

### **Sprinkler irrigation for site-specific, precision management of cotton.**

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The sprinkler scheduling study initiated in 2006 at the Tennessee Valley Research and Extension Center (TVREC) was continued during 2007 on a randomized block design of 48 plots (39'x39') to test the soil and plant response of cotton grown using six irrigation treatments ranging from 0% (dryland) to 125% of calculated pan evaporation adjusted for percent canopy cover. Of note, 2007 was the driest growing season on record at Belle Mina since 1954. June through August rainfall was less than 7 inches during both 2006 and 2007 growing seasons, with pan evaporation surpassing 23 inches each year.

Yield results from 2006 and 2007 (Figure 1) provided benchmarks indicating the response of various irrigation schedules on yield and operating cost. Sprinkler irrigated cotton yields averaged 2.3 bales in 2006 and 3.5 bales in 2007 (Table 1). From 2006 to 2007, dryland yield decreased while sprinkler-irrigated treatments increased. The highest yielding sprinkler treatment in 2007 (irrigation at 100% of calculated pan evaporation x canopy cover adjustment) yielded 4 bales per acre. Significantly increased 2007 sprinkler plot yields may have been due to a change in experimental method in 2007 using deeper, less frequent irrigations or due to higher number of total heat-degree days in 2007, especially during the month of July. In 2008, a canola-soybean-cotton rotation will be incorporated into 24 of the 48 sprinkler test plots to assess the economic feasibility of adding two oil crops to a northern Alabama cotton rotation.

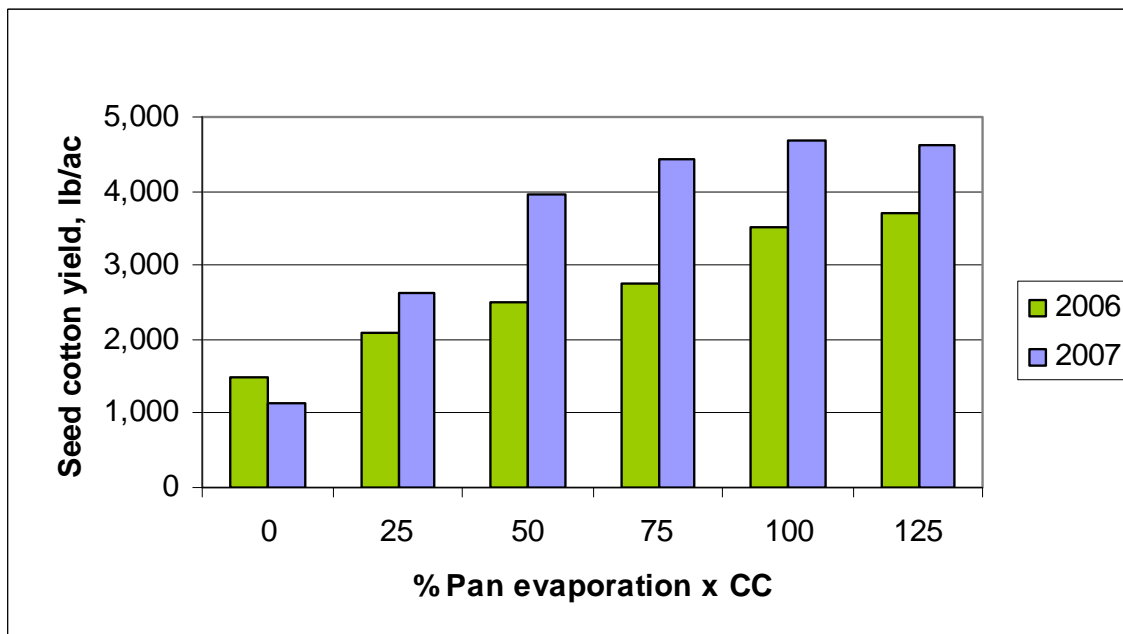


Figure 1. Seed cotton yield, precision sprinkler irrigation cotton trials, lb/A, for 2006 and 2007. Different subscripts denote statistical difference. In 2006, N=4, turnout = 38%. In 2007, N=8, turnout = 41%. In 2006, four out of eight replications were discarded due to irrigation malfunction. CC=canopy cover factor, where 100% equals closed canopy.

**Table 1. Yield averages per treatment for 2006 and 2007, sprinkler scheduling trials.**

Treatment	----- 2006 -----		----- 2007 -----	
	Seed Cotton (lbs/ac)*	Bales (bales/ac)	Seed Cotton (lbs/ac)*	Bales (bales/ac)
125% pan evaporation x canopy cover factor	3703.9 <sup>a</sup>	2.9	4612.1 <sup>a</sup>	3.9
100% pan evaporation x canopy cover factor	3520.4 <sup>a</sup>	2.8	4692.1 <sup>a</sup>	4.0
75% pan evaporation x canopy cover factor	2748.2 <sup>b</sup>	2.2	4436.5 <sup>a</sup>	3.8
50% pan evaporation x canopy cover factor	2491.0 <sup>b</sup>	2.0	3969.6 <sup>b</sup>	3.4
25% pan evaporation x canopy cover factor	2098.0 <sup>c</sup>	1.7	2612.5 <sup>c</sup>	2.2
0% pan evaporation (dryland)	1492.3 <sup>d</sup>	1.2	1151.3 <sup>d</sup>	1.0

\*Different subscripts denote statistical difference ( $\alpha=0.10$ ). In 2006, N=4, turnout 38%. In 2007, N=8, turnout 41%.

Table 2 provides estimated operating costs for pivot irrigation based on overhead sprinkler trials at TVREC during two back-to-back drought years, 2006 and 2007. Total irrigation operating costs of \$9.39 per acre-inch are taken from Timely Information Series publication BSEN-IRR-07-01 (May 2007), assuming a 140-acre pivot. In a separate report, net income gain due to irrigation in 2006 and 2007 is estimated by deducting total estimated irrigation costs (ownership + operating) from estimated gross receipts and then comparing with estimated dryland receipts.

**Table 2. Irrigation amounts and estimated center pivot operating costs, based on 2006 and 2007 TVREC sprinkler irrigation trials, Belle Mina, AL.**

Treatment	----- 2006 -----		----- 2007 -----	
	Irrigation depth (inches)	Operating costs (\$/ac) <sup>†</sup>	Irrigation depth (inches)	Operating costs (\$/ac) <sup>†</sup>
125% pan evaporation x canopy cover factor	25.17	\$236.35	24.42	\$229.30
100% pan evaporation x canopy cover factor	20.44	\$191.93	19.31	\$181.32
75% pan evaporation x canopy cover factor	15.24	\$143.10	14.71	\$138.13
50% pan evaporation x canopy cover factor	10.07	\$94.56	9.63	\$90.43
25% pan evaporation x canopy cover factor	4.87	\$45.73	4.29	\$40.28
0% pan evaporation (dryland)	0.00	\$0.00	0.00	\$0.00

<sup>†</sup>Operating cost for 101 horsepower diesel motor for irrigation pump; Estimated operating costs based on a 140-ac pivot-irrigated cotton field are \$9.39/ac-in. Source: <http://www.aces.edu/dept/irrig/anIRR-01.php>