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Saving Water for the Future

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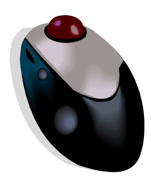


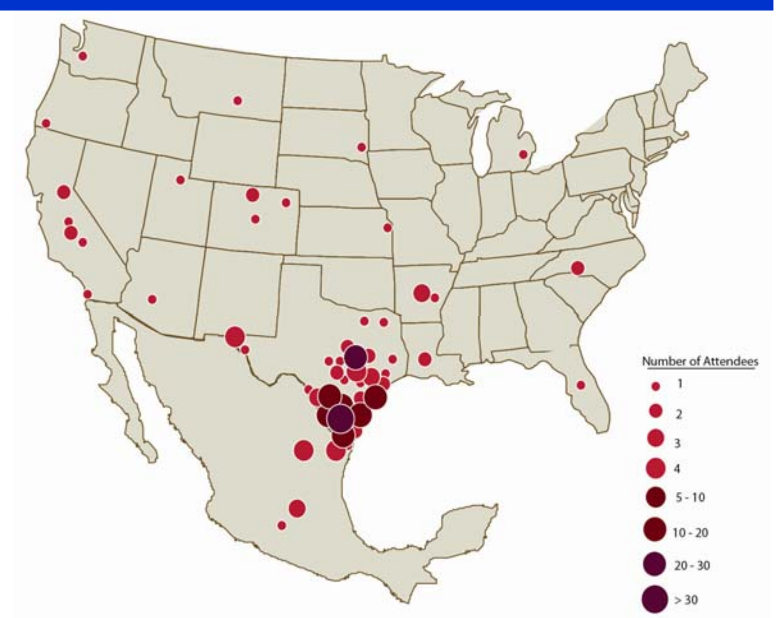
Message from the Manager

This year has been a busy one for Harlingen Irrigation District. We were pleased to present the first Texas Irrigation Expo, as part of the Agricultural Water Conservation Demonstration Initiative. The Expo attracted attendees not just from Texas, but across the United States and Mexico. We hope to present a similar event in the future, as the importance of on-farm water conservation will only continue to grow over time.

On behalf of the staff here at HID, I wish you and your family a very happy holiday season. We look forward to working with you in the new year!

Sincerely,

Wayne Halbert
General Manager, HID



Attendees of the 2010 Texas Irrigation Expo traveled from many locations, not just Texas, to learn about on-farm water conservation

Volume # 10-2 December 2010

Keep up with the latest news and projects affecting your production with the

HARLINGEN IRRIGATION DISTRICT NEWSLETTER

In this issue

Did you miss the 2010 Texas Irrigation Expo?

Visit *TexasIrrigationExpo.org* to view event photos, presentations, and more.

Texas Irrigation Expo Held in Mercedes

Texas Irrigation Expo | 2010

Water conservation, best management practices, and the economics of farming were among the topics discussed at the first Texas Irrigation Expo, which was held Oct. 21-22 at the Rio Grande Valley Livestock Show Grounds in Mercedes. The Harlingen Irrigation District coordinated the event as part of the state's *Agricultural Water Conservation Demonstration Initiative* (ADI program), which is funded through a grant from the Texas Water Development Board. The two-day event had over 230 attendees, and included presentations by expert speakers, tours of demonstration sites currently using on-farm water conservation tools and techniques, a scholarship contest for high school students, and exhibitors displaying the latest technology and equipment.

L-R: J. Kevin Ward of the Texas Water Development Board, IBWC Commissioner Edward Drusina, TCEQ Commissioner Carlos Rubinstein, and HID General Manager Wayne Halbert at the reception.

Prior to the start of the Expo, a reception was held for invited guests. US Commissioner Edward Drusina of the International Water and Boundary Commission and Texas Commission on Environmental Quality Commissioner Carlos Rubinstein attended and made remarks. Two local high school students won cash prizes for participating in a science contest that was part of the Expo. Ruben Saldana, Jr. of Weslaco won 1st place for his study of the Arroyo Colorado, earning him a $1,500 check from the Expo. Billie Ann Martinez of Harlingen won 2nd place and a check for $1,000 for her science experiment. The awards were presented to the winners by Shad Nelson, Ph.D. of Texas A&M University-Kingsville, an associate professor who serves as the chair of the Department of Agronomy and Resource Sciences.

Thursday's program included a mix of educational sessions and exhibits. Keynote speaker Donald Gohmert, the State Conservationist with the USDA/NRCS, gave a presentation titled "How Conservation Technical and Financial Assistance Can Make Every Drop Count." He discussed the NRCS, how technical and financial assistance can help growers meet their land management goals through conservation planning, and the benefits of installing improved and efficient irrigation systems. He also talked about recent funding from the Emergency Watershed Protection (EWP) program that

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Drip Irrigation Line Placement for Adequate Soil Moisture in Citrus Production Systems

Shad D. Nelson, Associate Professor, Texas A&M University-Kingsville
Juan Enciso, Associate Professor, Texas Agrilife Research and Extension, Weslaco
Mac Young, FARM Assistance Program Specialist, Texas Agrilife Extension, Corpus Christi

Proper placement of drip irrigation lines and the number of lines to place under mature citrus trees is a concern for growers considering drip systems. During periods of extensive drought, many growers using single-line drip irrigation find it challenging to apply sufficient water to trees in South Texas to meet crop water demand. However, for perennial tree crops like citrus, water stress can

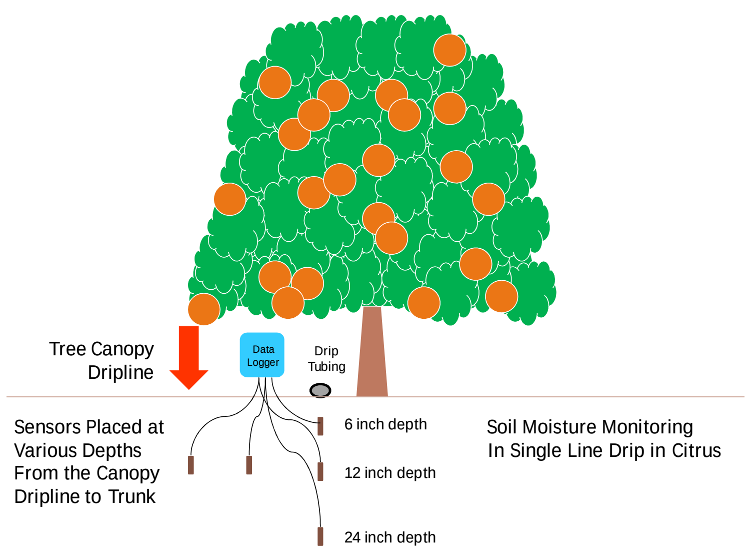

Figure 1: Placement of soil moisture sensors under the citrus tree canopy using single-line drip irrigation to monitor downward and lateral movement of water upon irrigation.

be a problem regardless of drought as trees can experience water stress throughout the year even when rains in Texas are at average rainfall levels.

This has to do with the way in which citrus trees grow and where the 'feeder roots' are primarily located for crop water uptake. A large majority of feeder roots for citrus reside within the upper 12 inches of the soil, with major stability roots anchoring the tree in place below this depth. Furthermore, a large majority of roots actively involved in water uptake are located along the 'dripline' of the tree canopy. These roots have adapted to rainfall cascading down and off of the tree leaves and landing on the outer perimeter of the tree.

Using low-volume irrigation systems, like drip irrigation, one must take this root growth pattern into consideration so as not to stress these actively growing feeder roots. One way to monitor soil moisture is through the use of soil moisture sensors equipped to a data logging device. When sensors are placed below a single drip line that is located near the tree truck at various depths in tandem with sensors located laterally away from the drip tubing that extend to the drip line of the tree canopy (Figure 1) growers can observe the lateral and downward movement of water after irrigation.

Figure 2 shows what commonly occurs to mature citrus trees under single line drip systems, as water does not move laterally enough through the upper 12 inch soil depth to meet the water needs of most feeder roots. This results in zones of dry soil at the outside of the tree canopy, and more especially on the side of the tree furthest away from the drip irrigation tubing.

The solution to this problem is simple, but does increase the cost of the drip irrigation system installation. Installing a 'dual-line' drip irrigation system (Figure 3) with the drip tubing located mid-way between the tree trunk and outer tree canopy dripline will provide for sufficient lateral movement to supply the water needs of the tree. A dual-line system can lead to better water management, as growers will avoid the need to run irrigation systems for an extended period of time to try and irrigate the entire root zone of the tree.

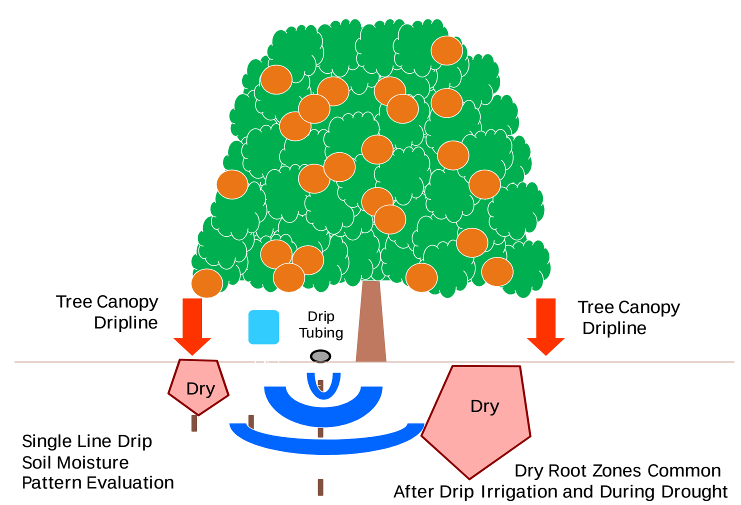

Figure 2: Single-line drip irrigation pattern leads to poor lateral movement to the tree canopy edge in mature citrus groves.

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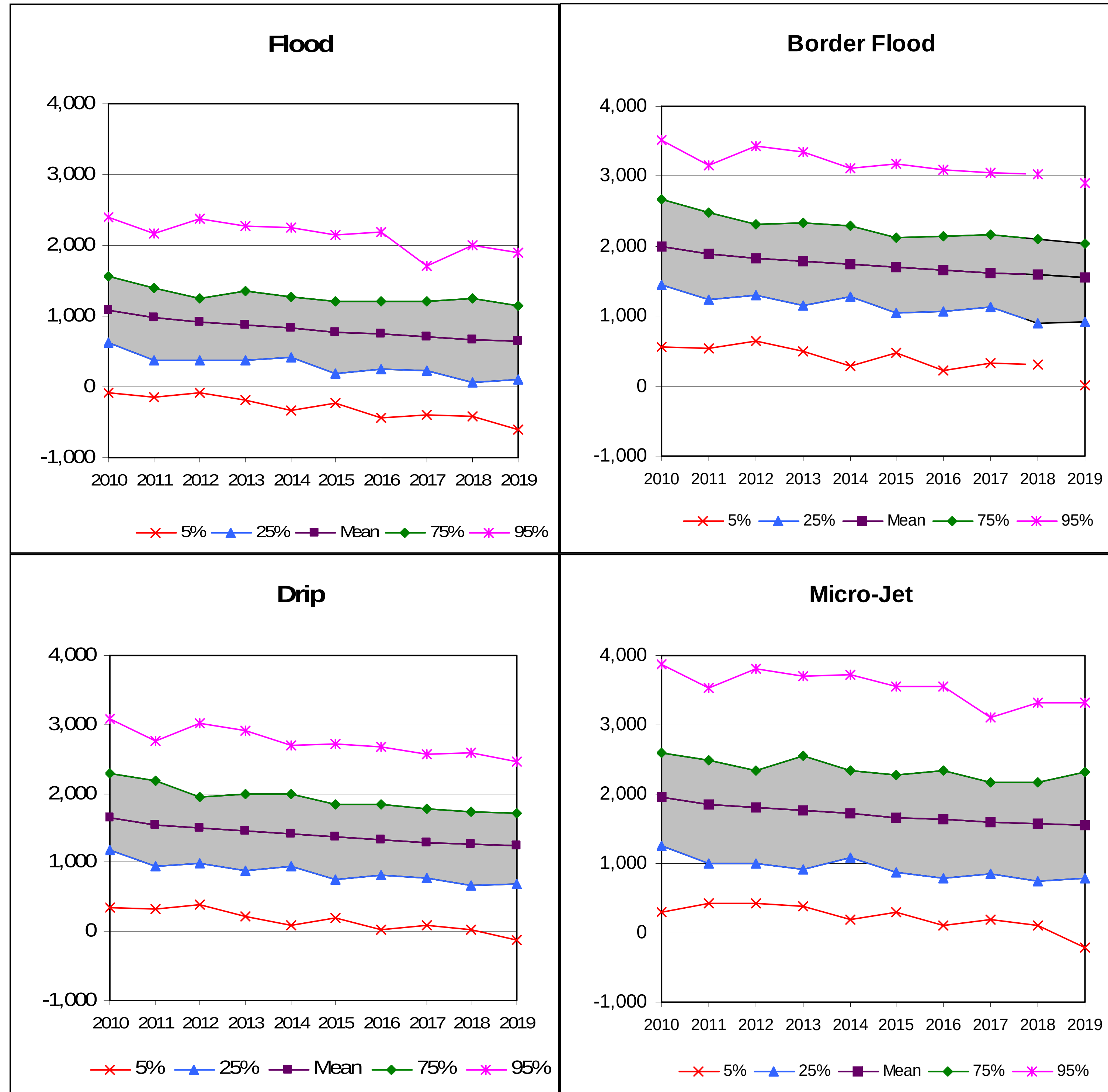
may be the best option. Border flood also has a cost advantage over the other three irrigation systems. However, other issues such as terrain, availability of labor, water savings, and cost of water may also play a role in deciding which system is the best fit for an individual producer.

ACKNOWLEDGEMENT

Xavier Peries, Texas AgriLife Extension Associate in District 12 is recognized for his data collection and monitoring efforts in the demonstration sites.



Figures 1-4: Projected Variability in Net Cash Farm Income Per Acre for Grapefruit, Average Pack-Out.

Note: Percentages indicate the probability that Net Farm Income is below the indicated level. The shaded area contains 50% of the projected outcomes.

Texas Irrigation Expo 2010

Clockwise from top left: Panelists from the ADI Program prepare for a Q&A session; Keynote speaker Don Gohmert of the USDA/NRCS gives a presentation; Participants view irrigation systems at one of the off-site tours for Expo attendees; Expo exhibitors discuss their products with the public; Gate demonstrations in the exhibit hall

HAPPY HOLIDAYS FROM THE HID STAFF!

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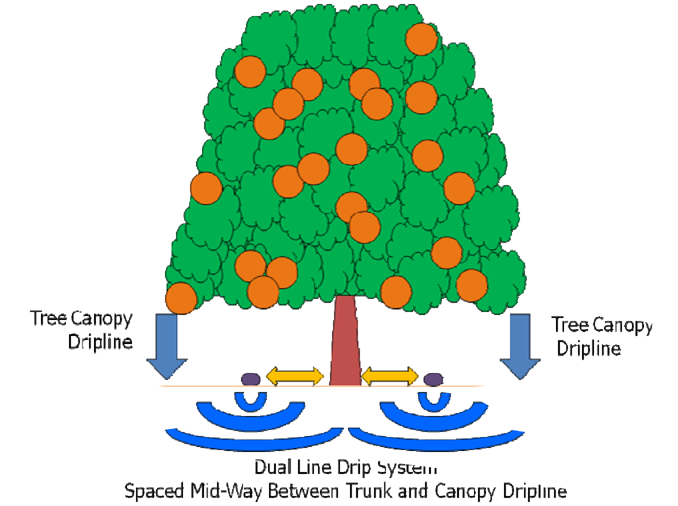

Figure 3. Placement of soil moisture sensors under the citrus tree canopy using dual-line drip irrigation will provide adequate downward and lateral movement of irrigation water to the tree canopy edge.

Notes & News

- **The Texas Water Development Board (TWDB) is accepting applications for agricultural water conservation grants for FY 2011. Deadline for submissions is January 12; visit their website www.twdb.state.tx.us for more details.**
- **The Rio Grande Regional Water Planning Group (Region M) recently submitted its updated regional water plan to the TWDB; visit their site www.RioGrandeWaterPlan.org for more information about the plan.**
- **The Sunset Advisory Commission recently released its staff report on the Texas Commission on Environmental Quality. Visit their website www.tceq.state.tx.us to view the report.**

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Science contest winners Billie Ann Martinez and Ruben Saldana, Jr., with Dr. Shad Nelson, Texas A&M University-Kingsville

provided more than $2.3 million for repairs to four Rio Grande Valley irrigation districts after Hurricane Dolly.

State Senator Eddie Lucio, Jr., was on hand to recognize Jimmy Pawlik and Jim Hoffman, winners of the first Irrigator of the Year awards. The awards were presented by Carole Baker on behalf of the Texas Water Conservation Advisory Council, in recognition of the honorees' contributions to the state's ADI Program. "We've been extremely fortunate to have Jim Hoffman and Jimmy Pawlik partner with us on the ADI Program," said Wayne Halbert, the general manager of HID. "They agreed to install different types of irrigation tools on their farms, and they allowed us to collect information showing the impact different types of irrigation can make on a wide variety of crops."

In the afternoon, attendees had the option of going on site tours of local demonstration sites that were part of the ADI program. One group visited the Flow Meter Calibration Center in the Lower Rio Grande Valley, while another group toured demonstration sites in the Upper RGV. A third group stayed on site to view production demonstrations from the Expo's sponsors and exhibitors.

The Expo ended Friday morning with pesticide training that qualified for CEU credits through the Texas Department of Agriculture, as well as other information about environmental regulations. Attendees called the Expo "very informative" and appreciated the "real life applicable info" and "diversity of products displayed." Plans are currently underway for a future event; stay tuned to the Expo website for more details. Photos and presentations from the 2010 are available there as well: www.TexasIrrigationExpo.org.

L-R: Texas State Senator Eddie Lucio, Jr., "Irrigator of the Year" award winners Jimmy Pawlik and Jim Hoffman, and Carole Baker of the Texas Water Conservation Advisory Council

Assessing Irrigation Methods Based on Grapefruit Pack-Out in the Lower Rio Grande Valley

Mac Young, Extension; Shad Nelson, TAMUK; Steven Klose, Extension; Juan Enciso, Extension

FARM Assistance Focus 2010-4, August 2010

Department of Agricultural Economics, Texas AgriLife Extension Service (Extension),
Texas A&M University System (TAMU)

Grapefruit is the major citrus crop in the Lower Rio Grande Valley of Texas (LRGV). USDA reports that grapefruit accounts for 18,500 acres, 67.8 % of the total citrus acreage in the region. Fresh and processed grapefruit sales contribute significantly to the overall economy of the region and agriculture industry of the state. Grapefruit sales make up 80.0 % of all citrus sales in the state of Texas and have averaged $53.2 million per year since the 2004-05 crop year. Approximately 91% of gross revenue comes from fresh market grapefruit sales.

The overall profitability of a crop is directly linked to the pack-out or quality and quantity of the fresh fruit produced and sold each year. The preferred pack-out grade is categorized as 'fancy,' followed by 'choice'. The remaining fruit is largely processed for juice. Within the fancy and choice grades, fruit is separated into different size classes with the largest, highest quality fruit receiving the higher prices for sale to the fresh market.

There is an increasing need to evaluate water conservation practices in the LRGV as this region has rapid growing population and economy, increasing the overall area demand for water from the Rio Grande River. Furthermore, since citrus is a perennial crop that requires irrigation water year-round from the Rio Grande, the preservation of citrus production in South Texas will require more water saving irrigation practices. Analyzing grapefruit fresh pack-out vs. juice production is one way to measure the cost-effectiveness of alternative irrigation methods as efficient water delivery systems in citrus production.

The Agricultural Water Conservation Demonstration Initiative (ADI) project is a coordinated effort between the Texas Water Development Board, Harlingen Irrigation District, South Texas agricultural producers, Texas AgriLife Extension Service (Extension), Texas A&M University-Kingsville and other agencies. It is designed to demonstrate state-of-the-art water distribution 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 for water consumption by various field, vegetable and citrus crops.

Texas A&M System research and extension scientists work with citrus growers to gather data on water use, yield production and irrigation use efficiency. Whereas, extension economists conduct the economic analyses of ADI demonstration results, evaluating the potential impact of adopting alternative water conserving technologies. Extension economists work 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.

Four typical irrigation technologies in producing Rio Red grapefruit studied in the ADI project—flood, border flood, micro-jet spray sprinkler, and drip—were compared to evaluate the impact on fresh pack-out and potential profitability of using various irrigation methods (Table 1). The following analysis evaluates the potential financial incentives for using the various systems. The investment costs of micro-jet spray and drip systems were also included.

Table 1: Average 2005-2009 Grapefruit Pack-Out Percentages by Irrigation Method, Lower Rio Grande Valley

Irrigation Method	Category	Pack-Out Percentages: Average	High	Low
Flood	Fancy	43.6	53.1	37.3
	Choice	21.0	19.3	23.6
	Juice	35.4	27.6	39.1
	Total	100.0	100.0	100.0
Border Flood	Fancy	47.3	56.7	41.3
	Choice	23.0	21.2	22.7
	Juice	29.7	22.1	36.0
	Total	100.0	100.0	100.0
Drip	Fancy	45.4	51.9	42.2
	Choice	16.7	11.7	22.6
	Juice	37.9	36.4	35.2
	Total	100.0	100.0	100.0
Micro-Jet	Fancy	46.8	48.1	39.3
	Choice	17.3	13.8	19.4
	Juice	35.9	38.1	41.3
	Total	100.0	100.0	100.0
Average	Fancy	45.8	48.8	43.3
	Choice	19.5	18.3	20.8
	Juice	34.7	32.9	35.9
	Total	100.0	100.0	100.0

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ASSUMPTIONS

Table 1 provides average pack-out percentages over five consecutive growing seasons (2005-2009) for Rio Red grapefruit by irrigation method. Pack-out percentage data for each growing season represents the average pack-out across multiple ADI participants (2 growers per irrigation method). Annual pack-out percentages were categorized (low, average or high) by the level of fancy fruit produced. Estimated 2010 production, irrigation and systems costs were based on information provided by collaborators involved in the ADI project and was assumed to be typical for the purpose of this case analysis. Actual yields were adjusted for 'shrink' or the loss of product weight due to dust, twigs, debris, and loss of moisture. Yields were held constant and based on 2005-09 averages—flood 17.2 tons/acre, border flood 21.1 tons/acre, micro-jet 22.5 tons/acre, and drip 21.1 tons/acre.

Average crop prices—fancy $308.96/ton, choice $103.22/ton, and juice $11.99/ton—were calculated from actual 2005-09 prices received by ADI producers. These are net prices received by the collaborators, adjusted for harvest, packing, and commission charges. Average prices for all collaborators were used to minimize price differences due to tree age, harvest timing and management. Projected 2010-2019 prices were held constant at expected levels. These assumptions are intended to make the analysis relevant to typical grapefruit and citrus producers in the Lower Rio Grande Valley area.

Table 2: 10-Year Average Per Acre Financial Indicators for Grapefruit, Lower Rio Grande Valley

Pack-Out Scenario	10-Year Averages Per Acre: Total Cash Receipts ($1000)	Total Cash Costs ($1000)	Net Cash Farm Income ($1000)	Cumulative 10-Yr Cash Flow/Acre ($1000)
Flood-High	3.28	2.01	1.27	13.87
Flood-Average	2.83	2.01	0.82	9.03
Flood-Low	2.56	2.01	0.55	6.03
Border Flood-High	4.27	2.00	2.27	24.80
Border Flood-Average	3.73	2.00	1.73	18.96
Border Flood-Low	3.36	2.00	1.37	14.96
Drip-High	3.82	2.10	1.72	18.75
Drip-Average	3.51	2.10	1.41	15.40
Drip-Low	3.42	2.10	1.31	14.39
Micro-Jet-High	3.87	2.13	1.73	18.95
Micro-Jet-Average	3.85	2.13	1.71	18.34
Micro-Jet-Low	3.40	2.13	1.27	13.88

The cost, yield and price data utilized in the analysis included information from two or more ADI producers for each irrigation method. Soil types, rainfall and management practices were assumed identical, and except for irrigation costs, all input costs and management practices were assumed to be the same across irrigation scenarios. For each 10-year outlook projection, input prices and overhead cost trends follow projections provided by the Food and Agricultural Policy Research Institute (FAPRI, at the University of Missouri).

RESULTS

Comprehensive projections, including price and yield risk, for the four irrigation methods are illustrated in Table 2 and Figures 1-4. Table 2 presents the average outcomes for selected financial projections, while the graphical presentations illustrate the full range of possibilities for net cash farm income.

By using 5-year average pack-out percentages, results indicate that the highest net cash farm income (NCFI) was with border flood (Table 2 and Figures 1-4). The projected 10-year average NCFI for border flood was $1,730/acre, 1.2% more than micro-jet, 22.7% more than drip, and more than double flood. An assessment of high to low pack-out also reflects similar results. Border flood's advantage over conventional flood is largely reflective of higher average yields (21.1 tons/acre for border flood and 17.2 tons/acre for flood). The advantage over micro-jet and drip is directly linked to overall costs. Average cash costs were $2,000/acre for border flood, 4.8% less than drip and 6.1% less than micro-jet. The cost per acre differences largely reflects additional investment costs for drip and micro-jet systems that override water and operating cost savings.

The NCFI advantage of border flood is also reflected in the ability to generate cash flow (Table 2). The 10-year cumulative cash flow balances illustrate the potential pre-tax cash requirements or flows generated using the four irrigation methods. Border flood, on average, generated a cumulative cash flow of $18,960/acre, 3.4% more than micro-jet, 23.1% more than drip, and more than double that for flood. Cumulative cash flow results assessing variations in pack-out also favor border flood.

SUMMARY

The results indicate that border flood may have a NCFI and cost advantage over flood, drip, and micro-jet irrigation systems in grapefruit production when evaluated using fresh vs. juice pack-out as a barometer. Whereas actual yields and pack-out percentages may vary based on rainfall, soil types, tree age, pruning, and other management practices, the five-year averages lend credence to the results that raising borders between citrus tree rows

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