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Surge Irrigation Illustration for Cotton in the Lower Rio Grande Valley

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Illustrating the economic viability of the site demonstrations allows for an evaluation of the viability of surge irrigation as an efficient water delivery system.

The overall demand for water in the Lower Rio Grande Valley is being pressured by a substantial population growth in recent years. This increasing demand coupled with the ongoing needs of irrigated production agriculture has spurred an interest in evaluating water conservation practices. As a result, water use demonstrations on irrigated crops, such as surge irrigation, have been established. Illustrating the economic viability of the site demonstrations allows for an evaluation of the viability of surge irrigation as an efficient water delivery system.

The Agricultural Water Demonstration Initiative (ADI) project is a multi-faceted effort among the Texas Water Development Board, the Harlingen Irrigation District, South Texas agricultural producers, Texas Cooperative Extension and other agencies. It is designed to demonstrate state-of-the-art water distribution network management and on-farm, cost-effective irrigation technologies to maximize surface water use efficiency. The project includes maximizing the efficiency of irrigation water diverted from the Rio Grande River to water consumption by various

field, vegetable, and citrus crops. Texas Cooperative Extension (TCE) conducts the economic analyses of demonstration results, evaluating the potential impact of adopting alternative water conserving technologies. TCE works individually with agricultural producers using the Financial And Risk Management (FARM) Assistance financial planning model to analyze the impact and cost-effectiveness of the alternative irrigation technologies.

Three surge valve technology demonstrations in 2006, associated with the ADI project, illustrate potential water application and irrigation costs scenarios in cotton production (Table 1). Irrigation water in the Lower Rio Grande Valley is currently sold on a per-watering basis regardless of amount used. For example, in a growing season a cotton crop may be watered 4 different occasions at a price of \$7 per watering. In this example, a producer would pay approximately \$28 in water costs. Labor, surge valve and poly-pipe would add to the total irrigation costs per acre. A surge valve may cost as much as \$1,800-\$2,200. The following analysis evaluates the potential financial incentives for using surge technology.

Assumptions

Table 1 provides the basic water use and irrigation cost assumptions for cotton surge irrigation. For the purpose of illustrating surge technology in cotton, three demonstration sites were used, including a 38.5-acre site (Site 41A&B), a 94-acre site (Site 42B) and a 38-acre site (Site 44A). Production costs were derived from custom rates and estimates of per acre overhead charges from the three individual cooperators. They are assumed to be typical for the region and were not changed for analysis purposes. These assumptions are intended to make the illustration relevant to a wide range of producers in the Lower Rio Grande Valley area.

The analysis consists of three separate demonstration sites not located adjacent to one another. Differences in soil types, rainfall and management practices likely affected irrigation water application, production costs and yields. As a result, the three are not replicated trials and the three combined are not a controlled experiment for comparison purposes. This comparison is merely a case study example illustrating results of

Table 1: Cotton Surge Irrigation Application and Cost Information Per Acre

Demo Site	Irrigation Method	Acres	Acre Inches Applied	Irrigation Costs Per Acre	Irrigation Costs Per Acre Inch	Yields Per Acre (lbs)	Yields Per Acre Inch (lbs)	Surge Valve
Site 41A&B	Surge	38.50	25.15	\$53.00	\$2.11	1,047	41.60	\$1,800.00
Site 42B	Surge	94.00	13.42	\$48.44	\$3.61	929	69.23	\$1,800.00
Site 44A	Surge	38.00	13.56	\$40.00	\$2.95	760	56.00	\$2,200.00

All three demonstration sites reflect profitable use of surge valve technology in irrigated cotton production.

Table 2: Financial Indicators Per Acre for Cotton, Surge Irrigation						
Demo Site	Irrigation Method	10-Year Averages Per Year				
		Total Cash Receipts (\$1,000)	Total Cash Costs (\$1,000)	Net Cash Farm Income (\$1,000)	Prob Net Cash Income <0 (%)	Avg Annual Operating Expense/Receipts
Site 41A&B	Surge	0.90	0.57	0.32	1.00	0.65
Site 42B	Surge	0.79	0.59	0.20	1.00	0.75
Site 44A	Surge	0.60	0.46	0.14	11.50	0.79

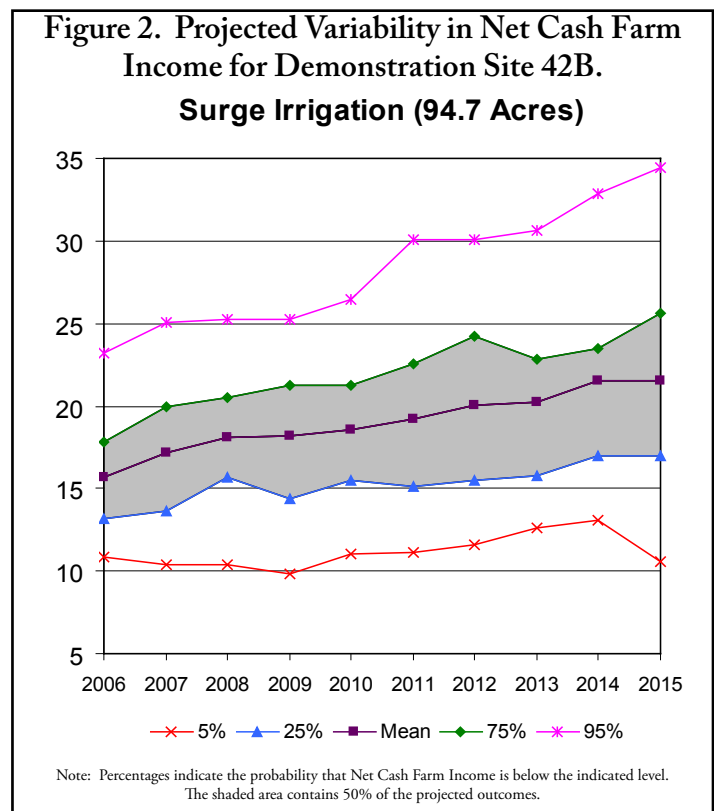
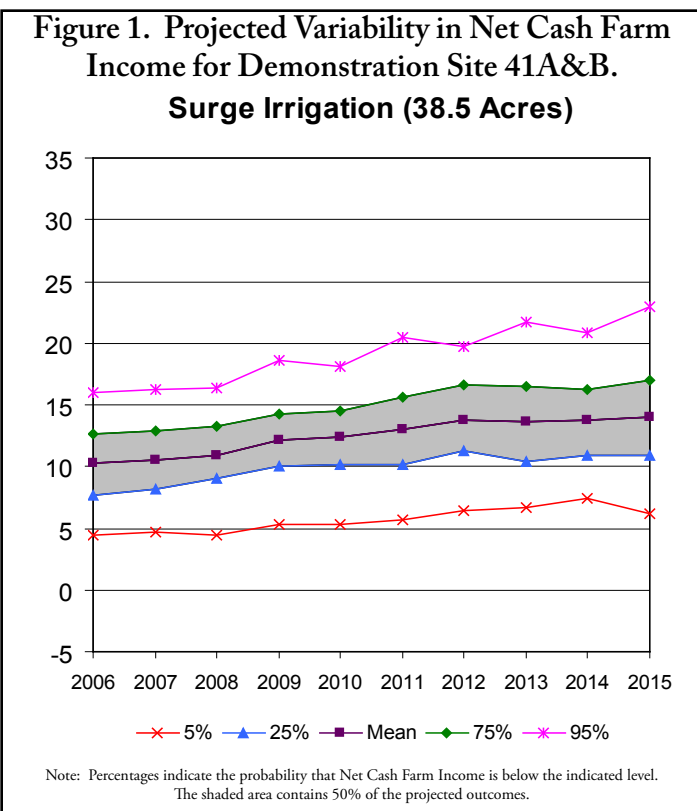
different sites. The first two surge sites assume a surge valve cost of \$1800 and the third \$2,200. The surge valve expense is evenly distributed over the 10-year period (\$180 or \$220) with the assumption of no financing costs. For the current analysis, no other major differences were assumed for the surge valve sites.

For each 10-year outlook projection, commodity price trends follow projections provided by the Food and Agricultural Policy Research Institute (FAPRI, at the University of Missouri) with costs adjusted for inflation over the planning horizon. Demonstration findings suggest a range of possible yields based on varying management

practices and production conditions.

Results

Comprehensive projections, including price and yield risk for surge irrigation, are illustrated in Table 2 and Figures 1-3. Table 2 presents the average



The economic incentives for producers to switch to surge irrigation systems will likely be determined by the future availability and cost of water.

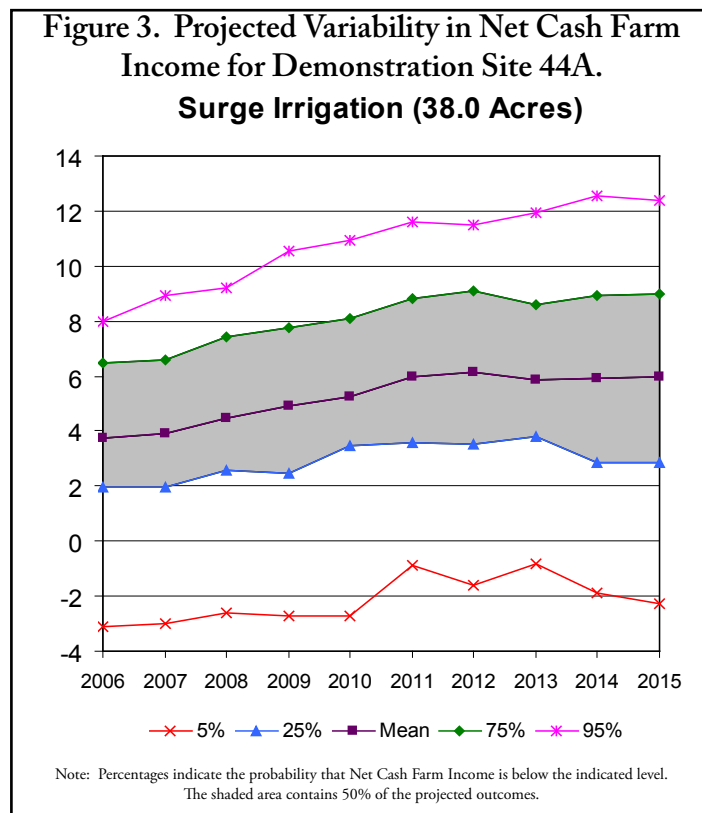
outcomes for selected financial projections, while the graphical presentations illustrate the full range of possibilities for net cash farm income. Cash receipts average \$600-\$900/acre over the 10-year period for the three sites. Average cash costs range from \$460/acre for Site 44A to \$590/acre for Site 42B.

Average Net Cash Farm Income (NCFI) is the highest for Site 41A&B at \$320/acre followed by Site 42B at \$200/acre and Site 44A \$140/acre (Table 2; Figures 1-3). NCFI rises slightly for all sites from 2006 to 2012 before flattening in the later years due to cost inflation outpacing increases in prices and yield. All three surge scenarios reflect significant levels of risk (Figures 1-3). Risk projections also indicate a 1% or less chance of a negative NCFI for Sites 41A&B and 42B, compared to 11.5% for Site 44A (Table 2).

Summary

The case study results of surge irrigation for cotton illustrate a wide range of possible water application rates and irrigation costs. Demonstration results vary due to differences in yields and management practices. All three demonstration

sites reflect profitable use of surge valve technology in irrigated cotton production. However, where previous studies have shown potential water use and cost savings, the economic incentives for producers to switch to surge irrigation systems will likely be determined by the future availability and cost of water.



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