

Tierra Prospera Farms CWSI Irrigation Scheduling Demonstration Test

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INTRODUCTION

This demonstration test was designed to determine if CWSI irrigation scheduling technology could be successfully transferred to a commercial cotton grower for use in normal farming operations. A junior college student with a minimal knowledge in cotton production was hired by the Pinal County Extension Office director. He was trained by the Extension plant and water relations specialist in the use of the infrared thermometer, an aspirated psychrometer, and a desktop computer to schedule field irrigations of cotton using the crop water stress index. He reported scheduled irrigations directly to the farm manager, who was responsible for all other management practices.

MATERIALS AND METHODS

A 32-acre, furrow-irrigated cotton field containing 8 4-acre blocks was randomized into 2 treatments containing 4 replicates. One treatment irrigation was scheduled by Tierra Prospera Farms while the other treatments irrigations were scheduled by the UA CWSI criteria. CWSI measurements were collected on both treatments on the average of 3 times weekly when skies were clear. When the UA plots required irrigation, the grower agreed to irrigate within 2 days of notification.

Initially, infrared measurements were collected from 10 random plants across the length of each plot. A vapor pressure deficit (VPD) was collected from the middle of each plot about 1 yard above the canopy. Infrared temperature measurements were collected from the fifth leaf from the plant top. The fifth leaf is the first fully-developed, transpiring leaf and is also used for petiole analysis. When an adequate canopy was developed, infrared measurements were taken out of the window of a pickup truck on the 4 corners of each plot from the headrow. One VPD measurement was taken from the front and back of the field.

RESULTS AND DISCUSSION

Table 1 lists the average CWSI at irrigation, seasonally averaged CWSI, lint yield, total water applied, and number of irrigations required for each plot. The seasonally-averaged CWSI represents the total stress incurred and the CWSI at irrigation represents the peak stress incurred. The seasonally-averaged CWSI is usually about half of the CWSI at irrigation. The UA treatment required 1 irrigation more than the grower treatment. No significant differences were measured at the 0.05 level for lint yield in the test. The CWSI technology can be successfully transferred and used by individuals untrained in cotton irrigation and production to assist a commercial cotton grower in irrigation-management decisions.

Table 1. CWSI at irrigation, seasonally averaged CWSI, lint yield, total water applied and # of irrigations per plot by treatment.

Trt	Plot #	CWSI At Irr	Seas CWSI	Lint Yield	Inches Water	# Of Irr.
Grower	1	0.30	0.19	1063	48.7	8
	3	0.35	0.18	1329	48.7	8
	5	0.26	0.15	1345	48.7	8
	7	0.28	0.15	1230	48.7	8
	Mean	0.30	0.17	1242	48.7	8
U of A	2	0.34	0.16	1094	54.4	9
	4	0.24	0.12	1285	54.4	9
	6	0.22	0.11	1113	54.4	9
	8	0.18	0.09	1459	54.4	9
	Mean	0.25	0.12	1238	54.4	9