



**Agricultural Water Conservation
Demonstration Initiative
2010**

Harlingen Irrigation District

Submitted by
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Agricultural Water Conservation Demonstration Initiative 2010
Annual Progress Report

Agricultural Water Conservation Demonstration Initiative 2010 Annual Progress
Report

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Executive Summary

The Harlingen Irrigation District-Cameron County No. 1, under the auspices of a grant from the Texas Water Development Board, is sponsoring the Agricultural Water Conservation Demonstration Initiative (ADI), a multi-year project to conduct a study of the maximization of on-farm surface water use efficiency by integration of on-farm application and district delivery systems. The ten-year project includes participation by Harlingen Irrigation District Cameron County No. 1, Delta Lake Irrigation District, Texas A & M University-Kingsville, USDA-Natural Resources Conservation Service, Rio Farms, Inc, Texas Cooperative Extension Service and agricultural producers in Cameron, Hidalgo and Willacy counties. This Project proposes to assist in the implementation of the agricultural water conservation management strategies, as identified in the Region M Approved Regional Water Plan and the Texas State Water Plan and will further agricultural water conservation in Texas. The project supplements on-going conservation efforts in the Lower Rio Grande Valley

The District has formed an advisory committee consisting of growers, demonstration co-operators, scientists and representatives of grower organizations. The primary responsibilities of this committee are to offer guidance and perspective to the project as a whole. The committee meets on a quarterly basis to discuss the progress and goals of the project. Our hopes are for this committee to become one of the main conduits for disseminating information to the growers of the Rio Grande Valley. Those members are:

- Danny Allen – Cooperator
- Sam Morrow - Grower
- Dr.. Shad Nelson – Texas A&M Kingsville
- Dr. Juan Enciso – Texas A&M Extension Service
- Dr. Al Blair – Axiom-Blair Engineering
- Dr. Steven Klose – Texas AgriLife Extension
- Enrique Perez – Cameron County Extension
- Andy Garza – TSSWCB
- Tom McLemore – HID Project Manager

The District has contracted the services of several irrigation researchers and engineers to carry out some of the tasks of the project. Dr Shad Nelson of Texas A&M University Kingsville is tasked with the Drip, Micro-jet, and flood irrigation in citrus and vegetables demonstrations. Dr Juan Enciso and Xavier Peries with Texas AgriLife Extension Service are tasked with the LESA/LEPA and other sprinkler demonstrations. Dr Steven Klose and Allan “Mac” Young are tasked with the economic evaluations of all of the demonstration sites. Dr. Al Blair of Axiom-Blair Engineering provides technical

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assistance and contracting services. Robyn Hadley with WaterPR is tasked with the public relations and report writing.

District personnel are also very involved in the project. Danny Allen works with the cooperators in the surge demonstrations and maintains monitoring equipment and meters. Heather Jones tracks all expenditures and aids in the dissemination of information through newsletters and other publications.

The ADI project continues to work closely with the cooperators of the demonstration sites and maintains a good relationship with many of the original cooperators as well as a few new ones. In the 2010-2011 seasons the Project maintained 27 demonstration sites.

2010 turned out to be another abnormal year for the ADI project. The beginning of the season was dry and irrigation took place at a rather fast clip. The dry weather remained until the arrival of Hurricane Alex which caused severe flooding throughout the Rio Grande Valley. This coupled with major water releases from Falcon dam caused damage to some of our demonstration sites. This rain came at a rather bad time seeing as most of the crops in the RGV had yet to be harvested. October of 2010 was the last time the Valley received any major rainfall and in January and February of 2011 the weather brought a freeze which devastated our sugar cane crop and some of our citrus. So to sum it up the weather was not good to farmers in 2010 and the drought in 2011 will make the upcoming growing season a challenge as well.

Our sub contractors continue to work with the cooperators to monitor irrigation practices on the demonstration sites. Dr. Shad Nelson, Dr. Juan Enciso, Xavier Peries, Mac Young, and Danny Allen have done an outstanding job working with the cooperators this past year. Their expertise and diligence is what is making this project a success.

The project has been collecting data for a little over five years now. We have been able to build and maintain a good working relationship with many cooperators who are as committed to water conservation as the District is. Our focus has turned to disseminating that information and educating the public on the technologies available to them to conserve the water we hold so dear. One of the avenues we have developed for education is through an Irrigation Expo. The District hired a public relation firm (WaterPR) to aid in the planning and execution of this first ever event in the Rio Grande Valley. The "Texas Irrigation Expo" took place in the fall of 2010. The event included vendors of water conservation technologies, sponsors from water conservation organizations as well as speakers, and information booths, which provided information on water conservation and the ADI project. Plans have begun for the 2011 Irrigation Expo.

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This report contains the annual update and progress made in the Agricultural Demonstration Initiative Project as indicated in the Scope of Work in the Contract between Harlingen Irrigation District – Cameron County No. 1 (HIDCC1 or the District) and the Texas Water Development Board (TWDB). A description of the overall progress, problems encountered delays in the timely completion of work, or change in the deliverables or objectives of the contract are discussed; as well as any corrective actions necessary.

The Site Summaries section contains all of the data collected at the on-farm demonstration sites in 2010. The demonstration site is designated by a number that identifies the grower and the entity responsible for the site. The sites data consists of a description of the site including soil type and irrigation as well as other pertinent information.

2010 Work Accomplished by Task

District and On-Farm Flow Meter Calibration and Demonstration Facilities

The Flow Meter Calibration Facility has been utilized this year to calibrate and test several meters from local growers and neighboring irrigation districts. District personnel have on many occasions repaired and verified meters as well. The District and other local conservation entities continue to use the facility for meetings and training events. We anticipate more such events as the year progresses.

Economic Evaluation of Demonstrated Technologies

A significant component of the demonstration project is the economic evaluation of each on farm technology. The District contracted Texas AgriLife Extension service to perform this task through its FARM Assist program. Economic summaries of each site are included in the Demonstration Site Summary Report for sites that economic analysis has been completed.

Activities and continual progress regarding the FARM Assistance task of the ADI project of the Harlingen Irrigation District revolves around two primary objectives. The first is collaborating with project management team and coordinating the FARM Assistance program into the project concepts, including participation in management team meetings, planning sessions, producer meetings, and contributions to project promotional materials. Extension faculty also supported the overall project effort of recruiting project demonstrators. The second objective is the completion of the economic analysis for project demonstrations. Economic analyses for individual demonstrators range from conducting an evaluation of the site demonstration to providing the complete FARM Assistance strategic analysis service for the demonstration participant.

An overall economic summary of 2010 FARM Assistance activities are provided, including outreach and education publications produced. Summaries of each 2010 demonstration site analysis are included.

Economic Summary

Texas AgriLife Extension Service's Financial and Risk Management Assistance (FARM Assistance) program works directly with ADI cooperators in the Lower Rio Grande Valley. FARM Assistance conducts economic evaluations on demonstration sites showing the financial benefit and/or viability of water conservation practices on the

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farming operations. Additionally, individual cooperators are offered FARM Assistance planning services for their entire operation, demonstrating the value of long-range financial planning to the farm manager. One ADI cooperator indicated, “The FARM Assistance program has been an excellent tool in helping me evaluate the direction I need to proceed with my farm operation.”

FARM Assistance specialists completed 5 whole-farm and 21 demonstration site analyses for 10 ADI participants in the 2010-2011 project period. Individual studies have included irrigated cotton, corn, grain sorghum, sugarcane, vegetables, onions, citrus, and other crops. Irrigation methods demonstrated include furrow, surge, drip, micro-jet, flood and narrow-border flood.

Economic analyses of the 2010 field crop demonstrations reflect some differences in the financial outlook for surge and drip irrigation technology compared to traditional furrow flood irrigation. These demonstrations as well as the 2005-2009 demonstrations (cotton, grain sorghum, corn, seed corn, soybeans and sugarcane) have shown the potential for water savings but, under current “per event” pricing structures, water savings do not necessarily translate into cost savings for producers. With no significant differences in yields, the additional fixed or variable costs related to a surge valve or drip system reduces the net returns per acre compared to furrow flood. An exception is onions where drip technology has shown water savings as well as economic incentives. While the FARM Assistance analyses indicate limited existing economic incentives for adoption of conservation practices in field crops, these demonstrations clearly illustrate the value of water saving methods under conditions of limited water availability and/or volume pricing.

In citrus, economic analyses of the 2005-2010 demonstrations have shown water savings as well as economic incentives to adopt border flood, micro-jet spray and drip technologies compared to traditional flood. The economic incentives are especially evident when evaluating differences in fruit quality and yields. In the article “Assessing Irrigation Methods Based on Grapefruit Pack-Out” (Focus 2010-4), results reflect that border flood, micro-jet and drip have an advantage over traditional flood. Evaluating average 2005-2009 yields and pack-out percentages (fancy, choice, and juice) and average crop prices for each category, border flood on average had the highest 10-year net cash farm income and cumulative pre-tax cash flow followed by micro-jet and drip. Specific results include:

- Projected 10-year average Net Cash Farm Income (NCFI) for border flood was 1.2% more than micro-jet, 22.7% more than drip, and more than double flood.
- Border flood’s advantage over conventional flood is largely reflective of higher average yields (21.1 tons/acre vs. 17.2 tons/acre).

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- The NCFI advantage over micro-jet and drip is largely linked to costs of systems.
- Average 2010 cash costs were \$2,000/acre for border flood, 4.8% less than drip and 6.1% less than micro-jet.
- Projected 10-year cumulative pre-tax cash flow balance for border flood was 3.4% more than micro-jet, 23.1% more than drip, and more than double that for flood.

Based on these findings, border flood may offer the best economical option for water savings and ease for producer adoption under current water pricing structures.

FARM Assistance completed 2 publications and 3 posters in outreach and education efforts.

- Nelson, Shad, Enciso, Juan, Peries, Xavier, and Young, Mac. *Water Savings and Irrigation Use Efficiency in South Texas Grapefruit Production*. Poster presented at the 2010 Irrigation Exposition, Mercedes, Texas, October 21-22, 2010.
- Young, Mac, Nelson, Shad, Klose, Steven, and Enciso, Juan. *Assessing Irrigation Methods Based on Grapefruit Pack-Out in the Lower Rio Grande Valley*. Poster presented at the 2010 Irrigation Exposition, Mercedes, Texas, October 21-22, 2010.
- Nelson, Shad, Young, Mac, Enciso, Juan, and Peries, Xavier. *Evaluation of Compost Use in Rio Red Grapefruit Production*. Poster presented at the 2010 Irrigation Exposition, Mercedes, Texas, October 21-22, 2010.
- Young, Mac, Nelson, Shad, Klose, Steven, and Enciso, Juan. *An Evaluation of Flood Irrigation and Compost Use in South Texas Rio Red Grapefruit Production*. Farm Assistance *Focus Series* 2010-5. Texas AgriLife Extension Service, Department of Agricultural Economics, Texas A&M University System. September 2010.
- Young, Mac, Nelson, Shad, Klose, Steven, and Enciso, Juan. *Assessing Irrigation Methods Based on Grapefruit Pack-Out in the Lower Rio Grande Valley*. Farm Assistance *Focus Series* 2010-4. Texas AgriLife Extension Service, Department of Agricultural Economics, Texas A&M University System. August 2010.

FARM Assistance helped plan and participated in the 2010 Texas Irrigation Expo in Mercedes, Texas, held October 20-22, 2010. Activities included involvement in an exhibit booth and a presentation on October 21. The presentation topic was “Economics of New Water Technologies in the Lower Rio Grande Valley.” A presentation was also made at the 2011 Annual Subtropical Plant Science Society Conference at the Texas

A&M University-Kingsville Citrus Center in Weslaco, Texas, on February 9, 2011. The topic was “Impact of Irrigation Method on Rio Red Grapefruit Pack-Out Economics.”

Demonstration of Internet Based Information Real-Time Flow, Weather, and Water User Accounting System

The District continues to improve the operation of its internet site. This year we upgraded the telemetry information and how it is displayed on the site. The District canal riders now have more information available to them and Drainage District #5 now has the ability to download all of the water level information needed to monitor their system. Information regarding the Districts new automatic gates is now available as well. While the technical portions of the web page seem to be working wonderfully we will concentrate on the aesthetics of the page this coming year. Water PR will be designing a new look to better disseminate the technical information and results that have been created by the ADI project. Our goal in the remaining years of the project is to do a much better job at “getting the word out” about the available water conservation technologies for growers in the Rio Grande Valley.

Drip and Furrow Flood Irrigation in Annual Crops and Multi Year Crops

Texas A&M University-Kingsville Citrus Center and Texas AgriLife Research and Extension at Weslaco have teamed together to establish various water conservation demonstration sites throughout the Lower Rio Grande Valley (LRGV). The project managers (Dr. Shad Nelson, TAMU-Kingsville and Dr. Juan Enciso, TAES, Weslaco) have made contact with 20 growers/collaborators in the Valley to monitor on farm irrigation at different demonstration sites. These sites encompass a variety of crops including, but not limited to young and mature citrus (grapefruit, orange and tangerine), onions, sugarcane, cotton and turfgrass. Irrigation practices to grow these crops are flood, polypipe furrow/flood, bordered flood, drip, microjet spray and overhead sprinkler.

Most Important Outcomes: 2005-2010

Evaluating alternative irrigation practices to traditional flood irrigation in citrus grove management:

Irrigation use data collected from collaborating grower’s citrus demonstration project sites has provided meaningful results in regards to alternative irrigation practices

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to traditional 'large-pan' flood irrigation practices that is prevalently used in Lower Rio Grande Valley citrus production.

The data collected between 2005 through 2009 growing seasons has experienced growing seasons with extensive drought (2008 season, 13 months no rain) to high rainfall (2006 season, about 40 inches) and impact from hurricane effects. Thus, the data collected provides and adequate picture of the irrigation practices citrus growers must adjust to according to extremes in weather conditions.

These results of the 2005-2009 growing seasons include 4 irrigated demonstration sites per irrigation method. Average annual inches of irrigation water applied during the 2005-2009 growing seasons was 36.6" Traditional Flood, 27.3" Border Flood, 24.4" Microjet Spray, and 22.9" Drip irrigation .

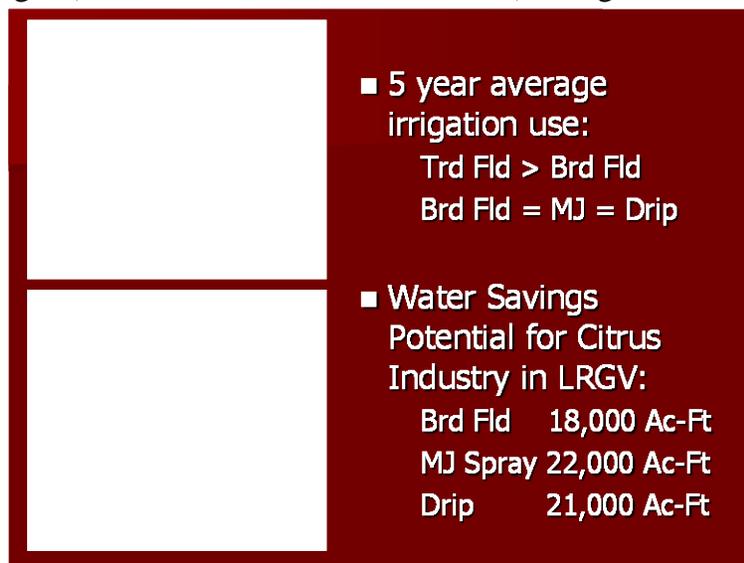


Figure 1 Five Year Average Irrigation Use

This translates to an average annual water savings 9.2" Border Flood, 12.2" Microjet Spray, and 13.7" Drip over Traditional Flood irrigation. These numbers in acre-feet are 0.77 ac-ft Border Flood, 1.01 ac-ft Microjet Spray, and 1.14 ac-ft Drip irrigation on average each year.

The impact factor that this information can provide to the overall water savings in the Lower Rio Grande Valley is substantial if all citrus growers adopted one of these alternative irrigation methods. The citrus industry in Texas is approximately 27,500 acres total, and if all growers changed from Traditional Flood irrigation to Border Flood, Microjet Spray, or Drip would result in a potential water savings of 18,000 to 22,000 acre-feet annually. This water could then be utilized for irrigating additional crops or municipal water needs.

The irrigation use for the 2010 growing season was not available at the time of these calculations, but will be incorporated by mid 2011 when citrus yield results are returned to the citrus growers from the packing sheds.

Irrigation method and assessment of citrus yield and profitability:

In addition to irrigation use, Mac Young and Shad Nelson collected the total yield and amount of grapefruit that went to juice market versus the fresh market. Grapefruit growers make their money on the amount of fruit that is sold to the fresh market. The fresh market 'pack-out' is classified into two categories, 'fancy' and 'choice'. Fruit in the fancy category brings a higher price to the grower.

Taking the average yields and pack-out from growers from 2005 through 2009, we found the highest average amount



Figure 2 Traditional Flooded Orchard



Figure 3 Bordered Flood Irrigation in an Orchard

of fruit going to the fancy category was that of Border Flood irrigation (47.3%), followed by Microjet Spray (46.8%), Drip (45.4%), and lastly Traditional Flood (43.6%).

Furthermore, Border Flood irrigation had a much lower amount of fruit sent on average to the juice market (29.7%), compared to the other irrigation methods (35.4-37.9%).

Therefore, the highest profits growers receive from the packing sheds are going to growers using Border Flood irrigation practices.

For citrus growers that are currently using Traditional Flood irrigation a switch to

Border Flood as an alternative irrigation practice that will conserve water would be the most cost effective. Border Flood will be a significantly lower cost to the grower to change irrigation practices, plus there will most result in a financial gain to the producer with more fruit going to the fresh market and in the fancy category. The initial costs for a Drip or Microjet Spray system will most likely not be an incentive to growers to change from current Traditional Flood practices.

Effect of water stress and drip line irrigation placement for mature citrus growth:

Other important findings over the past five years working with citrus growers using drip irrigation is the number of drip lines needed to adequately supply water to trees. The heavy fine clay soils of the Lower Rio Grande Valley lead to challenges in adequately moving water laterally in soils over distances of several feet. Through soil moisture sensor monitoring, we have been able to show conclusively that citrus growers

utilizing only one single drip line can not apply water sufficiently to move water laterally from the center of trunk out to drip line of the tree canopy. It is imperative that irrigation water reaches the tree's drip line (outer circumference where rain drips after cascading off the leaf canopy) because a large majority of feeder roots grow at this location.

Citrus growers using a dual-line drip system can move water laterally in heavy soils better than a single-line drip system. Trees under dual-line drip are typically far less stressed than a dual-line system,

even when the grower is doing their best to manage water. The single-line system is typically not able to apply water at a rate well long enough to match crop evapotranspiration demand during the hot summer months of South Texas. When a

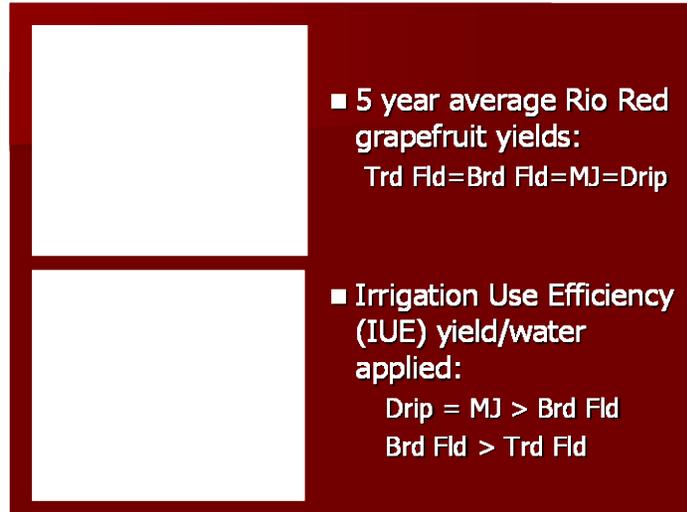
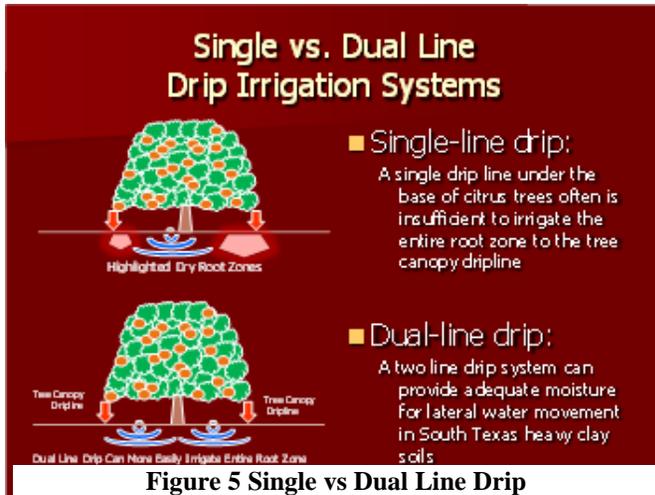


Figure 4 Five Year Average Grapefruit Yields

grower tries to keep the drip irrigation system on continuously, the cost to do this is inhibitive, plus the soil around the drip line remains saturated and leads to root rot or disease problem to the truck of the tree.

Our results have led to our single-drip line grower to change to a dual-line drip system for his mature citrus trees. We find that young orchard establishment is good using a single-drip line system, but should be changed to a dual-line system after the fifth year when fruit production is expected.



Evaluation of tile drains in newly established citrus orchards:

Newly established trees in South Texas are commonly planted after minor site preparation and land leveling. One demonstration site has newly established orange trees planted after the installation of tile drains spaced every 30 feet apart. This site is known to drain poorly and has sections of very high salt conditions. Despite these challenges, the orange trees after two years look extremely healthy and are growing vigorously under

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a single-line drip irrigation system. The trees are on schedule to produce fruit about 1 to 2 years earlier than other citrus trees planted on land without tile drain. The grower is convinced that tile drain installation is essential for fast citrus tree establishment and improved growth.

Leveraging of Project Resources:

The results on various on-farm management strategies, such as fertilization and water impacts on citrus, compost utilization on soil-water status and citrus yield, irrigation management on onions, impacts of irrigation practices on chemical fate and transport in South Texas soils and citrus pest control were published in the articles, presented at professional meetings, and were the catalyst to obtaining additional external grant funds to support the goals of the Rio Grande Basin Initiative projects discussed above. The outcomes from Dr. Nelson's collaborative efforts with Texas Water Resources Institute, Rio Grande Basin Initiative, Texas AgriLife Extension, Texas A&M University-Kingsville Citrus Center, Citrus Producers Board, and TAMUK graduate students are presented in the information that follows below. External grant dollars from funding sources besides that from the RGBI as mentioned below have helped to provide the labor sufficient for data collection, analysis and results interpretation.

External Grant Funds Supportive of ADI Project:

- \$ 7,500 Experimental Techniques in Animal & Wildlife Sciences, ANSC 4385. K. McCuiston, S. Nelson, and M. Garcia. Jan 2010-Dec 2010. QEP 2010 Quality Enhancement Plan Grants. TAMU-Kingsville.
- \$ 5,000 Impact of Saline Irrigation Water on Citrus Rootstocks in the Lower Rio Grande Valley. PD: C.R. Simpson, CoPD: S.D. Nelson. Mar 2010-Feb 2011. Texas Water Resources Institute graduate research grants. Funding provided by United States Geological Survey.
- \$290,000 Developing an Experiential Learning and Career Development Program to Foster and Mentor Students in Agricultural and Natural Resources. Jun 2010-May 2012. PD: R. Hanagriff, CoPD: R.D. Rhoades, C.R. Simpson, K.C. McCuiston, F. Hernandez, S.D. Nelson. USDA-NIFA HSI.
- \$ 42,669 USDA-FAS. Proposed Research Program for North African Borlaug Fellows in Irrigation Management and Water Resources. PI: S.D. Nelson, Co-PI: M. Setamou, J. daGraca, J. Enciso. Sept. 2010-Aug. 2011.
- \$ 15,000 Texas Citrus Producers Board. Effects of Different Sources of Compost and Biopesticides on the Management of Key Citrus Pests in Organic Production Systems. P.I. Shad Nelson, Co-PI: M. Setamou, R. Villanueva. Nov. 2010-Oct. 2011.

Extension Publications:

Young, M., Nelson, S., Klose, S. and Enciso, J. (2010, Sept). *An evaluation of flood irrigation and compost use in South Texas Rio Red grapefruit production*. Texas AgriLife Extension. (FARM Assistance Focus 2010-5).

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Young, M., Nelson, S., Klose, S. and Enciso, J. (2010, Aug.). *Assessing irrigation methods based on grapefruit pack-out in the Lower Rio Grande Valley*. Texas AgriLife Extension. (FARM Assistance Focus 2010-4).

Refereed Journal Publications:

Setamou, M., Rodriguez, D., Saldana, R.R., Schwarzlose, G., Palrang D. and Nelson S.D. (2010). Efficacy and uptake of soil-applied imidacloprid in the control of Asian citrus psyllid and citrus leafminer, two foliar feeding citrus pests. *J. Economic Entomology*. 103:1711-1719.

Uckoo, R.M., Jayaprakasha, G.K., Nelson, S.D., and Patil, B.S. (2010). Rapid simultaneous determination of amines and organic acids in citrus using high-performance liquid chromatography. *Talanta*. 83:948-954.

Simpson, C.R., Nelson, S.D. and Ajwa, H.A. (2010). Impact of soil texture and organic matter content on MITC volatilization from soil columns. *J. Agricultural Sci. & Technology*. (accepted for publication).

Simpson, C.R., Nelson, S.D., Stratmann, J.E., and Ajwa H.A. (2010). Surface water seal application to minimize volatilization loss of methyl isothiocyanate from soil columns. *Pest Management Sci*. 66:686-692.

Reddy, V.P., Madhurababu, K. Nelson, S.D. da Graca, J.V. and Skaria, M. (2010). Gene expression studies in sour orange and C-22 rootstocks challenged with the fungus, *Phytophthora nicotianae* and the nematode, *Tylenchulus semipenetrans*. *Pest Technology*. **4 (Special Issue 1):**29-34.

Presentations at Professional Meetings:

Nelson, S.D., Enciso, J., Peries, X. and Young, M. (2011, Feb.). *Water Use Efficiency and Water Savings in South Texas Grapefruit Production*. Southern Region of American Society of Horticultural Science. 108th Annual Meeting Southern Association of Agricultural Scientists, Corpus Christi, TX.

Simpson, C.R., Nelson, S.D., Cornell, S., Schuster, G. and Setamou, M. (2011, Feb.). *Evaluation of Salinity on Citrus and Watermelon Rootstock Seed Germination*. Southern Region of American Society of Horticultural Science. 108th Annual Meeting Southern Association of Agricultural Scientists, Corpus Christi, TX. (2nd place Ph.D. paper contest winner).

Nelson, S.D., Romero, M., Hinojosa, R.R. and Setamou, M. (2011, Jan.). *Potential Impact of Agricultural Chemical Fate in Subtropical Agricultural Systems*. MRP Project W-2082 Annual Meeting, Honolulu, HI.

Nelson, S.D., Young, M., Enciso, J. and Peries, X. (2010, Oct.). *On-Farm Water Conservation Strategies in Citrus Production for the LRGV*. 1st Annual Texas Irrigation Expo, Mercedes, TX.

Nelson, S.D., Enciso, J., Jifon, J., Roland, D., and Leskovar, D. (2010, May). *Project Overview in On-Farm Water Conservation in South Texas*. 2010 Annual Rio Grande Basin Initiative Conference, Alpine, TX.

Nelson, S.D., Hinojosa, R.R., and Romero, M. (2010, Apr.). *Master's Project Overview in Water Conservation and Management*. Annual Consortium for Irrigation Research and Education (CIRE) Conference, Weslaco, TX.

Posters at Professional Meetings:

Esparza, M., Raygoza, J., Nelson, S.D. and Setamou, M. (2011, Feb.). *Effect of Soil and Foliar Calcium Sources on the Survival of Asian Citrus Psyllid*. 65th Annual Meeting of the Subtropical Plant Science Society. Feb 9, 2010. Weslaco, TX. (1st place winner).

Peddabhoini, N.P., Setamou, M., Saldana, R. and Nelson, S.D. (2011, Feb.). *Testing the Efficacy of an "Attract and Kill" Strategy for the Control of Citrus Leafminer in Texas*. 65th Annual Meeting of the Subtropical Plant Science Society. Feb 9, 2010. Weslaco, TX. (3rd place winner).

Nelson, S.D., Young, M., Setamou, M., Peries, M. and Enciso, J. (2011, Feb.). *Evaluation of Compost Management in Citrus for Improved Crop Sustainability*. Southern Region of American Society of Horticultural Science. 108th Annual Meeting Southern Association of Agricultural Scientists. Feb 6-8, 2010. Corpus Christi, TX.

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Esparza, M., Raygoza, J., Setamou, M. and Nelson, S.D. (2011, Feb.). *Impact of Plant Available Calcium to Reduce Asian Citrus Psyllid Survival in 'Rio Red' Grapefruit*. Southern Region of American Society of Horticultural Science. 108th Annual Meeting Southern Association of Agricultural Scientists. Feb 6-8, 2010. Corpus Christi, TX.

Nelson, S.D., Romero, M., and Setamou, M. (2010, Nov.). *Implications of Sugarcane Harvesting Methods on Atrazine Movement*. ASA-CSSA-SSSA annual conference. Oct 31-Nov 4, 2010. Long Beach, CA.

Nelson, S., Enciso, J., Peries, X., and Young, M. (2010, Oct.). *Water Savings and Irrigation Use Efficiency in South Texas Grapefruit Production*. 2010 Irrigation Expo. Oct. 20-22, 2010. Mercedes, TX.

Nelson, S., Young, M. Enciso, J., and Peries, X. (2010, Oct.). *Evaluation of Compost Use in Rio Red Grapefruit Production*. 2010 Irrigation Expo. Oct. 20-22, 2010. Mercedes, TX.

Young, M., Nelson, S., Klose, S., and Enciso, J. (2010, Oct.). *Assessing Irrigation Methods Based on Grapefruit Pack-Out in the Lower Rio Grande Valley*. 2010 Irrigation Expo. Oct. 20-22, 2010. Mercedes, TX.

Esparza, M., Raygoza, J., Setamou, M. and Nelson, S.D. (2010, Sept.). *Impact of Plant Available Calcium to Reduce Asian Citrus Psyllid Survival in Citrus Production*. USDA-NIFA, Hispanic Serving Institution leadership meeting, Sept. 26-29. 2010. Washington, D.C.

Simpson, C.R., Nelson, S.D. and Ajwa, H.A. (2010, Aug). *Impact of Soil Texture and Organic Matter Content on MITC Volatilization from Soil Columns*. 19th World Congress of Soil Science. Aug. 1-6, 2010. Brisbane, Australia.

Nelson, S.D., Simpson, C.R., and Gardiner, D.T. (2010, June). *Incorporating College Students into a South Texas Public Landscape Horticulture Project*. American Public Gardens Association Annual Conference, Atlanta, GA.

Romero, M., Nelson, S.D., Setamou, M., and Schuster, G. (2010, Jan.). *Impact of Altering Harvesting Methods on the Adsorption of Atrazine to Sugarcane Residues*. 64th Annual Subtropical Science Society Meeting, Weslaco, TX. Jan. 25, 2010.

Raygoza, J., Setamou, M., and Nelson, S.D. (2010, Jan.). *Organic Production Practices on the Dynamics of Major Citrus Pests*. 64th Annual Subtropical Science Society Meeting, Weslaco, TX. Jan. 25, 2010.

Romero, M., Nelson, S.D., Setamou, M., and Schuster, G. (2010, Jan.). *Impact of Altering Harvesting Methods on the Adsorption of Atrazine to Sugarcane Residues*. 2010 Texas A&M AgriLife Conference, Texas A&M Univ., College Station, TX. Jan. 11-14, 2010.

Newsletters:

Nelson, S.D., Enciso, J. and Young, M. (2010, Dec.). *Drip Irrigation Line Placement for Adequate Soil Moisture in Citrus Production Systems*. Harlingen Irrigation District Newsletter. <http://www.hidcc1.org>

Nelson, S.D., Enciso, J. and Young, M. (2010, Dec.). *Drip Irrigation Line Placement for Adequate Soil Moisture in Citrus Production Systems*. Citrus Center Newsletter. Vol. 28. No. 6. <http://kcc-weslaco.tamu.edu>

Master's Thesis Publications:

Raul Ray Hinojosa (2010, May). Thesis: *Aldicarb Degradation in Flood Irrigated South Texas Soils in Relation to Asian Citrus Psyllid Control, Diaphorina citri Kuwayama*. Nelson, S.D., Advising Chair.

Madahy Romero (2010, May). Thesis: *Impact of Altering Sugarcane Harvesting Methods on Atrazine Adsorption to Sugarcane Leaf Litter*. Nelson, S.D., Advising Chair.

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Juan Raygoza (2010, May). Thesis: *Effects of Organic Production on Diaphorina citri Dynamics of and Nutrient Absorption of Citrus Trees*. Nelson, S.D., Advising Chair.

Justin Tanner (2010, Aug.). Thesis: *Studies on Citrus Tatter Leaf Virus Seed Transmission*. Nelson, S.D., Advising Co-Chair.

Haritha Dhanekula (2010, Aug.) Research Project: *Effect of Sulfate and Iron Reducing Bacteria on the Uranium (VI) Reduction through Biostimulation with Hydrogen and Ethanol*. Nelson, S.D., Advising Chair.

Surge, Automated Surface, and Precision Surface Irrigation

The District has maintained 2 surge demonstration sites throughout the 2010 growing season. Surge irrigation continues to be a promising irrigation practice for selected areas of the District. Some farmers find the added management required to operate the surge valve to be tedious but have found ways to implement the irrigation practice on their farm none the less. The large permanently installed surge valve that was developed by the District is still in operation and proves to be very effective at saving water in its application.

LESA/LPIC/LEPA Center Pivot Sprinkler Demonstration Sites

Harlingen Irrigation District contracted with Texas Cooperative Extension to maintain and collect data on sprinkler systems in the Rio Grande Valley. The contract allowed for the hiring of one person to maintain and collect data on four demonstration sites. Xavier Peries has been working in this position for the 2010 growing season.

Irrigation uniformities and energy costs are being evaluated for center pivots and side rolls. Flexibility on the irrigation network is being analyzed for these irrigation systems.

Several pastures and turf production farms combine flood with sprinkler irrigation to conserve water, increase pasture quality and reduce costs. Irrigation evaluations were conducted in three farms. Farmers were provided with a chart that explained the water needed in the soil according to the readings of his Watermark sensors and his application rates. Farmers were able to conserve approximately .7 ac-ft/yr per acre because they were able to match his application to the water demand as measured with soil water sensors which had been previously calibrated in the lab for each soil type.

Field Demonstrations of Projects/ Field Days

Texas Irrigation Expo Report

In May of 2009, the Harlingen Irrigation District and ADI program participants teamed with Austin public relations firm WaterPR to plan the 2010 Texas Irrigation Expo. The goal of the Expo was to reach two target audiences –

irrigation district board members and managers who can implement system-wide conservation strategies, such as lined canals and automatic gates, and producers who can implement on-farm techniques to reduce water usage.



In June, the team met to discuss the event, including setting the dates of October 21-22 and the name “Texas Irrigation Expo.” Initial plans were set in motion, including keynote speaker invitations, and inquiries to the potential facility at the Rio Grande Valley Livestock Show Grounds. A domain name was purchased, the first news release was sent, and logo development began, culminating in an Expo logo being selected in July. The logo can easily be manipulated to change the year.

Vendor selection and receipt of quotes for services continued into August to assist with development of the event budget. A brochure to target potential sponsors and exhibitors was developed for review, and a website was created for the event. A one-page flier was created to start promoting the event, and an e-mail marketing account was established. Program development was discussed, as was the possibility of training for TDA CEUs and exhibitor product demonstrations.

Another group meeting was held in September to finalize the flow of events at the Expo, following a one-on-one meeting of WaterPR and HID staff. The brochure was finalized, as was the event budget. Contracts were signed with major vendors, such as the venue, the exhibit backdrop company, and the caterer. A PayPal account was set up to accept sponsor/exhibitor registrations for the event, and a registration tracking spreadsheet was created to keep track of all participants. The main components of the website were finalized, with additional content to be added as needed throughout the next year. E-newsletter sign-up was made available to the public on the HID and the Irrigation Expo websites.

In October, the sponsor/exhibitor brochure was printed, and distribution began. Copies were handed out at the Texas Water Conservation Association conference, with plans to hand out more at the national Irrigation Association conference in December. Work began on integrating the PayPal account into online registration via the website. All

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parties continued to solicit contacts for the event e-newsletters, and speaker invitations continued. Science contest information was added to the website, and a flier created to promote the contest. HID staff distributed posters to all of the Rio Grande Valley irrigation districts, various schools, and other businesses in the community. WaterPR continued to research publicity options, including a billboard, though it was determined to be cost-prohibitive.

Work on the above items continued into November, and the online registration option for sponsors and exhibitors went live. A science contest news release was issued, as well as the first mass e-mail to recruit sponsors and exhibitors. Additional e-mails were sent in December, and sponsors began to register, after which they were added to the website.

Another team meeting was held in January 2010 to review progress to date. A draft program was created, to be included in the general registration brochure that was under development. Sponsor/exhibitor brochures were handed out at the Texas Irrigation Council meeting.

In February, a pop-up banner was designed for use at the 2010 Rio Grande Valley Livestock Show and other events to help promote the Expo. Promotional items were developed, including koozies and pens with the Expo logo. All these items were debuted in March, when HID staff had a booth at the RGV Livestock Show, where they promoted the Expo by handing out brochures and the branded Expo promotional items. Also in March, online registration for general registrants went live on the Expo website. News releases and e-newsletters continued to be sent out as appropriate. Informational/thank you letters and packets began to be distributed to sponsors and exhibitors, and going forward, were sent out as companies signed up. Speaker recruitment and program development continued, and a draft program was posted online.

In April, talks began with the Texas Water Conservation Advisory Council about the possibility of handing out awards for agricultural water conservation during the Expo. Invitation development began for a private reception to take place at the event, including sponsors/exhibitors, speakers, and special invited guests. Development of a print advertisement plan began, as did the creation of print ads. Confirmation/thank you letters were drafted, and speaker final recruitment efforts continued.

Another team meeting was held in May to revise the draft program and internal timeline/task list. Reception planning continued, and the draft advertising plan was presented to the ADI participants for review. The Arroyo Colorado Watershed Partnership sent information about the Expo to its mass e-mail list several times, and registration processing and tracking continued. Advertising planning continued through June, and an online banner ad was developed for the Texas Farm Bureau website. WaterPR staff continued to work to get other organizations and entities to post Expo

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information on their websites, and the Expo was featured in an issue of NRS Consulting Engineers' bi-monthly publication *Texas Water News*. An e-newsletter was sent to recognize sponsors/exhibitors to date and encourage new ones to sign up.

In July, WaterPR staff met with HID staff to review planning needs. Site tour locations were finalized, as was the bus contract. WPR staff began creating a presentation DVD to be played on the buses during travel time to the site tours. Progress was made on the Irrigation Awards, and letters were sent to thank speakers and let them know more details about the event and presentation logistics. Science contest ads were designed to be placed in August in Valley newspapers, targeting kids going back to school. Another team meeting was held in August. Plans for tours continued, as did registrant tracking and follow up. WaterPR worked with the exhibit company to set the exhibit floor plans for the event. Program content continued to be finalized, and work continued on a keynote speaker after Agriculture Commissioner Todd Staples was unable to attend. The Texas state conservationist, Don Gohmert, of the USDA-NRCS was able to step into the keynote speaker slot for us.

Reception invitations were sent out in September, and RSVP tracking began. WaterPR and partner representatives held a site meeting with the venue and major vendors to go over event spacing and catering logistics. E-news and press releases continued, as did tracking and follow-up and tour logistics planning. Work on print advertisements continued, although the ADI partners eventually decided not to pay for additional advertising. Sponsor signage development began, and program adjustments were made as needed. WaterPR also gave graphic assistance for the ADI logo for the report.

September and October were both busy months, with October full of final registrations, RSVPs, and program, vendor, and speaker logistics. An event pre-registration list was sent to sponsors and exhibitors. Catering orders were placed, and a final program was developed and printed. Attendee surveys, name badges, and sponsor/exhibitor signage was finalized and printed as well. Updated layouts were finalized, as was the product demo schedule. Final contact was made with speakers to confirm and collect presentations. Two WPR staff members travelled to the Valley with supplies in tow, in order to work at the event. Staff members worked with HID staff to clean and prep the facility, coordinated with vendors on-site, and manned the check-in desk.

All told, more than 230 people attended the 1 ½ day event (Oct. 21 and 22, 2010), including nearly 40 exhibitors from the private sector that are involved in irrigation and water conservation, and nearly a dozen exhibitors from the public and non-profit sectors who are also involved in water conservation.

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Figure 6 Science Contest Winners

Prior to the start of the Expo, a reception was held for invited guests. US Commissioner of the International Boundary and Water Commission, Edward Drusina, and TCEQ Commissioner Carlos Rubinsten attended and made remarks. The executive administrator of TWDB, J. Kevin Ward, also attended. Two local high school students won cash prizes for participating in a science contest. 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. Water conservation, best management practices, and the economics of farming were among the topics discussed.

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

Agricultural Water Conservation Demonstration Initiative 2010 Annual Progress Report

(EWP) program that provided more than \$2.3 million for repairs to four Rio Grande Valley irrigation districts after Hurricane Dolly.



Figure 7 Irrigators of the Year

State Senator Eddie Lucio, Jr. and Carole Baker of the Texas Water Conservation Advisory Council were on hand to recognize Jimmy Pawlik and Jim Hoffman, winners of the first “Irrigator of the Year” awards. “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 product demonstrations from the Expo’s sponsors and exhibitors. Irrigation district employees from as far away as El Paso attended the Expo, as well as several agricultural producers from Mexico

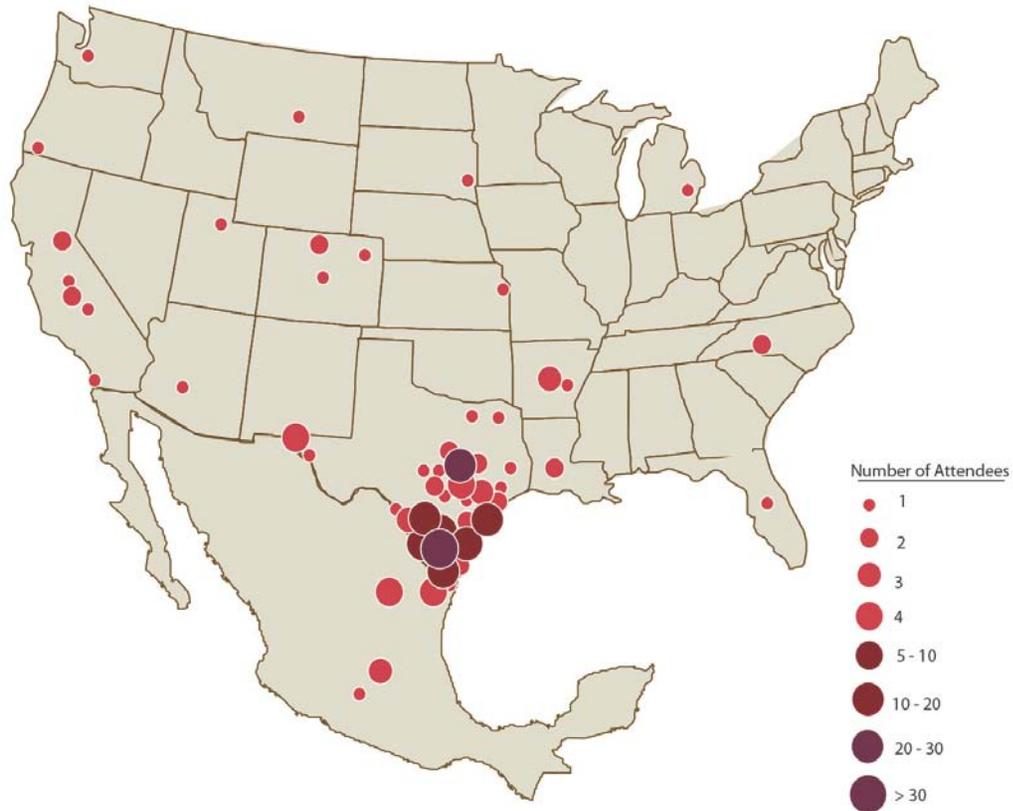


Figure 8 Attendees of the 2010 Texas Irrigation Expo

The Expo ended Friday morning with pesticide training that qualified CEU credits through the Texas Department of Agriculture, as well as other information about environmental regulations. For irrigation district managers, there was also a presentation by representatives of the U.S. Bureau of Reclamation about that agency’s funding opportunities for irrigation infrastructure. Attendees called the Expo “very informative” and said they appreciated the “real life applicable info” and “diversity of products displayed.” Plans are currently underway for a 2011 event. Details will be available at TexasIrrigationExpo.org.

After the event, WPR added all of the presentations, as well as photos, to the Irrigation Expo website for non-attendees to access. The names of on-site registrants were added to the pre-registrant list and sent to sponsors/exhibitors. Photos, presentations, and attendee survey results were also sent to key stakeholders, such as those at TWDB. Post-event press was also sent out regarding “Irrigator of the Year” award winners and science contest winners, including e-mail newsletters. WPR drafted thank you letters for sponsors and exhibitors and speakers, and sent to HID for signatures and mailing in early November. Attendee survey results were compiled, and web updates

Agricultural Water Conservation Demonstration Initiative 2010 Annual Progress Report

were made as needed. A post-event meeting was held for all team members to debrief from the event and plan for a future event.

Presentations at Water Conservation Meetings

Nelson, S.D., Enciso, J., Peries, X. and Young, M. (2011, Feb.). *WaterUse Efficiency and Water Savings in South Texas Grapefruit Production*. Southern Region of American Society of Horticultural Science. 108th Annual Meeting Southern Association of Agricultural Scientists, Corpus Christi, TX.

Nelson, S.D., Young, M., Enciso, J. and Peries, X. (2010, Oct.). *On-Farm Water Conservation Strategies in Citrus Production for the LRGV*. 1st Annual Texas Irrigation Expo, Mercedes, TX.

Nelson, S.D., Enciso, J., Jifon, J., Roland, D., and Leskovar, D. (2010, May). *Project Overview in On-Farm Water Conservation in South Texas*. 2010 Annual Rio Grande Basin Initiative Conference, Alpine, TX.

Nelson, S., Enciso, J., Peries, X., and Young, M. (2010, Oct.). *Water Savings and Irrigation Use Efficiency in South Texas Grapefruit Production*. 2010 Irrigation Expo. Oct. 20-22, 2010. Mercedes, TX.

Nelson, S., Young, M. Enciso, J., and Peries, X. (2010, Oct.). *Evaluation of Compost Use in Rio Red Grapefruit Production*. 2010 Irrigation Expo. Oct. 20-22, 2010. Mercedes, TX.

Young, M., Nelson, S., Klose, S., and Enciso, J. (2010, Oct.). *Assessing Irrigation Methods Based on Grapefruit Pack-Out in the Lower Rio Grande Valley*. 2010 Irrigation Expo. Oct. 20-22, 2010. Mercedes, TX.

Quarterly Progress Report

Harlingen Irrigation District has completed and filed three quarterly progress reports and associated reimbursement requests.

Program Administrative Work

Harlingen Irrigation District has maintained the accounting records and files for the ADI project. The project's primary administration is handled by Tom McLemore the Project Manager and the ADI Secretary Heather Jones. Together, with the Irrigation District's General Manger Wayne Halbert, we have issued and maintained subcontracts

Agricultural Water Conservation Demonstration Initiative 2010 Annual Progress Report

with Texas A&M University - Kingsville, Delta Lake Irrigation District, Texas Cooperative Extension and Axiom-Blair Engineering.

Report Preparation, Reproduction, and Distribution

The district has completed and filed three quarterly progress reports and the respective reimbursement request. The District has also completed their fifth annual report, reproduced and filed it with the Texas Water Development Board. The District Newsletter is published twice a year with information pertaining to the ADI program as well as all other conservation projects taking place in the District.

Additional External Grant Funds

The following is a list of additional external grant funds that support the ADI project. These funds are brought to the project through our cooperation with Texas A&M Kingsville.

\$295,000 Experiential Learning and Career Development in Agricultural and Natural Resources. July 2009-June 2011. PD: S.D. Nelson CoPDs: R.L. Stanko, K.C. McCuiston. USDA/CSREES HSI Grants. (Approximately 20% of total funds will pay for student labor on projects related to ADI goals, or \$60,000).

\$28,000 USDA/CSREES RGBI. On-Farm Water Savings Project in South Texas Citrus Production. PI: S.D. Nelson, CoPI: M. Setamou. Aug 2009-July 2010. (All funds pay for graduate student labor and water use research pertinent to ADI goals).

\$20,000 Bayer Crop Science. Effects of Water Timing on Temik Effectiveness in Citrus Pest Control. PI: M. Setamou, CoPI: S.D. Nelson. Mar 2009-Jan 2010. (All funds pay for graduate student labor and supplies for water use research pertinent to ADI goals).

\$30,000 USDA/CSREES Rio Grande Basin Initiative Grant. Effects of Water Deficit Irrigation on the Efficacy of Pesticides in Citrus Pest Management. PI: S.D. Nelson, Co-PI: M. Setamou. June 2008-May 2010. (All funds pay for graduate student labor and water use research pertinent to ADI goals).

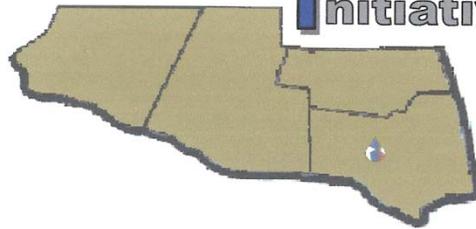
\$21,000 Bayer Crop Science. Effects of Water Stress on the Efficacy of Temik and Effectiveness of Selected Bayer Products. PI: M. Setamou, CoPI: S.D. Nelson. April 2008-March 2009. (All funds pay for graduate student labor and water use research pertinent to ADI goals).

\$7,000 Texas Citrus Producers Board. PI: S.D. Nelson, Co-PI: M. Setamou, H. Esquivel. Sept. 2008-Aug 2009. Approach for a Sustainable Organic System for Organic Farming in the LRGV. (All funds pay for supplies and travel related to graduate projects and water use research pertinent to ADI goals).

\$7,500 Experimental Techniques in Animal & Wildlife Sciences, ANSC 4385. K. McCuiston, S. Nelson, and M. Garcia. Jan 2010-Dec 2010. QEP 2010 Quality Enhancement Plan Grants. TAMU-Kingsville. (All funds pay for training, supplies and travel related to undergraduate research projects pertinent to ADI goals).

Harlingen Irrigation District Agricultural Water Conservation Demonstration Initiative HID, TAMUK, TCE Combined Demonstration Site Summaries For the 2010-2011 Growing Season

Agriculture Water Conservation Demonstration Initiative



FARM  Assistance

Helping Agriculture Make Informed Decisions

 **AgriLIFE EXTENSION**
Texas A&M System

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

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Site Summary Introduction

The following pages contain summaries of the demonstration sites maintained by all entities involved in the Agricultural Water Conservation Demonstration Initiative. Each site is designated by a site number, these site designations were developed to maintain the anonymity of the producers involved in the program. The first digit is the entity responsible for gathering data from the site, the second digit is the producer, and the third digit is a letter designating the field within the site. Site numbers beginning with "0" or "1" are maintained by Texas A&M University-Kingsville under the direction of Dr. Shad Nelson. Site numbers beginning with "2" or "3" are maintained by Texas AgriLife Extension Service under the direction of Dr. Juan Enciso. The sites beginning with "4" or "5" are maintained by Harlingen Irrigation District under the direction of Danny Allen. The economic summaries are provided by Texas AgriLife Extension Service FARM Assistance program under the direction of Dr. Steven Klose and Mac Young.

The Rio Grande Valley is unique in many ways and one of them is our ability to grow crops year round. Because of this, many of our demonstration sites do not have current yield data available at the time of the annual report. Typically the row crops are harvested in the fall of the reporting year and yield data is available for those crops. However the citrus harvest begins in early fall and continues through late winter and some years early spring. This extended harvest season is the reason you will see last year's harvest data reported in this year. Where it is available we have included data from last year and this year to give a better understanding of the yields at each demonstration site.

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site: #01A -2010-2011

Site Description:

Acres: 50
Soil type: clay loam 0-6 inches, sandy clay loam 6-36 inches
Field characteristics: 15' x 24' spacing (115 trees/Acre)
Crop variety: Rio Red grapefruit
Harvest season: Feb 08-Mar 09
Irrigation district: None-Class B water owner
Irrigation system: Narrow bordered flood, polypipe



Fertilizer applied:

Mar '10: 300 lbs/ac 21-0-0-24

Sensor information:

Soil moisture: Irrrometer data logger with Watermark sensors were placed at 6", 12", and 24" depths, sensor data is downloaded monthly and provided to grower for water management and irrigation scheduling as needed. Decagon data logger EM-50, equipped with ECHO-10 soil moisture probes removed in 2010 as outdoor lifespan seems to be 5 years

Irrigation schedule and amounts:

Total Irrigation for this site was 20 inches. Might have been more irrigation events in 2010 but flooding at entire farm submerged pumps for irrigation. Some water from level area on farm intruded into this field during summer. Total irrig + rain = 49.1 inches for 2010.

Irrigation method: Border Flood

Over the past 5 years of data collection, this irrigation methods has been shown to be the most effective water conserving irrigation method over traditional flood irrigation for mature citrus. The site is equipped with a 10 inch Turbine-type flow meter. Farmer uses 12" concrete outlet riser valve attached to poly-pipe. Farmer channels water more directly under the canopy (root zone) by using raised berms in between citrus tree rows. This method allows water to travel faster to the end of the row and grower will apply on average a 4-inch irrigation application amount using this method, as opposed to 6-inch irrigation event found in traditional flood irrigation practices. The grower will reform the raised berms each year after harvest season.

Observations made during the crop season:

This site was spared from flooding during June through October of 2010, as 90% of this grower's farm was under 2-4 feet of water after hurricanes and heavy rains went south through northern Mexico. Yield and irrigation totals for 2010-11 still to be collected, but will not be available until mid-May 2011. Below are the results obtained in May 2010 for the 2009-10 season, which demonstrates the delay in getting information back from the packing shed to grower.

Yield:

No yield obtained by grower for 2010 due to excessive loss by Flooding of farm and 2010 freeze

2009: 938 Tons or 18.8 Ton/ac

Packout:

82.7%; Juice 17.3%

Water use summary:

IUE: 2009: 1,834 lb/ac.in.

WUE: 2009: 979 lb/ac.in.

Economic Summary: Demonstration Site 1A

The Demonstration Site 1A analysis consists of a 10-year financial outlook (2010-2019) for the 50 acres of Rio Red grapefruit under narrow border flood irrigation. The orchard was assumed to have mature trees. The Rio Red grapefruit price is held constant at \$160/ton. 2010 producer costs and overhead charges are producer estimated rates.

Total cash receipts average \$3,525/acre over the 10-year period and cash costs average \$2,003/acre, including \$200/acre irrigation costs. Net cash farm income (NCFI) averages \$1,522/acre due largely to the price being held at a constant \$160/ton. The risk associated with prices and yields suggests some chance of negative NCFI. In a normal production year, NCFI could range as much as -\$500/acre to \$3,581/acre.

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site: #01B -2010-2011

Site Description:

Acres: 15.0
Soil type: clay loam 0-18 inches, loam 18-36 inches
Crop variety: Valencia oranges
Field characteristics: 15' x 23' spacing (124 trees/Acre)
Irrigation district: None-Class B water owner
Irrigation system: Narrow border flood, polypipe



Photo courtesy of TWDB by Russell Rankratz, 2009

Fertilizer applied:

Mar '10: 300 lbs/ac 21-0-0-24

Sensor information:

No soil moisture sensors for Valencia orchards. Turbine-type flow meter

Irrigation schedule and amounts:

Total irrigation: N/A ac.in
Total rainfall: 29.1 in.
Total water input: N/A ac.in

Irrigation method:

Farmer uses 12" concrete outlet valve and attaches turbine meter to valve and polypipe. Farmer waters only directly under the canopy (root zone) by using raised berms in between rows (Oranges/Grapefruit). Farmer reforms raised berms after each harvest in order to channel water at a faster rate to the end of the bed as a water conserving irrigation method for flood irrigating mature citrus.

Observations made during the crop season:

Valencia oranges are located in same irrigation block as Rio red grapefruit site #01C with similar soil characteristics. Trees were submerged under water for approximately two months during summer 2010 due to hurricane and flooding along Rio Grande River. Yield expectations for 2010 are expected to be near zero for 2010-11 harvest. Last season's yields are below.

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Yield:

No yield obtained by grower for 2010 due to excessive loss by Flooding of farm and 2010 freeze.

2009: 938 Tons or 18.8 Ton/ac

Packout:

82.7%; Juice 17.3%

Water use summary:

IUE: 2009: 1,827 lb/ac.in.

WUE: 2009: 962 lb/ac.in.

Economic Summary: Demonstration Site 01B

The Demonstration Site 1B analysis consists of a 10-year financial outlook (2010-2019) for the 15 acres of Valencia oranges under narrow border flood irrigation. The orchard was assumed to be eight years old. The Valencia orange price is held constant at \$150/ton. 2010 production costs and overhead charges are producer estimated rates.

Total cash receipts average \$2,249/acre over the 10-year period and cash costs average \$1,893/acre, including \$200/acre irrigation costs. Net cash farm income (NCFI) averages approximately \$356/acre due largely to the price being held at a constant \$150/ton. The risk associated with prices and yields suggests a 5.33% chance of negative NCFI. In a normal production year, NCFI could range as much as -\$647/acre to \$1,347/acre. Reflecting the potential of negative NCFI, the probability of carryover debt is 5% in 2010 and then drops to 3% or less in 2019.

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site: #01C-2010-2011

Site Description:

Acres: 85.0

Soil type: clay loam 0-18 inches,
loam 18-36 inches

Crop variety: Rio Red grapefruit

Field characteristics: 15' x 24'
spacing (115 trees/Acre)

Irrigation district: None-Class B water owner

Irrigation system: Narrow bordered flood, polypipe

Fertilizer applied:

Mar' 10: 300 lbs/ac 21-0-0-24

Sensor information:

Soil moisture: Irrometer data logger with Watermark sensors were placed at 6", 12", and 24" depths, sensor data is downloaded monthly and provided to grower for water management and irrigation scheduling as needed. Decagon data logger EM-50, equipped with ECHO-10 soil moisture probes removed in 2010 as outdoor lifespan seems to be 5 years. Davis Instruments Rain gauge located on adjacent Site #01C.

Irrigation schedule and amounts:

Only 2 irrigation events all year, as flood waters were over site most of summer 2010. Thus, only 8 inches irrigation. Total water is not appropriate for site. Total yield loss for 2010 as well. Trees were kept at this site after flooding

Irrigation method:

Farmer uses 12" concrete outlet valve and attaches turbine meter to valve and poly-pipe. Farmer waters only directly under the canopy (root zone) by using raised berms in between rows (Grapefruit). Farmer reforms raised berms after each harvest in order to channel water at a faster rate to the end of the bed as a water conserving irrigation method for flood irrigating mature citrus.

Observations made during the crop season:

Rio Red grapefruit trees were submerged under water for approximately two months during summer 2010 due to hurricane and flooding along Rio Grande River. Yield expectations for 2010 are expected to be near zero for 2010-11 harvest. Last season's yields are below.



Photo courtesy of TWDB by Russell Rankratz, 2009.

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Yield:

2009: 2137 Tons or 25.1 Ton/ac

Packout:

77.9% ; Juice 27.2%

Water use summary:

IUE: 2009: 2,231 lb/ac.in.

WUE: 2009: 1,133 lb/ac.in.

Economic Summary: Demonstration Site 1C

The Demonstration Site 1C analysis consists of a 10-year financial outlook (2010-2019) for the 85 acres of Rio Red grapefruit production under narrow border flood irrigation. The orchard was assumed to have mature trees. The Rio Red grapefruit price is held constant at \$160/ton. 2010 production costs and overhead charges are producer estimated rates.

Total cash receipts average \$3,528/acre over the 10-year period and cash costs average \$2,003/acre, including \$200/acre irrigation costs. Net cash farm income (NCFI) averages \$1,522/acre due largely to the price being held at a constant \$160/ton. The risks associated with prices and yields suggest some chance of negative NCFI. In a normal year, NCFI could range from -\$501/acre to \$3,576/acre.

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site: #01D-2010-2011

Site Description:

Acres: TBA (New Site as of Jan 2010)
Soil type: silty clay loam 0--36 inches
Crop variety: Rio Red grapefruit
Field characteristics: 15' x 24'
spacing (115 trees/Acre)
Irrigation district: None-Class B water

owner

Irrigation system: Very Narrow bordered flood, polypipe

Fertilizer applied:

Mar' 10: 300 lbs/ac 21-0-0-24

Sensor information:

Soil moisture: Irrometer data logger with Watermark sensors were placed at 6", 12", and 24" depths. This site was newly establish in January 2010. Sensor data is to be downloaded monthly and provided to grower for water management and irrigation scheduling as needed.

Irrigation schedule and amounts:

2010 Flood destroyed young trees at lower site, and no yield or water data reliable for high site where trees were kept.

Irrigation method:

Farmer uses 12" concrete outlet valve and attaches turbine-type meter to valve and poly-pipe. Farmer concentrates irrigation directly under within the root zone by using raised berms in between rows and just outside of the young tree canopy (Grapefruit).

Observations made during the crop season:

There were two new locations at this site, one on low ground, the other on high ground. The low ground trees were completely destroyed in 2010 by flooding and high water reaching up to a height almost covering the tree tops, thus killing the trees. These trees have been removed and burned from the low site. The high silty clay site has young trees still alive and we may see the first year of production from these trees.

Yield:

2009: n/a (young trees, 2010 1st year production if not delayed by flooding)



Photo courtesy of TWDB by Russell Rankratz, 2009.

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Water use summary:

IUE: 2009: n/a lb/ac.in.

WUE:

2009: n/a lb/ac.in.

Economic Summary:

There is no economic assessment on this newly acquired demonstration site for 2010.

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Annual Progress Report Site Summaries

Site: # 02A – 2010-2011

Site Description:

Acres: 14.0
Soil characteristics: sandy clay loam
0-24 inches, sandy clay 24-36 inches
Crop variety: Henderson grapefruit
Irrigation district: United
Field characteristics: 15' x 24'
spacing (115 trees/Acre)
Irrigation system: Narrow bordered
flood



Fertilizer applied:

Granular – 450 lbs/ac 34-0-0-12 split application

Soil moisture sensors:

Replaced WatchDog with Irrometer data loggers equipped with WaterMark sensor probes also set at 6, 12, 24 and depths. Decagon data logger EM-50 will not download, but some ECHO-10 probes sensor still working.

Irrigation schedule and amounts:

Total irrigation was 20 inches for 2010. Total irrig + rain = 45.2 inches.

Irrigation method:

Farmer reforms raised berms between rows to channel water at a faster rate to the end of the bed. Farmer uses 12" concrete outlet valve and we installed a 10-inch pipe with Siemens Transit-time meter installed in March 2007. Water delivered is approximately 4 inch irrigation event per acre. Yields not yet available for 2010-11 season, but expected to have this data by mid-May 2011. Below are results from previous season obtained in May 2010 from farm manager.

Yield:

2009: 121 Tons or 8.7 Ton/ac

Yield decline excessive in this location, data will no longer be reliable at this site due to high rate of tree decline and dying trees.

Water use summary:

IUE: 2009: 725 lb/ac.in

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WUE:

2009: 433 lb/ac.in

Economic Summary:

The Demonstration Site 02A analysis consists of a 10-year financial outlook (2010-2019) for the 11 acres of Henderson grapefruit under border flood irrigation. The orchard trees were assumed to have mostly mature trees with some replanted trees reaching maturity over the next few years. The Henderson grapefruit price is held constant at \$200/ton. 2010 production costs and overhead charges are producer estimated rates.

Total cash receipts average \$4,182/acre over the 10-year period and cash costs average \$1,866/acre, including \$207/acre variable irrigation costs in 2010. Net cash farm income (NCFI) averages \$2,316/acre due largely to the price being held constant at \$200/ton. The risk associated with prices and yields suggests some chance of negative NCFI. In a normal production year, NCFI could range as much as -\$1,545/acre to \$2,364/acre plus or minus the expected NCFI for the site. Reflecting the potential of negative NCFI, the probability of carryover debt is 17% or less during 2010 and then generally declines to 1% or less in 2011.

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site: # 02B -2010-2011

Site Description:

Acres: 8.0
Soil characteristics: sandy clay loam 0-36"
Crop variety: Rio Red grapefruit
Irrigation district: United
Field characteristics: 15' x 24' spacing (115 trees/Acre)
Irrigation system: Microjet spray



Photo courtesy of TWDB by Russell Rankratz, 2009.

Fertilizer applied:

Granular -300lbs/ac 34-0-0-12 Fall;
150lbs/ac 34-0-0-12 Spring

Soil moisture sensor monitoring:

Watchdog Data logger and 6", 12" and 24" watermark soil moisture sensors. Decagon data logger EM-50 is unreliable after 5 years in the field, ECHO-10 probes set at 6, 12, 24 and 36 inch depths are working but Davis Instruments rain gauge data is suspect due to wind movement. Decagon has many challenges downloading to the computer.

Irrigation Method:

This site was irrigated using microjet spray irrigation using water from an on-site reservoir holding pond. The irrigation system is allowed to run 24 hours and a 2" turbine meter was installed at end of season, March 2007.

Irrigation schedule and amounts:

Irrigation and yield data at this site will no longer be collected due to excessive tree decline and management changes at the grove. Land is being preserved for future building of homes, so emphasis on quality yields has declined as observed by 2009 numbers at only 8.7 tons/ac. Furthermore, 2010 freeze further impacted yield results.

Observations made during the crop season:

Good rainfall throughout the 2010 growing season. Fruit yield data will be forthcoming from the packing shed by mid-May 2011. Below are last year's yield results obtained in mid-May 2010.

Yield:

2009: 69.6 Tons or 8.7 Ton/ac

Water use summary:

IUE: 2009: 953 lbs/ac.in

WUE: 2009: 505 lbs/ac.in

Economic Summary: Demonstration Site 02B

The Demonstration Site 02B analysis consists of a 10-year financial outlook (2010-2019) for the 8 acres of Rio Red grapefruit under micro-jet spray irrigation. The orchard trees were assumed to have mostly mature trees with some replanted trees reaching maturity over the next two years. The Rio Red grapefruit price is held constant at \$225/ton. 2010 production costs and overhead charges are producer estimated rates.

The analysis also includes the purchase and use of a micro-jet spray system at a cost of \$1,800 per acre. The micro-jet spray system expense is evenly distributed (\$180/acre/year) over the 10-year period with the assumption of no financing costs.

Total cash receipts average \$5,175/acre over the 10-year period and cash costs average \$1,968/acre, including \$221.50/acre variable irrigation costs in 2010. Net cash farm income (NCFI) averages \$3,207/acre due largely to the price being held constant at \$225/ton. The risk associated with prices and yields suggests minimal chance of negative NCFI. In a normal production year, NCFI could range as much as \$261/acre to \$6,669/acre.

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site # 03 A -2010-2011

Site Description:

Acres: 41.3

Soil characteristics: Sandy clay loam 0-36 inches

Crop variety: Rio Red grapefruit

Irrigation district: Harlingen 1

Irrigation system: Conventional Flood

Field characteristics: 15' x 24' spacing (115 trees/Acre)

Fertilizer applied:

Jan '10 Ammonium Sulfate at 1 lb N/tree/yr [550 lbs. ac. (21-0-0)].

Soil moisture sensor monitoring:

Irrrometer Watermark Data logger and Watermark soil moisture sensors set at 6, 12, and 24 inch depths. Decagon data logger EM-50 not working well after 5 years in field, ECHO-10 probes at same depths; Davis Instruments Rain gauge.



Photo courtesy of TWDB by Russell

Irrigation Amount:

Conventional flood irrigation applies approximately 6 inch water depth over the entire irrigated soil surface per irrigation event. Grower typically under irrigates crop, but rains throughout 2010 have helped grapefruit crop this year compared to 2009.

Total irrigation at site was 30 inches in 2010. Good and frequent rains during first part of year assisted in lower water use. Irrig + rain = 50.2 inches.

Growers do not provide yield data anymore, thus we are going to no longer include this site into data analysis except for keeping track of the number of irrigation events applied each year. 5 flood events in all of 2010 with a 6 inch irrigation event for each application.

Observations made during the crop season:

At times this site has excessive weed growth throughout the orchard the impacts yield and grower care is below normal as the owner is planning to utilize this land for urban development and investing money into good tree management is not a priority. The 2010- 11 yield data is not collected, but 2009 yield collected in mid-May 2010 is shown below.

Yield:

2009: 12.5 Ton/ac

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Water use summary:

IUE: 2009: 1,042 lbs/ac.in

WUE: 2009: 531 lbs/ac.in

Economic summary:

Not available at report time. The owner of this site may be looking at turning this location into housing property soon as the farm manager overseeing the site has been keeping the trees alive, but not really paying attention to producing the best crop for 2009.

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site # 04 A -2010-2011

Site Description:

Acres: 16.5
Soil characteristics: sandy clay loam 0-24 inches, clay 24-36 inches
Crop variety: Rio Red grapefruit
Irrigation district: Hidalgo 1
Irrigation system: Drip Irrigation
Field characteristics: 15' x 24' spacing (115 trees/Acre)



Photo courtesy of TWDB by Russell Rankratz, 2009.

Fertilizer applied:

20 gal./ac. 7-21-0 & 5 gal./ac N-32

Soil moisture sensor monitoring:

Irrrometer data logger with 3 Watermark sensors also at 6, 12 and 24 inch depth under tree canopy and 12 inch sensor at drip line of canopy. To monitor lateral soil water movement from the drip tape, we installed WaterMark sensors at the 12" soil depth at 1, 2, and 3 feet away from the dripline. Decagon data logger EM-50 is working poorly after 5 years, ECHO-10 probes at 6, 12 and 24 inches equipped with Tipping bucket rain gauge.

Water meter:

Grower has own meters.

Irrigation schedule and amounts:

Total irrigation is 18.0 inches in 2010.

Irrig + rain = 42.1 inches.

Irrigation method:

Single line Drip system; 5/8" polyethylene line with emitters every 48.

Observations made during the crop season:

This grower has decided to make a change to the number of drip irrigation lines placed under his mature citrus trees, due to our observations of lateral water movement not extending far enough to influence roots located near the dripline of the trees. Soil moisture sensors have confirmed this problem and grower is changing his practice.

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Yields will not be back from the packing shed until mid-May 2011 for this 2010-11 season, thus data shown is 2009 season results that were obtained in mid-May 2010.

Yield:

2009: 17.2 ton/ac

2009 Packout: 48.5%; Juice: 51.5%

2010 yield = 13.7 ton/ac

Water use summary:

IUE: 2009: 1,319 lbs/ac.in

WUE: 2009: 752 lbs/ac.in

IUE 2010= 1,527 lbs/ac.in

WUE 2010 = 653 lbs/ac.in

Economic Summary:

The Demonstration Site 04A analysis consists of a 10-year financial outlook (2010-2019) for the 16.5 acres of Rio Red grapefruit under 1-line drip irrigation. The orchard was assumed to have mature trees. The Rio Red grapefruit price is held constant at \$150/ton. 2010 production costs and overhead charges are producer estimated rates.

The analysis also includes the purchase and use of a 1-line drip system at a cost of \$1,500 per acre. The 1-line drip system expense is evenly distributed (\$150/acre/year) over the 10-year period with the assumption of no financing costs.

Total cash receipts average \$3,000/acre over the 10-year period and cash costs average \$2,400/acre, including \$246.50/acre irrigation costs in 2010. Net cash farm income (NCFI) averages \$600/acre due largely to the price being held constant at \$150/ton. The risk associated with prices and yields suggests some chance of negative NCFI. In a normal production year, NCFI could range as much as -\$588/acre to \$2,361/acre. Reflecting the potential of negative NCFI, the probability of carryover debt is 9% in 2010 and generally declines to only 4% in 2017.

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Annual Progress Report Site Summaries

Site: #04 B – 2010-2011

Site Description:

Acres: 30
Soil characteristics: clay loam, 0-6 inches, clay, 6 -36 inches
Crop variety: Rio Red grapefruit
Irrigation district: Hidalgo 1
Irrigation system: Microjet spray
Field characteristics: 15' x 24' spacing (115 trees/Acre)



Fertilizer applied:

20 gal./ac. 7-21-0 & 5 gal./ac N-32

Soil moisture sensor monitoring:

Irrrometer data logger with 3 Watermark sensors also at 6, 12 and 24 inch depth under tree canopy and 12 inch sensor at drip line of canopy. Decagon data logger EM-50 not downloading well after 5 years in the field, ECHO-10 probes at 6, 12 and 24 inches. This grower has own water meters.

Irrigation schedule and amounts:

2010 Irrigation = 17.2 inches
Irrig + rain = 41.3 inches

Irrigation method:

Microjet spray system. Single riser with 360 degree rotation spray emitter placed at the middle between trees to minimize spray on tree trunk. Grower applies approximately 1.0 ac-in. per irrigation even.

Observations made during the crop season:

Periodic rains throughout 2010 have assisted in water management, compared to 2009 season that had extensive drought period and lower yield than in 2008, as shown below.

Yield:

2009: 12.4 ton/ac; 2008: 17.9 ton/ac
2009 Packout: 67.2%; Juice: 32.8%
2010 yield: 16.1 tons/ac

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Annual Progress Report Site Summaries

Water use summary:

IUE: 2009: 950 lbs/ac.in

WUE: 2009: 541 lbs/ac.in

IUE 2010= 1,877 lbs/ac.in

WUE2010 = 782 lbs/ac.in

Economic Summary:

The Demonstration Site 04B analysis consists of a 10-year financial outlook (2010-2019) for the 6 acres of Rio Red grapefruit under micro-jet spray irrigation. The orchard trees were assumed to have mature trees. The Rio Red grapefruit price is held constant at \$150/ton. 2010 production costs and overhead charges are producer estimated rates.

The analysis also includes the purchase and use of a micro-jet spray system at a cost of \$2,500 per acre. The micro-jet spray system expense is evenly distributed (\$250/acre/year) over the 10-year period with the assumption of no financing costs.

Total cash receipts average \$3,000/acre over the 10-year period and cash costs average \$2,600/acre, including \$316.23/acre irrigation costs in 2009. Net cash farm income (NCFI) averages \$400/acre due largely to the pricing being held constant at \$150/ton. The risk associated with prices and yields suggests significant chance of negative NCFI. In a normal production year, NCFI could range as much as -\$848/acre to \$2,192/acre. Reflecting the potential of negative NCFI, the probability of carryover debt is 22% in 2010 and generally declines to only 7% in 2019.

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Site: #04 C - 2010-2011

Site Description:

Acres: 40
Soil characteristics: clay loam, 0-6 inches, clay, 6 -36 inches
Crop variety: Rio Red grapefruit
Irrigation district: Hidalgo 1
Irrigation system: Traditional Flood
Field characteristics: 20' x 25' spacing (87 trees/Acre)



Fertilizer applied:

1 lb N/tree/year in split granular applications

Soil moisture sensor monitoring:

Irrrometer data logger with 3 Watermark sensors set at 6, 12 and 24 inches under center of tree canopy

Irrigation schedule and amounts:

2010 Irrigation = 30 inches
Irrig + rain = 54.1 inches

Irrigation method:

Traditional flood with 5 rows per irrigation pan for Rio Red grapefruit

Observations made during the crop season:

2008-09 drought impact on yield is apparent when you compare 2008 season yield to that of 2009, as shown below. The 2010 season had more consistent rainfall throughout the growing season which should translate into better yields, once the yield results are back from the packing shed in mid-May 2011

Yield:

2009: 12.8 ton/ac; 2008: 20.2 ton/ac
2009 Packout: 65.2%; Juice: 34.8%
2010 yield = 10.8 tons/ac

Water use summary:

IUE: 2009: 625 lbs/ac.in
WUE: 2009: 429 lbs/ac.in
IUE 2010= 720 lbs/ac.in
WUE 2010 = 399 lbs/ac.in

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Economic Summary:

The Demonstration Site 04C analysis consists of a 10-year financial outlook (2010-2019) for the 14 acres of Rio Red grapefruit under traditional flood irrigation. The orchard trees were assumed to have mature trees. The Rio Red grapefruit price is held constant at \$150/ton. 2010 production costs and overhead charges are producer estimated rates.

Total cash receipts average \$3,000/acre over the 10-year period and cash costs average \$2,250/acre, including \$245/acre irrigation costs in 2010. Net cash farm income (NCFI) averages \$750/acre due largely to the pricing being held constant at \$150/ton. The risk associated with prices and yields suggests significant chance of negative NCFI. In a normal production year, NCFI could range as much as -\$394/acre to \$2,513/acre.

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site: #04 D – 2010-2011

Site Description:

Acres: 35.0 (210 acres planted;
20 acres as Valencia oranges)
Soil characteristics: sandy clay loam,
0-36 inches
Crop variety: Rio Red grapefruit
Irrigation district: Delta lakes
Irrigation system: Single line drip
Field characteristics: 20' x 25' spacing
(115 trees/Acre)



Fertilizer applied:

Unknown, New drip site established with 1-year-old trees March 10, 2009.

Soil moisture sensor monitoring:

Irrrometer data logger with 3 Watermark sensors set at 6, 12 and 24 inches under center of tree canopy and one sensor placed 12" deep in the soil located one foot away from the drip tape to ensure lateral water movement.

Irrigation schedule and amounts:

Trees still too young for yield. Irrigation data not supplied by grower. No significant yield, but trees are growing well due to drain tiles prior to planting.

Irrigation method:

Single line Drip irrigation with emitters spaced every 2.0 feet.

Observations made during the crop season:

Trees at this new location are under stress due to high salt conditions. The Irrrometer station was moved to a more northern section of the field where salt conditions are less pronounced and has helped in monitoring and irrigation management. Sensors placed 6, 12, and 24 inches below drip tape between emitters, plus another sensor located 12 inches deep and 1 foot away from drip tape to monitor lateral water movement. Site has tile drains installed prior to planting which has greatly helped in fast growth for these trees since planting, thus demonstrating how beneficial tile drains can be for citrus tree health, despite poor soil salinity.

Yield:

Not Applicable; no fruit

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Water use summary:

Not Applicable; no fruit

Economic Summary:

The Demonstration Site 04D analysis consists of a 10-year financial outlook (2010-2019) for the 35 acres of Rio Red grapefruit under 1-line drip irrigation. The orchard trees were assumed to have been planted in 2009. The Rio Red grapefruit price is held constant at \$150/ton. 2010 production costs and overhead charges are producer estimated rates.

The analysis also includes the purchase and use of a 1-line drip system at a cost of \$1,500 per acre. The 1-line drip system expenses are evenly distributed (\$75/acre/year) over a 20-year period with the assumption of no financing costs. Irrigation labor amounted to \$38.73/acre, irrigation fuel \$27.15/acre, water costs \$21.48/acre and \$1.29/acre for drip maintenance. Total cash irrigation costs were \$88.65/acre, assuming 7 irrigation events. Irrigation fuel used was electricity.

The cost of installing drain tile in 2009 was also evenly distributed (\$30/acre/year) over a 20-year period with no financing costs assumed.

Results reflect positive net cash farm income in the 5th year and a 8-year payout to recover all establishment costs. Total cash receipts were zero in 2010 and average \$2,350/acre over the 10-year period. Cash costs average \$2,130/acre, including \$88.65/acre cash irrigation costs. Net cash farm income (NCFI) is negative the first four years and builds to \$790/acre in the 10th year. This somewhat reflects the price being held at a constant \$150/ton and projected increases in production costs. The risk associated with prices and yields suggests a significant chance of negative NCFI in the initial years and little risk after the trees reach maturity. Cash reserves are expected to be negative in the early years of the 10-year projection period and reach \$79,280 or \$2,270/acre by 2019. The average cash flow balances are intended to illustrate the cash requirements or flows generated using the 1-line drip irrigation method. The positive cash reserves in 2017 reflect the recovery of all establishment costs incurred. Reflecting the deficit cash reserves in 2010-2016, the probability of carryover debt is 99% or less during 2010-2013, and then declines to 14% or less in 2019.

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site: #06D - 2010-2011

Site Description:

Acres: 10.0 ac (experimental plot)
Crop variety: Rio Red grapefruit
Harvest season: Mar '09-Mar '10
Irrigation district:
Hidalgo Cameron 9
Irrigation system:
Traditional Flood
Field characteristics: 16' x 25'
spacing (105 trees/Acre)

Fertilizer applied:

Mar '10: 220 lb/ac 46-0-0 urea

Soil moisture sensor monitoring:

No soil moisture sensors set up at this research site, field managed by research station farm manager with irrigation typically once every month. Each irrigation event provided a 6 inch water depth.

Rain gauge:

Farm crew takes measurements by hand each day, thus providing very accurate rainfall data that can be used to double check rainfall records by nearby Texas Agrilife weather station or rains in Lower Rio Grande Valley

Water meter:

10" turbine-type flow meter

Irrigation schedule and amounts:

Irrigation = 36 inches
Irrig + rain = 48.1 inches

Irrigation method:

Traditional Flood

Observations made during the crop season:

High level of water applied to this site with trees harvested prior to January 2010. Rainfall was measured directly by hand each day at this location providing exactly 22.1 inches rainfall in 2010.

Yield:

2009: 15.3 Tons/ac
2010 yield: waiting for pack out



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All fruit harvested prior to January 2011, waiting on results from packing shed.
2009 yield results are shown above and where available mid 2010.

Water use summary:

IUE: 2009: 638 lbs/ac.in

WUE: 2009: 443 lbs/ac.in

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site: #07A -2010-2011

Site Description:

Acres: 7.3 (flood) Block N-O1
Soil characteristics: sandy clay loam, 0 – 36”
Crop variety: Rio Red
grapefruit, 5 years old
Irrigation district: Hidalgo Cameron 9
Irrigation system: Flood, conventional
Field characteristics: 15’ x 24’ spacing
(121trees/Acre)



Fertilizer applied:

Mar '10: 220 lb/ac 46-0-0 urea

Soil moisture sensor monitoring:

Soil moisture equipment not at this research site other than Davis Instrument Rain gauge and Watchdog Data logger. Irrigation scheduling performed by farm manager based on ETC and duration since last irrigation event. Each irrigation equivalent to a 6 inch irrigation application.

Rain gauge:

Watchdog Data logger attached to rain gauge is measured manually by Farm crew and is used to double check rain data logger reliability.

Water meter:

10” turbine-type flow meter

Irrigation schedule and amounts:

Irrigation performed using grower experience and estimations from Etc, typically irrigated at every 4-5 week intervals depending upon rainfall amount.

Total irrigation: -- ac.in

Total rainfall: 22.0 inch

Total water input: -- ac.in

Irrigation method:

Traditional flood; each irrigation a 6 inch irrigation event. As 2010 yield results are not yet provided by packing shed, the results obtained mid year 2010 for the 2009 season are shown below.

Yield:

2009: 3.4 Ton/ac.

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Water use summary:

IUE: 2009: 162 lbs/ac.in

WUE: 2009: 116 lbs/ac.in

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site #:24A -2010-2011

Site Description:

Acres: 7.0

Soil type: Sandy Clay Loam (up to 24-inch depth) and Clay Loam (below 30-inch depth)

Crop Variety: Rio Red Grapefruits (Planted 1993)

Irrigation system:
border flood

Field characteristics:

140 trees/acre, laser leveled, no ground cover, drain tiles



Sensor and flow meter information:

Watermark sensors (6, 12, 24-inch depth underneath canopy, and 12-inch depth at canopy drip line) connected to data logger (WM monitor) Portable flow meter / Rain gauge connected to a data logger on-site

Irrigation schedule and amounts:

Total irrigation: 21 inches (in 6 events: Jan. 2010-Dec 2010)

Total rainfall: 31.6 inches (Jan 2010-Dec 2010)

Total water input: 52.6 inches (Jan. 2010-Dec 2010)

Water use (70% cover): 42 inches

Irrigation method:

There is a border every other row and each pan is irrigated by one alfa-alfa valve (connected to canal: water provided by the district) until water fills in at the opposite side. Since the grower has a capacity of two heads (900 GPM), he opens four valves at a time (four pans). The design of his system allows him to apply about 3.5 inch each time. Water advances on the laser leveled ground 100 feet within 20 minutes. Irrigation scheduling was not based on soil moisture.

Yield:

19.2 ton/acre.

Water Use Summary

IUE: 1,829 lbs/inch of water applied by irrigation

WUE: 730 lbs/inch of water received (irrigation + rainfall)

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site #28A – 2010-2011

Site Description:

Acres: 8.0

Soil type: Sandy Loam (up to 30-inch depth)

Crop Variety: Valencia Oranges
(Planted 2003)

Irrigation system:

Micro-Jets (1 sprinkler/tree)

Field characteristics: 115 trees/acre; no ground cover; drain tiles

Fertilizer applied: total NPK 811 lb / 0 lb / 74 lb (fertigation, side-dressing) or **101 / 0 / 9 lb net/acre** type N32 (60 gal), 0-0-62 (120 lb), and 28-0-0-5 (185 gal)

Sensor and flow meter information:



Sensor and flow meter information:

Watermark (6, 12 & 24-inch depth) sensors connected data logger (two complete sets) Water meter installed at the pump house / Rain gauge connected to a data logger on-site

Irrigation schedule and amounts:

Total irrigation: 12.6 inches (Jan 2010-Dec. 2010)

Total rainfall: 33.74 inches (Jan 2010-Dec 2010)

Total water input: 46.4 inches (Jan 2010-Dec 2010)

Water use (70% cover): 42 inches

Irrigation method:

Irrigation scheduling was based on soil moisture and an average of 0.6 inch/acre was applied each time (total of 22 applications) by micro-jet; water was provided by the district (pipeline) into a reservoir (sand media filtration and pump system)

Observations made during the crop season:

Irrigation was monitored with the water mark sensors. The farmer triggered irrigation when 6, 12, and 24" water mark sensors reached a reading of approximately 24, 19, and 15 cb. .

Yield:

9 tons/acre

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Water use Summary: Demonstration Site 28A

IUE: 1428 lbs/inch of water applied by irrigation

WUE: 388 lbs/inch of water received (irrigation + rainfall)

Economic Summary:

The Demonstration Site 28A analysis consists of a 10-year financial outlook (2010-2019) for the 8 acres of Valencia oranges under micro-jet spray irrigation. The orchard trees were assumed to be 7 years old. The Valencia orange price is held constant at \$150/ton. 2010 production costs and overhead charges are producer estimated rates.

The analysis also includes the purchase and use of a micro-jet spray system at a cost of \$1,000 per acre. The micro-jet spray system expense is evenly distributed (\$100/acre/year) over the 10-year period with the assumption of no financing costs.

Total cash receipts average \$2,653/acre over the 10-year period and cash costs average \$1,480/acre, including \$215/acre irrigation costs in 2010. Net cash farm income (NCFI) is low in 2010 reflecting lower levels of production from immature trees. It then averages about \$1,170/acre for the 10-year period. The risk associated with prices and yields suggests a minimal chance of negative NCFI after 2010 when the trees reach maturity. In a normal production year and mature trees (2011-2019), NCFI could range as much as -\$188/acre to \$3,488/acre. Due to negative NCFI, the probability of carryover debt is 5% or greater during 2010 and then declines to 1% or less in 2011 as the trees reach maturity and annual production increases.

Agricultural Water Conservation Demonstration Initiative
Annual Progress Report Site Summaries

Site #:28B - 2010-2011

Site Description:

Acres: 3.3

Soil type: Sandy Loam (up to 30-inch depth)

Crop Variety: Rio Red Grapefruits (Planted 1992)

Irrigation system: Flood converted to drip in August 2006 (surface double line 30-inch emitter)

Field characteristics: 116 trees/acre; no ground cover; drain tiles

Fertilizer applied: total NPK 251 lb / 0 lb / 0 lb (fertigation) or **36 / 0 / 0 lb net/acre** type N32 (70 gal)



Sensor and flow meter information:

Watermark (6, 12 & 24-inch depth) and irrigation sensors connected to data logger
Water meter installed at the pump house

Irrigation schedule and amounts:

Total irrigation: 25.1 inches (Jan 2010-Dec. 2010).

Total rainfall: 33.74 inches (Jan 2010-Dec 2010)

Total water input: 58.9 inches/acre (Jan 2010-Dec. 2010)

Water use (70% cover): 42 inches

Irrigation method:

Irrigation scheduling was based on soil moisture and was applied each time by drip; water was provided by the district (pipeline) into a reservoir (sand media filtration and pump system)

Observations made during the crop season:

Irrigation was scheduled using soil water mark sensors. Irrigation was generally triggered when the sensors placed 6, 12, and 24" soil depth reached the readings of 32, 23, and 11 cb, respectively.

Yield:

23.77 tons/acre

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Water use summary

IUE: 1,894 lbs/inch of water applied by irrigation

WUE: 807 lbs/inch of water received (irrigation + rainfall)

Economic Summary:

The Demonstration Site 28B1 analysis consists of a 10-year financial outlook (2010-2019) for the 5 acres of Marrs under 2-line drip irrigation. The orchard trees were assumed to have mature trees. The Marrs orange price is held constant at \$120/ton. 2010 production costs and overhead charges are producer estimated rates.

The analysis also includes the purchase and use of a 2-line drip system at a cost of \$1,000 per acre. The 2-line drip system expense is evenly distributed (\$100/acre/year) over the 10-year period with the assumption of no financing costs.

Total cash receipts average \$2,036/acre over the 10-year period and cash costs average \$1,496/acre, including \$215/acre irrigation costs in 2010. Net cash farm income (NCFI) averages \$540/acre due largely to the price being held constant at \$120/ton. The risk associated with prices and yields suggests a significant chance of negative NCFI. In a normal production year, NCFI could range as much as -\$820/acre to \$2,660/acre. Due to negative NCFI, the probability of carryover debt is 29% or less in 2010 and then declines to 7% or less in 2013.

The Demonstration Site 28B2 analysis consists of a 10-year financial outlook (2010-2019) for the 3 acres of Rio Red grapefruit under 2-line drip irrigation. The orchard was assumed to have mature trees. The Rio Red grapefruit price is held constant at \$120/ton. 2010 production costs and overhead charges are producer estimated rates.

The analysis also includes the purchase and use of a 2-line drip system at a cost of \$1,000 per acre. The 2-line drip system expense is evenly distributed (\$100/acre/year) over the 10-year period with the assumption of no financing costs.

Total cash receipts average \$2,640/acre over the 10-year period and cash costs average \$1,600/acre, including \$215/acre variable irrigation costs. Net cash farm income (NCFI) averages \$1,040/acre due largely to the price being held at a constant \$120/ton. The risks associated with prices and yields suggest some chance of negative NCFI. In a normal production year, NCFI could range as much as -\$567/acre to \$3,600/acre. The probability of carryover debt is 12% or less during 2010 and then declines to 4% or less in 2012.

Site #:28C -2010-2011

Site Description:

Acres: 8.0

Soil type: Sandy Loam (up to 30-inch depth)

Crop Variety: Rio Red Grapefruits (Planted 1992)

Irrigation system: Micro-Jets (1 sprinkler/tree)

Field characteristics: 116 trees/acre; no ground cover; drain tiles

Fertilizer applied: total NPK 343 lb / 391 lb / 74 lb (fertigation, side-dressing) or **43 / 49 / 9 lb net/acre** type 32-0-0 (80 gal), 5-34-0 (100 gal), and 0-0-62 (120 lb)



Sensor and flow meter information:

Watermark (6, 12 & 24-inch depth) and irrigation sensors connected to data logger

Water meter installed at the pump house

Irrigation schedule and amounts:

Total irrigation: 20.4 inches (Jan 2010-Dec. 2010)

Total rainfall: 33.7 inches (Jan 2010-Dec 2010)

Total water input: 54.1 inches (Jan 2010-Dec. 2010)

Water use (70% cover): 42 inches

Irrigation method:

Irrigation scheduling was based on soil moisture and an average of 0.82 inch/acre was applied each time by Micro-Jet (total of 25 applications); water was provided by the district (pipeline) into a reservoir (sand media filtration and pump system)

Observations made during the crop season:

Irrigation was triggered with the water mark sensors when the sensors placed at 6, 12, and 24" profiles reached a reading of 61, 39, and 20 cb, respectively.

Yield:

23.77 tons/acre

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Water use summary:

IUE: 2,330 lbs/inch of water applied by irrigation

WUE: 879 lbs/inch of water received (irrigation + rainfall)

Economic Summary:

The Demonstration Site 28C analysis consists of a 10-year financial outlook (2010-2019) for the 8 acres of Rio Red grapefruit under micro-jet spray irrigation. The orchard was assumed to have mature trees. The Rio Red grapefruit price is held constant at \$120/ton. 2010 production costs and overhead charges are producer estimated rates.

The analysis also includes the purchase and use of a micro-jet spray system at a cost of \$1,000 per acre. The micro-jet spray system expense is evenly distributed (\$100/acre/year) over the 10-year period with the assumption of no financing costs.

Total cash receipts average \$2,641/acre over the 10-year period and cash costs average \$1,600/acre, including \$215/acre variable irrigation costs. Net cash farm income (NCFI) averages \$1,041/acre due largely to the price being held at a constant \$120/ton. The risks associated with prices and yields suggest some chance of negative NCFI. In a normal production year, NCFI could range as much as -\$563/acre to \$3,838/acre. The probability of carryover debt is 12% or less during 2010 and then declines to 4% or less in 2012.

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Site #:28D -2010-2011

Site Description:

Acres: 7.0

Soil type: Sandy Loam (up to 30-inch depth)

Crop Variety: Marrs and Navel Oranges (Planted 1991)

Irrigation system: Drip (surface double line 30-inch emitter)

Field characteristics: 115 trees/acre; no ground cover; drain tiles

Fertilizer applied: total NPK 1,543 lb / 594 lb / 0 lb (fertigation)

or **220 / 85 / 0 lb net/acre** type

28-0-0 (430 gal), 5-34-0 (152 gal), and 9-0-0 (65 gal)



Sensor and flow meter information:

Watermark (6, 12 & 24-inch depth) and irrigation sensors connected to data logger
Water meter installed at the pump house

Irrigation schedule and amounts:

Total irrigation: 24 inches/acre (Jan 2010-Dec. 2010)

Total rainfall: 33.7 inches (Jan 2010-Dec 2010)

Total water input: 57.7 inches/acre (Jan 2010-Dec. 2010)

Water use (70% cover): 42 inches

Irrigation method:

Irrigation scheduling was based on soil moisture and an average of 0.9 inch/acre was applied each time; water was provided by the district (pipeline) into a reservoir (sand media filtration and pump system)

Observations made during the crop season:

Irrigation was triggered when the water mark sensors placed at soil depth of 6, 12, and 24" profiles reached 67, 33, and 10 cb, respectively.

Yield:

17.37 tons/acre

Water use summary:

IUE: 1,448 lbs/inch of water applied by irrigation

WUE: 602 lbs/inch of water received (irrigation + rainfall)

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Economic Summary:

The Demonstration Site 28D1 analysis consists of a 10-year financial outlook (2010-2019) for the 3.5 acres of Navel oranges under 2-line drip irrigation. The orchard was assumed to have mature trees. The early orange price is held constant at \$120/ton. 2010 production costs and overhead charges are producer estimates.

The analysis also includes the purchase and use of a 2-line drip system at a cost of \$1,000 per acre. The 2-line drip system expense is evenly distributed (\$100/acre/year) over the 10-year period with the assumption of no financing costs.

Total cash receipts average \$1,620/acre over the 10-year period and cash costs average \$1,523/acre, including \$215/acre variable irrigation costs. Net cash farm income (NCFI) averages \$97/acre due largely to the price being held at a constant \$120/ton. The risks associated with prices and yields suggest a significant chance of negative NCFI. In a normal production year, NCFI could range as much as -\$1,171/acre to \$2,029/acre. Due to negative NCFI, the probability of carryover debt is 40% or less in 2010 and then decreases to 26% or less in 2018.

The Demonstration Site 28D2 analysis consists of a 10-year financial outlook (2010-2019) for the 3.5 acres of Marrs oranges under 2-line drip irrigation. The orchard was assumed to have mature trees. The early orange price is held constant at \$120/ton. 2010 production costs and overhead charges are producer estimates.

The analysis also includes the purchase and use of a 2-line drip system at a cost of \$1,000 per acre. The 2-line drip system expense is evenly distributed (\$100/acre/year) over the 10-year period with the assumption of no financing costs.

Total cash receipts average \$2,037/acre over the 10-year period and cash costs average \$1,497/acre, including \$215/acre variable irrigation costs. Net cash farm income (NCFI) averages \$540/acre due largely to the price being held at a constant \$120/ton. The risks associated with prices and yields suggest a significant chance of negative NCFI. In a normal production year, NCFI could range as much as -\$829/acre to \$2,657/acre. Due to negative NCFI, the probability of carryover debt is 29% or less in 2010 and then declines to 7% or less in 2013.

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Site # 28E - 2010-2011

Site Description:

Acres: 8.0

Soil type: Sandy Loam (up to 30-inch depth)

Crop Variety: Rio Red (Planted 1992)

Irrigation system: Drip (surface double line 30-inch emitter)

Field characteristics: 115 trees/acre; no ground cover; drain tiles

Fertilizer applied: total NPK 919 lb / 594 lb / 0 lb (fertigation) or **115 / 74 / 0 lb net/acre**

type 28-0-0 (250 gal), 5-34-0 (152 gal), and 9-0-0 (50 gal)



Sensor and flow meter information:

Watermark (6, 12 & 24-inch depth “underneath canopy” and 12-24-inch depth “canopy drip line”) connected to 3 data loggers (Watermark Monitor). Water meter installed at the pump house / Rain gauge connected to a data logger on-site

Irrigation schedule and amounts:

Total irrigation: 23.9 inches (Jan 2010-Dec. 2010)

Total rainfall: 33.7 inches (Jan 2010-Dec 2010)

Total water input: 57.6 inches/acre (Jan 2010-Dec. 2010)

Water use (70% cover): 42 inches

Irrigation method:

Irrigation scheduling was based on soil moisture and an average of 1.0 inch/acre was applied each time by drip (total of 37 applications); water was provided by the district (pipeline) into a reservoir (sand media filtration and pump system)

Observations made during the crop season:

Irrigation was triggered when 6, 12, and 24” profiles reached 118, 70, and 40 cb, respectively (0%, 25%, and 70% AW, respectively). Below the canopy drip lines, the 12” South exposure experienced greater depletions than the North exposure (Irrigation triggered at 63cb vs. 57cb).

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Yield:

23.77 t/acre

Water use summary

IUE: 1,989 lbs/inch of water applied by irrigation

WUE: 825 lbs/inch of water received (irrigation + rainfall)

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Site #:32A - 2010-2011

Site Description:

Acres: 64.0

Soil type: Sandy Clay Loam (from 0 to 40-inch depth)

Crop Variety: Sugar Cane 12-10 (P 11/01/06; H 02/07/08 "1st ratoon")

Irrigation system: furrow (by poly-pipe)

Field characteristics: 60-inch beds; 1,030 foot-long rows; 3 to 4 stocks/ linear foot at planting; drain tiles

Fertilizer applied: total NPK 11,928 lb / 0 lb / 0 lb (side dressing) or **186 / 0 / 0 lb net/acre** type 32-0-0 (52 gal/acre)



Sensor and flow meter information:

Watermark sensors (6, 12, 24, 36-inch depth) connected to data logger (WM monitor). Portable flow meter / Rain gauge connected to a data logger on-site

Irrigation schedule and amounts:

Total irrigation: 40.8 inches/acre (June 2010-Feb 2010)

Total rainfall: 28.7 inches (June 2010-Feb 2011)

Total water input: 69.5 inches/acre (June 2010-Feb 2010)

Crop water requirements: 60 inches

Irrigation method:

Irrigation scheduling was not based on soil moisture; water was running until it reached the end of the furrows; water was provided by the district (pipeline)

Observations made during the crop season:

The 2nd ratoon sugarcane was harvested on May 2010. The sensors were placed in June of 2010. The 3rd ratoon sugarcane was harvested on Feb 14th, 2011. Irrigation was triggered when the soil water sensors placed at a soil depth of 6, 12, 24 and 36 in reached a reading of about 89, 170, 28 and 0 cb, respectively.

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Yield:

28 t/ac

Economic summary:

IUE: 1,372 lbs of cane/inch of water applied by irrigation

WUE: 806 lbs of cane/inch of water received (irrigation + rainfall)

Economic Summary:

The Demonstration Site 32A analysis consists of a 10-year financial outlook (2010-2019) for the 64 acres of fourth year (third ratoon) sugarcane under furrow with poly-pipe irrigation. The price is held constant at \$20/ton. 2010 production costs and overhead charges are producer estimated rates.

Total cash receipts reach \$791/acre in 2010 and decline as the productive capacity of the sugarcane diminishes until the fifth year when the crop is replanted. Cash costs also reflect the sugarcane production cycle, requiring roughly \$508/acre in 2010 (the fourth crop year), and \$977/acre in the first replanting year (2012). Average NCFI generally follows the sugarcane production cycle producing \$212/acre profit in the fourth crop year (2010). It averages approximately \$167/acre per year for the assumed 10-year period. The risk associated with prices and yields suggests that, in a normal production year, NCFI could range as much as -\$344/acre to \$438/acre.

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Site # 36A - 2010-2011

Site Description:

Acres: 122.0

Soil type: Raymondville Clay Loam (from 0 to 24-inch depth)

Crop Variety: St Augustine Floratan turf grass

Irrigation system: 1,300 feet-long L.E.S.A. center pivot (155-foot spans)



Sensor and flow meter information:

Monitoring since August 2009

Two Watermark (6, 12 & 24-inch depth) sensors transmitters (950T1) sending wireless soil moisture data to a receiver (950R1 data logger), powered by a solar panel, and connected to a rain gage. Water meter attached to the sand-media filter, located downstream from the pivot.

Irrigation schedule and amounts:

Total irrigation: 16.1 inches (Jan 2010-Dec 2010) in 23 irrigation events.

Total rainfall: 26.9 inches (Jan 2010-Dec 2010)

Total water input: 43 inches (Jan 2010-Dec 2010)

Crop water requirements: 46 inches

Irrigation method:

Irrigation scheduling was not based on soil moisture. Water was provided by the district (pipeline)

Observations made during the crop season:

Irrigation was triggered when the soil water mark sensors installed at 6, 12, and 24" profiles reached 46, 25, and 10 cb, respectively.

Yield:

83 pallets/acre total

Water use summary:

IUE: 5.2 pallet/inch of water applied by irrigation

WUE: 1.93 pallet/inch of water received (irrigation + rainfall)

Agricultural Water Conservation Demonstration Initiative
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Site # 36B – 2010-2011

Site Description:

Acres: 83

Soil type: Raymondville Clay Loam (from 0 to 24-inch depth)

Crop Variety: St Augustine Floratan turf grass

Irrigation system: 1,280 feet-long side-roll sprinklers (40-foot ramps)

Sensor and flow meter information:

Monitoring since August 2009

Two Watermark (6, 12 & 24-inch depth)

sensors transmitters (950T1) sending wireless soil moisture data to a receiver (950R1 data logger), powered by a solar panel, and connected to a rain gage.

Water meter attached to the sand-media filter, located downstream from the pivot.



Irrigation schedule and amounts: monitoring since August 2009

Total irrigation: 19.1 inches (Jan 2010-Dec 2010)

Total rainfall: 26.9 inches (Jan 2010-Dec 2010)

Total water input: 46 inches/acre (Jan 2010-Dec 2010)

Crop water requirements: 46 inches

Irrigation method:

Irrigation scheduling was not based on soil moisture. Water was provided by the district (pipeline). The farmer mentioned that he preferred the center pivots, because the pivots used less labor and have better turf quality.

Observations made during the crop season:

Irrigation was triggered when 6, 12, and 24” profiles reached 14, 9, and 6 cb, respectively (equivalent to 0% AW for all profiles).

Yield:

79 pallets/acre total

Water use summary:

IUE: 4.1 pallet/inch of water applied by irrigation

WUE: 1.7 pallet/inch of water received (irrigation + rainfall)

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Site # 41A and 41B 2010

The 39 acre field was planted in cotton and divided into three equal sections, utilizing surge irrigation in the center section of the field. The soil type is Harlingen Clay (HA). The field has a slope of .0005' to the West and the same slope to the North. The row length is 1280'.



Sensor Installation:

One row located 50 rows from the North side was selected for installing a Watermark 900M monitor to record data for the furrow irrigation section. One other site 75' north of the field turnout (center) was used to collect data for the surge irrigation section. The sensor sites were located 150' inside of the east turnout. Each sensor site consisted of a soil temperature probe set at a 9" depth, and soil moisture sensors buried at 6", 12", and 24". Portable McCrometer flowmeters were used to measure the amount of water applied at the north turnout and at the center turnout.

Irrigation Schedule:

<u>Date</u>	<u>Water Applied per Acre, Surge</u>	<u>Water applied per acre, Flood</u>
6/3/2010	7.9"	11"

Irrigation Method:

The surge controller was programmed to complete the irrigation cycle in 24 hours with the first two alternations to occur at 5 hour intervals with the final setting running until completion. The cooperater used 18" diameter polypipe.

The row length is 1280'.

Observations:

Selecting three alternations in a 24-hour set insured a timely irrigation event and a minimum number of cycles with the benefit of applying 21% less water. Significant soil moisture differences at the 6" and 12" depths were recorded in the month of May. The furrow irrigated section showed relatively little change in soil moisture at the 24" depth while the surge irrigated section did show some moisture loss by the middle of June.

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Economic Summary: Demonstration Sites 41A & 41B

The Demonstration Sites 41A & 41B consists of a 10-year financial outlook (2010-2019) for 39 acres (26 acres of furrow and 13 acres of surge irrigated) cotton. It is not assumed the cotton acreage is rotated annually with another crop. The initial cotton price is \$.70/lb., including marketing loan deficiency payments. 2010 production costs and overhead charges are producer estimated rates.

The analysis also includes a \$1,800 cost for a surge valve. The surge valve expense is evenly distributed over the 10-year period with the assumption of no financing costs.

Total cash receipts average \$1,272/acre over the 10-year period for both irrigation methods. In addition to market receipts, total receipts include direct and counter-cyclical payments paid to base acres. Due primarily to the \$180 per year cost of the surge valve, cash costs average \$935/acre per year for the surge irrigation and \$920/acre per year for the furrow irrigation. Excluding the surge valve cost per year, irrigation costs in 2010 including water, labor and poly-pipe were \$35.82/acre for both the surge and furrow sites. NCFI averages \$352/acre per year for the surge and \$337/acre for the furrow. The risk associated with prices and yields suggests a minimal chance of negative NCFI. In a normal production year, NCFI could range as much as \$269/acre plus or minus the average expected NCFI for the furrow site and \$308/acre for the surge site.

Site # 44A 2010

Site Description:

The site is a 38 acre field which was planted in seed corn. The irrigation method is furrow irrigation with surge valve technology and the soil type is mainly Harlingen Clay. Field slope is approximately .0005' from the North and .00025' to the East.



Sensor Installation:

One furrow was selected with sensor sites 100' in from the upper end and 100' in from the lower end. Each site included a soil temperature probe and Watermark soil moisture sensors placed at depths of 6", 12", and 24". The soil moisture readings were recorded on a Watermark 900 series datalogger and radioed to a central datalogger.

Irrigation Schedule:

Date	Amount of Water Applied
Not available	

Irrigation Method:

The surge valve is located in the center of the field and the field is divided into two settings on each side of the surge valve. The surge valve was programmed to irrigate one section per side during a 24-hour period. During this 24-hour setting there were six alternations per side based on a variable time scale. The surge controller requires the operator to enter the initial setting time period and then calculates the remainder of the settings. Our initial setting time was 30 minutes. The entire field was irrigated in 48 hours.

Observations:

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The data for this site was lost when the male row shredder destroyed the data loggers.

Economic Summary: Demonstration Site 44A

The Demonstration Site 44A analysis consists of a 10-year financial outlook (2010-2019) for the 37.84 acres of seed corn production under surge irrigation with poly-pipe. It is not assumed the seed corn acreage is rotated annually with another crop. The initial price is \$21/bu., including marketing loan deficiency payments, if applicable. This is a calculated price base on total per acre payment received from the seed company divided by the number of bushels harvested. 2010 production costs and overhead charges are producer estimated rates.

The analysis also includes the purchase and use of a surge valve at a cost of \$2,200. The surge valve expense is evenly distributed (\$220/year) over the 10-year period with the assumption of no financing costs.

Total cash receipts average \$797/acre over the 10-year period and cash costs average \$266/acre, including \$40/acre variable irrigation costs. In addition to market receipts, total receipts include direct and counter-cyclical payments paid to base acres. Net cash farm income (NCFI) increases throughout the 10-year period from \$520/acre in 2010 to \$540/acre in 2019. The risks associated with prices and yields suggest some chances of negative NCFI. In a normal production year, NCFI could range as much as \$185/acre to \$211/acre plus or minus the average expected NCFI for the site.