

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

Mark Dougherty, Abdelaziz Abdelgadir, John Fulton, Charlie Burmester, Chet Norris, David Harkins, Larry Curtis, and Dale Monks

A sprinkler irrigation scheduling study initiated in 2006 at the Tennessee Valley Research and Extension Center was continued in 2008. The study evaluates cotton yield response to six irrigation treatments ranging from 0% (rainfed) to 125% of calculated pan evaporation adjusted for percent canopy cover. In 2007, the study was conducted on 48 plots (39'x39') arranged in a randomized complete block design with four replications. In 2008, a canola-soybean-cotton rotation was 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. Total seasonal rainfall (June-August) at TVREC for 2008 was 11.27", which was near the normal average of 11.50". Comparable growing season rainfall in 2006 and 2007 was less than 6.5 inches (Figure 1).

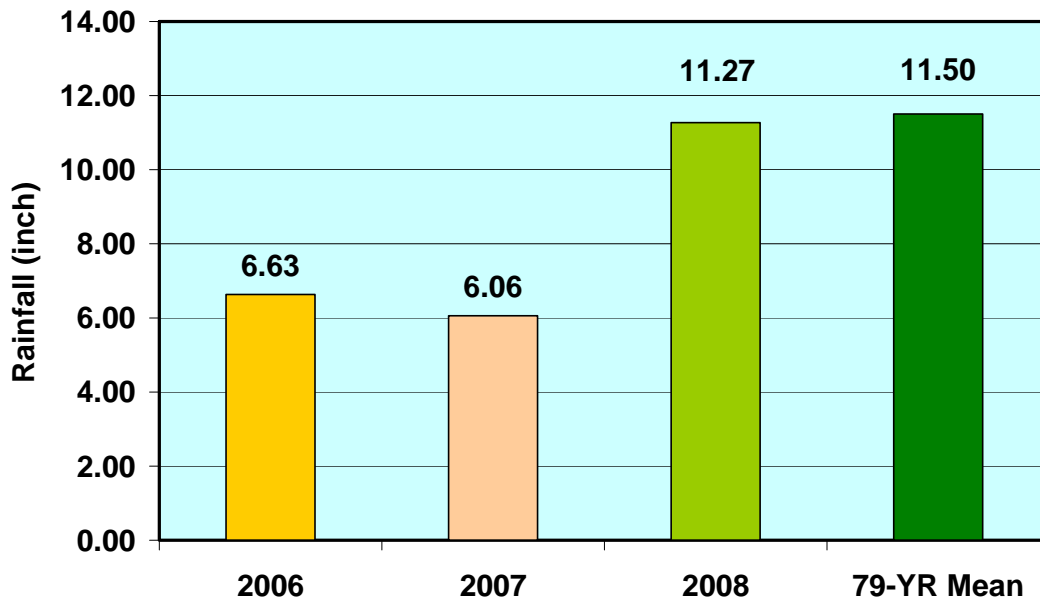


Figure 1. Total seasonal rainfall during June, July, and August period vs. 79-year average

Because of higher rainfall in 2008, rainfed, non-irrigated yields were higher in 2008 than in 2006 and 2007 (Figure 2). Due to irrigation malfunction, both the 50% and 75% irrigation treatments in 2008 were discarded. Due to the same malfunction, very little irrigation water (<0.5") was applied to the 100% irrigation treatment during August and September. However, yield was not negatively impacted and treatment results are included in Table 1. All three 2008 irrigation treatments reported in Table 1 significantly increased ($\alpha = 0.10$) seed cotton yield over the rainfed (0%) control. Irrigation near 100% of calculated pan evaporation adjusted for percent canopy cover resulted in the best yield in all three seasons (Table 1). Average sprinkler irrigated cotton yields were 2.3, 3.5, and 3.1 bales/acre in 2006, 2007, and 2008, respectively, compared to the 3-season

2008 Field Crops Research Report

average of 1.5 bales/ac for rainfed controls. Malfunction of the 2008 irrigation scheduling system has been corrected for the upcoming 2009 season.

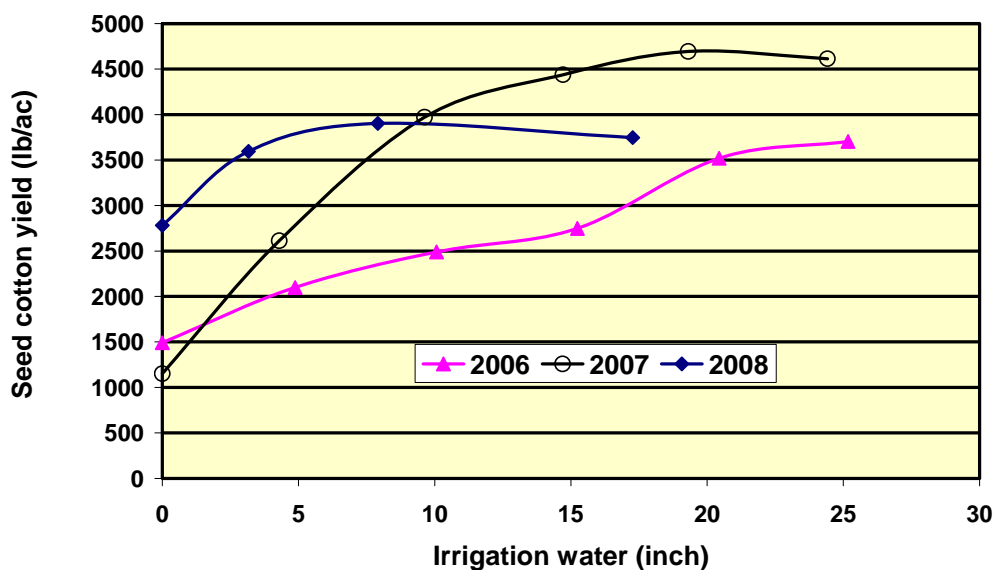


Figure 2. Effect of total amount of irrigation water on seed cotton yield in TVREC during 2006-2008 (In 2008, two irrigation treatments were discarded due to irrigation malfunction).

Table 1. Irrigation amounts and lint yield for sprinkler-scheduling trials, 2006-08.

Irrigation Treatment	2006		2007		2008	
	Irrigation (in)	Bales/ac	Irrigation (in)	Bales/ac	Irrigation (in)	Bales/ac
0	0.00	1.2	0.00	1.0	0.00	2.3
25%	4.87	1.7	4.29	2.2	3.16	3.0
50%	10.1	2.0	9.63	3.4	3.70* (6.76)	-
75%	15.2	2.2	14.7	3.8	5.86* (10.3)	-
100%	20.4	2.8	19.3	4.0	7.91 (13.9)	3.3
125%	25.2	2.9	24.4	3.9	17.3	3.1

*In 2008, the irrigation treatments 50% and 75% were discarded due to irrigation malfunction. Numbers in parentheses indicate target irrigation that was not achieved due to malfunction. In 2006, N=4, turnout = 38%. In 2007, N=8, turnout = 41%. In 2008, N=4, turnout 40%.