IRRIGATION OF COTTON MAKES "CENTS"

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Abstract

Irrigation of cotton makes sense to growers interested in improving crop production, but investment and operation of irrigation equipment is costly. This paper examines budgeted irrigation costs in several of the Southeastern cotton producing states, conducts an analysis of investment and operating costs, and a sensitivity analysis of profitability.

Introduction

Irrigation makes sense to a lot of growers interested in improving crop production, reducing yield variability and potentially increasing profits. However, irrigation can be costly. Investment and operating costs on irrigation equipment are significant and financing may be difficult to obtain. Water availability may be restricted and energy sources can be limited; adding to the cost to irrigate. Furthermore, the benefits to irrigation over non-irrigated production methods may be reduced due to rainfall during the growing season. The objective of this paper is to examine irrigation costs in several of the Southeastern cotton producing states and conduct a sensitivity analysis of profitability.

Analysis and Results

An analysis of cotton enterprise budgets from Arkansas, Georgia and Texas was conducted to summarize budgeted, or expected, differences in yield and cost of production. Budget data were summarized by production method and irrigation method (i.e. dryland versus furrow-irrigated versus pivot-irrigated). Table 1 shows budgeted yields, variable, fixed, and total costs. Arkansas budgets reflect an expected increase in yield due to irrigation of 400 pounds per acre, whereas irrigation is budgeted to increase yield by 500 pounds over dryland yields in Georgia and by 690 to 850 pounds per acre in Texas depending upon the type of irrigation method. Additional costs associated with irrigated cotton production are not only a result of the irrigation application. Irrigated acres tend to have more field operations due to increased weed, disease and insect pressure. There may also be additional cost associated with land preparation in the case of furrow irrigated acreage. Irrigated acres are budgeted to cost an additional $124 to $190 per acre over dryland production costs in Arkansas, an additional $254 per acre over dryland production costs in Georgia, and $279 to $390 per acre over dryland production costs in Texas.

Table 1. Cotton Enterprise Budgets, Selected Southeastern States, Cost per Acre and per Pound, 2012

	Arkansas			Georgia		Texas		
Production Method	Dryland	Furrow	Pivot	Dryland	Pivot	Dryland	Furrow	Pivot
Yield, pounds	800	1,200	1,200	700	1,200	430	1,120	1,280
Variable Cost, per acre	$415	$520	$553	$433	$571	$318	$562	$667
Fixed Cost, per acre	$102	$121	$153	$131	$247	$36	$71	$77
Total Cost, per acre	$517	$641	$706	$564	$818	$354	$634	$744
Total Cost, per pound	$0.65	$0.53	$0.59	$0.81	$0.68	$0.82	$0.57	$0.58

Sources: University of Arkansas, 2012 Cotton Enterprise Budgets, The University of Georgia 2012 Cotton Enterprise Budgets, Texas AgriLife Extension Service 2012 Cotton Enterprise Budgets.

Investment and operating costs can vary significantly among farms and by states. An analysis of investment and operating cost data on irrigation was conducted for Georgia and Texas. Investment and operating costs can be found in Tables 2-5. Investment costs are calculated depending upon the size of the irrigation system, type of irrigation system, size and type of the power unit and pump, and size and depth of the well.

Investment costs (Tables 2-3) in Georgia, assuming a 160 acre center pivot and a 300' well, range from $140,000 to $153,000 for electric and diesel operation, respectively. Operating costs for the diesel-operated pivot are $148.84 an acre, using a diesel fuel price of $3.55 per gallon. Operating costs for the electric-operated pivot in Georgia are $73.00 per acre; not including a potential surcharge for use of electricity during peak energy use hours.

Table 2. Initial Investment and Annual Ownership and Operating Costs, Center Pivot, Diesel Operation, 300' Well, 160 acres in Georgia

	Investment ($)	Useful Life (years)	Depreciation ($)	Interest ($)	Taxes & Insurance ($)
Sprinkler System	65,000	20	3,250	2,275	813
Power Unit	15,500	12	1,292	543	194
Well	28,000	20	1,400	980	350
Pump & Gearhead	33,500	12	2,792	1,173	419
Installation	11,000	20	550	385	138
Total Investment	$153,000		$9,283	$5,355	$1,913
Annual Fixed Cost:			$16,551		
Annual Fixed Cost per Acre:			$103.44		
Total Operating Cost per Acre:			$148.84		
Diesel Fuel Cost per Acre:			$112.20		
Lube, Repairs & Maintenance Cost per Acre:			$25.46		
Labor Cost per Acre:			$11.17		

Table 3. Initial Investment and Annual Ownership and Operating Costs, Center Pivot, Electric Operation, 300' Well, 160 acres in Georgia

	Investment ($)	Useful Life (years)	Depreciation ($)	Interest ($)	Taxes & Insurance ($)
Sprinkler System	65,000	20	3,250	2,275	813
Power Unit	15,500	12	1,292	543	194
Well	28,000	20	1,400	980	350
Pump	31,500	20	1,525	1,068	381
Total Investment	$140,000		$7,467	$4,865	$1,738
Annual Fixed Cost:			$14,069		
Annual Fixed Cost per Acre:			$87.93		
Total Operating Cost per Acre:			$73.00		
Electricity Cost per Acre:			$36.98*		
Lube, Repairs & Maintenance Cost per Acre:			$26.55		
Labor Cost per Acre:			$ 9.48		

*Does not include potential surcharge for operation during peak hours.

Investment costs (Tables 4-5) in Texas, assuming a 160 acre pivot or 160 acre furrow irrigation system and a 350' well, range from $170,000 to $137,000, respectively. Operating costs for the natural gas-operated pivot are $111.97 an acre, using a natural gas price of $6.00 per thousand cubic feet. Operating costs for the natural-gas operated furrow irrigation system are $141.23 per acre. The furrow-irrigation system has the highest labor cost because of the additional labor involved in land preparation and moving pipe.

Table 4. Initial Investment and Annual Ownership and Operating Costs, Center Pivot, Natural Gas Operation, 350' Well, 160 acres in Texas

	Investment ($)	Useful Life (years)	Depreciation ($)	Interest ($)	Taxes & Insurance ($)
Distribution System	65,000	25	2,780	2,433	869
Engine	9,000	25	360	315	113
Well	45,500	25	1,820	1,593	569
Pump	46,000	25	1,840	1,610	575
Total Investment	$170,000		$6,800	$5,950	$2,125
Annual Fixed Cost:			$14,875		
Annual Fixed Cost per Acre:			$ 92.97		
Total Operating Cost per Acre:			$111.97		
Natural Gas Cost per Acre:			$59.15		
Lube, Repairs & Maintenance Cost per Acre:			$38.47		
Labor Cost per Acre:			$14.36		

Source: Amosson et al., 2011. "Economics of Irrigation Systems." Texas AgriLife Extension Service Bulletin B-6113.

Table 5. Initial Investment and Annual Ownership and Operating Costs, Furrow Irrigation, Natural Gas Operation, 350' Well, 160 acres in Texas

	Investment ($)	Useful Life (years)	Depreciation ($)	Interest ($)	Taxes & Insurance ($)
Distribution System	36,800	25	1,472	1,288	460
Engine	9,000	25	360	315	113
Well	45,500	25	1,820	1,593	569
Pump	46,000	25	1,840	1,610	575
Total Investment	$170,000		$5,492	$4,806	$1,716

Annual Fixed Cost:	$12,014
Annual Fixed Cost per Acre:	$ 75.09
Total Operating Cost per Acre:	$141.23
Natural Gas Cost per Acre:	$70.85
Lube, Repairs & Maintenance Cost per Acre:	$46.10
Labor Cost per Acre:	$24.28

Source: Amosson et al., 2011. "Economics of Irrigation Systems." Texas AgriLife Extension Service Bulletin B-6113.

Irrigation makes economic sense when revenue from increased yield exceeds the increased cost of production. Table 6 shows the yields needed to cover the added cost of irrigation at varied prices of lint cotton. In Arkansas, the added cost of irrigation is $124 per acre for furrow irrigation and $190 per acre for pivot irrigation. At a lint price of $0.80 per pound, a grower will need an additional 155 to 237 pounds of cotton to justify paying the higher costs of irrigation. In Georgia, the added cost of irrigation is $254 per acre. At a lint price of $0.80 per pound, growers need an additional 318 pounds of cotton to justify paying the higher costs of irrigation. In Texas, the added cost of irrigation is $279 per acre for furrow irrigation and $390 per acre for pivot irrigation. At a lint price of $0.80 per pound, growers need an added 350 to 488 pounds of cotton to justify paying the higher costs of irrigation.

Table 6. Lint Yield Needed to Cover Added Cost of Irrigation by Type of Irrigation System and Lint Price, Selected Southeastern States, 2012

	Arkansas		Georgia	Texas	
Lint Price $/lb	Furrow (lb)	Pivot (lb)	Pivot (lb)	Furrow (lb)	Pivot (lb)
$0.70	178	271	363	399	558
$0.80	155	237	318	350	488
$0.90	138	211	282	310	434

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