M-3 (cont.): Potassium in drainage water, averages and standard error – large column experiment.

0.4 mg/L	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*
Sample Date	***2/22/05***	***2/22/05***	***2/22/05***	***2/22/05***	***3/8/05***	***3/8/05***	***3/8/05***	***3/8/05***	***3/22/05***	***3/22/05***	***3/22/05***	***3/22/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	83	0.00	0.00	0	85	0.00	0.00	0	76	0.00	0.00	0
ABIOTICL-1	100	0.00	0.00	0	135	0.40	1.38	10	121	0.60	1.84	15
ABIOTICL-2	80	0.53	1.08	13	106	0.80	2.16	20	99	0.63	1.61	16
ABIOTICL-3	61	0.56	0.88	14	64	0.50	0.82	13	78	0.81	1.61	21
ABIOTICL-4	95	0.00	0.00	0	110	0.60	1.70	15	110	0.56	1.56	14
ABIOTICL-5	50	0.59	0.75	15	102	0.68	1.78	17	89	0.82	1.87	21
RPBACTL-1	43	1.30	1.43	33	72	1.11	2.04	28	62	1.08	1.72	28
RPBACTL-2	45	0.79	0.91	20	48	1.45	1.78	37	70	1.15	2.06	29
RPBACTL-3	113	0.54	1.57	14	143	0.00	0.00	0	96	0.61	1.49	16
RPBACTL-5	122	0.00	0.00	0	108	0.00	0.00	0	128	0.62	2.04	16
RPBACTFUNGL-1	102	0.00	0.00	0	110	0.58	1.63	15	109	0.61	1.70	16
RPBACTFUNGL-2	31	0.61	0.48	16	62	0.89	1.41	23	88	0.99	2.23	25
RPBACTFUNGL-3	78	0.00	0.00	0	89	0.00	0.00	0	76	0.70	1.36	18
RPBACTFUNGL-4	139	0.00	0.00	0	161	0.86	3.52	22	142	0.52	1.87	13
RPBACTFUNGL-5	110	0.00	0.00	0	119	0.87	2.66	22	115	1.01	2.96	26
RPBFNOHOAGL-1	66	0.56	0.95	14	91	0.95	2.22	24	100	0.81	2.06	21
RPBFNOHOAGL-2	76	0.51	0.99	13	76	0.84	1.63	21	98	0.49	1.23	13
RPBFNOHOAGL-3	31	0.73	0.58	19	53	0.66	0.90	17	74	0.00	0.00	0
RPBFNOHOAGL-4	31	1.12	0.89	29	43	0.66	0.73	17	60	0.62	0.95	16
RPBFNOMINL-1	112	0.00	0.00	0	125	0.72	2.30	18	108	0.48	1.32	12
RPBFNOMINL-3	78	0.00	0.00	0	97	0.49	1.21	13	110	0.87	2.46	22
RPBFNOMINL-4	35	1.22	1.09	31	35	0.58	0.52	15	59	0.65	0.98	17
RPBFNOMINL-5	137	0.00	0.00	0	144	0.00	0.00	0	139	0.67	2.40	17
	2/22/05	*2/22/05*	*2/22/05*	*2/22/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/22/05*	*3/22/05*	*3/22/05*	*3/22/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	77.20	0.33	0.54	9	103.40	0.60	1.57	15	99.40	0.68	1.70	17
RPBACTL	80.75	0.66	0.98	17	92.75	0.64	0.96	16	89.00	0.87	1.83	22
RPBACTFUNGL	92.00	0.12	0.10	3	108.20	0.64	1.84	16	106.00	0.76	2.02	20
RPBFNOHOAGL	51.00	0.73	0.85	19	65.75	0.78	1.37	20	83.00	0.48	1.06	12
RPBFNOMINL	90.50	0.30	0.27	8	100.25	0.45	1.01	11	104.00	0.67	1.79	17
	2/22/05	*2/22/05*	*2/22/05*	*2/22/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/22/05*	*3/22/05*	*3/22/05*	*3/22/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	9.61	0.14	0.23	3.50	11.41	0.07	0.22	1.77	7.57	0.05	0.06	1.41
RPBACTL	21.30	0.27	0.36	6.89	20.80	0.38	0.55	9.63	14.89	0.15	0.14	3.73
RPBACTFUNGL	18.10	0.12	0.10	3.12	16.45	0.17	0.60	4.34	11.42	0.10	0.27	2.56
RPBFNOHOAGL	11.73	0.14	0.09	3.56	10.89	0.07	0.34	1.81	9.68	0.17	0.43	4.41
RPBFNOMINL	22.10	0.30	0.27	7.77	23.80	0.16	0.50	4.00	16.59	0.08	0.38	2.08

Table M-3 (cont.): Potassium in drainage water, averages and standard error – large column experiment.

0.4 mg/L	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*	*K*
Sample Date	***4/5/05***	***4/5/05***	***4/5/05***	***4/5/05***	***4/19/05***	***4/19/05***	***4/19/05***	***4/19/05***	***5/4/05***	***5/4/05***	***5/4/05***	***5/4/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	70	0.00	0.00	0	74	0.00	0.00	0	70	0.00	0.00	0
ABIOTICL-1	109	0.00	0.00	0	142	0.00	0.00	0	133	0.00	0.00	0
ABIOTICL-2	106	0.00	0.00	0	124	0.00	0.00	0	132	0.00	0.00	0
ABIOTICL-3	92	0.00	0.00	0	68	0.00	0.00	0	107	0.00	0.00	0
ABIOTICL-4	118	0.00	0.00	0	114	0.00	0.00	0	137	0.00	0.00	0
ABIOTICL-5	88	0.00	0.00	0	103	0.00	0.00	0	125	0.00	0.00	0
RPBACTL-1	53	0.53	0.72	14	58	0.71	1.05	18	77	0.00	0.00	0
RPBACTL-2	70	0.00	0.00	0	66	0.69	1.16	18	98	0.00	0.00	0
RPBACTL-3	120	0.00	0.00	0	125	0.00	0.00	0	118	0.00	0.00	0
RPBACTL-5	125	0.00	0.00	0	132	0.00	0.00	0	141	0.00	0.00	0
RPBACTFUNGL-1	113	0.00	0.00	0	127	0.00	0.00	0	135	0.00	0.00	0
RPBACTFUNGL-2	72	0.00	0.00	0	85	0.50	1.08	13	87	0.00	0.00	0
RPBACTFUNGL-3	83	0.00	0.00	0	123	0.00	0.00	0	120	0.00	0.00	0
RPBACTFUNGL-4	144	0.00	0.00	0	160	0.00	0.00	0	151	0.00	0.00	0
RPBACTFUNGL-5	124	0.00	0.00	0	100	0.00	0.00	0	136	0.00	0.00	0
RPBFNOHOAGL-1	89	0.00	0.00	0	113	0.00	0.00	0	105	0.46	1.24	12
RPBFNOHOAGL-2	93	0.00	0.00	0	96	0.00	0.00	0	132	0.00	0.00	0
RPBFNOHOAGL-3	53	1.21	1.63	31	63	0.00	0.00	0	81	0.00	0.00	0
RPBFNOHOAGL-4	61	0.73	1.14	19	65	0.00	0.00	0	90	0.47	1.07	12
RPBFNOMINL-1	128	0.00	0.00	0	127	0.00	0.00	0	132	0.00	0.00	0
RPBFNOMINL-3	105	0.00	0.00	0	116	0.00	0.00	0	138	0.00	0.00	0
RPBFNOMINL-4	54	0.00	0.00	0	68	0.00	0.00	0	73	0.00	0.00	0
RPBFNOMINL-5	146	0.00	0.00	0	152	0.00	0.00	0	170	0.00	0.00	0
	4/5/05	*4/5/05*	*4/5/05*	*4/5/05*	*4/19/05*	*4/19/05*	*4/19/05*	*4/19/05*	*5/4/05*	*5/4/05*	*5/4/05*	*5/4/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	102.60	0.00	0.00	0	110.20	0.00	0.00	0	126.80	0.00	0.00	0
RPBACTL	92.00	0.13	0.18	3	95.25	0.35	0.55	9	108.50	0.00	0.00	0
RPBACTFUNGL	107.20	0.00	0.00	0	119.00	0.10	0.22	3	125.80	0.00	0.00	0
RPBFNOHOAGL	74.00	0.48	0.69	12	84.25	0.00	0.00	0	102.00	0.23	0.58	6
RPBFNOMINL	108.25	0.00	0.00	0	115.75	0.00	0.00	0	128.25	0.00	0.00	0
	4/5/05	*4/5/05*	*4/5/05*	*4/5/05*	*4/19/05*	*4/19/05*	*4/19/05*	*4/19/05*	*5/4/05*	*5/4/05*	*5/4/05*	*5/4/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	5.55	0.00	0.00	0.00	12.35	0.00	0.00	0.00	5.31	0.00	0.00	0.00
RPBACTL	17.98	0.13	0.18	3.42	19.32	0.20	0.32	5.14	13.69	0.00	0.00	0.00
RPBACTFUNGL	13.22	0.00	0.00	0.00	12.80	0.10	0.22	2.55	10.87	0.00	0.00	0.00
RPBFNOHOAGL	9.98	0.30	0.41	7.57	12.20	0.00	0.00	0.00	11.16	0.13	0.34	3.43
RPBFNOMINL	19.93	0.00	0.00	0.00	17.61	0.00	0.00	0.00	20.22	0.00	0.00	0.00

Table M-3 (cont.): Potassium in drainage water, averages and standard error – large column experiment.

0.4 mg/L	K	K	K	K	K	K	K	K	K	K	K	K
Sample Date	5/16/05	5/16/05	5/16/05	5/16/05	5/31/05	5/31/05	5/31/05	5/31/05	6/14/05	6/14/05	6/14/05	6/14/05
Sample ID	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Johnson Blank	82	0.00	0.00	0	78	0.00	0.00	0	69	0.00	0.00	0
ABIOTICL-1	125	0.00	0.00	0	128	0.00	0.00	0	58	0.00	0.00	0
ABIOTICL-2	145	0.00	0.00	0	132	0.00	0.00	0	72	0.00	0.00	0
ABIOTICL-3	120	0.00	0.00	0	165	0.00	0.00	0	93	0.00	0.00	0
ABIOTICL-4	170	0.00	0.00	0	147	0.00	0.00	0	91	0.62	1.44	16
ABIOTICL-5	130	0.00	0.00	0	153	0.00	0.00	0	45	0.00	0.00	0
RPBACTL-1	138	0.00	0.00	0	130	0.00	0.00	0	35	0.00	0.00	0
RPBACTL-2	161	0.00	0.00	0	166	0.00	0.00	0	90	0.00	0.00	0
RPBACTL-3	137	0.00	0.00	0	140	0.00	0.00	0	86	0.00	0.00	0
RPBACTL-5	93	0.00	0.00	0	113	0.00	0.00	0	39	0.00	0.00	0
RPBACTFUNGL-1	128	0.48	1.56	12	107	0.00	0.00	0	26	0.45	0.30	12
RPBACTFUNGL-2	176	0.46	2.09	12	154	0.00	0.01	0	109	0.00	0.00	0
RPBACTFUNGL-3	184	0.00	0.00	0	156	0.00	0.00	0	106	0.00	0.00	0
RPBACTFUNGL-4	149	0.52	1.96	13	130	0.00	0.00	0	63	0.44	0.71	11
RPBACTFUNGL-5	129	0.00	0.00	0	102	0.00	0.00	0	33	0.00	0.00	0
RPBFNOHOAGL-1	145				122	0.00	0.00	0	37	0.00	0.00	0
RPBFNOHOAGL-2	159	0.00	0.00	0	145	0.00	0.00	0	87	0.00	0.00	0
RPBFNOHOAGL-3	109	0.00	0.00	0	84	0.00	0.00	0	30	0.00	0.00	0
RPBFNOHOAGL-4	157	0.00	0.00	0	131	0.00	0.00	0	56	0.00	0.00	0
RPBFNOMINL-1	152	0.00	0.00	0	164	0.00	0.00	0	71	0.00	0.00	0
RPBFNOMINL-3	115	0.00	0.00	0	146	0.00	0.00	0	102	0.00	0.00	0
RPBFNOMINL-4	147	0.00	0.00	0	119	0.00	0.00	0	108	0.00	0.00	0
RPBFNOMINL-5	172	0.00	0.00	0	170	0.00	0.00	0	111	0.00	0.00	0
	5/16/05	5/16/05	5/16/05	5/16/05	5/31/05	5/31/05	5/31/05	5/31/05	6/14/05	6/14/05	6/14/05	6/14/05
Average	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
ABIOTICL	138.00	0.00	0.00	0	145.00	0.00	0.00	0	71.80	0.12	0.29	3
RPBACTL	132.25	0.00	0.00	0	137.25	0.00	0.00	0	62.50	0.00	0.00	0
RPBACTFUNGL	153.20	0.29	1.12	7	129.80	0.00	0.00	0	67.40	0.18	0.20	5
RPBFNOHOAGL	142.50	0.00	0.00	0	120.50	0.00	0.00	0	52.50	0.00	0.00	0
RPBFNOMINL	146.50	0.00	0.00	0	149.75	0.00	0.00	0	98.00	0.00	0.00	0
	5/16/05	5/16/05	5/16/05	5/16/05	5/31/05	5/31/05	5/31/05	5/31/05	6/14/05	6/14/05	6/14/05	6/14/05
STE	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
ABIOTICL	9.03	0.00	0.00	0.00	6.80	0.00	0.00	0.00	9.29	0.12	0.29	3.16
RPBACTL	14.21	0.00	0.00	0.00	11.09	0.00	0.00	0.00	14.77	0.00	0.00	0.00
RPBACTFUNGL	11.63	0.12	0.47	3.05	11.32	0.00	0.00	0.02	17.52	0.11	0.14	2.79
RPBFNOHOAGL	11.59	0.00	0.00	0.00	13.05	0.00	0.00	0.00	12.74	0.00	0.00	0.00
RPBFNOMINL	11.81	0.00	0.00	0.00	11.45	0.00	0.00	0.00	9.19	0.00	0.00	0.00

Table M-3 (cont.): Potassium in drainage water, averages and standard error – large column experiment.

0.4 mg/L	K	K	K	K	K	K	K	K	K	K	K	K
Sample Date	6/28/05	6/28/05	6/28/05	6/28/05	7/12/05	7/12/05	7/12/05	7/12/05	7/28/05	7/28/05	7/28/05	7/28/05
Sample ID	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Johnson Blank	115	0.00	0.00	0	125	0.00	0.00	0	129	0.00	0.00	0
ABIOTICL-1	105	0.00	0.00	0	133	0.00	0.00	0	96	0.00	0.00	0
ABIOTICL-2	135	0.00	0.00	0	123	0.00	0.00	0	98	0.00	0.00	0
ABIOTICL-3	139	0.00	0.00	0	143	0.00	0.00	0	144	0.00	0.00	0
ABIOTICL-4	140	0.00	0.00	0	130	0.00	0.00	0	143	0.00	0.00	0
ABIOTICL-5	90	0.00	0.00	0	94	0.00	0.00	0	75	0.00	0.00	0
RPBACTL-1	80	0.00	0.00	0	110	0.00	0.00	0	87	0.00	0.00	0
RPBACTL-2	142	0.00	0.02	0	147	0.00	0.00	0	138	0.00	0.00	0
RPBACTL-3	129	0.00	0.00	0	118	0.00	0.00	0	123	0.00	0.00	0
RPBACTL-5	85	0.00	0.00	0	94	0.00	0.00	0	77	0.00	0.00	0
RPBACTFUNGL-1	57	0.00	0.00	0	91	0.00	0.00	0	66	0.00	0.00	0
RPBACTFUNGL-2	139	0.00	0.00	0	124	0.00	0.00	0	126	0.00	0.00	0
RPBACTFUNGL-3	119	0.00	0.00	0	124	0.00	0.00	0	127	0.00	0.00	0
RPBACTFUNGL-4	103	0.00	0.00	0	110	0.52	1.45	13	98	0.00	0.00	0
RPBACTFUNGL-5	79	0.00	0.00	0	80	0.00	0.00	0	78	0.00	0.00	0
RPBFNOHOAGL-1	95	0.48	1.17	12	106	0.00	0.00	0	90	0.00	0.00	0
RPBFNOHOAGL-2	118	0.00	0.00	0	135	0.00	0.00	0	135	0.00	0.00	0
RPBFNOHOAGL-3	65	0.00	0.00	0	84	0.00	0.00	0	126	0.00	0.00	0
RPBFNOHOAGL-4	112	0.00	0.00	0	112	0.00	0.00	0	113	0.00	0.00	0
RPBFNOMINL-1	115	0.00	0.00	0	146	0.00	0.00	0	98	0.00	0.00	0
RPBFNOMINL-3	126	0.00	0.00	0	144	0.50	1.85	13	124	0.00	0.00	0
RPBFNOMINL-4	92	0.00	0.00	0	119	0.00	0.00	0	99	0.00	0.00	0
RPBFNOMINL-5	146	0.00	0.00	0	147	0.00	0.00	0	142	0.00	0.00	0
	6/28/05	*6/28/05*	*6/28/05*	*6/28/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/28/05*	*7/28/05*	*7/28/05*	*7/28/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	121.80	0.00	0.00	0	124.60	0.00	0.00	0	111.20	0.00	0.00	0
RPBACTL	109.00	0.00	0.00	0	117.25	0.00	0.00	0	106.25	0.00	0.00	0
RPBACTFUNGL	99.40	0.00	0.00	0	105.80	0.10	0.29	3	99.00	0.00	0.00	0
RPBFNOHOAGL	97.50	0.12	0.29	3	109.25	0.00	0.00	0	116.00	0.00	0.00	0
RPBFNOMINL	119.75	0.00	0.00	0	139.00	0.13	0.46	3	115.75	0.00	0.00	0
	6/28/05	*6/28/05*	*6/28/05*	*6/28/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/28/05*	*7/28/05*	*7/28/05*	*7/28/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	10.23	0.00	0.00	0.00	8.30	0.00	0.00	0.00	13.79	0.00	0.00	0.00
RPBACTL	15.56	0.00	0.00	0.03	11.10	0.00	0.00	0.00	14.48	0.00	0.00	0.00
RPBACTFUNGL	14.46	0.00	0.00	0.00	8.85	0.10	0.29	2.64	12.34	0.00	0.00	0.00
RPBFNOHOAGL	11.88	0.12	0.29	3.07	10.48	0.00	0.00	0.00	9.77	0.00	0.00	0.00
RPBFNOMINL	11.26	0.00	0.00	0.00	6.70	0.13	0.46	3.21	10.62	0.00	0.00	0.00

Table M-3 (cont.): Potassium in drainage water, averages and standard error – large column experiment.

0.4 mg/L	K	K	K	K	K	K	K	K	K	K	K	K
Sample Date	8/9/05	8/9/05	8/9/05	8/9/05	8/23/05	8/23/05	8/23/05	8/23/05	9/6/05	9/6/05	9/6/05	9/6/05
Sample ID	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Johnson Blank	121	0.00	0.00	0	132	0.00	0.00	0	120	0.00	0.00	0
ABIOTICL-1	82	0.00	0.00	0	37	0.00	0.00	0	71	0.00	0.00	0
ABIOTICL-2	90	0.00	0.00	0	92	0.00	0.00	0	123	0.00	0.00	0
ABIOTICL-3	135	0.00	0.00	0	115	0.00	0.00	0	143	0.00	0.00	0
ABIOTICL-4	102	0.00	0.00	0	108	0.00	0.00	0	143	0.00	0.00	0
ABIOTICL-5	63	0.00	0.00	0	50	0.00	0.00	0	78	0.00	0.00	0
RPBACTL-1	64	0.00	0.00	0	47	0.00	0.00	0	134	0.00	0.00	0
RPBACTL-2	114	0.00	0.00	0	107	0.00	0.00	0	144	0.00	0.00	0
RPBACTL-3	102	0.00	0.00	0	74	0.00	0.00	0	130	0.00	0.00	0
RPBACTL-5	67	0.00	0.00	0	40	0.00	0.00	0	72	0.00	0.00	0
RPBACTFUNGL-1	40	0.00	0.00	0	22	0.00	0.00	0	47	0.00	0.00	0
RPBACTFUNGL-2	117	0.00	0.00	0	98	0.00	0.00	0	143	0.00	0.00	0
RPBACTFUNGL-3	82	0.00	0.00	0	79	0.00	0.00	0	146	0.00	0.00	0
RPBACTFUNGL-4	89	0.00	0.00	0	55	0.00	0.00	0	91	0.00	0.00	0
RPBACTFUNGL-5	54	0.00	0.00	0	38	0.00	0.00	0	76	0.00	0.00	0
RPBFNOHOAGL-1	82	0.00	0.00	0	61	0.52	0.81	13	76	0.50	0.98	13
RPBFNOHOAGL-2	112	0.00	0.00	0	88	0.00	0.00	0	93	0.00	0.00	0
RPBFNOHOAGL-3	42	0.00	0.00	0	21	0.00	0.00	0	65	0.00	0.00	0
RPBFNOHOAGL-4	87	0.00	0.00	0	65	0.00	0.00	0	100	0.00	0.00	0
RPBFNOMINL-1	116	0.00	0.00	0	76	0.00	0.00	0	71	0.00	0.00	0
RPBFNOMINL-3	111	0.00	0.00	0	100	0.00	0.00	0	140	0.00	0.00	0
RPBFNOMINL-4	92	0.00	0.00	0	65	0.00	0.00	0	142	0.00	0.00	0
RPBFNOMINL-5	128	0.00	0.00	0	128	0.00	0.00	0	146	0.00	0.00	0
	8/9/05	8/9/05	8/9/05	8/9/05	8/23/05	8/23/05	8/23/05	8/23/05	9/6/05	9/6/05	9/6/05	9/6/05
Average	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
ABIOTICL	94.40	0.00	0.00	0	80.40	0.00	0.00	0	111.60	0.00	0.00	0
RPBACTL	86.75	0.00	0.00	0	67.00	0.00	0.00	0	120.00	0.00	0.00	0
RPBACTFUNGL	76.40	0.00	0.00	0	58.40	0.00	0.00	0	100.60	0.00	0.00	0
RPBFNOHOAGL	80.75	0.00	0.00	0	58.75	0.13	0.20	3	83.50	0.13	0.24	3
RPBFNOMINL	111.75	0.00	0.00	0	92.25	0.00	0.00	0	124.75	0.00	0.00	0
	8/9/05	8/9/05	8/9/05	8/9/05	8/23/05	8/23/05	8/23/05	8/23/05	9/6/05	9/6/05	9/6/05	9/6/05
STE	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
ABIOTICL	11.97	0.00	0.00	0.00	15.65	0.00	0.00	0.00	15.62	0.00	0.00	0.00
RPBACTL	12.53	0.00	0.00	0.00	15.22	0.00	0.00	0.00	16.27	0.00	0.00	0.00
RPBACTFUNGL	13.54	0.00	0.00	0.00	13.68	0.00	0.00	0.00	19.27	0.00	0.00	0.00
RPBFNOHOAGL	14.49	0.00	0.00	0.00	13.92	0.13	0.20	3.33	7.96	0.13	0.24	3.21
RPBFNOMINL	7.49	0.00	0.00	0.00	13.98	0.00	0.00	0.00	17.96	0.00	0.00	0.00

Table M-4: Magnesium in drainage water, averages and standard error – large column experiment.

0.04 mg/L	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg
Sample Date	9/9/04	9/9/04	9/9/04	9/9/04	9/23/04	9/23/04	9/23/04	9/23/04	10/7/04	10/7/04	10/7/04	10/7/04
Sample ID	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Johnson Blank	88	0.01	0.02	0	85	0.00	0.00	0	50	0.02	0.03	1
ABIOTICL-1	141	0.76	4.43	31	100	1.36	5.61	56	125	0.64	3.28	26
ABIOTICL-2	49	2.11	4.26	87	57	1.36	3.20	56				
ABIOTICL-3	73	1.20	3.61	50	68	1.13	3.15	46	45	1.83	3.39	75
ABIOTICL-4	90	1.02	3.78	42	55	1.26	2.86	52	90	0.90	3.34	37
ABIOTICL-5	59	1.39	3.38	57	36	1.78	2.64	73	28	2.80	3.22	115
RPBACTL-1	90	1.07	3.96	44	91	0.95	3.56	39	110	0.77	3.46	31
RPBACTL-2	72	1.02	3.02	42	12		0.00	0	53	1.42	3.10	59
RPBACTL-3	103	0.80	3.39	33	61	0.72	1.80	29	93	0.79	3.00	32
RPBACTL-5	115	1.01	4.80	42	101	0.44	1.82	18	123	0.45	2.26	18
RPBACTFUNGL-1	73	1.22	3.66	50	76	1.12	3.49	46	77	0.87	2.76	36
RPBACTFUNGL-2	67	1.10	3.02	45					92	0.97	3.68	40
RPBACTFUNGL-3	63	0.94	2.44	39	41	1.43	2.41	59	59	1.23	2.99	51
RPBACTFUNGL-4	146	0.51	3.09	21	134	0.46	2.52	19	143	0.45	2.66	19
RPBACTFUNGL-5	109	1.31	5.89	54	78	0.85	2.74	35	94	0.64	2.46	26
RPBFNOHOAGL-1	136	0.74	4.15	30	123	0.65	3.28	27	133	0.59	3.25	24
RPBFNOHOAGL-2	132	0.74	4.01	30	111	0.51	2.35	21	120	0.54	2.66	22
RPBFNOHOAGL-3					62	0.64	1.64	26	103	0.56	2.39	23
RPBFNOHOAGL-4	125	0.74	3.81	30	115	0.62	2.94	26	125	0.55	2.82	23
RPBFNOMINL-1	119	0.21	1.02	9	108	0.16	0.73	7	101	0.15	0.64	6
RPBFNOMINL-3	109	0.13	0.58	5	78	0.12	0.39	5	83	0.09	0.32	4
RPBFNOMINL-4	93	0.22	0.83	9	121	0.05	0.25	2	71	0.08	0.24	3
RPBFNOMINL-5	127	0.16	0.85	7	109	0.09	0.40	4	113	0.08	0.37	3
	9/9/04	*9/9/04*	*9/9/04*	*9/9/04*	*9/23/04*	*9/23/04*	*9/23/04*	*9/23/04*	*10/7/04*	*10/7/04*	*10/7/04*	*10/7/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	82.40	1.30	3.89	53	63.20	1.38	3.49	57	72.00	1.54	3.31	63
RPBACTL	95.00	0.98	3.79	40	66.25	0.70	1.80	22	94.75	0.86	2.96	35
RPBACTFUNGL	91.60	1.02	3.62	42	82.25	0.96	2.79	40	93.00	0.83	2.91	34
RPBFNOHOAGL	131.00	0.74	3.99	30	102.75	0.61	2.55	25	120.25	0.56	2.78	23
RPBFNOMINL	112.00	0.18	0.82	7	104.00	0.11	0.44	4	92.00	0.10	0.39	4
	9/9/04	*9/9/04*	*9/9/04*	*9/9/04*	*9/23/04*	*9/23/04*	*9/23/04*	*9/23/04*	*10/7/04*	*10/7/04*	*10/7/04*	*10/7/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	16.19	0.23	0.20	9.39	10.54	0.11	0.54	4.51	19.66	0.44	0.03	18.07
RPBACTL	9.21	0.06	0.39	2.47	19.98	0.13	0.73	8.41	15.21	0.20	0.25	8.42
RPBACTFUNGL	15.86	0.14	0.60	5.76	17.20	0.18	0.22	7.58	13.99	0.13	0.21	5.55
RPBFNOHOAGL	2.78	0.00	0.09	0.04	13.81	0.03	0.36	1.29	6.34	0.01	0.18	0.50
RPBFNOMINL	7.33	0.02	0.09	0.83	9.16	0.02	0.10	1.00	9.33	0.02	0.09	0.72

Table M-4 (cont.): Magnesium in drainage water, averages and standard error – large column experiment.

0.04 mg/L	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg
Sample Date	**10/21/04**	**10/21/04**	**10/21/04**	**10/21/04**	**11/4/04**	**11/4/04**	**11/4/04**	**11/4/04**	**11/18/04**	**11/18/04**	**11/18/04**	**11/18/04**
Sample ID	**Volume (ml)**	**mg/L**	**umol**	**umol/L**	**Volume (ml)**	**mg/L**	**umol**	**umol/L**	**Volume (ml)**	**mg/L**	**umol**	**umol/L**
Johnson Blank	52	0.00	0.00	0								
ABIOTICL-1	140	0.47	2.70	19	127	0.43	2.26	18	115	0.43	2.05	18
ABIOTICL-2	97	0.70	2.78	29	14	2.29	1.32	94	7	5.30	1.53	218
ABIOTICL-3	82	0.86	2.91	35	46	1.10	2.08	45	23	2.22	2.10	91
ABIOTICL-4	63	1.18	3.06	49	75	0.66	2.04	27	36	1.24	1.83	51
ABIOTICL-5	62	1.18	3.02	49	23	1.63	1.54	67	75	0.76	2.35	31
RPBACTL-1	101	0.75	3.13	31	80	0.65	2.14	27	13	2.43	1.30	100
RPBACTL-2	101	0.63	2.62	26	40	0.85	1.40	35	8	4.37	1.35	180
RPBACTL-3	145	0.41	2.44	17	67	0.60	1.66	25	96	0.59	2.31	24
RPBACTL-5	139	0.37	2.09	15	89	0.42	1.52	17	79	0.46	1.51	19
RPBACTFUNGL-1	104	0.67	2.85	27	78	0.68	2.19	28	20	1.60	1.32	66
RPBACTFUNGL-2	90	0.65	2.39	27	35	0.85	1.22	35	20	1.97	1.62	81
RPBACTFUNGL-3	81	0.66	2.21	27	19	1.18	0.93	49				
RPBACTFUNGL-4	145	0.31	1.85	13	135	0.30	1.66	12	127	0.32	1.67	13
RPBACTFUNGL-5	96	0.56	2.21	23	70	0.61	1.77	25	110	0.44	1.98	18
RPBFNOHOAGL-1	145	0.41	2.42	17	137	0.40	2.24	16	97	0.45	1.80	19
RPBFNOHOAGL-2	134	0.42	2.30	17	108	0.45	1.98	18	95	0.44	1.70	18
RPBFNOHOAGL-3	49	0.39	0.80	16	16	0.64						
RPBFNOHOAGL-4	146	0.37	2.20	15	87	0.48	1.72	20	6	4.46	1.10	183
RPBFNOMINL-1	142	0.07	0.43	3	109	0.08	0.35	3	77	0.12	0.38	5
RPBFNOMINL-3	96	0.05	0.21	2	38	0.11	0.17	4	12	0.29	0.14	12
RPBFNOMINL-4	75	0.04	0.12	2	47	0.05	0.09	2	69	0.12	0.34	5
RPBFNOMINL-5	133	0.06	0.33	2	91	0.07	0.25	3	48	0.17	0.33	7
	10/21/04	*10/21/04*	*10/21/04*	*10/21/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/18/04*	*11/18/04*	*11/18/04*	*11/18/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	88.80	0.88	2.89	36	57.00	1.22	1.85	50	51.20	1.99	1.97	82
RPBACTL	121.50	0.54	2.57	22	69.00	0.63	1.68	26	48.88	1.96	1.62	81
RPBACTFUNGL	103.20	0.57	2.30	23	67.40	0.72	1.55	30	69.25	1.08	1.65	44
RPBFNOHOAGL	118.50	0.40	1.93	16	87.00	0.49	1.98	18	66.00	1.78	1.53	73
RPBFNOMINL	111.50	0.06	0.27	2	71.13	0.07	0.21	3	51.50	0.18	0.30	7
	10/21/04	*10/21/04*	*10/21/04*	*10/21/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/18/04*	*11/18/04*	*11/18/04*	*11/18/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	14.35	0.14	0.07	5.71	20.43	0.34	0.18	13.85	19.52	0.88	0.14	36.22
RPBACTL	11.90	0.09	0.22	3.79	10.67	0.09	0.16	3.68	22.60	0.92	0.24	37.85
RPBACTFUNGL	11.11	0.07	0.16	2.78	20.10	0.15	0.22	5.98	25.62	0.37	0.12	15.19
RPBFNOHOAGL	23.33	0.01	0.38	0.45	25.79	0.05	0.13	0.86	25.99	1.16	0.19	47.67
RPBFNOMINL	15.72	0.01	0.07	0.31	17.01	0.01	0.06	0.51	14.52	0.04	0.05	1.68

Table M-4 (cont.): Magnesium in drainage water, averages and standard error – large column experiment.

0.04 mg/L	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*
Sample Date	**12/2/04**	**12/2/04**	**12/2/04**	**12/2/04**	**12/17/04**	**12/17/04**	**12/17/04**	**12/17/04**	**12/29/04**	**12/29/04**	**12/29/04**	**12/29/04**
Sample ID	**Volume (ml)**	**mg/L**	**umol**	**umol/L**	**Volume (ml)**	**mg/L**	**umol**	**umol/L**	**Volume (ml)**	**mg/L**	**umol**	**umol/L**
Johnson Blank												
ABIOTICL-1	135	0.33	1.84	14	145	0.22	1.33	9	95	0.19	0.73	8
ABIOTICL-2	65	0.60	1.62	25	145	0.33	1.98	14	26	0.59	0.63	24
ABIOTICL-3	92	0.49	1.87	20	145	0.27	1.63	11	45	0.36	0.67	15
ABIOTICL-4	97	0.39	1.54	16	145	0.18	1.05	7	57	0.24	0.56	10
ABIOTICL-5	87	0.42	1.51	17	145	0.24	1.44	10	61	0.22	0.55	9
RPBACTL-1	67	0.51	1.42	21	145	0.39	2.33	16	19	1.89	1.48	78
RPBACTL-2	71	0.53	1.55	22	145	0.29	1.71	12	46	0.87	1.64	36
RPBACTL-3	95	0.34	1.31	14	145	0.18	1.10	8	86	0.50	1.77	21
RPBACTL-5	120	0.26	1.30	11	145	0.15	0.91	6	72	0.88	2.62	36
RPBACTFUNGL-1	59	0.59	1.42	24	145	0.30	1.78	12	43	1.03	1.82	42
RPBACTFUNGL-2	68	0.46	1.30	19	145	0.23	1.35	9	56	0.85	1.96	35
RPBACTFUNGL-3	78	0.60	1.92	25	145	0.30	1.80	12	44	0.92	1.66	38
RPBACTFUNGL-4	130	0.19	1.00	8	145	0.14	0.86	6	100	0.42	1.71	17
RPBACTFUNGL-5	119	0.27	1.32	11	145	0.18	1.08	7	77	0.52	1.64	21
RPBFNOHOAGL-1	110	0.31	1.39	13	145	0.17	1.03	7	71	0.22	0.65	9
RPBFNOHOAGL-2	132	0.29	1.55	12	145	0.18	1.09	8	84	0.18	0.63	8
RPBFNOHOAGL-3	73	0.19	0.58	8	145	0.14	0.81	6				
RPBFNOHOAGL-4	77	0.43	1.37	18	145	0.29	1.72	12	55	0.51	1.15	21
RPBFNOMINL-1	91	0.09	0.34	4	88	0.05	0.19	2	81	0.28	0.92	11
RPBFNOMINL-3	92	0.06	0.21	2	145	0.04	0.26	2	55	0.51	1.15	21
RPBFNOMINL-4	88	0.07	0.26	3	145	0.04	0.26	2	54	0.55	1.22	23
RPBFNOMINL-5	109	0.08	0.38	3	145	0.05	0.30	2	77	0.29	0.93	12
	12/2/04	*12/2/04*	*12/2/04*	*12/2/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/29/04*	*12/29/04*	*12/29/04*	*12/29/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	95.20	0.45	1.68	18	145.00	0.25	1.49	10	56.80	0.32	0.63	13
RPBACTL	88.25	0.41	1.39	17	145.00	0.25	1.51	10	55.75	1.04	1.88	43
RPBACTFUNGL	90.80	0.42	1.39	17	145.00	0.23	1.37	9	64.00	0.75	1.76	31
RPBFNOHOAGL	98.00	0.30	1.22	13	145.00	0.20	1.16	8	70.00	0.30	0.81	13
RPBFNOMINL	95.00	0.08	0.30	3	130.75	0.05	0.25	2	66.75	0.41	1.06	17
	12/2/04	*12/2/04*	*12/2/04*	*12/2/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/29/04*	*12/29/04*	*12/29/04*	*12/29/04*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	11.35	0.05	0.08	1.95	0.00	0.03	0.16	1.07	11.32	0.07	0.03	3.05
RPBACTL	12.26	0.07	0.06	2.72	0.00	0.05	0.32	2.21	14.79	0.30	0.25	12.31
RPBACTFUNGL	14.19	0.08	0.15	3.43	0.00	0.03	0.19	1.29	10.89	0.12	0.06	4.88
RPBFNOHOAGL	14.04	0.05	0.22	2.02	0.00	0.03	0.19	1.34	7.26	0.09	0.15	3.64
RPBFNOMINL	4.74	0.01	0.04	0.31	14.25	0.00	0.02	0.09	7.12	0.07	0.08	2.93

Table M-4 (cont.): Magnesium in drainage water, averages and standard error – large column experiment.

0.04 mg/L	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg
Sample Date	1/11/05	1/11/05	1/11/05	1/11/05	1/25/05	1/25/05	1/25/05	1/25/05	2/8/05	2/8/05	2/8/05	2/8/05
Sample ID	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Johnson Blank	69	0.01	0.03	0	82	0.00	0.02	0	105	0.00	0.00	0
ABIOTICL-1	90	1.01	3.75	42	182	1.13	8.49	47	131	0.00	0.01	0
ABIOTICL-2	43	1.20	2.13	49	117	2.03	9.77	83	117	0.02	0.10	1
ABIOTICL-3	77	0.77	2.45	32	130	1.61	8.60	66	82	0.03	0.11	1
ABIOTICL-4	72	1.13	3.35	47	116	1.63	7.78	67	93	0.01	0.05	1
ABIOTICL-5	77	1.06	3.37	44	136	1.25	7.00	51	98	0.01	0.03	0
RPBACTL-1					74	2.14	6.53	88	137	0.61	3.46	25
RPBACTL-2	38	0.32	0.50	13	99	1.48	6.03	61	99	0.64	2.60	26
RPBACTL-3	89	0.17	0.62	7	186	0.70	5.37	29	154	0.52	3.32	22
RPBACTL-5	86	0.19	0.66	8	155	0.78	4.96	32	141	0.34	1.95	14
RPBACTFUNGL-1	14	0.33	0.19	14	163	1.01	6.76	41	116	0.02	0.08	1
RPBACTFUNGL-2	25	2.24	2.31	92	96	1.67	6.60	69	62	0.03	0.07	1
RPBACTFUNGL-3	39	0.27	0.43	11	114	1.42	6.65	58	93	0.02	0.09	1
RPBACTFUNGL-4	119	0.04	0.18	2	184	0.73	5.54	30	161	0.00	0.03	0
RPBACTFUNGL-5	107	0.13	0.55	5	168	0.84	5.81	35	111	0.13	0.60	5
RPBFNOHOAGL-1	82	0.29	0.98	12	194	0.33	2.63	14	106	0.18	0.78	7
RPBFNOHOAGL-2	78	0.33	1.04	13	153	0.20	1.27	8	102	0.20	0.83	8
RPBFNOHOAGL-3	47	0.26	0.50	11	91	0.16	0.60	7	64	0.14	0.36	6
RPBFNOHOAGL-4	23	0.84	0.80	35	89	0.41	1.48	17	59	0.37	0.91	15
RPBFNOMINL-1	73	0.00	0.00	0	157	0.57	3.69	23	143	0.00	0.03	0
RPBFNOMINL-3	81	0.00	0.01	0	102	0.80	3.37	33	82	0.00	0.01	0
RPBFNOMINL-4	83	0.01	0.02	0	129	0.87	4.64	36	65	0.01	0.03	0
RPBFNOMINL-5	85	0.00	0.00	0	169	0.36	2.49	15	155	0.01	0.07	0
	1/11/05	1/11/05	1/11/05	1/11/05	1/25/05	1/25/05	1/25/05	1/25/05	2/8/05	2/8/05	2/8/05	2/8/05
Average	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
ABIOTICL	71.80	1.04	3.01	43	136.20	1.53	8.33	63	104.20	0.01	0.06	1
RPBACTL	71.00	0.22	0.59	9	128.50	1.28	5.72	53	132.75	0.53	2.83	22
RPBACTFUNGL	60.80	0.60	0.73	25	145.00	1.13	6.27	47	108.60	0.04	0.17	2
RPBFNOHOAGL	57.50	0.43	0.83	18	131.75	0.27	1.50	11	82.75	0.22	0.72	9
RPBFNOMINL	80.50	0.00	0.01	0	139.25	0.65	3.55	27	111.25	0.01	0.03	0
	1/11/05	1/11/05	1/11/05	1/11/05	1/25/05	1/25/05	1/25/05	1/25/05	2/8/05	2/8/05	2/8/05	2/8/05
STE	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
ABIOTICL	7.79	0.07	0.31	3.01	12.07	0.16	0.46	6.50	8.77	0.01	0.02	0.21
RPBACTL	14.31	0.04	0.04	1.67	25.58	0.34	0.35	13.92	11.82	0.07	0.35	2.82
RPBACTFUNGL	21.76	0.41	0.40	17.01	16.94	0.18	0.25	7.32	16.16	0.02	0.11	0.95
RPBFNOHOAGL	13.91	0.14	0.12	5.71	25.52	0.06	0.42	2.34	12.34	0.05	0.12	2.15
RPBFNOMINL	2.63	0.00	0.01	0.06	14.98	0.12	0.44	4.82	22.21	0.00	0.01	0.07

Table M-4 (cont.): Magnesium in drainage water, averages and standard error – large column experiment.

0.04 mg/L	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*
Sample Date	*2/22/05*	*2/22/05*	*2/22/05*	*2/22/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/22/05*	*3/22/05*	*3/22/05*	*3/22/05*
Sample ID	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
Johnson Blank	83	0.01	0.04	0	85	0.00	0.01	0	76	0.00	0.00	0
ABIOTICL-1	100	0.17	0.71	7	135	0.09	0.49	4	121	0.39	1.96	16
ABIOTICL-2	80	0.12	0.40	5	106	0.13	0.57	5	99	0.39	1.58	16
ABIOTICL-3	61	0.25	0.62	10	64	0.21	0.55	9	78	0.43	1.39	18
ABIOTICL-4	95	0.12	0.46	5	110	0.09	0.42	4	110	0.41	1.84	17
ABIOTICL-5	50	0.25	0.52	10	102	0.15	0.62	6	89	0.40	1.46	16
RPBACTL-1	43	0.62	1.10	25	72	0.49	1.44	20	62	0.66	1.68	27
RPBACTL-2	45	0.91	1.68	37	48	0.72	1.42	30	70	0.64	1.84	26
RPBACTL-3	113	0.35	1.63	14	143	0.20	1.17	8	96	0.45	1.78	19
RPBACTL-5	122	0.37	1.88	15	108	0.19	0.87	8	128	0.45	2.36	18
RPBACTFUNGL-1	102	0.35	1.45	14	110	0.28	1.25	11	109	0.59	2.64	24
RPBACTFUNGL-2	31	0.55	0.70	22	62	0.61	1.57	25	88	0.91	3.28	37
RPBACTFUNGL-3	78	0.27	0.86	11	89	0.30	1.11	12	76	0.87	2.71	36
RPBACTFUNGL-4	139	0.21	1.19	9	161	0.28	1.84	11	142	0.52	3.06	22
RPBACTFUNGL-5	110	0.37	1.68	15	119	0.48	2.37	20	115	0.86	4.09	36
RPBFNOHOAGL-1	66	0.30	0.82	12	91	0.29	1.08	12	100	0.21	0.86	9
RPBFNOHOAGL-2	76	0.51	1.61	21	76	0.64	2.01	26	98	0.13	0.51	5
RPBFNOHOAGL-3	31	0.65	0.83	27	53	0.28	0.60	11	74	0.10	0.30	4
RPBFNOHOAGL-4	31	0.62	0.79	25	43	0.48	0.85	20	60	0.12	0.29	5
RPBFNOMINL-1	112	0.14	0.62	6	125	0.08	0.43	3	108	0.35	1.55	14
RPBFNOMINL-3	78	0.16	0.51	6	97	0.11	0.45	5	110	0.33	1.48	13
RPBFNOMINL-4	35	0.37	0.53	15	35	0.24	0.35	10	59	0.52	1.26	21
RPBFNOMINL-5	137	0.09	0.52	4	144	0.04	0.25	2	139	0.23	1.31	9
	2/22/05	*2/22/05*	*2/22/05*	*2/22/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/22/05*	*3/22/05*	*3/22/05*	*3/22/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	77.20	0.18	0.54	7	103.40	0.13	0.53	6	99.40	0.40	1.65	17
RPBACTL	80.75	0.56	1.57	23	92.75	0.40	1.22	16	89.00	0.55	1.91	23
RPBACTFUNGL	92.00	0.35	1.18	14	108.20	0.39	1.63	16	106.00	0.75	3.16	31
RPBFNOHOAGL	51.00	0.52	1.01	21	65.75	0.42	1.14	17	83.00	0.14	0.49	6
RPBFNOMINL	90.50	0.19	0.54	8	100.25	0.12	0.37	5	104.00	0.36	1.40	15
	2/22/05	*2/22/05*	*2/22/05*	*2/22/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/22/05*	*3/22/05*	*3/22/05*	*3/22/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	9.61	0.03	0.05	1.20	11.41	0.02	0.03	0.90	7.57	0.01	0.11	0.31
RPBACTL	21.30	0.13	0.17	5.33	20.80	0.13	0.13	5.19	14.89	0.06	0.15	2.36
RPBACTFUNGL	18.10	0.06	0.18	2.35	16.45	0.07	0.22	2.80	11.42	0.08	0.26	3.30
RPBFNOHOAGL	11.73	0.08	0.20	3.23	10.89	0.09	0.31	3.58	9.68	0.02	0.13	1.01
RPBFNOMINL	22.10	0.06	0.03	2.52	23.80	0.04	0.05	1.76	16.59	0.06	0.07	2.48

Table M-4 (cont.): Magnesium in drainage water, averages and standard error – large column experiment.

0.04 mg/L	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg
Sample Date	4/5/05	4/5/05	4/5/05	4/5/05	4/19/05	4/19/05	4/19/05	4/19/05	5/4/05	5/4/05	5/4/05	5/4/05
Sample ID	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
Johnson Blank	70	0.00	0.00	0	74	0.01	0.02	0	70	0.00	0.01	0
ABIOTICL-1	109	0.00	0.00	0	142	0.28	1.65	12	133	0.00	0.01	0
ABIOTICL-2	106	0.00	0.00	0	124	0.22	1.11	9	132	0.01	0.04	0
ABIOTICL-3	92	0.00	0.00	0	68	0.49	1.36	20	107	0.03	0.13	1
ABIOTICL-4	118	0.00	0.00	0	114	0.26	1.22	11	137	0.02	0.09	1
ABIOTICL-5	88	0.00	0.00	0	103	0.28	1.18	11	125	0.00	0.03	0
RPBACTL-1	53	0.02	0.04	1	58	0.51	1.22	21	77	0.08	0.25	3
RPBACTL-2	70	0.00	0.00	0	66	0.44	1.20	18	98	0.02	0.07	1
RPBACTL-3	120	0.03	0.14	1	125	0.34	1.76	14	118	0.05	0.25	2
RPBACTL-5	125	0.01	0.03	0	132	0.28	1.54	12	141	0.01	0.06	0
RPBACTFUNGL-1	113	0.02	0.10	1	127	0.47	2.46	19	135	0.04	0.23	2
RPBACTFUNGL-2	72	0.06	0.17	2	85	0.78	2.74	32	87	0.09	0.31	4
RPBACTFUNGL-3	83	0.05	0.18	2	123	0.43	2.16	18	120	0.06	0.29	2
RPBACTFUNGL-4	144	0.02	0.10	1	160	0.44	2.92	18	151	0.04	0.24	2
RPBACTFUNGL-5	124	0.04	0.21	2	100	0.75	3.08	31	136	0.02	0.14	1
RPBFNOHOAGL-1	89	0.23	0.86	10	113	0.19	0.89	8	105	0.21	0.92	9
RPBFNOHOAGL-2	93	0.14	0.54	6	96	0.16	0.64	7	132	0.15	0.80	6
RPBFNOHOAGL-3	53	0.11	0.24	5	63	0.08	0.20	3	81	0.28	0.95	12
RPBFNOHOAGL-4	61	0.38	0.94	15	65	0.32	0.85	13	90	0.22	0.83	9
RPBFNOMINL-1	128	0.00	0.00	0	127	0.19	1.01	8	132	0.00	0.00	0
RPBFNOMINL-3	105	0.00	0.00	0	116	0.19	0.90	8	138	0.00	0.00	0
RPBFNOMINL-4	54	0.00	0.00	0	68	0.32	0.89	13	73	0.00	0.01	0
RPBFNOMINL-5	146	0.00	0.00	0	152	0.15	0.95	6	170	0.00	0.03	0
	4/5/05	4/5/05	4/5/05	4/5/05	4/19/05	4/19/05	4/19/05	4/19/05	5/4/05	5/4/05	5/4/05	5/4/05
Average	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
ABIOTICL	102.60	0.00	0.00	0	110.20	0.31	1.31	13	126.80	0.01	0.06	1
RPBACTL	92.00	0.01	0.05	1	95.25	0.40	1.43	16	108.50	0.04	0.16	2
RPBACTFUNGL	107.20	0.04	0.15	2	119.00	0.57	2.67	24	125.80	0.05	0.24	2
RPBFNOHOAGL	74.00	0.22	0.64	9	84.25	0.19	0.64	8	102.00	0.22	0.87	9
RPBFNOMINL	108.25	0.00	0.00	0	115.75	0.21	0.94	9	128.25	0.00	0.01	0
	4/5/05	4/5/05	4/5/05	4/5/05	4/19/05	4/19/05	4/19/05	4/19/05	5/4/05	5/4/05	5/4/05	5/4/05
STE	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L	Volume (ml)	mg/L	umol	umol/L
ABIOTICL	5.55	0.00	0.00	0.00	12.35	0.05	0.10	1.92	5.31	0.01	0.02	0.21
RPBACTL	17.98	0.01	0.03	0.25	19.32	0.05	0.14	2.09	13.69	0.02	0.05	0.65
RPBACTFUNGL	13.22	0.01	0.02	0.33	12.80	0.08	0.16	3.23	10.87	0.01	0.03	0.43
RPBFNOHOAGL	9.98	0.06	0.16	2.45	12.20	0.05	0.16	2.06	11.16	0.03	0.03	1.14
RPBFNOMINL	19.93	0.00	0.00	0.00	17.61	0.04	0.03	1.50	20.22	0.00	0.01	0.05

Table M-4 (cont.): Magnesium in drainage water, averages and standard error – large column experiment.

0.04 mg/L	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*
Sample Date	***5/16/05***	***5/16/05***	***5/16/05***	***5/16/05***	***5/31/05***	***5/31/05***	***5/31/05***	***5/31/05***	***6/14/05***	***6/14/05***	***6/14/05***	***6/14/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	82	0.00	0.00	0	78	0.01	0.02	0	69	0.02	0.04	1
ABIOTICL-1	125	0.12	0.63	5	128	0.00	0.00	0	58	0.33	0.80	14
ABIOTICL-2	145	0.21	1.23	8	132	0.00	0.00	0	72	0.33	0.99	14
ABIOTICL-3	120	0.01	0.03	0	165	0.01	0.07	0	93	0.43	1.63	18
ABIOTICL-4	170	0.17	1.21	7	147	0.01	0.08	1	91	0.32	1.21	13
ABIOTICL-5	130	0.21	1.11	9	153	0.01	0.05	0	45	0.51	0.95	21
RPBACTL-1	138	0.21	1.18	9	130	0.00	0.00	0	35	0.59	0.85	24
RPBACTL-2	161	0.20	1.29	8	166	0.00	0.02	0	90	0.29	1.07	12
RPBACTL-3	137	0.23	1.30	9	140	0.00	0.00	0	86	0.35	1.24	14
RPBACTL-5	93	0.04	0.16	2	113	0.00	0.00	0	39	0.81	1.31	33
RPBACTFUNGL-1	128	0.48	2.55	20	107	0.03	0.13	1	26	1.40	1.50	58
RPBACTFUNGL-2	176	0.45	3.24	18	154	0.04	0.25	2	109	0.61	2.73	25
RPBACTFUNGL-3	184	0.29	2.20	12	156	0.02	0.11	1	106	0.39	1.71	16
RPBACTFUNGL-4	149	0.46	2.84	19	130	0.01	0.05	0	63	0.85	2.20	35
RPBACTFUNGL-5	129	0.55	2.91	23	102	0.00	0.00	0	33	1.42	1.92	58
RPBFNOHOAGL-1					122	0.13	0.67	5	37	0.31	0.48	13
RPBFNOHOAGL-2	159	0.11	0.72	5	145	0.08	0.48	3	87	0.10	0.37	4
RPBFNOHOAGL-3	109	0.07	0.31	3	84	0.08	0.27	3	30	0.08	0.10	3
RPBFNOHOAGL-4	157	0.16	1.02	6	131	0.10	0.52	4	56	0.20	0.47	8
RPBFNOMINL-1	152	0.17	1.07	7	164	0.00	0.00	0	71	0.28	0.83	12
RPBFNOMINL-3	115	0.02	0.09	1	146	0.01	0.04	0	102	0.22	0.91	9
RPBFNOMINL-4	147	0.14	0.86	6	119	0.03	0.15	1	108	0.25	1.13	10
RPBFNOMINL-5	172	0.09	0.67	4	170	0.02	0.13	1	111	0.19	0.87	8
	5/16/05	*5/16/05*	*5/16/05*	*5/16/05*	*5/31/05*	*5/31/05*	*5/31/05*	*5/31/05*	*6/14/05*	*6/14/05*	*6/14/05*	*6/14/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	138.00	0.14	0.84	6	145.00	0.01	0.04	0	71.80	0.39	1.11	16
RPBACTL	132.25	0.17	0.98	7	137.25	0.00	0.01	0	62.50	0.51	1.12	21
RPBACTFUNGL	153.20	0.45	2.75	18	129.80	0.02	0.11	1	67.40	0.93	2.01	38
RPBFNOHOAGL	141.67	0.11	0.68	5	120.50	0.10	0.48	4	52.50	0.18	0.35	7
RPBFNOMINL	146.50	0.11	0.67	4	149.75	0.01	0.08	1	98.00	0.24	0.94	10
	5/16/05	*5/16/05*	*5/16/05*	*5/16/05*	*5/31/05*	*5/31/05*	*5/31/05*	*5/31/05*	*6/14/05*	*6/14/05*	*6/14/05*	*6/14/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	9.03	0.04	0.23	1.55	6.80	0.00	0.02	0.11	9.29	0.04	0.15	1.50
RPBACTL	14.21	0.04	0.28	1.78	11.09	0.00	0.01	0.03	14.77	0.12	0.10	4.93
RPBACTFUNGL	11.63	0.04	0.18	1.76	11.32	0.01	0.04	0.28	17.52	0.21	0.21	8.53
RPBFNOHOAGL	14.15	0.02	0.18	0.92	13.05	0.01	0.08	0.53	12.74	0.05	0.09	2.19
RPBFNOMINL	11.81	0.03	0.21	1.37	11.45	0.01	0.04	0.29	9.19	0.02	0.07	0.85

Table M-4 (cont.): Magnesium in drainage water, averages and standard error – large column experiment.

0.04 mg/L	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*
Sample Date	***6/28/05***	***6/28/05***	***6/28/05***	***6/28/05***	***7/12/05***	***7/12/05***	***7/12/05***	***7/12/05***	***7/28/05***	***7/28/05***	***7/28/05***	***7/28/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	115	0.01	0.05	0	125	0.00	0.00	0	129	0.00	0.00	0
ABIOTICL-1	105	0.01	0.05	0	133	0.42	2.30	17	96	0.03	0.14	1
ABIOTICL-2	135	0.03	0.19	1	123	0.48	2.45	20	98	0.02	0.09	1
ABIOTICL-3	139	0.01	0.09	1	143	0.42	2.49	17	144	0.03	0.19	1
ABIOTICL-4	140	0.02	0.12	1	130	0.34	1.80	14	143	0.04	0.26	2
ABIOTICL-5	90	0.05	0.20	2	94	0.46	1.79	19	75	0.04	0.12	2
RPBACTL-1	80	0.09	0.30	4	110	0.44	1.99	18	87	0.10	0.36	4
RPBACTL-2	142	0.04	0.21	2	147	0.41	2.45	17	138	0.01	0.06	0
RPBACTL-3	129	0.08	0.44	3	118	0.45	2.19	19	123	0.07	0.34	3
RPBACTL-5	85	0.09	0.31	4	94	0.59	2.29	24	77	0.01	0.05	1
RPBACTFUNGL-1	57		0.00	0	91	0.52	1.94	21	66	0.00	0.00	0
RPBACTFUNGL-2	139	0.07	0.43	3	124	0.61	3.13	25	126	0.03	0.16	1
RPBACTFUNGL-3	119	0.03	0.14	1	124	0.36	1.86	15	127	0.00	0.00	0
RPBACTFUNGL-4	103	0.05	0.23	2	110	0.55	2.50	23	98	0.00	0.00	0
RPBACTFUNGL-5	79	0.04	0.12	2	80	0.57	1.87	23	78	0.00	0.00	0
RPBFNOHOAGL-1	95	0.21	0.82	9	106	0.17	0.74	7	90	0.21	0.76	8
RPBFNOHOAGL-2	118	0.13	0.61	5	135	0.15	0.82	6	135	0.17	0.95	7
RPBFNOHOAGL-3	65	0.07	0.19	3	84	0.13	0.46	6	126	0.06	0.33	3
RPBFNOHOAGL-4	112	0.18	0.81	7	112	0.16	0.74	7	113	0.18	0.86	8
RPBFNOMINL-1	115	0.02	0.08	1	146	0.18	1.06	7	98	0.01	0.03	0
RPBFNOMINL-3	126	0.00	0.02	0	144	0.20	1.20	8	124	0.01	0.08	1
RPBFNOMINL-4	92	0.01	0.04	0	119	0.24	1.20	10	99	0.01	0.06	1
RPBFNOMINL-5	146	0.01	0.09	1	147	0.13	0.76	5	142	0.03	0.16	1
	6/28/05	*6/28/05*	*6/28/05*	*6/28/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/28/05*	*7/28/05*	*7/28/05*	*7/28/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	121.80	0.03	0.13	1	124.60	0.43	2.16	17	111.20	0.03	0.16	1
RPBACTL	109.00	0.07	0.32	3	117.25	0.47	2.23	19	106.25	0.05	0.20	2
RPBACTFUNGL	99.40	0.05	0.18	2	105.80	0.52	2.26	22	99.00	0.01	0.03	0
RPBFNOHOAGL	97.50	0.15	0.61	6	109.25	0.15	0.69	6	116.00	0.16	0.72	6
RPBFNOMINL	119.75	0.01	0.06	0	139.00	0.19	1.05	8	115.75	0.02	0.08	1
	6/28/05	*6/28/05*	*6/28/05*	*6/28/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/28/05*	*7/28/05*	*7/28/05*	*7/28/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	10.23	0.01	0.03	0.33	8.30	0.03	0.15	1.04	13.79	0.00	0.03	0.16
RPBACTL	15.56	0.01	0.05	0.53	11.10	0.04	0.10	1.69	14.48	0.02	0.09	0.88
RPBACTFUNGL	14.46	0.01	0.07	0.51	8.85	0.04	0.25	1.75	12.34	0.01	0.03	0.26
RPBFNOHOAGL	11.88	0.03	0.15	1.25	10.48	0.01	0.08	0.32	9.77	0.03	0.14	1.30
RPBFNOMINL	11.26	0.00	0.01	0.11	6.70	0.02	0.10	1.01	10.62	0.00	0.03	0.17

Table M-4 (cont.): Magnesium in drainage water, averages and standard error – large column experiment.

0.04 mg/L	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*	*Mg*
Sample Date	***8/9/05***	***8/9/05***	***8/9/05***	***8/9/05***	***8/23/05***	***8/23/05***	***8/23/05***	***8/23/05***	***9/6/05***	***9/6/05***	***9/6/05***	***9/6/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***	***Volume (ml)***	***mg/L***	***umol***	***umol/L***
Johnson Blank	121	0.01	0.05	0	132	0.02	0.13	1	120	0.00	0.02	0
ABIOTICL-1	82	0.04	0.15	2	37	0.49	0.75	20	71	0.00	0.01	0
ABIOTICL-2	90	0.04	0.15	2	92	0.20	0.75	8	123	0.05	0.23	2
ABIOTICL-3	135	0.09	0.50	4	115	0.26	1.22	11	143	0.02	0.15	1
ABIOTICL-4	102	0.06	0.25	2	108	0.20	0.89	8	143	0.02	0.14	1
ABIOTICL-5	63	0.06	0.15	2	50	0.45	0.92	18	78	0.03	0.09	1
RPBACTL-1	64	0.05	0.13	2	47	0.55	1.07	23	134	0.03	0.15	1
RPBACTL-2	114	0.07	0.35	3	107	0.20	0.90	8	144	0.02	0.10	1
RPBACTL-3	102	0.10	0.41	4	74	0.35	1.05	14	130	0.05	0.29	2
RPBACTL-5	67	0.06	0.17	3	40	0.68	1.12	28	72	0.02	0.06	1
RPBACTFUNGL-1	40	0.01	0.02	0	22	1.72	1.56	71	47	0.07	0.14	3
RPBACTFUNGL-2	117	0.23	1.12	10	98	0.58	2.35	24	143	0.04	0.25	2
RPBACTFUNGL-3	82	0.14	0.47	6	79	0.20	0.64	8	146	0.04	0.22	1
RPBACTFUNGL-4	89	0.29	1.07	12	55	0.70	1.57	29	91	0.01	0.02	0
RPBACTFUNGL-5	54	0.14	0.31	6	38	0.79	1.23	32	76	0.09	0.28	4
RPBFNOHOAGL-1	82	0.23	0.79	10	61	0.30	0.75	12	76	0.22	0.69	9
RPBFNOHOAGL-2	112	0.14	0.66	6	88	0.15	0.53	6	93	0.18	0.70	8
RPBFNOHOAGL-3	42	0.12	0.20	5	21	0.16	0.14	7	65	0.12	0.32	5
RPBFNOHOAGL-4	87	0.22	0.79	9	65	0.27	0.72	11	100	0.24	0.97	10
RPBFNOMINL-1	116	0.08	0.39	3	76	0.14	0.43	6	71	0.01	0.02	0
RPBFNOMINL-3	111	0.09	0.42	4	100	0.12	0.51	5	140	0.00	0.00	0
RPBFNOMINL-4	92	0.10	0.36	4	65	0.14	0.38	6	142	0.00	0.00	0
RPBFNOMINL-5	128	0.11	0.56	4	128	0.06	0.33	3	146	0.00	0.00	0
	8/9/05	*8/9/05*	*8/9/05*	*8/9/05*	*8/23/05*	*8/23/05*	*8/23/05*	*8/23/05*	*9/6/05*	*9/6/05*	*9/6/05*	*9/6/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	94.40	0.06	0.24	2	80.40	0.32	0.91	13	111.60	0.03	0.12	1
RPBACTL	86.75	0.07	0.27	3	67.00	0.45	1.03	18	120.00	0.03	0.15	1
RPBACTFUNGL	76.40	0.16	0.60	7	58.40	0.80	1.47	33	100.60	0.05	0.18	2
RPBFNOHOAGL	80.75	0.18	0.61	7	58.75	0.22	0.54	9	83.50	0.19	0.67	8
RPBFNOMINL	111.75	0.09	0.43	4	92.25	0.12	0.41	5	124.75	0.00	0.00	0
	8/9/05	*8/9/05*	*8/9/05*	*8/9/05*	*8/23/05*	*8/23/05*	*8/23/05*	*8/23/05*	*9/6/05*	*9/6/05*	*9/6/05*	*9/6/05*
STE	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*	*Volume (ml)*	*mg/L*	*umol*	*umol/L*
ABIOTICL	11.97	0.01	0.07	0.36	15.65	0.06	0.09	2.59	15.62	0.01	0.04	0.28
RPBACTL	12.53	0.01	0.07	0.44	15.22	0.11	0.05	4.36	16.27	0.01	0.05	0.34
RPBACTFUNGL	13.54	0.05	0.22	1.98	13.68	0.25	0.28	10.39	19.27	0.01	0.05	0.60
RPBFNOHOAGL	14.49	0.03	0.14	1.20	13.92	0.04	0.14	1.56	7.96	0.03	0.13	1.06
RPBFNOMINL	7.49	0.00	0.04	0.21	13.98	0.02	0.04	0.74	17.96	0.00	0.00	0.06

Table M-5: Silica in drainage water, averages and standard error – large column experiment. Silica content of the input water was high, so the values were corrected for it, shown in µmol* columns.

	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si
Sample Date	***9/9/04***	***9/9/04***	***9/9/04***	***9/9/04***	***9/23/04***	***9/23/04***	***9/23/04***	***9/23/04***	***10/7/04***	***10/7/04***	***10/7/04***	***10/7/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****
Johnson Blank			38				20				8	
ABIOTICL-1	141	16	81	43	100	12	44	24	125	15	67	59
ABIOTICL-2	49	50	88	50	57	30	61	41				
ABIOTICL-3	73	23	59	21	68	25	60	40	45			
ABIOTICL-4	90	30	96	58	55	19	37	17	90	21	69	61
ABIOTICL-5	59	36	77	39	36	40	51	31	28			
RPBACTL-1	90	26	82	44	91	23	74	54	110	16	62	54
RPBACTL-2	72	29	75	37					53	34	63	55
RPBACTL-3	103	24	89	51	61	22	47	27	93	22	71	63
RPBACTL-5	115	27	109	71	101	38	135	115	123	17	73	65
RPBACTFUNGL-1	73	25	65	27	76	24	65	45	77	20	54	46
RPBACTFUNGL-2	67	23	55	17					92	23	75	67
RPBACTFUNGL-3	63	26	58	20					59	25	52	44
RPBACTFUNGL-4	146	15	80	42	134	13	64	44	143	13	68	60
RPBACTFUNGL-5	109	24	95	57	78	22	62	42	94	20	66	58
RPBFNOHOAGL-1	136				123	15	65	45	133	16	75	67
RPBFNOHOAGL-2	132	20	96	58	111	17	68	48	120	17	72	64
RPBFNOHOAGL-3					62	9	19		103	9	34	26
RPBFNOHOAGL-4	125	20	88	50	115	16	66	46	125	16	71	63
RPBFNOMINL-1	119	14	61	23	108	20	77	57	101	15	55	47
RPBFNOMINL-3	109				78	24	68	48	83	19	57	49
RPBFNOMINL-4	93	17	58	20	121	17	75	55	71	24	60	52
RPBFNOMINL-5	127	17	75	37	109	21	82	62	113	15	59	51
	9/9/04	*9/9/04*	*9/9/04*	*9/9/04*	*9/23/04*	*9/23/04*	*9/23/04*	*9/23/04*	*10/7/04*	*10/7/04*	*10/7/04*	*10/7/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	82.40	31.13	80.14	42.14	63.20	25.11	50.47	30.47	72.00	18.18	67.58	59.58
RPBACTL	95.00	26.44	88.81	50.81	84.33	27.45	85.64	65.64	94.75	21.92	67.46	59.46
RPBACTFUNGL	91.60	22.79	70.73	32.73	96.00	19.92	63.60	43.60	93.00	20.04	62.90	54.90
RPBFNOHOAGL	131.00	20.12	92.09	54.09	102.75	14.20	54.52	46.35	120.25	14.50	63.11	55.11
RPBFNOMINL	112.00	16.15	64.61	26.61	104.00	20.73	75.41	55.41	92.00	18.25	57.73	49.73
	9/9/04	*9/9/04*	*9/9/04*	*9/9/04*	*9/23/04*	*9/23/04*	*9/23/04*	*9/23/04*	*10/7/04*	*10/7/04*	*10/7/04*	*10/7/04*
STD	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	36.20	13.16	13.88	13.88	23.57	10.46	10.21	10.21	43.96	4.53	1.30	1.30
RPBACTL	18.42	1.98	14.81	14.81	20.82	8.87	45.17	45.17	30.42	8.19	5.29	5.29
RPBACTFUNGL	35.47	4.21	16.72	16.72	32.92	5.75	1.20	1.20	31.28	4.31	9.85	9.85
RPBFNOHOAGL	5.57	0.48	5.72	5.72	27.62	3.85	23.70	1.63	12.69	3.52	19.53	19.53
RPBFNOMINL	14.65	1.59	9.01	9.01	18.31	2.90	6.08	6.08	18.65	4.23	2.15	2.15

Table M-5 (cont.): Silica in drainage water, averages and standard error – large column experiment. Silica content of the input water represented by the "Johnson Blank" was high, so the values were corrected for it, shown in µmol* columns.

	Si	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*
Sample Date	***10/21/04***	***10/21/04***	***10/21/04***	***10/21/04***	***11/4/04***	***11/4/04***	***11/4/04***	***11/4/04***	***11/18/04***	***11/18/04***	***11/18/04***	***11/18/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****
Johnson Blank			9		88	6	19				18	
ABIOTICL-1	140	12	58	49	127	14	65	46	115	16	67	49
ABIOTICL-2	97	25	87	78								
ABIOTICL-3	82	19	56	47	46	29	47	28	23			
ABIOTICL-4	63	29	66	57	75	21	56	37	36			
ABIOTICL-5	62	28	62	53					75	27	71	53
RPBACTL-1	101	18	65	56	80	21	61	42				
RPBACTL-2	101	19	67	58	40							
RPBACTL-3	145	13	69	60	67	26	63	44	96	32	108	90
RPBACTL-5	139	14	68	59	89	19	62	43	79	26	74	56
RPBACTFUNGL-1	104	17	62	53	78	21	57	38				
RPBACTFUNGL-2	90	18	57	48	35							
RPBACTFUNGL-3	81	18	52	43								
RPBACTFUNGL-4	145	11	57	48	135	14	67	48	127	17	77	59
RPBACTFUNGL-5	96	19	64	55	70	22	54	35	110	21	82	64
RPBFNOHOAGL-1	145	13	67	58	137	14	70	51	97	21	74	56
RPBFNOHOAGL-2	134	14	67	58	108	17	66	47	95	22	76	58
RPBFNOHOAGL-3	49	13	22	13	16							
RPBFNOHOAGL-4	146	13	66	57	87	19	58	40				
RPBFNOMINL-1	142	12	59	50	109	16	62	43	77	24	65	47
RPBFNOMINL-3	96	16	55	46								
RPBFNOMINL-4	75	23	62	53	47	30	50	31	69	33	81	63
RPBFNOMINL-5	133	13	62	53	91	20	65	56	48	41	70	52
	10/21/04	*10/21/04*	*10/21/04*	*10/21/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/18/04*	*11/18/04*	*11/18/04*	*11/18/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	88.80	22.72	65.87	56.87	82.67	21.28	55.84	37.10	62.25	21.59	69.36	51.36
RPBACTL	121.50	15.92	67.08	58.08	69.00	22.42	61.88	43.14	87.50	29.03	91.27	73.27
RPBACTFUNGL	103.20	16.47	58.43	49.43	79.50	18.69	59.28	40.54	118.50	19.08	79.92	61.92
RPBFNOHOAGL	118.50	13.12	55.68	46.68	87.00	16.75	64.67	45.93	96.00	21.92	74.89	56.89
RPBFNOMINL	111.50	15.99	59.41	50.41	82.17	21.89	58.77	43.28	64.67	32.53	71.87	53.87
	10/21/04	*10/21/04*	*10/21/04*	*10/21/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/4/04*	*11/18/04*	*11/18/04*	*11/18/04*	*11/18/04*
STD	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	32.09	7.30	12.28	12.28	41.04	7.12	9.02	9.02	41.53	7.27	2.85	2.85
RPBACTL	23.80	2.83	1.60	1.60	21.34	3.53	0.86	0.86	12.02	3.82	24.33	24.33
RPBACTFUNGL	24.83	3.13	4.80	4.80	41.44	4.14	6.89	6.89	12.02	2.80	3.63	3.63
RPBFNOHOAGL	46.65	0.66	22.44	22.44	51.58	2.26	5.90	5.90	1.41	0.65	1.13	1.13
RPBFNOMINL	31.44	5.06	2.96	2.96	31.69	7.02	8.18	12.71	14.98	8.83	8.07	8.07

Table M-5 (cont.): Silica in drainage water, averages and standard error – large column experiment. Silica content of the input water represented by the "Johnson Blank" was high, so the values were corrected for it, shown in µmol* columns.

	Si	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*
Sample Date	***12/2/04***	***12/2/04***	***12/2/04***	***12/2/04***	***12/17/04***	***12/17/04***	***12/17/04***	***12/17/04***	***12/29/04***	***12/29/04***	***12/29/04***	***12/29/04***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****
Johnson Blank	50	8	15		85	13	39		52	13	24	
ABIOTICL-1	135	15	74	59	145	17	90	90	95	23	78	78
ABIOTICL-2	65	15	35	21	145	27	140	140				
ABIOTICL-3	92	18	58	44	145	20	101	101	45	34	54	54
ABIOTICL-4	97	19	64	50	145	18	94	94	57	30	62	62
ABIOTICL-5	87	18	55	41	145	20	102	102	61	25	54	54
RPBACTL-1	67	14	33	19	145	25	130	130	19			
RPBACTL-2	71	16	41	26	145	21	107	107	46	44	72	72
RPBACTL-3	95	17	58	43	145	20	101	101	86	29	89	89
RPBACTL-5	120	17	73	59	145	18	94	94	72	26	67	67
RPBACTFUNGL-1	59	14	30	16	145	20	105	105	43	40	62	62
RPBACTFUNGL-2	68	12	28	13	145	19	96	96	56	28	55	55
RPBACTFUNGL-3	78	15	42	27	145	18	91	91	44	27	42	42
RPBACTFUNGL-4	130	15	71	57	145	16	84	84	100	23	80	80
RPBACTFUNGL-5	119	17	71	56	145	16	83	83	77	19	53	53
RPBFNOHOAGL-1	110	17	66	52	145	18	94	94	71	28	70	70
RPBFNOHOAGL-2	132	18	85	70	145	17	89	89	84	24	73	73
RPBFNOHOAGL-3	73	12	30	16	145	14	73	73				
RPBFNOHOAGL-4	77	14	38	23	145	22	114	114	55			
RPBFNOMINL-1	91	15	50	35	88	18	55	55	81	28	80	80
RPBFNOMINL-3	92	16	51	36	145	19	98	98	55	39	77	77
RPBFNOMINL-4	88	19	61	46	145	20	101	101	54	42	81	81
RPBFNOMINL-5	109	18	71	56	145	18	92	92	77	32	87	87
	12/2/04	*12/2/04*	*12/2/04*	*12/2/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/29/04*	*12/29/04*	*12/29/04*	*12/29/04*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	95.20	16.95	57.32	42.80	145.00	20.42	105.42	105.42	64.50	28.06	62.04	62.04
RPBACTL	88.25	16.05	51.20	36.67	145.00	20.85	107.65	107.65	55.75	33.04	75.98	75.98
RPBACTFUNGL	90.80	14.60	48.37	33.84	145.00	17.79	91.84	91.84	64.00	27.34	58.50	58.50
RPBFNOHOAGL	98.00	15.06	54.70	40.17	145.00	17.88	92.33	92.33	70.00	25.94	71.22	71.22
RPBFNOMINL	95.00	17.14	58.08	43.56	130.75	18.48	86.48	86.48	66.75	35.16	81.07	81.07
	12/2/04	*12/2/04*	*12/2/04*	*12/2/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/17/04*	*12/29/04*	*12/29/04*	*12/29/04*	*12/29/04*
STD	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	25.38	1.52	14.26	14.26	0.00	3.84	19.82	19.82	21.44	4.88	11.26	11.26
RPBACTL	24.51	1.49	17.87	17.87	0.00	3.02	15.59	15.59	29.58	9.52	11.53	11.53
RPBACTFUNGL	31.73	1.90	21.33	21.33	0.00	1.76	9.10	9.10	24.34	7.96	14.18	14.18
RPBFNOHOAGL	28.08	2.98	25.45	25.45	0.00	3.29	16.98	16.98	14.53	2.26	2.27	2.27
RPBFNOMINL	9.49	1.99	9.88	9.88	28.50	0.92	21.26	21.26	14.24	6.71	4.09	4.09

Table M-5 (cont.): Silica in drainage water, averages and standard error – large column experiment. Silica content of the input water represented by the “Johnson Blank” was high, so the values were corrected for it, shown in µmol* columns.

	Si	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*
Sample Date	***1/11/05***	***1/11/05***	***1/11/05***	***1/11/05***	***1/25/05***	***1/25/05***	***1/25/05***	***1/25/05***	***2/8/05***	***2/8/05***	***2/8/05***	***2/8/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****
Johnson Blank	69	15	37		82	13	38		105	13	49	
ABIOTICL-1	90	30	95	57	182	34	219	181	131	37	173	124
ABIOTICL-2	43				117	45	186	148	117	43	181	132
ABIOTICL-3	77	30	82	45	130	31	143	105	82	36	104	56
ABIOTICL-4	72	33	84	47	116	42	173	135	93	47	155	107
ABIOTICL-5	77	31	85	48	136	45	216	178	98	54	188	139
RPBACTL-1					74	55	144	105	137	40	197	148
RPBACTL-2	38				99	38	134	96	99	41	145	96
RPBACTL-3	89	33	104	66	186	33	220	182	154	41	223	174
RPBACTL-5	86	36	109	71	155	36	201	162	141	40	200	152
RPBACTFUNGL-1	14				163	29	169	131	116	45	185	136
RPBACTFUNGL-2	25				96	40	137	99	62	40	89	40
RPBACTFUNGL-3	39				114	35	142	104	93	36	119	70
RPBACTFUNGL-4	119	26	108	71	184	32	213	174	161	35	201	152
RPBACTFUNGL-5	107	26	100	63	168	34	203	165	111	46	180	132
RPBFNOHOAGL-1	82	26	76	38	194	31	213	174	106	35	132	84
RPBFNOHOAGL-2	78	33	91	54	153	31	166	128	102	33	119	70
RPBFNOHOAGL-3	47	37	62	25	91	25	80	42	64	26	59	11
RPBFNOHOAGL-4	23				89	41	130	92	59	45	95	46
RPBFNOMINL-1	73	29	75	38	157	35	195	157	143	36	183	134
RPBFNOMINL-3	81	31	90	52	102	36	132	94	82	36	106	57
RPBFNOMINL-4	83	34	100	63	129	43	197	159	65	65	151	102
RPBFNOMINL-5	85	32	96	58	169	31	186	148	155	31	171	123
	1/11/05	*1/11/05*	*1/11/05*	*1/11/05*	*1/25/05*	*1/25/05*	*1/25/05*	*1/25/05*	*2/8/05*	*2/8/05*	*2/8/05*	*2/8/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	71.80	30.83	86.47	49.22	136.20	39.19	187.53	149.09	104.20	43.41	160.33	111.73
RPBACTL	71.00	34.12	106.22	68.97	128.50	40.56	174.71	136.27	132.75	40.49	191.16	142.56
RPBACTFUNGL	60.80	25.94	104.29	67.04	145.00	34.17	172.97	134.52	108.60	40.33	154.79	106.19
RPBFNOHOAGL	57.50	31.99	76.41	39.16	131.75	31.80	147.37	108.93	82.75	34.68	101.18	52.58
RPBFNOMINL	80.50	31.38	90.18	52.93	139.25	36.34	177.85	139.41	111.25	42.04	152.55	103.95
	1/11/05	*1/11/05*	*1/11/05*	*1/11/05*	*1/25/05*	*1/25/05*	*1/25/05*	*1/25/05*	*2/8/05*	*2/8/05*	*2/8/05*	*2/8/05*
STD	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	17.43	1.48	5.59	5.59	26.99	6.40	31.68	31.68	19.61	7.43	33.57	33.57
RPBACTL	28.62	1.96	3.53	3.53	51.15	9.58	42.30	42.30	23.64	0.51	32.84	32.84
RPBACTFUNGL	48.65	0.59	5.47	5.47	37.87	4.06	34.28	34.28	36.13	4.86	48.25	48.25
RPBFNOHOAGL	27.81	5.66	14.56	14.56	51.04	6.75	55.97	55.97	24.68	7.91	32.10	32.10
RPBFNOMINL	5.26	2.11	11.05	11.05	29.96	5.01	30.65	30.65	44.41	15.52	34.04	34.04

Table M-5 (cont.): Silica in drainage water, averages and standard error – large column experiment. Silica content of the input water represented by the "Johnson Blank" was high, so the values were corrected for it, shown in µmol* columns.

	Si	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*
Sample Date	***2/22/05***	***2/22/05***	***2/22/05***	***2/22/05***	***3/8/05***	***3/8/05***	***3/8/05***	***3/8/05***	***3/22/05***	***3/22/05***	***3/22/05***	***3/22/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****
Johnson Blank	83	13	38		85	13	39		76	11	30	
ABIOTICL-1	100	35	123	85	135	35	171	132	121	34	146	116
ABIOTICL-2	80	56	158	121	106	43	161	122	99	43	151	121
ABIOTICL-3	61	38	83	45	64	48	109	71	78	43	120	90
ABIOTICL-4	95	47	160	123	110	42	165	127	110	36	142	112
ABIOTICL-5	50	82	146	109	102	53	191	153	89	44	140	110
RPBACTL-1	43				72	56	142	104	62	50	111	81
RPBACTL-2	45				48	68	117	78	70	49	121	91
RPBACTL-3	113	50	201	163	143	43	220	181	96	43	148	118
RPBACTL-5	122	43	187	149	108	47	179	140	128	34	153	123
RPBACTFUNGL-1	102	47	169	132	110	45	175	136	109	38	147	117
RPBACTFUNGL-2	31				62	70	154	115	88	40	124	94
RPBACTFUNGL-3	78	42	117	80	89	40	126	87	76	45	123	93
RPBACTFUNGL-4	139	49	242	204	161	33	190	151	142	32	161	131
RPBACTFUNGL-5	110	46	181	143	119	45	191	153	115	37	151	122
RPBFNOHOAGL-1	66	28	67	29	91	28	91	52	100	29	105	75
RPBFNOHOAGL-2	76	32	86	48	76	42	114	76	98	44	153	123
RPBFNOHOAGL-3	31				53	27	51	12	74	26	69	39
RPBFNOHOAGL-4	31				43				60	44	94	64
RPBFNOMINL-1	112	40	158	120	125	39	173	134	108	36	137	107
RPBFNOMINL-3	78	39	108	70	97	45	154	115	110	35	137	107
RPBFNOMINL-4	35				35				59	57	120	91
RPBFNOMINL-5	137	37	182	145	144	35	180	141	139	33	163	133
	2/22/05	*2/22/05*	*2/22/05*	*2/22/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/22/05*	*3/22/05*	*3/22/05*	*3/22/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	77.20	51.60	134.25	96.58	103.40	44.19	159.47	120.83	99.40	39.98	139.47	109.59
RPBACTL	80.75	46.51	194.00	156.33	92.75	53.39	164.43	125.79	89.00	43.88	133.12	103.25
RPBACTFUNGL	92.00	45.97	177.32	139.65	108.20	46.42	167.00	128.36	106.00	38.37	141.39	111.51
RPBFNOHOAGL	51.00	30.04	76.24	38.57	65.75	32.35	85.17	46.53	83.00	35.88	105.24	75.36
RPBFNOMINL	90.50	38.62	149.42	111.75	100.25	39.52	168.95	130.31	104.00	40.22	139.38	109.50
	2/22/05	*2/22/05*	*2/22/05*	*2/22/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/8/05*	*3/22/05*	*3/22/05*	*3/22/05*	*3/22/05*
STD	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	21.49	18.99	32.35	32.35	25.51	6.50	30.36	30.36	16.92	4.65	11.78	11.78
RPBACTL	42.60	4.94	10.14	10.14	41.60	11.29	44.74	44.74	29.78	7.48	20.51	20.51
RPBACTFUNGL	40.47	2.79	51.28	51.28	36.78	13.85	27.61	27.61	25.54	4.88	17.14	17.14
RPBFNOHOAGL	23.45	2.38	13.57	13.57	21.78	8.55	32.08	32.08	19.36	9.32	35.05	35.05
RPBFNOMINL	44.20	1.16	37.95	37.95	47.59	4.81	13.32	13.32	33.18	11.47	17.76	17.76

Table M-5 (cont.): Silica in drainage water, averages and standard error – large column experiment. Silica content of the input water represented by the "Johnson Blank" was high, so the values were corrected for it, shown in µmol* columns.

	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si
Sample Date	***4/5/05***	***4/5/05***	***4/5/05***	***4/5/05***	***4/19/05***	***4/19/05***	***4/19/05***	***4/19/05***	***5/4/05***	***5/4/05***	***5/4/05***	***5/4/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****
Johnson Blank	70	13	33		74	14	36		70	13	32	
ABIOTICL-1	109	39	153	121	142	43	217	180	133	42	198	166
ABIOTICL-2	106	49	184	151	124	50	220	184	132	46	216	184
ABIOTICL-3	92	43	140	107	68	55	133	97	107	41	154	123
ABIOTICL-4	118	43	181	148	114	51	207	171	137	40	196	165
ABIOTICL-5	88	54	170	138	103	58	213	177	125	47	209	177
RPBACTL-1	53				58	61	126	89	77	51	141	109
RPBACTL-2	70	57	143	110	66	62	145	109	98	53	184	152
RPBACTL-3	120	43	184	152	125	50	223	187	118	49	207	175
RPBACTL-5	125	41	185	152	132	44	209	173	141	40	199	167
RPBACTFUNGL-1	113	45	181	148	127	49	224	187	135	43	207	175
RPBACTFUNGL-2	72	41	106	73	85	49	147	111	87	49	153	121
RPBACTFUNGL-3	83	42	125	92	123	48	210	173	120	37	160	128
RPBACTFUNGL-4	144	30	155	123	160	37	213	177	151	35	186	155
RPBACTFUNGL-5	124	41	182	149	100	48	170	134	136	41	198	166
RPBFNOHOAGL-1	89	29	91	59	113	30	120	84	105	33	123	91
RPBFNOHOAGL-2	93	32	107	75	96	37	127	90	132	33	155	124
RPBFNOHOAGL-3	53	29	54	22	63	28	62	25	81	28	80	48
RPBFNOHOAGL-4	61	46	100	68	65	50	116	80	90	44	141	109
RPBFNOMINL-1	128	40	181	148	127	46	209	173	132	42	197	165
RPBFNOMINL-3	105	72	270	237	116	49	201	164	138	42	208	177
RPBFNOMINL-4	54	39	76	43	68	73	176	139	73	67	175	144
RPBFNOMINL-5	146	39	204	171	152	56	304	267	170	35	214	182
	4/5/05	*4/5/05*	*4/5/05*	*4/5/05*	*4/19/05*	*4/19/05*	*4/19/05*	*4/19/05*	*5/4/05*	*5/4/05*	*5/4/05*	*5/4/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	102.60	45.64	165.54	133.04	110.20	51.42	198.19	161.86	126.80	43.13	194.86	163.01
RPBACTL	92.00	47.32	170.60	138.09	95.25	54.33	175.83	139.50	108.50	48.21	182.54	150.69
RPBACTFUNGL	107.20	39.98	149.69	117.18	119.00	46.23	192.72	156.39	125.80	41.10	180.88	149.03
RPBFNOHOAGL	74.00	33.97	88.11	55.61	84.25	36.13	106.12	69.79	102.00	34.43	124.85	93.00
RPBFNOMINL	108.25	47.57	182.41	149.90	115.75	55.88	222.28	185.95	128.25	46.78	198.61	166.76
	4/5/05	*4/5/05*	*4/5/05*	*4/5/05*	*4/19/05*	*4/19/05*	*4/19/05*	*4/19/05*	*5/4/05*	*5/4/05*	*5/4/05*	*5/4/05*
STD	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	12.40	5.90	18.70	18.70	27.61	5.81	36.57	36.57	11.88	3.14	24.00	24.00
RPBACTL	35.95	8.72	23.98	23.98	38.64	8.43	47.67	47.67	27.38	5.91	29.42	29.42
RPBACTFUNGL	29.56	5.62	33.79	33.79	28.63	4.99	32.55	32.55	24.30	5.70	23.63	23.63
RPBFNOHOAGL	19.97	8.29	23.63	23.63	24.40	10.14	29.95	29.95	22.32	6.75	32.48	32.48
RPBFNOMINL	39.87	16.36	80.54	80.54	35.22	11.92	56.04	56.04	40.43	14.18	17.01	17.01

Table M-5 (cont.): Silica in drainage water, averages and standard error – large column experiment. Silica content of the input water represented by the "Johnson Blank" was high, so the values were corrected for it, shown in µmol* columns.

	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si
Sample Date	***5/16/05***	***5/16/05***	***5/16/05***	***5/16/05***	***5/31/05***	***5/31/05***	***5/31/05***	***5/31/05***	***6/14/05***	***6/14/05***	***6/14/05***	***6/14/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****
Johnson Blank	82	12	36		78	13	35		69	13	31	
ABIOTICL-1	125	36	161	125	128	35	158	123	58	54	112	80
ABIOTICL-2	145	33	171	135	132	34	161	126	72	49	127	95
ABIOTICL-3	120				165	29	171	136	93	41	136	105
ABIOTICL-4	170	30	180	144	147	32	165	130	91	45	146	115
ABIOTICL-5	130	35	161	124	153	34	183	148	45	77	123	92
RPBACTL-1	138	35	174	138	130	34	157	122	35	56	70	39
RPBACTL-2	161	33	190	153	166	31	186	151	90	43	138	107
RPBACTL-3	137	34	168	132	140	34	167	132	86	52	160	129
RPBACTL-5	93	44	147	111	113	38	151	116	39	72	99	68
RPBACTFUNGL-1	128	40	181	145	107	39	149	114	26			
RPBACTFUNGL-2	176	30	190	154	154	31	168	133	109	42	164	133
RPBACTFUNGL-3	184	29	192	155	156	31	174	139	106	41	156	125
RPBACTFUNGL-4	149	33	174	138	130	35	160	125	63	49	110	79
RPBACTFUNGL-5	129	40	184	147	102	40	147	112	33	84	98	67
RPBFNOHOAGL-1	145	32	163	127	122	33	144	109	37	54	72	40
RPBFNOHOAGL-2	159	29	163	126	145	30	153	118	87	37	116	85
RPBFNOHOAGL-3	109	22	84	48	84	23	70	35	30	29	31	
RPBFNOHOAGL-4	157	30	170	134	131	35	164	128	56	41	82	51
RPBFNOMINL-1	152	33	178	141	164	35	205	170	71	55	139	108
RPBFNOMINL-3	115	36	147	111	146	32	165	130	102	44	161	130
RPBFNOMINL-4	147	35	181	145	119	40	171	136	108	52	200	168
RPBFNOMINL-5	172	29	176	140	170	30	182	147	111	43	169	138
	5/16/05	*5/16/05*	*5/16/05*	*5/16/05*	*5/31/05*	*5/31/05*	*5/31/05*	*5/31/05*	*6/14/05*	*6/14/05*	*6/14/05*	*6/14/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	138.00	33.46	168.28	131.99	145.00	32.66	167.78	132.70	71.80	53.27	128.69	97.47
RPBACTL	132.25	36.83	169.68	133.39	137.25	34.13	165.36	130.28	62.50	55.85	117.03	85.82
RPBACTFUNGL	153.20	34.42	184.08	147.79	129.80	35.20	159.50	124.42	67.40	54.05	132.07	100.86
RPBFNOHOAGL	142.50	28.13	145.13	108.84	120.50	30.29	132.59	97.51	52.50	40.50	75.22	58.78
RPBFNOMINL	146.50	33.03	170.47	134.18	149.75	34.33	180.80	145.72	98.00	48.55	167.30	136.09
	5/16/05	*5/16/05*	*5/16/05*	*5/16/05*	*5/31/05*	*5/31/05*	*5/31/05*	*5/31/05*	*6/14/05*	*6/14/05*	*6/14/05*	*6/14/05*
STD	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	20.19	2.77	9.28	9.28	15.22	2.27	9.92	9.92	20.78	13.95	13.16	13.16
RPBACTL	28.42	5.10	17.78	17.78	22.17	2.55	15.28	15.28	29.54	11.84	40.12	40.12
RPBACTFUNGL	26.01	5.12	7.08	7.08	25.32	4.42	11.84	11.84	39.17	19.94	32.82	32.82
RPBFNOHOAGL	23.17	4.44	40.70	40.70	26.11	5.14	42.68	42.68	25.49	10.55	35.11	23.22
RPBFNOMINL	23.61	3.15	15.50	15.50	22.90	4.54	17.51	17.51	18.38	5.89	24.92	24.92

Table M-5 (cont.): Silica in drainage water, averages and standard error – large column experiment. Silica content of the input water represented by the "Johnson Blank" was high, so the values were corrected for it, shown in µmol* columns.

	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si
Sample Date	***6/28/05***	***6/28/05***	***6/28/05***	***6/28/05***	***7/12/05***	***7/12/05***	***7/12/05***	***7/12/05***	***7/28/05***	***7/28/05***	***7/28/05***	***7/28/05***
Sample ID	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****
Johnson Blank	115	13	51		125	13	56		129	13	59	
ABIOTICL-1	105	48	179	128	133	39	184	127	96	52	179	120
ABIOTICL-2	135	39	185	134	123	41	181	125	98	49	171	113
ABIOTICL-3	139	35	173	121	143	37	187	131	144	35	180	122
ABIOTICL-4	140	35	174	123	130	40	187	131	143	37	186	127
ABIOTICL-5	90	55	177	126	94	53	179	122	75	61	162	104
RPBACTL-1	80	46	131	80	110	41	161	105	87	52	160	102
RPBACTL-2	142	37	188	137	147	40	210	154	138	38	189	130
RPBACTL-3	129	40	186	134	118	43	180	124	123	42	182	123
RPBACTL-5	85	53	161	110	94	56	187	130	77	57	157	98
RPBACTFUNGL-1	57				91	40	130	74	66	60	142	83
RPBACTFUNGL-2	139	38	186	135	124	41	181	125	126	42	190	131
RPBACTFUNGL-3	119	38	162	110	124	42	184	128	127	37	168	109
RPBACTFUNGL-4	103	39	143	91	110	44	173	117	98	42	147	88
RPBACTFUNGL-5	79	32	90	39	80	56	160	103	78	48	132	73
RPBFNOHOAGL-1	95	41	138	87	106	37	141	85	90	47	150	91
RPBFNOHOAGL-2	118	34	142	90	135	36	173	117	135	35	168	109
RPBFNOHOAGL-3	65	25	58		84	27	82		126	29	128	69
RPBFNOHOAGL-4	112	25	98	47	112	38	152	95	113	38	152	93
RPBFNOMINL-1	115	49	200	149	146	40	209	153	98	45	158	99
RPBFNOMINL-3	126	40	179	127	144	39	198	142	124	39	173	114
RPBFNOMINL-4	92	51	168	117	119	46	194	138	99	48	168	110
RPBFNOMINL-5	146	34	177	126	147	38	197	141	142	35	175	116
	6/28/05	*6/28/05*	*6/28/05*	*6/28/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/28/05*	*7/28/05*	*7/28/05*	*7/28/05*
Average	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	121.80	42.30	177.63	126.20	124.60	42.14	183.54	127.23	111.20	46.78	175.77	117.02
RPBACTL	109.00	44.21	166.44	115.01	117.25	44.97	184.48	128.17	106.25	47.24	172.01	113.27
RPBACTFUNGL	99.40	36.67	145.11	93.68	105.80	44.67	165.81	109.50	99.00	45.93	155.82	97.07
RPBFNOHOAGL	97.50	31.06	109.04	74.73	109.25	34.70	136.90	98.85	116.00	36.97	149.31	90.56
RPBFNOMINL	119.75	43.57	181.22	129.79	139.00	40.64	199.86	143.56	115.75	41.70	168.54	109.79
	6/28/05	*6/28/05*	*6/28/05*	*6/28/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/12/05*	*7/28/05*	*7/28/05*	*7/28/05*	*7/28/05*
STD	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	22.88	8.96	4.87	4.87	18.56	6.50	3.80	3.80	30.83	10.86	9.14	9.14
RPBACTL	31.12	7.02	26.56	26.56	22.20	7.28	20.28	20.28	28.95	8.75	15.79	15.79
RPBACTFUNGL	32.32	3.16	40.80	40.80	19.78	6.52	21.95	21.95	27.59	8.90	23.04	23.04
RPBFNOHOAGL	23.76	7.82	39.53	24.18	20.97	4.90	38.89	16.37	19.54	7.53	16.41	16.41
RPBFNOMINL	22.51	8.00	13.64	13.64	13.39	3.65	6.53	6.53	21.23	5.98	7.39	7.39

Table M-5 (cont.): Silica in drainage water, averages and standard error – large column experiment. Silica content of the input water represented by the "Johnson Blank" was high, so the values were corrected for it, shown in μmol* columns.

	Si	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*	*Si*
Sample Date	***8/9/05***	***8/9/05***	***8/9/05***	***8/23/05***	***8/23/05***	***8/23/05***	***8/23/05***	***9/6/05***	***9/6/05***	***9/6/05***	***9/6/05***
Sample ID	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****	***Volume (ml)***	***mg/L***	***umol***	***umol****
Johnson Blank	15	65		132	15	70		120	15	63	
ABIOTICL-1	72	209	144	37				71	83	209	146
ABIOTICL-2	53	170	105	92	96	314	245	123	51	224	161
ABIOTICL-3	42	200	136	115	65	266	197	143	47	237	174
ABIOTICL-4	49	180	115	108	61	235	165	143	48	246	183
ABIOTICL-5	78	174	109	50	133	237	167	78	93	258	194
RPBACTL-1	47	108	43	47	64	107	38	134	43	205	142
RPBACTL-2	46	185	120	107	71	271	202	144	52	265	201
RPBACTL-3	55	199	134	74	91	240	171	130	58	270	207
RPBACTL-5	64	153	88	40				72	71	183	119
RPBACTFUNGL-1	54	76	11	22				47	53	89	26
RPBACTFUNGL-2	46	190	125	98	64	224	154	143	49	251	187
RPBACTFUNGL-3	48	140	75	79	64	180	110	146	47	246	183
RPBACTFUNGL-4				55	60	117	48	91	48	155	92
RPBACTFUNGL-5				38	54	74		76	45	123	59
RPBFNOHOAGL-1	43	125	60	61	60	130	60	76	45	121	58
RPBFNOHOAGL-2	33	132	67	88	47	149	79	93	43	143	79
RPBFNOHOAGL-3	35	53		21				65	31	72	
RPBFNOHOAGL-4	42	131	66	65	58	134	64	100	46	163	100
RPBFNOMINL-1	57	237	172	76	97	261	192	71	71	178	115
RPBFNOMINL-3	50	196	131	100	68	242	172	140	49	244	181
RPBFNOMINL-4	63	206	141	65	57	132	62	142	57	286	223
RPBFNOMINL-5	45	207	142	128	54	244	175	146	43	221	158
	8/9/05	*8/9/05*	*8/9/05*	*8/23/05*	*8/23/05*	*8/23/05*	*8/23/05*	*9/6/05*	*9/6/05*	*9/6/05*	*9/6/05*
Average	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	58.73	186.77	121.83	80.40	88.75	263.08	193.45	111.60	64.33	234.82	171.61
RPBACTL	53.03	161.39	96.46	67.00	75.48	206.23	136.59	120.00	56.01	230.47	167.26
RPBACTFUNGL	49.08	135.48	70.55	58.40	60.60	148.66	104.03	100.60	48.57	172.64	109.43
RPBFNOHOAGL	38.35	110.10	64.29	58.75	55.02	137.45	67.82	83.50	41.20	124.75	79.12
RPBFNOMINL	53.80	211.40	146.47	92.25	68.71	219.69	150.06	124.75	54.64	232.32	169.11
	8/9/05	*8/9/05*	*8/9/05*	*8/23/05*	*8/23/05*	*8/23/05*	*8/23/05*	*9/6/05*	*9/6/05*	*9/6/05*	*8/9/05*
STD	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*	*Volume (ml)*	*mg/L*	*umol*	*umol*
ABIOTICL	15.28	17.22	17.22	35.00	33.28	37.13	37.13	34.93	21.79	18.70	18.70
RPBACTL	8.46	40.36	40.36	30.43	14.04	87.11	87.11	32.54	11.93	43.56	43.56
RPBACTFUNGL	4.13	56.91	56.91	30.60	4.54	66.45	53.60	43.10	2.89	72.95	72.95
RPBFNOHOAGL	4.97	38.34	3.44	27.84	6.60	10.01	10.01	15.93	6.82	39.14	21.04
RPBFNOMINL	7.85	17.74	17.74	27.96	19.52	59.38	59.38	35.92	12.05	45.00	45.00

Table M-6: Cation concentration on soil-exchangeable sites (mg of cation/ g of soil) and the total cation amount on soil-exchangeable sites (μmol) initially and after 1 year incubation (A). The average total cation amount on soil-exchangeable sites (μmol) and standard error were also estimated (B).

A)

Cation exctraction	Extracted Weight	Total Weight	Ca	Ca	K	K	Mg	Mg	Fe	Fe	Al	Al
Sample ID	**g**	**g**	**mg/g**	**umol**	**mg/g**	**umol**	**mg/g**	**umol**	**mg/g**	**umol**	**mg/g**	**umol**
Initial1	4.0024	825	0.003	70.91	0.000	0.00	0.000	14.40	0.001	14.67	0.001	31.69
Initial2	4.0083	825	0.003	71.74	0.000	0.00	0.000	12.78	0.001	16.19	0.001	42.96
Initial3	4.0006	825	0.004	72.67	0.000	0.00	0.000	13.18	0.001	17.40	0.001	38.13
AbioticL1	3.9974	825	0.003	66.48	0.000	0.00	0.000	13.56	0.001	11.65	0.001	27.70
AbioticL2	4.0009	825	0.003	64.63	0.000	0.00	0.000	12.97	0.001	15.60	0.001	39.62
AbioticL3	4.0011	710	0.003	49.68	0.000	0.00	0.000	10.66	0.001	10.26	0.001	23.32
AbioticL4	4.0025	825	0.003	65.95	0.000	0.00	0.000	10.40	0.001	10.84	0.001	28.93
AbioticL5	3.9969	825	0.003	66.49	0.000	0.00	0.000	12.69	0.001	12.16	0.001	24.83
RPBactL1	4.0027	825	0.002	44.09	0.000	0.00	0.000	13.52	0.001	10.00	0.001	25.94
RPBactL2	4.0026	825	0.002	38.10	0.000	0.00	0.000	13.81	0.001	11.74	0.001	29.38
RPBactL3	3.9994	825	0.002	36.63	0.000	0.00	0.000	10.95	0.001	12.41	0.001	33.56
RPBactL5	4.0048	825	0.002	42.12	0.000	0.00	0.000	13.80	0.001	12.24	0.001	32.59
RPBactFungL1	4.0026	825	0.002	45.74	0.000	0.00	0.001	20.14	0.001	11.21	0.001	34.34
RPBactFungL2	4.0007	825	0.002	49.95	0.000	0.00	0.000	13.53	0.001	11.17	0.001	35.25
RPBactFungL3	4.0003	825	0.003	65.99	0.000	0.00	0.001	18.42	0.001	12.37	0.001	30.68
RPBactFungL4	3.9996	825	0.003	65.70	0.000	0.00	0.001	24.18	0.001	11.65	0.001	36.87
RPBactFungL5	4.0029	710	0.003	44.38	0.000	0.00	0.001	18.07	0.001	10.60	0.001	30.23
RPBFNOHoagL1	4.0033	825	0.004	90.20	0.000	0.00	0.001	25.88	0.001	11.41	0.001	29.28
RPBFNOHoagL2	4.0024	825	0.004	84.56	0.000	0.00	0.001	25.62	0.001	11.09	0.001	34.57
RPBFNOHoagL3	4.0087	710	0.005	82.03	0.000	0.00	0.001	20.01	0.001	9.76	0.001	25.45
RPBFNOHoagL4	4.0020	825	0.004	79.88	0.000	0.00	0.001	16.98	0.001	11.04	0.001	24.80
RPBFNOMinL1	4.0031	825	0.001	22.68	0.000	0.00	0.000	5.19	0.001	9.49	0.001	21.01
RPBFNOMinL2	4.0041	825	0.001	29.11	0.000	0.00	0.000	5.19	0.000	7.33	0.001	15.83
RPBFNOMinL3	4.0019	825	0.002	35.11	0.000	0.00	0.000	7.19	0.001	8.09	0.001	21.47
RPBFNOMinL4	4.0006	825	0.001	23.29	0.000	0.00	0.000	4.04	0.001	8.70	0.001	19.06
RPBFNOMinL5	4.0019	710	0.001	21.84	0.000	0.00	0.000	5.94	0.001	7.18	0.001	16.22

B)

	umol	**umol**	**umol**	**umol**	**umol**
Average values	Ca	K	Mg	Fe	Al
Initial	71.77	0.00	13.45	16.09	37.59
AbioticL	62.65	0.00	12.05	12.10	28.88
RPBactL	40.23	0.00	13.02	11.60	30.37
RPBactFungL	54.35	0.00	18.87	11.40	33.47
RPBFNOHoagL	84.16	0.00	22.12	10.82	28.52
RPBFNOMinL	26.40	0.00	5.51	8.16	18.72
STE	Ca	K	Mg	Fe	Al
Initial	0.51	0.00	0.49	0.79	3.27
AbioticL	3.26	0.00	0.64	0.93	2.86
RPBactL	1.73	0.00	0.69	0.55	1.73
RPBactFungL	4.78	0.00	1.72	0.29	1.30
RPBFNOHoagL	2.23	0.00	2.18	0.36	2.24
RPBFNOMinL	2.53	0.00	0.52	0.43	1.17

Table M-7: Cation concentration of tree-biomass (mg of cation/ g of soil) and the total cation amount in tree-biomass (µmol) after 1 year growth. Above-ground and below-ground biomass were measured separately, dry weight and corrected dry weight are listed.

Aboveground (AGB)	Weigh for digestion	Weigh for digestion	Ca mg	Corrected Ca mg	Ca mg/g	Ca umol	K mg	Corrected K mg	K mg/g	K umol
RPBactL1	0.4469	0.4469	1.24	1.24	2.76	30.83	0.63	0.63	1.41	16.07
RPBactL2*	0.1417	0.1417	0.85	0.85	6.00	21.21	0.27	0.27	1.93	7.00
RPBactL3	0.2258	0.2258	0.73	0.73	3.22	18.13	0.19	0.19	0.84	4.88
RPBactL5	0.4457	0.4457	1.47	1.47	3.30	36.68	0.55	0.55	1.24	14.13
RPBactFungL1*	0.4307	0.4307	1.09	1.09	2.54	27.31	0.72	0.72	1.66	18.32
RPBactFungL2	0.4659	0.4659	0.72	0.72	1.55	18.05	0.91	0.91	1.94	23.16
RPBactFungL3	0.5966	0.5966	1.17	1.17	1.96	29.12	1.39	1.39	2.33	35.54
RPBactFungL4	0.8700	0.8700	1.11	1.11	1.27	27.64	1.32	1.32	1.51	33.65
RPBactFungL5*	0.4828	0.4828	0.96	0.96	1.99	23.91	1.04	1.04	2.15	26.52
RPBFNOHoagL1	0.0518	0.0518	0.06	0.06	1.20	1.55	0.00	0.00	0.00	0.00
RPBFNOHoagL2	0.0916	0.0916	0.23	0.23	2.52	5.76	0.06	0.06	0.64	1.49
RPBFNOHoagL3*	0.0957	0.0957	0.25	0.25	2.63	6.28	0.10	0.10	1.01	2.47
RPBFNOHoagL4	0.2750	0.2750	0.04	0.04	0.14	0.94	0.00	0.00	0.00	0.00
RPBFNOMinL1*	0.1181	0.1181	0.32	0.32	2.71	7.97	0.05	0.05	0.41	1.23
RPBFNOMinL2*	0.0490	0.0490	0.09	0.09	1.83	2.23	0.00	0.00	0.00	0.00
RPBFNOMinL3	0.0707	0.0707	0.18	0.18	2.57	4.53	0.00	0.00	0.00	0.00
RPBFNOMinL4	0.0747	0.0747	0.15	0.15	2.02	3.77	0.00	0.00	0.00	0.00
RPBFNOMinL5	0.0543	0.0543	0.10	0.10	1.83	2.47	0.00	0.00	0.00	0.00
Belowground (BGB)	**Weigh for digestion**	**Weigh for digestion**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**K mg/g**	**K umol**
RPBactL1	0.6032	0.4536	0.72	0.54	1.19	13.47	1.03	0.77	1.70	19.74
RPBactL2*	0.2645	0.1989	0.86	0.64	3.24	16.07	0.91	0.68	3.44	17.51
RPBactL3	0.4088	0.3074	0.46	0.35	1.13	8.65	0.67	0.50	1.64	12.89
RPBactL5	0.5779	0.4346	0.58	0.44	1.00	10.85	0.97	0.73	1.68	18.71
RPBactFungL1*	0.8395	0.3778	1.65	0.74	1.97	18.56	2.26	1.02	2.70	26.05
RPBactFungL2	0.7432	0.3344	1.25	0.56	1.69	14.06	1.80	0.81	2.42	20.67
RPBactFungL3	0.7965	0.7965	1.18	1.18	1.48	29.39	1.58	1.58	1.98	40.33
RPBactFungL4	0.9534	0.4290	1.22	0.55	1.27	13.64	1.99	0.90	2.09	22.92
RPBactFungL5*	1.0387	0.3635	2.47	0.87	2.38	21.60	2.40	0.84	2.31	21.46
RPBFNOHoagL1	0.1215	0.0960	0.34	0.27	2.79	6.68	0.24	0.19	1.93	4.75
RPBFNOHoagL2	0.1715	0.1355	0.45	0.35	2.61	8.81	0.47	0.37	2.76	9.56
RPBFNOHoagL3*	0.1294	0.1022	0.43	0.34	3.31	8.45	0.37	0.29	2.82	7.38
RPBFNOHoagL4	0.0858	0.0678	0.20	0.16	2.37	4.01	0.14	0.11	1.61	2.78
RPBFNOMinL1*	0.3594	0.2516	0.32	0.22	0.89	5.57	0.26	0.18	0.71	4.59
RPBFNOMinL2*	0.1058	0.1058	0.10	0.10	0.93	2.46	0.03	0.03	0.31	0.84
RPBFNOMinL3	0.1875	0.1313	0.19	0.13	1.00	3.29	0.10	0.07	0.54	1.81
RPBFNOMinL4	0.1912	0.1912	0.21	0.21	1.12	5.35	0.11	0.11	0.59	2.86
RPBFNOMinL5	0.1475	0.1475	0.19	0.19	1.28	4.72	0.07	0.07	0.48	1.80

Table M-7 (cont.): Cation concentration of tree-biomass (mg of cation/ g of soil) and the total cation amount in tree-biomass (μmol) after 1 year growth. Above-ground and below-ground biomass were measured separately.

Aboveground (AGB)	Mg mg	Corrected Mg mg	Mg mg/g	Mg umol	Fe mg	Corrected Fe mg	Fe mg/g	Fe umol
RPBactL1	0.38	0.38	0.84	15.52	0.01	0.01	0.03	0.25
RPBactL2*	0.27	0.27	1.92	11.18	0.01	0.01	0.04	0.10
RPBactL3	0.18	0.18	0.81	7.55	0.01	0.01	0.03	0.12
RPBactL5	0.39	0.39	0.88	16.20	0.04	0.04	0.08	0.66
RPBactFungL1*	0.16	0.16	0.37	6.58	0.01	0.01	0.02	0.17
RPBactFungL2	0.30	0.30	0.64	12.26	0.01	0.01	0.03	0.25
RPBactFungL3	0.41	0.41	0.68	16.76	0.01	0.01	0.02	0.23
RPBactFungL4	0.47	0.47	0.54	19.39	0.02	0.02	0.02	0.29
RPBactFungL5*	0.41	0.41	0.85	16.90	0.01	0.01	0.02	0.17
RPBFNOHoagL1	0.02	0.02	0.40	0.85	0.00	0.00	0.04	0.04
RPBFNOHoagL2	0.07	0.07	0.77	2.89	0.00	0.00	0.03	0.04
RPBFNOHoagL3*	0.08	0.08	0.88	3.47	0.00	0.00	0.03	0.05
RPBFNOHoagL4	0.01	0.01	0.04	0.44	0.00	0.00	0.01	0.03
RPBFNOMinL1*	0.04	0.04	0.30	1.45	0.00	0.00	0.02	0.05
RPBFNOMinL2*	0.01	0.01	0.26	0.52	0.00	0.00	0.09	0.08
RPBFNOMinL3	0.02	0.02	0.28	0.82	0.00	0.00	0.04	0.05
RPBFNOMinL4	0.02	0.02	0.20	0.63	0.00	0.00	0.02	0.03
RPBFNOMinL5	0.01	0.01	0.21	0.48	0.00	0.00	0.03	0.03
Belowground (BGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
RPBactL1	0.73	0.55	1.21	22.60	1.14	0.86	1.89	15.35
RPBactL2*	0.76	0.57	2.87	23.47	0.35	0.26	1.31	4.66
RPBactL3	0.51	0.39	1.25	15.86	0.76	0.57	1.85	10.18
RPBactL5	0.50	0.38	0.87	15.61	0.76	0.57	1.32	10.26
RPBactFungL1*	2.09	0.94	2.48	38.61	2.94	1.32	3.50	23.60
RPBactFungL2	1.55	0.70	2.09	28.78	2.67	1.20	3.59	21.46
RPBactFungL3	1.40	1.40	1.75	57.50	2.42	2.42	3.04	43.25
RPBactFungL4	1.72	0.77	1.80	31.84	2.51	1.13	2.63	20.16
RPBactFungL5*	2.52	0.88	2.43	36.34	3.65	1.28	3.52	22.83
RPBFNOHoagL1	0.20	0.16	1.68	6.64	0.27	0.21	2.22	3.81
RPBFNOHoagL2	0.33	0.26	1.92	10.69	0.48	0.38	2.80	6.78
RPBFNOHoagL3*	0.30	0.23	2.29	9.63	0.43	0.34	3.31	6.05
RPBFNOHoagL4	0.11	0.09	1.31	3.66	0.14	0.11	1.68	2.03
RPBFNOMinL1*	0.12	0.08	0.32	3.34	0.10	0.07	0.29	1.31
RPBFNOMinL2*	0.04	0.04	0.35	1.54	0.02	0.02	0.15	0.28
RPBFNOMinL3	0.06	0.04	0.33	1.76	0.03	0.02	0.18	0.43
RPBFNOMinL4	0.07	0.07	0.35	2.78	0.04	0.04	0.19	0.66
RPBFNOMinL5	0.06	0.06	0.38	2.29	0.04	0.04	0.28	0.73

Table M-7 (cont.): Cation concentration of tree-biomass (mg of cation/ g of soil) and the total cation amount in tree-biomass (µmol) after 1 year growth. Above-ground and below-ground biomass were measured separately.

Aboveground (AGB)	Al mg	Corrected Al mg	Al mg/g	Al umol	P mg	Corrected P mg	Pmg/g	P umol
RPBactL1	0.10	0.10	0.21	3.54	0.17	0.17	0.37	5.39
RPBactL2*	0.02	0.02	0.15	0.81	0.06	0.06	0.41	1.86
RPBactL3	0.05	0.05	0.22	1.84	0.09	0.09	0.39	2.81
RPBactL5	0.12	0.12	0.28	4.57	0.20	0.20	0.45	6.53
RPBactFungL1*	0.07	0.07	0.16	2.55	0.26	0.26	0.60	8.33
RPBactFungL2	0.04	0.04	0.10	1.65	0.28	0.28	0.60	8.97
RPBactFungL3	0.07	0.07	0.11	2.46	0.35	0.35	0.59	11.38
RPBactFungL4	0.08	0.08	0.09	3.06	0.39	0.39	0.45	12.53
RPBactFungL5*	0.06	0.06	0.12	2.16	0.29	0.29	0.61	9.44
RPBFNOHoagL1	0.00	0.00	0.05	0.09	0.01	0.01	0.19	0.32
RPBFNOHoagL2	0.01	0.01	0.09	0.31	0.02	0.02	0.23	0.68
RPBFNOHoagL3*	0.01	0.01	0.10	0.34	0.03	0.03	0.30	0.92
RPBFNOHoagL4	0.00	0.00	0.00	0.04	0.01	0.01	0.02	0.19
RPBFNOMinL1*	0.01	0.01	0.06	0.24	0.05	0.05	0.43	1.65
RPBFNOMinL2*	0.00	0.00	0.08	0.14	0.02	0.02	0.43	0.68
RPBFNOMinL3	0.00	0.00	0.07	0.17	0.04	0.04	0.56	1.27
RPBFNOMinL4	0.00	0.00	0.05	0.13	0.04	0.04	0.47	1.14
RPBFNOMinL5	0.00	0.00	0.03	0.07	0.02	0.02	0.37	0.65
Belowground (BGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
RPBactL1	0.87	0.65	1.44	24.26	0.24	0.18	0.39	5.78
RPBactL2*	0.28	0.21	1.07	7.91	0.13	0.10	0.51	3.25
RPBactL3	0.47	0.35	1.15	13.13	0.20	0.15	0.49	4.82
RPBactL5	0.62	0.46	1.06	17.13	0.24	0.18	0.41	5.76
RPBactFungL1*	2.71	1.22	3.23	45.18	0.38	0.17	0.45	5.54
RPBactFungL2	2.14	0.96	2.88	35.73	0.37	0.16	0.49	5.32
RPBactFungL3	1.98	1.98	2.48	73.19	0.34	0.34	0.42	10.81
RPBactFungL4	2.19	0.99	2.30	36.54	0.51	0.23	0.54	7.43
RPBactFungL5*	3.98	1.39	3.83	51.57	0.43	0.15	0.41	4.83
RPBFNOHoagL1	0.22	0.17	1.82	6.48	0.05	0.04	0.43	1.33
RPBFNOHoagL2	0.34	0.26	1.96	9.81	0.06	0.05	0.33	1.46
RPBFNOHoagL3*	0.30	0.24	2.30	8.72	0.06	0.04	0.43	1.42
RPBFNOHoagL4	0.11	0.09	1.33	3.34	0.03	0.02	0.32	0.69
RPBFNOMinL1*	0.14	0.10	0.40	3.75	0.25	0.18	0.71	5.73
RPBFNOMinL2*	0.02	0.02	0.23	0.92	0.09	0.09	0.84	2.87
RPBFNOMinL3	0.05	0.04	0.29	1.40	0.14	0.10	0.75	3.19
RPBFNOMinL4	0.05	0.05	0.26	1.81	0.21	0.21	1.08	6.64
RPBFNOMinL5	0.06	0.06	0.40	2.20	0.14	0.14	0.97	4.61

Table M-7 (cont.): Average values for above- and below-ground and for whole biomass were computed and standard errors were estimated for all tree-treatments.

Average (AGB)	Weigh for digestion	Weigh for digestion	Ca mg	Corrected Ca mg	Ca mg/g	Ca umol	K mg	Corrected K mg	K mg/g	K umol
RPBactL	0.32	0.32	1.07	1.07	3.82	26.71	0.41	0.41	1.36	10.52
RPBactFungL	0.57	0.57	1.01	1.01	1.86	25.21	1.07	1.07	1.92	27.44
RPBFNOHoagL	0.13	0.13	0.15	0.15	1.62	3.63	0.04	0.04	0.41	0.99
RPBFNOMinL	0.07	0.07	0.17	0.17	2.19	4.20	0.01	0.01	0.08	0.25
Average (BGB)	**Weigh for digestion**	**Weigh for digestion**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**K mg/g**	**K umol**
RPBactL	0.46	0.35	0.65	0.49	1.64	12.26	0.89	0.67	2.12	17.21
RPBactFungL	0.87	0.46	1.55	0.78	1.76	19.45	2.01	1.03	2.30	26.29
RPBFNOHoagL	0.13	0.10	0.35	0.28	2.77	6.99	0.30	0.24	2.28	6.12
RPBFNOMinL	0.20	0.17	0.20	0.17	1.05	4.28	0.11	0.09	0.53	2.38
Average Whole plant	**Weigh for digestion**	**Weigh for digestion**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**K mg/g**	**K umol**
RPBactL	0.78	0.66	1.72	1.56	5.46	38.97	1.31	1.08	3.47	27.74
RPBactFungL	1.44	1.03	2.56	1.79	3.62	44.66	3.08	2.10	4.22	53.72
RPBFNOHoagL	0.26	0.23	0.50	0.43	4.39	10.62	0.34	0.28	2.69	7.11
RPBFNOMinL	0.27	0.24	0.37	0.34	3.24	8.47	0.12	0.10	0.61	2.63
STE (AGB)	**Weigh for digestion**	**Weigh for digestion**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**K mg/g**	**K umol**
RPBactL	0.08	0.08	0.17	0.17	0.74	4.28	0.11	0.11	0.23	2.71
RPBactFungL	0.08	0.08	0.08	0.08	0.22	1.98	0.13	0.13	0.15	3.21
RPBFNOHoagL	0.05	0.05	0.06	0.06	0.59	1.39	0.02	0.02	0.25	0.61
RPBFNOMinL	0.01	0.01	0.04	0.04	0.19	1.03	0.01	0.01	0.08	0.25
STE (BGB)	**Weigh for digestion**	**Weigh for digestion**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**K mg/g**	**K umol**
RPBactL	0.08	0.06	0.09	0.06	0.53	1.61	0.08	0.06	0.44	1.51
RPBactFungL	0.05	0.09	0.25	0.12	0.19	2.89	0.15	0.14	0.13	3.63
RPBFNOHoagL	0.02	0.01	0.06	0.04	0.20	1.10	0.07	0.06	0.30	1.48
RPBFNOMinL	0.04	0.03	0.04	0.02	0.07	0.60	0.04	0.02	0.07	0.64
STE Whole plant	**Weigh for digestion**	**Weigh for digestion**	**Ca mg**	**Corrected Ca mg**	**Ca mg/g**	**Ca umol**	**K mg**	**Corrected K mg**	**K mg/g**	**K umol**
RPBactL	0.16	0.14	0.26	0.24	1.27	5.89	0.18	0.17	0.67	4.22
RPBactFungL	0.13	0.17	0.32	0.20	0.41	4.87	0.28	0.27	0.28	6.84
RPBFNOHoagL	0.07	0.06	0.11	0.10	0.79	2.48	0.10	0.08	0.55	2.09
RPBFNOMinL	0.06	0.04	0.08	0.07	0.26	1.64	0.05	0.03	0.15	0.88

Table M-7 (cont.): Average values for above- and below-ground and for whole biomass were computed and standard errors were estimated for all tree-treatments.

Average (AGB)	Mg mg	Corrected Mg mg	Mg mg/g	Mg umol	Fe mg	Corrected Fe mg	Fe mg/g	Fe umol
RPBactL	0.31	0.31	1.11	12.61	0.02	0.02	0.05	0.28
RPBactFungL	0.35	0.35	0.62	14.38	0.01	0.01	0.02	0.22
RPBFNOHoagL	0.05	0.05	0.52	1.91	0.00	0.00	0.03	0.04
RPBFNOMinL	0.02	0.02	0.25	0.78	0.00	0.00	0.04	0.05
Average (BGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
RPBactL	0.63	0.47	1.55	19.38	0.75	0.57	1.60	10.11
RPBactFungL	1.86	0.94	2.11	38.62	2.84	1.47	3.26	26.26
RPBFNOHoagL	0.24	0.19	1.80	7.66	0.33	0.26	2.50	4.66
RPBFNOMinL	0.07	0.06	0.35	2.34	0.05	0.04	0.22	0.68
Average Whole plant	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
RPBactL	0.93	0.78	2.67	32.00	0.77	0.58	1.64	10.40
RPBactFungL	2.21	1.29	2.73	52.99	2.85	1.48	3.28	26.48
RPBFNOHoagL	0.28	0.23	2.32	9.57	0.33	0.26	2.53	4.70
RPBFNOMinL	0.09	0.08	0.60	3.12	0.05	0.04	0.26	0.73
STE (AGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
RPBactL	0.05	0.05	0.27	2.02	0.01	0.01	0.01	0.13
RPBactFungL	0.05	0.05	0.08	2.26	0.00	0.00	0.00	0.02
RPBFNOHoagL	0.02	0.02	0.19	0.75	0.00	0.00	0.01	0.01
RPBFNOMinL	0.00	0.00	0.02	0.18	0.00	0.00	0.01	0.01
STE (BGB)	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
RPBactL	0.07	0.05	0.45	2.11	0.16	0.12	0.16	2.18
RPBactFungL	0.20	0.12	0.15	5.02	0.22	0.24	0.18	4.29
RPBFNOHoagL	0.05	0.04	0.20	1.58	0.08	0.06	0.35	1.08
RPBFNOMinL	0.01	0.01	0.01	0.33	0.02	0.01	0.03	0.18
STE Whole plant	**Mg mg**	**Corrected Mg mg**	**Mg mg/g**	**Mg umol**	**Fe mg**	**Corrected Fe mg**	**Fe mg/g**	**Fe umol**
RPBactL	0.12	0.10	0.71	4.14	0.17	0.13	0.17	2.31
RPBactFungL	0.26	0.18	0.23	7.29	0.22	0.24	0.19	4.31
RPBFNOHoagL	0.07	0.06	0.40	2.33	0.08	0.06	0.36	1.09
RPBFNOMinL	0.02	0.01	0.03	0.51	0.02	0.01	0.04	0.19

Table M-7 (cont.): Average values for above- and below-ground and for whole biomass were computed and standard errors were estimated for all tree-treatments.

Average (AGB)	Al mg	Corrected Al mg	Al mg/g	Al umol	P mg	Corrected P mg	P mg/g	P umol
RPBactL	0.07	0.07	0.22	2.69	0.13	0.13	0.41	4.15
RPBactFungL	0.06	0.06	0.12	2.38	0.31	0.31	0.57	10.13
RPBFNOHoagL	0.01	0.01	0.06	0.19	0.02	0.02	0.18	0.53
RPBFNOMinL	0.00	0.00	0.06	0.15	0.03	0.03	0.45	1.08
Average (BGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
RPBactL	0.56	0.42	1.18	15.61	0.20	0.15	0.45	4.90
RPBactFungL	2.60	1.31	2.94	48.44	0.40	0.21	0.46	6.79
RPBFNOHoagL	0.24	0.19	1.85	7.09	0.05	0.04	0.38	1.23
RPBFNOMinL	0.07	0.05	0.32	2.01	0.17	0.14	0.87	4.61
Average Whole plant	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
RPBactL	0.63	0.49	1.40	18.30	0.33	0.28	0.85	9.05
RPBactFungL	2.66	1.37	3.06	50.82	0.72	0.52	1.03	16.91
RPBFNOHoagL	0.25	0.20	1.91	7.28	0.06	0.05	0.56	1.76
RPBFNOMinL	0.07	0.06	0.37	2.16	0.20	0.18	1.32	5.69
STE (AGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
RPBactL	0.02	0.02	0.03	0.84	0.03	0.03	0.02	1.09
RPBactFungL	0.01	0.01	0.01	0.23	0.02	0.02	0.03	0.79
RPBFNOHoagL	0.00	0.00	0.02	0.08	0.01	0.01	0.06	0.17
RPBFNOMinL	0.00	0.00	0.01	0.03	0.01	0.01	0.03	0.19
STE (BGB)	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
RPBactL	0.12	0.09	0.09	3.45	0.02	0.02	0.03	0.59
RPBactFungL	0.37	0.18	0.27	6.84	0.03	0.03	0.02	1.10
RPBFNOHoagL	0.05	0.04	0.20	1.43	0.01	0.01	0.03	0.18
RPBFNOMinL	0.02	0.01	0.04	0.48	0.03	0.02	0.07	0.72
STE Whole plant	**Al mg**	**Corrected Al mg**	**Al mg/g**	**Al umol**	**P mg**	**Corrected P mg**	**P mg/g**	**P umol**
RPBactL	0.15	0.12	0.11	4.29	0.06	0.05	0.05	1.68
RPBactFungL	0.37	0.19	0.29	7.07	0.06	0.06	0.05	1.89
RPBFNOHoagL	0.05	0.04	0.22	1.50	0.01	0.01	0.09	0.35
RPBFNOMinL	0.02	0.01	0.04	0.51	0.03	0.03	0.10	0.91

Table M-8: Average values of dry weight, carbon content, nitrogen content, root length, and ectomycorrhizal root length were computed for above- and below-ground as applied. Root:Shoot ratio was also reported. Standard errors were estimated.

Average (AGB)					**Weight**	**C%**	**C (g)**	**N%**	**N (mg)**
RPBactL					0.32	52%	0.0741	0.86%	1.2186
RPBactFungL					0.57	49%	0.2255	0.78%	3.5392
RPBFNOHoagL					0.13	46%	0.0444	0.52%	0.4976
RPBFNOMinL					0.07	50%	0.0419	1.21%	0.9601
Average (BGB)	**Root length (cm)**	**EM Root length (cm)**	**EM %**	**Root:Shoot ratio**	**Weight**	**C%**	**C (g)**	**N%**	**N (mg)**
RPBactL	1005	-----	0	1.11	0.35	48%	0.0957	6.73%	13.3837
RPBactFungL	812	211	26	0.81	0.46	50%	0.1862	1.16%	4.3298
RPBFNOHoagL	309	55	18	0.78	0.10	48%	0.0491	0.72%	0.7376
RPBFNOMinL	515	31	6	2.26	0.17	47%	0.0971	1.11%	2.2470
STE (AGB)							**Stdev C**		**Stdev N**
RPBactL							0.0112		0.1842
RPBactFungL							0.0145		0.2079
RPBFNOHoagL							0.0000		0.0000
RPBFNOMinL							0.0175		0.3035
STE (BGB)	**STE**	**STE**					**Stdev C**		**Stdev N**
RPBactL	159.80	-----	83.7				0.0000		0.0000
RPBactFungL	58.89	15.30					0.0050		0.0601
RPBFNOHoagL	39.01	18.28					0.0000		0.0000
RPBFNOMinL	76.93	9.82	14.47				0.0253		0.5221

Table M-9: A) Chemical denudation and weathering fluxes were estimated using the following data for 1 year time interval (all in mol). Standard error was estimated for all treatments.
B) Chemical denudation and weathering fluxes were estimated by mass-balance for 1 year interval (mol/m^2/yr). Standard error was estimated for all treatments. m^2 = area of each tube, not mineral surface area.

A)

Input	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*
	mol	*mol*	*mol*	*mol*	*mol*	*mol*	**STE**	**STE**	**STE**	**STE**	**STE**	**STE**
ABIOTICL	3.38E-06	0.00E+00	1.18E-06	4.56E-06	0.00E+00	0.00E+00	1.69E-07	0.00E+00	5.90E-08	2.28E-07	0.00E+00	0.00E+00
RPBACTL	2.90E-06	4.22E-06	4.98E-06	1.21E-05	7.87E-08	5.59E-08	1.45E-07	2.11E-07	2.49E-07	6.05E-07	3.93E-09	2.79E-09
RPBACTFUNGL	8.28E-07	6.29E-06	4.99E-06	1.21E-05	3.73E-07	2.23E-07	4.14E-08	3.15E-07	2.49E-07	6.06E-07	1.87E-08	1.11E-08
RPBFNOHOAGL	8.28E-07	6.29E-06	4.99E-06	1.21E-05	3.73E-07	2.23E-07	4.14E-08	3.15E-07	2.49E-07	6.06E-07	1.87E-08	1.11E-08
RPBFNOMINL	8.28E-07	6.29E-06	4.99E-06	1.21E-05	3.73E-07	2.23E-07	4.14E-08	3.15E-07	2.49E-07	6.06E-07	1.87E-08	1.11E-08
Drainage	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*
Averages	*mol*	*mol*	*mol*	*mol*	*mol*	*mol*	**STE**	**STE**	**STE**	**STE**	**STE**	**STE**
ABIOTICL	1.70E-04	0.00E+00	4.24E-05	2.12E-04			1.41E-05	2.67E-05	3.32E-06	4.42E-05		
RPBACTL	1.50E-04	0.00E+00	4.10E-05	1.91E-04			1.67E-05	0.00E+00	4.80E-06	2.15E-05		
RPBACTFUNGL	1.39E-04	3.06E-05	4.51E-05	2.15E-04			1.64E-05	3.80E-06	4.89E-06	2.50E-05		
RPBFNOHOAGL	9.78E-05	3.16E-05	3.12E-05	1.61E-04			1.57E-05	8.72E-06	4.67E-06	2.91E-05		
RPBFNOMINL	4.10E-05	3.51E-05	1.46E-05	9.08E-05			5.63E-06	6.99E-06	1.78E-06	1.44E-05		
Change in Biomass	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*
	mol	*mol*	*mol*	*mol*	*mol*	*mol*	**STE**	**STE**	**STE**	**STE**	**STE**	**STE**
ABIOTICL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RPBACTL	3.90E-05	2.77E-05	3.20E-05	9.87E-05	1.04E-05	1.83E-05	5.89E-06	4.22E-06	4.14E-06	1.42E-05	1.04E-05	4.29E-06
RPBACTFUNGL	4.47E-05	5.37E-05	5.30E-05	1.51E-04	2.65E-05	5.08E-05	4.87E-06	6.84E-06	7.29E-06	1.90E-05	2.65E-05	7.07E-06
RPBFNOHOAGL	1.06E-05	7.11E-06	9.57E-06	2.73E-05	4.70E-06	7.28E-06	2.48E-06	2.09E-06	2.33E-06	6.90E-06	4.7E-06	1.5E-06
RPBFNOMINL	8.47E-06	2.63E-06	3.12E-06	1.42E-05	7.27E-07	2.16E-06	1.64E-06	8.85E-07	5.07E-07	3.03E-06	7.27E-07	5.11E-07
Change in Soil	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*
	mol	*mol*	*mol*	*mol*	*mol*	*mol*	**STE**	**STE**	**STE**	**STE**	**STE**	**STE**
ABIOTICL	-9.13E-06	0.00E+00	-1.40E-06	-1.05E-05	-3.99E-06	-8.71E-06	3.26E-06	0.00E+00	6.39E-07	3.90E-06	9.33E-07	2.86E-06
RPBACTL	-3.15E-05	0.00E+00	-4.30E-07	-3.20E-05	-4.49E-06	-7.23E-06	1.73E-06	0.00E+00	6.93E-07	2.42E-06	5.49E-07	1.73E-06
RPBACTFUNGL	-1.74E-05	0.00E+00	5.42E-06	-1.20E-05	-4.69E-06	-4.12E-06	4.78E-06	0.00E+00	1.72E-06	6.50E-06	2.94E-07	1.30E-06
RPBFNOHOAGL	1.24E-05	0.00E+00	8.67E-06	2.11E-05	-5.26E-06	-9.07E-06	2.23E-06	0.00E+00	2.18E-06	4.41E-06	3.64E-07	2.24E-06
RPBFNOMINL	2.64E-06	0.00E+00	5.51E-07	3.19E-06	8.16E-07	1.87E-06	2.53E-06	0.00E+00	5.19E-07	3.04E-06	4.32E-07	1.17E-06

B)

Denudation	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*
	mol	*mol*	*mol*	*mol*	*mol*	*mol*	**STE**	**STE**	**STE**	**STE**	**STE**	**STE**
ABIOTICL	1.66E-04	0.00E+00	4.12E-05	2.08E-04	0.00E+00	0.00E+00	1.40E-05	2.67E-05	3.26E-06	4.40E-05	0.00E+00	0.00E+00
RPBACTL	1.47E-04	-4.22E-06	3.60E-05	1.79E-04	-7.87E-08	-5.59E-08	1.66E-05	-2.11E-07	4.55E-06	2.09E-05	3.93E-09	2.79E-09
RPBACTFUNGL	1.38E-04	2.43E-05	4.01E-05	2.03E-04	-3.73E-07	-2.23E-07	1.63E-05	3.48E-06	4.64E-06	2.44E-05	1.87E-08	1.11E-08
RPBFNOHOAGL	9.70E-05	2.53E-05	2.62E-05	1.48E-04	-3.73E-07	-2.23E-07	1.57E-05	8.41E-06	4.42E-06	2.85E-05	1.87E-08	1.11E-08
RPBFNOMINL	4.02E-05	2.88E-05	9.64E-06	7.86E-05	-3.73E-07	-2.23E-07	5.59E-06	6.68E-06	1.53E-06	1.38E-05	1.87E-08	1.11E-08
Denudation Flux	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*
	mol/m^2/yr	*mol/m^2/yr*	*mol/m^2/yr*	*mol/m^2/yr*	*mol/m^2/yr*	*mol/m^2/yr*	**STE**	**STE**	**STE**	**STE**	**STE**	**STE**
ABIOTICL	9.11E-02	0.00E+00	2.26E-02	1.14E-01	0.00E+00	0.00E+00	7.64E-03	1.46E-02	1.78E-03	2.41E-02	0.00E+00	0.00E+00
RPBACTL	8.05E-02	-2.31E-03	1.97E-02	9.79E-02	-4.31E-05	-3.06E-05	9.07E-03	-1.16E-04	2.49E-03	1.15E-02	2.15E-06	1.53E-06
RPBACTFUNGL	7.56E-02	1.33E-02	2.20E-02	1.11E-01	-2.04E-04	-1.22E-04	8.93E-03	1.91E-03	2.54E-03	1.34E-02	1.02E-05	6.10E-06
RPBFNOHOAGL	5.31E-02	1.38E-02	1.43E-02	8.13E-02	-2.04E-04	-1.22E-04	8.59E-03	4.60E-03	2.42E-03	1.56E-02	1.02E-05	6.10E-06
RPBFNOMINL	2.20E-02	1.58E-02	5.28E-03	4.30E-02	-2.04E-04	-1.22E-04	3.06E-03	3.65E-03	8.36E-04	7.55E-03	1.02E-05	6.10E-06
Weathering	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*
	mol	*mol*	*mol*	*mol*	*mol*	*mol*	**STE**	**STE**	**STE**	**STE**	**STE**	**STE**
ABIOTICL	1.57E-04	0.00E+00	3.98E-05	1.97E-04	-3.99E-06	-8.71E-06	1.72E-05	2.67E-05	3.90E-06	4.79E-05	9.33E-07	2.86E-06
RPBACTL	1.55E-04	2.35E-05	6.76E-05	2.46E-04	5.83E-06	1.10E-05	2.42E-05	4.01E-06	9.38E-06	3.76E-05	1.09E-05	6.01E-06
RPBACTFUNGL	1.65E-04	7.80E-05	9.86E-05	3.42E-04	2.14E-05	4.65E-05	2.60E-05	1.03E-05	1.36E-05	4.99E-05	2.68E-05	8.36E-06
RPBFNOHOAGL	1.20E-04	3.24E-05	4.44E-05	1.97E-04	-9.33E-07	-2.01E-06	2.04E-05	1.05E-05	8.93E-06	3.98E-05	5.05E-06	3.74E-06
RPBFNOMINL	5.13E-05	3.14E-05	1.33E-05	9.61E-05	1.17E-06	3.81E-06	9.75E-06	7.56E-06	2.55E-06	1.99E-05	1.14E-06	1.67E-06
Weathering Flux	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*	*Ca*	*K*	*Mg*	*Ca+K+Mg*	*Fe*	*Al*
	mol/m^2/yr	*mol/m^2/yr*	*mol/m^2/yr*	*mol/m^2/yr*	*mol/m^2/yr*	*mol/m^2/yr*	**STE**	**STE**	**STE**	**STE**	**STE**	**STE**
ABIOTICL	8.61E-02	0.00E+00	2.18E-02	1.08E-01	-2.18E-03	-4.77E-03	9.43E-03	1.46E-02	2.13E-03	2.62E-02	5.11E-04	1.57E-03
RPBACTL	8.46E-02	1.29E-02	3.70E-02	1.34E-01	3.19E-03	6.03E-03	1.32E-02	2.19E-03	5.14E-03	2.06E-02	5.99E-03	3.29E-03
RPBACTFUNGL	9.05E-02	4.27E-02	5.39E-02	1.87E-01	1.17E-02	2.54E-02	1.42E-02	5.65E-03	7.47E-03	2.73E-02	1.46E-02	4.58E-03
RPBFNOHOAGL	6.57E-02	1.77E-02	2.43E-02	1.08E-01	-5.11E-04	-1.10E-03	1.12E-02	5.75E-03	4.89E-03	2.18E-02	2.76E-03	2.05E-03
RPBFNOMINL	2.81E-02	1.72E-02	7.29E-03	5.26E-02	6.40E-04	2.09E-03	5.34E-03	4.14E-03	1.40E-03	1.09E-02	6.24E-04	9.16E-04

APPENDIX N

$^{13}CO_2$ pulse-labeling experiment design, set-up and data

$^{13}CO_2$ pulse-labeling experiment:

The experiment was carried out on the large column experiment after 1 year monitoring of growth and water chemistry response to Ca, K, and Mg limitations. The aim of this study was to semi-quantitatively determine the effect of ectomycorrhizal fungi on carbon allocation patterns under nutrient limitations and estimate the cost of weathering in a replicated column experiment. We hypothesized that ectomycorrhizal tree-treatments allocate the largest amount of labeled carbon to the belowground biomass pool compared to the other treatments, but aboveground biomass pool would allocate the same amount of carbon in all treatments.

The column set-up is shown in Appendix H. Three replicates of each treatment were selected for $^{13}CO_2$ labeling and the rest and abiotic columns were kept in a separate room as controls. The growth chamber was turned on with 8/16 hours night/day periods and on 16/21 ^oC night/day temperatures. A plastic and transparent cuvette was placed in the chamber and the 12 seedlings on their holding rack were placed inside of the cuvette (Figure N-1). The cuvette door was sealed, but five openings remained: an intake hole, an exhaust hole, two for the IRGA, and one for the fan cord (the latter was sealed before start of the labeling). Ambient CO_2 was scrubbed from the entire system by routing the circulating air on concentrated NaOH liquid (500 ml). The small capacity of the IRGA pump and the small volume of NaOH did not allow complete draw-down of ambient CO_2, because after 8 hours of scrubbing the CO_2 level was still 300 ppm. The IRGA was disconnected from NaOH and connected on the cuvette on a closed circle. The IRGA was used to monitor gas concentration during the entire experiment. The 99 atom% $^{13}CO_2$ was added through the intake hole in short pulses until the CO_2 in the cuvette reached ~800 ppm (in few minutes). A small blower fan mixed and circulated the air in the cuvette. The drawn-down was monitored and the pulse labeling was repeated when CO_2

concentration decreased to ~400 ppm because of the uptake by photosynthesizing seedlings (following Phillips and Fahey, 2005).

The seedlings were destructively sampled 48 hours after the start of the pulse-labeling, when the CO_2 concentration was ~360 ppm in the cuvette. The trees were carefully removed from the growth tubes and the adhering soil was gently shaken off. After scanning the root system the above and belowground parts were separated and were freeze dried in aluminum foil envelopes. The soil was well homogenized then sub-sampled for extractable cation analyzes and microscopy. All remaining soil was placed into an ultra-cold freezer for later PLFA analyzes. The dried tree-biomass was ground to a powder consistency in liquid nitrogen and 3 mg sample was measured into an aluminum foil capsule to determine carbon and nitrogen isotopic composition. The measurements were made via EA-IRMS, where the elemental analyzer was model ECS 4010 by Costech Analytical (Valencia, CA). The GC column (Costech 051082) was maintained at 40C and a flow rate of 112 mL/min (Qi et al, 2003).The isotope ratio was measured with a mass spectrometer (Delta plus XP, ThermoFinnigan, Bremen Germany). The results are in Table N-1 and Figure N-2 but the PLFA analyses did not get completed.

Phillips, R. P. and Fahey, T. J. (2005) Patterns of rhizosphere carbon flux in sugar maple (*Acer saccharum*) and yellow birch (*Betula allegheniensis*) saplings. Global Change Biology, 11: 983-995.

Qi, H., Coplen, T. B., Geilmann, H., Brand, W. A. and Bohlke, J. K. (2003) Two new organic reference materials for $\delta^{13}C$ and $\delta^{15}N$ measurements and new value for the $\delta^{13}C$ of NBS22 oil. Rapid communications in mass spectrometry, 17: 2483-2487.

Figure N-1: The schematics of the $^{13}CO_2$ pulse-labeling experiment, not to scale, the two columns are just examples of the 12 columns have been in the cuvette.

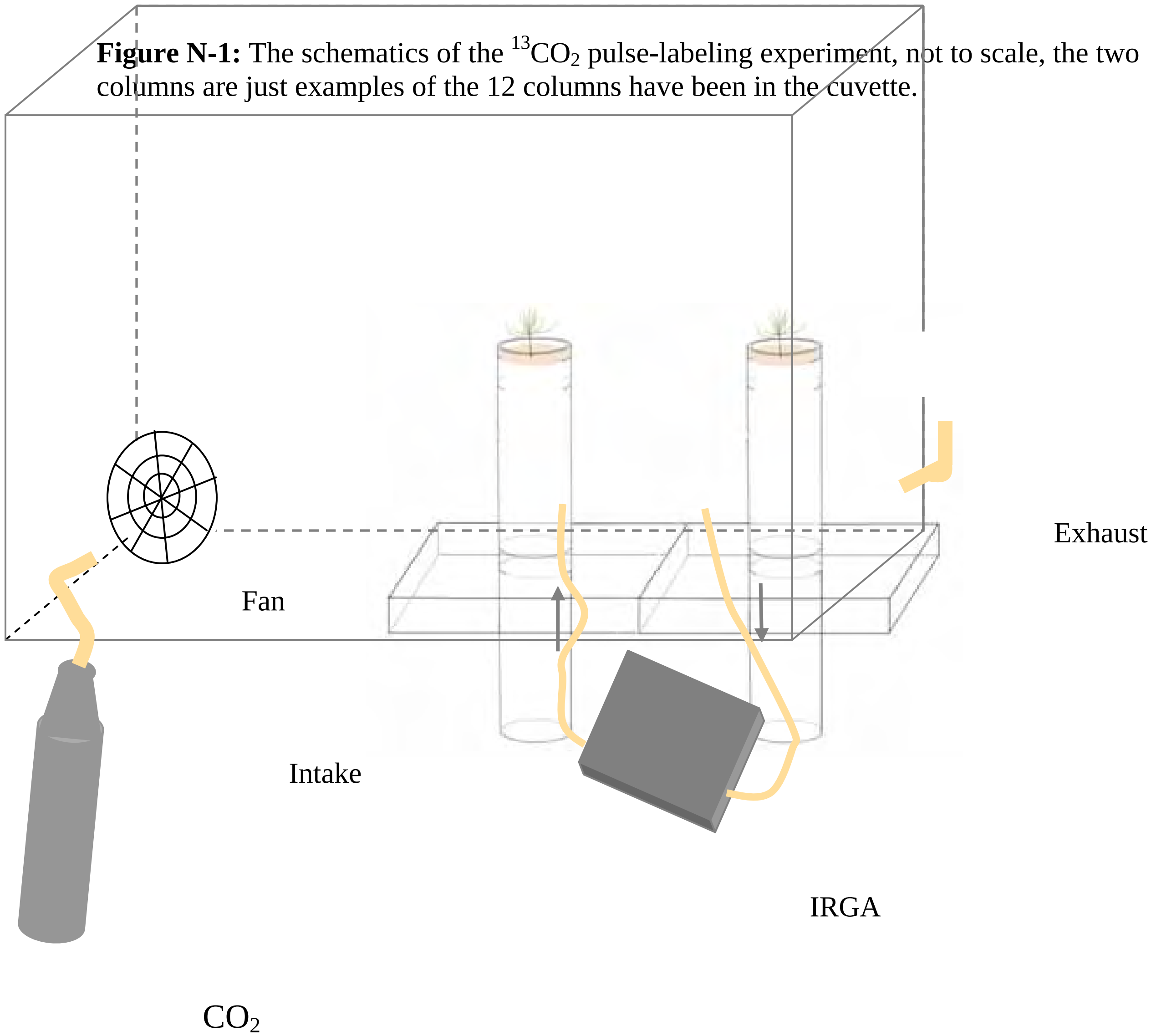


Table N-1: The results of carbon and nitrogen isotope analyses both on control and pulse-labeled samples, above and belowground tree-biomass were separately analyzed. Standard error was estimated. Carbon content of each sample was estimated without (*) and with (**) correction for mineral contamination.

Control samples											
Sample ID	*d ^{13} CVPDB*	*Average*	*STE*	*C% **	*C (g)*	*Average*	*STE*	*Corrected C% ***	*Average*	*Dry Weight * (g)*	*Corrected Weight **(g)*
RPBactL2* AG	-14.8			44.4%	0.0628			44.4%		0.1417	0.1417
RPBactL2* AG	-13.9	-14.4	0.44	60.2%	0.0853	0.0741	0.0112	60.2%	52.3%	0.1417	0.1417
RPBactFungL1* AG	-22.7			49.0%	0.2110			49.0%		0.4307	0.4307
RPBactFungL5* AG	-22.3	-22.5	0.21	49.7%	0.2401	0.2255	0.0145	49.7%	49.4%	0.4828	0.4828
RPBFNOHoagL3* AG	-11.0	-11.0		46.4%	0.0444	0.0444		46.4%	46.4%	0.0957	0.0957
RPBFNOMinL1* AG	-22.9			50.4%	0.0595			50.4%		0.1181	0.1181
RPBFNOMinL2* AG	-19.2	-21.0	1.84	49.8%	0.0244	0.0419	0.0175	49.8%	50.1%	0.0490	0.0490
RPBactL2* BG	-25.2	-25.2		36.2%	0.0957	0.0957		48.1%	48.1%	0.2645	0.1989
RPBactFungL1* BG	-25.7			22.6%	0.1896			50.2%		0.8395	0.3778
RPBactFungL1* BG	-25.6			22.9%	0.1926			51.0%		0.8395	0.3778
RPBactFungL5* BG	-24.0	-25.1	0.54	17.0%	0.1765	0.1862	0.0050	48.5%	49.9%	1.0387	0.3635
RPBFNOHoagL3* BG	-27.9	-27.9		38.0%	0.0491	0.0491		48.1%	48.1%	0.1294	0.1022
RPBFNOMinL1* BG	-25.7			32.1%	0.1155			45.9%		0.3594	0.2516
RPBFNOMinL1* BG	-25.7			35.8%	0.1287			51.1%		0.3594	0.2516
RPBFNOMinL2* BG	-25.6	-25.6	0.03	44.5%	0.0470	0.0971	0.0253	44.5%	47.2%	0.1058	0.1058
Enriched with C^{13}											
Sample ID	*d ^{13} CVPDB*	*Average*	*STE*	*C% **	*C (g)*	*Average*	*STE*	*Corrected C% ***	*Average*	*Dry Weight * (g)*	*Corrected Weight **(g)*
RPBactL1 AG	1059.3			49.9%	0.2232			49.9%		0.4469	0.4469
RPBactL1 AG	1041.8			53.0%	0.2368			53.0%		0.4469	0.4469
RPBactL3 AG	1103.1			53.4%	0.1206			53.4%		0.2258	0.2258
RPBactL5 AG	1096.0	1075.0	14.65	48.8%	0.2175	0.1995	0.0266	48.8%	51.3%	0.4457	0.4457
RPBactFungL2 AG	1663.4			54.7%	0.2548			54.7%		0.4659	0.4659
RPBactFungL3 AG	1212.7			17.8%	0.1064			17.8%		0.5966	0.5966
RPBactFungL4 AG	1511.2	1462.5	132.38	48.9%	0.4251	0.2621	0.0921	48.9%	40.5%	0.8700	0.8700
RPBFNOHoagL1 AG	550.0			50.0%	0.0259			50.0%		0.0518	0.0518
RPBFNOHoagL2 AG	625.6			52.0%	0.0477			52.0%		0.0916	0.0916
RPBFNOHoagL4 AG	221.9	465.8	123.91	42.0%	0.1156	0.0630	0.0270	42.0%	48.0%	0.2750	0.2750
RPBFNOMinL3 AG	981.3			52.0%	0.0368			52.0%		0.0707	0.0707
RPBFNOMinL4 AG	1082.5			51.8%	0.0387			51.8%		0.0747	0.0747
RPBFNOMinL5 AG	891.9	985.2	55.07	49.1%	0.0267	0.0340	0.0037	49.1%	51.0%	0.0543	0.0543
RPBactL1 BG	427.6			41.4%	0.2494			55.0%		0.6032	0.4536
RPBactL3 BG	588.1			41.3%	0.1687			54.9%		0.4088	0.3074
RPBactL5 BG	779.0			27.0%	0.1560			35.9%		0.5779	0.4346
RPBactL5 BG	736.3	632.7	79.69	29.7%	0.1716	0.1864	0.0213	39.5%	46.3%	0.5779	0.4346
RPBactFungL2 BG	1082.1			22.6%	0.1680			50.2%		0.7432	0.3344
RPBactFungL3 BG	1580.0			61.0%	0.4859			61.0%		0.7965	0.7965
RPBactFungL3 BG	1581.5			47.5%	0.3781			47.5%		0.7965	0.7965
RPBactFungL4 BG	1124.9			21.6%	0.2056			47.9%		0.9534	0.4290
RPBactFungL4 BG	1084.2	1290.5	118.72	22.7%	0.2162	0.2908	0.0607	50.4%	51.4%	0.9534	0.4290
RPBFNOHoagL1 BG	228.7			33.2%	0.0404			42.1%		0.1215	0.0960
RPBFNOHoagL2 BG	295.0			36.0%	0.0618			45.6%		0.1715	0.1355
RPBFNOHoagL4 BG	89.8			40.8%	0.0350			51.6%		0.0858	0.0678
RPBFNOHoagL4 BG	89.5	175.7	51.53	39.4%	0.0338	0.0427	0.0065	49.9%	47.3%	0.0858	0.0678
RPBFNOMinL3 BG	344.1			40.5%	0.0760			57.9%		0.1875	0.1313
RPBFNOMinL4 BG	946.8			49.8%	0.0952			49.8%		0.1912	0.1912
RPBFNOMinL5 BG	816.7	702.5	183.11	43.9%	0.0647	0.0786	0.0089	43.9%	50.5%	0.1475	0.1475

Table N-1 (cont.): The results of carbon and nitrogen isotope analyses both on control and pulse-labeled samples, above and belowground tree-biomass were separately analyzed. Standard error was estimated. Carbon content of each sample was estimated without (*) and with (**) correction for mineral contamination.

Control samples											
Sample ID	*d^{15} Nair*	*Average*	*STE*	*N% **	*N (mg)*	*Average*	*STE*	*Corrected N% ***	*Average*	*Weight * (g)*	*Weight **(g)*
RPBactL2* AG	-2.2			0.7%	1.0344			0.7%		0.1417	0.1417
RPBactL2* AG	-1.8	-2.0	0.20	1.0%	1.4028	1.2186	0.1842	1.0%	0.9%	0.1417	0.1417
RPBactFungL1* AG	-4.4			0.9%	3.7471			0.9%		0.4307	0.4307
RPBactFungL5* AG	-3.8	-4.1	0.29	0.7%	3.3313	3.5392	0.2079	0.7%	0.8%	0.4828	0.4828
RPBFNOHoagL3* AG	-4.0	-4.0		0.5%	0.4976	0.4976		0.5%	0.5%	0.0957	0.0957
RPBFNOMinL1* AG	-1.7			1.1%	1.2637			1.1%		0.1181	0.1181
RPBFNOMinL2* AG	-3.6	-2.7	0.93	1.3%	0.6566	0.9601	0.3035	1.3%	1.2%	0.0490	0.0490
RPBactL2* BG	-2.0	-2.0		5.1%	13.3837	13.3837		6.7%	6.7%	0.2645	0.1989
RPBactFungL1* BG	-6.1			0.5%	4.2815			1.1%		0.8395	0.3778
RPBactFungL1* BG	-4.1			0.5%	4.4494			1.2%		0.8395	0.3778
RPBactFungL5* BG	-2.8	-4.3	0.98	0.4%	4.2587	4.3298	0.0601	1.2%	1.2%	1.0387	0.3635
RPBFNOHoagL3* BG	-3.2	-3.2		0.6%	0.7376	0.7376		0.7%	0.7%	0.1294	0.1022
RPBFNOMinL1* BG	-2.2			0.8%	2.6955			1.1%		0.3594	0.2516
RPBFNOMinL1* BG	-1.9			0.8%	2.8393			1.1%		0.3594	0.2516
RPBFNOMinL2* BG	-2.7	-2.2	0.24	1.1%	1.2061	2.2470	0.5221	1.1%	1.1%	0.1058	0.1058
Enriched with C^{13}											
Sample ID	*d^{15} Nair*	*Average*	*STE*	*N% **	*N (mg)*	*Average*	*STE*	*Corrected N% ***	*Average*	*Weight * (g)*	*Weight **(g)*
RPBactL1 AG	-2.8			0.6%	2.5920			0.6%		0.4469	0.4469
RPBactL1 AG	-2.7			0.6%	2.6367			0.6%		0.4469	0.4469
RPBactL3 AG	-2.4			0.7%	1.6483			0.7%		0.2258	0.2258
RPBactL5 AG	-2.9	-2.7	0.11	0.7%	2.8971	2.4435	0.2735	0.7%	0.6%	0.4457	0.4457
RPBactFungL2 AG	-4.6			0.6%	2.6090			0.6%		0.4659	0.4659
RPBactFungL3 AG	-2.9			0.3%	1.7898			0.3%		0.5966	0.5966
RPBactFungL4 AG	-4.9	-4.1	0.62	0.5%	3.9150	2.7713	0.6188	0.5%	0.4%	0.8700	0.8700
RPBFNOHoagL1 AG	-4.4			0.4%	0.2072			0.4%		0.0518	0.0518
RPBFNOHoagL2 AG	-2.4			0.5%	0.4214			0.5%		0.0916	0.0916
RPBFNOHoagL4 AG	-5.6	-4.1	0.94	0.5%	1.4300	0.6862	0.3770	0.5%	0.5%	0.2750	0.2750
RPBFNOMinL3 AG	-1.9			1.2%	0.8555			1.2%		0.0707	0.0707
RPBFNOMinL4 AG	-2.0			1.1%	0.8142			1.1%		0.0747	0.0747
RPBFNOMinL5 AG	-2.8	-2.2	0.28	1.0%	0.5267	0.7321	0.1034	1.0%	1.1%	0.0543	0.0543
RPBactL1 BG	-2.8			0.5%	2.8954			0.6%		0.6032	0.4536
RPBactL3 BG	-3.5			0.5%	2.2075			0.7%		0.4088	0.3074
RPBactL5 BG	-5.2			0.4%	2.3116			0.5%		0.5779	0.4346
RPBactL5 BG	-3.4	-3.7	0.51	0.4%	2.1960	2.4026	0.1663	0.5%	0.6%	0.5779	0.4346
RPBactFungL2 BG	-3.9			0.3%	2.4526			0.7%		0.7432	0.3344
RPBactFungL3 BG	-3.8			0.6%	4.7790			0.6%		0.7965	0.7965
RPBactFungL3 BG	-4.2			0.5%	3.8232			0.5%		0.7965	0.7965
RPBactFungL4 BG	-3.4			0.3%	3.0509			0.7%		0.9534	0.4290
RPBactFungL4 BG	-3.4	-3.7	0.15	0.3%	3.1462	3.4504	0.3970	0.7%	0.7%	0.9534	0.4290
RPBFNOHoagL1 BG	-0.6			0.5%	0.5954			0.6%		0.1215	0.0960
RPBFNOHoagL2 BG	-2.1			0.4%	0.7203			0.5%		0.1715	0.1355
RPBFNOHoagL4 BG	-4.7			0.6%	0.4805			0.7%		0.0858	0.0678
RPBFNOHoagL4 BG	-5.4	-3.2	1.12	0.5%	0.4633	0.5649	0.0595	0.7%	0.6%	0.0858	0.0678
RPBFNOMinL3 BG	-2.1			0.9%	1.6875			1.3%		0.1875	0.1313
RPBFNOMinL4 BG	-1.7			1.2%	2.2944			1.2%		0.1912	0.1912
RPBFNOMinL5 BG	-2.7	-2.1	0.29	1.0%	1.4603	1.8141	0.2490	1.0%	1.2%	0.1475	0.1475

Table N-1 (cont.): Average values were calculated for all treatments with standard errors.

Control average values	*d* ^{13} *CVPDB*		*C (g)*		*d* ^{15} *Nair*		*N (mg)*	
Aboveground B	*Average*	*STE*	*Average*	*STE*	*Average*	*STE*	*Average*	*STE*
RPBactL	-14.4	0.44	0.0741	0.0112	-2.0	0.20	1.2186	0.1842
RPBactFungL	-22.5	0.21	0.2255	0.0145	-4.1	0.29	3.5392	0.2079
RPBFNOHoagL	-11.0	0.00	0.0444	0.0000	-4.0	0.00	0.4976	0.0000
RPBFNOMinL	-21.0	1.84	0.0419	0.0175	-2.7	0.93	0.9601	0.3035
Belowground B								
RPBactL	-25.2	0.00	0.0957	0.0000	-2.0	0.00	13.3837	0.0000
RPBactFungL	-25.1	0.54	0.1862	0.0050	-4.3	0.98	4.3298	0.0601
RPBFNOHoagL	-27.9	0.00	0.0491	0.0000	-3.2	0.00	0.7376	0.0000
RPBFNOMinL	-25.6	0.03	0.0971	0.0253	-2.2	0.24	2.2470	0.5221
Enriched C^{13} Average values	*d* ^{13} *CVPDB*		*C (g)*		*d* ^{15} *Nair*		*N (mg)*	
Aboveground B	*Average*	*STE*	*Average*	*STE*	*Average*	*STE*	*Average*	*STE*
RPBactL	1075.0	14.7	0.1995	0.0266	-2.7	0.1	2.4435	0.2735
RPBactFungL	1462.5	132.4	0.2621	0.0921	-4.1	0.6	2.7713	0.6188
RPBFNOHoagL	465.8	123.9	0.0630	0.0270	-4.1	0.9	0.6862	0.3770
RPBFNOMinL	985.2	55.1	0.0340	0.0037	-2.2	0.3	0.7321	0.1034
Belowground B								
RPBactL	632.7	79.7	0.1864	0.0213	-3.7	0.5	2.4026	0.1663
RPBactFungL	1290.5	118.7	0.2908	0.0607	-3.7	0.1	3.4504	0.3970
RPBFNOHoagL	175.7	51.5	0.0427	0.0065	-3.2	1.1	0.5649	0.0595
RPBFNOMinL	702.5	183.1	0.0786	0.0089	-2.1	0.3	1.8141	0.2490

Figure N-2: The tracer distribution among treatments for both above and belowground biomass compartment.