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The Effects of Vegetation and Soil Hydraulic Properties on Passive Microwave Sensing of Soil Moisture: Data Report for the 1982 Field Experiments

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ABSTRACT

During June – September, 1982 personnel from NASA/GSFC and USDA/BARC conducted field experiments to (1) study the biomass and geometrical structure properties of vegetation canopies to determine their impact on microwave emission data, and (2) to verify whether time series microwave data can be related to soil hydrologic properties for use in soil type classification. Truck-mounted radiometers at 1.4 GHz and 5 GHz were used to obtain microwave brightness temperatures of bare and vegetated test plots under different conditions of soil wetness, plant water content and canopy structure. Observations of soil moisture, soil temperature, vegetation biomass and other soil and canopy parameters were made concurrently with the microwave measurements. This report documents the experimental design and data collection procedures for both experiments, and presents the reduced data in tabular form.

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THE EFFECTS OF VEGETATION AND SOIL HYDRAULIC PROPERTIES ON PASSIVE MICROWAVE SENSING OF SOIL MOISTURE: DATA REPORT FOR THE 1982 FIELD EXPERIMENTS

1. INTRODUCTION

During June – September, 1982 personnel from NASA/Goddard Space Flight Center (GSFC) and USDA/Beltsville Agricultural Research Center (BARC) conducted two field experiments using truck-mounted microwave radiometers to examine the sensitivity of microwave emission data for soil moisture determination in the presence of vegetation and for soil classification purposes. The experiments took place at three local agricultural test sites managed by BARC which contained a variety of crop covers and soil types. This report documents the experimental design and data collection procedures for both experiments, and presents the reduced data in tabular form.

Previous research has indicated that while passive microwave radiometers can measure soil moisture remotely (Schmugge et al., 1980), the presence of a vegetation cover reduces microwave sensitivity to variations in the underlying soil moisture (Jackson et al., 1982; Theis et al., 1982; Wang et al., 1982a; Ulaby et al., 1982). This reduction in sensitivity may be due to both biomass and geometrical structure properties of the vegetation canopy which, individually or in combination, may impact the microwave response. In order for remotely sensed data to be used effectively in developing algorithms for extracting soil moisture information from observations of a vegetation-soil complex, the effects of vegetation on these data must be well understood. Since designing experiments to isolate the individual effects of vegetation biomass and structure is difficult under typical crop or plant conditions because both factors vary simultaneously, the 1982 field experiment utilized artificial arrangements of plant components to obtain information about these parameters.

The second part of the experiment was designed to examine the relationship between time

series microwave emission data and the hydraulic properties of soils. Differences in microwave emission from different soils are particularly evident for wet soils. When the soils are wet, both the microwave response and the water holding capacity of the soils are influenced by the particle size distribution. Thus, there may be a relationship between microwave emissivity and some hydraulic characteristic of the soil such as ponded infiltration rate which would permit soils to be classified according to their hydrologic properties by remote sensing techniques. Field measurements over bare and vegetated plots were obtained to validate model simulations which tended to confirm this possibility (Blanchard and O'Neill, 1983).

In addition to descriptions of the equipment and the test sites used, data presented in this report include:

- Appendix A – field notes;
- Appendix B – weather data;
- Appendix C – soil moisture and bulk density measurements for the vegetation experiments;
- Appendix D – soil temperature measurements for the vegetation experiments;
- Appendix E – microwave data for the vegetation experiments;
- Appendix F – vegetation measurements;
- Appendix G – soil temperature measurements for the time series experiments;
- Appendix H – soil moisture and microwave data for the time series experiments.

2. MICROWAVE SENSOR SYSTEMS

Microwave data were acquired with C (5 GHz, 6 cm) and L (1.4 GHz, 21 cm) band radiometers mounted on a boom truck. Both sensors are dual-polarized Dicke radiometers which measure thermal microwave emission in both vertical and horizontal polarizations almost simultaneously. The radiometers have a comparable 3-dB beamwidth of ~ 13° and a calibration accuracy of ± 3 K. These sensors have been used in previous moisture experiments at BARC test sites and are fully documented elsewhere (Wang et al., 1980 and 1982b).

Calibration of the microwave system was verified daily by measuring two targets of known brightness temperature (T_B): the cold sky and a microwave absorbing material (Eccosorb) whose brightness temperature is nearly equivalent to its physical temperature (absorption coefficient of 0.99 at 1.4 GHz). At the beginning and end of the measurement season, the system was also calibrated over a pond of fresh water at a known temperature. Applying a linear regression to the entire set of calibration data gives the dependence of the target brightness temperature on normalized antenna voltage N for each of the radiometers as:

at 1.4 GHz frequency,

$$T_{BV} = 334.16 - 349.46\ N_V$$

$$T_{BH} = 330.30 - 319.40\ N_H$$

at 5 GHz frequency,

$$T_{BV} = 320.08 - 246.09\ N_V$$

$$T_{BH} = 331.69 - 272.56\ N_H$$

(The subscripts V and H stand for vertical and horizontal polarization, respectively.)
These equations were used for the derivation of calibrated brightness temperatures in all of the field measurement data sets.

3. EXPERIMENTAL DESIGN

The 1982 field experiments took place at three agricultural sites within the USDA research farm in Beltsville, MD. Figure 1 shows the test plot configuration for the Edmonston site, denoted by the letter "E" in plot identifications. Similarly, Figure 2 illustrates the layout of test plots at the South Farm site (designated "S"). The Gish site consisted of a bare plot and a corn field used only in one of the time series experiments and is not pictured here. Taken together, these sites contained a range of soil types and a variety of crop covers; specific information about each plot is given in Table 1.

The experimental design for the 1982 measurements directly reflects the objectives of the

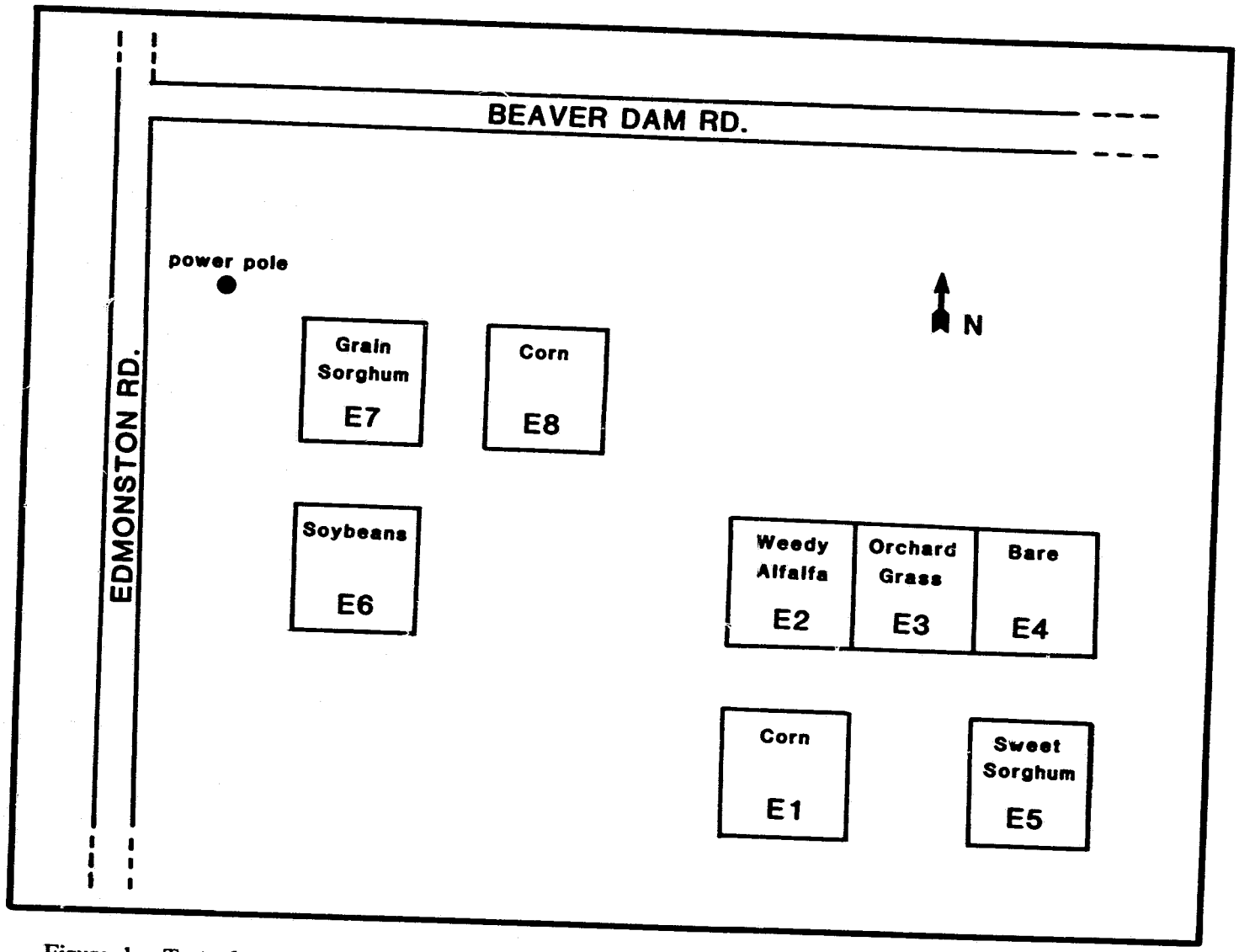

Figure 1. Test plot configuration for the Edmonston and Beaver Dam site (not to scale).

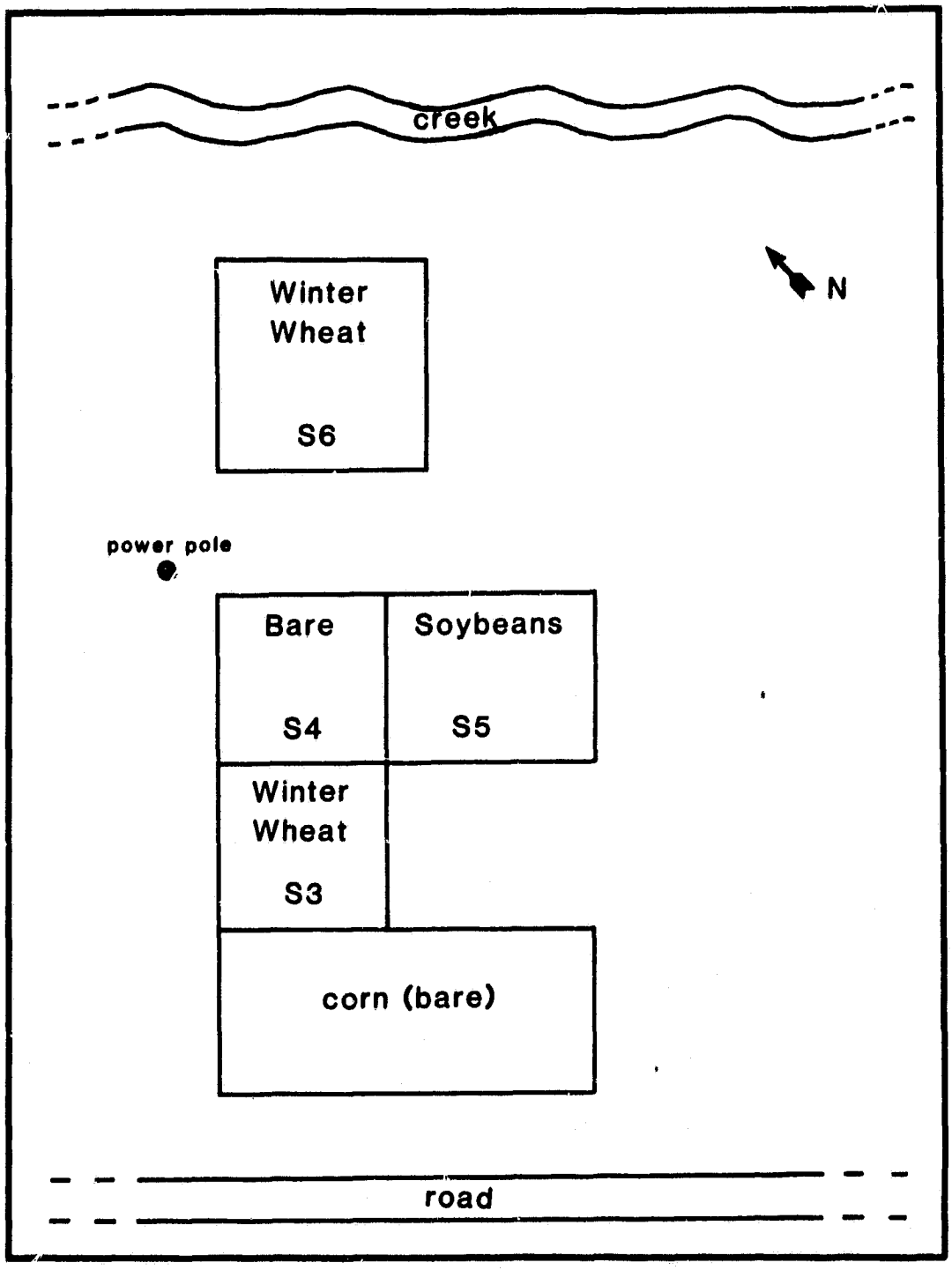

Figure 2. Test plot configuration for the South Farm site (not to scale).

Table 1. Test Site Description

Plot	Location	Surface Cover	Soil Texture *			USDA Classification
			% Sand	% Silt	% Clay	
E1	Edmonston	Corn	69	22	10	Sandy loam
E2	"	Weedy Alfalfa	53	34	13	Sandy loam
E3	"	Orchard Grass	70	18	12	Sandy loam
E4	"	Bare	68	21	11	Sandy loam
E5	"	Sweet Sorghum	60	28	12	Sandy loam
E6	"	Soybeans				Sandy loam
E7	"	Grain Sorghum				Sandy loam
E8	"	Corn				Sandy loam
S3	South Farm	Winter Wheat	31	45	24	Loam
S4	"	Bare	34	42	24	Loam
S5	"	Soybeans	27	47	26	Loam
S6	"	Winter Wheat	28	46	26	Loam
—	Gish	Bare	24	47	29	Loam/clay loam
—	"	Corn	24	47	29	"

*Based on four samples per plot from the 0-5 cm depth; hydrometer analysis was used to determine the textural percentages.

two different studies being conducted. A summary of the measurement approach is found in Table 2. In the vegetation experiment, "crop destruction" measurements were obtained in order to:

1) examine the effects of vegetation structure and orientation on the microwave response by disturbing the natural order of the vegetation canopy while maintaining the same amount of biomass in the radiometer field of view, and
2) examine the effects of plant water content by retaining a given stage of structure/orientation while varying the amount of biomass in the radiometer field of view.

To achieve these goals, test plots consisting of winter wheat, grass, corn, soybeans, grain sorghum and sweet sorghum were systematically modified to isolate either biomass or structure properties. These "modifications" included cutting crop canopies into vertical layers, stripping plants of leaves and grain heads, and orienting cut stalks on the surface in different azimuthal directions relative to the radiometer line of sight. In most of the crop destruction series, water was applied to the fields prior to measurement, both to reduce the chance that differences in the observed microwave response were caused by differences in the underlying soil moisture, and to better enable the effects of vegetation to be observed against a cold background. Metal screens at various heights within the crop canopy were also used in some measurements as a very cold microwave target, effectively blocking the soil emission from below and providing more direct information about emission and attenuation of microwave energy by the vegetation itself.

Unlike the vegetation experiments which usually involved independent series of measurements on different days, the experiment on hydraulic properties examined the changes in microwave emission over time as a soil dried down after saturation. The experiment was conducted over both bare and vegetated plots at three sites comprised of different soils (two of these three sites were also used in the vegetation experiments). At least 5 to 8 cm of water were applied to each plot immediately prior to initiation of the measurements. Temperature,

Table 2. Measurement Approach

- Crop Destruction by Stages
  - Wheat, Corn, Grain Sorghum, Sweet Sorghum
- Crop Destruction by Layering
  - Grass, Corn, Grain Sorghum, Sweet Sorghum
- Crop Destruction by Plant Removal
  - Soybeans, Corn
- Canopy Emission via Metal Screens at Various Heights in the Canopy
  - Corn, Sweet Sorghum
- Stalk Investigations
  - Sweet Sorghum, Dry Corn, Freshly-cut Corn
- Support Data
  - Mixed Field of View, Screen Baseline Measurements, Stubble Comparisons
- Time-Series Data for Hydraulic Properties Investigation
  - Bare and Vegetated Plots at Three Sites

humidity, rainfall and pan evaporation data collected by BARC personnel were used to verify that the soil drying at the three sites was not influenced by local meteorological differences during the first few days of the measurement periods, thus permitting a valid comparison of whether volumetric soil moisture as measured by microwave radiometers at any one point within an initial period after saturation could be a detectable indicator of soil type.

4. GROUND TRUTH ACQUISITION AND PROCESSING

4.1 Soil Moisture

Observations of soil moisture, soil temperature and vegetation parameters were made concurrent with microwave measurements from the truck radiometers. For the vegetation ex-

periments, soil moisture was determined by gravimetric sampling at four locations within each plot at depths of 0-2.5 and 2.5-5 cm and at two locations at depths of 0-1 and 0-15 cm. Approximately 100 grams in size, the samples were carved from the face of a shallow hole with a special sampling tool, except for the 0-15 cm sample which was obtained with a coring device. Each sample was placed in a prelabeled plastic jar and sealed with a moisture tight lid.

The soil samples were taken into the lab and weighed (wet weight) that same day. The samples were then dried for 80 minutes in a microwave oven and weighed again (dry weight). All of the sample containers weighed within ± 0.01 g of each other, which was considered to be constant. Volumetric soil moisture was calculated by the following:

$$\theta_V = \frac{\text{wet weight - dry weight}}{\text{dry weight - container weight}} \quad (D_b)$$

where D_b is the soil bulk density. Mean values of volumetric soil moisture were computed for each depth from the samples collected within each plot; the typical standard deviation of the plot averaged values was about 1-2 percent.

4.2 Bulk Density

Precise bulk density measurements were made in each test plot several times during the experimental season (approximately every two weeks). Bulk density was sampled at four points in each plot for the 0-2.5 and 2.5-5 cm layers. Values for the other soil layers were estimated using these measurements and data collected in previous years under similar conditions.

Determination of soil bulk density in 1982 was based on a volumetric displacement procedure that utilizes a specially designed bulk density ring with a hook gage and three one-foot-long bolts. The bulk density ring is placed on the ground and secured by driving in the three bolts. A sheet of plastic film is used to line the inside of the cylinder. Using a water-filled 500 ml graduated cylinder, the bulk density cylinder is filled to the hook gage and the quantity of water is recorded. This is returned to the graduated cylinder. The soil from the inside of the bulk density ring is then dug out to the desired depth of measurement and placed in a

sealed container. The plastic liner is replaced and the ring is filled again. This amount of water is recorded. The soil wet and then dry weights are measured. The volume of soil removed is equal to the difference between the two water volumes used to fill the bulk density ring. The bulk density is computed by dividing the dry weight by this volume.

All of the data collected over the experimental period were plotted and a value of the bulk density was estimated for each period when conditions were the same. In some cases values had to be extrapolated or interpolated. Bulk density samples were also collected before and after all experiments in which a large number of people were in the field between truck measurements, i.e., the crop destruction experiments. Soil moisture and bulk density values for all of the vegetation experiments are summarized in Appendix C.

4.3 Soil Temperature and Meteorological Data

Near surface soil temperatures were monitored by inserting temperature probes into the soil at depths of 1, 3 and 7.5 cm at one or two locations within each plot. At the same time surface temperatures were collected using a small, hand-held infrared thermometer which measures thermal emissions at wavelengths between 8 and 14 microns with an accuracy of $\pm$ 0.5 K. Appendix D presents all of the temperature data for the various vegetation experiments.

Local meteorological data consisting of rainfall, temperature, humidity, total wind movement and pan evaporation were measured at the Edmonston test site on a daily basis. Although separated by more than one mile, these data were also considered representative of the South Farm sites and are listed in Appendix B. Complementing this information, a day-to-day documentation of surface cover characteristics and general weather observations during the experiments is found in Appendix A, Field Notes.

4.4 Vegetation Parameters

The basic parameters used to describe the condition of the vegetation canopy are the plant height, canopy cover, wet biomass, dry biomass and water content. During 1982 wet

biomass was determined by periodic sampling of the vegetation in the test plots, generally at least once during the week microwave observations were made. Corn, sweet sorghum and grain sorghum were sampled by cutting individual plants. Soybeans, grass and winter wheat were sampled by cutting all plants in a measured area. At least ten samples were used.

After the vegetation wet weight was determined, the samples were dried and reweighed to obtain the dry weight. Vegetation water content was determined by subtracting the dry weight from the wet weight.

In addition to the whole plant samples, various plant components corresponding to measurements made with the radiometers during crop destructions were also obtained. All of the vegetation data are presented in Appendix F.

Corn plant parameters at maturity included a nodal length of 16 cm and stalk diameters of 1.5-2 cm (elliptical). The number of leaves averaged about 12 per plant. Sweet sorghum at maturity had a nodal length of 23 cm and averaged 9 leaves per plant.

For the time series experiments gravimetric soil moisture was sampled for the 0-2 cm and 2-4 cm soil depths at four corners of the plots on an hourly basis during the time periods when microwave radiometric data were being collected. Bulk density samples of the soil layers were collected once during and once after completion of the time series. Table 3 lists the bulk density values for the 0-4 cm layer in these plots. Soil temperatures were recorded at

Table 3. Bulk Density Values for Time Series Experiments

Plot	Bulk Density (g/cm^3)
E4	1.39
E5	1.35
S4	1.45
S5	1.33
Gish bare	1.15
Gish corn	1.15

thirty-minute intervals coincident with the microwave measurements. Particle size analyses of these soils were available from previous experiments on these plots. Appendices G and H contain the measured soil temperature, soil moisture and microwave data for the three time series experiments.

SUMMARY

The objectives of the 1982 field experiments were two-fold: (1) to study the biomass and geometrical structure properties of vegetation canopies to determine their impact on microwave emission data, and (2) to verify whether time series microwave data can be related to soil hydrologic properties for use in soil type classification. To achieve these goals, two truck-mounted radiometers at 1.4 GHz and 5 GHz were used to obtain microwave brightness temperatures of bare and vegetated test plots under different conditions of soil wetness, plant water content and canopy structure. Observations of soil surface/canopy temperature, soil profile temperature, soil moisture, soil texture, bulk density, vegetation biomass and canopy characteristics were made either concurrently with the microwave measurements or periodically throughout the experiments as necessary. These data are summarized in Appendices A-H. In addition to visual descriptions, field conditions were documented photographically during each measurement series; although not reproduced here, this photographic record is maintained at GSFC.

Preliminary analysis of the crop destruction data indicate that detailed measurements using artificial arrangements of plant components are helpful in advancing fundamental understanding of the interactions of microwave energy with a vegetation canopy. Although vegetation biomass has a major influence on measured microwave emission, the orientation of stalks and the presence of vertical structure in a crop canopy also affect the microwave response at different frequencies from a vegetation/soil scene. Figure 3 illustrates several stages in a corn destruction measurement series, while Figure 4 gives the results of a four-stage sequence of measurements using the same set of corn stalks in different orientations relative to the radiometer

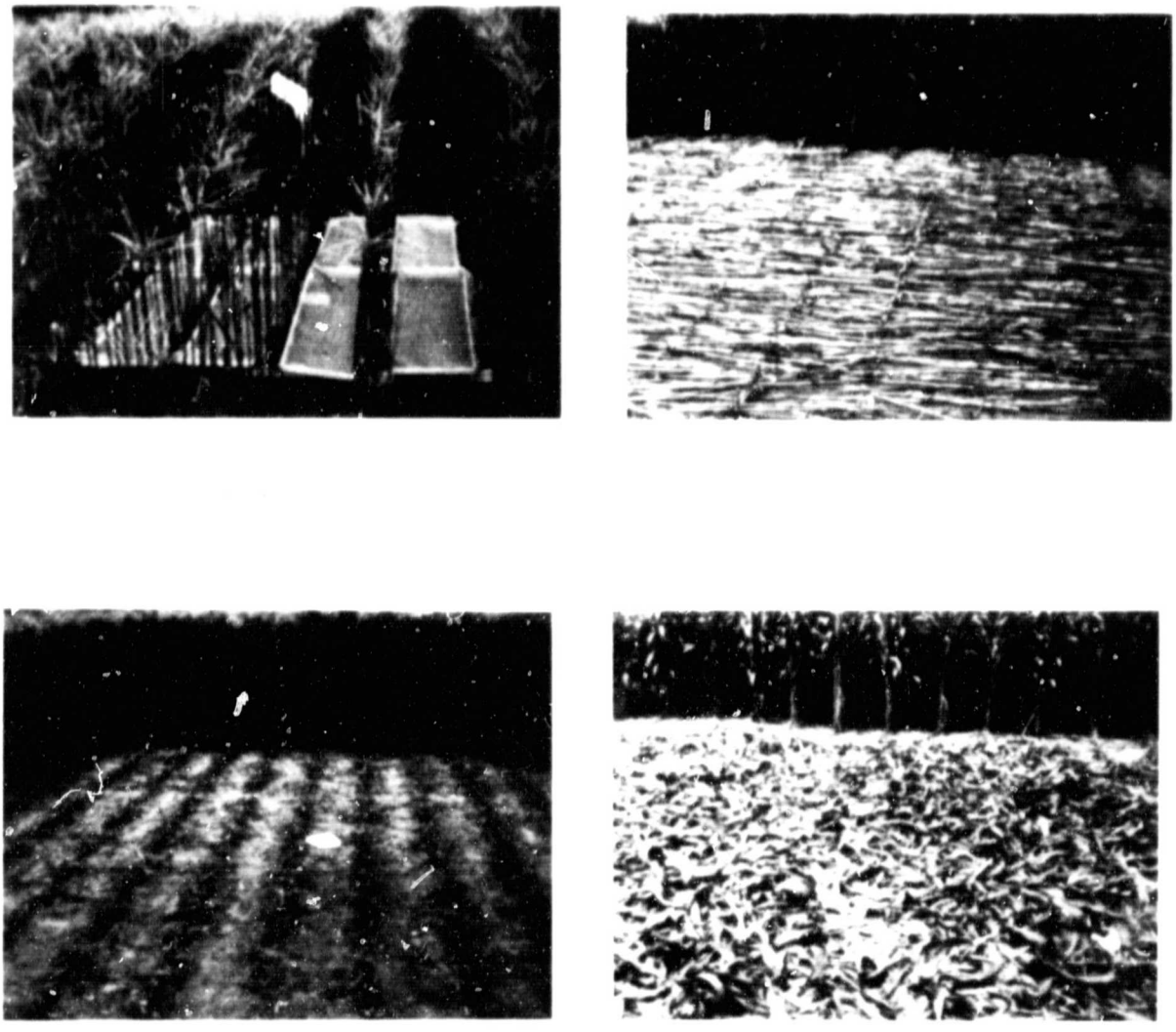

Figure 3. Photographic illustration of a crop destruction sequence for corn. A complete series of measurements would include full canopy; standing stalks (from which leaves and ears have been stripped); stubble (for the bare soil background); cut stalks parallel, perpendicular and random; and all portions of the canopy random.

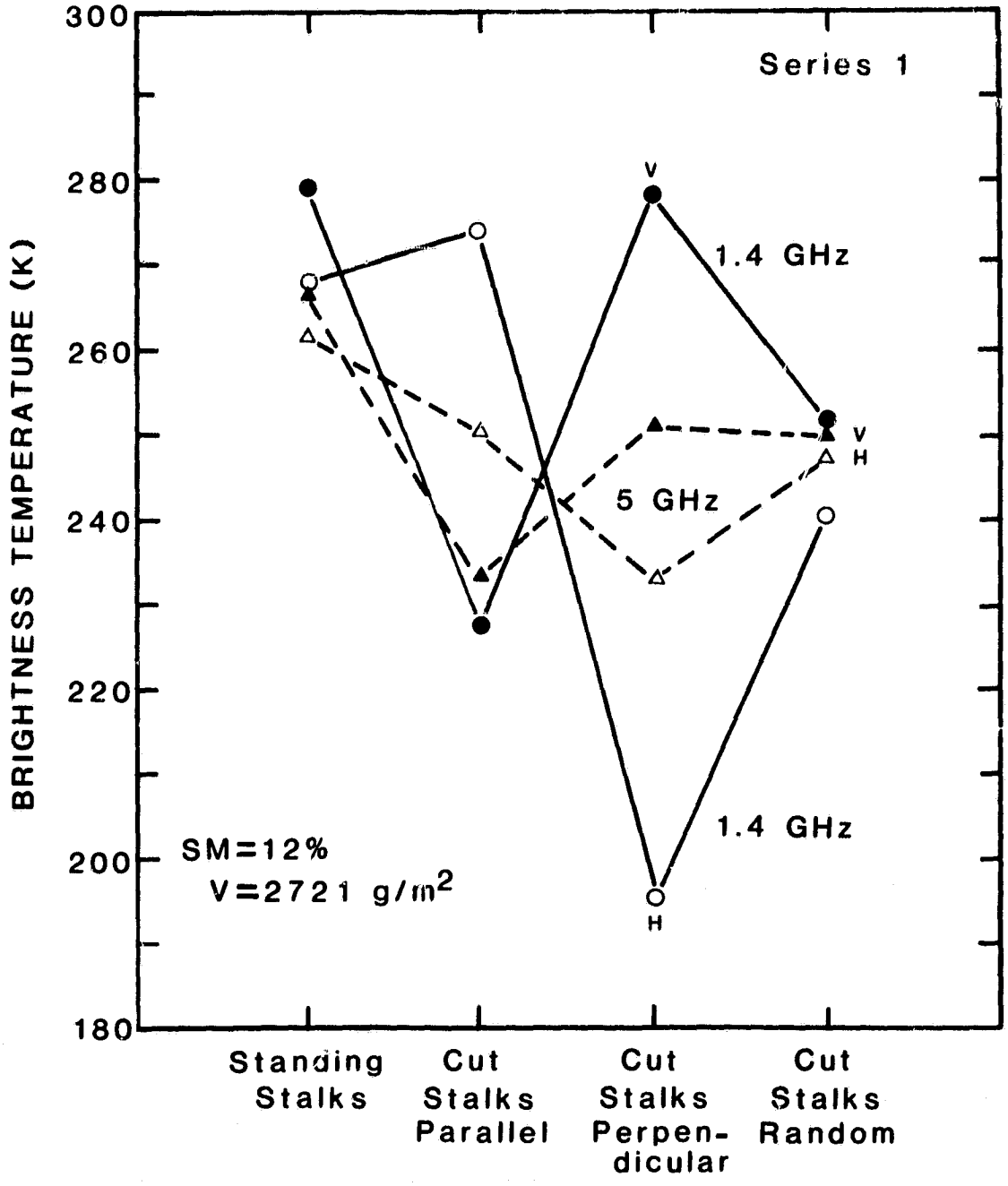

Figure 4. Effect of corn stalk orientation on measured brightness temperature with vegetation biomass held constant. SM is volumetric soil moisture in the 0-5 cm layer; V is vegetation water content. The small H's and V's refer to horizontal and vertical polarization, respectively, for each frequency.

antenna beam (i.e., biomass was held constant). The large variation in observed brightness temperature is polarization- and frequency-dependent; the magnitude of the effect varies with the amount of water in the crops, disappearing at low levels of vegetation water content. Delineation of the extent of the effect of canopy structure and plant water content on microwave data through experiments of this type should be very useful to the development of appropriate physically-based vegetation models and to more accurate interpretation of microwave measurements for a variety of applications.

Analysis of model simulations and microwave data from the time series experiments suggest that a relative classification of the hydrologic soil type can be accomplished with a one time microwave measurement if it is known that the surface soils were subjected to significant rainfall from ½ to 2 days prior to measurement. A more qunatitative classification can be made if a long term time series of microwave data can be collected over large areas where some ground verification of soil properties is available.

6. ACKNOWLEDGEMENTS

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APPENDIX A

Field Notes

Field Notes

6/18/82
- sunny, hot, hazy, humid, high clouds
- S4 has light albedo with some darker patches; a few tuffs of dead weeds and remnants of N-S tractor rows
- wheat in S3 is 90 cm high; in "tough dough" stage, with heads turning brown, leaves and stalks still green
- S3 canopy closure is ~ 15% at 10°, ~ 100% at 70° look angle

6/21/82
- sunny, warm, breezy, a few clouds
- border between S3 and S4 is still moist
- wheat in S3 is much drier than on 6/18; McMurtrey estimates a 30% moisture loss in the wheat over the weekend; wheat stalks and heads are yellow with a touch of green

6/23/82
- sunny, clear skies, temperatures in high 60°'s to low 70°'s, strong breeze rippling wheat
- thunderstorms occurred last night – surface of S4 wetter than on 6/21; also tractor marks
- soybeans in S5 replanted this morning
- wheat in S3 planted in NE-SW rows about 15 cm apart

6/25/82
- sunny, breezy, warm, some haze; less windy than 6/23
- wheat in S6 is 90 cm high, planted in NE-SW rows about 15 cm apart; wheat is light brown in color, heads dry, kernels chewy
- canopy closure is minimal at 10° look angle; no row structure apparent at 40° perpendicular to rows
- general slope of S6 is west to east, with some variation in topography and canopy height

6/29/82
- hot, muggy, gray, overcast with thick cloud cover, rain and thunderstorms expected in the afternoon

6/29/82
- E4 has weathered surface with slight trace of boxlike tractor tire pattern
- grass in E3 is dense and tall (~ 35-40 cm), with individual blades bent over; soil surface obscured at all angles
- weeds & alfalfa in E2, canopy height very variable (35 to 90 cm), low spot in field center; some soil surface visible at low angles
- corn in E1 is 80 cm high, in E-W rows; row spacing is ~ 78 cm
- sweet sorghum in E5 is 20 cm high in E-W rows; row spacing is ~ 78 cm; some grass between rows

7/26/82
- sunny, hot, clear
- E4 surface is dry and light in color; scattered weeds were cleared from corner target area
- grass in E3 is 20 cm high, much drier than 6/29; surface soil is very dry
- soil in E2 also dry; tall thin weeds 90 cm high over 25% of area; tangled ripe alfalfa is ~ 48 cm high
- E1 is flat tilled; corn is ~ 180 cm to top of leaves, ~ 210 cm to top of tassels; row spacing ~ 76-78 cm, plant spacing varies between 10 and 30 cm; soil is very dry
- E5 also flat tilled; sweet sorghum is ~ 135 cm high; row spacing ~ 76 to 78 cm, plant spacing ~ 10 cm; soil is very dry

7/27/82
- sunny, hot, hazy
- grass in E3 is a mix of green and brown, with some blades matted down and bending over
- grass cut in rows with remains of blades oriented in alternating N-S directions
- screens in E1 and E5 were placed in rows back to back, covering an area 3 m x 4 m

8/2/82
- sunny, hot, hazy

8/2/82
- start of Time Series I
- E4 irrigated with 1½ tanks of water (~ 8 cm over target area); standing water drained rapidly, starting with NW corner and working toward east edge
- E5 target area slopes from north to south; south border was breeched with firs ½ tank of water; trenches were dug to distribute the water more evenly; subsequent water was trickled in to allow drainage and prevent overflow
- sorghum is ~ 180 cm high in E5

8/3/82
- sunny, hot, breezy
- E4 was covered overnight with a plastic tarp as a precaution against rain – condensation had collected on the inside of the tarp by morning
- surfaces of E4 and E5 are still damp

8/4/82
- warm, hazy, humid, stratocumulus clouds blocking direct sun at times
- most of surfaces in E4 and E5 are still damp, with some drying at sampling sites

8/5/82
- hot, hazy, very humid, overcast; rain likely during the day
- NW corner of E4 appears dry, while SE corner looks the most moist
- south end of E5 wetter than north end due to ground slope

8/9/82
- sunny, hot, some wind; thunderstorms likely tonight
- corn in E8 is ~ 240-260 cm high to the top of the tassels; E-W rows spaced ~ 76 cm apart

8/10/82
- sunny, hot, humid, breezy
- "tic-tac-toe" pattern evident in E4 due to tractor marks; beginnings of weed and grass growth
- sorghum in E5 is ~ 210 cm high; some sorghum bent slightly over due to putting on and taking off of plastic tarp
- grain sorghum in E7 is ~ 108 cm high, with ~ 90% canopy closure; row spacing ~ 80 cm

8/11/82
- sunny, warm and breezy with some clouds
- soybeans in E6 are ~ 60-70 cm high, planted in E-W rows spaced ~ 76 cm apart; plant spacing ~ 8 cm;

8/16/82
- sunny, hot, hazy, breezy, humidity starting to climb
- drilled soybeans in S5 are 60-70 cm high, with almost 100% canopy closure; NW-SE row direction not discernible due to plant density
- start of Time Series II; plots were watered on 8/13 (600 gal.) and again this morning (300 gal.)
- first set of soil samples taken at 10:30-11:00 am before last load of water was applied
- sample sites #1 and #3 in S5 are drier than sites #2 and #4

8/17/82
- sunny, hot, humid, hazy, breezy
- soybeans in S5 are 70-80 cm high
- plot surfaces still appear wet

8/18/82
- sunny, hot, clear
- thunderstorms and strong gusty winds occurred last night; S4 was covered, but not S5; 5 mm of rain in raingage in S5
- S4 surface is still moist and dark in appearance
- S4 has ~ 2% slope west to east; S5 has ~ 2% slope to the southeast

8/19/82
- sunny, hot
- surface of S4 shows marked drying since yesterday; west end is dry in appearance, east end is moist in appearance, middle is mottled
- S5 surface also drier

8/20/82
- sunny, hot, clear, breezy
- S4 surface is dry and finely cracked; light in color

8/23/82
- sunny, hot, hazy, breezy; 50% chance of rain

8/23/82
- plastic tarps were placed on plots Friday afternoon (8/20) and removed this morning; wind had ripped the tarp over S5 to shreds, although it doesn't appear that much water got through;
- there was some seepage of water under the tarp over S4

8/25/82
- overcast at 9 am, light sprinkles, hot and muggy
- rain in late morning, then became sunny and hot
- started measurements in early afternoon after replacing radiometer transistor
- sweet sorghum in E5 variable in height, averaging ~ 250 cm

8/26/82
- sunny, hot, clear
- west end of plot watered yesterday morning and this morning

8/31/82
- partly cloudy, warm, hazy, breezy; chance of rain
- start of Time Series III; plots watered on 8/27 and 8/30; ~ 5 cm of water applied in all
- surface of bare plot is smooth compared to adjacent areas; bare plot was covered with plastic tarp during the evening of 8/30
- corn is ~ 205-210 cm high to top of tassel, with ~ 80% canopy closure; row spacing ~ 76 cm; corn is suffering from worm infestation

9/1/82
- overcast, breezy, not so warm, chance of rain in the morning; windy with some sun in the afternoon
- surface starting to crack, feels drier

9/2/82
- sunny, hot, some haze, few clouds, a little breeze
- no rain in raingage overnight; chance of showers today and tonight
- surface is cracked, looks drier than yesterday

9/3/82
- ~ 2 cm of rain in raingage at test site from overnight storm
- dry down terminated

9/7/82
- sunny, warm, a few clouds, slight breeze

9/7/82

- water calibration at GSFC pond; water surface is pretty calm
- water temperatures:

time	IR	thermometer
10:45	21.6°	25.0°
11:05	21.6°	25.0°
14:30	25.0° (ϵ = .95)	26.7°
	24.3° (ϵ = .99)	

APPENDIX B

Weather Data

Weather Data
Edmonston and Beaver Dam Site, 1982

Date	Time	Rainfall (cm)	Evaporation (cm/day)	Air Temperature (C)				Water Temperature (C)		Total Wind	Relative Humidity(%)
				Max	Min	Dry	Wet	Max	Min		
6/5	(0850)	1.286	–	–	–	–	–	–	–	–	–
6/6	(0850)	0.254	–	21.8	11.1	–	–	–	–	–	–
6/7	0850	0.0	–	19.7	10.0	16.7	15.9	–	–	4214.1	85
6/8	(0850)	0.0	0.338	20.4	13.3	17.3	15.9	–	–	4248.1	89.6
6/9	0846	0.0	0.460	28.8	14.5	20.4	18.1	–	–	4262.9	80.8
6/10	0847	0.0	0.0	17.9	16.0	17.3	14.4	–	–	4281.2	84.3
6/11	0857	0.137	0.130	20.3	12.8	18.2	17.4	–	–	4293.8	98.2
6/12	(0850)	0.0	0.130	20.0	12.8	–	–	–	–	–	–
6/13	(0850)	4.160	0.130	16.9	12.5	–	–	–	–	–	–
6/14	(0850)	0.0	0.447	25.8	11.6	16.8	14.7	–	–	4384.5	82.6
6/15	0918	0.0	0.681	28.4	21.0	21.9	19.3	–	–	4404.3	78.0
6/16	(0850)	0.0	0.559	30.7	19.8	23.0	20.7	–	–	4504.0	96.0
6/17	(0850)	0.066	0.439	27.4	18.0	25.0	21.1	–	–	4560.9	–
6/18	0907	0.0	0.744	26.4	16.1	19.8	16.8	–	–	4577.6	73.7
6/19	(0850)	0.0	0.744	28.9	14.4	–	–	–	–	–	–
6/20	(0850)	0.0	0.744	25.4	14.4	–	–	33.3	19.2	–	–
6/21	0851	0.0	0.726	29.3	14.3	21.8	20.4	32.8	20.1	4668.1	86.8
6/22	0851	0.0	0.536	27.3	16.2	23.8	18.5	29.1	19.3	4692.1	56.2
6/23	(0850)	0.259	0.721	25.4	10.4	19.6	16.4	30.9	16.8	4725.6	65.8
6/24	0854	0.0	0.711	26.6	12.3	19.6	15.6	31.0	18.3	4757.8	60.7
6/25	0904	0.0	0.198	28.1	10.6	21.8	18.9	–	–	4784.0	78.2
6/26	(0850)	0.0	0.198	31.1	16.9	–	–	–	–	–	–
6/27	(0850)	0.0	0.198	31.1	14.9	–	–	35.8	19.2	–	–
6/28	0903	0.0	0.198	32.7	22.7	25.2	22.4	35.3	23.9	4878.0	84.8
6/29	0923	0.0	0.485	31.5	17.8	23.9	22.2	33.3	22.1	4937.3	94.1
6/30	0859	0.004	0.556	31.3	13.7	24.5	20.8	31.5	18.2	4974.3	74.2

Weather Data
Edmonston and Beaver Dam Site, 1982

Date	Time	Rainfall (cm)	Evaporation (cm/day)	Air Temperature (C)				Water Temperature (C)		Total Wind	Relative Humidity (%)
				Max	Min	Dry	Wet	Max	Min		
7/1	(0850)	0.142	0.744	26.8	10.7	19.9	14.3	18.8	17.9	5012.4	53.4
7/2	0903	0.0	0.528	27.8	8.9	20.2	17.1	–	–	5042.8	64.3
7/3	(0850)	0.140	0.528	26.7	15.2	–	–	–	–	–	–
7/4	(0850)	0.0	0.528	25.8	13.7	–	–	–	–	–	–
7/5	(0850)	0.0	0.528	26.1	10.6	–	–	32.9	17.9	–	–
7/6	(0850)	0.0	0.693	28.1	16.7	21.5	18.0	34.2	20.9	5170.4	80.8
7/7	(0858)	0.0	0.866	31.8	20.8	23.8	20.9	35.2	22.7	5209.3	84.4
7/8	0904	0.0	0.673	34.8	19.7	27.8	24.3	37.7	23.8	5258.6	79.5
7/9	0906	0.0	0.404	32.2	18.3	24.8	22.3	–	–	5283.3	92.7
7/10	(0850)	0.0	0.404	28.9	19.6	–	–	–	–	–	–
7/11	(0850)	0.0	0.404	29.2	18.9	–	–	34.4	23.9	–	–
7/12	0916	0.0	0.732	31.6	20.4	24.9	22.7	35.9	24.8	5357.8	94.7
7/13	0856	0.0	0.744	32.0	18.9	26.1	20.7	35.1	23.6	5381.8	62.4
7/14	0854	0.533	0.190	31.1	18.2	–	–	29.0	23.1	5402.2	97.3
7/15	(0850)	0.0	0.630	31.2	19.2	–	–	29.8	23.9	5417.3	97.8
7/16	(0850)	0.0	0.582	31.4	18.3	–	–	–	–	5436.5	97.8
7/17	(0850)	0.0	0.582	33.6	18.4	–	–	–	–	–	–
7/18	(0850)	0.0	0.582	34.4	20.3	–	–	37.3	24.3	–	–
7/19	0858	0.0	0.686	35.1	20.0	–	–	37.7	24.1	5508.8	74.6
7/20	0904	0.178	0.490	30.8	17.7	–	–	31.6	20.1	5532.0	97.4
7/21	0909	0.013	0.909	33.3	18.8	–	–	33.3	18.8	5580.1	61.5
7/22	0854	0.0	0.841	31.9	21.8	–	–	34.3	20.4	5611.4	72.4
7/23	(0850)	0.213	0.417	28.3	19.4	–	–	–	–	5642.1	98.2
7/24	(0850)	0.0	0.417	30.0	16.1	–	–	–	–	–	–
7/25	(0850)	0.0	0.417	33.1	14.4	–	–	36.2	21.7	–	–
7/26	(0850)	0.013	0.803	34.5	21.4	–	–	37.0	25.2	5709.9	68.2
7/27	0906	0.0	0.457	32.9	21.5	–	–	35.6	24.3	5733.4	66.4
7/28	(0850)	1.194	0.444	30.4	16.6	–	–	31.7	20.1	5760.0	97.8
7/29	0901	0.0	0.277	28.9	15.7	–	–	34.0	20.9	5792.8	75.5
7/30	(0850)	0.813	0.312	23.3	14.4	–	–	–	–	5813.8	97.8
7/31	(0850)	0.0	0.312	28.1	15.6	–	–	–	–	–	–

Weather Data
Edmonston and Beaver Dam Site, 1982

Date	Time	Rainfall (cm)	Evaporation (cm/day)	Air Temperature (C)				Water Temperature (C)		Total Wind	Relative Humidity (%)
				Max	Min	Dry	Wet	Max	Min		
8/1	(0850)	0.0	0.312	28.1	15.6	–	–	–	–	–	–
8/2	(0850)	0.0	0.490	29.9	16.6	–	–	33.7	21.2	5885.8	98.2
8/3	0902	0.0	0.561	30.0	16.3	–	–	29.9	21.8	5907.0	83.8
8/4	0847	0.0	0.505	32.0	21.8	–	–	34.7	22.5	5930.6	97.9
8/5	0852	0.0	0.477	32.3	21.6	–	–	29.1	23.9	5955.7	98.0
8/6	0840	0.899	0.193	32.2	19.4	–	–	–	–	5983.7	97.8
8/7	(0850)	0.818	0.193	25.6	17.8	–	–	–	–	–	–
8/8	(0850)	0.0	0.193	27.5	20.0	–	–	–	–	–	–
8/9	(0850)	0.097	0.291	29.8	21.2	–	–	32.7	23.5	6067.8	92.2
8/10	(0850)	0.0	0.711	31.0	17.4	24.4	22.8	35.1	22.9	6095.4	91.4
8/11	0859	0.0	0.536	26.2	15.2	21.1	18.8	31.2	18.2	6118.8	69.3
8/12	(0850)	1.07	0.460	25.9	11.2	18.1	16.7	30.4	17.7	6174.8	89.5
8/13	0909	0.0	0.470	32.2	9.9	17.9	16.1	–	–	6196.7	87.2
8/14	(0850)	0.0	0.470	27.2	12.8	–	–	–	–	–	–
8/15	(0850)	0.0	0.470	28.9	13.2	–	–	–	–	–	–
8/16	0859	0.0	0.490	30.0	17.9	20.9	19.4	32.8	20.0	6232.5	98.2
8/17	0904	0.386	0.597	31.6	13.7	23.2	21.6	34.1	19.3	6251.6	90.0
8/18	(0850)	0.0	0.988	27.7	11.9	20.5	17.9	32.7	18.4	6279.9	78.0
8/19	0854	0.0	0.605	30.3	15.4	20.1	12.3	32.8	19.4	6305.7	94.0
8/20	0906	0.0	0.505	28.6	14.2	23.2	21.1	–	–	6331.7	87.2
8/21	(0850)	0.160	0.505	25.7	14.4	–	–	–	–	–	–
8/22	(0850)	0.0	0.505	23.9	10.4	–	–	–	–	–	–
8/23	(0850)	0.013	0.267	26.8	17.5	20.9	20.1	26.4	19.3	6442.2	97.0
8/24	(0850)	0.0	0.495	30.4	20.9	21.6	20.8	33.3	21.9	6479.3	90.8
8/25	(0850)	0.427	0.742	31.5	11.0	22.9	20.8	31.7	16.3	6517.7	98.2
8/26	0909	0.0	0.625	28.9	11.2	18.4	22.7	32.0	16.3	6570.0	68.4
8/27	0852	0.0	0.513	25.6	9.4	18.2	17.1	–	–	6597.6	91.4
8/28	(0850)	0.0	0.513	25.8	11.7	–	–	–	–	–	–
8/29	(0850)	0.0	0.513	22.5	1.7	–	–	–	–	–	–
8/30	0858	0.0	0.427	23.3	13.0	14.4	12.8	24.2	14.6	6709.7	70.2
8/31	0931	0.0	0.681	30.4	21.2	21.1	19.4	31.1	18.3	6756.0	88.2

Weather Data
Edmonston and Beaver Dam Site, 1982

Date	Time	Rainfall (cm)	Evaporation (cm/day)	Air Temperature (C)				Water Temperature (C)		Total Wind	Relative Humidity (%)
				Max	Min	Dry	Wet	Max	Min		
9/1	0924	0.0	0.323	27.4	22.2	21.7	20.7	27.0	20.7	6845.7	96.4
9/2	(0850)	0.008	0.640	31.9	18.4	23.1	22.2	32.9	21.5	6921.1	98.2
9/3	(0850)	1.15	0.579	27.8	8.3	19.9	18.9	–	–	6964.6	98.2
9/4	(0850)	0.0	0.579	27.8	8.3	–	–	–	–	–	–
9/5	(0850)	0.0	0.579	25.6	6.1	–	–	–	–	–	–
9/6	(0850)	0.0	0.579	25.6	6.7	–	–	–	–	–	–
9/7	0855	0.0	0.554	26.5	17.1	19.6	17.3	29.7	17.7	7074.5	83.2
9/8	0900	0.0	0.140	20.9	14.2	17.7	17.1	22.1	17.4	7132.5	97.7
9/9	(0850)	0.01	0.284	24.9	11.1	17.9	16.7	25.4	16.3	7155.0	97.3
9/10	0906	0.0	0.457	27.8	9.7	18.4	17.8	–	–	7176.8	97.8
9/11	(0850)	0.0	0.457	30.0	10.8	–	–	–	–	–	–
9/12	(0850)	0.0	0.457	30.3	12.1	–	–	–	–	–	–
9/13	0920	0.0	0.620	29.8	15.1	19.9	19.2	30.7	19.3	7253.0	98.0
9/14	(0850)	0.005	0.290	28.2	15.1	22.6	21.4	28.6	18.8	7282.4	96.0
9/15	0908	0.0	0.259	29.3	18.1	19.8	19.0	29.2	19.7	7300.9	98.0
9/16	0920	0.0	0.648	30.3	12.2	23.2	21.5	31.8	16.9	7320.4	84.7
9/17	0930	0.0	0.676	22.2	8.3	18.2	15.1	–	–	7364.8	66.7
9/18	(0850)	0.0	0.676	29.2	6.6	–	–	–	–	–	–
9/19	(0850)	0.0	0.676	25.0	7.2	–	–	–	–	–	–
9/20	0913	0.658	0.028	18.2	13.2	17.4	17.2	19.9	16.1	7461.6	98.2
9/21	(0850)	0.043	0.020	19.8	13.8	16.7	16.2	21.2	15.8	7484.4	96.4
9/22	0939	2.271	0.0	15.1	8.8	14.8	14.4	17.1	11.8	–	96.7
9/23	(0850)	0.185	0.0	20.4	5.6	12.3	11.2	23.2	11.4	7582.5	72.8
9/24	0910	0.0	0.198	22.2	3.6	13.3	12.8	–	–	7613.1	97.4
9/25	(0850)	0.0	0.198	22.5	13.6	–	–	–	–	–	–
9/26	(0850)	1.52	0.198	18.9	8.3	–	–	–	–	–	–
9/27	(0850)	0.597	0.328	25.2	10.1	16.9	16.0	26.7	15.6	7742.8	87.8
9/28	0927	0.0	0.020	22.2	10.4	16.5	15.1	23.1	14.4	7762.3	92.8
9/29	0908	0.0	0.356	23.7	14.6	16.8	16.1	25.2	15.1	7785.5	97.0
9/30	1005	0.0	0.157	19.0	8.4	17.7	16.8	–	–	7846.4	97.9

APPENDIX C

Soil Moisture and Bulk Density Measurements for Vegetation Experiments

Volumetric Soil Moisture and Bulk Density for BARC Plots, 1982

Date	Plot	Volumetric soil moisture Depth layer (cm)				Bulk density Depth layer (cm)		Comments
		0-1	0-2.5	2.5-5	0-15	0-2.5	2.5-5	
		-%-				-%-		
6/18/82	S3	23.19	21.27	24.29	23.01	1.10	1.26	
6/18/82	S4	14.23	17.84	21.73	25.06	1.41	1.41	
6/21/82	S3	16.72	15.02	19.45	17.70	1.10	1.26	
6/21/82	S4	6.71	14.28	17.29	15.86	1.41	1.41	
6/23/82	S3	21.62	21.04	23.99	20.25	1.10	1.26	Full.
6/23/82	S3	32.73	28.51	23.10	--	1.44	1.26	Heads removed, stalks cut.
6/23/82	S3	32.56	29.28	23.54	--	1.44	1.26	Cleared.
6/23/82	S4	17.26	19.35	21.11	21.76	1.41	1.41	
6/23/82	S5	19.91	21.18	23.41	21.62	1.41	1.41	
6/25/82	S6	19.43	18.67	21.66	22.73	1.10	1.26	Full.
6/25/82	S6	19.27	18.79	17.34	--	1.44	1.26	Stalks cut.
6/25/82	S6	16.42	17.37	17.11	--	1.44	1.26	Cleared.
6/29/82	E1	2.17	4.56	8.30	6.95	1.22	1.22	
6/29/82	E1	1.33	4.48	9.99	--	1.22	1.22	End of day.
6/29/82	E2	4.19	4.53	6.94	9.02	1.19	1.42	
6/29/82	E3	2.25	4.34	6.08	4.49	1.16	1.40	
6/29/82	E4	2.24	4.80	8.20	8.76	1.20	1.16	
6/29/82	E5	2.24	7.56	10.80	10.71	1.22	1.22	
6/29/82	E5	2.73	7.09	10.52	--	1.22	1.22	End of day.
7/26/82	E1	1.29	2.93	4.97	5.60	1.22	1.23	
7/26/82	E2	5.06	5.11	7.20	8.74	1.19	1.42	
7/26/82	E3	2.80	4.01	5.33	3.80	1.19	1.42	
7/26/82	E4	1.23	5.63	8.27	9.24	1.18	1.15	
7/26/82	E5	1.40	2.78	4.99	5.14	1.21	1.22	
7/27/82	E1	1.96	3.66	4.62	6.28	1.22	1.23	
7/27/82	E3	2.03	2.12	3.79	4.36	1.19	1.42	
7/27/82	E3	1.31	1.77	3.54	--	1.19	1.42	End of day.

Date	Plot	Volumetric soil moisture Depth layer (cm)				Bulk density Depth layer (cm)		Comments
		0-1	0-2.5	2.5-5	0-15	0-2.5	2.5-5	
		-%-				-%-		
7/27/82	E4	0.85	3.62	8.34	8.27	1.18	1.15	
7/27/82	E5	2.24	2.96	5.77	4.96	1.21	1.22	
8/09/82	E8	10.33	13.32	12.34	—	1.28	1.28	Cleared.
8/09/82	E8	12.41	12.22	11.63	11.97	1.21	1.18	Full.
8/09/82	E8	12.86	12.98	11.62	—	1.28	1.28	Stripped stalks, tassels removed.
8/09/82	E8	11.66	12.58	12.86	12.94	1.28	1.28	Stalks cut, layers cut.
8/10/82	E7	8.18	9.02	10.51	—	1.28	1.25	Cleared.
8/10/82	E7	8.68	9.62	9.58	10.79	1.20	1.20	Full – North side.
8/10/82	E7	10.34	11.17	11.51	—	1.28	1.25	Full – South side.
8/10/82	E7	8.60	9.79	10.94	11.76	1.28	1.25	Stripped stalks, layers cut.
8/11/82	E1	2.51	5.92	7.24	12.07	1.22	1.23	Full – North side (dry).
8/11/82	E1	13.18	14.79	14.26	11.26	1.22	1.23	Full – South side (wet).
8/11/82	E1	12.28	13.65	14.46	—	1.29	1.33	Cleared – South side (wet).
8/11/82	E6	3.80	6.47	8.32	14.67	1.20	1.16	Full – North side.
8/11/82	E6	12.62	12.08	11.53	12.13	1.20	1.16	Full – South side.
8/11/82	E6	12.76	13.65	12.98	—	1.26	1.20	Cleared – South side.
8/25/82	E5	13.16	13.78	13.56	—	1.29	1.29	Cleared.
8/25/82	E5	21.78	18.27	16.67	9.93	1.21	1.22	Full.
8/25/82	E5	17.69	17.07	15.63	—	1.29	1.29	Stalks cut, stripped stalks.
8/26/82	E5	17.57	15.75	14.41	—	1.29	1.29	Cleared.
8/26/82	E5	18.62	18.33	17.13	11.08	1.21	1.22	Full.
8/26/82	E8	8.59	12.02	12.70	12.08	1.28	1.28	Cleared – South side.
8/26/82	E8	2.46	3.08	7.59	—	1.28	1.28	Cleared – North side.
9/15/82	E8	0.54	1.06	2.11	2.55	1.28	1.28	North side.
9/15/82	E8	14.43	13.80	—	—	1.28	1.28	South side, p.m.
9/15/82	E8	15.42	14.75	14.18	12.84	1.28	1.28	South side, a.m.

APPENDIX D

Soil Temperature Measurements for Vegetation Experiments

Notation:

Canopy/Air Difference

+ indicates that the surface/canopy is warmer than the air

- indicates that the surface/canopy is cooler than the air

Soil Temperature Data for BARC Plots, 1982 (In Degrees C)

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
6/18/82	S3	10:55	+ 1.6	25.5	23.3	23.5	22.6	
	(Winter	11:20			24.5	24.7	23.4	
	wheat)	11:42			24.8	25.1	23.8	
		12:15		26.3	25.0	25.4	24.8	
6/18/82	S4 A	10:55	+ 1.5	25.5	27.0	26.5	–	Site A in near corner
	(Bare) B	11:00			–	28.5	22.0	Site B in far corner
	A	11:27			24.5	25.0	–	Thermometers exposed
	B	11:25			28.5	29.0	23.5	to direct sun
	A	11:44			28.0	27.5	–	
	B	11:44			27.9	29.0	24.1	
	A	12:17		25.6	27.0	27.5	–	
	B	12:19			28.1	28.5	24.5	
6/21/82	S3 A	09:45	+ 2.6	27.5	27.8	26.7	23.9	Site A in near corner
	(winter B	10:10			26.7	25.6	22.2	Site B in far corner
	wheat) A	10:15			32.2	28.9	24.4	Site A thermometers
	A	10:35			31.1	30.0	25.0	affected by direct
	B	11:00			28.9	27.8	23.3	sun
	A	11:00	+ 2.8	30.0	31.1	29.4	25.6	
	A	11:15			29.4	28.9	25.6	
	B	11:15			28.9	28.3	23.3	
6/21/82	S4 A	09:45	- 2.8	25.0	28.9	28.9	24.4	Thermometers in direct
	(Bare) B	09:50			29.4	28.3	24.4	sun
	A	10:25			30.0	30.0	25.6	In shadow of radio-
	B	10:25			31.7	30.0	25.6	meters
	A	10:55			31.7	31.7	26.1	
	B	10:55	+ 3.6	31.1	32.2	31.1	26.7	
	A	11:10			28.9	29.4	26.7	
	B	11:10			31.1	30.6	27.2	

Date	Plot	(EDT) Time	Canopy/Air Dif	Sfc	1 cm	3 cm	7.5 cm	Comments
6/23/82	S3 A	09:45	+ 1.3	23.5*	23.9	22.8	21.7	*1° drop when wind blows
	(winter B	09:50			22.8	23.3	21.1	Full canopy
	wheat) A	11:05	+ 1.3	26.0	27.8	25.6	23.3	Heads removed
	B	11:20			26.7	25.6	22.2	
	A	11:30	+ 4.6	29.0	26.7	26.7	24.4	Stalks cut
	B	11:35		(25.5) uncut wheat	27.2	25.6	22.8	
	A	12:05	+ 4.0	27.5	26.7	26.1	24.4	Stalks removed
	B	12:10		(22.0) (in shadow of radiometer)	29.4	26.7	23.3	
6/23/82	S5	10:05		—	25.0	24.4	22.8	Bare, soybeans just planted in N-S rows
	S4	10:10		—	23.9	23.9	23.3	Bare
	S5	11:20		—	25.6	23.9	21.1	
	S4	11:20		—	25.6	23.3	22.2	
6/25/82	S6 A	09:15	+ 0.8	25.5	23.3	21.7	21.1	Site A on south side
	(winter B	09:15			24.4	22.2	20.0	Site B on west side
	wheat) A	09:40			24.4	22.2	21.7	Radiometers parallel to
	B	09:40			24.4	22.8	20.0	row direction
	A	09:55			24.4	22.2	21.7	Radiometers perpendicular
	B	09:55		28.0	25.0	23.3	20.6	to row direction
	A	10:30	+ 2.4	28.6	28.9	25.6	23.3	Cut wheat
	B	10:30	+ 2.8	29.3	29.4	25.6	21.7	perpendicular
	A	11:10	+ 4.3	32.0	30.6	26.7	24.4	Cut wheat parallel
	B	11:10			31.1	26.7	22.2	
	A	11:35	+ 2.2	31.0	28.9	25.6	24.4	Stubble
	B	11:35			30.0	26.7	22.2	
	A	12:00	+ 3.0	32.5	29.4	25.6	24.4	Stalks random, 1 layer
	B	12:00			33.3	27.2	23.3	
	A	12:35	+ 2.7	32.9	29.4	26.7	25.6	Stalks random, 2 layers
	B	12:35			33.9	27.8	24.4	

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
6/29/82	E2	10:15	- 1.3	25.7	25.6	25.0	24.7	
	(Alfalfa)	10:45	- 0.2	26.4	26.1	26.1	25.0	
	E3	10:45	- 0.1	26.2	26.7	26.1	25.6	
	(Grass)	11:00	- 0.4	28.0	27.2	26.1	25.6	
	E4 A	10:50	+ 2.6	30.3	28.3	27.2	27.2	Site A near, Site B far
	(Bare) B	10:50			28.3	27.8	27.5	
	A	11:05	+ 2.5	31.2	28.9	28.3	28.1	
	B	11:05			28.9	28.9	27.8	
	E5	11:20	+ 0.7	29.4	31.1	30.9	30.0	
	(S. Sorghum)	11:45	+ 0.8	32.5	31.1	30.6	30.0	
		13:10	+ 1.1	32.8	32.2	31.7	30.6	
	E1	11:20	+ 0.4	26.7	31.1	30.0	28.3	
	(Corn)	11:45	+ 0.1	28.4	32.2	30.0	28.9	
		13:25	+ 0.0	29.2	33.3	31.7	30.0	
7/26/82	E2	09:20	+ 2.1	31.6	28.9	26.7	24.4	
	(Alfalfa)	10:00	+ 1.5	32.0	28.9	26.7	25.0	
	E3	09:20	+ 2.8	32.3	30.0	28.9	25.6	
	(Grass)	10:00	+ 3.1	32.2	30.0	29.4	26.1	
	E4 A	09:20	+ 6.3	37.3	35.0	35.0	30.6	
	(Bare) B	09:20			35.0	34.4	31.1	
	A	10:00	+ 6.0	36.9	33.9	32.8	32.2	
	B	10:00			33.9	32.2	31.7	
	E1	10:40	- 0.4	31.3	35.6	35.0	31.1	
	(Corn)	11:15	+ 0.1	33.0	35.6	35.0	31.7	
		12:45	+ 1.6	34.6	36.7	35.6	33.9	
		13:15	+ 1.5	34.7	37.8	36.7	35.0	
	E5	10:40	- 2.0	30.2	32.2	31.1	27.8	
	(S. Sorghum)	11:15	- 1.6	31.8	32.8	31.7	28.9	
		12:45	- 2.4	32.5	36.1	34.4	31.7	
		13:15	- 2.8	32.9	37.2	35.6	32.2	

Date	Plot	(EDT) Time	Canopy/Air Dif	Sfc	1 cm	3 cm	7.5 cm	Comments
7/27/82	E3	09:15	+ 1.8	31.9	31.1	28.3	26.1	Full canopy
		09:45	+ 2.2	33.0	32.2	29.4	26.7	
		11:15	+ 9.5	39.5	38.9	37.8	30.6	First cut
		14:50	+ 10.1	43.1	38.9	36.1	32.8	Second cut
	E1	10:40	+ 0.2	30.6	33.9	32.8	28.9	Screens at 4"
	E5	10:50	- 2.5	30.3	35.0	32.2	27.8	
	A	14:16	- 1.1	30.7	33.9	32.8	30.0	Screens at 4"
	B	14:16			33.9	32.8	31.1	
	A	14:30	- 0.9	33.1	36.1	35.0	30.6	Screens at 20"
	B	14:30			36.1	34.4	32.2	
8/9/82	E8	08:53	- 0.8	24.6	25.6	24.2	24.2	Full canopy, south side
		09:28	- 0.7	24.6				Standing stalks, south side
		09:45	- 0.3	26.0				Top ⅓ cut, north side
		10:00	0.0	26.4				Tassels cut, south side
		10:20	+ 2.1	27.0				Second ⅓ cut, north side
		10:35	+ 3.2	29.2				Stubble, north side
		10:50	+ 0.4	28.1				Stubble, south side
		11:10	+ 1.2	29.6				Cut stalks parallel, south s.
		12:10	+ 6.3	35.5				Everything random, south s.
8/10/82	E7	09:15	+ 0.3	26.5				Full canopy, south side
		09:20	+ 0.7	28.2				Standing stalks, south side
		09:40	+ 0.5	27.5				Grain heads removed, north s.
		10:05	+ 2.4	29.4				Cut stalks parallel, south s.
		10:20	+ 3.9	30.6				Cut stalks perpendicular, south
		10:45	+ 4.0	31.0				Everything random, south side
		11:00	+ 3.1	29.6				50% cut, north side
		11:30	+ 2.8	29.8				Stubble, north side

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
8/11/82	E6	09:05	- 1.6	21.2	23.9	23.3	23.3	Full canopy, wet side (south)
		09:20	- 1.7	21.9	25.6	25.6	25.0	Full canopy, dry side (north)
		09:40	- 1.1	21.6	22.6			50% of plants removed, wet
		10:00	- 0.4	24.6	23.7			Stubble, wet side
		12:30	- 1.2	28.0				dry side
8/11/82	E1	10:30	- 1.7	24.1	25.2			Full canopy, wet side (south)
		10:45	- 0.6	24.2	25.4			Full canopy, dry side (north)
		11:00	- 2.6	23.7	24.5			25% of plants removed
		11:20	- 0.7	24.3	25.1			50% of plants removed
		11:45	+ 1.3	25.5	26.2			75% of plants removed
		12:10	0.0	28.1	29.0			Stubble
8/25/82	E5	09:15	+ 0.6	24.8				Full canopy
		11:00	+ 1.2	29.3				Full canopy
		11:15	+ 1.0	28.9				
		11:45	- 1.2	26.6				Standing stalks
		13:00	0.0	31.3	29.4	25.6	24.4	Standing stalks
		13:15	- 2.4	28.5	30.0	25.6	24.4	Stubble
		13:30	- 0.5	29.3	30.3	26.1	24.4	Cut stalks, parallel
		13:45	+ 0.1	31.6	30.6	26.1	24.4	Cut stalks, perpendicular
		14:00	- 7.1	24.1	30.9	26.1	24.4	Screens (baseline)
		14:22	- 0.8	31.6	31.7	26.7	25.0	Screens w/ 280 stalks perpen.
		15:00	- 0.3	31.4	32.8	27.2	25.3	Screens w/280 stalks parallel
		15:15	- 1.2	30.4	32.8	31.7	25.3	Cut stalks random
		15:30	+ 2.4	33.9	33.3	32.0	25.6	Everything random

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
8/26/82	E5	09:30	0.0	23.3	21.1	20.0	19.4	Full canopy
		09:55	- 1.2	23.6	22.2	20.6	20.0	Top ⅓ cut
		10:10	- 0.9	21.6	22.2	20.6	20.0	Top ⅓ cut with screens
		10:15	- 0.8	20.1	22.8	20.9	20.0	Second ⅓ cut with screens
		10:25	+ 0.2	24.5	22.8	20.9	20.0	Second ⅓ cut, no screens
		10:40	+ 1.6	25.1	23.9	21.4	20.6	Stubble
		10:55	- 0.2	24.2	23.9	21.4	20.9	Stubble
		11:10	- 0.6	25.8	24.4	21.7	21.1	Stubble with wood blocks
8/26/82	E8	12:53	+ 8.7	35.9				Dry stalks perpendicular
		13:15	+ 8.3	34.7	32.8	30.0	28.3	Dry stalks parallel
		13:30	+ 3.1	33.7	33.9	30.6	28.6	Stubble
		13:45	+ 5.6	23.1				Screens at 60" high over stub.
		14:05	- 4.2	22.4				Screens at 30"
		14:15	- 2.1	24.5				Screens at 4"
		14:30	- 1.4	26.2				Screens at 4", no posts
		14:40	+ 8.2	36.2				Stubble baseline
9/15/82	E8	09:47	22.5 (soil)	24.4	25.9	22.2	20.9	Standing stalks, wet side (s.)
		10:00		23.2	25.9	22.5	21.1	Stubble, wet side
		10:11		25.1	27.5	23.1	21.4	100 stalks parallel, wet side
		10:15		26.0	28.1	23.3	21.4	200 stalks " "
		10:18		26.9	26.7	23.3	21.7	300 stalks " "
		10:25		26.6	26.7	23.3	21.7	400 stalks " "
		10:30		26.1	26.4	23.3	21.7	500 stalks " "
		10:37		28.1	28.9	23.6	22.0	600 stalks " "
		13:00		31.9	31.4	27.8	25.6	1200 stalks " "
		13:00			30.6	25.6	23.9	(measured under stalks)

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
9/15/82	E8	10:41		29.6	30.6	31.1	23.3	Standing stalks, dry side (n.)
		10:55		31.1	31.1	31.7	23.6	Stubble, dry side
		11:05		32.8	32.5	31.1	23.9	100 stalks parallel, dry side
		11:08		32.0	32.8	31.1	24.2	200 " " "
		11:16		31.6	33.3	31.1	24.4	300 " " "
		11:22		32.6	33.3	31.4	24.4	400 " " "
		11:29		32.9	32.2	31.1	24.4	500 " " "
		11:34		32.0	31.7	31.1	25.0	600 " " "
9/15/82	E8	13:09		34.5	33.1	33.3	27.2	100 dry stalks parallel, dry side
		13:15		33.9	32.8	33.6	27.5	200 " " "
		13:22		36.6	32.8	33.9	27.5	300 " " "
		13:31		39.0	35.0	35.6	27.8	500 " " "
		14:13		36.6	34.4	35.3	28.3	Stubble, dry side (34.4° inside dry stalks)
9/15/82	E8	13:40	A = inside plot	34.2	31.1	27.2		500 dry stalks parallel, wet side
			B = outside plot		32.2	28.3	26.4	
		13:50	A	29.0	29.4	26.7		Stubble, wet side
			B		25.3	28.3	26.7	
		13:55	A	30.0	30.0	26.7		100 dry stalks parallel, wet side
			B		25.3	28.1	26.7	
		14:06	A	33.1	31.4	27.2		300 dry stalks parallel, wet side
			B		32.2	28.1	26.7	(33.3° inside stalk at top of pile,dry) (31.1° inside stalk at bottom of pile, wet)

APPENDIX E

Microwave Data for Vegetation Experiments

Notation:

CV = 5 GHz vertical polarization

CH = 5 GHz horizontal polarization

LV = 1.4 GHz vertical polarization

LH = 1.4 GHz horizontal polarization

SD = standard deviation of 20-30 samples averaged to give one T_B value

Microwave Data for BARC Plots, 1982 (In Degrees K)

Date	Time (EDT)	Plot	Angle	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
6/18/82	10:32	S3	70	280.25	.30	268.94	.29	257.55	1.70	202.61	.95	
	10:40	S3	60	287.94	1.07	267.56	.34	263.39	1.28	192.04	.71	
	10:43	S3	50	290.98	.41	265.46	.44	260.02	1.10	200.33	.71	
	10:45	S3	40	289.22	.54	264.45	.44	252.40	1.17	208.80	.94	
	10:47	S3	30	284.49	.25	265.17	.35	243.50	.67	217.04	1.15	
	10:50	S3	20	278.13	.54	266.12	.43	236.17	1.00	221.65	.99	
	10:53	S3	10	272.87	.27	267.62	.39	232.90	1.41	226.55	1.09	
	10:57	S4	10	236.94	.41	232.17	.51	235.87	1.36	231.81	.86	
	10:59	S4	20	240.55	.85	226.09	.43	238.44	1.13	224.35	1.14	
	11:01	S4	30	249.01	.24	217.83	.32	244.06	1.26	216.52	.96	
	11:04	S4	40	259.54	.62	206.07	.50	249.89	1.19	205.13	.76	
	11:08	S4	50	274.89	.30	186.41	.52	259.23	1.52	183.09	.94	
	11:10	S4	60	283.93	1.04	162.59	.44	263.20	1.15	158.21	.92	
	11:13	S4	70	280.24	.35	135.37	.64	254.72	1.68	128.46	.87	
	11:17	S4	70	280.70	.49	136.17	.71	255.59	1.60	129.32	.92	
	11:20	S4	40	265.48	.87	209.56	.33	250.63	1.33	201.40	.68	Mixed Field of View all S4
	11:28	S4	40	266.47	.34	216.63	.41	250.66	1.46	206.41	.97	Mainly S4
	11:30	S4	40	263.99	.24	218.54	.42	252.88	1.06	208.97	.75	More S4 than S3
	11:34	S4	40	273.32	.34	232.99	.27	239.98	1.06	199.71	.91	½ S4, ½S3; C-band centered
	11:37	S3	40	280.38	.62	243.03	.35	239.60	1.47	200.74	.62	½ S4, ½S3; L-band centered
	11:39	S3	40	288.72	.64	266.31	.34	254.39	1.64	211.29	.70	More S3 than S4
	11:43	S3	40	290.93	.37	265.92	.32	252.78	1.03	212.11	.90	Mainly S3
	11:46	S3	40	290.15	.63	265.18	.30	241.67	1.01	233.00	.93	All S3
	12:07	S3	10	274.35	.38	270.08	.43	241.00	1.12	232.65	.88	All S3
	12:11	S3	10	274.35	.36	270.84	.49	231.74	1.05	230.09	1.06	Mainly S3
	12:13	S3	10	264.42	.43	259.53	.36	227.18	1.06	225.45	.80	½ S3, ½ S4; L-band centered
	12:15	S4	10	254.68	.30	249.22	.42	240.89	1.40	236.54	1.06	½ S3, ½ S4; C-band centered
	12:17	S4	10	250.81	.41	247.01	.30	241.11	.86	236.56	1.16	More S4
	12:20	S4	10	252.30	.33	247.71	.46	237.48	1.48	232.79	1.17	Mainly S4
	12:23	S4	10	250.54	.20	242.31	.31	297.78	1.01	297.72	.89	All S4

Date	Time (EDT)	Plot	Angle	CV T_B ± SD	CH T_B ± SD	LV T_B ± SD	LH T_B ± SD	Comments
6/21/82	09:40	S3	70	287.64 .35	267.88 .39	265.82 1.32	198.99 .98	
	09:43	S3	60	293.61 .52	272.26 .33	270.17 1.26	210.72 .85	
	09:48	S3	50	294.64 .35	271.28 .32	267.47 .83	218.73 .84	
	09:50	S3	40	292.29 .90	271.55 .29	262.15 1.41	226.93 .97	
	09:52	S3	30	287.87 1.37	272.65 .36	257.34 .92	234.77 1.19	
	09:55	S3	20	281.98 .37	272.44 .34	251.75 1.31	238.84 1.15	
	09:57	S3	10	278.78 .42	275.12 .46	250.37 1.27	246.04 .88	
	10:01	S4	10	271.18 .34	267.68 .39	255.57 1.00	251.26 .71	
	10:04	S4	20	273.91 .37	264.01 .30	258.35 1.19	246.49 .86	
	10:07	S4	30	278.48 .69	257.06 .29	261.96 .95	237.48 .69	
	10:09	S4	40	285.49 .48	245.74 .33	265.42 1.43	224.21 1.10	
	10:12	S4	50	291.42 .24	230.49 .48	269.32 1.44	208.45 1.09	
	10:25	S4	60	293.04 .64	207.28 .35	270.27 1.18	182.87 .87	
	10:28	S4	70	277.66 .50	174.30 .38	255.86 1.79	147.87 .97	
	10:36	S3	10	278.97 .53	275.62 .26	252.05 1.50	247.20 .80	Mixed Field of View; all S3
	10:38	S3	10	277.74 .41	275.28 .32	252.47 .95	249.22 .87	Mainly S3
	10:41	S3	10	275.73 .60	272.80 .42	247.45 1.16	247.75 1.12	½ S3, ½ S4; L-band centered
	10:44	S3	10	268.82 .64	267.03 .32	246.39 1.13	244.45 .96	½ S3, ½ S4; C-band centered
	10:46	S4	10	274.19 1.09	273.08 .31	256.42 1.38	253.37 .81	Mainly S4
	10:49	S4	10	277.72 1.25	274.91 .29	258.18 1.22	255.66 .95	All S4
	10:51	S4	40	289.80 .38	252.80 .34	266.45 1.34	226.55 .89	All S4
	10:54	S4	40	286.01 .69	255.26 .38	264.78 1.61	228.68 .97	Mainly S4
	10:58	S4	40	283.67 .92	253.53 .31	255.64 1.31	219.70 .72	½ S4, ½ S3; C-band centered
	10:59	S4	40	286.93 .62	259.02 .41	255.35 1.35	220.16 .87	½ S4, ½ S3; L-band centered
	11:01	S3	40	291.18 .84	270.47 .28	260.93 1.28	226.59 1.21	Mainly S3
	11:04	S3	40	291.64 .57	269.82 .35	261.36 .99	226.73 .90	All S3
6/23/82	09:36	S3	10	276.31 .25	272.52 .36	238.06 1.28	234.27 .83	Full canopy
	09:38	S3	20	279.59 .32	270.95 .35	240.73 1.51	228.34 1.13	"
	09:40	S3	30	284.20 1.11	270.98 .25	245.54 1.27	221.70 .90	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD	CH T_B ± SD	LV T_B ± SD	LH T_B ± SD	Comments
6/23/82	09:43	S3	40	288.28 .91	270.28 .30	253.72 1.02	214.22 .95	Full canopy
	09:45	S3	50	291.07 .51	270.79 .26	259.88 1.47	206.65 .80	"
	09:54	S4	25	254.87 .21	243.26 .41	243.30 1.11	226.03 .82	
	09:58	S4	40	262.49 .87	230.84 .26	249.09 .98	209.28 .90	
	10:00	S5	40	282.72 .37	270.94 .34	271.63 1.41	251.56 .93	Soybeans just planted
	10:05	S5	25	282.98 1.18	276.84 .33	273.86 .88	264.06 1.06	
	11:00	S3	10	274.74 .49	273.84 .36	238.70 1.07	236.51 .79	Heads removed
	11:04	S3	20	277.40 .77	271.63 .36	238.69 .80	230.98 .75	"
	11:05	S3	30	282.21 .28	270.63 .33	244.94 1.28	224.53 .95	"
	11:07	S3	40	288.56 .72	271.72 .29	253.52 .98	219.22 .91	"
	11:09	S3	50	293.53 .60	272.95 .32	261.20 1.19	212.66 1.00	"
	11:17	S5	40	288.63 1.27	280.17 .32	272.13 1.26	251.96 .84	Bare-no soybeans visible
	11:19	S5	25	288.81 1.11	284.64 .25	275.37 1.31	265.84 .93	"
	11:22	S4	25	264.66 .69	253.89 .37	245.03 1.12	228.71 1.04	
	11:26	S4	40	272.59 .24	242.43 .37	252.05 1.16	211.74 1.08	
	11:31	S3	50	280.09 .63	270.08 .26	251.42 1.18	249.54 .94	Cut stalks perpendicular
	11:34	S3	40	276.80 1.13	270.59 .37	247.12 1.20	252.84 1.06	"
	11:39	S3	30	271.30 .87	269.91 .38	242.86 1.20	247.75 1.07	"
	11:43	S3	20	267.32 .78	269.98 .40	239.77 1.52	247.37 1.15	"
	11:46	S3	10	266.31 .64	269.79 .33	243.81 1.10	253.24 .69	"
	12:00	S3	10	251.87 .69	251.90 .33	229.80 1.06	220.70 .93	Stubble
	12:01	S3	20	253.97 .52	250.14 .38	225.71 1.25	213.04 .88	"
	12:03	S3	30	258.85 .30	249.23 .32	229.00 1.09	208.45 2.17	"
	12:06	S3	40	265.05 .71	247.27 .41	233.75 1.03	194.61 .59	"
	12:09	S3	50	272.43 .56	248.97 .32	240.98 1.20	182.19 1.13	"
6/25/82	09:08	S6	70	286.68 .50	273.83 .23	264.22 1.37	210.48 1.07	Full canopy, parallel
	09:13	S6	60	290.59 .25	274.96 .44	270.92 1.04	221.14 .88	"
	09:16	S6	50	291.57 .20	276.03 .19	271.54 1.08	233.08 .87	"
	09:18	S6	40	290.76 .38	277.68 .43	268.16 1.17	240.52 .72	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
6/25/82	09:21	S6	30	288.41	.42	279.98	.26	265.08	1.41	246.44	.84	Full canopy parallel
	09:23	S6	20	285.59	.24	281.67	.30	260.42	1.31	252.30	.81	"
	09:29	S6	10	282.67	.42	282.87	.34	258.54	.92	256.31	.97	"
	09:39	S6	10	284.00	.32	281.81	.39	258.69	1.05	252.59	.86	Full canopy perpend.
	09:45	S6	20	286.39	.34	281.09	.37	261.28	1.62	249.52	1.02	"
	09:49	S6	30	289.04	.84	279.66	.25	262.95	1.28	243.92	.97	"
	09:51	S6	40	291.44	.33	277.91	.31	265.69	1.11	238.16	.80	"
	09:53	S6	50	293.33	.35	275.93	.37	269.84	1.27	230.99	.84	"
	09:55	S6	60	293.20	.48	272.84	.31	269.26	1.16	222.40	.86	"
	10:00	S6	70	288.62	.55	267.06	.33	262.28	1.32	213.33	.75	"
	10:19	S6	70	286.58	.88	268.60	.33	254.69	1.26	248.48	1.08	Cut stalks perpend.
	10:22	S6	60	289.45	1.10	274.86	.30	265.77	1.14	258.82	1.16	"
	10:24	S6	50	288.35	.61	277.59	.26	267.00	1.63	262.03	1.05	"
	10:27	S6	40	287.20	.19	279.39	.22	266.73	.97	263.26	.76	"
	10:30	S6	30	285.05	.39	280.26	.31	264.94	.94	264.55	.99	"
	10:32	S6	20	282.89	.28	280.86	.29	265.69	1.17	267.55	1.31	"
	10:36	S6	10	281.62	.56	282.14	.28	264.21	.87	269.73	.82	"
	10:47	S6	10	282.36	.43	281.04	.37	276.09	2.05	267.05	.95	"
	10:50	S6	10	282.19	1.34	280.83	.29	276.57	1.29	267.37	.88	Cut stalks parallel
	10:52	S6	20	284.75	.40	280.89	.34	274.10	1.23	261.96	1.03	"
	10:57	S6	30	286.94	.43	279.80	.35	274.00	1.53	255.50	.92	"
	11:03	S6	40	288.69	.47	277.72	.41	273.37	1.86	250.42	.89	"
	11:05	S6	50	291.24	1.11	277.06	.28	274.58	1.42	247.76	1.14	"
	11:08	S6	60	291.34	.50	275.40	.31	271.93	1.03	237.76	.98	"
	11:12	S6	70	288.39	1.07	273.51	.27	261.83	1.64	231.79	.89	"
	11:27	S6	70	285.57	.73	264.99	.32	252.21	1.63	170.82	.87	Stubble
	11:29	S6	60	290.15	1.28	264.18	.36	262.80	.87	197.94	.75	"
	11:32	S6	50	289.61	.41	265.70	.29	264.83	1.18	220.26	.81	"
	11:34	S6	40	285.55	.33	268.64	.29	263.19	1.07	234.72	.81	"
	11:37	S6	30	281.86	.60	271.90	.37	261.22	1.09	245.08	.79	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD	CH T_B ± SD	LV T_B ± SD	LH T_B ± SD	Comments
6/25/82	11:39	S6	20	279.66 .87	275.60 .45	260.62 .97	252.88 .82	Stubble
	11:43	S6	10	277.67 .23	276.84 .40	258.89 1.40	257.95 .91	"
	11:53	S6	10	283.96 .41	284.06 .27	270.15 1.38	269.80 .70	Cut stalks random,
	11:54	S6	20	286.02 .26	284.25 .33	270.94 1.19	265.36 .82	" 1 layer
	11:58	S6	30	286.65 .30	281.97 .32	270.54 1.17	258.80 .96	"
	12:00	S6	40	288.91 1.29	282.03 .41	271.41 1.56	256.04 .88	"
	12:02	S6	50	291.88 .62	280.95 .33	272.36 1.11	251.01 1.00	"
	12:07	S6	60	293.83 .24	280.17 .24	272.25 1.43	251.59 .76	"
	12:10	S6	70	288.93 .60	275.19 .25	261.64 1.57	247.38 .72	"
	12:28	S6	70	292.42 .57	280.76 .30	265.29 1.33	258.54 .90	Cut stalks random,
	12:30	S6	60	294.69 .49	285.05 .38	274.25 1.24	261.07 1.07	" 2 layers
	12:33	S6	50	294.21 .64	286.71 .34	275.85 1.30	262.70 .83	"
	12:35	S6	40	292.22 1.18	287.15 .35	274.59 1.17	264.98 .96	"
	12:38	S6	30	290.68 .42	288.10 .42	274.28 1.52	268.57 1.28	"
	12:40	S6	20	290.02 .36	289.04 .31	274.24 .97	271.35 1.15	"
	12:42	S6	10	288.69 .41	288.91 .31	274.22 1.35	271.54 1.02	"
6/29/82	09:09	—	10	80.69 .45	48.49 1.07	75.64 1.35	56.97 .95	Metal plates over grass; L. antenna 41.5" high
	09:14	—	10	68.27 .20	38.21 .94	151.95 1.32	124.45 1.11	Metal plates over grass; C. antenna 44.5" high
	09:17	—	20	31.41 .32	18.97 1.09	52.96 .85	28.94 .97	Metal plates over grass; C antenna 52.5" high
	09:20	—	20	41.80 .30	34.06 1.07	44.17 1.20	21.69 .87	Metal plates over grass; L antenna 48" high
	09:24	—	20	293.75 .63	291.20 .31	294.56 1.61	288.98 .97	Grass only
	09:26	—	10	295.41 .64	293.48 .28	297.68 1.21	296.39 1.07	Grass only
	09:28	—	10	269.66 1.17	266.71 .22	174.21 1.18	160.41 .67	Chain link over grass; L.
	09:31	—	10	267.97 .45	266.21 .32	177.35 .66	175.16 .70	Chain link over grass; C.
	09:33	—	20	253.61 .23	248.59 .35	78.09 .98	105.06 .79	Chain link over grass; C.
	09:35	—	20	256.18 .59	256.20 .35	93.79 .89	94.75 .96	Chain link over grass; L.
	09:37	—	20	251.21 .51	250.68 .34	101.93 1.88	109.42 5.30	Chain link elevated; rippling as held.
	09:40	—	20	264.60 .86	275.88 .34	187.35 1.02	242.70 1.05	Chicken wire over grass; L-centered.

Date	Time (EDT)	Plot	Angle	CV T_B ± SD	CH T_B ± SD	LV T_B ± SD	LH T_B ± SD	Comments
6/29/82	09:58	E2	10	287.71 .54	288.01 .40	287.04 1.13	284.34 .84	Baseline measurements
	10:04	E2	20	287.96 .37	287.66 .36	288.34 1.41	283.13 .81	
	10:05	E2	30	288.08 .48	286.55 .37	288.50 1.02	279.30 .96	
	10:07	E2	40	288.21 .34	285.60 .31	286.22 1.33	276.16 1.23	
	10:09	E2	50	288.19 1.17	284.71 .33	285.70 1.34	273.55 1.27	
	10:13	E3	50	296.96 .56	292.90 .31	284.94 1.25	266.68 1.00	Baseline measurements
	10:15	E3	40	297.78 .23	293.74 .33	286.58 1.42	274.93 .96	
	10:18	E3	30	297.50 .62	295.17 .42	288.25 1.20	280.86 .93	
	10:20	E3	20	297.04 .56	295.52 .32	288.73 1.29	283.92 1.00	
	10:22	E3	10	296.85 .33	295.88 .31	288.03 1.21	286.39 .96	
	10:24	E4	10	289.43 .51	287.81 .41	280.68 1.62	276.55 1.12	Baseline measurements
	10:26	E4	20	290.81 .64	285.24 .28	281.22 1.16	272.10 1.04	
	10:28	E4	30	293.55 .29	281.36 .26	280.59 1.23	264.64 .94	
	10:30	E4	40	296.48 .84	274.25 .28	281.81 1.26	254.08 .90	
	10:32	E4	50	298.46 1.20	263.23 .39	281.28 1.36	238.89 1.07	
	10:40	E2	60	288.28 .59	283.79 .34	282.07 .78	271.28 .96	
	10:42	E2	70	286.25 .24	281.41 .38	273.01 1.70	268.70 1.02	
	10:45	E3	70	291.54 .59	286.67 .37	272.13 1.37	248.78 1.12	
	10:47	E3	60	296.71 .42	291.96 .41	283.33 1.35	266.04 .97	
	10:50	E4	60	296.35 .37	245.78 .32	279.11 1.44	216.15 .69	
	10:51	E4	70	278.54 .71	214.33 .40	258.99 1.21	178.68 .68	
	11:09	E5	10	287.54 .38	285.48 .51	277.45 1.18	273.12 1.18	Parallel to rows
	11:13	E5	20	288.81 .65	284.14 .33	277.71 1.18	270.74 .68	"
	11:15	E5	30	290.11 .84	279.50 .27	276.50 1.01	264.20 .82	"
	11:17	E5	40	293.06 .25	273.02 .24	277.49 1.49	249.13 1.34	"
	11:20	E5	50	294.87 .35	263.14 .31	278.24 1.10	234.75 .99	"
	11:22	E5	60	293.19 1.40	249.14 .35	275.38 1.10	213.98 1.10	"
	11:25	E5	70	283.15 .33	230.56 .36	258.28 1.17	184.48 .81	"
	11:31	E1	70	281.21 .41	264.61 .35	275.24 1.28	250.17 .79	"
	11:33	E1	60	287.76 .55	272.57 .54	284.26 1.21	257.48 .92	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
6/29/82	11:35	E1	50	289.45	.47	276.03	.37	286.60	1.64	267.34	1.18	Parallel to rows
	11:38	E1	40	290.21	.44	280.44	.40	286.63	1.34	273.45	.93	"
	11:41	E1	30	289.25	.21	283.35	.36	289.01	1.32	278.56	.87	"
	11:42	E1	20	288.07	.40	286.32	.39	288.64	1.13	283.55	.87	"
	11:44	E1	10	287.40	.25	286.93	.35	289.49	1.21	287.59	.92	"
	12:45	E5	70	287.88	.45	245.86	.31	253.05	1.01	184.46	1.06	Perpendicular to rows
	12:48	E5	60	296.68	.41	261.75	.34	271.77	1.29	214.20	.83	"
	12:50	E5	50	298.61	.82	273.55	.21	276.97	1.24	238.68	1.01	"
	12:54	E5	40	297.86	.49	280.32	.27	275.62	1.08	250.43	.93	"
	12:56	E5	30	296.19	.37	285.80	.31	278.16	1.13	260.59	1.09	"
	12:58	E5	20	294.47	.44	289.23	.33	278.58	1.64	268.33	.83	"
	13:00	E5	10	292.66	1.28	291.34	.32	295.89	1.50	289.53	1.09	"
	13:09	E1	10	288.72	.48	288.47	.32	291.40	1.22	288.67	1.27	"
	13:12	E1	20	289.79	.31	287.35	.28	289.81	1.20	282.81	.89	"
	13:14	E1	30	291.00	.34	286.66	.46	289.21	1.19	278.74	1.01	"
	13:16	E1	40	291.98	.20	284.92	.34	287.42	1.16	272.94	.98	"
	13:18	E1	50	291.40	.49	282.05	.36	285.27	1.07	265.82	.84	"
	13:21	E1	60	288.50	.26	277.41	.37	281.98	1.13	257.20	1.09	"
	13:24	E1	70	281.11	.28	269.35	.41	270.38	1.46	247.68	.64	"
7/26/82	09:28	E2	10	289.13	.28	289.35	.44	278.42	.79	290.05	1.16	Baseline #2
	09:36	E2	20	288.26	1.03	287.81	.30	278.94	1.07	287.58	1.29	
	09:39	E2	30	288.51	.62	286.13	.39	279.01	1.04	283.85	1.16	
	09:41	E2	40	287.60	.36	283.47	.30	278.32	1.05	280.79	1.50	
	09:44	E2	50	287.51	1.03	283.26	.41	277.35	1.04	277.04	1.20	
	09:46	E3	50	301.57	1.15	296.18	.25	277.31	.72	269.76	.99	
	09:48	E3	40	301.34	.37	297.12	.38	280.50	.89	281.62	1.31	
	09:52	E3	30	300.43	.32	298.79	.33	281.01	1.13	285.39	1.18	
	09:54	E3	20	299.58	.37	299.38	.28	280.14	1.07	288.54	1.87	
	09:57	E3	10	298.82	1.36	299.53	.34	280.75	.90	291.49	1.93	

Date	Time (EDT)	Plot	Angle	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
7/26/82	09:59	E4	10	292.28	1.07	291.13	.31	279.64	.81	287.01	.84	
	10:01	E4	20	294.10	.90	289.36	.30	278.97	.77	282.75	1.48	
	10:03	E4	30	297.05	.72	285.73	.34	278.67	1.01	275.10	.96	
	10:06	E4	40	300.42	.52	279.07	.45	278.63	1.07	266.16	1.28	
	10:10	E4	50	302.65	.34	268.21	.23	278.26	1.21	250.17	1.60	
	10:15	E2	60	287.14	.66	282.98	.36	274.07	.93	268.66	1.12	
	10:20	E2	70	286.70	.21	281.17	.36	266.81	1.07	266.62	1.09	
	10:23	E3	70	299.50	.86	291.00	.40	267.41	1.36	249.72	1.25	
	10:24	E3	60	303.78	.38	295.76	.26	275.64	1.06	254.86	1.36	
	10:27	E4	60	300.61	.53	251.44	.34	273.40	.86	226.33	.92	
	10:30	E4	70	281.44	.24	218.59	.47	252.28	.89	184.96	1.00	
	10:43	E1	10	294.01	.58	293.98	.21	299.43	1.52	299.08	.78	Parallel to rows
	10:46	E1	20	294.15	.45	293.33	.42	301.79	3.00	297.30	2.41	"
	10:49	E1	30	294.12	.65	292.61	.41	296.79	1.37	292.33	.90	"
	10:51	E1	40	294.30	.44	291.41	.18	295.16	1.08	291.17	.93	"
	10:53	E1	50	294.09	.22	288.99	.37	292.84	1.15	288.13	.91	"
	10:55	E1	60	292.81	.54	285.77	.25	289.69	1.21	286.27	.84	"
	10:58	E1	70	289.78	.40	281.49	.38	283.80	1.06	283.05	.93	"
	11:00	E5	70	284.23	.45	273.30	.36	276.86	1.01	273.62	.73	"
	11:05	E5	60	290.92	.70	281.96	.38	286.06	1.05	277.06	1.02	"
	11:07	E5	50	293.55	.35	287.62	.39	289.95	1.05	280.56	.77	"
	11:09	E5	40	293.69	.53	289.55	.25	291.18	1.29	283.34	.91	"
	11:12	E5	30	294.38	.32	292.07	.36	293.50	1.00	289.27	.93	"
	11:14	E5	20	294.79	.63	293.88	.36	293.88	1.34	290.75	.98	"
	11:17	E5	10	294.50	1.20	295.25	.34	294.39	1.43	293.54	1.11	"
	12:42	E5	10	297.53	.45	296.26	.29	296.32	1.70	292.47	.96	Perpendicular to rows
	12:45	E5	20	298.13	.38	296.08	.41	297.28	1.35	290.52	.92	"
	12:48	E5	30	298.45	.69	295.59	.31	295.23	1.15	283.76	.92	"
	12:52	E5	40	297.31	.67	293.61	.33	293.34	1.06	281.02	.99	"
	12:54	E5	50	296.02	1.12	290.86	.25	289.67	1.36	275.64	.77	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
7/26/82	12:58	E5	60	293.70	.50	287.58	.30	284.49	1.73	269.30	.99	Perpendicular to rows
	13:01	E5	70	286.38	.40	278.31	.34	273.02	1.68	259.56	.93	"
	13:08	E1	70	288.30	.48	279.88	.40	276.51	1.21	277.16	.87	"
	13:09	E1	60	294.11	.66	287.92	.28	285.89	1.42	281.14	.93	"
	13:11	E1	50	296.83	.42	292.63	.35	291.42	1.19	285.90	.94	"
	13:14	E1	40	297.68	.61	294.97	.36	294.71	1.00	289.04	.97	"
	13:16	E1	30	297.78	.49	296.35	.38	297.87	1.45	292.02	.83	"
	13:19	E1	20	297.52	.24	296.26	.35	300.02	1.33	294.66	1.04	"
	13:21	E1	10	296.68	1.38	296.27	.39	300.87	.82	297.20	.62	"
	13:30	E5	20	297.53	.49	296.46	.33	291.09	1.44	286.01	1.22	45° angle to row
	13:33	E5	20	297.51	.82	296.02	.43	291.91	1.30	286.62	1.22	" boom is 6 ft. lower
	13:37	E4	20	295.89	.42	288.92	.27	289.56	1.05	282.60	.71	Boom same as 13:33
	13:38	E4	20	295.51	.29	288.48	.30	289.98	1.32	284.18	.85	Boom same as 13:30
7/27/82	08:56	E3	10	299.05	.25	298.41	.24	292.06	1.53	288.22	.99	Full canopy
	09:00	E3	20	299.28	.58	299.09	.21	290.97	1.93	285.33	.87	"
	09:03	E3	30	300.22	.40	298.50	.35	290.75	1.39	282.06	.85	"
	09:05	E3	40	300.82	.58	297.36	.32	289.09	.99	276.70	.75	"
	09:07	E3	50	301.31	.89	295.94	.35	287.96	1.32	267.76	.97	"
	09:09	E3	60	301.44	.31	293.86	.29	281.92	1.42	254.07	.99	"
	09:14	E3	70	296.29	.85	287.85	.28	272.46	1.03	247.48	.83	"
	09:25	E4	70	281.65	.31	215.09	.37	259.02	1.31	190.11	.79	
	09:27	E4	60	299.12	.89	244.51	.22	281.81	1.05	227.64	.75	
	09:29	E4	50	302.18	.99	265.28	.25	288.07	1.25	253.02	.87	
	09:32	E4	40	299.96	.70	276.27	.28	289.15	1.40	265.72	1.11	
	09:35	E4	30	296.79	1.01	284.36	.35	289.80	1.33	274.43	.72	
	09:36	E4	20	294.57	.86	289.12	.33	288.98	1.08	281.23	.97	
	09:38	E4	10	293.96	.92	292.12	.30	291.89	1.31	287.46	1.08	
	10:38	E1	10	274.44	.84	273.88	.42	253.73	1.59	256.12	.95	Screens in corn at 4"
	10:41	E1	20	274.14	.53	274.14	.33	256.18	1.26	252.78	.94	Parallel to rows

Date	Time (EDT)	Plot	Angle	CV T_B ± SD	CH T_B ± SD	LV T_B ± SD	LH T_B ± SD	Comments
7/27/82	10:43	E1	30	275.17 .56	276.74 .31	250.18 1.28	254.39 .87	Parallel to rows
	10:46	E1	40	281.07 .25	281.69 .27	256.07 1.09	261.68 .63	"
	10:48	E1	50	286.10 .37	283.91 .41	265.97 1.09	271.25 .96	"
	10:50	E1	60	288.23 .87	283.44 .33	269.46 1.35	274.23 .95	"
	10:56	E3	70	298.01 .71	274.18 .23	259.17 1.15	227.80 .98	First cut
	10:58	E3	60	302.06 .34	285.25 .24	275.68 1.05	249.54 1.27	"
	11:02	E3	50	303.11 .67	291.74 .21	282.76 1.12	262.38 1.01	"
	11:06	E3	40	303.08 .35	296.47 .33	286.53 1.27	272.81 1.00	"
	11:09	E3	30	301.76 .40	298.35 .31	286.76 1.38	277.07 .86	"
	11:12	E3	20	300.93 .32	299.60 .26	287.25 1.23	281.25 .95	"
	11:15	E3	10	300.28 .53	300.34 .34	287.92 1.39	284.55 1.30	"
	11:20	E1	10	268.13 1.20	265.35 .37	237.59 1.01	246.85 .92	Screens in corn at 31"
	11:22	E1	20	264.90 .51	265.73 .32	233.04 1.67	231.28 .92	Parallel to rows
	11:24	E1	30	266.52 .57	270.24 .35	231.62 1.36	229.76 .96	"
	11:26	E1	40	273.80 .40	276.64 .35	238.10 1.34	241.20 .96	"
	11:28	E1	50	281.70 .18	280.65 .29	245.49 1.64	250.16 1.08	"
	11:47	E1	50	247.23 .32	244.31 .38	208.23 1.32	194.82 .81	Screens in corn at 60"
	11:49	E1	40	241.53 .51	235.81 .44	198.55 .86	192.35 .91	(Boom is 12' above corn)
	11:50	E1	30	233.63 .68	226.88 .40	190.86 .91	185.34 .74	"
	11:52	E1	20	221.64 .26	215.56 .50	174.36 1.21	175.59 1.05	"
	11:54	E1	10	232.29 .22	219.47 .43	188.02 1.24	195.86 .80	"
	12:14	E1	10	166.35 .25	139.66 .71	121.37 1.10	124.78 .93	Screens in corn at 90"
	12:16	E1	20	104.70 .29	103.28 .77	97.39 1.06	100.33 1.02	"
	12:18	E1	30	105.06 .25	111.55 .87	103.96 1.67	101.47 1.07	"
	12:20	E1	40	117.53 .21	129.52 .86	112.29 1.23	106.32 1.10	"
	12:22	E1	50	141.78 .23	157.45 .79	129.23 .98	118.43 .95	"
	12:30	E1	50	296.63 .95	292.40 .28	288.42 1.40	284.98 .58	Just posts, no screens
	12:34	E1	40	297.90 .69	295.21 .31	289.98 1.16	288.80 1.19	"
	12:35	E1	30	297.95 .76	296.59 .29	292.90 1.23	290.08 1.13	"
	12:37	E1	20	297.26 .65	297.44 .32	294.88 1.35	293.51 .85	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
7/27/82	12:39	E1	10	297.29	.57	297.56	.31	295.01	1.16	296.39	.93	Just posts, no screens
	13:39	E3	10	299.63	.35	298.75	.37	288.82	3.61	285.06	3.26	Grass-second cut
	13:40	E3	20	299.62	.28	297.54	.28	283.69	1.85	277.66	.96	"
	13:42	E3	30	299.97	.81	296.20	.29	284.71	3.69	276.37	1.61	"
	13:45	E3	40	300.26	.45	292.82	.29	278.81	1.21	266.11	1.09	"
	13:47	E3	50	300.04	.36	286.80	.34	275.68	1.36	254.83	1.00	"
	13:49	E3	60	297.49	.30	275.67	.40	266.94	1.35	235.43	.94	"
	13:51	E3	70	288.04	.98	256.65	.36	243.18	1.79	202.00	.66	"
	14:04	—	0	116.13	.18	101.33	.98	54.08	1.09	114.76	1.02	Screens on Eccosorb
	14:14	E5	10	249.93	.39	256.46	.48	197.23	1.02	207.15	1.00	Screens at 4"
	14:16	E5	20	249.80	.25	255.17	.45	202.18	1.35	201.87	1.12	Parallel to rows
	14:18	E5	30	255.13	.42	260.03	.46	209.93	1.34	203.66	1.18	"
	14:19	E5	40	264.80	.42	268.43	.36	224.97	1.04	214.77	.84	"
	14:21	E5	50	273.65	.84	273.92	.42	239.19	1.16	231.82	.76	"
	14:23	E5	50	262.22	.40	266.02	.34	223.55	1.26	211.46	1.07	Screens at 20"
	14:30	E5	40	247.24	.62	255.80	.39	206.55	1.08	197.89	.91	"
	14:33	E5	30	235.46	.50	243.77	.47	—	—	194.23	.94	"
	14:35	E5	20	230.69	.32	238.26	.55	187.66	2.32	195.74	.85	"
	14:37	E5	10	231.71	.71	237.58	.43	176.13	1.24	197.20	1.23	"
	14:39	E5	10	85.53	.30	80.62	.78	71.79	1.38	83.23	.96	Screens at 66"
	14:51	E5	20	75.55	.26	83.42	.95	76.02	1.04	78.32	1.05	"
	14:52	E5	30	80.81	.40	89.30	.77	76.68	1.23	77.73	.76	"
	14:54	E5	40	90.33	.30	102.74	.89	82.24	1.00	83.20	1.06	"
	14:57	E5	50	106.99	.29	127.46	.90	95.05	1.22	89.83	.75	"
	14:59	E5	50	296.50	.68	290.33	.23	285.61	1.15	275.69	.78	Just posts-no screens
	15:05	E5	40	295.94	.20	291.35	.32	289.20	1.12	281.65	.72	"
	15:07	E5	30	295.35	.34	293.30	.40	289.19	1.67	285.57	1.21	"
	15:10	E5	20	294.04	.80	293.63	.35	291.39	1.10	289.43	.93	"
	15:11	E5	10	294.40	.36	295.20	.52	291.37	1.42	291.25	1.17	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
8/3/82	13:17	–	10	48.24	.43	36.35	.92	75.75	1.11	69.77	1.04	Screens on Eccosorb-parallel
	13:27	–	10	45.92	.32	21.88	1.34	72.49	.91	83.82	1.18	" -perpendicular
	13:46	–	20	61.22	.31	20.90	1.13	52.34	1.14	49.05	1.15	" boom 3.5' above scr.
	13:51	–	20	60.00	.24	20.91	1.13	49.96	.94	55.47	1.11	" perp w/ extra row of scr.
	13:54	–	20	47.13	.30	27.30	1.14	36.63	.87	29.59	1.18	" – parallel
	13:55	–	20	42.45	.28	27.41	.95	36.78	1.10	30.11	1.08	" " w/ extra row of scr.
	13:57	–	20	33.12	.32	21.61	1.15	59.81	1.36	31.11	.95	" at 45° azimuth to boom
	14:17	–	20	49.32	.32	52.43	1.02	58.69	.96	58.09	1.06	Parallel screens on grass-L-centered with boom 2' high
	14:21	–	20	27.34	.30	34.82	.88	70.09	.99	58.80	1.08	-C-centered
8/9/82	08:24	E8	20	274.41	.49	276.72	.32	236.24	1.06	231.02	1.00	Full canopy with screens (S) -L-centered on row
	08:31	E8	20	269.47	1.10	272.01	.39	235.45	1.08	231.89	.88	-L-centered ⇔rows
	08:34	E8	10	265.85	.20	266.85	.30	229.81	1.26	231.07	.85	"
	08:40	E8	10	285.91	.35	286.10	.30	289.77	1.46	285.82	1.10	Full canopy-no screens
	08:42	E8	20	285.80	.34	285.06	.32	291.27	1.74	282.01	1.23	"
	08:45	E8	30	286.75	1.01	285.23	.36	291.21	1.38	280.08	1.00	"
	08:47	E8	40	287.29	.74	284.11	.35	289.37	1.06	277.32	.88	"
	09:04	E8	20	138.49	.17	146.89	.68	190.98	1.15	163.89	1.09	Leaves & ears stripped, w/ scr. (S)
	09:06	E8	10	144.67	.44	153.93	.76	192.64	1.13	187.77	1.05	"
	09:13	E8	10	265.13	.37	264.54	.33	280.28	1.35	273.48	.93	Leaves & ears stripped, no scr. (S)
	09:14	E8	20	266.68	1.14	261.85	.37	279.14	1.19	267.03	1.07	"
	09:17	E8	30	271.62	.34	260.84	.43	282.39	1.37	260.99	1.27	"
	09:19	E8	40	279.90	.31	265.29	.32	280.90	1.61	259.22	.73	" overshooting target a bit
	09:31	E8	20	252.70	.24	257.26	.45	232.33	1.16	228.28	1.01	Top 1/3 cut (N) w/ screens
	09:33	E8	10	251.86	.33	252.83	.33	226.14	1.22	229.44	.90	"
	09:38	E8	10	281.21	.78	281.56	.44	287.53	1.29	283.89	.97	Top 1/3 cut (N) no screens
	09:39	E8	20	281.79	.45	280.90	.34	287.92	1.38	281.03	.90	"
	09:42	E8	30	283.12	.30	280.59	.32	287.46	1.08	277.91	.64	"
	09:44	E8	40	283.39	1.07	278.95	.34	285.61	1.54	275.38	1.13	"
	09:53	E8	10	129.12	.22	128.29	.80	179.33	.83	171.43	.87	Tassels removed from stalks (S) -w/ screens

Date	Time (EDT)	Plot	Angle	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
8/9/82	09:57	E8	20	116.44	.25	122.43	.80	181.75	.92	153.12	1.79	Tassels removed from stalks (S)-w/screens
	09:59	E8	10	264.03	.36	262.06	.38	280.98	1.91	275.14	1.57	" no screens
	10:02	E8	20	265.44	1.05	259.24	.27	280.84	1.34	268.07	1.00	"
	10:04	E8	30	269.22	.64	256.71	.34	280.56	1.31	260.13	.88	"
	10:06	E8	40	275.41	.40	254.93	.35	279.95	1.31	253.98	.92	"
	10:16	E8	10	128.11	.23	125.63	.62	161.45	.84	153.69	.77	Middle 1/3 cut (N)-w/ screens
	10:18	E8	20	117.28	.45	124.65	.86	143.75	.99	135.02	.97	"
	10:22	E8	10	266.53	.37	265.74	.47	274.78	1.02	268.83	.87	" no screens
	10:26	E8	20	267.66	.19	263.08	.34	274.42	1.43	263.00	1.14	"
	10:28	E8	30	271.94	.27	260.66	.36	275.41	1.17	256.19	.93	"
	10:31	E8	40	277.00	.27	257.66	.42	276.26	1.25	249.24	.84	"
	10:41	E8	40	268.07	.43	238.22	.42	266.64	1.42	228.50	.86	Stubble (N)
	10:43	E8	30	260.42	.26	244.09	.32	261.58	1.16	236.24	.93	"
	10:46	E8	20	256.23	.45	249.39	.48	259.63	1.33	244.87	.99	"
	10:50	E8	10	255.60	.38	254.23	.32	260.33	1.08	253.54	.96	"
	10:58	E8	10	255.53	.32	252.66	.37	264.68	1.24	258.85	1.01	Stubble (S)
	11:00	E8	20	256.23	.60	248.62	.45	264.74	1.25	249.64	1.06	"
	11:03	E8	30	261.30	.63	244.09	.39	268.26	.86	243.05	.93	"
	11:05	E8	40	268.55	.90	239.05	.49	270.99	1.17	232.41	.55	"
	11:14	E8	40	244.22	.33	253.81	.42	240.01	.91	267.79	.80	Cut stalks parallel (S)
	11:16	E8	30	237.60	.39	251.42	.42	234.39	.88	271.39	.88	"
	11:18	E8	20	233.26	.28	250.52	.46	227.77	1.26	274.07	.66	"
	11:20	E8	10	233.06	.58	251.51	.52	230.11	1.01	278.32	.82	"
	11:32	E8	10	249.96	.25	235.46	.48	—	—	—	—	Cut stalks perpen (S)
	11:33	E8	20	251.04	.33	233.29	.42	278.32	1.11	195.20	.85	"
	11:36	E8	30	252.78	.30	229.52	.40	278.76	.93	191.23	.92	"
	11:38	E8	40	255.38	.29	226.96	.44	278.60	1.44	186.39	1.31	"
	11:47	E8	40	256.73	1.16	248.41	.42	255.19	1.14	230.91	1.00	Cut stalks random (S)
	11:48	E8	40	256.28	.86	247.95	.49	254.83	1.35	229.98	.92	"
	11:51	E8	40	256.52	1.09	247.61	.39	—	—	229.14	.85	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
8/9/82	11:52	E8	30	252.74	.49	248.20	.48	253.32	1.12	234.67	.78	Cut stalks random (S)
	11:54	E8	20	249.50	.37	247.64	.29	251.83	1.20	240.50	.75	"
	11:57	E8	10	248.38	.78	249.39	.44	255.56	1.23	252.12	.68	"
	12:04	E8	10	280.74	.89	280.20	.22	288.14	1.53	277.54	1.13	Everything random (S)
	12:07	E8	10	279.89	.62	278.45	.28	286.67	1.34	275.78	1.27	"
	12:09	E8	20	279.20	.91	276.51	.37	—	—	—	—	"
	12:11	E8	30	278.80	1.39	275.02	.29	283.91	1.37	270.99	.93	"
	12:13	E8	40	279.80	1.15	274.74	.37	282.82	1.05	268.41	.76	"
	12:17	E8	20	279.81	.43	277.13	.32	284.08	1.93	272.56	1.19	"
	13:48	—	20	92.67	.33	107.07	.90	76.38	1.02	65.89	.98	Screens on grass
	13:53	—	20	92.59	.21	106.91	.93	—	—	67.07	.57	with boom 17' high
	13:54	—	20	92.29	.31	106.63	.75	76.76	.61	67.52	.84	
	13:56	—	10	105.97	.33	114.36	.83	100.28	1.41	86.07	.80	
8/10/82	08:48	E7	10	234.00	.57	238.45	.43	213.20	1.00	208.14	.93	Full canopy w/ screens (S)
	08:51	E7	20	232.32	.28	238.90	.51	212.38	1.71	203.60	.89	"
	08:54	E7	10	282.38	.40	281.35	.45	290.65	1.39	287.49	1.07	Full canopy no screens (S)
	08:58	E7	20	282.73	1.09	280.69	.42	290.12	1.35	283.23	1.33	"
	09:01	E7	30	283.59	.73	279.62	.29	290.30	1.31	277.08	.95	"
	09:02	E7	40	284.03	.78	278.72	.25	289.23	1.14	273.18	.92	"
	09:12	E7	20	101.29	.26	118.49	.91	125.89	1.05	120.38	.78	Leaves & heads stripped from stalks(S)-w/ screens
	09:14	E7	10	102.14	.30	106.25	.88	121.26	.93	125.34	.79	"
	09:17	E7	10	272.34	.27	270.68	.43	278.67	1.26	274.49	.77	Leaves & heads stripped from stalks(S)-no screens
	09:19	E7	20	273.97	.69	269.06	.35	280.09	1.35	269.85	1.02	"
	09:21	E7	30	276.54	.30	266.40	.41	281.31	1.41	261.09	1.25	"
	09:24	E7	40	280.87	.77	266.70	.31	284.04	1.25	254.60	.96	"
	09:31	E7	20	219.99	.30	226.53	.52	193.29	1.22	183.70	.95	Heads removed (N) - w/ screens
	09:34	E7	10	219.12	.21	221.01	.51	196.72	4.83	193.95	4.87	"
	09:36	E7	10	282.72	.34	281.86	.22	290.59	1.31	286.71	1.17	Heads removed (N) - no screens
	09:38	E7	20	282.85	1.20	280.98	.33	290.75	1.39	283.43	1.47	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD	CH T_B ± SD	LV T_B ± SD	LH T_B ± SD	Comments
8/10/82	09:40	E7	30	283.23 .31	279.11 .38	290.63 .99	277.54 .79	Heads removed (N) - no screens
	09:42	E7	40	283.98 .78	278.54 .34	289.66 1.48	274.03 1.06	"
	09:51	E7	40	277.90 .39	261.83 .52	277.90 1.43	246.89 .81	Stubble (S)
	09:54	E7	30	273.48 .98	263.60 .36	277.08 1.76	256.66 1.03	Grass/weeds ↔ rows
	09:57	E7	20	270.92 .39	266.16 .31	275.60 —	265.23 1.07	"
	09:59	E7	10	269.59 .72	268.66 .35	274.21 1.01	269.99 1.04	"
	10:06	E7	10	261.88 .34	271.20 .34	240.53 .94	279.03 .90	Cut stalks parallel (S)
	10:08	E7	20	263.84 .46	270.46 .48	242.37 1.18	274.46 1.02	"
	10:10	E7	30	267.31 .71	269.91 .32	246.44 1.43	268.96 .90	"
	10:12	E7	40	272.55 .96	270.58 .30	251.48 1.04	260.59 .75	"
	10:19	E7	40	277.33 .35	253.13 .42	279.07 1.33	191.60 .92	Cut stalks perp. (S)
	10:20	E7	30	275.39 .91	257.69 .31	279.80 1.21	205.12 1.20	"
	10:24	E7	20	274.65 .59	260.83 .23	278.26 1.20	212.53 .82	"
	10:26	E7	10	274.15 .76	263.13 .38	278.03 1.57	219.69 .97	"
	10:33	E7	10	269.47 .78	270.98 .34	254.88 .99	252.04 .75	Cut stalks random (S)
	10:35	E7	20	270.80 .81	269.89 .37	255.88 1.18	248.25 .90	"
	10:37	E7	30	272.37 1.04	268.07 .31	255.62 1.37	243.47 1.03	"
	10:39	E7	40	275.44 .50	267.32 .23	256.73 1.30	232.02 .94	"
	10:48	E7	40	281.43 .57	277.37 .25	277.12 1.22	268.97 1.08	Everything random (S) -leaves wet
	10:50	E7	30	280.30 .94	277.95 .34	276.91 1.33	271.12 .61	"
	10:52	E7	20	279.23 .56	278.90 .33	274.63 1.40	273.53 .97	"
	10:54	E7	10	278.37 .54	279.10 .39	272.77 1.48	274.88 .93	"
	11:02	E7	10	125.96 .66	131.86 .95	142.88 1.16	138.98 1.03	50% of plants removed (N) - w/ screens
	11:04	E7	20	122.49 .26	132.31 .85	150.80 .91	138.94 .65	"
	11:06	E7	10	279.75 .53	279.14 .39	281.87 .94	277.63 .59	50% of plants removed (N) - no screens
	11:09	E7	20	280.88 .48	277.75 .27	286.10 1.53	273.74 .66	"
	11:11	E7	30	283.33 .84	277.89 .44	286.08 1.23	269.22 1.81	"
	11:13	E7	40	285.33 .86	276.99 .30	285.71 1.17	261.87 1.15	"
	11:29	E7	40	280.26 .34	264.94 .34	278.86 1.19	247.75 1.00	Stubble (N)
	11:30	E7	30	277.85 .97	270.57 .45	278.71 1.29	257.88 .92	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD	CH T_B ± SD	LV T_B ± SD	LH T_B ± SD	Comments
8/10/82	11:32	E7	20	276.19 1.10	273.01 .32	277.19 1.13	264.81 .85	Stubble (N)
	11:34	E7	10	275.15 1.16	274.41 .31	275.98 1.21	269.85 .80	"
8/11/82	09:04	E6	10	184.47 .48	190.48 .56	169.16 .93	169.87 .98	Full canopy (S) - w/ screens
	09:06	E6	10	184.44 .64	190.12 .50	170.58 .93	171.90 .78	"
	09:07	E6	20	180.05 .37	190.15 .62	161.55 .95	159.14 .83	"
	09:10	E6	10	264.66 .34	263.95 .31	265.53 1.55	263.41 1.15	Full canopy (S) - no screens
	09:13	E6	20	264.86 .52	262.43 .39	268.14 1.44	259.41 .86	"
	09:15	E6	30	267.29 .36	261.27 .31	272.03 1.48	252.71 1.04	"
	09:17	E6	40	270.61 .20	260.85 .36	274.01 1.34	250.03 1.11	"
	09:25	E6	40	277.95 .47	269.85 .44	287.64 1.22	267.64 .89	Full canopy (N)-no screens
	09:27	E6	30	276.48 .37	271.78 .32	287.82 1.21	272.81 .99	"
	09:29	E6	20	275.49 .55	273.61 .38	287.56 1.31	279.75 .98	"
	09:30	E6	10	275.25 .35	275.00 .39	285.96 1.22	284.30 .98	"
	09:40	E6	10	148.20 .39	148.64 .59	151.32 .94	145.94 1.09	50% of plants removed (S) - with screens
	09:42	E6	20	142.03 .44	148.15 .69	144.24 1.02	134.95 .92	"
	09:45	E6	10	260.00 .45	257.54 .45	261.55 1.20	259.15 3.08	(N) " no screens
	09:47	E6	20	260.87 .70	255.47 .48	265.36 1.23	252.80 .98	"
	09:49	E6	30	263.66 .70	253.90 .44	— —	245.45 .74	"
	09:51	E6	30	264.02 .81	254.04 .35	267.58 1.46	246.07 1.14	"
	09:52	E6	40	268.41 .82	252.41 .42	270.50 1.63	239.71 1.00	"
	10:04	E6	40	258.53 .31	224.54 .51	262.60 2.17	218.60 .85	Stubble (S)
	10:05	E6	40	258.51 .51	224.79 .45	261.18 1.16	217.84 1.31	"
	10:06	E6	30	250.90 .67	231.61 .43	258.00 1.47	229.56 .85	"
	10:09	E6	20	244.98 .81	237.17 .41	254.20 1.30	238.77 .95	"
	10:11	E6	10	243.42 .26	241.41 .37	252.02 1.23	243.95 1.13	"
	10:28	E1	10	262.52 .57	267.11 .53	249.33 1.11	249.05 .87	Full canopy (S)-w/screens
	10:30	E1	20	266.82 .63	271.28 .38	253.05 1.14	242.23 1.00	"
	10:32	E1	10	285.00 .30	284.85 .36	290.90 1.04	287.56 .83	Full canopy (S)-no screens
	10:35	E1	20	284.84 .99	284.79 .31	290.79 1.33	282.44 .91	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD	CH T_B ± SD	LV T_B ± SD	LH T_B ± SD	Comments
8/11/82	10:38	E1	30	285.02 .73	284.06 .34	289.49 1.18	278.89 1.08	Full canopy (S)-no screens
	10:40	E1	40	285.82 .81	283.05 .37	285.51 1.07	275.46 .94	"
	11:00	E1	20	252.24 1.41	257.26 .34	234.99 1.52	218.02 .77	25% of plants removed (S) - with screens
	11:03	E1	10	246.77 .68	250.98 .38	228.77 1.24	223.96 .79	"
	11:06	E1	10	280.97 .59	280.86 .38	286.80 2.06	283.03 1.13	25% of plants removed (S) - no screens
	11:09	E1	20	281.35 .57	280.37 .59	286.62 1.11	276.71 1.06	"
	11:11	E1	30	281.30 .56	279.13 .44	285.60 1.48	271.87 .94	"
	11:13	E1	40	283.46 .36	279.65 .38	282.40 1.23	269.51 1.13	"
	11:23	E1	20	221.52 1.14	227.60 .95	221.12 1.73	200.07 1.03	50% of plants removed (S) - with screens
	11:25	E1	10	222.13 .84	217.59 .49	216.40 1.05	216.35 .86	"
	11:27	E1	10	275.40 .76	275.54 .41	283.48 .94	279.43 .89	50% of plants removed (S) - no screens
	11:29	E1	20	276.50 .33	275.20 .43	282.81 .78	270.30 .94	"
	11:32	E1	30	279.04 .42	275.76 .39	282.67 1.14	264.75 .97	"
	11:34	E1	40	281.69 .48	276.93 .37	282.00 1.01	263.25 1.12	"
	11:47	E1	20	188.52 .47	192.43 .69	203.00 2.29	182.54 1.05	75% of plants removed (S) - with screens
	11:49	E1	20	— —	— —	202.20 1.29	180.63 .79	"
	11:52	E1	10	187.29 .71	184.96 .56	195.24 1.18	193.39 1.00	"
	11:55	E1	10	268.67 .88	267.27 .45	275.73 .92	272.71 .90	75% of plants removed (S) - no screens
	11:56	E1	20	271.81 .49	267.58 .28	278.72 1.49	266.86 1.24	"
	11:58	E1	30	273.26 .75	266.88 .31	277.08 1.50	260.75 1.34	"
	12:00	E1	40	276.93 .27	266.54 .40	274.56 1.27	250.42 .68	"
	12:10	E1	40	259.75 .36	234.08 .31	259.96 1.42	223.01 1.14	Stubble
	12:12	E1	30	252.85 .28	237.98 .42	257.00 1.19	232.40 .67	"
	12:14	E1	20	247.32 .69	242.15 .42	253.44 1.42	239.19 .99	"
	12:16	E1	10	246.43 .37	247.35 .55	256.09 1.18	249.22 1.17	"
	12:22	E1	10	291.29 .56	291.18 .40	304.75 1.77	300.65 .91	Full canopy (N) - no scr.
	12:24	E1	20	291.30 .97	290.28 .33	302.63 1.99	293.38 1.14	"
	12:27	E1	30	291.67 .97	289.47 .36	302.51 1.55	289.79 1.29	"
	12:28	E1	40	291.79 .27	288.66 .34	292.68 1.19	285.40 .65	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD	CH T_B ± SD	LV T_B ± SD	LH T_B ± SD	Comments
8/25/82	10:49	E5	20	256.37 .31	263.58 .47	224.18 1.00	235.17 1.62	Full canopy-w/ screens
	10:52	E5	20	255.80 .45	264.00 .63	222.04 1.25	234.04 1.24	"
	10:54	E5	20	255.57 .94	263.35 .38	222.83 1.07	232.49 .92	"
	10:56	E5	10	250.72 1.30	258.27 .83	213.42 1.26	240.25 1.34	"
	11:00	E5	10	280.86 1.18	282.07 .27	276.06 1.28	282.60 1.23	Full canopy-no screens
	11:02	E5	20	282.17 .34	281.54 .31	276.50 .90	276.49 .73	"
	11:04	E5	30	283.59 .68	280.40 .29	278.53 1.21	270.39 1.03	"
	11:06	E5	40	285.14 .40	278.72 .35	281.07 1.45	267.54 .82	"
	12:47	E5	10	152.07 1.31	157.76 .90	156.97 1.39	192.84 1.02	Leaves stripped from stalks-w/ screens
	12:49	E5	20	— —	161.10 1.69	178.00 1.90	177.48 1.38	"
	12:51	E5	20	166.44 .71	160.35 1.23	181.03 1.46	174.83 .76	"
	12:53	E5	10	267.85 .59	268.65 .38	263.73 1.07	271.15 1.03	Leaves stripped from stalks-no screens
	12:55	E5	20	271.68 .73	271.29 .33	266.22 1.45	263.54 1.58	"
	12:57	E5	30	274.02 1.38	264.20 .42	270.41 1.26	253.05 1.19	"
	13:00	E5	40	280.50 .46	267.95 .80	271.78 1.96	247.17 1.04	"
	13:14	E5	40	255.37 .40	229.62 .54	245.87 1.10	209.16 .90	Stubble
	13:15	E5	30	240.35 .27	223.09 .48	238.28 .99	215.85 .98	"
	13:17	E5	20	235.44 .33	228.50 .42	232.99 1.56	224.89 .98	"
	13:21	E5	10	236.73 .26	234.79 .47	238.11 1.38	236.01 .97	"
	13:32	E5	10	236.29 .31	264.02 .47	199.86 1.15	264.06 .92	Cut stalks parallel
	13:34	E5	20	235.43 .73	263.45 .36	200.54 1.17	259.56 .89	"
	13:35	E5	30	239.70 .36	264.98 .47	202.42 1.06	259.43 .79	"
	13:37	E5	40	255.97 .24	273.34 .50	208.84 1.19	259.11 .82	"
	13:49	E5	40	266.59 1.07	242.79 .41	260.28 1.36	184.80 1.19	Cut stalks perp.
	13:51	E5	30	263.86 .90	240.27 .34	259.78 1.37	185.64 1.08	"
	13:53	E5	20	260.85 .73	243.36 .44	260.12 1.08	188.77 .81	"
	13:55	E5	10	260.75 .29	244.98 .31	260.22 1.63	191.76 .87	"
	14:07	E5	10	48.03 .39	47.81 .95	69.65 1.11	82.36 1.11	Screens on stubble-L-centered
	14:09	E5	20	37.24 .32	44.89 1.15	61.36 1.01	63.44 .74	"
	14:22	E5	20	202.72 .41	212.28 .49	167.56 1.19	172.50 1.06	280 stalks on screens perpendicular

Date	Time (EDT)	Plot	Angle	CV T_B ± SD	CH T_B ± SD	LV T_B ± SD	LH T_B ± SD	Comments
8/25/82	14:24	E5	10	203.45 .51	209.36 .52	168.13 1.25	192.51 .89	280 stalks on screens perpendicular
	14:33	E5	10	240.43 .31	227.12 .45	228.11 1.21	190.87 .92	560 stalks on screens perpendicular
	14:35	E5	20	239.82 .27	226.99 .41	225.68 .88	188.11 .80	"
	14:53	E5	20	203.94 .63	208.15 .83	184.57 .95	186.92 1.05	280 stalks on screens parallel
	14:55	E5	10	203.38 .41	208.13 .38	193.42 .81	191.03 .54	"
	15:02	E5	10	222.04 .54	240.68 .37	201.76 1.11	227.90 1.06	560 stalks on screens parallel
	15:03	E5	20	223.70 .52	239.65 .43	203.23 1.03	228.11 .89	"
	15:14	E5	10	254.24 .41	258.23 .37	226.48 1.09	230.27 .89	Cut stalks random
	15:16	E5	20	254.90 .44	257.37 .46	226.69 1.07	228.80 1.05	"
	15:17	E5	30	258.46 1.06	257.77 .42	230.75 1.10	223.58 .94	"
	15:20	E5	40	263.49 .78	257.51 .45	232.53 1.34	220.23 .80	"
	15:30	E5	40	284.50 .79	280.39 .28	271.97 1.26	272.10 .94	Everything random
	15:31	E5	30	282.22 .28	279.63 .39	269.66 1.24	272.33 .90	"
	15:34	E5	20	280.95 .28	279.84 .39	271.41 1.01	275.79 .91	"
	15:36	E5	10	280.11 .39	279.84 .31	272.91 .94	277.96 .96	"
8/26/82	09:16	E5	20	262.19 .44	267.43 .31	224.56 .82	225.40 1.01	Full canopy-w/ screens
	09:20	E5	10	254.76 .61	257.12 .25	220.22 1.31	229.11 .82	"
	09:23	E5	10	281.96 .55	281.98 .33	270.94 1.44	271.65 .99	Full canopy-no screens
	09:24	E5	20	279.41 1.12	278.23 .40	272.19 1.41	269.41 1.02	"
	09:27	E5	30	278.27 .45	276.43 .58	273.59 1.32	265.90 .90	"
	09:29	E5	40	277.88 .46	270.08 .37	274.89 1.42	261.61 1.08	"
	09:43	E5	40	273.99 .75	263.60 .60	260.91 1.24	248.77 .83	Top 1/3 cut-no screens
	09:45	E5	30	271.30 .31	265.72 .98	259.89 1.26	254.43 .55	"
	09:46	E5	20	266.72 .44	265.48 .26	261.23 1.23	258.91 .91	"
	09:48	E5	10	268.50 .31	267.74 .37	264.67 1.53	264.28 .99	"
	09:54	E5	10	211.09 .25	221.54 .45	193.94 1.16	196.42 .68	Top 1/3 cut-w/ screens
	09:56	E5	20	215.33 .60	227.16 .41	189.98 .97	189.59 .93	"
	10:15	E5	20	126.01 .32	137.14 .75	138.93 .80	140.33 .73	Mid 1/3 cut-w/ screens
	10:17	E5	10	132.42 .22	138.16 .76	146.49 1.40	151.60 1.01	"

Date	Time (EDT)	Plot	Angle	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
8/26/82	10:20	E5	10	246.88	.63	246.12	.48	250.19	1.17	250.30	.96	Mid. 1/3 cut-no screens
	10:21	E5	20	246.94	.35	243.05	.47	246.25	1.25	244.61	.89	"
	10:24	E5	30	251.21	.95	239.76	.53	247.78	1.36	238.29	.90	"
	10:26	E5	40	259.18	1.07	236.95	.38	251.94	1.38	233.99	.72	"
	10:37	E5	40	250.01	.47	217.34	.47	245.68	1.29	219.75	.87	Stubble
	10:38	E5	30	242.80	.37	225.28	.44	237.12	.80	221.07	.95	"
	10:42	E5	20	237.39	.24	229.22	.40	234.60	1.11	229.71	.83	"
	10:44	E5	10	237.74	.36	235.79	.46	235.58	.96	232.27	1.00	"
	10:47	E5	10	102.87	.30	101.17	1.18	98.79	.93	96.73	1.00	4" stubble-w/ screens
	10:51	E5	20	88.78	1.02	96.64	.68	92.22	1.01	90.79	.93	"
	10:53	E5	20	234.20	.68	225.26	.50	230.61	.89	222.20	.62	Stubble-no screens or wood blocks
	10:57	E5	20	232.66	.64	223.53	.30	229.13	1.00	220.77	1.10	Stubble-L centered ⇔rows
	11:01	E5	20	236.77	.52	227.36	.49	231.10	1.30	227.54	.86	Stubble-w/ wood blocks
	11:16	E5	20	231.71	.57	222.34	.52	225.40	1.06	216.56	.74	1" stubble
	12:47	E8	40	267.45	.72	251.62	.39	261.85	1.29	262.93	.85	Dry cut stalks-perp.
	12:50	E8	30	263.10	.37	254.57	.33	260.80	1.42	266.80	1.14	"
	12:52	E8	20	260.07	.88	254.80	.34	258.25	1.48	270.95	1.32	"
	12:54	E8	10	259.20	.78	256.19	.41	256.56	.75	272.09	1.06	"
	13:06	E8	10	252.77	.43	260.82	.41	276.64	1.59	260.27	.99	Dry cut stalks-parallel
	13:09	E8	20	253.60	.54	258.81	.46	273.73	1.53	253.96	1.06	"
	13:11	E8	30	258.55	.39	258.70	.42	275.72	1.02	248.56	.86	"
	13:13	E8	40	265.99	.30	259.25	.40	274.92	1.37	241.39	.87	"
	13:18	E8	40	264.21	.23	227.47	.40	252.65	1.22	215.41	.68	Stubble (S)
	13:20	E8	30	255.94	.51	235.69	.44	247.89	1.29	225.16	1.15	"
	13:22	E8	20	251.09	.54	242.75	.47	243.37	.99	234.69	1.01	"
	13:24	E8	10	251.33	.32	248.60	.57	245.13	1.76	242.77	1.12	"
	13:42	E8	10	62.07	.23	60.02	.92	94.96	1.04	108.94	1.40	Screens at 60" over dry stubble (N)
	13:45	E8	20	50.26	.32	54.77	1.06	—	—	53.64	2.44	"
	13:47	E8	20	50.14	.36	54.59	1.07	57.72	1.01	51.49	1.20	"
	14:03	E8	20	68.85	.31	76.37	.92	109.96	1.14	99.56	1.10	Screens at 30" over dry stubble (N)

Date	Time (EDT)	Plot	Angle	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
8/26/82	14:05	E8	10	79.65	.27	73.23	.94	118.18	1.00	111.39	.90	Screens at 30" over dry stubble (N)
	14:14	E8	10	92.98	.33	87.08	.88	133.38	1.07	118.58	1.05	Screens at 4" over dry stubble (N)
	14:17	E8	20	82.30	.25	97.68	.92	107.92	.90	101.74	.99	"
	14:23	E8	20	57.14	.19	71.71	1.03	64.63	1.20	69.59	1.18	Screens at 4"-no posts
	14:25	E8	10	72.17	.30	74.64	1.10	71.45	1.16	76.81	1.25	"
	14:30	E8	10	295.53	.60	295.14	.25	274.10	1.07	272.46	1.59	Dry stubble (N)
	14:31	E8	20	296.38	.68	293.31	.31	272.27	1.58	266.35	.84	"
9/15/82	09:30	E8	20	248.58	.41	236.80	.36	261.65	1.69	242.74	1.35	Standing stalks (S)
	09:55	E8	20	238.62	.92	226.40	.45	246.45	1.09	231.01	1.00	Stubble (S)
	10:04	E8	20	227.37	.36	229.70	.62	241.27	1.76	246.09	1.21	100 freshly cut stalks parallel (S)
	10:09	E8	20	225.98	.33	234.72	.47	246.46	1.69	254.39	1.00	200 "
	10:14	E8	20	224.08	.34	239.23	.46	251.46	1.66	260.56	1.37	300 "
	10:19	E8	20	220.02	.35	241.30	.39	256.87	1.58	259.63	1.27	400 "
	10:23	E8	20	217.46	.33	243.44	.59	246.79	1.43	260.28	1.49	500 "
	10:29	E8	20	221.19	1.01	246.56	.35	253.70	1.77	262.03	1.04	600 "
	10:38	E8	20	288.53	.65	284.96	.34	290.25	1.40	282.67	1.02	Standing stalks (N)
	10:52	E8	20	284.38	.31	279.91	.45	291.28	1.80	280.75	1.62	Stubble (N)
	10:59	E8	20	263.10	.79	272.11	.37	267.70	1.61	282.63	1.67	100 freshly cut stalks parallel (N)
	11:04	E8	20	247.08	.38	265.47	.44	266.54	1.22	284.75	1.58	200 "
	11:09	E8	20	237.03	.71	261.76	.43	257.65	1.63	284.54	1.37	300 "
	11:15	E8	20	234.03	.45	259.69	.37	262.62	1.50	283.89	1.16	400 "
	11:20	E8	20	227.76	.40	256.46	.39	267.62	2.01	285.07	1.23	500 "
	11:27	E8	20	228.82	.43	258.39	.52	272.20	1.02	286.45	1.53	600 "
	12:52	E8	20	228.14	.87	258.93	.57	268.54	2.38	276.52	1.44	1200 cut stalks parallel (S)
	13:07	E8	20	287.81	.41	284.19	.37	288.21	1.62	281.36	1.08	100 dry stalks parallel (N)
	13:13	E8	20	287.35	.54	284.90	.42	289.92	1.51	282.38	1.68	200 "
	13:18	E8	20	287.73	.33	285.42	.33	290.69	1.68	283.37	1.37	300 "
	13:26	E8	20	290.41	.57	288.40	.24	292.52	1.78	284.65	1.82	500 "
	13:36	E8	20	264.81	.35	247.32	.35	266.62	1.68	243.34	1.06	500 dry stalks paral (S)

Date	Time (EDT)	Plot	Angle	CV T_B ± SD	CH T_B ± SD	LV T_B ± SD	LH T_B ± SD	Comments
9/15/82	13:42	E8		245.32 .43	234.68 .37	245.84 1.52	233.78 1.22	Stubble (S)
	13:49	E8		249.59 .29	238.01 .44	250.97 1.55	236.25 1.19	100 dry stalks parallel (S)
	13:53	E8		255.63 .40	241.90 .46	259.19 1.29	239.75 1.15	200 "
	13:56	E8		260.77 .33	245.50 .41	265.06 1.56	242.06 1.28	300 "
	14:04	E8		290.64 .35	285.20 .31	286.35 1.45	280.34 1.32	Stubble (N)

APPENDIX F

Vegetation Measurements

Date	Plot	Crop	Component or Treatment	Plant Height	Canopy Cover	Plant Density	Wet Weight	Dry Weight	Water Content	Note
				(cm)	(%)	(per m^2)	———	(gm/m^2)	———	
6/18/82	S3	Winter wheat		80	100	600	1431	780	651	
	S3	Winter wheat	Heads	—	—	600	586	390	195	
	S3	Weeds		15	25	—	88	21	67	
6/23/82	S3	Winter wheat		80	100	600	1268	827	441	
	S3	Winter wheat	Heads	—	—	600	464	358	106	
	S3	Weeds		15	25	—	219	62	157	
6/25/82	S6	Winter wheat		80	100	600	933	619	314	
	S6	Weeds		15	25	—	157	46	111	
	S3	Winter wheat	S3 added	—	—	—	614	370	144	1
7/27/82	E3	Grass		30	100	—	466	257	209	
	E3	Grass	Clipped	10	100	—	138	96	42	
7/28/82	E1	Corn		275	100	9.3	4746	700	4046	
	E1	Corn	Layer removed	150	80	9.3	3708	365	3343	
	E1	Corn	Layer removed	75	50	9.3	1938	265	1673	
7/29/82	E5	Sweet sorghum		150	100	23.4	4207	564	3643	
	E5	Sweet sorghum	Layer removed	60	50	23.4	1417	156	1261	

Date	Plot	Crop	Component or Treatment	Plant Height	Canopy Cover	Plant Density	Wet Weight	Dry Weight	Water Content	Note
				(cm)	(%)	(per m^2)	-------	(gm/m^2)	-------	
8/09/82	E8	Corn		230	100	9.1	6899	891	6008	
	E8	Corn	Layer removed	150	90	9.1	6119	696	5423	
	E8	Corn	Layer removed	75	50	9.1	2254	194	2060	
	E8	Corn	Tassels	—	—	9.1	77	29	48	
	E8	Corn	Leaves	—	—	—	1313	289	1024	
	E8	Corn	Cobs	—	—	—	1521	193	1328	
	E8	Corn	Stalks	240	—	9.1	3227	506	2721	
8/10/82	E5	Sweet sorghum		230	100	23.4	8161	1170	6991	
	E7	Grain sorghum		100	100	11.6	3074	652	2422	
	E7	Grain sorghum	Layer removed	50	50	11.6	1709	360	1349	
	E7	Grain sorghum	Heads	—	—	11.6	418	129	289	
	E7	Grain sorghum	Leaves	—	—	—	900	198	702	
	E7	Grain sorghum	Stalks	100	—	11.6	1755	324	1431	
8/11/82	E1	Corn (south s.)		275	100	9.3	5978	984	4494	
	E1	Corn (north s.)		275	100	9.3	4317	963	3354	
	E1	Corn	Leaves	—	—	—	1020	242	778	
	E1	Corn	Stalks	275	—	9.3	3297	721	2576	
	E5	Sweet sorghum		240	100	23.4	2494	400	2094	
	E5	Sweet sorghum	Leaves	—	—	—	653	164	489	
	E5	Sweet sorghum	Stalks	240	—	23.4	1841	236	1605	
	E6	Soybeans	Average	60	90	13.0	1802	187	894	
	E6	Soybeans	Irrigated	60	90	13.0	1130	192	937	
	E6	Soybeans	Non-irrigated	60	90	13.0	940	173	767	

Date	Plot	Crop	Component or Treatment	Plant Height	Canopy Cover	Plant Density	Wet Weight	Dry Weight	Water Content	Note
				(cm)	(%)	(per m^2)	———	(gm/m^2)	———	
8/20/82	E5	Sweet sorghum		240	100	23.4	7023	1360	5663	
8/25/82	E5	Sweet sorghum	Leaves	240	—	—	1248	—	—	2
	E5	Sweet sorghum	Stalks	240	—	23.4	6955	—	—	2
	E5	Sweet sorghum	Stalks or screens	—	—	15.0	1530	—	—	2
8/26/82	E5	Sweet sorghum		240	100	23.4	6881	—	—	2
	E5	Sweet sorghum	Layer removed	150	100	23.4	4986	—	—	2
	E5	Sweet sorghum	Layer removed	75	50	23.4	2494	—	—	2
	E8	Corn	Stalks	270	—	15.0	1370	825	545	3
9/03/82	E1	Corn		275	100	9.3	4351	1454	2897	
	E1	Corn	Leaves	—	—	—	678	236	442	
	E1	Corn	Stalks	275	—	9.3	3673	1218	2455	
	E5	Sweet sorghum		260	100	23.4	4801	2022	2779	
	E5	Sweet sorghum	Leaves	—	—	—	683	256	427	
	E5	Sweet sorghum	Stalks	260	—	23.4	4118	1766	2352	
9/15/82	E5	Sweet sorghum		260	100	23.4	7225	1870	5355	
	E5	Sweet sorghum	Stubble	10	—	—	494	101	393	
	E8	Corn	S-Stalks	270	—	9.1	1470	367	1103	
	E8	Corn	N-Stalks	270	—	9.1	1254	369	885	
	E8	Corn	Stalks	240	—	—	54	43	11	4

Notes: 1 — Winter wheat from S3 redistributed on S6.
2 — Drying oven malfunction suspected, weights discarded.
3 — Stalks redistributed.
4 — Values are per stalk.

APPENDIX G

Soil Temperature Measurements for Time Series Experiments

Notation:

Canopy/Air Difference

+ indicates that the surface/canopy is warmer than the air

- indicates that the surface/canopy is cooler than the air

Soil Temperature Data for Time Series Measurements at BARC Plots, 1982 (In Degrees C)

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
8/2/82	E4	10:35		29.2				Time Series I – Bare (Day 1)
		10:45		29.6				
		11:00		30.5				
		11:15		30.7				
		12:00		31.0				
		12:33		32.0		30.3	29.7	
		13:00		31.4	31.7	30.0	29.4	
		13:30		31.8	32.2	30.6	29.7	
		14:00		31.0	32.8	31.1	30.0	
		14:30		32.1	33.9	31.7	30.6	
		15:00		31.7	32.8	31.7	30.6	
		15:45		30.4	31.7	30.6	30.0	
8/2/82	E5	12:24		28.5				Time Series I – Sweet Sorghum (Day 1)
		12:45	A in near side	28.6	28.9	27.8	25.6	
			B in far side		29.4	27.8	26.1	
		13:15	A	28.0	28.9	27.8	25.6	
			B		28.9	27.8	26.1	
		13:45	A	28.4	28.9	27.5	25.6	
			B		29.4	27.8	26.1	
		14:15	A	29.2	28.9	27.8	26.7	
			B		28.9	27.8	26.1	
		14:45	A	29.3	29.4	28.3	26.7	
			B		30.0	28.3	26.1	
		15:00	A	29.4	30.0	28.3	26.1	
		15:45	A	29.1	29.4	28.3	26.1	
8/3/82	E4	11:15		30.1	29.4	28.3	27.8	Time Series I – Bare (Day 2)
		11:30		30.4	30.6	29.4	28.3	
		12:00		29.5	31.7	29.4	28.3	
		12:30		31.8	32.2	30.6	29.4	

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
8/3/82	E4 (cont.)	13:00		33.3	32.5	31.1	31.1	
		13:30		33.3	32.0	30.3	31.1	
		14:07		33.4	34.4	31.7	31.4	
		14:35		33.0	32.8	31.7	31.7	
8/3/82	E5	11:20	A - 1.2	26.4	26.1	25.0	23.3	Time Series I – Sweet Sorghum (Day 2)
			B		26.7	25.6	23.3	
		11:35	A - 2.5	27.2	26.7	25.6	23.9	
			B		27.2	25.6	23.3	
		11:50	A - 2.2	27.1	26.7	25.6	23.9	
			B		27.2	25.6	23.3	
		12:15	A - 2.0	28.0	26.7	26.1	24.4	
			B		27.8	26.7	23.3	
		12:45	A - 1.1	28.6	27.2	26.7	25.0	
			B		27.8	26.7	23.9	
		14:07	A	29.6	29.4	28.3	26.1	
			B		29.4	27.5	25.6	
		14:20		29.8				
8/4/82	E4	11:05		29.5	29.2	29.2	28.9	Time Series I – Bare (Day 3)
					29.6			
		11:30	+ 1.2	32.0	31.1	30.0	29.4	(Additional measurement at 1 cm taken with small digital thermometer which was exposed to direct sun)
					31.5			
		12:00	+ 0.2	31.9	30.6	30.0	30.0	
					31.6			
		12:35	+ 1.0	34.1	31.7	31.1	30.6	
					33.6			
		13:00	+ 1.1	32.6	31.7	31.1	31.1	
					33.7			
		13:30		33.7	32.8	31.7	31.1	
					35.1			

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
8/4/82	E4 (cont.)	14:00		33.8	32.2	32.0	31.1	
					33.5			
		14:30		33.9	32.8	32.0	31.1	
					34.4			
8/4/82	E5 A	11:17	- 1.0	27.8	27.5	25.9	23.9	Time Series I – Sweet Sorghum (Day 3)
	B				27.8	26.1	23.3	
	A	11:45	- 3.2	27.8	28.3	26.4	24.4	
	B				28.9	26.7	24.4	
	A	12:15	- 2.0	29.0	28.3	26.7	24.7	
	B				29.4	27.5	25.3	
	A	12:47	- 2.5	29.5	27.8	29.4	25.0	
	B				30.6	27.8	25.9	
	A	13:19		29.6	28.9	29.4	25.6	
	B				31.1	29.2	26.1	
	A	13:49	- 1.1	29.5	30.6	28.9	26.1	
	B				31.1	28.3	26.4	
	A	14:40	- 2.6	30.1	32.0	28.9	26.7	
	B				31.7	29.4	27.5	
8/5/82	E4	11:30		31.0	31.4	29.7	29.2	Time Series I – Bare (Day 4)
					31.1			
		12:00	+ 2.3	33.6	33.3	31.1	29.4	
					32.3			
		12:30	+ 1.7	35.0	33.6	31.7	30.6	
					33.3			
		13:00	+ 2.5	34.7	33.6	31.7	30.9	
					33.1			
		13:30	+ 2.4	34.9	33.9	32.0	31.1	
					33.7			

Date	Plot		(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
8/5/82	E4 (cont.)		14:04	+ 2.7 (dry)	35.2	34.2	32.2	31.7	
				+ 0.9 (wet)	33.8	34.0			
			14:25	+ 2.9	35.2	35.0	32.5	31.7	
						34.4			
8/5/82	E5	A	11:33	- 0.5	28.9	28.9	27.8	26.1	Time Series I – Sweet
		B				29.4	27.8	26.1	Sorghum (Day 4)
		A	11:46	- 0.8	28.5	28.9	27.8	26.1	
		B				29.4	27.8	26.1	
		A	12:15	- 1.0	29.9	29.7	28.6	26.7	(patches of sun on surface)
		B				30.6	28.9	26.7	
		A	12:45	- 0.6	30.2	30.3	28.9	26.7	
		B				30.9	28.9	27.2	
		A	13:15	- 1.8	31.7	30.9	29.4	27.2	
		B				32.2	29.4	27.2	
		A	13:49	- 1.3	30.9	32.2	30.6	27.8	
		B			31.1	32.2	29.4	27.8	
		A	14:18	- 1.4	31.0	32.2	30.9	27.8	
		B				33.1	29.4	27.8	
8/9/82	E4		13:10	+ 5.4	34.8	33.3	34.4	34.4	Time Series I – Bare
			14:05	+ 4.4	34.1				(Day 8)
8/9/82	E5	A	13:25	- 1.2	28.6	28.9	27.8	26.7	Time Series I – Sweet
		B				28.3	27.8	26.1	Sorghum (Day 8)
8/10/82	E4		13:20	+ 10.3	40.4	34.4	34.4	32.8	Time Series I – Bare
						38.9			(Day 9)
			13:50	+ 9.1	39.2	35.0	34.4	33.3	
						37.9			
			14:15	+ 7.1	36.3	35.0	34.4	33.3	
						35.4			

Date	Plot		(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
8/10/82	E5	A	13:25	- 3.6	28.8	29.4	27.8	25.0	Time Series I – Sweet
		B				28.9	27.8	25.6	Sorghum (Day 9)
		A	13:45	- 0.8	29.6	29.4	27.8	25.6	
		B				28.9	27.8	25.6	
		A	14:20	- 2.1	27.3	28.3	27.2	25.6	
		B				28.9	27.8	25.6	
8/11/82	E4		13:05		38.0	31.7	33.3	32.2	Time Series I – Bare (Day 10)
					35.0	35.9			(sfc measurement over tire track)
			13:31		40.4	32.0	33.3	32.8	
					37.0	36.1			(sfc measurement over tire track)
			14:02	+ 12.0	39.8	31.7	32.8	32.8	
					37.0	35.3			(sfc measurement over tire track)
8/11/82	E5	A	13:14	- 1.0	26.7	26.7	26.1	24.4	Time Series I – Sweet
		A	13:45	- 1.4	25.3	26.1	26.7	24.4	Sorghum (Day 10)
		B				26.1	26.1	24.4	
		A	14:15	+ 0.6	27.6	27.8	27.2	25.0	
		B				27.2	26.7	25.0	
8/16/82	S4		10:50	- 0.1 to + 0.5	28.9	27.2	27.8	28.1	Time Series II – Bare
			11:00	- 0.8	29.0	28.3	28.3	28.3	(Day 1)
			11:20	- 0.4	29.3	28.6	29.2	28.9	
						29.9			
			11:33	+ 0.6	30.1	29.4	29.7	29.2	
						29.9			
			12:02	+ 0.3	30.7	30.0	30.0	29.4	
						30.2			
			12:30	- 0.4	30.6	30.6	30.6	30.0	
						30.2			
			13:10	+ 0.5	31.5	29.4	30.9	30.6	
						30.1			

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
8/16/82	S4 (cont.)	13:37	+ 0.5	32.2 30.5*	30.3 31.1	31.4	30.6	* in shadow of radiometer
		14:01	+ 1.2	32.0	30.0 31.2	31.1	31.1	
		14:31	- 0.8	31.8	31.1 31.6	32.2	31.7	
		15:00	+ 0.7	31.4	31.4 31.0	31.7	31.7	
8/16/82	S5	11:17	- 1.6	26.6	24.7	23.3	21.7	Time Series II — Soybeans (Day 1)
		11:47	- 0.3 (?)	27.7	25.0	23.3	21.7	
		12:19	- 2.4	29.2	26.1	23.9	22.2	
		13:12	- 2.6	29.2	26.1	23.9	22.2	
		13:52	- 2.2	29.0	26.1	24.2	22.2	
		14:15	- 2.5	29.4	25.6	24.4	22.8	
		14:47	- 3.1	29.6	26.7	24.4	22.8	
8/17/82	S4	11:05	0.0	29.4	29.4 28.4	29.4	27.8	Time Series II — Bare (Day 2)
		11:27	+ 0.3	29.8	30.6 28.7	30.0	28.3	
		11:59	- 0.7	30.0	31.4 29.0	30.6	28.9	
		12:28	- 1.0	30.8	31.7 28.9	30.6	29.2	
		12:56	- 2.7	30.4	31.7 29.0	30.3	29.2	
		13:24	- 1.7	30.6	32.5 29.7	30.9	29.4	
		13:56	- 2.4	30.6	32.0 29.4	29.4	28.6	

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
8/17/82	S4 (cont.)	14:26	- 2.6	29.2	32.2 28.3	28.9	29.2	
8/17/82	S5	11:14	- 2.4	27.1	25.6	23.3	21.7	Time Series II – Soybeans
		11:50	- 0.6	28.2	26.7	23.9	22.2	(Day 2)
		12:15	- 3.0	27.7	27.2	23.9	22.2	
		12:41	- 4.4	28.1	27.2	24.4	22.8	
		13:17	- 4.2	28.6	27.2	24.4	22.8	
		13:41	- 4.0	29.2	26.7	24.4	22.8	
		14:12	- 4.3	27.5	26.7	24.4	23.1	
8/18/82	S4	11:06	+ 1.6	26.4	27.8 27.9	27.0	29.2	Time Series II – Bare (Day 3)
		11:28	+ 1.4	27.3	27.5 27.8	26.7	28.9	
		11:54	+ 1.3	26.6	27.5 27.6	26.7	28.9	
		12:30	+ 1.4	28.4	27.5 27.7	27.0	28.9	
		13:03	+ 1.5	28.4	28.3 28.0	27.8	29.4	
		13:30	+ 0.5 to + 1.5	28.5*	28.3 27.2	27.8	29.4	* varied from 27.5° to 28.5°
		14:00	+ 0.8	29.4	28.6 27.4	27.8	29.4	
		14:30	+ 0.7	29.0	28.9 27.6	27.8	29.4	
8/18/82	S5	11:15	- 0.2	24.2	22.8	21.1	20.3	Time Series II – Soybeans
		11:43	- 0.7	24.1	23.3	21.1	20.6	(Day 3)
		12:15	- 0.9	24.3	23.3	21.7	21.1	

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
8/18/82	S5 (cont.)	12:45	- 0.8	25.5	23.9	22.0	21.1	
		13:10	- 3.7	25.4	23.9	22.0	21.1	
		13:45	- 1.4	27.3	23.9	22.0	21.1	
		14:15	- 2.3	26.4	23.9	22.0	21.1	
8/19/82	S4	11:26	- 1.8	28.2	29.7 28.4	28.9	27.0	Time Series II – Bare (Day 4)
		12:09	0.0	29.1	29.7 29.0	28.9	27.8	
		12:30	- 0.6	29.9	30.0 29.4	29.2	28.1	
		13:00	- 1.6	29.8	30.6 29.6	30.0	28.3	
		13:30	- 2.3	30.3	32.8 30.0	31.1	28.9	
		14:00	- 2.4	30.0	32.6 29.6	31.1	29.2	
		14:30	- 2.5 to - 2.8	29.6	32.6 29.4	31.1	29.4	
		15:57	- 1.7	29.0	34.4* 32.1*	31.1*	30.0*	* temperature probes in new location after accidental removal from old site
8/19/82	S5	12:15	- 2.2	27.5	25.0	22.2	21.1	Time Series II – Soybeans (Day 4)
		12:45	- 1.6	27.1	25.6	22.5	21.7	
		13:15	- 1.1	28.1	25.9	22.8	21.7	
		13:45	- 3.1	27.9	25.9	22.8	21.7	
		14:15	- 2.2	28.1	25.9	22.8	21.7	
		14:51	- 3.8	27.7	25.6	23.3	21.7	
8/20/82	S4	11:01	- 1.4	27.6	31.7 29.6	28.9	26.7	Time Series II – Bare (Day 5)

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
8/20/82	S4 (cont.)	11:32	- 1.1	28.2	31.1 29.8	29.2	27.8	
		12:03	- 0.5	30.2	33.3 30.5	30.6	28.9	
		12:33	+ 0.1	31.1	33.6 31.1	31.1	29.4	
		13:00	+ 0.1	30.9	33.9 31.3	31.7	29.7	
		13:30	- 0.8	31.3	33.6 32.2	32.8	31.1	
		14:00	+ 0.6	32.6	35.6 33.6	33.6	31.7	
8/20/82	S5	11:16	- 2.2	27.8	25.6	22.8	21.1	Time Series II – Soybeans
		11:47	- 4.0	29.2	26.7	22.8	21.1	(Day 5)
		12:17	- 3.1	28.1	26.7	23.3	21.7	
		12:47	- 2.7	28.3	26.7	23.3	21.7	
		13:15	- 1.3	29.2	27.0	23.3	22.0	
		13:45	- 4.7	28.9	27.2	23.6	22.6	
		14:15	- 4.6	28.4	27.5	23.9	22.2	
		14:45	- 5.3	26.9	27.2	23.9	22.2	
8/23/82	S4	11:10	- 2.6	26.0				Time Series II – Bare
		12:00	- 1.4	24.9	26.7 26.8	27.0	27.8	(Day 8)
		12:30	- 0.7	26.2	27.0 27.5	27.0	27.8	
		13:00	- 0.5	25.5	27.2 27.2	27.0	27.8	
		13:30	- 0.9	27.9	30.0 28.6	27.8	27.8	
		14:00	+ 0.6	29.6*				* dry portion of plot

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
8/23/82	S5	11:30	- 1.6	24.4	22.8	21.1	20.0	Time Series II – Soybeans
		11:50	- 2.1	23.0	22.8	21.1	20.0	(Day 8)
		12:15	- 1.0	25.5	22.8	21.1	20.0	
		12:45	- 1.7	23.2	22.8	21.1	20.0	
		13:15	- 2.2	25.0	22.8	21.4	20.6	
8/31/82	Gish	10:49	+ 1.6	27.0	28.1	25.6	23.6	Time Series III – Bare
	Bare	11:03	+ 1.1	27.8	29.2	26.4	23.9	(Day 1)
					25.8			
		11:33	+ 1.4	28.3	29.4	27.2	24.4	
					25.8			
		11:55	+ 2.5	30.0	30.6	27.8	25.0	
					26.3			
		12:30	+ 2.5	30.6	32.0	28.6	25.9	
					27.4			
		13:02	+ 1.8	29.9	32.2	28.9	26.7	
					27.8			
		13:27	+ 0.5	30.6	33.1	29.4	27.0	
					28.5			
		14:16	- 0.1	30.8	34.4	30.0	27.8	
					29.2			
		14:31	0.4	30.9	34.2	30.0	28.1	
					29.1			
8/31/82	Gish	10:47	- 1.5	24.7	23.3	21.1	19.4	Time Series III – Corn
	Corn	11:20	- 0.5	26.6	24.7	22.0	20.0	(Day 1)
		11:47	- 3.3	26.7	25.0	22.2	20.3	
		12:20	+ 0.1	28.1	26.1	23.3	21.1	
		12:45	- 0.2	28.7	26.7	23.6	21.4	
		13:15	- 0.6	28.5	27.2	23.9	21.7	
		13:43	- 0.5	28.9	27.5	24.4	22.0	
		14:15	- 2.2	30.3	28.6	25.0	22.2	

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
9/1/82	Gish Bare	11:33	0.0	24.0	25.6 23.2	23.3	22.5	Time Series III – Bare (Day 2)
		12:03	– 0.3	24.3	26.1 23.5	23.6	22.8	
		12:35	+ 0.5	27.0	28.6 25.0	25.0	23.1	
		12:58	– 0.7	25.5	26.7 24.6	24.4	23.3	
		13:34	– 0.7	26.5	27.8 25.1	25.6	23.9	
		14:02	– 0.1	27.7	29.7 26.4	26.7	24.4	
		14:27	– 0.1	27.7	29.4 26.4	26.7	24.4	
9/1/82	Gish Corn	11:17	+ 0.8	24.4	23.3	22.2	21.1	Time Series III – Corn (Day 2)
		11:42	+ 0.4	24.7	23.9	22.2	21.4	
		12:17	+ 0.1	25.4	24.4	22.8	21.4	
		12:42	– 0.5	26.7	25.6	23.3	21.7	
		13:15	0.0	26.8	25.6	23.3	22.2	
		13:43	– 0.7	27.6	26.1	23.9	22.2	
		14:18	– 1.5	27.8	26.4	24.2	22.8	
9/2/82	Gish Bare	11:00	+ 1.9	31.2 31.6*	32.8 29.3	28.9	26.1	Time Series III – Bare (Day 3)
		11:27	0.0	31.8	33.3 29.2	28.9	26.7	
		12:03	– 0.7	34.1	35.6 30.5	30.0	27.2	
		12:31	+ 0.4	31.0	32.5 29.3	28.9	27.5	

Date	Plot	(EDT) Time	Canopy/Air Dif.	Sfc	1 cm	3 cm	7.5 cm	Comments
9/2/82	Gish Bare (cont.)	13:03	+ 0.7	32.2	34.2 29.5	29.2	27.8	
		13:28	+ 1.0	33.7	33.3 29.6	29.4	27.8	
		14:04	0.0	30.7	32.2 29.4	28.9	28.3	
		14:25	- 0.9	31.9	34.4 29.7	29.4	28.1	
9/2/82	Gish Corn	11:11	- 0.9	29.6	28.1	25.3	23.3	Time Series III — Corn (Day 3)
		11:41	- 4.2	29.2	28.9	25.6	23.3	
		12:19	- 0.7	30.0	28.6	26.1	23.9	
		12:46	- 0.8	30.2	28.9	26.1	24.2	
		13:17	- 4.1	30.7	29.4	26.4	24.2	
		13:48	- 1.9	30.2	30.0	26.7	24.4	
		14:17	- 2.2	29.5	28.9	26.4	24.4	

APPENDIX H

Soil Moisture and Microwave Data for Time Series Experiments

Notation:

CV = 5 GHz vertical polarization

CH = 5 GHz horizontal polarization

LV = 1.4 GHz vertical polarization

LH = 1.4 GHz horizontal polarization

SD = standard deviation of 20-30 samples averaged to give one T_B value

Soil Moisture and Microwave Data for Time Series Measurements at BARC Plots, 1982
(Incidence Angle = 20°, Azimuth Angle = 45° to row direction)

Time Series I: Plot E4–Bare

Date	Time (EDT)	VSM 0-2 cm	VSM 0-4 cm	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
8/2/82	09:38	—	—	165.29	.73	147.64	.64	154.69	1.19	140.16	1.06	~90% cov. standing water
	10:14	32.4	32.2	195.43	.25	180.60	.59	197.80	1.48	181.67	1.01	~30% cov. standing water
	10:28	30.2	29.9	201.68	.43	188.27	.53	205.22	1.36	189.54	1.16	~3% cov. by standing water
	10:43	28.4	28.1	204.75	.34	191.87	.53	208.24	.81	192.85	.76	no standing water
	10:58	27.2	26.7	206.43	.72	193.99	.62	211.47	.90	196.25	.88	
	11:13	26.3	25.9	208.47	.38	196.12	.49	212.50	1.14	197.90	.96	
	11:24	25.8	25.4	209.43	.89	197.01	.50	214.39	1.04	198.60	1.18	
	11:27	25.6	25.3	209.40	.24	196.96	.42	213.89	1.34	199.12	.79	
	11:55	24.5	24.0	211.93	.34	199.54	.70	215.76	1.05	200.60	.53	
	12:22	23.7	23.2	213.23	.44	200.33	.42	217.87	.90	202.82	.90	
	12:30	23.5	22.8	212.98	.46	199.99	.67	217.87	1.06	203.05	.66	
	12:58	22.4	21.9	212.57	.55	199.28	.56	218.83	.77	203.99	.84	
	13:28	22.0	21.5	215.58	.23	202.95	.46	219.40	1.23	205.33	.95	
	13:59	22.0	21.5	217.14	.49	204.71	.52	220.81	1.55	208.07	1.33	
	14:27	—	—	218.07	.40	205.37	.53	222.33	1.15	209.02	.77	
	14:44	21.9	21.4	218.19	.40	204.98	.39	221.92	1.19	208.59	1.20	
	14:57	21.9	21.4	219.10	.35	205.92	.56	223.50	1.26	209.12	.81	
	15:26	21.9	21.4	219.00	.19	205.81	.52	224.18	1.36	210.80	.82	
8/3/82	11:06	18.2	19.3	227.44	.51	214.17	.40	230.99	1.47	215.84	.71	Day 2
	11:10	18.0	19.2	225.77	.26	213.29	.50	230.98	1.33	215.77	.83	
	11:31	17.6	18.6	229.02	.30	215.94	.47	232.71	1.38	217.34	.98	
	11:58	17.0	17.9	229.86	.35	216.79	.47	233.74	1.15	218.43	1.21	
	12:27	16.7	17.6	230.44	.30	218.58	.55	234.50	1.37	220.31	.84	
	12:58	17.4	17.9	233.24	.62	221.28	.55	236.53	1.56	221.17	.71	
	13:29	18.2	18.4	233.94	.37	221.97	.53	235.35	1.39	220.42	1.07	
	13:59	19.1	19.0	235.43	.66	224.21	.49	236.24	1.26	222.65	.85	
	14:30	19.9	19.5	238.27	.33	225.47	.47	238.20	1.31	222.83	1.14	
8/4/82	10:59	16.6	16.2	242.02	.46	230.26	.48	240.26	1.11	224.22	.93	Day 3

Date	Time (EDT)	VSM 0-2 cm	VSM 0-4 cm	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
8/4/82	11:27	16.1	15.9	243.03	.42	231.53	.39	241.31	1.23	226.35	.92	Day 3
	11:57	15.6	15.5	243.81	.34	232.75	.39	241.47	.92	226.92	.75	
	12:27	15.1	15.3	245.66	.51	234.55	.47	242.67	1.18	228.41	1.22	
	12:58	14.5	15.2	248.27	.74	237.74	.57	243.91	1.24	229.83	.79	
	13:00	14.5	15.2	247.98	.72	237.52	.39	244.00	.97	229.55	.83	
	13:25	15.0	15.3	249.90	.21	239.83	.40	245.32	1.27	232.32	.94	
	13:56	15.9	15.8	249.78	1.03	239.82	.40	245.09	1.22	231.87	.77	
	14:26	16.9	16.5	255.01	.62	244.75	.45	244.58	1.37	232.84	.69	
8/5/82	11:27	12.3	13.4	256.42	.32	245.75	.36	250.43	.95	236.09	1.10	Day 4
	11:58	11.6	12.8	258.84	.91	248.38	.35	253.60	.89	237.68	.78	
	12:28	11.1	12.2	264.46	.66	253.69	.39	254.30	1.17	239.73	1.11	
	12:57	10.6	11.7	264.86	1.09	254.13	.33	254.61	1.10	240.54	.87	
	13:28	10.5	11.5	268.44	.56	257.62	.52	260.73	3.18	242.19	1.14	
	13:59	11.2	12.2	268.97	.40	258.62	.49	261.46	2.85	243.95	1.04	
	14:01	11.2	12.2	268.75	.73	258.67	.36	259.91	1.33	244.35	1.16	
	14:30	12.1	13.1	271.37	.27	260.98	.40	256.23	1.37	243.92	.86	
8/9/82	13:27	11.1	12.1	282.13	.58	275.03	.39	266.21	1.13	253.00	.98	Day 8
	13:58	11.1	12.1	283.17	.67	276.62	.34	267.22	1.79	255.44	1.26	
8/10/82	13:08	6.0	7.9	293.31	.37	288.30	.27	271.99	1.11	260.42	1.02	Day 9
	13:10	6.0	7.9	293.01	.48	288.25	.36	271.90	1.19	260.51	1.08	
	13:28	6.0	7.9	294.85	1.12	290.48	.31	273.27	1.52	261.15	.73	
	13:59	5.7	7.8	296.33	.22	291.45	.27	273.79	1.29	262.07	1.03	
	14:28	5.5	7.8	297.19	.67	292.63	.36	274.78	1.27	263.02	.96	
8/11/82	12:56	5.9	7.8	294.85	1.01	290.40	.32	276.99	1.33	263.93	.79	Day 10
	13:27	5.9	7.8	297.52	.97	293.23	.41	276.96	1.18	265.42	.92	
	13:57	5.9	7.8	298.16	1.03	293.76	.21	277.37	1.63	265.83	.88	

Time Series I: Plot E5—Sweet Sorghum

Date	Time (EDT)	VSM 0-2 cm	VSM 0-4 cm	CV T_B	± SD	CH T_B	± SD	LV T_B	± SD	LH T_B	± SD	Comments
8/2/82	12:08	32.4	30.1	284.57	1.21	284.23	.33	273.41	1.13	271.29	.91	~1% standing water
	12:18	32.4	30.1	285.18	.34	284.40	.52	276.03	1.40	278.00	.99	no standing water
	12:43	31.5	29.0	285.07	.33	283.97	.48	277.75	1.29	267.03	.89	
	12:45	31.5	29.0	284.99	1.00	284.43	.34	276.18	1.33	265.29	.76	
	13:13	29.8	27.9	285.00	.93	284.68	.20	271.91	1.16	257.90	1.06	
	13:42	27.3	27.1	284.99	1.20	284.26	.17	271.46	1.21	256.28	.91	
	14:11	25.0	26.2	284.98	.28	284.08	.33	272.15	1.26	259.01	.80	
	14:49	27.7	27.4	286.25	.38	285.66	.28	273.72	1.68	259.71	.58	
	15:12	29.6	28.1	285.56	.84	285.46	.34	272.77	1.27	258.79	1.18	
	15:17	29.6	28.1	285.85	1.08	285.84	.35	273.81	1.13	259.55	.90	
	15:41	29.6	28.1	285.62	1.36	285.05	.35	272.81	1.24	259.06	.74	
8/3/82	11:12	25.3	24.5	285.36	.79	285.10	.41	276.64	1.27	263.19	1.18	Day 2
	11:15	25.3	24.5	287.35	.40	285.89	.44	279.18	1.22	262.27	.96	
	11:45	24.7	23.9	286.06	.60	285.16	.39	278.79	1.16	266.16	1.25	
	12:14	24.0	23.2	287.64	.43	287.26	.33	280.06	1.67	274.68	1.06	
	12:45	23.5	22.7	288.02	1.17	287.71	.33	280.71	1.01	269.51	1.04	
	13:14	23.1	22.2	287.10	.71	286.35	.29	277.71	.94	264.76	.90	
	13:43	23.0	21.8	287.71	.28	286.40	.60	276.74	1.13	265.25	.78	
	14:14	22.4	21.6	287.46	.79	287.31	.53	277.42	1.48	265.39	.94	
8/4/82	11:13	19.6	18.9	287.35	1.12	286.85	.37	281.48	1.21	267.81	.99	Day 3
	11:42	19.4	18.8	288.46	1.13	287.79	.36	281.51	1.25	270.39	1.26	
	12:12	19.2	18.7	288.88	.54	287.94	.31	282.55	1.49	274.27	.90	
	12:43	19.0	18.7	289.24	.40	288.80	.24	283.37	1.36	272.06	.79	
	13:13	18.7	18.6	289.58	.37	289.03	.37	281.31	1.29	270.76	.87	
	13:43	18.5	18.6	288.85	.99	288.06	.36	280.52	1.35	269.17	.75	
	14:13	18.4	18.5	290.27	.75	289.68	.31	280.32	1.06	269.32	.79	
	14:41	18.2	18.4	290.49	.48	289.59	.15	278.94	.93	268.78	.61	

Date	Time (EDT)	VSM 0-2 cm	VSM 0-4 cm	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
8/5/82	11:25	19.0	18.0	290.49	.37	289.78	.31	285.83	1.57	272.92	1.18	Day 4
	11:44	18.5	17.7	290.90	.47	290.24	.34	285.17	1.50	273.21	.92	
	12:14	17.5	16.9	291.24	.43	291.08	.26	285.13	1.36	274.80	.93	
	12:43	16.6	16.2	291.18	.52	290.44	.29	283.11	.97	271.95	.83	
	13:14	16.6	16.2	292.19	.26	291.18	.46	287.36	2.82	273.62	.77	
	13:44	16.3	15.8	292.03	.27	291.58	.37	286.02	1.60	273.71	1.36	
	14:15	15.0	14.5	292.01	.36	291.49	.44	282.83	1.27	272.24	1.09	
8/9/82	13:40	14.7	15.2	288.15	.36	286.71	.38	286.32	1.66	273.02	1.04	Day 8
	14:13	14.7	15.2	287.01	.93	286.11	.26	286.72	1.42	273.30	1.15	
8/10/82	13:11	12.6	13.1	289.51	.37	288.73	.45	289.21	1.44	275.40	.99	Day 9
	13:42	12.6	13.1	288.16	.68	288.13	.29	288.31	1.05	273.48	1.05	
	14:12	12.6	13.1	286.08	.86	285.70	.33	288.79	1.17	273.19	.85	
8/11/82	13:09	10.3	10.7	287.01	1.09	286.22	.37	289.18	1.31	275.02	1.13	Day 10
	13:42	10.3	10.7	286.45	.49	285.88	.26	289.36	1.69	274.82	.74	
	14:11	10.3	10.7	287.96	.28	286.55	.25	291.16	1.35	277.11	1.05	

Time Series II: Plot S4--Bare

Date	Time (EDT)	VSM 0-2 cm	VSM 0-4 cm	CV T_B ± SD	CH T_B ± SD	LV T_B ± SD	LH T_B ± SD	Comments
8/16/82	10:45	35.8	34.1	175.72 .62	160.91 .68	193.57 1.37	177.63 1.11	Day 1
	10:59	35.5	33.9	188.67 .31	173.39 .63	199.34 1.08	183.46 .88	
	11:14	35.2	33.5	188.82 .26	174.81 .52	199.10 1.14	184.74 .59	
	11:30	34.8	33.2	188.71 .40	174.21 .56	200.11 1.03	185.07 .90	
	11:56	34.2	32.6	189.98 .69	175.21 .60	201.62 1.23	186.07 .81	
	12:26	33.6	32.0	190.60 .42	176.22 .54	201.92 1.33	186.45 1.00	
	12:59	33.0	31.3	189.29 .19	174.74 .56	201.68 1.04	186.51 .88	
	13:31	32.2	30.6	191.36 .30	177.54 .56	203.66 1.20	188.75 .97	
	13:58	31.6	30.0	191.42 .43	176.99 .58	202.75 1.12	187.89 1.00	
	14:36	31.0	29.4	191.10 .40	176.10 .56	203.76 .94	189.84 .90	
	14:56	30.4	28.8	191.72 .34	176.85 .61	204.20 1.38	189.25 .86	
8/17/82	11:01	26.2	25.5	195.18 .63	179.54 .65	208.39 1.55	187.35 .85	Day 2
	11:31	26.2	25.5	191.43 .48	177.02 .58	207.04 1.55	189.91 .87	
	12:01	26.1	25.5	191.26 .42	176.64 .61	207.77 1.28	191.57 1.17	
	12:30	26.0	25.4	190.92 .24	177.14 .66	208.39 1.38	192.45 .70	
	13:00	26.0	25.4	191.21 .36	176.95 .66	210.68 1.22	194.72 .83	
	13:30	25.9	25.3	193.71 .36	178.78 .65	209.69 1.29	193.73 .92	
	13:59	25.7	25.3	192.50 .50	178.71 .64	211.62 1.29	196.82 .82	
	14:15	25.7	25.3	192.04 .57	177.70 .57	213.69 1.24	196.51 .80	
	14:31	25.7	25.3	192.70 .31	177.08 .61	212.64 .97	196.98 .81	
8/18/82	11:03	27.4	26.5	192.32 .46	175.61 .72	211.36 1.16	195.12 .89	Day 3
	11:32	27.4	26.5	191.96 .50	178.27 .58	213.42 1.26	198.16 .87	
	11:58	27.3	26.5	193.21 .32	178.71 .54	214.72 1.23	199.24 .93	
	12:30	27.2	26.2	193.75 .40	178.96 .64	216.75 .85	201.86 1.08	
	12:59	26.7	25.9	195.80 .21	181.57 .55	219.99 1.33	204.61 .80	
	13:27	26.2	25.4	199.22 .25	182.97 .57	221.69 1.10	205.90 1.17	
	13:59	25.5	24.7	201.48 .36	186.16 .61	224.58 .86	209.55 1.00	
	14:29	24.6	23.8	207.08 .33	189.79 .57	226.30 1.59	212.34 1.05	

Date	Time (EDT)	VSM 0-2 cm	VSM 0-4 cm	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
8/19/82	11:32	20.5	21 0	233.46	.33	216.91	.49	—	—	229.55	.65	Day 4
	11:35	20.5	21.0	233.65	.34	217.16	.49	241.33	1.28	229.26	1.25	
	12:06	19.9	20.5	238.74	.32	222.01	.44	245.51	1.31	233.22	1.98	
	12:29	19.0	20.0	242.02	.94	226.76	.37	246.89	1.34	236.16	1.10	
	12:58	18.0	19.4	248.07	.36	232.49	.46	250.52	1.49	239.40	.89	
	13:29	16.7	18.6	253.54	.35	237.81	.42	252.42	1.08	241.11	.79	
	14:01	14.7	17.4	256.48	.24	241.02	.30	253.61	1.25	243.21	1.12	
	14:29	12.9	16.2	259.41	.43	244.86	.43	254.99	1.05	244.25	.79	
	15:04	11.0	14.6	264.54	.95	251.16	.44	258.30	1.26	246.30	1.19	
	15:07	11.0	14.6	264.85	1.13	251.64	.37	257.77	1.26	246.19	.90	
8/20/82	10:57	14.3	16.4	264.99	.24	252.54	.39	257.51	1.19	244.06	.74	Day 5
	11:27	14.1	16.4	269.34	.58	258.22	.47	258.54	1.35	245.92	.83	
	12:00	13.8	16.0	273.88	.79	264.12	.38	260.42	1.55	248.05	1.15	
	12:30	13.5	15.8	277.22	.38	267.35	.37	260.87	1.29	249.29	1.00	
	12:59	13.1	15.4	280.64	.84	271.00	.28	262.61	1.23	249.79	.96	
	13:29	12.6	15.1	282.38	.67	273.39	.34	263.23	1.33	249.74	.90	
	13:58	12.0	14.6	284.71	.39	275.71	.42	263.71	1.23	251.16	1.21	
8/23/82	11:08	11.5	14.1	269.95	.32	257.51	.36	258.05	2.07	246.52	1.25	Day 8
	11:14	11.5	14.1	268.76	.31	256.64	.39	258.22	1.83	246.42	1.85	
	11:58	11.3	14.1	267.09	.33	255.76	.33	257.12	1.97	247.45	1.62	
	12:00	—	—	268.07	.25	255.29	.42	255.34	1.90	243.54	1.97	Radiometer sees just dry center of plot
	12:06	—	—	264.80	.64	258.36	.34	237.37	2.23	222.17	1.63	Radiometer sees part of moist edge of plot
	12:29	11.2	14.1	268.15	.39	256.81	.34	257.58	2.75	247.60	1.42	
	12:31	11.2	14.1	267.87	.87	256.75	.41	257.25	1.96	246.78	1.31	
	12:58	11.0	14.1	268.01	.52	256.46	.29	259.34	1.67	248.07	1.41	
	13:29	11.0	14.1	268.05	.39	256.89	.33	258.70	2.05	248.82	1.56	
	13:57	7.2	10.9	288.83	.28	282.25	.33	271.62	2.07	263.72	1.71	Radiometers over dry area of plot

Time Series II: Plot S5—Soybeans

Date	Time (EDT)	VSM 0-2 cm	VSM 0-4 cm	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
8/16/82	11:10	31.5	30.5	284.36	1.30	282.44	.43	262.97	1.02	248.02	.75	Day 1
	11:43	30.6	30.1	284.41	.32	282.12	.39	263.46	1.43	249.66	.82	
	12:12	29.7	29.5	285.58	.31	283.11	.45	265.30	1.17	251.79	1.14	
	13:01	28.4	28.7	285.36	1.05	283.33	.38	266.18	1.43	251.82	.55	
	13:08	28.2	28.6	285.46	.32	283.20	.36	265.90	1.11	252.28	1.07	
	13:19	27.8	28.2	285.15	.42	283.14	.36	267.64	1.38	252.89	.83	
	13:47	26.9	27.5	284.54	.60	282.45	.29	267.64	1.33	252.97	.99	
	14:12	26.1	26.6	284.25	.34	281.43	.30	265.31	1.08	252.55	.66	
	14:53	24.6	25.0	285.05	.26	281.36	.48	266.71	1.19	252.31	1.22	
8/17/82	11:19	22.5	22.3	284.71	.49	283.31	.28	273.74	1.43	259.96	.89	Day 2
	11:47	22.2	22.0	284.62	.84	283.74	.35	274.40	1.32	261.20	.80	
	12:12	21.9	21.8	285.76	.27	284.50	.37	274.45	1.01	262.08	.96	
	12:45	21.6	21.5	285.08	.98	283.87	.32	275.65	1.24	262.78	.80	
	13:15	21.3	21.3	286.25	.36	284.77	.32	275.33	1.06	262.20	.89	
	13:45	20.9	20.9	284.38	.92	283.18	.29	276.00	1.37	263.85	.74	
	14:17	20.6	20.7	284.90	.61	282.82	.28	277.13	1.20	263.86	.94	
8/18/82	11:16	22.9	21.7	282.16	.53	281.06	.19	267.90	1.16	259.88	1.10	Day 3
	11:47	22.5	21.6	282.40	.31	281.17	.27	268.70	1.32	261.08	.96	
	12:14	22.0	21.4	283.43	.56	282.18	.34	272.66	1.31	261.99	1.04	
	12:45	21.6	21.2	283.57	.73	282.79	.32	274.16	1.31	262.72	1.02	
	13:16	21.2	20.9	282.68	.60	282.58	.45	274.65	1.32	262.66	.92	
	13:45	20.7	20.7	281.67	.21	282.36	.40	276.28	1.74	265.04	.88	
	14:14	20.2	20.5	282.03	.32	281.31	.38	274.77	1.15	264.46	.78	
8/19/82	12:16	18.2	18.4	287.35	.75	286.48	.33	278.37	.99	271.10	.86	Day 4
	12:43	17.8	18.0	286.47	.34	285.74	.43	279.22	1.32	271.11	1.21	
	13:15	17.5	17.7	286.26	.35	285.15	.26	280.06	1.71	271.62	1.17	
	13:44	17.1	17.3	286.86	.41	286.25	.36	282.93	1.24	272.98	1.25	

Date	Time (EDT)	VSM 0-2 cm	VSM 0-4 cm	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
8/19/82	13:46	17.1	17.3	287.06	1.16	286.92	.47	282.51	1.20	272.78	.77	
	14:14	16.9	17.1	285.67	.66	284.24	.38	280.85	1.48	271.69	.72	
	14:46	16.5	16.8	288.33	.18	286.48	.44	281.37	1.49	272.68	.85	
8/20/82	11:14	11.5	12.5	287.10	.53	286.20	.41	285.68	1.81	276.77	.84	Day 5
	11:45	11.4	12.5	287.93	.25	286.43	.27	286.57	.86	276.56	.72	
	12:15	11.3	12.5	288.79	.59	288.26	.23	288.39	1.21	280.21	.81	
	12:44	11.2	12.5	289.63	.29	288.52	.31	288.12	1.03	279.34	.92	
	13:14	11.2	12.5	288.95	.32	288.28	.32	288.01	1.00	278.43	1.17	
	13:43	11.1	12.5	287.47	.37	287.69	.29	287.69	1.31	278.90	.92	
	14:14	11.0	12.5	287.03	.51	285.81	.38	286.19	1.17	276.66	.94	
	14:43	11.0	12.5	285.36	1.01	284.50	.30	284.71	1.36	276.70	.91	
8/23/82	11:18	7.4	8.3	283.19	1.25	282.57	.29	285.78	1.97	281.09	1.41	Day 8
	11:47	7.3	8.2	281.62	.58	280.67	.33	281.67	2.24	277.52	1.68	
	11:51	7.3	8.2	281.48	.66	280.42	.39	281.24	2.57	277.94	2.08	
	12:12	7.2	8.3	282.44	.58	281.26	.32	284.49	1.55	279.64	1.17	
	12:42	7.1	8.3	281.74	.92	280.79	.32	284.75	2.49	280.12	1.64	
	12:45	7.1	8.3	281.84	1.16	280.79	.35	284.54	1.90	278.92	1.88	
	13:15	6.9	8.3	283.06	.96	281.88	.39	284.72	2.37	281.22	1.77	
	13:17	6.9	8.3	283.32	.94	282.29	.48	284.01	2.27	280.95	1.73	

Time Series III: Gish–Bare

Date	Time (EDT)	VSM 0-2 cm	VSM 0-4 cm	CV T_B	± SD	CH T_B	± SD	LV T_B	± SD	LH T_B	± SD	Comments
8/31/82	10:24	35.1	34.3	176.69	.62	164.19	.68	199.27	2.98	180.63	.78	Day 1
	10:35	35.1	34.3	176.77	.36	164.17	.62	198.92	1.15	181.52	1.71	
	10:57	34.6	33.8	177.06	.34	164.41	.67	199.79	1.10	183.87	.82	
	11:28	34.1	33.2	177.80	.27	165.67	.62	201.76	1.40	187.62	1.04	
	11:58	33.6	32.9	179.31	.22	165.91	.62	202.65	1.30	186.94	.89	
	12:25	33.1	32.4	179.29	.58	168.93	.72	207.71	1.29	190.54	1.25	
	12:55	32.8	32.0	182.31	.40	170.66	.56	217.82	1.05	191.63	.82	
	13:26	32.4	31.5	182.80	.31	170.60	.61	227.62	1.33	193.98	.72	
	13:58	32.2	31.2	183.03	.36	169.75	.60	213.28	1.43	196.28	.83	
	14:09	32.2	31.2	182.30	.39	169.31	.61	213.08	1.26	196.77	1.22	
	14:24	32.0	31.2	182.07	.44	170.36	.66	212.29	1.12	196.29	.81	
9/1/82	11:28	31.1	30.2	179.41	.34	167.21	.68	212.28	1.44	195.80	.55	Day 2
	11:59	30.8	30.0	179.60	.40	167.51	.63	210.96	1.10	194.18	.79	
	12:29	30.4	30.0	181.62	.19	169.52	.64	215.99	1.10	196.72	.57	
	13:00	30.1	29.6	181.67	.59	173.40	.64	224.08	1.18	196.50	.99	
	13:29	29.8	29.4	182.77	.29	173.50	.61	225.97	.76	196.75	.86	
	13:58	29.5	29.3	183.99	.27	173.34	.74	216.15	1.33	198.22	.99	
	14:28	29.4	29.2	184.40	.51	172.04	.57	216.84	1.20	200.50	1.07	
9/2/82	10:55	29.4	29.2	190.09	.40	178.34	.59	219.98	.93	202.46	1.00	Day 3
	11:29	29.0	29.2	191.03	.30	179.71	.83	222.58	1.22	209.66	.85	
	11:59	28.5	28.7	194.06	.20	182.06	.63	224.44	1.25	208.75	1.15	
	12:27	27.8	29.0	193.61	.31	181.79	.44	226.10	1.05	208.52	1.08	
	12:58	27.2	28.4	197.09	.32	184.86	.62	235.18	1.18	210.96	.88	
	13:26	26.7	27.1	198.68	.49	186.43	.52	241.36	1.02	212.23	.77	
	13:59	26.2	26.7	195.94	.34	183.72	.52	228.77	.94	213.46	1.09	
	14:29	25.7	26.2	196.39	.20	184.18	.61	226.77	1.38	213.25	.86	

Time Series III: Gish–Corn

Date	Time (EDT)	VSM 0-2 cm	VSM 0-4 cm	CV T_B ± SD		CH T_B ± SD		LV T_B ± SD		LH T_B ± SD		Comments
8/31/82	10:40	31.4	30.7	278.82	.18	279.11	.43	276.87	1.19	270.16	.87	Day 1
	10:53	31.3	30.6	280.45	.52	280.52	.31	272.59	1.64	265.42	.91	
	11:16	31.2	30.4	281.70	.54	281.84	.32	274.14	1.33	266.80	1.26	
	11:41	31.1	30.3	282.30	1.02	282.36	.27	275.10	1.50	266.43	.74	
	11:43	31.1	20.3	282.14	.85	282.09	.39	274.76	1.09	265.75	.73	
	12:16	30.8	30.1	282.33	.35	282.67	.38	276.04	1.08	270.29	1.28	
	12:41	30.7	30.0	283.73	.50	283.79	.36	276.65	1.34	269.64	1.14	
	13:10	30.5	29.8	284.08	.76	283.79	.41	278.22	1.19	270.14	.87	
	13:42	30.4	29.7	283.96	.52	283.73	.28	278.35	1.36	270.74	1.15	
	14:11	30.2	29.5	285.07	.64	284.53	.33	279.51	1.53	270.83	1.08	
9/1/82	11:12	28.0	27.5	282.72	.46	282.13	.30	278.04	.98	269.45	.96	Day 2
	11:43	27.8	27.4	281.40	.39	280.59	.40	277.68	1.35	271.02	1.09	
	12:14	27.6	27.3	281.56	1.01	280.84	.23	278.44	1.13	271.81	1.11	
	12:44	27.4	27.2	282.59	.46	282.30	.38	278.39	1.69	272.12	.95	
	13:13	27.2	27.1	282.96	1.13	282.58	.43	279.59	1.06	272.77	.76	
	13:47	27.0	26.9	283.96	.49	284.09	.28	281.66	1.21	272.91	.97	
	14:13	26.8	26.8	282.89	.66	283.28	.48	279.29	1.46	271.25	1.20	
9/2/82	11:14	26.1	25.6	286.33	.39	286.07	.31	283.58	1.40	276.96	1.02	Day 3
	11:45	25.4	25.2	286.34	.57	285.95	.32	283.85	1.13	277.34	1.08	
	12:15	24.7	24.8	284.96	.42	284.54	.31	281.25	1.53	274.58	.94	
	12:43	23.9	24.2	285.71	1.26	285.59	.32	281.33	1.16	275.57	.99	
	13:13	23.2	23.8	285.85	1.17	285.90	.24	282.13	.79	277.98	.94	
	13:44	22.5	23.2	286.00	.44	285.36	.41	283.69	1.18	278.36	1.11	
	14:12	21.6	22.7	285.16	.38	284.29	.38	282.70	1.51	279.13	1.08	