2003 Corn and Grain Sorghum Research Summary

Project Title: Improving Corn Irrigation Practices and Recommendations in Arkansas (Year 3)

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Crop: Corn

Objectives:
1. Develop a new crop coefficient curve for irrigation scheduling of corn.
2. Determine whether the corn crop coefficient curve needs to be adjusted for maturity of the particular hybrid being grown.
3. Field test the resulting Irrigation Scheduler program for corn.
4. Conduct on-farm tests and demonstrations of irrigation-related production practices.

2003 Results: Field studies under this project were conducted at NEREC, Keiser, and on-farm at corn verification fields and with other interested growers. Three Pioneer hybrids of different relative maturities (P33J57 – 113 day, P32P76 – 116 day, P31B13 – 119 day) were planted on April 3, on 38-inch rows at NEREC. The irrigation system was operated daily in the absence of rain from June 1 through July 24 at rates of 100% and 60% of the estimated evapotranspiration (ET), along with a nonirrigated check. Yield differences were not significant among the three treatments (Table 1). However, drainage problems early in the season were evident all season long in terms of smaller plants in the reps in the lower portion of the field (3&4). Yields from reps 1 and 2 (high end) averaged 45 bushels/acre greater than from reps 3 and 4. The effect of the drainage overshadowed any treatment effects. Additional measurements of soil moisture recorded hourly may indicate whether the soil was drying differently in the different treatments, but the drainage problems likely overshadowed any treatment effect. Drainage improvements were made to the field, but not in time for the 2003 study. The drip irrigation system worked well at allowing the application of precise amounts of water, but could not overcome the early-season effects of poor drainage.

Irrigation data from the corn Research Verification fields will be studied over the winter along with observations from the fields. The first impression was that the computerized projections fit the crop well in 2003. Several growers participated in irrigation-related demonstrations, but on-farm tests were not conducted. The lack of a non-invasive flowmeter precluded conducting fertigation tests under a center pivot. An accurate measure of the flowrate is required for fertigation and the propeller-type flowmeters available could not be used in a closed system like a center pivot. If a non-invasive flowmeter is obtained before the 2004 crop is very old, fertigation tests will be conducted then.

Table 1. Results from 2003 drip irrigated corn at NEREC. No significant hybrid effects or interactions were observed.

	Irrigation Treatment*		
	Hi	Lo	NI
	(100% ET)	(60% ET)	
Irrigation Period	6/1-7/24	6/1-7/24	
ET during IP (in)	14.5	14.5	14.5
Rain during IP (in)	4.8	4.8	4.8
Rain during IP (% of ET)	33	33	33
Irrigation (in)	11.2	7.5	0
Irrigation (% of ET)	77**	51	0
Avg. SWD during IP (in)	1.1	2.5	5.7
Yield (bu/acre@15%)	186 a	196 a	180 a

* Irrigation treatments: Hi = 100% of daily ET replaced each day; Lo = 60% of daily ET replaced each day; NI = nonirrigated

** effective rainfall reason value < 100

Impact: With the season-long impact of the drainage problems early in the season, the information obtained from the 2003 study will be limited. However, the drip irrigation system was successfully used to precisely apply water to the plots. Results from the entire study, along with observations and data from the Research Verification fields will aid Arkansas corn producers for many years to come. The additional on-farm demonstrations will benefit producers. Irrigation is an essential component of the corn production system in Arkansas and as more data are collected, the findings from this project will tailor irrigation recommendations to Arkansas conditions, rather than trying to adapt them from very different climates.