DROUGHT TOLERANT CORN RESPONSE TO WATER AVAILABILITY

by

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ABSTRACT

Due to decreased availability of irrigation water in central and western Kansas and an increase in water restrictions, producers are looking for more efficient ways to use available irrigation water. Drought-tolerant technologies have become popular in hybrids for stress-prone environments across central and western Kansas and are marketed for their ability to produce greater grain yields with less water. The objective of this research was to understand how DT and non-DT corn hybrids respond in a wide range of environmental conditions in terms of soil water status change, canopy indicators of stress, dry matter partitioning, and grain yield. Soil water status change, yield, and canopy response characteristics of two DT hybrids, and one non-DT hybrid were compared at five locations over two years in rain-fed, semi-irrigated, or fully irrigated regimes making a total of 18 environments. Field experiments were established in 2014 and 2015 near Topeka, Scandia, Hutchinson, Garden City, and Tribune, KS. Two corn hybrids with different approaches drought tolerance (Pioneer 1151 AQUAmax, bred drought tolerance and Croplan 6000 DroughtGard, bred drought tolerance plus transgenic drought tolerance), and one hybrid with no specific drought tolerance characteristics but with proven performance in favorable environments (Croplan 6274) were used in the experiment. Soil moisture content (measured using a neutron moisture meter), canopy temperature, ear leaf temperature, and chlorophyll content were measured at tasseling (VT), milk or dough (R3-R4), and physiological maturity (R6) developmental stages. Grain yield was at all 18 environments, and biomass production was estimated at 14 of the environments. Hybrid plasticity of yield results show the response for Croplan 6000DG and Pioneer 1151AM differed, but Croplan 6274 was the same as both other hybrids at the 0.10 alpha level. Yields of all hybrids remained comparable in most

environments, but as environment yields increased beyond 200 bu ac^{-1}, Croplan 6000DG lagged behind Pioneer 1151AM. Hybrid harvest index plasticity shoed that all hybrids had the same response to environment in harvest index. Although, not statistically significant, when an environment supported favorable harvest index values greater than 0.40, it’s observed that Croplan 6000DG does have an improvement in harvest index relative to the Pioneer 1151AM and Croplan 6274.

Table of Contents

List of Figures

List of Tables

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Chapter 1 - Literature Review

Kansas Corn Production Trends

Since the mid 1990's Kansas corn (*Zea mays* L.) acres have doubled, with irrigated corn acres remaining relatively unchanged (Kansas Department of Agriculture, 2014). In 1983, only about 28% of corn acres were dryland. In 2013, 63% of Kansas corn acres are non-irrigated, with non-irrigated yields increasing 33% over the past 40 years. Irrigated corn yields have increased 55% over the same time period. In 2013, 37% of corn acres were irrigated, producing 57% of the total crop. Of the Kansas corn acres, 63% were non-irrigated, producing 43% of the crop. In 2013 the Kansas corn crop was valued at $2.31 billion, making it the most valued crop the state produces. Corn has been the highest valued crop in Kansas in 4 of the past 5 years, with a record high of over $3 billion in 2010 (Kansas Department of Agriculture, 2014). Corn is prominent in both irrigated and rain-fed cropping systems of the west-central Great Plains. The mean annual precipitation of 13.8 to 21.7 in. across the High Plains region of South Dakota, Nebraska, Kansas, Oklahoma, and Texas (High Plains Regional Climate Center, 2010) supplies only 57 to 89% of the seasonal water requirement (evapotranspiration, *ET*) of full-production corn resulting in considerable use of supplemental irrigation (Frank et al., 2013) or dependence on stored soil moisture in rain-fed systems. A major challenge for dryland cropping in the Great Plains is the high level of temporal and spatial climate variability with recurring periods of severe drought (Stone et al., 2006). Annual precipitation can vary by more than 100% from year to year (Hansen et al., 2012). Although irrigated corn is still the dominant production system in Kansas in terms of total corn production, rain-fed systems have increased dramatically in acreage, and now contribute a significant amount to the total Kansas corn production.

Semiarid Cropping Systems

Soil-water conservation is an important topic in semiarid cropping regions of the western Corn Belt due to low rainfall, and high air temperatures. Recently, producers are being driven to intensify their operations in response to increasing demands resulting from the growth in global population, as well as the tightening profit margins. Drought and high air temperature are two major environmental factors that severely limit plant productivity in the United States and worldwide, often causing extensive economic loss to agriculture (Chen et al., 2012). The constraints in dryland conditions call for implementation of more efficient cropping systems in order to make more efficient use of already limited natural resources to enhance crop productivity (Mampana et al., 2014).

Dryland corn production has been expanding in Kansas over the past years (Kansas Dept. of Agriculture, 2014). Much of the expansion can be attributed to the adoption of no-till/conservation tillage, improved hybrid performance, and generally favorable corn prices (Staggenborg et al., 2008). As production has expanded, the performance of dryland corn also has increased (Staggenborg et al., 2008). In the western 2/3 of Kansas, rainfall amounts range from 13.7 to 28.5 in. annually (National Climatic Data Center, 2010). The total water requirement of maize for the entire growing period ranges from 19.7 to 31.4 in (Brouwer and Heibloem, 1986). This is problematic in central and western Kansas dryland cropping systems. Producers have begun adopting no-till to conserve soil moisture, as well as utilizing drought-tolerant corn varieties in water-stressed environments. Residue reduces, but does not eliminate, evaporation. The loss through evaporation has been estimated to be 0.08 to 0.1 inch for each wetting event (van Donk, 2010). Tilled soils often dry to the depth of tillage. Each tillage operation can cause 0.5 to 0.75 inch of soil water evaporation (van Donk, 2010). With multiple tillage events, soil water may not be adequate in the seed zone for uniform germination and emergence. A positive linear relationship between yield and water use has been recognized by researchers (Kiziloglu et al., 2008). Drought tolerant corn technology is relatively new, but breeding corn adapted for water-stressed environments has become an area of focus for breeders since more production acres are moving into rain-fed cropping systems (Stone et al., 2006). As more producers turn to no-till/conservation tillage, modern corn breeding has selected for water-stressed environments. Many of the traits selected for semiarid systems focus on an improved harvest index, increased rooting depth, and improved light interception. Semiarid cropping systems in the western Corn Belt must use these and other tools to continue to adapt as the demand for grain increases world-wide.

Limited Irrigation

The west-central Great Plains of the U.S. is a semiarid region utilizing water for irrigation largely from the Ogallala Aquifer, which has experienced extensive water-level declines (Stone et al., 1995). Crop production in this area is particularly vulnerable to heat and drought stress because ET typically exceeds precipitation (Stone et al., 1995). Farmers respond to reduced water supplies with alternative management such as no-till cropping, more efficient irrigation equipment, and crop selection. Many of the irrigation systems today in the Central Great Plains are limited by water resources. They can no longer apply peak irrigation needs during the summer and must rely on soil water reserves to buffer the crop from water stress (Schlegel et al., 2012).

The water supply for irrigation in the region depends on groundwater, with the Ogallala formation of the High Plains Aquifer being the primary source (McGuire, 2004). With declining water levels in the Ogallala Aquifer and increasing energy costs, optimal utilization of limited irrigation water is required (Schlegel, 2012). Corn is the most common crop grown under deficit irrigation in western Kansas (Schlegel et al., 2012). Researchers in Texas found that 20 in. of water was required to produce the first 102 bu. ac^{-1} of corn (Becker, 2012). An additional 6 in of water produced another 94 bu. ac^{-1}. Maximum yield was reached by adding another 7 in. of water, but yield was increased by only 8 bu. ac^{-1}. Results from their study illustrate that more water applied to the crop does translate to a greater yield, but there are eventually diminishing returns. With limited irrigation systems gaining popularity in the western Corn Belt, it is evident that producers can efficiently produce corn with limited irrigation production systems.

With anticipated increased restrictions on water usage of the Ogallala Aquifer in Kansas coming from the Kansas Water Appropriations Act of 2013 (Barfield, 2013), producers are beginning to adapt their irrigated cropping systems to deal with drought stress. Producers have begun adopting high-efficiency irrigation systems with drop-nozzles, and precision irrigation applications to increase precision application. From 1991 to 2011, total acres using flood systems decreased from 1.42 million ac to 134,000 ac (Kenny and Juracek, 2013). During this period, center pivot systems have become the predominant method of irrigation, with the greatest increase in irrigated acres reported for center pivot systems with drop nozzles. By 2011, 2.32 million acres were irrigated using center pivot systems with drop nozzles, or 76% of the total reported acres (Kenny and Juracek, 2013). Limited irrigation, conservation tillage, and drought tolerant corn hybrids are becoming common practices for producers in central and western Kansas as means to maintain production while combatting drought stresses.

Drought Tolerant Corn

Drought tolerant corn is becoming a popular choice of producers across the western Corn Belt as a means to produce more grain with less water in semi-arid and limited irrigation cropping systems. Water availability represents the most limiting factor for crop productivity (Bruce et al., 2002). Recent research indicates that historic corn yield gains have been coupled with increasing planting densities in the U.S. and were accompanied by increased sensitivity to drought in modern hybrids (Lobell et al., 2014). Compared to the past 900 years, with the exception of the Dust Bowl of the 1930s, the past 120 years have been highly productive, with relatively benign drought episodes in the United States (Boyer et al., 2013). The 1988 U.S. drought was preceded by a severe drought five years earlier. In both instances, corn yields were reduced by about 25% relative to the five previous non-drought years and prices increased by 17 to 24% as a result (Boyer et al., 2013; USDA NASS, 2012). Based on corn percent yield reduction, the 2012 drought was similar to slightly less severe than what farmers experienced in the 1980's. In 2012, by contrast, maize prices spiked 53% compared to an already historically high previous 5-year average, and by 146% relative to the decade of 2000-2009 (Boyer et al., 2013).

Corn is an economically important crop to Kansas, but is susceptible to drought stress. Some of the gains through breeding have increased corn tolerance to drought stress during flowering, the developmental stage most sensitive to water limitation (Classen and Shaw, 1970; Boyer and Westgate, 2004; Campos et al., 2006). Efforts have been made for decades to enhance drought tolerance through traditional plant breeding techniques (Campos et al., 2006). More recently, transgenic approaches have been applied with the hope of regulating endogenous stress pathways through the expression of key genes to accelerate the process of enhancing drought tolerance (Nelson et al., 2007; Castiglioni et al., 2008).

Three corn hybrid technologies currently are being marketed for drought tolerance. Pioneer Optimum AQUAmax™ (DuPont Pioneer, Johnston, IA) and Syngenta Artesian™ (Syngenta Seeds, Minnetonka, MN) are both promoted as drought tolerant genetics, achieved through traditional breeding. The third drought tolerant technology is Monsanto's Genuity™ DroughtGard™ (Monsanto Co., St. Louis, MO), which is promoted as conferring drought tolerance through both traditional plant breeding and the introduction of a transgenic trait.

Monsanto, in collaboration with BASF (BASF Co., Fordham Park, NJ), developed the first biotechnology-derived drought-tolerant corn by expressing bacterial cold shock protein B (Nemali et al., 2015). Cold shock proteins (CSPs) contain RNA binding sequences referred to as cold shock domains (CSDs) and are well known to act as RNA chaperones (Horn et al., 2007; Nemaili et al., 2015). The CSD-containing proteins transiently and non-specifically bind to RNA (Hofweber et at, 2005; Horn et al., 2007; Namali et al., 2015). The best characterized CSPs are CspA from *Escherichia coli* and CspB from *Baciliius subtilis*. At high concentrations, CSP's have the ability to inhibit translation in eukaryotes. It is evident that CSP's can play a powerful role in plants at high concentrations. Plant CSD-containing proteins have been reported to respond to abiotic stress (Castiglioni et al., 2008; Chaikam and Karlson, 2008; Fusaro et al., 2007; Juntawong et al., 2013; Karlson et al., 2002; Nemali et al., 2015). The CSPs accumulate to high amounts in recently divided, cell types that exhibit meristematic activity (Chaikam and Karlson, 2008; Nakaminami et al., 2006; Nemali et al., 2015). In such cells, the combination of water and high CSP accumulation may result in reduced cellular expansion during that acclimation phase (Nemali et al; 2015). In theory, a plant containing a gene for CspB expression at all times would imply a stronger resistance to drought than a plant not containing the CspB gene.

Genetic improvement for grain yield over the past 40 years in the US and Canada was associated with an increase in plant dry matter production without a change in harvest index (Nemali et al., 2015; Tollenar and Lee, 2006). However, in Argentina, where drought stress can significantly affect crop production, genetic improvement for grain yield was associated with improvement in harvest index without a change in plant dry matter production (Echarte et al., 2004; Edmeades et al., 1999; Nemali et al., 2015; Tollenar and Lee, 2006). An increase in harvest index was associated with increased kernel set and specific increase in ear growth and dry matter partitioning to the ear at silking in the modern Argentinean hybrids (Echarte et al., 2004; Nemali et al., 2015). It is theorized that the CspB gene insertion in DroughtGard™ hybrids will improve harvest index, thus improving yield in drought stressed environments (Nemali et al., 2015).

Water Use Efficiency

Water use efficiency (WUE) can be defined in a number of ways. The Food and Agriculture Organization (FAO) of the United Nations defines it as the ratio of effective water use and actual water withdrawal (Hillel, 1997). In irrigation, WUE represents the ratio of estimated irrigation water requirements (through evapotranspiration) and actual water withdrawal. Efficient use of water in agriculture can be pursued by reducing water losses in transmission and distribution, increasing crop productivity or diverting water towards higher value crops. However, just because an agricultural use of water becomes more efficient does not mean that water is ‘saved’. When pursuing greater efficiency, it is important to take a broad view, recognizing the contribution that losses can make the productivity of other users and in other parts of the water cycle (Hillel, 1997).

Irrigated agriculture accounts for nearly 70% of total fresh water use worldwide, representing the largest use of fresh water (Siebert et al., 2010). In the U.S., irrigated agriculture accounts for 58% and 42% of total surface and groundwater use, respectively (McGuire, 2004). Agricultural productivity and water use efficiency should be considered together when evaluating sustainability of farming systems. From an economic perspective, farmers want to maximize production and profit per unit of water, and the goal of a sustainable system is to minimize the use of water per unit of production (Gandankis et al., 2015).

There are several methods used to determine crop WUE. Generally, WUE is defined as the ratio of grain yield (bu.) to the amount of water (in^3) supplied through water input. Hillel (1997) defines efficiency as the relationship between output and input calculated as a ratio (output/input). Relevant outputs include crop production measured as total biomass, grain yield, or particular yield components such as oil, protein, or kilocalories. Inputs include water, nutrients, radiation, fossil energy, labor, and capital.

Drought tolerance and WUE of crop plants are increasingly important because aridity in many areas of the world severely limits yield. This problem is expected to become more severe (Bunce, 2009). Yields would be greater in many cropping regions if greater water were available for crop growth. Water is essential to plant growth because it provides the medium for most cellular functions (Condon et al., 2002). To maximize crop WUE, it is necessary to both conserve water and maximize growth. Strategies available for maximizing WUE include planting high-yielding crops well adapted to the local soil and climate. They also include optimization of growing conditions via proper timing and performance of planting and harvesting, tillage, fertilization, and pest control. Improving WUE requires best farm management practices from start to finish (Hillel, 1997).

Forecasts of increasing scarcity of water for agriculture remain a strong motivation for improving crop water use efficiency (Bunce, 2009). Corn is relatively insensitive to water stress imposed during early vegetative growth stages because water demand is relatively small and plants can adapt to water stress to reduce the impact of periods of drought stress (Shaw, 1977). Corn grain yield is most sensitive to water stress from just before silking through grain fill (Shaw, 1977; Hall et al., 1982; Westgate and Boyer, 1985). Much work has focused on effects of crop management practices on water use efficiency. Recent research has begun to examine physiological traits as a way to improve WUE, and reduce drought stress in corn. Drought tolerance involves maintaining adequate cell turgor while preventing disruptions in cellular metabolism (Touchette et al., Munns et al., 1988, Save et al., 1993), whereas drought avoidance includes responses such as increased stomatal and cuticular resistances, changes in leaf area and anatomy, and changes in root anatomy (Touchette et al., Morgan, 1984; Jones and Corlette, 1992; Zlatev, 2005). Rooting depth has been identified as a strategy for drought avoidance in agricultural vegetation as well as in crops like corn and sorghum (Hund et al., 2008). Efforts in breeding and genetics to improve drought tolerance are assumed to result in improved WUE.

Research Question and Justification

Recently there has been an influx of drought tolerant corn traits into the corn seed market, most notably Monsanto's DroughtGard™, and Pioneer's AQUAmax™ technologies. These technologies have been used in semiarid dryland and limited irrigation cropping systems across the Great Plains. These technologies have been deployed in rain-fed, limited irrigated, and fully irrigated cropping systems since they came to market. With a desire to intensify cropping, and increase WUE, drought-tolerance traits seem like a promising tool to obtain those goals. A better understanding of the soil water status, yield, and response to environmental conditions is needed for hybrids with these technologies. Yields have been improving in High Plains cropping systems. Limited irrigation systems show promise for producers with low-yielding wells when used properly in a system to combat drought stress while maximizing yield. With dwindling water supplies from the Ogallala Aquifer and increased regulation of current irrigation wells, producers are looking for ways to maximize profits in water-stressed environments. Drought tolerant corn may be an important tool for producers facing this situation.

The objective of this research was to understand how DT and non-DT corn hybrids respond in a wide range of environmental conditions in terms of soil water status change, canopy indicators of stress, dry matter partitioning, and grain yield.

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Chapter 2 - Drought Tolerant Corn Response to Water Availability

Introduction

Producers in central and western Kansas are faced yearly with unpredictable periods of drought stress, which can be detrimental to crop production in this semi-arid environment. Many producers have turned to irrigation as a means to overcome the lack of rainfall, but with the declining availability of irrigation water from the Ogallala Aquifer and speculated increased regulation from the Kansas Water Appropriations Act of 2013 (Barfield, 2013), producers see that production practices need to adapt.

Since the mid 1990's Kansas corn acres have doubled, although irrigated corn acres have remained relatively unchanged. In 2013, 63% of Kansas corn acres were non-irrigated, representing 43% of the total state production (Kansas Department of Agriculture, 2014). With most of the new corn acres in Kansas going to rain-fed production systems, producers have shifted production practices to compensate for the lack of rainfall. The mean annual precipitation of 13.7-21.6 in. across the High Plains region only supplies 57-89% of the seasonal water requirement of full-production corn (Stone et al., 2006). Much of the production shift has come from the adoption of no-till/conservation tillage, and semi-irrigated systems. As production has expanded west, the performance of dryland corn also has increased (Staggenborg et al., 2008).

Soil-water conservation is an important topic in the semi-arid cropping regions of the western Corn Belt, due to low rainfall and high air temperatures. Producers have begun to intensify their operations in response to global population growth, as well as tightening profit margins. We have seen many new technologies come into the corn seed market being marketed as drought tolerant.

Drought tolerant corn hybrids are being marketed as part of the solution to producers who struggle with below-optimal water availability during the growing season. Drought tolerant corn hybrids are a relatively new technology, but could be valuable for producers in semi-arid cropping regions when used in a system where maximum benefit can be reached. The objective of this research was to understand how DT corn and non-DT hybrids respond in a wide range of environmental conditions in terms of soil water extraction patterns, canopy indicators of stress, dry matter partitioning, and grain yield.

In parallel to this project Brockleman (2016) conducted complimentary research trials in the same study locations studying grain sorghum response to environment and water supply.

Materials and Methods

Experiments were conducted in 2014 and 2015 at five locations throughout Kansas: Topeka, Hutchinson, Scandia, Garden City, and Tribune. Each location contained one to three different environments based on irrigation regimes (Table 1) as a way to generate additional responses to water availability. Hutchinson was the only site to contain dryland, semi-irrigated, and fully irrigated environments. Topeka and Scandia both contained rain-fed and fully irrigated environments. Tribune and Garden City each contained only a rain-fed environment. The combinations of year, location, and irrigation generated a total of 19 environments.

Agronomic management was specific for each environment (Table 2). Seeding rates were based on a recommended seeding rate a producer in the area of the field-site would use in either irrigated or rain-fed systems. Fertilizer rates were based on Kansas State University Soil Testing Lab recommendations (Leikam et al., 2003) for specific site and water input yield goals. In Topeka, Scandia, and Hutchinson, the previous crop was soybean. In Tribune the previous crop was fallow for 2014, and wheat in 2015. In Garden City the previous crop was wheat in both years. All plots were planted into 30-inch rows, four rows per plot, at a length of 30 to 45 ft., set up as a randomized complete block design with each hybrid replicated four times within each environment, and five times in Scandia and Hutchinson in 2015. Figures 1 to 5 present each site’s precipitation and maximum and minimum air temperatures.

Table 1. Agronomic management for 19 environments where DT and non-DT hybrids were evaluated in Kansas in 2014 and 2015

Environment	Planting date	Seeding rate	Yield goal	Harvest date	N	P_2O_5	K_2O	Plot Size
		seed ac^{-1}	bu. ac^{-1}		lb. ac^{-1}	lb. ac^{-1}	lb. ac^{-1}	ft. x ft.
Hutchinson 2014 Rain-fed	4/22/14	24,000	100	9/13/14	100	0	0	10x45
33ET		28,000	130		100			
66ET		32,000	160		140			
100ET			240		180			
Topeka 2014 Rain-fed	4/21/14	25,000	170	9/8/14	142	52	60	10x30
100ET		30,000	260		222			
Scandia 2014 Rain-fed	5/2/14	28,000	150	9/22/14	100	30	0	10x45
100ET		34,000	230	10/15/14	230			
Tribune 2014 Rain-fed	5/8/14	18,000	80	10/7/14	50	45	65	10x45
Garden City 2014 Rain-fed	5/28/14	18,000	80	10/6/14	50	45	0	10x30
Hutchinson 2015 Rain-fed	4/22/15	24,000	100	10/1/15	288	35	0	10x45
50ET		30,000	170					
100ET		36,000	250					
Topeka 2015 Rain-fed	4/16/15	25,000	170	9/30/15	250	52	60	10x30
100ET		30,000	230		100			
Scandia 2015 Rain-fed	4/29/15	28,000	170	9/30/15	100	30	0	10x45
100ET		34,000	230		250	45	60	
Tribune 2015 Rain-fed	5/15/15	18,000	80	10/7/15	50	45	60	10x45
Garden City 2015 Rain-fed	4/29/15	18,000	80	10/5/15	50	45	0	10x30

Table 2. Study site descriptions and irrigation inputs for 18 environments where DT and non-Dt hybrids were evaluated in Kansas in 2014-2015

Environment	Soil series	Soil classificaiton	Normal precip.	Observed precip.	Irrigation	Normal air temperature	Coordinates
			in.	in.	in.	F	
Hutchinson 2014 Rain-fed	Nalim loam soil	Fine-loamy, mixed, superactive, mesic Udic Argiustolls	17.81	15.69	0	55	37°56’37.3”N 98°06’30.7”W
33ET					3.39		
66ET					7.36		
100ET					11.33		
Topeka 2014 Rain-fed	Eudora-Bismarckgrove silt loam	Coarse-silty, mixed, superactive, mesic Fluventic Hapludolls	19.45	13.76	0	55	39°04’41.4”N 95°46’06.4”W
100ET					10.27		
Scandia 2014 Rain-fed	Crete silt loam soil	Fine, smectic, mesic Pahic Udertic Argiustolls	17.5	13.88	0	54	39°50’00.3”N 97°50’21.1”W
100ET					10		
Tribune 2014 Rain-fed	Ulysses silt loam	Fine-silty, mixed, superactive, mesic Aridic Haplustolls	10.53	12.27	0	52	38°28’07.0”N 101°46’43.9W
Garden City 2014 Rain-fed	Beeler silt loam	Fine-silty, mixed, superactive, mesic Aridic Argiustolls	9.58	16.61	0	54	37°59’29.1”N 100°49’10.9”W
Hutchinson 2015 Rain-fed	Nalim loam soil	Fine-loamy, mixed, superactive, mesic Udic Argiustolls	18.31	13.62	0	55	(37°56’37.3”N 98°06’30.7”W
50ET					5.75		

100ET	11.5

Table 2. Study site descriptions and irrigation inputs for 18 environments where DT and non-Dt hybrids were evaluated in Kansas in 2014-2015 (continued).							
Environment	Soil Type	Soil Class	Normal Precip.	Observed Precip.	Irrigation	Normal air Temperature	Coordinates
			(in)	**(in)**	**(in)**	**F**	
Topeka 2015 Rain-fed	Eudora-Bismarckgrove silt loam	Coarse-silty, mixed, superactive, mesic Fluventic Hapludolls	20.2	24.77	0	55	39°04’41.4”N 95°46’06.4”W
100ET					3.03		
Scandia 2015 Rain-fed	Crete silt loam soil	Fine, smectic, mesic Pahic Udertic Argiustolls	14.38	13.57	0	54	39°50’00.3”N 97°50’21.1”W
100ET					6.25		
Tribune 2015 Rain-fed	Ulysses silt loam	Fine-silty, mixed, superactive, mesic Aridic Haplustolls	11.27	10.86	0	52	38°28’07.0”N 101°46’43.9W
Garden City 2015 Rain-fed	Beeler silt loam	Fine-silty, mixed, superactive, mesic Aridic Argiustolls	12.79	15.63	0	54	37°59’29.1”N 100°49’10.9”W

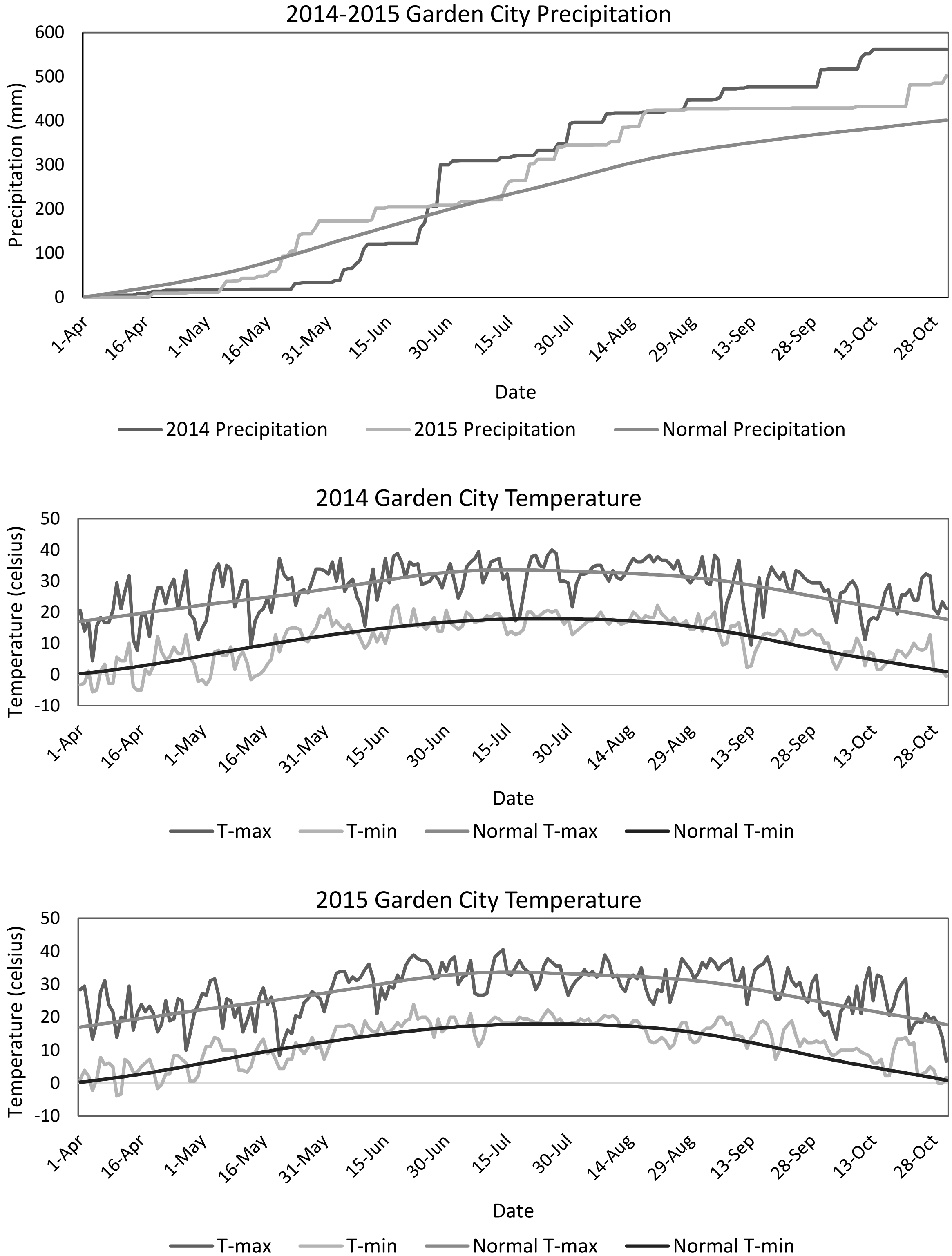


Figure 1. Normal and actual precipitation and normal and actual maximum and minimum air temperatures for Garden City, KS 2014-2015.

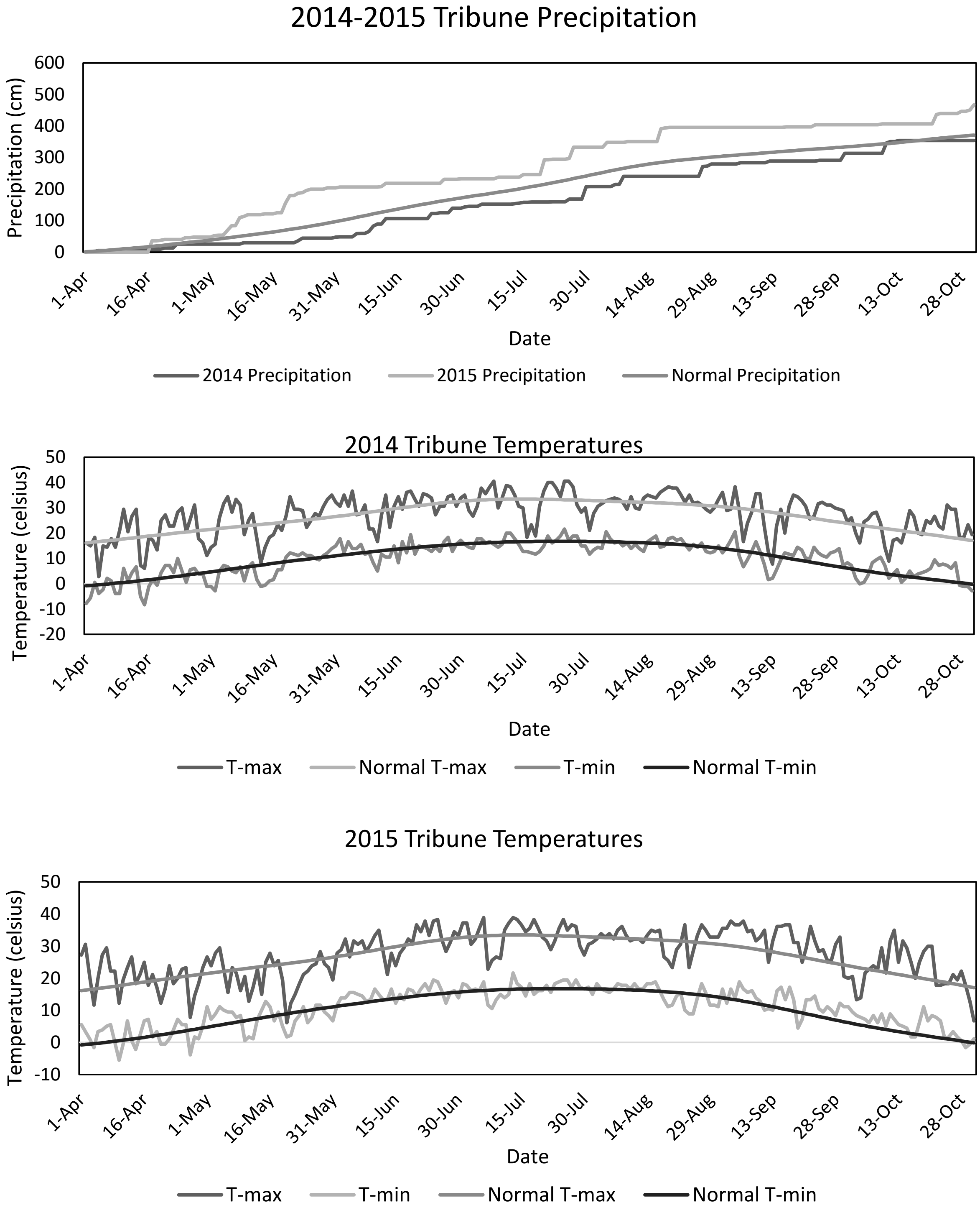


Figure 1. Normal and actual precipitation and normal and actual maximum and minimum air temperatures for Tribune, KS 2014-2015.

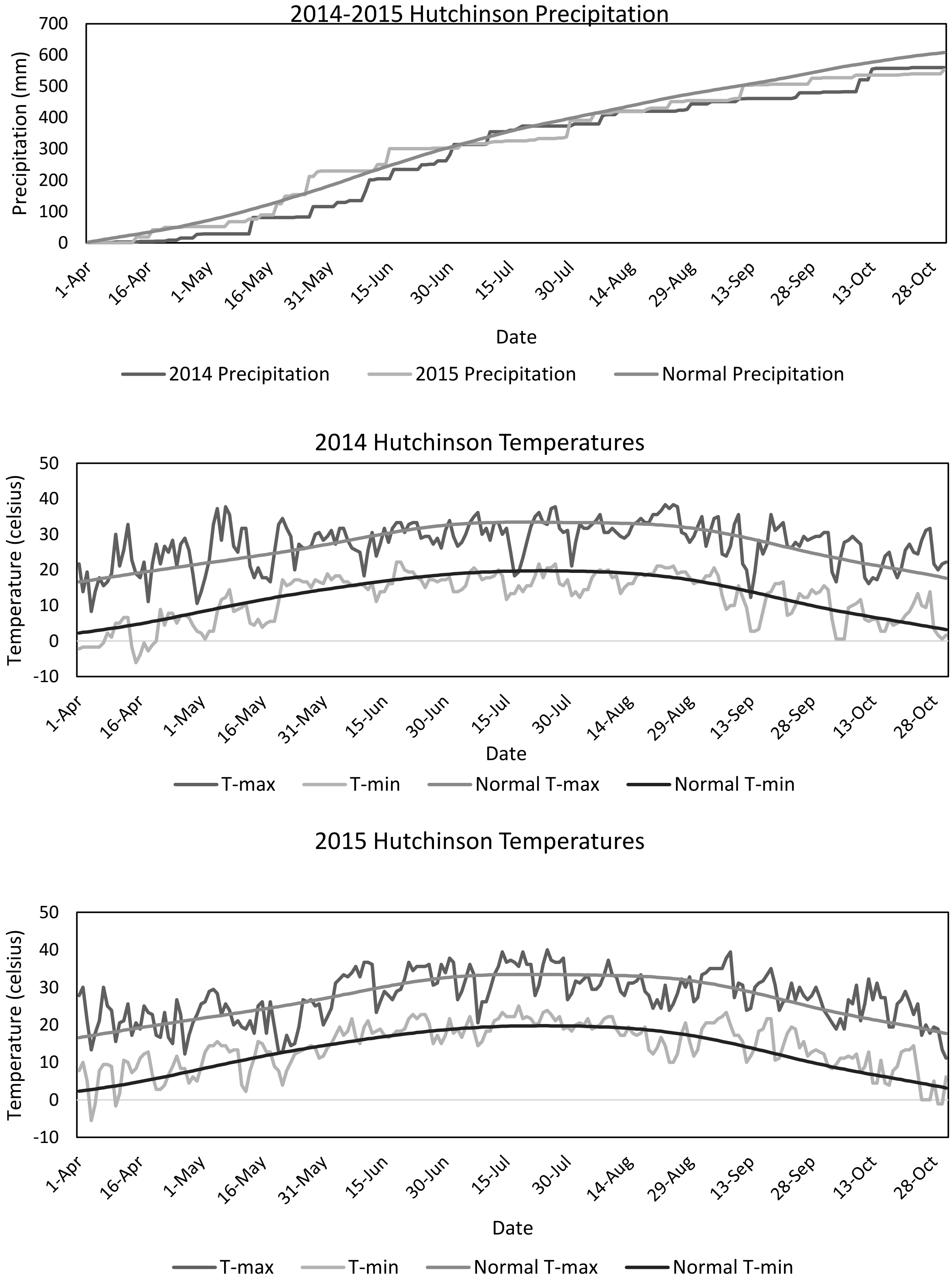


Figure 3. Normal and actual precipitation and normal and actual maximum and minimum air temperatures for Tribune, KS 2014-2015.

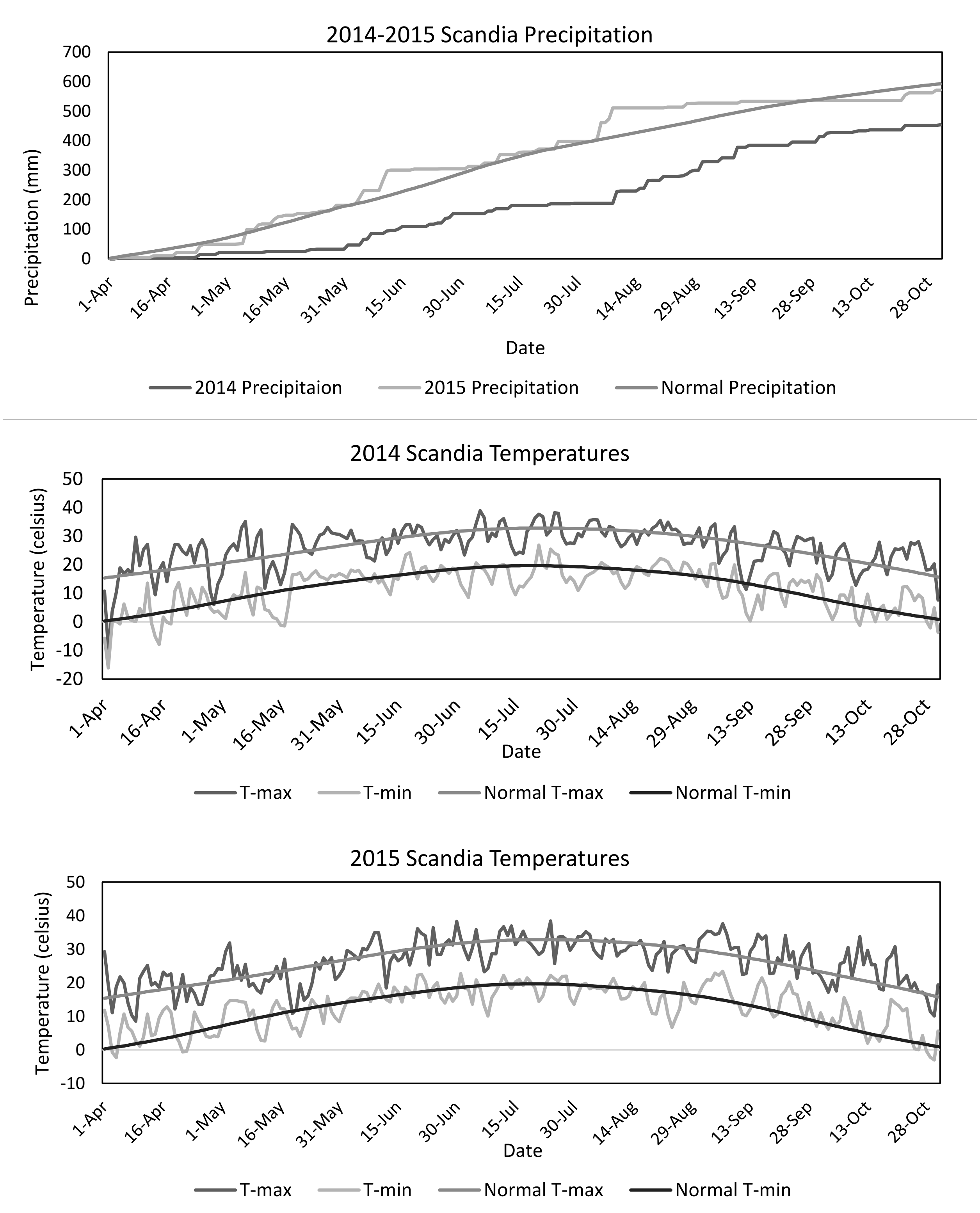
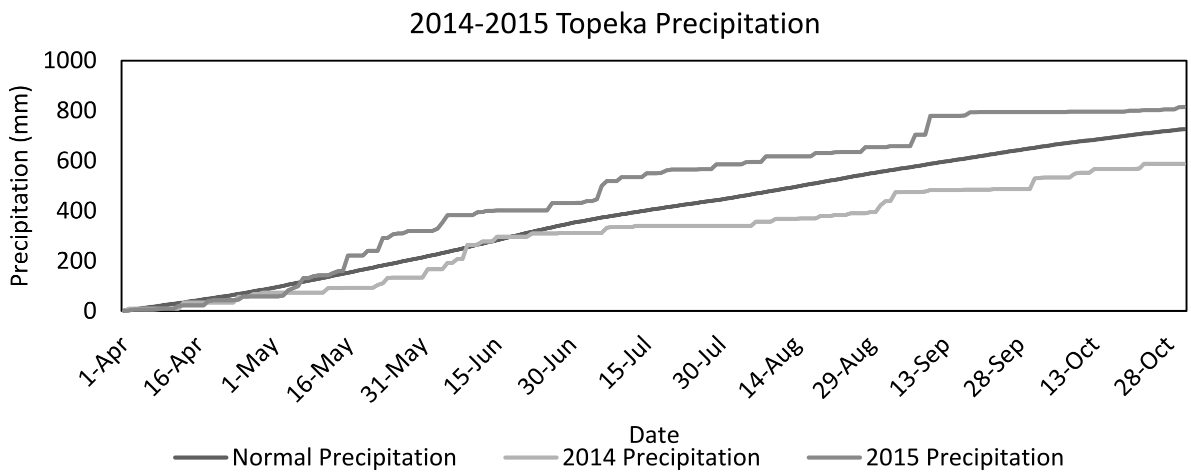
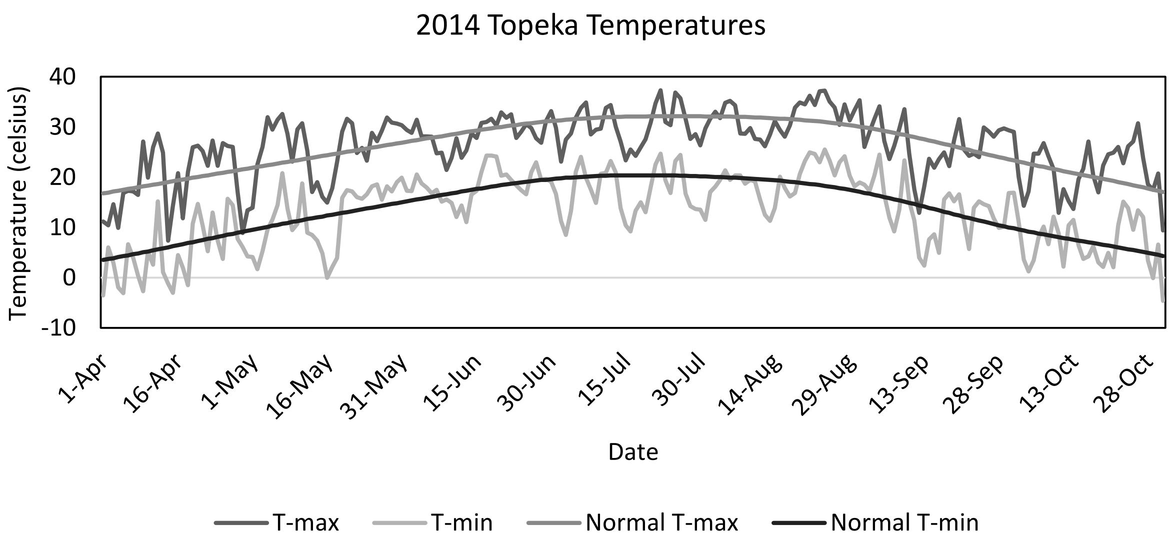


Figure 4. Normal and actual precipitation and normal and actual maximum and minimum air temperatures for Scandia, KS 2014-2015..





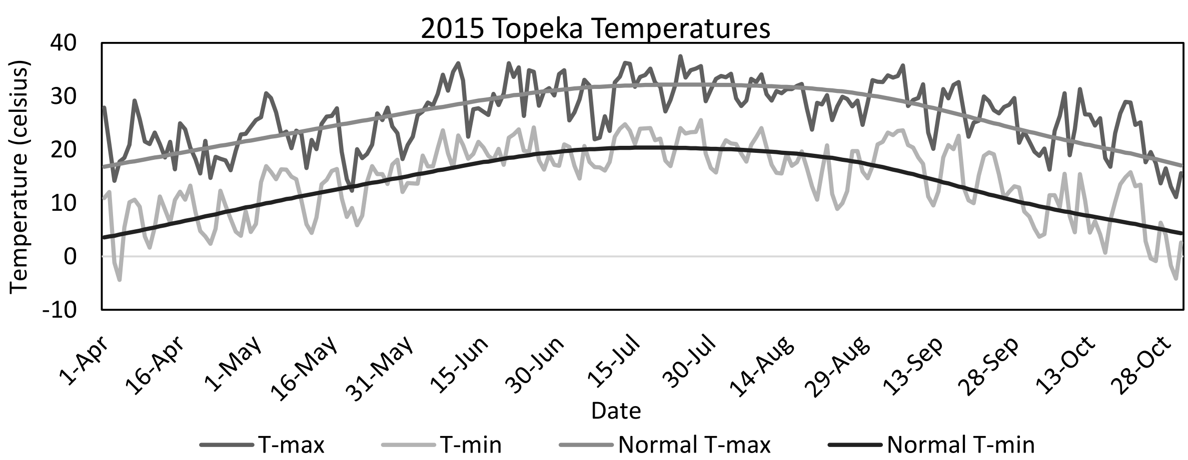


Figure 5. Normal and actual precipitation and normal and actual maximum and minimum air temperatures for Topeka, KS 2014-2015..

Three corn hybrids were used in all experiments. Hybrids were chosen based on their drought-tolerant (DT) characteristics and popularity among Kansas producers, recommended by seed industry professionals. Croplan 6000 DroughtGard™ (Land O' Lakes, Inc., St. Paul, MN) is a well-adapted 111-day relative maturity (RM) hybrid with conventional drought tolerance plus transgenic drought tolerance. Pioneer 1151 AQUAmax™ tolerance (DuPont Pioneer, Johnston, IA) is a 111-day RM hybrid with conventional drought. Croplan 6274 (Land O' Lakes, Inc., St. Paul, MN) is 111-day RM hybrid with no documented specific drought tolerance characteristics. It was included for its proven performance in well-watered environments as an intentional contrast with the two DT hybrids.

Soil water content was measured with a neutron moisture meter at all sites, in all years, using a 503DR Hydroprobe Moisture Gauge (CPN International, Inc., Martinez, CA) with a count duration of 16 seconds. Neutron moisture meter access tubes (6061-T6 aluminum tubing, outside diameter 4.128 cm, wall thickness 0.089 cm) 6 ft. in length, were installed in each individual plot to a depth of 5.5 ft. Moisture readings were taken at a starting depth of 0.5 ft. below the soil surface, with water content measured at increments of 1.0 ft. to 4.5 ft. The access tubes were installed into holes made with a soil sampling tube (1.625 in o.d., Giddings Machine Company, Inc., Windsor, CO) and a tractor-mounted hydraulic probe (Model GSRTS, Giddings Machine Company, Inc.), and tubes were covered with a PVC cap. The tubes were installed before the V3 stage of corn development for each location, and placed in the center of the middle two rows in each plot. Standard counts were recorded before and after tube measurements at each time of sampling. A mean standard count was used to calculate the count ratio (CR) from each tube-measured count (CR = measured count / mean standard count). The factory calibration equation ($\theta = 0.1733*CR - 0.006923$) of the neutron probe was used to calculate the volumetric water content (θ) in Topeka, Scandia, Hutchinson, and Garden City. In Tribune the following calibration (((NR/Std)(1.742109))+0.4008), (NR = neutron reading, and Std = standard count) was used to calculate volumetric water content (θ). Soil water content was measured at each experiment location at the growth stages of pre-V4, mid-vegetative (V8-V10), tassel (VT), mid-reproductive (R2-R4), and physiological maturity (R6).

The water content data were used to calculate change in soil water content ($\Delta\theta$) over three time intervals, namely, the interval between growth stages VE and VT (VEG), the interval between VT and R6 (Rep), and the interval between VE and R6 (Season). Change in water content for these intervals was calculated with the expressions $\Delta\theta_{VEG} = \theta_{VT} - \theta_{VE}$, $\Delta\theta_{REP} = \theta_{R6} - \theta_{VT}$, and $\Delta\theta_{SEASON} = \theta_{R6} - \theta_{VE}$. These $\Delta\theta$ values were calculated for all three hybrids and all five sampling depths (i.e., 0.5, 1.5, 2.5, 3.5 and 4.5 ft) in each environment. Accurate determination of θ and $\Delta\theta$ requires a soil-specific neutron probe calibration equation for each location. Because water contents at Topeka, Scandia, Hutchinson and Garden City were calculated by using the neutron probe's factory calibration equation, the calculated $\Delta\theta$ values for these locations are biased and of questionable accuracy. Nevertheless, because all $\Delta\theta$ values for a given location contain the same bias, it is valid to use them for determining how change in water content was influenced by hybrid at that given location. Hereafter, the $\Delta\theta$ values will be referred to as *approximate* changes in water content, to acknowledge the fact that they are biased estimates.

Soil water content data also were used to estimate total water input for each hybrid in each environment. Precipitation and irrigation from planting to physiological maturity (R6) in each environment were added to the estimates for approximate growing season changes in soil water content ($\Delta\theta_{SEASON}$) to estimate seasonal water input for each hybrid. These estimates were converted to a percent of maximum water input by dividing each estimate by the maximum observed value across all hybrids and environments (Percent of maximum water input = estimated seasonal water input / maximum observed estimate of seasonal water input).

Grain yield of each plot was recorded at all locations in both years. The center two rows of each plot were machine harvested at Topeka, Tribune, and Garden City in both years and at Hutchinson in 2015. Due to lodging issues at Scandia in 2014 and Hutchinson in 2014, plots were hand-harvested by collecting all ears from ten feet of the center two rows (20 ft. total) and shelling them mechanically with an Almaco ECS Sheller (Almaco, Nevada, IA). All grain yields were normalized to 15.5% moisture. Plots were harvested by hand using the same method mentioned above at Scandia in 2015.

Biomass production and harvest index (HI) were determined at Topeka, Scandia, and Hutchinson in 2014 and 2015 for each plot. Total biomass was measured soon after the crop reached the R6 developmental stage (physiological maturity). Five representative plants were cut from one of the outside two rows of each plot and weighed to determine fresh weight. The five plants were then chopped with an upright chipper-shredder to a particle size of 1x1", and a representative 800-g sub-sample was obtained for dry matter determination. Total dry matter accumulation was determined by weighing the 800-g sub-sample before and after drying for 72 hours at 150°F. Total dry matter accumulation was calculated on a per acre basis using the plant stand recorded for each plot. The grain harvest index was calculated as the ratio of grain weight to total dry matter weight.

Crop response to environmental conditions was characterized whenever soil water content was determined at Topeka, Scandia, and Hutchinson via estimates of canopy temperature, ear-leaf temperature, and SPAD measurements (Prasad et al., 2006; Fletcher et al. 2007). Canopy temperature and ear leaf temperature were recorded with an Omega OS499 Series

Laser Infrared Thermometer (OMEGA Engineering, Inc., Stamford, Connecticut). Three readings were taken within the center two rows of each plot were averaged to estimate canopy temperature at each sampling date. Ear leaf temperature was recorded for the same five marked plants located in one of the center two rows beginning when the ear leaf could be identified until the mid-reproductive stage. As a general indication of plant health, SPAD readings were taken with a Konica Minolta Chlorophyll Meter SPAD-502Plus (Konica Minolta, Inc., Ramsey, NJ). One SPAD reading was obtained from the uppermost developed leaf on each of the same five marked plants and averaged to provide a value for each plot on each sampling date.

Given the inconsistency of irrigation environment structure across locations, analysis of variance was conducted for each location using the GLIMMIX procedure in SAS 9.4 (SAS Institute, 2014) to determine significance of experimental factors and their interactions. Hybrid, environment, and year were designated as fixed effects, and replications as random effects. Statistical significance was established at the 0.10 probability level. The 2014 100ET environment in Hutchinson was removed from the analysis due to planting problems, including excessive variability in row spacing.

Hybrid plasticity is useful for comparing how hybrids respond to different environments (Mahadevan et al. 2015). Hybrid plasticity was characterized by plotting each hybrid’s yield and harvest index within each environment vs. the means of all environments in Prism 5.0 (GraphPad Prism 5.0, 2007). The slopes of each hybrid’s yield response relative to the environment means were compared at the 0.10 probability level.

Regression analysis was performed to illustrate the relationship of hybrid yield to percent maximum water input, in the PROC REG procedure of SAS 9.4 (SAS Institute, 2014). The quadratic model was the best observed model used to fit data. Other models such as linear, linear plateau, and quadratic plateau were evaluated but did not fit the data as well as the quadratic model.

Correlation analysis was conducted in SAS 9.4 using the PROC CORR procedure to explore relationships between yield and other response variables. A subsequent linear regression analysis was performed to test for slope differences between hybrids at the 0.10 probability level for response variables that exhibited a significant relationship with yield: biomass production and SPAD at mid-reproductive to yield.

Results

Within each location, the interaction of year, environment, and hybrid interaction was not significant for any response variable (Tables 3 to 14). The environment by hybrid interaction term was significant for only Scandia SPAD at VT (Table 7), Hutchinson canopy temperature at VT (Table 10), and Topeka ear leaf temperature at VT (Table 13). All response variables had a significant year effect with the exception of Topeka and Hutchinson harvest index (Table 5). Environment effects were generally observed with yield, biomass, harvest index, and change in soil water status (Tables 3-6).

The predominant lack of significance for the interaction of irrigation with hybrid indicates that the hybrids responded in a similar manner regardless of irrigation regime within a location. This could be due to the fact that the hybrids are similarly adapted for the semi-arid cropping region of the Great Plains.

Environmental factors also played a significant role in hybrid responses. For the 2014 and 2015 growing seasons, Garden City and Tribune both experienced favorable years in terms of precipitation and air temperatures (Figure 1 and 2). In both years, Garden City received above-normal precipitation, and had near-normal maximum and minimum air temperatures (Figure 1).

In 2014 Tribune received above-normal precipitation (Table 2), but many times experienced cooler air temperatures at crucial developmental stages (Figure 1). A significant example of this is the cool air temperatures between July 14, and July 19 where observed maximum temperatures ranged from 18-30.5°C, opposed to the 30 year normal of 33°C when the crop was pollinating. At Tribune for the 2015 growing season, precipitation exceeded normal beginning in mid-April, and stayed above normal for the remainder of the season ending the growing season with 2.84 in. above normal precipitation. At Hutchinson, precipitation for 2014 and 2015 largely remained at normal (Figure 3), but there were noticeable differences in air temperature differences between years. In 2014 temperatures remained relatively cool over the course of the growing season, and did not experience extremes from normal. In 2015, above normal temperatures at important stages of crop development were observed (Figure 3), most notably at the VT stage where temperatures exceeded normals. Scandia in 2014 (Figure 4) experienced below-normal precipitation for the growing season, but 2015 saw above normal precipitation amounts 14.38 in. Temperatures at Scandia in 2014 at normal, with few instances of extreme highs and lows. In 2015 there were more instances of highs above-normal air temperatures than in 2014. In Topeka (Figure 5) the 2014 season saw below-normal precipitation 13.76 in. versus 19.45 in. as normal, opposed to 2015 where precipitation of 24.77 in. observed remained above normal 20.2 in. for the season. Much like Scandia, Topeka saw less instances of extreme high air temperatures in 2014 than in 2015.

The highly significant year and environment effects for most response variables at most locations indicate that the environments were indeed different from each other. Therefore, hybrid mean separations for response variables within each environment show specifically how each hybrid responded to the environmental conditions where they were placed.

Table 3. By location ANOVA of yield for experiments comparing DT and non-DT hybrids in different irrigation environments at five locations in Kansas in 2014 and 2015.

Source of variation	Hutchinson	Topeka	Scandia	Tribune	Garden City
			Pr>F		
Year	0.0179	<0.0001	<0.0001	<0.0001	<0.0001
Environment	<0.0001	0.9815	<0.0001	--	--
Hybrid	0.3536	0.4041	0.1349	0.6914	0.1547
Year*Hybrid	0.9553	0.8376	0.9131	0.8267	0.4120
Year*Environment	<0.0001	0.451	0.0001	--	--
Environment*Hybrid	0.1519	0.9057	0.4734	--	--
Year*Irrigation*Hybrid	0.3584	0.8729	0.1302	--	--

Table 4. By location ANOVA of season water status change for experiments comparing DT and non-DT hybrids in different irrigation environments at five locations in Kansas in 2014 and 2015.

Source of variation	Hutchinson	Topeka	Scandia	Tribune	Garden City
			Pr>F		
Year	<0.0001	<0.0001	0.0039	<0.0001	0.0003
Environment	<0.0001	<0.0001	<0.0001	--	--
Hybrid	0.6771	0.8300	0.4663	0.0069	0.2341
Year*Hybrid	<0.0001	<0.0001	0.0044	0.5649	0.2178
Year*Environment	0.8231	0.1033	0.9576	--	--
Environment*Hybrid	0.3192	0.4966	0.5113	--	--
Year*Irrigation*Hybrid	0.2650	0.1703	0.9993	--	--

Table 5. By location ANOVA of harvest index for experiments comparing DT and non-DT hybrids in different irrigation environments at five locations in Kansas in 2014 and 2015.

Source of variation	Hutchinson	Topeka	Scandia
		Pr>F	
Year	0.1505	0.3357	<0.0001
Environment	0.8494	<.0001	0.0036
Hybrid	0.2124	0.5397	0.9266
Year*Hybrid	0.1375	0.0740	0.388
Year*Environment	0.8048	0.4837	0.4731
Environment*Hybrid	0.2259	0.7256	0.8196
Year*Irrigation*Hybrid	0.3420	0.9500	0.8669

Table 6. By location ANOVA of biomass production for experiments comparing DT and non-DT hybrids in different irrigation environments at five locations in Kansas in 2014 and 2015.

Source of variation	Hutchinson	Topeka	Scandia
		Pr>F	
Year	<0.0001	<0.0001	0.0894
Environment	<0.0001	<0.0001	<0.0001
Hybrid	0.3804	0.9505	0.2579
Year*Hybrid	--	0.4663	0.7710
Year*Environment	0.0689	0.4729	0.1166
Environment*Hybrid	0.2337	0.9459	0.9283
Year*Env*Hybrid	--	0.3469	0.3555

Table 7. By location ANOVA of SPAD at VT for experiments comparing DT and non-DT hybrids in different irrigation environments at five locations in Kansas in 2014 and 2015.

Source of variation	Hutchinson	Topeka	Scandia	Tribune	Garden City
			Pr>F		
Year	<0.0001	<0.0001	<0.0001	<0.0001	0.0054
Environment	0.0011	0.2181	0.0403	--	--
Hybrid	0.7749	0.4223	0.1864	0.0832	0.5436
Year*Hybrid	--	0.2822	<0.0001	--	--
Year*Environment	0.7153	0.6066	0.0478	0.8072	0.2947
Environment*Hybrid	0.9968	0.8191	0.0889	--	--
Year*Env*Hybrid	--	0.2420	0.7251	--	--

Table 8. By location ANOVA of SPAD at mid-reproduction for experiments comparing DT and non-DT hybrids in different irrigation environments at five locations in Kansas in 2014 and 2015.

Source of variation	Hutchinson	Topeka	Scandia
		Pr>F	
Year	<0.0001	0.0277	0.0029
Environment	<0.0001	0.8714	0.1696
Hybrid	0.1821	0.5528	0.0056
Year*Hybrid	--	0.0577	<0.0001
Year*Environment	0.1567	0.1461	0.0538
Environment*Hybrid	0.2568	0.4254	0.5503
Year*Env*Hybrid	--	0.5594	0.1313

Table 9. By location ANOVA of SPAD at R6 for experiments comparing DT and non-DT hybrids in different irrigation regimes at five locations in Kansas in 2014 and 2015.

Source of variation	Hutchinson	Topeka	Scandia
		Pr>F	
Environment	0.7650	0.0766	0.2696
Hybrid	0.0405	0.7248	0.5006
Environment*Hybrid	0.9952	0.6319	0.5281

Table 10. By location ANOVA of canopy temperature at VT for experiments comparing DT and non-DT hybrids in different irrigation environments at five locations in Kansas in 2014 and 2015.

Source of variation	Hutchinson	Topeka	Scandia	Tribune	Garden City
			Pr>F		
Year	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Environment	<0.0001	0.7691	0.7372	--	--
Hybrid	0.1683	0.7310	0.6609	0.4317	0.3199
Year*Hybrid	--	0.1478	0.4584	--	--
Year*Environment	0.0004	0.4211	0.6578	0.6533	0.4798
Environment*Hybrid	0.0016	0.1346	0.2525	--	--
Year*Env*Hybrid	--	0.5783	0.8185	--	--

Table 11. By location ANOVA of canopy temperature at mid-reproduction, for experiments comparing DT and non-DT hybrids in different irrigation environments at five locations in Kansas in 2014 and 2015.

Source of variation	Hutchinson	Topeka	Scandia
		Pr>F	
Year	<0.0001	0.0058	<0.0001
Environment	<0.0001	0.2213	0.2765
Hybrid	0.6436	0.3791	0.1392
Year*Hybrid	--	0.5216	0.2765
Year*Environment	0.3900	0.4419	0.1392
Environment*Hybrid	0.8428	0.4453	0.8143
Year*Env*Hybrid	--	0.2791	0.8143

Table 12. By location ANOVA of canopy temperature at R6 for experiments comparing DT and non-DT hybrids in different irrigation environments at five locations in Kansas in 2014 and 2015.

Source of variation	Hutchinson	Topeka	Scandia
		Pr>F	
Environment	0.0205	0.5979	<0.0001
Hybrid	0.3754	0.0827	0.8181
Environment*Hybrid	0.5473	0.5591	0.3643

Table 13. By location ANOVA of ear leaf temperature at VT for experiments comparing DT and non-DT hybrids in different irrigation environments at five locations in Kansas in 2014 and 2015.

	Hutchinson	Topeka	Scandia	Tribune	Garden City
			Pr>F		
Year	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Environment	0.0197	0.9723	0.6619	--	--
Hybrid	0.4695	0.0111	0.8334	0.5280	0.0297
Year*Hybrid	--	0.0113	0.4546	--	--
Year*Environment	0.3512	0.2160	0.3089	0.9132	0.0346
Environment*Hybrid	0.3606	0.0074	0.6247	--	--
Year*Env*Hybrid	--	0.0316	0.5511	--	--

Table 14. By location ANOVA of ear leaf temperature at R6 for experiments comparing DT and non-DT hybrids in different irrigation environments at five locations in Kansas in 2014 and 2015.

Source of variation	Hutchinson	Topeka	Scandia
		Pr>F	
Year	<0.0001	0.0014	<0.0001
Environment	<0.0001	0.8281	<0.0001
Hybrid	0.8430	0.5238	0.6958
Year*Hybrid	--	0.7996	<0.0001
Year*Environment	0.5835	0.0724	0.6004
Environment*Hybrid	0.8402	0.4089	0.3830
Year*Env*Hybrid	--	0.4785	0.2497

In few environments were differences among hybrid yield observed (Table 15). Among all rain-fed environments, differences were observed only at Tribune 2014, and Garden City in 2014 and 2015. For all these environments, Croplan 6000DG had a significantly lower grain yield than Croplan 6274. Hybrid yields did not differ in any of the semi-irrigated environments. In the 100ET environments, the only environment that had no differences for grain yield was in Topeka for the 2014 and 2015 seasons. In the 100ET environments where a difference in yield was detected, Pioneer 1151AM had greater yield than Croplan 6000DG, and was similar in yield to Croplan 6274. Although yields did not differ very often in the environments where these hybrids were placed, Croplan 6000DG tended to produce the least grain and did so more frequently in the 100ET environments. In general, Pioneer 1151AM and Croplan 6274 were the leading hybrids when a separation of means was detected.

Table 15. DT and non-DT hybrid yield comparison in 18 environments in Kansas in 2014 and 2015.

Environment	Croplan 6274		Pioneer 1151AM		Croplan 6000DG	
Rain-fed			bu. ac^{-1}			
Hutchinson 2014	109	a†	129	a	124	a
Hutchinson 2015	62	a	64	a	57	a
Topeka 2014	134	a	125	a	116	a
Topeka 2015	173	a	160	a	153	a
Scandia 2014	118	a	129	a	134	a
Scandia 2015	166	a	172	a	165	a
Tribune 2014	168	a	166	a	156	b
Tribune 2015	119	a	119	a	117	a
Garden City 2014	64	a	57	ab	50	b
Garden City 2015	167	a	137	ab	145	b
Limited-irrigated						
Hutchinson 2014 33ET	126	a	134	a	120	a
Hutchinson 2014 66ET	171	a	168	a	167	a
Hutchinson 2015 50ET	119	a	134	a	152	a
100ET						
Hutchinson 2015	177	ab	190	a	162	b
Topeka 2014	121	a	116	a	120	a
Topeka 2015	177	a	165	a	162	a
Scandia 2014	218	ab	229	a	205	b
Scandia 2015	224	ab	228	a	215	b

†Values in a row followed by the same letter are not significantly different (α=0.10).

In the rain-fed environments, difference in biomass production was detected at Hutchinson 2014, and Scandia 2015 (Table 16). At Hutchinson 2014 Pioneer 1151AM had greater biomass than both Croplan 6000DG and Croplan 6274. At Scandia 2015 Pioneer 1151AM again produced more biomass than Croplan 6000DG, but Croplan 6274 did not differ from Pioneer 1151AM or Croplan 6000DG (Table 16). There were no separations in biomass production in the semi-irrigated environments. Only in one environment in the 100ET group was a separation in biomass detected. At Scandia 2014 Pioneer 1151AM and Croplan 6000DG did not differ, but were both greater than Croplan 6274 (Table 16).

Where there was separation in the rain-fed environments, Croplan 6000DG always had the least biomass production, but no differences in HI or yield were detected in those environments (Table 16). This is to be expected from the observations made by Nemail (2014), where the introduction of the CspB gene reduced overall biomass production in stressed environments. Pioneer 1151AM in all instances produced the highest biomass of all hybrids, implying the ability to maintain plant function in water-stressed environments (Table 16).

Table 16. DT and non-DT hybrid biomass production comparison in 18 environments in Kansas in 2014 and 2015.

Environment	Croplan 6274		Pioneer 1151AM		Croplan 6000DG	
Rain-fed			lb. ac^{-1}			
Hutchinson 2014	14 717	b†	19 308	a	15 759	b
Hutchinson 2015	9505	a	8664	a	8719	a
Topeka 2014	14 230	a	12 452	a	14 525	a
Topeka 2015	21 716	a	22 192	a	22 550	a
Scandia 2014	17 054	a	18 006	a	20 427	a
Scandia 2015	20 142	ab	20 560	a	18 770	b
Semi-irrigated						
Hutchinson 2014 33ET	20 552	a	18 583	a	19 174	a
Hutchinson 2014 66ET	25 149	a	22 476	a	22 880	a
Hutchinson 2015 50ET	19 830	a	19 019	a	18 719	a
100ET						
Hutchinson 2015	24 000	a	22 284	a	23 016	a
Topeka 2014	18 758	a	18 336	a	20 998	a
Topeka 2015	27 535	a	28 575	a	24 465	a
Scandia 2014	21 737	b	24 114	a	24 222	a
Scandia 2015	24 061	a	24 260	a	24 619	a

†Values in a row followed by the same letter are not significantly different (α=0.10).

In the rain-fed environments, only two locations revealed differences in HI (Table 17). In Hutchinson 2014, and Topeka 2015 Croplan 6000DG had the greatest HI of 0.44 value followed by Croplan 6274, and Pioneer 1151AM. One instance of HI difference in the semi-irrigated environments was observed. For the 100ET environments, differences were observed in

Hutchinson 2015, and Scandia 2014. In Hutchinson 2015 Croplan 6274 had a greatest HI of 0.46 than Croplan 6000DG, and Pioneer 1151AM did not differ from either of the other two hybrids. In Scandia 2014 Croplan 6000DG had a smaller HI value than both Pioneer 1151AM and Croplan 6274. Among rain-fed and semi-irrigated environments, Croplan 6000DG consistently had the greatest HI value when there were differences detected, generally followed by Croplan 6274, and lastly Pioneer 1151AM. In the 100ET environments where differences were found, Croplan 6000DG always had the smallest HI, and Pioneer 1151AM always had the greatest HI. This indicates that in these environments, Pioneer 1151AM had an improved HI of 6 to 10% compared to Croplan 6000DG, and generally the same HI as Croplan 6274.

When differences in HI were observed, Croplan 6000DG had the lower HI in the 100ET environments, and Pioneer 1151AM had the lowest HI in the rain-fed environments. Croplan 6274 always had the highest HI, or was no different from the leading hybrid in instances when differences were observed. The findings of an improved HI in the rain-fed environment follows similar results as Nemali (2014), where the introduction of the CspB gene improved the HI 6-8% in water-limited environments.

Table 17. Harvest index for DT and non-DT hybrids in 18 environments in Kansas in 2014 and 2015.

Environment	Croplan 6274		Pioneer 1151AM		Croplan 6000DG	
Rain-fed						
Hutchinson 2014	0.40	ab†	0.37	b	0.44	a
Hutchinson 2015	0.38	a	0.40	a	0.38	a
Topeka 2014	0.42	a	0.43	a	0.44	a
Topeka 2015	0.42	ab	0.37	b	0.45	a
Scandia 2014	0.29	a	0.28	a	0.27	a
Scandia 2015	0.47	a	0.47	a	0.49	a
Semi-irrigated						
Hutchinson 2014 33ET	0.37	a	0.41	a	0.35	a
Hutchinson 2014 66ET	0.38	a	0.41	a	0.41	a
Hutchinson 2015 50ET	0.34	a	0.38	a	0.45	a
100ET						
Hutchinson 2015	0.46	a	0.42	ab	0.38	b
Topeka 2014	0.30	a	0.32	a	0.30	a
Topeka 2015	0.35	a	0.35	a	0.38	a
Scandia 2014	0.35	a	0.34	a	0.32	b
Scandia 2015	0.50	a	0.52	a	0.51	a

†Values in a row followed by the same letter are not significantly different (α=0.10).

In the rain-fed environments, differences in seasonal water input between hybrids occurred in Topeka 2015, Tribune 2014, and Tribune 2015 (Table 18). In the Tribune environments, Croplan 6000DG lagged the other hybrids by 7%, but in Topeka 2015 Pioneer 1151AM lagged the other hybrids by 4 to 5%. In the semi-irrigated environments, only in Hutchinson 2014 66ET was a difference in water input observed. In this environment, Croplan 6000DG had 1% less water input than Croplan 6274 and Pioneer 1151AM. In the 100ET environments, the only differences in crop water loss was observed in Hutchinson 2015 where Croplan 6274 had 3%more seasonal water input than Pioneer 1151AM, which had 3% more than Croplan 6000DG. No major, consistent differences between hybrids in seasonal water inputs were detected in the tested environments. In only five environments was a difference detected. In those five environments, Croplan 6000DG had the least water input in three of them, and Croplan 6274 had the greatest water input in every environment.

Water input differences occurred most frequently in the rain-fed environments, and most notably Croplan 6000DG generally received the least amount of water input. This was expected in the rain-fed environments considering no additional water from irrigation was being supplied. The fact that Croplan 6000DG produced yields similar to the other hybrids in some environments where it had less seasonal water input suggests that it could have enhanced water use efficiency

Table 18. Seasonal water inputs for DT and non-DT hybrids expressed as a percent of maximum in 18 environments in Kansas in 2014 and 2015.

Environment	Croplan 6274		Pioneer 1151AM		Croplan 6000DG	
Rain-fed	——% of maximum water input——					
Hutchinson 2014	64	a†	65	a	65	a
Hutchinson 2015	53	a	56	a	53	a
Topeka 2014	56	a	56	a	56	a
Topeka 2015	100	a	95	b	99	ab
Scandia 2014	55	a	55	a	55	a
Scandia 2015	58	a	58	a	58	a
Tribune 2014	59	a	58	ab	56	b
Tribune 2015	45	a	46	a	42	b
Garden City 2014	60	a	62	a	60	a
Garden City 2015	75	a	74	a	72	a
Semi-irrigated						
Hutchinson 2014 33ET	73	a	73	a	72	a
Hutchinson 2014 66ET	83	a	83	ab	82	b
Hutchinson 2015 50ET	74	a	74	a	75	a
100ET						
Hutchinson 2015	96	a	90	b	93	ab
Topeka 2014	80	a	86	a	85	a
Topeka 2015	100	a	99	a	98	a
Scandia 2014	72	a	72	a	71	a
Scandia 2015	72	a	72	a	71	a

†Values in a row followed by the same letter are not significantly different (α=0.10).

In the rain-fed environments, differences in SPAD values at VT were observed in Topeka 2015, Scandia 2014, and Scandia 2015 (Table 19). In Topeka 2015 Croplan 6000GD had the greatest SPAD value and was 3.6 units greater than Pioneer 1151AM. In Scandia 2014 Pioneer 1151AM and Cropland 6000DG did not differ from each other, but both were greater than the Croplan 6274 SPAD value of 53. At Scandia 2015 Pioneer 1151AM had the greatest observed SPAD value and was 7 units greater than Croplan 6000DG. In the semi-irrigated environments, the only differences in SPAD at mid-reproduction were observed at Hutchinson 2015 50ET environment (Table 19). At this environment, Croplan 6000DG and Croplan 6274 did not differ, but both were 4 units greater than Pioneer 1151AM. In the 100ET locations, only in Scandia 2015 were differences in SPAD values observed (Table 19). Here Croplan 6274 had a SPAD value that was 3 units greater the value for Croplan 6000DG. In the rain-fed environments Croplan 6000DG had the largest SPAD value at VT, with the exception of Scandia 2015, where it and Croplan 6274 both had the same SAPD value, but both were greater than Pioneer 1151AM.

Table 19. SPAD index for DT and non-DT hybrids at VT in 18 environments in Kansas in 2014 and 2015.

Environment	Croplan 6274		Pioneer 1151AM		Croplan 6000DG	
Rain-fed						
Hutchinson 2014	51	a†	53	a	51	a
Hutchinson 2015	38	a	37	a	39	a
Topeka 2014	58	a	59	a	58	a
Topeka 2015	52	ab	51	b	55	a
Scandia 2014	53	b	58	a	56	a
Scandia 2015	39	ab	42	a	36	b
Tribune 2014	54	ab	52	b	56	a
Tribune 2015	46	a	44	a	47	a
Garden City 2014	48	a	51	a	50	a
Garden City 2015	54	ab	52	b	55	a
Semi-irrigated						
Hutchinson 2014 33ET	50	a	50	a	46	a
Hutchinson 2014 66ET	46	a	54	a	53	a
Hutchinson 2015 50ET	44	a	41	b	44	a
100ET						
Hutchinson 2015	45	a	43	a	45	a
Topeka 2014	59	a	60	a	61	a
Topeka 2015	52	a	53	a	52	a
Scandia 2014	54	a	53	a	54	a
Scandia 2015	46	a	45	ab	43	b

†Values in a row followed by the same letter are not significantly different (α=0.10).

Differences in SPAD at the mid-reproductive were observed at Scandia 2014 and 2015, and in Hutchinson 2015 (Table 20). In Scandia 2014, Croplan 6000DG and Pioneer 1151AM had the same SPAD value of 58, but Croplan 6274 had a value that was 8 units less. In Scandia 2015 Croplan 6000DG had the greatest SPAD value at 48, which was greater than Pioneer 1151AM, but no different than Croplan 6274. In the Hutchinson 2015 50ET environment, Pioneer 1151AM had the lowest SPAD value at 45. In the 100ET environments the only difference was detected at Hutchinson 2015 where Croplan 6000DG had the greatest SPAD value, Croplan 6274 had the smallest, and Pioneer 1151AM did not differ from either.

Table 20. Mean DT and non-DT hybrid SPAD index at mid-reproductive, in 18 environments in Kansas in 2014 and 2015.

Environment	Croplan 6274		Pioneer 1151AM		Croplan 6000DG	
Rain-fed						
Hutchinson 2014	44	a†	46	a	48	a
Hutchinson 2015	38	b	41	a	37	b
Topeka 2014	47	a	53	a	52	a
Topeka 2015	54	a	56	a	57	a
Scandia 2014	50	b	58	a	58	a
Scandia 2015	47	ab	45	b	48	a
Semi-irrigated						
Hutchinson 2014 33ET	44	a	45	a	47	a
Hutchinson 2014 66ET	45	a	51	a	50	a
Hutchinson 2015 50ET	49	a	45	b	48	a
100ET						
Hutchinson 2015	47	b	48	ab	50	a
Topeka 2014	53	a	55	a	51	a
Topeka 2015	54	a	52	a	55	a
Scandia 2014	49	a	50	a	52	a
Scandia 2015	53	a	54	a	55	a

†Values in a row followed by the same letter are not significantly different (α=0.10).

No differences in SPAD values were detected in the rain-fed, or 100ET environments at the R6 development stage (Table 21). The only differences detected were at Hutchinson 2014 33ET where Pioneer 1151AM at 56 was greater than Croplan 6000DG, and Croplan 6274 was not different than either of the other two hybrids. At black layer, SPAD values were not different between hybrids in most of the tested environments.

Table 21. Mean DT and non-DT hybrid SPAD index at R6 in 7 environments in Kansas in 2014 and 2015.

Environment	Croplan 6274		Pioneer 1151AM		Croplan 6000DG	
Rain-fed						
Hutchinson 2014	55	a†	56	a	53	a
Topeka 2014	48	a	46	a	47	a
Scandia 2014	46	a	54	a	53	a
Semi-irrigated						
Hutchinson 2014 33ET	56	ab	57	a	53	b
Hutchinson 2014 66ET	55	a	56	a	53	a
100ET						
Topeka 2014	41	a	43	a	35	a
Scandia 2014	54	a	53	a	56	a

†Values in a row followed by the same letter are not significantly different (α=0.10).

In the rain-fed locations, differences in mean canopy temperature at VT were observed at Hutchinson 2015, and in Garden City 2015 (Table 22). In Hutchinson 2015 and Garden City 2015, Croplan 6274 had a higher canopy temperature than Pioneer 1151AM and Croplan 6000DG, butthe two did not differ from each other. No differences in canopy temperature at VT were observed in the 100ET environments. In general, Croplan 6274 maintained the highest canopy temperature among all hybrids in most of the environments. Croplan 6000DG and Pioneer 1151AM either had the same, or cooler canopy temperature at VT than the other hybrids tested.

Canopy temperature is expected to remain cooler in a non-DT hybrid than a DT hybrid due to the nature of the genetics involved. Plants respond to elevated temperatures by transpiring water in an effort to cool their canopy. Conversely a DT hybrid is expected to maintain regular physiological function at elevated temperatures. That particular trend was not observed for any hybrid at any environment of this study, but most differences were within 1 or 2°F.

Table 22. Mean DT and non-DT hybrid canopy temperature at VT in 18 environments in Kansas in 2014 and 2015.

Environment	Croplan 6274		Pioneer 1151AM		Croplan 6000DG	
Rain-fed			Fahrenheit			
Hutchinson 2014	73	a†	73	a	73	a
Hutchinson 2015	82	a	78	b	78	b
Topeka 2014	82	a	83	a	83	a
Topeka 2015	86	a	86	a	86	a
Scandia 2014	87	a	87	a	88	a
Scandia 2015	84	a	85	a	85	a
Tribune 2014	94	a	94	a	94	a
Tribune 2015	72	a	70	a	70	a
Garden City 2014	90	a	89	a	90	a
Garden City 2015	65	a	64	b	56	b
Semi-irrigated						
Hutchinson 2014 33ET	73	a	73	a	72	b
Hutchinson 2014 66ET	73	a	73	a	73	a
Hutchinson 2015 50ET	75	ab	74	b	76	a
100ET						
Hutchinson 2015	74	a	74	a	74	a
Topeka 2014	82	a	82	a	82	a
Topeka 2015	86	a	85	a	86	a
Scandia 2014	87	a	88	a	86	a
Scandia 2015	84	a	85	a	84	a

†Values in a row followed by the same letter are not significantly different (α=0.10).

In the rain-fed locations, differences in canopy temperature at mid-reproductive were observed at Topeka 2015 only (Table 23). Pioneer 1151AM had a higher canopy temperature than Croplan 6000DG, but Croplan 6274 did not differ from either of the two other hybrids. No differences were observed in the semi-irrigated environments. In the 100ET environment, differences were observed only at Topeka 2015 where Croplan 6000DG had a higher canopy temperature than both Pioneer 1151AM. Pioneer 1151AM had a lower canopy temperature than

Croplan 6000DG, but higher than Croplan 6274 which had the lowest observed canopy temperature at mid-reproductive there was little separation of canopy temperature at mid-reproductive. In most environments, Pioneer 1151AM had similar canopy temperature values as Croplan 6274 and Croplan 6000DG with the exception of Topeka 2015 where it was 3 to 5 °F cooler than those hybrids.

Table 23. Mean DT and non-DT hybrid canopy temperature at mid-reproduction in 12 environments in Kansas in 2014 and 2015.

Environment	Croplan 6274		Pioneer 1151AM		Croplan 6000DG	
Rain-fed	Fahrenheit					
Hutchinson 2014	96	a†	95	a	96	a
Hutchinson 2015	92	a	89	a	92	a
Topeka 2014	96	a	93	a	91	a
Topeka 2015	79	ab	81	a	78	b
Scandia 2014	76	a	75	a	75	a
Semi-irrigated						
Hutchinson 2014 33ET	90	a	91	a	90	a
Hutchinson 2014 66ET	95	a	94	a	94	a
Hutchinson 2015 50ET	87	a	87	a	87	a
100ET						
Hutchinson 2015	85	a	84	a	84	a
Topeka 2014	90	a	92	a	92	a
Topeka 2015	75	b	72	c	77	a
Scandia 2014	75	a	74	a	73	a

†Values in a row followed by the same letter are not significantly different (α=0.10).

The only hybrid differences in canopy temperature at R6 were observed at Hutchinson 2014 66ET (Table 24). In this environment, Cropland 6274 had a higher canopy temperature than Croplan 6000DG, and Pioneer 1151AM did not differ from either of the other two hybrids. In general, all hybrids responded similarly, with only one environment showing separation between hybrids. The likelihood of detecting differences in canopy temperature at this stage of crop development is likely small due to the plant beginning senescence in the early reproductive stages.

Table 24. Mean DT and non-DT hybrid canopy temperature at R6 in 7 environments in Kansas in 2014 and 2015.

Environment	Croplan 6274		Pioneer 1151AM		Croplan 6000DG	
Rain-fed			———Celsius———			
Hutchinson 2014	83	a†	81	a	82	a
Topeka 2014	76	a	83	a	83	a
Scandia 2014	77	a	78	a	80	a
Semi-irrigated						
Hutchinson 2014 33ET	79	a	79	a	79	a
Hutchinson 2014 66ET	80	a	80	ab	79	b
100ET						
Topeka 2014	80	a	82	a	83	a
Scandia 2014	90	a	90	a	89	a

†Values in a row followed by the same letter are not significantly different (α=0.10).

In the rain-fed environments differences in ear leaf temperature at VT were observed at Topeka 2014, Scandia 2014, and Garden City 2015 (Table 25). In Topeka 2014, Croplan 6274 had a higher ear leaf temperature than Croplan 6000DG, but Pioneer 1151AM did not differ from either. In Scandia 2014 Croplan 6000DG had a higher ear leaf temperature than Croplan 6274, and Pioneer 1151AM did not differ from either. In Garden City 2015 Croplan 6274 had the highest ear leaf temperature, but Pioneer 1151 and Croplan 6000DG, both less, did not differ from each other. No differences were observed in the semi-irrigated or 100ET environments. Although hybrid differences were evident in some rain-fed environments, no hybrid was consistently different from the others

Table 25. Mean DT and non-DT hybrid ear leaf temperature at VT in 18 environments in Kansas in 2014 and 2015.

Environment	Croplan 6274		Pioneer 1151AM		Croplan 6000DG	
Rain-fed	Fahrenheit					
Hutchinson 2014	97	a†	95	a	97	a
Hutchinson 2015	79	a	77	a	79	a
Topeka 2014	93	a	91	ab	91	b
Topeka 2015	88	a	86	a	84	a
Scandia 2014	75	b	78	ab	78	a
Scandia 2015	84	a	84	a	84	a
Tribune 2014	93	a	95	a	94	a
Tribune 2015	72	a	72	a	72	a
Garden City 2014	88	a	91	a	87	a
Garden City 2015	64	a	63	b	63	b
Semi-irrigated						
Hutchinson 2014 33ET	92	a	92	a	91	a
Hutchinson 2014 66ET	96	a	95	a	95	a
Hutchinson 2015 50ET	75	a	73	a	75	a
100ET						
Hutchinson 2015	74	a	74	a	74	a
Topeka 2014	91	a	91	a	90	a
Topeka 2015	85	a	85	a	86	a
Scandia 2014	78	a	76	a	78	a
Scandia 2015	83	a	84	a	84	a

†Values in a row followed by the same letter are not significantly different (α=0.10).

No hybrid differences in ear leaf temperature at mid-reproductive were observed in the rain-fed environments (Table 26). In the semi-irrigated environments, differences were observed only at the Hutchinson 2014 66ET environment. Here, ear leaf temperature for Pioneer 1151AM had a greater ear leaf temperature than Croplan 6274, but Croplan 6000DG did not differ from either of the other two hybrids. In the 100ET environments, the only differences observed was in the Topeka 2015 environment. Here, Pioneer 1151AM had the lowest ear leaf temperature, and Croplan 6274 and Croplan 6000DG did not differ from each other. In general ear-leaf temperature at mid-reproductive did not vary between hybrids in any environment. Pioneer 1151AM maintained the highest ear-leaf temperature in all environments, with the exception of Topeka 2015 100ET where it had the lowest ear-leaf temperature. It is anticipated that a hybrid defined as drought tolerant would have a higher ear leaf temperature than one that is not drought tolerant (Jackson, 1982). This is due to the fact that plants transpire water in an effort to keep a cooler canopy in stressful conditions. This pattern was not observed in these experiments.

Table 26. Mean DT and non-DT hybrid ear leaf temperature at mid-reproduction in 12 environments in Kansas in 2014 and 2015.

Environment	Croplan 6274		Pioneer 1151AM		Croplan 6000DG	
Rain-fed			Fahrenheit			
Hutchinson 2014	84	a†	82	a	81	a
Hutchinson 2015	90	a	91	a	90	a
Topeka 2014	82	a	83	a	81	a
Topeka 2015	80	a	81	a	80	a
Scandia 2014	104	a	90	a	102	a
Semi-irrigated						
Hutchinson 2014 33ET	77	a	78	a	77	a
Hutchinson 2014 66ET	79	b	79	a	79	ab
Hutchinson 2015 50ET	87	a	87	a	87	a
100ET						
Hutchinson 2015	84	a	84	a	85	a
Topeka 2014	81	a	84	a	83	a
Topeka 2015	75	a	73	b	76	a
Scandia 2014	93	a	94	a	93	a

†Values in a row followed by the same letter are not significantly different (α=0.10).

In 2014 change in soil water status at Garden City varied from hybrid to hybrid (Table 27). From VE to VT stages of crop development, Pioneer 1151AM and Croplan 6274 had both lost more water from the 0.5 to 2.5 ft. depths than Croplan 6000DG. From VT to R6 stages of development, no differences in soil water status change were detected between hybrids. For the entire growing season from VE-R6, the only difference detected was with Croplan 6274 which lost more water at the 0.5ft depth than either Croplan 6000DG or Pioneer 1151AM.

In 2015, different trends in soil water status were observed (Table 27). From VE-VT stages of crop development Croplan 6274 lost less water than both other hybrids from 1.5-4.5 ft. From VT-R6, Croplan 6274 extracted more water at the 1.5 and 2.5 ft. depths than Croplan 6000DG and Pioneer 1151AM. No differences in total season (VE-R6) soil water status change was detected among hybrids in Garden City in 2015.

Although there were differences in hybrid water loss at different physiological stages of development, the seasonal change in soil water status did not differ between hybrids at Garden City.

Table 27. Soil water status change for DT and non-DT hybrids in rain-fed environments at Garden City, KS 2014 and 2015.

Depth	Garden City 2014 Rain-fed Croplan 6000DG		Croplan 6274		Pioneer 1151AM		Garden City 2015 Rain-fed Croplan 6000DG		Croplan 6274		Pioneer 1151AM	
ft.	———in ft^{-1}.———						———in ft^{-1}.———					
			VE-VT						**VE-VT**			
0.5	-0.714	ab†	-0.666	a	-0.840	b	-0.381	a	0.129	a	-0.414	a
1.5	-0.435	a	-0.690	b	-0.780	b	-0.798	b	-0.303	a	-0.861	b
2.5	-0.186	a	-0.393	ab	-0.474	b	-0.936	b	-0.435	a	-0.978	b
3.5	0.147	a	0.108	a	0.135	a	-0.936	b	-0.435	a	-0.978	b
4.5	0.312	a	0.165	a	0.345	a	-0.600	b	-0.249	a	-0.708	b
			VT-R6						**VT-R6**			
0.5	0.798	a	0.942	a	0.915	a	-0.876	a	-1.288	a	-0.867	a
1.5	-0.264	a	-0.213	a	-0.108	a	-0.234	a	-0.700	b	-0.264	a
2.5	-0.258	a	-0.282	a	-0.351	a	-0.225	a	-0.612	b	-0.264	a
3.5	-0.414	a	-0.258	a	-0.381	a	-0.471	a	-0.660	a	-0.498	a
4.5	-0.258	a	-0.192	a	-0.327	a	-0.678	a	-0.896	a	-0.918	a
			VE-R6						**VE-R6**			
0.5	0.084	b	0.276	a	0.075	b	-1.257	a	-1.284	a	-1.281	a
1.5	-0.699	a	-0.903	a	-0.888	a	-1.032	a	-1.061	a	-1.125	a
2.5	-0.444	a	-0.675	a	-0.825	a	-1.161	a	-1.176	a	-1.224	a
3.5	-0.267	a	-0.246	a	-0.150	a	-1.071	a	-0.984	a	-1.206	a
4.5	0.054	a	-0.027	a	0.018	a	-0.780	a	-0.756	a	-1.083	a

†Values in a row within an environment followed by the same letter are not significantly different (α=0.10).

In 2014 in Tribune from the VE to VT stages of crop development, Pioneer 1151AM and Croplan 6274 had extracted more water than Croplan 6000DG at the 1.5-3.5 ft. depths (Table 28). From VT to R6 development stages Croplan 6274 extracted more water than Croplan 6000DG and Pioneer 1151AM at the 0.5 ft. depth. From 2.5 to 3.5 ft. Croplan 6000DG extracted more water than Croplan 6274. Over the course of the growing season (VE-R6), Croplan 6000DG had more water remaining at each depth than both Croplan 6274 and Pioneer 1151AM.

In 2015, soil profile water loss differed compared to 2014. From VE to VT, Croplan 6274 extracted more water than Croplan 6000DG from 1.5-4.5 ft., but did not differ from Pioneer 1151AM. From VT to R6, Croplan 6000DG extracted more water than Croplan 6274 from 0.5-

1.5 ft. Over the course of the growing season from VE to R6 Croplan 6274 and Pioneer 1151AM lost more water than Croplan 6000DG from 1.5-4.5 ft.

In Tribune across both years, it can be seen that Croplan 6274 and Pioneer 1151AM exhibited greater efficiency in soil water extraction than Croplan 6000DG. It is also observed that Croplan 6000DG had the smallest change in soil water status compared to both other hybrids.

Table 28. Soil water status change for DT and non-DT hybrids in rain fed environments at Tribune, KS in 2014 and 2015.

	Tribune 2014 Rain-fed						Tribune 2015 Rain-fed					
Depth	Croplan 6000DG		Croplan 6274		Pioneer 1151AM		Croplan 6000DG		Croplan 6274		Pioneer 1151AM	
ft.	In ft^{-1}.						In ft^{-1}.					
	VE-VT						**VE-VT**					
0.5	0.313	a†	0.318	a	0.334	a	-0.779	a	-0.970	a	-0.845	a
1.5	-0.650	a	-0.832	a	-0.733	a	-0.480	a	-0.751	b	-0.627	ab
2.5	-0.533	a	-0.787	b	-0.731	b	-0.713	a	-0.987	b	-0.864	ab
3.5	-0.230	a	-0.567	b	-0.480	b	-0.583	a	-0.906	b	-0.748	ab
4.5	0.019	a	-0.157	b	-0.120	b	-0.312	a	-0.580	b	-0.478	ab
	VT-R6						**VT-R6**					
0.5	-0.924	a	-1.126	b	-0.889	a	-0.408	b	-0.244	a	-0.362	b
1.5	-0.182	a	-0.140	a	-0.190	a	-0.381	b	-0.265	a	-0.381	ab
2.5	-0.295	b	-0.127	a	-0.224	ab	-0.422	a	-0.313	a	-0.384	a
3.5	-0.593	b	-0.351	a	-0.461	ab	-0.434	a	-0.303	a	-0.441	a
4.5	-0.789	a	-0.807	a	-0.834	a	-0.467	a	-0.415	a	-0.579	a
	VE-R6						**VE-R6**					
0.5	-0.611	a	-0.807	b	-0.555	a	-1.187	a	-1.214	a	-1.207	a
1.5	-0.803	a	-1.022	b	-0.873	ab	-0.869	a	-1.051	b	-0.969	ab
2.5	-0.830	a	-0.915	b	-0.955	b	-1.136	a	-1.299	b	-1.248	b
3.5	-0.823	a	-0.917	b	-0.940	b	-1.017	a	-1.209	b	-1.188	b
4.5	-0.770	a	-0.954	b	-0.954	b	-0.779	a	-0.994	b	-1.053	b

†Values in a row within an environment followed by the same letter are not significantly different (α=0.10).

In Scandia, across both years in the rain-fed environment, no consistent trends in hybrid water extraction were observed (Table 29). In the Scandia 2014 rain-fed environment, Croplan 6000DG had a positive change in soil water statuts, but the other two hybrids had a negative change at the 0.5 ft. depth. From VT to R6 Croplan 6274 lost more water at the 2.5 ft. depth than Pioneer 1151AM and Croplan 6000DG. From VE to R6 no differences in soil water loss were observed in 2014.

In 2015 from VE to VT, Croplan 6000DG gained more water at the 4.5 ft. depth than Pioneer 1151AM. From VT to R6, Pioneer 1151AM and Croplan 6274 extracted more water from the 2.5 to 3.5 ft. depths than Croplan 6000DG. At the 4.5 ft. depth, Croplan 6274 extracted more water than Pioneer 1151AM.

Table 29. Soil water status change for DT and non-DT hybrids in rain fed environments at Scandia, KS in 2014 and 2015.

	Scandia 2014 Rain-fed						Scandia 2015 Rain-fed					
Depth	Croplan 6000DG		Croplan 6274		Pioneer 1151AM		Croplan 6000DG		Croplan 6274		Pioneer 1151AM	
ft.	In ft^{-1}.						In ft^{-1}.					
			VE-VT						VE-VT			
0.5	0.864	b†	-0.713	a	-0.812	ab	-1.212	a	-1.144	a	-1.301	a
1.5	-0.331	a	-0.225	a	-0.310	a	-0.418	a	-0.341	a	-0.192	a
2.5	-0.019	a	0.147	a	0.087	a	-0.221	a	-0.072	a	-0.019	a
3.5	0.147	a	0.173	a	0.206	a	0.119	a	0.118	a	0.002	a
4.5	0.102	a	0.109	a	0.113	a	0.064	a	0.055	ab	0.015	b
			VT-R6						VT-R6			
0.5	1.224	a	1.069	a	1.239	a	-0.587	a	-0.702	a	-0.634	a
1.5	0.314	a	0.205	a	0.461	a	-0.306	a	-0.489	b	-0.417	ab
2.5	0.073	ab	-0.233	b	0.089	a	-0.340	a	-0.479	b	-0.506	b
3.5	-0.187	a	-0.403	a	-0.106	a	-0.612	a	-0.573	a	-0.564	a
4.5	-0.118	a	-0.149	a	-0.181	a	-0.202	ab	-0.235	b	-0.119	a
			VE-R6						VE-R6			
0.5	0.360	a	0.356	a	0.424	a	-1.798	a	-1.846	a	-1.935	a
1.5	-0.176	a	-0.020	a	0.151	a	-0.724	a	-0.830	a	-0.609	a
2.5	0.054	a	-0.086	a	0.177	a	-0.561	a	-0.551	a	-0.525	a
3.5	-0.040	a	-0.229	a	0.100	a	-0.493	a	-0.455	a	-0.562	a
4.5	-0.016	a	-0.039	a	-0.016	a	-0.138	a	-0.187	a	-0.103	a

†Values in a row within an environment followed by the same letter are not significantly different (α=0.10).

In 2014 and 2015, few differences in soil water status were observed in the 100ET environment in Scandia (Table 30). In 2014 from VE-VT Croplan 6274 gained the least amount of water at the 2.5 ft. depth. From VT-R6, Pioneer 1151AM extracted the most water from the 3.5 ft depth. From VE-R6 Croplan 6000DG extracted the least amount of water at the 2.5 ft. depth compared to Croplan 6274 and Pioneer 1151AM.

In 2015, from VE-VT, Croplan 6274 gained soil water, but Pioneer 1151AM and Croplan 6000DG both lost water at the 4.5 ft. depth. During VT-R6 Pioneer 1151AM extracted more water at the 3.5 ft. depth than Croplan 6000DG. Over the course of the growing season from VE-R6, Pioneer 1151AM and Croplan 6000DG extracted more water at the 4.5 ft. depth than Croplan 6274, providing evidence that the two DT hybrids extracted water from a deeper depth than the non-DT hybrid.

Table 30. Soil water status change for DT and non-DT hybrids in 100ET environments at Scandia, KS in 2014 and 2015.

	Scandia 2014 100ET						Scandia 2015 100ET					
Depth	Croplan 6000DG		Croplan 6274		Pioneer 1151AM		Croplan 6000DG		Croplan 6274		Pioneer 1151AM	
ft.	In ft^{-1}.						In ft^{-1}.					
			VE-VT						**VE-VT**			
0.5	-0.667	a†	-0.706	a	-0.709	a	-0.705	a	-0.703	a	-0.666	a
1.5	-0.191	a	-0.265	a	-0.286	a	-0.339	a	-0.198	a	-0.285	a
2.5	0.113	a	0.014	b	0.026	ab	-0.010	a	-0.100	a	0.046	a
3.5	0.044	a	0.095	a	0.095	a	0.076	a	0.056	a	0.104	a
4.5	0.107	a	0.062	a	0.067	a	-0.056	b	0.066	a	-0.030	ab
			VT-R6						**VT-R6**			
0.5	1.048	a	1.040	a	1.051	a	-0.170	a	-0.178	a	-0.317	a
1.5	0.215	a	0.067	a	0.056	a	0.016	a	-0.116	a	-0.146	a
2.5	-0.127	a	-0.173	a	-0.208	a	-0.070	a	-0.174	a	-0.191	a
3.5	-0.202	a	-0.204	a	-0.298	b	-0.232	a	-0.276	ab	-0.337	b
4.5	-0.094	a	-0.014	a	-0.064	a	-0.057	a	-0.039	a	-0.054	a
			VE-R6						**VE-R6**			
0.5	0.382	a	0.333	a	0.382	a	-0.876	a	-0.844	a	-1.020	a
1.5	0.024	a	-0.198	a	-0.230	a	-0.323	a	-0.313	a	-0.432	a
2.5	-0.014	a	-0.159	b	-0.182	b	-0.080	a	-0.274	a	-0.145	a
3.5	-0.157	a	-0.109	a	-0.203	a	-0.156	a	-0.221	a	-0.233	a
4.5	0.013	a	0.048	a	0.002	a	-0.113	b	-0.027	a	-0.112	b

†Values in a row within an environment followed by the same letter are not significantly different (α=0.10).

In Topeka, across both years, no conclusive trends were observed for differences in hybrid soil water extraction in the rain-fed environments (Table 31). In 2014, Croplan 6274 gained more water at the 2.5 ft. depth than Pioneer 1151AM and Croplan 6000DG. From VT-R6 Croplan 6274 extracted more water at the 3.5 ft. depth than Pioneer 1151AM. At the 4.5 ft. depth

Croplan 6000DG extracted water than Croplan 6274. For total season change VE-R6, Pioneer 1151AM extracted more water at the 1.5 ft. depth than Croplan 6000DG. At the 4.5 ft. depth Croplan 6000DG extracted more water than both hybrids. In 2015 from VE-VT, the only difference observed came at the 4.5 ft. depth where Pioneer 1151AM extracted less water than Croplan 6000DG. From VT-R6 Croplan 6274 extracted the most water from 1.5-2.5 ft., and 4.5 ft. than Croplan 6000DG and Pioneer 1151AM. No differences were observed from VE-R6 in seasonal total soil water status change.

Table 31. Soil water status change for DT and non-DT hybrids in rain fed environments at Topeka, KS in 2014 and 2015.

	Topeka 2014 Rain-fed						Topeka 2015 Rain-fed					
Depth	Croplan 6000DG		Croplan 6274		Pioneer 1151AM		Croplan 6000DG		Croplan 6274		Pioneer 1151AM	
ft.	In ft^{-1}.						In ft^{-1}.					
			VT-VT						**VE-VT**			
0.5	-0.673	a†	-0.652	a	-0.523	a	-1.212	a	-1.144	a	-1.301	a
1.5	-0.098	a	-0.404	a	-0.339	a	-0.418	a	-0.341	a	-0.192	a
2.5	0.050	b	0.110	a	0.050	b	-0.221	a	-0.072	a	-0.019	a
3.5	0.232	a	0.465	a	0.180	a	0.119	a	0.118	a	0.002	a
4.5	0.211	a	-0.012	a	0.248	a	0.064	a	0.049	ab	0.015	b
			VT-R6						**VT-R6**			
0.5	-0.472	a	-0.636	a	-0.644	a	-0.587	a	-0.702	a	-0.634	a
1.5	-0.618	a	-0.452	a	-0.732	a	-0.306	a	-0.489	b	-0.417	ab
2.5	-0.378	a	-0.408	a	-0.325	a	-0.340	a	-0.479	b	-0.506	a
3.5	-0.683	ab	-1.031	b	-0.467	a	-0.612	a	-0.573	a	-0.564	a
4.5	-0.573	b	-0.066	a	-0.348	ab	-0.202	ab	-0.235	b	-0.119	a
			VE-R6						**VE-R6**			
0.5	-1.145	a	-1.287	a	-1.168	a	-1.798	a	-1.846	a	-1.935	a
1.5	-0.715	a	-0.856	ab	-1.071	b	-0.724	a	-0.830	a	-0.609	a
2.5	-0.328	a	-0.298	a	-0.265	a	-0.561	a	-0.551	a	-0.525	a
3.5	-0.451	a	-0.565	a	-0.287	a	-0.493	a	-0.455	a	-0.562	a
4.5	-0.363	b	-0.078	a	-0.099	a	-0.138	a	-0.187	a	-0.103	a

†Values in a row within an environment followed by the same letter are not significantly different (α=0.10).

At the Topeka 2014 100ET environment, it is observed that Croplan 6000DG had gained less water than Croplan 6274 and Pioneer 1151AM at the 3.5 and 4.5 ft. depths from VE-VT.

Between VT and R6, Croplan 6000DG extracted more water at the 0.5 and 1.5 ft. depths compared to Pioneer 1151AM and Croplan 6274. In the overall season change in soil water status for 2014, Croplan 6000DG extracted more water at the 0.5, 1.5, and 4.5 ft. depths than Croplan 6274, but remained the same as Pioneer 1151AM.

In the Topeka 2015 100ET environment, Croplan 6000DG extracted more water than both Pioneer 1151AM, and Croplan 6274 from VE to VT. From the VT to R6, Croplan 6000DG extracted the least amount of water between hybrids at all depths. In the overall season change in soil water status, Croplan 6000DG had extracted more water from the 4.5 ft. depth than Pioneer 1151AM and Croplan 6274.

Overall, no consistent differences in soil water extraction were observed in Topeka.

Table 32. Soil water status change for DT and non-DT hybrids in 100ET environments at Topeka, KS in 2014 and 2015.

	Topeka 2014 100ET						Topeka 2015 100ET					
Depth	Croplan 6000DG		Croplan 6274		Pioneer 1151AM		Croplan 6000DG		Croplan 6274		Pioneer 1151AM	
ft.	in ft^{-1}.						in ft^{-1}.					
	VE-VT						**VE-VT**					
0.5	-0.637	a†	0.921	a	-0.775	a	-0.705	a	-0.666	a	-0.703	a
1.5	-0.388	a	-0.201	a	-0.309	a	-0.339	a	-0.198	a	-0.285	a
2.5	-0.092	a	0.005	a	-0.061	a	-0.010	a	-0.100	a	0.046	a
3.5	0.084	b	0.220	a	0.179	ab	0.076	a	0.056	a	0.104	a
4.5	0.172	b	0.329	a	0.270	a	-0.056	b	0.066	a	0.030	ab
	VT-R6						**VT-R6**					
0.5	0.373	b	0.975	a	0.708	a	-0.170	a	-0.178	a	-0.317	a
1.5	-0.393	b	0.169	a	-0.209	ab	0.016	a	-0.116	a	-0.146	a
2.5	-0.156	a	-0.107	a	-0.180	a	-0.070	a	-0.174	a	-0.191	a
3.5	-0.189	a	-0.191	a	-0.205	a	-0.232	a	-0.276	ab	-0.337	b
4.5	-0.143	a	-0.174	a	-0.180	a	-0.057	a	-0.039	a	-0.054	a
	VE-R6						**VE-R6**					
0.5	-0.263	b	0.054	a	-0.067	ab	-0.876	a	-0.844	a	-1.020	a
1.5	-0.781	b	-0.321	a	-0.518	ab	-0.323	a	-0.313	a	-0.432	a
2.5	-0.248	a	-0.103	a	-0.241	a	-0.080	a	-0.274	a	-0.145	a
3.5	-0.105	a	0.029	a	-0.021	a	-0.156	a	-0.221	a	-0.233	a
4.5	0.029	b	0.155	a	0.090	ab	-0.113	b	0.027	a	-0.024	ab

†Values in a row within an environment followed by the same letter are not significantly different (α=0.10).

In the Hutchinson 2014 rain-fed environment from VE to VT, Croplan 6000DG extracted more water than both of the other hybrids at the 2.5 ft. depth (Table 33). At the 3.5 ft. depth, Pioneer 1151AM extracted more water than Croplan 6274. From VT to R6, Croplan 6274 extracted more water than Pioneer 1151AM, which extracted more water than Croplan 6000DG at the 2.5 ft. depth. Overall hybrid differences in season soil water status change from VE to R6 in 2014 were minor at all depths.

In the Hutchinson 2015 rain-fed environment, soil water loss patterns were similar to 2014. From the VE to VT development stages, Pioneer 1151AM extracted the least amount of water at the 4.5 ft. depth compared to the other two hybrids. From VT to R6, Croplan 6000DG extracted more water at the 0.5 ft. depth than Pioneer 1151AM. Seasonal soil water extraction followed no significant trends among hybrids. Croplan 6000DG extracted more water at the 0.5 and 4.5 ft. depth than Pioneer 1151AM.

Table 33. Soil water status change for DT and non-DT hybrids in rain fed environments at Hutchinson, KS in 2014 and 2015.

	Hutchinson 2014 Rain-fed						Hutchinson 2015 Rain-fed					
Depth	Croplan 6000DG		Croplan 6274		Pioneer 1151AM		Croplan 6000DG		Croplan 6274		Pioneer 1151AM	
ft.	———In ft^{-1}.———						———In ft^{-1}.———					
			VE-VT						**VE-VT**			
0.5	-1.116	a†	-0.920	a	-0.901	a	-1.547	a	-1.370	a	-1.336	a
1.5	-0.430	a	-0.487	a	-0.378	a	-0.813	a	-0.833	a	-0.813	a
2.5	-0.089	b	0.020	a	-0.013	a	-0.431	a	-0.466	a	-0.395	a
3.5	0.061	ab	0.096	a	0.004	b	-0.296	a	-0.252	a	-0.263	a
4.5	-0.069	a	-0.002	a	0.048	a	-0.227	b	-0.259	b	-0.119	a
			VT-R6						**VT-R6**			
0.5	0.351	a	0.228	a	0.199	a	1.266	b	1.398	ab	1.427	a
1.5	-0.281	a	-0.009	a	-0.286	a	0.271	a	0.322	a	0.385	a
2.5	-0.505	a	-0.599	c	-0.543	b	-0.279	a	-0.034	a	-0.111	a
3.5	-0.358	a	-0.416	a	-0.251	a	-0.400	a	-0.233	a	-0.267	a
4.5	-0.012	a	-0.073	a	-0.147	a	-0.327	a	-0.183	a	-0.217	a
			VE-R6						**VE-R6**			
0.5	-0.765	a	-0.693	a	-0.703	a	-0.281	b	0.027	ab	0.090	a
1.5	-0.710	a	-0.496	a	-0.664	a	-0.542	a	-0.510	a	-0.428	a
2.5	-0.593	a	-0.579	a	-0.556	a	-0.710	a	-0.501	a	-0.505	a
3.5	-0.297	a	-0.320	a	-0.247	a	-0.696	a	-0.485	a	-0.529	a
4.5	-0.081	a	-0.982	a	-0.989	a	-0.553	b	-0.441	ab	-0.336	a

†Values in a row within an environment followed by the same letter are not significantly different (α=0.10).

In the Hutchinson 2014 33ET environment, only a few differences in soil water status changes were detected (Table 34). From VE to VT growth stages, Pioneer 1151AM extracted more water that Croplan 6274 at the 0.5 ft. depth. No differences were observed at the VT to R6 stages of development. Over the growing season from VE to R6, the only difference in soil water status change came at the 3.5 ft. depth where Pioneer 1151AM extracted more water than Croplan 6000DG.

In the 2014 66ET environment at Hutchinson, no differences in soil water status change were detected from VE to VT growth stage (Table 34)s. From the VE to R6 stages the only detectable differences were at the 1.5 ft. depth where Pioneer 1151AM extracted more water than Croplan 6274. At the 3.5 ft. depth Croplan 6274 extracted more water than Croplan 6000DG.

Overall water extraction patterns did not indicate any consistent trends between hybrids at Hutchinson in the limited irrigation environments in 2014.

Table 34. Soil water status change for DT and non-DT hybrids in 33ET and 66ET environments at Hutchinson in 2014.

	Hutchinson 2014 33ET						Hutchinson 2014 66ET					
Depth	Croplan 6000DG		Croplan 6274		Pioneer 1151AM		Croplan 6000DG		Croplan 6274		Pioneer 1151AM	
ft.	In ft^{-1}.						In ft^{-1}.					
			VE-VT						**VE-VT**			
0.5	-0.803	ab†	-0.741	a	-0.919	b	-0.924	a	-0.860	a	-0.944	a
1.5	-0.462	a	-0.482	a	-0.520	a	-0.410	a	-0.384	a	-0.406	a
2.5	-0.128	a	-0.781	a	-0.080	a	-0.131	a	-0.133	a	0.125	a
3.5	-0.245	a	0.136	a	0.027	a	0.431	a	0.037	a	0.098	a
4.5	-0.055	a	-0.216	a	-0.161	a	-0.341	a	-0.604	a	-0.349	a
			VT-R6						**VT-R6**			
0.5	0.717	a	0.665	a	0.758	a	1.013	a	0.951	a	0.912	a
1.5	0.109	a	0.086	a	0.242	a	0.474	a	0.381	a	0.377	a
2.5	-0.350	a	0.205	a	-0.379	a	0.132	a	-0.038	ab	-0.134	b
3.5	0.042	a	-0.424	a	-0.373	a	-0.484	a	-0.324	a	-0.262	a
4.5	-0.027	a	0.143	a	0.060	a	0.292	a	0.511	a	0.257	a
			VE-R6						**VE-R6**			
0.5	-0.086	a	-0.076	a	-0.160	a	0.088	a	0.901	a	-0.032	b
1.5	-0.353	a	-0.396	a	-0.278	a	0.072	a	-0.011	b	-0.029	b
2.5	-0.478	a	-0.577	a	-0.459	a	0.001	a	-0.171	a	-0.009	a
3.5	-0.203	a	-0.288	ab	-0.346	b	-0.053	a	-0.287	b	-0.164	ab
4.5	-0.082	a	-0.074	a	-0.101	a	-0.049	a	-0.093	a	-0.092	a

†Values in a row within an environment followed by the same letter are not significantly different (α=0.10).

In the Hutchinson 2015 50ET environment from VE to VT, no differences in soil water status change were detected (Table 35). From VT to R6, Pioneer 1151AM extracted more water than Croplan 6000DG at the 4.5 ft. depth. Total season soil water status change from VE to R6 was similar for all three hybrids at each depth.

In the Hutchinson 2015 100ET environment, Croplan 6000DG extracted more water than both Croplan 6274 and Pioneer 1151AM at the 0.5 ft. depth. From the VT to R6 stages of crop development, Pioneer 1151AM and Croplan 6274 extracted more water than Croplan 6000DG from the 3.5 to 4.5 ft. depths. Hybrid differences in total season soil water status change were not significant except for at the 3.5 ft. depth where Croplan 6274 and Pioneer 1151AM extracted more water than Croplan 6000DG.

Table 35. Soil water status change for DT and non-DT hybrids in 50ET and 100ET environments at Hutchinson, KS in 2015.

	Hutchinson 2015 50ET						Hutchinson 2015 100ET					
Depth	Croplan 6000DG		Croplan 6274		Pioneer 1151AM		Croplan 6000DG		Croplan 6274		Pioneer 1151AM	
ft.	In ft^{-1}.						In ft^{-1}.					
			VE-VT						**VE-VT**			
0.5	-0.559	a†	-0.545	a	-0.481	a	-1.031	a	-1.038	a	-1.000	a
1.5	-0.504	a	-0.578	a	-0.590	a	-1.608	b	-0.555	a	-0.585	a
2.5	-0.264	a	-0.235	a	-0.207	a	-0.218	a	-0.290	a	-0.247	a
3.5	-0.241	a	-0.192	a	-0.133	a	-0.226	a	-0.222	a	-0.225	a
4.5	-0.169	a	-0.126	a	-0.037	a	-0.163	a	-0.168	a	-0.162	a
			VT-R6						**VT-R6**			
0.5	0.749	a	0.147	a	0.690	a	1.085	a	1.096	a	1.042	a
1.5	0.387	a	-0.340	a	0.459	a	0.356	a	0.310	a	0.284	a
2.5	-0.059	a	-0.663	a	-0.028	a	-0.107	a	-0.102	a	-0.199	a
3.5	-0.161	a	-0.268	a	-0.356	a	0.104	a	-0.250	b	-0.263	b
4.5	-0.148	a	-0.272	ab	-0.338	b	-0.114	a	-0.329	ab	-0.365	b
			VE-R6						**VE-R6**			
0.5	0.190	a	-0.398	a	0.210	a	0.054	a	0.058	a	-0.042	a
1.5	-0.117	a	-0.919	a	-0.130	a	-0.287	a	-0.255	a	-0.274	a
2.5	-0.483	a	-0.301	a	-0.234	a	-0.327	a	-0.393	a	-0.445	a
3.5	-0.401	a	-0.460	a	-0.489	a	-0.112	a	-0.466	b	-0.499	b
4.5	-0.317	a	-0.398	a	-0.375	a	-0.281	a	-0.496	a	-0.527	a

†Values in a row in the same environment followed by the same letter are not significantly different (α=0.10).

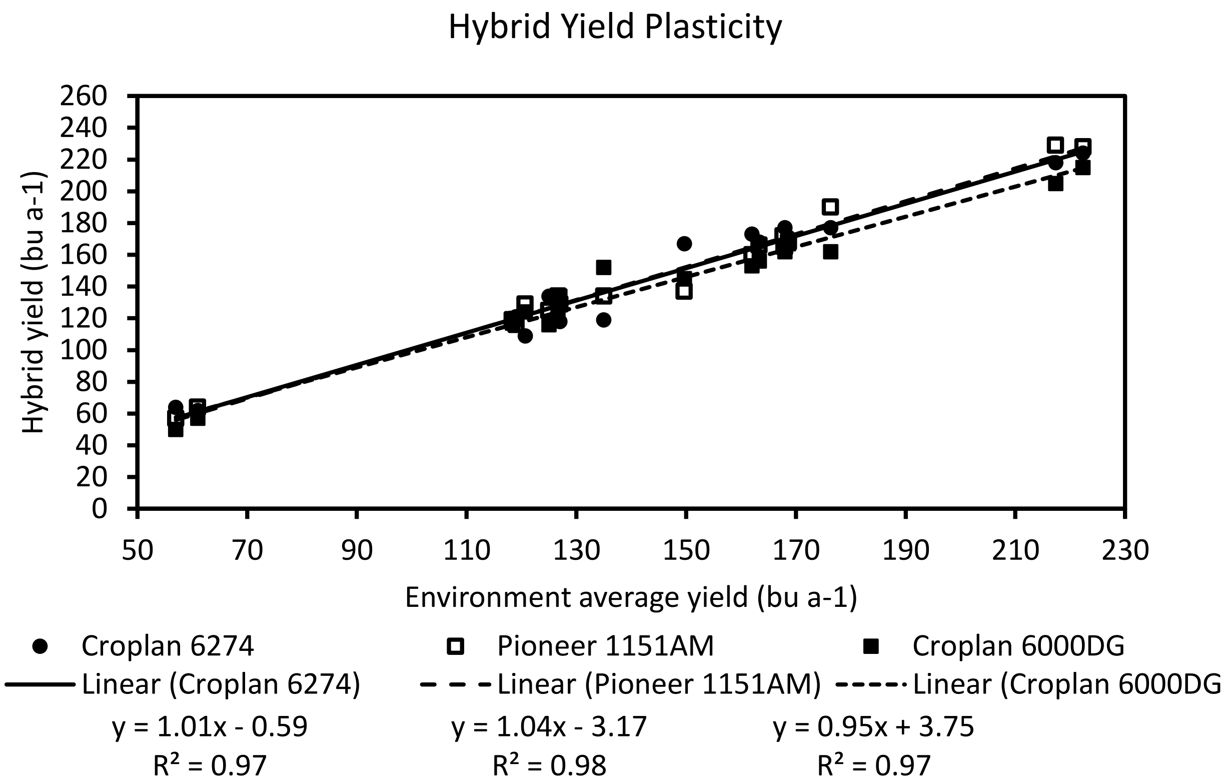


Figure 6. Hybrid Plasticity: Hybrid Yield vs. Environment mean of DT and non-DT hybrids in 18 environments in Kansas in 2014 and 2015.

Hybrid plasticity represents the yield of each hybrid over the environment mean (Figure 6). The slopes for Croplan 6000DG and Pioneer 1151AM differed, but Croplan 6274 was the same as both other hybrids at the 0.10 alpha level. Yields of all hybrids remained comparable in most environments, but as environment yields increased beyond 200 bu ac^{-1}, Croplan 6000DG lagged behind Pioneer 1151AM.

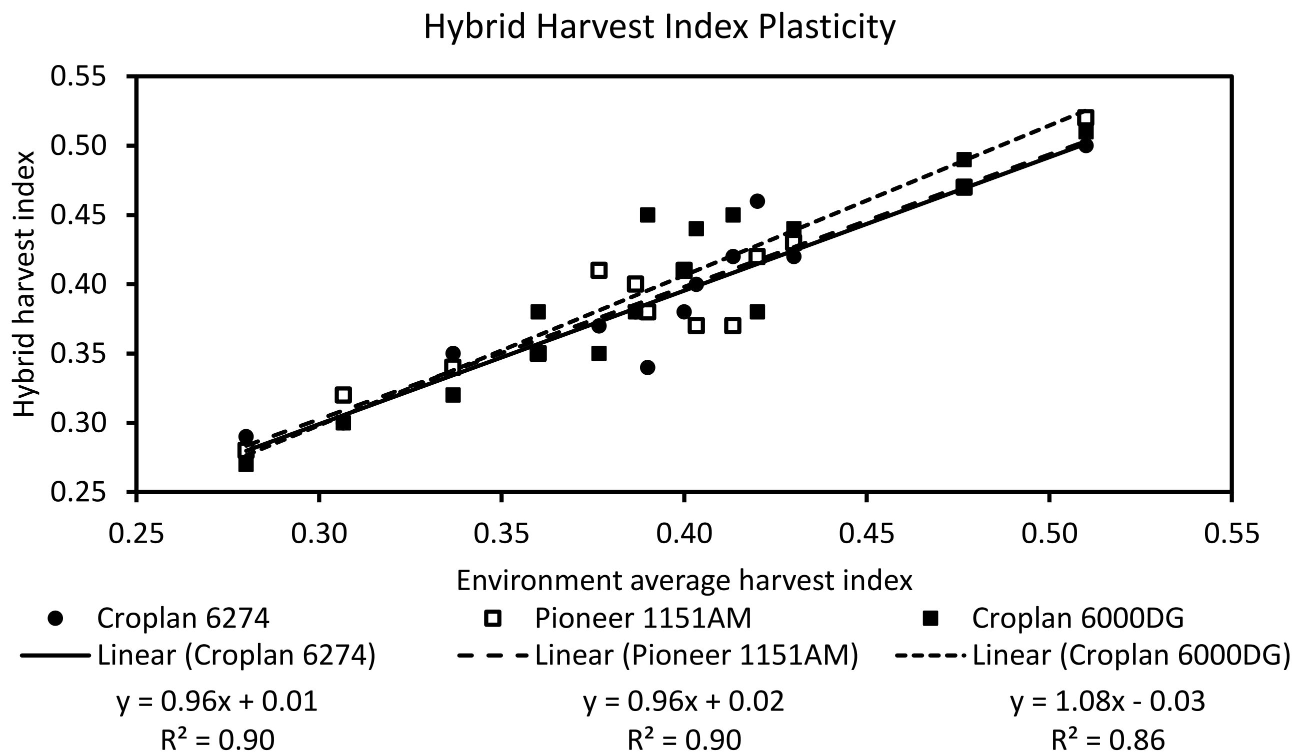


Figure 7. Hybrid plasticity of harvest index: Hybrid harvest index vs. environment mean of DT and non-DT hybrids in 18 environments in Kansas in 2014 and 2015.

At the 0.10 alpha level, all hybrids had the same response to environment in harvest index (Figure 7). Although, not statistically significant, when an environment supported favorable harvest index values greater than 0.40, it's observed that Croplan 6000DG does have an improvement in harvest index relative to the Pioneer 1151AM and Croplan 6274.

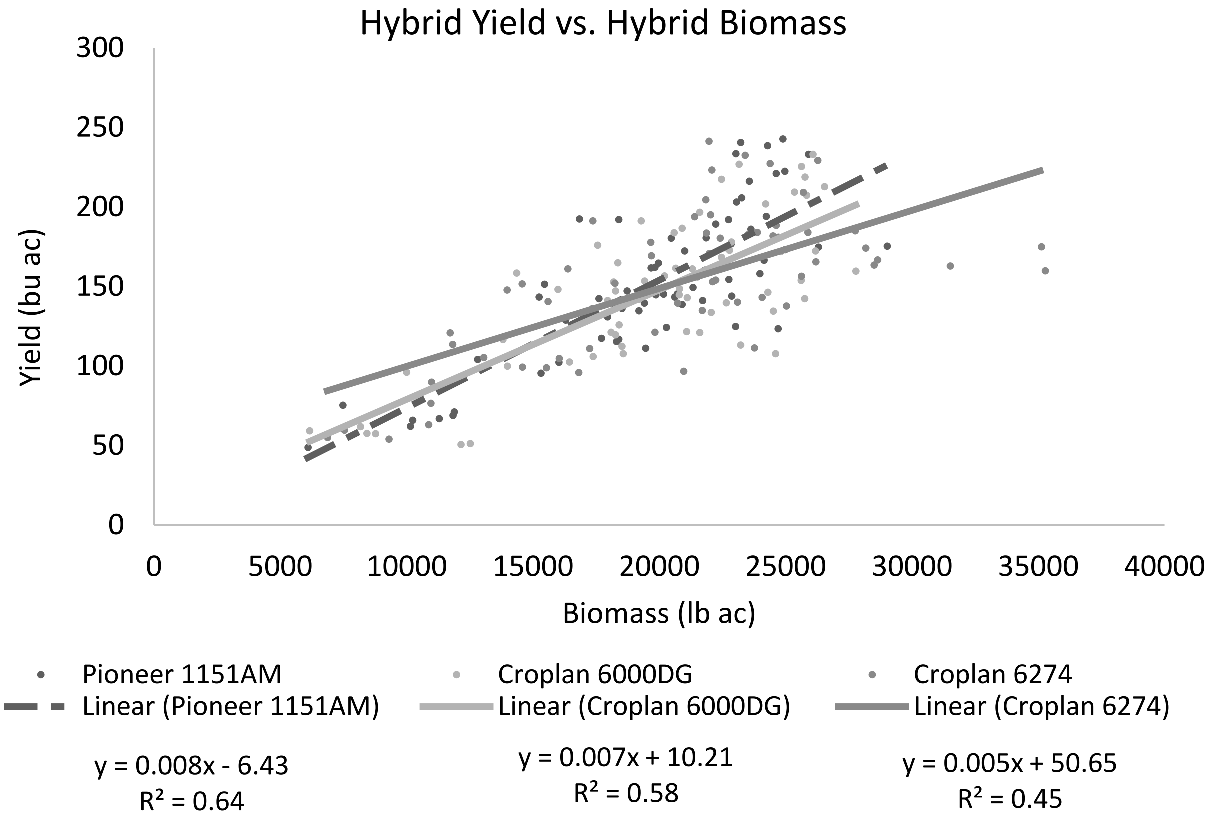


Figure 8. Linear regression of hybrid yield on biomass in 18 environments in Kansas in 2014 and 2015.

The Pearson correlation coefficient for yield and biomass production across all hybrids and environments was 0.73, indicating a strong positive relationship between yield and biomass production. Figure 8 presents the regression of yield to biomass production for each hybrid. In general, as biomass production increased, yield increased. Pioneer 1151AM and Croplan 6000DG had similar slopes, but Croplan 6274 differed from both at the 0.10 probability level. The reason for Croplan 6274 having a different slope in this figure is due to three specific data points where a very high biomass was produced, but relatively average yields at the same point.

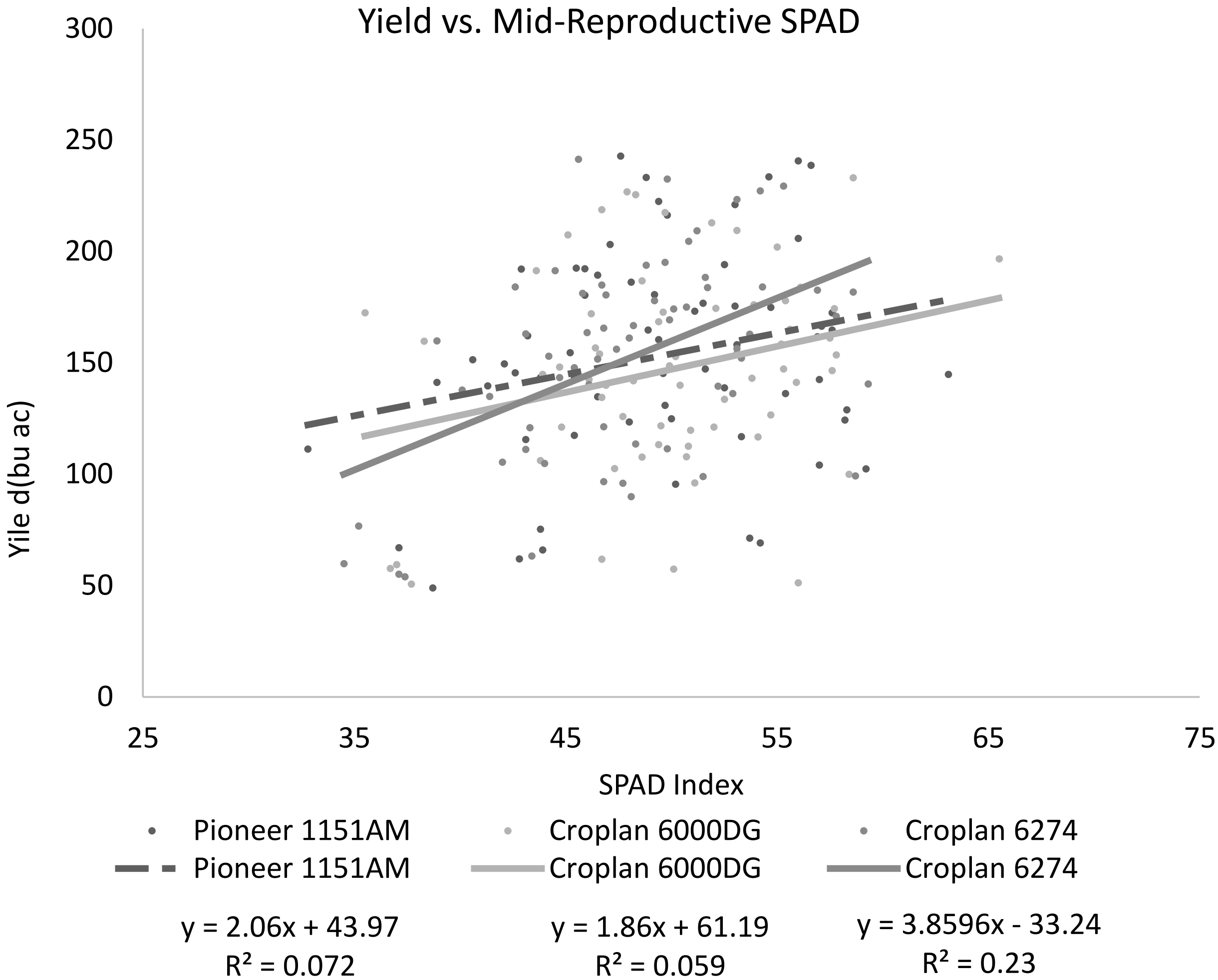


Figure 9. Linear regression of hybrid yield on mid-reproductive SPAD in 18 environments in Kansas in 2014 and 2015.

The Pearson correlation coefficient for yield and mid-reproductive SPAD values was 0.38, representing a significant (alpha = 0.10) but weak positive relationship between the two across all hybrids and environments. Figure 9 presents the regression of yield on mid-reproductive SPAD values for each hybrid. In general, as SPAD at mid-reproductive increased, the yield increased, but the slope was significant only for Croplan 6274.

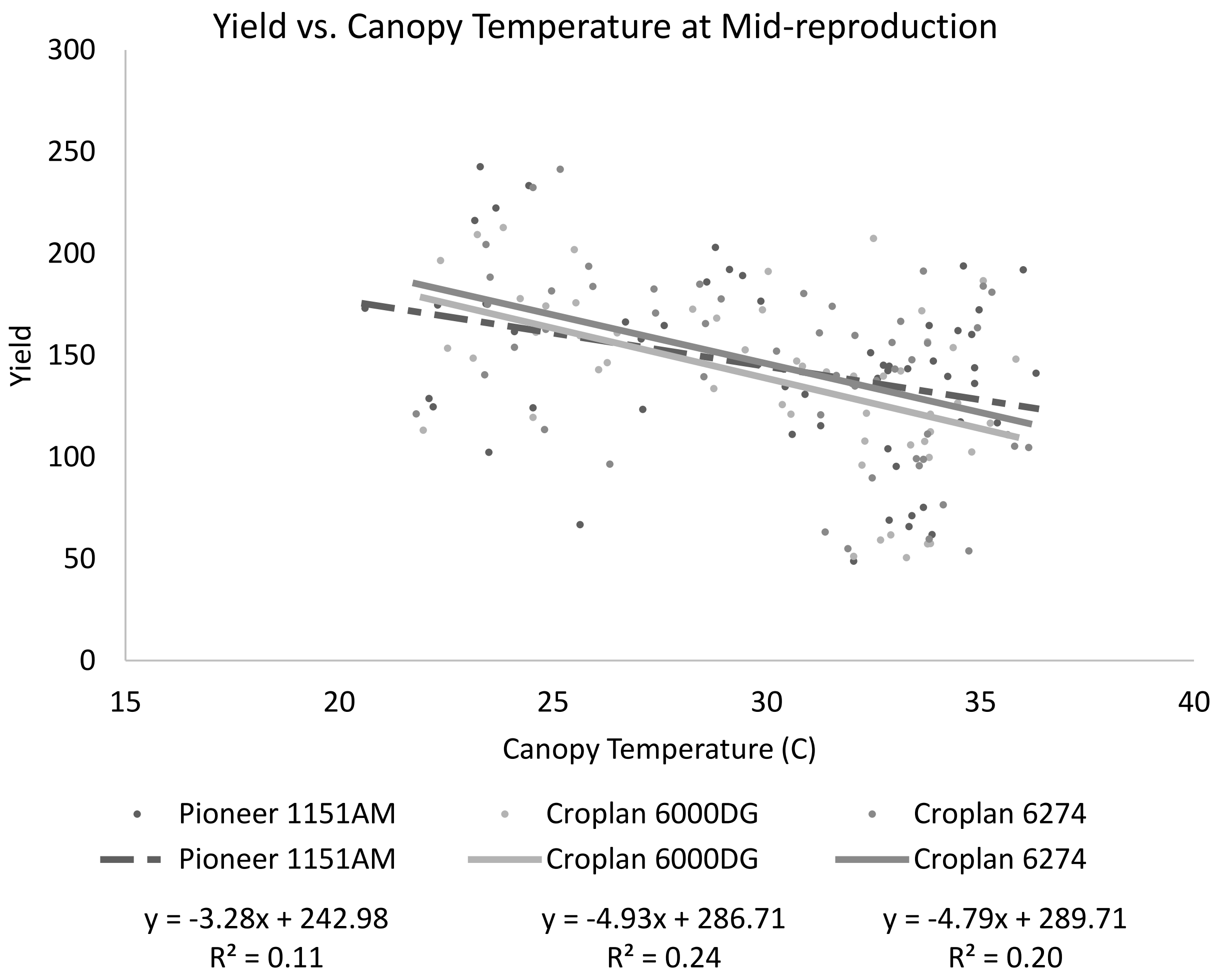


Figure 10. Linear regression of hybrid yield on mid-reproductive canopy temperature in 18 environments in Kansas in 2014 and 2015.

The Pearson correlation coefficient for yield and mid-reproductive canopy temperature was -0.41, representing a significant but weak negative relationship between yield and mid-reproductive canopy temperature over all hybrids and environments. Figure 10 presents the linear regressions of yield on mid-reproductive SPAD values for each hybrid. In general, as canopy temperature at mid-reproductive stages increases, the yield decreases. All hybrids had the same slope response.

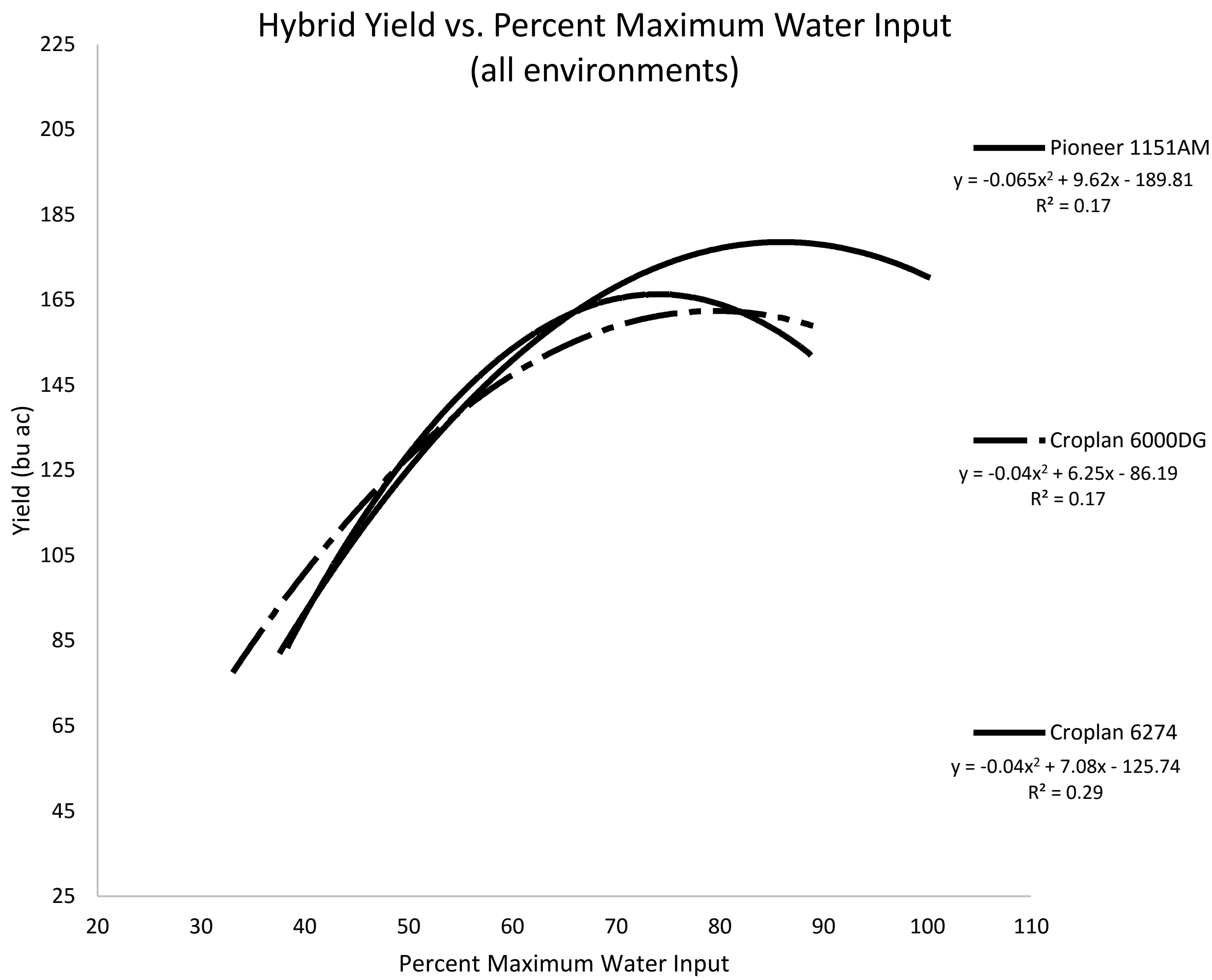


Figure 11. Hybrid yield vs. Percent maximum water input for DT and non-DT hybrids in 18 environments in Kansas in 2014 and 2015.

The yield response of each hybrid to percent of observed maximum water input was best characterized by quadratic models (Figure 11, Table 36). The 90% confidence intervals for all three models overlap so each hybrid is assumed to have responded to water input in a similar manner. Even so, the models provide some indication that Croplan 6274 had the highest peak yield, which occured near 85% maximum water input. Pioneer 1151AM and Croplan 6000DG have similar yield peaks, but Croplan 6000DG maintained greater yields than both other hybrids as water become more limited.

Table 36. Quadratic models for hybrid yield vs. percent maximum water input for three hybrids evaluated in 18 environments in Kansas in 2014 and 2015.

Croplan 6274 Quadratic Model

Source	DF	Pr > F
Model	2	<.0001
Root MSE	40.74882	
R-Square	0.2851	

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-125.735	±88.15686	-1.43	0.1581
Percent max. water loss	1	7.08057	±2.73993	2.58	0.0118
PMAXSQ	1	-0.04119	±0.02049	-2.01	0.0481

Croplan 6000DG Quadratic Model

Source	DF	Pr > F
Model	2	0.001
Root MSE	43.57419	
R-Square	0.1724	

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-86.18716	±92.28335	-0.93	0.3534
Percent max. water loss	1	6.2516	±2.99058	2.09	0.0401
PMAXSQ	1	-0.03931	±0.02342	-1.68	0.0975

Pioneer 1151AM Quadratic Model

Source	DF	Pr > F
Model	2	0.001
Root MSE	46.27754	
R-Square	0.1708	

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-189.8	±115.62298	-1.64	0.1049
Percent max water loss	1	9.62402	±3.69307	2.61	0.0111
PMAXSQ	1	-0.06503	±0.02857	-2.28	0.0258

Conclusion

Across the range of environments sampled in this study, the three hybrids tested did not differ significantly in yield response to water availability. Few significant interactions of hybrid with environment occurred for any of the response variables. Yields across all locations varied across the environment in which they were placed. The only exception was that one of the DT hybrids did not match yields of the other DT hybrid or the non-DT hybrid when yields were greater than 200 bu a^{-1}. Producers should take into consideration the management of these drought tolerant hybrids to achieve maximum benefit such as hybrid selections, proper fertility, proper seeding rates, and proper seed placement. Across the 18 environments, differences of SPAD, canopy temperature, and ear-leaf temperature were recorded at VT, and mid-reproductive stages, but overall crop performance in terms of yield was unaffected. It is evident that at times, hybrids differed in response to environment, but a significant and consistent yield advantage in water-limited environments was not observed. Taking into account best management practices should be first considered when coming up with a cropping system for semi-arid environment, then one can choose the best-fit hybrid for their system.

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Appendix A – Raw Data

Table A1: **Raw data for 2014-2015 yield and HI**

Raw data for 2014-2015 yield and HI								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**YIELD**	**HI**
							bu ac^{-1}	lb ac^{-1}
HU201550	50	2015	HU	6	6274	104	139.59	0.38
HU201550	50	2015	HU	6	6000	105	125.91	0.38
HU201550	50	2015	HU	6	1151	106	130.89	0.41
HU20150	0	2015	HU	6	6274	107	63.26	0.33
HU20150	0	2015	HU	6	6000	108	50.73	0.23
HU20150	0	2015	HU	6	1151	109	75.36	0.56
HU2015100	100	2015	HU	2	1151	201	186.18	0.44
HU2015100	100	2015	HU	2	6000	202	172.81	0.42
HU2015100	100	2015	HU	2	6274	203	165.64	0.35
HU2015100	100	2015	HU	4	6274	301	.	.
HU2015100	100	2015	HU	4	6000	302	133.71	0.34
HU2015100	100	2015	HU	4	1151	303	189.35	0.48
HU201550	50	2015	HU	4	1151	304	145.50	0.39
HU201550	50	2015	HU	4	6000	305	191.34	0.56
HU201550	50	2015	HU	4	6274	306	140.20	0.34
HU20150	0	2015	HU	4	1151	307	62.07	0.34
HU20150	0	2015	HU	4	6000	308	57.66	0.38
HU20150	0	2015	HU	4	6274	309	59.78	0.44
HU2015100	100	2015	HU	1	1151	401	203.12	0.49
HU2015100	100	2015	HU	1	6000	402	168.42	0.42
HU2015100	100	2015	HU	1	6274	403	185.02	0.37
HU201550	50	2015	HU	1	6274	404	152.11	0.47
HU201550	50	2015	HU	1	1151	405	143.40	0.39
HU201550	50	2015	HU	1	6000	406	152.83	0.47
HU20150	0	2015	HU	1	6000	407	59.36	0.54
HU20150	0	2015	HU	1	1151	408	48.97	0.45
HU20150	0	2015	HU	1	6274	409	55.13	0.45
HU2015100	100	2015	HU	5	6000	501	.	.
HU2015100	100	2015	HU	5	1151	502	176.75	0.43
HU2015100	100	2015	HU	5	6274	503	180.53	0.45
HU201550	50	2015	HU	5	1151	504	115.54	0.35
HU201550	50	2015	HU	5	6274	505	0.00	0.00
HU201550	50	2015	HU	5	6000	506	144.76	0.39
HU20150	0	2015	HU	5	6274	507	54.02	0.33
HU20150	0	2015	HU	5	6000	508	61.88	0.42

Raw data for 2014-2015 yield and HI (continued)								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**YIELD**	**HI**
							bu ac^{-1}	lb ac^{-1}
HU2015100	100	2015	HU	3	6274	601	177.86	0.51
HU2015100	100	2015	HU	3	6000	602	172.50	0.37
HU2015100	100	2015	HU	3	1151	603	192.22	0.47
HU201550	50	2015	HU	3	1151	604	134.77	0.39
HU201550	50	2015	HU	3	6000	605	147.30	0.45
HU201550	50	2015	HU	3	6274	606	161.12	0.55
HU20150	0	2015	HU	3	6274	607	76.71	0.39
HU20150	0	2015	HU	3	1151	608	65.98	0.36
HU20150	0	2015	HU	3	6000	609	57.46	0.37
TO2015100	100	2015	TO	3	1151	701	124.88	0.30
TO2015100	100	2015	TO	3	6000	702	159.67	0.32
TO2015100	100	2015	TO	3	6274	703	188.45	0.43
TO20150	0	2015	TO	3	6274	704	182.68	0.43
TO20150	0	2015	TO	3	6000	705	143.11	0.38
TO20150	0	2015	TO	3	1151	706	123.49	0.28
TO2015100	100	2015	TO	1	1151	801	173.22	0.39
TO2015100	100	2015	TO	1	6000	802	177.99	0.44
TO2015100	100	2015	TO	1	6274	803	175.12	0.28
TO20150	0	2015	TO	1	6274	804	170.84	0.44
TO20150	0	2015	TO	1	6000	805	176.00	0.56
TO20150	0	2015	TO	1	1151	806	164.79	0.46
TO2015100	100	2015	TO	4	1151	901	174.88	0.37
TO2015100	100	2015	TO	4	6000	902	174.40	0.43
TO2015100	100	2015	TO	4	6274	903	162.90	0.29
TO20150	0	2015	TO	4	6000	904	161.10	0.42
TO20150	0	2015	TO	4	6274	905	154.12	0.39
TO20150	0	2015	TO	4	1151	906	166.52	0.39
TO2015100	100	2015	TO	2	1151	1001	175.45	0.34
TO2015100	100	2015	TO	2	6274	1002	181.80	0.42
TO2015100	100	2015	TO	2	6000	1003	146.49	0.34
TO20150	0	2015	TO	2	1151	1004	158.22	0.37
TO20150	0	2015	TO	2	6000	1005	161.53	0.44
TO20150	0	2015	TO	2	6274	1006	184.02	0.43
SC2015100	100	2015	SC	5	1151	1101	240.65	0.58
SC2015100	100	2015	SC	5	6274	1102	229.45	0.49
SC2015100	100	2015	SC	5	6000	1103	233.15	0.50
SC20150	0	2015	SC	5	1151	1104	180.70	0.46
SC20150	0	2015	SC	5	6274	1105	195.13	0.50

Raw data for 2014-2015 yield and HI (continued)								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**YIELD**	**HI**
							bu ac^{-1}	lb ac^{-1}
SC20150	0	2015	SC	5	6000	1106	174.43	0.43
SC2015100	100	2015	SC	4	1151	1201	238.66	0.55
SC2015100	100	2015	SC	4	6000	1202	225.56	0.49
SC2015100	100	2015	SC	4	6274	1203	209.29	0.46
SC20150	0	2015	SC	4	6000	1204	183.93	0.50
SC20150	0	2015	SC	4	6274	1205	169.30	0.48
SC20150	0	2015	SC	4	1151	1206	180.38	0.49
SC2015100	100	2015	SC	3	6000	1301	226.85	0.55
SC2015100	100	2015	SC	3	1151	1302	221.04	0.50
SC2015100	100	2015	SC	3	6274	1303	227.27	0.52
SC20150	0	2015	SC	3	6274	1304	162.96	0.41
SC20150	0	2015	SC	3	1151	1305	154.60	0.38
SC20150	0	2015	SC	3	6000	1306	141.24	0.44
SC2015100	100	2015	SC	1	6274	1401	223.39	0.57
SC2015100	100	2015	SC	1	6000	1402	218.82	0.48
SC2015100	100	2015	SC	1	1151	1403	233.21	0.50
SC20150	0	2015	SC	1	1151	1404	192.50	0.64
SC20150	0	2015	SC	1	6000	1405	158.45	0.62
SC20150	0	2015	SC	1	6274	1406	151.77	0.58
SC2015100	100	2015	SC	2	1151	1501	205.83	0.50
SC2015100	100	2015	SC	2	6000	1502	217.44	0.54
SC2015100	100	2015	SC	2	6274	1503	183.74	0.47
SC20150	0	2015	SC	2	6000	1504	165.00	0.50
SC20150	0	2015	SC	2	6274	1505	153.05	0.39
SC20150	0	2015	SC	2	1151	1506	149.57	0.39
TR20150	0	2015	TR	2	6274	1601	81.69	.
TR20150	0	2015	TR	2	1151	1602	80.80	.
TR20150	0	2015	TR	2	6000	1603	104.47	.
TR20150	0	2015	TR	3	6000	1701	110.34	.
TR20150	0	2015	TR	3	1151	1702	124.07	.
TR20150	0	2015	TR	3	6274	1703	97.25	.
TR20150	0	2015	TR	1	1151	1801	150.40	.
TR20150	0	2015	TR	1	6274	1802	145.29	.
TR20150	0	2015	TR	1	6000	1803	134.96	.
TR20150	0	2015	TR	4	6000	1901	118.67	.
TR20150	0	2015	TR	4	1151	1902	121.96	.
TR20150	0	2015	TR	4	6274	1903	151.47	.
GC20150	0	2015	GC	1	6274	2001	117.63	.

Raw data for 2014-2015 yield and HI (continued)								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**YIELD**	**HI**
							bu ac^{-1}	lb ac^{-1}
GC20150	0	2015	GC	1	1151	2002	60.05	.
GC20150	0	2015	GC	1	6000	2003	125.03	.
GC20150	0	2015	GC	2	6274	2101	175.99	.
GC20150	0	2015	GC	2	6000	2102	129.33	.
GC20150	0	2015	GC	2	1151	2103	157.60	.
GC20150	0	2015	GC	3	6274	2201	195.53	.
GC20150	0	2015	GC	3	6000	2202	160.78	.
GC20150	0	2015	GC	3	1151	2203	169.00	.
GC20150	0	2015	GC	4	1151	2301	160.91	.
GC20150	0	2015	GC	4	6274	2302	180.48	.
GC20150	0	2015	GC	4	6000	2303	164.09	.
HU2014100	100	2014	HU	1	1151	101	145.25	0.40
HU2014100	100	2014	HU	1	6274	102	174.24	0.35
HU2014100	100	2014	HU	1	6000	103	142.48	0.31
HU201433	33	2014	HU	1	6274	104	137.75	0.31
HU201433	33	2014	HU	1	6000	105	121.16	0.31
HU201433	33	2014	HU	1	1151	106	111.27	0.32
HU201466	66	2014	HU	1	6000	107	171.99	0.39
HU201466	66	2014	HU	1	1151	108	172.48	0.46
HU201466	66	2014	HU	1	6274	109	181.16	0.41
HU20140	0	2014	HU	1	6000	110	126.62	0.42
HU20140	0	2014	HU	1	6274	111	111.09	0.36
HU20140	0	2014	HU	1	1151	112	117.47	0.37
HU2014100	100	2014	HU	2	6000	201	107.78	0.25
HU2014100	100	2014	HU	2	1151	202	164.77	0.41
HU2014100	100	2014	HU	2	6274	203	143.34	0.33
HU201433	33	2014	HU	2	6000	204	112.55	0.34
HU201433	33	2014	HU	2	1151	205	136.22	0.41
HU201433	33	2014	HU	2	6274	206	134.98	0.35
HU201466	66	2014	HU	2	1151	207	194.08	0.45
HU201466	66	2014	HU	2	6274	208	156.19	0.41
HU201466	66	2014	HU	2	6000	209	156.69	0.43
HU20140	0	2014	HU	2	1151	210	139.69	0.40
HU20140	0	2014	HU	2	6274	211	.	.
HU20140	0	2014	HU	2	6000	212	148.18	0.52
HU2014100	100	2014	HU	3	1151	301	162.21	0.46
HU2014100	100	2014	HU	3	6274	302	159.93	0.25
HU2014100	100	2014	HU	3	6000	303	134.52	0.31

Raw data for 2014-2015 yield and HI (continued)								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**YIELD**	**HI**
							bu ac^{-1}	lb ac^{-1}
HU201433	33	2014	HU	3	1151	304	151.46	0.55
HU201433	33	2014	HU	3	6000	305	141.94	0.41
HU201433	33	2014	HU	3	6274	306	120.89	0.58
HU201466	66	2014	HU	3	1151	307	144.05	0.35
HU201466	66	2014	HU	3	6000	308	153.96	0.34
HU201466	66	2014	HU	3	6274	309	184.10	0.40
HU20140	0	2014	HU	3	1151	310	116.92	0.36
HU20140	0	2014	HU	3	6274	311	105.47	0.45
HU20140	0	2014	HU	3	6000	312	116.78	0.47
HU2014100	100	2014	HU	4	1151	401	143.53	0.53
HU2014100	100	2014	HU	4	6274	402	166.75	0.33
HU2014100	100	2014	HU	4	6000	403	139.90	0.35
HU201433	33	2014	HU	4	1151	404	138.83	0.37
HU201433	33	2014	HU	4	6274	405	111.39	0.26
HU201433	33	2014	HU	4	6000	406	106.09	0.34
HU201466	66	2014	HU	4	6000	407	186.80	0.50
HU201466	66	2014	HU	4	6274	408	163.61	0.32
HU201466	66	2014	HU	4	1151	409	160.39	0.41
HU20140	0	2014	HU	4	6274	410	104.80	0.37
HU20140	0	2014	HU	4	1151	411	141.27	0.36
HU20140	0	2014	HU	4	6000	412	102.56	0.35
TO2014100	100	2014	TO	1	6000	501	139.97	0.41
TO2014100	100	2014	TO	1	6274	502	147.85	0.49
TO2014100	100	2014	TO	1	1151	503	192.05	0.39
TO20140	0	2014	TO	1	1151	504	142.51	0.27
TO20140	0	2014	TO	1	6000	505	121.70	0.25
TO20140	0	2014	TO	1	6274	506	136.28	0.27
TO2014100	100	2014	TO	2	1151	601	144.86	0.40
TO2014100	100	2014	TO	2	6000	602	121.23	0.43
TO2014100	100	2014	TO	2	6274	603	191.43	0.39
TO20140	0	2014	TO	2	1151	604	147.26	0.22
TO20140	0	2014	TO	2	6274	605	156.49	0.21
TO20140	0	2014	TO	2	6000	606	207.50	0.22
TO2014100	100	2014	TO	3	6000	701	107.90	0.40
TO2014100	100	2014	TO	3	1151	702	95.50	0.42
TO2014100	100	2014	TO	3	6274	703	95.92	0.39
TO20140	0	2014	TO	3	6000	704	100.03	0.33

Raw data for 2014-2015 yield and HI (continued)								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**YIELD**	**HI**
							bu ac^{-1}	lb ac^{-1}
TO20140	0	2014	TO	3	6274	705	99.32	0.28
TO20140	0	2014	TO	3	1151	706	71.31	0.41
TO2014100	100	2014	TO	4	6274	801	99.04	0.43
TO2014100	100	2014	TO	4	6000	802	96.15	0.53
TO2014100	100	2014	TO	4	1151	803	69.09	0.51
TO20140	0	2014	TO	4	1151	804	104.19	0.38
TO20140	0	2014	TO	4	6274	805	89.90	0.45
TO20140	0	2014	TO	4	6000	806	51.31	0.41
SC2014100	100	2014	SC	1	6274	901	232.49	0.36
SC2014100	100	2014	SC	1	1151	902	242.81	0.35
SC2014100	100	2014	SC	1	6000	903	212.86	0.31
SC20140	0	2014	SC	1	6274	904	113.60	0.35
SC20140	0	2014	SC	1	1151	905	124.38	0.26
SC20140	0	2014	SC	1	6000	906	113.27	0.21
SC2014100	100	2014	SC	2	1151	1001	233.55	0.36
SC2014100	100	2014	SC	2	6274	1002	241.44	0.38
SC2014100	100	2014	SC	2	6000	1003	202.05	0.32
SC20140	0	2014	SC	2	6274	1004	96.66	0.21
SC20140	0	2014	SC	2	6000	1005	119.69	0.27
SC20140	0	2014	SC	2	1151	1006	128.92	0.31
SC2014100	100	2014	SC	3	1151	1101	222.53	0.33
SC2014100	100	2014	SC	3	6000	1102	196.70	0.34
SC2014100	100	2014	SC	3	6274	1103	193.89	0.34
SC20140	0	2014	SC	3	6274	1104	121.32	0.26
SC20140	0	2014	SC	3	1151	1105	102.46	0.26
SC20140	0	2014	SC	3	6000	1106	148.70	0.29
SC2014100	100	2014	SC	4	6000	1201	209.51	0.32
SC2014100	100	2014	SC	4	6274	1202	204.59	0.34
SC2014100	100	2014	SC	4	1151	1203	216.34	0.34
SC20140	0	2014	SC	4	6274	1204	140.55	0.34
SC20140	0	2014	SC	4	1151	1205	161.76	0.32
SC20140	0	2014	SC	4	6000	1206	153.54	0.31
TR20140	0	2014	TR	1	6274	1301	163.43	.
TR20140	0	2014	TR	1	6000	1302	151.25	.
TR20140	0	2014	TR	1	1151	1303	172.80	.
TR20140	0	2014	TR	2	6000	1401	160.99	.
TR20140	0	2014	TR	2	6274	1402	170.81	.
TR20140	0	2014	TR	2	1151	1403	169.18	.

Raw data for 2014-2015 yield and HI (continued)								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**YIELD**	**HI**
							bu ac^{-1}	lb ac^{-1}
TR20140	0	2014	TR	3	6000	1501	160.31	.
TR20140	0	2014	TR	3	1151	1502	160.41	.
TR20140	0	2014	TR	3	6274	1503	158.75	.
TR20140	0	2014	TR	4	6000	1601	150.20	.
TR20140	0	2014	TR	4	1151	1602	161.21	.
TR20140	0	2014	TR	4	6274	1603	179.45	.
GC20140	0	2014	GC	1	6274	1701	80.09	.
GC20140	0	2014	GC	1	1151	1702	66.17	.
GC20140	0	2014	GC	1	6000	1703	64.00	.
GC20140	0	2014	GC	2	6274	1801	63.13	.
GC20140	0	2014	GC	2	6000	1802	43.69	.
GC20140	0	2014	GC	2	1151	1803	68.71	.
GC20140	0	2014	GC	3	6274	1901	77.83	.
GC20140	0	2014	GC	3	6000	1902	62.45	.
GC20140	0	2014	GC	3	1151	1903	77.56	.
GC20140	0	2014	GC	4	1151	2001	16.03	.
GC20140	0	2014	GC	4	6274	2002	34.34	.
GC20140	0	2014	GC	4	6000	2003	31.12	.

Table A2: **2014-2015 Raw data for SPAD**

2014-2015 Raw data for SPAD									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
HU201550	50	2015	HUTCH	6	6274	104	46.4	52.2	.
HU201550	50	2015	HUTCH	6	6000	105	46.4	47.7	.
HU201550	50	2015	HUTCH	6	1151	106	39.7	49.7	.
HU20150	0	2015	HUTCH	6	6274	107	35.0	43.4	.
HU20150	0	2015	HUTCH	6	6000	108	38.3	37.7	.
HU20150	0	2015	HUTCH	6	1151	109	37.9	43.8	.
HU2015100	100	2015	HUTCH	2	1151	201	41.2	48.1	.
HU2015100	100	2015	HUTCH	2	6000	202	44.9	49.6	.
HU2015100	100	2015	HUTCH	2	6274	203	42.1	46.8	.
HU2015100	100	2015	HUTCH	4	6274	301	43.9	42.0	.
HU2015100	100	2015	HUTCH	4	6000	302	46.8	52.5	.
HU2015100	100	2015	HUTCH	4	1151	303	42.5	46.5	.
HU201550	50	2015	HUTCH	4	1151	304	39.2	42.6	.
HU201550	50	2015	HUTCH	4	6000	305	43.7	43.6	.
HU201550	50	2015	HUTCH	4	6274	306	47.3	46.1	.
HU20150	0	2015	HUTCH	4	1151	307	37.9	42.8	.

2014-2015 Raw data for SPAD (continued)									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
HU20150	0	2015	HUTCH	4	6000	308	37.6	36.7	.
HU20150	0	2015	HUTCH	4	6274	309	32.2	34.5	.
HU2015100	100	2015	HUTCH	1	1151	401	44.3	47.1	.
HU2015100	100	2015	HUTCH	1	6000	402	40.6	49.4	.
HU2015100	100	2015	HUTCH	1	6274	403	43.6	46.7	.
HU201550	50	2015	HUTCH	1	6274	404	40.8	53.3	.
HU201550	50	2015	HUTCH	1	1151	405	39.0	43.8	.
HU201550	50	2015	HUTCH	1	6000	406	44.1	50.2	.
HU20150	0	2015	HUTCH	1	6000	407	37.2	37.0	.
HU20150	0	2015	HUTCH	1	1151	408	33.8	38.7	.
HU20150	0	2015	HUTCH	1	6274	409	38.8	37.1	.
HU2015100	100	2015	HUTCH	5	6000	501	46.0	43.9	.
HU2015100	100	2015	HUTCH	5	1151	502	41.7	51.5	.
HU2015100	100	2015	HUTCH	5	6274	503	46.0	46.9	.
HU201550	50	2015	HUTCH	5	1151	504	45.3	43.1	.
HU201550	50	2015	HUTCH	5	6274	505	43.0	47.1	.
HU201550	50	2015	HUTCH	5	6000	506	46.3	46.7	.
HU20150	0	2015	HUTCH	5	6274	507	40.9	37.4	.
HU20150	0	2015	HUTCH	5	6000	508	39.4	35.5	.
HU20150	0	2015	HUTCH	5	1151	509	36.8	37.1	.
HU2015100	100	2015	HUTCH	3	6274	601	46.8	49.2	.
HU2015100	100	2015	HUTCH	3	6000	602	47.4	55.3	.
HU2015100	100	2015	HUTCH	3	1151	603	45.8	45.9	.
HU201550	50	2015	HUTCH	3	1151	604	39.4	46.5	.
HU201550	50	2015	HUTCH	3	6000	605	41.8	50.1	.
HU201550	50	2015	HUTCH	3	6274	606	42.3	48.0	.
HU20150	0	2015	HUTCH	3	6274	607	40.7	35.2	.
HU20150	0	2015	HUTCH	3	1151	608	39.2	43.9	.
HU20150	0	2015	HUTCH	3	6000	609	40.4	38.3	.
TO2015100	100	2015	TOP	3	1151	701	50.4	50.0	.
TO2015100	100	2015	TOP	3	6000	702	53.8	53.8	.
TO2015100	100	2015	TOP	3	6274	703	53.2	51.6	.
TO20150	0	2015	TOP	3	6274	704	53.6	56.9	.
TO20150	0	2015	TOP	3	6000	705	55.1	55.4	.
TO20150	0	2015	TOP	3	1151	706	51.2	48.0	.
TO2015100	100	2015	TOP	1	1151	801	54.9	51.1	.
TO2015100	100	2015	TOP	1	6000	802	52.9	53.9	.
TO2015100	100	2015	TOP	1	6274	803	48.6	50.7	.
TO20150	0	2015	TOP	1	6274	804	51.9	57.8	.

2014-2015 Raw data for SPAD (continued)									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
TO20150	0	2015	TOP	1	6000	805	57.0	57.7	.
TO20150	0	2015	TOP	1	1151	806	48.2	57.6	.
TO2015100	100	2015	TOP	4	1151	901	53.9	54.7	.
TO2015100	100	2015	TOP	4	6000	902	50.7	57.5	.
TO2015100	100	2015	TOP	4	6274	903	51.2	53.7	.
TO20150	0	2015	TOP	4	6000	904	53.6	57.6	.
TO20150	0	2015	TOP	4	6274	905	54.1	53.1	.
TO20150	0	2015	TOP	4	1151	906	51.5	57.1	.
TO2015100	100	2015	TOP	2	1151	1001	52.3	53.0	.
TO2015100	100	2015	TOP	2	6274	1002	56.0	58.6	.
TO2015100	100	2015	TOP	2	6000	1003	52.1	53.8	.
TO20150	0	2015	TOP	2	1151	1004	52.7	53.1	.
TO20150	0	2015	TOP	2	6000	1005	52.3	58.6	.
TO20150	0	2015	TOP	2	6274	1006	47.4	54.3	.
SC2015100	100	2015	SCAN	5	1151	1101	48.2	56.0	.
SC2015100	100	2015	SCAN	5	6274	1102	47.1	55.3	.
SC2015100	100	2015	SCAN	5	6000	1103	44.6	52.1	.
SC20150	0	2015	SCAN	5	1151	1104	44.1	49.2	.
SC20150	0	2015	SCAN	5	6274	1105	38.1	49.7	.
SC20150	0	2015	SCAN	5	6000	1106	34.3	48.3	.
SC2015100	100	2015	SCAN	4	1151	1201	43.4	56.6	.
SC2015100	100	2015	SCAN	4	6000	1202	41.4	56.1	.
SC2015100	100	2015	SCAN	4	6274	1203	41.7	51.2	.
SC20150	0	2015	SCAN	4	6000	1204	38.2	47.9	.
SC20150	0	2015	SCAN	4	6274	1205	46.0	49.9	.
SC20150	0	2015	SCAN	4	1151	1206	41.1	45.9	.
SC2015100	100	2015	SCAN	3	6000	1301	43.6	55.9	.
SC2015100	100	2015	SCAN	3	1151	1302	44.4	53.0	.
SC2015100	100	2015	SCAN	3	6274	1303	50.1	54.2	.
SC20150	0	2015	SCAN	3	6274	1304	34.0	43.1	.
SC20150	0	2015	SCAN	3	1151	1305	43.2	45.2	.
SC20150	0	2015	SCAN	3	6000	1306	37.0	46.7	.
SC2015100	100	2015	SCAN	1	6274	1401	47.7	53.1	.
SC2015100	100	2015	SCAN	1	6000	1402	44.0	55.2	.
SC2015100	100	2015	SCAN	1	1151	1403	44.7	48.8	.
SC20150	0	2015	SCAN	1	1151	1404	33.7	45.5	.
SC20150	0	2015	SCAN	1	6000	1405	35.2	49.7	.
SC20150	0	2015	SCAN	1	6274	1406	37.6	46.5	.
SC2015100	100	2015	SCAN	2	1151	1501	46.1	56.0	.

2014-2015 Raw data for SPAD (continued)									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
SC2015100	100	2015	SCAN	2	6000	1502	43.1	55.6	.
SC2015100	100	2015	SCAN	2	6274	1503	43.3	51.7	.
SC20150	0	2015	SCAN	2	6000	1504	33.6	46.1	.
SC20150	0	2015	SCAN	2	6274	1505	39.9	44.2	.
SC20150	0	2015	SCAN	2	1151	1506	49.7	42.1	.
TR20150	0	2015	TRIB	2	6274	1601	47.9	.	.
TR20150	0	2015	TRIB	2	1151	1602	42.8	.	.
TR20150	0	2015	TRIB	2	6000	1603	51.6	.	.
TR20150	0	2015	TRIB	3	6000	1701	48.8	.	.
TR20150	0	2015	TRIB	3	1151	1702	46.2	.	.
TR20150	0	2015	TRIB	3	6274	1703	45.9	.	.
TR20150	0	2015	TRIB	1	1151	1801	47.9	.	.
TR20150	0	2015	TRIB	1	6274	1802	45.3	.	.
TR20150	0	2015	TRIB	1	6000	1803	46.4	.	.
TR20150	0	2015	TRIB	4	6000	1901	40.4	.	.
TR20150	0	2015	TRIB	4	1151	1902	38.8	.	.
TR20150	0	2015	TRIB	4	6274	1903	45.3	.	.
GC20150	0	2015	GC	1	6274	2001	51.10	.	.
GC20150	0	2015	GC	1	1151	2002	48.00	.	.
GC20150	0	2015	GC	1	6000	2003	54.10	.	.
GC20150	0	2015	GC	2	6274	2101	55.50	.	.
GC20150	0	2015	GC	2	6000	2102	53.70	.	.
GC20150	0	2015	GC	2	1151	2103	54.10	.	.
GC20150	0	2015	GC	3	6274	2201	55.80	.	.
GC20150	0	2015	GC	3	6000	2202	56.10	.	.
GC20150	0	2015	GC	3	1151	2203	51.60	.	.
GC20150	0	2015	GC	4	1151	2301	55.10	.	.
GC20150	0	2015	GC	4	6274	2302	54.30	.	.
GC20150	0	2015	GC	4	6000	2303	56.70	.	.
HU2014100	100	2014	HUTCH	1	1151	101	62.40	49.60	58.20
HU2014100	100	2014	HUTCH	1	6274	102	53.20	50.10	53.20
HU2014100	100	2014	HUTCH	1	6000	103	50.80	44.80	55.00
HU201433	33	2014	HUTCH	1	6274	104	44.60	40.10	55.20
HU201433	33	2014	HUTCH	1	6000	105	42.30	46.20	50.40
HU201433	33	2014	HUTCH	1	1151	106	44.90	32.80	55.80
HU201466	66	2014	HUTCH	1	6000	107	61.20	54.70	54.40
HU201466	66	2014	HUTCH	1	1151	108	48.70	57.60	50.20
HU201466	66	2014	HUTCH	1	6274	109	51.20	45.80	53.90
HU20140	0	2014	HUTCH	1	6000	110	46.70	48.60	49.60

2014-2015 Raw data for SPAD (continued)									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
HU20140	0	2014	HUTCH	1	6274	111	51.10	43.10	53.90
HU20140	0	2014	HUTCH	1	1151	112	42.74	45.40	51.90
HU2014100	100	2014	HUTCH	2	6000	201	47.70	50.80	54.00
HU2014100	100	2014	HUTCH	2	1151	202	43.90	48.90	52.60
HU2014100	100	2014	HUTCH	2	6274	203	40.90	44.70	53.00
HU201433	33	2014	HUTCH	2	6000	204	44.70	46.40	54.50
HU201433	33	2014	HUTCH	2	1151	205	52.50	55.40	53.10
HU201433	33	2014	HUTCH	2	6274	206	43.50	41.40	53.40
HU201466	66	2014	HUTCH	2	1151	207	51.60	52.50	57.90
HU201466	66	2014	HUTCH	2	6274	208	46.60	47.40	54.80
HU201466	66	2014	HUTCH	2	6000	209	48.80	44.70	50.30
HU20140	0	2014	HUTCH	2	1151	210	47.20	41.30	60.40
HU20140	0	2014	HUTCH	2	6274	211	47.90	53.70	58.80
HU20140	0	2014	HUTCH	2	6000	212	44.10	46.70	56.30
HU2014100	100	2014	HUTCH	3	1151	301	57.60	43.20	52.80
HU2014100	100	2014	HUTCH	3	6274	302	49.10	38.90	56.00
HU2014100	100	2014	HUTCH	3	6000	303	63.40	48.20	53.30
HU201433	33	2014	HUTCH	3	1151	304	47.50	40.60	58.80
HU201433	33	2014	HUTCH	3	6000	305	50.70	46.60	56.70
HU201433	33	2014	HUTCH	3	6274	306	50.00	43.30	58.40
HU201466	66	2014	HUTCH	3	1151	307	70.20	45.50	55.90
HU201466	66	2014	HUTCH	3	6000	308	50.50	54.10	53.80
HU201466	66	2014	HUTCH	3	6274	309	63.70	42.60	55.60
HU20140	0	2014	HUTCH	3	1151	310	54.40	53.30	57.20
HU20140	0	2014	HUTCH	3	6274	311	52.30	42.00	51.50
HU20140	0	2014	HUTCH	3	6000	312	67.80	50.40	56.80
HU2014100	100	2014	HUTCH	4	1151	401	53.30	45.40	56.30
HU2014100	100	2014	HUTCH	4	6274	402	46.00	48.20	50.40
HU2014100	100	2014	HUTCH	4	6000	403	45.30	43.80	63.80
HU201433	33	2014	HUTCH	4	1151	404	54.30	52.50	57.70
HU201433	33	2014	HUTCH	4	6274	405	62.00	49.80	56.30
HU201433	33	2014	HUTCH	4	6000	406	47.20	48.60	52.10
HU201466	66	2014	HUTCH	4	6000	407	49.50	47.30	51.80
HU201466	66	2014	HUTCH	4	6274	408	57.60	46.00	55.30
HU201466	66	2014	HUTCH	4	1151	409	45.40	49.40	61.00
HU20140	0	2014	HUTCH	4	6274	410	53.50	44.00	53.80
HU20140	0	2014	HUTCH	4	1151	411	68.30	38.90	53.30
HU20140	0	2014	HUTCH	4	6000	412	44.10	46.90	48.90
TO20140	100	2014	TOP	1	6000	501	57.30	49.50	44.20

2014-2015 Raw data for SPAD (continued)									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
TO20140	100	2014	TOP	1	6274	502	54.90	45.40	45.70
TO20140	100	2014	TOP	1	1151	503	61.10	42.90	41.00
TO2014100	0	2014	TOP	1	1151	504	60.70	57.00	46.40
TO2014100	0	2014	TOP	1	6000	505	57.80	52.00	57.80
TO2014100	0	2014	TOP	1	6274	506	62.30	52.90	42.40
TO20140	100	2014	TOP	2	1151	601	55.50	63.10	36.40
TO20140	100	2014	TOP	2	6000	602	55.60	45.10	38.60
TO20140	100	2014	TOP	2	6274	603	59.30	44.50	46.90
TO2014100	0	2014	TOP	2	1151	604	61.70	51.60	41.80
TO2014100	0	2014	TOP	2	6274	605	58.20	53.10	31.50
TO2014100	0	2014	TOP	2	6000	606	62.10	50.70	19.90
TO20140	100	2014	TOP	3	6000	701	59.00	58.40	55.60
TO20140	100	2014	TOP	3	1151	702	56.20	50.20	41.30
TO20140	100	2014	TOP	3	6274	703	59.00	47.70	58.00
TO2014100	0	2014	TOP	3	6000	704	60.90	51.10	34.70
TO2014100	0	2014	TOP	3	6274	705	58.20	58.70	46.10
TO2014100	0	2014	TOP	3	1151	706	62.10	53.70	39.70
TO20140	100	2014	TOP	4	6274	801	58.30	51.50	40.30
TO20140	100	2014	TOP	4	6000	802	60.60	56.00	51.00
TO20140	100	2014	TOP	4	1151	803	64.20	54.20	66.60
TO2014100	0	2014	TOP	4	1151	804	56.00	57.00	45.30
TO2014100	0	2014	TOP	4	6274	805	58.60	48.10	42.70
TO2014100	0	2014	TOP	4	6000	806	62.70	51.90	27.50
SC2014100	100	2014	SCAN	1	6274	901	51.90	49.80	55.50
SC2014100	100	2014	SCAN	1	1151	902	53.10	47.60	51.70
SC2014100	100	2014	SCAN	1	6000	903	53.80	49.40	55.00
SC20140	0	2014	SCAN	1	6274	904	53.10	48.30	40.70
SC20140	0	2014	SCAN	1	1151	905	54.80	58.20	53.90
SC20140	0	2014	SCAN	1	6000	906	56.40	55.00	38.00
SC2014100	100	2014	SCAN	2	1151	1001	44.10	54.60	55.20
SC2014100	100	2014	SCAN	2	6274	1002	55.00	45.60	57.90
SC2014100	100	2014	SCAN	2	6000	1003	54.70	50.90	46.90
SC20140	0	2014	SCAN	2	6274	1004	55.90	46.80	53.00
SC20140	0	2014	SCAN	2	6000	1005	56.80	65.50	57.90
SC20140	0	2014	SCAN	2	1151	1006	59.20	58.30	45.90
SC2014100	100	2014	SCAN	3	1151	1101	58.00	49.40	53.40
SC2014100	100	2014	SCAN	3	6000	1102	55.50	49.90	51.30
SC2014100	100	2014	SCAN	3	6274	1103	52.80	48.80	49.50
SC20140	0	2014	SCAN	3	6274	1104	54.00	46.80	47.70

2014-2015 Raw data for SPAD (continued)									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
SC20140	0	2014	SCAN	3	1151	1105	58.20	59.20	60.80
SC20140	0	2014	SCAN	3	6000	1106	54.50	53.10	48.20
SC2014100	100	2014	SCAN	4	6000	1201	53.80	57.80	70.60
SC2014100	100	2014	SCAN	4	6274	1202	55.70	50.81	53.70
SC2014100	100	2014	SCAN	4	1151	1203	55.40	49.80	52.70
SC20140	0	2014	SCAN	4	6274	1204	49.50	59.30	43.80
SC20140	0	2014	SCAN	4	1151	1205	57.80	56.90	55.60
SC20140	0	2014	SCAN	4	6000	1206	58.10	57.80	68.10
TR20140	0	2014	TRIB	1	6274	1301	56.00	.	.
TR20140	0	2014	TRIB	1	6000	1302	54.40	.	.
TR20140	0	2014	TRIB	1	1151	1303	56.00	.	.
TR20140	0	2014	TRIB	2	6000	1401	58.00	.	.
TR20140	0	2014	TRIB	2	6274	1402	53.30	.	.
TR20140	0	2014	TRIB	2	1151	1403	48.60	.	.
TR20140	0	2014	TRIB	3	6000	1501	57.80	.	.
TR20140	0	2014	TRIB	3	1151	1502	49.10	.	.
TR20140	0	2014	TRIB	3	6274	1503	53.20	.	.
TR20140	0	2014	TRIB	4	6000	1601	54.80	.	.
TR20140	0	2014	TRIB	4	1151	1602	53.60	.	.
TR20140	0	2014	TRIB	4	6274	1603	52.30	.	.
GC20140	0	2014	GC	1	6274	1701	49.10	.	.
GC20140	0	2014	GC	1	1151	1702	54.00	.	.
GC20140	0	2014	GC	1	6000	1703	49.00	.	.
GC20140	0	2014	GC	2	6274	1801	40.20	.	.
GC20140	0	2014	GC	2	6000	1802	48.80	.	.
GC20140	0	2014	GC	2	1151	1803	50.60	.	.
GC20140	0	2014	GC	3	6274	1901	50.10	.	.
GC20140	0	2014	GC	3	6000	1902	52.30	.	.
GC20140	0	2014	GC	3	1151	1903	52.30	.	.
GC20140	0	2014	GC	4	1151	2001	46.60	.	.
GC20140	0	2014	GC	4	6274	2002	52.30	.	.
GC20140	0	2014	GC	4	6000	2003	51.30	.	.

Table A3: **2014-2015 Raw data for canopy temperature**

2014-2015 Raw data for canopy temperature									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
							°C	°C	°C
HU201550	50	2015	HU	6	6274	104	24.07	28.5	.
HU201550	50	2015	HU	6	6000	105	25.53	30.4	.

2014-2015 Raw data for canopy temperature (continued)									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
							°C	°C	°C
HU201550	50	2015	HU	6	1151	106	24.13	30.9	.
HU20150	0	2015	HU	6	6274	107	25.97	31.4	.
HU20150	0	2015	HU	6	6000	108	25.47	33.3	.
HU20150	0	2015	HU	6	1151	109	26.87	33.7	.
HU2015100	100	2015	HU	2	1151	201	24.40	28.6	.
HU2015100	100	2015	HU	2	6000	202	24.07	28.3	.
HU2015100	100	2015	HU	2	6274	203	23.63	28.6	.
HU2015100	100	2015	HU	4	6274	301	23.87	31.2	.
HU2015100	100	2015	HU	4	6000	302	23.13	28.8	.
HU2015100	100	2015	HU	4	1151	303	22.77	29.4	.
HU201550	50	2015	HU	4	1151	304	22.83	29.8	.
HU201550	50	2015	HU	4	6000	305	23.30	30.0	.
HU201550	50	2015	HU	4	6274	306	25.07	31.6	.
HU20150	0	2015	HU	4	1151	307	25.63	33.9	.
HU20150	0	2015	HU	4	6000	308	25.13	33.8	.
HU20150	0	2015	HU	4	6274	309	28.83	33.8	.
HU2015100	100	2015	HU	1	1151	401	23.03	28.8	.
HU2015100	100	2015	HU	1	6000	402	22.97	28.8	.
HU2015100	100	2015	HU	1	6274	403	23.23	28.4	.
HU201550	50	2015	HU	1	6274	404	23.37	30.2	.
HU201550	50	2015	HU	1	1151	405	23.10	30.4	.
HU201550	50	2015	HU	1	6000	406	24.27	29.5	.
HU20150	0	2015	HU	1	6000	407	27.10	32.7	.
HU20150	0	2015	HU	1	1151	408	25.17	32.0	.
HU20150	0	2015	HU	1	6274	409	27.47	31.9	.
HU2015100	100	2015	HU	5	6000	501	23.97	30.0	.
HU2015100	100	2015	HU	5	1151	502	23.97	29.9	.
HU2015100	100	2015	HU	5	6274	503	22.77	30.9	.
HU201550	50	2015	HU	5	1151	504	22.77	31.3	.
HU201550	50	2015	HU	5	6274	505	24.17	31.0	.
HU201550	50	2015	HU	5	6000	506	25.23	30.8	.
HU20150	0	2015	HU	5	6274	507	28.00	34.7	.
HU20150	0	2015	HU	5	6000	508	24.87	32.9	.
HU20150	0	2015	HU	5	1151	509	27.00	25.6	.
HU2015100	100	2015	HU	3	6274	601	23.73	28.9	.
HU2015100	100	2015	HU	3	6000	602	24.03	29.9	.
HU2015100	100	2015	HU	3	1151	603	23.30	29.1	.
HU201550	50	2015	HU	3	1151	604	24.43	30.4	.

2014-2015 Raw data for canopy temperature (continued)									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
							°C	°C	°C
HU201550	50	2015	HU	3	6000	605	24.00	30.7	.
HU201550	50	2015	HU	3	6274	606	23.73	31.2	.
HU20150	0	2015	HU	3	6274	607	27.77	34.1	.
HU20150	0	2015	HU	3	1151	608	24.17	33.3	.
HU20150	0	2015	HU	3	6000	609	24.67	33.8	.
TO2015100	100	2015	TO	3	1151	701	29.57	22.2	.
TO2015100	100	2015	TO	3	6000	702	29.93	25.6	.
TO2015100	100	2015	TO	3	6274	703	30.40	23.5	.
TO20150	0	2015	TO	3	6274	704	29.67	27.4	.
TO20150	0	2015	TO	3	6000	705	29.37	26.1	.
TO20150	0	2015	TO	3	1151	706	30.27	27.1	.
TO2015100	100	2015	TO	1	1151	801	29.43	20.6	.
TO2015100	100	2015	TO	1	6000	802	29.40	24.2	.
TO2015100	100	2015	TO	1	6274	803	30.57	23.5	.
TO20150	0	2015	TO	1	6274	804	30.57	27.4	.
TO20150	0	2015	TO	1	6000	805	30.07	25.5	.
TO20150	0	2015	TO	1	1151	806	30.53	27.6	.
TO2015100	100	2015	TO	4	1151	901	29.60	22.3	.
TO2015100	100	2015	TO	4	6000	902	30.07	24.8	.
TO2015100	100	2015	TO	4	6274	903	29.70	24.8	.
TO20150	0	2015	TO	4	6000	904	30.30	26.5	.
TO20150	0	2015	TO	4	6274	905	29.27	24.1	.
TO20150	0	2015	TO	4	1151	906	29.60	26.7	.
TO2015100	100	2015	TO	2	1151	1001	28.93	23.4	.
TO2015100	100	2015	TO	2	6274	1002	29.13	25.0	.
TO2015100	100	2015	TO	2	6000	1003	30.77	26.3	.
TO20150	0	2015	TO	2	1151	1004	29.60	27.1	.
TO20150	0	2015	TO	2	6000	1005	29.57	24.6	.
TO20150	0	2015	TO	2	6274	1006	30.30	25.9	.
SC2015100	100	2015	SC	5	1151	1101	29.40	18.1	.
SC2015100	100	2015	SC	5	6274	1102	29.40	18.1	.
SC2015100	100	2015	SC	5	6000	1103	28.53	18.1	.
SC20150	0	2015	SC	5	1151	1104	29.50	18.1	.
SC20150	0	2015	SC	5	6274	1105	29.63	18.1	.
SC20150	0	2015	SC	5	6000	1106	29.13	18.1	.
SC2015100	100	2015	SC	4	1151	1201	29.37	18.1	.
SC2015100	100	2015	SC	4	6000	1202	28.50	18.1	.
SC2015100	100	2015	SC	4	6274	1203	26.90	18.1	.

2014-2015 Raw data for canopy temperature (continued)									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
							°C	°C	°C
SC20150	0	2015	SC	4	6000	1204	30.67	18.1	.
SC20150	0	2015	SC	4	6274	1205	28.50	18.1	.
SC20150	0	2015	SC	4	1151	1206	29.13	18.1	.
SC2015100	100	2015	SC	3	6000	1301	29.63	18.1	.
SC2015100	100	2015	SC	3	1151	1302	29.20	18.1	.
SC2015100	100	2015	SC	3	6274	1303	27.80	18.1	.
SC20150	0	2015	SC	3	6274	1304	30.00	18.1	.
SC20150	0	2015	SC	3	1151	1305	30.93	18.1	.
SC20150	0	2015	SC	3	6000	1306	29.33	18.1	.
SC2015100	100	2015	SC	1	6274	1401	29.50	18.1	.
SC2015100	100	2015	SC	1	6000	1402	29.00	18.1	.
SC2015100	100	2015	SC	1	1151	1403	30.37	18.1	.
SC20150	0	2015	SC	1	1151	1404	29.23	18.1	.
SC20150	0	2015	SC	1	6000	1405	28.73	18.1	.
SC20150	0	2015	SC	1	6274	1406	28.43	18.1	.
SC2015100	100	2015	SC	2	1151	1501	29.07	18.1	.
SC2015100	100	2015	SC	2	6000	1502	28.53	18.1	.
SC2015100	100	2015	SC	2	6274	1503	30.30	18.1	.
SC20150	0	2015	SC	2	6000	1504	29.23	18.1	.
SC20150	0	2015	SC	2	6274	1505	29.17	18.1	.
SC20150	0	2015	SC	2	1151	1506	28.23	18.1	.
TR20150	0	2015	TR	2	6274	1601	21.10	.	.
TR20150	0	2015	TR	2	1151	1602	20.90	.	.
TR20150	0	2015	TR	2	6000	1603	20.87	.	.
TR20150	0	2015	TR	3	6000	1701	21.90	.	.
TR20150	0	2015	TR	3	1151	1702	20.87	.	.
TR20150	0	2015	TR	3	6274	1703	21.37	.	.
TR20150	0	2015	TR	1	1151	1801	21.23	.	.
TR20150	0	2015	TR	1	6274	1802	21.40	.	.
TR20150	0	2015	TR	1	6000	1803	22.07	.	.
TR20150	0	2015	TR	4	6000	1901	20.63	.	.
TR20150	0	2015	TR	4	1151	1902	21.80	.	.
TR20150	0	2015	TR	4	6274	1903	24.43	.	.
GC20150	0	2015	GC	1	6274	2001	20.03	.	.
GC20150	0	2015	GC	1	1151	2002	17.77	.	.
GC20150	0	2015	GC	1	6000	2003	17.37	.	.
GC20150	0	2015	GC	2	6274	2101	18.57	.	.
GC20150	0	2015	GC	2	6000	2102	17.63	.	.

2014-2015 Raw data for canopy temperature (continued)									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
							°C	°C	°C
GC20150	0	2015	GC	2	1151	2103	17.20	.	.
GC20150	0	2015	GC	3	6274	2201	18.40	.	.
GC20150	0	2015	GC	3	6000	2202	17.57	.	.
GC20150	0	2015	GC	3	1151	2203	16.80	.	.
GC20150	0	2015	GC	4	1151	2301	17.77	.	.
GC20150	0	2015	GC	4	6274	2302	17.37	.	.
GC20150	0	2015	GC	4	6000	2303	16.73	.	.
HU2014100	100	2014	HU	1	1151	101	22.70	32.73	22.07
HU2014100	100	2014	HU	1	6274	102	22.77	31.53	24.30
HU2014100	100	2014	HU	1	6000	103	22.53	33.13	25.50
HU201433	33	2014	HU	1	6274	104	22.80	32.57	27.37
HU201433	33	2014	HU	1	6000	105	22.53	30.57	27.03
HU201433	33	2014	HU	1	1151	106	22.70	30.60	28.13
HU201466	66	2014	HU	1	6000	107	22.73	33.63	25.23
HU201466	66	2014	HU	1	1151	108	22.60	34.97	26.20
HU201466	66	2014	HU	1	6274	109	22.57	35.27	26.33
HU20140	0	2014	HU	1	6000	110	22.83	34.47	27.10
HU20140	0	2014	HU	1	6274	111	22.63	35.63	29.20
HU20140	0	2014	HU	1	1151	112	22.60	34.53	30.03
HU2014100	100	2014	HU	2	6000	201	22.70	33.70	24.83
HU2014100	100	2014	HU	2	1151	202	22.63	33.80	25.23
HU2014100	100	2014	HU	2	6274	203	22.73	33.00	23.10
HU201433	33	2014	HU	2	6000	204	22.70	33.83	27.37
HU201433	33	2014	HU	2	1151	205	22.83	34.87	24.20
HU201433	33	2014	HU	2	6274	206	22.73	32.07	25.37
HU201466	66	2014	HU	2	1151	207	22.57	34.60	27.33
HU201466	66	2014	HU	2	6274	208	22.80	33.77	26.30
HU201466	66	2014	HU	2	6000	209	22.63	33.77	26.27
HU20140	0	2014	HU	2	1151	210	22.70	34.23	26.80
HU20140	0	2014	HU	2	6274	211	22.50	34.80	26.43
HU20140	0	2014	HU	2	6000	212	22.60	35.83	27.23
HU2014100	100	2014	HU	3	1151	301	22.63	34.47	24.27
HU2014100	100	2014	HU	3	6274	302	22.87	32.07	27.73
HU2014100	100	2014	HU	3	6000	303	22.73	32.90	24.40
HU201433	33	2014	HU	3	1151	304	22.60	32.43	27.40
HU201433	33	2014	HU	3	6000	305	22.37	31.40	26.83
HU201433	33	2014	HU	3	6274	306	22.60	31.27	26.33
HU201466	66	2014	HU	3	1151	307	22.57	34.87	26.77

2014-2015 Raw data for canopy temperature (continued)									
ENV	IRR	YEAR	LOC	BLOC	HYB	PLOT	VT	MREP	BL
							°C	°C	°C
HU201466	66	2014	HU	3	6000	308	22.77	34.37	26.73
HU201466	66	2014	HU	3	6274	309	22.57	35.07	27.50
HU20140	0	2014	HU	3	1151	310	22.53	35.40	25.20
HU20140	0	2014	HU	3	6274	311	22.50	35.80	30.17
HU20140	0	2014	HU	3	6000	312	22.93	35.23	29.73
HU2014100	100	2014	HU	4	1151	401	22.97	33.30	26.00
HU2014100	100	2014	HU	4	6274	402	22.67	33.13	25.73
HU2014100	100	2014	HU	4	6000	403	22.57	32.03	24.27
HU201433	33	2014	HU	4	1151	404	22.67	32.60	26.50
HU201433	33	2014	HU	4	6274	405	22.73	33.77	26.23
HU201433	33	2014	HU	4	6000	406	22.47	33.37	23.90
HU201466	66	2014	HU	4	6000	407	22.73	35.07	25.80
HU201466	66	2014	HU	4	6274	408	22.43	34.93	27.40
HU201466	66	2014	HU	4	1151	409	22.63	34.80	26.10
HU20140	0	2014	HU	4	6274	410	22.67	36.13	29.47
HU20140	0	2014	HU	4	1151	411	22.83	36.30	25.83
HU20140	0	2014	HU	4	6000	412	22.63	34.80	26.77
TO2014100	100	2014	TO	1	6000	501	28.77	32.73	23.67
TO2014100	100	2014	TO	1	6274	502	28.03	33.40	27.30
TO2014100	100	2014	TO	1	1151	503	27.87	36.00	27.93
TO20140	0	2014	TO	1	1151	504	28.37	32.84	30.73
TO20140	0	2014	TO	1	6000	505	28.10	132.33	29.60
TO20140	0	2014	TO	1	6274	506	27.67	32.00	28.80
TO2014100	100	2014	TO	2	1151	601	28.67	32.87	29.60
TO2014100	100	2014	TO	2	6000	602	28.17	33.83	29.17
TO2014100	100	2014	TO	2	6274	603	27.83	33.67	23.67
TO20140	0	2014	TO	2	1151	604	28.47	33.90	27.17
TO20140	0	2014	TO	2	6274	605	27.87	32.93	29.47
TO20140	0	2014	TO	2	6000	606	27.40	32.50	27.37
TO2014100	100	2014	TO	3	6000	701	28.53	32.30	31.00
TO2014100	100	2014	TO	3	1151	702	28.13	33.03	30.23
TO2014100	100	2014	TO	3	6274	703	27.80	33.57	17.68
TO20140	0	2014	TO	3	6000	704	28.07	33.80	29.87
TO20140	0	2014	TO	3	6274	705	28.23	33.50	24.50
TO20140	0	2014	TO	3	1151	706	27.63	33.40	27.93
TO2014100	100	2014	TO	4	6274	801	28.37	33.67	28.30
TO2014100	100	2014	TO	4	6000	802	28.00	32.23	30.70
TO2014100	100	2014	TO	4	1151	803	27.97	32.87	26.43

2014-2015 Raw data for canopy temperature (continued)									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
							°C	°C	°C
TO20140	0	2014	TO	4	1151	804	27.80	32.83	25.57
TO20140	0	2014	TO	4	6274	805	28.10	32.47	23.90
TO20140	0	2014	TO	4	6000	806	27.73	32.03	28.50
SC2014100	100	2014	SC	1	6274	901	31.07	24.53	32.77
SC2014100	100	2014	SC	1	1151	902	30.23	23.30	33.00
SC2014100	100	2014	SC	1	6000	903	31.17	23.83	31.50
SC20140	0	2014	SC	1	6274	904	30.83	24.80	35.40
SC20140	0	2014	SC	1	1151	905	31.07	24.53	39.43
SC20140	0	2014	SC	1	6000	906	30.33	21.97	40.20
SC2014100	100	2014	SC	2	1151	1001	31.93	24.43	30.13
SC2014100	100	2014	SC	2	6274	1002	30.53	25.17	33.13
SC2014100	100	2014	SC	2	6000	1003	29.97	25.50	32.47
SC20140	0	2014	SC	2	6274	1004	31.10	26.33	35.00
SC20140	0	2014	SC	2	6000	1005	33.33	24.53	38.67
SC20140	0	2014	SC	2	1151	1006	29.53	22.10	35.63
SC2014100	100	2014	SC	3	1151	1101	32.27	23.67	32.67
SC2014100	100	2014	SC	3	6000	1102	31.03	22.37	32.30
SC2014100	100	2014	SC	3	6274	1103	29.57	25.83	32.77
SC20140	0	2014	SC	3	6274	1104	31.10	21.80	34.60
SC20140	0	2014	SC	3	1151	1105	30.77	23.50	33.33
SC20140	0	2014	SC	3	6000	1106	30.90	23.13	34.67
SC2014100	100	2014	SC	4	6000	1201	30.37	23.23	31.63
SC2014100	100	2014	SC	4	6274	1202	32.10	23.43	31.90
SC2014100	100	2014	SC	4	1151	1203	30.03	23.17	32.60
SC20140	0	2014	SC	4	6274	1204	29.27	23.40	37.23
SC20140	0	2014	SC	4	1151	1205	30.20	24.10	37.70
SC20140	0	2014	SC	4	6000	1206	30.60	22.53	35.50
TR20140	0	2014	TR	1	6274	1301	33.90	.	.
TR20140	0	2014	TR	1	6000	1302	35.07	.	.
TR20140	0	2014	TR	1	1151	1303	34.23	.	.
TR20140	0	2014	TR	2	6000	1401	33.27	.	.
TR20140	0	2014	TR	2	6274	1402	35.30	.	.
TR20140	0	2014	TR	2	1151	1403	33.30	.	.
TR20140	0	2014	TR	3	6000	1501	33.67	.	.
TR20140	0	2014	TR	3	1151	1502	35.47	.	.
TR20140	0	2014	TR	3	6274	1503	34.80	.	.
TR20140	0	2014	TR	4	6000	1601	34.67	.	.
TR20140	0	2014	TR	4	1151	1602	35.23	.	.

2014-2015 Raw data for canopy temperature (continued)									
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**	**BL**
							°C	°C	°C
TR20140	0	2014	TR	4	6274	1603	34.40	.	.
GC20140	0	2014	GC	1	6274	1701	31.57	.	.
GC20140	0	2014	GC	1	1151	1702	32.20	.	.
GC20140	0	2014	GC	1	6000	1703	31.50	.	.
GC20140	0	2014	GC	2	6274	1801	31.23	.	.
GC20140	0	2014	GC	2	6000	1802	32.30	.	.
GC20140	0	2014	GC	2	1151	1803	31.97	.	.
GC20140	0	2014	GC	3	6274	1901	31.23	.	.
GC20140	0	2014	GC	3	6000	1902	34.17	.	.
GC20140	0	2014	GC	3	1151	1903	31.23	.	.
GC20140	0	2014	GC	4	1151	2001	32.03	.	.
GC20140	0	2014	GC	4	6274	2002	34.90	.	.
GC20140	0	2014	GC	4	6000	2003	31.10	.	.

Table A4: **2014-2015 Raw data for ear leaf temperature**

2014-2015 Raw data for ear leaf temperature								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**
						°C	°C	°C
HU201550	50	2015	HU	6	6274	104	23.88	30.00
HU201550	50	2015	HU	6	6000	105	24.9	31.16
HU201550	50	2015	HU	6	1151	106	24.5	31.34
HU20150	0	2015	HU	6	6274	107	25.2	30.52
HU20150	0	2015	HU	6	6000	108	25.18	33.02
HU20150	0	2015	HU	6	1151	109	25.68	32.68
HU2015100	100	2015	HU	2	1151	201	24.18	28.44
HU2015100	100	2015	HU	2	6000	202	23.38	29.24
HU2015100	100	2015	HU	2	6274	203	23.46	28.98
HU2015100	100	2015	HU	4	6274	301	23.42	29.46
HU2015100	100	2015	HU	4	6000	302	22.6	28.60
HU2015100	100	2015	HU	4	1151	303	22.76	28.48
HU201550	50	2015	HU	4	1151	304	18.68	29.42
HU201550	50	2015	HU	4	6000	305	24.08	29.98
HU201550	50	2015	HU	4	6274	306	24.66	30.50
HU20150	0	2015	HU	4	1151	307	25.18	32.88
HU20150	0	2015	HU	4	6000	308	24.96	30.42
HU20150	0	2015	HU	4	6274	309	26.52	33.10
HU2015100	100	2015	HU	1	1151	401	23.54	28.62
HU2015100	100	2015	HU	1	6000	402	23.12	29.24

2014-2015 Raw data for ear leaf temperature (continued)								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**
						°C	°C	°C
HU2015100	100	2015	HU	1	6274	403	23	29.16
HU201550	50	2015	HU	1	6274	404	23.12	30.16
HU201550	50	2015	HU	1	1151	405	23.6	30.46
HU201550	50	2015	HU	1	6000	406	24.46	30.58
HU20150	0	2015	HU	1	6000	407	26.98	33.14
HU20150	0	2015	HU	1	1151	408	24.18	30.82
HU20150	0	2015	HU	1	6274	409	26.76	31.88
HU2015100	100	2015	HU	5	6000	501	23.16	30.14
HU2015100	100	2015	HU	5	1151	502	23.82	29.54
HU2015100	100	2015	HU	5	6274	503	22.56	29.48
HU201550	50	2015	HU	5	1151	504	23.74	32.40
HU201550	50	2015	HU	5	6274	505	23.62	30.96
HU201550	50	2015	HU	5	6000	506	24.22	31.58
HU20150	0	2015	HU	5	6274	507	25.08	31.20
HU20150	0	2015	HU	5	6000	508	24.84	31.42
HU20150	0	2015	HU	5	1151	509	26.14	34.68
HU2015100	100	2015	HU	3	6274	601	23.78	28.28
HU2015100	100	2015	HU	3	6000	602	24.08	29.92
HU2015100	100	2015	HU	3	1151	603	24.16	30.02
HU201550	50	2015	HU	3	1151	604	23.6	31.00
HU201550	50	2015	HU	3	6000	605	23.6	30.74
HU201550	50	2015	HU	3	6274	606	24.1	31.46
HU20150	0	2015	HU	3	6274	607	25.7	33.50
HU20150	0	2015	HU	3	1151	608	24.24	32.84
HU20150	0	2015	HU	3	6000	609	26.42	34.06
TO2015100	100	2015	TO	3	1151	701	29.68	21.66
TO2015100	100	2015	TO	3	6000	702	29.66	24.78
TO2015100	100	2015	TO	3	6274	703	30.64	24.66
TO20150	0	2015	TO	3	6274	704	31.7	26.68
TO20150	0	2015	TO	3	6000	705	30.64	26.72
TO20150	0	2015	TO	3	1151	706	30.22	27.24
TO2015100	100	2015	TO	1	1151	801	29.92	21.24
TO2015100	100	2015	TO	1	6000	802	29.5	24.52
TO2015100	100	2015	TO	1	6274	803	30.18	24.92
TO20150	0	2015	TO	1	6274	804	31.82	28.48
TO20150	0	2015	TO	1	6000	805	30.52	26.52
TO20150	0	2015	TO	1	1151	806	29.42	27.40
TO2015100	100	2015	TO	4	1151	901	28.72	23.22

2014-2015 Raw data for ear leaf temperature (continued)								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**
						°C	°C	°C
TO2015100	100	2015	TO	4	6000	902	29.32	24.42
TO2015100	100	2015	TO	4	6274	903	28.3	25.84
TO20150	0	2015	TO	4	6000	904	25.16	27.74
TO20150	0	2015	TO	4	6274	905	31.42	25.42
TO20150	0	2015	TO	4	1151	906	29.64	27.12
TO2015100	100	2015	TO	2	1151	1001	30.04	25.08
TO2015100	100	2015	TO	2	6274	1002	29.24	25.76
TO2015100	100	2015	TO	2	6000	1003	31	25.86
TO20150	0	2015	TO	2	1151	1004	31.46	27.76
TO20150	0	2015	TO	2	6000	1005	30	25.76
TO20150	0	2015	TO	2	6274	1006	29.84	26.58
SC2015100	100	2015	SC	5	1151	1101	28.74	18.52
SC2015100	100	2015	SC	5	6274	1102	28.88	18.52
SC2015100	100	2015	SC	5	6000	1103	28.7	18.52
SC20150	0	2015	SC	5	1151	1104	29.1	18.52
SC20150	0	2015	SC	5	6274	1105	29.68	18.52
SC20150	0	2015	SC	5	6000	1106	28.84	18.52
SC2015100	100	2015	SC	4	1151	1201	28.36	18.52
SC2015100	100	2015	SC	4	6000	1202	28.06	18.52
SC2015100	100	2015	SC	4	6274	1203	27.88	18.52
SC20150	0	2015	SC	4	6000	1204	29.3	18.52
SC20150	0	2015	SC	4	6274	1205	28.5	18.52
SC20150	0	2015	SC	4	1151	1206	28.92	18.52
SC2015100	100	2015	SC	3	6000	1301	31.02	18.52
SC2015100	100	2015	SC	3	1151	1302	28.04	18.52
SC2015100	100	2015	SC	3	6274	1303	28.24	18.52
SC20150	0	2015	SC	3	6274	1304	29.62	18.52
SC20150	0	2015	SC	3	1151	1305	30.18	18.52
SC20150	0	2015	SC	3	6000	1306	29.18	18.52
SC2015100	100	2015	SC	1	6274	1401	28.94	18.52
SC2015100	100	2015	SC	1	6000	1402	28.8	18.52
SC2015100	100	2015	SC	1	1151	1403	29.92	18.52
SC20150	0	2015	SC	1	1151	1404	28.8	18.52
SC20150	0	2015	SC	1	6000	1405	28.58	18.52
SC20150	0	2015	SC	1	6274	1406	28.28	18.52
SC2015100	100	2015	SC	2	1151	1501	31.62	18.52
SC2015100	100	2015	SC	2	6000	1502	29.12	18.52
SC2015100	100	2015	SC	2	6274	1503	30	18.52

2014-2015 Raw data for ear leaf temperature (continued)								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**
						°C	°C	°C
SC20150	0	2015	SC	2	6000	1504	28.82	18.52
SC20150	0	2015	SC	2	6274	1505	29	18.52
SC20150	0	2015	SC	2	1151	1506	28.42	18.52
TR20150	0	2015	TR	2	6274	1601	21.44	.
TR20150	0	2015	TR	2	1151	1602	22.18	.
TR20150	0	2015	TR	2	6000	1603	21.78	.
TR20150	0	2015	TR	3	6000	1701	21.92	.
TR20150	0	2015	TR	3	1151	1702	22.18	.
TR20150	0	2015	TR	3	6274	1703	21.5	.
TR20150	0	2015	TR	1	1151	1801	21.62	.
TR20150	0	2015	TR	1	6274	1802	21.72	.
TR20150	0	2015	TR	1	6000	1803	22.42	.
TR20150	0	2015	TR	4	6000	1901	22.2	.
TR20150	0	2015	TR	4	1151	1902	21.44	.
TR20150	0	2015	TR	4	6274	1903	24.08	.
GC20150	0	2015	GC	1	6274	2001	19.12	.
GC20150	0	2015	GC	1	1151	2002	17.28	.
GC20150	0	2015	GC	1	6000	2003	17.44	.
GC20150	0	2015	GC	2	6274	2101	18.34	.
GC20150	0	2015	GC	2	6000	2102	17.28	.
GC20150	0	2015	GC	2	1151	2103	16.7	.
GC20150	0	2015	GC	3	6274	2201	18.1	.
GC20150	0	2015	GC	3	6000	2202	17.36	.
GC20150	0	2015	GC	3	1151	2203	16.5	.
GC20150	0	2015	GC	4	1151	2301	17.6	.
GC20150	0	2015	GC	4	6274	2302	17.3	.
GC20150	0	2015	GC	4	6000	2303	16.86	.
HU2014100	100	2014	HU	1	1151	101	32.32	23.26
HU2014100	100	2014	HU	1	6274	102	32.1	24.78
HU2014100	100	2014	HU	1	6000	103	33.84	24.40
HU201433	33	2014	HU	1	6274	104	33.5	25.20
HU201433	33	2014	HU	1	6000	105	31.38	26.12
HU201433	33	2014	HU	1	1151	106	31.86	26.42
HU201466	66	2014	HU	1	6000	107	33.38	25.76
HU201466	66	2014	HU	1	1151	108	34.98	26.16
HU201466	66	2014	HU	1	6274	109	35.48	25.62
HU20140	0	2014	HU	1	6000	110	35.34	27.86
HU20140	0	2014	HU	1	6274	111	35.9	29.12

2014-2015 Raw data for ear leaf temperature (continued)								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**
						°C	°C	°C
HU20140	0	2014	HU	1	1151	112	35.32	29.04
HU2014100	100	2014	HU	2	6000	201	33.02	23.82
HU2014100	100	2014	HU	2	1151	202	33.52	25.44
HU2014100	100	2014	HU	2	6274	203	33.5	22.88
HU201433	33	2014	HU	2	6000	204	35.16	25.24
HU201433	33	2014	HU	2	1151	205	33.78	24.06
HU201433	33	2014	HU	2	6274	206	33.06	24.90
HU201466	66	2014	HU	2	1151	207	34.96	27.20
HU201466	66	2014	HU	2	6274	208	35.06	25.98
HU201466	66	2014	HU	2	6000	209	35.2	26.18
HU20140	0	2014	HU	2	1151	210	34.3	27.48
HU20140	0	2014	HU	2	6274	211	35.92	28.86
HU20140	0	2014	HU	2	6000	212	37.22	27.80
HU2014100	100	2014	HU	3	1151	301	32.92	24.58
HU2014100	100	2014	HU	3	6274	302	32.88	26.74
HU2014100	100	2014	HU	3	6000	303	33.7	25.28
HU201433	33	2014	HU	3	1151	304	33.96	25.74
HU201433	33	2014	HU	3	6000	305	30.92	25.02
HU201433	33	2014	HU	3	6274	306	31.42	25.32
HU201466	66	2014	HU	3	1151	307	34.36	26.12
HU201466	66	2014	HU	3	6000	308	35.98	26.46
HU201466	66	2014	HU	3	6274	309	35.78	26.14
HU20140	0	2014	HU	3	1151	310	35.4	27.30
HU20140	0	2014	HU	3	6274	311	36.56	27.36
HU20140	0	2014	HU	3	6000	312	35.74	29.02
HU2014100	100	2014	HU	4	1151	401	34.2	24.84
HU2014100	100	2014	HU	4	6274	402	33.96	25.16
HU2014100	100	2014	HU	4	6000	403	33.18	23.68
HU201433	33	2014	HU	4	1151	404	34.2	26.20
HU201433	33	2014	HU	4	6274	405	33.84	25.20
HU201433	33	2014	HU	4	6000	406	33.04	24.28
HU201466	66	2014	HU	4	6000	407	35.24	26.04
HU201466	66	2014	HU	4	6274	408	35.52	26.00
HU201466	66	2014	HU	4	1151	409	34.86	26.46
HU20140	0	2014	HU	4	6274	410	35.6	30.14
HU20140	0	2014	HU	4	1151	411	36.14	27.26
HU20140	0	2014	HU	4	6000	412	35.6	26.02
TO2014100	100	2014	TO	1	6000	501	32.36	25.98

2014-2015 Raw data for ear leaf temperature (continued)								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**
						°C	°C	°C
TO2014100	100	2014	TO	1	6274	502	33.7	27.98
TO2014100	100	2014	TO	1	1151	503	33.44	27.80
TO20140	0	2014	TO	1	1151	504	32.68	27.78
TO20140	0	2014	TO	1	6000	505	31.7	28.10
TO20140	0	2014	TO	1	6274	506	31.7	30.48
TO2014100	100	2014	TO	2	1151	601	32.94	28.84
TO2014100	100	2014	TO	2	6000	602	33.7	24.75
TO2014100	100	2014	TO	2	6274	603	34.32	25.46
TO20140	0	2014	TO	2	1151	604	32.8	27.98
TO20140	0	2014	TO	2	6274	605	32.72	27.60
TO20140	0	2014	TO	2	6000	606	32	29.90
TO2014100	100	2014	TO	3	6000	701	33.18	27.80
TO2014100	100	2014	TO	3	1151	702	33.46	27.60
TO2014100	100	2014	TO	3	6274	703	33.32	29.90
TO20140	0	2014	TO	3	6000	704	32.9	31.48
TO20140	0	2014	TO	3	6274	705	33.48	24.64
TO20140	0	2014	TO	3	1151	706	32.4	29.90
TO2014100	100	2014	TO	4	6274	801	32.96	28.22
TO2014100	100	2014	TO	4	6000	802	31.52	29.96
TO2014100	100	2014	TO	4	1151	803	32.2	28.84
TO20140	0	2014	TO	4	1151	804	32.24	30.48
TO20140	0	2014	TO	4	6274	805	32.66	27.53
TO20140	0	2014	TO	4	6000	806	32.02	24.75
SC2014100	100	2014	SC	1	6274	901	25.8	32.76
SC2014100	100	2014	SC	1	1151	902	25.58	33.84
SC2014100	100	2014	SC	1	6000	903	25.24	33.32
SC20140	0	2014	SC	1	6274	904	25.54	41.58
SC20140	0	2014	SC	1	1151	905	27.36	39.54
SC20140	0	2014	SC	1	6000	906	26.38	39.58
SC2014100	100	2014	SC	2	1151	1001	25.436	32.98
SC2014100	100	2014	SC	2	6274	1002	25.78	34.24
SC2014100	100	2014	SC	2	6000	1003	24.12	33.50
SC20140	0	2014	SC	2	6274	1004	25.66	39.66
SC20140	0	2014	SC	2	6000	1005	25.76	40.36
SC20140	0	2014	SC	2	1151	1006	24.16	40.18
SC2014100	100	2014	SC	3	1151	1101	25.98	35.76
SC2014100	100	2014	SC	3	6000	1102	26.26	35.46
SC2014100	100	2014	SC	3	6274	1103	26.28	34.84

2014-2015 Raw data for ear leaf temperature (continued)								
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**VT**	**MREP**
						°C	°C	°C
SC20140	0	2014	SC	3	6274	1104	23.76	39.18
SC20140	0	2014	SC	3	1151	1105	25.42	40.56
SC20140	0	2014	SC	3	6000	1106	26	39.84
SC2014100	100	2014	SC	4	6000	1201	26.68	33.04
SC2014100	100	2014	SC	4	6274	1202	25.28	34.46
SC2014100	100	2014	SC	4	1151	1203	24.3	36.86
SC20140	0	2014	SC	4	6274	1204	23.48	40.44
SC20140	0	2014	SC	4	1151	1205	25.08	39.84
SC20140	0	2014	SC	4	6000	1206	26	36.38
TR20140	0	2014	TR	1	6274	1301	33.34	.
TR20140	0	2014	TR	1	6000	1302	34.74	.
TR20140	0	2014	TR	1	1151	1303	34.36	.
TR20140	0	2014	TR	2	6000	1401	33.96	.
TR20140	0	2014	TR	2	6274	1402	34.58	.
TR20140	0	2014	TR	2	1151	1403	34.7	.
TR20140	0	2014	TR	3	6000	1501	34.58	.
TR20140	0	2014	TR	3	1151	1502	35.04	.
TR20140	0	2014	TR	3	6274	1503	34.68	.
TR20140	0	2014	TR	4	6000	1601	34.82	.
TR20140	0	2014	TR	4	1151	1602	34.78	.
TR20140	0	2014	TR	4	6274	1603	34.74	.
GC20140	0	2014	GC	1	6274	1701	31.4	.
GC20140	0	2014	GC	1	1151	1702	33.1	.
GC20140	0	2014	GC	1	6000	1703	30.5	.
GC20140	0	2014	GC	2	6274	1801	30.7	.
GC20140	0	2014	GC	2	6000	1802	29.5	.
GC20140	0	2014	GC	2	1151	1803	29.9	.
GC20140	0	2014	GC	3	6274	1901	30.7	.
GC20140	0	2014	GC	3	6000	1902	30	.
GC20140	0	2014	GC	3	1151	1903	31.1	.
GC20140	0	2014	GC	4	1151	2001	39.1	.
GC20140	0	2014	GC	4	6274	2002	29.4	.
GC20140	0	2014	GC	4	6000	2003	31.2	.

Table A5: **2014-2015 raw data for biomass**

2014-2015 raw data for biomass (continued)						
ENV	**IRR**	**YR**	**LOC**	**HYB**	**PLOT**	**BIOM**
						(lb ac^{-1})
HU201550	50	2015	HU	1151	104	20730.05
HU201550	50	2015	HU	6000	105	18402.64
HU201550	50	2015	HU	6274	106	17955.59
HU20150	0	2015	HU	6274	107	10867.29
HU20150	0	2015	HU	6000	108	12145.23
HU20150	0	2015	HU	1151	109	7478.03
HU2015100	100	2015	HU	1151	201	23628.02
HU2015100	100	2015	HU	6000	202	22771.15
HU2015100	100	2015	HU	6274	203	26202.76
HU2015100	100	2015	HU	6000	302	22055.34
HU2015100	100	2015	HU	1151	303	22236.03
HU201550	50	2015	HU	6000	304	20714.32
HU201550	50	2015	HU	1151	305	19277.92
HU201550	50	2015	HU	6274	306	23088.54
HU20150	0	2015	HU	1151	307	10150.94
HU20150	0	2015	HU	6000	308	8421.00
HU20150	0	2015	HU	6274	309	7541.05
HU2015100	100	2015	HU	6274	401	23056.81
HU2015100	100	2015	HU	1151	402	22465.81
HU2015100	100	2015	HU	6000	403	27757.04
HU201550	50	2015	HU	1151	404	18248.46
HU201550	50	2015	HU	6274	405	20609.10
HU201550	50	2015	HU	6000	406	18188.36
HU20150	0	2015	HU	1151	407	6160.50
HU20150	0	2015	HU	6000	408	6089.62
HU20150	0	2015	HU	6274	409	6867.26
HU2015100	100	2015	HU	6000	502	22840.65
HU2015100	100	2015	HU	1151	503	22405.92
HU201550	50	2015	HU	6274	504	18307.86
HU201550	50	2015	HU	1151	506	20790.34
HU20150	0	2015	HU	1151	507	9300.74
HU20150	0	2015	HU	6000	508	8176.49
HU20150	0	2015	HU	6274	509	11294.08
HU2015100	100	2015	HU	6000	601	19655.22
HU2015100	100	2015	HU	1151	602	26183.09
HU2015100	100	2015	HU	6274	603	22741.34
HU201550	50	2015	HU	6274	604	19187.38

2014-2015 raw data for biomass (continued)						
ENV	**IRR**	**YR**	**LOC**	**HYB**	**PLOT**	**BIOM**
						(lb ac^{-1})
HU201550	50	2015	HU	1151	605	18269.46
HU201550	50	2015	HU	1151	606	16374.18
HU20150	0	2015	HU	6274	607	10959.55
HU20150	0	2015	HU	1151	608	10234.08
HU20150	0	2015	HU	6000	609	8762.79
TO2015100	100	2015	TO	1151	701	23017.60
TO2015100	100	2015	TO	6000	702	27781.21
TO2015100	100	2015	TO	6274	703	24623.19
TO20150	0	2015	TO	1151	704	23517.03
TO20150	0	2015	TO	6000	705	21105.04
TO20150	0	2015	TO	6274	706	24696.13
TO2015100	100	2015	TO	6274	801	24979.57
TO2015100	100	2015	TO	6000	802	22852.58
TO2015100	100	2015	TO	1151	803	35127.69
TO20150	0	2015	TO	6000	804	21974.66
TO20150	0	2015	TO	6274	805	17552.73
TO20150	0	2015	TO	1151	806	19959.14
TO2015100	100	2015	TO	1151	901	26303.39
TO2015100	100	2015	TO	6000	902	22733.46
TO2015100	100	2015	TO	6274	903	31522.54
TO20150	0	2015	TO	1151	904	21311.16
TO20150	0	2015	TO	6274	905	22227.19
TO20150	0	2015	TO	6000	906	24145.62
TO2015100	100	2015	TO	6274	1001	29015.46
TO2015100	100	2015	TO	6000	1002	24494.73
TO2015100	100	2015	TO	1151	1003	24301.82
TO20150	0	2015	TO	1151	1004	23980.55
TO20150	0	2015	TO	6274	1005	20651.74
TO20150	0	2015	TO	6274	1006	23876.33
SC2015100	100	2015	SC	1151	1101	23220.12
SC2015100	100	2015	SC	6274	1102	26271.21
SC2015100	100	2015	SC	6000	1103	26082.40
SC20150	0	2015	SC	1151	1104	21855.58
SC20150	0	2015	SC	6274	1105	22029.74
SC20150	0	2015	SC	6000	1106	22597.90
SC2015100	100	2015	SC	1151	1201	24283.23
SC2015100	100	2015	SC	6000	1202	25620.95
SC2015100	100	2015	SC	6274	1203	25704.79

2014-2015 raw data for biomass (continued)						
ENV	**IRR**	**YR**	**LOC**	**HYB**	**PLOT**	**BIOM**
						(lb ac^{-1})
SC20150	0	2015	SC	6000	1204	20580.95
SC20150	0	2015	SC	6274	1205	19687.52
SC20150	0	2015	SC	1151	1206	20469.91
SC2015100	100	2015	SC	6000	1301	23156.50
SC2015100	100	2015	SC	1151	1302	24632.15
SC2015100	100	2015	SC	6274	1303	24382.62
SC20150	0	2015	SC	6274	1304	22323.97
SC20150	0	2015	SC	1151	1305	22748.83
SC20150	0	2015	SC	6000	1306	17957.13
SC2015100	100	2015	SC	6274	1401	22083.92
SC2015100	100	2015	SC	6000	1402	25770.68
SC2015100	100	2015	SC	1151	1403	25908.69
SC20150	0	2015	SC	1151	1404	16836.30
SC20150	0	2015	SC	6000	1405	14354.14
SC20150	0	2015	SC	6274	1406	14565.39
SC2015100	100	2015	SC	1151	1501	23255.13
SC2015100	100	2015	SC	6000	1502	22466.19
SC2015100	100	2015	SC	6274	1503	21862.45
SC20150	0	2015	SC	6000	1504	18357.91
SC20150	0	2015	SC	6274	1505	22104.64
SC20150	0	2015	SC	1151	1506	21337.36
HU2014100	100	2014	HU	1151	101	20171.49
HU2014100	100	2014	HU	6274	102	28176.18
HU2014100	100	2014	HU	6000	103	25759.36
HU201433	33	2014	HU	6274	104	25036.34
HU201433	33	2014	HU	6000	105	21599.51
HU201433	33	2014	HU	1151	106	19458.14
HU201466	66	2014	HU	6000	107	24799.84
HU201466	66	2014	HU	1151	108	20998.70
HU201466	66	2014	HU	6274	109	24711.76
HU20140	0	2014	HU	6000	110	16787.36
HU20140	0	2014	HU	6274	111	17243.28
HU20140	0	2014	HU	1151	112	17712.44
HU2014100	100	2014	HU	6000	201	24599.04
HU2014100	100	2014	HU	1151	202	22548.86
HU2014100	100	2014	HU	6274	203	24064.44
HU201433	33	2014	HU	6000	204	18521.94
HU201433	33	2014	HU	1151	205	18526.59

2014-2015 raw data for biomass (continued)						
ENV	**IRR**	**YR**	**LOC**	**HYB**	**PLOT**	**BIOM**
						(lb ac^{-1})
HU201433	33	2014	HU	6274	206	21698.39
HU201466	66	2014	HU	1151	207	24231.97
HU201466	66	2014	HU	6274	208	21504.91
HU201466	66	2014	HU	6000	209	20199.83
HU20140	0	2014	HU	1151	210	19411.22
HU20140	0	2014	HU	6274	211	12536.60
HU20140	0	2014	HU	6000	212	15990.54
HU2014100	100	2014	HU	1151	301	19823.02
HU2014100	100	2014	HU	6274	302	35273.76
HU2014100	100	2014	HU	6000	303	24513.02
HU201433	33	2014	HU	1151	304	15450.58
HU201433	33	2014	HU	6000	305	19193.60
HU201433	33	2014	HU	6274	306	11712.99
HU201466	66	2014	HU	1151	307	22869.95
HU201466	66	2014	HU	6000	308	25616.19
HU201466	66	2014	HU	6274	309	25876.91
HU20140	0	2014	HU	1151	310	18390.96
HU20140	0	2014	HU	6274	311	13044.96
HU20140	0	2014	HU	6000	312	13810.44
HU2014100	100	2014	HU	1151	401	15240.58
HU2014100	100	2014	HU	6274	402	28639.24
HU2014100	100	2014	HU	6000	403	22648.24
HU201433	33	2014	HU	1151	404	20896.11
HU201433	33	2014	HU	6274	405	23759.69
HU201433	33	2014	HU	6000	406	17379.78
HU201466	66	2014	HU	6000	407	20905.51
HU201466	66	2014	HU	6274	408	28504.12
HU201466	66	2014	HU	1151	409	21803.40
HU20140	0	2014	HU	6274	410	16044.55
HU20140	0	2014	HU	1151	411	21717.15
HU20140	0	2014	HU	6000	412	16447.51
TO2014100	100	2014	TO	6000	501	18450.16
TO2014100	100	2014	TO	6274	601	13973.57
TO2014100	100	2014	TO	1151	701	18397.74
TO2014100	100	2014	TO	1151	801	17612.51
TO2014100	100	2014	TO	6000	502	21076.36
TO2014100	100	2014	TO	6274	602	17349.78
TO2014100	100	2014	TO	1151	702	19863.65

2014-2015 raw data for biomass (continued)						
ENV	**IRR**	**YR**	**LOC**	**HYB**	**PLOT**	**BIOM**
						(lb ac^{-1})
TO2014100	100	2014	TO	6000	802	18093.57
TO2014100	100	2014	TO	6274	503	17369.99
TO2014100	100	2014	TO	1151	603	18717.49
TO2014100	100	2014	TO	6274	703	25628.41
TO2014100	100	2014	TO	6000	803	25833.91
TO20140	0	2014	TO	6000	504	18577.07
TO20140	0	2014	TO	1151	604	15316.72
TO20140	0	2014	TO	6274	704	16808.03
TO20140	0	2014	TO	6000	804	13989.21
TO20140	0	2014	TO	6274	505	14576.46
TO20140	0	2014	TO	1151	605	11878.52
TO20140	0	2014	TO	6274	705	15531.80
TO20140	0	2014	TO	6000	805	9999.01
TO20140	0	2014	TO	1151	506	11833.99
TO20140	0	2014	TO	1151	606	12810.90
TO20140	0	2014	TO	6274	706	10988.92
TO20140	0	2014	TO	6000	806	12518.58
SC2014100	100	2014	SC	6000	901	23403.83
SC2014100	100	2014	SC	1151	902	24888.68
SC2014100	100	2014	SC	6000	903	26535.93
SC20140	0	2014	SC	6274	904	11824.61
SC20140	0	2014	SC	1151	905	20276.55
SC20140	0	2014	SC	6000	906	23215.72
SC2014100	100	2014	SC	1151	1001	23029.05
SC2014100	100	2014	SC	6274	1002	21970.14
SC2014100	100	2014	SC	6000	1003	24212.75
SC20140	0	2014	SC	6274	1004	20969.34
SC20140	0	2014	SC	6000	1005	18273.95
SC20140	0	2014	SC	1151	1006	16290.14
SC2014100	100	2014	SC	1151	1101	24974.63
SC2014100	100	2014	SC	6000	1102	21603.04
SC2014100	100	2014	SC	6274	1103	21399.84
SC20140	0	2014	SC	6274	1104	19829.99
SC20140	0	2014	SC	1151	1105	16020.66
SC20140	0	2014	SC	6000	1106	20802.56
SC2014100	100	2014	SC	6000	1201	25352.45
SC2014100	100	2014	SC	6274	1202	21840.41
SC2014100	100	2014	SC	1151	1203	23565.17

2014-2015 raw data for biomass (continued)						
ENV	**IRR**	**YR**	**LOC**	**HYB**	**PLOT**	**BIOM**
						(lb ac^{-1})
SC20140	0	2014	SC	6274	1204	15592.54
SC20140	0	2014	SC	1151	1205	19675.62
SC20140	0	2014	SC	6000	1206	19415.17

Table A6: **2014 Water status change data**

2014 Water status change data										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
GC20140	0	2014	GC	1	1151	1702	0.5	-0.712	0.735	0.023
GC20140	0	2014	GC	2	1151	1803	0.5	-0.534	0.341	-0.194
GC20140	0	2014	GC	3	1151	1903	0.5	-2.681	2.361	-0.320
GC20140	0	2014	GC	4	1151	2001	0.5	0.506	-0.716	-0.210
GC20140	0	2014	GC	1	6000	1703	0.5	-1.107	1.124	0.017
GC20140	0	2014	GC	2	6000	1802	0.5	-0.731	0.773	0.043
GC20140	0	2014	GC	3	6000	1902	0.5	-0.485	0.251	-0.234
GC20140	0	2014	GC	4	6000	2003	0.5	-0.085	-0.209	-0.294
GC20140	0	2014	GC	1	6274	1701	0.5	0.149	-0.213	-0.063
GC20140	0	2014	GC	2	6274	1801	0.5	0.161	-0.151	0.011
GC20140	0	2014	GC	3	6274	1901	0.5	-1.036	0.965	-0.071
GC20140	0	2014	GC	4	6274	2002	0.5	-0.646	0.507	-0.139
GC20140	0	2014	GC	1	1151	1702	1.5	-0.119	-0.300	-0.420
GC20140	0	2014	GC	2	1151	1803	1.5	0.048	-0.241	-0.193
GC20140	0	2014	GC	3	1151	1903	1.5	0.091	-0.182	-0.091
GC20140	0	2014	GC	4	1151	2001	1.5	-0.812	0.888	0.076
GC20140	0	2014	GC	1	6000	1703	1.5	-0.254	0.370	0.116
GC20140	0	2014	GC	2	6000	1802	1.5	-0.089	0.069	-0.020
GC20140	0	2014	GC	3	6000	1902	1.5	0.029	0.066	0.095
GC20140	0	2014	GC	4	6000	2003	1.5	0.069	-0.077	-0.009
GC20140	0	2014	GC	1	6274	1701	1.5	-0.901	0.848	-0.053
GC20140	0	2014	GC	2	6274	1801	1.5	-0.232	0.237	0.005
GC20140	0	2014	GC	3	6274	1901	1.5	-0.118	-0.345	-0.463
GC20140	0	2014	GC	4	6274	2002	1.5	0.076	-0.284	-0.209
GC20140	0	2014	GC	1	1151	1702	2.5	0.038	-0.191	-0.152

2014 Water status change data										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
								in ft^{-1}	in ft^{-1}	in ft^{-1}
GC20140	0	2014	GC	2	1151	1803	2.5	-0.940	1.132	0.192
GC20140	0	2014	GC	3	1151	1903	2.5	-0.459	0.432	-0.027
GC20140	0	2014	GC	4	1151	2001	2.5	-0.162	0.048	-0.115
GC20140	0	2014	GC	1	6000	1703	2.5	0.032	-0.430	-0.398
GC20140	0	2014	GC	2	6000	1802	2.5	-0.573	0.436	-0.137
GC20140	0	2014	GC	3	6000	1902	2.5	-1.445	0.934	-0.511
GC20140	0	2014	GC	4	6000	2003	2.5	-0.449	-0.121	-0.570
GC20140	0	2014	GC	1	6274	1701	2.5	-0.096	-0.476	-0.572
GC20140	0	2014	GC	2	6274	1801	2.5	0.059	-0.218	-0.160
GC20140	0	2014	GC	3	6274	1901	2.5	-0.451	0.380	-0.071
GC20140	0	2014	GC	4	6274	2002	2.5	-0.843	0.075	-0.768
GC20140	0	2014	GC	1	1151	1702	3.5	-0.283	-0.375	-0.658
GC20140	0	2014	GC	2	1151	1803	3.5	0.000	-0.550	-0.550
GC20140	0	2014	GC	3	1151	1903	3.5	0.117	-0.433	-0.316
GC20140	0	2014	GC	4	1151	2001	3.5	0.113	-0.188	-0.075
GC20140	0	2014	GC	1	6000	1703	3.5	-0.860	0.393	-0.468
GC20140	0	2014	GC	2	6000	1802	3.5	-0.268	-0.256	-0.523
GC20140	0	2014	GC	3	6000	1902	3.5	0.034	-0.464	-0.430
GC20140	0	2014	GC	4	6000	2003	3.5	-0.002	-0.299	-0.301
GC20140	0	2014	GC	1	6274	1701	3.5	0.097	-0.182	-0.085
GC20140	0	2014	GC	2	6274	1801	3.5	-0.859	0.594	-0.265
GC20140	0	2014	GC	3	6274	1901	3.5	-0.487	-0.374	-0.861
GC20140	0	2014	GC	4	6274	2002	3.5	-0.096	-0.705	-0.801
GC20140	0	2014	GC	1	1151	1702	4.5	0.022	-0.272	-0.250
GC20140	0	2014	GC	2	1151	1803	4.5	0.102	-0.034	0.067
GC20140	0	2014	GC	3	1151	1903	4.5	-1.044	0.877	-0.167

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
								in ft^{-1}	in ft^{-1}	in ft^{-1}
GC20140	0	2014	GC	4	1151	2001	4.5	-0.644	0.409	-0.235
GC20140	0	2014	GC	1	6000	1703	4.5	-0.187	-0.081	-0.268
GC20140	0	2014	GC	2	6000	1802	4.5	0.029	-0.441	-0.412
GC20140	0	2014	GC	3	6000	1902	4.5	-0.227	0.076	-0.151
GC20140	0	2014	GC	4	6000	2003	4.5	-0.840	0.836	-0.003
GC20140	0	2014	GC	1	6274	1701	4.5	-0.499	0.114	-0.385
GC20140	0	2014	GC	2	6274	1801	4.5	-0.145	-0.522	-0.667
GC20140	0	2014	GC	3	6274	1901	4.5	0.046	-0.330	-0.285
GC20140	0	2014	GC	4	6274	2002	4.5	0.108	-0.060	0.048
GC20140	0	2014	GC	1	1151	1702	5.5	-0.964	0.930	-0.034
GC20140	0	2014	GC	2	1151	1803	5.5	-0.430	0.496	0.066
GC20140	0	2014	GC	3	1151	1903	5.5	0.547	0.062	0.609
GC20140	0	2014	GC	4	1151	2001	5.5	0.053	-0.333	-0.280
GC20140	0	2014	GC	1	6000	1703	5.5	-0.467	0.338	-0.129
GC20140	0	2014	GC	2	6000	1802	5.5	-0.776	0.823	0.047
GC20140	0	2014	GC	3	6000	1902	5.5	-0.354	0.355	0.001
GC20140	0	2014	GC	4	6000	2003	5.5	-0.030	-0.047	-0.077
GC20140	0	2014	GC	1	6274	1701	5.5	0.030	-0.160	-0.130
GC20140	0	2014	GC	2	6274	1801	5.5	-0.654	0.537	-0.117
GC20140	0	2014	GC	3	6274	1901	5.5	-1.020	1.121	0.102
GC20140	0	2014	GC	4	6274	2002	5.5	-0.497	0.619	0.122
HU20140	0	2014	HU	1	1151	112	0.5	-0.162	0.197	0.034
HU20140	0	2014	HU	2	1151	210	0.5	1.676	-1.652	0.024
HU20140	0	2014	HU	3	1151	310	0.5	-0.311	0.177	-0.133
HU20140	0	2014	HU	1	6000	110	0.5	-0.941	-0.035	-0.976
HU20140	0	2014	HU	2	6000	212	0.5	-0.327	-0.483	-0.810

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU20140	0	2014	HU	3	6000	312	0.5	0.041	-0.670	-0.629
HU20140	0	2014	HU	4	6000	412	0.5	-0.008	-0.160	-0.167
HU20140	0	2014	HU	1	6274	111	0.5	0.002	-0.091	-0.089
HU20140	0	2014	HU	2	6274	211	0.5	-1.027	0.394	-0.633
HU20140	0	2014	HU	3	6274	311	0.5	-0.421	-0.238	-0.658
HU20140	0	2014	HU	4	6274	410	0.5	0.154	-0.710	-0.556
HU20140	0	2014	HU	1	1151	112	1.5	0.007	-0.398	-0.391
HU20140	0	2014	HU	2	1151	210	1.5	0.064	-0.083	-0.019
HU20140	0	2014	HU	3	1151	310	1.5	-0.743	0.013	-0.730
HU20140	0	2014	HU	4	1151	411	1.5	-0.421	-0.518	-0.939
HU20140	0	2014	HU	1	6000	110	1.5	0.001	-0.583	-0.582
HU20140	0	2014	HU	2	6000	212	1.5	0.178	-0.310	-0.132
HU20140	0	2014	HU	3	6000	312	1.5	0.065	-0.136	-0.071
HU20140	0	2014	HU	1	6274	111	1.5	-0.855	0.517	-0.338
HU20140	0	2014	HU	2	6274	211	1.5	-0.388	-0.076	-0.465
HU20140	0	2014	HU	3	6274	311	1.5	-0.042	-0.558	-0.601
HU20140	0	2014	HU	4	6274	410	1.5	0.000	-0.498	-0.498
HU20140	0	2014	HU	1	1151	112	2.5	-0.545	0.505	-0.040
HU20140	0	2014	HU	2	1151	210	2.5	-0.736	0.680	-0.056
HU20140	0	2014	HU	3	1151	310	2.5	-0.391	0.373	-0.018
HU20140	0	2014	HU	4	1151	411	2.5	-0.092	-0.155	-0.247
HU20140	0	2014	HU	1	6000	110	2.5	-1.188	1.004	-0.184
HU20140	0	2014	HU	2	6000	212	2.5	-0.515	0.325	-0.190
HU20140	0	2014	HU	3	6000	312	2.5	-0.856	0.725	-0.131
HU20140	0	2014	HU	1	6274	111	2.5	-0.500	-0.065	-0.566
HU20140	0	2014	HU	2	6274	211	2.5	-0.284	-0.485	-0.769

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU20140	0	2014	HU	3	6274	311	2.5	-0.056	-0.333	-0.389
HU20140	0	2014	HU	4	6274	410	2.5	0.026	-0.233	-0.206
HU20140	0	2014	HU	1	1151	112	3.5	-0.881	0.873	-0.008
HU20140	0	2014	HU	2	1151	210	3.5	-0.433	0.333	-0.100
HU20140	0	2014	HU	3	1151	310	3.5	-0.049	-0.129	-0.178
HU20140	0	2014	HU	4	1151	411	3.5	0.164	-0.168	-0.003
HU20140	0	2014	HU	1	6000	110	3.5	-0.896	1.004	0.108
HU20140	0	2014	HU	2	6000	212	3.5	-0.911	1.051	0.140
HU20140	0	2014	HU	3	6000	312	3.5	-0.491	0.505	0.014
HU20140	0	2014	HU	4	6000	412	3.5	-0.103	0.072	-0.031
HU20140	0	2014	HU	1	6274	111	3.5	0.053	-0.125	-0.072
HU20140	0	2014	HU	2	6274	211	3.5	-0.556	0.600	0.044
HU20140	0	2014	HU	3	6274	311	3.5	-0.866	0.897	0.031
HU20140	0	2014	HU	4	6274	410	3.5	-0.339	0.357	0.018
HU20140	0	2014	HU	1	1151	112	4.5	-0.164	-0.190	-0.354
HU20140	0	2014	HU	2	1151	210	4.5	0.079	-0.427	-0.348
HU20140	0	2014	HU	3	1151	310	4.5	-1.255	1.194	-0.061
HU20140	0	2014	HU	4	1151	411	4.5	-0.903	0.239	-0.664
HU20140	0	2014	HU	1	6000	110	4.5	-0.519	-0.115	-0.634
HU20140	0	2014	HU	2	6000	212	4.5	-0.003	-0.574	-0.577
HU20140	0	2014	HU	3	6000	312	4.5	-0.011	-0.123	-0.134
HU20140	0	2014	HU	4	6000	412	4.5	0.000	-0.037	-0.038
HU20140	0	2014	HU	1	6274	111	4.5	-0.887	0.045	-0.842
HU20140	0	2014	HU	2	6274	211	4.5	-0.679	0.003	-0.676
HU20140	0	2014	HU	3	6274	311	4.5	-0.016	-0.611	-0.627
HU201433	33	2014	HU	1	1151	106	0.5	0.150	-0.545	-0.395

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU201433	33	2014	HU	2	1151	205	0.5	-0.184	0.052	-0.132
HU201433	33	2014	HU	3	1151	304	0.5	-0.919	0.447	-0.472
HU201433	33	2014	HU	4	1151	404	0.5	-0.396	-0.288	-0.684
HU201433	33	2014	HU	1	6000	105	0.5	-0.089	-0.528	-0.617
HU201433	33	2014	HU	2	6000	204	0.5	0.010	-0.246	-0.236
HU201433	33	2014	HU	3	6000	305	0.5	0.063	-0.049	0.014
HU201433	33	2014	HU	4	6000	406	0.5	-0.739	0.674	-0.065
HU201433	33	2014	HU	1	6274	104	0.5	-0.400	0.126	-0.274
HU201433	33	2014	HU	2	6274	206	0.5	0.030	-0.577	-0.547
HU201433	33	2014	HU	3	6274	306	0.5	0.032	-0.312	-0.280
HU201433	33	2014	HU	4	6274	405	0.5	0.037	-0.159	-0.122
HU201433	33	2014	HU	1	1151	106	1.5	-0.558	0.363	-0.195
HU201433	33	2014	HU	2	1151	205	1.5	-0.394	-0.046	-0.440
HU201433	33	2014	HU	3	1151	304	1.5	-0.015	-0.536	-0.551
HU201433	33	2014	HU	4	1151	404	1.5	0.049	-0.317	-0.268
HU201433	33	2014	HU	1	6000	105	1.5	0.108	-0.262	-0.154
HU201433	33	2014	HU	2	6000	204	1.5	-0.885	0.820	-0.065
HU201433	33	2014	HU	3	6000	305	1.5	-0.483	0.185	-0.299
HU201433	33	2014	HU	4	6000	406	1.5	-0.239	-0.331	-0.570
HU201433	33	2014	HU	1	6274	104	1.5	0.037	-0.351	-0.315
HU201433	33	2014	HU	2	6274	206	1.5	0.032	-0.250	-0.218
HU201433	33	2014	HU	3	6274	306	1.5	-0.953	0.990	0.037
HU201433	33	2014	HU	4	6274	405	1.5	-0.362	0.400	0.038
HU201433	33	2014	HU	1	1151	106	2.5	-0.171	0.191	0.020
HU201433	33	2014	HU	2	1151	205	2.5	-0.035	-0.223	-0.259
HU201433	33	2014	HU	3	1151	304	2.5	-0.565	0.468	-0.097

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU201433	33	2014	HU	4	1151	404	2.5	-0.176	0.036	-0.140
HU201433	33	2014	HU	1	6000	105	2.5	0.009	-0.279	-0.270
HU201433	33	2014	HU	2	6000	204	2.5	0.066	-0.121	-0.055
HU201433	33	2014	HU	3	6000	305	2.5	-1.029	0.997	-0.032
HU201433	33	2014	HU	4	6000	406	2.5	-0.527	0.440	-0.087
HU201433	33	2014	HU	1	6274	104	2.5	-0.070	-0.125	-0.195
HU201433	33	2014	HU	2	6274	206	2.5	-0.924	0.396	-0.528
HU201433	33	2014	HU	3	6274	306	2.5	-0.565	0.572	0.007
HU201433	33	2014	HU	4	6274	405	2.5	-0.058	-0.523	-0.581
HU201433	33	2014	HU	1	1151	106	3.5	0.109	-0.287	-0.178
HU201433	33	2014	HU	2	1151	205	3.5	-0.400	-0.289	-0.689
HU201433	33	2014	HU	3	1151	304	3.5	-0.123	-0.466	-0.589
HU201433	33	2014	HU	4	1151	404	3.5	0.034	-0.421	-0.386
HU201433	33	2014	HU	1	6000	105	3.5	0.095	-0.279	-0.184
HU201433	33	2014	HU	2	6000	204	3.5	-1.357	0.010	-1.347
HU201433	33	2014	HU	3	6000	305	3.5	-0.002	-0.659	-0.661
HU201433	33	2014	HU	4	6000	406	3.5	0.047	-0.243	-0.196
HU201433	33	2014	HU	1	6274	104	3.5	-0.469	0.506	0.037
HU201433	33	2014	HU	2	6274	206	3.5	-0.325	0.191	-0.134
HU201433	33	2014	HU	3	6274	306	3.5	-0.287	0.063	-0.225
HU201433	33	2014	HU	4	6274	405	3.5	-0.048	-0.133	-0.181
HU201433	33	2014	HU	1	1151	106	4.5	0.129	-0.063	0.066
HU201433	33	2014	HU	2	1151	205	4.5	-0.911	0.953	0.042
HU201433	33	2014	HU	3	1151	304	4.5	-0.277	0.002	-0.275
HU201433	33	2014	HU	4	1151	404	4.5	-0.197	-0.234	-0.431
HU201433	33	2014	HU	1	6000	105	4.5	0.130	-0.206	-0.076

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU201433	33	2014	HU	2	6000	204	4.5	0.338	-0.204	0.134
HU201433	33	2014	HU	3	6000	305	4.5	-0.611	0.637	0.025
HU201433	33	2014	HU	4	6000	406	4.5	-0.249	0.046	-0.203
HU201433	33	2014	HU	1	6274	104	4.5	-0.137	-0.128	-0.265
HU201433	33	2014	HU	2	6274	206	4.5	-0.012	-0.249	-0.261
HU201433	33	2014	HU	3	6274	306	4.5	0.274	-0.155	0.120
HU201433	33	2014	HU	4	6274	405	4.5	-0.509	-1.409	-1.918
HU201466	66	2014	HU	1	1151	108	0.5	-0.222	-1.140	-1.362
HU201466	66	2014	HU	2	1151	207	0.5	-0.064	-0.410	-0.474
HU201466	66	2014	HU	3	1151	307	0.5	0.018	-0.353	-0.335
HU201466	66	2014	HU	4	1151	409	0.5	0.208	-0.252	-0.044
HU201466	66	2014	HU	1	6000	107	0.5	-0.054	-0.567	-0.621
HU201466	66	2014	HU	2	6000	209	0.5	0.340	-1.793	-1.454
HU201466	66	2014	HU	3	6000	308	0.5	-0.138	-0.644	-0.782
HU201466	66	2014	HU	4	6000	407	0.5	0.275	-0.888	-0.613
HU201466	66	2014	HU	1	6274	109	0.5	0.230	-0.508	-0.279
HU201466	66	2014	HU	2	6274	208	0.5	-0.468	-0.677	-1.146
HU201466	66	2014	HU	3	6274	309	0.5	-0.682	-0.842	-1.524
HU201466	66	2014	HU	1	1151	108	1.5	-0.040	-0.144	-0.184
HU201466	66	2014	HU	2	1151	207	1.5	1.029	-1.101	-0.072
HU201466	66	2014	HU	3	1151	307	1.5	-0.689	0.743	0.053
HU201466	66	2014	HU	4	1151	409	1.5	-1.064	0.930	-0.134
HU201466	66	2014	HU	1	6000	107	1.5	-0.209	0.247	0.038
HU201466	66	2014	HU	2	6000	209	1.5	-0.058	-0.090	-0.149
HU201466	66	2014	HU	3	6000	308	1.5	0.090	-0.171	-0.080
HU201466	66	2014	HU	4	6000	407	1.5	0.366	-0.275	0.090

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU201466	66	2014	HU	1	6274	109	1.5	-1.082	0.780	-0.301
HU201466	66	2014	HU	2	6274	208	1.5	-0.221	-0.120	-0.341
HU201466	66	2014	HU	3	6274	309	1.5	0.025	-0.300	-0.275
HU201466	66	2014	HU	1	1151	108	2.5	0.029	-0.313	-0.284
HU201466	66	2014	HU	2	1151	207	2.5	0.136	-0.291	-0.155
HU201466	66	2014	HU	3	1151	307	2.5	-1.000	1.134	0.134
HU201466	66	2014	HU	1	6000	107	2.5	-0.127	0.251	0.123
HU201466	66	2014	HU	2	6000	209	2.5	0.056	-0.100	-0.044
HU201466	66	2014	HU	3	6000	308	2.5	0.210	-0.192	0.017
HU201466	66	2014	HU	4	6000	407	2.5	0.372	-0.176	0.196
HU201466	66	2014	HU	1	6274	109	2.5	-0.333	-0.247	-0.580
HU201466	66	2014	HU	2	6274	208	2.5	-0.089	-0.861	-0.950
HU201466	66	2014	HU	3	6274	309	2.5	-0.025	-0.253	-0.278
HU201466	66	2014	HU	4	6274	408	2.5	0.118	-0.392	-0.274
HU201466	66	2014	HU	1	1151	108	3.5	0.190	-0.409	-0.219
HU201466	66	2014	HU	2	1151	207	3.5	-0.541	-0.925	-1.466
HU201466	66	2014	HU	3	1151	307	3.5	-0.202	-0.527	-0.729
HU201466	66	2014	HU	1	6000	107	3.5	0.067	-0.200	-0.133
HU201466	66	2014	HU	2	6000	209	3.5	0.295	-1.455	-1.160
HU201466	66	2014	HU	3	6000	308	3.5	0.154	-0.286	-0.133
HU201466	66	2014	HU	4	6000	407	3.5	-0.705	-0.906	-1.610
HU201466	66	2014	HU	1	6274	109	3.5	-0.322	-0.092	-0.414
HU201466	66	2014	HU	2	6274	208	3.5	-0.036	0.087	0.051
HU201466	66	2014	HU	3	6274	309	3.5	0.162	-0.803	-0.641
HU201466	66	2014	HU	4	6274	408	3.5	0.170	-1.047	-0.877
HU201466	66	2014	HU	1	1151	108	4.5	-0.403	0.095	-0.308

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU201466	66	2014	HU	2	1151	207	4.5	-0.356	-1.147	-1.503
HU201466	66	2014	HU	3	1151	307	4.5	-0.014	-0.239	-0.252
HU201466	66	2014	HU	4	1151	409	4.5	0.207	-0.213	-0.006
HU201466	66	2014	HU	1	6000	107	4.5	0.186	-0.110	0.076
HU201466	66	2014	HU	2	6000	209	4.5	-1.065	0.956	-0.110
HU201466	66	2014	HU	3	6000	308	4.5	-0.016	-0.512	-0.528
HU201466	66	2014	HU	4	6000	407	4.5	0.107	-0.310	-0.202
HU201466	66	2014	HU	1	6274	109	4.5	0.180	-0.128	0.052
HU201466	66	2014	HU	2	6274	208	4.5	0.167	-0.030	0.137
HU201466	66	2014	HU	3	6274	309	4.5	-0.914	0.809	-0.106
HU201466	66	2014	HU	4	6274	408	4.5	-0.222	0.025	-0.197
SC20140	0	2014	SC	1	1151	905	0.5	0.072	-0.229	-0.157
SC20140	0	2014	SC	2	1151	1006	0.5	0.202	-0.293	-0.091
SC20140	0	2014	SC	3	1151	1105	0.5	0.252	-0.212	0.039
SC20140	0	2014	SC	4	1151	1205	0.5	-0.746	-0.202	-0.948
SC20140	0	2014	SC	1	6000	906	0.5	-0.020	-0.393	-0.413
SC20140	0	2014	SC	2	6000	1005	0.5	0.117	-0.755	-0.638
SC20140	0	2014	SC	3	6000	1106	0.5	0.066	-0.749	-0.683
SC20140	0	2014	SC	4	6000	1206	0.5	0.243	-0.607	-0.364
SC20140	0	2014	SC	1	6274	904	0.5	-0.850	-0.493	-1.343
SC20140	0	2014	SC	2	6274	1004	0.5	-0.473	-0.162	-0.635
SC20140	0	2014	SC	3	6274	1104	0.5	0.176	-0.537	-0.360
SC20140	0	2014	SC	4	6274	1204	0.5	0.097	-0.546	-0.448
SC20140	0	2014	SC	1	1151	905	1.5	0.187	-0.435	-0.247
SC20140	0	2014	SC	2	1151	1006	1.5	-0.710	-0.364	-1.074
SC20140	0	2014	SC	3	1151	1105	1.5	-0.553	-0.514	-1.067

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
SC20140	0	2014	SC	4	1151	1205	1.5	0.122	-0.190	-0.068
SC20140	0	2014	SC	1	6000	906	1.5	0.290	-0.432	-0.142
SC20140	0	2014	SC	2	6000	1005	1.5	0.195	-0.321	-0.127
SC20140	0	2014	SC	3	6000	1106	1.5	-0.861	1.005	0.144
SC20140	0	2014	SC	4	6000	1206	1.5	-0.178	0.398	0.220
SC20140	0	2014	SC	1	6274	904	1.5	0.088	0.134	0.222
SC20140	0	2014	SC	2	6274	1004	1.5	0.337	-0.071	0.266
SC20140	0	2014	SC	3	6274	1104	1.5	0.354	-0.103	0.251
SC20140	0	2014	SC	4	6274	1204	1.5	-0.593	0.112	-0.481
SC20140	0	2014	SC	1	1151	905	2.5	-0.652	-0.494	-1.145
SC20140	0	2014	SC	2	1151	1006	2.5	-0.092	-0.146	-0.238
SC20140	0	2014	SC	3	1151	1105	2.5	0.147	-0.098	0.050
SC20140	0	2014	SC	4	1151	1205	2.5	0.237	-0.106	0.131
SC20140	0	2014	SC	1	6000	906	2.5	-0.360	0.308	-0.052
SC20140	0	2014	SC	2	6000	1005	2.5	-0.761	-0.618	-1.379
SC20140	0	2014	SC	3	6000	1106	2.5	-0.153	-0.192	-0.346
SC20140	0	2014	SC	4	6000	1206	2.5	0.457	-0.272	0.185
SC20140	0	2014	SC	1	6274	904	2.5	0.274	-0.261	0.013
SC20140	0	2014	SC	2	6274	1004	2.5	-0.540	-0.557	-1.098
SC20140	0	2014	SC	3	6274	1104	2.5	-0.489	-0.414	-0.903
SC20140	0	2014	SC	4	6274	1204	2.5	0.209	-0.448	-0.238
SC20140	0	2014	SC	1	1151	905	3.5	0.294	-0.691	-0.398
SC20140	0	2014	SC	2	1151	1006	3.5	0.401	-0.408	-0.008
SC20140	0	2014	SC	3	1151	1105	3.5	-0.748	-0.447	-1.195
SC20140	0	2014	SC	4	1151	1205	3.5	-0.259	-0.277	-0.536
SC20140	0	2014	SC	1	6000	906	3.5	0.237	-0.752	-0.515

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
SC20140	0	2014	SC	2	6000	1005	3.5	0.439	-1.021	-0.581
SC20140	0	2014	SC	3	6000	1106	3.5	0.302	-0.287	0.014
SC20140	0	2014	SC	4	6000	1206	3.5	-1.187	-0.214	-1.401
SC20140	0	2014	SC	1	6274	904	3.5	-0.388	-0.192	-0.580
SC20140	0	2014	SC	2	6274	1004	3.5	0.259	-0.202	0.057
SC20140	0	2014	SC	3	6274	1104	3.5	0.425	-0.293	0.131
SC20140	0	2014	SC	4	6274	1204	3.5	0.201	-0.131	0.069
SC20140	0	2014	SC	1	1151	905	4.5	-0.880	1.334	0.453
SC20140	0	2014	SC	2	1151	1006	4.5	-0.220	0.435	0.215
SC20140	0	2014	SC	3	1151	1105	4.5	0.113	0.028	0.142
SC20140	0	2014	SC	4	1151	1205	4.5	0.095	-0.233	-0.138
SC20140	0	2014	SC	1	6000	906	4.5	0.074	0.021	0.095
SC20140	0	2014	SC	2	6000	1005	4.5	-0.803	1.158	0.355
SC20140	0	2014	SC	3	6000	1106	4.5	-0.356	0.225	-0.132
SC20140	0	2014	SC	4	6000	1206	4.5	0.056	-0.150	-0.093
SC20140	0	2014	SC	1	6274	904	4.5	0.028	-0.415	-0.387
SC20140	0	2014	SC	2	6274	1004	4.5	0.029	-0.061	-0.031
SC20140	0	2014	SC	3	6274	1104	4.5	-0.912	1.341	0.429
SC20140	0	2014	SC	4	6274	1204	4.5	-0.347	0.510	0.163
SC2014100	100	2014	SC	1	1151	902	0.5	0.083	0.032	0.115
SC2014100	100	2014	SC	2	1151	1001	0.5	0.052	-0.158	-0.106
SC2014100	100	2014	SC	3	1151	1101	0.5	0.126	-0.076	0.050
SC2014100	100	2014	SC	4	1151	1203	0.5	-0.394	0.735	0.340
SC2014100	100	2014	SC	1	6000	903	0.5	-0.035	0.251	0.216
SC2014100	100	2014	SC	2	6000	1003	0.5	0.209	0.245	0.454
SC2014100	100	2014	SC	3	6000	1102	0.5	0.087	-0.047	0.040

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
SC2014100	100	2014	SC	4	6000	1201	0.5	0.083	-0.080	0.003
SC2014100	100	2014	SC	1	6274	901	0.5	-0.609	1.174	0.565
SC2014100	100	2014	SC	2	6274	1002	0.5	-0.241	0.462	0.221
SC2014100	100	2014	SC	3	6274	1103	0.5	-0.049	0.413	0.365
SC2014100	100	2014	SC	4	6274	1202	0.5	0.125	0.021	0.147
SC2014100	100	2014	SC	1	1151	902	1.5	0.151	-0.089	0.062
SC2014100	100	2014	SC	2	1151	1001	1.5	-0.729	1.095	0.365
SC2014100	100	2014	SC	3	1151	1101	1.5	-0.417	0.527	0.110
SC2014100	100	2014	SC	4	1151	1203	1.5	-0.026	0.533	0.507
SC2014100	100	2014	SC	1	6000	903	1.5	0.094	0.133	0.227
SC2014100	100	2014	SC	2	6000	1003	1.5	0.102	0.063	0.165
SC2014100	100	2014	SC	3	6000	1102	1.5	-0.256	0.534	0.278
SC2014100	100	2014	SC	4	6000	1201	1.5	-0.128	-0.305	-0.432
SC2014100	100	2014	SC	1	6274	901	1.5	0.156	-0.267	-0.111
SC2014100	100	2014	SC	2	6274	1002	1.5	0.109	-0.119	-0.010
SC2014100	100	2014	SC	3	6274	1103	1.5	0.060	-0.032	0.027
SC2014100	100	2014	SC	4	6274	1202	1.5	-0.062	0.435	0.373
SC2014100	100	2014	SC	1	1151	902	2.5	-0.075	-0.131	-0.205
SC2014100	100	2014	SC	2	1151	1001	2.5	0.082	-0.141	-0.058
SC2014100	100	2014	SC	3	1151	1101	2.5	0.132	-0.048	0.084
SC2014100	100	2014	SC	4	1151	1203	2.5	0.039	0.046	0.085
SC2014100	100	2014	SC	1	6000	903	2.5	-0.403	0.825	0.422
SC2014100	100	2014	SC	2	6000	1003	2.5	0.005	0.177	0.182
SC2014100	100	2014	SC	3	6000	1102	2.5	0.143	-0.147	-0.004
SC2014100	100	2014	SC	4	6000	1201	2.5	0.096	-0.135	-0.039
SC2014100	100	2014	SC	1	6274	901	2.5	0.127	-0.025	0.102

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
SC2014100	100	2014	SC	2	6274	1002	2.5	-0.752	1.058	0.306
SC2014100	100	2014	SC	3	6274	1103	2.5	-0.304	-0.155	-0.459
SC2014100	100	2014	SC	4	6274	1202	2.5	0.048	-0.349	-0.301
SC2014100	100	2014	SC	1	1151	902	3.5	0.131	-0.135	-0.004
SC2014100	100	2014	SC	2	1151	1001	3.5	0.083	-0.001	0.082
SC2014100	100	2014	SC	3	1151	1101	3.5	-0.893	1.296	0.403
SC2014100	100	2014	SC	4	1151	1203	3.5	-0.362	0.440	0.077
SC2014100	100	2014	SC	1	6000	903	3.5	0.010	-0.044	-0.034
SC2014100	100	2014	SC	2	6000	1003	3.5	0.114	-0.196	-0.081
SC2014100	100	2014	SC	3	6000	1102	3.5	0.017	-0.060	-0.043
SC2014100	100	2014	SC	4	6000	1201	3.5	-0.773	1.187	0.414
SC2014100	100	2014	SC	1	6274	901	3.5	-0.318	0.454	0.136
SC2014100	100	2014	SC	2	6274	1002	3.5	0.122	0.385	0.507
SC2014100	100	2014	SC	3	6274	1103	3.5	0.078	0.078	0.156
SC2014100	100	2014	SC	4	6274	1202	3.5	0.027	0.004	0.031
SC2014100	100	2014	SC	1	1151	902	4.5	-0.787	1.154	0.368
SC2014100	100	2014	SC	2	1151	1001	4.5	-0.252	0.080	-0.172
SC2014100	100	2014	SC	3	1151	1101	4.5	-0.011	-0.195	-0.207
SC2014100	100	2014	SC	4	1151	1203	4.5	0.165	-0.206	-0.042
SC2014100	100	2014	SC	1	6000	903	4.5	0.104	-0.018	0.086
SC2014100	100	2014	SC	2	6000	1003	4.5	-0.978	1.381	0.403
SC2014100	100	2014	SC	3	6000	1102	4.5	-0.227	0.205	-0.022
SC2014100	100	2014	SC	4	6000	1201	4.5	0.120	-0.198	-0.077
SC2014100	100	2014	SC	1	6274	901	4.5	0.034	-0.172	-0.138
SC2014100	100	2014	SC	2	6274	1002	4.5	0.029	-0.005	0.025
SC2014100	100	2014	SC	3	6274	1103	4.5	-0.950	1.167	0.216

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
SC2014100	100	2014	SC	4	6274	1202	4.5	-0.396	-0.007	-0.403
TO20140	0	2014	TO	1	1151	504	0.5	-0.018	-0.284	-0.302
TO20140	0	2014	TO	2	1151	604	0.5	0.082	-0.212	-0.130
TO20140	0	2014	TO	3	1151	706	0.5	0.053	-0.086	-0.033
TO20140	0	2014	TO	4	1151	804	0.5	-0.897	1.206	0.309
TO20140	0	2014	TO	1	6000	505	0.5	-0.363	0.238	-0.125
TO20140	0	2014	TO	2	6000	606	0.5	0.086	-0.404	-0.318
TO20140	0	2014	TO	3	6000	704	0.5	0.224	-0.683	-0.460
TO20140	0	2014	TO	4	6000	806	0.5	0.148	-0.322	-0.175
TO20140	0	2014	TO	1	6274	506	0.5	-1.007	1.345	0.338
TO20140	0	2014	TO	2	6274	605	0.5	-0.387	0.488	0.101
TO20140	0	2014	TO	3	6274	705	0.5	0.214	-0.386	-0.172
TO20140	0	2014	TO	4	6274	805	0.5	0.402	-0.544	-0.142
TO20140	0	2014	TO	1	1151	504	1.5	0.205	-0.110	0.095
TO20140	0	2014	TO	2	1151	604	1.5	-1.053	1.480	0.427
TO20140	0	2014	TO	3	1151	706	1.5	-0.226	0.533	0.307
TO20140	0	2014	TO	4	1151	804	1.5	0.057	0.151	0.208
TO20140	0	2014	TO	1	6000	505	1.5	0.221	-0.013	0.208
TO20140	0	2014	TO	2	6000	606	1.5	0.180	-0.095	0.085
TO20140	0	2014	TO	3	6000	704	1.5	-0.374	0.647	0.273
TO20140	0	2014	TO	4	6000	806	1.5	-0.193	-0.033	-0.226
TO20140	0	2014	TO	1	6274	506	1.5	0.107	-0.195	-0.087
TO20140	0	2014	TO	2	6274	605	1.5	-0.005	-0.341	-0.346
TO20140	0	2014	TO	3	6274	705	1.5	0.146	-0.272	-0.126
TO20140	0	2014	TO	4	6274	805	1.5	-0.933	1.223	0.290
TO20140	0	2014	TO	1	1151	504	2.5	-0.368	-0.029	-0.397

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TO20140	0	2014	TO	2	1151	604	2.5	-0.119	-0.296	-0.415
TO20140	0	2014	TO	3	1151	706	2.5	0.071	-0.322	-0.251
TO20140	0	2014	TO	4	1151	804	2.5	0.082	-0.039	0.043
TO20140	0	2014	TO	1	6000	505	2.5	-0.990	1.357	0.367
TO20140	0	2014	TO	2	6000	606	2.5	-0.409	0.224	-0.185
TO20140	0	2014	TO	3	6000	704	2.5	-0.096	-0.219	-0.315
TO20140	0	2014	TO	4	6000	806	2.5	0.079	-0.450	-0.372
TO20140	0	2014	TO	1	6274	506	2.5	0.076	-0.150	-0.074
TO20140	0	2014	TO	2	6274	605	2.5	-0.808	1.277	0.469
TO20140	0	2014	TO	3	6274	705	2.5	-0.196	0.485	0.289
TO20140	0	2014	TO	4	6274	805	2.5	0.246	-0.424	-0.178
TO20140	0	2014	TO	1	1151	504	3.5	0.251	-0.745	-0.494
TO20140	0	2014	TO	2	1151	604	3.5	0.123	-0.191	-0.067
TO20140	0	2014	TO	3	1151	706	3.5	-0.861	1.250	0.389
TO20140	0	2014	TO	4	1151	804	3.5	-0.296	0.440	0.145
TO20140	0	2014	TO	1	6000	505	3.5	0.063	-0.056	0.007
TO20140	0	2014	TO	2	6000	606	3.5	0.217	0.020	0.237
TO20140	0	2014	TO	3	6000	704	3.5	0.068	-0.090	-0.021
TO20140	0	2014	TO	4	6000	806	3.5	-0.781	1.026	0.245
TO20140	0	2014	TO	1	6274	506	3.5	-0.319	-0.246	-0.565
TO20140	0	2014	TO	2	6274	605	3.5	-0.119	-0.346	-0.465
TO20140	0	2014	TO	3	6274	705	3.5	0.157	-0.672	-0.515
TO20140	0	2014	TO	4	6274	805	3.5	0.110	-0.380	-0.270
TO20140	0	2014	TO	1	1151	504	4.5	0.516	-1.569	-1.053
TO20140	0	2014	TO	2	1151	604	4.5	-0.804	-0.338	-1.142
TO20140	0	2014	TO	3	1151	706	4.5	-0.754	-0.099	-0.853

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TO20140	0	2014	TO	4	1151	804	4.5	-0.546	-0.343	-0.888
TO20140	0	2014	TO	1	6000	505	4.5	-0.136	-0.837	-0.973
TO20140	0	2014	TO	2	6000	606	4.5	0.122	-0.977	-0.855
TO20140	0	2014	TO	3	6000	704	4.5	0.324	-0.959	-0.635
TO20140	0	2014	TO	4	6000	806	4.5	-0.718	-0.140	-0.858
TO20140	0	2014	TO	1	6274	506	4.5	-0.628	-0.251	-0.879
TO20140	0	2014	TO	2	6274	605	4.5	-0.131	-0.710	-0.840
TO20140	0	2014	TO	3	6274	705	4.5	0.138	-0.894	-0.756
TO20140	0	2014	TO	4	6274	805	4.5	0.368	-0.925	-0.558
TO2014100	100	2014	TO	1	1151	503	0.5	0.183	-0.905	-0.722
TO2014100	100	2014	TO	2	1151	601	0.5	-0.892	-0.090	-0.981
TO2014100	100	2014	TO	3	1151	702	0.5	-0.871	-0.128	-1.000
TO2014100	100	2014	TO	4	1151	803	0.5	-0.637	-0.329	-0.966
TO2014100	100	2014	TO	1	6000	501	0.5	-0.177	-0.854	-1.031
TO2014100	100	2014	TO	2	6000	602	0.5	0.169	-1.072	-0.904
TO2014100	100	2014	TO	3	6000	701	0.5	0.379	-0.947	-0.568
TO2014100	100	2014	TO	4	6000	802	0.5	-0.281	-0.379	-0.659
TO2014100	100	2014	TO	1	6274	502	0.5	-0.171	-0.548	-0.720
TO2014100	100	2014	TO	2	6274	603	0.5	-0.007	-0.667	-0.675
TO2014100	100	2014	TO	3	6274	703	0.5	0.022	-0.663	-0.641
TO2014100	100	2014	TO	4	6274	801	0.5	0.119	-0.551	-0.432
TO2014100	100	2014	TO	1	1151	503	1.5	0.334	-1.022	-0.688
TO2014100	100	2014	TO	2	1151	601	1.5	-0.690	-0.082	-0.772
TO2014100	100	2014	TO	3	1151	702	1.5	-0.788	-0.156	-0.944
TO2014100	100	2014	TO	4	1151	803	1.5	-0.349	-0.551	-0.899
TO2014100	100	2014	TO	1	6000	501	1.5	-0.013	-0.907	-0.921

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TO2014100	100	2014	TO	2	6000	602	1.5	0.220	-0.968	-0.747
TO2014100	100	2014	TO	3	6000	701	1.5	0.523	-1.087	-0.564
TO2014100	100	2014	TO	4	6000	802	1.5	-0.868	-0.086	-0.954
TO2014100	100	2014	TO	1	6274	502	1.5	-0.830	-0.093	-0.923
TO2014100	100	2014	TO	2	6274	603	1.5	-0.792	-0.164	-0.956
TO2014100	100	2014	TO	3	6274	703	1.5	-0.307	-0.624	-0.931
TO2014100	100	2014	TO	4	6274	801	1.5	0.054	-0.860	-0.806
TO2014100	100	2014	TO	1	1151	503	2.5	0.159	-0.796	-0.637
TO2014100	100	2014	TO	2	1151	601	2.5	-0.993	-0.046	-1.039
TO2014100	100	2014	TO	3	1151	702	2.5	-0.733	-0.124	-0.856
TO2014100	100	2014	TO	4	1151	803	2.5	-0.478	-0.498	-0.976
TO2014100	100	2014	TO	1	6000	501	2.5	-0.059	-0.816	-0.875
TO2014100	100	2014	TO	2	6000	602	2.5	0.071	-0.869	-0.798
TO2014100	100	2014	TO	3	6000	701	2.5	0.290	-0.520	-0.230
TO2014100	100	2014	TO	4	6000	802	2.5	-0.269	-0.227	-0.496
TO2014100	100	2014	TO	1	6274	502	2.5	-0.501	-0.369	-0.870
TO2014100	100	2014	TO	2	6274	603	2.5	-0.206	-0.702	-0.908
TO2014100	100	2014	TO	3	6274	703	2.5	0.007	-0.893	-0.886
TO2014100	100	2014	TO	4	6274	801	2.5	0.155	-0.887	-0.732
TO2014100	100	2014	TO	1	1151	503	3.5	0.130	-0.848	-0.718
TO2014100	100	2014	TO	2	1151	601	3.5	-0.928	-0.168	-1.097
TO2014100	100	2014	TO	3	1151	702	3.5	-0.845	-0.121	-0.966
TO2014100	100	2014	TO	4	1151	803	3.5	-0.660	-0.301	-0.962
TO2014100	100	2014	TO	1	6000	501	3.5	-0.172	-0.811	-0.983
TO2014100	100	2014	TO	2	6000	602	3.5	0.047	-0.864	-0.817
TO2014100	100	2014	TO	3	6000	701	3.5	0.389	-0.994	-0.605

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TO2014100	100	2014	TO	4	6000	802	3.5	-0.610	-0.163	-0.773
TO2014100	100	2014	TO	1	6274	502	3.5	-0.608	-0.257	-0.865
TO2014100	100	2014	TO	2	6274	603	3.5	-0.301	-0.498	-0.799
TO2014100	100	2014	TO	3	6274	703	3.5	-0.027	-0.782	-0.809
TO2014100	100	2014	TO	4	6274	801	3.5	0.177	-0.930	-0.754
TO2014100	100	2014	TO	1	1151	503	4.5	0.339	-1.044	-0.705
TO2014100	100	2014	TO	2	1151	601	4.5	-0.903	-0.159	-1.062
TO2014100	100	2014	TO	3	1151	702	4.5	-0.723	-0.306	-1.028
TO2014100	100	2014	TO	4	1151	803	4.5	-0.285	-0.647	-0.932
TO2014100	100	2014	TO	1	6000	501	4.5	-0.004	-0.964	-0.969
TO2014100	100	2014	TO	2	6000	602	4.5	0.128	-1.024	-0.896
TO2014100	100	2014	TO	3	6000	701	4.5	0.294	-1.064	-0.770
TO2014100	100	2014	TO	4	6000	802	4.5	-0.905	-0.173	-1.077
TO2014100	100	2014	TO	1	6274	502	4.5	-0.762	-0.133	-0.895
TO2014100	100	2014	TO	2	6274	603	4.5	-0.713	-0.207	-0.920
TO2014100	100	2014	TO	3	6274	703	4.5	-0.266	-0.673	-0.940
TO2014100	100	2014	TO	4	6274	801	4.5	0.043	-1.040	-0.997
TR20140	0	2014	TR	1	1151	1303	0.5	-0.372	0.912	0.540
TR20140	0	2014	TR	2	1151	1403	0.5	-0.648	-0.276	-0.924
TR20140	0	2014	TR	3	1151	1502	0.5	-0.312	-0.528	-0.840
TR20140	0	2014	TR	4	1151	1602	0.5	-0.048	-0.240	-0.288
TR20140	0	2014	TR	1	6000	1302	0.5	0.156	-0.132	0.024
TR20140	0	2014	TR	2	6000	1401	0.5	0.204	-0.156	0.048
TR20140	0	2014	TR	3	6000	1501	0.5	-0.840	1.224	0.384
TR20140	0	2014	TR	4	6000	1601	0.5	-0.852	0.516	-0.336
TR20140	0	2014	TR	1	6274	1301	0.5	-0.132	-0.060	-0.192

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TR20140	0	2014	TR	2	6274	1402	0.5	0.480	-0.156	0.324
TR20140	0	2014	TR	3	6274	1503	0.5	0.876	-0.264	0.612
TR20140	0	2014	TR	4	6274	1603	0.5	0.276	-0.024	0.252
TR20140	0	2014	TR	1	1151	1303	1.5	-0.564	0.852	0.288
TR20140	0	2014	TR	2	1151	1403	1.5	-0.420	-0.468	-0.888
TR20140	0	2014	TR	3	1151	1502	1.5	-0.192	0.120	-0.072
TR20140	0	2014	TR	4	1151	1602	1.5	0.204	0.000	0.204
TR20140	0	2014	TR	1	6000	1302	1.5	0.516	-0.192	0.324
TR20140	0	2014	TR	2	6000	1401	1.5	0.264	-0.024	0.240
TR20140	0	2014	TR	3	6000	1501	1.5	-0.456	0.648	0.192
TR20140	0	2014	TR	4	6000	1601	1.5	-0.492	-0.156	-0.648
TR20140	0	2014	TR	1	6274	1301	1.5	-0.396	-0.132	-0.528
TR20140	0	2014	TR	2	6274	1402	1.5	0.120	-0.204	-0.084
TR20140	0	2014	TR	3	6274	1503	1.5	0.168	-0.144	0.024
TR20140	0	2014	TR	4	6274	1603	1.5	0.096	-0.144	-0.048
TR20140	0	2014	TR	1	1151	1303	2.5	-0.540	0.540	0.000
TR20140	0	2014	TR	2	1151	1403	2.5	-0.072	-0.336	-0.408
TR20140	0	2014	TR	3	1151	1502	2.5	0.072	-0.924	-0.852
TR20140	0	2014	TR	4	1151	1602	2.5	0.192	-0.792	-0.600
TR20140	0	2014	TR	1	6000	1302	2.5	0.312	-0.264	0.048
TR20140	0	2014	TR	2	6000	1401	2.5	0.120	-0.060	0.060
TR20140	0	2014	TR	3	6000	1501	2.5	-0.696	0.504	-0.192
TR20140	0	2014	TR	4	6000	1601	2.5	-0.732	-0.264	-0.996
TR20140	0	2014	TR	1	6274	1301	2.5	-0.468	-0.672	-1.140
TR20140	0	2014	TR	2	6274	1402	2.5	0.132	-0.408	-0.276
TR20140	0	2014	TR	3	6274	1503	2.5	0.120	-0.300	-0.180

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TR20140	0	2014	TR	4	6274	1603	2.5	0.036	-0.072	-0.036
TR20140	0	2014	TR	1	1151	1303	3.5	-0.888	1.008	0.120
TR20140	0	2014	TR	2	1151	1403	3.5	-0.768	-0.408	-1.176
TR20140	0	2014	TR	3	1151	1502	3.5	-0.468	-0.600	-1.068
TR20140	0	2014	TR	4	1151	1602	3.5	0.120	-0.396	-0.276
TR20140	0	2014	TR	1	6000	1302	3.5	0.096	-0.168	-0.072
TR20140	0	2014	TR	2	6000	1401	3.5	0.180	-0.120	0.060
TR20140	0	2014	TR	3	6000	1501	3.5	-0.876	0.864	-0.012
TR20140	0	2014	TR	4	6000	1601	3.5	-0.456	-0.672	-1.128
TR20140	0	2014	TR	1	6274	1301	3.5	-0.396	-0.144	-0.540
TR20140	0	2014	TR	2	6274	1402	3.5	0.072	-0.348	-0.276
TR20140	0	2014	TR	3	6274	1503	3.5	0.216	-0.336	-0.120
TR20140	0	2014	TR	4	6274	1603	3.5	0.048	-0.036	0.012
TR20140	0	2014	TR	1	1151	1303	4.5	-0.996	0.996	0.000
TR20140	0	2014	TR	2	1151	1403	4.5	-0.780	-0.300	-1.080
TR20140	0	2014	TR	3	1151	1502	4.5	-0.840	-0.300	-1.140
TR20140	0	2014	TR	4	1151	1602	4.5	-0.144	-0.624	-0.768
TR20140	0	2014	TR	1	6000	1302	4.5	0.144	-0.576	-0.432
TR20140	0	2014	TR	2	6000	1401	4.5	0.480	-0.312	0.168
TR20140	0	2014	TR	3	6000	1501	4.5	-0.828	0.936	0.108
TR20140	0	2014	TR	4	6000	1601	4.5	-0.756	-0.384	-1.140
TR20140	0	2014	TR	1	6274	1301	4.5	-0.456	-0.372	-0.828
TR20140	0	2014	TR	2	6274	1402	4.5	0.072	-0.336	-0.264
TR20140	0	2014	TR	3	6274	1503	4.5	0.240	-0.168	0.072
TR20140	0	2014	TR	4	6274	1603	4.5	0.192	-0.096	0.096
TR20140	0	2014	TR	1	1151	1303	5.5	-0.948	1.200	0.252

2014 Water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TR20140	0	2014	TR	2	1151	1403	5.5	-0.852	-0.012	-0.864
TR20140	0	2014	TR	3	1151	1502	5.5	-0.396	0.132	-0.264
TR20140	0	2014	TR	4	1151	1602	5.5	0.240	-0.192	0.048
TR20140	0	2014	TR	1	6000	1302	5.5	0.240	-0.324	-0.084
TR20140	0	2014	TR	2	6000	1401	5.5	0.216	-0.180	0.036
TR20140	0	2014	TR	3	6000	1501	5.5	-0.876	0.936	0.060
TR20140	0	2014	TR	4	6000	1601	5.5	-0.792	0.420	-0.372
TR20140	0	2014	TR	1	6274	1301	5.5	-0.228	-0.084	-0.312
TR20140	0	2014	TR	2	6274	1402	5.5	0.120	-0.516	-0.396
TR20140	0	2014	TR	3	6274	1503	5.5	0.204	-0.240	-0.036
TR20140	0	2014	TR	4	6274	1603	5.5	0.096	-0.180	-0.084

Table A7: 2015 Soil water Status Change

2015 Raw water status change data										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU201550	50	2015	HU	6	1151	104	0.5	1.082	-1.124	-0.042
HU201550	50	2015	HU	6	1151	104	1.5	0.420	-0.336	0.084
HU201550	50	2015	HU	6	1151	104	2.5	0.190	0.012	0.202
HU201550	50	2015	HU	6	1151	104	3.5	0.178	0.249	0.427
HU201550	50	2015	HU	6	1151	104	4.5	0.138	0.277	0.415
HU201550	50	2015	HU	6	6000	105	0.5	0.967	-0.996	-0.028
HU201550	50	2015	HU	6	6000	105	1.5	3.468	-3.353	0.115
HU201550	50	2015	HU	6	6000	105	2.5	0.215	0.051	0.265
HU201550	50	2015	HU	6	6000	105	3.5	0.202	0.206	0.408
HU201550	50	2015	HU	6	6000	105	4.5	0.185	0.230	0.415
HU201550	50	2015	HU	6	6274	106	0.5	0.922	-0.978	-0.056

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU201550	50	2015	HU	6	6274	106	1.5	0.302	0.011	0.313
HU201550	50	2015	HU	6	6274	106	2.5	0.197	0.181	0.378
HU201550	50	2015	HU	6	6274	106	3.5	0.136	0.158	0.294
HU201550	50	2015	HU	6	6274	106	4.5	0.153	0.359	0.512
HU20150	0	2015	HU	6	6274	107	0.5	1.473	-1.574	-0.101
HU20150	0	2015	HU	6	6274	107	1.5	0.674	-0.519	0.155
HU20150	0	2015	HU	6	6274	107	2.5	0.129	-0.066	0.062
HU20150	0	2015	HU	6	6274	107	3.5	0.072	-0.033	0.038
HU20150	0	2015	HU	6	6274	107	4.5	0.133	-0.100	0.033
HU20150	0	2015	HU	6	6000	108	0.5	1.562	-1.692	-0.130
HU20150	0	2015	HU	6	6000	108	1.5	0.838	-0.678	0.160
HU20150	0	2015	HU	6	6000	108	2.5	0.434	-0.389	0.045
HU20150	0	2015	HU	6	6000	108	3.5	0.213	-0.009	0.204
HU20150	0	2015	HU	6	6000	108	4.5	0.103	0.091	0.194
HU20150	0	2015	HU	6	1151	109	0.5	1.378	-1.581	-0.203
HU20150	0	2015	HU	6	1151	109	1.5	0.734	-0.618	0.115
HU20150	0	2015	HU	6	1151	109	2.5	0.214	-0.154	0.060
HU20150	0	2015	HU	6	1151	109	3.5	0.033	0.037	0.070
HU20150	0	2015	HU	6	1151	109	4.5	-0.024	-0.017	-0.041
HU2015100	100	2015	HU	2	1151	201	0.5	0.675	-0.941	-0.265
HU2015100	100	2015	HU	2	1151	201	1.5	0.586	-0.478	0.108
HU2015100	100	2015	HU	2	1151	201	2.5	0.285	-0.085	0.200
HU2015100	100	2015	HU	2	1151	201	3.5	0.215	0.024	0.240
HU2015100	100	2015	HU	2	1151	201	4.5	0.009	0.173	0.182
HU2015100	100	2015	HU	2	6000	202	0.5	0.485	-0.767	-0.281
HU2015100	100	2015	HU	2	6000	202	1.5	0.363	-0.251	0.113

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU2015100	100	2015	HU	2	6000	202	2.5	0.192	0.348	0.540
HU2015100	100	2015	HU	2	6000	202	3.5	0.196	0.505	0.701
HU2015100	100	2015	HU	2	6000	202	4.5	-0.032	0.215	0.183
HU2015100	100	2015	HU	2	6274	203	0.5	0.859	-1.048	-0.189
HU2015100	100	2015	HU	2	6274	203	1.5	0.485	-0.380	0.105
HU2015100	100	2015	HU	2	6274	203	2.5	0.213	0.062	0.274
HU2015100	100	2015	HU	2	6274	203	3.5	0.383	0.395	0.778
HU2015100	100	2015	HU	2	6274	203	4.5	0.007	0.386	0.393
HU2015100	100	2015	HU	4	6274	301	0.5	0.221	2.289	2.510
HU2015100	100	2015	HU	4	6274	301	1.5	0.640	2.764	3.404
HU2015100	100	2015	HU	4	6274	301	2.5	0.181	-0.124	0.057
HU2015100	100	2015	HU	4	6274	301	3.5	-0.003	0.077	0.074
HU2015100	100	2015	HU	4	6274	301	4.5	0.152	0.221	0.373
HU2015100	100	2015	HU	4	6000	302	0.5	0.512	-0.821	-0.309
HU2015100	100	2015	HU	4	6000	302	1.5	0.653	-0.600	0.052
HU2015100	100	2015	HU	4	6000	302	2.5	0.207	2.819	3.026
HU2015100	100	2015	HU	4	6000	302	3.5	0.230	-0.228	0.002
HU2015100	100	2015	HU	4	6000	302	4.5	0.413	-0.039	0.374
HU2015100	100	2015	HU	4	1151	303	0.5	0.276	-0.452	-0.176
HU2015100	100	2015	HU	4	1151	303	1.5	0.464	-0.358	0.106
HU2015100	100	2015	HU	4	1151	303	2.5	0.260	-0.164	0.096
HU2015100	100	2015	HU	4	1151	303	3.5	0.201	0.070	0.272
HU2015100	100	2015	HU	4	1151	303	4.5	0.197	0.264	0.460
HU201550	50	2015	HU	4	6000	304	0.5	0.972	-1.030	-0.058
HU201550	50	2015	HU	4	6000	304	1.5	0.789	-0.204	0.586
HU201550	50	2015	HU	4	6000	304	2.5	0.321	0.202	0.523

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU201550	50	2015	HU	4	6000	304	3.5	0.354	-0.752	-0.398
HU201550	50	2015	HU	4	6000	304	4.5	0.186	-0.340	-0.155
HU201550	50	2015	HU	4	1151	305	0.5	1.057	-1.077	-0.020
HU201550	50	2015	HU	4	1151	305	1.5	0.797	-0.437	0.360
HU201550	50	2015	HU	4	1151	305	2.5	0.490	0.170	0.659
HU201550	50	2015	HU	4	1151	305	3.5	0.399	0.198	0.596
HU201550	50	2015	HU	4	1151	305	4.5	0.178	0.388	0.566
HU201550	50	2015	HU	4	6274	306	0.5	1.135	-1.194	-0.059
HU201550	50	2015	HU	4	6274	306	1.5	0.703	-0.565	0.137
HU201550	50	2015	HU	4	6274	306	2.5	0.352	-0.043	0.309
HU201550	50	2015	HU	4	6274	306	3.5	0.253	0.290	0.543
HU201550	50	2015	HU	4	6274	306	4.5	0.180	0.254	0.434
HU20150	0	2015	HU	4	1151	307	0.5	1.284	-1.300	-0.016
HU20150	0	2015	HU	4	1151	307	1.5	0.758	-0.393	0.365
HU20150	0	2015	HU	4	1151	307	2.5	0.539	-0.116	0.423
HU20150	0	2015	HU	4	1151	307	3.5	0.392	0.214	0.606
HU20150	0	2015	HU	4	1151	307	4.5	0.139	0.379	0.517
HU20150	0	2015	HU	4	6000	308	0.5	1.173	-1.052	0.121
HU20150	0	2015	HU	4	6000	308	1.5	0.723	-0.360	0.363
HU20150	0	2015	HU	4	6000	308	2.5	0.172	0.088	0.260
HU20150	0	2015	HU	4	6000	308	3.5	0.250	0.260	0.510
HU20150	0	2015	HU	4	6000	308	4.5	0.252	0.285	0.537
HU20150	0	2015	HU	4	6274	309	0.5	1.344	-1.169	0.176
HU20150	0	2015	HU	4	6274	309	1.5	0.844	-0.278	0.566
HU20150	0	2015	HU	4	6274	309	2.5	0.323	0.065	0.388
HU20150	0	2015	HU	4	6274	309	3.5	0.097	0.269	0.365

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
								in ft^{-1}	in ft^{-1}	in ft^{-1}
HU20150	0	2015	HU	4	6274	309	4.5	0.201	0.283	0.484
HU2015100	100	2015	HU	1	6274	401	0.5	0.262	-0.515	-0.253
HU2015100	100	2015	HU	1	6274	401	1.5	0.528	-0.448	0.080
HU2015100	100	2015	HU	1	6274	401	2.5	0.207	-0.094	0.113
HU2015100	100	2015	HU	1	6274	401	3.5	0.123	0.342	0.464
HU2015100	100	2015	HU	1	6274	401	4.5	0.148	0.294	0.441
HU2015100	100	2015	HU	1	1151	402	0.5	0.633	-0.895	-0.262
HU2015100	100	2015	HU	1	1151	402	1.5	0.746	-0.613	0.132
HU2015100	100	2015	HU	1	1151	402	2.5	0.312	-0.178	0.134
HU2015100	100	2015	HU	1	1151	402	3.5	0.351	0.312	0.662
HU2015100	100	2015	HU	1	1151	402	4.5	-0.026	0.296	0.270
HU2015100	100	2015	HU	1	6000	403	0.5	0.672	-0.863	-0.191
HU2015100	100	2015	HU	1	6000	403	1.5	0.540	-0.366	0.175
HU2015100	100	2015	HU	1	6000	403	2.5	0.183	0.237	0.420
HU2015100	100	2015	HU	1	6000	403	3.5	0.105	0.525	0.630
HU2015100	100	2015	HU	1	6000	403	4.5	0.055	0.335	0.390
HU201550	50	2015	HU	1	1151	404	0.5	0.993	-0.899	0.094
HU201550	50	2015	HU	1	1151	404	1.5	0.452	-0.203	0.249
HU201550	50	2015	HU	1	1151	404	2.5	0.158	0.184	0.341
HU201550	50	2015	HU	1	1151	404	3.5	0.026	0.329	0.354
HU201550	50	2015	HU	1	1151	404	4.5	0.199	0.418	0.617
HU201550	50	2015	HU	1	6274	405	0.5	1.034	-1.242	-0.208
HU201550	50	2015	HU	1	6274	405	1.5	0.590	-0.503	0.087
HU201550	50	2015	HU	1	6274	405	2.5	0.284	0.101	0.385
HU201550	50	2015	HU	1	6274	405	3.5	0.215	0.306	0.521
HU201550	50	2015	HU	1	6274	405	4.5	0.168	0.217	0.385

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
								in ft^{-1}	in ft^{-1}	in ft^{-1}
HU201550	50	2015	HU	1	6000	406	0.5	1.154	-1.230	-0.076
HU201550	50	2015	HU	1	6000	406	1.5	0.567	-0.510	0.058
HU201550	50	2015	HU	1	6000	406	2.5	0.139	-0.038	0.101
HU201550	50	2015	HU	1	6000	406	3.5	0.071	0.233	0.304
HU201550	50	2015	HU	1	6000	406	4.5	0.126	0.442	0.568
HU20150	0	2015	HU	1	1151	407	0.5	1.384	-1.530	-0.147
HU20150	0	2015	HU	1	1151	407	1.5	0.854	-0.835	0.019
HU20150	0	2015	HU	1	1151	407	2.5	0.415	-0.251	0.164
HU20150	0	2015	HU	1	1151	407	3.5	0.178	0.022	0.200
HU20150	0	2015	HU	1	1151	407	4.5	0.084	0.088	0.173
HU20150	0	2015	HU	1	6000	408	0.5	2.365	-1.200	1.165
HU20150	0	2015	HU	1	6000	408	1.5	0.842	-0.571	0.272
HU20150	0	2015	HU	1	6000	408	2.5	0.625	0.040	0.664
HU20150	0	2015	HU	1	6000	408	3.5	0.316	0.663	0.979
HU20150	0	2015	HU	1	6000	408	4.5	0.256	0.456	0.712
HU20150	0	2015	HU	1	6274	409	0.5	1.285	-1.431	-0.146
HU20150	0	2015	HU	1	6274	409	1.5	0.877	-0.544	0.333
HU20150	0	2015	HU	1	6274	409	2.5	0.681	-0.444	0.237
HU20150	0	2015	HU	1	6274	409	3.5	0.582	-0.472	0.109
HU20150	0	2015	HU	1	6274	409	4.5	0.222	0.021	0.242
HU2015100	100	2015	HU	5	6274	501	0.5	0.877	-0.864	0.013
HU2015100	100	2015	HU	5	6274	501	1.5	0.895	-0.019	0.876
HU2015100	100	2015	HU	5	6274	501	2.5	0.275	0.536	0.811
HU2015100	100	2015	HU	5	6274	501	3.5	0.400	0.324	0.724
HU2015100	100	2015	HU	5	6274	501	4.5	0.191	0.236	0.427
HU2015100	100	2015	HU	5	6000	502	0.5	0.555	-0.585	-0.030

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU2015100	100	2015	HU	5	6000	502	1.5	0.452	-0.435	0.017
HU2015100	100	2015	HU	5	6000	502	2.5	0.358	-28.860	-28.503
HU2015100	100	2015	HU	5	6000	502	3.5	0.424	-0.257	0.167
HU2015100	100	2015	HU	5	6000	502	4.5	0.199	0.065	0.264
HU2015100	100	2015	HU	5	1151	503	0.5	0.324	-0.538	-0.214
HU2015100	100	2015	HU	5	1151	503	1.5	0.791	-0.620	0.171
HU2015100	100	2015	HU	5	1151	503	2.5	-0.021	0.547	0.525
HU2015100	100	2015	HU	5	1151	503	3.5	-0.463	0.972	0.509
HU2015100	100	2015	HU	5	1151	503	4.5	-0.273	0.719	0.446
HU201550	50	2015	HU	5	6274	504	0.5	1.024	-1.071	-0.047
HU201550	50	2015	HU	5	6274	504	1.5	0.539	-0.324	0.215
HU201550	50	2015	HU	5	6274	504	2.5	0.270	0.066	0.335
HU201550	50	2015	HU	5	6274	504	3.5	0.258	0.051	0.309
HU201550	50	2015	HU	5	6274	504	4.5	0.149	0.205	0.354
HU201550	50	2015	HU	5	6274	505	0.5	0.943	-1.163	-0.220
HU201550	50	2015	HU	5	6274	505	1.5	0.462	-0.318	0.144
HU201550	50	2015	HU	5	6274	505	2.5	0.245	-0.053	0.193
HU201550	50	2015	HU	5	6274	505	3.5	0.126	0.187	0.313
HU201550	50	2015	HU	5	6274	505	4.5	0.151	0.448	0.599
HU201550	50	2015	HU	5	1151	506	0.5	0.960	-1.059	-0.099
HU201550	50	2015	HU	5	1151	506	1.5	0.561	-0.407	0.155
HU201550	50	2015	HU	5	1151	506	2.5	0.180	0.095	0.275
HU201550	50	2015	HU	5	1151	506	3.5	0.159	0.095	0.254
HU201550	50	2015	HU	5	1151	506	4.5	0.066	0.170	0.236
HU20150	0	2015	HU	5	1151	507	0.5	1.292	-1.226	0.066
HU20150	0	2015	HU	5	1151	507	1.5	0.966	0.041	1.007

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU20150	0	2015	HU	5	1151	507	2.5	0.370	0.674	1.044
HU20150	0	2015	HU	5	1151	507	3.5	0.387	0.641	1.028
HU20150	0	2015	HU	5	1151	507	4.5	0.155	0.417	0.572
HU20150	0	2015	HU	5	6000	508	0.5	1.339	-1.280	0.059
HU20150	0	2015	HU	5	6000	508	1.5	0.895	0.112	1.008
HU20150	0	2015	HU	5	6000	508	2.5	0.677	0.471	1.148
HU20150	0	2015	HU	5	6000	508	3.5	0.443	0.529	0.973
HU20150	0	2015	HU	5	6000	508	4.5	0.319	0.448	0.768
HU20150	0	2015	HU	5	6274	509	0.5	1.337	-1.440	-0.103
HU20150	0	2015	HU	5	6274	509	1.5	0.862	-0.299	0.562
HU20150	0	2015	HU	5	6274	509	2.5	0.546	0.231	0.776
HU20150	0	2015	HU	5	6274	509	3.5	0.251	0.692	0.943
HU20150	0	2015	HU	5	6274	509	4.5	0.210	0.650	0.860
HU2015100	100	2015	HU	3	6000	601	0.5	0.572	-0.710	-0.138
HU2015100	100	2015	HU	3	6000	601	1.5	0.511	-0.283	0.228
HU2015100	100	2015	HU	3	6000	601	2.5	0.380	0.003	0.383
HU2015100	100	2015	HU	3	6000	601	3.5	0.247	0.259	0.506
HU2015100	100	2015	HU	3	6000	601	4.5	0.211	0.165	0.376
HU2015100	100	2015	HU	3	1151	602	0.5	0.496	-0.626	-0.130
HU2015100	100	2015	HU	3	1151	602	1.5	0.362	-0.228	0.134
HU2015100	100	2015	HU	3	1151	602	2.5	0.198	0.018	0.216
HU2015100	100	2015	HU	3	1151	602	3.5	0.360	0.399	0.760
HU2015100	100	2015	HU	3	1151	602	4.5	0.278	0.237	0.515
HU2015100	100	2015	HU	3	6274	603	0.5	0.506	-0.595	-0.089
HU2015100	100	2015	HU	3	6274	603	1.5	0.342	-0.217	0.126
HU2015100	100	2015	HU	3	6274	603	2.5	0.300	-0.048	0.252

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU2015100	100	2015	HU	3	6274	603	3.5	0.056	0.203	0.258
HU2015100	100	2015	HU	3	6274	603	4.5	0.131	0.223	0.354
HU201550	50	2015	HU	3	6274	604	0.5	1.167	-0.928	0.238
HU201550	50	2015	HU	3	6274	604	1.5	0.733	-0.162	0.571
HU201550	50	2015	HU	3	6274	604	2.5	0.358	0.282	0.639
HU201550	50	2015	HU	3	6274	604	3.5	0.308	0.444	0.752
HU201550	50	2015	HU	3	6274	604	4.5	0.180	0.481	0.660
HU201550	50	2015	HU	3	1151	605	0.5	0.874	-1.125	-0.251
HU201550	50	2015	HU	3	1151	605	1.5	0.698	-0.381	0.317
HU201550	50	2015	HU	3	1151	605	2.5	0.228	0.489	0.717
HU201550	50	2015	HU	3	1151	605	3.5	0.370	0.454	0.824
HU201550	50	2015	HU	3	1151	605	4.5	0.199	0.451	0.650
HU201550	50	2015	HU	3	1151	606	0.5	1.032	-0.969	0.063
HU201550	50	2015	HU	3	1151	606	1.5	0.581	0.059	0.640
HU201550	50	2015	HU	3	1151	606	2.5	0.254	0.431	0.685
HU201550	50	2015	HU	3	1151	606	3.5	0.305	0.317	0.623
HU201550	50	2015	HU	3	1151	606	4.5	0.213	0.507	0.720
HU20150	0	2015	HU	3	6274	607	0.5	1.413	-1.373	0.040
HU20150	0	2015	HU	3	6274	607	1.5	0.905	0.030	0.935
HU20150	0	2015	HU	3	6274	607	2.5	0.653	0.386	1.039
HU20150	0	2015	HU	3	6274	607	3.5	0.259	0.709	0.968
HU20150	0	2015	HU	3	6274	607	4.5	0.526	0.061	0.587
HU20150	0	2015	HU	3	1151	608	0.5	1.345	-1.496	-0.151
HU20150	0	2015	HU	3	1151	608	1.5	0.752	-0.118	0.634
HU20150	0	2015	HU	3	1151	608	2.5	0.437	0.399	0.836
HU20150	0	2015	HU	3	1151	608	3.5	0.322	0.418	0.741

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
HU20150	0	2015	HU	3	1151	608	4.5	0.242	0.219	0.461
HU20150	0	2015	HU	3	6000	609	0.5	1.295	-1.106	0.189
HU20150	0	2015	HU	3	6000	609	1.5	0.765	0.141	0.906
HU20150	0	2015	HU	3	6000	609	2.5	0.247	1.183	1.431
HU20150	0	2015	HU	3	6000	609	3.5	0.259	0.555	0.815
HU20150	0	2015	HU	3	6000	609	4.5	0.203	0.353	0.556
TO2015100	100	2015	TO	3	1151	701	0.5	1.777	-0.284	1.493
TO2015100	100	2015	TO	3	1151	701	1.5	0.860	0.278	1.137
TO2015100	100	2015	TO	3	1151	701	2.5	-0.041	0.281	0.240
TO2015100	100	2015	TO	3	1151	701	3.5	-0.161	0.454	0.293
TO2015100	100	2015	TO	3	1151	701	4.5	-1.021	0.130	-0.891
TO2015100	100	2015	TO	3	6000	702	0.5	1.003	-0.471	0.532
TO2015100	100	2015	TO	3	6000	702	1.5	0.802	0.086	0.888
TO2015100	100	2015	TO	3	6000	702	2.5	0.354	0.669	1.024
TO2015100	100	2015	TO	3	6000	702	3.5	0.185	0.484	0.669
TO2015100	100	2015	TO	3	6000	702	4.5	-0.741	0.096	-0.645
TO2015100	100	2015	TO	3	6274	703	0.5	1.061	-0.284	0.778
TO2015100	100	2015	TO	3	6274	703	1.5	1.167	0.043	1.210
TO2015100	100	2015	TO	3	6274	703	2.5	0.730	0.777	1.506
TO2015100	100	2015	TO	3	6274	703	3.5	0.012	0.373	0.385
TO2015100	100	2015	TO	3	6274	703	4.5	-0.812	0.187	-0.624
TO20150	0	2015	TO	3	1151	704	0.5	1.713	-0.727	0.985
TO20150	0	2015	TO	3	1151	704	1.5	1.009	0.657	1.666
TO20150	0	2015	TO	3	1151	704	2.5	0.263	0.725	0.988
TO20150	0	2015	TO	3	1151	704	3.5	0.240	0.396	0.636
TO20150	0	2015	TO	3	1151	704	4.5	-0.100	0.257	0.157

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TO20150	0	2015	TO	3	6000	705	0.5	1.607	-0.666	0.941
TO20150	0	2015	TO	3	6000	705	1.5	1.078	0.285	1.364
TO20150	0	2015	TO	3	6000	705	2.5	0.356	1.071	1.428
TO20150	0	2015	TO	3	6000	705	3.5	0.330	0.614	0.944
TO20150	0	2015	TO	3	6000	705	4.5	-0.058	0.275	0.216
TO20150	0	2015	TO	3	6274	706	0.5	1.488	-0.639	0.848
TO20150	0	2015	TO	3	6274	706	1.5	0.815	0.191	1.006
TO20150	0	2015	TO	3	6274	706	2.5	0.344	0.469	0.813
TO20150	0	2015	TO	3	6274	706	3.5	0.182	0.264	0.447
TO20150	0	2015	TO	3	6274	706	4.5	0.056	0.322	0.378
TO2015100	100	2015	TO	1	6274	801	0.5	0.636	0.168	0.804
TO2015100	100	2015	TO	1	6274	801	1.5	0.540	0.268	0.809
TO2015100	100	2015	TO	1	6274	801	2.5	-0.002	0.466	0.463
TO2015100	100	2015	TO	1	6274	801	3.5	0.155	0.367	0.522
TO2015100	100	2015	TO	1	6274	801	4.5	-0.401	0.126	-0.275
TO2015100	100	2015	TO	1	6000	802	0.5	1.247	-0.614	0.633
TO2015100	100	2015	TO	1	6000	802	1.5	0.848	-0.154	0.693
TO2015100	100	2015	TO	1	6000	802	2.5	0.330	0.564	0.894
TO2015100	100	2015	TO	1	6000	802	3.5	0.217	0.405	0.622
TO2015100	100	2015	TO	1	6000	802	4.5	-0.518	0.109	-0.409
TO2015100	100	2015	TO	1	1151	803	0.5	1.164	-0.635	0.529
TO2015100	100	2015	TO	1	1151	803	1.5	0.983	-0.306	0.678
TO2015100	100	2015	TO	1	1151	803	2.5	0.866	0.569	1.435
TO2015100	100	2015	TO	1	1151	803	3.5	0.256	0.422	0.679
TO2015100	100	2015	TO	1	1151	803	4.5	-0.372	0.278	-0.094
TO20150	0	2015	TO	1	6000	804	0.5	0.586	-0.067	0.519

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TO20150	0	2015	TO	1	6000	804	1.5	1.208	0.153	1.360
TO20150	0	2015	TO	1	6000	804	2.5	0.340	0.810	1.150
TO20150	0	2015	TO	1	6000	804	3.5	0.276	0.463	0.739
TO20150	0	2015	TO	1	6000	804	4.5	0.051	0.315	0.367
TO20150	0	2015	TO	1	6274	805	0.5	1.092	-0.112	0.980
TO20150	0	2015	TO	1	6274	805	1.5	0.963	0.158	1.121
TO20150	0	2015	TO	1	6274	805	2.5	0.343	0.394	0.737
TO20150	0	2015	TO	1	6274	805	3.5	0.284	0.302	0.585
TO20150	0	2015	TO	1	6274	805	4.5	-0.092	0.365	0.273
TO20150	0	2015	TO	1	1151	806	0.5	1.218	-0.665	0.553
TO20150	0	2015	TO	1	1151	806	1.5	1.003	0.111	1.114
TO20150	0	2015	TO	1	1151	806	2.5	0.526	0.833	1.359
TO20150	0	2015	TO	1	1151	806	3.5	0.294	0.435	0.729
TO20150	0	2015	TO	1	1151	806	4.5	-0.009	0.286	0.277
TO2015100	100	2015	TO	4	1151	901	0.5	1.320	-0.396	0.924
TO2015100	100	2015	TO	4	1151	901	1.5	0.722	0.110	0.832
TO2015100	100	2015	TO	4	1151	901	2.5	0.174	0.278	0.452
TO2015100	100	2015	TO	4	1151	901	3.5	0.121	0.398	0.519
TO2015100	100	2015	TO	4	1151	901	4.5	-0.345	0.113	-0.232
TO2015100	100	2015	TO	4	6000	902	0.5	1.168	-0.674	0.493
TO2015100	100	2015	TO	4	6000	902	1.5	0.763	-0.249	0.514
TO2015100	100	2015	TO	4	6000	902	2.5	0.218	0.425	0.643
TO2015100	100	2015	TO	4	6000	902	3.5	0.229	0.276	0.505
TO2015100	100	2015	TO	4	6000	902	4.5	-0.926	0.083	-0.842
TO2015100	100	2015	TO	4	6274	903	0.5	1.000	-0.516	0.484
TO2015100	100	2015	TO	4	6274	903	1.5	0.879	-0.504	0.374

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TO2015100	100	2015	TO	4	6274	903	2.5	0.741	0.628	1.370
TO2015100	100	2015	TO	4	6274	903	3.5	0.279	0.101	0.380
TO2015100	100	2015	TO	4	6274	903	4.5	-0.583	0.277	-0.306
TO20150	0	2015	TO	4	1151	904	0.5	0.873	-0.394	0.479
TO20150	0	2015	TO	4	1151	904	1.5	1.158	-0.100	1.058
TO20150	0	2015	TO	4	1151	904	2.5	0.348	0.566	0.914
TO20150	0	2015	TO	4	1151	904	3.5	0.319	0.502	0.821
TO20150	0	2015	TO	4	1151	904	4.5	-0.094	0.605	0.511
TO20150	0	2015	TO	4	6274	905	0.5	1.041	-0.344	0.697
TO20150	0	2015	TO	4	6274	905	1.5	-2.030	0.109	-1.921
TO20150	0	2015	TO	4	6274	905	2.5	0.487	0.737	1.224
TO20150	0	2015	TO	4	6274	905	3.5	0.277	0.420	0.697
TO20150	0	2015	TO	4	6274	905	4.5	-0.041	0.267	0.226
TO20150	0	2015	TO	4	6000	906	0.5	1.247	-0.356	0.891
TO20150	0	2015	TO	4	6000	906	1.5	1.216	0.081	1.297
TO20150	0	2015	TO	4	6000	906	2.5	0.476	0.557	1.033
TO20150	0	2015	TO	4	6000	906	3.5	0.239	0.607	0.846
TO20150	0	2015	TO	4	6000	906	4.5	-0.008	0.184	0.176
TO2015100	100	2015	TO	2	6274	1001	0.5	1.362	-0.678	0.685
TO2015100	100	2015	TO	2	6274	1001	1.5	0.860	-0.115	0.745
TO2015100	100	2015	TO	2	6274	1001	2.5	0.208	0.422	0.630
TO2015100	100	2015	TO	2	6274	1001	3.5	0.181	0.327	0.508
TO2015100	100	2015	TO	2	6274	1001	4.5	-0.895	0.166	-0.729
TO2015100	100	2015	TO	2	6000	1002	0.5	0.481	-0.047	0.434
TO2015100	100	2015	TO	2	6000	1002	1.5	0.834	-0.300	0.535
TO2015100	100	2015	TO	2	6000	1002	2.5	0.348	0.517	0.865

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TO2015100	100	2015	TO	2	6000	1002	3.5	0.222	0.322	0.544
TO2015100	100	2015	TO	2	6000	1002	4.5	-0.315	0.122	-0.193
TO2015100	100	2015	TO	2	1151	1003	0.5	0.906	-0.430	0.476
TO2015100	100	2015	TO	2	1151	1003	1.5	0.665	-0.203	0.462
TO2015100	100	2015	TO	2	1151	1003	2.5	0.831	0.607	1.439
TO2015100	100	2015	TO	2	1151	1003	3.5	0.050	0.089	0.138
TO2015100	100	2015	TO	2	1151	1003	4.5	-0.697	0.291	-0.405
TO20150	0	2015	TO	2	1151	1004	0.5	1.792	-0.655	1.137
TO20150	0	2015	TO	2	1151	1004	1.5	1.456	0.238	1.694
TO20150	0	2015	TO	2	1151	1004	2.5	0.340	0.377	0.717
TO20150	0	2015	TO	2	1151	1004	3.5	0.262	0.630	0.892
TO20150	0	2015	TO	2	1151	1004	4.5	-0.613	0.653	0.040
TO20150	0	2015	TO	2	6274	1005	0.5	1.386	-0.418	0.968
TO20150	0	2015	TO	2	6274	1005	1.5	1.233	-0.013	1.220
TO20150	0	2015	TO	2	6274	1005	2.5	0.602	0.674	1.276
TO20150	0	2015	TO	2	6274	1005	3.5	0.304	0.667	0.971
TO20150	0	2015	TO	2	6274	1005	4.5	-0.068	0.451	0.383
TO20150	0	2015	TO	2	6274	1006	0.5	1.129	-0.458	0.671
TO20150	0	2015	TO	2	6274	1006	1.5	1.034	0.124	1.158
TO20150	0	2015	TO	2	6274	1006	2.5	0.676	0.771	1.446
TO20150	0	2015	TO	2	6274	1006	3.5	0.140	0.583	0.724
TO20150	0	2015	TO	2	6274	1006	4.5	-0.193	0.305	0.112
SC2015100	100	2015	SC	5	1151	1101	0.5	0.569	0.187	0.756
SC2015100	100	2015	SC	5	1151	1101	1.5	0.304	0.075	0.379
SC2015100	100	2015	SC	5	1151	1101	2.5	0.062	0.142	0.204
SC2015100	100	2015	SC	5	1151	1101	3.5	0.054	0.154	0.208

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
SC2015100	100	2015	SC	5	1151	1101	4.5	0.001	0.092	0.093
SC2015100	100	2015	SC	5	6274	1102	0.5	0.496	0.127	0.623
SC2015100	100	2015	SC	5	6274	1102	1.5	-0.448	0.111	-0.337
SC2015100	100	2015	SC	5	6274	1102	2.5	0.061	0.184	0.245
SC2015100	100	2015	SC	5	6274	1102	3.5	-0.048	0.296	0.248
SC2015100	100	2015	SC	5	6274	1102	4.5	-0.060	0.135	0.075
SC2015100	100	2015	SC	5	6000	1103	0.5	0.644	0.403	1.047
SC2015100	100	2015	SC	5	6000	1103	1.5	0.398	0.073	0.471
SC2015100	100	2015	SC	5	6000	1103	2.5	-0.015	0.207	0.192
SC2015100	100	2015	SC	5	6000	1103	3.5	0.119	0.156	0.275
SC2015100	100	2015	SC	5	6000	1103	4.5	0.011	0.035	0.047
SC20150	0	2015	SC	5	1151	1104	0.5	1.053	0.780	1.832
SC20150	0	2015	SC	5	1151	1104	1.5	0.272	0.657	0.929
SC20150	0	2015	SC	5	1151	1104	2.5	0.159	0.529	0.687
SC20150	0	2015	SC	5	1151	1104	3.5	0.191	0.693	0.884
SC20150	0	2015	SC	5	1151	1104	4.5	-0.033	0.359	0.325
SC20150	0	2015	SC	5	6274	1105	0.5	1.123	0.651	1.774
SC20150	0	2015	SC	5	6274	1105	1.5	0.336	0.546	0.882
SC20150	0	2015	SC	5	6274	1105	2.5	0.212	0.467	0.678
SC20150	0	2015	SC	5	6274	1105	3.5	0.095	0.706	0.801
SC20150	0	2015	SC	5	6274	1105	4.5	-0.070	0.678	0.608
SC20150	0	2015	SC	5	6000	1106	0.5	1.067	0.600	1.666
SC20150	0	2015	SC	5	6000	1106	1.5	0.497	0.257	0.753
SC20150	0	2015	SC	5	6000	1106	2.5	0.300	0.344	0.644
SC20150	0	2015	SC	5	6000	1106	3.5	-0.023	0.614	0.591
SC20150	0	2015	SC	5	6000	1106	4.5	-0.052	0.371	0.320

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
SC2015100	100	2015	SC	4	1151	1201	0.5	0.603	0.161	0.764
SC2015100	100	2015	SC	4	1151	1201	1.5	0.217	0.070	0.287
SC2015100	100	2015	SC	4	1151	1201	2.5	0.073	0.220	0.293
SC2015100	100	2015	SC	4	1151	1201	3.5	-0.015	0.433	0.418
SC2015100	100	2015	SC	4	1151	1201	4.5	-0.079	0.072	-0.007
SC2015100	100	2015	SC	4	6000	1202	0.5	0.693	0.102	0.795
SC2015100	100	2015	SC	4	6000	1202	1.5	0.264	0.074	0.338
SC2015100	100	2015	SC	4	6000	1202	2.5	0.250	0.130	0.380
SC2015100	100	2015	SC	4	6000	1202	3.5	0.182	0.221	0.403
SC2015100	100	2015	SC	4	6000	1202	4.5	0.217	0.130	0.347
SC2015100	100	2015	SC	4	6274	1203	0.5	0.587	0.324	0.911
SC2015100	100	2015	SC	4	6274	1203	1.5	0.213	0.055	0.267
SC2015100	100	2015	SC	4	6274	1203	2.5	0.100	0.140	0.240
SC2015100	100	2015	SC	4	6274	1203	3.5	0.036	0.332	0.368
SC2015100	100	2015	SC	4	6274	1203	4.5	-0.026	0.045	0.018
SC20150	0	2015	SC	4	6000	1204	0.5	1.478	0.312	1.791
SC20150	0	2015	SC	4	6000	1204	1.5	0.447	0.277	0.724
SC20150	0	2015	SC	4	6000	1204	2.5	0.192	0.411	0.603
SC20150	0	2015	SC	4	6000	1204	3.5	0.063	0.776	0.839
SC20150	0	2015	SC	4	6000	1204	4.5	-0.048	0.264	0.215
SC20150	0	2015	SC	4	6274	1205	0.5	1.085	0.632	1.716
SC20150	0	2015	SC	4	6274	1205	1.5	0.168	0.626	0.794
SC20150	0	2015	SC	4	6274	1205	2.5	0.213	0.500	0.713
SC20150	0	2015	SC	4	6274	1205	3.5	0.115	0.658	0.773
SC20150	0	2015	SC	4	6274	1205	4.5	-0.107	0.148	0.041
SC20150	0	2015	SC	4	1151	1206	0.5	1.004	0.866	1.870

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
SC20150	0	2015	SC	4	1151	1206	1.5	0.344	0.483	0.827
SC20150	0	2015	SC	4	1151	1206	2.5	0.208	0.723	0.931
SC20150	0	2015	SC	4	1151	1206	3.5	-0.074	0.626	0.552
SC20150	0	2015	SC	4	1151	1206	4.5	-0.033	0.136	0.103
SC2015100	100	2015	SC	3	6000	1301	0.5	0.736	0.015	0.751
SC2015100	100	2015	SC	3	6000	1301	1.5	0.347	-0.083	0.264
SC2015100	100	2015	SC	3	6000	1301	2.5	-0.071	-0.009	-0.080
SC2015100	100	2015	SC	3	6000	1301	3.5	-0.136	0.245	0.108
SC2015100	100	2015	SC	3	6000	1301	4.5	-0.080	0.060	-0.020
SC2015100	100	2015	SC	3	1151	1302	0.5	0.806	0.482	1.288
SC2015100	100	2015	SC	3	1151	1302	1.5	0.396	0.150	0.545
SC2015100	100	2015	SC	3	1151	1302	2.5	0.084	0.118	0.203
SC2015100	100	2015	SC	3	1151	1302	3.5	-0.201	0.379	0.179
SC2015100	100	2015	SC	3	1151	1302	4.5	-0.175	0.103	-0.072
SC2015100	100	2015	SC	3	6274	1303	0.5	0.788	0.161	0.949
SC2015100	100	2015	SC	3	6274	1303	1.5	0.394	0.252	0.646
SC2015100	100	2015	SC	3	6274	1303	2.5	-0.083	0.267	0.185
SC2015100	100	2015	SC	3	6274	1303	3.5	-0.120	0.290	0.170
SC2015100	100	2015	SC	3	6274	1303	4.5	-0.062	0.010	-0.051
SC20150	0	2015	SC	3	6274	1304	0.5	1.540	0.394	1.934
SC20150	0	2015	SC	3	6274	1304	1.5	0.553	0.395	0.949
SC20150	0	2015	SC	3	6274	1304	2.5	0.215	0.514	0.729
SC20150	0	2015	SC	3	6274	1304	3.5	-0.190	0.399	0.209
SC20150	0	2015	SC	3	6274	1304	4.5	-0.035	0.063	0.028
SC20150	0	2015	SC	3	1151	1305	0.5	1.037	0.679	1.716
SC20150	0	2015	SC	3	1151	1305	1.5	0.396	0.446	0.842

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
SC20150	0	2015	SC	3	1151	1305	2.5	-0.224	0.534	0.311
SC20150	0	2015	SC	3	1151	1305	3.5	-0.132	0.519	0.387
SC20150	0	2015	SC	3	1151	1305	4.5	0.050	-0.012	0.038
SC20150	0	2015	SC	3	6000	1306	0.5	1.163	0.497	1.661
SC20150	0	2015	SC	3	6000	1306	1.5	0.263	0.468	0.731
SC20150	0	2015	SC	3	6000	1306	2.5	0.210	0.444	0.654
SC20150	0	2015	SC	3	6000	1306	3.5	-0.128	0.403	0.275
SC20150	0	2015	SC	3	6000	1306	4.5	-0.032	0.021	-0.011
SC2015100	100	2015	SC	1	6274	1401	0.5	0.634	0.133	0.767
SC2015100	100	2015	SC	1	6274	1401	1.5	0.258	0.075	0.333
SC2015100	100	2015	SC	1	6274	1401	2.5	0.002	0.149	0.151
SC2015100	100	2015	SC	1	6274	1401	3.5	-0.210	0.164	-0.046
SC2015100	100	2015	SC	1	6274	1401	4.5	-0.079	0.031	-0.048
SC2015100	100	2015	SC	1	6000	1402	0.5	0.691	0.246	0.937
SC2015100	100	2015	SC	1	6000	1402	1.5	0.309	-0.074	0.235
SC2015100	100	2015	SC	1	6000	1402	2.5	-0.028	0.026	-0.002
SC2015100	100	2015	SC	1	6000	1402	3.5	-0.225	0.219	-0.005
SC2015100	100	2015	SC	1	6000	1402	4.5	0.050	0.030	0.080
SC2015100	100	2015	SC	1	1151	1403	0.5	0.804	0.595	1.399
SC2015100	100	2015	SC	1	1151	1403	1.5	0.239	0.566	0.806
SC2015100	100	2015	SC	1	1151	1403	2.5	-0.285	0.439	0.154
SC2015100	100	2015	SC	1	1151	1403	3.5	-0.253	0.463	0.210
SC2015100	100	2015	SC	1	1151	1403	4.5	0.141	-0.040	0.100
SC20150	0	2015	SC	1	1151	1404	0.5	1.355	0.473	1.827
SC20150	0	2015	SC	1	1151	1404	1.5	0.410	0.218	0.628
SC20150	0	2015	SC	1	1151	1404	2.5	0.378	0.393	0.771

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
SC20150	0	2015	SC	1	1151	1404	3.5	0.075	0.636	0.711
SC20150	0	2015	SC	1	1151	1404	4.5	-0.032	0.059	0.027
SC20150	0	2015	SC	1	6000	1405	0.5	1.371	0.570	1.941
SC20150	0	2015	SC	1	6000	1405	1.5	0.464	0.181	0.645
SC20150	0	2015	SC	1	6000	1405	2.5	0.150	0.268	0.418
SC20150	0	2015	SC	1	6000	1405	3.5	-0.195	0.502	0.307
SC20150	0	2015	SC	1	6000	1405	4.5	-0.083	0.190	0.107
SC20150	0	2015	SC	1	6274	1406	0.5	0.903	1.050	1.953
SC20150	0	2015	SC	1	6274	1406	1.5	0.227	0.468	0.695
SC20150	0	2015	SC	1	6274	1406	2.5	-0.092	0.421	0.328
SC20150	0	2015	SC	1	6274	1406	3.5	-0.273	0.455	0.182
SC20150	0	2015	SC	1	6274	1406	4.5	0.011	0.046	0.057
SC2015100	100	2015	SC	2	1151	1501	0.5	0.733	0.158	0.891
SC2015100	100	2015	SC	2	1151	1501	1.5	0.271	-0.131	0.141
SC2015100	100	2015	SC	2	1151	1501	2.5	-0.163	0.035	-0.128
SC2015100	100	2015	SC	2	1151	1501	3.5	-0.103	0.255	0.152
SC2015100	100	2015	SC	2	1151	1501	4.5	-0.038	0.042	0.004
SC2015100	100	2015	SC	2	6000	1502	0.5	0.763	0.084	0.848
SC2015100	100	2015	SC	2	6000	1502	1.5	0.377	-0.070	0.308
SC2015100	100	2015	SC	2	6000	1502	2.5	-0.086	-0.006	-0.092
SC2015100	100	2015	SC	2	6000	1502	3.5	-0.322	0.319	-0.003
SC2015100	100	2015	SC	2	6000	1502	4.5	0.080	0.029	0.109
SC2015100	100	2015	SC	2	6274	1503	0.5	0.822	0.147	0.969
SC2015100	100	2015	SC	2	6274	1503	1.5	0.571	0.085	0.656
SC2015100	100	2015	SC	2	6274	1503	2.5	0.419	0.133	0.552
SC2015100	100	2015	SC	2	6274	1503	3.5	0.063	0.300	0.362

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
SC2015100	100	2015	SC	2	6274	1503	4.5	-0.105	-0.024	-0.129
SC20150	0	2015	SC	2	6000	1504	0.5	0.978	0.954	1.932
SC20150	0	2015	SC	2	6000	1504	1.5	0.419	0.349	0.768
SC20150	0	2015	SC	2	6000	1504	2.5	0.254	0.234	0.488
SC20150	0	2015	SC	2	6000	1504	3.5	-0.311	0.765	0.454
SC20150	0	2015	SC	2	6000	1504	4.5	-0.106	0.163	0.057
SC20150	0	2015	SC	2	6274	1505	0.5	1.070	0.784	1.853
SC20150	0	2015	SC	2	6274	1505	1.5	0.420	0.410	0.830
SC20150	0	2015	SC	2	6274	1505	2.5	-0.186	0.492	0.306
SC20150	0	2015	SC	2	6274	1505	3.5	-0.336	0.644	0.309
SC20150	0	2015	SC	2	6274	1505	4.5	-0.042	0.240	0.198
SC20150	0	2015	SC	2	1151	1506	0.5	2.056	0.373	2.429
SC20150	0	2015	SC	2	1151	1506	1.5	-0.462	0.280	-0.183
SC20150	0	2015	SC	2	1151	1506	2.5	-0.428	0.351	-0.077
SC20150	0	2015	SC	2	1151	1506	3.5	-0.069	0.346	0.277
SC20150	0	2015	SC	2	1151	1506	4.5	-0.030	0.052	0.022
TR20150	0	2015	TR	2	6274	1601	0.5	1.084	0.124	1.208
TR20150	0	2015	TR	2	6274	1601	1.5	0.889	0.145	1.035
TR20150	0	2015	TR	2	6274	1601	2.5	1.031	0.214	1.245
TR20150	0	2015	TR	2	6274	1601	3.5	1.014	0.155	1.169
TR20150	0	2015	TR	2	6274	1601	4.5	0.846	0.089	0.936
TR20150	0	2015	TR	2	6274	1601	5.5	-0.038	0.163	0.125
TR20150	0	2015	TR	2	1151	1602	0.5	1.022	0.306	1.328
TR20150	0	2015	TR	2	1151	1602	1.5	0.723	0.260	0.983
TR20150	0	2015	TR	2	1151	1602	2.5	0.914	0.333	1.247
TR20150	0	2015	TR	2	1151	1602	3.5	0.846	0.300	1.146

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TR20150	0	2015	TR	2	1151	1602	4.5	0.586	0.374	0.960
TR20150	0	2015	TR	2	1151	1602	5.5	-0.430	0.512	0.082
TR20150	0	2015	TR	2	6000	1603	0.5	1.053	0.265	1.319
TR20150	0	2015	TR	2	6000	1603	1.5	0.766	0.151	0.917
TR20150	0	2015	TR	2	6000	1603	2.5	0.814	0.273	1.087
TR20150	0	2015	TR	2	6000	1603	3.5	0.806	0.311	1.118
TR20150	0	2015	TR	2	6000	1603	4.5	0.493	0.444	0.938
TR20150	0	2015	TR	2	6000	1603	5.5	-0.368	0.459	0.091
TR20150	0	2015	TR	3	6000	1701	0.5	0.996	0.405	1.401
TR20150	0	2015	TR	3	6000	1701	1.5	0.813	0.253	1.066
TR20150	0	2015	TR	3	6000	1701	2.5	1.090	0.179	1.269
TR20150	0	2015	TR	3	6000	1701	3.5	1.032	0.145	1.178
TR20150	0	2015	TR	3	6000	1701	4.5	0.728	0.178	0.906
TR20150	0	2015	TR	3	6000	1701	5.5	-0.300	0.431	0.131
TR20150	0	2015	TR	3	1151	1702	0.5	0.736	0.327	1.063
TR20150	0	2015	TR	3	1151	1702	1.5	0.616	0.314	0.930
TR20150	0	2015	TR	3	1151	1702	2.5	0.739	0.439	1.178
TR20150	0	2015	TR	3	1151	1702	3.5	0.626	0.587	1.213
TR20150	0	2015	TR	3	1151	1702	4.5	0.578	0.627	1.205
TR20150	0	2015	TR	3	1151	1702	5.5	0.318	0.842	1.161
TR20150	0	2015	TR	3	6274	1703	0.5	1.023	0.312	1.335
TR20150	0	2015	TR	3	6274	1703	1.5	0.730	0.238	0.968
TR20150	0	2015	TR	3	6274	1703	2.5	0.979	0.326	1.305
TR20150	0	2015	TR	3	6274	1703	3.5	1.091	0.233	1.324
TR20150	0	2015	TR	3	6274	1703	4.5	0.917	0.277	1.194
TR20150	0	2015	TR	3	6274	1703	5.5	0.507	0.532	1.039

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TR20150	0	2015	TR	1	1151	1801	0.5	0.794	0.360	1.154
TR20150	0	2015	TR	1	1151	1801	1.5	0.584	0.367	0.952
TR20150	0	2015	TR	1	1151	1801	2.5	0.922	0.337	1.259
TR20150	0	2015	TR	1	1151	1801	3.5	0.674	0.430	1.104
TR20150	0	2015	TR	1	1151	1801	4.5	0.370	0.585	0.955
TR20150	0	2015	TR	1	1151	1801	5.5	0.020	0.762	0.782
TR20150	0	2015	TR	1	6274	1802	0.5	0.846	0.288	1.134
TR20150	0	2015	TR	1	6274	1802	1.5	0.654	0.365	1.018
TR20150	0	2015	TR	1	6274	1802	2.5	0.952	0.386	1.338
TR20150	0	2015	TR	1	6274	1802	3.5	0.604	0.482	1.086
TR20150	0	2015	TR	1	6274	1802	4.5	0.106	0.714	0.821
TR20150	0	2015	TR	1	6274	1802	5.5	-0.738	0.836	0.098
TR20150	0	2015	TR	1	6000	1803	0.5	0.502	0.541	1.042
TR20150	0	2015	TR	1	6000	1803	1.5	0.220	0.527	0.747
TR20150	0	2015	TR	1	6000	1803	2.5	0.499	0.688	1.187
TR20150	0	2015	TR	1	6000	1803	3.5	0.172	0.640	0.812
TR20150	0	2015	TR	1	6000	1803	4.5	-0.086	0.631	0.545
TR20150	0	2015	TR	1	6000	1803	5.5	-0.781	0.421	-0.360
TR20150	0	2015	TR	4	6000	1901	0.5	0.566	0.422	0.988
TR20150	0	2015	TR	4	6000	1901	1.5	0.154	0.592	0.746
TR20150	0	2015	TR	4	6000	1901	2.5	0.451	0.548	1.000
TR20150	0	2015	TR	4	6000	1901	3.5	0.322	0.639	0.961
TR20150	0	2015	TR	4	6000	1901	4.5	0.114	0.614	0.728
TR20150	0	2015	TR	4	6000	1901	5.5	-0.144	0.610	0.466
TR20150	0	2015	TR	4	1151	1902	0.5	0.830	0.453	1.283
TR20150	0	2015	TR	4	1151	1902	1.5	0.586	0.427	1.013

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
TR20150	0	2015	TR	4	1151	1902	2.5	0.881	0.428	1.310
TR20150	0	2015	TR	4	1151	1902	3.5	0.846	0.445	1.291
TR20150	0	2015	TR	4	1151	1902	4.5	0.365	0.730	1.094
TR20150	0	2015	TR	4	1151	1902	5.5	-0.060	0.713	0.653
TR20150	0	2015	TR	4	6274	1903	0.5	0.924	0.255	1.178
TR20150	0	2015	TR	4	6274	1903	1.5	0.729	0.311	1.040
TR20150	0	2015	TR	4	6274	1903	2.5	0.984	0.324	1.308
TR20150	0	2015	TR	4	6274	1903	3.5	0.917	0.341	1.257
TR20150	0	2015	TR	4	6274	1903	4.5	0.450	0.577	1.027
TR20150	0	2015	TR	4	6274	1903	5.5	0.007	0.731	0.738
GC20150	0	2015	GC	1	6274	2001	1	0.888	0.312	1.200
GC20150	0	2015	GC	1	6274	2001	2	0.780	0.384	1.164
GC20150	0	2015	GC	1	6274	2001	3	0.732	0.312	1.044
GC20150	0	2015	GC	1	6274	2001	4	0.468	0.300	0.768
GC20150	0	2015	GC	1	6274	2001	5	-0.204	0.648	0.444
GC20150	0	2015	GC	1	6274	2001	6	-0.552	0.564	0.012
GC20150	0	2015	GC	1	1151	2002	1	0.828	0.348	1.176
GC20150	0	2015	GC	1	1151	2002	2	0.972	0.144	1.116
GC20150	0	2015	GC	1	1151	2002	3	1.056	0.144	1.200
GC20150	0	2015	GC	1	1151	2002	4	0.600	0.216	0.816
GC20150	0	2015	GC	1	1151	2002	5	-0.072	0.588	0.516
GC20150	0	2015	GC	1	1151	2002	6	-0.408	0.456	0.048
GC20150	0	2015	GC	1	6000	2003	1	-0.456	1.692	1.236
GC20150	0	2015	GC	1	6000	2003	2	0.420	0.540	0.960
GC20150	0	2015	GC	1	6000	2003	3	0.876	0.444	1.320
GC20150	0	2015	GC	1	6000	2003	4	0.624	0.648	1.272

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
GC20150	0	2015	GC	1	6000	2003	5	0.000	0.888	0.888
GC20150	0	2015	GC	1	6000	2003	6	-0.228	0.972	0.744
GC20150	0	2015	GC	2	6274	2101	1	-0.312	1.752	1.440
GC20150	0	2015	GC	2	6274	2101	2	0.132	0.936	1.068
GC20150	0	2015	GC	2	6274	2101	3	0.420	0.852	1.272
GC20150	0	2015	GC	2	6274	2101	4	0.084	0.924	1.008
GC20150	0	2015	GC	2	6274	2101	5	-0.204	1.092	0.888
GC20150	0	2015	GC	2	6274	2101	6	-0.540	1.320	0.780
GC20150	0	2015	GC	2	6000	2102	1	0.528	0.588	1.116
GC20150	0	2015	GC	2	6000	2102	2	0.900	0.084	0.984
GC20150	0	2015	GC	2	6000	2102	3	0.696	0.120	0.816
GC20150	0	2015	GC	2	6000	2102	4	0.012	0.336	0.348
GC20150	0	2015	GC	2	6000	2102	5	-0.444	0.504	0.060
GC20150	0	2015	GC	2	6000	2102	6	-0.612	0.636	0.024
GC20150	0	2015	GC	2	1151	2103	1	-0.276	1.644	1.368
GC20150	0	2015	GC	2	1151	2103	2	0.588	0.480	1.068
GC20150	0	2015	GC	2	1151	2103	3	0.744	0.528	1.272
GC20150	0	2015	GC	2	1151	2103	4	0.516	0.720	1.236
GC20150	0	2015	GC	2	1151	2103	5	0.204	1.284	1.488
GC20150	0	2015	GC	2	1151	2103	6	-0.084	0.516	0.432
GC20150	0	2015	GC	3	6274	2201	1	-0.504	.	.
GC20150	0	2015	GC	3	6274	2201	2	0.132	.	.
GC20150	0	2015	GC	3	6274	2201	3	0.048	.	.
GC20150	0	2015	GC	3	6274	2201	4	0.048	.	.
GC20150	0	2015	GC	3	6274	2201	5	-0.072	.	.
GC20150	0	2015	GC	3	6274	2201	6	-0.240	.	.

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft	in ft^{-1}	in ft^{-1}	in ft^{-1}
GC20150	0	2015	GC	3	6000	2202	1	0.744	0.960	1.704
GC20150	0	2015	GC	3	6000	2202	2	0.924	0.264	1.188
GC20150	0	2015	GC	3	6000	2202	3	0.936	0.300	1.236
GC20150	0	2015	GC	3	6000	2202	4	0.696	0.444	1.140
GC20150	0	2015	GC	3	6000	2202	5	0.000	0.924	0.924
GC20150	0	2015	GC	3	6000	2202	6	-0.420	1.044	0.624
GC20150	0	2015	GC	3	1151	2203	1	0.408	0.840	1.248
GC20150	0	2015	GC	3	1151	2203	2	0.828	0.336	1.164
GC20150	0	2015	GC	3	1151	2203	3	0.984	0.228	1.212
GC20150	0	2015	GC	3	1151	2203	4	0.600	0.732	1.332
GC20150	0	2015	GC	3	1151	2203	5	0.168	0.900	1.068
GC20150	0	2015	GC	3	1151	2203	6	-0.108	1.056	0.948
GC20150	0	2015	GC	4	1151	2301	1	0.696	0.636	1.332
GC20150	0	2015	GC	4	1151	2301	2	1.056	0.096	1.152
GC20150	0	2015	GC	4	1151	2301	3	1.128	0.084	1.212
GC20150	0	2015	GC	4	1151	2301	4	1.116	0.324	1.440
GC20150	0	2015	GC	4	1151	2301	5	0.360	0.900	1.260
GC20150	0	2015	GC	4	1151	2301	6	-0.168	1.284	1.116
GC20150	0	2015	GC	4	6274	2302	1	-0.588	1.800	1.212
GC20150	0	2015	GC	4	6274	2302	2	0.168	0.780	0.948
GC20150	0	2015	GC	4	6274	2302	3	0.540	0.672	1.212
GC20150	0	2015	GC	4	6274	2302	4	0.396	0.756	1.152
GC20150	0	2015	GC	4	6274	2302	5	-0.012	0.948	0.936
GC20150	0	2015	GC	4	6274	2302	6	-0.348	1.008	0.660
GC20150	0	2015	GC	4	6000	2303	1	0.708	0.264	0.972
GC20150	0	2015	GC	4	6000	2303	2	0.948	0.048	0.996

2015 Raw water status change data (continued)										
ENV	**IRR**	**YEAR**	**LOC**	**BLOC**	**HYB**	**PLOT**	**DEPTH**	**VE-VT**	**VT-BL**	**VE-BL**
							ft.	in ft^{-1}	in ft^{-1}	in ft^{-1}
GC20150	0	2015	GC	4	6000	2303	3	1.236	0.036	1.272
GC20150	0	2015	GC	4	6000	2303	4	1.068	0.456	1.524
GC20150	0	2015	GC	4	6000	2303	5	0.852	0.396	1.248
GC20150	0	2015	GC	4	6000	2303	6	-0.168	1.032	0.864

Appendix B – SAS Code

By location ANOVA SAS 9.4 code

```
DATA RCB; SET RCB;
  IF ENV = "HU2014100" THEN DELETE;
RUN;
PROC SORT; BY ENV;
RUN;
PROC PRINT DATA=RCB;
RUN;
PROC GLIMMIX DATA=RCB; TITLE2 'GL MIXED MODEL RCB ANALYSIS WITHOUT
SPATIAL COVARIATE';
 CLASS BLOC ENV YEAR LOC IRR HYB; *BY ENV;
 MODEL YIELD = YEAR IRR HYB YEAR*IRR YEAR*HYB IRR*HYB YEAR*IRR*HYB
              /DDFM=SATTERTH;
 RANDOM BLOC;
 *LSMEANS HYB*LOC/LINES ALPHA=0.10;
 *LSMEANS HYB*IRR/LINES ALPHA=0.10;
 *LSMEANS HYB/LINES ALPHA=0.10;
RUN;
/*
%macro mixanova/parmbuff;

  %PUT ***Syspbuff contains: &syspbuff***;
   %let num=1;
   %let respvar=%SC(&syspbuff,&num);
   %do %while(&respvar ne);

PROC GLIMMIX DATA=RCB; TITLE2 'GL MIXED MODEL RCB ANALYSIS WITH
SPATIAL COVARIATE';
 CLASS BLOC ENV HYB; BY ENV;
 MODEL &respvar = HYB/DDFM=SATTERTH;
 RANDOM BLOC;
 random _residual_ / type=sp(sph)(RANGE ROW);
 LSMEANS HYB/LINES ALPHA=0.10;
 LSMEANS HYB/PDIFF ALPHA=0.10;
%let num=%eval(&num+1);
      %let respvar=%SC(&syspbuff,&num);
   %end;
%mend mixanova;
**Enter response variable list as follows:
   %mixanova(VAR1, VAR2, ...) in next line;

%mixanova(POP MOIST TSTWT YIELD SOILUSE TOTUSE WUE); *;
RUN;
*/
QUIT;
```

Mean Separations Code SAS 9.4

```
DATA RCB; SET RCB;
  *ENV = LOC & YEAR & IRR ;
RUN;

PROC SORT; BY ENV;
RUN;

PROC PRINT DATA=RCB;
RUN;

PROC GLIMMIX DATA=RCB; TITLE2 'GL MIXED MODEL RCB ANALYSIS WITHOUT
SPATIAL COVARIATE';
 CLASS BLOC YEAR ENV LOC IRR HYB; BY ENV;
 MODEL HI = LOC IRR YEAR HYB
              /DDFM=SATTERTH;
 RANDOM BLOC;

 LSMEANS HYB/LINES ALPHA=0.10;
 LSMEANS HYB/PDIFF ALPHA=0.10;
RUN;
/*
%macro mixanova/parmbuff;

  %PUT ***Syspbuff contains: &syspbuff***;
   %let num=1;
   %let respvar=%SC(&syspbuff,&num);
   %do %while(&respvar ne);

PROC GLIMMIX DATA=RCB; TITLE2 'GL MIXED MODEL RCB ANALYSIS WITH
SPATIAL COVARIATE';
 CLASS BLOC ENV HYB; BY ENV;
 MODEL &respvar = HYB/DDFM=SATTERTH;
 RANDOM BLOC;
 random _residual_ / type=sp(sph)(RANGE ROW);
 LSMEANS HYB/LINES ALPHA=0.10;
 LSMEANS HYB/PDIFF ALPHA=0.10;

%let num=%eval(&num+1);
      %let respvar=%SC(&syspbuff,&num);
   %end;
%mend mixanova;

**Enter response variable list as follows:
   %mixanova(VAR1, VAR2, ...) in next line;

%mixanova(POP MOIST TSTWT YIELD SOILUSE TOTUSE WUE); *;
RUN;
*/
QUIT;
```

SAS 9.4 Interactions Code

```
DATA RCB; SET RCB;
  *ENV = LOC & YEAR & IRR ;
RUN;

PROC SORT; BY ENV;
RUN;

PROC PRINT DATA=RCB;
RUN;

PROC GLIMMIX DATA=RCB; TITLE2 'GL MIXED MODEL RCB ANALYSIS WITHOUT
SPATIAL COVARIATE';
 CLASS BLOC YEAR ENV LOC IRR HYB; *BY ENV;
 MODEL YIELD = LOC IRR YEAR HYB LOC*IRR LOC*YEAR LOC*HYB IRR*YEAR
IRR*HYB YEAR*HYB LOC*IRR*YEAR LOC*IRR*HYB LOC*IRR*YEAR*HYB
               /DDFM=SATTERTH;
 RANDOM BLOC;
 *LSMEANS HYB/LINES ALPHA=0.10;
 *LSMEANS HYB/PDIFF ALPHA=0.10;

RUN;
/*
%macro mixanova/parmbuff;

  %PUT ***Syspbuff contains: &syspbuff***;
   %let num=1;
   %let respvar=%SC(&syspbuff,&num);
   %do %while(&respvar ne);

PROC GLIMMIX DATA=RCB; TITLE2 'GL MIXED MODEL RCB ANALYSIS WITH
SPATIAL COVARIATE';
 CLASS BLOC ENV HYB; BY ENV;
 MODEL &respvar = HYB/DDFM=SATTERTH;
 RANDOM BLOC;
 random _residual_ / type=sp(sph)(RANGE ROW);
 LSMEANS HYB/LINES ALPHA=0.10;
 LSMEANS HYB/PDIFF ALPHA=0.10;

%let num=%eval(&num+1);
      %let respvar=%SC(&syspbuff,&num);
   %end;
%mend mixanova;

**Enter response variable list as follows:
   %mixanova(VAR1, VAR2, ...) in next line;

%mixanova(POP MOIST TSTWT YIELD SOILUSE TOTUSE WUE); *;
RUN;
*/
QUIT;
```

Regression Code SAS 9.4

```
DM 'LOG;CLEAR; OUTPUT; CLEAR;';
OPTIONS PS = 5000 LS=78 NODATE;

TITLE 'DT Corn Regressions';

DATA DTYA;
  INPUT EnvAv C6274 P1151AM C6000DG;
  DATALINES;

;

PROC PRINT DATA=DTYA;
RUN;

title 'Yield Plasticity';
proc REG data=DTYA plots=predictions(X=EnvAv) ALPHA=0.1;
  model C6274 P1151AM C6000DG = EnvAv/ R CLM CLI;
  ODS GRAPHICS ON;
RUN;
QUIT;
```

Quadratic Regression Model Code SAS 9.4

```
DATA DTYA; set DTYA;
  PMAXSQ = PMAX*PMAX;
RUN;

PROC SORT;
  BY HYBRID;
RUN;

PROC PRINT DATA=DTYA;
RUN;

title 'Linear Model';
proc REG data=DTYA plots=predictions(X=PMAX) ALPHA=0.1; BY HYBRID;
  model YIELD = PMAX/ R CLM CLI;
  ODS GRAPHICS ON;
RUN;

TITLE 'QUADRATIC MODEL';
proc REG data=DTYA plots=predictions(X=PMAX) ALPHA=0.1; BY HYBRID;
  model YIELD = PMAX PMAXSQ/ R CLM CLI;
RUN;
QUIT;

OPTIONS PS = 5000 LS=120 NODATE;

TITLE 'Corn Irrigation x DT Hybrids x Seeding Rate Split Plot ANOVA';

PROC IMPORT
```

Correlation Code SAS 9.4

```
 DATAFILE="C:\Users\kraig\Documents\Grad Students\Trent
Newell\Thesis\CORR Data File.xlsx"
  OUT=COR REPLACE DBMS=EXCEL;
  SHEET='DATA';
  GETNAMES=YES;
RUN;

PROC SORT DATA=COR;
BY HYB ENV;
RUN;

PROC PRINT;
DATA CORR;
RUN;

PROC CORR DATA=COR;
   VAR YIELD;
   WITH BIOM HI SVT SMREP SBL CTVT CTMREP CTBL ETVT ETMREP;
RUN;

PROC CORR DATA=COR PLOTS=MATRIX(HISTOGRAM);
   VAR YIELD BIOM HI SVT SMREP;
RUN;

PROC CORR DATA=COR PLOTS=MATRIX(HISTOGRAM);
   VAR YIELD SBL CTVT CTMREP CTBL;
RUN;

PROC CORR DATA=COR PLOTS=MATRIX(HISTOGRAM);
   VAR YIELD ETVT ETMREP;
RUN;

PROC CORR DATA=COR PLOTS=MATRIX(HISTOGRAM);
   VAR YIELD BIOM HI SMREP CTMREP ETMREP;
   BY HYB;
RUN;

QUIT;
```