EVALUATING THE ENVIRONMENTAL IMPACT OF WOODY BIOMASS REMOVAL FOR BIOFUEL PRODUCTION

by

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STATEMENT OF THESIS APPROVAL

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ABSTRACT

Bioenergy is necessary to meet future world-wide energy demands while helping to offset the global impacts of increased carbon dioxide from traditional fossil fuels. Options for producing bioenergy without adversely impacting food, water, and other environmental resources are currently being explored including using woody biomass as feedstock. Key issues among stakeholders include soil and water quality and loss of biodiversity as collecting small-diameter woody biomass may significantly alter post-timber harvesting landscapes. Linkages between land use changes and runoff, erosion, and sedimentation processes in river basins are known to exist but little is known about how land use changes impact the entire ecological function of the watershed. The objectives of this study were to explore using changes in microbial soil populations as a function of woody biomass removal treatment scenarios to determine potential changes in long-term water export and nutrient ecology, measuring changes in sediment erosion and collecting data to measure changes in infiltration/evaporation. This will help us understand the environmental impacts of biomass removal in the production of jet fuel and will be the start of holistic river basin management strategies focused on hydrologic implications of the entire food web.

Microbial population data were collected from 28 one-acre plots subject to different land treatments and analyzed statistically to evaluate a null hypothesis that changes in biomass removal do not impact subsurface environment. Finger printing analysis and bio diversity index were calculated to understand the impact from a biological point of view. Sediment erosion was estimated using the WEPP model and then we tried to compare the model result with observed result. Results indicate that significant removal of biomass is possible without statistically altering the microbial food web, and the sites possessed such unique characteristics for which parameterization of the WEPP model for the whole Pacific Northwest is not possible using the data of these sites. Longer term analysis of soil infiltration and site runoff are needed to quantify the role of climate condition on these findings.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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CHAPTER 1

INTRODUCTION

Sustainable production of bioenergy is necessary to meet future world-wide energy demands while helping to offset the global impacts of increased carbon dioxide from traditional fossil fuels (Berndes 2002; Johansson and Azar 2007; Beringer et al. 2011, Araniola et al. 2014). However, major concerns have been raised regarding the sustainability of large-scale cultivation of energy crops due to social and environmental issues (Koh and Ghazoul 2008; Searchinger et al. 2008). Several options for producing bioenergy without adversely impacting food, land, and other environmental resources are currently being explored. The three main categories are residues from agriculture and forestry, organic wastes, and surplus forestry (Beringer et al. 2011). A promising technology gaining momentum is that of using woody biomass for the production of renewable energy (Alavalapti and Lal 2009; White 2011). The Northwest Advanced Renewables Alliance (NARA), a broad alliance of private industry and educational institutions led by Washington State University and supported by the Agriculture and Food Research Initiative from the USDA National Institute of Food and Agriculture (NIFA), takes a comprehensive approach to building a supply chain within WA, OR, ID and MT for aviation biofuel based on using forest residuals with the goal of increasing efficiency in everything from forestry operations to conversion processes. The mission of NARA is to provide stakeholders, interested in creating a forest residuals to bio-jet industry, with regional solutions that are economically viable, socially acceptable, and meet the high environmental standards of the Pacific Northwest. Forest residuals from logging operations will be used as feedstock to fulfill the project aims of creating a sustainable industry to produce aviation biofuels and important co-products. Key issues among stakeholders include soil and water quality, loss of biodiversity, climate, market sustainability, and competition. Many of these issues are being investigated by different groups such as education, sustainability measurement, feedstock, conversion and outreach as part of the NARA. This study focuses on the hydrologic/environmental concerns and is part of a larger effort by the sustainability measurement group aimed at examining the ecosystem impacts of additional biomass removal. Specifically, we are examining the potential repercussions of incremental woody biomass removal on nutrient, sediment, and water fluxes using innovative microbial methods and state-of-the-art modeling procedures.

The thesis presents findings related to three key aspects of biomass removal associated with changes in: 1) potential long-term soil nutrient behavior as indicated by microbial populations, 2) sediment erosion; and 3) infiltration/evaporation induced hydrologic variations. In response to fluctuations in habitat conditions, including forest disturbances like harvesting, organic matter removal, compaction, microbial population reacts faster than any other natural community. Bacteria are a very important component of the microbial community as they are involved in virtually all of the organic transactions that characterize a healthy soil system, especially with regard to nutrient cycling, and also mediate the oxidation and reduction of many macro- and micronutrients in the soil, facilitating transformations into and out of bioavailable forms. (Brady and Weil 2002).

Several studies have documented the impacts of logging and forest conversion on soil bacteria in tropical climates (Borneman and Triplett 1997; Lee-Cruz et al. 2013), but little has been done in the Pacific Northwest climate regions attempting to quantify incremental biomass removal. Though change in microbial community composition associated with harvesting or changes in vegetation cover (Grigal 2000) has been inconsistent, investigating the change of microbial community for this study will help to understand the effects of ground cover removal on soil nutrient and long-term effects on productivity.

Sediment erosion is another potential impact of ground cover removal. Land areas covered by ground cover like plant biomass live or dead experience a small amount of soil erosion due to rain drop and wind energy as these are dissipated by the biomass layer and the top soil is protected (Agriculture CA 2002; SWAG 2002). Field research has found that timber harvesting tends to compact the soil which increases soil erosion and adversely impacts forest productivity (Yoho 1980). Therefore timber harvesting and ground cover removal sometimes may cause accelerated erosion resulting in deterioration of soil physical properties, nutrient loss, and degraded stream water quality from sediment, herbicides, and plant nutrients (Douglas and Goodwin 1980). The theoretical factors in sediment erosion prediction were examined to determine if the consequences of biomass removal could be explicitly quantified.

Finally, the decrease in residual ground cover due to harvesting and removal of woody biomass may result in a change in evapotranspiration. In turn, this could contribute to changes in subsurface flow and runoff resulting in an overall change in the water balance of the site and additional downstream channel erosion. Several studies have already shown that changing in land cover and land use have a significant effects on evapotranspiration

(ET), soil moisture and groundwater recharge (Hillel 1998; Rodriguez-Iturbe 2000; Eagleson 2002). This study examines precipitation and soil moisture changes as a function of depth to see if any noticeable patterns exist with respect to land treatments.

1.1 Objectives

The overarching goal of this study is to investigate the potential hydrologic and environmental impacts of residual ground cover (biomass) removal in the production of biojet fuel in the Pacific Northwest. This specifically includes: 1) impacts on the potential long-term changes to nutrient ecology as measured by changes in microbial soil populations, 2) changes in sediment erosion from forested environments with less ground cover, and 3) changes in the water balance due to deviation of evaporation and infiltration processes.

The following three objectives will be used to help achieve this goal:

(1) to collect soil samples and examine microbial communities at the test plots in order to predict impacts on soil nutrient and productivity on long term;

(2) to evaluate sediment erosion potential using WEPP to examine biomass harvesting options at field-scale test plots;

(3) to collect and process data and make them useable for developing a predictive water quantity model to evaluate watershed-scale regional impacts of large-scale biomass removal.

A fourth objective, to evaluate the potential impacts of altered hydrologic conditions on stream channels, is part of the overall NARA project but it is not an objective of this thesis as it is being conducted by Dr. John Petrie and his team at Washington State

University. The three study objectives described above will be evaluated using the following hypotheses:

i) H_o: There will be no change in microbial community as a function of land use treatment levels.

H_a: Changes in biomass removal will impact microbial community indicating potential long-term implications to nutrient dynamics and ecosystem function.

ii) H_o: Data from this LTSP site may be parameterized using the WEPP model to determine if similar biomass removal will cause sediment erosion at sites through the Pacific Northwest.

H_a: Data from these sites are too unique to be used elsewhere.

iii) H_o: Increased biomass removal will have no impact on infiltration or the water budget.

H_a: Increased biomass removal will result in more infiltration and less evapotranspiration from sites and thus impact the water budget.

This study will help quantify the effects of woody biomass removal on the soil, water balance, and microbial community of the study sites and thus demonstrate the sustainability of harvesting woody biomass forest residuals as a source of biomass for bioenergy feedstock. Each of the specific hypotheses will be addressed in the following three chapters.

1.2 Description of the Study Sites and Treatment Process

Data for the investigations conducted in this thesis were collected from Weyerhaeuser's Long-Term Soil Productivity (LTSP) site in the southern Willamette

Valley of Oregon (see Figure 1.1 and Figure 1.2). Rather than repeat the information in each chapter, a common description of study sites and biomass treatment options is provided below.

As part of Weyerhaeuser's effort to sustainably manage its more than six million acres of forested timberland in the U.S., it continues to conduct, evaluate, and support research associated with the North American Long-Term Soil Productivity program (Ponder and Fleming 2012). A new Long-Term Soil Productivity (LTSP) site near Springfield, Oregon was created to support the Northwest Advanced Renewables Alliance (NARA) project. A total of 28 one-acre plots were selected by Weyerhaeuser to aid in this investigation and round out an existing regional study, to extend into warmer and drier parts of the Douglas-fir ranges, and to contribute to the broader LTSP network. The treatment plots were laid out in such a way so that any plot could feasibly receive any treatment randomly assigned to it. The original site selection criteria were for one harvest unit in the vicinity of Cottage Grove/Springfield, Oregon, on uniform soil with low rock content of an area large enough to contain the study plots with appropriate buffer between plots to allow equipment movement and access. The harvest unit was selected in the Springfield operating area by Weyerhaeuser. The selected unit is East of Springfield, OR and South of the Mackenzie River on Weyerhaeuser ownership on the Booth Kelly 400 Rd. (Sec 1 18S 01W) at 44.032 Latitude and -122.76 Longitude (Figure 1.1). In addition to a current aerial photo, a LiDAR DEM is available for this site as well as historical photos showing former skid roads and other features, which aides in determining appropriate plot locations.

As illustrated in Figure 1.3, all study plots were laid in on a 9° azimuth to match

Figure 1.1 Location of the LTSP Site in Oregon Regional Map

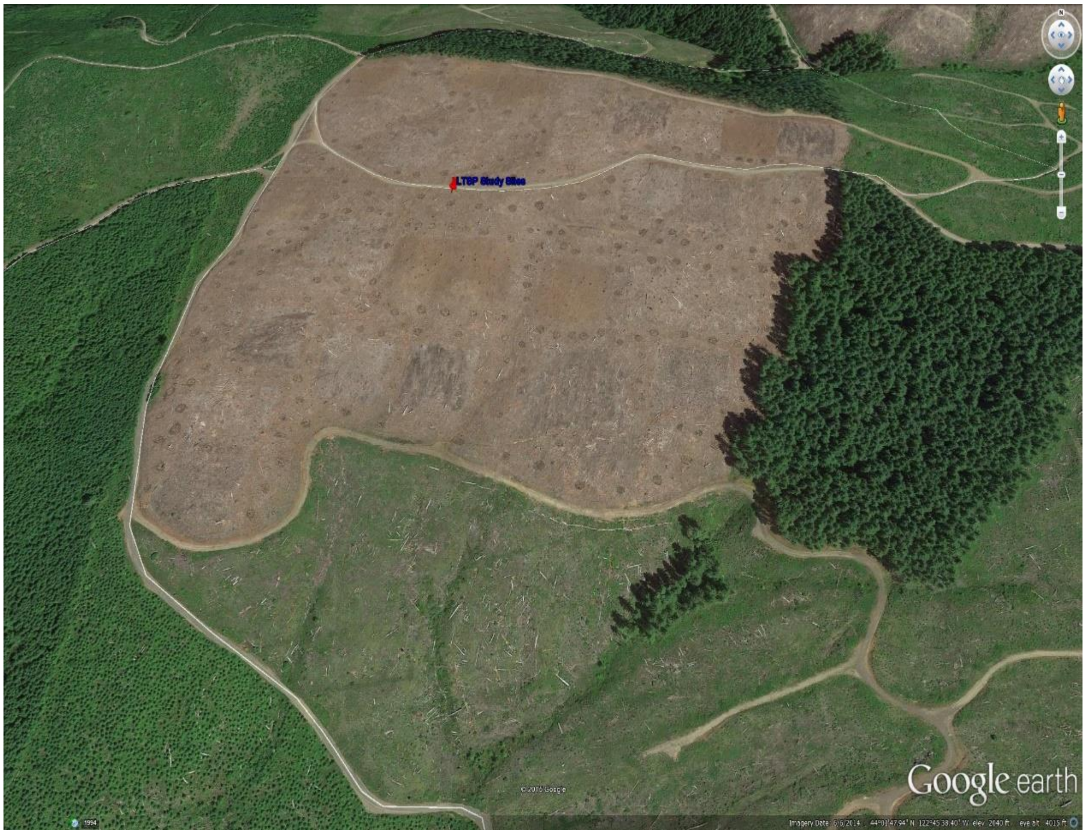

Figure 1.2 Location of the LTSP Sites Satellite Image

site topography and simplify plot installation. These plots were not individual sub-basins for hydrologic analysis but rather part of a larger interconnected network. The study site is between 2000 and 2150ft elevation on gentle slopes of 2 to 20%. The soil is mainly silty clay loam with some percentage of cobby loam consists of three hydrologic soil category C, B and D with an average of 35% sand, 50% silt and 15% clay (http://www.websoilsurvey.sc.egov.usda.gov). The average annual precipitation at this location is 47.5" (1206.5 mm). The month with the most precipitation on average is December with 8.1" (205.7 mm) of precipitation. The month with the least precipitation on average is July with an average of 0.6" (15.2 mm).

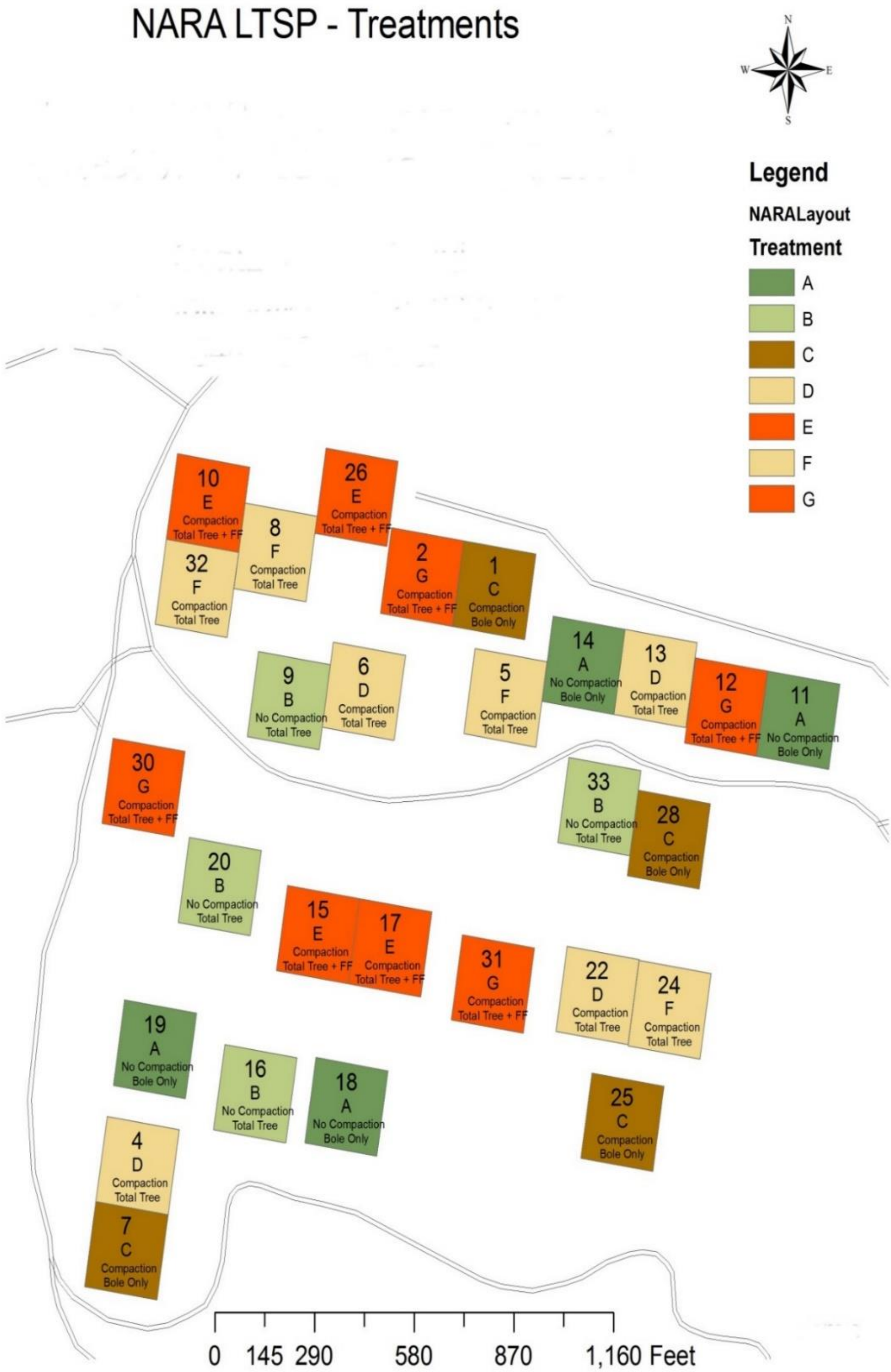

Figure 1.3 LTSP Study Plots and Treatment Combinations

The warmest month, on average, is July with an average temperature of 82°F and the coolest month on average is January, with an average temperature of 34°F. Summers tend to be dry with less than one-third of the precipitation of the wettest winter month, and with less than 30 mm (1.18 in) of precipitation in a summer month (http://www. eugenecascadescoast. org /plan/weather-seasons).

General LTSP "Core" Treatments consists a 3 × 3 factorial combination of compaction (C0, none; C1, moderate; C2, heavy) and aboveground OM removal (OM0, bole only; OM1, whole tree; OM2, whole tree plus forest floor removal). Three levels of organic matter removal and three levels of compaction in a 3 x 3 complete factorial design – totaling 9 treatment plots. Multiple passes with heavy machinery (equipment type varied by LTSP installation) were used to compact soils. Seven different treatment combinations have been applied to 28 study plots; 4 plots of each treatment. Figure 1.2 shows the study sites and the treatment applied to each plot. The treatment combinations are categorized as follows.

A - *No Compaction Bole Only* – Bole only harvest to a saw log top (5" top) all limbs and tops remain on the site. No ground trafficking.

B - *No Compaction Total Tree* - Whole-tree type harvest where ~75+% of limb/top material is removed along with the bole. Remaining material will be dispersed. No ground trafficking.

C - *Compaction Bole Only* - Bole only harvest to a saw log (5") top – all limbs and tops remain across the whole site. Fixed Traffic lanes.

D/F – *Compaction Total Tree* - Whole-tree type harvest where ~75+% of limb/top material is removed along with the bole. Remaining material will be dispersed and equal across like plots. Fixed traffic lanes.

E/G – *Compaction Total Tree + FF* - Whole-tree type harvest where ~90-95% of limb/top material is removed along with the bole. Forest floor and legacy woody debris also removed. Compaction on this treatment will be the baseline for all compaction treatments.

Typical examples of the LTSP plots after woody biomass removal are shown below in Figure 1.4 and Figure 1.5. The compaction tracks caused by harvesting activities are clearly visible in Figure 1.5.

Figure 1.4 LTSP Site of No Compaction Bole Only

Figure 1.5 LTSP Site of Compaction Total Tree+FF

The objectives of this study will be completed by collecting samples from the field for laboratory analysis which includes DNA extraction and finger printing analysis in addition to the statistical analysis by using two-samples t-tests for equal variances for a better understanding of the change in microbial community. The WEPP (Water Erosion Prediction Project), developed by the USDA, will be used to examine the sediment erosion for various treatment after removal of ground cover from study sites. Data will be collected from the moisture probes and weather station that have been installed in the field and will be processed to make them useable for the win UNSAT-H model to determine the change in runoff, infiltration, evapotranspiration and overall water balance by developing a predictive water quantity models that can be used to evaluate watershed-scale regional impacts. The overall outcome is a better indication of the amount of woody biomass that can be removed as forest residuals following conventional harvest without a reduction in productive capacity of the site.

CHAPTER 2

MICROBIAL ANALYSIS OF THE IMPACTS OF LAND USE CHANGE

Forests have always experienced both natural and manmade disturbances like wildfires, harvesting, land development, etc. which in many cases have beneficial long-term effects on forest ecosystems. In managed forests, however, harvesting has become the most important disturbance with compaction of forest soils the ultimate outcome of harvesting. Therefore, theoretically microbial communities, which play an important role in the resilience of forests to disturbances and in the regeneration process, react most rapidly to fluctuations in habitat conditions (Chanasyk et al. 2003; Busse et al. 2006; Smith et al. 2008). A trademark of most soil microbial communities is genetic diversity. For example, bacteria alone account for several thousand distinct genomes in a single gram of soil (Torsvik et al. 1990). Severe compaction had no effect on community size or activity at subtropical or Mediterranean type climate LTSP sites and bacterial community structure and carbon utilization were similar between the reference stand and LTSP plantation, suggesting that harvesting had not much impact on bacteria which agrees with several studies that found that clear-cutting either increases or has no effect on bacterial size and function (Niemala and Sundman 1977; Sundman et al. 1978; Lundgren 1982; Busse et al. 2006).

One of the objectives of this study was to collect soil samples and examine microbial communities at the LTSP test plots to determine if there were any changes caused by removing additional biomass from the field (land treatments). Specifically, the goal was to determine if there was any significant change in bacterial community structure indicating potential long-term implications to nutrient dynamics. Again, the null and alternative hypotheses for this analysis are:

- H_o: There will be no changes in microbial community.
- H_a: Changes in soil moisture as a result of biomass removal may impact microbial community.

2.1 Methodology

2.1.1 Collection of Soil Sample

Soil samples were collected in May 2014 from LTSP plots to perform DNA extraction test in the laboratory. Nine samples were collected from each plot in the following pattern: South-West, South, South-East, North-West, North, North-East, Center, Mid-West, and Mid-East (Figure 2.1).

The samples were taken at a depth of 0-20cm using a hand shovel. Rubber gloves were used at the time of collecting soil samples and the shovel was always cleaned properly after taking samples from every location.

The soil samples were kept in 8-ounce, air tight jars and were preserved in coolers at a temperature of less than 4°C to keep the microbial community safe. Dry ice was used to maintain the temperature of the coolers. A total of 252 samples from the LTSP plots and four samples from an unharvested plot were collected for subsequent DNA Extraction

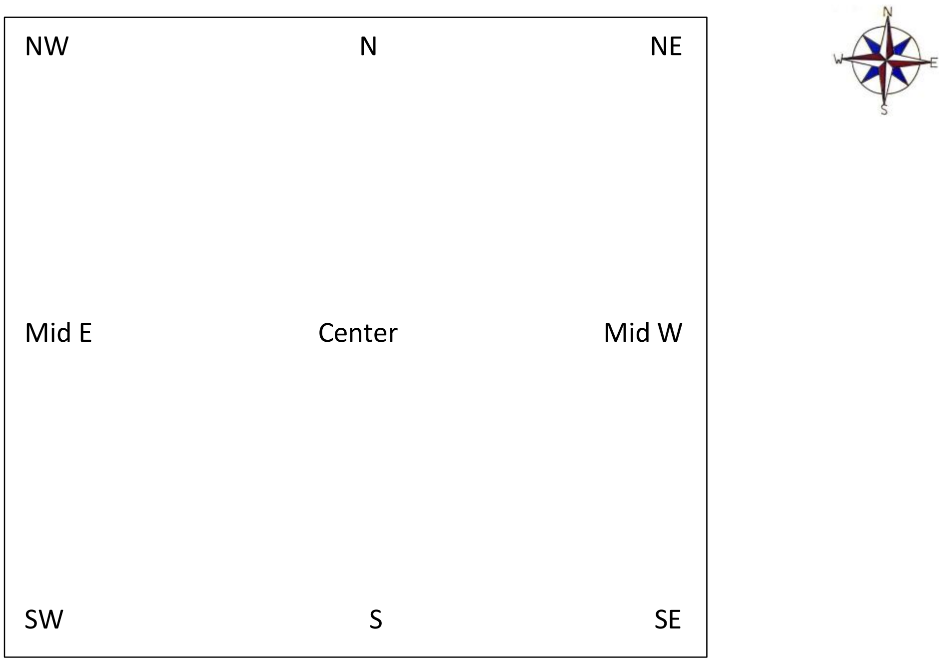

Figure 2.1 Sample Collection Procedure from Each Plot

testing in the laboratory. The samples were kept in a -20°C temperature freezer in the laboratory to preserve them for a long time.

2.1.2 DNA Extraction Method

Different methods have been published for extracting DNA from soil (Ogram et al. 1987; Steffan et al. 1988; Jacobson and Rusmussen 1992; Tsai and Olsen 1991; Smalla et al. 1993; Zhou et al. 1996; Kresk and Wellington 1999; Hurt et al. 2001) with a variety of procedures which are laborious, time-consuming and not suited for processing a large number of samples (Whitehouse and Hottel 2007). In addition to several different DNA extraction and purification methods which have been developed specifically for soils over the years, a variety of commercial extraction kits are also available which are cheaper and faster than the traditional methods (Tsai and Olson 1992; Young et al. 1993; Harry et al. 1999; Varanini and Pinton 2001; Mahmoudi et al. 2011). Among the commercial DNA extraction kits, the highest A260/A230 ratios as well as the cleanest DNA was provided by the Power Max or Power Soil kits depending on the soil but the higher yield of the Power Soil isolation kit than the Power Max kit makes the previous one a better choice in terms of providing the greatest amount of high-quality DNA (Mahmoudi et al. 2011).

2.1.3 DNA Extraction Test

MO Bio's Power Soil DNA isolation kit was used in the laboratory to extract DNA from the collected soil samples. Four DNA extraction tests for each soil sample, i.e., 144 for each treatment and 16 for the control one, concluding a total of 1024 tests have been performed. MO BIO has developed a standard protocol (Appendix – A) to extract DNA from any soil using this kit which has been followed in this analysis. According to the protocol 0.25g soil was taken from each 8-ounce jar of soil samples and then six different solutions were used in different stages of the experiment. The detail of solution C1, C2, C3, C4, C5 and C6 is given in Appendix – B. After isolating the DNA following the above protocol, a Nano Drop 2000c Spectrophotometer was used to measure the concentration of DNA. Before using the Nano drop meter, it was cleaned by using sterile DNA-free PCR Grade water. Then using solution C6 a blank test was run to make sure that there was no DNA. After running the blank test a drop of 2µl was put on the tiny small hole of the spectrophotometer. Then the lid of the meter was put down. A software has already been installed in the connecting computer named Nano drop software which calculated the concentration of DNA in ng/µl.

2.1.4 Finger Printing Analysis

Forty samples out of 1024 DNA samples, 5 from each treatment including the control one, have been selected for the finger printing analysis, in such a way so that those can be considered as the representative sample for each treatment. Community fingerprinting is used to profile the diversity of microbial community. These techniques show how many variants of a gene are present instead of counting individual cells in a sample. Community fingerprinting presents an overall picture of a microbial community instead of identification of individual microbe species, but still it is used to measure biodiversity or track changes in community structure. DNA fingerprinting allows the rapid assessment of the genetic structure of complex communities in diverse environments (Muyzer and Smalla 1998) and of the extent of changes caused by environmental disturbances (Massol-Deya et al. 1997; Engelen et al. 1998). There are different types of fingerprinting techniques among which the two most common techniques are i) T-RFLP (Terminal restriction fragment length polymorphism) and ii) ARISA (Automated ribosomal intergenic spacer analysis).

ARISA, which provides an estimates of microbial richness and diversity based on the length heterogeneity of the bacterial rRNA operon 16S-23S intergenic spacer, whereas T-RFLP targets the 16S rRNA gene, has been chosen for this study. Though the two techniques provided similar results in the analysis of community structure, bacterial richness and diversity estimates were found significantly higher using ARISA which is also more effective than T-RFLP in detecting the presence of bacterial taxa accounting for <5% of total amplified product (Danovaro et al. 2006). Additional advantages of ARISA are it is fast and cheap as ARISA does not require the enzymatic digestion of the amplicons, as required for T-RFLP (Hartmann et al. 2005; Danovaro et al. 2006). The study conducted by Hartmann et al. (2005), showed that these two fingerprinting techniques were statistically equivalent in distinguishing bacterial communities in soil samples subjected to different treatments. ARISA, because of its instrumental automatism and the easy analysis of the output data, has become a very suitable technique for analyzing and comparing large numbers of samples from different sources like freshwater, bacterioplankton and different soils (Fisher and Triplett 1999; Fisher et al. 2000; Graham et al. 2001; Ranjard et al. 2001).

2.1.5 ARISA Procedure

Extracted DNA was amplified using primers ITSF/ITSReub. The 5´ and 3´ ends of primers ITSF (5_-GTCGTAACAAGGTAGCCGTA-3´) and ITSReub (5´-GCCAAGGCATCCACC-3´) were, respectively, complementary to positions 1423 and 1443 of the 16S rRNA and 38 and 23 of the 23S rRNA of *E. coli*. ITSF and ITSReub amplified all the bacteria at DNA template concentrations from 280 to 0.14 ng/µl^{-1} while the other primer sets failed to detect the spacers of one or more bacterial strains and the number of peaks obtained for natural soil community profile using ITSF/ITSReub were double than S-D-Bact-1522-b-S-20/L-D-Bact-132-a-A-18 primer set obtained while 1406F/23Sr primer set was failed to obtained any peak which suggests the use of the ITSF/ITSReub primer set was appropriate for research where the purpose was to evaluate bacterial community structure by ARISA (Cardinale et al. 2004).

The forward primer ITSF had been labeled at the 5´ end with the fluorescent dye. All PCRs were performed in a volume of 25µl in a Master cycler gradient (Eppendorf AG, Germany) using the PCR Master Mix 2x (Promega USA). Thirty-five PCR cycles were used, consisting of 94°C for 1 min, 55°C for 0.45 min, and 72°C for 2 min, preceded by 3 min of initial denaturation at 94°C and followed by a final extension of 2 min at 72°C. Negative controls containing the PCR mixture but without the DNA template were run to check for eventual contamination of the PCR reagents, during each amplification analysis. For staining and visualization of DNA, the PCR products were checked on agarose–Tris-borate-EDTA (TBE) gels (1%) containing ethidium bromide.

ARISA samples were prepared from this PCR samples by following the protocol given below: 25µl of filtered sterilized DI (nuclease-free) water was added to each 20 µl of PCR product. Then 10.0µL formamide (thawed from -20°C) was dispensed into the 96 well plate. A micro liter of diluted PCR product was then added to the formamide dispensed into the well plates. After sealing with adhesive film and wrapping in aluminum foil, the plate was submitted to the genomic core facilities lab for running ARISA. Internal standard dye (ROX) was added to the samples by core facilities lab.

2.2 Results

Forests biomasses are becoming a potential source for feedstock for bioenergy to develop sustainable bioenergy systems as climate change and energy costs are the main concerns at present. In a managed forest, the increase of the intensity of woody biomass harvest include increased removal of residue which is usually left in the forests, including increased harvest frequency and increased harvested area (Jang et al. 2013; Peckham et al. 2013). Biomass harvesting could possibly impact the microbial community, water balance system and the overall environment including the ecosystems in various ways. For example, compaction of the forest floor during the biomass harvesting process decreases soil porosity, hampering the movement of air, water, and nutrients needed for microbial activity and also may have an impact on productivity as deeper fine-textured soils typically display decreases in forest productivity following compaction and displacement whereas shallower, coarse-textured soils are more likely to evidence an increase in productivity ensuing some level of compaction (Thibodeau et al. 2000; Powers et al. 2005; Hayes et al. 2005; Kimsey Jr. et al. 2011). This study focuses on the potential environmental impacts of residual ground cover (biomass) removal in the production of biojet fuel in the Pacific Northwest which includes the impact on potential long-term changes to nutrient ecology as measured by changes in microbial soil populations, water balance due to evaporation and infiltration processes and sediment erosion from forested environments.

2.2.1 DNA Extraction Results

Results of the DNA extraction tests are summarized in Table 2.1 and the full results is given in Appendix – C. From the table it has been found that the average DNA concentrations (ng/µl) are different for different plots, even for those undergoing the same treatment process. For example, plot #14 and plot #18 both have the same treatment of "No Compaction - Bole Only" but the average DNA concentration is 51.84 ng/µl and 12.08 ng/µl, respectively, whereas considering plot #19 and plot #9 it has been found that the average DNA concentrations are 37.14 ng/µl and 37.85 ng/µl (although the treatment processes are different). Four samples were taken from an unharvested control site where the average DNA concentrations is 15.44 ng/µl.

Table 2.1 Results of DNA Extraction Tests for the LTSP Sites

Treatments		Plot Number	Average DNA Concentrations (ng/µl)
A	No Compaction Bole Only	11	29.06
		14	51.84
		18	12.08
		19	37.14
B	No Compaction Total Tree Removal	9	37.85
		16	31.75
		20	63.77
		33	20.69
C	Compaction Bole Only	1	56.40
		7	38.48
		25	20.27
		28	45.84
D	Compaction Total Tree Removal	4	33.08
		6	24.70
		13	35.14
		22	21.49
E	Compaction Total Tree + Forest Floor	10	14.64
		15	20.35
		17	23.19
		26	28.92

Table 2.1 Continued

Treatments		Plot Number	Average DNA Concentrations (ng/µl)
F	Compaction Total Tree	5	49.06
		8	19.31
		24	27.51
		32	30.07
G	Compaction Total Tree + Forest Floor	2	27.60
		12	16.13
		30	28.32
		31	15.01
	No Treatment	Unharvested Site	15.44

2.2.2 Hypothesis Analysis of DNA Concentrations

Two sample t-tests assuming equal variances was used to analyze the DNA concentrations found from different soil samples and to observe if there is any correlation between the variation of DNA concentrations and different treatments processes. Table 2.2 represents the result of the hypothetical analysis, i.e., whether the null hypothesis is accepted or rejected including type-II error, power of the test, and effect size in terms of Cohen's d for 144 observations, whereas Table 2.3 displays the same parameters mentioned above for 36 observations.

From Table 2.2, it has been found that only for seven cases, the null hypothesis, which is no changes in microbial community due to land use changes, has been accepted with a large probability of type –II error whereas from Table 2.3, the acceptance of the null hypothesis increased to 13 cases with almost the same probability of type – II error. Effect size for which the null hypothesis has been rejected varies from small ($0<d<0.2$) to medium ($0.2<d<0.8$) for almost all cases except two instances, which are B-Control and C-Control for 144 observations. Effect size for 36 observations is medium for 10 cases and large ($d>0.8$) for 4 cases.

2.2.3 Fingerprinting Analysis Results

There are different methods for community fingerprinting, out of which the Automated Ribosomal Intergenic Spacer Analysis (ARISA) method will be followed in this case. The complex profiles for eight different land disturbances with peaks ranging from 200bp to 1002bp as extrapolated by the Applied Biosystems Genemapper V3.7 with size standard GS 500 Liz were obtained and are shown in Figure 2.2 to Figure 2.9.

Table 2.2 Hypothesis Testing for 144 Observations

Treat-ment	Df	t stat	P	Result based on P value α=0.05	Comments	Type II Error (β)	Power of the test (1- β)	Cohen's d (Effect size)
A-B	282	-1.9053	0.0578	P> α	Null hypothesis accepted	0.5255	0.4745	
A-C	283	-2.3129	0.0214	P< α	Null hypothesis rejected			0.274
A-D	282	1.3784	0.1692	P> α	Null hypothesis accepted	0.7191	0.2809	
A-E	284	3.8968	0.0001	P< α	Null hypothesis rejected			0.460
A-F	283	0.2945	0.7686	P> α	Null hypothesis accepted	0.94	0.0600	

Table 2.2 Continued

Treat-ment	Df	t stat	P	Result based on P value α=0.05	Comments	Type II Error (β)	Power of the test (1- β)	Cohen's d (Effect size)
A-G	283	3.9236	0.0001	P< α	Null hypothesis rejected			0.464
A-Control	156	2.3740	0.0188	P< α	Null hypothesis rejected			0.626
B-C	283	-0.5346	0.5933	P> α	Null hypothesis accepted	0.9166	0.0834	
B-D	282	3.7116	0.0002	P< α	Null hypothesis rejected			0.440
B-E	284	6.3895	0.0000	P< α	Null hypothesis rejected			0.755

Table 2.2 Continued

Treat-ment	Df	t stat	P	Result based on P value α=0.05	Comments	Type II Error (β)	Power of the test (1- β)	Cohen's d (Effect size)
B-F	283	2.4259	0.0159	P< α	Null hypothesis rejected			0.287
B-G	283	6.4502	0.0000	P< α	Null hypothesis rejected			0.764
B-Control	156	3.4268	0.0008	P< α	Null hypothesis rejected			0.903
C-D	283	4.0149	0.0001	P< α	Null hypothesis rejected			0.475
C-E	285	6.4781	0.0000	P< α	Null hypothesis rejected			0.764

Table 2.2 Continued

Treat-ment	Df	t stat	P	Result based on P value α=0.05	Comments	Type II Error (β)	Power of the test (1- β)	Cohen's d (Effect size)
C-F	284	2.8234	0.0051	P< α	Null hypothesis rejected			0.334
C-G	284	6.5247	0.0000	P< α	Null hypothesis rejected			0.771
C-Control	157	3.2873	0.0012	P<α	Null hypothesis rejected			0.866
D-E	284	3.1835	0.0016	P< α	Null hypothesis rejected			0.376
D-F	283	-1.2259	0.2213	P> α	Null hypothesis rejected			0.145

Table 2.2 Continued

Treat-ment	Df	t stat	P	Result based on P value α=0.05	Comments	Type II Error (β)	Power of the test (1- β)	Cohen's d (Effect size)
D-G	283	3.2274	0.0014	P< α	Null hypothesis rejected			0.382
D-Control	156	2.6245	0.0095	P< α	Null hypothesis rejected			0.692
E-F	285	-4.1288	0.0000	P< α	Null hypothesis rejected			0.487
E-G	285	-0.0171	0.9863	P> α	Null hypothesis accepted	0.95	0.0500	
E-Control	158	1.2973	0.1964	P> α	Null hypothesis accepted	0.8204	0.1796	

Table 2.2 Continued

Treat-ment	Df	t stat	P	Result based on P value α=0.05	Comments	Type II Error (β)	Power of the test (1- β)	Cohen's d (Effect size)
F-G	284	4.1747	0.0000	P< α	Null hypothesis rejected			0.493
F-Control	157	2.7458	0.0067	P< α	Null hypothesis rejected			0.723
G-Control	157	1.3524	0.1782	P> α	Null hypothesis accepted	0.8182	0.1818	

Table 2.3 Hypothesis Testing for 36 Observations

Treat-ment	Df	t stat	P	Result based on P value α=0.05	Comments	Type II Error	Power of the test (1- β)	Cohen's d (Effect size)
A-B	72	-1.090	0.2794	P> α	Null hypothesis accepted	0.8066	0.1934	
A-C	72	-1.305	0.1961	P> α	Null hypothesis accepted	0.7432	0.2568	
A-D	72	0.7568	0.4517	P> α	Null hypothesis accepted	0.8823	0.1177	
A-E	72	1.9175	0.0593	P> α	Null hypothesis accepted	0.5169	0.4831	
A-F	72	0.1379	0.8905	P> α	Null hypothesis accepted	0.9478	0.0522	

Table 2.3 Continued

Treat-ment	Df	t stat	P	Result based on P value α=0.05	Comments	Type II Error (β)	Power of the test (1- β)	Cohen's d (Effect size)
A-G	72	2.1257	0.0371	P< α	Null hypothesis rejected			.501
A-Control	52	2.2528	0.0287	P< α	Null hypothesis rejected			.676
B-C	72	-0.310	0.7575	P> α	Null hypothesis accepted	0.9389	0.0611	
B-D	72	2.156	0.0345	P< α	Null hypothesis rejected			.508
B-E	72	3.356	0.0013	P< α	Null hypothesis rejected			.791

Table 2.3 Continued

Treat-ment	Df	t stat	P	Result based on P value α=0.05	Comments	Type II Error (β)	Power of the test (1- β)	Cohen's d (Effect size)
B-F	72	1.410	0.1631	P> α	Null hypothesis accepted	0.7086	0.2914	
B-G	72	3.686	0.0004	P< α	Null hypothesis rejected			.868
B-Control	52	3.330	0.0016	P< α	Null hypothesis rejected			1.000
C-D	72	2.279	0.0257	P< α	Null hypothesis rejected			.537
C-E	72	3.364	0.0012	P< α	Null hypothesis rejected			.792

Table 2.3 Continued

Treat-ment	Df	t stat	P	Result based on P value α=0.05	Comments	Type II Error (β)	Power of the test (1- β)	Cohen's d (Effect size)
C-F	72	1.609	0.1121	P> α	Null hypothesis accepted	0.6369	0.3631	
C-G	72	3.637	0.0005	P< α	Null hypothesis rejected			.857
C-Control	52	3.210	0.0023	P<α	Null hypothesis rejected			.964
D-E	72	1.5396	0.1282	P> α	Null hypothesis accepted	0.6627	0.3373	
D-F	72	-0.746	0.4582	P> α	Null hypothesis accepted	0.8842	0.1158	

Table 2.3 Continued

Treat-ment	Df	t stat	P	Result based on P value α=0.05	Comments	Type II Error (β)	Power of the test (1- β)	Cohen's d (Effect size)
D-G	72	1.832	0.0712	P> α	Null hypothesis accepted	0.5507	0.4493	
D-Control	52	2.336	0.0235	P< α	Null hypothesis rejected			.701
E-F	72	-2.137	0.0361	P< α	Null hypothesis rejected			.503
E-G	72	0.121	0.8978	P> α	Null hypothesis accepted	0.9481	0.0519	
E-Control	52	1.189	0.2399	P> α	Null hypothesis accepted	0.8152	0.1848	

Table 2.3 Continued

Treat-ment	Df	t stat	P	Result based on P value α=0.05	Comments	Type II Error (β)	Power of the test (1- β)	Cohen's d (Effect size)
F-G	72	2.443	0.0171	P< α	Null hypothesis rejected			.575
F-Control	72	2.637	0.0111	P< α	Null hypothesis rejected			.792
G-Control	52	1.222	0.2275	P> α	Null hypothesis accepted	0.8258	0.1742	

All peaks from the electropherograms corresponding to spacer sizes ranging between 86 to 890bp were considered (Table 2.4). Each spike in the figure below a background level represents a different potential microbial community. The probability of the signal representing a community increases with the size of the spike (y-axis). Even in samples of the same treatment there are some obvious variations although patterns and trends do exist. With a low fluorescence threshold of 50 U of fluorescence intensity as well as considering optimal and similar resolution power throughout the entire process, between 20 and 133 bands were detected per profile with a mean of 401 peaks per treatment and a standard deviation of 60. Analyzing the structure of the profiles characterized by the number and the length distribution of major bands (i.e., peaks of highest relative fluorescence intensity) which were easily distinguishable from the electrophoregrams, a pattern was found which seemed to be different among some treatments and the same for others. The major bands in the profiles of treatment A, C and no treatment (Unharvested) were of small fragment sizes from 250 to 475bp whereas the major bands in profiles of treatment D and G were between 300 to 700bp. Profiles of treatments B, E, F and G have some noticeable major bands between 600 and 700bp. Bands over 800bp were found in most of the profiles regardless of treatments. No major bands of 1002bp were observed among the profiles.

A total of 1197 intergenic spacer sequences out of 3211 were examined by using the data base prepared by Kovacs et al. (2010). A total of 56 genera were found, the majority of which are from taxa belonging to either the gram positive or gram negative phyla (Table 2.5). Diversity indices are calculated by using the Shannon – Weaver diversity index method (Shannon and Weaver 1948) and Simpson's method (Simpson 1949).

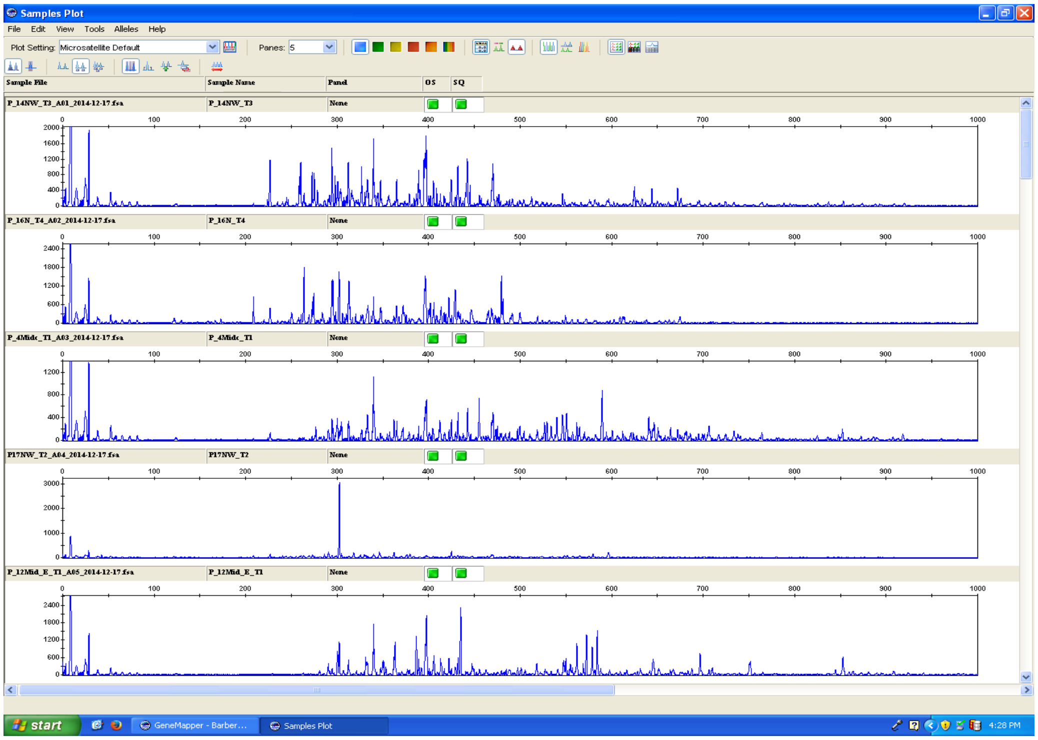

Figure 2.2 ARISA Test Run Result for Treatment A

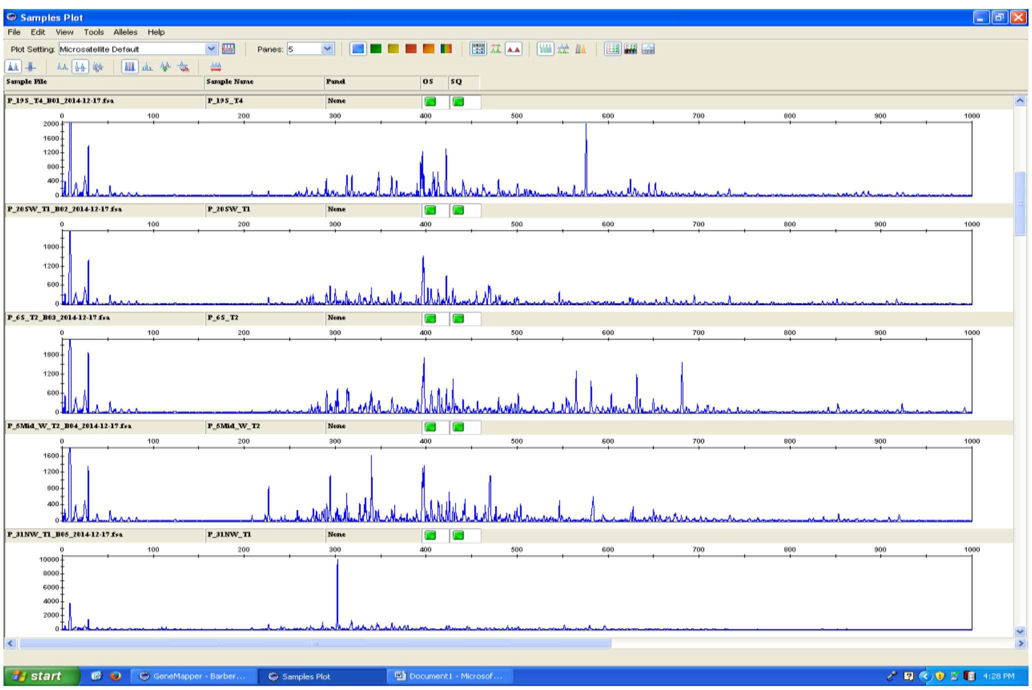

Figure 2.3 ARISA Test Run Result for Treatment B

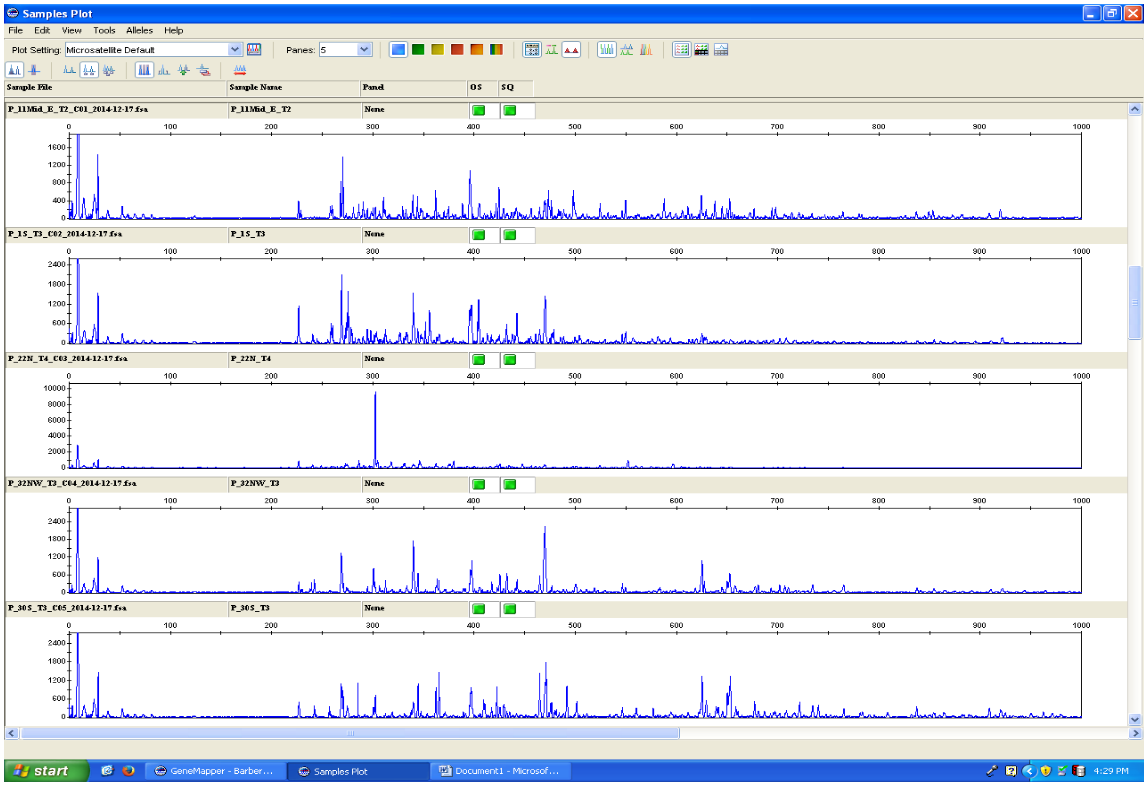

Figure 2.4 ARISA Test Run Result for Treatment C

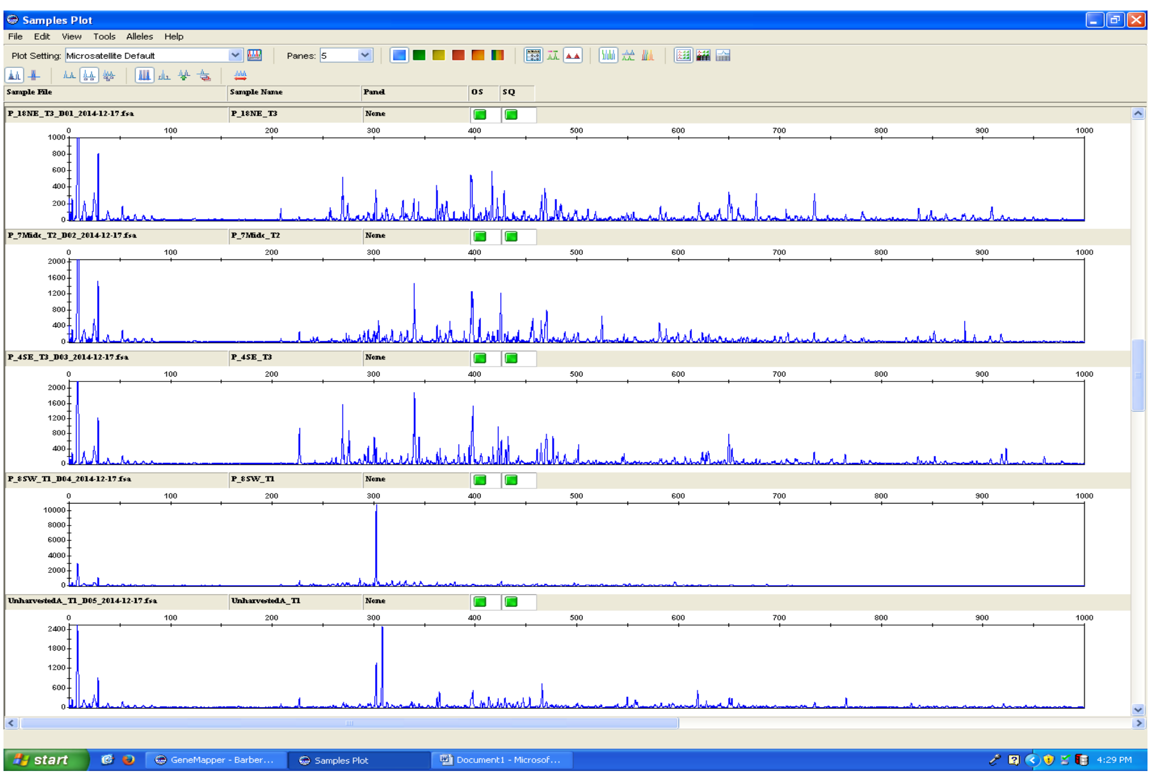

Figure 2.5 ARISA Test Run Result for Treatment D

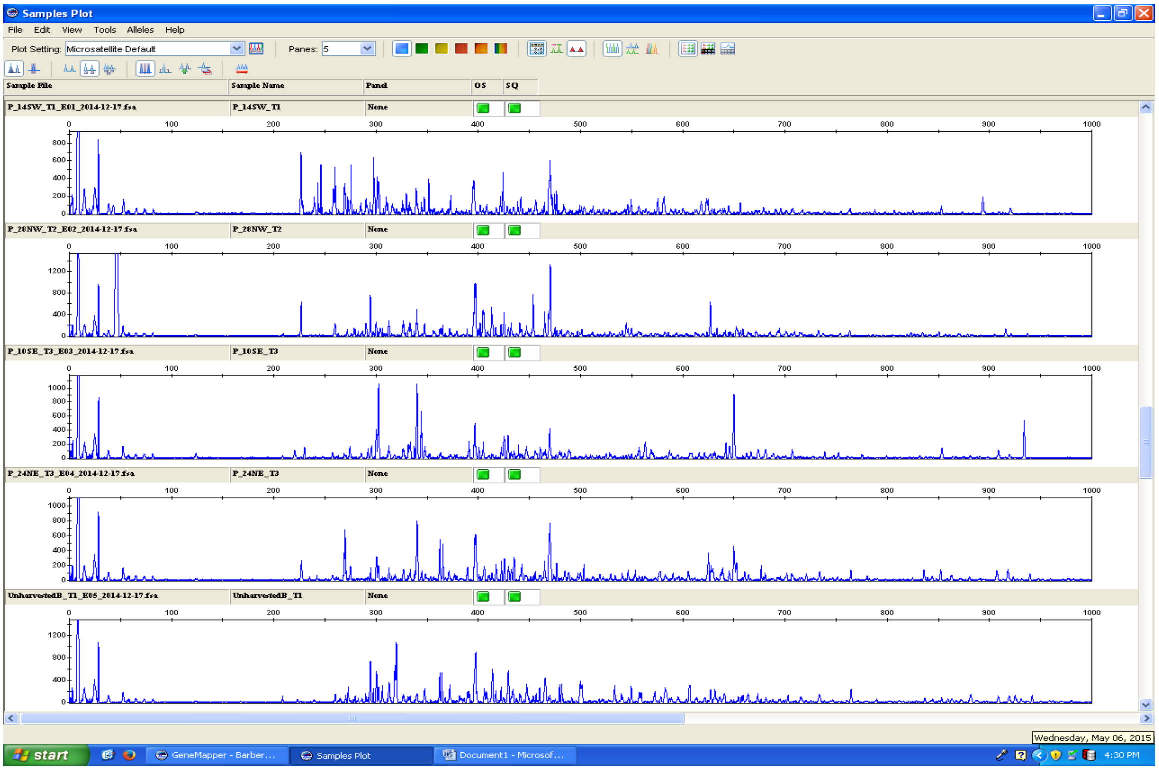

Figure 2.6 ARISA Test Run Result for Treatment E

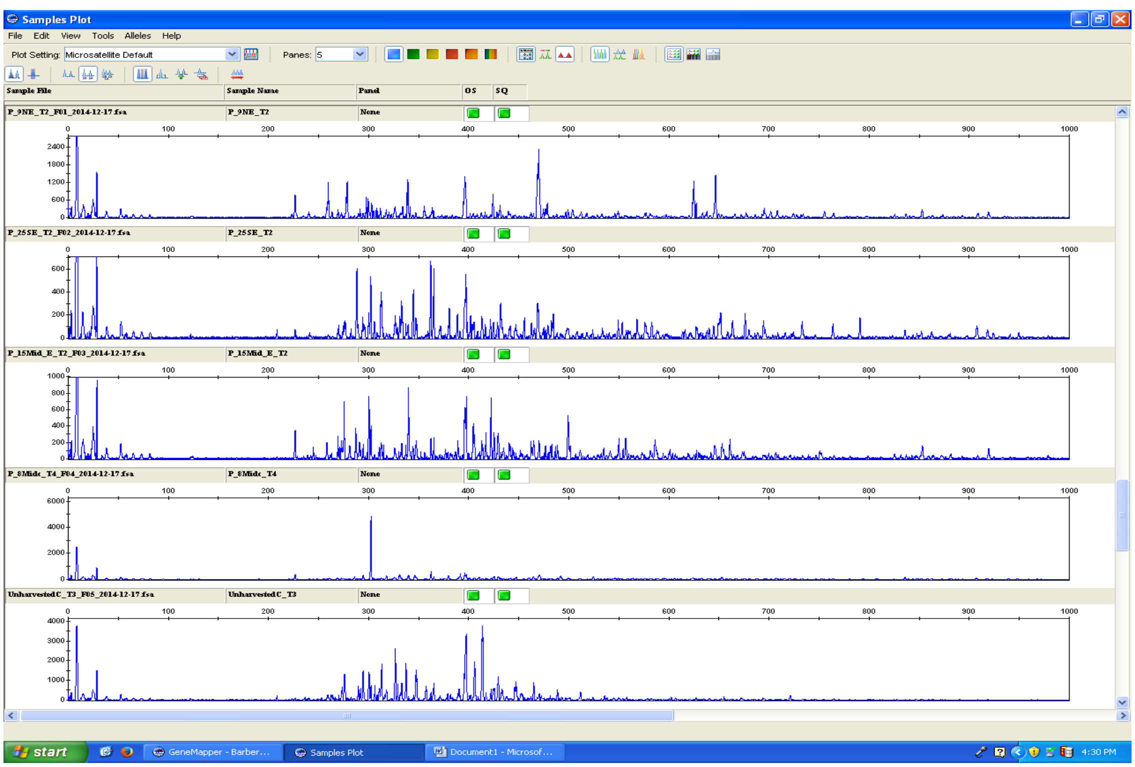

Figure 2.7 ARISA Test Run Result for Treatment F

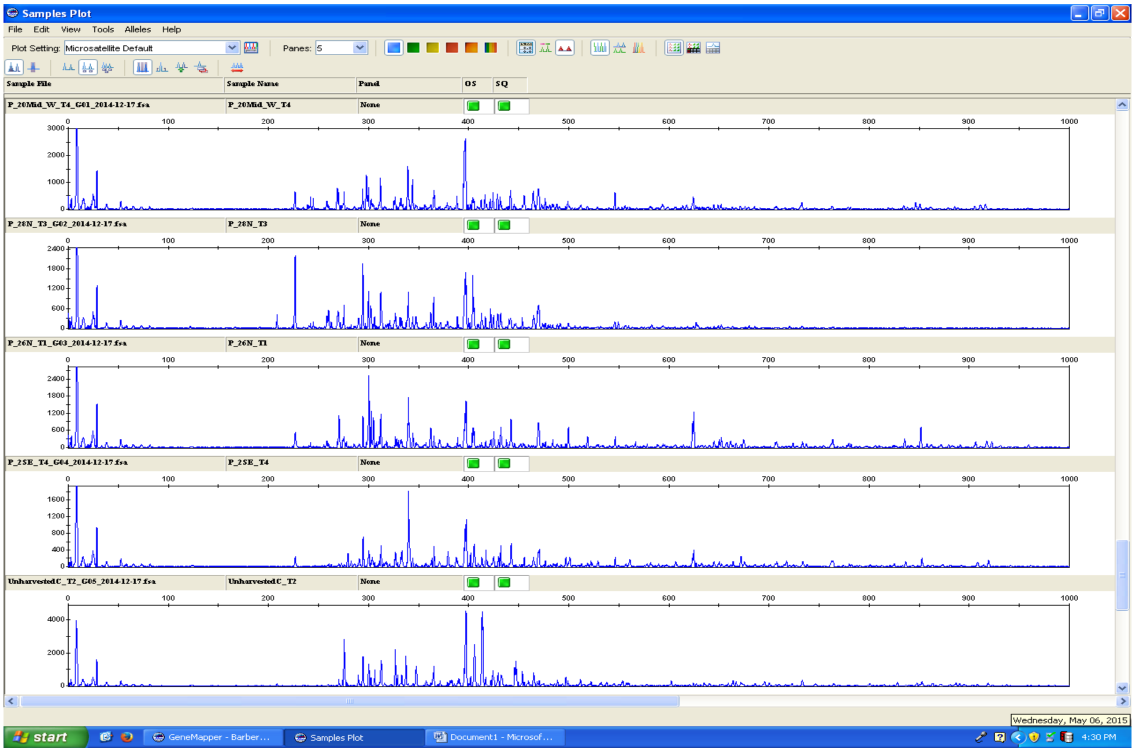

Figure 2.8 ARISA Test Run Result for Treatment G

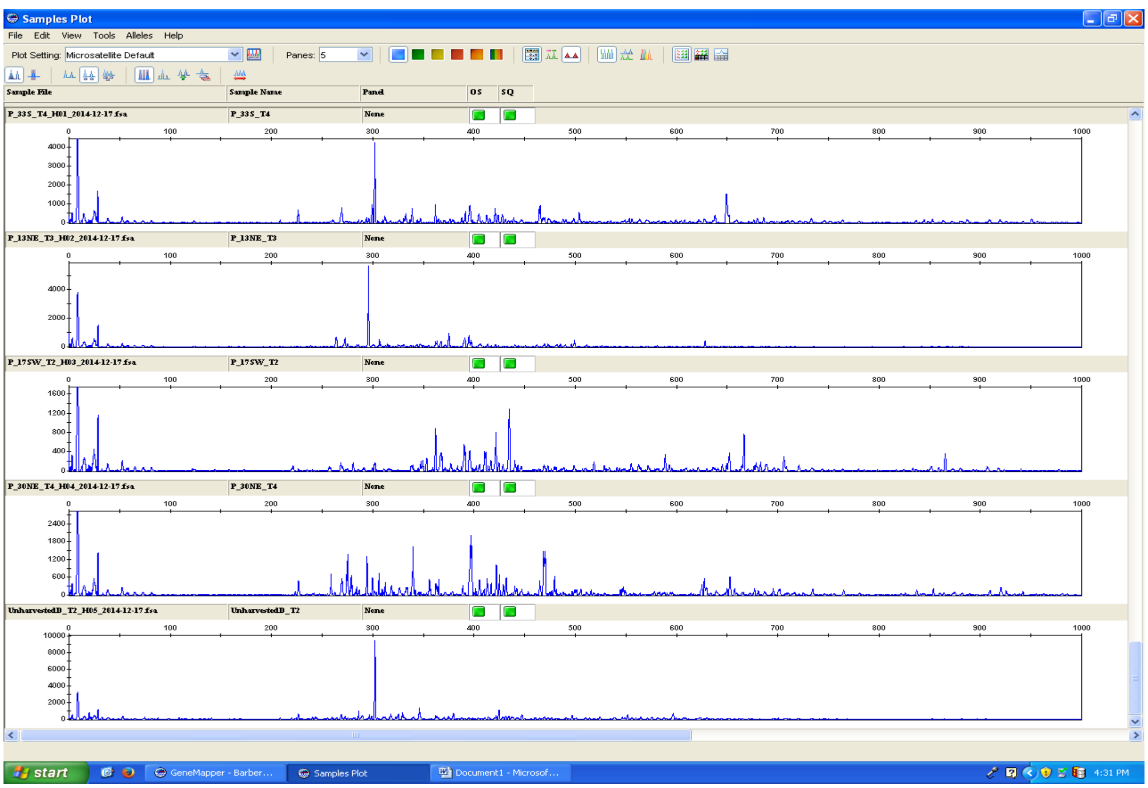

Figure 2.9 ARISA Test Run Result for Control

Table 2.4 Peak Value Ranges and Sizes in the ARISA Profiles for Different Treatments

Treatments	No. of Peaks	Range of peak size (bp)	Range of spacer size (bp)
Treat A	397	208.46 – 920	86.46 – 798
Treat B	464	208.46 – 950.59	86.46 – 828.59
Treat C	404	208.48 – 917.79	86.48 – 795.79
Treat D	442	226.69 – 1002.1	104.69 – 880.1
Treat E	288	220 – 934.01	98 – 812.01
Treat F	337	208.62 – 921.7	86.63 – 799.7
Treat G	438	208.59 – 971.53	86.59 – 849.53
No Treatment	441	208.58 – 941.52	86.58 – 819.52
Total	3211		

Table 2.5 List of Genus Found from ARISA Results

Treatments	A	B	C	D	E	F	G	Control	Total
Genus of Bacteria									
Actinobacllus	3	1	0	1	1	0	0	1	7
Alkaliphilus	5	3	6	4	1	3	2	6	30
Anabaena	0	0	1	0	1	0	1	0	3
Bacillus	27	25	33	25	21	20	24	30	205
Baumannia	2	3	4	1	0	3	1	3	17
Burkholderia	6	4	2	2	4	1	5	5	29
Caldicellulosiruptor	4	5	8	4	4	2	4	3	34
Candidatus	0	1	1	0	1	1	0	0	4

Table 2.5 Continued

Treatments	A	B	C	D	E	F	G	Control	Total
Genus of Bacteria									
Carboxydothermus	1	1	0	0	1	0	0	1	4
Chlamydia	0	1	1	1	0	1	2	0	6
Chlamydophila	2	0	0	2	1	1	2	3	11
Clorobium	0	0	0	1	0	1	2	1	5
Clostridium	26	31	21	23	14	17	30	23	185
Colwellia	0	3	0	0	2	1	1	1	8
Coprothermobacter	4	4	4	1	1	2	2	2	20
Corynebacterium	3	4	5	3	2	2	3	2	24
Cytophaga	3	6	6	2	1	1	1	0	20
Erythrobacter	0	0	2	1	0	1	0	0	4
Escherechia coli	2	1	0	2	2	3	2	1	13
Exiguobacterium	1	5	4	3	1	2	3	7	26
Finegoldia	1	1	0	1	2	2	1	4	12
Francisella	0	0	1	1	0	3	0	3	8
Frankia	2	1	2	1	0	0	2	1	9
Fusobacterium	1	1	0	4	1	3	3	4	17
Geobacillus	4	3	1	4	3	2	3	1	21
Geobacter	3	4	1	3	1	3	4	4	23
Haemophilus	2	4	0	1	0	0	1	1	9
Halorhodospira	1	1	1	1	1	1	1	2	9

Table 2.5 Continued

Treatments	A	B	C	D	E	F	G	Control	Total
Genus of Bacteria									
Klebsiella	1	0	0	5	4	3	4	3	20
Lactobacillus	8	6	6	10	4	1	6	3	44
Legionella	4	2	3	5	1	2	2	2	21
Magnetococcus	0	0	1	2	2	2	3	1	11
Mycobacterium	0	0	1	4	4	0	3	8	20
Mycoplasma	0	1	2	0	1	0	1	0	5
Nitrosomonas	0	1	0	2	0	1	3	1	8
Nocardia	0	0	2	2	1	1	1	1	8
Petrotoga	1	0	1	2	2	0	2	4	12
Propionibacterium	0	0	0	1	1	0	1	1	4
Pseodoalteromonus	0	0	0	0	1	0	2	1	4
Pseudomonus	0	3	0	1	1	0	3	2	10
Ralstonia	0	0	1	0	1	0	0	0	2
Roseiflexus	0	1	3	6	4	2	2	3	21
Saccharopolyspora	3	2	1	3	2	1	1	1	14
Salmonella	5	4	1	0	0	1	2	1	14
Serratia	0	1	1	2	0	0	2	1	7
Shewanella	11	15	6	10	4	4	11	7	68
Staphylococcus	2	3	4	5	1	2	8	2	27
Streptococcus	0	2	0	1	1	1	1	1	7

Table 2.5 Continued

Treatments	A	B	C	D	E	F	G	Control	Total
Genus of Bacteria									
Streptomyces	2	2	1	6	1	2	2	3	19
Symbiobacterium	1	3	1	1	0	2	0	0	8
Thermoanerobacter	3	7	8	5	6	4	5	5	43
Thermodesulfovibrio	0	1	2	1	0	0	2	0	6
Verminephrobacter	1	2	0	0	0	1	1	0	5
Vibrio	3	2	4	4	3	1	7	2	26
									1197

The Shannon – Weaver diversity indices varied from 2.98 to 3.30 for different treatments with the equitability indices of 0.84 to 0.87 whereas Simpson’s indices varied from 0.059 to 0.084 (Table 2.6).

2.3 Discussion

The primary objective of this analysis is to understand the potential environmental impacts of residual ground cover removal by measuring changes in microbial soil populations to get an idea of potential long-term changes to nutrient ecology.

Average DNA concentrations are found different for different plots from the results of DNA extractions of 28 plots regardless of treatment processes.

Table 2.6 Diversity Index Results

Treatments	A	B	C	D	E	F	G	Unharvested
Shannon – Weaver Index (H)	2.98	3.13	3.03	3.30	3.21	3.19	3.30	3.22
Shannon's Equitability Index (E_H)	0.85	0.84	0.83	0.87	0.86	0.86	0.86	0.85
Simpson's Index (D)	0.084	0.075	0.084	0.059	0.069	0.074	0.065	0.071

No patterns has been found from the DNA extraction results which indicate any change in microbial community due to biomass removal including different treatments. Moreover the average DNA concentration for the unharvested (no treatment) site is less than in the study sites.On the basis of these average DNA concentrations it is not possible to say that the null hypothesis is right or wrong because a greater DNA quantity does not always means a greater species richness because of the possibility that extracted DNA might be from mainly easily lysed cell types (Stach et al. 2001). Furthermore, the ability of micro-organisms to interact with soil colloids, such as clay-organic aggregates, makes the efficiency of a soil microbial DNA extraction dependent on soil quality; soil characteristics include pH, organic matter, clay and silt content, particularly the clay and organic matter contents because micro-organisms can interact with soil colloids, such as clay-organic aggregates (Roose-Amsaleg et al. 2001; Fortin et al. 2004). To have a better understanding of the average DNA concentration results hypothesis testing and finger printing analysis were performed which gave the opportunity to look at the event from both statistical and biological point of views.

Because of choosing the samples for different treatments randomly and as there was no relationship between the samples of different groups including that they are not dependent on each other so two-independent samples t-test assuming equal variances were done with 95% confidence interval to analyze the result of average DNA concentrations statistically. The hypothesis testing with 144 observations between different treatments showed the acceptance of null hypothesis for seven cases whereas the same test with 36 observations presented the acceptance for 14 cases. The rejection of a null hypothesis does not always mean that the null hypothesis is false, i.e., the null hypothesis might really be true, and it may be a result of chance that the experimental results deviate from the null hypothesis and this event is defined as Type I error, the probability of which is equal to the significance level, in this case 5%. But a hypothesis test does not really evaluate the absolute size of treatment effect for which the effect size was calculated following the Cohen's d method, which represents the effect size of the rejection of null hypothesis. In the case of 144 observations hypothesis testing though, the null hypothesis has been rejected for 21 cases; the effect size is medium for 18 cases and for 36 observations, 10 out of 14 cases have the medium effect size, signifying the mean difference is around 0.5 standard deviation. Two common cases in addition to B-G and C-G for 36 observations for which the effect size is large for both the observations are B-Control and C-Control indicating that the mean difference is greater than 0.8 standard deviation. Another consideration should be accepting the null hypothesis, even though it's not true, which is a false negative or type II error. For both 144 and 36 observations hypothesis testing, the value calculated as type II error, i.e., β was greater than 0.5 which indicates a good probability of accepting the null hypothesis when it might be false. The ability to reject or accept the null hypothesis when it is false/true also depends on sample size, the variance of the difference and the significance level at which the null hypothesis will be rejected or accepted. Though this analysis gave a good indication regarding the hypothesis, it cannot be possible to make any concrete decision that there must or must not be an impact on the microbial community due to residual biomass harvesting rather more reliable decision is for some cases there is a good probability of acceptance of the null hypothesis and for other cases though it may not be possible to accept the null hypothesis statistically, more than 80% of those have an medium effect size.

The result of statistical analysis does not provide enough evidence so that the null hypothesis can be accepted or rejected from a biological point of view which leads to further analysis of extracted DNA samples. Finger printing analysis (ARISA) of the selected DNA samples from each treatments were performed for biological analysis. DNA purity was assessed for contamination from residual proteins using a ratio of A260/A280, where ratios lower than 1.7 reflect protein contamination and ratios greater than 1.7 reflect pure DNA, and purity from humic compounds was also determined using a ratio of A260/A230, where ratios <2 reveal humic acid contamination and ratios >2 are characteristic of pure DNA (Mahmoudi et al. 2011). The samples selected for finger printing analysis possessed a ratio of >1.7 for A260/A280 and >2 for A260/A230. ARISA is a quick and precise method that allows microbial communities to be investigated and compared easily, highlighting the taxonomic diversity, evident from the marked variability in ribosomal spacer length, in the prokaryote genomes (Fisher and Triplett 1999; Ranjard et al. 2001). ARISA can be considered one of the most suitable techniques for rapidly analyzing and comparing great numbers of samples because of its ability to analyze microbial diversity at the intraspecific level (Cardinale et al. 2004). An average of 401 peaks per profile per treatment were detected by using capillary electrophoresis system whereas Ranjard et al. (2001) got more than 200 peaks for the various soil bacterial communities and Fisher and Triplett observed fewer than 50 peaks within the profiles of fresh water communities. Ranjard et al. (2001) confirmed the potential of ARISA for characterizing and differentiating the genetic structure of soil bacterial communities, but at the same time, ARISA is subject to the usual systematic biases as it depends on total community DNA extraction and PCR ampli fication procedures, including overlapping intergenic spacer size classes among unrelated organisms, which may lead to underestimates of diversity or single organisms that are likely to contribute more than one peak to an ARISA profile due to interoperonic differences in spacer length and frequently occur within the genomes of cultured organisms (Fisher and Triplett 1999). For this study assuming biases remain fairly constant between samples, ARISA has been used to estimate the relative diversity among treatments counting the total number of peaks in a profile. To understand the change among different treatments Shannon – Weaver diversity indices and Simpson's D were determined by using the 54 genera identified from ARISA peaks. The Shannon-Weaver (it's really the Shannon-Wiener Index) index indicates species diversity of an area where the higher the value, the higher the diversity. If there is more diversity, this indicates less competition between species. If the value is lower, this indicates that competition has narrowed down the number of species able to make a living in that community or area. In this study, Shannon – Weaver indices for different treatments varies from 2.98 to 3.3 with an average of 3.17 and standard deviation of 0.11 indicating not only higher diversity but it also indicates no major change in diversity due to different treatments processes as well as less competition between species. Shannon – Weaver equitability indices, which is also known as evenness index, measures the equality or distribution of individuals, i.e., how the diversity of the species distributed with a value of 0 to 1 with 1 being complete evenness. Comparing the different treatments in terms of equitability index gave a sense of equitable distribution of the species. Simpson's Diversity Index is a measure of diversity which takes into account the number of species present, as well as the relative abundance of each species. As species richness and evenness increase, so diversity increases. The value of **D** ranges between 0 and 1 with 0 represents infinite diversity and

1, no diversity. That is, the bigger the value of D, the lower the diversity. Measured value of Simpson's D were less than 0.1 for different treatments indicating same result found by the Shannon's Index.

According to Fisher and Triplett (1999), considering all of its drawback ARISA can successfully be used to estimate community composition in natural samples, especially for fine-scale comparative purposes. Because of the high reproducibility and sensitivity of the method, it is also possible to compare the electropherograms among different sites and precisely quantified by using the Genemapper V 3.7 analysis software. Various indices are increasingly used to quantitatively assess the ARISA results to find out the similarity among communities (Liu et al. 1997; Lindstorm 1998). So the results found from the finger printing analysis following ARISA and further analysis of ARISA results by using Shannon – Weaver diversity index and Simpson's Indices are acceptable which shows that biologically no impact has been found on the microbial communities due to the removal of residual ground cover following different treatments.

2.4 Conclusion

Nine soil samples were collected from each of the 28 one-acre sites and four DNA extraction tests were performed for each sample for a total of 1008 data points. The average DNA concentration (ng/µl) per plot was developed based on the result of 36 DNA extraction tests for that plot. Analysis of average DNA concentrations did not show any statistically significant trends, which would indicate that microbial variation due to different treatment processes is minimal and apparently nullify the hypothesis. This indicates that small diameter waste branches and other woody debris can be harvested without significant detrimental impact to the long-term flux of water and nutrients. For an in depth analysis, two-sample t-tests assuming equal variances were performed to find out the correlation between DNA concentration and different treatments. As the result of the hypothesis tests were not able to make any decision, a biological analysis was done using finger printing analysis following ARISA procedure from which a total of 3211 peaks have been found for different treatments. 1197 intergenic spacer sequences out of 3211 were examined resulting 54 genera. For further analysis, the diversity index was calculated by using both Shannon – Weaver and Simpson's diversity index methods indicating a higher and equitable distribution of diversity among different treatments without any major changes or patterns. From all these analyses it has been found that the biomass removal from the field does not have any statically significant detrimental impact on the long-term flux of nutrient populations and microbial ecology.

CHAPTER 3

SEDIMENT EROSION PREDICTION

Erosion is a natural phenomenon caused by a process of detachment and transport of soil particles by erosive agents such as water and wind that has been occurring for some 450 million years. In general, natural erosion removes soil at roughly the same rate as the soil is formed. But accelerated soil erosion, which is the loss of soil at a much faster rate than it is formed, is a far more recent problem typically caused by anthropogenic disturbances in the environment. Large quantities of eroded soil transported by surface runoff can cause deterioration of water quality which has become a severe problem worldwide. The objective of this portion of the analysis is to investigate the effects of additional biofuels-related ground cover (biomass) removal on soil erosion. Understanding the effects of woody biomass removal on soil will help determine the areas where minimal impacts occur and demonstrate the sustainability of harvesting woody biomass forest residuals as a source of biomass for bio energy feedstock. The work will involve modifying the WEPP model based on location specific parameters associated with tree harvesting areas.

3.1 Methodology

3.1.1 Model Selection

The universal soil loss equation (USLE) developed by Wischmeier and Smith (1965) is one of the most widely used methods to model soil erosion that estimates average annual soil loss using rainfall, soil, topographic and management data. Though empirical methods have been quite commonly used in the past for sediment yield estimation, they are not capable of accommodating the spatial and temporal variability in the ongoing natural process which has been addressed by process based soil erosion models (Walling 1988; Tiwari et al. 2000).

The USDA-Water Erosion Prediction Project (WEPP) was initiated in 1985 to develop new generation water erosion prediction technology for use in soil and water conservation planning and assessment (Foster and Lane 1987). WEPP is a process-based continuous simulation computer model which can predict soil loss and deposition rather than average net soil loss offering the advantages of predicting spatial and temporal distributions of net soil loss or gain for the entire hillslope for any period of time, a wider range of applicability as it contains its own process-based hydrology, water balance, plant growth, residue decomposition, and soil consolidation models as well as a climate generator. Compared to USLE, which had no capabilities to estimate runoff, spatial locations of soil loss on a hillslope profile or within a small watershed, channel erosion, effects of impoundments, recurrence probabilities of erosion events, or watershed sediment yield WEPP is far more useful (Tiwari et al. 2000; Flanagan et al. 2007).

3.1.2 Basis of WEPP

The WEPP model includes components for weather generation, frozen soils, snow accumulation and melt, irrigation, infiltration, overland flow hydraulics, water balance, plant growth, residue decomposition, soil disturbance by tillage, consolidation, and erosion and deposition.

The soil component of WEPP deals with temporal changes in soil properties, measures the impact of many factors, maintains a daily record of the status of the soil and surface variables which comprise random roughness, ridge height (an oriented roughness), saturated hydraulic conductivity, and bulk density (Laflen et al. 1991). Soil erosion is represented in two ways for WEPP overland flow profile applications: 1) soil particle detachment by raindrop impact and transport by sheet flow on interrill areas (interrill delivery rate), and 2) soil particle detachment, transport and deposition by concentrated flow in rill areas (rill erosion). The baseline interrill erodibility on croplands is multiplied by an assortment of adjustment factors including canopy cover, ground cover, dead and live roots, sealing and crusting, slope adjustment and freezing and thawing. The final adjusted interrill erodibility, which is used on a day during a WEPP simulation, is:

$$K_{iadj} = K_{ib}(CK_{ican})(CK_{igc})(CK_{idr})(CK_{ilr})(CK_{isc})(CK_{isl})(CK_{ift}) \qquad 3.1$$

where K_{iadj} is the adjusted interrill erodibility (Albert et al. 1995). Among these adjustment factors, ground cover adjustment factor (CK_{igc}) is the most important one for this study which is predicted by equation 3.2 given below.

$$(CK_{igc}) = e^{-2.5inrcov} \qquad 3.2$$

where *inrcov* is the interrill cover (0-1) and the graphical representation of the equation is shown in Figure 3.1.

The baseline rill erodibility in the WEPP model is also multiplied by a set of adjustment factors including incorporated residue, live and dead roots, sealing and crusting, and freezing and thawing. The final adjusted rill erodibility used on a simulation day to predict rill detachment is:

$$K_{radj} = K_{rb}(CK_{rbr})(CK_{rdr})(CK_{rlr})(CK_{rsc})(CK_{rft}) \qquad 3.3$$

where K_{radj} is the adjusted rill erodibility, and K_{rb} is the baseline rill erodibility (Alberts et al. 1995).

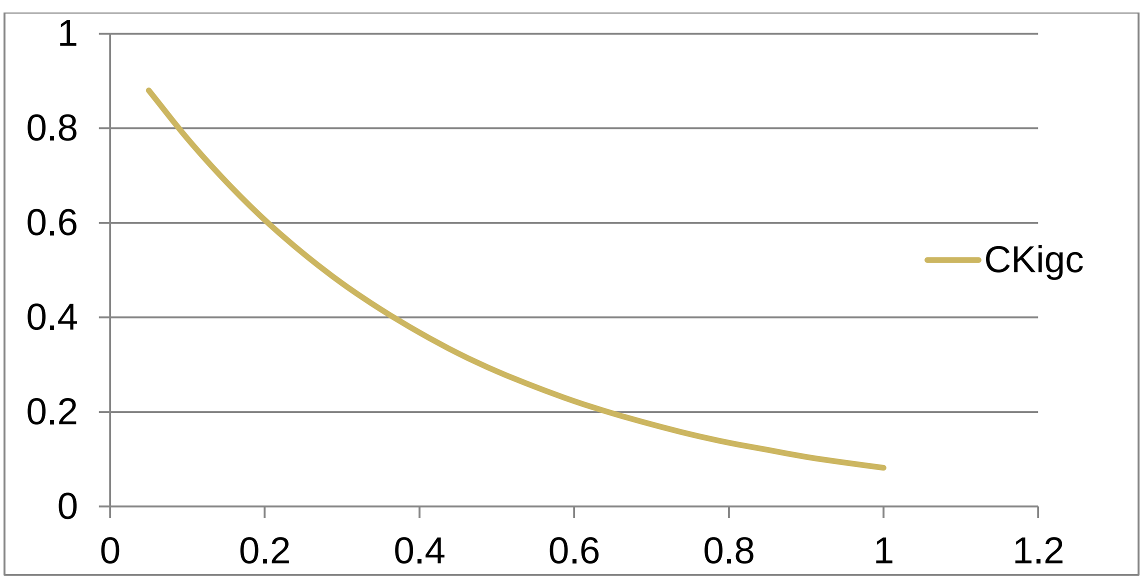

Figure 3.1 Graphical Representation of Ground Cover Adjustment Factor Prediction Equation

Rill erosion is modeled as a function of the flow's capacity to detach soil, transport capacity, and the existing sediment load in the flow. Net soil detachment in rills occurs when hydraulic shear stress exceeds critical shear stress and when sediment load is less than sediment transport capacity.

CLIGEN, a stochastic weather generator, is usually used in WEPP to build climate file and the solution of Green-Ampt equation for unsteady rainfall developed by Chu (1978) has been used to predict infiltration. Runoff is considered as the difference between rainfall and infiltration and storage and is routed over the land surface using the kinematic wave equations (Tiwari et al. 2000).

As with most other process based models, the erosion component of WEPP is based firmly on a steady state continuity equation, of the form:

$$\frac{dG}{dX} = D_f + D_i \tag{3.4}$$

where x represent distance downslope, G is sediment load, D_f is the rill erosion rate, and D_i is interrill erosion rate. WEPP calculates erosion from the rill and interill areas on a per rill area basis. Rill erosion, D_f, is positive for detachment and negative for deposition where as interrill erosion, D_i, is considered to be independent of distance meaning interill erosion occurs at a constant rate down the slope. Each of these parameters is calculated on a per rill area basis, and thus the sediment load is solved as soil loss per unit rill area (Foster et al. 1995). A significant difference between WEPP and most other models is that the sediment continuity equation in case of WEPP is applied within rills rather than using uniform flow hydraulics (Tiwari et al. 2000).

3.2 Results

The WEPP model has been run for 5% steepness and 10% steepness. A Cligen file has been developed automatically by WEPP for the study sites interpolating the data from the four nearest climate station. The model has been run keeping everything as default except changing the climate file, using silt loam as soil types and a different percentage of ground cover. The results found for 5% and 10% slope with s-shaped slope and different percentage of ground cover are shown in Table 3.1 and Table 3.2.

Table 3.1 Sediment Erosion for 5% Slope

1 yr Simulation	10% cover	20% cover	30% cover	Units
Average Annual Precipitation	55.45	55.45	55.45	In
Average Annual Runoff	17.50	17.50	17.50	In
Average Annual Soil loss	0.646	0.564	0.491	ton/acre
Average Annual Sediment Yield	0.426	0.384	0.342	ton/acre

Table 3.2 Sediment Erosion for 10% Slope

1 yr Simulation	10% cover	20% cover	30% cover	Units
Average Annual Precipitation	55.45	55.45	55.45	In
Average Annual Runoff	12.81	12.81	12.79	In
Average Annual Soil loss	0.824	0.711	0.607	ton/acre
Average Annual Sediment Yield	0.649	0.572	0.501	ton/acre

The average annual rainfall the model measured by interpolating data from the nearest four climate station is 55.45 inches which is very close to the observed data of 56.01 inches from the field weather station. For 10% slope the model automatically generated 9 rain storm and 13 snow melt events which caused runoff of total 12.81 inches whereas for 5% slope 15 rain storm and 18 snow melt events caused a total runoff of 17.50 inches. The number of storm events which generate runoff varies for different slopes indifferent of climate file and the model adjusts the number of storm events automatically by itself. The decrease in ground cover increases the amount of soil loss while soil loss and sediment yield also increase with the increase of steepness of the sites.

3.3 Discussion

NARA is interested in removing biomass (ground cover) to produce biojet fuels. Rummer et al. (2003) predicted erosion rates due to the removal of forest biomass for fuel would range from 0 to 0.4 Mg/ha depending on climate and topography. Critical slope gradients have been estimated to be between 41.5° ∽ 50° depending on grain size, soil bulk density, surface roughness, runoff length, net rain excess, and the friction coefficient of soil, etc., which influence maximum erosion (Liu et al. 2001). In forestry applications, slopes greater than 35% are generally considered steeper slopes. The typical slope of the LTSP study sites ranges between 2 and 20% and the soil is mostly silty clay. The annual rainfall observed is 56.01 inches with the highest rainfall in 24 hours of 2.2 inches on 2/14/2014. Since no noticeable erosion was found after one of the heaviest rainfalls of the season, additional runs of the model were not done.

3.4 Conclusion

Surface erosion in general is nominal in an undisturbed hillslope (Megahan and King 2004; Elliot et al. 2010b). Wild fire and road network are the two main disturbances in forests but there are some other disturbances like timber harvest, prescribed fire, recreational activities etc. Some climatic factors are superimposed on these factors like heavy rainfall, and rapid warming causing high snow melt resulting major runoff events, which generate surface or sediment erosion in forest land (McClelland et al. 1997). But most of these weather events that cause heavy erosion occur only about once every 10 years (Gares et al. 1994; Kirchner et al. 2001). While Figure 3.1 indicates a significant increase in erosion should occur with reduced ground cover, discussions with the WEPP developer (Flanagan) verified that the equations were developed for tilled agricultural areas and though they have been modified for post wildfire applications by researchers in the Pacific Northwest, application to forested environments would require substantial effort with respect to verifying observed and predicted erosion. As no noticeable erosion has been found after one of the heaviest rains of the season, maybe the typical slope of the sites, soil characteristics, climatic condition, position of the water table and other factors make these study sites a unique one. In the northwestern U.S., there is a significant variation in precipitation amount and distribution even within the same watershed (Daly et al. 1994) including variations in typical hillslopes, soil characteristics and other factors which define the limitation of the study so that it cannot be possible to make any decision from this analysis for a 10-year or 100-year design storm event and also it does not stand for the whole Northwest Pacific, not even for the whole watershed.

CHAPTER 4

WATER BALANCE MODEL

Forest soils serve as reservoirs for water. Trees not only use this soil moisture but also intercept precipitation through their branches and leaves resulting in transpiration and evaporation of the water which means the water intercepted or transpired by trees is unavailable for stream-flow. Over 35 % of increase in annual stream flow after clearcutting was found in an old-growth Douglas-fir forest in Oregon (Rothacher 1970). Harr and Krygier 1972 observed a large increase in summer flow after clearcutting. The amount of precipitation reaching the ground is influenced significantly by the forest cover, and any changes in the amount and type of vegetation can alter evaporation from the forest (Bonan 2008). Rate of evaporation of a wet exposed soil surface immediately after clearcutting or a fire is higher than the evaporation rate of a normal forest, but this rate decreases rapidly as the bare soil dries within 1-2 days after rainfall (Novak and Black 1982; Spittlehouse 1989); This reduction of evaporation increases water storage in the watersheds. Because of the high infiltration capacities of undisturbed forest soils in the Pacific Northwest, excess overland is generally not an important process for streamflow generation (Wondzell and King 2003). Reduction in interception loss can increase the amount of infiltration of water into the soil and results in a higher water table during storms (Dhakal and Sidle 2004). Removal of forest cover leads to a reduction in interception and evaporation of water, and increases rainfall intensity at the soil surface which may cause more rapid subsurface flow and larger peak flows (Keim et al. 2006).

The objective of this part of the study is to examine probable alteration of the ecological environment through measurement of runoff as well as to develop predictive water quantity and quality models which may also be helpful to evaluate the potential impacts of altered hydrologic conditions on stream channels. Based on this objective the following hypothesis will be tested:

- H_o: Increased biomass removal will have no impact on infiltration or the water budget.
- H_a: Increased biomass removal will result in more infiltration and less evapotranspiration from sites and thus impact the water budget.

4.1 Methodology

4.1.1 Data Collection

The weather station was installed in the sites to measure precipitation, air temperature, wind speed, relative humidity, and solar radiation at every hour. The collected data were processed to get maximum, minimum and average daily air temperature, average wind speed per day, relative humidity and average solar radiation. Dew point temperature was calculated from relative humidity and average temperatures. A sample of weather station data is given in Table 4.1 and the whole dataset is provided in Appendix – D.

Cloud cover data have been taken from the nearest NCDC weather station situated in Mahlon Sweet Field Airport (24221) located at Lat: 44.127, Lon: -123.220. One year of data starting from 16 October 2013 to 16 October 2014 were collected. Sample cloud cover

Table 4.1 Samples of Collected Data for Water Balance Model

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mph)	Avg. RH	Avg. Solar Radiation (Langleys/ day)
10/16/2013	0.00	52.52	60.62	54.86	44.01	1.12	0.67	15.97
10/17/2013	0.00	47.66	62.06	53.78	44.88	1.12	0.72	88.73
10/18/2013	0.00	50.72	65.48	56.66	44.52	1.12	0.64	88.40
10/19/2013	0.00	51.98	68.36	59.18	46.07	1.57	0.62	87.44
10/20/2013	0.00	50.72	64.22	57.02	46.86	1.34	0.69	86.66
10/21/2013	0.00	55.94	73.22	64.94	44.67	2.01	0.48	84.74
10/22/2013	0.00	59.18	71.96	66.02	41.53	2.68	0.41	82.70
10/23/2013	0.00	56.48	69.44	62.06	45.60	1.34	0.55	81.30
10/24/2013	0.00	54.14	66.38	59.00	47.16	1.12	0.65	80.04
10/25/2013	0.00	42.26	59.00	51.44	46.07	1.34	0.82	81.34
10/26/2013	0.01	41.18	52.70	45.32	43.11	1.79	0.92	79.93
10/27/2013	0.19	40.10	44.42	41.90	40.83	3.36	0.96	15.60
10/28/2013	0.00	39.56	49.82	43.16	35.68	3.58	0.75	68.10
10/29/2013	0.00	38.66	52.34	44.60	28.35	1.57	0.53	75.38
10/30/2013	0.00	41.72	54.14	47.66	37.51	2.46	0.68	70.95
10/31/2013	0.06	48.38	54.14	50.36	44.36	3.13	0.8	22.96
11/1/2013	0.02	45.50	58.82	51.26	48.40	2.01	0.9	75.09
11/2/2013	0.59	38.30	55.22	44.96	42.46	7.83	0.91	34.90

Table 4.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mph)	Avg. RH	Avg. Solar Radiation (Langleys/ day)
11/3/2013	0.44	36.50	40.10	38.12	36.80	4.03	0.95	18.93
11/4/2013	0.12	37.22	43.34	40.10	38.49	5.82	0.94	29.43
11/5/2013	0.61	42.44	48.20	45.68	44.31	6.26	0.95	8.28
11/6/2013	0.14	48.38	57.20	51.98	50.58	3.58	0.95	35.42
11/7/2013	0.75	40.10	51.62	46.04	44.95	6.04	0.96	7.73
11/8/2013	0.02	39.74	46.58	42.44	39.68	2.68	0.9	35.31
11/9/2013	0.00	37.94	51.80	45.32	39.12	1.34	0.79	40.41
11/10/2013	0.00	48.74	62.42	53.78	45.25	1.34	0.73	59.74
11/11/2013	0.00	48.02	60.98	52.70	44.92	1.34	0.75	49.95
11/12/2013	0.18	48.38	55.22	50.90	46.19	2.68	0.84	14.09
11/13/2013	0.01	42.62	51.08	46.22	45.13	1.34	0.96	46.47
11/14/2013	0.14	39.38	42.98	41.00	39.93	1.12	0.96	11.83
11/15/2013	0.04	37.22	41.18	38.66	37.33	3.80	0.95	19.52
11/16/2013	0.80	38.12	41.90	39.74	38.41	8.05	0.95	15.97

data from 10/16/2013 to 11/16/2013 are shown in Table 4.2 while the whole data set is given in Appendix – D. Moisture probes have been installed in the field at 10 cm, 20 cm, 30 cm and 100 cm depth to measure volumetric water content at every hour. Seven different plots for seven different treatments were selected to process the hourly moisture probe data to daily data. Sample processed data of VWC of Treatment A, plot 11 is shown in Table 4.3 and the whole data set is given in Appendix – D. The graphical representation of the above data is shown in Figure 4.2. The graphical representation of VWC data for other treatment and also for the unharvested site is given in Appendix – E. The graphical representation will help to understand the data and to compare the data among different treatment easily. These data will also be helpful to validate the model results with the observed results.

4.1.2 Selection of the Model

An unsaturated flow recharge model can be used to estimate infiltration to the groundwater which will also help to predict the recharge rates for current and future conditions accurately. Various numerical models such as HYDRUS (Šimůnek et al. 2007), SWIM (Verburg et al. 1996), and UNSAT-H (Fayer 2000) have been widely adopted to predict recharge estimates using the basis of Richards' Equation (Benson 2007). All of these models use van Genuchten (1980) and Brooks-Corey (1964) water retention functions and the Mualem (1978) hydraulic conductivity function. In addition to using meteorological data to estimate the output of the recharge flux (Scanlon et al. 2002), all these models are able to simulate atmospheric interactions, plant transpiration, solute transport, heat transfer and vapor flow using modified forms of Richards' Equation (Fayer 2000).

Table 4.2 Samples of Average Daily Cloud Cover Data

Date	Avg. Cloud Cover (tenth)
10/16/2013	5.75
10/17/2013	5.47
10/18/2013	5.33
10/19/2013	5.16
10/20/2013	4.93
10/21/2013	4.76
10/22/2013	4.65
10/23/2013	4.51
10/24/2013	4.33
10/25/2013	4.21
10/26/2013	4.21
10/27/2013	4.26
10/28/2013	4.36
10/29/2013	4.46
10/30/2013	4.56
10/31/2013	4.54
11/1/2013	4.52
11/2/2013	4.61
11/3/2013	4.69
11/4/2013	4.78
11/5/2013	4.87

Table 4.2 Continued

11/6/2013	4.92
11/7/2013	5.00
11/8/2013	5.06
11/9/2013	5.09
11/10/2013	4.95
11/11/2013	4.83
11/12/2013	4.79
11/13/2013	4.75
11/14/2013	4.81
11/15/2013	4.82
11/16/2013	4.88

Table 4.3 Sample Data of VWC at Different Depths for Treatment A, Plot 11

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/16/2013	0.198	0.265	0.265	0.265
10/17/2013	0.200	0.273	0.273	0.273
10/18/2013	0.202	0.277	0.277	0.277
10/19/2013	0.203	0.278	0.278	0.278
10/20/2013	0.203	0.279	0.279	0.279
10/21/2013	0.203	0.279	0.279	0.279
10/22/2013	0.203	0.277	0.277	0.277
10/23/2013	0.202	0.276	0.276	0.276
10/24/2013	0.202	0.275	0.275	0.275
10/25/2013	0.201	0.276	0.276	0.276
10/26/2013	0.203	0.279	0.279	0.279
10/27/2013	0.221	0.284	0.284	0.284
10/28/2013	0.237	0.304	0.304	0.304
10/29/2013	0.226	0.302	0.302	0.302
10/30/2013	0.223	0.300	0.300	0.300
10/31/2013	0.225	0.297	0.297	0.297
11/1/2013	0.226	0.295	0.295	0.295
11/2/2013	0.275	0.335	0.335	0.335
11/3/2013	0.295	0.349	0.349	0.349

Table 4.3 Continued

11/4/2013	0.292	0.347	0.347	0.347
11/5/2013	0.302	0.353	0.353	0.353
11/6/2013	0.297	0.352	0.352	0.352
11/7/2013	0.301	0.353	0.353	0.353
11/8/2013	0.290	0.344	0.344	0.344
11/9/2013	0.275	0.337	0.337	0.337
11/10/2013	0.268	0.331	0.331	0.331
11/11/2013	0.262	0.328	0.328	0.328
11/12/2013	0.266	0.324	0.324	0.324
11/13/2013	0.277	0.331	0.331	0.331
11/14/2013	0.274	0.329	0.329	0.329
11/15/2013	0.281	0.332	0.332	0.332
11/16/2013	0.314	0.362	0.362	0.362

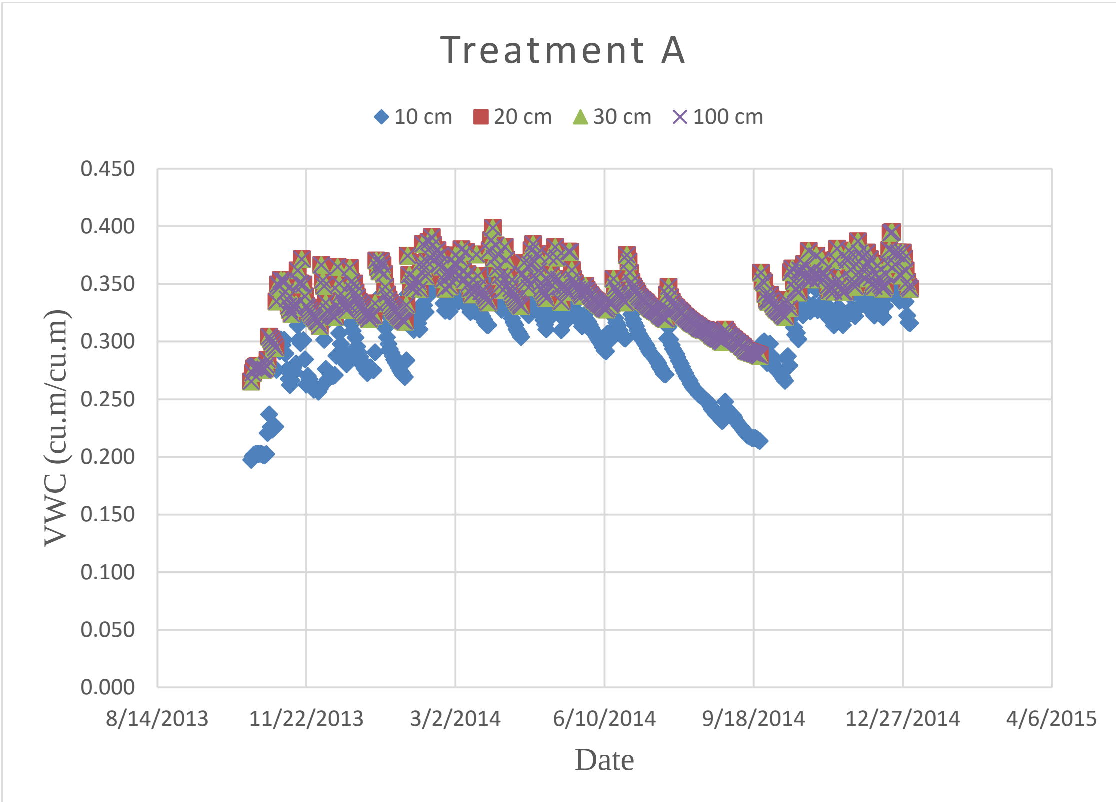

Figure 4.2 Graphical Representation of VWC Data of Treatment A

UNSAT-H is a 1-D model that uses the finite difference method to solve for Richards' equation (Benson 2007) whereas HYDRUS (1, 2, or 3-D) uses the finite element method to solve Richards' equation.

UNSAT-H is the only model that allows precipitation to be input as a specified rate (cm/hr), allowing evapotranspiration to occur throughout the day and provide more accurate results than HYDRUS 1-D and SWIM which overestimate evapotranspiration and underestimate the change in water storage (Scanlon et al. 2002). The difference between the predictions from1-D and 2-D HYDRUS model are modest but a 1-D simulation probably would be more adequate (Benson 2007). One-dimensional numerical models are appropriate for regions of flat topography with small to negligible runoff (Dawes et al. 1997; Hatton

1998; Liggett and Allen 2009). Win UNSAT-H is the windows interface version of UNSAT-H model developed by Dr. Craig H. Benson, in the Department of Geological Engineering at the University of Wisconsin-Madison in 2011. This model follows exactly the same theory and procedures as UNSAT-H. The only difference is because of interface system it is easier to input data which makes it more user friendly. For this reason and the input technique of precipitation and evapotranspiration, the 1-D WinUNSAT-H model was considered most appropriate for this study.

4.1.3 The Basis of WinUNSAT-H

The differential equation for liquid water flow is a modified form of Richards' equation (Richards 1931) which describes the change in water storage, redistribution, and plant water uptake at every point within the soil profile. The following two relations are the basis of modified Richards' equation: (4.1) the water flux rate inside the soil is proportional to the water potential gradient, which is the basis of Darcy's law, and (2) the change in water content at a specific location is due to the convergence/divergence of water fluxes at another location, the basis of continuity (Ren 2005). The development of the modified Richards' equation begins with Darcy's law. The one-dimensional differential form of Darcy's law (Hillel 1980) is

$$q_L = -K_s \frac{\delta H}{\delta z} \tag{4.1}$$

where q_L is the flux density of water (cm/hr), K_S is the saturated hydraulic conductivity (cm/hr), H is the hydraulic potential and z is the depth below the soil surface. Darcy's law can be extended to unsaturated flow by replacing K_S with liquid conductivity, K_L, as a function of matric potential, Ψ, resulting in,

$$q_L = -K_L(\varphi)\frac{\delta H}{\delta z} \qquad 4.2$$

Equation (4.2) must be combined with the continuity equation to describe transient flow which states that the change in water content of a volume of soil must equal the difference between flux into and out of the soil (Fayer 2000). For one-dimensional flow, the continuity equation is,

$$\frac{\delta\theta}{\delta t} = -\frac{\delta q_L}{\delta z} \qquad 4.3$$

where θ is the volumetric water content (cm^3/cm^3), and t is time (hr). Combining Equation (4.2) with (4.3) yields,

$$\frac{\delta\theta}{\delta t} = -\frac{\delta}{\delta z}[-K_L(\varphi)\frac{\delta H}{\delta z}] \qquad 4.4$$

UNSAT-H has two sign conventions that relate to heads. The first convention concerns gravitational head whereas the second one concerns matric head. With the soil surface as the reference elevation, the gravitational head at a point in the soil is the elevation of the point with respect to the soil surface and thus is negative and the matric head is a negative number for unsaturated soil conditions. Therefore, in UNSAT-H, z is replaced with –z and matric head is replaced with suction head, h, which is the negative of matric head. In conclusion, a positive suction head denotes a matric head, and a negative suction head a pressure head. The calculation of hydraulic head then changes from H =+ Z to the UNSAT-H form

$$H = -(h + Z) \tag{4.5}$$

Using the chain rule of differentiation, in Equation (4.5) $\frac{\delta\theta}{\delta t}$ can be replaced by $C(h)\frac{\delta h}{\delta t}$ where *C(h)* represents $\frac{\delta\theta}{\delta t}$. Through derivation using the chain rule and replacing –φ with h, Equation (4.5) now becomes,

$$C(h)\frac{\delta h}{\delta t} = \frac{\delta}{\delta z}\left[K_L(h)\left(\frac{\delta h}{\delta z} + 1\right)\right] - S(z,t) \tag{4.6}$$

where, $\frac{\delta H}{z} = \frac{\delta h}{\delta z} + 1$, through differentiation of Equation (5). S(z,t) is a sink term added for later uptake by plants as a function of depth and time.

Three assumptions that make this modified Richards' equation true are that fluid is incompressible in three dimensions, which follows the conservation of mass; air phase is continuous; and the pore-air pressure is at atmospheric pressure (Lam et al. 1987). Equation 4.7 shows that water content and hydraulic conductivity are functions of suction head and in the case of unsaturated flow it is often difficult to predict these three independent parameters because of the multidimensional, nonhomogeneous characteristics of soil (van Genuchten 1980). Burdine (1953) and Mualem (1976) derived analytical expressions to accurately predict the hydraulic conductivity and the conductivity at saturation.

UNSAT-H must be supplied with relationships for both hydraulic conductivity and water content as functions of suction head in order to solve the flow equation for liquid. The capacity term can be calculated by UNSAT-H from the soil water-retention curve. The UNSAT-H code comprises four options for describing the soil hydraulic properties: polynomials (Bond et al. 1984), Haverkamp functions (Haverkamp et al. 1977), Brooks-Corey functions (Corey 1977), and van Genuchten functions (van Genuchten 1978). The polynomial option allows up to four polynomials of the forms

$$\theta = a + blog(h) + clog^2(h) + dlog^3(h) + elog^4(h) \tag{4.7}$$

and

$$logK_L = a + blog(h) + clog^2(h) + dlog^3(h) + elog^4(h) \tag{4.8}$$

to be used to describe each soil property for different ranges of h. Bond et al. (1984) developed a computer program that can be used to fit polynomials to measured soil hydraulic data and to ensure that the fit is continuous at each matching point. Two major advantages of this option are that the user can easily fit polynomials to any data set and can extend the polynomials into the high suction-head range. Disadvantages of the polynomial option are that it requires many parameter inputs and consumes slightly more computer time for representing soil properties than the other options. The second option uses the Haverkamp functions (Haverkamp et al. 1977) to describe soil properties by equations of the forms

$$\theta = \theta_r + \mathrm{a}\frac{\theta_s - \theta_r}{\alpha + \ |h|^{\ \beta}} \qquad 4.9$$

and

$$K_L = K_s + \frac{A}{A + \ |h|^{\ B}} \qquad 4.10$$

where r is the residual water content measured in cm3 cm-3, s is the saturated water content measured in cm3 cm-3, and a, b, A, and B are curve-fitting parameters. The option exists in UNSAT-H to replace the h term in Equation (4.7) with ln(h). McKeon et al. (1983) developed two programs that can be used to fit the Haverkamp functions to measured soil hydraulic data. The third option uses the Brooks-Corey functions (Corey 1977) to describe soil properties with equations of the forms

$$\theta = \theta_r + (\theta_s - \theta_r)\left[\frac{h_e}{h}\right]^{\frac{1}{b}} when\ h > h_e$$

4.11

$$\theta = \theta_s\ when\ h \leq h_e$$

and

$$K_L = K_s\left[\frac{h_e}{h}\right]^{2+\frac{b'}{b}} \quad when\ h > h_e$$

4.12

$$K_L = K_s \; when \; h \leq h_e$$

where h_e represents the air-entry suction head (the point at which the soil begins to desaturate) and b is a curve-fitting parameter. For the Burdine conductivity model, b' represents ℓ+b, where ℓ is the exponent (usually 2) of the pore interaction term. For the Mualem model, b' represents 2+ ℓ, where ℓ is usually 0.5. The term r was not included in UNSAT-H Version 1.0.

The fourth option uses the van Genuchten (1978) functions to describe soil properties with equations of the forms

$$\theta = \theta_r + (\theta_s - \theta_r)[1 + (\alpha h)^n]^{-m} \quad 4.13$$

where a, m, and n are curve-fitting parameters, and where it is assumed that m = 1 - 1/n, and

$$K_L = K_s \frac{\{1 - (\alpha h)^{n-2}[1 + (\alpha h)^n]^{-m}\}}{[1 + (\alpha h)^n]^{lm}} \quad 4.14$$

where the conductivity function is based on the Burdine conductivity model (Burdine 1953), or

$$K_L = K_s \frac{\{1 - (\alpha h)^{n-1}[1 + (\alpha h)^n]^{-m}\}^2}{[1 + (\alpha h)^n]^{lm}} \quad 4.15$$

where the conductivity function is based on the Mualem conductivity model (Mualem 1976).

To arrive at Equation (6), in addition to the assumption of modified Richard's equation it was assumed that the fluid is incompressible, liquid water flow is isothermal, and vapor flow is negligible.

4.2 Discussion

To find out the impact on water quantity specifically on runoff, infiltration and evapotranspiration, a water balance model has to be developed in the near future by using the Windows version of UNSAT-H model. All necessary data and literature review have already been done. Developing the water balance model will help to understand the impact of ground residual removal from hydrologic point of view. Preparing a water balance model by Win UNSAT-H using field data and then trying to figure out the overall impact on water balance due to evaporation and infiltration processes to complete the study objectives and examine the hypotheses required for achieving the goals and may be helpful to look at the results microbial soil populations result from a different point of view.

4.3 Conclusion

Trees draw moisture out of the soil and release it into the atmosphere through evapotranspiration as well as tree may prevent excessive evaporation from dry sites. Depending on topography, soil and availability of water, clearing trees can have various effects on water tables. Fluctuating water tables cause increased soil salinity or changes in soil pH, and it may also modify annual soil water status and alter the hydrologic regime of the site. So it is important to determine the change of infiltration, water table and overall water balance if any due to various treatment procedures. Model selection, how the model works, and data processing have been completed. To understand the impact of woody biomass removal form hydrologic point of view, running the model, validation of the model and determining the impact for various designed storms are necessary.

CHAPTER 5

OVERALL SUMMARY AND CONCLUSION

This collective body of analyses has provided a birds–eye view concerning the ecosystem implications of expanding the bioenergy sector specifically with respect to production of aviation fuel from forest residuals. This study has been specifically conducted to determine environmental impacts on the basis of changes in microbial populations to better understand impacts from the biological point of view as well as potential changes in sediment erosion and water budget to understand changes from the hydrological perspective. In examining the microbial analysis, no statistically significant change has been found due to various treatments in case of microbial population, i.e., concentration of bacterial DNA, richness and evenness of biodiversity, which have been evaluated by Shanon – Weaver and Simson's diversity indices methods. Although the results are extremely variable, this conclusion is consistent with similar findings regarding the impacts of logging operations in tropical environments.

In terms of erosion, no observable sediment erosion has been found from the study sites even after some heavy rainfalls. The topography of the 28 LTSP sites were not ideal in terms of erosion production. Although theoretically the equations used in WEPP predict a nonlinear increase in erosion as ground cover is decreased, the visual evidence did not support this claim. The WEPP model was not used to model the sediment erosion from the study sites as it seems to be impractical because of the unavailability of the field data to validate the model. But the characteristics of the sites including slopes, soil types and characteristics, infiltration capacity, bulk density, as well as the climatic conditions, are so unique that they cannot be applicable for the whole Pacific Northwest and not even for whole watershed of the study area. Additional work in this area is needed.

Harvesting results in a decrease in evapotranspiration, which may contribute to increase in infiltration, subsurface flow, streamflow, change in water table and also may change the water budget of the whole area. Windows version of UNSAT-H model can be used to determine the change in water budget for the whole area. Literature review, data processing and other necessary work have already been done. Future study required to run the model, validate the model and find out the impact for 10 years and 100years design storm event. The overall conclusion is that from a microbial point of view especially for bacterial populations there is no change for different treatments, no sediment erosion, which is site specific because of the unique characteristics of the sites and climate in that region. Model selection, how the model works and data processing have been completed but running the model, validation of the model and determining the impact for a design storm event has to be done to understand the impact on water balance.

APPENDIX A

MO BIO POWER SOIL DNA ISOLATION KIT PPROTOCOL

1. 0.25 grams of soil sample has been added to the Power Bead Tubes provided.

2. Then the tube was vortexed gently to mix.

3. Before using solution C1 it was checked every time. If Solution C1 is precipitated, it has to be heated to 60°C until dissolved.

4. Then 60 µl of Solution C1 has been added to the tube and inverted several times or vortexed briefly.

5. Power Bead Tube has been secured horizontally on a flat-bed vortex pad with tape and vortexed at maximum speed of 10,000 rpm for 10 minutes.

6. It has been ensured that the Power Bead Tubes rotate freely in the centrifuge without rubbing. The tube has been centrifuged at 10,000 x *g* for 30 seconds at room temperature.

7. The supernatant was transferred to a clean 2 ml Collection Tube provided with the kit. The collection tube and the pipet tips have been sterilized in the enclave at 121°C before using. The expected amount of the supernatant would be 400 to 500 µl. Supernatant may still contain some soil particles.

8. A 250 µl of Solution C2 has been added, vortex for 5 seconds and then incubated at 4°C for 5 minutes.

9. The tube was centrifuged at room temperature for 1 minute at 10,000 x *g*.

10. A supernatant up to, but no more than, 600 µl has been transferred to a clean 2 ml sterilized collection tube, avoiding the pellet.

11. 200 µl of Solution C3 has been added, vortexed briefly and then incubated at 4°C for 5 minutes.

12. The tube was centrifuged at room temperature for 1 minute at 10,000 x *g*.

13. A supernatant up to, but no more than, 750 µl has been transferred to a clean 2 ml sterilized collection tube, avoiding the pellet.

14. Solution C4 has to be shaken before use. 1200 µl of Solution C4 has been added to the supernatant and vortexed for 5 seconds.

15. Approximately 675 µl of supernatant has been loaded onto a Spin Filter and centrifuged at 10,000 x *g* for 1 minute at room temperature. The flow through the filter has been discarded and an additional 675 µl of supernatant has been added to the Spin Filter and centrifuged at 10,000 x *g* for 1 minute at room temperature. The remaining supernatant has been loaded onto the Spin Filter and centrifuged at 10,000 x *g* for 1 minute at room temperature.

Note: A total of three loads for each sample processed are required.

16. 500 µl of Solution C5 has been added and centrifuged at room temperature for 30 seconds at 10,000 x *g*.

17. The flow through has been discarded.

18. Then it has been centrifuged again at room temperature for 1 minute at 10,000 x *g*.

19. The spin filter was placed carefully in a clean 2 ml Collection Tube avoiding the splashing of any Solution C5 onto the Spin Filter.

20. 100 µl of Solution C6 has been added to the center of the white filter membrane.

21. Then it has been centrifuged at room temperature for 30 seconds at 10,000 x *g*.

22. The Spin Filter has been discarded. The DNA in the tube is now ready for any downstream application. No further steps are required. It is recommended to store DNA frozen (-20° to -80°C). Solution C6 contains no EDTA.

APPENDIX B

SOLUTIONS USED IN POWER SOIL DNA ISOLATION KIT

Solution C1

Solution C1 contains SDS and other disruption agents required for complete cell lysis. In addition to aiding in cell lysis, SDS is an anionic detergent that breaks down fatty acids and lipids associated with the cell membrane of several organisms. If it gets cold, it will form a white precipitate in the bottle. Heating to 60ºC will dissolve the SDS and will not harm the SDS or the other disruption agents. Solution C1 can be used while it is still warm.

Solution C2

Solution C2 is patented Inhibitor Removal Technology® (IRT). It contains a reagent to precipitate non-DNA organic and inorganic material including humic substances, cell debris, and proteins. It is important to remove contaminating organic and inorganic matter that may reduce DNA purity and inhibit downstream DNA applications.

Solution C3

Solution C3 is patented Inhibitor Removal Technology® (IRT) and is a second reagent to precipitate additional non-DNA organic and inorganic material including humic acid, cell debris, and proteins. It is important to remove contaminating organic and inorganic matter that may reduce DNA purity and inhibit downstream DNA applications.

Solution C4

Solution C4 is a high concentration salt solution. Since DNA binds tightly to silica at high salt concentrations, this will adjust the DNA solution salt concentrations to allow binding of DNA, but not non-DNA organic and inorganic material that may still be present at low levels, to the Spin Filters.

Solution C5

Solution C5 is an ethanol based wash solution used to further clean the DNA that is bound to the silica filter membrane in the Spin Filter. This wash solution removes residual salt, humic acid, and other contaminants while allowing the DNA to stay bound to the silica membrane.

Solution C6

Solution C6 is a sterile elution buffer which has been placed in the center of the small white membrane and will make sure the entire membrane is wetted. This will result in a more efficient and complete release of the DNA from the silica Spin Filter membrane. As Solution C6 (elution buffer) passes through the silica membrane, DNA that was bound in the presence of high salt is selectively released by Solution C6 (10 mM Tris) which lacks salt.

APPENDIX C

DNA EXTRACTION RESULTS

Table C.1 DNA Extraction Results

	DNA Concentration (ng/µl)								
Plots & Treatment	NE	N	NW	Mid W	Mid C	Mid E	SE	S	SW
P#1- C(I) Compaction Bole Only	63.8	34.9	37.8	41.8	64.1	80.1	95.4	73.5	16.6
	87.3	77.6	12.4	21	45	2.4	89.7	89.3	72.6
	77.5	43.9	23.2	45.7	49.7	55.5	88.1	98.4	57.3
	61	40.4	31.9	36.9	67.1	75.9	75.5	79.7	17.3
P#2- G(I) Compaction Total tree + FF	33.9	9.8	25.3	17.1	26.9	14.6	82.3	30.2	3
	41.8	52.3	29.5	9.8	23.5	21.1	44.5	23.8	-1.1
	34.7	33.3	30	4.2	16.4	7	21.5	40.9	39.4
	34.2	21.8	17.7	13.7	34.9	15.4	100.2	23	17.1
P#4- D(II) Compaction Total tree	6.9	3.1	46	38.4	49.7	64.4	23.3	39.2	39
	24.6	26.9	37.3	31	40.3	15.2	19.3	36.2	41
	31.5	6.9	44.7	40.5	36.1	33.8	39.1	38.4	45.7
	28.7	6.9	35	28.9	42.7	36	48.2	26.4	39.5

Table C.1 Continued

	DNA Concentration (ng/µl)								
Plots & Treatment	NE	N	NW	Mid W	Mid C	Mid E	SE	S	SW
P#5- F(I) Compaction Total tree	62.7	48.7	21.3	47.3	50.8	44.1	69.4	37.6	48.5
	55	13.2	67.4	48.2	36.6	85.2	48.7	40	61
	49.3	60	33.8	43.5	60.3	79.5	64.3	37.8	11.1
	14.5	57.1	50.4	38.8	61.4	83.4	71.7	54	9.7
P#6- D(III) Compaction Total tree	7.7	22.4	29.3	19.7	3.4	40.9	45	14	12.3
	18.9	33.1	18.2	6	32.3	37.2	32.6	25	
	32.6	29.3	42.3		5	44.6	36.2	14	14.6
	18.3	23.4	27	43.2	6.2	44.5	37.2	18.6	1.5
P#7- C(II) Compaction Bole Only	4.8	31.7	61.9	29.2	61.4	61.1	24.6	36.1	16.6
	4.8	39.1	73.8	35.7	65.7	73.5	42.2	21.5	3.7
	38.8	39.3	79.4	4.7	62.7	63.4	41.8	6.5	32.6
	17	43.9	61	28.5	51.4	57.1	42.5	3.9	23.2
P#8- F(III) Compaction Total tree	-0.8	41.9	36.2	17.2	27.5	22.6	17.6	38	22.7
	0.8	41.4	9.8	19.9	26.3	16.5	12.6	15.1	17.6
	2.5	37.4	6.3	24.9	5.1	22.8	14	18.2	13.6
	1.8	46.4	16.6	10.1	14.4	33.7	15.4	20.6	8.4
P#9- B(I) No Compaction Total tree	37.7	3.6	36.2	48.2	50.7	3.9	40.3	56.1	49.8
	39.9	4.1	28	75.8	68.1		52.5	44.1	54.1
	42.4	13.8	26.8	36.6	2.7	13.9	48.7	46.4	50.6
	46.5	2.4	33.8	26.3	50.3	40.4	44.1	47.1	51

Table C.1 Continued

	DNA Concentration (ng/µl)								
Plots & Treatment	NE	N	NW	Mid W	Mid C	Mid E	SE	S	SW
P#10- E(I)	3.5	20.3	19.2	10.2	38.1	3.8	0.8	33.2	6.7
Compaction	18.3	18.1	15.8	5.2	34.9	5.4	1	3.4	57.1
Total tree+	4.9	6.9	19.7	7.7	24.8	3.2	10.9	8.5	2
FF	6	12.4	8.3	10.8	45.1	4.5	9	33.5	13.7
P#11- A(III)	9.3	28		67	48.5	64.3	21.7	8.9	20.9
No	11.5	5.7	9.1	69.5	12.6	55.6	41.9	4.2	34.8
Compaction	9.6	2.3	6.5	3.4	61.6	58.9	28.6	18.1	19.5
Bole only	12.6	40.3	11.1	37.1	53.2	57.6	43	21.6	14.2
P#12- G(III)	25.3	21.2	1.9	0.9	29.2	20.8	3.4	15.6	10
Compaction	14.9	35.5	18	1.3	52.3	40	3.1	18.7	2.4
Total tree+	23.4	2.6	13.5	18.5		19.4	10.8	16.5	14.7
FF	10.4	14.1	16.4	7.6	33.5	10	6.7	11.9	21.1
P#13- D(I)	73.9	78.9	53.8	40.8	31.5	58.4	42.3	7.5	4
Compaction	65.9	74.1	34.1	30.7	37.3	1.2	46.5	6.9	38.3
Total tree	87.7	75.5	13.7	36.4	5.1	9.3	40.8	26.1	18.2
	77.9	68.1	11.9	27.7	12.4	6.4	5.3	3.8	12.6
P#14- A(I)	34.2	41.7	86.1	61.5	13.7	39.8	36.7	100.3	74.9
No	15.2	45.5	56.8	47.7	17.6	26.9	28.6	65.2	95.3
Compaction	15.4	39.1	119.9	67.3	52.4	45.9	40.6	58.9	90
Bole only	11.3	51.6	87.9	18.6	27.1	45.7	35.3	75.1	96.3

Table C.1 Continued

	DNA Concentration (ng/µl)								
Plots & Treatment	NE	N	NW	Mid W	Mid C	Mid E	SE	S	SW
P#15- E(II)	26.3	51.6	32.4	6.7	17.1	60.4	5.3	4.5	17.4
Compaction	12.3	34.1	34.9	4.4	5.4	43.9	13.7	10.2	1.6
Total tree+	13	25.2	28	16.7	13.6	46	9.2	21.6	5.8
FF	14.6	24.1	25	6.5	16.3	63.4	7.8	11.7	2
P#16- B(IV)	38.3	45.8	41.4		29.9	34.3	25.9	3.4	50
No	8.9	33.5	15.1	44.1	25.6	38.7	37	10.8	31.5
Compaction	8.6	48.5	27.1	48.1	30.8	30.1	33	18.2	28.8
Total tree	7.1	55.7	23.4	30.1	36.6	46	73.4	19.7	29.9
P#17- E(IV)	23.2	19.3	43.5	8.2	6.4	11.8	9.7	40.3	87.7
Compaction	19.4	21.1	27.6	7.9	14.2	7.4	10	32.4	32.2
Total tree+	20.1	13.9	33.8	7.9	10.9	9.2	7.5	35.1	42.4
FF	28.6	41	32.1	4.9	10.7	8.9	3.8	46.3	55.6
P#18-	52.8	2	2.5	27.9	3.4	2.1	2.6	20.4	25.3
A(IV) No	6.5	1.9	12.9	9.2	2.9	2.7	2.8	6.5	16.1
Compaction	14.7	1.7	17.5	25.9	1.6	2.4	21.8	17.3	39.8
Bole only	2.7	7.4	16	24.9	2.3	3.1	1.6	15.2	18.6
P#19- A(II)	18	48.1	31.4	14.7	48.1	10.1	94.4	74.8	29
No	39.4	50.4	23.8	3.1	50.4	13.5	116	32.8	30.3
Compaction	11.3	33.5	31.8	5.8	33.1	15	106.5	40.2	1.7
Bole only	45.1	51.5	30.1	2.1	51.5	14.3	84.4	43.6	7.4

Table C.1 Continued

	DNA Concentration (ng/µl)								
Plots & Treatment	NE	N	NW	Mid W	Mid C	Mid E	SE	S	SW
P#20- B(II) No Compaction Total tree	114.9	43.7	91.6	6.2	33.3	58.4	66.2	41.6	79.8
	117.7	14.3	100.5	72.2	31.2	78	59.8	47.4	99.2
	81.7	45.1	44.1	69.6	11.5	84.5	37.4	63.5	60.8
	102.4	59	96.7	101.8	27.4	65.5	56.2	63	69.5
P#22- D(IV) Compaction Total tree	41.1	16.7	4.2	35.9	24.8	29.3	5.5	7.9	41.8
	29.9	16.5	3.3	11.4	41.6	31.6	8.4	11.3	24.9
	40.2	13.2	2.3	18.9	49.3	37.1	17	11.9	41.2
	24.3	14.7	1.4	21.4	16.4	42.9	5	12.4	17.9
P#24- F(IV) Compaction Total tree	52	3	4	37.3		0.7	50.6	33.3	66.4
	52.5	11.1	16.9	37.3	23.6	17.5	83.9	16.2	4.3
	37.9	12.7	22.4	35.1	21	17.1	18.4	10.3	50.9
	55.7	21.8	52.2	31.4	7.2	-1.3	38.9	25.5	7.1
P#25- C(IV) Compaction Bole only	4	26.2	38.2	10.3	9.8	14.9	9.6	4	18.9
	16.9	46.4	31.7	23.2	4.1	4.8	18.2	5.6	43
	22.4	46	38.2	14.7	9.4	3.4	8.4	2.3	27.5
	52.2	38.6	59.4	19.5	34.5	2.6	10.6	3	7.2
P#26- E(III) Compaction Total tree+FF	4.7	82.6	28.4	27.9	28.9	22.4	46.9	36.4	5
	5.7	61.8	17.3	50.1	12.9	14.9	47.1	23.4	14.1
	19.6	79.7	16	37.9	8.8	27.9	39.9	30.8	5.7
	15	72.8	15.2	38.4	13	25.1	39.3	19.5	6.1

Table C.1 Continued

	DNA Concentration (ng/µl)								
Plots & Treatment	NE	N	NW	Mid W	Mid C	Mid E	SE	S	SW
P#28- C(III) Compaction Bole only	46.4	66.2	10.3	26.8	23.2	19.2	47.8	56.4	136
	65.9	12.2	37.6	10.8	5.7		50.1	49.3	98.2
	43.3	52.4	27.9	4.3	26.6	39.8	54.3	54.2	158.3
	58.8	16.3	5.1	20.4	31.2	36.8	43.7	45.6	127.9
P#30- G(II) Compaction Total tree+FF	33	76.3	4.7	18.7	18.1	26.7	8.2	29.6	27.9
	48.2	46.1	3.9	32.3	9	27.2	17.2	66.5	40.4
	50.8	51.7	5.5	4.8	1.1	27.4	29.6	42.1	10
	63.2	51.8	5.4	20.7	-0.3	17.8	10.4	51.7	41.8
P#31- G(IV) Compaction Total tree+FF	14.8	3.3	4.9	3	31	42.6	22.2	11.4	16.1
	23.1	6.6	8.7	2.3	11.7	28.8	13.9	11.1	16.6
	18.4	10.2	12.5	2.2	22.9	18.8	8.4	16.3	7.8
	29.8	8	18.3	16.2	20.8	18.9	21.3	13.5	3.9
P#32- F(II) Compaction Total tree	7.5	6.9	39.5	49	36.9	10.3	5.8	17.5	95.9
	15.3	3.8	33	69.1	34.4	6.3	19	10.9	28.9
	8.6	4.4	56.4	63.5	45.2	26.1	20.7	18	90.4
	10	12.4	45.3	46.7	26.9	15.5	17	23.4	62.1
P#33- B(III) No Compaction Total tree	0.3	21	20.6	1.7	3.1	15.8	28	7.8	46.9
	26.6	24.6	14	5.4	2.4	14.7	15.3	28	60.7
	16.7	18.4	24.1	3.8	7.6	11	41.2	58.8	45.8
	11.5	22.4	21.4	16.4	2.2	16	25.2	19.7	45.9

Table C.1 Continued

	DNA Concentration (ng/µl)								
Plots & Treatment	NE	N	NW	Mid W	Mid C	Mid E	SE	S	SW
Unharvested	4.1	19.5	17	2.9					
	3.5	3.2	63.3	7.1					
	5.6	1.2	83.4	3.6					
	1.2	11	18	2.4					

APPENDIX D

WEATHER STATION AND MOISTURE PROBE DATA

Table D.1 Processed Field Weather Station Data

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
10/16/2013	0.00	52.52	60.62	54.86	44.01	1.12	0.67	15.97
10/17/2013	0.00	47.66	62.06	53.78	44.88	1.12	0.72	88.73
10/18/2013	0.00	50.72	65.48	56.66	44.52	1.12	0.64	88.40
10/19/2013	0.00	51.98	68.36	59.18	46.07	1.57	0.62	87.44
10/20/2013	0.00	50.72	64.22	57.02	46.86	1.34	0.69	86.66
10/21/2013	0.00	55.94	73.22	64.94	44.67	2.01	0.48	84.74
10/22/2013	0.00	59.18	71.96	66.02	41.53	2.68	0.41	82.70
10/23/2013	0.00	56.48	69.44	62.06	45.60	1.34	0.55	81.30
10/24/2013	0.00	54.14	66.38	59.00	47.16	1.12	0.65	80.04
10/25/2013	0.00	42.26	59.00	51.44	46.07	1.34	0.82	81.34
10/26/2013	0.01	41.18	52.70	45.32	43.11	1.79	0.92	79.93

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
10/27/2013	0.19	40.10	44.42	41.90	40.83	3.36	0.96	15.60
10/28/2013	0.00	39.56	49.82	43.16	35.68	3.58	0.75	68.10
10/29/2013	0.00	38.66	52.34	44.60	28.35	1.57	0.53	75.38
10/30/2013	0.00	41.72	54.14	47.66	37.51	2.46	0.68	70.95
10/31/2013	0.06	48.38	54.14	50.36	44.36	3.13	0.8	22.96
11/1/2013	0.02	45.50	58.82	51.26	48.40	2.01	0.9	75.09
11/2/2013	0.59	38.30	55.22	44.96	42.46	7.83	0.91	34.90
11/3/2013	0.44	36.50	40.10	38.12	36.80	4.03	0.95	18.93
11/4/2013	0.12	37.22	43.34	40.10	38.49	5.82	0.94	29.43
11/5/2013	0.61	42.44	48.20	45.68	44.31	6.26	0.95	8.28
11/6/2013	0.14	48.38	57.20	51.98	50.58	3.58	0.95	35.42
11/7/2013	0.75	40.10	51.62	46.04	44.95	6.04	0.96	7.73
11/8/2013	0.02	39.74	46.58	42.44	39.68	2.68	0.9	35.31
11/9/2013	0.00	37.94	51.80	45.32	39.12	1.34	0.79	40.41
11/10/2013	0.00	48.74	62.42	53.78	45.25	1.34	0.73	59.74
11/11/2013	0.00	48.02	60.98	52.70	44.92	1.34	0.75	49.95
11/12/2013	0.18	48.38	55.22	50.90	46.19	2.68	0.84	14.09
11/13/2013	0.01	42.62	51.08	46.22	45.13	1.34	0.96	46.47

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
11/14/2013	0.14	39.38	42.98	41.00	39.93	1.12	0.96	11.83
11/15/2013	0.04	37.22	41.18	38.66	37.33	3.80	0.95	19.52
11/16/2013	0.80	38.12	41.90	39.74	38.41	8.05	0.95	15.97
11/17/2013	0.09	38.66	44.60	41.36	38.61	6.93	0.9	15.68
11/18/2013	0.46	42.44	49.46	45.68	39.80	8.95	0.8	12.57
11/19/2013	0.91	38.12	48.38	45.86	44.49	7.61	0.95	3.88
11/20/2013	0.01	28.94	37.40	32.36	30.80	1.79	0.94	35.79
11/21/2013	0.00	28.94	41.90	34.52	18.52	1.57	0.52	58.97
11/22/2013	0.00	33.98	51.26	43.52	16.09	2.24	0.33	56.27
11/23/2013	0.00	44.78	57.92	51.44	21.60	1.79	0.31	52.61
11/24/2013	0.00	44.78	61.34	51.26	22.20	0.89	0.32	51.72
11/25/2013	0.00	45.14	54.50	49.46	25.33	0.89	0.39	50.43
11/26/2013	0.00	42.26	57.20	49.46	29.36	1.57	0.46	33.31
11/27/2013	0.00	46.58	57.02	49.64	33.52	0.89	0.54	39.52
11/28/2013	0.00	44.06	56.12	47.84	35.32	1.12	0.62	48.43
11/29/2013	0.00	42.26	53.06	45.86	37.25	1.34	0.72	40.04
11/30/2013	0.00	41.54	53.06	46.58	40.35	2.46	0.79	32.31
12/1/2013	0.09	45.50	50.00	48.20	44.77	11.63	0.88	6.29

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
12/2/2013	1.95	30.74	46.22	37.94	36.89	7.38	0.96	13.68
12/3/2013	0.09	22.64	34.16	29.30	27.23	2.24	0.92	23.77
12/4/2013	0.02	20.48	31.46	24.62	17.10	1.12	0.73	48.17
12/5/2013	0.01	17.96	28.22	23.36	17.13	1.34	0.77	36.82
12/6/2013	0.00	17.96	27.86	24.44	20.52	4.70	0.85	7.17
12/7/2013	0.09	11.12	27.86	17.78	13.43	1.12	0.83	20.08
12/8/2013	0.03	12.38	30.74	18.32	13.11	1.12	0.8	26.84
12/9/2013	0.05	17.96	38.30	26.06	18.49	1.34	0.73	44.66
12/10/2013	0.02	27.14	39.38	31.28	24.18	1.34	0.75	25.40
12/11/2013	0.02	31.82	50.36	41.36	30.35	1.12	0.65	44.59
12/12/2013	0.11	38.48	47.84	43.52	30.82	4.47	0.61	24.14
12/13/2013	0.00	39.56	48.02	42.62	38.98	4.03	0.87	35.90
12/14/2013	0.00	40.28	50.18	44.42	36.21	2.24	0.73	33.31
12/15/2013	0.00	39.56	50.90	44.96	36.02	1.79	0.71	22.66
12/16/2013	0.00	38.12	51.62	44.60	39.06	1.34	0.81	45.25
12/17/2013	0.00	41.00	57.38	49.28	31.26	1.34	0.5	44.99
12/18/2013	0.02	30.74	41.00	37.76	33.60	1.57	0.85	14.57
12/19/2013	0.00	24.26	32.72	27.86	25.27	2.24	0.9	32.24

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
12/20/2013	0.44	26.06	41.00	33.98	30.76	5.37	0.88	6.47
12/21/2013	0.28	41.18	42.98	41.90	41.10	4.92	0.97	13.38
12/22/2013	0.06	41.18	50.54	45.14	42.93	4.03	0.92	31.17
12/23/2013	0.20	39.74	48.02	45.14	41.76	4.47	0.88	7.51
12/24/2013	0.01	34.34	41.18	37.94	36.89	1.12	0.96	26.99
12/25/2013	0.01	33.98	51.44	41.18	36.35	1.34	0.83	40.59
12/26/2013	0.00	42.08	61.16	50.72	33.09	1.12	0.51	46.33
12/27/2013	0.00	40.64	53.96	48.38	33.25	2.24	0.56	32.42
12/28/2013	0.00	28.58	39.38	34.34	31.95	1.12	0.91	39.19
12/29/2013	0.00	29.66	46.04	37.40	31.72	1.57	0.8	35.75
12/30/2013	0.00	41.18	52.16	47.48	30.08	2.24	0.51	18.26
12/31/2013	0.00	43.70	52.70	48.02	29.08	2.01	0.48	22.26
1/1/2014	0.00	42.44	51.26	46.22	34.59	1.34	0.64	39.48
1/2/2014	0.00	45.14	60.26	51.26	34.56	2.46	0.53	36.38
1/3/2014	0.13	31.46	46.40	40.10	37.65	2.46	0.91	24.88
1/4/2014	0.02	28.94	47.30	37.04	29.09	1.34	0.73	48.32
1/5/2014	0.00	42.08	59.18	49.15	16.50	1.73	0.27	47.17
1/6/2014	0.02	39.56	54.14	48.38	22.49	1.71	0.36	21.30

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
1/7/2014	0.43	42.62	48.56	45.45	38.02	7.81	0.75	7.76
1/8/2014	0.87	40.46	46.94	43.96	42.04	10.23	0.93	7.76
1/9/2014	0.54	37.22	42.62	39.30	37.84	9.84	0.95	9.13
1/10/2014	0.06	42.08	50.72	44.83	39.95	8.65	0.83	13.16
1/11/2014	2.04	35.06	52.70	41.96	37.94	14.67	0.86	7.14
1/12/2014	0.30	35.96	42.44	39.30	38.18	8.62	0.96	8.61
1/13/2014	0.13	40.10	45.86	41.70	39.49	2.31	0.92	31.65
1/14/2014	0.00	38.84	53.78	45.03	36.34	1.28	0.72	43.37
1/15/2014	0.00	44.24	60.62	50.38	31.77	1.15	0.49	52.02
1/16/2014	0.00	45.14	62.06	51.81	27.94	0.64	0.40	53.61
1/17/2014	0.00	50.18	65.66	57.06	24.34	1.12	0.28	54.38
1/18/2014	0.00	46.94	60.80	53.63	30.93	2.05	0.42	51.69
1/19/2014	0.00	45.50	57.74	49.78	31.24	1.43	0.49	52.39
1/20/2014	0.00	44.42	63.86	52.56	34.41	1.07	0.50	53.94
1/21/2014	0.00	37.40	59.54	50.86	32.47	2.05	0.50	56.05
1/22/2014	0.00	33.08	47.30	40.11	34.06	2.05	0.79	54.27
1/23/2014	0.00	33.26	59.72	48.16	30.10	4.50	0.50	58.12
1/24/2014	0.00	48.20	63.68	55.08	21.14	6.88	0.27	58.97

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
1/25/2014	0.00	46.22	57.92	51.29	29.19	1.25	0.43	56.12
1/26/2014	0.00	46.94	59.18	51.30	32.69	1.50	0.49	56.12
1/27/2014	0.00	44.42	53.24	49.38	35.19	1.29	0.58	13.72
1/28/2014	0.77	45.68	51.26	48.47	45.09	2.43	0.88	12.75
1/29/2014	1.21	39.02	50.72	44.50	43.07	11.55	0.95	9.35
1/30/2014	0.02	33.98	42.44	37.03	34.53	2.68	0.91	38.30
1/31/2014	0.14	32.36	37.04	34.35	32.66	3.79	0.94	20.81
2/1/2014	0.01	32.90	44.60	37.76	33.77	2.24	0.86	67.14
2/2/2014	0.17	33.08	44.96	38.01	34.04	1.67	0.86	27.65
2/3/2014	0.06	30.92	36.50	32.10	30.87	2.70	0.95	25.58
2/4/2014	0.11	30.20	35.06	31.58	30.22	1.84	0.95	23.96
2/5/2014	0.00	22.82	29.84	26.44	24.43	1.55	0.92	35.01
2/6/2014	0.33	20.48	33.98	26.52	24.73	4.73	0.93	15.97
2/7/2014	1.17	30.20	35.60	32.62	31.38	6.05	0.95	12.87
2/8/2014	0.91	34.16	47.84	40.23	38.78	8.08	0.95	11.17
2/9/2014	0.14	40.64	48.74	43.31	41.69	4.14	0.94	42.55
2/10/2014	0.20	40.10	46.22	43.48	40.69	6.67	0.90	18.15
2/11/2014	0.70	40.46	46.94	43.51	39.76	10.38	0.87	22.70

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
2/12/2014	1.81	43.70	48.38	46.91	45.80	13.07	0.96	9.24
2/13/2014	0.68	41.90	49.46	45.83	42.87	7.59	0.89	36.23
2/14/2014	2.20	39.92	48.38	44.79	43.49	9.87	0.95	8.69
2/15/2014	1.04	36.32	53.06	45.01	42.74	10.69	0.92	14.12
2/16/2014	0.43	32.36	43.52	37.95	34.26	10.77	0.87	37.23
2/17/2014	0.78	39.02	42.62	40.95	37.51	12.25	0.88	11.09
2/18/2014	1.04	33.98	47.30	41.17	38.72	12.60	0.91	8.76
2/19/2014	0.28	31.82	37.94	34.25	32.86	6.23	0.95	30.13
2/20/2014	0.46	35.06	41.00	38.27	36.95	7.43	0.95	18.08
2/21/2014	0.08	38.66	45.14	40.65	39.60	2.29	0.96	41.78
2/22/2014	0.00	33.98	49.10	40.59	36.21	1.38	0.84	82.44
2/23/2014	0.24	39.56	53.60	44.78	36.81	4.19	0.74	47.80
2/24/2014	0.06	45.86	57.02	51.22	47.93	3.72	0.89	45.33
2/25/2014	0.00	43.52	55.94	49.21	46.12	1.64	0.89	81.08
2/26/2014	0.00	35.42	48.56	43.79	40.56	1.85	0.88	43.22
2/27/2014	0.34	37.04	53.60	45.07	42.76	2.25	0.92	47.43
2/28/2014	0.06	40.82	56.84	46.73	42.56	2.17	0.85	52.65
3/1/2014	0.51	43.16	47.30	44.74	43.54	3.58	0.96	22.74

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
3/2/2014	0.46	45.14	47.48	46.05	44.04	9.46	0.93	10.65
3/3/2014	0.20	45.14	52.52	47.19	44.97	8.65	0.92	32.76
3/4/2014	0.00	45.50	57.20	50.66	45.65	5.56	0.83	69.62
3/5/2014	0.83	48.38	56.66	51.73	47.57	12.47	0.86	20.56
3/6/2014	1.01	40.82	47.84	43.78	40.66	13.19	0.89	12.53
3/7/2014	0.06	41.54	57.56	48.09	41.91	4.20	0.79	92.76
3/8/2014	0.13	50.72	57.92	53.77	40.10	11.08	0.60	25.81
3/9/2014	2.20	45.86	52.34	50.24	48.66	6.70	0.94	18.41
3/10/2014	0.45	36.68	44.78	41.35	39.19	5.51	0.92	54.16
3/11/2014	0.01	32.90	53.78	42.16	36.08	1.61	0.79	105.00
3/12/2014	0.00	42.62	61.16	51.25	30.58	3.43	0.45	108.07
3/13/2014	0.00	43.70	57.56	50.28	35.77	2.09	0.58	98.27
3/14/2014	0.22	44.24	55.04	47.67	43.38	5.48	0.85	53.72
3/15/2014	0.00	46.94	63.68	53.65	37.73	4.74	0.55	100.01
3/16/2014	0.28	40.46	53.78	47.79	43.58	6.01	0.85	69.62
3/17/2014	0.38	33.62	42.62	36.40	33.17	3.28	0.88	60.48
3/18/2014	0.00	31.10	52.52	40.68	33.80	2.09	0.77	111.65
3/19/2014	0.10	36.14	48.38	41.81	37.03	3.21	0.83	68.17

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
3/20/2014	0.00	30.56	48.02	38.39	32.14	2.94	0.78	117.35
3/21/2014	0.00	28.40	48.92	37.76	30.48	1.98	0.75	115.79
3/22/2014	0.00	34.16	55.22	43.69	30.61	1.74	0.60	117.46
3/23/2014	0.00	38.30	59.90	48.04	31.38	1.67	0.53	116.35
3/24/2014	0.00	48.92	68.18	56.96	33.71	2.55	0.42	108.69
3/25/2014	0.31	38.48	52.34	45.62	36.97	8.56	0.72	38.08
3/26/2014	0.84	37.76	43.16	40.22	38.01	8.65	0.92	34.90
3/27/2014	0.87	36.50	44.42	39.88	38.15	10.78	0.94	34.72
3/28/2014	1.72	41.18	46.40	44.26	41.66	13.14	0.91	13.64
3/29/2014	0.36	38.30	45.86	42.67	38.89	10.77	0.87	47.99
3/30/2014	0.35	35.42	44.42	38.53	36.31	5.37	0.92	55.23
3/31/2014	0.24	34.52	45.32	40.87	34.27	8.11	0.77	26.14
4/1/2014	0.07	35.42	44.78	40.06	35.49	2.70	0.84	50.47
4/2/2014	0.02	36.86	53.96	43.98	38.07	1.63	0.80	80.71
4/3/2014	0.01	39.20	52.88	44.95	37.44	3.60	0.75	74.57
4/4/2014	0.32	38.30	50.18	42.55	39.29	5.72	0.88	83.37
4/5/2014	0.70	40.46	45.86	43.18	41.92	7.45	0.95	26.58
4/6/2014	0.05	44.24	59.54	49.88	46.93	5.19	0.90	85.55

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
4/7/2014	0.00	47.30	70.34	57.25	48.86	1.83	0.74	129.47
4/8/2014	0.00	46.04	65.48	55.25	46.76	2.42	0.73	125.15
4/9/2014	0.03	45.32	59.18	50.20	41.86	2.36	0.73	119.23
4/10/2014	0.00	40.28	61.88	49.90	34.80	2.09	0.56	136.72
4/11/2014	0.00	41.54	64.58	52.07	38.58	2.61	0.60	137.97
4/12/2014	0.00	38.30	58.10	46.58	38.81	2.53	0.74	111.47
4/13/2014	0.00	43.70	69.08	55.41	35.95	2.51	0.48	142.89
4/14/2014	0.00	43.16	64.04	56.79	34.18	4.00	0.43	113.46
4/15/2014	0.00	39.38	54.50	45.92	37.77	2.13	0.73	126.70
4/16/2014	0.00	39.74	57.74	47.54	39.48	1.59	0.74	82.37
4/17/2014	0.76	41.18	47.84	45.60	42.48	5.05	0.89	26.99
4/18/2014	0.00	37.04	57.56	46.26	40.99	2.01	0.82	123.30
4/19/2014	0.18	42.26	52.70	47.31	40.33	6.76	0.77	49.13
4/20/2014	0.00	40.82	62.42	50.14	40.99	2.11	0.71	123.33
4/21/2014	0.13	40.64	58.10	46.67	39.79	3.34	0.77	77.12
4/22/2014	0.45	37.04	44.78	39.88	37.50	7.48	0.91	76.09
4/23/2014	0.72	37.58	47.30	42.66	40.18	12.14	0.91	40.41
4/24/2014	0.83	39.56	48.02	44.91	42.21	9.79	0.90	54.68

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
4/25/2014	0.20	33.08	48.38	40.78	36.76	2.65	0.86	103.78
4/26/2014	0.22	35.06	49.82	41.39	36.01	6.39	0.81	91.10
4/27/2014	0.42	37.58	43.34	40.21	38.15	7.95	0.92	55.38
4/28/2014	0.00	36.68	58.82	47.71	37.79	2.89	0.69	141.52
4/29/2014	0.00	45.86	73.94	60.10	44.49	1.63	0.57	149.03
4/30/2014	0.00	62.96	86.00	72.51	34.41	5.98	0.25	155.02
5/1/2014	0.00	66.02	83.30	74.14	34.41	4.57	0.23	147.11
5/2/2014	0.00	49.28	64.94	58.78	44.35	2.36	0.59	107.66
5/3/2014	0.00	44.42	57.56	50.44	42.36	7.40	0.74	78.19
5/4/2014	0.76	42.98	52.16	46.39	43.56	9.78	0.90	79.01
5/5/2014	0.27	41.18	51.62	45.08	41.59	4.15	0.88	99.27
5/6/2014	0.01	40.82	55.58	47.04	40.94	2.67	0.79	117.05
5/7/2014	0.00	37.04	58.64	46.90	37.79	2.12	0.71	142.15
5/8/2014	0.63	42.80	51.98	47.61	45.18	7.38	0.91	29.54
5/9/2014	0.61	40.28	46.40	43.28	41.80	8.30	0.95	46.32
5/10/2014	0.17	39.02	50.90	44.26	40.98	3.89	0.88	91.24
5/11/2014	0.00	41.90	61.70	51.02	44.68	1.87	0.79	155.57
5/12/2014	0.00	49.82	73.04	60.73	42.05	2.36	0.50	153.87

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
5/13/2014	0.00	56.30	79.70	67.35	41.99	2.31	0.40	163.11
5/14/2014	0.00	63.14	87.44	74.47	46.98	1.79	0.38	164.45
5/15/2014	0.00	54.50	77.00	68.67	47.84	2.34	0.48	119.71
5/16/2014	0.00	45.86	65.66	53.87	45.32	2.88	0.73	125.63
5/17/2014	0.04	46.04	65.48	54.27	46.46	3.20	0.75	144.93
5/18/2014	0.87	44.96	50.72	47.47	45.17	6.96	0.92	68.88
5/19/2014	0.15	45.14	60.80	51.56	46.04	4.39	0.82	124.22
5/20/2014	0.00	44.60	67.28	55.50	48.10	2.16	0.76	159.16
5/21/2014	0.00	45.86	66.92	54.58	47.56	2.39	0.77	133.83
5/22/2014	0.00	50.54	76.28	62.79	50.00	2.58	0.63	157.24
5/23/2014	0.01	54.68	65.30	60.08	53.59	2.05	0.79	72.39
5/24/2014	0.00	50.90	65.66	57.03	50.75	1.74	0.80	131.06
5/25/2014	0.01	50.18	69.44	58.12	48.01	4.07	0.69	141.63
5/26/2014	0.00	48.02	64.58	54.95	46.99	3.01	0.75	130.99
5/27/2014	0.00	43.70	57.56	49.30	42.08	2.40	0.76	81.19
5/28/2014	0.31	42.08	53.06	46.53	43.19	2.95	0.88	89.25
5/29/2014	0.00	41.90	64.22	52.45	45.44	2.66	0.77	173.98
5/30/2014	0.00	43.70	68.36	54.78	46.98	1.78	0.75	152.10

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
5/31/2014	0.00	45.86	69.44	54.78	46.98	1.78	0.75	152.10
6/1/2014	0.00	46.94	64.04	53.59	48.72	1.50	0.84	104.15
6/2/2014	0.00	49.46	73.58	60.49	50.61	1.90	0.70	174.43
6/3/2014	0.01	44.60	62.78	51.19	46.24	1.80	0.83	86.25
6/4/2014	0.00	46.58	69.98	57.72	47.96	2.77	0.70	177.83
6/5/2014	0.00	48.38	72.68	59.72	46.64	2.68	0.62	176.68
6/6/2014	0.00	48.56	73.94	60.99	43.69	2.77	0.53	175.50
6/7/2014	0.00	50.54	72.50	61.48	46.12	2.84	0.57	173.61
6/8/2014	0.00	51.98	77.18	63.67	51.79	2.68	0.65	174.32
6/9/2014	0.00	50.90	71.42	61.32	49.65	3.17	0.66	177.83
6/10/2014	0.00	47.66	71.96	59.20	46.12	2.75	0.62	176.46
6/11/2014	0.00	50.18	73.40	61.43	46.93	2.41	0.59	177.79
6/12/2014	0.09	46.40	59.18	50.76	45.69	5.60	0.83	70.02
6/13/2014	0.31	46.58	51.80	48.34	46.75	6.16	0.94	28.87
6/14/2014	0.00	43.88	59.54	50.82	44.91	2.01	0.80	103.96
6/15/2014	0.05	45.86	56.66	50.31	46.45	2.20	0.87	69.14
6/16/2014	0.34	42.26	51.08	45.91	42.85	2.23	0.89	66.33
6/17/2014	0.03	42.98	52.70	47.44	44.92	1.57	0.91	54.72

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
6/18/2014	0.00	46.22	68.18	56.79	47.40	1.75	0.71	172.02
6/19/2014	0.00	50.72	73.40	61.19	49.53	2.93	0.66	175.50
6/20/2014	0.06	49.82	65.12	55.73	49.43	2.40	0.80	124.22
6/21/2014	0.00	45.68	70.16	57.41	45.83	2.18	0.65	159.23
6/22/2014	0.00	52.34	76.10	63.42	45.70	2.00	0.53	168.62
6/23/2014	0.02	52.52	73.58	62.66	49.18	2.76	0.62	140.01
6/24/2014	0.00	50.72	74.66	62.15	50.36	1.81	0.65	164.45
6/25/2014	0.39	55.94	65.66	59.19	55.09	1.35	0.86	57.64
6/26/2014	0.53	52.34	61.52	55.90	53.91	4.83	0.93	72.02
6/27/2014	0.28	52.34	61.70	56.27	53.59	7.67	0.91	70.80
6/28/2014	0.00	51.62	63.50	56.36	51.43	3.95	0.84	102.48
6/29/2014	0.00	50.72	69.62	58.96	50.87	2.56	0.75	163.67
6/30/2014	0.00	50.54	79.34	64.76	53.76	1.98	0.68	176.39
7/1/2014	0.00	64.22	87.80	74.86	57.02	2.26	0.54	174.43
7/2/2014	0.00	53.42	77.00	64.33	54.25	2.73	0.70	159.20
7/3/2014	0.00	50.54	68.36	57.58	51.82	1.55	0.81	82.96
7/4/2014	0.00	51.80	75.20	63.04	52.50	2.05	0.69	157.35
7/5/2014	0.00	54.50	82.76	68.17	53.89	2.15	0.60	173.39

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
7/6/2014	0.00	58.10	84.02	70.63	53.04	2.59	0.54	173.54
7/7/2014	0.00	61.52	86.36	73.14	57.88	2.71	0.59	172.84
7/8/2014	0.00	60.98	83.12	71.52	59.91	2.41	0.67	136.31
7/9/2014	0.00	59.72	83.84	71.49	57.08	2.68	0.61	173.84
7/10/2014	0.00	57.56	82.94	69.79	53.47	1.81	0.56	175.54
7/11/2014	0.00	62.42	72.86	67.85	53.87	1.88	0.61	68.21
7/12/2014	0.00	59.36	85.46	71.69	61.22	1.57	0.70	164.41
7/13/2014	0.00	55.76	70.88	62.08	57.62	1.98	0.85	89.06
7/14/2014	0.01	54.68	83.84	65.75	58.01	2.44	0.76	139.79
7/15/2014	0.00	64.94	89.06	75.99	58.82	1.92	0.55	165.67
7/16/2014	0.00	66.20	88.88	76.96	58.86	1.56	0.54	158.20
7/17/2014	0.00	55.76	82.22	68.89	52.37	2.63	0.56	170.07
7/18/2014	0.00	54.86	78.62	66.93	50.15	2.78	0.55	160.27
7/19/2014	0.00	59.54	85.64	71.80	55.42	2.36	0.56	167.22
7/20/2014	0.00	57.02	68.90	62.41	55.75	2.04	0.79	68.28
7/21/2014	0.01	51.62	64.58	58.35	53.06	1.90	0.83	58.01
7/22/2014	0.03	54.50	71.24	61.79	54.80	1.49	0.78	94.39
7/23/2014	0.38	50.54	59.36	53.14	49.37	4.21	0.87	48.58

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
7/24/2014	0.00	49.10	64.04	55.83	48.92	4.54	0.78	104.52
7/25/2014	0.00	49.46	75.92	61.75	50.82	2.11	0.68	166.00
7/26/2014	0.00	54.14	80.78	67.03	52.30	2.73	0.59	164.11
7/27/2014	0.00	57.74	80.06	68.15	54.75	1.59	0.62	113.87
7/28/2014	0.00	63.14	88.34	75.07	60.56	1.77	0.61	160.86
7/29/2014	0.00	63.86	87.26	75.20	56.60	2.03	0.53	160.93
7/30/2014	0.00	60.08	86.36	72.89	57.00	2.33	0.58	159.16
7/31/2014	0.00	62.60	83.84	73.46	55.26	1.95	0.53	130.47
8/1/2014	0.00	63.50	86.18	73.94	57.99	2.03	0.58	151.21
8/2/2014	0.00	59.54	82.22	70.59	57.33	2.18	0.63	151.62
8/3/2014	0.00	59.90	80.06	70.16	57.84	1.13	0.65	112.95
8/4/2014	0.00	62.78	81.14	70.86	59.70	1.59	0.68	122.82
8/5/2014	0.00	55.94	78.62	66.13	52.64	2.11	0.62	134.46
8/6/2014	0.00	56.12	81.50	68.07	53.55	2.42	0.60	155.79
8/7/2014	0.00	58.46	80.42	68.85	53.53	2.03	0.58	154.87
8/8/2014	0.00	52.16	77.18	64.39	47.91	2.91	0.55	151.91
8/9/2014	0.00	53.78	79.70	66.11	50.75	2.09	0.58	146.70
8/10/2014	0.00	59.36	86.00	72.07	53.98	3.24	0.53	135.02

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
8/11/2014	0.00	71.96	92.48	80.18	55.54	2.64	0.43	89.21
8/12/2014	0.00	56.12	75.38	64.63	57.11	2.51	0.77	49.17
8/13/2014	0.00	52.70	66.92	58.35	54.42	1.56	0.87	44.48
8/14/2014	0.02	55.40	68.90	61.34	55.32	1.57	0.81	69.95
8/15/2014	0.00	55.40	73.40	63.11	56.74	1.45	0.80	111.10
8/16/2014	0.00	56.30	81.86	67.99	58.09	1.73	0.71	142.49
8/17/2014	0.00	59.90	83.30	71.26	56.78	2.24	0.60	141.56
8/18/2014	0.00	59.00	85.28	71.52	58.34	1.94	0.63	134.80
8/19/2014	0.00	59.72	80.24	69.78	57.72	2.39	0.66	138.49
8/20/2014	0.03	56.12	71.24	62.09	54.34	1.83	0.76	100.38
8/21/2014	0.00	52.16	75.92	63.45	47.45	1.73	0.56	140.23
8/22/2014	0.00	52.52	75.38	63.19	47.70	2.77	0.57	135.17
8/23/2014	0.00	55.58	81.32	67.51	50.80	2.93	0.55	140.38
8/24/2014	0.00	60.44	78.62	68.52	47.57	2.31	0.47	137.97
8/25/2014	0.00	56.48	84.20	69.42	48.99	2.94	0.48	138.38
8/26/2014	0.00	65.12	86.72	75.29	49.40	1.73	0.40	135.83
8/27/2014	0.00	65.66	85.46	75.19	52.48	1.88	0.45	135.02
8/28/2014	0.00	60.62	80.96	70.42	54.26	2.02	0.57	135.13

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
8/29/2014	0.00	54.86	73.22	64.34	53.12	2.35	0.67	126.00
8/30/2014	0.29	52.70	61.70	56.78	52.84	3.51	0.87	42.26
8/31/2014	0.01	51.26	69.98	58.86	50.92	1.37	0.75	101.60
9/1/2014	0.00	53.78	77.18	64.37	51.91	2.32	0.64	134.54
9/2/2014	0.00	53.96	71.78	62.25	52.21	2.33	0.70	130.21
9/3/2014	0.00	46.94	68.18	57.03	45.57	3.01	0.66	134.65
9/4/2014	0.00	50.00	79.70	63.83	46.07	2.97	0.53	133.50
9/5/2014	0.00	66.02	89.06	76.18	36.66	7.18	0.24	134.35
9/6/2014	0.00	66.74	85.46	76.28	37.27	4.19	0.24	109.66
9/7/2014	0.00	58.64	78.62	68.48	45.56	1.70	0.44	107.66
9/8/2014	0.00	57.92	77.18	66.20	48.99	1.57	0.54	123.59
9/9/2014	0.00	52.52	68.72	59.14	48.84	2.13	0.69	108.07
9/10/2014	0.00	52.52	75.74	62.80	46.14	2.03	0.55	125.48
9/11/2014	0.00	58.28	82.22	68.66	39.40	3.20	0.34	126.40
9/12/2014	0.00	60.80	81.32	70.41	33.99	1.78	0.26	122.26
9/13/2014	0.00	61.34	82.76	71.95	38.43	1.57	0.30	122.78
9/14/2014	0.00	63.86	84.02	74.26	38.35	1.58	0.27	119.01
9/15/2014	0.00	57.38	82.94	73.68	42.61	1.87	0.33	97.71

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
9/16/2014	0.00	52.52	73.04	62.24	48.25	1.86	0.60	105.29
9/17/2014	0.00	57.02	67.82	61.35	51.62	1.93	0.71	42.81
9/18/2014	0.00	55.04	65.12	60.45	53.81	1.77	0.79	47.36
9/19/2014	0.00	55.58	77.36	65.38	55.36	2.05	0.70	107.40
9/20/2014	0.00	60.26	86.00	72.57	55.53	1.17	0.55	110.02
9/21/2014	0.00	53.96	80.42	68.57	54.47	1.88	0.61	106.44
9/22/2014	0.00	51.08	64.22	57.04	52.21	1.69	0.84	58.89
9/23/2014	0.00	57.38	69.98	64.93	50.26	2.24	0.59	28.84
9/24/2014	1.78	53.06	61.70	56.52	53.80	6.24	0.91	11.28
9/25/2014	0.17	52.70	62.06	55.52	48.99	4.91	0.79	67.40
9/26/2014	0.00	52.52	64.94	57.05	48.82	4.09	0.74	95.75
9/27/2014	0.00	49.82	60.44	53.87	50.29	2.53	0.88	63.89
9/28/2014	0.00	50.36	67.82	57.40	51.97	1.34	0.82	91.54
9/29/2014	0.21	50.36	60.26	54.58	51.08	3.10	0.88	47.03
9/30/2014	0.04	48.56	58.10	51.82	49.04	1.58	0.90	70.50
10/1/2014	0.02	45.14	61.34	52.22	46.73	1.65	0.82	101.30
10/2/2014	0.00	47.30	67.28	56.20	47.96	1.44	0.74	99.53
10/3/2014	0.00	55.76	78.62	65.88	51.49	1.13	0.60	101.11

Table D.1 Continued

Date	Precip. (in/day)	Daily Min. Temp °F	Daily Max. Temp °F	Avg. Daily Temp °F	Dew Point temp °F	Avg. Wind Speed (mi/hr)	Avg. RH	Avg. Solar Radiation (Langleys / day)
10/4/2014	0.00	63.32	79.70	70.67	47.12	1.30	0.43	99.67
10/5/2014	0.00	61.16	78.08	69.18	49.91	1.60	0.50	96.86
10/6/2014	0.00	62.60	78.62	69.87	54.52	1.47	0.58	96.01
10/7/2014	0.00	62.42	78.26	69.49	56.85	0.96	0.64	92.65
10/8/2014	0.00	56.30	69.44	62.25	54.59	1.24	0.76	91.10
10/9/2014	0.00	54.32	70.16	61.74	49.44	1.07	0.64	82.04
10/10/2014	0.00	55.94	69.08	61.69	48.90	1.79	0.63	79.60
10/11/2014	0.20	51.26	59.54	55.50	49.92	3.39	0.82	50.13
10/12/2014	0.02	48.38	63.50	55.02	48.45	1.13	0.79	76.79
10/13/2014	0.00	55.94	68.36	62.12	39.49	4.37	0.43	83.63
10/14/2014	0.63	49.28	58.64	51.93	48.35	6.32	0.88	11.83
10/15/2014	0.49	45.14	51.26	48.28	44.44	10.97	0.87	26.03
10/16/2014	0.00	49.46	63.32	55.15	42.91	3.96	0.64	81.11
10/17/2014	0.16	52.34	59.72	56.63	46.17	6.49	0.68	16.45
10/18/2014	0.01	54.86	69.44	61.89	51.94	4.46	0.70	77.75
10/19/2014	0.00	55.04	70.52	61.94	51.93	2.63	0.70	79.27
10/20/2014	0.78	48.38	57.56	52.17	48.61	5.76	0.88	33.79
10/21/2014	0.06	46.04	49.82	47.76	44.17	9.05	0.87	18.29

Table D.2 Cloud Cover Data

Date	Cloud cover (tenth)
10/16/2013	5.75
10/17/2013	5.47
10/18/2013	5.33
10/19/2013	5.16
10/20/2013	4.93
10/21/2013	4.76
10/22/2013	4.65
10/23/2013	4.51
10/24/2013	4.33
10/25/2013	4.21
10/26/2013	4.21
10/27/2013	4.26
10/28/2013	4.36
10/29/2013	4.46
10/30/2013	4.56
10/31/2013	4.54
11/1/2013	4.52
11/2/2013	4.61
11/3/2013	4.69
11/4/2013	4.78
11/5/2013	4.87

Table D.2 Continued

Date	Cloud cover (tenth)
11/6/2013	4.92
11/7/2013	5.00
11/8/2013	5.06
11/9/2013	5.09
11/10/2013	4.95
11/11/2013	4.83
11/12/2013	4.79
11/13/2013	4.75
11/14/2013	4.81
11/15/2013	4.82
11/16/2013	4.88
11/17/2013	4.96
11/18/2013	5.01
11/19/2013	5.07
11/20/2013	5.13
11/21/2013	5.18
11/22/2013	5.22
11/23/2013	5.27
11/24/2013	5.31
11/25/2013	5.27
11/26/2013	5.22

Table D.2 Continued

Date	Cloud cover (tenth)
11/27/2013	5.19
11/28/2013	5.14
11/29/2013	5.16
11/30/2013	5.15
12/1/2013	5.17
12/2/2013	5.21
12/3/2013	5.27
12/4/2013	5.31
12/5/2013	5.34
12/6/2013	5.28
12/7/2013	5.31
12/8/2013	5.30
12/9/2013	5.33
12/10/2013	5.34
12/11/2013	5.24
12/12/2013	5.23
12/13/2013	5.22
12/14/2013	5.16
12/15/2013	5.18
12/16/2013	5.12
12/17/2013	5.05

Table D.2 Continued

Date	Cloud cover (tenth)
12/18/2013	5.04
12/19/2013	5.04
12/20/2013	5.07
12/21/2013	5.11
12/22/2013	5.12
12/23/2013	5.16
12/24/2013	5.09
12/25/2013	5.02
12/26/2013	4.96
12/27/2013	4.90
12/28/2013	4.88
12/29/2013	4.89
12/30/2013	4.88
12/31/2013	4.89
1/1/2014	4.84
1/2/2014	4.83
1/3/2014	4.85
1/4/2014	4.85
1/5/2014	4.83
1/6/2014	4.84
1/7/2014	4.86

Table D.2 Continued

Date	Cloud cover (tenth)
1/8/2014	4.89
1/9/2014	4.90
1/10/2014	4.93
1/11/2014	4.95
1/12/2014	4.98
1/13/2014	5.00
1/14/2014	4.94
1/15/2014	4.89
1/16/2014	4.85
1/17/2014	4.81
1/18/2014	4.76
1/19/2014	4.72
1/20/2014	4.69
1/21/2014	4.67
1/22/2014	4.64
1/23/2014	4.67
1/24/2014	4.70
1/25/2014	4.72
1/26/2014	4.72
1/27/2014	4.74
1/28/2014	4.74

Table D.2 Continued

Date	Cloud cover (tenth)
1/29/2014	4.76
1/30/2014	4.78
1/31/2014	4.81
2/1/2014	4.83
2/2/2014	4.86
2/3/2014	4.89
2/4/2014	4.91
2/5/2014	4.93
2/6/2014	4.92
2/7/2014	4.90
2/8/2014	4.91
2/9/2014	4.88
2/10/2014	4.87
2/11/2014	4.89
2/12/2014	4.89
2/13/2014	4.91
2/14/2014	4.93
2/15/2014	4.95
2/16/2014	4.97
2/17/2014	4.99
2/18/2014	5.01

Table D.2 Continued

Date	Cloud cover (tenth)
2/19/2014	5.03
2/20/2014	5.05
2/21/2014	5.05
2/22/2014	5.05
2/23/2014	5.03
2/24/2014	5.05
2/25/2014	5.06
2/26/2014	5.08
2/27/2014	5.08
2/28/2014	5.06
3/1/2014	5.07
3/2/2014	5.08
3/3/2014	5.10
3/4/2014	5.12
3/5/2014	5.13
3/6/2014	5.15
3/7/2014	5.16
3/8/2014	5.18
3/9/2014	5.20
3/10/2014	5.22
3/11/2014	5.21

Table D.2 Continued

Date	Cloud cover (tenth)
3/12/2014	5.22
3/13/2014	5.23
3/14/2014	5.24
3/15/2014	5.25
3/16/2014	5.27
3/17/2014	5.29
3/18/2014	5.30
3/19/2014	5.32
3/20/2014	5.33
3/21/2014	5.34
3/22/2014	5.36
3/23/2014	5.37
3/24/2014	5.38
3/25/2014	5.39
3/26/2014	5.40
3/27/2014	5.42
3/28/2014	5.43
3/29/2014	5.44
3/30/2014	5.46
3/31/2014	5.47
4/1/2014	5.48

Table D.2 Continued

Date	Cloud cover (tenth)
4/2/2014	5.50
4/3/2014	5.51
4/4/2014	5.53
4/5/2014	5.55
4/6/2014	5.56
4/7/2014	5.55
4/8/2014	5.56
4/9/2014	5.57
4/10/2014	5.59
4/11/2014	5.60
4/12/2014	5.62
4/13/2014	5.63
4/14/2014	5.64
4/15/2014	5.65
4/16/2014	5.67
4/17/2014	5.67
4/18/2014	5.66
4/19/2014	5.67
4/20/2014	5.68
4/21/2014	5.69
4/22/2014	5.71

Table D.2 Continued

Date	Cloud cover (tenth)
4/23/2014	5.72
4/24/2014	5.73
4/25/2014	5.74
4/26/2014	5.75
4/27/2014	5.76
4/28/2014	5.78
4/29/2014	5.79
4/30/2014	5.80
5/1/2014	5.81
5/2/2014	5.82
5/3/2014	5.83
5/4/2014	5.84
5/5/2014	5.86
5/6/2014	5.87
5/7/2014	5.88
5/8/2014	5.88
5/9/2014	5.89
5/10/2014	5.90
5/11/2014	5.91
5/12/2014	5.92
5/13/2014	5.93

Table D.2 Continued

Date	Cloud cover (tenth)
5/14/2014	5.94
5/15/2014	5.95
5/16/2014	5.96
5/17/2014	5.97
5/18/2014	5.99
5/19/2014	5.99
5/20/2014	6.00
5/21/2014	6.01
5/22/2014	6.02
5/23/2014	6.04
5/24/2014	6.05
5/25/2014	6.06
5/26/2014	6.07
5/27/2014	6.08
5/28/2014	6.09
5/29/2014	6.09
5/30/2014	6.10
5/31/2014	6.11
6/1/2014	6.12
6/2/2014	6.12
6/3/2014	6.13

Table D.2 Continued

Date	Cloud cover (tenth)
6/4/2014	6.14
6/5/2014	6.15
6/6/2014	6.16
6/7/2014	6.17
6/8/2014	6.17
6/9/2014	6.18
6/10/2014	6.19
6/11/2014	6.20
6/12/2014	6.21
6/13/2014	6.22
6/14/2014	6.23
6/15/2014	6.24
6/16/2014	6.25
6/17/2014	6.26
6/18/2014	6.26
6/19/2014	6.27
6/20/2014	6.28
6/21/2014	6.29
6/22/2014	6.30
6/23/2014	6.30
6/24/2014	6.31

Table D.2 Continued

Date	Cloud cover (tenth)
6/25/2014	6.32
6/26/2014	6.33
6/27/2014	6.34
6/28/2014	6.34
6/29/2014	6.35
6/30/2014	6.36
7/1/2014	6.37
7/2/2014	6.38
7/3/2014	6.39
7/4/2014	6.39
7/5/2014	6.40
7/6/2014	6.41
7/7/2014	6.42
7/8/2014	6.43
7/9/2014	6.43
7/10/2014	6.44
7/11/2014	6.45
7/12/2014	6.46
7/13/2014	6.47
7/14/2014	6.48
7/15/2014	6.49

Table D.2 Continued

Date	Cloud cover (tenth)
7/16/2014	6.49
7/17/2014	6.50
7/18/2014	6.51
7/19/2014	6.52
7/20/2014	6.52
7/21/2014	6.52
7/22/2014	6.53
7/23/2014	6.54
7/24/2014	6.55
7/25/2014	6.56
7/26/2014	6.56
7/27/2014	6.57
7/28/2014	6.57
7/29/2014	6.58
7/30/2014	6.59
7/31/2014	6.60
8/1/2014	6.60
8/2/2014	6.61
8/3/2014	6.61
8/4/2014	6.62
8/5/2014	6.63

Table D.2 Continued

Date	Cloud cover (tenth)
8/6/2014	6.63
8/7/2014	6.64
8/8/2014	6.65
8/9/2014	6.65
8/10/2014	6.66
8/11/2014	6.67
8/12/2014	6.67
8/13/2014	6.68
8/14/2014	6.69
8/15/2014	6.70
8/16/2014	6.70
8/17/2014	6.71
8/18/2014	6.71
8/19/2014	6.72
8/20/2014	6.73
8/21/2014	6.73
8/22/2014	6.74
8/23/2014	6.75
8/24/2014	6.75
8/25/2014	6.76
8/26/2014	6.76

Table D.2 Continued

Date	Cloud cover (tenth)
8/27/2014	6.77
8/28/2014	6.78
8/29/2014	6.78
8/30/2014	6.79
8/31/2014	6.79
9/1/2014	6.80
9/2/2014	6.81
9/3/2014	6.81
9/4/2014	6.82
9/5/2014	6.83
9/6/2014	6.83
9/7/2014	6.83
9/8/2014	6.84
9/9/2014	6.84
9/10/2014	6.85
9/11/2014	6.85
9/12/2014	6.86
9/13/2014	6.86
9/14/2014	6.87
9/15/2014	6.87
9/16/2014	6.88

Table D.2 Continued

Date	Cloud cover (tenth)
9/17/2014	6.88
9/18/2014	6.89
9/19/2014	6.89
9/20/2014	6.90
9/21/2014	6.91
9/22/2014	6.91
9/23/2014	6.90
9/24/2014	6.90
9/25/2014	6.91
9/26/2014	6.91
9/27/2014	6.92
9/28/2014	6.92
9/29/2014	6.92
9/30/2014	6.93
10/1/2014	6.92
10/2/2014	6.92
10/3/2014	6.93
10/4/2014	6.92
10/5/2014	6.92
10/6/2014	6.92
10/7/2014	6.93

Table D.2 Continued

Date	Cloud cover (tenth)
10/8/2014	6.93
10/9/2014	6.92
10/10/2014	6.92
10/11/2014	6.93
10/12/2014	6.92
10/13/2014	6.92
10/14/2014	6.92
10/15/2014	6.93
10/16/2014	6.93
10/17/2014	6.94
10/18/2014	6.94
10/19/2014	6.95
10/20/2014	6.95
10/21/2014	6.96

Table D.3 Daily Volumetric Water Content (VWC) Data for Treatment A, Plot 11

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/16/2013	0.198	0.265	0.265	0.265
10/17/2013	0.200	0.273	0.273	0.273
10/18/2013	0.202	0.277	0.277	0.277
10/19/2013	0.203	0.278	0.278	0.278
10/20/2013	0.203	0.279	0.279	0.279
10/21/2013	0.203	0.279	0.279	0.279
10/22/2013	0.203	0.277	0.277	0.277
10/23/2013	0.202	0.276	0.276	0.276
10/24/2013	0.202	0.275	0.275	0.275
10/25/2013	0.201	0.276	0.276	0.276
10/26/2013	0.203	0.279	0.279	0.279
10/27/2013	0.221	0.284	0.284	0.284
10/28/2013	0.237	0.304	0.304	0.304
10/29/2013	0.226	0.302	0.302	0.302
10/30/2013	0.223	0.300	0.300	0.300
10/31/2013	0.225	0.297	0.297	0.297
11/1/2013	0.226	0.295	0.295	0.295
11/2/2013	0.275	0.335	0.335	0.335
11/3/2013	0.295	0.349	0.349	0.349

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/4/2013	0.292	0.347	0.347	0.347
11/5/2013	0.302	0.353	0.353	0.353
11/6/2013	0.297	0.352	0.352	0.352
11/7/2013	0.301	0.353	0.353	0.353
11/8/2013	0.290	0.344	0.344	0.344
11/9/2013	0.275	0.337	0.337	0.337
11/10/2013	0.268	0.331	0.331	0.331
11/11/2013	0.262	0.328	0.328	0.328
11/12/2013	0.266	0.324	0.324	0.324
11/13/2013	0.277	0.331	0.331	0.331
11/14/2013	0.274	0.329	0.329	0.329
11/15/2013	0.281	0.332	0.332	0.332
11/16/2013	0.314	0.362	0.362	0.362
11/17/2013	0.301	0.351	0.351	0.351
11/18/2013	0.299	0.350	0.350	0.350
11/19/2013	0.326	0.371	0.371	0.371
11/20/2013	0.301	0.350	0.350	0.350
11/21/2013	0.285	0.339	0.339	0.339
11/22/2013	0.263	0.331	0.331	0.331

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/23/2013	0.270	0.330	0.330	0.330
11/24/2013	0.267	0.327	0.327	0.327
11/25/2013	0.264	0.325	0.325	0.325
11/26/2013	0.261	0.323	0.323	0.323
11/27/2013	0.258	0.322	0.322	0.322
11/28/2013	0.259	0.320	0.320	0.320
11/29/2013	0.259	0.318	0.318	0.318
11/30/2013	0.257	0.317	0.317	0.317
12/1/2013	0.259	0.313	0.313	0.313
12/2/2013	0.330	0.367	0.367	0.367
12/3/2013	0.314	0.353	0.353	0.353
12/4/2013	0.302	0.348	0.348	0.348
12/5/2013	0.276	0.334	0.334	0.334
12/6/2013	0.267	0.327	0.327	0.327
12/7/2013	0.274	0.327	0.327	0.327
12/8/2013	0.272	0.325	0.325	0.325
12/9/2013	0.271	0.323	0.323	0.323
12/10/2013	0.270	0.322	0.322	0.322
12/11/2013	0.271	0.321	0.321	0.321

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/12/2013	0.288	0.331	0.331	0.331
12/13/2013	0.328	0.365	0.365	0.365
12/14/2013	0.307	0.350	0.350	0.350
12/15/2013	0.298	0.341	0.341	0.341
12/16/2013	0.292	0.336	0.336	0.336
12/17/2013	0.286	0.332	0.332	0.332
12/18/2013	0.283	0.329	0.329	0.329
12/19/2013	0.280	0.327	0.327	0.327
12/20/2013	0.288	0.333	0.333	0.333
12/21/2013	0.328	0.364	0.364	0.364
12/22/2013	0.316	0.352	0.352	0.352
12/23/2013	0.309	0.345	0.345	0.345
12/24/2013	0.318	0.350	0.350	0.350
12/25/2013	0.304	0.343	0.343	0.343
12/26/2013	0.296	0.338	0.338	0.338
12/27/2013	0.291	0.335	0.335	0.335
12/28/2013	0.287	0.332	0.332	0.332
12/29/2013	0.283	0.329	0.329	0.329
12/30/2013	0.279	0.327	0.327	0.327

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/31/2013	0.277	0.324	0.324	0.324
1/1/2014	0.275	0.323	0.323	0.323
1/2/2014	0.273	0.322	0.322	0.322
1/3/2014	0.277	0.320	0.320	0.320
1/4/2014	0.278	0.322	0.322	0.322
1/5/2014	0.276	0.323	0.323	0.323
1/6/2014	0.275	0.322	0.322	0.322
1/7/2014	0.291	0.333	0.333	0.333
1/8/2014	0.336	0.370	0.370	0.370
1/9/2014	0.334	0.365	0.365	0.365
1/10/2014	0.328	0.361	0.361	0.361
1/11/2014	0.337	0.370	0.370	0.370
1/12/2014	0.334	0.366	0.366	0.366
1/13/2014	0.326	0.359	0.359	0.359
1/14/2014	0.312	0.348	0.348	0.348
1/15/2014	0.304	0.341	0.341	0.341
1/16/2014	0.298	0.337	0.337	0.337
1/17/2014	0.294	0.334	0.334	0.334
1/18/2014	0.290	0.331	0.331	0.331

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
1/19/2014	0.287	0.329	0.329	0.329
1/20/2014	0.284	0.327	0.327	0.327
1/21/2014	0.282	0.326	0.326	0.326
1/22/2014	0.280	0.324	0.324	0.324
1/23/2014	0.278	0.322	0.322	0.322
1/24/2014	0.275	0.321	0.321	0.321
1/25/2014	0.273	0.319	0.319	0.319
1/26/2014	0.271	0.318	0.318	0.318
1/27/2014	0.269	0.317	0.317	0.317
1/28/2014	0.284	0.332	0.332	0.332
1/29/2014	0.341	0.374	0.374	0.374
1/30/2014	0.324	0.358	0.358	0.358
1/31/2014	0.314	0.347	0.347	0.347
2/1/2014	0.317	0.351	0.351	0.351
2/2/2014	0.310	0.346	0.346	0.346
2/3/2014	0.321	0.354	0.354	0.354
2/4/2014	0.319	0.354	0.354	0.354
2/5/2014	0.316	0.351	0.351	0.351
2/6/2014	0.311	0.345	0.345	0.345

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/7/2014	0.331	0.368	0.368	0.368
2/8/2014	0.350	0.385	0.385	0.385
2/9/2014	0.332	0.363	0.363	0.363
2/10/2014	0.326	0.357	0.357	0.357
2/11/2014	0.339	0.369	0.369	0.369
2/12/2014	0.356	0.387	0.387	0.387
2/13/2014	0.343	0.373	0.373	0.373
2/14/2014	0.358	0.391	0.391	0.391
2/15/2014	0.353	0.384	0.384	0.384
2/16/2014	0.347	0.377	0.377	0.377
2/17/2014	0.347	0.373	0.373	0.373
2/18/2014	0.353	0.379	0.379	0.379
2/19/2014	0.345	0.367	0.367	0.367
2/20/2014	0.350	0.375	0.375	0.375
2/21/2014	0.344	0.365	0.365	0.365
2/22/2014	0.333	0.354	0.354	0.354
2/23/2014	0.327	0.346	0.346	0.346
2/24/2014	0.340	0.360	0.360	0.360
2/25/2014	0.333	0.355	0.355	0.355

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/26/2014	0.326	0.348	0.348	0.348
2/27/2014	0.335	0.359	0.359	0.359
2/28/2014	0.334	0.358	0.358	0.358
3/1/2014	0.343	0.368	0.368	0.368
3/2/2014	0.347	0.375	0.375	0.375
3/3/2014	0.344	0.367	0.367	0.367
3/4/2014	0.335	0.356	0.356	0.356
3/5/2014	0.348	0.372	0.372	0.372
3/6/2014	0.354	0.380	0.380	0.380
3/7/2014	0.342	0.361	0.361	0.361
3/8/2014	0.334	0.353	0.353	0.353
3/9/2014	0.354	0.378	0.378	0.378
3/10/2014	0.338	0.358	0.358	0.358
3/11/2014	0.330	0.350	0.350	0.350
3/12/2014	0.326	0.346	0.346	0.346
3/13/2014	0.327	0.341	0.341	0.341
3/14/2014	0.330	0.347	0.347	0.347
3/15/2014	0.326	0.344	0.344	0.344
3/16/2014	0.348	0.376	0.376	0.376

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
3/17/2014	0.333	0.357	0.357	0.357
3/18/2014	0.326	0.349	0.349	0.349
3/19/2014	0.325	0.343	0.343	0.343
3/20/2014	0.322	0.343	0.343	0.343
3/21/2014	0.319	0.341	0.341	0.341
3/22/2014	0.317	0.339	0.339	0.339
3/23/2014	0.315	0.337	0.337	0.337
3/24/2014	0.314	0.334	0.334	0.334
3/25/2014	0.346	0.379	0.379	0.379
3/26/2014	0.357	0.388	0.388	0.388
3/27/2014	0.364	0.399	0.399	0.399
3/28/2014	0.348	0.372	0.372	0.372
3/29/2014	0.355	0.383	0.383	0.383
3/30/2014	0.341	0.364	0.364	0.364
3/31/2014	0.349	0.375	0.375	0.375
4/1/2014	0.334	0.357	0.357	0.357
4/2/2014	0.328	0.350	0.350	0.350
4/3/2014	0.329	0.345	0.345	0.345
4/4/2014	0.356	0.382	0.382	0.382

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/5/2014	0.347	0.371	0.371	0.371
4/6/2014	0.335	0.358	0.358	0.358
4/7/2014	0.329	0.351	0.351	0.351
4/8/2014	0.324	0.346	0.346	0.346
4/9/2014	0.320	0.343	0.343	0.343
4/10/2014	0.317	0.340	0.340	0.340
4/11/2014	0.314	0.338	0.338	0.338
4/12/2014	0.311	0.336	0.336	0.336
4/13/2014	0.309	0.334	0.334	0.334
4/14/2014	0.306	0.332	0.332	0.332
4/15/2014	0.304	0.331	0.331	0.331
4/16/2014	0.330	0.359	0.359	0.359
4/17/2014	0.341	0.368	0.368	0.368
4/18/2014	0.330	0.355	0.355	0.355
4/19/2014	0.328	0.352	0.352	0.352
4/20/2014	0.323	0.347	0.347	0.347
4/21/2014	0.342	0.367	0.367	0.367
4/22/2014	0.351	0.379	0.379	0.379
4/23/2014	0.357	0.384	0.384	0.384

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/24/2014	0.345	0.370	0.370	0.370
4/25/2014	0.332	0.355	0.355	0.355
4/26/2014	0.351	0.376	0.376	0.376
4/27/2014	0.337	0.361	0.361	0.361
4/28/2014	0.328	0.350	0.350	0.350
4/29/2014	0.323	0.346	0.346	0.346
4/30/2014	0.319	0.343	0.343	0.343
5/1/2014	0.315	0.341	0.341	0.341
5/2/2014	0.311	0.338	0.338	0.338
5/3/2014	0.331	0.353	0.353	0.353
5/4/2014	0.346	0.374	0.374	0.374
5/5/2014	0.332	0.358	0.358	0.358
5/6/2014	0.323	0.349	0.349	0.349
5/7/2014	0.330	0.354	0.354	0.354
5/8/2014	0.354	0.382	0.382	0.382
5/9/2014	0.348	0.373	0.373	0.373
5/10/2014	0.330	0.354	0.354	0.354
5/11/2014	0.323	0.347	0.347	0.347
5/12/2014	0.310	0.335	0.335	0.335

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
5/13/2014	0.328	0.350	0.350	0.350
5/14/2014	0.325	0.348	0.348	0.348
5/15/2014	0.321	0.345	0.345	0.345
5/16/2014	0.319	0.343	0.343	0.343
5/17/2014	0.354	0.378	0.378	0.378
5/18/2014	0.355	0.378	0.378	0.378
5/19/2014	0.339	0.362	0.362	0.362
5/20/2014	0.332	0.354	0.354	0.354
5/21/2014	0.328	0.351	0.351	0.351
5/22/2014	0.325	0.348	0.348	0.348
5/23/2014	0.322	0.346	0.346	0.346
5/24/2014	0.319	0.344	0.344	0.344
5/25/2014	0.317	0.342	0.342	0.342
5/26/2014	0.313	0.340	0.340	0.340
5/27/2014	0.322	0.344	0.344	0.344
5/28/2014	0.324	0.348	0.348	0.348
5/29/2014	0.319	0.345	0.345	0.345
5/30/2014	0.317	0.343	0.343	0.343
5/31/2014	0.315	0.341	0.341	0.341

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
6/1/2014	0.312	0.339	0.339	0.339
6/2/2014	0.310	0.338	0.338	0.338
6/3/2014	0.307	0.336	0.336	0.336
6/4/2014	0.306	0.335	0.335	0.335
6/5/2014	0.304	0.334	0.334	0.334
6/6/2014	0.302	0.333	0.333	0.333
6/7/2014	0.300	0.332	0.332	0.332
6/8/2014	0.298	0.331	0.331	0.331
6/9/2014	0.295	0.330	0.330	0.330
6/10/2014	0.292	0.328	0.328	0.328
6/11/2014	0.292	0.328	0.328	0.328
6/12/2014	0.307	0.330	0.330	0.330
6/13/2014	0.306	0.334	0.334	0.334
6/14/2014	0.302	0.332	0.332	0.332
6/15/2014	0.309	0.334	0.334	0.334
6/16/2014	0.331	0.354	0.354	0.354
6/17/2014	0.321	0.348	0.348	0.348
6/18/2014	0.316	0.344	0.344	0.344
6/19/2014	0.314	0.342	0.342	0.342

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
6/20/2014	0.310	0.340	0.340	0.340
6/21/2014	0.307	0.338	0.338	0.338
6/22/2014	0.305	0.336	0.336	0.336
6/23/2014	0.303	0.336	0.336	0.336
6/24/2014	0.303	0.334	0.334	0.334
6/25/2014	0.347	0.375	0.375	0.375
6/26/2014	0.344	0.370	0.370	0.370
6/27/2014	0.332	0.360	0.360	0.360
6/28/2014	0.324	0.352	0.352	0.352
6/29/2014	0.319	0.348	0.348	0.348
6/30/2014	0.316	0.346	0.346	0.346
7/1/2014	0.313	0.344	0.344	0.344
7/2/2014	0.310	0.341	0.341	0.341
7/3/2014	0.307	0.339	0.339	0.339
7/4/2014	0.305	0.338	0.338	0.338
7/5/2014	0.303	0.336	0.336	0.336
7/6/2014	0.301	0.335	0.335	0.335
7/7/2014	0.299	0.334	0.334	0.334
7/8/2014	0.297	0.333	0.333	0.333

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/9/2014	0.294	0.331	0.331	0.331
7/10/2014	0.291	0.330	0.330	0.330
7/11/2014	0.290	0.329	0.329	0.329
7/12/2014	0.288	0.328	0.328	0.328
7/13/2014	0.287	0.327	0.327	0.327
7/14/2014	0.285	0.326	0.326	0.326
7/15/2014	0.283	0.326	0.326	0.326
7/16/2014	0.281	0.325	0.325	0.325
7/17/2014	0.279	0.324	0.324	0.324
7/18/2014	0.276	0.322	0.322	0.322
7/19/2014	0.274	0.321	0.321	0.321
7/20/2014	0.272	0.320	0.320	0.320
7/21/2014	0.272	0.320	0.320	0.320
7/22/2014	0.303	0.341	0.341	0.341
7/23/2014	0.313	0.348	0.348	0.348
7/24/2014	0.302	0.338	0.338	0.338
7/25/2014	0.297	0.335	0.335	0.335
7/26/2014	0.294	0.332	0.332	0.332
7/27/2014	0.292	0.330	0.330	0.330

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/28/2014	0.289	0.329	0.329	0.329
7/29/2014	0.286	0.328	0.328	0.328
7/30/2014	0.283	0.326	0.326	0.326
7/31/2014	0.281	0.325	0.325	0.325
8/1/2014	0.278	0.324	0.324	0.324
8/2/2014	0.275	0.323	0.323	0.323
8/3/2014	0.273	0.322	0.322	0.322
8/4/2014	0.270	0.320	0.320	0.320
8/5/2014	0.268	0.319	0.319	0.319
8/6/2014	0.266	0.318	0.318	0.318
8/7/2014	0.263	0.317	0.317	0.317
8/8/2014	0.261	0.316	0.316	0.316
8/9/2014	0.259	0.315	0.315	0.315
8/10/2014	0.258	0.315	0.315	0.315
8/11/2014	0.256	0.314	0.314	0.314
8/12/2014	0.254	0.313	0.313	0.313
8/13/2014	0.253	0.312	0.312	0.312
8/14/2014	0.252	0.311	0.311	0.311
8/15/2014	0.252	0.311	0.311	0.311

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
8/16/2014	0.250	0.310	0.310	0.310
8/17/2014	0.249	0.310	0.310	0.310
8/18/2014	0.248	0.309	0.309	0.309
8/19/2014	0.247	0.308	0.308	0.308
8/20/2014	0.244	0.307	0.307	0.307
8/21/2014	0.241	0.306	0.306	0.306
8/22/2014	0.240	0.305	0.305	0.305
8/23/2014	0.238	0.304	0.304	0.304
8/24/2014	0.237	0.303	0.303	0.303
8/25/2014	0.236	0.302	0.302	0.302
8/26/2014	0.235	0.302	0.302	0.302
8/27/2014	0.233	0.301	0.301	0.301
8/28/2014	0.231	0.300	0.300	0.300
8/29/2014	0.236	0.302	0.302	0.302
8/30/2014	0.248	0.311	0.311	0.311
8/31/2014	0.242	0.308	0.308	0.308
9/1/2014	0.240	0.306	0.306	0.306
9/2/2014	0.239	0.305	0.305	0.305
9/3/2014	0.237	0.304	0.304	0.304

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
9/4/2014	0.236	0.302	0.302	0.302
9/5/2014	0.234	0.302	0.302	0.302
9/6/2014	0.232	0.300	0.300	0.300
9/7/2014	0.230	0.299	0.299	0.299
9/8/2014	0.228	0.298	0.298	0.298
9/9/2014	0.227	0.298	0.298	0.298
9/10/2014	0.225	0.296	0.296	0.296
9/11/2014	0.224	0.295	0.295	0.295
9/12/2014	0.222	0.294	0.294	0.294
9/13/2014	0.220	0.292	0.292	0.292
9/14/2014	0.219	0.292	0.292	0.292
9/15/2014	0.218	0.291	0.291	0.291
9/16/2014	0.217	0.291	0.291	0.291
9/17/2014	0.216	0.290	0.290	0.290
9/18/2014	0.216	0.290	0.290	0.290
9/19/2014	0.216	0.289	0.289	0.289
9/20/2014	0.216	0.289	0.289	0.289
9/21/2014	0.215	0.289	0.289	0.289
9/22/2014	0.214	0.288	0.288	0.288

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
9/23/2014	0.291	0.360	0.360	0.360
9/24/2014	0.299	0.353	0.353	0.353
9/25/2014	0.300	0.351	0.351	0.351
9/26/2014	0.287	0.341	0.341	0.341
9/27/2014	0.281	0.336	0.336	0.336
9/28/2014	0.285	0.334	0.334	0.334
9/29/2014	0.298	0.341	0.341	0.341
9/30/2014	0.288	0.337	0.337	0.337
10/1/2014	0.282	0.333	0.333	0.333
10/2/2014	0.278	0.330	0.330	0.330
10/3/2014	0.276	0.329	0.329	0.329
10/4/2014	0.275	0.328	0.328	0.328
10/5/2014	0.273	0.326	0.326	0.326
10/6/2014	0.272	0.325	0.325	0.325
10/7/2014	0.270	0.324	0.324	0.324
10/8/2014	0.268	0.323	0.323	0.323
10/9/2014	0.266	0.321	0.321	0.321
10/10/2014	0.286	0.336	0.336	0.336
10/11/2014	0.287	0.335	0.335	0.335

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/12/2014	0.279	0.329	0.329	0.329
10/13/2014	0.320	0.360	0.360	0.360
10/14/2014	0.324	0.363	0.363	0.363
10/15/2014	0.312	0.352	0.352	0.352
10/16/2014	0.306	0.345	0.345	0.345
10/17/2014	0.308	0.345	0.345	0.345
10/18/2014	0.302	0.343	0.343	0.343
10/19/2014	0.326	0.362	0.362	0.362
10/20/2014	0.326	0.361	0.361	0.361
10/21/2014	0.323	0.356	0.356	0.356
10/22/2014	0.336	0.367	0.367	0.367
10/23/2014	0.325	0.355	0.355	0.355
10/24/2014	0.333	0.360	0.360	0.360
10/25/2014	0.348	0.379	0.379	0.379
10/26/2014	0.326	0.354	0.354	0.354
10/27/2014	0.328	0.354	0.354	0.354
10/28/2014	0.332	0.361	0.361	0.361
10/29/2014	0.329	0.358	0.358	0.358
10/30/2014	0.345	0.375	0.375	0.375

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/31/2014	0.327	0.354	0.354	0.354
11/1/2014	0.332	0.357	0.357	0.357
11/2/2014	0.333	0.356	0.356	0.356
11/3/2014	0.345	0.370	0.370	0.370
11/4/2014	0.333	0.359	0.359	0.359
11/5/2014	0.331	0.356	0.356	0.356
11/6/2014	0.332	0.357	0.357	0.357
11/7/2014	0.322	0.348	0.348	0.348
11/8/2014	0.320	0.344	0.344	0.344
11/9/2014	0.325	0.347	0.347	0.347
11/10/2014	0.319	0.346	0.346	0.346
11/11/2014	0.314	0.343	0.343	0.343
11/12/2014	0.344	0.371	0.371	0.371
11/13/2014	0.356	0.381	0.381	0.381
11/14/2014	0.330	0.354	0.354	0.354
11/15/2014	0.322	0.349	0.349	0.349
11/16/2014	0.317	0.345	0.345	0.345
11/17/2014	0.314	0.343	0.343	0.343
11/18/2014	0.320	0.343	0.343	0.343

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/19/2014	0.347	0.373	0.373	0.373
11/20/2014	0.345	0.370	0.370	0.370
11/21/2014	0.356	0.379	0.379	0.379
11/22/2014	0.339	0.363	0.363	0.363
11/23/2014	0.329	0.354	0.354	0.354
11/24/2014	0.325	0.349	0.349	0.349
11/25/2014	0.322	0.348	0.348	0.348
11/26/2014	0.343	0.367	0.367	0.367
11/27/2014	0.362	0.387	0.387	0.387
11/28/2014	0.353	0.377	0.377	0.377
11/29/2014	0.332	0.357	0.357	0.357
11/30/2014	0.349	0.373	0.373	0.373
12/1/2014	0.342	0.365	0.365	0.365
12/2/2014	0.332	0.355	0.355	0.355
12/3/2014	0.355	0.377	0.377	0.377
12/4/2014	0.344	0.367	0.367	0.367
12/5/2014	0.346	0.371	0.371	0.371
12/6/2014	0.330	0.355	0.355	0.355
12/7/2014	0.325	0.351	0.351	0.351

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/8/2014	0.323	0.348	0.348	0.348
12/9/2014	0.336	0.359	0.359	0.359
12/10/2014	0.339	0.366	0.366	0.366
12/11/2014	0.330	0.355	0.355	0.355
12/12/2014	0.326	0.349	0.349	0.349
12/13/2014	0.322	0.348	0.348	0.348
12/14/2014	0.321	0.346	0.346	0.346
12/15/2014	0.331	0.348	0.348	0.348
12/16/2014	0.339	0.359	0.359	0.359
12/17/2014	0.342	0.368	0.368	0.368
12/18/2014	0.354	0.380	0.380	0.380
12/19/2014	0.369	0.394	0.394	0.394
12/20/2014	0.369	0.395	0.395	0.395
12/21/2014	0.354	0.377	0.377	0.377
12/22/2014	0.347	0.367	0.367	0.367
12/23/2014	0.352	0.376	0.376	0.376
12/24/2014	0.354	0.377	0.377	0.377
12/25/2014	0.335	0.358	0.358	0.358
12/26/2014	0.336	0.357	0.357	0.357

Table D.3 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/27/2014	0.355	0.377	0.377	0.377
12/28/2014	0.349	0.372	0.372	0.372
12/29/2014	0.335	0.362	0.362	0.362
12/30/2014	0.323	0.352	0.352	0.352
12/31/2014	0.316	0.347	0.347	0.347
1/1/2015	0.316	0.346	0.346	0.346

Table D.4 Daily Volumetric Water Content (VWC) Data for Treatment B, Plot 09

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/16/2013	0.279	0.312	0.164	0.164
10/17/2013	0.283	0.312	0.165	0.165
10/18/2013	0.284	0.313	0.166	0.166
10/19/2013	0.283	0.312	0.166	0.166
10/20/2013	0.283	0.312	0.166	0.166
10/21/2013	0.282	0.313	0.166	0.166
10/22/2013	0.283	0.315	0.166	0.166
10/23/2013	0.282	0.316	0.166	0.166
10/24/2013	0.281	0.316	0.166	0.166
10/25/2013	0.282	0.316	0.166	0.166
10/26/2013	0.282	0.316	0.167	0.167
10/27/2013	0.288	0.319	0.168	0.168
10/28/2013	0.301	0.318	0.167	0.167
10/29/2013	0.297	0.313	0.165	0.165
10/30/2013	0.295	0.313	0.165	0.165
10/31/2013	0.292	0.316	0.167	0.167
11/1/2013	0.299	0.321	0.168	0.168
11/2/2013	0.336	0.359	0.193	0.193

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/3/2013	0.345	0.376	0.206	0.206
11/4/2013	0.339	0.372	0.204	0.204
11/5/2013	0.351	0.383	0.214	0.214
11/6/2013	0.341	0.378	0.208	0.208
11/7/2013	0.347	0.383	0.212	0.212
11/8/2013	0.336	0.375	0.203	0.203
11/9/2013	0.321	0.364	0.195	0.195
11/10/2013	0.316	0.359	0.191	0.191
11/11/2013	0.313	0.355	0.189	0.189
11/12/2013	0.326	0.359	0.190	0.190
11/13/2013	0.331	0.365	0.193	0.193
11/14/2013	0.327	0.363	0.192	0.192
11/15/2013	0.335	0.367	0.193	0.193
11/16/2013	0.363	0.392	0.219	0.219
11/17/2013	0.344	0.381	0.207	0.207
11/18/2013	0.343	0.379	0.205	0.205
11/19/2013	0.374	0.405	0.234	0.234
11/20/2013	0.342	0.381	0.208	0.208
11/21/2013	0.323	0.365	0.195	0.195

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/22/2013	0.261	0.351	0.219	0.219
11/23/2013	0.315	0.356	0.187	0.187
11/24/2013	0.312	0.353	0.185	0.185
11/25/2013	0.310	0.351	0.184	0.184
11/26/2013	0.308	0.349	0.183	0.183
11/27/2013	0.306	0.347	0.182	0.182
11/28/2013	0.305	0.346	0.181	0.181
11/29/2013	0.304	0.344	0.180	0.180
11/30/2013	0.302	0.343	0.179	0.179
12/1/2013	0.308	0.348	0.180	0.180
12/2/2013	0.374	0.408	0.233	0.233
12/3/2013	0.349	0.386	0.209	0.209
12/4/2013	0.330	0.369	0.197	0.197
12/5/2013	0.328	0.355	0.195	0.195
12/6/2013	0.323	0.352	0.192	0.192
12/7/2013	0.314	0.350	0.185	0.185
12/8/2013	0.313	0.351	0.183	0.183
12/9/2013	0.312	0.349	0.182	0.182
12/10/2013	0.311	0.349	0.181	0.181

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/11/2013	0.310	0.349	0.180	0.180
12/12/2013	0.316	0.351	0.181	0.181
12/13/2013	0.365	0.396	0.215	0.215
12/14/2013	0.334	0.377	0.200	0.200
12/15/2013	0.327	0.369	0.194	0.194
12/16/2013	0.324	0.364	0.190	0.190
12/17/2013	0.319	0.360	0.188	0.188
12/18/2013	0.319	0.359	0.187	0.187
12/19/2013	0.317	0.357	0.185	0.185
12/20/2013	0.332	0.363	0.187	0.187
12/21/2013	0.368	0.399	0.223	0.223
12/22/2013	0.350	0.385	0.208	0.208
12/23/2013	0.343	0.379	0.201	0.201
12/24/2013	0.350	0.385	0.207	0.207
12/25/2013	0.334	0.373	0.198	0.198
12/26/2013	0.326	0.367	0.193	0.193
12/27/2013	0.322	0.363	0.190	0.190
12/28/2013	0.319	0.360	0.188	0.188
12/29/2013	0.318	0.358	0.186	0.186

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/30/2013	0.315	0.356	0.185	0.185
12/31/2013	0.313	0.353	0.184	0.184
1/1/2014	0.312	0.352	0.183	0.183
1/2/2014	0.310	0.351	0.182	0.182
1/3/2014	0.322	0.356	0.184	0.184
1/4/2014	0.320	0.353	0.182	0.182
1/5/2014	0.317	0.350	0.181	0.181
1/6/2014	0.315	0.351	0.181	0.181
1/7/2014	0.336	0.361	0.184	0.184
1/8/2014	0.375	0.405	0.225	0.225
1/9/2014	0.369	0.403	0.223	0.223
1/10/2014	0.357	0.395	0.218	0.218
1/11/2014	0.375	0.413	0.231	0.231
1/12/2014	0.371	0.408	0.226	0.226
1/13/2014	0.357	0.393	0.213	0.213
1/14/2014	0.337	0.378	0.202	0.202
1/15/2014	0.329	0.370	0.196	0.196
1/16/2014	0.325	0.365	0.192	0.192
1/17/2014	0.322	0.362	0.190	0.190

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
1/18/2014	0.319	0.359	0.188	0.188
1/19/2014	0.317	0.357	0.187	0.187
1/20/2014	0.316	0.355	0.185	0.185
1/21/2014	0.314	0.353	0.184	0.184
1/22/2014	0.312	0.352	0.184	0.184
1/23/2014	0.311	0.351	0.183	0.183
1/24/2014	0.310	0.349	0.182	0.182
1/25/2014	0.308	0.347	0.182	0.182
1/26/2014	0.307	0.346	0.181	0.181
1/27/2014	0.306	0.344	0.180	0.180
1/28/2014	0.329	0.359	0.185	0.185
1/29/2014	0.379	0.419	0.238	0.238
1/30/2014	0.353	0.393	0.214	0.214
1/31/2014	0.346	0.383	0.206	0.206
2/1/2014	0.348	0.383	0.204	0.204
2/2/2014	0.339	0.377	0.200	0.200
2/3/2014	0.357	0.385	0.204	0.204
2/4/2014	0.350	0.384	0.204	0.204
2/5/2014	0.343	0.380	0.202	0.202

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/6/2014	0.342	0.376	0.198	0.198
2/7/2014	0.386	0.416	0.230	0.230
2/8/2014	0.396	0.440	0.253	0.253
2/9/2014	0.362	0.399	0.216	0.216
2/10/2014	0.355	0.390	0.209	0.209
2/11/2014	0.370	0.406	0.222	0.222
2/12/2014	0.396	0.442	0.256	0.256
2/13/2014	0.370	0.421	0.238	0.238
2/14/2014	0.403	0.439	0.262	0.262
2/15/2014	0.391	0.432	0.251	0.251
2/16/2014	0.382	0.423	0.243	0.243
2/17/2014	0.381	0.416	0.235	0.235
2/18/2014	0.384	0.425	0.246	0.246
2/19/2014	0.374	0.409	0.228	0.228
2/20/2014	0.383	0.418	0.235	0.235
2/21/2014	0.365	0.405	0.224	0.224
2/22/2014	0.347	0.388	0.212	0.212
2/23/2014	0.345	0.387	0.205	0.205
2/24/2014	0.363	0.409	0.212	0.212

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/25/2014	0.346	0.401	0.210	0.210
2/26/2014	0.339	0.393	0.206	0.206
2/27/2014	0.359	0.405	0.211	0.211
2/28/2014	0.351	0.405	0.215	0.215
3/1/2014	0.376	0.421	0.229	0.229
3/2/2014	0.377	0.428	0.237	0.237
3/3/2014	0.366	0.420	0.227	0.227
3/4/2014	0.352	0.407	0.218	0.218
3/5/2014	0.376	0.427	0.238	0.238
3/6/2014	0.383	0.438	0.248	0.248
3/7/2014	0.360	0.417	0.224	0.224
3/8/2014	0.348	0.402	0.215	0.215
3/9/2014	0.380	0.437	0.246	0.246
3/10/2014	0.353	0.409	0.221	0.221
3/11/2014	0.345	0.397	0.212	0.212
3/12/2014	0.340	0.391	0.207	0.207
3/13/2014	0.347	0.392	0.207	0.207
3/14/2014	0.347	0.392	0.206	0.206
3/15/2014	0.342	0.390	0.205	0.205

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
3/16/2014	0.374	0.423	0.231	0.231
3/17/2014	0.348	0.403	0.215	0.215
3/18/2014	0.342	0.395	0.208	0.208
3/19/2014	0.346	0.394	0.206	0.206
3/20/2014	0.340	0.389	0.202	0.202
3/21/2014	0.336	0.387	0.200	0.200
3/22/2014	0.333	0.384	0.199	0.199
3/23/2014	0.331	0.381	0.197	0.197
3/24/2014	0.331	0.381	0.197	0.197
3/25/2014	0.383	0.419	0.225	0.225
3/26/2014	0.388	0.438	0.245	0.245
3/27/2014	0.395	0.447	0.254	0.254
3/28/2014	0.369	0.427	0.228	0.228
3/29/2014	0.380	0.434	0.234	0.234
3/30/2014	0.362	0.415	0.220	0.220
3/31/2014	0.369	0.425	0.227	0.227
4/1/2014	0.349	0.404	0.212	0.212
4/2/2014	0.343	0.395	0.207	0.207
4/3/2014	0.353	0.396	0.205	0.205

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/4/2014	0.387	0.430	0.232	0.232
4/5/2014	0.366	0.421	0.227	0.227
4/6/2014	0.348	0.402	0.214	0.214
4/7/2014	0.342	0.394	0.209	0.209
4/8/2014	0.339	0.390	0.207	0.207
4/9/2014	0.334	0.385	0.203	0.203
4/10/2014	0.330	0.382	0.201	0.201
4/11/2014	0.328	0.380	0.199	0.199
4/12/2014	0.325	0.377	0.197	0.197
4/13/2014	0.322	0.374	0.196	0.196
4/14/2014	0.320	0.372	0.194	0.194
4/15/2014	0.317	0.370	0.193	0.193
4/16/2014	0.352	0.391	0.201	0.201
4/17/2014	0.359	0.409	0.219	0.219
4/18/2014	0.348	0.397	0.210	0.210
4/19/2014	0.347	0.395	0.207	0.207
4/20/2014	0.341	0.391	0.205	0.205
4/21/2014	0.370	0.411	0.218	0.218
4/22/2014	0.380	0.424	0.230	0.230

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/23/2014	0.389	0.440	0.245	0.245
4/24/2014	0.368	0.419	0.224	0.224
4/25/2014	0.348	0.401	0.213	0.213
4/26/2014	0.380	0.422	0.225	0.225
4/27/2014	0.356	0.408	0.218	0.218
4/28/2014	0.344	0.395	0.209	0.209
4/29/2014	0.339	0.389	0.206	0.206
4/30/2014	0.334	0.384	0.204	0.204
5/1/2014	0.330	0.380	0.202	0.202
5/2/2014	0.326	0.377	0.199	0.199
5/3/2014	0.361	0.393	0.205	0.205
5/4/2014	0.372	0.420	0.230	0.230
5/5/2014	0.349	0.401	0.214	0.214
5/6/2014	0.341	0.392	0.207	0.207
5/7/2014	0.357	0.401	0.212	0.212
5/8/2014	0.384	0.427	0.236	0.236
5/9/2014	0.369	0.419	0.227	0.227
5/10/2014	0.345	0.397	0.211	0.211
5/11/2014	0.339	0.388	0.205	0.205

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
5/12/2014	0.325	0.375	0.196	0.196
5/13/2014	0.338	0.382	0.217	0.217
5/14/2014	0.336	0.379	0.216	0.216
5/15/2014	0.333	0.377	0.213	0.213
5/16/2014	0.332	0.375	0.211	0.211
5/17/2014	0.364	0.391	0.219	0.219
5/18/2014	0.363	0.407	0.239	0.239
5/19/2014	0.347	0.393	0.227	0.227
5/20/2014	0.342	0.387	0.221	0.221
5/21/2014	0.339	0.383	0.218	0.218
5/22/2014	0.337	0.380	0.216	0.216
5/23/2014	0.335	0.378	0.214	0.214
5/24/2014	0.333	0.376	0.213	0.213
5/25/2014	0.332	0.375	0.211	0.211
5/26/2014	0.329	0.373	0.210	0.210
5/27/2014	0.333	0.375	0.210	0.210
5/28/2014	0.335	0.375	0.208	0.208
5/29/2014	0.333	0.374	0.208	0.208
5/30/2014	0.331	0.373	0.208	0.208

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
5/31/2014	0.330	0.372	0.207	0.207
6/1/2014	0.329	0.371	0.207	0.207
6/2/2014	0.327	0.369	0.206	0.206
6/3/2014	0.325	0.368	0.205	0.205
6/4/2014	0.324	0.366	0.204	0.204
6/5/2014	0.322	0.364	0.204	0.204
6/6/2014	0.321	0.362	0.204	0.204
6/7/2014	0.319	0.360	0.203	0.203
6/8/2014	0.317	0.359	0.203	0.203
6/9/2014	0.316	0.357	0.202	0.202
6/10/2014	0.314	0.356	0.202	0.202
6/11/2014	0.314	0.358	0.202	0.202
6/12/2014	0.322	0.367	0.202	0.202
6/13/2014	0.323	0.362	0.199	0.199
6/14/2014	0.321	0.361	0.199	0.199
6/15/2014	0.329	0.365	0.199	0.199
6/16/2014	0.349	0.375	0.202	0.202
6/17/2014	0.340	0.374	0.204	0.204
6/18/2014	0.336	0.373	0.205	0.205

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
6/19/2014	0.334	0.372	0.206	0.206
6/20/2014	0.330	0.370	0.206	0.206
6/21/2014	0.328	0.368	0.205	0.205
6/22/2014	0.326	0.366	0.204	0.204
6/23/2014	0.325	0.364	0.204	0.204
6/24/2014	0.324	0.365	0.204	0.204
6/25/2014	0.364	0.397	0.228	0.228
6/26/2014	0.359	0.399	0.233	0.233
6/27/2014	0.345	0.389	0.226	0.226
6/28/2014	0.339	0.383	0.220	0.220
6/29/2014	0.336	0.379	0.217	0.217
6/30/2014	0.334	0.376	0.215	0.215
7/1/2014	0.331	0.373	0.214	0.214
7/2/2014	0.329	0.370	0.212	0.212
7/3/2014	0.326	0.368	0.210	0.210
7/4/2014	0.325	0.366	0.209	0.209
7/5/2014	0.323	0.364	0.208	0.208
7/6/2014	0.322	0.362	0.208	0.208
7/7/2014	0.320	0.361	0.207	0.207

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/8/2014	0.318	0.360	0.207	0.207
7/9/2014	0.316	0.359	0.207	0.207
7/10/2014	0.315	0.358	0.206	0.206
7/11/2014	0.313	0.358	0.204	0.204
7/12/2014	0.312	0.357	0.204	0.204
7/13/2014	0.312	0.359	0.204	0.204
7/14/2014	0.310	0.356	0.203	0.203
7/15/2014	0.309	0.355	0.203	0.203
7/16/2014	0.307	0.354	0.203	0.203
7/17/2014	0.305	0.353	0.202	0.202
7/18/2014	0.304	0.353	0.202	0.202
7/19/2014	0.302	0.352	0.201	0.201
7/20/2014	0.300	0.351	0.200	0.200
7/21/2014	0.298	0.351	0.199	0.199
7/22/2014	0.317	0.355	0.199	0.199
7/23/2014	0.324	0.356	0.198	0.198
7/24/2014	0.320	0.356	0.198	0.198
7/25/2014	0.317	0.354	0.198	0.198
7/26/2014	0.315	0.353	0.199	0.199

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/27/2014	0.314	0.353	0.199	0.199
7/28/2014	0.313	0.353	0.200	0.200
7/29/2014	0.311	0.353	0.201	0.201
7/30/2014	0.309	0.353	0.201	0.201
7/31/2014	0.308	0.353	0.201	0.201
8/1/2014	0.306	0.352	0.201	0.201
8/2/2014	0.304	0.352	0.201	0.201
8/3/2014	0.301	0.352	0.200	0.200
8/4/2014	0.299	0.351	0.200	0.200
8/5/2014	0.297	0.351	0.199	0.199
8/6/2014	0.296	0.351	0.199	0.199
8/7/2014	0.294	0.350	0.198	0.198
8/8/2014	0.292	0.350	0.198	0.198
8/9/2014	0.290	0.350	0.198	0.198
8/10/2014	0.289	0.350	0.198	0.198
8/11/2014	0.287	0.349	0.197	0.197
8/12/2014	0.285	0.347	0.196	0.196
8/13/2014	0.283	0.347	0.196	0.196
8/14/2014	0.283	0.346	0.195	0.195

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
8/15/2014	0.283	0.347	0.195	0.195
8/16/2014	0.282	0.347	0.195	0.195
8/17/2014	0.281	0.347	0.196	0.196
8/18/2014	0.280	0.347	0.195	0.195
8/19/2014	0.278	0.347	0.195	0.195
8/20/2014	0.276	0.345	0.194	0.194
8/21/2014	0.275	0.346	0.194	0.194
8/22/2014	0.274	0.346	0.194	0.194
8/23/2014	0.273	0.347	0.193	0.193
8/24/2014	0.271	0.347	0.193	0.193
8/25/2014	0.270	0.347	0.193	0.193
8/26/2014	0.269	0.347	0.193	0.193
8/27/2014	0.267	0.347	0.193	0.193
8/28/2014	0.266	0.346	0.193	0.193
8/29/2014	0.264	0.346	0.193	0.193
8/30/2014	0.265	0.342	0.192	0.192
8/31/2014	0.263	0.335	0.190	0.190
9/1/2014	0.263	0.336	0.191	0.191
9/2/2014	0.264	0.337	0.191	0.191

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
9/3/2014	0.264	0.337	0.191	0.191
9/4/2014	0.265	0.339	0.191	0.191
9/5/2014	0.265	0.340	0.192	0.192
9/6/2014	0.264	0.339	0.192	0.192
9/7/2014	0.263	0.339	0.191	0.191
9/8/2014	0.261	0.339	0.191	0.191
9/9/2014	0.260	0.338	0.191	0.191
9/10/2014	0.259	0.338	0.191	0.191
9/11/2014	0.259	0.338	0.190	0.190
9/12/2014	0.257	0.338	0.190	0.190
9/13/2014	0.256	0.338	0.190	0.190
9/14/2014	0.254	0.338	0.190	0.190
9/15/2014	0.253	0.336	0.190	0.190
9/16/2014	0.252	0.335	0.190	0.190
9/17/2014	0.250	0.333	0.189	0.189
9/18/2014	0.249	0.333	0.188	0.188
9/19/2014	0.249	0.333	0.188	0.188
9/20/2014	0.249	0.333	0.189	0.189
9/21/2014	0.248	0.332	0.189	0.189

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
9/22/2014	0.246	0.331	0.188	0.188
9/23/2014	0.344	0.388	0.230	0.230
9/24/2014	0.333	0.381	0.218	0.218
9/25/2014	0.332	0.378	0.213	0.213
9/26/2014	0.325	0.373	0.210	0.210
9/27/2014	0.322	0.370	0.208	0.208
9/28/2014	0.323	0.369	0.205	0.205
9/29/2014	0.331	0.372	0.205	0.205
9/30/2014	0.325	0.372	0.206	0.206
10/1/2014	0.321	0.369	0.204	0.204
10/2/2014	0.319	0.367	0.204	0.204
10/3/2014	0.317	0.365	0.202	0.202
10/4/2014	0.315	0.363	0.202	0.202
10/5/2014	0.314	0.362	0.202	0.202
10/6/2014	0.312	0.361	0.201	0.201
10/7/2014	0.310	0.359	0.201	0.201
10/8/2014	0.309	0.358	0.200	0.200
10/9/2014	0.307	0.357	0.199	0.199
10/10/2014	0.314	0.361	0.198	0.198

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/11/2014	0.318	0.364	0.199	0.199
10/12/2014	0.315	0.361	0.198	0.198
10/13/2014	0.342	0.386	0.215	0.215
10/14/2014	0.348	0.401	0.234	0.234
10/15/2014	0.338	0.388	0.221	0.221
10/16/2014	0.333	0.382	0.216	0.216
10/17/2014	0.336	0.382	0.215	0.215
10/18/2014	0.330	0.379	0.213	0.213
10/19/2014	0.352	0.399	0.234	0.234
10/20/2014	0.347	0.397	0.232	0.232
10/21/2014	0.347	0.396	0.229	0.229
10/22/2014	0.362	0.414	0.244	0.244
10/23/2014	0.348	0.394	0.225	0.225
10/24/2014	0.359	0.402	0.232	0.232
10/25/2014	0.378	0.432	0.262	0.262
10/26/2014	0.346	0.396	0.227	0.227
10/27/2014	0.350	0.394	0.223	0.223
10/28/2014	0.349	0.400	0.230	0.230
10/29/2014	0.352	0.401	0.233	0.233

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/30/2014	0.367	0.422	0.252	0.252
10/31/2014	0.347	0.394	0.224	0.224
11/1/2014	0.349	0.397	0.225	0.225
11/2/2014	0.352	0.397	0.225	0.225
11/3/2014	0.367	0.416	0.245	0.245
11/4/2014	0.349	0.400	0.230	0.230
11/5/2014	0.352	0.397	0.225	0.225
11/6/2014	0.348	0.397	0.227	0.227
11/7/2014	0.340	0.389	0.219	0.219
11/8/2014	0.342	0.386	0.216	0.216
11/9/2014	0.346	0.389	0.216	0.216
11/10/2014	0.337	0.386	0.214	0.214
11/11/2014	0.333	0.383	0.211	0.211
11/12/2014	0.380	0.424	0.249	0.249
11/13/2014	0.384	0.440	0.262	0.262
11/14/2014	0.347	0.396	0.224	0.224
11/15/2014	0.337	0.385	0.215	0.215
11/16/2014	0.334	0.381	0.211	0.211
11/17/2014	0.332	0.380	0.208	0.208

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/18/2014	0.340	0.380	0.208	0.208
11/19/2014	0.363	0.412	0.236	0.236
11/20/2014	0.366	0.413	0.240	0.240
11/21/2014	0.375	0.429	0.255	0.255
11/22/2014	0.354	0.405	0.232	0.232
11/23/2014	0.343	0.394	0.222	0.222
11/24/2014	0.341	0.390	0.218	0.218
11/25/2014	0.339	0.387	0.215	0.215
11/26/2014	0.363	0.409	0.239	0.239
11/27/2014	0.382	0.434	0.265	0.265
11/28/2014	0.370	0.425	0.251	0.251
11/29/2014	0.344	0.395	0.223	0.223
11/30/2014	0.371	0.419	0.248	0.248
12/1/2014	0.356	0.409	0.234	0.234
12/2/2014	0.346	0.396	0.223	0.223
12/3/2014	0.367	0.421	0.244	0.244
12/4/2014	0.355	0.408	0.233	0.233
12/5/2014	0.358	0.415	0.242	0.242
12/6/2014	0.342	0.395	0.222	0.222

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/7/2014	0.339	0.389	0.217	0.217
12/8/2014	0.337	0.387	0.215	0.215
12/9/2014	0.352	0.400	0.228	0.228
12/10/2014	0.350	0.404	0.232	0.232
12/11/2014	0.343	0.395	0.222	0.222
12/12/2014	0.340	0.391	0.218	0.218
12/13/2014	0.337	0.387	0.214	0.214
12/14/2014	0.337	0.387	0.213	0.213
12/15/2014	0.346	0.389	0.213	0.213
12/16/2014	0.352	0.396	0.217	0.217
12/17/2014	0.352	0.405	0.229	0.229
12/18/2014	0.372	0.427	0.254	0.254
12/19/2014	0.396	0.445	0.279	0.279
12/20/2014	0.388	0.450	0.281	0.281
12/21/2014	0.368	0.428	0.256	0.256
12/22/2014	0.358	0.410	0.235	0.235
12/23/2014	0.371	0.424	0.251	0.251
12/24/2014	0.370	0.429	0.252	0.252
12/25/2014	0.348	0.404	0.229	0.229

Table D.4 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/26/2014	0.353	0.402	0.226	0.226
12/27/2014	0.370	0.428	0.250	0.250
12/28/2014	0.364	0.421	0.242	0.242
12/29/2014	0.344	0.389	0.223	0.223
12/30/2014	0.338	0.380	0.216	0.216
12/31/2014	0.338	0.377	0.212	0.212
1/1/2015	0.333	0.372	0.209	0.209

Table D.5 Daily Volumetric Water Content (VWC) Data for Treatment C, Plot 07

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/30/2013	0.258	0.343	0.293	0.358
10/31/2013	0.257	0.342	0.293	0.360
11/1/2013	0.260	0.339	0.294	0.361
11/2/2013	0.324	0.352	0.309	0.360
11/3/2013	0.346	0.361	0.321	0.360
11/4/2013	0.336	0.362	0.320	0.362
11/5/2013	0.354	0.367	0.324	0.365
11/6/2013	0.347	0.368	0.322	0.375
11/7/2013	0.350	0.369	0.326	0.380
11/8/2013	0.332	0.361	0.320	0.382
11/9/2013	0.314	0.359	0.316	0.379
11/10/2013	0.303	0.357	0.314	0.377
11/11/2013	0.296	0.355	0.312	0.376
11/12/2013	0.304	0.348	0.309	0.375
11/13/2013	0.313	0.348	0.308	0.374
11/14/2013	0.304	0.346	0.306	0.374
11/15/2013	0.319	0.347	0.307	0.373
11/16/2013	0.366	0.378	0.328	0.372

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/17/2013	0.346	0.368	0.322	0.378
11/18/2013	0.343	0.367	0.320	0.378
11/19/2013	0.378	0.390	0.337	0.386
11/20/2013	0.342	0.369	0.323	0.391
11/21/2013	0.323	0.366	0.318	0.381
11/22/2013	0.257	0.354	0.324	0.369
11/23/2013	0.304	0.360	0.315	0.378
11/24/2013	0.299	0.358	0.313	0.377
11/25/2013	0.294	0.357	0.312	0.376
11/26/2013	0.291	0.356	0.312	0.375
11/27/2013	0.288	0.355	0.311	0.375
11/28/2013	0.285	0.354	0.310	0.374
11/29/2013	0.283	0.353	0.308	0.374
11/30/2013	0.281	0.352	0.306	0.373
12/1/2013	0.279	0.348	0.306	0.373
12/2/2013	0.375	0.391	0.340	0.385
12/3/2013	0.355	0.376	0.325	0.389
12/4/2013	0.337	0.378	0.321	0.386
12/5/2013	0.322	0.372	0.316	0.381
12/6/2013	0.313	0.368	0.314	0.380

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/7/2013	0.305	0.363	0.313	0.378
12/8/2013	0.301	0.361	0.312	0.377
12/9/2013	0.298	0.360	0.311	0.377
12/10/2013	0.296	0.358	0.310	0.376
12/11/2013	0.313	0.357	0.310	0.375
12/12/2013	0.354	0.366	0.312	0.374
12/13/2013	0.357	0.386	0.326	0.373
12/14/2013	0.334	0.375	0.321	0.375
12/15/2013	0.322	0.368	0.318	0.376
12/16/2013	0.315	0.364	0.316	0.376
12/17/2013	0.309	0.362	0.314	0.376
12/18/2013	0.305	0.358	0.312	0.376
12/19/2013	0.301	0.358	0.312	0.376
12/20/2013	0.320	0.361	0.312	0.375
12/21/2013	0.371	0.389	0.331	0.374
12/22/2013	0.352	0.377	0.325	0.378
12/23/2013	0.342	0.371	0.321	0.379
12/24/2013	0.350	0.373	0.322	0.378
12/25/2013	0.333	0.367	0.319	0.379
12/26/2013	0.323	0.366	0.318	0.379

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/27/2013	0.315	0.364	0.316	0.378
12/28/2013	0.310	0.361	0.315	0.378
12/29/2013	0.305	0.359	0.314	0.377
12/30/2013	0.301	0.359	0.312	0.376
12/31/2013	0.297	0.358	0.311	0.376
1/1/2014	0.294	0.357	0.310	0.375
1/2/2014	0.292	0.356	0.309	0.375
1/3/2014	0.291	0.351	0.309	0.374
1/4/2014	0.294	0.354	0.309	0.374
1/5/2014	0.294	0.355	0.308	0.374
1/6/2014	0.292	0.355	0.307	0.373
1/7/2014	0.321	0.358	0.308	0.372
1/8/2014	0.377	0.393	0.330	0.371
1/9/2014	0.369	0.393	0.334	0.377
1/10/2014	0.360	0.390	0.332	0.388
1/11/2014	0.372	0.396	0.338	0.388
1/12/2014	0.372	0.398	0.335	0.403
1/13/2014	0.359	0.390	0.329	0.390
1/14/2014	0.337	0.378	0.324	0.389
1/15/2014	0.327	0.371	0.320	0.384

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
1/16/2014	0.320	0.367	0.318	0.382
1/17/2014	0.313	0.365	0.317	0.381
1/18/2014	0.308	0.363	0.315	0.380
1/19/2014	0.304	0.362	0.313	0.379
1/20/2014	0.300	0.360	0.312	0.378
1/21/2014	0.297	0.360	0.311	0.377
1/22/2014	0.295	0.359	0.311	0.377
1/23/2014	0.292	0.357	0.310	0.376
1/24/2014	0.290	0.357	0.309	0.376
1/25/2014	0.288	0.357	0.308	0.375
1/26/2014	0.287	0.356	0.308	0.375
1/27/2014	0.285	0.355	0.308	0.374
1/28/2014	0.318	0.363	0.310	0.373
1/29/2014	0.384	0.401	0.341	0.384
1/30/2014	0.355	0.385	0.328	0.392
1/31/2014	0.345	0.373	0.323	0.388
2/1/2014	0.349	0.375	0.322	0.384
2/2/2014	0.336	0.372	0.321	0.382
2/3/2014	0.357	0.374	0.321	0.380
2/4/2014	0.349	0.375	0.323	0.380

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/5/2014	0.340	0.373	0.322	0.380
2/6/2014	0.334	0.370	0.321	0.379
2/7/2014	0.364	0.389	0.336	0.378
2/8/2014	0.378	0.411	0.353	0.407
2/9/2014	0.363	0.392	0.332	0.394
2/10/2014	0.356	0.385	0.329	0.389
2/11/2014	0.371	0.396	0.333	0.388
2/12/2014	0.389	0.417	0.355	0.410
2/13/2014	0.371	0.404	0.352	0.409
2/14/2014	0.390	0.418	0.360	0.410
2/15/2014	0.383	0.415	0.348	0.411
2/16/2014	0.375	0.412	0.344	0.407
2/17/2014	0.371	0.403	0.341	0.397
2/18/2014	0.376	0.410	0.349	0.401
2/19/2014	0.369	0.403	0.338	0.402
2/20/2014	0.376	0.410	0.341	0.396
2/21/2014	0.366	0.403	0.338	0.398
2/22/2014	0.348	0.388	0.332	0.394
2/23/2014	0.342	0.379	0.328	0.386
2/24/2014	0.362	0.388	0.329	0.384

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/25/2014	0.346	0.384	0.329	0.384
2/26/2014	0.336	0.378	0.327	0.383
2/27/2014	0.356	0.386	0.328	0.382
2/28/2014	0.349	0.385	0.329	0.382
3/1/2014	0.370	0.397	0.335	0.381
3/2/2014	0.372	0.404	0.340	0.384
3/3/2014	0.364	0.396	0.335	0.389
3/4/2014	0.349	0.386	0.331	0.387
3/5/2014	0.370	0.399	0.339	0.386
3/6/2014	0.376	0.409	0.347	0.394
3/7/2014	0.360	0.393	0.335	0.396
3/8/2014	0.345	0.384	0.330	0.391
3/9/2014	0.390	0.416	0.363	0.394
3/10/2014	0.375	0.408	0.347	0.404
3/11/2014	0.353	0.390	0.334	0.393
3/12/2014	0.342	0.381	0.329	0.388
3/13/2014	0.335	0.377	0.327	0.385
3/14/2014	0.337	0.372	0.325	0.383
3/15/2014	0.341	0.374	0.325	0.383
3/16/2014	0.338	0.373	0.324	0.381

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
3/17/2014	0.370	0.402	0.341	0.381
3/18/2014	0.346	0.387	0.331	0.384
3/19/2014	0.337	0.379	0.328	0.384
3/20/2014	0.337	0.374	0.326	0.383
3/21/2014	0.332	0.374	0.325	0.382
3/22/2014	0.326	0.372	0.324	0.381
3/23/2014	0.317	0.369	0.321	0.380
3/24/2014	0.314	0.365	0.320	0.379
3/25/2014	0.374	0.393	0.331	0.378
3/26/2014	0.380	0.409	0.349	0.385
3/27/2014	0.386	0.415	0.352	0.400
3/28/2014	0.367	0.400	0.340	0.402
3/29/2014	0.376	0.407	0.341	0.393
3/30/2014	0.360	0.394	0.335	0.393
3/31/2014	0.368	0.401	0.337	0.392
4/1/2014	0.348	0.388	0.332	0.390
4/2/2014	0.339	0.381	0.329	0.386
4/3/2014	0.341	0.374	0.326	0.384
4/4/2014	0.382	0.404	0.340	0.383
4/5/2014	0.366	0.399	0.339	0.388

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/6/2014	0.348	0.387	0.331	0.388
4/7/2014	0.338	0.380	0.328	0.386
4/8/2014	0.330	0.374	0.326	0.384
4/9/2014	0.324	0.372	0.324	0.383
4/10/2014	0.319	0.370	0.322	0.381
4/11/2014	0.315	0.368	0.321	0.381
4/12/2014	0.311	0.366	0.320	0.380
4/13/2014	0.307	0.365	0.318	0.379
4/14/2014	0.304	0.364	0.318	0.379
4/15/2014	0.301	0.363	0.316	0.378
4/16/2014	0.337	0.372	0.321	0.377
4/17/2014	0.354	0.387	0.332	0.378
4/18/2014	0.339	0.379	0.328	0.379
4/19/2014	0.339	0.377	0.326	0.380
4/20/2014	0.329	0.373	0.325	0.380
4/21/2014	0.362	0.388	0.331	0.380
4/22/2014	0.373	0.398	0.337	0.380
4/23/2014	0.381	0.409	0.347	0.392
4/24/2014	0.366	0.397	0.337	0.396
4/25/2014	0.345	0.385	0.332	0.392

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/26/2014	0.374	0.397	0.336	0.387
4/27/2014	0.355	0.392	0.335	0.389
4/28/2014	0.340	0.381	0.330	0.388
4/29/2014	0.330	0.375	0.327	0.386
4/30/2014	0.323	0.371	0.324	0.384
5/1/2014	0.317	0.369	0.322	0.383
5/2/2014	0.312	0.366	0.321	0.383
5/3/2014	0.340	0.367	0.322	0.382
5/4/2014	0.369	0.394	0.338	0.382
5/5/2014	0.347	0.384	0.332	0.384
5/6/2014	0.334	0.376	0.328	0.384
5/7/2014	0.343	0.376	0.327	0.384
5/8/2014	0.380	0.401	0.342	0.384
5/9/2014	0.370	0.399	0.340	0.390
5/10/2014	0.345	0.383	0.332	0.390
5/11/2014	0.334	0.376	0.328	0.388
5/12/2014	0.317	0.357	0.315	0.378
5/13/2014	0.334	0.362	0.334	0.389
5/14/2014	0.329	0.359	0.332	0.388
5/15/2014	0.324	0.358	0.331	0.387

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
5/16/2014	0.320	0.356	0.330	0.387
5/17/2014	0.371	0.366	0.335	0.386
5/18/2014	0.372	0.381	0.345	0.387
5/19/2014	0.350	0.370	0.340	0.389
5/20/2014	0.339	0.364	0.337	0.390
5/21/2014	0.332	0.361	0.335	0.389
5/22/2014	0.327	0.359	0.333	0.389
5/23/2014	0.323	0.357	0.332	0.388
5/24/2014	0.319	0.356	0.330	0.387
5/25/2014	0.316	0.355	0.329	0.387
5/26/2014	0.314	0.354	0.328	0.387
5/27/2014	0.319	0.353	0.328	0.386
5/28/2014	0.322	0.355	0.329	0.386
5/29/2014	0.318	0.355	0.329	0.385
5/30/2014	0.316	0.354	0.328	0.385
5/31/2014	0.313	0.353	0.327	0.385
6/1/2014	0.311	0.353	0.326	0.384
6/2/2014	0.308	0.352	0.326	0.384
6/3/2014	0.306	0.351	0.325	0.384
6/4/2014	0.304	0.351	0.324	0.384

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
6/5/2014	0.302	0.350	0.323	0.383
6/6/2014	0.300	0.350	0.322	0.383
6/7/2014	0.298	0.349	0.321	0.383
6/8/2014	0.297	0.348	0.320	0.383
6/9/2014	0.295	0.348	0.319	0.383
6/10/2014	0.293	0.347	0.319	0.383
6/11/2014	0.292	0.347	0.318	0.383
6/12/2014	0.297	0.346	0.321	0.383
6/13/2014	0.298	0.348	0.321	0.382
6/14/2014	0.297	0.348	0.321	0.382
6/15/2014	0.311	0.347	0.322	0.382
6/16/2014	0.348	0.355	0.327	0.381
6/17/2014	0.330	0.356	0.328	0.381
6/18/2014	0.321	0.355	0.327	0.381
6/19/2014	0.315	0.353	0.326	0.381
6/20/2014	0.311	0.352	0.325	0.381
6/21/2014	0.307	0.352	0.324	0.381
6/22/2014	0.305	0.351	0.323	0.381
6/23/2014	0.302	0.350	0.322	0.380
6/24/2014	0.300	0.348	0.321	0.381

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
6/25/2014	0.363	0.364	0.337	0.380
6/26/2014	0.358	0.365	0.339	0.380
6/27/2014	0.339	0.362	0.338	0.381
6/28/2014	0.327	0.359	0.335	0.382
6/29/2014	0.320	0.356	0.332	0.383
6/30/2014	0.315	0.354	0.331	0.383
7/1/2014	0.312	0.353	0.329	0.384
7/2/2014	0.308	0.352	0.328	0.384
7/3/2014	0.305	0.351	0.327	0.383
7/4/2014	0.303	0.350	0.326	0.384
7/5/2014	0.300	0.349	0.324	0.384
7/6/2014	0.298	0.349	0.323	0.384
7/7/2014	0.296	0.348	0.322	0.384
7/8/2014	0.294	0.347	0.321	0.384
7/9/2014	0.292	0.346	0.320	0.385
7/10/2014	0.290	0.346	0.319	0.385
7/11/2014	0.289	0.346	0.319	0.384
7/12/2014	0.287	0.345	0.318	0.384
7/13/2014	0.287	0.345	0.318	0.383
7/14/2014	0.285	0.344	0.316	0.383

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/15/2014	0.283	0.344	0.315	0.383
7/16/2014	0.282	0.343	0.315	0.383
7/17/2014	0.280	0.343	0.314	0.383
7/18/2014	0.279	0.343	0.313	0.383
7/19/2014	0.277	0.342	0.312	0.383
7/20/2014	0.276	0.342	0.312	0.383
7/21/2014	0.275	0.342	0.312	0.383
7/22/2014	0.284	0.342	0.315	0.382
7/23/2014	0.293	0.346	0.317	0.382
7/24/2014	0.290	0.345	0.317	0.382
7/25/2014	0.288	0.345	0.316	0.381
7/26/2014	0.286	0.344	0.315	0.382
7/27/2014	0.285	0.344	0.314	0.382
7/28/2014	0.283	0.343	0.312	0.381
7/29/2014	0.282	0.343	0.311	0.381
7/30/2014	0.280	0.343	0.311	0.381
7/31/2014	0.279	0.342	0.310	0.381
8/1/2014	0.277	0.342	0.310	0.380
8/2/2014	0.275	0.342	0.309	0.380
8/3/2014	0.274	0.341	0.309	0.381

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
8/4/2014	0.273	0.341	0.308	0.381
8/5/2014	0.272	0.341	0.308	0.381
8/6/2014	0.270	0.340	0.307	0.380
8/7/2014	0.269	0.340	0.306	0.380
8/8/2014	0.268	0.339	0.306	0.380
8/9/2014	0.267	0.339	0.306	0.380
8/10/2014	0.266	0.339	0.305	0.380
8/11/2014	0.265	0.338	0.305	0.380
8/12/2014	0.264	0.338	0.305	0.380
8/13/2014	0.263	0.338	0.305	0.380
8/14/2014	0.263	0.338	0.304	0.380
8/15/2014	0.263	0.338	0.304	0.380
8/16/2014	0.262	0.337	0.303	0.379
8/17/2014	0.261	0.337	0.303	0.379
8/18/2014	0.260	0.337	0.302	0.379
8/19/2014	0.260	0.337	0.303	0.379
8/20/2014	0.258	0.337	0.302	0.379
8/21/2014	0.257	0.336	0.301	0.379
8/22/2014	0.256	0.336	0.301	0.379
8/23/2014	0.255	0.336	0.300	0.379

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
8/24/2014	0.254	0.336	0.300	0.379
8/25/2014	0.254	0.335	0.299	0.379
8/26/2014	0.254	0.335	0.299	0.380
8/27/2014	0.253	0.335	0.299	0.379
8/28/2014	0.252	0.334	0.299	0.378
8/29/2014	0.253	0.335	0.301	0.378
8/30/2014	0.255	0.336	0.304	0.378
8/31/2014	0.253	0.335	0.303	0.378
9/1/2014	0.253	0.335	0.302	0.378
9/2/2014	0.253	0.335	0.300	0.377
9/3/2014	0.252	0.335	0.299	0.377
9/4/2014	0.252	0.335	0.298	0.377
9/5/2014	0.251	0.334	0.297	0.377
9/6/2014	0.250	0.334	0.297	0.377
9/7/2014	0.249	0.334	0.297	0.377
9/8/2014	0.249	0.334	0.297	0.377
9/9/2014	0.248	0.333	0.296	0.377
9/10/2014	0.247	0.333	0.296	0.377
9/11/2014	0.246	0.333	0.295	0.377
9/12/2014	0.245	0.332	0.295	0.376

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
9/13/2014	0.244	0.332	0.295	0.376
9/14/2014	0.243	0.332	0.295	0.376
9/15/2014	0.243	0.332	0.295	0.376
9/16/2014	0.242	0.331	0.295	0.376
9/17/2014	0.242	0.331	0.295	0.376
9/18/2014	0.242	0.331	0.295	0.376
9/19/2014	0.242	0.331	0.294	0.376
9/20/2014	0.242	0.331	0.294	0.376
9/21/2014	0.241	0.331	0.294	0.376
9/22/2014	0.240	0.331	0.294	0.376
9/23/2014	0.323	0.358	0.336	0.375
9/24/2014	0.308	0.356	0.336	0.380
9/25/2014	0.307	0.353	0.333	0.382
9/26/2014	0.294	0.350	0.330	0.384
9/27/2014	0.288	0.348	0.328	0.384
9/28/2014	0.287	0.346	0.327	0.384
9/29/2014	0.294	0.346	0.327	0.384
9/30/2014	0.289	0.347	0.326	0.384
10/1/2014	0.284	0.346	0.325	0.384
10/2/2014	0.282	0.345	0.324	0.384

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/3/2014	0.280	0.344	0.322	0.384
10/4/2014	0.279	0.344	0.322	0.384
10/5/2014	0.279	0.343	0.321	0.384
10/6/2014	0.277	0.343	0.320	0.384
10/7/2014	0.276	0.342	0.319	0.384
10/8/2014	0.275	0.342	0.318	0.384
10/9/2014	0.275	0.342	0.318	0.384
10/10/2014	0.282	0.342	0.318	0.384
10/11/2014	0.283	0.342	0.318	0.383
10/12/2014	0.280	0.342	0.318	0.383
10/13/2014	0.336	0.348	0.325	0.381
10/14/2014	0.347	0.365	0.341	0.381
10/15/2014	0.324	0.357	0.336	0.383
10/16/2014	0.311	0.353	0.333	0.384
10/17/2014	0.312	0.351	0.331	0.384
10/18/2014	0.304	0.350	0.329	0.384
10/19/2014	0.343	0.360	0.337	0.384
10/20/2014	0.340	0.362	0.341	0.385
10/21/2014	0.334	0.358	0.338	0.387
10/22/2014	0.359	0.369	0.348	0.412

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/23/2014	0.343	0.359	0.338	0.401
10/24/2014	0.356	0.360	0.338	0.394
10/25/2014	0.378	0.379	0.353	0.405
10/26/2014	0.348	0.361	0.339	0.399
10/27/2014	0.349	0.358	0.336	0.394
10/28/2014	0.353	0.364	0.339	0.392
10/29/2014	0.349	0.363	0.339	0.391
10/30/2014	0.371	0.379	0.349	0.404
10/31/2014	0.348	0.361	0.337	0.399
11/1/2014	0.352	0.360	0.336	0.392
11/2/2014	0.355	0.362	0.336	0.391
11/3/2014	0.370	0.373	0.343	0.391
11/4/2014	0.355	0.366	0.340	0.394
11/5/2014	0.353	0.361	0.337	0.392
11/6/2014	0.352	0.362	0.337	0.391
11/7/2014	0.337	0.358	0.335	0.391
11/8/2014	0.337	0.355	0.333	0.390
11/9/2014	0.346	0.355	0.332	0.389
11/10/2014	0.335	0.357	0.331	0.388
11/11/2014	0.327	0.356	0.330	0.387

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/12/2014	0.364	0.376	0.343	0.388
11/13/2014	0.379	0.391	0.356	0.416
11/14/2014	0.351	0.366	0.340	0.399
11/15/2014	0.340	0.364	0.337	0.393
11/16/2014	0.333	0.361	0.334	0.390
11/17/2014	0.328	0.359	0.332	0.389
11/18/2014	0.333	0.356	0.332	0.388
11/19/2014	0.369	0.377	0.342	0.387
11/20/2014	0.367	0.378	0.344	0.388
11/21/2014	0.379	0.388	0.352	0.401
11/22/2014	0.362	0.374	0.344	0.401
11/23/2014	0.349	0.367	0.339	0.395
11/24/2014	0.342	0.362	0.337	0.391
11/25/2014	0.338	0.360	0.335	0.390
11/26/2014	0.363	0.374	0.342	0.388
11/27/2014	0.387	0.393	0.356	0.397
11/28/2014	0.376	0.386	0.351	0.413
11/29/2014	0.354	0.372	0.342	0.399
11/30/2014	0.371	0.384	0.351	0.396
12/1/2014	0.365	0.376	0.346	0.401

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/2/2014	0.354	0.368	0.341	0.394
12/3/2014	0.379	0.384	0.348	0.392
12/4/2014	0.368	0.378	0.345	0.393
12/5/2014	0.370	0.384	0.349	0.394
12/6/2014	0.351	0.370	0.341	0.393
12/7/2014	0.344	0.365	0.338	0.391
12/8/2014	0.338	0.361	0.336	0.389
12/9/2014	0.353	0.368	0.340	0.388
12/10/2014	0.361	0.377	0.345	0.389
12/11/2014	0.349	0.367	0.340	0.390
12/12/2014	0.342	0.363	0.338	0.389
12/13/2014	0.336	0.361	0.336	0.388
12/14/2014	0.332	0.359	0.335	0.387
12/15/2014	0.342	0.358	0.334	0.387
12/16/2014	0.356	0.359	0.334	0.386
12/17/2014	0.364	0.370	0.337	0.386
12/18/2014	0.378	0.390	0.353	0.387
12/19/2014	0.393	0.403	0.364	0.403
12/20/2014	0.393	0.409	0.366	0.422
12/21/2014	0.377	0.393	0.355	0.418

Table D.5 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/22/2014	0.371	0.379	0.346	0.401
12/23/2014	0.376	0.389	0.353	0.401
12/24/2014	0.379	0.395	0.355	0.405
12/25/2014	0.358	0.376	0.345	0.402
12/26/2014	0.359	0.373	0.343	0.393
12/27/2014	0.381	0.392	0.354	0.393
12/28/2014	0.376	0.388	0.350	0.395
12/29/2014	0.360	0.379	0.345	0.393
12/30/2014	0.350	0.373	0.339	0.391
12/31/2014	0.344	0.369	0.337	0.389
1/1/2015	0.340	0.367	0.337	0.389

Table D.6 Daily Volumetric Water Content (VWC) Data for Treatment D, Plot 06

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/6/2013	0.371	0.338	0.365	0.434
11/7/2013	0.385	0.347	0.372	0.496
11/8/2013	0.376	0.340	0.360	0.496
11/9/2013	0.363	0.327	0.340	0.498
11/10/2013	0.360	0.321	0.328	0.419
11/11/2013	0.356	0.318	0.322	0.345
11/12/2013	0.368	0.315	0.320	0.341
11/13/2013	0.376	0.324	0.331	0.340
11/14/2013	0.374	0.319	0.327	0.340
11/15/2013	0.380	0.327	0.340	0.340
11/16/2013	0.398	0.350	0.391	0.470
11/17/2013	0.385	0.341	0.364	0.501
11/18/2013	0.381	0.338	0.366	0.496
11/19/2013	0.410	0.371	0.418	0.504
11/20/2013	0.386	0.344	0.365	0.505
11/21/2013	0.367	0.331	0.339	0.489
11/22/2013	0.300	0.332	0.328	0.350
11/23/2013	0.366	0.321	0.323	0.345

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/24/2013	0.364	0.320	0.320	0.343
11/25/2013	0.362	0.318	0.318	0.342
11/26/2013	0.361	0.317	0.316	0.341
11/27/2013	0.360	0.316	0.315	0.341
11/28/2013	0.359	0.315	0.313	0.340
11/29/2013	0.358	0.314	0.312	0.340
11/30/2013	0.357	0.313	0.311	0.340
12/1/2013	0.368	0.311	0.315	0.339
12/2/2013	0.411	0.376	0.419	0.477
12/3/2013	0.402	0.352	0.387	0.495
12/4/2013	0.377	0.345	0.356	0.498
12/5/2013	0.358	0.342	0.330	0.474
12/6/2013	0.356	0.337	0.321	0.357
12/7/2013	0.365	0.331	0.321	0.346
12/8/2013	0.362	0.329	0.318	0.344
12/9/2013	0.361	0.327	0.316	0.343
12/10/2013	0.361	0.325	0.315	0.342
12/11/2013	0.364	0.322	0.315	0.341
12/12/2013	0.380	0.322	0.325	0.341
12/13/2013	0.407	0.355	0.426	0.489

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/14/2013	0.385	0.340	0.358	0.498
12/15/2013	0.380	0.333	0.342	0.456
12/16/2013	0.376	0.328	0.332	0.352
12/17/2013	0.372	0.325	0.326	0.346
12/18/2013	0.374	0.322	0.324	0.344
12/19/2013	0.374	0.320	0.323	0.342
12/20/2013	0.385	0.329	0.339	0.342
12/21/2013	0.418	0.359	0.423	0.488
12/22/2013	0.405	0.350	0.385	0.502
12/23/2013	0.401	0.343	0.364	0.499
12/24/2013	0.409	0.346	0.379	0.492
12/25/2013	0.393	0.334	0.349	0.429
12/26/2013	0.383	0.330	0.337	0.353
12/27/2013	0.378	0.327	0.330	0.348
12/28/2013	0.374	0.325	0.327	0.346
12/29/2013	0.372	0.322	0.324	0.344
12/30/2013	0.370	0.321	0.321	0.344
12/31/2013	0.368	0.321	0.319	0.343
1/1/2014	0.366	0.320	0.318	0.342
1/2/2014	0.365	0.319	0.318	0.342

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
1/3/2014	0.380	0.315	0.319	0.341
1/4/2014	0.374	0.318	0.318	0.341
1/5/2014	0.369	0.320	0.317	0.341
1/6/2014	0.367	0.318	0.316	0.340
1/7/2014	0.387	0.332	0.345	0.340
1/8/2014	0.424	0.367	0.427	0.431
1/9/2014	0.424	0.367	0.398	0.501
1/10/2014	0.412	0.360	0.390	0.501
1/11/2014	0.424	0.383	0.398	0.503
1/12/2014	0.429	0.375	0.414	0.504
1/13/2014	0.414	0.359	0.390	0.502
1/14/2014	0.392	0.342	0.355	0.505
1/15/2014	0.386	0.335	0.340	0.499
1/16/2014	0.380	0.330	0.332	0.402
1/17/2014	0.377	0.328	0.328	0.353
1/18/2014	0.374	0.326	0.326	0.349
1/19/2014	0.372	0.325	0.324	0.347
1/20/2014	0.370	0.323	0.322	0.346
1/21/2014	0.369	0.322	0.321	0.345
1/22/2014	0.367	0.321	0.319	0.344

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
1/23/2014	0.367	0.320	0.319	0.344
1/24/2014	0.364	0.320	0.318	0.343
1/25/2014	0.362	0.319	0.316	0.343
1/26/2014	0.361	0.319	0.316	0.343
1/27/2014	0.360	0.319	0.315	0.342
1/28/2014	0.380	0.333	0.344	0.342
1/29/2014	0.422	0.381	0.437	0.489
1/30/2014	0.405	0.356	0.391	0.501
1/31/2014	0.403	0.346	0.359	0.506
2/1/2014	0.404	0.351	0.373	0.501
2/2/2014	0.397	0.344	0.354	0.467
2/3/2014	0.421	0.361	0.433	0.369
2/4/2014	0.411	0.352	0.373	0.366
2/5/2014	0.401	0.345	0.360	0.364
2/6/2014	0.398	0.339	0.343	0.360
2/7/2014	0.435	0.381	0.394	0.402
2/8/2014	0.449	0.415	0.437	0.512
2/9/2014	0.420	0.368	0.428	0.508
2/10/2014	0.413	0.357	0.380	0.512
2/11/2014	0.426	0.373	0.416	0.513

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/12/2014	0.453	0.438	0.415	0.514
2/13/2014	0.434	0.402	0.421	0.513
2/14/2014	0.457	0.427	0.415	0.514
2/15/2014	0.448	0.429	0.419	0.515
2/16/2014	0.433	0.409	0.427	0.516
2/17/2014	0.429	0.388	0.403	0.513
2/18/2014	0.438	0.404	0.422	0.516
2/19/2014	0.433	0.385	0.413	0.514
2/20/2014	0.435	0.386	0.412	0.514
2/21/2014	0.422	0.368	0.390	0.515
2/22/2014	0.402	0.345	0.358	0.516
2/23/2014	0.401	0.338	0.342	0.432
2/24/2014	0.422	0.362	0.402	0.356
2/25/2014	0.403	0.350	0.367	0.358
2/26/2014	0.394	0.340	0.347	0.355
2/27/2014	0.415	0.357	0.395	0.354
2/28/2014	0.407	0.352	0.370	0.360
3/1/2014	0.437	0.375	0.395	0.435
3/2/2014	0.438	0.382	0.416	0.512
3/3/2014	0.426	0.369	0.407	0.512

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
3/4/2014	0.407	0.352	0.367	0.514
3/5/2014	0.429	0.377	0.396	0.512
3/6/2014	0.433	0.394	0.415	0.515
3/7/2014	0.416	0.363	0.383	0.514
3/8/2014	0.400	0.344	0.355	0.514
3/9/2014	0.452	0.414	0.408	0.515
3/10/2014	0.441	0.399	0.420	0.517
3/11/2014	0.406	0.353	0.367	0.518
3/12/2014	0.396	0.339	0.347	0.502
3/13/2014	0.389	0.335	0.340	0.369
3/14/2014	0.398	0.331	0.335	0.352
3/15/2014	0.396	0.334	0.337	0.351
3/16/2014	0.397	0.335	0.337	0.350
3/17/2014	0.426	0.368	0.405	0.482
3/18/2014	0.401	0.347	0.360	0.504
3/19/2014	0.395	0.338	0.343	0.426
3/20/2014	0.401	0.334	0.337	0.355
3/21/2014	0.391	0.332	0.336	0.352
3/22/2014	0.385	0.330	0.334	0.351
3/23/2014	0.383	0.329	0.332	0.350

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
3/24/2014	0.381	0.328	0.330	0.349
3/25/2014	0.391	0.328	0.329	0.349
3/26/2014	0.442	0.379	0.408	0.385
3/27/2014	0.445	0.386	0.414	0.512
3/28/2014	0.456	0.413	0.422	0.514
3/29/2014	0.432	0.384	0.404	0.512
3/30/2014	0.418	0.362	0.376	0.513
3/31/2014	0.426	0.372	0.401	0.515
4/1/2014	0.405	0.348	0.357	0.516
4/2/2014	0.397	0.341	0.343	0.500
4/3/2014	0.412	0.339	0.335	0.379
4/4/2014	0.448	0.386	0.415	0.455
4/5/2014	0.428	0.371	0.401	0.513
4/6/2014	0.404	0.352	0.360	0.516
4/7/2014	0.396	0.343	0.345	0.510
4/8/2014	0.395	0.340	0.338	0.409
4/9/2014	0.386	0.337	0.336	0.353
4/10/2014	0.383	0.335	0.334	0.352
4/11/2014	0.383	0.334	0.333	0.351
4/12/2014	0.378	0.332	0.331	0.350

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/13/2014	0.375	0.332	0.330	0.349
4/14/2014	0.374	0.331	0.329	0.349
4/15/2014	0.372	0.330	0.328	0.348
4/16/2014	0.410	0.358	0.380	0.393
4/17/2014	0.411	0.363	0.387	0.420
4/18/2014	0.403	0.354	0.355	0.369
4/19/2014	0.401	0.351	0.350	0.355
4/20/2014	0.394	0.344	0.340	0.352
4/21/2014	0.431	0.372	0.391	0.357
4/22/2014	0.444	0.382	0.412	0.452
4/23/2014	0.447	0.389	0.420	0.515
4/24/2014	0.427	0.374	0.398	0.511
4/25/2014	0.405	0.355	0.359	0.516
4/26/2014	0.440	0.381	0.404	0.516
4/27/2014	0.411	0.361	0.372	0.519
4/28/2014	0.397	0.348	0.347	0.507
4/29/2014	0.392	0.344	0.340	0.390
4/30/2014	0.385	0.341	0.337	0.354
5/1/2014	0.381	0.340	0.335	0.352
5/2/2014	0.378	0.338	0.334	0.351

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
5/3/2014	0.410	0.349	0.356	0.350
5/4/2014	0.425	0.373	0.396	0.498
5/5/2014	0.401	0.357	0.362	0.506
5/6/2014	0.393	0.347	0.344	0.424
5/7/2014	0.412	0.359	0.363	0.361
5/8/2014	0.445	0.387	0.426	0.512
5/9/2014	0.430	0.376	0.402	0.514
5/10/2014	0.402	0.353	0.356	0.519
5/11/2014	0.395	0.346	0.343	0.500
5/12/2014	0.378	0.336	0.333	0.362
5/13/2014	0.379	0.350	0.348	0.359
5/14/2014	0.376	0.349	0.347	0.357
5/15/2014	0.372	0.347	0.346	0.357
5/16/2014	0.371	0.345	0.345	0.356
5/17/2014	0.425	0.383	0.400	0.365
5/18/2014	0.414	0.380	0.395	0.519
5/19/2014	0.388	0.363	0.364	0.518
5/20/2014	0.382	0.355	0.353	0.423
5/21/2014	0.379	0.352	0.350	0.360
5/22/2014	0.377	0.351	0.348	0.357

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
5/23/2014	0.374	0.348	0.347	0.357
5/24/2014	0.372	0.347	0.346	0.356
5/25/2014	0.372	0.346	0.346	0.356
5/26/2014	0.368	0.345	0.344	0.355
5/27/2014	0.380	0.353	0.345	0.355
5/28/2014	0.378	0.350	0.345	0.354
5/29/2014	0.374	0.346	0.344	0.354
5/30/2014	0.372	0.344	0.343	0.354
5/31/2014	0.369	0.343	0.343	0.354
6/1/2014	0.368	0.343	0.342	0.354
6/2/2014	0.366	0.342	0.342	0.354
6/3/2014	0.365	0.342	0.341	0.353
6/4/2014	0.364	0.341	0.340	0.353
6/5/2014	0.362	0.342	0.340	0.353
6/6/2014	0.361	0.342	0.339	0.353
6/7/2014	0.360	0.342	0.339	0.353
6/8/2014	0.359	0.342	0.338	0.353
6/9/2014	0.357	0.342	0.338	0.353
6/10/2014	0.356	0.342	0.337	0.353
6/11/2014	0.356	0.342	0.338	0.353

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
6/12/2014	0.382	0.363	0.349	0.352
6/13/2014	0.368	0.352	0.342	0.352
6/14/2014	0.365	0.346	0.340	0.352
6/15/2014	0.377	0.356	0.367	0.352
6/16/2014	0.388	0.369	0.370	0.352
6/17/2014	0.375	0.359	0.349	0.352
6/18/2014	0.371	0.353	0.344	0.352
6/19/2014	0.371	0.351	0.344	0.352
6/20/2014	0.367	0.348	0.342	0.352
6/21/2014	0.365	0.346	0.341	0.352
6/22/2014	0.364	0.346	0.340	0.352
6/23/2014	0.363	0.346	0.340	0.352
6/24/2014	0.367	0.351	0.344	0.352
6/25/2014	0.402	0.383	0.400	0.354
6/26/2014	0.403	0.380	0.392	0.358
6/27/2014	0.381	0.366	0.364	0.368
6/28/2014	0.376	0.359	0.352	0.362
6/29/2014	0.374	0.355	0.349	0.359
6/30/2014	0.372	0.353	0.348	0.358
7/1/2014	0.369	0.352	0.346	0.357

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/2/2014	0.366	0.351	0.345	0.357
7/3/2014	0.365	0.350	0.344	0.356
7/4/2014	0.364	0.349	0.343	0.356
7/5/2014	0.362	0.349	0.342	0.356
7/6/2014	0.361	0.350	0.342	0.356
7/7/2014	0.359	0.350	0.341	0.355
7/8/2014	0.358	0.350	0.341	0.355
7/9/2014	0.357	0.349	0.340	0.355
7/10/2014	0.355	0.349	0.339	0.355
7/11/2014	0.355	0.348	0.339	0.355
7/12/2014	0.354	0.348	0.339	0.354
7/13/2014	0.355	0.347	0.339	0.354
7/14/2014	0.353	0.347	0.338	0.354
7/15/2014	0.353	0.348	0.338	0.354
7/16/2014	0.351	0.348	0.337	0.354
7/17/2014	0.350	0.347	0.337	0.354
7/18/2014	0.350	0.347	0.336	0.353
7/19/2014	0.348	0.347	0.336	0.353
7/20/2014	0.348	0.344	0.335	0.353
7/21/2014	0.347	0.343	0.335	0.353

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/22/2014	0.355	0.345	0.339	0.352
7/23/2014	0.356	0.350	0.340	0.352
7/24/2014	0.354	0.346	0.338	0.352
7/25/2014	0.354	0.345	0.337	0.352
7/26/2014	0.353	0.345	0.336	0.352
7/27/2014	0.352	0.346	0.336	0.352
7/28/2014	0.351	0.347	0.336	0.352
7/29/2014	0.350	0.347	0.335	0.352
7/30/2014	0.349	0.347	0.335	0.352
7/31/2014	0.348	0.347	0.335	0.352
8/1/2014	0.348	0.347	0.335	0.352
8/2/2014	0.347	0.346	0.334	0.352
8/3/2014	0.346	0.345	0.334	0.352
8/4/2014	0.345	0.344	0.333	0.352
8/5/2014	0.344	0.344	0.333	0.352
8/6/2014	0.343	0.343	0.332	0.352
8/7/2014	0.342	0.343	0.332	0.352
8/8/2014	0.341	0.342	0.331	0.352
8/9/2014	0.341	0.342	0.331	0.351
8/10/2014	0.340	0.342	0.331	0.351

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
8/11/2014	0.339	0.341	0.330	0.351
8/12/2014	0.338	0.339	0.330	0.351
8/13/2014	0.338	0.339	0.330	0.351
8/14/2014	0.338	0.338	0.330	0.351
8/15/2014	0.338	0.338	0.330	0.351
8/16/2014	0.337	0.339	0.329	0.351
8/17/2014	0.336	0.339	0.328	0.350
8/18/2014	0.336	0.338	0.328	0.350
8/19/2014	0.336	0.338	0.329	0.350
8/20/2014	0.333	0.337	0.327	0.350
8/21/2014	0.333	0.336	0.326	0.350
8/22/2014	0.332	0.336	0.326	0.350
8/23/2014	0.331	0.336	0.325	0.349
8/24/2014	0.330	0.335	0.325	0.349
8/25/2014	0.329	0.335	0.325	0.349
8/26/2014	0.328	0.335	0.325	0.349
8/27/2014	0.326	0.334	0.325	0.349
8/28/2014	0.324	0.334	0.324	0.349
8/29/2014	0.326	0.332	0.328	0.349
8/30/2014	0.327	0.329	0.330	0.348

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
8/31/2014	0.322	0.329	0.325	0.348
9/1/2014	0.323	0.329	0.324	0.348
9/2/2014	0.322	0.329	0.324	0.348
9/3/2014	0.322	0.329	0.323	0.348
9/4/2014	0.321	0.331	0.322	0.348
9/5/2014	0.320	0.331	0.321	0.348
9/6/2014	0.318	0.330	0.321	0.348
9/7/2014	0.316	0.329	0.320	0.348
9/8/2014	0.314	0.328	0.321	0.348
9/9/2014	0.312	0.327	0.320	0.348
9/10/2014	0.311	0.326	0.319	0.348
9/11/2014	0.309	0.324	0.318	0.347
9/12/2014	0.307	0.323	0.318	0.347
9/13/2014	0.304	0.322	0.318	0.347
9/14/2014	0.302	0.320	0.318	0.347
9/15/2014	0.300	0.319	0.317	0.347
9/16/2014	0.297	0.318	0.317	0.347
9/17/2014	0.295	0.316	0.317	0.347
9/18/2014	0.293	0.315	0.317	0.347
9/19/2014	0.293	0.314	0.317	0.347

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
9/20/2014	0.292	0.313	0.316	0.347
9/21/2014	0.290	0.312	0.316	0.346
9/22/2014	0.287	0.311	0.316	0.346
9/23/2014	0.391	0.387	0.420	0.473
9/24/2014	0.363	0.369	0.364	0.517
9/25/2014	0.360	0.365	0.351	0.478
9/26/2014	0.349	0.356	0.345	0.369
9/27/2014	0.346	0.351	0.342	0.359
9/28/2014	0.349	0.349	0.343	0.357
9/29/2014	0.357	0.349	0.344	0.356
9/30/2014	0.350	0.348	0.342	0.356
10/1/2014	0.346	0.346	0.339	0.356
10/2/2014	0.344	0.345	0.338	0.355
10/3/2014	0.343	0.344	0.337	0.355
10/4/2014	0.342	0.344	0.337	0.355
10/5/2014	0.341	0.344	0.336	0.355
10/6/2014	0.341	0.343	0.336	0.354
10/7/2014	0.340	0.343	0.335	0.354
10/8/2014	0.339	0.343	0.334	0.354
10/9/2014	0.338	0.342	0.333	0.354

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/10/2014	0.341	0.342	0.336	0.353
10/11/2014	0.341	0.341	0.335	0.353
10/12/2014	0.340	0.340	0.334	0.353
10/13/2014	0.371	0.377	0.398	0.352
10/14/2014	0.378	0.381	0.395	0.411
10/15/2014	0.362	0.369	0.365	0.382
10/16/2014	0.357	0.360	0.351	0.364
10/17/2014	0.359	0.357	0.347	0.359
10/18/2014	0.355	0.355	0.345	0.358
10/19/2014	0.385	0.382	0.399	0.404
10/20/2014	0.373	0.379	0.386	0.513
10/21/2014	0.375	0.371	0.367	0.506
10/22/2014	0.385	0.381	0.388	0.518
10/23/2014	0.375	0.368	0.367	0.521
10/24/2014	0.387	0.374	0.381	0.513
10/25/2014	0.412	0.394	0.418	0.522
10/26/2014	0.374	0.367	0.368	0.523
10/27/2014	0.380	0.362	0.358	0.509
10/28/2014	0.378	0.369	0.378	0.431
10/29/2014	0.383	0.367	0.368	0.397

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/30/2014	0.399	0.385	0.405	0.526
10/31/2014	0.381	0.365	0.361	0.528
11/1/2014	0.380	0.366	0.366	0.465
11/2/2014	0.385	0.364	0.359	0.365
11/3/2014	0.403	0.379	0.391	0.480
11/4/2014	0.381	0.368	0.371	0.527
11/5/2014	0.387	0.365	0.362	0.443
11/6/2014	0.382	0.366	0.366	0.367
11/7/2014	0.372	0.356	0.353	0.362
11/8/2014	0.376	0.352	0.347	0.359
11/9/2014	0.380	0.356	0.349	0.358
11/10/2014	0.368	0.353	0.349	0.357
11/11/2014	0.363	0.350	0.347	0.357
11/12/2014	0.404	0.386	0.391	0.395
11/13/2014	0.426	0.416	0.417	0.525
11/14/2014	0.379	0.365	0.368	0.526
11/15/2014	0.366	0.356	0.353	0.505
11/16/2014	0.364	0.351	0.348	0.369
11/17/2014	0.362	0.349	0.346	0.358
11/18/2014	0.370	0.347	0.344	0.357

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/19/2014	0.393	0.372	0.395	0.398
11/20/2014	0.397	0.373	0.391	0.421
11/21/2014	0.416	0.387	0.420	0.524
11/22/2014	0.389	0.372	0.379	0.526
11/23/2014	0.376	0.359	0.360	0.522
11/24/2014	0.374	0.354	0.352	0.408
11/25/2014	0.370	0.352	0.349	0.359
11/26/2014	0.399	0.368	0.379	0.424
11/27/2014	0.433	0.398	0.428	0.526
11/28/2014	0.422	0.409	0.418	0.526
11/29/2014	0.377	0.365	0.369	0.526
11/30/2014	0.406	0.387	0.388	0.527
12/1/2014	0.396	0.377	0.389	0.525
12/2/2014	0.384	0.361	0.363	0.528
12/3/2014	0.416	0.383	0.419	0.529
12/4/2014	0.395	0.372	0.382	0.529
12/5/2014	0.396	0.375	0.400	0.530
12/6/2014	0.376	0.357	0.359	0.521
12/7/2014	0.370	0.353	0.352	0.384
12/8/2014	0.368	0.351	0.350	0.358

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/9/2014	0.384	0.359	0.365	0.397
12/10/2014	0.383	0.369	0.379	0.528
12/11/2014	0.376	0.357	0.359	0.509
12/12/2014	0.374	0.352	0.351	0.373
12/13/2014	0.369	0.349	0.349	0.358
12/14/2014	0.370	0.347	0.347	0.357
12/15/2014	0.379	0.348	0.347	0.356
12/16/2014	0.394	0.355	0.347	0.356
12/17/2014	0.391	0.368	0.373	0.356
12/18/2014	0.415	0.382	0.414	0.510
12/19/2014	0.450	0.426	0.425	0.527
12/20/2014	0.456	0.485	0.433	0.529
12/21/2014	0.428	0.426	0.418	0.528
12/22/2014	0.406	0.380	0.394	0.528
12/23/2014	0.410	0.387	0.414	0.529
12/24/2014	0.417	0.390	0.426	0.528
12/25/2014	0.385	0.363	0.367	0.531
12/26/2014	0.390	0.360	0.359	0.512
12/27/2014	0.422	0.388	0.422	0.533
12/28/2014	0.415	0.384	0.406	0.534

Table D.6 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/29/2014	0.377	0.365	0.369	0.531
12/30/2014	0.363	0.362	0.350	0.454
12/31/2014	0.360	0.359	0.346	0.361
1/1/2015	0.364	0.355	0.346	0.359

Table D.7 Daily Volumetric Water Content (VWC) Data for Treatment E, Plot 10

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/6/2013	0.337	0.379	0.376	0.362
11/7/2013	0.337	0.382	0.380	0.411
11/8/2013	0.332	0.378	0.374	0.454
11/9/2013	0.335	0.374	0.371	0.448
11/10/2013	0.331	0.371	0.369	0.400
11/11/2013	0.329	0.369	0.368	0.375
11/12/2013	0.326	0.369	0.369	0.375
11/13/2013	0.325	0.374	0.371	0.375
11/14/2013	0.322	0.372	0.370	0.375
11/15/2013	0.325	0.375	0.370	0.375
11/16/2013	0.337	0.388	0.383	0.441
11/17/2013	0.333	0.383	0.376	0.458
11/18/2013	0.340	0.382	0.377	0.460
11/19/2013	0.357	0.400	0.393	0.456
11/20/2013	0.332	0.384	0.377	0.457
11/21/2013	0.337	0.376	0.368	0.462
11/22/2013	0.280	0.365	0.363	0.439
11/23/2013	0.325	0.370	0.364	0.400
11/24/2013	0.324	0.369	0.363	0.378

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/25/2013	0.322	0.367	0.362	0.378
11/26/2013	0.321	0.365	0.361	0.378
11/27/2013	0.319	0.364	0.360	0.377
11/28/2013	0.319	0.363	0.358	0.377
11/29/2013	0.318	0.361	0.357	0.377
11/30/2013	0.318	0.360	0.356	0.377
12/1/2013	0.319	0.361	0.363	0.377
12/2/2013	0.351	0.392	0.390	0.447
12/3/2013	0.337	0.383	0.378	0.460
12/4/2013	0.335	0.367	0.360	0.463
12/5/2013	0.331	0.360	0.357	0.459
12/6/2013	0.324	0.356	0.353	0.440
12/7/2013	0.325	0.354	0.351	0.390
12/8/2013	0.327	0.353	0.349	0.378
12/9/2013	0.328	0.354	0.350	0.378
12/10/2013	0.327	0.355	0.350	0.378
12/11/2013	0.324	0.356	0.349	0.378
12/12/2013	0.331	0.366	0.358	0.378
12/13/2013	0.356	0.395	0.389	0.457
12/14/2013	0.338	0.377	0.367	0.452

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/15/2013	0.334	0.374	0.364	0.427
12/16/2013	0.332	0.371	0.363	0.388
12/17/2013	0.329	0.369	0.361	0.381
12/18/2013	0.330	0.369	0.364	0.380
12/19/2013	0.331	0.368	0.363	0.379
12/20/2013	0.334	0.375	0.368	0.382
12/21/2013	0.346	0.398	0.393	0.455
12/22/2013	0.341	0.386	0.378	0.455
12/23/2013	0.342	0.383	0.373	0.442
12/24/2013	0.340	0.389	0.381	0.408
12/25/2013	0.338	0.381	0.373	0.386
12/26/2013	0.335	0.375	0.365	0.383
12/27/2013	0.332	0.372	0.362	0.382
12/28/2013	0.331	0.372	0.364	0.381
12/29/2013	0.331	0.372	0.365	0.381
12/30/2013	0.326	0.367	0.359	0.380
12/31/2013	0.325	0.365	0.357	0.380
1/1/2014	0.324	0.364	0.356	0.380
1/2/2014	0.323	0.363	0.355	0.379
1/3/2014	0.331	0.370	0.367	0.380

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
1/4/2014	0.330	0.366	0.359	0.379
1/5/2014	0.325	0.363	0.353	0.379
1/6/2014	0.324	0.362	0.353	0.379
1/7/2014	0.333	0.371	0.363	0.380
1/8/2014	0.358	0.401	0.393	0.425
1/9/2014	0.351	0.397	0.388	0.465
1/10/2014	0.347	0.392	0.382	0.464
1/11/2014	0.358	0.401	0.395	0.462
1/12/2014	0.346	0.400	0.391	0.460
1/13/2014	0.347	0.394	0.382	0.466
1/14/2014	0.345	0.386	0.372	0.470
1/15/2014	0.341	0.384	0.370	0.467
1/16/2014	0.337	0.379	0.367	0.460
1/17/2014	0.334	0.377	0.365	0.435
1/18/2014	0.331	0.374	0.363	0.391
1/19/2014	0.329	0.372	0.361	0.383
1/20/2014	0.327	0.370	0.360	0.382
1/21/2014	0.325	0.368	0.359	0.381
1/22/2014	0.324	0.366	0.358	0.381
1/23/2014	0.325	0.367	0.360	0.381

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
1/24/2014	0.321	0.362	0.353	0.380
1/25/2014	0.319	0.360	0.351	0.380
1/26/2014	0.318	0.359	0.351	0.380
1/27/2014	0.317	0.357	0.350	0.380
1/28/2014	0.329	0.367	0.363	0.391
1/29/2014	0.357	0.399	0.394	0.458
1/30/2014	0.345	0.388	0.380	0.461
1/31/2014	0.346	0.386	0.376	0.467
2/1/2014	0.347	0.387	0.375	0.468
2/2/2014	0.342	0.384	0.371	0.465
2/3/2014	0.348	0.393	0.379	0.457
2/4/2014	0.348	0.392	0.378	0.428
2/5/2014	0.346	0.389	0.375	0.391
2/6/2014	0.338	0.384	0.370	0.385
2/7/2014	0.353	0.399	0.386	0.409
2/8/2014	0.367	0.412	0.405	0.458
2/9/2014	0.349	0.397	0.386	0.463
2/10/2014	0.349	0.395	0.382	0.469
2/11/2014	0.358	0.404	0.395	0.470
2/12/2014	0.375	0.415	0.409	0.460

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/13/2014	0.356	0.403	0.395	0.461
2/14/2014	0.379	0.416	0.407	0.460
2/15/2014	0.366	0.411	0.403	0.460
2/16/2014	0.360	0.407	0.396	0.461
2/17/2014	0.360	0.406	0.393	0.465
2/18/2014	0.360	0.410	0.402	0.464
2/19/2014	0.350	0.405	0.392	0.464
2/20/2014	0.356	0.408	0.396	0.470
2/21/2014	0.347	0.404	0.389	0.473
2/22/2014	0.348	0.398	0.383	0.472
2/23/2014	0.345	0.395	0.380	0.467
2/24/2014	0.353	0.403	0.386	0.454
2/25/2014	0.348	0.398	0.382	0.415
2/26/2014	0.343	0.394	0.379	0.389
2/27/2014	0.349	0.396	0.385	0.388
2/28/2014	0.350	0.399	0.385	0.387
3/1/2014	0.355	0.411	0.398	0.407
3/2/2014	0.334	0.297	0.304	0.479
3/3/2014	0.355	0.412	0.400	0.442
3/4/2014	0.354	0.407	0.394	0.455

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
3/5/2014	0.350	0.401	0.385	0.439
3/6/2014	0.358	0.411	0.402	0.414
3/7/2014	0.362	0.414	0.404	0.454
3/8/2014	0.351	0.404	0.390	0.471
3/9/2014	0.346	0.399	0.385	0.468
3/10/2014	0.380	0.425	0.418	0.466
3/11/2014	0.351	0.404	0.389	0.469
3/12/2014	0.351	0.404	0.389	0.469
3/13/2014	0.346	0.397	0.384	0.473
3/14/2014	0.341	0.392	0.380	0.470
3/15/2014	0.340	0.392	0.385	0.463
3/16/2014	0.343	0.392	0.380	0.436
3/17/2014	0.339	0.389	0.380	0.395
3/18/2014	0.360	0.411	0.401	0.456
3/19/2014	0.347	0.399	0.385	0.447
3/20/2014	0.341	0.396	0.382	0.411
3/21/2014	0.341	0.397	0.385	0.390
3/22/2014	0.339	0.391	0.375	0.388
3/23/2014	0.336	0.386	0.373	0.387
3/24/2014	0.334	0.383	0.371	0.387

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
3/25/2014	0.333	0.381	0.370	0.387
3/26/2014	0.332	0.381	0.374	0.386
3/27/2014	0.367	0.412	0.402	0.441
3/28/2014	0.370	0.417	0.413	0.461
3/29/2014	0.380	0.420	0.416	0.460
3/30/2014	0.357	0.407	0.397	0.462
3/31/2014	0.363	0.413	0.405	0.462
4/1/2014	0.354	0.405	0.391	0.468
4/2/2014	0.357	0.410	0.398	0.470
4/3/2014	0.350	0.402	0.387	0.473
4/4/2014	0.345	0.398	0.383	0.471
4/5/2014	0.344	0.397	0.387	0.465
4/6/2014	0.373	0.420	0.406	0.466
4/7/2014	0.354	0.410	0.399	0.473
4/8/2014	0.349	0.401	0.386	0.473
4/9/2014	0.344	0.395	0.381	0.470
4/10/2014	0.340	0.392	0.381	0.463
4/11/2014	0.337	0.385	0.375	0.444
4/12/2014	0.334	0.381	0.372	0.403
4/13/2014	0.333	0.381	0.374	0.390

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/14/2014	0.330	0.376	0.368	0.389
4/15/2014	0.328	0.374	0.365	0.388
4/16/2014	0.326	0.372	0.363	0.388
4/17/2014	0.325	0.370	0.363	0.387
4/18/2014	0.345	0.389	0.377	0.417
4/19/2014	0.347	0.399	0.387	0.466
4/20/2014	0.342	0.390	0.378	0.456
4/21/2014	0.344	0.390	0.376	0.422
4/22/2014	0.339	0.387	0.374	0.391
4/23/2014	0.361	0.404	0.389	0.426
4/24/2014	0.379	0.415	0.399	0.455
4/25/2014	0.376	0.418	0.405	0.460
4/26/2014	0.358	0.408	0.391	0.463
4/27/2014	0.346	0.399	0.381	0.469
4/28/2014	0.360	0.408	0.390	0.472
4/29/2014	0.351	0.404	0.385	0.471
4/30/2014	0.345	0.395	0.380	0.469
5/1/2014	0.342	0.389	0.376	0.461
5/2/2014	0.339	0.385	0.373	0.441
5/3/2014	0.336	0.380	0.371	0.400

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
5/4/2014	0.333	0.378	0.370	0.390
5/5/2014	0.349	0.395	0.387	0.391
5/6/2014	0.360	0.410	0.399	0.458
5/7/2014	0.349	0.400	0.385	0.447
5/8/2014	0.342	0.391	0.379	0.417
5/9/2014	0.346	0.397	0.387	0.405
5/10/2014	0.365	0.416	0.408	0.467
5/11/2014	0.356	0.411	0.399	0.471
5/12/2014	0.348	0.401	0.387	0.470
5/13/2014	0.343	0.393	0.381	0.465
5/14/2014	0.332	0.374	0.365	0.454
5/15/2014	0.346	0.375	0.371	0.420
5/16/2014	0.344	0.371	0.370	0.398
5/17/2014	0.341	0.367	0.368	0.396
5/18/2014	0.340	0.366	0.366	0.396
5/19/2014	0.355	0.384	0.379	0.409
5/20/2014	0.359	0.394	0.384	0.461
5/21/2014	0.350	0.382	0.375	0.447
5/22/2014	0.346	0.376	0.371	0.413
5/23/2014	0.345	0.372	0.369	0.398

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
5/24/2014	0.343	0.370	0.369	0.397
5/25/2014	0.341	0.368	0.368	0.396
5/26/2014	0.340	0.366	0.366	0.396
5/27/2014	0.339	0.365	0.366	0.396
5/28/2014	0.336	0.361	0.363	0.396
5/29/2014	0.337	0.364	0.367	0.396
5/30/2014	0.337	0.362	0.364	0.395
5/31/2014	0.336	0.358	0.361	0.395
6/1/2014	0.336	0.358	0.360	0.395
6/2/2014	0.334	0.356	0.360	0.395
6/3/2014	0.333	0.355	0.359	0.395
6/4/2014	0.330	0.353	0.358	0.395
6/5/2014	0.329	0.352	0.357	0.395
6/6/2014	0.328	0.350	0.357	0.395
6/7/2014	0.326	0.348	0.357	0.395
6/8/2014	0.325	0.347	0.357	0.394
6/9/2014	0.323	0.346	0.356	0.394
6/10/2014	0.321	0.345	0.357	0.394
6/11/2014	0.319	0.344	0.356	0.394
6/12/2014	0.317	0.343	0.356	0.394

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
6/13/2014	0.313	0.343	0.357	0.394
6/14/2014	0.313	0.347	0.363	0.394
6/15/2014	0.313	0.344	0.356	0.394
6/16/2014	0.314	0.343	0.355	0.394
6/17/2014	0.315	0.349	0.363	0.394
6/18/2014	0.323	0.356	0.367	0.394
6/19/2014	0.324	0.351	0.360	0.394
6/20/2014	0.324	0.350	0.357	0.394
6/21/2014	0.324	0.350	0.359	0.394
6/22/2014	0.321	0.347	0.356	0.394
6/23/2014	0.321	0.347	0.356	0.394
6/24/2014	0.320	0.346	0.356	0.394
6/25/2014	0.318	0.345	0.356	0.394
6/26/2014	0.317	0.346	0.359	0.394
6/27/2014	0.336	0.372	0.381	0.400
6/28/2014	0.344	0.374	0.380	0.397
6/29/2014	0.339	0.367	0.371	0.395
6/30/2014	0.335	0.362	0.366	0.395
7/1/2014	0.333	0.360	0.365	0.395
7/2/2014	0.333	0.359	0.364	0.395

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/3/2014	0.330	0.357	0.363	0.395
7/4/2014	0.327	0.354	0.362	0.395
7/5/2014	0.325	0.351	0.361	0.395
7/6/2014	0.324	0.350	0.361	0.395
7/7/2014	0.323	0.349	0.360	0.395
7/8/2014	0.321	0.348	0.360	0.395
7/9/2014	0.319	0.347	0.360	0.395
7/10/2014	0.317	0.346	0.359	0.395
7/11/2014	0.315	0.345	0.359	0.395
7/12/2014	0.311	0.343	0.358	0.395
7/13/2014	0.310	0.343	0.357	0.395
7/14/2014	0.308	0.342	0.357	0.394
7/15/2014	0.307	0.342	0.358	0.394
7/16/2014	0.301	0.342	0.357	0.395
7/17/2014	0.298	0.341	0.357	0.395
7/18/2014	0.293	0.340	0.357	0.395
7/19/2014	0.288	0.339	0.356	0.395
7/20/2014	0.285	0.338	0.355	0.395
7/21/2014	0.279	0.338	0.354	0.395
7/22/2014	0.275	0.336	0.353	0.395

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/23/2014	0.275	0.335	0.352	0.395
7/24/2014	0.284	0.342	0.360	0.395
7/25/2014	0.299	0.343	0.357	0.394
7/26/2014	0.294	0.340	0.353	0.394
7/27/2014	0.294	0.339	0.352	0.394
7/28/2014	0.293	0.339	0.352	0.394
7/29/2014	0.293	0.339	0.353	0.394
7/30/2014	0.291	0.339	0.354	0.394
7/31/2014	0.287	0.339	0.354	0.394
8/1/2014	0.282	0.338	0.353	0.394
8/2/2014	0.279	0.337	0.353	0.394
8/3/2014	0.276	0.337	0.352	0.394
8/4/2014	0.271	0.336	0.352	0.394
8/5/2014	0.269	0.335	0.351	0.394
8/6/2014	0.267	0.334	0.351	0.394
8/7/2014	0.264	0.333	0.350	0.394
8/8/2014	0.262	0.333	0.350	0.394
8/9/2014	0.259	0.332	0.349	0.394
8/10/2014	0.256	0.331	0.349	0.394
8/11/2014	0.254	0.330	0.348	0.394

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
8/12/2014	0.253	0.330	0.348	0.394
8/13/2014	0.249	0.329	0.346	0.394
8/14/2014	0.247	0.328	0.345	0.394
8/15/2014	0.248	0.327	0.345	0.394
8/16/2014	0.249	0.327	0.344	0.394
8/17/2014	0.250	0.327	0.344	0.394
8/18/2014	0.249	0.327	0.345	0.394
8/19/2014	0.247	0.327	0.344	0.394
8/20/2014	0.246	0.327	0.344	0.394
8/21/2014	0.244	0.326	0.344	0.394
8/22/2014	0.243	0.325	0.343	0.394
8/23/2014	0.241	0.325	0.343	0.394
8/24/2014	0.240	0.325	0.342	0.394
8/25/2014	0.239	0.324	0.343	0.394
8/26/2014	0.237	0.324	0.342	0.394
8/27/2014	0.237	0.324	0.342	0.394
8/28/2014	0.235	0.323	0.342	0.394
8/29/2014	0.234	0.323	0.341	0.394
8/30/2014	0.231	0.322	0.341	0.394
8/31/2014	0.229	0.323	0.343	0.394

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
9/1/2014	0.236	0.326	0.343	0.393
9/2/2014	0.235	0.323	0.337	0.393
9/3/2014	0.237	0.323	0.338	0.393
9/4/2014	0.237	0.322	0.338	0.393
9/5/2014	0.236	0.322	0.338	0.393
9/6/2014	0.238	0.323	0.339	0.393
9/7/2014	0.236	0.323	0.340	0.393
9/8/2014	0.233	0.323	0.340	0.393
9/9/2014	0.231	0.322	0.339	0.393
9/10/2014	0.229	0.321	0.339	0.393
9/11/2014	0.228	0.321	0.339	0.393
9/12/2014	0.228	0.320	0.338	0.393
9/13/2014	0.227	0.320	0.339	0.393
9/14/2014	0.226	0.320	0.338	0.393
9/15/2014	0.225	0.319	0.338	0.393
9/16/2014	0.224	0.319	0.338	0.393
9/17/2014	0.221	0.318	0.337	0.393
9/18/2014	0.220	0.317	0.336	0.392
9/19/2014	0.219	0.316	0.334	0.392
9/20/2014	0.220	0.316	0.334	0.392

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
9/21/2014	0.222	0.317	0.334	0.392
9/22/2014	0.222	0.317	0.335	0.392
9/23/2014	0.219	0.316	0.334	0.392
9/24/2014	0.218	0.316	0.333	0.392
9/25/2014	0.280	0.359	0.374	0.443
9/26/2014	0.301	0.345	0.364	0.414
9/27/2014	0.301	0.347	0.363	0.396
9/28/2014	0.285	0.342	0.359	0.396
9/29/2014	0.280	0.339	0.357	0.396
9/30/2014	0.277	0.339	0.358	0.396
10/1/2014	0.290	0.340	0.359	0.396
10/2/2014	0.284	0.338	0.356	0.395
10/3/2014	0.277	0.336	0.353	0.395
10/4/2014	0.274	0.335	0.352	0.395
10/5/2014	0.272	0.335	0.351	0.395
10/6/2014	0.270	0.334	0.350	0.395
10/7/2014	0.269	0.334	0.350	0.395
10/8/2014	0.267	0.334	0.350	0.395
10/9/2014	0.264	0.333	0.349	0.395
10/10/2014	0.260	0.332	0.348	0.395

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/11/2014	0.258	0.331	0.348	0.395
10/12/2014	0.258	0.332	0.350	0.395
10/13/2014	0.258	0.331	0.349	0.394
10/14/2014	0.257	0.330	0.347	0.394
10/15/2014	0.287	0.336	0.355	0.394
10/16/2014	0.315	0.358	0.372	0.397
10/17/2014	0.303	0.350	0.364	0.395
10/18/2014	0.298	0.346	0.361	0.395
10/19/2014	0.303	0.348	0.361	0.395
10/20/2014	0.292	0.345	0.359	0.395
10/21/2014	0.312	0.366	0.376	0.398
10/22/2014	0.313	0.361	0.372	0.396
10/23/2014	0.310	0.359	0.370	0.398
10/24/2014	0.317	0.366	0.377	0.437
10/25/2014	0.313	0.359	0.370	0.400
10/26/2014	0.317	0.366	0.375	0.400
10/27/2014	0.326	0.380	0.388	0.455
10/28/2014	0.313	0.360	0.371	0.438
10/29/2014	0.313	0.360	0.371	0.400
10/30/2014	0.317	0.364	0.374	0.399

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/31/2014	0.318	0.367	0.376	0.404
11/1/2014	0.327	0.378	0.385	0.457
11/2/2014	0.316	0.364	0.372	0.412
11/3/2014	0.315	0.366	0.374	0.399
11/4/2014	0.319	0.367	0.374	0.399
11/5/2014	0.323	0.378	0.384	0.404
11/6/2014	0.317	0.367	0.374	0.401
11/7/2014	0.317	0.366	0.375	0.399
11/8/2014	0.314	0.367	0.377	0.398
11/9/2014	0.310	0.361	0.372	0.398
11/10/2014	0.310	0.360	0.370	0.398
11/11/2014	0.312	0.362	0.371	0.397
11/12/2014	0.307	0.357	0.365	0.397
11/13/2014	0.299	0.351	0.360	0.396
11/14/2014	0.326	0.392	0.386	0.414
11/15/2014	0.331	0.406	0.392	0.463
11/16/2014	0.313	0.366	0.372	0.438
11/17/2014	0.308	0.352	0.362	0.398
11/18/2014	0.305	0.350	0.360	0.397
11/19/2014	0.302	0.349	0.357	0.396

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/20/2014	0.308	0.352	0.360	0.396
11/21/2014	0.329	0.378	0.380	0.400
11/22/2014	0.330	0.379	0.381	0.407
11/23/2014	0.333	0.388	0.392	0.474
11/24/2014	0.323	0.372	0.375	0.465
11/25/2014	0.316	0.364	0.368	0.402
11/26/2014	0.314	0.362	0.368	0.397
11/27/2014	0.312	0.358	0.365	0.397
11/28/2014	0.326	0.377	0.381	0.408
11/29/2014	0.340	0.393	0.395	0.446
11/30/2014	0.330	0.384	0.387	0.468
12/1/2014	0.315	0.360	0.366	0.451
12/2/2014	0.332	0.388	0.389	0.430
12/3/2014	0.323	0.376	0.381	0.467
12/4/2014	0.321	0.368	0.371	0.404
12/5/2014	0.337	0.389	0.391	0.399
12/6/2014	0.327	0.375	0.376	0.399
12/7/2014	0.327	0.378	0.381	0.405
12/8/2014	0.315	0.364	0.368	0.399
12/9/2014	0.311	0.357	0.365	0.397

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/10/2014	0.310	0.357	0.366	0.396
12/11/2014	0.321	0.367	0.373	0.396
12/12/2014	0.323	0.368	0.372	0.396
12/13/2014	0.317	0.364	0.369	0.396
12/14/2014	0.316	0.362	0.368	0.396
12/15/2014	0.310	0.356	0.363	0.396
12/16/2014	0.312	0.358	0.365	0.396
12/17/2014	0.323	0.362	0.366	0.396
12/18/2014	0.325	0.368	0.368	0.396
12/19/2014	0.325	0.371	0.371	0.395
12/20/2014	0.335	0.390	0.390	0.404
12/21/2014	0.346	0.409	0.407	0.441
12/22/2014	0.349	0.405	0.410	0.461
12/23/2014	0.333	0.388	0.390	0.466
12/24/2014	0.330	0.381	0.381	0.452
12/25/2014	0.334	0.392	0.393	0.406
12/26/2014	0.328	0.386	0.388	0.413
12/27/2014	0.321	0.372	0.373	0.400
12/28/2014	0.322	0.374	0.377	0.398
12/29/2014	0.333	0.392	0.399	0.404

Table D.7 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/30/2014	0.330	0.387	0.388	0.400
12/31/2014	0.320	0.363	0.371	0.399
1/1/2015	0.314	0.358	0.366	0.397
1/2/2015	0.311	0.354	0.363	0.397

Table D.8 Daily Volumetric Water Content (VWC) Data for Treatment F, Plot 08

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/6/2013	0.315	0.290	0.266	0.396
11/7/2013	0.318	0.291	0.283	0.426
11/8/2013	0.311	0.285	0.270	0.448
11/9/2013	0.303	0.277	0.256	0.446
11/10/2013	0.297	0.270	0.252	0.437
11/11/2013	0.292	0.265	0.249	0.414
11/12/2013	0.301	0.264	0.251	0.411
11/13/2013	0.307	0.274	0.254	0.411
11/14/2013	0.302	0.268	0.253	0.411
11/15/2013	0.309	0.276	0.254	0.410
11/16/2013	0.323	0.293	0.292	0.448
11/17/2013	0.315	0.286	0.273	0.455
11/18/2013	0.314	0.286	0.269	0.449
11/19/2013	0.334	0.302	0.308	0.452
11/20/2013	0.313	0.286	0.277	0.460
11/21/2013	0.304	0.281	0.258	0.456
11/22/2013	0.258	0.277	0.255	0.420
11/23/2013	0.293	0.270	0.248	0.420
11/24/2013	0.290	0.267	0.246	0.419
11/25/2013	0.288	0.264	0.244	0.419

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/26/2013	0.286	0.262	0.244	0.419
11/27/2013	0.283	0.260	0.243	0.419
11/28/2013	0.282	0.258	0.242	0.419
11/29/2013	0.280	0.257	0.242	0.418
11/30/2013	0.278	0.255	0.240	0.417
12/1/2013	0.281	0.253	0.240	0.416
12/2/2013	0.338	0.300	0.300	0.459
12/3/2013	0.322	0.289	0.273	0.466
12/4/2013	0.310	0.289	0.263	0.466
12/5/2013	0.303	0.278	0.263	0.467
12/6/2013	0.298	0.271	0.260	0.456
12/7/2013	0.297	0.268	0.250	0.431
12/8/2013	0.298	0.267	0.247	0.428
12/9/2013	0.296	0.265	0.245	0.427
12/10/2013	0.295	0.264	0.244	0.426
12/11/2013	0.295	0.263	0.243	0.424
12/12/2013	0.301	0.262	0.244	0.422
12/13/2013	0.329	0.301	0.284	0.457
12/14/2013	0.311	0.288	0.261	0.460
12/15/2013	0.305	0.280	0.256	0.451

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/16/2013	0.301	0.274	0.252	0.430
12/17/2013	0.298	0.270	0.250	0.426
12/18/2013	0.296	0.267	0.249	0.425
12/19/2013	0.295	0.265	0.246	0.426
12/20/2013	0.302	0.267	0.249	0.424
12/21/2013	0.328	0.296	0.292	0.448
12/22/2013	0.319	0.290	0.273	0.447
12/23/2013	0.315	0.283	0.263	0.436
12/24/2013	0.318	0.288	0.272	0.430
12/25/2013	0.309	0.282	0.260	0.430
12/26/2013	0.304	0.278	0.253	0.427
12/27/2013	0.300	0.275	0.251	0.426
12/28/2013	0.297	0.271	0.249	0.426
12/29/2013	0.295	0.269	0.247	0.426
12/30/2013	0.292	0.266	0.246	0.425
12/31/2013	0.291	0.264	0.246	0.425
1/1/2014	0.289	0.262	0.245	0.424
1/2/2014	0.287	0.261	0.244	0.424
1/3/2014	0.294	0.258	0.244	0.422
1/4/2014	0.297	0.262	0.240	0.423

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
1/5/2014	0.293	0.262	0.241	0.423
1/6/2014	0.291	0.261	0.242	0.421
1/7/2014	0.301	0.267	0.246	0.418
1/8/2014	0.333	0.302	0.297	0.427
1/9/2014	0.329	0.297	0.295	0.466
1/10/2014	0.323	0.296	0.286	0.468
1/11/2014	0.334	0.305	0.301	0.469
1/12/2014	0.329	0.297	0.300	0.471
1/13/2014	0.322	0.292	0.280	0.470
1/14/2014	0.309	0.287	0.262	0.470
1/15/2014	0.303	0.281	0.255	0.465
1/16/2014	0.299	0.278	0.252	0.462
1/17/2014	0.296	0.274	0.249	0.447
1/18/2014	0.293	0.270	0.248	0.429
1/19/2014	0.291	0.268	0.246	0.426
1/20/2014	0.289	0.266	0.245	0.425
1/21/2014	0.287	0.264	0.244	0.425
1/22/2014	0.285	0.262	0.243	0.424
1/23/2014	0.284	0.261	0.243	0.424
1/24/2014	0.282	0.259	0.243	0.424

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
1/25/2014	0.280	0.258	0.243	0.424
1/26/2014	0.278	0.257	0.242	0.423
1/27/2014	0.277	0.256	0.242	0.422
1/28/2014	0.293	0.266	0.254	0.426
1/29/2014	0.340	0.308	0.309	0.468
1/30/2014	0.319	0.292	0.281	0.468
1/31/2014	0.313	0.281	0.267	0.469
2/1/2014	0.316	0.287	0.263	0.467
2/2/2014	0.309	0.282	0.258	0.461
2/3/2014	0.320	0.288	0.266	0.460
2/4/2014	0.318	0.288	0.262	0.444
2/5/2014	0.315	0.289	0.258	0.431
2/6/2014	0.310	0.284	0.258	0.427
2/7/2014	0.338	0.306	0.290	0.442
2/8/2014	0.351	0.318	0.319	0.473
2/9/2014	0.327	0.295	0.286	0.473
2/10/2014	0.322	0.291	0.274	0.473
2/11/2014	0.333	0.300	0.291	0.475
2/12/2014	0.355	0.320	0.322	0.476
2/13/2014	0.334	0.306	0.324	0.476

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/14/2014	0.354	0.352	0.383	0.476
2/15/2014	0.344	0.332	0.388	0.478
2/16/2014	0.339	0.320	0.355	0.478
2/17/2014	0.334	0.308	0.326	0.478
2/18/2014	0.337	0.307	0.337	0.478
2/19/2014	0.330	0.299	0.321	0.478
2/20/2014	0.336	0.299	0.309	0.478
2/21/2014	0.326	0.293	0.297	0.478
2/22/2014	0.313	0.288	0.279	0.476
2/23/2014	0.310	0.281	0.272	0.475
2/24/2014	0.326	0.292	0.281	0.468
2/25/2014	0.313	0.287	0.274	0.466
2/26/2014	0.305	0.282	0.268	0.446
2/27/2014	0.319	0.288	0.281	0.457
2/28/2014	0.315	0.284	0.279	0.467
3/1/2014	0.332	0.293	0.296	0.473
3/2/2014	0.404	0.355	0.320	0.479
3/3/2014	0.327	0.291	0.294	0.478
3/4/2014	0.316	0.285	0.280	0.476
3/5/2014	0.330	0.295	0.301	0.477

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
3/6/2014	0.335	0.301	0.312	0.479
3/7/2014	0.322	0.287	0.288	0.479
3/8/2014	0.309	0.282	0.276	0.478
3/9/2014	0.350	0.316	0.329	0.480
3/10/2014	0.336	0.301	0.315	0.480
3/11/2014	0.315	0.284	0.284	0.479
3/12/2014	0.307	0.280	0.273	0.478
3/13/2014	0.301	0.276	0.267	0.471
3/14/2014	0.308	0.269	0.267	0.467
3/15/2014	0.309	0.276	0.262	0.447
3/16/2014	0.304	0.275	0.262	0.432
3/17/2014	0.329	0.297	0.304	0.476
3/18/2014	0.310	0.283	0.276	0.475
3/19/2014	0.302	0.277	0.269	0.468
3/20/2014	0.307	0.271	0.266	0.466
3/21/2014	0.301	0.275	0.261	0.447
3/22/2014	0.296	0.272	0.258	0.431
3/23/2014	0.292	0.269	0.257	0.428
3/24/2014	0.289	0.267	0.255	0.428
3/25/2014	0.291	0.264	0.256	0.427

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
3/26/2014	0.343	0.309	0.312	0.467
3/27/2014	0.345	0.311	0.321	0.476
3/28/2014	0.350	0.317	0.331	0.477
3/29/2014	0.330	0.295	0.303	0.478
3/30/2014	0.323	0.288	0.288	0.478
3/31/2014	0.328	0.295	0.301	0.479
4/1/2014	0.312	0.281	0.277	0.477
4/2/2014	0.305	0.277	0.269	0.470
4/3/2014	0.312	0.272	0.270	0.468
4/4/2014	0.343	0.309	0.313	0.474
4/5/2014	0.328	0.294	0.301	0.479
4/6/2014	0.311	0.281	0.278	0.477
4/7/2014	0.304	0.277	0.270	0.472
4/8/2014	0.297	0.272	0.267	0.468
4/9/2014	0.292	0.270	0.262	0.457
4/10/2014	0.288	0.267	0.259	0.436
4/11/2014	0.284	0.265	0.258	0.430
4/12/2014	0.280	0.263	0.256	0.429
4/13/2014	0.277	0.262	0.255	0.429
4/14/2014	0.273	0.260	0.254	0.429

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/15/2014	0.270	0.259	0.253	0.429
4/16/2014	0.303	0.282	0.283	0.448
4/17/2014	0.319	0.290	0.291	0.473
4/18/2014	0.311	0.282	0.273	0.472
4/19/2014	0.312	0.283	0.270	0.466
4/20/2014	0.301	0.276	0.268	0.460
4/21/2014	0.329	0.294	0.300	0.468
4/22/2014	0.340	0.306	0.316	0.476
4/23/2014	0.345	0.313	0.325	0.478
4/24/2014	0.329	0.296	0.302	0.478
4/25/2014	0.310	0.280	0.281	0.478
4/26/2014	0.336	0.302	0.310	0.479
4/27/2014	0.319	0.285	0.289	0.479
4/28/2014	0.307	0.278	0.275	0.474
4/29/2014	0.300	0.275	0.270	0.469
4/30/2014	0.294	0.271	0.267	0.458
5/1/2014	0.287	0.269	0.264	0.437
5/2/2014	0.282	0.266	0.261	0.431
5/3/2014	0.305	0.275	0.279	0.435
5/4/2014	0.330	0.299	0.307	0.475

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
5/5/2014	0.312	0.281	0.281	0.474
5/6/2014	0.301	0.275	0.272	0.468
5/7/2014	0.310	0.283	0.288	0.469
5/8/2014	0.340	0.310	0.321	0.478
5/9/2014	0.330	0.298	0.306	0.479
5/10/2014	0.310	0.279	0.280	0.478
5/11/2014	0.301	0.274	0.272	0.472
5/12/2014	0.290	0.264	0.264	0.470
5/13/2014	0.308	0.283	0.285	0.449
5/14/2014	0.304	0.282	0.283	0.435
5/15/2014	0.299	0.279	0.281	0.433
5/16/2014	0.296	0.277	0.279	0.433
5/17/2014	0.333	0.318	0.327	0.466
5/18/2014	0.336	0.313	0.323	0.479
5/19/2014	0.319	0.292	0.299	0.477
5/20/2014	0.312	0.287	0.291	0.472
5/21/2014	0.306	0.283	0.287	0.458
5/22/2014	0.302	0.280	0.284	0.437
5/23/2014	0.298	0.277	0.282	0.434
5/24/2014	0.294	0.276	0.280	0.434

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
5/25/2014	0.291	0.274	0.279	0.433
5/26/2014	0.287	0.274	0.277	0.433
5/27/2014	0.284	0.269	0.277	0.432
5/28/2014	0.294	0.269	0.276	0.432
5/29/2014	0.293	0.271	0.275	0.432
5/30/2014	0.290	0.271	0.275	0.430
5/31/2014	0.286	0.271	0.275	0.430
6/1/2014	0.283	0.270	0.274	0.429
6/2/2014	0.280	0.270	0.273	0.430
6/3/2014	0.277	0.268	0.272	0.429
6/4/2014	0.274	0.268	0.272	0.429
6/5/2014	0.271	0.268	0.271	0.430
6/6/2014	0.268	0.267	0.271	0.430
6/7/2014	0.265	0.267	0.271	0.430
6/8/2014	0.263	0.266	0.271	0.430
6/9/2014	0.260	0.266	0.271	0.430
6/10/2014	0.258	0.265	0.270	0.430
6/11/2014	0.256	0.264	0.270	0.430
6/12/2014	0.261	0.262	0.271	0.428
6/13/2014	0.293	0.271	0.268	0.428

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
6/14/2014	0.289	0.270	0.268	0.428
6/15/2014	0.289	0.277	0.282	0.431
6/16/2014	0.313	0.299	0.301	0.461
6/17/2014	0.306	0.287	0.284	0.434
6/18/2014	0.298	0.281	0.278	0.428
6/19/2014	0.291	0.276	0.276	0.428
6/20/2014	0.287	0.273	0.274	0.428
6/21/2014	0.283	0.271	0.272	0.428
6/22/2014	0.279	0.270	0.272	0.429
6/23/2014	0.275	0.268	0.271	0.429
6/24/2014	0.271	0.267	0.272	0.429
6/25/2014	0.322	0.312	0.326	0.468
6/26/2014	0.327	0.311	0.321	0.468
6/27/2014	0.314	0.292	0.299	0.466
6/28/2014	0.305	0.284	0.290	0.450
6/29/2014	0.298	0.280	0.285	0.433
6/30/2014	0.293	0.277	0.283	0.432
7/1/2014	0.288	0.275	0.281	0.432
7/2/2014	0.282	0.274	0.279	0.432
7/3/2014	0.278	0.272	0.278	0.432

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/4/2014	0.274	0.271	0.277	0.432
7/5/2014	0.271	0.270	0.276	0.432
7/6/2014	0.268	0.270	0.276	0.432
7/7/2014	0.265	0.269	0.276	0.432
7/8/2014	0.261	0.268	0.275	0.432
7/9/2014	0.258	0.268	0.275	0.432
7/10/2014	0.256	0.267	0.275	0.433
7/11/2014	0.253	0.265	0.274	0.432
7/12/2014	0.251	0.265	0.273	0.432
7/13/2014	0.249	0.264	0.273	0.432
7/14/2014	0.247	0.264	0.273	0.432
7/15/2014	0.246	0.264	0.273	0.432
7/16/2014	0.244	0.263	0.273	0.432
7/17/2014	0.242	0.263	0.273	0.432
7/18/2014	0.240	0.262	0.273	0.433
7/19/2014	0.239	0.262	0.273	0.433
7/20/2014	0.236	0.260	0.271	0.432
7/21/2014	0.234	0.259	0.270	0.432
7/22/2014	0.234	0.258	0.269	0.431
7/23/2014	0.245	0.261	0.266	0.430

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/24/2014	0.251	0.261	0.267	0.430
7/25/2014	0.252	0.262	0.268	0.431
7/26/2014	0.251	0.262	0.268	0.431
7/27/2014	0.250	0.261	0.269	0.431
7/28/2014	0.250	0.262	0.269	0.431
7/29/2014	0.248	0.262	0.270	0.431
7/30/2014	0.247	0.262	0.270	0.431
7/31/2014	0.245	0.262	0.270	0.429
8/1/2014	0.243	0.261	0.271	0.429
8/2/2014	0.241	0.261	0.271	0.430
8/3/2014	0.239	0.260	0.270	0.430
8/4/2014	0.236	0.259	0.270	0.430
8/5/2014	0.234	0.259	0.270	0.430
8/6/2014	0.233	0.259	0.270	0.430
8/7/2014	0.231	0.258	0.270	0.430
8/8/2014	0.229	0.257	0.270	0.430
8/9/2014	0.228	0.257	0.270	0.430
8/10/2014	0.226	0.257	0.270	0.429
8/11/2014	0.224	0.256	0.270	0.429
8/12/2014	0.221	0.254	0.269	0.429

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
8/13/2014	0.221	0.253	0.268	0.429
8/14/2014	0.220	0.253	0.267	0.429
8/15/2014	0.220	0.253	0.267	0.429
8/16/2014	0.220	0.253	0.268	0.429
8/17/2014	0.219	0.253	0.269	0.429
8/18/2014	0.218	0.253	0.269	0.429
8/19/2014	0.216	0.253	0.269	0.428
8/20/2014	0.214	0.252	0.268	0.428
8/21/2014	0.214	0.251	0.268	0.428
8/22/2014	0.213	0.251	0.268	0.428
8/23/2014	0.212	0.251	0.268	0.427
8/24/2014	0.211	0.251	0.268	0.427
8/25/2014	0.210	0.251	0.269	0.427
8/26/2014	0.210	0.251	0.269	0.427
8/27/2014	0.209	0.250	0.269	0.427
8/28/2014	0.207	0.250	0.269	0.427
8/29/2014	0.206	0.249	0.267	0.427
8/30/2014	0.206	0.248	0.262	0.426
8/31/2014	0.207	0.248	0.262	0.426
9/1/2014	0.209	0.248	0.262	0.425

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
9/2/2014	0.210	0.248	0.262	0.425
9/3/2014	0.211	0.248	0.262	0.425
9/4/2014	0.212	0.248	0.263	0.425
9/5/2014	0.213	0.249	0.265	0.425
9/6/2014	0.213	0.249	0.266	0.425
9/7/2014	0.212	0.249	0.266	0.425
9/8/2014	0.211	0.249	0.266	0.425
9/9/2014	0.210	0.248	0.266	0.425
9/10/2014	0.210	0.248	0.266	0.424
9/11/2014	0.209	0.248	0.266	0.424
9/12/2014	0.208	0.248	0.267	0.424
9/13/2014	0.207	0.248	0.267	0.424
9/14/2014	0.207	0.248	0.267	0.424
9/15/2014	0.205	0.247	0.267	0.424
9/16/2014	0.204	0.246	0.266	0.424
9/17/2014	0.202	0.246	0.265	0.423
9/18/2014	0.202	0.245	0.264	0.423
9/19/2014	0.202	0.245	0.264	0.423
9/20/2014	0.202	0.246	0.265	0.423
9/21/2014	0.201	0.245	0.265	0.423

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
9/22/2014	0.199	0.244	0.264	0.423
9/23/2014	0.270	0.315	0.326	0.460
9/24/2014	0.303	0.304	0.297	0.467
9/25/2014	0.303	0.304	0.294	0.465
9/26/2014	0.289	0.287	0.285	0.447
9/27/2014	0.281	0.280	0.280	0.432
9/28/2014	0.279	0.275	0.278	0.430
9/29/2014	0.301	0.289	0.278	0.429
9/30/2014	0.292	0.283	0.276	0.430
10/1/2014	0.283	0.277	0.274	0.430
10/2/2014	0.275	0.273	0.273	0.430
10/3/2014	0.269	0.271	0.272	0.430
10/4/2014	0.264	0.269	0.272	0.429
10/5/2014	0.259	0.267	0.271	0.429
10/6/2014	0.256	0.266	0.271	0.429
10/7/2014	0.253	0.265	0.271	0.429
10/8/2014	0.250	0.264	0.270	0.429
10/9/2014	0.248	0.263	0.269	0.429
10/10/2014	0.270	0.284	0.284	0.428
10/11/2014	0.279	0.280	0.275	0.427

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/12/2014	0.271	0.272	0.271	0.427
10/13/2014	0.307	0.310	0.325	0.453
10/14/2014	0.318	0.308	0.320	0.467
10/15/2014	0.310	0.296	0.297	0.463
10/16/2014	0.304	0.285	0.287	0.457
10/17/2014	0.308	0.289	0.284	0.433
10/18/2014	0.297	0.282	0.281	0.430
10/19/2014	0.318	0.307	0.322	0.447
10/20/2014	0.318	0.302	0.311	0.462
10/21/2014	0.318	0.299	0.305	0.461
10/22/2014	0.326	0.311	0.323	0.474
10/23/2014	0.318	0.300	0.304	0.470
10/24/2014	0.325	0.310	0.315	0.464
10/25/2014	0.336	0.326	0.341	0.475
10/26/2014	0.318	0.300	0.303	0.477
10/27/2014	0.319	0.301	0.304	0.472
10/28/2014	0.320	0.302	0.311	0.460
10/29/2014	0.320	0.303	0.310	0.442
10/30/2014	0.332	0.318	0.333	0.477
10/31/2014	0.318	0.299	0.305	0.475

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/1/2014	0.319	0.301	0.309	0.469
11/2/2014	0.323	0.302	0.304	0.444
11/3/2014	0.332	0.316	0.327	0.458
11/4/2014	0.320	0.301	0.308	0.467
11/5/2014	0.321	0.303	0.309	0.444
11/6/2014	0.319	0.300	0.309	0.434
11/7/2014	0.310	0.290	0.296	0.432
11/8/2014	0.312	0.286	0.291	0.431
11/9/2014	0.316	0.292	0.290	0.430
11/10/2014	0.310	0.289	0.286	0.430
11/11/2014	0.304	0.287	0.282	0.430
11/12/2014	0.329	0.316	0.325	0.452
11/13/2014	0.337	0.326	0.358	0.477
11/14/2014	0.317	0.297	0.306	0.477
11/15/2014	0.310	0.298	0.292	0.474
11/16/2014	0.306	0.293	0.286	0.469
11/17/2014	0.303	0.288	0.282	0.446
11/18/2014	0.307	0.287	0.282	0.431
11/19/2014	0.328	0.311	0.316	0.458
11/20/2014	0.330	0.312	0.317	0.450

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/21/2014	0.338	0.323	0.335	0.477
11/22/2014	0.326	0.304	0.310	0.478
11/23/2014	0.316	0.295	0.297	0.474
11/24/2014	0.313	0.289	0.292	0.467
11/25/2014	0.311	0.288	0.287	0.440
11/26/2014	0.329	0.310	0.316	0.451
11/27/2014	0.344	0.331	0.344	0.477
11/28/2014	0.336	0.320	0.333	0.478
11/29/2014	0.319	0.305	0.302	0.476
11/30/2014	0.335	0.318	0.324	0.478
12/1/2014	0.326	0.307	0.316	0.479
12/2/2014	0.321	0.296	0.299	0.478
12/3/2014	0.337	0.319	0.328	0.481
12/4/2014	0.329	0.308	0.312	0.477
12/5/2014	0.329	0.310	0.321	0.481
12/6/2014	0.316	0.296	0.297	0.476
12/7/2014	0.310	0.293	0.290	0.467
12/8/2014	0.307	0.287	0.287	0.437
12/9/2014	0.325	0.298	0.302	0.442
12/10/2014	0.323	0.302	0.309	0.475

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/11/2014	0.315	0.293	0.296	0.469
12/12/2014	0.314	0.289	0.290	0.460
12/13/2014	0.309	0.289	0.286	0.433
12/14/2014	0.310	0.283	0.284	0.429
12/15/2014	0.323	0.290	0.284	0.428
12/16/2014	0.325	0.304	0.299	0.427
12/17/2014	0.325	0.305	0.310	0.427
12/18/2014	0.337	0.321	0.336	0.471
12/19/2014	0.352	0.341	0.355	0.476
12/20/2014	0.353	0.342	0.361	0.478
12/21/2014	0.339	0.327	0.360	0.479
12/22/2014	0.332	0.310	0.321	0.479
12/23/2014	0.338	0.320	0.330	0.479
12/24/2014	0.338	0.320	0.330	0.480
12/25/2014	0.322	0.299	0.306	0.479
12/26/2014	0.325	0.302	0.305	0.477
12/27/2014	0.340	0.322	0.331	0.482
12/28/2014	0.337	0.318	0.324	0.479
12/29/2014	0.321	0.312	0.304	0.472
12/30/2014	0.315	0.308	0.294	0.469

Table D.8 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/31/2014	0.311	0.301	0.288	0.441
1/1/2015	0.311	0.297	0.285	0.434

Table D.9 Daily Volumetric Water Content (VWC) Data for Treatment G, Plot 12

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/30/2013	0.344	0.316	0.274	0.314
10/31/2013	0.346	0.316	0.274	0.316
11/1/2013	0.349	0.314	0.274	0.317
11/2/2013	0.370	0.347	0.338	0.411
11/3/2013	0.387	0.359	0.361	0.451
11/4/2013	0.386	0.357	0.343	0.453
11/5/2013	0.393	0.365	0.375	0.457
11/6/2013	0.390	0.361	0.356	0.459
11/7/2013	0.398	0.370	0.368	0.461
11/8/2013	0.397	0.360	0.341	0.461
11/9/2013	0.385	0.347	0.318	0.464
11/10/2013	0.379	0.342	0.310	0.461
11/11/2013	0.375	0.339	0.307	0.447
11/12/2013	0.387	0.344	0.308	0.401
11/13/2013	0.391	0.350	0.315	0.337
11/14/2013	0.386	0.345	0.311	0.328
11/15/2013	0.395	0.350	0.315	0.328
11/16/2013	0.418	0.384	0.404	0.450
11/17/2013	0.405	0.366	0.358	0.461
11/18/2013	0.404	0.366	0.354	0.462

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/19/2013	0.431	0.400	0.429	0.465
11/20/2013	0.402	0.371	0.373	0.467
11/21/2013	0.386	0.349	0.318	0.467
11/22/2013	0.364	0.345	0.312	0.461
11/23/2013	0.379	0.340	0.308	0.457
11/24/2013	0.377	0.338	0.306	0.430
11/25/2013	0.374	0.337	0.304	0.348
11/26/2013	0.372	0.335	0.303	0.330
11/27/2013	0.371	0.335	0.302	0.329
11/28/2013	0.370	0.334	0.301	0.328
11/29/2013	0.368	0.333	0.300	0.328
11/30/2013	0.367	0.332	0.299	0.328
12/1/2013	0.368	0.332	0.299	0.328
12/2/2013	0.428	0.400	0.417	0.456
12/3/2013	0.410	0.379	0.427	0.468
12/4/2013	0.392	0.357	0.339	0.467
12/5/2013	0.379	0.348	0.317	0.469
12/6/2013	0.374	0.343	0.310	0.470
12/7/2013	0.374	0.340	0.308	0.465
12/8/2013	0.374	0.338	0.306	0.451

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/9/2013	0.373	0.337	0.304	0.421
12/10/2013	0.373	0.336	0.303	0.345
12/11/2013	0.374	0.336	0.303	0.330
12/12/2013	0.386	0.345	0.319	0.343
12/13/2013	0.409	0.388	0.423	0.469
12/14/2013	0.394	0.359	0.345	0.468
12/15/2013	0.389	0.352	0.324	0.470
12/16/2013	0.386	0.347	0.317	0.472
12/17/2013	0.384	0.344	0.313	0.468
12/18/2013	0.382	0.342	0.310	0.462
12/19/2013	0.380	0.339	0.308	0.447
12/20/2013	0.389	0.350	0.331	0.426
12/21/2013	0.410	0.391	0.426	0.472
12/22/2013	0.404	0.375	0.409	0.472
12/23/2013	0.402	0.367	0.360	0.471
12/24/2013	0.404	0.371	0.379	0.473
12/25/2013	0.395	0.355	0.331	0.472
12/26/2013	0.391	0.350	0.319	0.474
12/27/2013	0.388	0.347	0.315	0.473
12/28/2013	0.385	0.344	0.311	0.469

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/29/2013	0.382	0.342	0.309	0.458
12/30/2013	0.380	0.341	0.308	0.443
12/31/2013	0.379	0.340	0.306	0.394
1/1/2014	0.377	0.339	0.305	0.338
1/2/2014	0.376	0.338	0.304	0.332
1/3/2014	0.382	0.338	0.305	0.330
1/4/2014	0.384	0.339	0.304	0.330
1/5/2014	0.381	0.339	0.304	0.330
1/6/2014	0.379	0.338	0.303	0.330
1/7/2014	0.392	0.349	0.328	0.352
1/8/2014	0.417	0.394	0.426	0.470
1/9/2014	0.417	0.394	0.428	0.473
1/10/2014	0.413	0.391	0.424	0.473
1/11/2014	0.430	0.393	0.399	0.473
1/12/2014	0.433	0.406	0.422	0.474
1/13/2014	0.414	0.390	0.403	0.474
1/14/2014	0.402	0.361	0.336	0.473
1/15/2014	0.396	0.353	0.321	0.474
1/16/2014	0.391	0.349	0.316	0.476
1/17/2014	0.388	0.346	0.313	0.474

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
1/18/2014	0.385	0.344	0.311	0.470
1/19/2014	0.382	0.342	0.309	0.461
1/20/2014	0.380	0.341	0.308	0.447
1/21/2014	0.378	0.340	0.307	0.410
1/22/2014	0.376	0.339	0.305	0.348
1/23/2014	0.374	0.338	0.304	0.333
1/24/2014	0.372	0.337	0.303	0.332
1/25/2014	0.371	0.336	0.302	0.332
1/26/2014	0.370	0.336	0.302	0.332
1/27/2014	0.369	0.335	0.301	0.332
1/28/2014	0.380	0.346	0.321	0.346
1/29/2014	0.422	0.398	0.427	0.473
1/30/2014	0.407	0.378	0.405	0.474
1/31/2014	0.406	0.365	0.348	0.473
2/1/2014	0.406	0.365	0.349	0.473
2/2/2014	0.401	0.357	0.329	0.474
2/3/2014	0.411	0.370	0.359	0.476
2/4/2014	0.409	0.367	0.348	0.476
2/5/2014	0.403	0.359	0.331	0.475
2/6/2014	0.400	0.354	0.324	0.472

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/7/2014	0.420	0.388	0.410	0.473
2/8/2014	0.450	0.416	0.434	0.475
2/9/2014	0.416	0.390	0.419	0.477
2/10/2014	0.411	0.370	0.362	0.476
2/11/2014	0.419	0.386	0.407	0.476
2/12/2014	0.447	0.411	0.436	0.476
2/13/2014	0.432	0.404	0.433	0.477
2/14/2014	0.449	0.412	0.423	0.476
2/15/2014	0.449	0.413	0.425	0.476
2/16/2014	0.439	0.416	0.430	0.477
2/17/2014	0.429	0.392	0.412	0.477
2/18/2014	0.440	0.407	0.439	0.477
2/19/2014	0.430	0.398	0.442	0.478
2/20/2014	0.427	0.395	0.414	0.478
2/21/2014	0.418	0.380	0.378	0.477
2/22/2014	0.407	0.359	0.326	0.476
2/23/2014	0.418	0.376	0.368	0.479
2/24/2014	0.407	0.362	0.334	0.477
2/25/2014	0.399	0.354	0.321	0.473
2/26/2014	0.409	0.366	0.346	0.469

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/27/2014	0.409	0.365	0.340	0.468
2/28/2014	0.421	0.383	0.404	0.469
3/1/2014	0.421	0.390	0.415	0.478
3/2/2014	0.419	0.378	0.382	0.478
3/3/2014	0.409	0.363	0.333	0.477
3/4/2014	0.417	0.381	0.389	0.478
3/5/2014	0.434	0.396	0.411	0.478
3/6/2014	0.418	0.379	0.376	0.478
3/7/2014	0.403	0.357	0.325	0.478
3/8/2014	0.442	0.399	0.406	0.478
3/9/2014	0.438	0.400	0.418	0.479
3/10/2014	0.411	0.364	0.336	0.477
3/11/2014	0.401	0.354	0.320	0.480
3/12/2014	0.396	0.350	0.316	0.476
3/13/2014	0.403	0.349	0.315	0.466
3/14/2014	0.403	0.351	0.315	0.445
3/15/2014	0.397	0.348	0.313	0.387
3/16/2014	0.419	0.383	0.407	0.466
3/17/2014	0.408	0.362	0.336	0.477
3/18/2014	0.400	0.353	0.321	0.473

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
3/19/2014	0.402	0.350	0.317	0.462
3/20/2014	0.396	0.348	0.314	0.446
3/21/2014	0.393	0.346	0.312	0.392
3/22/2014	0.387	0.343	0.310	0.336
3/23/2014	0.384	0.342	0.309	0.335
3/24/2014	0.415	0.380	0.392	0.419
3/25/2014	0.422	0.412	0.435	0.476
3/26/2014	0.443	0.417	0.440	0.477
3/27/2014	0.437	0.402	0.424	0.478
3/28/2014	0.427	0.398	0.415	0.478
3/29/2014	0.419	0.372	0.352	0.477
3/30/2014	0.421	0.376	0.369	0.477
3/31/2014	0.410	0.359	0.327	0.478
4/1/2014	0.402	0.353	0.320	0.480
4/2/2014	0.407	0.352	0.317	0.476
4/3/2014	0.426	0.395	0.410	0.476
4/4/2014	0.420	0.384	0.398	0.479
4/5/2014	0.408	0.361	0.331	0.478
4/6/2014	0.401	0.354	0.321	0.480
4/7/2014	0.397	0.351	0.317	0.476

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/8/2014	0.392	0.348	0.315	0.465
4/9/2014	0.389	0.346	0.313	0.443
4/10/2014	0.387	0.345	0.311	0.373
4/11/2014	0.384	0.344	0.310	0.337
4/12/2014	0.382	0.343	0.309	0.336
4/13/2014	0.379	0.342	0.308	0.336
4/14/2014	0.377	0.341	0.307	0.336
4/15/2014	0.391	0.351	0.323	0.335
4/16/2014	0.409	0.370	0.360	0.389
4/17/2014	0.402	0.357	0.327	0.367
4/18/2014	0.404	0.355	0.320	0.341
4/19/2014	0.396	0.351	0.317	0.337
4/20/2014	0.413	0.367	0.337	0.337
4/21/2014	0.421	0.382	0.400	0.419
4/22/2014	0.423	0.392	0.442	0.477
4/23/2014	0.417	0.376	0.373	0.477
4/24/2014	0.404	0.358	0.329	0.476
4/25/2014	0.419	0.371	0.346	0.480
4/26/2014	0.412	0.363	0.335	0.480
4/27/2014	0.401	0.354	0.321	0.477

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/28/2014	0.397	0.351	0.317	0.469
4/29/2014	0.393	0.349	0.315	0.448
4/30/2014	0.389	0.347	0.313	0.385
5/1/2014	0.385	0.345	0.312	0.339
5/2/2014	0.386	0.345	0.312	0.336
5/3/2014	0.413	0.375	0.378	0.437
5/4/2014	0.406	0.361	0.333	0.451
5/5/2014	0.397	0.353	0.321	0.441
5/6/2014	0.399	0.356	0.324	0.387
5/7/2014	0.418	0.384	0.420	0.455
5/8/2014	0.416	0.377	0.385	0.477
5/9/2014	0.405	0.358	0.326	0.478
5/10/2014	0.399	0.353	0.319	0.479
5/11/2014	0.387	0.341	0.307	0.472
5/12/2014	0.393	0.355	0.325	0.445
5/13/2014	0.391	0.354	0.324	0.378
5/14/2014	0.387	0.352	0.322	0.346
5/15/2014	0.385	0.351	0.322	0.346
5/16/2014	0.407	0.367	0.347	0.352
5/17/2014	0.415	0.378	0.374	0.466

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
5/18/2014	0.403	0.363	0.334	0.468
5/19/2014	0.398	0.358	0.328	0.450
5/20/2014	0.395	0.356	0.326	0.404
5/21/2014	0.391	0.355	0.325	0.350
5/22/2014	0.389	0.353	0.323	0.346
5/23/2014	0.387	0.352	0.322	0.346
5/24/2014	0.385	0.351	0.321	0.346
5/25/2014	0.382	0.350	0.321	0.346
5/26/2014	0.382	0.348	0.320	0.345
5/27/2014	0.382	0.348	0.319	0.345
5/28/2014	0.383	0.348	0.319	0.345
5/29/2014	0.383	0.348	0.319	0.345
5/30/2014	0.382	0.348	0.318	0.345
5/31/2014	0.381	0.347	0.318	0.345
6/1/2014	0.379	0.347	0.317	0.345
6/2/2014	0.378	0.346	0.317	0.345
6/3/2014	0.377	0.346	0.316	0.345
6/4/2014	0.375	0.346	0.316	0.345
6/5/2014	0.374	0.346	0.316	0.345
6/6/2014	0.372	0.346	0.316	0.345

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
6/7/2014	0.371	0.345	0.315	0.345
6/8/2014	0.368	0.345	0.315	0.346
6/9/2014	0.366	0.345	0.315	0.346
6/10/2014	0.363	0.344	0.314	0.346
6/11/2014	0.366	0.340	0.314	0.345
6/12/2014	0.364	0.340	0.313	0.345
6/13/2014	0.364	0.340	0.312	0.345
6/14/2014	0.370	0.341	0.312	0.345
6/15/2014	0.393	0.357	0.318	0.344
6/16/2014	0.387	0.353	0.318	0.345
6/17/2014	0.384	0.351	0.317	0.345
6/18/2014	0.383	0.350	0.316	0.345
6/19/2014	0.380	0.348	0.316	0.345
6/20/2014	0.379	0.347	0.315	0.345
6/21/2014	0.379	0.347	0.315	0.345
6/22/2014	0.377	0.346	0.315	0.345
6/23/2014	0.376	0.346	0.315	0.345
6/24/2014	0.407	0.370	0.347	0.468
6/25/2014	0.409	0.373	0.352	0.474
6/26/2014	0.399	0.363	0.334	0.477

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
6/27/2014	0.394	0.359	0.328	0.469
6/28/2014	0.392	0.357	0.326	0.442
6/29/2014	0.392	0.356	0.325	0.374
6/30/2014	0.390	0.354	0.324	0.349
7/1/2014	0.386	0.353	0.323	0.348
7/2/2014	0.384	0.352	0.322	0.348
7/3/2014	0.382	0.351	0.321	0.348
7/4/2014	0.382	0.351	0.320	0.348
7/5/2014	0.380	0.350	0.320	0.348
7/6/2014	0.379	0.350	0.319	0.348
7/7/2014	0.376	0.349	0.319	0.348
7/8/2014	0.374	0.349	0.319	0.348
7/9/2014	0.370	0.348	0.318	0.348
7/10/2014	0.368	0.346	0.317	0.348
7/11/2014	0.366	0.346	0.316	0.348
7/12/2014	0.365	0.345	0.316	0.348
7/13/2014	0.365	0.345	0.315	0.348
7/14/2014	0.363	0.345	0.315	0.348
7/15/2014	0.361	0.344	0.315	0.348
7/16/2014	0.358	0.344	0.314	0.349

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/17/2014	0.356	0.343	0.313	0.348
7/18/2014	0.352	0.342	0.313	0.348
7/19/2014	0.348	0.341	0.312	0.349
7/20/2014	0.345	0.339	0.311	0.349
7/21/2014	0.353	0.338	0.311	0.349
7/22/2014	0.358	0.338	0.311	0.348
7/23/2014	0.359	0.339	0.311	0.348
7/24/2014	0.361	0.340	0.311	0.348
7/25/2014	0.361	0.340	0.311	0.348
7/26/2014	0.362	0.340	0.311	0.348
7/27/2014	0.363	0.341	0.311	0.348
7/28/2014	0.363	0.341	0.311	0.348
7/29/2014	0.362	0.341	0.311	0.348
7/30/2014	0.360	0.341	0.311	0.348
7/31/2014	0.358	0.341	0.311	0.348
8/1/2014	0.354	0.341	0.310	0.348
8/2/2014	0.351	0.340	0.310	0.348
8/3/2014	0.349	0.340	0.310	0.348
8/4/2014	0.346	0.339	0.309	0.348
8/5/2014	0.345	0.338	0.308	0.348

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
8/6/2014	0.341	0.338	0.308	0.348
8/7/2014	0.337	0.337	0.307	0.348
8/8/2014	0.333	0.337	0.307	0.348
8/9/2014	0.329	0.336	0.307	0.348
8/10/2014	0.323	0.335	0.306	0.348
8/11/2014	0.316	0.333	0.305	0.348
8/12/2014	0.315	0.332	0.304	0.348
8/13/2014	0.316	0.331	0.304	0.348
8/14/2014	0.318	0.332	0.303	0.348
8/15/2014	0.318	0.332	0.303	0.348
8/16/2014	0.315	0.332	0.303	0.348
8/17/2014	0.310	0.332	0.303	0.348
8/18/2014	0.304	0.331	0.303	0.348
8/19/2014	0.299	0.330	0.302	0.348
8/20/2014	0.298	0.329	0.301	0.348
8/21/2014	0.294	0.329	0.300	0.348
8/22/2014	0.291	0.329	0.300	0.348
8/23/2014	0.285	0.328	0.300	0.348
8/24/2014	0.282	0.328	0.299	0.348
8/25/2014	0.277	0.327	0.299	0.347

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
8/26/2014	0.272	0.327	0.299	0.347
8/27/2014	0.266	0.326	0.298	0.348
8/28/2014	0.269	0.324	0.299	0.348
8/29/2014	0.288	0.323	0.299	0.348
8/30/2014	0.280	0.324	0.298	0.348
8/31/2014	0.283	0.324	0.298	0.348
9/1/2014	0.284	0.323	0.298	0.347
9/2/2014	0.283	0.322	0.297	0.347
9/3/2014	0.285	0.323	0.297	0.347
9/4/2014	0.283	0.323	0.296	0.347
9/5/2014	0.277	0.323	0.296	0.346
9/6/2014	0.271	0.323	0.295	0.347
9/7/2014	0.266	0.322	0.295	0.347
9/8/2014	0.260	0.321	0.295	0.347
9/9/2014	0.257	0.321	0.294	0.347
9/10/2014	0.254	0.320	0.294	0.347
9/11/2014	0.249	0.320	0.293	0.347
9/12/2014	0.246	0.319	0.293	0.346
9/13/2014	0.241	0.319	0.292	0.346
9/14/2014	0.237	0.318	0.292	0.346

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
9/15/2014	0.232	0.317	0.292	0.346
9/16/2014	0.230	0.315	0.291	0.346
9/17/2014	0.235	0.313	0.290	0.346
9/18/2014	0.238	0.314	0.290	0.346
9/19/2014	0.237	0.314	0.290	0.346
9/20/2014	0.232	0.314	0.290	0.346
9/21/2014	0.227	0.312	0.289	0.345
9/22/2014	0.386	0.366	0.356	0.451
9/23/2014	0.383	0.362	0.334	0.472
9/24/2014	0.381	0.360	0.329	0.476
9/25/2014	0.367	0.354	0.325	0.473
9/26/2014	0.363	0.351	0.322	0.452
9/27/2014	0.365	0.349	0.321	0.390
9/28/2014	0.377	0.349	0.321	0.357
9/29/2014	0.368	0.349	0.320	0.350
9/30/2014	0.364	0.348	0.319	0.350
10/1/2014	0.363	0.347	0.318	0.350
10/2/2014	0.362	0.346	0.318	0.349
10/3/2014	0.361	0.346	0.317	0.349
10/4/2014	0.360	0.346	0.317	0.349

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/5/2014	0.359	0.345	0.316	0.349
10/6/2014	0.358	0.345	0.316	0.349
10/7/2014	0.356	0.344	0.315	0.348
10/8/2014	0.354	0.343	0.315	0.348
10/9/2014	0.355	0.342	0.314	0.348
10/10/2014	0.352	0.341	0.314	0.348
10/11/2014	0.351	0.341	0.313	0.348
10/12/2014	0.380	0.349	0.317	0.387
10/13/2014	0.399	0.368	0.341	0.469
10/14/2014	0.385	0.362	0.335	0.471
10/15/2014	0.379	0.356	0.328	0.455
10/16/2014	0.387	0.358	0.327	0.414
10/17/2014	0.376	0.354	0.325	0.355
10/18/2014	0.396	0.366	0.339	0.440
10/19/2014	0.395	0.369	0.347	0.476
10/20/2014	0.394	0.365	0.339	0.479
10/21/2014	0.399	0.384	0.382	0.478
10/22/2014	0.392	0.362	0.333	0.479
10/23/2014	0.399	0.366	0.339	0.480
10/24/2014	0.410	0.392	0.409	0.478

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/25/2014	0.390	0.364	0.338	0.478
10/26/2014	0.390	0.359	0.328	0.481
10/27/2014	0.392	0.364	0.336	0.481
10/28/2014	0.391	0.361	0.336	0.477
10/29/2014	0.405	0.384	0.395	0.479
10/30/2014	0.390	0.360	0.331	0.479
10/31/2014	0.392	0.360	0.330	0.480
11/1/2014	0.397	0.363	0.333	0.468
11/2/2014	0.405	0.372	0.356	0.474
11/3/2014	0.392	0.364	0.336	0.481
11/4/2014	0.390	0.359	0.328	0.477
11/5/2014	0.391	0.361	0.330	0.459
11/6/2014	0.383	0.356	0.326	0.407
11/7/2014	0.385	0.354	0.325	0.351
11/8/2014	0.390	0.357	0.326	0.349
11/9/2014	0.380	0.354	0.325	0.349
11/10/2014	0.374	0.351	0.322	0.349
11/11/2014	0.403	0.370	0.351	0.416
11/12/2014	0.438	0.405	0.417	0.477
11/13/2014	0.392	0.364	0.339	0.476

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/14/2014	0.379	0.355	0.327	0.479
11/15/2014	0.375	0.352	0.325	0.473
11/16/2014	0.373	0.350	0.324	0.446
11/17/2014	0.378	0.350	0.324	0.372
11/18/2014	0.398	0.373	0.376	0.474
11/19/2014	0.400	0.375	0.378	0.479
11/20/2014	0.406	0.395	0.439	0.478
11/21/2014	0.395	0.369	0.352	0.477
11/22/2014	0.387	0.359	0.333	0.479
11/23/2014	0.385	0.356	0.329	0.475
11/24/2014	0.384	0.355	0.328	0.451
11/25/2014	0.395	0.368	0.373	0.441
11/26/2014	0.415	0.400	0.444	0.478
11/27/2014	0.420	0.398	0.431	0.478
11/28/2014	0.390	0.364	0.342	0.477
11/29/2014	0.412	0.385	0.392	0.479
11/30/2014	0.401	0.378	0.385	0.479
12/1/2014	0.394	0.362	0.336	0.479
12/2/2014	0.409	0.379	0.385	0.477
12/3/2014	0.400	0.368	0.345	0.479

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/4/2014	0.400	0.371	0.356	0.478
12/5/2014	0.387	0.359	0.332	0.481
12/6/2014	0.382	0.355	0.328	0.472
12/7/2014	0.379	0.352	0.326	0.438
12/8/2014	0.392	0.357	0.329	0.396
12/9/2014	0.395	0.366	0.342	0.479
12/10/2014	0.389	0.359	0.333	0.476
12/11/2014	0.388	0.357	0.330	0.459
12/12/2014	0.382	0.354	0.328	0.411
12/13/2014	0.382	0.353	0.327	0.351
12/14/2014	0.396	0.360	0.329	0.347
12/15/2014	0.396	0.361	0.332	0.347
12/16/2014	0.397	0.366	0.342	0.351
12/17/2014	0.406	0.376	0.377	0.469
12/18/2014	0.431	0.427	0.465	0.476
12/19/2014	0.452	0.467	0.479	0.476
12/20/2014	0.425	0.426	0.446	0.477
12/21/2014	0.404	0.375	0.361	0.477
12/22/2014	0.405	0.379	0.390	0.473
12/23/2014	0.407	0.386	0.414	0.473

Table D.9 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/24/2014	0.394	0.363	0.337	0.473
12/25/2014	0.395	0.363	0.344	0.475
12/26/2014	0.408	0.382	0.390	0.470
12/27/2014	0.405	0.375	0.360	0.475
12/28/2014	0.383	0.360	0.334	0.477
12/29/2014	0.374	0.354	0.326	0.470
12/30/2014	0.372	0.352	0.324	0.444
12/31/2014	0.373	0.351	0.324	0.370
1/1/2015	0.374	0.350	0.324	0.348
1/2/2015	0.381	0.350	0.324	0.346
1/3/2015	0.385	0.351	0.324	0.346

Table D.10 Daily Volumetric Water Content (VWC) Data for Unharvested Site

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/20/2013	0.287	0.349	0.383	0.435
11/21/2013	0.281	0.337	0.379	0.437
11/22/2013	0.277	0.328	0.377	0.438
11/23/2013	0.271	0.324	0.374	0.440
11/24/2013	0.267	0.320	0.372	0.441
11/25/2013	0.263	0.317	0.369	0.441
11/26/2013	0.259	0.313	0.367	0.442
11/27/2013	0.256	0.310	0.365	0.442
11/28/2013	0.254	0.307	0.363	0.443
11/29/2013	0.249	0.305	0.362	0.443
11/30/2013	0.219	0.304	0.361	0.443
12/1/2013	0.219	0.302	0.360	0.443
12/2/2013	0.291	0.371	0.391	0.468
12/3/2013	0.276	0.358	0.384	0.465
12/4/2013	0.267	0.344	0.382	0.449
12/5/2013	0.260	0.337	0.380	0.450
12/6/2013	0.256	0.332	0.377	0.450
12/7/2013	0.253	0.328	0.375	0.451
12/8/2013	0.251	0.323	0.373	0.452
12/9/2013	0.248	0.321	0.372	0.452

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/10/2013	0.248	0.320	0.371	0.452
12/11/2013	0.252	0.321	0.370	0.451
12/12/2013	0.280	0.346	0.372	0.450
12/13/2013	0.275	0.351	0.380	0.450
12/14/2013	0.269	0.345	0.379	0.450
12/15/2013	0.264	0.340	0.378	0.450
12/16/2013	0.260	0.336	0.376	0.450
12/17/2013	0.257	0.332	0.374	0.450
12/18/2013	0.254	0.329	0.373	0.450
12/19/2013	0.253	0.326	0.372	0.450
12/20/2013	0.263	0.332	0.371	0.450
12/21/2013	0.297	0.380	0.394	0.451
12/22/2013	0.285	0.366	0.386	0.454
12/23/2013	0.278	0.356	0.382	0.454
12/24/2013	0.284	0.365	0.386	0.456
12/25/2013	0.273	0.353	0.383	0.455
12/26/2013	0.268	0.344	0.380	0.454
12/27/2013	0.265	0.338	0.378	0.454
12/28/2013	0.261	0.334	0.376	0.454
12/29/2013	0.258	0.331	0.375	0.454

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/30/2013	0.256	0.328	0.373	0.454
12/31/2013	0.254	0.325	0.372	0.453
1/1/2014	0.251	0.322	0.370	0.453
1/2/2014	0.249	0.319	0.369	0.453
1/3/2014	0.251	0.318	0.368	0.454
1/4/2014	0.255	0.318	0.367	0.451
1/5/2014	0.254	0.319	0.366	0.452
1/6/2014	0.253	0.318	0.365	0.451
1/7/2014	0.264	0.325	0.365	0.451
1/8/2014	0.299	0.380	0.390	0.452
1/9/2014	0.295	0.378	0.392	0.452
1/10/2014	0.291	0.375	0.392	0.456
1/11/2014	0.296	0.377	0.392	0.458
1/12/2014	0.298	0.381	0.393	0.485
1/13/2014	0.292	0.375	0.391	0.470
1/14/2014	0.278	0.357	0.385	0.461
1/15/2014	0.272	0.347	0.381	0.459
1/16/2014	0.268	0.341	0.379	0.458
1/17/2014	0.264	0.337	0.376	0.458
1/18/2014	0.261	0.335	0.375	0.457

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
1/19/2014	0.257	0.332	0.372	0.456
1/20/2014	0.254	0.328	0.371	0.456
1/21/2014	0.251	0.325	0.369	0.456
1/22/2014	0.247	0.321	0.368	0.455
1/23/2014	0.244	0.314	0.366	0.455
1/24/2014	0.242	0.311	0.365	0.454
1/25/2014	0.240	0.309	0.363	0.454
1/26/2014	0.237	0.306	0.361	0.453
1/27/2014	0.235	0.303	0.360	0.452
1/28/2014	0.253	0.313	0.360	0.452
1/29/2014	0.305	0.388	0.402	0.467
1/30/2014	0.289	0.373	0.391	0.460
1/31/2014	0.280	0.359	0.383	0.459
2/1/2014	0.282	0.359	0.382	0.459
2/2/2014	0.277	0.353	0.381	0.457
2/3/2014	0.287	0.363	0.381	0.458
2/4/2014	0.286	0.364	0.383	0.458
2/5/2014	0.284	0.363	0.384	0.458
2/6/2014	0.281	0.359	0.383	0.457
2/7/2014	0.301	0.384	0.396	0.464

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/8/2014	0.309	0.391	0.404	0.494
2/9/2014	0.294	0.375	0.389	0.495
2/10/2014	0.289	0.368	0.386	0.487
2/11/2014	0.297	0.377	0.389	0.468
2/12/2014	0.311	0.394	0.401	0.490
2/13/2014	0.305	0.388	0.411	0.499
2/14/2014	0.316	0.444	0.418	0.500
2/15/2014	0.310	0.417	0.422	0.501
2/16/2014	0.305	0.396	0.420	0.501
2/17/2014	0.301	0.382	0.411	0.501
2/18/2014	0.305	0.387	0.410	0.502
2/19/2014	0.300	0.380	0.402	0.502
2/20/2014	0.304	0.381	0.395	0.504
2/21/2014	0.300	0.379	0.393	0.505
2/22/2014	0.289	0.368	0.388	0.506
2/23/2014	0.283	0.360	0.384	0.502
2/24/2014	0.294	0.367	0.383	0.494
2/25/2014	0.288	0.365	0.384	0.474
2/26/2014	0.282	0.359	0.382	0.470
2/27/2014	0.292	0.367	0.383	0.469

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
2/28/2014	0.291	0.370	0.387	0.468
3/1/2014	0.300	0.377	0.388	0.467
3/2/2014	0.304	0.383	0.392	0.467
3/3/2014	0.297	0.376	0.389	0.469
3/4/2014	0.291	0.370	0.386	0.469
3/5/2014	0.299	0.377	0.389	0.468
3/6/2014	0.306	0.388	0.395	0.471
3/7/2014	0.296	0.376	0.389	0.479
3/8/2014	0.289	0.366	0.385	0.471
3/9/2014	0.313	0.392	0.397	0.478
3/10/2014	0.307	0.393	0.406	0.505
3/11/2014	0.293	0.374	0.392	0.508
3/12/2014	0.286	0.363	0.386	0.503
3/13/2014	0.281	0.355	0.383	0.489
3/14/2014	0.280	0.352	0.379	0.474
3/15/2014	0.286	0.355	0.378	0.471
3/16/2014	0.282	0.353	0.378	0.469
3/17/2014	0.304	0.382	0.390	0.469
3/18/2014	0.292	0.371	0.387	0.469
3/19/2014	0.286	0.363	0.384	0.468

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
3/20/2014	0.285	0.359	0.381	0.469
3/21/2014	0.284	0.357	0.380	0.467
3/22/2014	0.281	0.353	0.379	0.467
3/23/2014	0.277	0.348	0.377	0.466
3/24/2014	0.274	0.344	0.375	0.465
3/25/2014	0.271	0.340	0.372	0.465
3/26/2014	0.299	0.368	0.379	0.465
3/27/2014	0.310	0.390	0.395	0.466
3/28/2014	0.313	0.394	0.398	0.478
3/29/2014	0.300	0.382	0.392	0.502
3/30/2014	0.306	0.388	0.393	0.481
3/31/2014	0.295	0.376	0.388	0.474
4/1/2014	0.301	0.381	0.389	0.472
4/2/2014	0.291	0.371	0.387	0.471
4/3/2014	0.286	0.363	0.384	0.470
4/4/2014	0.285	0.360	0.380	0.470
4/5/2014	0.310	0.388	0.392	0.469
4/6/2014	0.301	0.385	0.392	0.471
4/7/2014	0.292	0.373	0.387	0.471
4/8/2014	0.287	0.366	0.384	0.470

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/9/2014	0.283	0.358	0.381	0.469
4/10/2014	0.280	0.352	0.379	0.468
4/11/2014	0.276	0.347	0.377	0.468
4/12/2014	0.273	0.342	0.375	0.466
4/13/2014	0.270	0.337	0.373	0.466
4/14/2014	0.267	0.334	0.371	0.466
4/15/2014	0.264	0.329	0.369	0.465
4/16/2014	0.260	0.325	0.368	0.464
4/17/2014	0.281	0.345	0.370	0.464
4/18/2014	0.300	0.382	0.388	0.464
4/19/2014	0.290	0.369	0.384	0.462
4/20/2014	0.290	0.366	0.382	0.462
4/21/2014	0.285	0.360	0.381	0.460
4/22/2014	0.302	0.381	0.387	0.460
4/23/2014	0.305	0.386	0.391	0.460
4/24/2014	0.310	0.393	0.397	0.460
4/25/2014	0.301	0.384	0.391	0.465
4/26/2014	0.293	0.375	0.388	0.466
4/27/2014	0.306	0.388	0.393	0.465
4/28/2014	0.297	0.380	0.391	0.467

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
4/29/2014	0.290	0.368	0.386	0.466
4/30/2014	0.285	0.362	0.383	0.465
5/1/2014	0.281	0.356	0.381	0.464
5/2/2014	0.276	0.350	0.378	0.463
5/3/2014	0.272	0.344	0.377	0.463
5/4/2014	0.276	0.343	0.374	0.463
5/5/2014	0.305	0.387	0.389	0.464
5/6/2014	0.295	0.377	0.388	0.464
5/7/2014	0.288	0.366	0.385	0.462
5/8/2014	0.291	0.367	0.384	0.463
5/9/2014	0.309	0.393	0.396	0.463
5/10/2014	0.305	0.389	0.395	0.469
5/11/2014	0.293	0.375	0.389	0.468
5/12/2014	0.288	0.366	0.385	0.467
5/13/2014	0.270	0.350	0.373	0.467
5/14/2014	0.297	0.367	0.385	0.465
5/15/2014	0.294	0.363	0.383	0.465
5/16/2014	0.289	0.357	0.382	0.464
5/17/2014	0.285	0.352	0.380	0.463
5/18/2014	0.302	0.367	0.379	0.464

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
5/19/2014	0.316	0.399	0.395	0.464
5/20/2014	0.309	0.387	0.392	0.463
5/21/2014	0.303	0.379	0.389	0.462
5/22/2014	0.299	0.372	0.387	0.461
5/23/2014	0.297	0.366	0.385	0.461
5/24/2014	0.294	0.361	0.384	0.460
5/25/2014	0.291	0.357	0.382	0.460
5/26/2014	0.288	0.352	0.380	0.459
5/27/2014	0.284	0.347	0.378	0.458
5/28/2014	0.283	0.345	0.376	0.459
5/29/2014	0.287	0.343	0.375	0.458
5/30/2014	0.287	0.342	0.373	0.456
5/31/2014	0.284	0.340	0.372	0.455
6/1/2014	0.282	0.338	0.371	0.454
6/2/2014	0.280	0.335	0.370	0.453
6/3/2014	0.277	0.332	0.369	0.452
6/4/2014	0.274	0.329	0.368	0.451
6/5/2014	0.270	0.326	0.366	0.450
6/6/2014	0.267	0.323	0.365	0.449
6/7/2014	0.262	0.320	0.363	0.449

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
6/8/2014	0.259	0.317	0.362	0.448
6/9/2014	0.255	0.315	0.360	0.447
6/10/2014	0.249	0.311	0.359	0.447
6/11/2014	0.244	0.308	0.357	0.446
6/12/2014	0.240	0.305	0.356	0.445
6/13/2014	0.241	0.305	0.355	0.445
6/14/2014	0.246	0.303	0.354	0.443
6/15/2014	0.245	0.302	0.353	0.442
6/16/2014	0.251	0.301	0.352	0.441
6/17/2014	0.285	0.310	0.351	0.442
6/18/2014	0.279	0.313	0.351	0.440
6/19/2014	0.274	0.312	0.350	0.439
6/20/2014	0.268	0.311	0.349	0.439
6/21/2014	0.263	0.309	0.349	0.437
6/22/2014	0.258	0.307	0.347	0.436
6/23/2014	0.254	0.305	0.346	0.436
6/24/2014	0.248	0.303	0.345	0.435
6/25/2014	0.245	0.301	0.343	0.434
6/26/2014	0.289	0.365	0.343	0.434
6/27/2014	0.307	0.376	0.346	0.434

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
6/28/2014	0.303	0.376	0.353	0.434
6/29/2014	0.297	0.366	0.357	0.433
6/30/2014	0.291	0.357	0.357	0.432
7/1/2014	0.286	0.351	0.355	0.432
7/2/2014	0.280	0.344	0.354	0.431
7/3/2014	0.274	0.337	0.353	0.430
7/4/2014	0.269	0.331	0.351	0.430
7/5/2014	0.263	0.326	0.349	0.429
7/6/2014	0.257	0.322	0.347	0.429
7/7/2014	0.251	0.317	0.345	0.428
7/8/2014	0.245	0.313	0.343	0.427
7/9/2014	0.238	0.309	0.340	0.427
7/10/2014	0.231	0.304	0.337	0.426
7/11/2014	0.224	0.300	0.334	0.425
7/12/2014	0.219	0.296	0.331	0.425
7/13/2014	0.214	0.293	0.328	0.424
7/14/2014	0.210	0.289	0.326	0.423
7/15/2014	0.206	0.287	0.322	0.423
7/16/2014	0.200	0.285	0.318	0.422
7/17/2014	0.194	0.281	0.315	0.421

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
7/18/2014	0.188	0.277	0.311	0.420
7/19/2014	0.184	0.273	0.308	0.419
7/20/2014	0.181	0.270	0.306	0.418
7/21/2014	0.178	0.265	0.304	0.417
7/22/2014	0.175	0.261	0.303	0.416
7/23/2014	0.176	0.263	0.302	0.415
7/24/2014	0.182	0.270	0.302	0.414
7/25/2014	0.182	0.267	0.301	0.413
7/26/2014	0.180	0.264	0.299	0.412
7/27/2014	0.179	0.262	0.297	0.411
7/28/2014	0.178	0.260	0.296	0.410
7/29/2014	0.176	0.258	0.294	0.408
7/30/2014	0.173	0.254	0.293	0.406
7/31/2014	0.171	0.250	0.291	0.405
8/1/2014	0.169	0.246	0.290	0.403
8/2/2014	0.166	0.242	0.288	0.401
8/3/2014	0.164	0.239	0.287	0.399
8/4/2014	0.162	0.236	0.286	0.398
8/5/2014	0.160	0.233	0.285	0.396
8/6/2014	0.158	0.229	0.283	0.394

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
8/7/2014	0.157	0.227	0.282	0.393
8/8/2014	0.155	0.224	0.281	0.391
8/9/2014	0.153	0.222	0.280	0.389
8/10/2014	0.153	0.220	0.279	0.387
8/11/2014	0.154	0.219	0.278	0.385
8/12/2014	0.153	0.218	0.278	0.384
8/13/2014	0.151	0.216	0.278	0.383
8/14/2014	0.150	0.214	0.277	0.381
8/15/2014	0.149	0.213	0.276	0.380
8/16/2014	0.149	0.212	0.275	0.379
8/17/2014	0.149	0.212	0.275	0.378
8/18/2014	0.149	0.211	0.274	0.377
8/19/2014	0.148	0.211	0.274	0.375
8/20/2014	0.147	0.210	0.273	0.374
8/21/2014	0.145	0.208	0.272	0.373
8/22/2014	0.145	0.207	0.271	0.372
8/23/2014	0.144	0.206	0.270	0.371
8/24/2014	0.144	0.206	0.269	0.370
8/25/2014	0.143	0.205	0.269	0.369
8/26/2014	0.144	0.206	0.269	0.368

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
8/27/2014	0.144	0.206	0.268	0.367
8/28/2014	0.143	0.205	0.268	0.366
8/29/2014	0.142	0.204	0.268	0.365
8/30/2014	0.140	0.203	0.268	0.364
8/31/2014	0.141	0.205	0.270	0.363
9/1/2014	0.142	0.206	0.269	0.364
9/2/2014	0.142	0.205	0.269	0.363
9/3/2014	0.140	0.203	0.268	0.363
9/4/2014	0.140	0.201	0.267	0.362
9/5/2014	0.141	0.201	0.267	0.362
9/6/2014	0.142	0.202	0.266	0.361
9/7/2014	0.141	0.201	0.265	0.360
9/8/2014	0.140	0.201	0.264	0.359
9/9/2014	0.139	0.200	0.264	0.359
9/10/2014	0.138	0.198	0.263	0.358
9/11/2014	0.137	0.198	0.262	0.357
9/12/2014	0.137	0.198	0.261	0.357
9/13/2014	0.137	0.198	0.261	0.356
9/14/2014	0.137	0.198	0.260	0.356
9/15/2014	0.137	0.198	0.260	0.355

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
9/16/2014	0.135	0.197	0.260	0.355
9/17/2014	0.134	0.196	0.259	0.354
9/18/2014	0.134	0.196	0.259	0.354
9/19/2014	0.134	0.196	0.258	0.353
9/20/2014	0.134	0.195	0.258	0.353
9/21/2014	0.135	0.196	0.258	0.353
9/22/2014	0.132	0.195	0.258	0.352
9/23/2014	0.132	0.194	0.258	0.352
9/24/2014	0.202	0.305	0.359	0.351
9/25/2014	0.195	0.303	0.370	0.351
9/26/2014	0.189	0.298	0.362	0.351
9/27/2014	0.187	0.290	0.356	0.352
9/28/2014	0.185	0.285	0.350	0.352
9/29/2014	0.198	0.286	0.345	0.352
9/30/2014	0.215	0.300	0.344	0.352
10/1/2014	0.201	0.290	0.342	0.352
10/2/2014	0.194	0.285	0.336	0.353
10/3/2014	0.189	0.280	0.330	0.353
10/4/2014	0.184	0.279	0.324	0.353
10/5/2014	0.180	0.276	0.318	0.354

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/6/2014	0.176	0.272	0.312	0.354
10/7/2014	0.172	0.270	0.307	0.354
10/8/2014	0.168	0.266	0.302	0.354
10/9/2014	0.164	0.261	0.297	0.354
10/10/2014	0.161	0.257	0.292	0.354
10/11/2014	0.186	0.257	0.291	0.353
10/12/2014	0.184	0.259	0.291	0.354
10/13/2014	0.171	0.258	0.289	0.354
10/14/2014	0.240	0.293	0.288	0.355
10/15/2014	0.249	0.325	0.322	0.354
10/16/2014	0.225	0.313	0.327	0.354
10/17/2014	0.214	0.302	0.320	0.355
10/18/2014	0.207	0.295	0.314	0.355
10/19/2014	0.200	0.290	0.308	0.355
10/20/2014	0.262	0.338	0.319	0.355
10/21/2014	0.258	0.346	0.356	0.354
10/22/2014	0.248	0.332	0.353	0.355
10/23/2014	0.287	0.370	0.380	0.356
10/24/2014	0.269	0.351	0.373	0.355
10/25/2014	0.277	0.355	0.371	0.356

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
10/26/2014	0.305	0.388	0.387	0.358
10/27/2014	0.279	0.366	0.380	0.360
10/28/2014	0.270	0.354	0.375	0.362
10/29/2014	0.283	0.369	0.380	0.364
10/30/2014	0.280	0.364	0.379	0.366
10/31/2014	0.303	0.388	0.388	0.379
11/1/2014	0.285	0.369	0.380	0.400
11/2/2014	0.289	0.374	0.381	0.404
11/3/2014	0.285	0.368	0.378	0.404
11/4/2014	0.300	0.383	0.384	0.405
11/5/2014	0.290	0.376	0.382	0.405
11/6/2014	0.290	0.372	0.379	0.406
11/7/2014	0.289	0.374	0.382	0.407
11/8/2014	0.276	0.361	0.379	0.408
11/9/2014	0.274	0.355	0.376	0.408
11/10/2014	0.282	0.361	0.375	0.408
11/11/2014	0.273	0.355	0.375	0.408
11/12/2014	0.266	0.348	0.373	0.408
11/13/2014	0.297	0.375	0.383	0.422
11/14/2014	0.312	0.397	0.398	0.466

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
11/15/2014	0.291	0.375	0.382	0.434
11/16/2014	0.282	0.364	0.379	0.429
11/17/2014	0.276	0.358	0.377	0.427
11/18/2014	0.272	0.353	0.375	0.425
11/19/2014	0.271	0.349	0.373	0.424
11/20/2014	0.302	0.383	0.382	0.424
11/21/2014	0.297	0.380	0.385	0.423
11/22/2014	0.311	0.396	0.393	0.431
11/23/2014	0.297	0.383	0.385	0.434
11/24/2014	0.287	0.370	0.381	0.431
11/25/2014	0.281	0.362	0.378	0.429
11/26/2014	0.277	0.358	0.377	0.428
11/27/2014	0.294	0.375	0.380	0.427
11/28/2014	0.313	0.399	0.395	0.430
11/29/2014	0.311	0.399	0.396	0.470
11/30/2014	0.295	0.379	0.384	0.441
12/1/2014	0.306	0.389	0.394	0.445
12/2/2014	0.302	0.388	0.390	0.456
12/3/2014	0.292	0.375	0.382	0.438
12/4/2014	0.308	0.392	0.387	0.434

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/5/2014	0.300	0.384	0.384	0.433
12/6/2014	0.305	0.392	0.389	0.434
12/7/2014	0.291	0.374	0.382	0.433
12/8/2014	0.284	0.365	0.379	0.432
12/9/2014	0.279	0.359	0.377	0.430
12/10/2014	0.287	0.368	0.378	0.429
12/11/2014	0.299	0.387	0.386	0.430
12/12/2014	0.289	0.372	0.381	0.430
12/13/2014	0.284	0.365	0.379	0.430
12/14/2014	0.280	0.360	0.377	0.429
12/15/2014	0.277	0.356	0.375	0.428
12/16/2014	0.278	0.354	0.374	0.427
12/17/2014	0.283	0.356	0.372	0.427
12/18/2014	0.294	0.370	0.374	0.426
12/19/2014	0.312	0.400	0.391	0.426
12/20/2014	0.321	0.410	0.403	0.446
12/21/2014	0.326	0.416	0.417	0.483
12/22/2014	0.314	0.406	0.426	0.486
12/23/2014	0.308	0.396	0.392	0.488
12/24/2014	0.312	0.400	0.392	0.490

Table D.10 Continued

Date	VWC at P1 (10 cm) m^3/m^3	VWC at P2 (20 cm) m^3/m^3	VWC at P3 (30 cm) m^3/m^3	VWC at P4 (100 cm) m^3/m^3
12/25/2014	0.310	0.399	0.391	0.490
12/26/2014	0.298	0.385	0.385	0.493
12/27/2014	0.295	0.380	0.382	0.489
12/28/2014	0.314	0.402	0.389	0.486
12/29/2014	0.312	0.399	0.388	0.471
12/30/2014	0.303	0.388	0.384	0.456
12/31/2014	0.297	0.378	0.381	0.445
1/1/2015	0.292	0.373	0.379	0.441
1/2/2015	0.291	0.370	0.378	0.438

APPENDIX E

GRAPHICAL REPRESENTATION OF VWC DATA

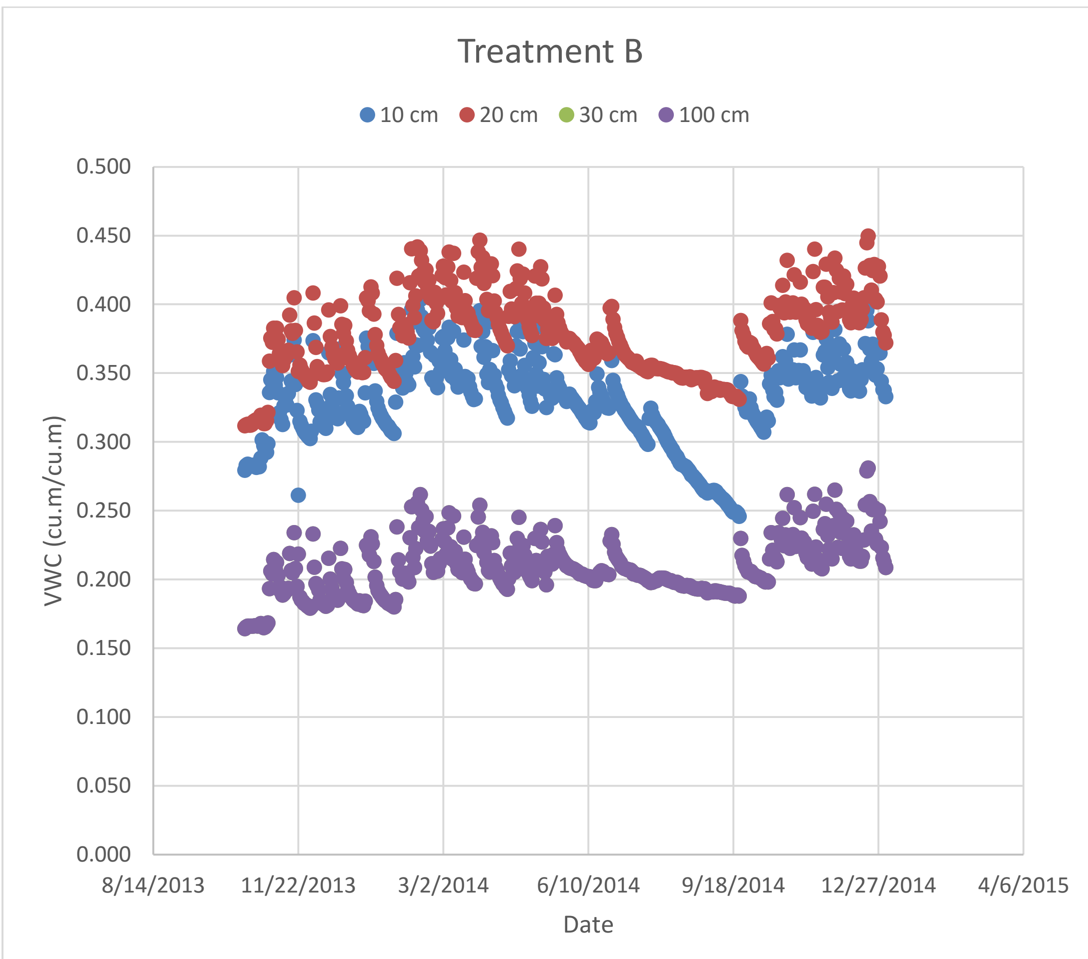

Figure E.1 Graphical Representation of VWC Data for Treatment B

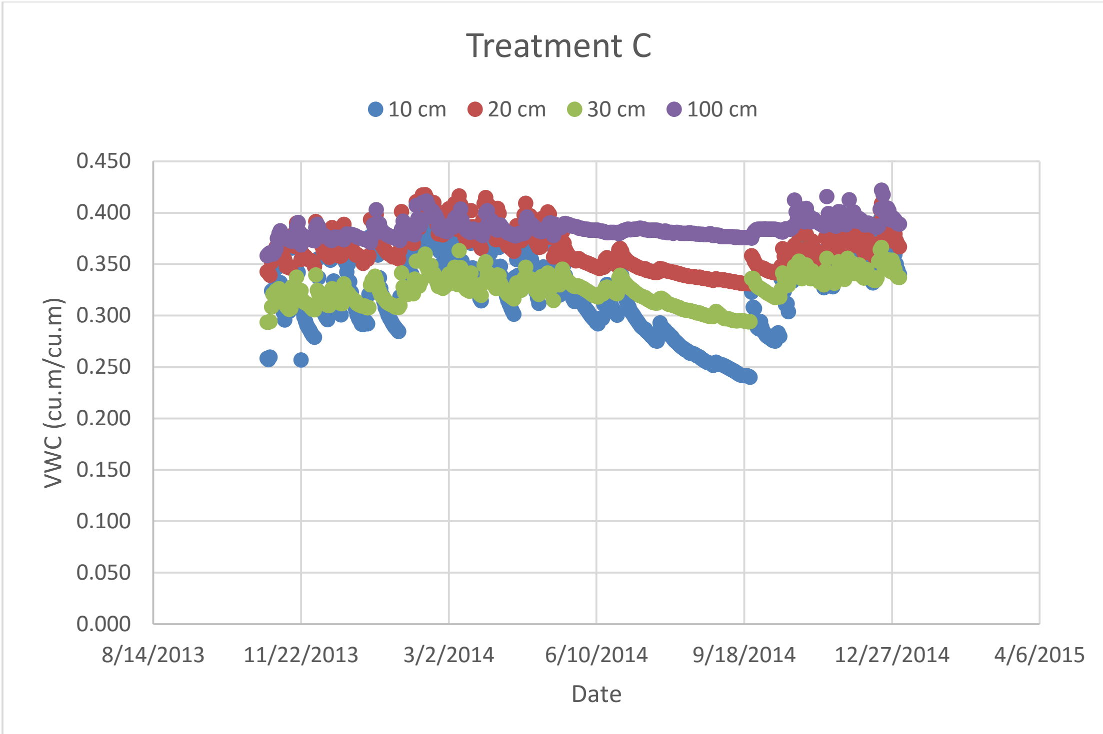

Figure E.2 Graphical Representation of VWC Data for Treatment C

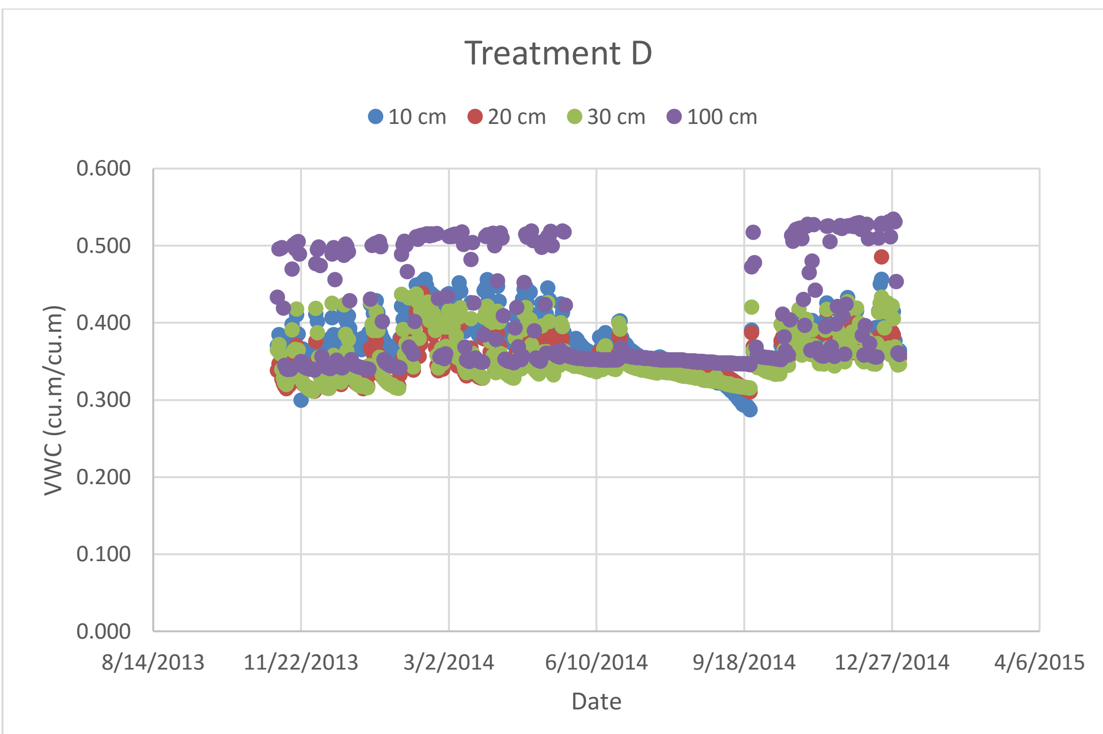

Figure E.3 Graphical Representation of VWC Data for Treatment D

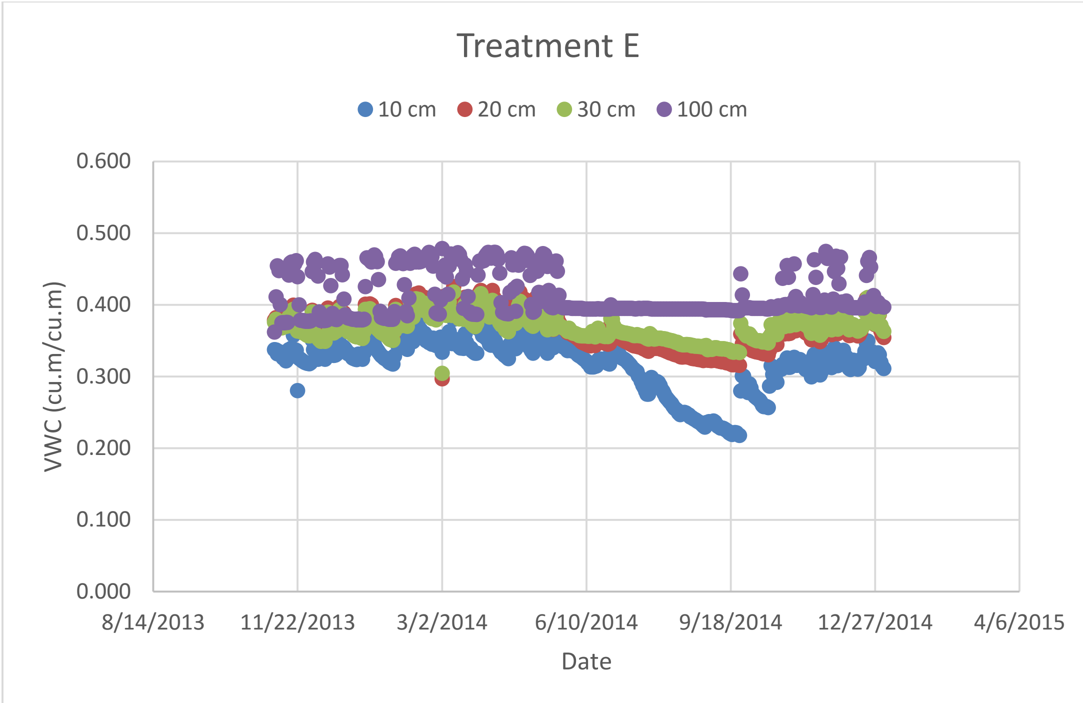

Figure E.4 Graphical Representation for VWC Data of Treatment E

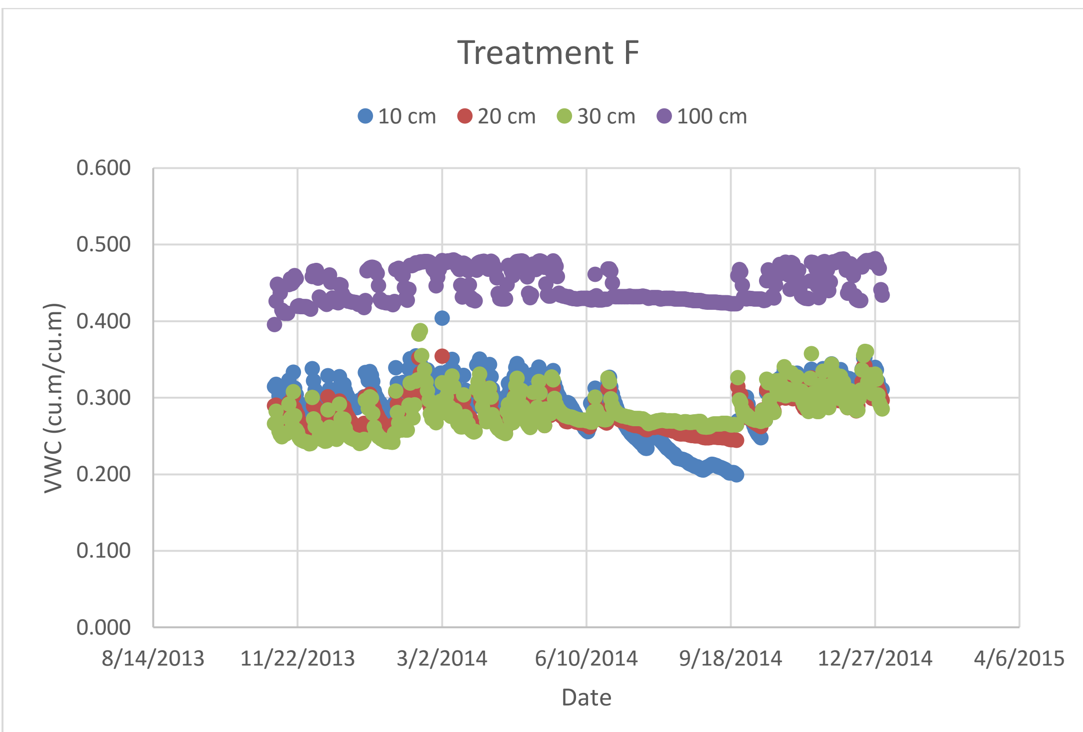

Figure E.5 Graphical Representation of VWC Data for Treatment F

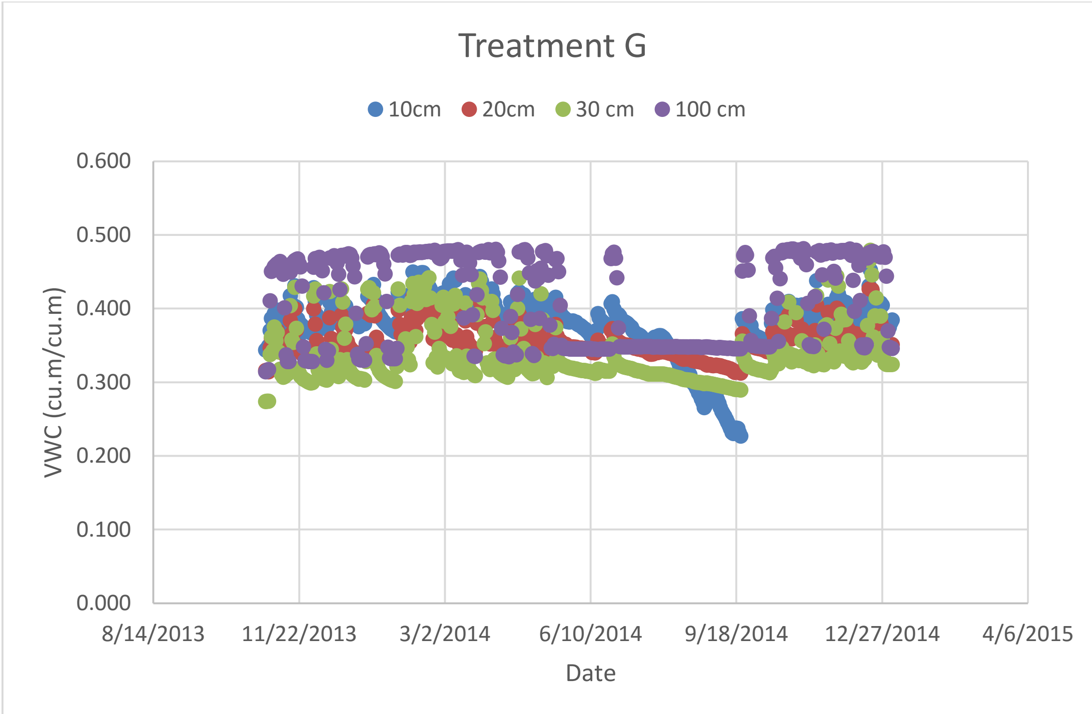

Figure E.6 Graphical Representation of VWC Data for Treatment G

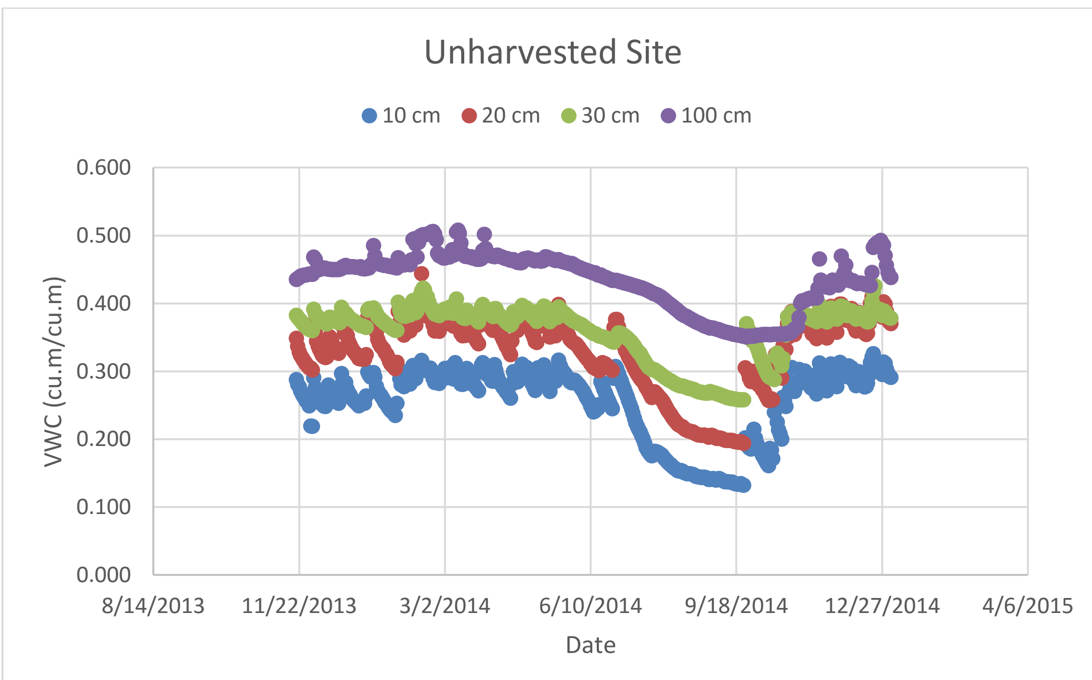

Figure E.7 Graphical Representation of VWC Data for Unharvested Site

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