

## Cotton Income Gains Due to Irrigation – 2007 report

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The 2006 and 2007 growing seasons were progressively dryer at the Tennessee Valley Research and Extension Center (TVREC), Belle Mina, AL, with decreasing precipitation and increasing evaporation during both years (Figure 1). The most recent 10-year average rainfall at Belle Mina for June through August is 10.5 inches; and the 78-year average is 11.5 inches. Comparable season rainfall in 2006 and 2007 was less than 7 inches. Only four previous years on record had such low rainfall during these months; and only one year on record, 1954, had less rainfall than 2007. Not only was rainfall low, but evapotranspiration (approximated by pan evaporation in Figure 1), was extremely high throughout the growing season of both years. As a result, cotton producers with adequate irrigation had the potential to realize significant yield gains in 2006 and 2007, similar to the excellent response to irrigation observed in 1999 and 2000.

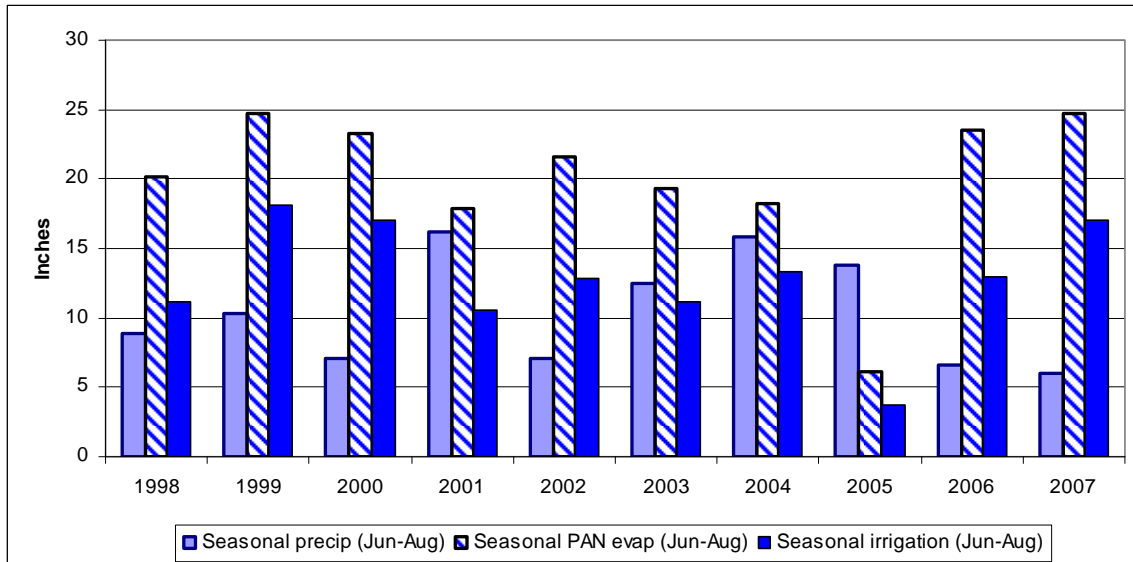


Figure 1. Ten-year seasonal water balance (June through August only), TVREC, Belle Mina, AL. Annual seasonal irrigation is calculated as 90% x seasonal pan evaporation x crop canopy factor.

This report evaluates irrigated cotton income gains over comparable dryland cotton using yield and irrigation data for overhead sprinkler plots at TVREC during two back-to-back drought years, 2006 and 2007. Total annual irrigation system ownership costs of \$87.95 per acre and irrigation operating costs of \$9.39 per acre-inch for a 140-acre pivot are taken from Timely Information Series publication BSEN-IRR-07-01 (May 2007) (<http://www.aces.edu/dept/irrig/anIRR-01.php>). Table 1 shows increasing seasonal operating costs for irrigation as larger depths of water are applied. During the 2006 and 2007 drought, 100% of pan evaporation, adjusted for canopy cover, was required in sprinkler research plots to achieve maximum yields (Table 1). Total seasonal irrigation depths were extremely high during 2006 and 2007 (approximately 20 inches).

Table 1. Comparative yields, gross receipts, and estimated operating costs for overhead sprinkler irrigation, 2006 and 2007, TVREC, Belle Mina, AL. Operating costs do not include irrigation annual ownership costs.

Source: TVREC record - 2006-07	2006 Lint Yield (bales/ac)*	2007 Lint Yield (bales/ac)*	2006 Gross Receipts (\$/ac)**	2007 Gross Receipts (\$/ac)**	2006 Operating Costs (\$/ac)†	2007 Operating Costs (\$/ac)†
Sprinkler plots (actual 2006, 2007 irrigation depths):						
Dryland / winter cover (0.0", 0.0")	1.2	1.0	\$312	\$260	\$0	\$0
25% x PAN x canopy cover factor (4.9", 4.3")	1.7	2.2	\$438	\$589	\$46	\$40
50% x PAN x canopy cover factor (10.1", 9.6")	2.0	3.4	\$521	\$895	\$95	\$90
75% x PAN x canopy cover factor (15.2", 14.7")	2.2	3.8	\$574	\$1,000	\$143	\$138
100% x PAN x canopy cover factor (20.4", 19.3")	2.8	4.0	\$736	\$1,058	\$192	\$181
125% x PAN x canopy cover factor (25.2", 24.4")	2.9	3.9	\$774	\$1,040	\$236	\$229

\* 2006: 38% turnout; 2007: 41% turnout.

\*\* Gross receipts \$0.55 / pound lint (includes resale of \$200/ton seed)

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

Table 2 shows that in 2006, if estimated irrigation ownership and operating costs are charged against 2006 gross receipts, overhead sprinkler irrigation results in a net income gain of \$26 per acre over dryland (irrigation replaces 50% of pan evaporation, adjusted for crop canopy). A maximum net income gain of \$144 per acre over dryland would be realized if irrigation replaced 100% of pan evaporation, adjusted for crop canopy. In 2007, a higher response to irrigation was observed in all sprinkler research plots. As a result, when estimated irrigation ownership and operating costs are charged against 2007 gross receipts, net income gain due to irrigation is \$201 per acre over dryland even if irrigation replaces only 25% of pan evaporation, adjusted for crop canopy. Based on 2007 field trial data, a maximum net income gain of \$529 per acre would be realized if irrigation replaced 100% of pan evaporation, adjusted for crop canopy. A separate report discusses reasons for the higher irrigation response in 2007 sprinkler trials at TVREC.

Table 2. Estimated net income gain over dryland due to overhead sprinkler irrigation, 2006 2007, TVREC, Belle Mina, AL.

Source: TVREC records - 2006-07	2006 Gross Receipts (\$/ac)**	2007 Gross Receipts (\$/ac)**	2006 Total Ownership + Operating Costs (\$/ac)‡	2007 Total Ownership + Operating Costs (\$/ac)	2007 Net Income Gain Over Dryland (\$/ac)	2006 Net Income Gain Over Dryland (\$/ac)
Sprinkler plots (actual 2006, 2007 irrigation depths):						
Dryland / winter cover (0.0", 0.0")	\$312	\$260	\$0	\$0	---	---
25% x PAN x canopy cover factor (4.9", 4.3")	\$438	\$589	\$134	\$128	(\$7)	\$201
50% x PAN x canopy cover factor (10.1", 9.6")	\$521	\$895	\$183	\$178	\$26	\$457
75% x PAN x canopy cover factor (15.2", 14.7")	\$574	\$1,000	\$231	\$226	\$31	\$515
100% x PAN x canopy cover factor (20.4", 19.3")	\$736	\$1,058	\$280	\$269	\$144	\$529
125% x PAN x canopy cover factor (25.2", 24.4")	\$774	\$1,040	\$324	\$317	\$138	\$463

\*\* Gross receipts \$0.55 / pound lint (includes resale of \$200/ton seed)

‡ Ownership costs = \$87.95/ac; Operating costs = \$9.39/ac-in (Table 1). Estimated costs include a 140-ac pivot system, with pump and motor. Source: <http://www.aces.edu/dept/irrig/anIRR-01.php>