

# Lower Rio Grande Valley Irrigation Education and Outreach Program

Texas Water Development Board Project Contract No. 1613581996

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October 2020

Funding for this project was provided through an Agricultural Water Conservation Grant from the Texas Water Development Board

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*Comments received from Texas Water Development Board regarding the report are noted below and were addressed in this final report document.*

**Draft Review for Contract #1613581996 Texas AgriLife**

**Overall Comments:**

- Capitalize 'Agricultural Water Conservation Program' and change 'their' to 'the' (page 3)



## Introduction

According to the 2016 Region M Water Plan, an additional supply of 797,344 acre-feet per year will be needed by 2070 to support the municipal, irrigation and other water needs in the Lower Rio Grande Valley (LRGV). Between 2020 and 2070, population in the region is expected to grow 106 percent. With increased municipal demands and less reliable water delivery from the Rio Grande, significant unmet irrigation needs are projected. Agricultural irrigation water demand makes up the largest share of current water demands but is projected to decrease due largely to urbanization. Irrigation district and on-farm water conservation is expected to provide 43 percent of future water needs (347,730 ac-ft/yr).

Increased adoption of water conservation practices within irrigation districts and farms is needed to realize these needed reductions in irrigation water use and meet future water needs outlined in the regional water plan. The 2016 Region M Water Plan states that “educational programs for farmers, irrigation district boards of directors, and irrigation district employees are recommended and should be supported by the TWDB, TCEQ, and the universities in Texas.” This project supports this recommendation by promoting water conservation strategies among growers and irrigation district boards and managers regarding benefits and advantages of water conservation and water use efficiency of various on-farm irrigation and irrigation district management practices when compared to conventional practices.

## Goal and Objectives

The Lower Rio Grande Valley Irrigation Education and Outreach Program’s primary goal was to provide pertinent and timely educational resources on irrigation water conservation to growers and irrigation district personnel. A secondary goal was for real water savings to be realized through the delivery of these education programs and the knowledge gained by their attendees.

Four specific objectives were established to incrementally provide water conservation related resources to the intended audiences and achieve the project’s primary goal. These objectives included: 1) developing and delivering programming focused on grower needs; 2) developing and delivering educational content for irrigation district directors and board members; 3) convening a multi-faceted focus group to discuss water resource concerns as they relate to irrigation in the LRGV; and, 4) to perform general outreach via media and public relations avenues including news, magazines, and online content. A post-program survey was developed and delivered electronically to meeting attendees to evaluate their knowledge gained, perceptions of water conservation, and to quantify water conservation savings resulting from these programs.

## Project Implementation

The Lower Rio Grande Valley Irrigation Education and Outreach Program was initiated in Summer 2016 and began with meetings of the project team and key individuals in the Lower Rio Grande Valley. These meetings were used to discuss key water conservation issues, educational needs, program delivery timing, potential speakers, appropriate venues, and coordination

challenges with other programs. Discussions revolved around groupings of educational topics: grower education programs (generic irrigation training, commodity specific irrigation trainings focusing on citrus, vegetables and row-crops) and irrigation district trainings.

## Commodity Specific Programs

A series of commodity specific programs were developed to highlight specific techniques, technologies and challenges faced in irrigating the variety of crops present in the LRGV. Topical experts were engaged to discuss these subjects and to provide input on what emerging technologies can be expected in the future. Grower panel discussions were also a part of each program and proved to be most valuable for attendees.

### *Citrus*

A program focused on providing relevant irrigation information to citrus growers was developed and delivered May 9, 2017 in Mission. Lone Star Citrus hosted the program at their facility and sponsored refreshments for the event. This free producer program focused on the practical aspects of implementing water conserving irrigation technologies in citrus production and provided an opportunity to observe and discuss these practices in a commercial citrus grove. Producers currently using these techniques provided their perspectives on adopted practices, and researchers conveyed water conservation, economic and other findings on each approach discussed. Citrus pest management techniques and their water conservation impacts were also discussed and allowed for one hour of continuing education units (CEUs) for Texas Department of Agriculture (TDA) pesticide applicators license holders to be provided. Technical and financial assistance discussions from the Natural Resources Conservation Service (NRCS), Texas State Soil and Water Conservation Board (TSSWCB) and the Texas Water Development Board (TWDB) were also provided. During lunch, the video developed for the Texas Ag Water Efficiency project's Texas Environmental Excellence Award was shown and highlighted the findings of that project.

In total, 53 people attended. The audience consisted of a variety of growers/irrigators, industry representatives, scientists, and agency personnel. Great discussion occurred and information shared by growers was well received and considered the most valuable information by other growers present. Program materials including the announcement flyer, agenda and news release are included in Appendix B.



**Figure 1. Citrus program field tour at Lone Star Citrus grove**

A second education program focused on citrus growers was planned for March 25, 2020 with a field tour and scientific presentations delivered at the Texas Citrus Mutual offices in Mission. Due to the COVID-19 pandemic and subsequent shut down of travel and public meetings, this event was delayed indefinitely. The decision was made to convert the event to an online format and the program was delivered on September 17, 2020. This program content remained unchanged and focused on improving sustainability of water use in citrus groves by incorporating raised beds, plastic tarps, and drip irrigation into new orchards were discussed. The implications of these practices on soils, roots and productivity plus the effects on pest management were all discussed. Irrigation management in mature citrus groves and potential for water reuse was also highlighted along with funding and technical assistance opportunities from NRCS and TWDB. The planned field tour was the only programmatic change made and it was converted to a prerecorded video highlighting newer approaches to citrus irrigation. This video, entitled “How Raised-beds Improve Citrus Irrigation Efficiency” is available on YouTube at <https://www.youtube.com/watch?v=xknybLF1JkE>. An article highlighting the presence of this video was also published in the November/December 2020 issue of *The Ag Mag* (Appendix D).

Approximately 43 people attended this virtual program and consisted of growers/irrigators, industry representatives, scientists, and agency personnel. Program materials including the announcement flyer, agenda and news release are included in Appendix B.

### *Vegetables*

A program focused on providing relevant irrigation information to vegetable growers was developed and delivered March 6, 2018 in Mission at the Texas International Produce Association office. This program focused on practical implementation of water conservation in vegetable production by discussing technology advancements, water conservation impacts, and economic returns for discussed technology. A grower panel discussion was also convened and allowed growers to discuss how implementation of a variety of practices have impacted their operations. This afforded other growers the opportunity to ask questions about practical application of the practices. Pest management implications of practice implementation were discussed and allowed 1 hour of TDA CEUs to be provided. Agency representative described technical and financial assistance opportunities and Director Jackson from TWDB highlighted efforts of the agency and the Agricultural Water Conservation Program. A total of 45 people attended this program and consisted of growers/irrigators, industry representatives, scientists, and agency personnel. Program materials including the announcement flyer, agenda and news release are included in Appendix B.

### *Row Crops*

An irrigation education program was developed to specifically discuss irrigation conservation techniques in row crop production. This program was delivered October 16, 2018 in Weslaco and focused on the yield implications of cotton and other row crops with less water to improve producer’s economic returns. Furrow irrigation is the most common irrigation technique used in

row crops across the LRGV and this program focused on maximizing its efficiency to use less water while maintaining or improving yields. Experiences in improving furrow irrigation efficiency in the Mississippi Delta region and how those efforts translate to the LRGV were also discussed. A moderated panel discussion consisting of local producers highlighted their irrigation experiences and answer questions regarding practical aspects of enhanced furrow irrigation management. Improving crop yields and economics with irrigation management was discussed and technical and financial assistance opportunities were also highlighted.

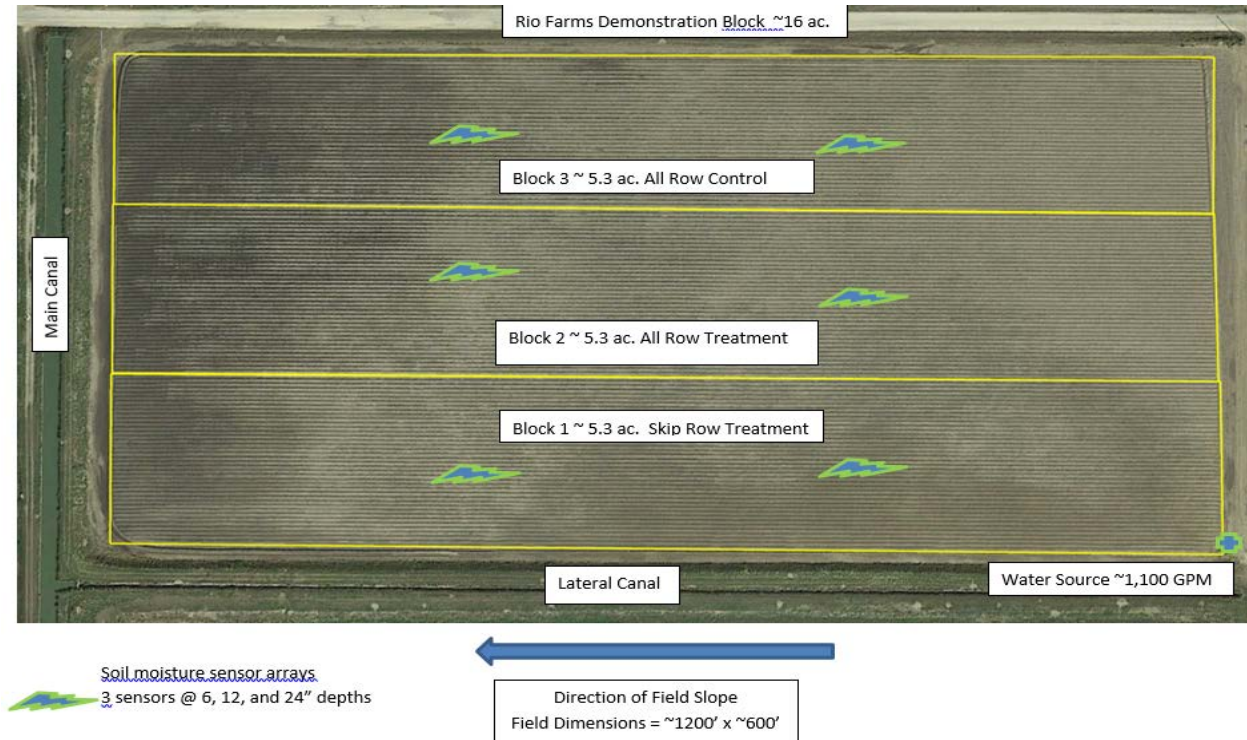
Discussion during the meeting highlighted many of the challenges that growers in the LRGV face relative to other irrigated areas. The focus on furrow irrigation in the Mississippi Delta during the program highlighted many of these differences. Groundwater is the primary irrigation source in Mississippi. Wells can be started at any time desired and flow rates from those wells vary little over time. In the LRGV, water delivery timing to the field relative to when it is requested from the irrigation district and the uncertainty around head pressure/flow rate into the field during the course of an irrigation event are the most common and daunting challenges. Without certainty in receipt of water and flow rates, irrigators find it quite difficult to precisely irrigate their fields.

Approximately 40 people attended this program and consisted of growers/irrigators, industry representatives, scientists, and agency personnel. Program materials including the announcement flyer, agenda and news release are included in Appendix B.

#### *Efficient Row Crop Irrigation Technology and Management Demonstration*

The row crop irrigation education program spurred discussion about the need for technology and management demonstrations in the LRGV. Specific technologies and management deemed viable for demonstration included water metering using web connected devices, scheduling irrigation based on soil moisture sensor data, using computerized hole size selection for polytubing, and using alternate row irrigation. Equipment and supply resources were provided by Delta Plastics Inc., Delta Lake Irrigation District, Texas A&M University Kingsville Citrus Center, and the Texas Water Resources Institute. Rio Farms Inc contributed land space for the demonstration and labor for all farming and irrigation operations.

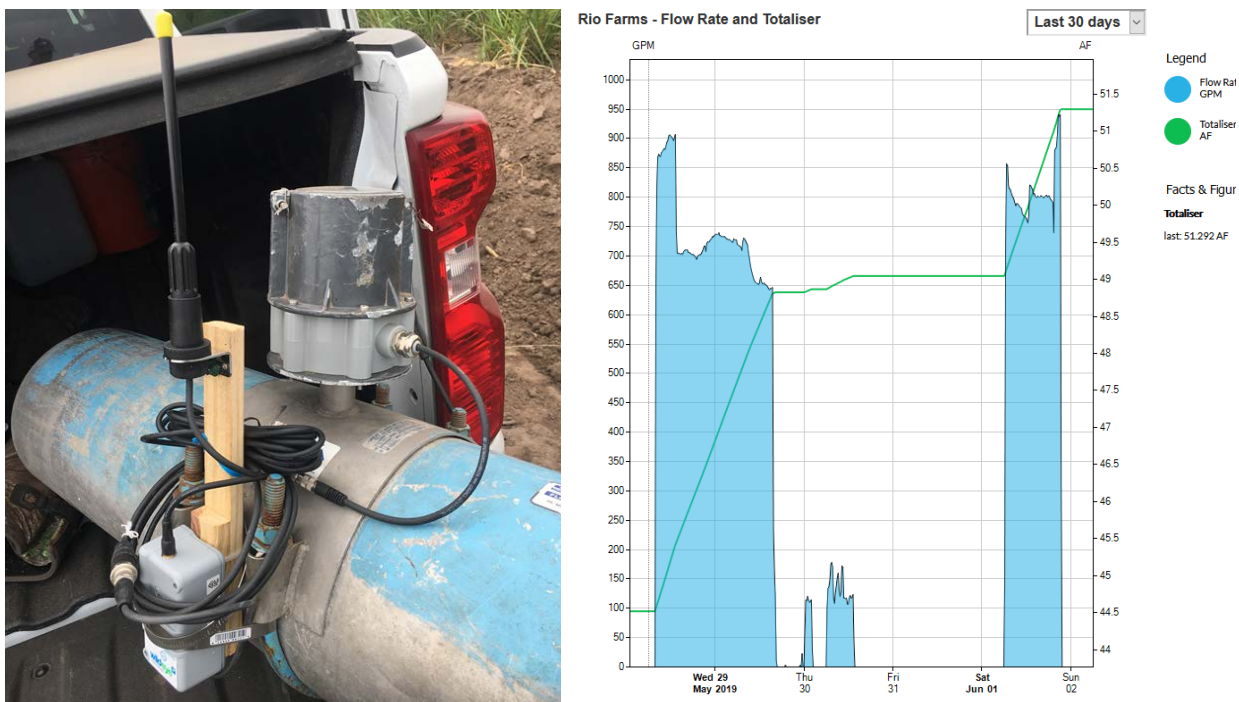
The demonstration was conducted in the spring 2019 growing season on a 16 acre block. Cotton was selected as the crop. The same variety was planted and the same fertilization strategy was used for the entire block. A pre-plant irrigation was applied to completely saturate the soil profile uniformly across the entire block. Subsequent irrigations were planned for three separate blocks within the field: 1) control – irrigate every furrow based on grower/irrigator experience; 2) treatment 1 – irrigate every furrow with timing based on soil moisture thresholds; 3) treatment 2 – irrigate every other furrow (skip row) with timing base on soil moisture thresholds (Fig 2.)



**Figure 2. Cotton irrigation demonstration field block layout**

The goal of this on-farm trial is to provide commercial scale data that demonstrates the potential for irrigation water savings without sacrificing crop yields or quality. To accomplish this, irrigation water was measured using a data logging flow meter. A McCrometer propeller type meter donated by Delta Lake Irrigation District was retrofitted with a WildEye flow meter monitoring unit (Fig 3a). This unit records and reports irrigation start and stop times, flow rates, and total irrigation water usage to an online platform that provides notifications back to the irrigator (Fig 3b). This technology confirmed the challenges of many growers by illustrating changes in flow rate during irrigation events. The irrigation occurring on May 28/29 (left side of Fig 3b.) illustrates the substantial drop in flow volume (from ~900 gpm down to ~700 gpm) when an irrigation event was started in an adjacent field. Propeller type meters have also proven problematic in surface water irrigation due to potential for clogging from debris in irrigation water. During our demonstration, the meter was plugged several times and resulted in erroneous meter readings and reduced flow rate into the field (Fig 3b: flow output between May 30 and 31).





**Figure 3. a) McCrometer flow meter retrofitted with WildEye monitoring system; b) WildEye data output**

Soil moisture sensors were used to monitor subsurface moisture conditions within each treatment block in the field. Sensor arrays were installed in two locations in the field (Fig 2) and sensors were placed at 6, 12, and 24 inch depths. Watermark soil moisture sensors were utilized and connected to a Watermark data logger (Fig 4a). Data was retrieved manually and plotted weekly to monitor soil moisture conditions (Fig 4b). Plotted data visually represented moisture conditions at each soil depth. This information combined with grower knowledge was used to make informed decisions regarding irrigation timing during the growing season. However, only one irrigation event was completed during the growing season. On June 25<sup>th</sup>, a couple days prior to the start of a second planned irrigation, the field received approximately 13 inches of rainfall. This effectively saturated the entire field to depths greater than 24 inches. Due to subsequent rains during the growing season, an additional irrigation was not needed prior to harvest.

Results from the demonstration were not what we hoped they would be due primarily to the June 25<sup>th</sup> rain event that essentially normalized moisture conditions across all treatment and control blocks. Quality tests revealed no significant differences in quality or resulting payback between treatments which ranged from \$0.5255 to \$0.5275/lb. The control block graded highest and the skip row block graded lowest. Lint yields were also similar between blocks with no significant differences identified. Additional demonstration is needed to further evaluate these approaches and their potential for minimizing water use without affecting productivity.

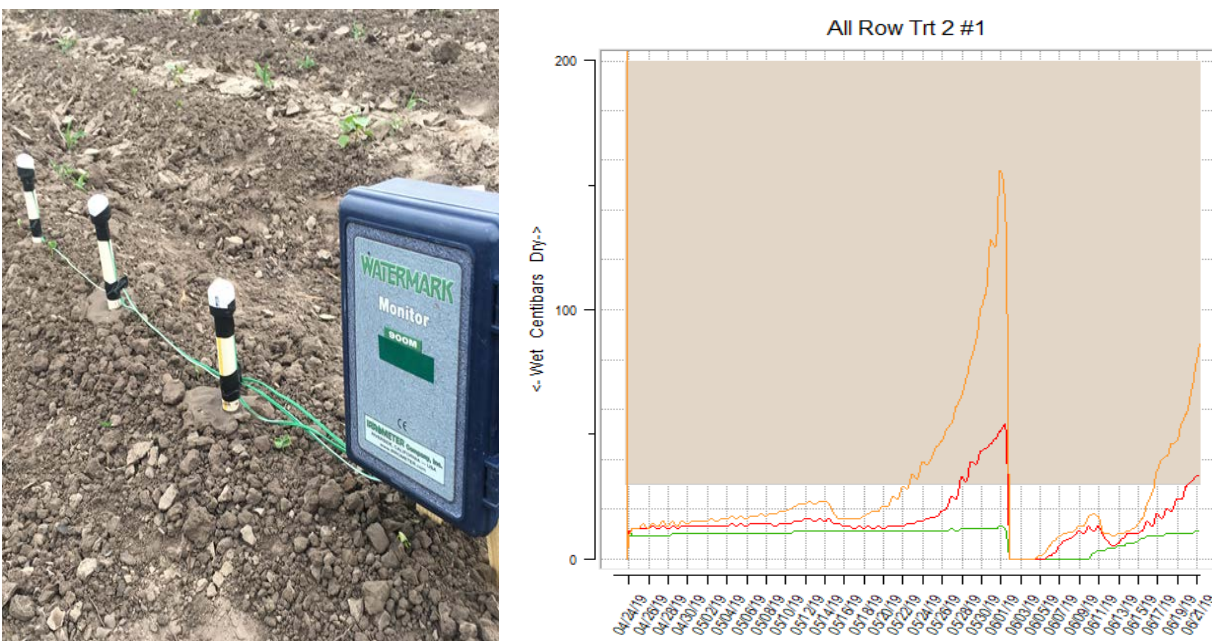


Figure 4. a) Watermark sensor array and data logger; b) soil moisture data outputs

## Irrigation Training Workshops

A total of three irrigation training workshops were developed and delivered exclusively through this project. Programs were held in Eagle Pass, San Benito and Edinburg on September 13, 2017, September 25, 2019 and September 26, 2019 respectively. The program in Eagle Pass was tailored to meet the needs of the local irrigation community. Content focused on irrigation technologies and water conserving best management practices, irrigation scheduling tools, irrigation economics, irrigation water quality considerations, irrigation needs for pecan production and assistance opportunities available from federal and state agencies. A total of 24 people attended and consisted of growers/irrigators, industry representatives, scientists, and agency personnel. Program materials including the announcement flyer, agenda and news release are included in Appendix B.

Identical “Irrigation Management and Technology Workshops” were hosted on subsequent days in San Benito and Edinburg. This program highlighted current irrigation management techniques and technologies available to growers that have the potential to add efficiency to their operations and conserve water resources. Discussion items included irrigation scheduling, irrigation management techniques, new technologies available to growers, salinity management, economics and value of irrigation water, and technical and financial assistance opportunities and resources available to producers. Options for chemigation and fertigation were also discussed and provided 1 hour of CEU credit for TDA pesticide applicator license holders. Attendance at these programs totaled 75 people and included growers/irrigators, industry representatives, scientists, and agency personnel. Program materials including the announcement flyer, agenda and news release are included in Appendix B.

Other irrigation programs held in the LRGV hosted by AgriLife Extension were also supported and allowed us to expand the reach of this project. The Irrigation Training Program for the LRGV was held September 12, 2017 in Weslaco and focused on practical aspects of implementing water-conserving irrigation technologies as well as presentations on research findings about water conservation, economic issues and other issues. A total of 36 people participated in this program. The LRGV Irrigation Expo was held October 26, 2017 in Mercedes. This program was broad in scope and included discussions on long-term water supply strategies in the Rio Grande, financial and technical assistance programs, climate and rainfall outlooks, irrigation district approaches to reduce water losses, irrigated agriculture and the Food Safety Modernization Act, Rio Grande water quality, the use of unmanned aerial vehicles for on-farm management and leak detection, advances in irrigation technologies, and a new products panel. Approximately 80 attendees participated in this program. Program materials including the agenda are also included in Appendix B.

## **Irrigation District Training**

Discussions with the project team and key members of the irrigation district community in the LRGV highlighted two diverging needs for district managers and board members. One need is the continued discussion of technologies and practices to improve operational efficiencies within the irrigation district conveyance systems and the other is general knowledge regarding legal and operational considerations for districts and why these exist. To meet these needs, two separate programs were developed and delivered.

### *LRGV Irrigation Tour*

A comprehensive tour of irrigation district facilities and topical discussions were arranged to provide a broad perspective on irrigation in the valley. The tour began at the Old Hidalgo Pumphouse Museum in Hidalgo. The facility was toured and the history of irrigation in the LRGV was discussed. Discussion on the background of irrigation and the role of irrigation districts and district managers and board members continued at the Texas A&M AgriLife Research and Extension Center in Weslaco. Conversation also include the challenges and opportunities of irrigation district operations and examples of unique partnerships between irrigation districts and other entities were discussed. The tour then moved to the Center for Ag Water Conservation at the Harlingen Irrigation District, Cameron County #1 (HIDCC #1) pumping facility near San Benito. A tour of the facility and its testing, calibration, and demonstration capabilities were highlighted. Components discussed were the supervisory control and data acquisition (SCADA) system used to monitor operations across the district, automated canal gates, water level monitoring systems, and the meter calibration array. The tour's last stop was along one of the canals in the HIDCC #1 service area. At this location, automated canal gates, SCADA, and telemetry were all on display at this location. Practical considerations such as operation and maintenance, security, and service were discussed in the field.



A total of 27 attendees participated in this program and represented growers/irrigators, irrigation district managers and board members, scientists, and agency personnel. The program agenda is included in Appendix B.

#### *LRGV Irrigation Management Modernization Challenges and Opportunities Workshop*

This program was developed to address management and modernization challenges and opportunities within irrigation districts and on-farm. Rio Farms Inc. graciously hosted the meeting at their facility and lunch was provided by Texas Regional Bank. Content focused on highlighting the advancements in irrigation system technology that have been made in the LRGV and what else can be done to further implement technological solutions for system optimization. Case studies from other irrigation districts and district networks from El Paso, TX; California; and Australia were highlighted. Growers in the LRGV have expressed concern over increasing salinity concentrations in irrigation water. To address these concerns, irrigation management techniques to mitigate salinity toxicity issues was presented as well. A brief overview and field tour of a cotton irrigation demonstration conducted in partnership with Rio Farms Inc., the Texas A&M University Kingsville Citrus Center, Delta Plastics Inc., and the Texas Water Resources Institute also occurred. The meeting concluded after lunch with legislative updates relative to irrigation in the LRGV provided and financial assistance opportunities for irrigation districts discussed. TWDB Director Brooke Paup further discussed the role that TWDB plays in water infrastructure and conservation.

Exposure to content delivered at this program was maximized by hosting this meeting jointly with the Irrigation District Managers Association's monthly meeting. Approximately 65 people attended the program and included growers/irrigators, irrigation district managers and board members, industry representatives, scientists, and agency personnel. Program materials including the announcement flyer, agenda and news release are included in Appendix B.

## **Focus Groups**

The agriculture community in the LRGV consists of an evolving and diverse demographic of growers. Age is one of the most prominent differences within this group and is driven by the transfer of farming operation leadership being passed down to sons and daughters. With this change comes a shift in knowledge, opinions, perceptions, information transfer preferences regarding agronomic information.

A goal of this project was to better understand these items and to discern attitudes and behaviors related to water conservation and irrigation efficiency practices. To accomplish this, an online survey was developed and widely advertised and distributed across the LRGV. In total, only 13 people completed the survey with 10 being growers and 3 being irrigation district personnel. Grower concerns identified and feedback from the survey included:

- Demand for water by municipalities, businesses and citizens will increase, while

water available for farming will decrease

- Mexico's inability or refusal to release water to the Rio Grande according to the 1944 Treaty
- Urban development will squeeze out farmers
- 9 out of 10 respondents plan to change irrigation practices for water efficiency in the next 5-7 years

Irrigation district respondents indicated that water efficiency programs most likely to be implemented by districts include:

- Lining canals
- Installing underground pipeline
- Staff and grower education
- Seeking grants and local funds to implement efficiency projects rather than loans or bonds

The project team also engaged two separate groups in focused discussions. One group consisted of growers and the other of irrigation district managers and board member (some are also growers). The goal of this effort was to discover and synthesize perceptions, observations and practices regarding the future of agriculture in the LRGV in terms of water availability and reliability. Irrigation district managers and growers representing both small and large acreage operations were identified as primary groups from which to gain insight relevant to the challenges, needs and concerns regarding agricultural water usage in the LRGV. Specific goals of these discussions were to:

- Understand opinions about the future of agriculture in RGV in relation to water availability and reliability (Rio Grande, Mexico, district services and efficiency, competition from municipal/industrial growth)
- Increase understanding of irrigation efficiency practices and barriers to implementation including cost, management and water rights.
- Define grower's concerns and priorities for implementation of water efficient practices along with role of the Irrigation District.
- Determine best communication vehicles and messages to connect with Valley growers on irrigation efficiency.
- Refine and enhance outreach and education to growers regarding water conservation and irrigation efficiency practices.

A complete summary of focus group results is documented in a report for that specific task. In short, growers are willing and able to adapt and invest in water conservation, but feel that more water conservation can be realized by modernizing irrigation district conveyance systems. Funding for modernized infrastructure improvement is an important solution, but are concerned that perceptions and lack of education will hold back efforts to get the necessary funding from state or federal sources. Growers remain frustrated over uncertainty posed by 1944 U.S. and Mexico Treaty enforcement issues. Drip irrigation is perceived positively, but equipment costs

and inability to access/store water needed for the duration of an irrigation event are prohibitive. Water metering and pricing by volume is perceived as a beneficial conservation strategy going forward. Growers want to see a strong communications and outreach strategy deployed to help educate and improve perceptions among the general population and elected officials so that water policy and funding will advance. Irrigation district managers largely agreed with growers on needs across the LRGV. One other concern they voiced was that saving water depends largely on expensive infrastructure upgrades; however, rapid urbanization in the area is negatively affecting agriculture and making the cost for infrastructure upgrades less palatable.

Information regarding information transfer channels and resources was also compiled to illustrate how and where the LRGV agriculture community gets its information. A grower survey instrument was used to identify effective channels of information transfer and improve information delivery through this program. Results are summarized by the tally of respondents indicating their preferences for specific types of information transfer (Table 1).

**Table 1. Summarized grower feedback regarding information transfer and messaging preferences for LRGV agriculture**

<b>Information Type</b>	<b>Source</b>
Cost Share Program Info	NRCS – 8 TSSWCB - 1
General Agriculture Info	Grower to Grower – 6 Manufacturer – 5 AgriLife Research/Extension – 3 Crop Advisors – 2
Media Based Agriculture Info	Industry Publications – 5      Online Resources – 5 The Ag Mag – 3                      Newspaper – 2 Local TV – 1                            Local Radio – 1
Info Obtained from Social Media	Facebook – 6                      YouTube – 5 Instagram – 2                      Do Not Use Social Media – 2
Top 4 Messaging Content Preferences for LRGV Agriculture (in order from most preferred to least)	-Agriculture is Working to Save Water for Future Generations -Ag is a Mainstay of the Texas economy -Texas agriculture is technology savvy -Texas agriculture is working smarter to save water

## Outreach

Reaching a wider audience with educational materials was a primary goal for this project. Advertising upcoming educational events, discussing relevant water conservation and quality topics, and highlighting existing video content were specific objectives of the project.

### *Media and Social Media*

Upcoming education and outreach programs were widely advertised with traditional media avenues including newspaper and local magazines such as *The AgMag* (Appendix B). Printed flyers or agendas were posted in prominent locations (irrigation district offices, seed/fertilizer

reps, etc.) and flyers were emailed directly to growers using AgriLife Extension mailing lists. Social media posts advertising events were also posted and promoted on TWRI Facebook, Twitter, and Instagram accounts. In total, seven news releases, seven flyers/agendas, two articles in *The AgMag* were developed and distributed to advertise the commodity specific, generic irrigation training, and one of the irrigation district focused programs. Follow up articles were developed and published in *The AgMag* for the row crop irrigation training and the LRGV irrigation tour held for irrigation district personnel to highlight content and discussion from those programs (Appendix B).

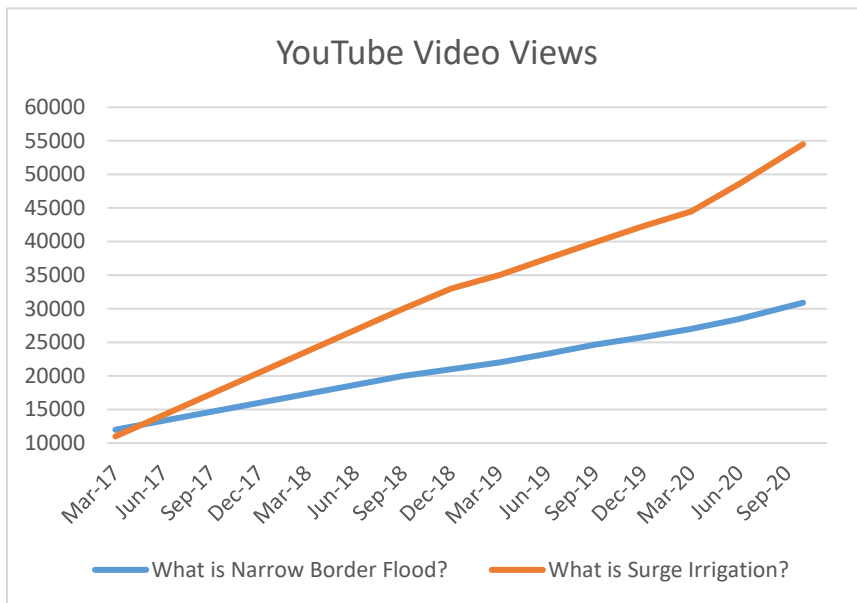
Social media proved to be fairly effective in reaching audiences across the LRGV. Facebook, Twitter, and Instagram were all utilized for program promotion with Facebook and Twitter proving most effective (Table 2). This corresponds with feedback from Focus Group participants that demonstrated Facebook as the most used social media platform.

**Table 2. Social media outreach use and impacts**

Social Media Platform	Posts/Tweets	Reach	Engagements
Facebook	15	4,578	396
Twitter	27	17,104	206
Instagram	3	35	n/a

*Video Content*

Delivering and preserving information relative to water conservation and efforts occurring in the LRGV to manage and conserve agricultural water was accomplished via the renaming and



development of video content. Seven videos created under the Texas Project for Ag Water Efficiency were aggregated into a new YouTube channel named “Agriculture Water Efficiency.” The videos that discussed Narrow Border Flood and Surge Irrigation were renamed to “What is Narrow Border Flood?” and “What is Surge Irrigation?” to improve searchability. This change in naming resulted

**Figure 5. YouTube irrigation video views following renaming**

in stark increases in views. The “What is Surge Irrigation?” video went from about 11,000 views in early 2017 to over 54,000 views three years later. Views for “What is Narrow Border Flood?” have more than doubled to over 30,000 views in that same timeframe (Fig 5).

A similarly styled video was created by the Texas A&M University-Kingsville Citrus Center titled “How Raised-beds Improve Citrus Irrigation Efficiency” in early September 2020. The video was originally used as a virtual field day for an online education and outreach program. It has been posted to YouTube and will provide viewers with information regarding some of the benefits and challenges of implementing raised beds in new citrus plantings. An article highlighting this video was published in TWRI’s *Conservation Matters* online newsletter and the November/December 2020 issue of *The Ag Mag*. Copies of both are included in Appendix D.

## **Water Conservation Outcomes**

Quantifying water conservation realized as a result of education program participation was attempted by using an online survey instrument emailed directly to program participants. The mailing list was developed from online program registration forms and written sign in sheets from each event. In total, the mailing list consisted of 136 individuals. This value is less than total program attendance due to people attending more than one event, attendees not signing in, or non-legible email addresses provided. Recipients were prompted four times asking to complete the survey. A total of 25 individual completed the survey for a completion rate of 18.4%. Of these respondents, 6 identified as growers, 7 were irrigation district personnel, and 12 were neither.

### *On Farm Conservation*

Growers completing the survey managed 615 acres and used drip (382 ac.), furrow (165 ac.) and micro spray (68 ac.) irrigation methods. Citrus was the dominant crop irrigated (466 ac.) followed by row crops (147 ac.) and vegetables (2 ac.). Several changes in their irrigation approaches were reported to have been made as a result of participation in educational events. Temperature and soil moisture sensors were installed in 300 ac. of citrus to inform irrigation scheduling rather than simply using the time since last irrigation was completed. Irrigation scheduling tool use was also added in 80 ac. of row crop (40 ac. furrow, 40 ac. drip). The remaining growers indicate that they plan to implement practices in the future including automating an existing drip system, adding soil moisture sensors, and converting 80 ac. of furrow to drip. Discussions with growers and managers with several companies indicate that several new citrus groves totaling approximately 650 ac. have recently been planted, or will be planted in the next year or so that incorporate raised beds with plastic tarp and drip irrigation. Although these are new plantings, irrigation conservation practices implemented will save water in the future compared to what would be used in traditional pan flood irrigation.

Reporting actual water savings realized from these improvements is not possible as water usage data is not available. To estimate water savings, assumed water usage, applicable acreage, and practice efficiency improvements are combined to calculate an expected volume saved (Table 3). In these calculations, an assumed annual irrigation volume of 24” of irrigation is applied per acre; or 2 acre feet per year. Actual irrigation volumes will vary by crops, by year due to

different moisture and temperature conditions, and by irrigation method but are unknown in these situations. Actual efficiencies gained can also vary greatly and depend heavily on system management, operation and maintenance. For purposes of calculating water savings, the specific assumptions used are averages of published efficiency values and are stated below (Table 3).

**Table 3. Estimated potential water savings resulting from grower programs delivered**

<b>Acres and Crop Irrigated</b>	<b>Conservation Practice</b>	<b>Assumed Efficiency Improvement</b>	<b>Estimated Water Saved</b>	<b>Practice Implemented or Planned</b>
300 ac. citrus	Soil moisture and temperature sensors to aid irrigation scheduling	34% water savings	204 acre feet annually	Implemented
80 ac. row crops	Irrigation scheduling tool	25% water savings	40 acre feet annually	Implemented
80 ac. row crops	Planned conversion from furrow to drip irrigation	78% water savings	124.8 acre feet annually	Planned
2 ac. vegetables	Automate drip system	15% water savings	0.6 acre feet annually	Planned
450 ac. citrus	Raised beds with plastic tarp and drip	30% water savings over pan flood	270 acre feet annually	Planned
200 ac. citrus	Raised beds with plastic tarp and drip	30% water savings over pan flood	120 acre feet annually	Planned
<b>Total Potential Water Savings Estimated</b>			<b>759.4 acre feet annually</b>	

*Irrigation District Conservation*

Irrigation district personnel completing the post program evaluations managed and operated 181 miles of earthen canals, 199 miles of lined canals and 1,002 miles of pipeline. Only one respondent indicated that they planned to make changes within their district following delivery of these programs. Planned implementation includes converting 5,000 ft of concrete lined canal to PVC pipeline annually, adding automation canal gates to 2 or 3 sites annually, and adding SCADA to 10 additional sites.

Actual water savings from each of these planned activities is difficult to quantify. Converting concrete lined canals to PVC pipeline will most certainly result in water savings, but the quantity depends heavily on the size and condition of canals that are being converted. Without actual

water loss measurements in the existing canal sections that will be replaced, reasonable estimates cannot be made. Automated canal gates and SCADA systems are more likely to improve irrigation water delivery efficiency rather than directly yield water savings. Potential water savings from these improvements stem from decreased potential for overfilling lateral canals and by delivering more consistent flows to the grower's field. Labor savings for the irrigation district are one of the biggest benefits of added automation and SCADA monitoring.

## **Conclusions**

Development and delivery of relevant educational material through this project focused on promoting adoption of water conserving practices, techniques, and technologies in irrigated agriculture in the LRGV. The goal of this program was to promote water conservation practice adoption and produce actual water savings through practices implemented as result of information transfer through educational events. This goal was achieved with over 750 acre feet of water savings estimated to occur annually.

Growers and irrigation districts are aware of water conservation management practices and technologies but indicated that useful information was provided via educational resources through the project. Factors aside from water conservation potential primarily drive decisions regarding practice implementation. Costs of doing business primarily drive grower decision making. Initial capital investment, impact on labor costs, potential yield gains/losses, potential crop quality change, and potential impacts on nutrient and pesticide/herbicide application and efficiency. Irrigation water costs are a relatively small portion of a grower's expenses and investment in new tools or technologies to save water alone often does not make economic sense. However, if these tools provide potential economic benefits in the form of labor savings, increased yield and/or quality potential, or ability to manage the crop then the value of a water conservation and management practice becomes much more valuable than from a water savings perspective alone. Within irrigation districts, improving existing infrastructure to minimize water losses and improve delivery efficiency is well understood but does not necessarily translate to active implementation. Capital investment required to perform these upgrades are substantial and are not readily available to many irrigation districts in the LRGV.

Programmatic content delivered through planned education and outreach programs did not focus on water conservation benefits alone. Considerable discussion regarding ancillary value provided to growers and irrigation districts through implementing practices included expected labor savings, production yield improvements, and more. Discussion regarding available technical and financial assistance opportunities for growers and irrigation districts was included in each education program. Collectively, the project and the events delivered to provide technical discussion and field demonstration of the practices discussed were well received and were considered beneficial to program attendees.

Focus group discussions identified over-arching concerns of growers and irrigation district personnel alike that have bearing on water conservation investment. Establishing a clearer interpretation of the 1944 U.S. and Mexico Treaty with actionable enforcement mechanisms is a top concern and priority. Current uncertainty in water supplies delivered from Mexico and the risk of running out of water during dry periods that the current situation presents is a disincentive

to invest in practices that will take many years to pay off. Both parties agreed that obtaining significant funding to upgrade irrigation district water delivery infrastructure would result in water savings during conveyance and allow more efficient water application on grower's fields. Collectively, growers and irrigation district manager groups felt that improved messaging regarding the value that irrigation plays in the valley and highlights the work that is being done to conserve and effectively use irrigation water will go a long way toward changing perceptions of water, its costs, its value, and the need to invest in water conservation now and in the future.

Growers and irrigation districts recognize the importance of water conservation and already do what is economically feasible. Water is their livelihood and they fully realize the need to protect and conserve the resource. Many growers have installed drip irrigation or integrated polytube into furrow irrigated fields. These practices have saved considerable amounts of water on-farm. Irrigation districts are also making improvements by lining canals, converting canals to pipelines, and installing automation as they can afford to. The desire to continue making improvements to their respective operations is there, but the necessary capital often isn't.



## Appendix A: Scope of Work

### TASK 1. Administration

- 1.1. The Texas Water Resources Institute (TWRI) will coordinate and administer the project.** An experienced team has been organized to successfully deliver this project. This team consists of Texas A&M AgriLife Extension Service, Texas A&M AgriLife Research, Texas A&M University – Kingsville Citrus Center (TAMUK), Harlingen Irrigation District (HID), and a variety of others including previous participants with the Texas AWE program and commodity groups leaders in the Lower Rio Grande Valley (LRGV).

TWRI and other project team members will ensure billing and local match attributed to this project is not duplicative of other TWDB grant projects, including but not limited to 1513581853 with Texas A&M University-Kingsville and 1613581997 with Texas A&M AgriLife Research for a similar project in the Lower Rio Grande Valley.

- 1.2. Quarterly conference calls.** To ensure timely completion of proposed work, quarterly conference calls with the project team will be held to discuss and coordinate project activities, project schedule, communication needs, deliverables, and other requirements.
- 1.3. Quarterly reports.** TWRI will work with the project team to develop and submit quarterly activity reports to TWDB.
- 1.4. Develop and Submit Draft and Final Report.** TWRI will work with the project team to develop a Final Report that summarizes project activities and conclusions, describes the extent to which project goals were achieved, documents water savings resulting from the project, and matches the formatting requirements as described in Exhibit D.

### TASK 2. Grower Education Programs

In partnership with select irrigation districts, the project team will conduct at least three grower education programs per year in the Lower Rio Grande Valley. At each educational event, available cost share opportunities and relevant requirements will be discussed.

The project team will coordinate education and outreach efforts on this project with activities funded through Texas A&M University – Kingsville on TWDB Ag Grant contract #1513581853 and Texas A&M AgriLife Research on TWDB Ag Grant contract #1613581997 to ensure the projects complement one other without competing for the same audience.

- 2.1. Delivery of irrigation training workshops.** The project team will coordinate at least three Irrigation Training Programs with one each being held in the upper

Valley (e.g. Maverick Irrigation District), middle Valley (e.g. Rio Farms), and lower Valley (e.g. Harlingen Irrigation District). These programs will be delivered in cooperation with local irrigation districts and County Extension Agents and will consist of specialists that will present on various topics including, but not limited to:

- Water conservation best management practices
- Economics of conservation practice adoption
- Irrigation scheduling
- Irrigation technologies and conservation practices
- Water quality issues
- Crop-specific guidelines

New irrigation training materials will be developed, printed, and provided to participants. The project team will coordinate the Irrigation Training Programs with assistance from TAMUK, Extension Irrigation Specialists and Economist, and others such as Texas State Soil and Water Conservation Board (TSSWCB) staff. Workshops will emphasize on-farm and in-district water conservation practices included in the Region M water plan, particularly those that the Texas AWE project researched and tested, as well as other practices. Workshops will address the role of irrigation district infrastructure and operating practices as a critical component of on-farm water conservation. Harlingen Irrigation District personnel will present on Texas AWE research while TAMUK and Extension Irrigation Specialists will present on other practices for the Valley. Economic considerations and cost-share programs available will be presented as well.

**2.2. Delivery of commodity specific trainings.** In addition to the irrigation training programs, at least three commodity specific trainings will be held to address irrigation water conservation for citrus, row crops, and vegetable producers. These will consist of a combination of presentations and field tours. Conservation practices and cost-share programs available to assist with their implementation will be presented. Continuing education units (CEUs) will be provided at each event to encourage attendance.

**Citrus water conservation training/field day.** A citrus water conservation training/field day will be held to observe demonstration of narrow border flood irrigation and other new irrigation conservation technology and practices adopted (e.g. soil moisture monitoring, soil health, new planting raised bed concept, and potential for a cover crop between the tree lines). Much of the data presented will be from demonstration plots installed at Texas A&M University – Kingsville Citrus Center in Weslaco and Pawlik Farms in Mission/McAllen, TX through a previous TWDB grant. Field tours will take place at these demonstration plots. Two raised bed sites were installed at both of these sites, as well as Narrow-Border Flood (NBF) irrigated citrus at Pawlik Farms allowing comparison between irrigation methods. Field tours will compare raised beds with channel furrows adjacent to each row, raised beds covered with a mesh groundcover material and channel furrows adjacent to each bed, traditional flood irrigation on flat rows, microjet spray irrigation systems, and drip irrigation with single and/or dual lines installed. The project team will discuss soil moisture data, water use efficiency, soil temperature, Phytophthora incidence, and other findings. Growers will provide their experience with the practices adopted. The project team will provide training on:

- Narrow Border Flood
  - Most growers are familiar with this concept on newly planted orchards so the demonstration will emphasize the use of this practice on existing orchards.
- Water savings using dual-line drip or microspray systems. Land does not have to be leveled to use a microsprayer system.
  - An advantage to growers willing to invest in a dual-line drip system: during extreme drought and water restriction times: they can implement a ‘Partial Root-Zone Drying’ technique to sustain yield, fruit quality, and tree health by irrigating only one-side of the tree one month, then switching to the other side of the tree next month (using the established dual-line drip system).
  - Microspray systems have advantage of more uniform irrigation to the root zone, and freeze abatement during winters.
- Use of cisterns or holding ponds for water storage that can be filled monthly with water sufficient to irrigate an orchard. This is important for drip and microspray systems when the orchard is not located on a canal that is charged with water all the time.
- New planting designs, such as establishment of ‘raised beds’ that can use either drip or ‘side channel flood’ irrigation methods; is a new approach for citrus that growers are starting to adopt in the Valley.
- Cost share and other programs available to assist with implementation of conservation practices

**Field crop water conservation training/field day.** A training/field day will be held at a cooperating grower’s row crop farm that successfully utilizes surge valves, center pivot irrigation, or other conservation technology. This will allow demonstrations to be provided along with comments by the grower and others on benefits and costs, pros and cons, and potential for conserving irrigation water. Use of polypipe for improved water delivery and reduced water loss, along with surge irrigation for water savings in row crops will be discussed [the U.S. Bureau of Reclamation funded the Rio Grande Regional Water Authority and HID to provide surge valves at a greatly reduced cost to South Texas Ag Crop growers, but more information is needed by producers on operational consideration (e.g. soil type, length of row, etc.) to enhance adoption]. The value of laser leveling fields for water conservation and efficient operations will be addressed. Using a water balance approach to irrigation scheduling for horticultural and agricultural row crops as well as use of daily evapotranspiration (ET) data to estimate crop water use will be discussed by the project team. For row crops with pressurized water delivery systems, the project team will provide additional instruction on water application uniformity and center pivot systems that can save water (e.g. Low-Energy Precision Application) and water sensor and soil moisture monitoring that works and is affordable.

**Vegetable water conservation training/field day.** Water conservation practices for vegetable producers include drip irrigation and plastic mulch. Water conservation can be achieved using drip compared to flood; however, the growers of vegetable crops in the Valley are using drip for several reasons in addition to water conservation and these

include higher quality crops, improved yields, and the ability to access a field for harvesting on a timely basis because the fields are not as wet. Optimizing use of these practices will be presented along with discussion of advances in plastic to avoid collection and disposal issues, instruction on water sensor and soil moisture monitoring that works and is affordable, and irrigation scheduling.

**2.3. Demonstration of Irrigation Efficient Technology and Management Approaches in Row Crops.** In cooperation with Rio Farms Inc. and Delta Lake Irrigation District, the project team will plan and conduct an on-farm demonstration of management practices and technologies to improve irrigation water management in row-crop production scenarios. Technologies tested will include soil moisture sensors, surge valve, water metering, and computerized hole size selection for poly pipe tubing. Management practices implemented will include irrigation event scheduling based on soil moisture, surge irrigation, and alternate row irrigation. Water budgets will be developed for each treatment to allow for technology/management approach comparisons. Crop yield/quality and economics analysis will also be conducted and information will be provided to producers along with water savings benefits. A field day will be held during the growing season to describe the technologies/management approaches and to allow growers to observe demonstrated technologies in the field.

#### *TASK 3. Irrigation District Training*

The project team will work together with irrigation districts and others to provide one educational program annually for Irrigation District Boards of Directors and General Managers on use of Supervisory Control and Data Acquisition (SCADA), Unmanned Aerial Vehicles (UAVs), on-farm best management practices (BMPs), metering, automated gates, and better partnering with cost-share programs to achieve system efficiency. This will be a one-day training (9a-4p) with 30-minute lunch provided. This training will take advantage of curriculum previously compiled through the Texas AWE project. Additionally, application of UAVs for detecting leaks in irrigation canals will be presented at one or more training programs by the UAV initiative of Texas A&M AgriLife, which is working to expand its applicability to irrigation in South Texas through use of appropriate sensor(s) and data processing advances.

#### *TASK 4. Focus Groups*

The project team will engage eight to ten select growers in a focus group setting to discern attitudes and behaviors related to water conservation and irrigation efficiency practices and best messages and channels to reach Valley growers to:

- Understand opinions about the future of agriculture in RGV in relation to water availability and reliability (Rio Grande, Mexico, district services and efficiency, competition from municipal/industrial growth)
- Increase understanding of irrigation efficiency practices and barriers to implementation including cost, management and water rights.
- Define grower's concerns and priorities for implementation of water

efficient practices along with role of the Irrigation District.

- Determine best communication vehicles and messages to connect with Valley growers on irrigation efficiency.
- Refine and enhance outreach and education to growers regarding water conservation and irrigation efficiency practices.

**4.1 Focus Group Selection.** The project team will select a sample of growers—including progressive early adopters, as well as late adopters—to be invited to serve on the focus group, explore incentives for group participation, develop the invitation format (letter, phone call), distribute the invitation, and establish the focus group.

**4.2 Focus Group Meeting Preparation.** The project team will develop the discussion guide, visual aids, and other materials needed by the moderator and focus group (including incentives/motivations for growers). The project team will secure appropriate facilities for the focus group meeting and prepare all materials required.

**4.3 Conduct Focus Group Meeting.** Focus group meetings will both inform and improve upon the grower training(s). The project team will serve as the on-site moderator for the focus group meetings and record the meetings via audio and/or video.

**4.4 Summarize results.** The project team will record results of focus group meetings, provide analysis of results and provide an executive summary of the findings.

#### *TASK 5. Outreach*

**5.1 Media and Public Relations.** The project team will provide media and public relations support for news stories, event promotions, editorials, telling success stories, etc. both within (i.e. provide articles to “Ag Mag”) and beyond agricultural media. Working with the Texas A&M AgriLife Research and Extension Center in Weslaco, a consistent message will be delivered. Multiple media outlets will be used to disseminate project information, such as the TexasAWE website, the Arroyo Colorado website, Facebook pages, local radio stations and newspapers, AgriLife News articles, etc.

**5.2 YouTube Video Channel & Content.** The project team will develop a YouTube channel around agricultural practices in the Lower Rio Grande Valley targeting irrigation efficiency and water conservation; develop video content at grower workshops and field days; and promote the channel. This will:

- Reach a large audience with quality video tools demonstrating latest research and practices in irrigation efficiency at relatively low cost
- Gain broader audience for education on irrigation efficiency practices
- Build a searchable library of short videos on a variety of water-saving irrigation practices
- Leverage video content on all social media channels (Facebook, Twitter, Instagram, Pinterest)
- Raise awareness in techniques and practices that can save water while preserving or improving product quality and pack out rate

## Appendix B: Program Materials

### Commodity Specific Education Programs

# Citrus irrigation techniques to save water and improve grower returns

May 9, 8 a.m.- 3 p.m.

Lone Star Citrus Growers, 9625 North Moorefield Road, Mission, TX

This free producer program will focus on the practical aspects of implementing water conserving irrigation technologies in citrus production and provide an opportunity to observe and discuss these practices in a commercial grove.

Producers currently using these techniques will provide their perspectives, and researchers will convey water conservation, economic and other findings on each approach discussed.

- Free catered lunch
- 1 hour CEU credit (pesticide applicator license) available
- Technical and financial assistance opportunities and resources available to producers will be discussed

**Please register by May 5 at:**  
[twri.tamu.edu/irrigation](http://twri.tamu.edu/irrigation)

  
Texas Water  
Resources Institute



TEXAS A&M  
AGRI LIFE  
EXTENSION



## Citrus grower education program slated for May 9 in Mission

[today.agrilife.org/2017/04/11/citrus-grower-education-program-slated-may-9-mission/](http://today.agrilife.org/2017/04/11/citrus-grower-education-program-slated-may-9-mission/)

View all articles by Paul Schattenberg

April 11, 2017

→

### Program will focus on practical aspects of new water conservation technologies

Contacts: Lucas Gregory, 979-845-7869, [LFGregory@ag.tamu.edu](mailto:LFGregory@ag.tamu.edu)

Shad Nelson, 361-593-3712, [shad.nelson@tamuk.edu](mailto:shad.nelson@tamuk.edu)

Brad Cowan, 956-383-1026, [brad.cowan@ag.tamu.edu](mailto:brad.cowan@ag.tamu.edu)

**MISSION** – An educational program for Rio Grande Valley citrus growers on the practical aspects of new water conservation technologies will be held from 8 a.m.-3 p.m. May 9 at the Lone Star Citrus Growers headquarters, 9625 N. Moorefield Road, Mission.



A program on the practical aspects of water conservation technologies for citrus producers in the Lower Rio Grande Valley will be held May 9 in Mission. (Photo courtesy of Dr. Shad Nelson)

Registration will begin at 8 a.m. at the citrus growers' packing house. The program is co-hosted by the Texas Water Resources Institute, Texas A&M AgriLife Extension Service, Texas A&M University-Kingsville Citrus Center and the Texas Water Development Board.

The event is free, but attendees are required to preregister by May 5 at <http://twri.tamu.edu/irrigation>.

Dr. Lucas Gregory, Texas Water Resources Institute research scientist, College Station, said the program will start in the Lone Star Citrus Growers' orchard with a discussion on recent advances and demonstrations of water-conserving irrigation technologies.

"The field session will emphasize producer perspectives on the advantages of drip irrigation and practical methods for using narrow border flood," he said. "Growers will also be able to make preliminary observations on raised beds, with and without plastic mesh."

Gregory said producers who have implemented some of these technologies will provide relevant insights to other producers and answer questions about how the technologies have affected their operations.

He said the program will move into the packing house mid-morning for discussions on water savings and the economics of each water conservation practice.

Dr. Shad Nelson, interim dean, Texas A&M University-Kingsville College of Agriculture, Natural Resources and Human Sciences, said local scientists and economists will highlight recent research conducted by the Citrus Center and Texas A&M AgriLife.

"Findings presented from citrus field demonstrations will show water savings and economic benefits that can be expected when these practices are implemented," Nelson said. "A grower panel discussion will also highlight local experiences using alternative irrigation strategies."

Brad Cowan, AgriLife Extension agent for Hidalgo County, said an update on some key citrus issues will be given after lunch.

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"Pest management issues relative to water management strategies and financial assistance opportunities for producers will be covered," he said.

One Texas Department of Agriculture continuing education unit in the general category will be offered due to the disease- and entomology-related issues and mitigation strategy presentations, Cowan said.

"Information about funding opportunities for producers to defray some of the implementation costs will conclude the day," he said.

Funding for the event is provided by the Texas Water Development Board through an Agricultural Water Conservation Grant to AgriLife Extension.

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Texas International Produce Association  
901 Business Park Dr. Suite 500, Mission TX

**March 6, 2018 | 8:00 am – 12:00 pm**

This free producer program will focus on the practical aspects of implementing water conserving irrigation technologies in vegetable production. Producers currently using these practices will provide local perspectives and industry representatives will discuss technology advancements, water conservation impacts and economic returns for discussed technology. Pest management implications of practice implementation will be covered and allow 1 hour of TDA CEUs to be provided. Technical and financial assistance opportunities and resources available to producers will be discussed. Please register by March 1 at: [twri.tamu.edu/irrigation](http://twri.tamu.edu/irrigation)

- 7:30 am Registration and coffee – Texas International Produce Association
- 8:00 am Welcome – *Dante Galeazzi*, President and CEO, Texas International Produce Association
- 8:05 am Workshop Overview – *Lucas Gregory*, Research Scientist, Texas Water Resources Institute
- 8:15 am Grower Experiences and Perspectives on Drip Irrigation in Vegetables:  
- Moderator: *Ray Prewett*  
- Grower Representatives: *Mike Helle*, Helle Farms & *Fred Schuster*, Schuster Farms
- 9:00 am New Irrigation Technologies for Produce:  
- Moderator: *Lucas Gregory*  
- Industry Representatives: *Danny Sosebee*, Netafim & *Steven Vandever*, Sustena  
- AgriLife Representatives: *Thiago Marconi*, AgriLife Research – UAS in Vegetable Production & *Catherine Simpson*, Texas A&M Kingsville Citrus Center – Advances in Valley Vegetable Production and Irrigation
- 10:00 am Agency Resources and Cost share programs  
- EQIP and Other NRCS programs – *Oz Longoria*, NRCS – San Benito  
- 319 and 503 program – *Ronnie Ramirez*, TSSWCB – Harlingen  
- Regional Conservation Partnership Program – *Victor Gutierrez*, Texas Water Resources Institute – Weslaco  
- TWDB Water Conservation Programs – *Kathleen Jackson*, TWDB Director
- 10:45 am Vegetable Production IPM – *Juan Anciso*, AgriLife Extension
- 11:45 am Discussion and Next Steps in the Industry – *Dante Galeazzi*
- 12:00 pm Adjourn

## Vegetable grower education program March 6 in Mission

[today.agrilife.org/2018/02/23/vegetable-grower-education-program-march-6-mission/](https://today.agrilife.org/2018/02/23/vegetable-grower-education-program-march-6-mission/)

February 23, 2018

### Practical aspects of new water conservation technologies to be highlighted

Contact: Lucas Gregory, 979-845-7869, [LEGregory@ag.tamu.edu](mailto:LEGregory@ag.tamu.edu)

Brad Cowan, 956-383-1026, [brad.cowan@ag.tamu.edu](mailto:brad.cowan@ag.tamu.edu)

MISSION – An education program for Rio Grande Valley vegetable growers on the practical aspects of water conservation technologies will be presented from 8 a.m.–noon March 6 in Mission.

The Texas Water Resources Institute, Texas A&M AgriLife Extension Service and Texas Water Development Board will co-host the free program at the Texas International Produce Association, 901 Business Park Drive, Suite 500.

Day-of registration and coffee will be at 7:30 a.m., but attendees are required to preregister at <http://twri.tamu.edu/irrigation>.

Dr. Lucas Gregory, Texas Water Resources Institute research scientist, College Station, said the program will begin with a panel discussion with growers on drip irrigation application in vegetables.

"The discussion will highlight the perspectives of growers who have implemented drip irrigation in their operations," he said. "Growers will describe their specific experiences with drip irrigation and discuss the advantages and disadvantages of its application in their operations."

Gregory said these producers will be able to provide relevant insight to other producers and can answer questions about how their operations have been improved by implementing drip irrigation.

Gregory said the program also will focus on the application of newer technology in vegetable irrigation and production.

"Industry representatives will discuss data integration tools that can provide information to farm managers to improve irrigation efficiencies and crop performance while reducing irrigation needs," he said.

Research conducted by Texas A&M AgriLife Research and AgriLife Extension personnel in Weslaco will also be highlighted.

Dr. Juan Landivar, director of the Texas A&M AgriLife Research and Extension Center at Corpus Christi and Weslaco, will discuss the use of unmanned aerial systems, or UAS, in production agriculture. Dr. Juan Enciso, AgriLife Research irrigation engineer, Weslaco, will give an overview of ongoing efforts to improve irrigation efficiencies and promote conservation.

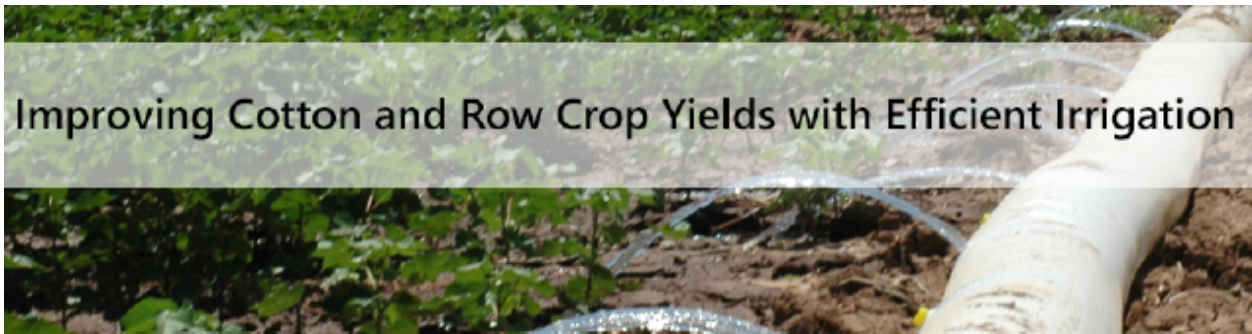
Brad Cowan, AgriLife Extension agent for Hidalgo County, said an update on pertinent vegetable production issues will round out the program.

"Pest management issues and financial assistance opportunities for producers will be covered," he said. "Diseases and entomology-related issues and mitigation strategy presentations will allow us to offer one hour of Texas Department of Agriculture continuing education units."

Cowan said information about funding opportunities so producers may defray some of their implementation costs will conclude the day.

Funding for this event is provided by the Texas Water Development Board through an Agricultural Water Conservation Grant to AgriLife Extension.





**Where:** Texas A&M Kingsville Citrus Center  
312 N. International Blvd. Weslaco, TX 78599

**When:** Tuesday, October 16, 2018      7:30 am – 12:00 pm

This free educational program will focus on the practical aspects of producing more cotton and other row crops with less water to improve the bottom line of producers. Furrow irrigation is the most common practice used in row crops and this program will focus on maximizing its efficiency to use less water while maintaining or improving yields. Dr. Jason Krutz, from Mississippi will talk at length about his experience working with producers to improve furrow irrigation efficiency in the Mississippi Delta region and how those efforts can translate to the LRGV. He will also interact with a moderated panel of local producers to discuss and answer questions regarding their experiences and practical aspects of enhanced furrow irrigation management.

**Please register by October 10<sup>th</sup> at: <http://twri.tamu.edu/irrigation>**

- 7:30 Registration and coffee
- 8:00 Welcome and program overview  
Lucas Gregory, Senior Research Scientist, Texas Water Resources Institute
- 8:15 Producer experience with improving furrow irrigation in the southeast: will these approaches work in Rio Grande Valley?  
Jason Krutz, Director, Mississippi Water Resources Research Institute
- 9:00 Cotton producer panel on potential solutions to improve furrow irrigation  
Moderator: Ray Prewett, Ag Issues Consultant
- 10:15 Break
- 10:30 Improving Crop Yields and Economics through Irrigation Management  
Mac Young, Extension Program Specialist, Texas A&M AgriLife Extension
- 11:00 Agency Program Updates
  - NRCS EQIP and other Programs:      Sonny Vela
  - TSSWCB WQMP Program:              Ronnie Ramirez
  - TWDB Programs                              Whitney Johnson
- 11:30 Rio Grande Study Update  
Askar Karimov, Research Associate, Texas A&M AgriLife Extension Service
- 11:40 Producers questionnaire and program evaluation
- 11:50 Closing comments – Lucas Gregory, Senior Research Scientist, Texas Water Resources Institute



## Row crop grower education program set for Oct. 16 in Weslaco

October 3, 2018

Contacts: Lucas Gregory, 979-845-7869, [LFGregory@ag.tamu.edu](mailto:LFGregory@ag.tamu.edu)

Brad Cowan, 956-383-1026, [brad.cowan@ag.tamu.edu](mailto:brad.cowan@ag.tamu.edu)

WESLACO – Lower Rio Grande Valley row crop growers have a chance to learn practical ways to maximize efficiency and productivity in furrow irrigated production at a half-day education program Oct. 16 in Weslaco.

The Texas Water Resources Institute, the Texas A&M AgriLife Extension Service and the Texas Water Development Board are co-hosting the program.

Registration and coffee is at 7:30 a.m. at the Texas A&M Kingsville Citrus Center, 312 N. International Blvd. The event is free, but attendees are required to preregister at <http://twri.tamu.edu/irrigation> (<http://twri.tamu.edu/irrigation>) by Oct. 10.

Dr. Lucas Gregory, Texas Water Resources Institute senior research scientist, College Station, said the program will begin with a keynote presentation from Dr. Jason Krutz, director of the Mississippi Water Resources Research Institute.

“His presentation will cover maximizing profitability and reducing water use in furrow irrigated fields using a combination of technology and management approaches proven effective in the Mississippi Delta,” he said.

Gregory said there is a common misconception that furrow irrigation is not efficient, but integrating new technologies into a furrow irrigation system has proven otherwise.

“While the location may be different, the approach is similar and some of the lessons learned in Mississippi are applicable to the Valley,” he said.

Gregory said a panel of local producers will discuss some unique factors impacting irrigation in the Valley and the challenges they pose when considering application of irrigation methods used in the southeast.



“This will provide a great opportunity for all producers present to interact with each other and engage the speakers in valuable discussion,” he said.

Mac Young, AgriLife Extension risk management program specialist in Corpus Christi, will highlight irrigation management to improve yields and economics in the Valley.

Brad Cowan, AgriLife Extension agent for Hidalgo County, said brief agency program updates from the U.S. Department of Agriculture’s Natural Resource Conservation Service and the Texas State Soil and Water Conservation Board will be provided.

“The updates always provide useful information to producers about some of the technical and financial assistance sources available to them,” Cowan said.

Dr. Askar Karimov, a research associate in Texas A&M University’s biological and agricultural engineering department, will wrap up the program by providing a brief overview of a Texas Water Resources Institute-led Rio Grande Basin project. The project is evaluating how the use of available water resources within the basin can be optimized to provide the greatest societal return to help sustain agricultural production while promoting economic development, increasing water-use efficiency and improving valuable ecosystem services.

Funding for this event is provided by the Texas Water Development Board through an Agricultural Water Conservation Grant to AgriLife Extension.

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## Valley producers learn about technology, management approaches used in Mississippi Delta

BY KATHY WYTHE,  
Texas Water Resources Institute

**A** group of Lower Rio Grande Valley producers recently learned how a combination of technology and management approaches being applied in the Mississippi Delta could be used in the Valley to help reduce water use in furrow-irrigated fields while maintaining or increasing yield.

Dr. Jason Krutz, director of the Mississippi Water Resources Research Institute, spoke Oct. 16 in Weslaco at a workshop sponsored by the Texas Water Resources Institute (TWRI), Texas A&M AgriLife Extension Service and Texas Water Development Board (TWDB). Krutz recommended Valley producers use three irrigation tools—computerized hole selection (CHS) for polypipe tubing, surge valves and soil moisture sensors—in their farming practices.

He said these approaches will work because the farming practices in the Mississippi Delta are similar to the practices in the Lower Rio Grande Valley. Both areas predominantly use polypipe to furrow irrigate poorly drained soils. A couple differences do exist; in the Mississippi Delta, well water is the exclusive source of water for irrigation and fields have a bit more slope to them. Krutz's recommendations stem from his research as part of the Row-crop Irrigation Science Extension and Resesarch (RISER) Program at Mississippi State University. RISER's goal is to develop a science-based approach for evaluating irrigation water management (IWM) practices in the Mississippi Delta and to assist producers in the adoption of IWM practices that reduce water use, while maintaining or improving yield and profitability.

*"I am passionate about developing production systems that maximize yield and net returns with as little water as possible, particularly in a furrow-irrigated environment," said Krutz. "Any technology I recommend needs to give producers more money and yield while maximizing the environmental parameters."*

### Computerized hole selection

Unlike the traditional trial and error method for putting different sized holes in polypipe tubing, CHS provides a way to maximize irrigation uniformity in fields before punching any holes in the polypipe. This saves time, money and water by cutting down on irrigation times, reducing labor costs and minimizing excess water application to the field.

At Mississippi State, Krutz has tested the use of CHS using the Delta Plastics Pipe Planner program (<https://www.pipeplanner.com>), a free web-based irrigation management tool that provides producers with specific polypipe irrigation design for their fields.

His research results have shown that using CHS results in 25 percent less time, fuel and water with a \$10 per acre savings over traditional use of polypipe. Used on an irregularly shaped field, the results are even better with 50 percent less time, fuel and water and \$20 per acre savings. Krutz said they were also able to fully irrigate a field or farm in about half the time that traditional irrigation approaches take. *"By using CHS, I know what I need the flow rate to be in every furrow and I know I can get on and off the irrigation set in 12 to 24 hours and I can do all that at*



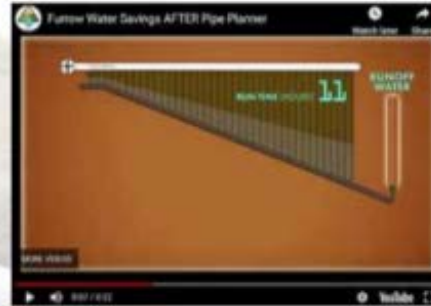
my desk," he said. "I can stop guessing what size my irrigation set should be and design one correctly."

### Surge Valves

Surge valves apply irrigation water in a series of on-off cycles. Krutz said using surge valves reduces surface runoff losses, decreases deep percolation losses and improves infiltration in sealing soils with an application efficiency 25 percent higher than conventional irrigation.

"The big benefit (of surge valves) is they take care of irrigation delivery efficiency," he said. Krutz said a surge valve can be programed to eliminate tailwater runoff if need be.

"If you do the surge valve correctly in a furrow irrigation system, you are approaching the efficiency of center pivot, so it is not something to dismiss."



A demonstration in Texas is needed, however, to confirm economic results locally, he said. These irrigation applications and their water savings can benefit more than just the individual producers.

"The United States is running out of water," he said. "We just can't irrigate the way we have been doing it."

Krutz encouraged the participants to use the three tools to increase their water-use efficiency. "Irrigation is critical to sustain agricultural production in the future, but we're going to have to stretch our water to do that," he said.

"My approach has always been very pragmatic," he said. "These techniques make you more money but they are saving water as well."

### Soil moisture sensors

Krutz said soil moisture sensors are a must when scheduling irrigation because the sensors help schedule irrigation based on actual soil moisture levels.

"Irrigation for a crop means giving it what water it needs in the rooting zone," he said, adding that soil moisture sensors allow producers to see the rooting zone, the rooting depth and the point at which the moisture level could be a problem for yield. "If you can't do those things, you can't irrigate," he said. "You can water but you can't irrigate."

### Benefits to producers, water savings

Krutz said using these three tools in Mississippi costs producers \$8.20 per acre. For example, he said, using these tools for corn yielded a seven bushel average yield increase, used 50 percent less water and resulted in a \$40 per acre increase in profits compared to the typical irrigation approach.

For more details about these practices, visit the H2O Initiative (<http://h2oinitiative.com/>) and RISER (<http://www.mississippi-crops.com/2017/02/03/2016-riser-program-irrigation-summary/>).

The workshop was part of TWRI's Lower Rio Grande Valley Irrigation Education and Outreach project, funded by the TWDB. The project promotes water conservation strategies among growers and irrigation district boards and managers and the benefits and advantages of water conservation and water use efficiency of various on-farm irrigation and irrigation district water management practices, especially when compared to conventional practices. Project partners include Texas A&M AgriLife Extension Service, Texas A&M AgriLife Research, Texas A&M University-Kingsville Citrus Center, Harlingen Irrigation District, WaterPR and commodity group leaders in the Valley.

# Novel Citrus Management Practices for Sustainable Water Use

Thursday, September 17, 2020

This free, online producer program will discuss water management and planting designs for citrus orchards and some pest management implications of these practices. Technical and financial assistance opportunities plus disaster recovery programs will also be highlighted.

Registration is required for this event at: <https://twri.tamu.edu/sign-up>. Registered attendees will receive log-in instructions directly via email at the address provided during the registration process.

TDA Pesticide License holders will be able to earn 2 general CEUs through program participation.

8:45 a.m. – 9:00 a.m. **Online Event Log-In**

9:00 a.m. – 11:00 a.m. **Scientific Presentations**

- Welcome and Introductory Video by Dr. Shad D. Nelson
- Novel Field Planting Designs for New Orchards  
*Dr. Mamoudou Setamou, Professor, TAMUK Citrus Center*
- Impacts of Soils and Management on Citrus Roots and Productivity  
*Dr. Catherine Simpson, Assistant Professor of Horticulture, Texas Tech University*
- Sustainable Water Conservation Practices for Mature Orchards  
*Dr. Shad D. Nelson, Dean & Professor, TAMUK*
- Sustainable Water Reuse Options for Agriculture & Cities  
*Dr. Clinton Williams, Soil Scientist, USDA-ARS, Maricopa, AZ*

11:00 a.m. – 11:30 a.m. **Agency Assistance Updates**

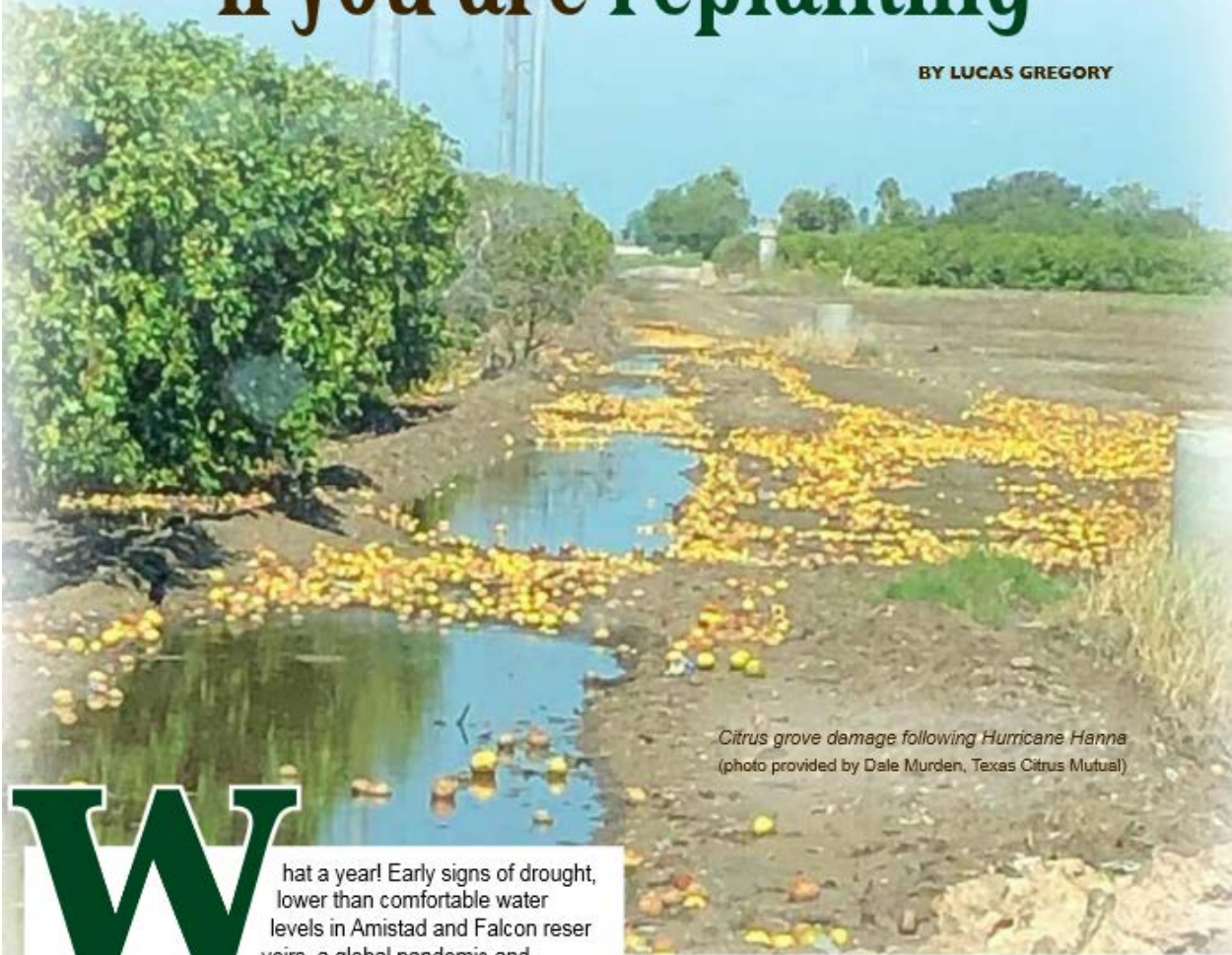
- Agricultural Water Conservation Program Updates  
*Cameron Turner, Program Manager, Texas Water Development Board*
- NCRS Disaster Recovery, Technical and Financial Assistance Opportunities  
*Sonny Vela, Programs Specialist, NCRS, Corpus Christi*





# Rethink citrus irrigation if you are replanting

BY LUCAS GREGORY



Citrus grove damage following Hurricane Hanna  
(photo provided by Dale Murden, Texas Citrus Mutual)

**W**hat a year! Early signs of drought, lower than comfortable water levels in Amistad and Falcon reservoirs, a global pandemic and Hurricane Hanna! Saying that agriculture in the Rio Grande Valley has had a rough year may not be strong enough.

Throughout it all, one thing has remained a constant; growers never seem to have the right amount of water when and where they need it.

*"Over the last nine months, irrigation conditions have been on a bit of a roller coaster,"* said Dr. Lucas Gregory, senior research scientist at the Texas Water Resources Institute (TWRI), College Station.

*"In mid-January, only the western part of Hidalgo County was in moderate drought conditions; by March all of the Valley was. Now with Hurricane Hanna not too far behind in the rearview mirror, drought is technically gone from the Valley."*

Gregory said as of mid-February, Amistad and Falcon reservoirs sat at a combined storage capacity of about 54%, about 10% less than this time last year. In the middle of August, capacity in the two reservoirs sat just above 43%. One normal benefit of a hurricane is capturing runoff. *"That really didn't happen with Hurricane Hanna though,"*

Gregory said. "Pair that with the National Weather Service (NWS) outlook for drier-than-normal conditions forecasted through October for the Rio Grande basin and the water supply situation could look better."

"If there is a silver lining to all of this, it might be that the current situation presents a good time to plan for the future," Gregory said. "If Hurricane Hanna damaged your citrus groves to the point of needing to replant, now is a good time to consider some newer planting and irrigation techniques gaining traction in the industry that can improve the location and timing of irrigation water application."

Dr. Shad Nelson, dean of the Dick and Mary Lewis Kleberg College of Agriculture and Natural Resources at Texas A&M University-Kingsville, said a number of planting and irrigation practices have been developed over recent years that are being implemented across the citrus industry to conserve water and help mitigate some disease and pest vectors.

"In existing groves, converting traditional pan flood irrigation to narrow-border flood, drip or micro-spray applications have all shown to save water," Nelson said. "In newly planted groves, raised beds paired with drip irrigation and plastic mulch not only save water but have also proven effective in managing certain pests."

These practices and more will all be discussed during a virtual offering of the Novel Citrus Management Practices for Sustainable Water Use workshop. This event will be held online Thursday, Sept. 17 from 9–11:30 a.m. Advance online registration at: <https://twri.tamu.edu/sign-up> is required to participate in this event. Event log-in details will be emailed to registered participants the day before the virtual event.

The Texas A&M University-Kingsville Citrus Center, TWRI and the Texas Water Development Board (TWDB) are cohosting the free program. Event log-in will begin at 8:45 a.m. and the program will begin at 9:00 a.m.

Presentations will include water conservation practices in mature orchards, novel field planting designs for new orchards and their impacts on water and pest management, sustainable water reuse options in agriculture and cities and the impacts of soils and management on citrus roots and productivity.

TWDB and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) personnel will also provide timely updates about available technical and financial assistance opportunities. This will include NRCS disaster recovery assistance available to growers following damage from Hurricane Hanna.

This program is being hosted as a part of the Lower Rio Grande Valley Irrigation Education and Outreach project funded by TWDB through an Agricultural Water Conservation Grant to the Texas A&M AgriLife Extension Service.

*Recent citrus grove planting at Lone Star Citrus using raised beds, drip, and plastic mulch*  
(Lucas Gregory, Texas Water Resources Institute)





## Irrigation Training Programs



**September 13, 2017**

**Maverick County Junior Livestock Show Meeting Room  
2350 East Main, Eagle Pass, TX 78852**

Please register by September 11 at <http://twri.tamu.edu/irrigation>

### Planned Agenda

- 8:00        **Registration**
- 8:30        **Welcome and Introductions**  
Dr. Lucas Gregory, Texas Water Resources Institute
- 8:40        **Irrigation Technologies and Best Management Practices for Water Conservation**  
Dr. Askar Karimov, Texas A&M AgriLife Extension Service
- 9:25        **Irrigation Scheduling and New Technologies**  
Dr. Juan Enciso, Texas A&M AgriLife Extension Service
- 10:00      **Economics of Irrigation Water Conservation**  
Dr. Samuel Zapata, Texas A&M Agricultural Economics
- 10:35      **Networking Break and Refreshments**
- 10:50      **Water Quality Issues in Irrigation**  
Dr. Dana Porter, Texas A&M Biological and Agricultural Engineering
- 11:30      **Irrigation Considerations for Pecan Production**  
Larry Stein, Texas A&M AgriLife Extension Service
- 12:00      **TWDB Water Conservation Program and Assistance Opportunities**  
Kevin Kluge, Texas Water Development Board
- 12:15      **NRCS Technical and Financial Assistance Opportunities**  
Serafin Aguirre, NRCS District Conservationist
- 12:30      **Program Evaluation and Adjourn**

## Maverick County Agricultural Irrigation Field Day set Sept. 13 in Eagle Pass

[today.agrilife.org/2017/08/31/maverick-county-agricultural-irrigation-field-day-set-sept-13-eagle-pass/](http://today.agrilife.org/2017/08/31/maverick-county-agricultural-irrigation-field-day-set-sept-13-eagle-pass/)

View all articles by AgriLife Today

→

August 31,  
2017

Contacts: Lucas Gregory, 979-845-7869, [LFGregory@ag.tamu.edu](mailto:LFGregory@ag.tamu.edu)

Oscar Galindo, 830-773-5064, [ogalindo@ag.tamu.edu](mailto:ogalindo@ag.tamu.edu)

EAGLE PASS – The Texas Water Resources Institute is hosting an educational field day focusing on water conservation in irrigated agriculture for producers Sept. 13 in Eagle Pass.

The event is free and will be from 8 a.m.–12:30 p.m. at the Maverick County Junior Livestock Show Meeting Room, 2350 E. Main St. Registration will begin at 8 a.m.

The workshop is co-hosted by the Texas A&M AgriLife Extension Service and Texas Water Development Board.

Dr. Lucas Gregory, Texas Water Resources Institute research scientist, College Station, said the event is open to anyone interested in irrigation water conservation, but attendees are required to preregister at <http://twri.tamu.edu/irrigation>.

The workshop will include speakers from AgriLife Extension, Texas Water Development Board and U.S. Department of Agriculture Natural Resources Conservation Service.

Gregory said presenters will discuss recent advances and practices in irrigation water conservation, the economics of water conserving practices and irrigation scheduling.

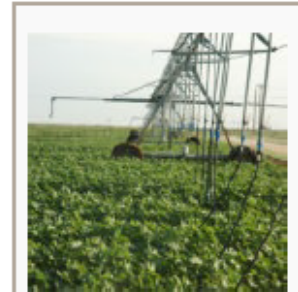
"Information conveyed will highlight some of the newer tools in irrigation management and include practical discussion on integrating them into existing operations," he said.

Oscar Galindo, AgriLife Extension agent for Maverick County, said information on irrigation water quality and a pecan production update will also be presented.

"Water quality is becoming a bigger concern as supplies decrease and demand increases," Galindo said. "Add drought to the equation and irrigation management becomes quite critical. This program will have some good information that can help producers both when water is scarce and plentiful."

The full agenda is available at the website. For more information, contact Gregory at 979-845-7869 or [LFGregory@ag.tamu.edu](mailto:LFGregory@ag.tamu.edu).

Funding for this event is provided by the Texas Water Development Board through an Agricultural Water Conservation Grant to AgriLife Extension.



The Texas Water Resources Institute will present an educational field day on agricultural irrigation Sept. 13 in Eagle Pass. (Texas A&M AgriLife photo by Kay Ledbetter)



## Irrigation Management and Technology Workshop

Cameron County San Benito Annex: Extension Meeting Room  
1390 W. Expressway 83, San Benito, TX  
September 25<sup>th</sup>, 2019

This free producer program will highlight current irrigation management techniques and technologies available to growers that have the potential to add efficiency to their operations and conserve water resources. Discussion items will include irrigation scheduling, irrigation management techniques, new technologies available to the grower and salinity management. Economics and value of irrigation water will also be highlighted. Options for chemigation and fertigation discussion will provide **1 hour of CEU credit** for TDA pesticide applicator license holders. Technical and financial assistance opportunities and resources available to producers will also be discussed.

Please Register by September 20<sup>th</sup> at <http://twri.tamu.edu/irrigation>

### Program Agenda

- |       |  |
|-------|--|
| 12:15 | Registration & Light Refreshments  |
| 12:30 | Welcome and Introductions<br>Dr. Lucas Gregory, Texas Water Resources Institute  |
| 12:40 | Irrigation Scheduling Tools and Approaches<br>Dr. Dana Porter, Texas A&M AgriLife Extension Service, Biological and Agricultural Engineering             |
| 1:15  | Irrigation Management and Technologies Panel<br>Mr. Danny Sosebee, Netafim USA<br>Mr. Jeffery Kleypas, Toro Irrigation<br>Mr. Ken Whitley, Trellis, Inc. |
| 2:00  | Economics and Value of Irrigation Water<br>Dr. Luis Ribera, Texas A&M Agricultural Economics   |
| 2:30  | Networking Break and Refreshments  |
| 2:45  | TWDB TexMesonet Overview<br>Leyon Greene, Texas Water Development Board  |
| 3:00  | NRCS Technical and Financial Assistance Opportunities<br>TBD, NRCS District Conservationist  |
| 3:10  | TSSWCB Technical and Financial Assistance Opportunities<br>Mr. Ronnie Ramirez, TSSWCB Conservation Planner   |
| 3:20  | Salinity Management in Irrigation Water<br>Dr. Girisha Ganjegunte, Texas A&M Soil and Crop Sciences  |
| 4:05  | Chemigation and Fertigation Irrigation Options and Considerations for Growers<br>Dr. Juan Enciso, Texas A&M AgriLife Research                            |
| 5:05  | Program Evaluation and Adjourn   |



## Irrigation Management and Technology Workshop

Echo Hotel and Conference Center: Vista Room  
1903 South Closser Blvd. Edinburg, TX  
September 26<sup>th</sup>, 2019

This free producer program will highlight current irrigation management techniques and technologies available to growers that have the potential to add efficiency to their operations and conserve water resources. Discussion items will include irrigation scheduling, irrigation management techniques, new technologies available to the grower and salinity management. Economics and value of irrigation water will also be highlighted. Options for chemigation and fertigation discussion will provide **1 hour of CEU credit** for TDA pesticide applicator license holders. Technical and financial assistance opportunities and resources available to producers will also be discussed.

**Please Register by September 20<sup>th</sup> at <http://twri.tamu.edu/irrigation>**

### Program Agenda

- 07:45 Registration & Coffee
- 08:00 Welcome and Introductions  
Dr. Lucas Gregory, Texas Water Resources Institute
- 08:10 Irrigation Scheduling Tools and Approaches  
Dr. Dana Porter, Texas A&M AgriLife Extension Service, Biological and Agricultural Engineering
- 08:45 Irrigation Management and Technologies Panel  
Mr. Danny Sosebee, Netafim USA  
Mr. Jeffery Kleypas, Toro Irrigation  
Mr. Ken Whitley, Trellis, Inc.
- 09:30 Economics and Value of Irrigation Water  
Dr. Luis Ribera, Texas A&M Agricultural Economics
- 10:00 Networking Break and Refreshments
- 10:15 TWDB TexMesonet Overview  
Leyon Greene, Texas Water Development Board
- 10:30 NRCS Technical and Financial Assistance Opportunities  
TBD, NRCS District Conservationist
- 10:40 TSSWCB Technical and Financial Assistance Opportunities  
Mr. Ronnie Ramirez, TSSWCB Conservation Planner
- 10:50 Salinity Management in Irrigation Water  
Dr. Girisha Ganjgunte, Texas A&M Soil and Crop Sciences
- 11:35 Chemigation and Fertigation Irrigation Options and Considerations for Growers  
Dr. Juan Enciso, Texas A&M AgriLife Research
- 12:35 Program Evaluation and Adjourn

## Irrigation management, technology workshops slated for Sept. 25, 26 in Rio Grande Valley

[today.agrilife.org/2019/09/05/irrigation-management-technology-workshops-slated-for-sept-25-26-in-rio-](http://today.agrilife.org/2019/09/05/irrigation-management-technology-workshops-slated-for-sept-25-26-in-rio-)

September 5,  
2019



The Texas Water Resources Institute will hold an identical irrigation management workshop on Sept. 25 and Sept. 26 at two different locations in the Lower Rio Grande Valley. (Texas Water Resources Institute photo)

SAN BENITO – The [Texas Water Resources Institute](http://www.twri.tamu.edu), or TWRI, is hosting two identical workshops focused on improving irrigation management techniques and technologies for producers in the Rio Grande Valley on Sept. 25 and Sept. 26.

The Sept. 25 workshop will be 12:30-5 p.m., with registration beginning at 12:15 p.m. at the Cameron County San Benito Annex, 1390 W. Expressway 83 in San Benito.

The Sept. 26 event will be 8 a.m.- 12:30 p.m., with registration beginning at 7:45 a.m. at the Echo Hotel and Conference Center, 1903 S. Closner Blvd. in Edinburg.

The workshops are free, but attendees are required to preregister at <http://twri.tamu.edu/irrigation> by Sept. 20. They are presented by the Texas Water Resources Institute, the [Texas A&M AgriLife Extension Service](http://www.tamu.edu/agrilife) and the Texas Water Development Board.

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Lucas Gregory, Ph.D., TWRI senior research scientist, College Station, said the workshops will highlight irrigation management techniques and technologies that have the potential to add efficiency to producers' operations, improve profitability and conserve water resources.

"Speakers will discuss irrigation scheduling, management techniques and new technologies available to the grower as well as salinity management and irrigation water valuation," Gregory said.

He said the workshops will have a discussion of chemigation and fertigation options, which will provide attendees with one hour of continuing education units for Texas Department of Agriculture pesticide applicator license holders.



The programs have also been approved for four continuing education units for Certified Crop Advisors.

Presenters and topics will include:

- Dana Porter, Ph.D., AgriLife Extension agricultural water management, Lubbock. Irrigation scheduling tools and approaches.
- Danny Sosebee, Netafim USA; Jeffery Kleypas, Toro Irrigation; Ken Whitley, Trellis, Inc. Irrigation management and technologies panel.
- Luis Ribera, Ph.D., AgriLife Extension specialist – agricultural economics, College Station. Economics and value of irrigation water.
- Leyon Greene, Ph.D., hydrologist, Texas Water Development Board. Texas Water Development Board TexMesonet overview.
- Ronnie Ramirez, Texas State Soil and Water Conservation Board conservation planner. Texas State Soil and Water Conservation Board technical and financial assistance opportunities.
- Girisha Ganjegunte, Ph.D., Texas A&M AgriLife Research associate professor, El Paso. Salinity management in irrigation water.



— Juan Enciso, Ph.D., AgriLife Research associate professor, Weslaco. Chemigation and fertigation irrigation options and considerations for growers.

There also will be a presentation on U.S. Department of Agriculture Natural Resources Conservation Service technical and financial assistance opportunities.

These events are part of TWRI's Lower Rio Grande Valley Irrigation Education and Outreach project funded by the Texas Water Development Board through an Agricultural Water Conservation Grant to AgriLife Extension.

-30-



## Irrigation management, technology workshops slated for Sept. 25th and 26th in the Rio Grande Valley

BY KATHY WYTHE

**R**io Grande Valley producers will have an opportunity to attend one of two identical workshops focused on improving irrigation management techniques and technologies Sept. 25 and Sept. 26.

The Sept. 25 workshop will be 12:30-5 p.m. with registration beginning at 12:15 p.m. at the Cameron County San Benito Annex, 1390 W. Expressway 83 in San Benito. The Sept. 26 event will be from 8 a.m.-12:30 p.m. with registration beginning at 7:45 a.m. at the Echo Hotel and Conference Center, 1903 S. Closner Blvd. in Edinburg.

The workshops are free, but attendees are required to pre-register at <http://twri.tamu.edu/irrigation> by **Sept. 20**. The workshops are presented by the Texas Water Resources Institute

(TWRI), the Texas A&M AgriLife Extension Service and the Texas Water Development Board (TWDB).

Dr. Lucas Gregory, TWRI senior research scientist, College Station, said the workshops will highlight irrigation management techniques and technologies that have the potential to add efficiency to producers' operations, improve profitability and conserve water resources. "Speakers will discuss irrigation scheduling, management techniques and new technologies available to the grower as well as salinity management and irrigation water valuation," Gregory said.

He said the workshops will have a discussion of chemigation and fertigation options, which will provide attendees with 1 hour of continuing education units for Texas Department of Agriculture pesticide applicator license holders.





Gregory said presenters and topics will include:

- *Dr. Dana Porter, AgriLife Extension, Biological and Agricultural Engineering; irrigation scheduling tools and approaches.*
- *Danny Sosebee, Netafim USA; Jeffery Kleypas, Toro Irrigation; Ken Whitley, Trellis, Inc.; irrigation management and technologies panel.*
- *Dr. Luis Ribera, AgriLife Extension, Agricultural Economics; economics and value of irrigation water.*
- *Leyon Greene, TWDB; TWDB TexMesonet overview.*
- *Natural Resources Conservation Service (NRCS) District Conservationist; NRCS technical and financial assistance opportunities.*
- *Ronnie Ramirez, Texas State Soil and Water Conservation Board (TSSWCB) conservation planner; TSSWCB Technical and Financial Assistance Opportunities.*
- *Dr. Girisha Ganjgunte, Texas A&M University Department of Soil and Crop Sciences; salinity management in irrigation water.*
- *Dr. Juan Enciso, Texas A&M AgriLife Research; chemigation and fertigation irrigation options and considerations for growers.*

These events are part of TWRI's Lower Rio Grande Valley Irrigation Education and Outreach project, funded by TWDB through an Agricultural Water Conservation Grant to AgriLife Extension.



## Other Irrigation Training Programs Supported



September 12, 2017

2415 U.S. 83 Business, Weslaco, TX 78596

This free producer program will focus on the practical aspects of implementing water-conserving irrigation technologies as well as presentations on research findings about water conservation, economic issues and other issues.

- 8:00 – 8:30    **Registration**
- 8:30        **Welcome and Introductions**  
Dr. Lucas Gregory
- 8:40        **Value of Irrigation in the LRGV**  
Dr. Luis Ribera
- 9:05        **Irrigation Scheduling (Soil Moisture Monitoring) and Best Management Practices**  
Dr. Juan Enciso
- 9:30        **Irrigation Technologies and Crop Specific Guidelines**  
Dr. Dana Porter
- 9:55        **Break**
- 10:10      **Water Quality Issues in Irrigation**  
Dr. Askar Karimov
- 10:35      **TWDB Ag Water Conservation**  
Kevin Kluge
- 11:00      **NRCS Nutrient Management**  
NRCS Representative
- 11:25      **TSSWCB Irrigation Conservation Practices**  
TSSWCB Representative
- 11:50      **Fertigation/Chemigation**  
Danny Sosebee
- 12:15      **Adjourn**



# 9<sup>th</sup> **LRG Irrigation Conference & Trade Show**

RGV Livestock Showgrounds, Mercedes  
October 26, 2017

**Trade Show & Registration Open 7:30 am**  
Coffee and tacos served in the trade show area

Session I: 8:30 – 10:20 am



## **Long Term Water Supply Strategies for the Rio Grande Region**

*Tomas Rodriguez, Chairman of the Rio Grande Regional Water Planning Group, Laredo*

## **Financial and Technical Assistance Programs**

*Sonny Vela, Zone Program Liaison, Natural Resource Conservation Service, Corpus Christi  
Cameron Turner, Manager – Ag Water Conservation, Texas Water Development Board, Austin  
Collins Balcombe, Manager of Planning and Project Development, Oklahoma-Texas Area Office,  
Bureau of Reclamation, Austin*

## **2018+ Climate and Rainfall Outlook**

*Barry Goldsmith, Warning Coordination Meteorologist, National Weather Service, Brownsville*

## **What Irrigation Districts Are Doing to Reduce Losses and Improve Water Deliveries**

Managers Panel: Canal Lining, Automatic Gates and Control Systems, Incentives for On-farm Efficiency

*Sonny Hinojosa, HCID#2, San Juan*

*Sonia Lambert, CCID#2, San Benito*

*Tom McLemore, Harlingen IDCC#1*

Break: 10:20-10:40 am

Session II: 10:40 – 12:30 pm

## **Irrigated Agriculture and Implications of the Food Safety Modernization Act**

*Dr. Juan Anciso, Extension Vegetable Specialist, Texas A&M AgriLife Extension Service, Weslaco  
Richard De Los Santos, Produce Safety Director, Texas Department of Agriculture, Austin*

## **What Do We Know about the Water Quality of the Rio Grande?**

*Roger Miranda, Geoscientist/TMDL Project Manager, TCEQ*

## **Unmanned Aerial Vehicles**

### **Research Update: Droned-based System for Leak Detection in Canals and Pipelines**

*Dr. Guy Fipps, P.E., Professor/Extension Agricultural Engineer, College Station*

### **Drones for On-Farm Management, What Is the State-of-the-Art?**

*Dr. Alex Thomasson, P.E., Professor/Cotton Engineering Chair, Texas A&M University, College Station*

Lunch: 12:30-1:00 pm

Afternoon Session: 1:00 - 3:45 pm

**Irrigation Technologies – What’s New and Improved?**

Wireless Sensor Networks & Control Systems for Irrigation Management, Drip Drag-lines on Pivots, Water Management Strategies & Technologies.

*Dr. Guy Fipps, P.E., Professor/Extension Agricultural Engineer, College Station*

*Eric Elle, Product Development Manager, Lubbock*

**Manufacturers’ Panel – New Products and Know-How Showcase**

Advances in Drip Irrigation

Surface Irrigation & Water Management: Poly Pipe as Gated Pipe and the Sizing of Holes, Surge Irrigation

Advances in and Use of Soil Moisture Sensors

Exhibitors Include

<i>Dynamax Inc</i>	<i>Delta Plastic</i>
<i>Jain Irrigation, Inc.</i>	<i>Toro Micro-Irrigation</i>
<i>Amos Sales</i>	<i>Eco-Drip</i>
<i>Triad Inc. (DamSurge Valves)</i>	<i>CropX</i>
<i>Texas Water Development Board</i>	<i>Andros Engineering</i>
<i>Ewing Irrigation</i>	<i>P&amp;R Surge Systems, Inc</i>
<i>Irrigation-Mart</i>	<i>SWISH</i>
<i>Netafim USA</i>	

Registration

Registration is \$20 and includes lunch. Register online at <http://agriliferegister.tamu.edu>.

Attendees can RSVP online at <http://itc.tamu.edu> or by calling the

Hidalgo County Extension Office at 956-383-1026

Only cash or checks accepted at the door (no credit cards).

For additional information contact the Hidalgo County Extension Office

Presented By



TEXAS A&M  
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Lower Rio Grande Valley  
Water District Managers'  
Association

Funding Support provided by the Texas Water Development Board  
through the Ag Water Conservation Grants Program


For more information contact:

Brad Cowan, County Extension Agent-Agriculture, Hidalgo County, 383-1026,  
Dr. Enrique Perez, County Extension Agent-Agriculture, Cameron County, 361-8236  
Matthew Rodriguez, County Extension Agent- Agriculture, Willacy County, 689-2412  
Dr Guy Fipps, Extension Agricultural Engineer, College Station, 979-845-7454

Persons with special needs are requested to call 800-638-8239 in advance so these may be addressed.

Educational programs of the Texas A&M AgriLife Extension Service are open to all people without regard to race, color, sex, disability, religion, age or national origin.  
The Texas A&M University System, U.S. Department of Agriculture and the County Commissioners Courts of Texas Cooperating

## Irrigation District Programs



### Lower Rio Grande Valley Irrigation Tour

**July 15, 2019 | 8:00 am – 5:00 pm**  
Casa De Palmas Hotel 101 N. Main St., McAllen, TX

This tour will highlight the past and present of irrigation in the LRGV while giving attendees the opportunity to discuss irrigation's future. Tour space is limited, so please RSVP by July 8<sup>th</sup> to reserve your seat. Contact Lucas Gregory at [LFGregory@ag.tamu.edu](mailto:LFGregory@ag.tamu.edu) or 979-845-7869 to RSVP.

**8:00 – 8:30 am** Meet at Casa De Palmas Hotel 101 North Main St., Mc Allen, TX  
Park in Hotel Garage and meet at bus for tour

**8:30 am** Depart hotel via bus

**9:00 – 9:45 am** Tour the Old Hidalgo Pumphouse Museum 902 S. 2<sup>nd</sup> Street, Hidalgo, TX

Self-guided tour of museum with historic pictures/captions and info about the rise of agriculture and early irrigation in RGV

**10:00 am** Depart Old Hidalgo Pumphouse Museum via bus

**10:30 am** Arrive at Vegetable Bldg, Texas A&M Research & Extension Center  
2401 E. Business 83, Weslaco, TX

**10:30 am** RGV Irrigation 101  
Mr. Wayne Halbert  
Former General Manager, HIDCC #1

**11:00 am** Challenges of Operating an Irrigation District  
Mr. Randy Winston  
Manager, Hidalgo ID #9

**11:30 am** Catered Lunch and Open Discussion

**12:15 pm** Depart Weslaco via bus

**1:00 pm** Arrive at HIDCC #1 Center for Ag Water Conservation  
Trevino Rd, San Benito, TX

**1:00 pm** Guided Tour of the Center for Ag Water Conservation and HIDCC# 1 Pumphouse  
Mr. Tom McLemore, General Manager HIDCC #1  
Mr. Al Blair, Principal of Axiom Blair Engineering

**2:30 pm** Visit Automated Canal Gates in HIDCC #1

**3:30 pm** Depart for Casa De Palmas via bus



# Valley program focused on challenges, opportunities of modernizing irrigation systems

BY LUCAS GREGORY *Texas Water Resources Institute*

The Texas Water Resources Institute along with Texas A&M AgriLife Extension Service and the Texas Water Development Board co-hosted an education program July 15 for Rio Grande Valley irrigation district managers and board members.

The free program was focused on the past and present of irrigation in the Lower Rio Grande Valley and began at the Casa De Palmas Hotel in McAllen followed by a bus tour with stops at the Old Hidalgo Pumphouse Museum, the Texas A&M AgriLife Research and Extension Center at Weslaco and the Rio Grande Center for Ag Water Efficiency.

The intent of this program was to provide a complete view of irrigation in the Valley and describe how the irrigation network was developed historically and how it affects irrigation district operations today. An overview of legislation that has shaped irrigation was provided along with a discussion on challenges that irrigation districts currently face.

The tour concluded with a visit to the Rio Grande Center for Ag Water Efficiency located in the Harlingen Irrigation District, Cameron County #1. This center highlights modern technologies used in irrigation districts across the valley and provides an opportunity for district personnel to receive hands-on training on multiple types of equipment commonly employed.

Dr. Lucas Gregory, Texas Water Resources Institute senior research scientist, College Station, said this event was part of the institute's Lower Rio Grande Valley Irrigation Education and Outreach project, funded by the Texas Water Development Board through an Agricultural Water Conservation Grant to AgriLife Extension.

The project promotes water conservation strategies among growers and irrigation district boards and managers. It also promotes the benefits and advantages of water conservation and water use efficiency of various on-farm irrigation and irrigation district water management practices, especially when compared to conventional practices.



*Water level sensor and automated gates in the demonstration channel at the Rio Grande Center for Ag Water Efficiency. Photo by Lucas Gregory, Texas Water Resources Institute.*



*Shown here are diesel-powered twin centrifugal water pumps. Photo by Lucas Gregory, Texas Water Resources Institute.*



*Tom McLemore, general manager, Harlingen Irrigation District, discusses the components and utility of the automated canal gate demonstration channel at the Rio Grande Center for Ag Water Efficiency. Photo by Lucas Gregory, Texas Water Resources Institute.*





Rio Farms Inc.  
25601 North FM 88, Monte Alto TX  
July 16, 2019 | 8:00 am – 2:15 pm

This program will discuss opportunities, tools, technologies and challenges to modernizing irrigation in the Lower Rio Grande Valley. Relevant work from around the world will be discussed, local action taken and ongoing efforts to demonstrate practices will be highlighted. Salinity management will also be discussed as salt concentrations in the river continue to rise and are a growing concern. Lastly, legislative updates and funding opportunities will be discussed. Please register by July 8 at: [twri.tamu.edu/irrigation](http://twri.tamu.edu/irrigation)

- 7:30 am Registration and Coffee
- 8:00 am Welcome and Introductions  
*Lucas Gregory, Senior Research Scientist, Texas Water Resources Institute*
- 8:15 am Modernizing Australian Irrigation Systems: Opportunities for the RGV  
*Darren McGregor, North America General Manager, Rubicon Water*
- 9:00 am Impacts of Water Management Automation in the Harlingen District  
*Al Blair, Axiom Blair Engineering*
- 9:30 am Benefits of Delta Lake District Converting Smaller Concrete Canals to Pipelines  
*Isaac Huacuja, SWG Engineering, LLC*
- 10:00 am Coffee Break
- 10:20 am Practices to Reduce Impact of Saline Irrigation Water  
*Girisha Ganjgunte, Texas A&M AgriLife Research, El Paso*
- 11:00 am Moving Toward More Efficient Furrow Irrigation  
*Lucas Gregory, Senior Research Scientist, Texas Water Resources Institute*  
*Matt Klostermann, Rio Farms Inc.*
- 11:15 am Rio Farms Cotton Irrigation Demo Project Tour
- 12:15 pm Lunch Sponsored by Texas Regional Bank
- 1:00 pm Texas Legislative Update  
*Wayne Halbert*  
*Kim Nygren, Director of Water Availability Division, TCEQ*
- 1:30 pm Financing Irrigation District Improvements  
*Brooke Paup, Director, Texas Water Development Board*  
*Sonny Vela, U.S. Department of Agriculture Natural Resources Conservation Service*
- 2:15 pm Adjourn

## Irrigation management program slated for July 16 in Monte Alto

[today.agrilife.org/2019/06/23/irrigation-management-program-slated-for-july-16-in-monte-alto/](http://today.agrilife.org/2019/06/23/irrigation-management-program-slated-for-july-16-in-monte-alto/)

June 23, 2019

### Will focus on challenges, opportunities of system modernization



Irrigation in the Rio Grande Valley will be the focus of the July 16 program in Monte Alto. (Photo courtesy Texas Water Resources Institute)

MONTE ALTO – An educational program focused on improving efficiency within irrigation districts and farms in the Rio Grande Valley will be presented from 8 a.m.-2:30 p.m. July 16 in Monte Alto.

The program is free, but attendees are required to preregister at <http://twri.tamu.edu/irrigation> by July 8. It is designed for irrigation district managers, board members and growers, and is presented by the Texas Water Resources Institute, the Texas A&M AgriLife Extension Service and the Texas Water Development Board.

Registration begins at 7:30 a.m. in the conference room at the Rio Farms Inc., 25601 N.

Farm-to-Market Road 88. A catered lunch sponsored by Texas Regional Bank will be provided at the Rio Farms conference room.

Dr. Lucas Gregory, Texas Water Resources Institute senior research scientist, College Station, said Darren McGregor, general manager for Rubicon Water in North America, will give the keynote presentation.

"McGregor's presentation will highlight the work Rubicon Water has done in Australia to modernize the irrigation conveyance system in the Murray-Darling River basin," he said.

Gregory said integrating technology and operational systems such as automated canal gates and valves, flow metering, and employing the latest systems and technology have improved operational efficiency for irrigation districts and on farms.

"But these don't come without some challenges," he said. "McGregor's discussion will focus on highlighting the challenges faced and lessons learned with modernizing and increasing efficiency in the Australian irrigation system network."

Gregory said topics and presenters will include:

- **Harlingen Irrigation District Cameron County No.1 efforts to improve its efficiency and capabilities of the Rio Grande Center for Ag Water Efficiency, Al Blair, Axiom Blair Engineering, Austin.**
- **Benefits of converting small irrigation canals to pipelines. Isaac Huacuja of SWG Engineering LLC, Weslaco.**
- **Salinity management options for irrigators, Dr. Girisha Ganjgunte, AgriLife Research associate professor, El Paso.**
- **Approaches implemented in the field and lessons learned for an ongoing cotton irrigation demonstration project, Matt Klostermann, president of Rio Farms Inc., and Gregory. The presentation will include a demonstration-site field tour.**
- **Updates on the recent Texas Legislative session. Wayne Halbert, former general manager of the Harlingen Irrigation District.**
- **Financial programs available to improve irrigation infrastructure within the districts and on farms, Brooke Paup, Texas Water Development Board director.**
- **Additional resources available to water districts and farmers, Sonny Vela, U.S. Department of Agriculture Natural Resources Conservation Service specialist.**

The event is part of TWRI's Lower Rio Grande Valley Irrigation Education and Outreach project, funded by the Texas Water Development Board through an Agricultural Water Conservation Grant to AgriLife Extension.

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Contacts: Lucas Gregory, 979-845-7869, [LFGregory@ag.tamu.edu](mailto:LFGregory@ag.tamu.edu)



# Valley program to focus on challenges, opportunities of modernizing irrigation systems

BY LUCAS GREGORY  
AND KATHY WYTHE

**A**n education program focused on improving efficiency within irrigation districts and farms for Rio Grande Valley irrigation district managers, board members and growers is set for July 16 in Monte Alto. The program will be 8 a.m. - 2:30 p.m. at the Rio Farms, Inc., 25601 N. Farm-to-Market Road 88.

The Texas Water Resources Institute, Texas A&M AgriLife Extension Service and Texas Water Development Board are co-hosting the program.

The program is free but attendees are required to pre-register at <http://twri.tamu.edu/irrigation> by July 8. Registration and coffee begins at 7:30 a.m. in Rio Farms conference room.

Dr. Lucas Gregory, Texas Water Resources Institute senior research scientist, College Station, said this event is part of the institute's Lower Rio Grande Valley Irrigation Education and Outreach project, funded by the Texas Water Development Board through an Agricultural Water Conservation Grant to AgriLife Extension.

The project promotes water conservation strategies among growers and irrigation district boards and managers. It also educates the target audience on the benefits and advantages of water conservation and water use efficiency of various on-farm irrigation and irrigation district water management practices, especially when compared to conventional practices.

Darren McGregor, general manager for Rubicon Water for North America, will give the keynote presentation.

Newly planted watermelons in drip-irrigated field with plastic mulch

Gregory said McGregor's talk will focus on work Rubicon Water has done in Australia to modernize the irrigation conveyance system in the Murray-Darling River basin, one of the most significant agricultural areas in Australia.

*"Integrating technology and operational systems such as automated canal gates and valves, flow metering, supervisory control and data acquisition, or SCADA, and telemetry have improved operational efficiency of irrigation districts and on farms, but these don't come without some challenges," he said.*

*"McGregor's discussion will highlight the challenges faced and lessons learned with modernizing and increasing efficiency in the Australian irrigation system network."*

Al Blair of Axiom Blair Engineering, Austin, will discuss efforts the Harlingen Irrigation District Cameron County #1 has undertaken to improve its efficiency and will highlight the development and capabilities of the Rio Grande Center for Ag Water Efficiency.

Pre-plant furrow irrigation with polytube



Isaac Huacuja of SWG Engineering, LLC, Weslaco, will speak on the benefits of converting small irrigation canals to pipelines realized by the Delta Lake Irrigation District.

The program will then turn its focus to the farm. Dr. Girisha Ganjegunte, associate professor in the Department of Soil and Crop Sciences at the Texas A&M AgriLife Research Center in El Paso, will discuss salinity management options for irrigators.

Matt Klostermann, president of Rio Farms Inc., and Gregory will summarize approaches implemented in the field and lessons learned to date for an ongoing cotton irrigation demonstration project. They will give a field tour of the demonstration site.

Following the field site tour, a catered lunch sponsored by Texas Regional Bank will be provided at the Rio Farms conference room.

In the afternoon, Wayne Halbert will provide updates on the recent Texas Legislative session.

Texas Water Development Board Director Brooke Paup will provide information regarding the agency's financial programs available to improve irrigation infrastructure within the districts and on-farm.

Sonny Vela, U.S. Department of Agriculture Natural Resources Conservation Service specialist, will discuss additional resources available to districts and farmers.

Pre-plant furrow irrigation with polytube



Furrow irrigation tail water at end of the field

canola grown in the LRGV without irrigation

## Appendix C: Focus Group



# ATTENTION GROWERS & DISTRICT BOARD/STAFF

**We want to know what you think about water – as it relates to your operation!**

Please participate in online survey at **SpeakUpAg.com**



**IT'S SAFE.**

The survey takes your opinion, not your identity. Share your thoughts about ag water conservation—your answers will be anonymous.



**IT'S SHORT.**

The survey will take less than ten minutes to complete — about the same time it takes to drink a hot cup of coffee.



**IT'S IMPORTANT.**

Your honest answers will lead to better understanding of ag industry concerns across the LRGV and improve mechanisms for information transfer.

For more information, contact Lucas Gregory, [lfgregory@ag.tamu.edu](mailto:lfgregory@ag.tamu.edu)

*Survey conducted by the Texas Water Resources Institute through an Ag Water Conservation Grant from the Texas Water Development Board.*



## Institute asking for input on Lower Rio Grande Valley water conservation

[today.agrilife.org/2018/01/05/institute-asking-input-lower-rio-grande-valley-water-conservation/](http://today.agrilife.org/2018/01/05/institute-asking-input-lower-rio-grande-valley-water-conservation/)

January 5, 2018

### Producers, water district personnel requested to participate in survey

Writer: Paul Schattenberg, 210-859-5752, [paschattenberg@ag.tamu.edu](mailto:paschattenberg@ag.tamu.edu)

Dr. Lucas Gregory, 979-845-7869, [lfgregory@ag.tamu.edu](mailto:lfgregory@ag.tamu.edu)

COLLEGE STATION — The Texas A&M AgriLife Extension Service, Texas Water Resources Institute and project partners are asking agricultural producers and irrigation district managers and board members in the Lower Rio Grande Valley to participate in a survey regarding water conservation programs and opportunities.

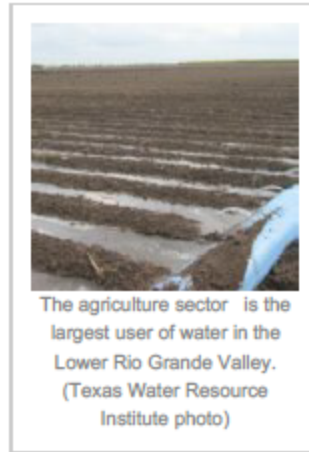
"Agriculture is the Valley's biggest economic sector and is also the No. 1 user of water," said Dr. Lucas Gregory, a research scientist with the Texas Water Resources Institute based in College Station. "Ensuring there is sufficient water for irrigation is vital to sustain and grow this \$28 billion industry."

"The institute and project partners, including AgriLife Extension, Texas A&M AgriLife Research, Texas A&M University-Kingsville Citrus Center, Harlingen Irrigation District and WaterPR have been tasked with delivering water conservation and efficiency programs to growers and irrigation districts," he said. "To do this in a more effective manner, we are asking Valley growers and irrigation district staff or board members to participate in a brief online survey."

Gregory said the survey is short, safe and important.

"It will take less than 10 minutes to complete and survey answers will be anonymous," he said. "And participants will be given the option to share their email address if they are interested in further discussion."

The survey can be found at <http://SpeakUpAg.com>. Information from the survey, funded by an Ag Water Conservation grant from the Texas Water Development Board to AgriLife Extension and TWRI, will be used to improve future irrigation-related programming in the Lower Rio Grande Valley.



"This information will be used to better educate producers on how irrigation water efficiency can offer growers proven ways to save water, enhance yields and improve net cash farm income," he said.

Gregory also noted this year the institute's Lower Rio Grande Valley Irrigation Education and Outreach project team will deliver programs to educate area producers and irrigation districts on water conservation strategies and explain the benefits of these strategies in comparison to conventional water management practices.

"Texas A&M AgriLife, Texas A&M University-Kingsville and partners are continuing to develop and demonstrate new methods for improving water resource management in the Valley," he said. "Adopting water-conserving agricultural practices will go a long way toward conserving water needed for future growth, ensuring the continued vitality of the area's agriculture and making a positive impact on the LRGV's economy and environment."

The Texas Water Resources Institute, part of AgriLife Research, AgriLife Extension and the College of Agriculture and Life Sciences at Texas A&M University, fosters and communicates research and educational outreach programs focused on water resources and management issues in Texas and beyond.

For more information, contact Gregory at [lfgregory@ag.tamu.edu](mailto:lfgregory@ag.tamu.edu).

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Writer Karen Ford is a principal at WaterPR, a full-service communication company located in San Marcos, Texas. Research partner on this project was Robin Rather, principal at Collective Strength. Please send your thoughts, ideas and input on this article to: [kford@waterpr.com](mailto:kford@waterpr.com). If you would like to get on the mailing list for the Lower Rio Grande Valley Education & Outreach Program, contact: [lfrgregory@ag.tamu.edu](mailto:lfrgregory@ag.tamu.edu)

Recent Focus Group with Valley growers found consensus on the many benefits of drip irrigation, but the economics for grower, and District, still present a challenge.

PART ONE

# REVELATIONS ON AG & WATER

## Report on focus groups with growers in the RGV

BY KAREN FORD Water PR

Focus groups are a great way to gather information about attitudes and behaviors on just about anything. We were happily tasked with learning more about irrigation practices in the Rio Grande Valley (RGV) and decided qualitative research through focus groups and in-depth interviews was a good choice for our purposes. In August 2018 we conducted two facilitated focus groups—one with Valley growers and the other with irrigation district managers.

This article presents the findings from the Valley growers group. We will bring findings and conclusions from irrigation districts in the next issue of Ag Mag. Here, we provide a brief recounting of the research objectives and methodology, as well as the trends we discovered, the challenges faced, and solutions recommended. The full report on our Focus Group research will be available in the final report for the Lower Rio Grande Valley Irrigation Education and Outreach Program that is underway and funded by the Texas Water Development Board through an Agricultural Water Conservation Grant.

This qualitative research seeks to understand and synthesize the mindset of agricultural growers about the water challenges and solutions. Specifically, our research team had the following objectives:

- Gather opinions about future of agriculture in RGV in relation to water availability and supply reliability
- Increase efficient irrigation practice understanding; discuss barriers to implementation
- Define grower's priorities for implementing water efficient practices
- Determine best communication vehicles and messages to connect with Valley growers on irrigation efficiency.
- Utilize results to refine and enhance outreach and education to growers regarding water conservation and irrigation efficiency practices.

### Methodology & Demographics

The grower's focus group was conducted at the Texas A&M University-Kingsville Citrus Center in Weslaco, Texas, on August 15, 2018. A total of 10 growers participated on a confidential basis in order to maximize candor. Participants in

the focus group represented more than 19,400 acres currently being farmed in the RGV. Crops included mixed vegetables, citrus, native grasses, sorghum, cotton and sugar cane. The group included three women and seven men with an average age of 32 and an age range from 24 to 66 years. Three participants were Hispanic and seven were Caucasian. Counties represented included: Cameron, Hidalgo and Willacy.

### Key Findings from Growers

#### 1. Long Term Viability of Farming is in Doubt

Despite a willingness to do whatever it takes to continue farming the land, growers are increasingly pessimistic that farming itself can survive in the RGV. Water deliveries from Mexico are seen as both essential and precarious. Investment in water infrastructure for agriculture is not forthcoming. Expenses are up, and prices are down. Urbanization is paving over rich soil. Changing consumer tolerances for chemicals and a crippling shortage of labor willing to farm are key trends that in combination are leading growers to doubt whether farming in the region will survive.

#### 2. Generational Differences in RGV Agriculture

The current, young generation of farmers perceives several systemic differences that did not affect prior generations as dramatically, including:

- Intensified global market competition
- Higher volume of crop imports than exports
- Expectation that food products will be delivered "cheaper and cheaper"
- Shift in financing to a "cost upfront" model, where largest investment comes before the seed is in the ground
- The transition from family farms to large corporate farms
- A feeling that no real support for farming endures at the federal level

#### 3. Mexico/ US Treaty Rights a Top Concern

This treaty is critical to water deliveries that RGV growers depend on. There is an overwhelming sense that Treaty enforcement from the U.S is inadequate and/or misinterpreted. Growers believe Mexico should be held accountable for its water deliveries as clearly specified in the 1944 US/Mexico Treaty.



**4. Metering and Selling Water By Volume is a Key Driver**

The way water is currently sold doesn't incentivize or reward those who conserve water, nor does it penalize those who are inefficient with water in their irrigation practices.

**5. Losing Farms to Urbanization is A Serious Threat**

Growers understand all too well that agriculture is legally secondary to municipal water rights. As the region continues to explode with population in cities, growers believe their water rights are increasingly threatened both by municipal water use and by land fragmentation.

**6. Drip Irrigation is Well Understood, but Price Point Way Too High**

The pros and cons of drip irrigation were well understood and easy for the participants to articulate.

**Pros for drip irrigation:**

- water savings/efficiency
- being able to put water where you need it
- fertilizing while you drip (fertigating)
- ability to grow multiple crops on the same line
- better yields
- harvesting while irrigating
- fewer weeds
- less need to level land.

**Cons of drip irrigation:**

- high cost of drip (currently at \$1-3K per acre)
- perception that districts are ill-equipped to provide drip at scale
- a fear that districts will go bankrupt if they deliver water for drip (due to need for small volumes of water over long period of time vs large volume for short period).

**7. Climate Change is NOT Perceived as A Serious Worry**

Participating growers rated climate change an average of "two" on a ten-point scale where one was not at all worried and ten was intensely worried. However, growers did express concern about increasingly volatile weather events.

**8. Irrigation Districts are Perceived as Holding All the Efficiency Cards**

Growers believe that they get a lot of the blame and pressure for water inefficiency but that in reality, it is the Districts who have the most to gain with efficiency measures. Growers believe that the only thing farmers can control is how much water they spill on their land.

**9. Municipalities Seen as Far Stronger Politically Than Growers**

Urbanization and its effect on agriculture land are seen as the top negative trends affecting the future of agriculture. Growers feel that municipalities have far greater political influence than they do thus driving this trend. Growers believe that the number of voters that can be won by an elected official is much higher in municipalities and thus all the political focus—and investment—goes to cities and not to agriculture.

**10. Solutions**

When asked what they would do to solve the most pressing issues facing farmers, the following solutions were offered by the growers:

- Fight the Mexico Treaty rights issue with far more intensity.
- Change the perception of farmers and educate both elected officials and the general public about the role of farmers in the RGV and the water/crop issues they are facing.
- Fund and implement infrastructure improvements – specifically rebuild and modify the canal system to make it more efficient and get it ready for drip irrigation.
- Provide incentives for farmers to work together within a farm block.
- Price water on a graduated scale based on usage and impose stronger penalties for those who are not using water efficiency practices.
- Revoke the "blanket allocation" and gradually increase the price with each irrigation cycle.
- Merge the current 26 water district system down to perhaps 5 in order to upgrade the management of the districts, make them more efficient overall and provide more consistency regarding water saving policies. (It must be noted, growers agreed this type of district consolidation would be very difficult, if not impossible, to enact.)

**11. Communication and Outreach as a Core Strategy**

Growers believe they are at a severe disadvantage when it comes to education

and outreach. They feel the general public doesn't respect farmers, sees them as "behind the times", "not cool" and "water wasters" due to media coverage. Growers like the idea of a public media program that delivers a positive message about farming, farmers and their efforts to be good stewards of the land and water.

**Conclusions from Grower Research**

Growers are willing and able to adapt and invest in water conservation, but feel it is largely out of their control with Irrigation Districts in the RGV holding all the cards instead. They believe that funding for modernized infrastructure improvement is an important solution, but are concerned that perceptions and lack of education will hold back efforts to get the necessary funding from State of Texas, let alone federal sources.

A tremendous amount of frustration exists over the uncertainty posed by enforcement issues around the 1944 Treaty with Mexico, as well as a strong desire to see a far more effective strategy deployed. Drip Irrigation is perceived in a positive light except that the price point is considered too high at this time. Water metering and pricing by volume is perceived as a key strategy going forward.

Growers want to see a strong communications and outreach strategy deployed to help educate and improve perceptions among the general population and especially among elected officials so that water policy and funding will advance.



**Recommendations From Grower Research**

1. Develop a more aggressive strategy regarding enforcement of the US-Mexico 1944 Treaty.
2. Obtain sufficient funding to upgrade water infrastructure.
3. Attack drip irrigation affordability problem. Good subject for workshop.
4. Consider pricing water by volume and metering to encourage and reward conservation.
5. Form an "innovation incubator" in the RGV to test new technologies.
6. Evaluate benefits of restructuring/ streamlining irrigation districts to improve consistency in pricing, water saving policies, and infrastructure upgrades.
7. Create a communication and outreach strategy that changes perceptions of farmers, "tells the RGV story," highlights success stories and statewide impacts of agriculture in order to drive water infrastructure investment.
8. Grower to grower outreach. Have growers host workshops. Partner with NRCS and other funding programs.
9. Develop more content for Texas AWE YouTube channel.
10. Focus on drip irrigation and ways to convert from flood, develop programs with financial assistance for conversion, develop infrastructure enhancements to support drip, educate growers on conversion.

BY KAREN FORD

# REVELATIONS ON AG & WATER PART TWO

Report on focus group discussions with Irrigation District Managers in the RGV\*



Automated gates at work, a game-changing improvement to aging district infrastructure.

This is the second article in a two-part series revealing the results of facilitated focus group discussions in August 2018—one with Rio Grande Valley (RGV) growers and the other with irrigation district managers. The project team sought to understand and synthesize discussions with both groups regarding the water challenges and solutions for irrigated agriculture in the RGV and the ongoing health of agriculture in this region.

In this article we present the findings from our discussions with irrigation district managers (DM) in the RGV. We recap the project's objectives and methodology and then share key findings and recommended solutions as discussed among the DMs.

*Specifically, the objectives for the focus group discussions were to:*

- Gather opinions about the future of agriculture in the RGV in relation to water availability and reliability (Rio Grande, Mexico, district services and efficiency, threats from municipal/industrial growth);
- Understand current knowledge of irrigation efficiency practices and discuss barriers to implementation;
- Identify priorities for implementation of water efficient practices;
- Determine effective communication vehicles and messages to connect with RGV growers on irrigation efficiency; and
- Utilize results to refine and enhance outreach and education to growers regarding water conservation and irrigation efficiency practices.

## Methodology & Demographics

A focus group discussion was conducted with three DMs at the Texas A&M University-Kingsville Citrus Center in Weslaco, Texas, on August 15, 2018. Within the same week, three in-depth interviews were conducted with irrigation district managers unable to attend the focus group. A total of six DMs participated on a confidential basis in order to maximize candor.

We note that each of the six participants represented a district that has recognized the need for water efficiency and infrastructure improvements and have made some of those changes with support from State and Federal grants and loans, as well as with district funds.

## Key Findings from Irrigation District Managers

### 1. Infrastructure Improvements Needed but Funding Not There

DMs believe that the greatest opportunities for water savings and efficiency are to be found in irrigation district operations. They recognize a dire need to upgrade their water management technology and make improvements to aging infrastructure, but face three critical impediments:

- *Rapid urbanization. In some counties good alluvial soils are being covered in asphalt at a very rapid pace, and those water rights are being transferred to municipalities. Once land is out of ag, it's not going back to ag. Growers in urbanizing counties may find it easier to sell than farm, and infrastructure improvements to canal systems serving farms that might not be around in five to ten years just don't make economic sense.*
- *Municipalities a priority for elected officials. The voice of agriculture is getting weaker and weaker in the halls of government. There are more votes in the cities and more elected leaders representing the dense urban populations.*
- *More competition for federal and state funds. DMs firmly believe the best water savings strategy for irrigated agriculture in the RGV is to invest in the aging infrastructure, but there are new, innovative water projects now that get more attention and funding. Lining a canal that's been around for 80-100 years is just not as "sexy".*

Thus, despite a near universal view among growers and district managers that upgrading the canal delivery infrastructure is the best way to achieve efficiency and to truly conserve water, a profound pessimism exists about the chances to capture the necessary funding. Significant infrastructure improvements have been made in the last twenty-five years with grant funding, but it was not adequate to make improvements on the scale needed.

### 2. 1944 U.S.-Mexico Treaty Needs to be Enforced as Written

Most if not all of the DMs interviewed grew up in the RGV and understand

its unique culture. Despite this, when it comes to enforcement of the Treaty, they expressed extreme frustration and anger over what they perceive as a poorly informed and/or wrong approach to protecting U.S. water rights. DMs believe stronger enforcement is paramount if irrigated agriculture in the RGV is to survive.

**3. Perception: Urbanization is More Profitable than Agriculture for both Land and Water** DMs expressed a fatalistic opinion that urbanization would likely put irrigated agriculture out of business in vast areas of the RGV. Districts that provide water to one or more municipalities may survive as water providers for municipal use, but rural districts predominantly reliant on growers may not make it on their own and may need to merge with larger districts.

**4. Need for More Sources of Water** Participants felt strongly that exploding population growth coupled with difficulty with the 1944 U.S.-Mexico Treaty fuel the need for other sources of water to be developed. Desalination, brackish water and water from other river basins were all mentioned.

### 5. Frustration with Research followed by Lack of Implementation

A perception exists that there is funding for water research in Texas, but funding to implement recommendations is not sufficient. DMs hope, generally without citing specifics, that new technologies may make it less expensive and more feasible for their infrastructure to be upgraded and for water to be conserved.

**6. Consolidation/ Streamlining of Districts is Seen as Inevitable – but on a Limited Basis** Management may be consolidated, but rate structure and physical plant operations are seen as much trickier if not impossible to merge.

**7. Labor Shortage** A lack of skilled and hard-working labor is a serious problem. DMs feel that national and state political influencers and elected officials are unrealistic about the impact of policies on the border and the effect it has in talent acquisition. Additionally, young people in the community don't understand the purpose of the canals, other than as a trash receptacle, and recruiting employees for irrigation districts is becoming more difficult.

**Solutions** When asked for ways to make irrigated agriculture in the RGV more efficient, conserve water, keep production high, and make water more reliable, the following solutions were offered by the DMs:

- *Invest in improved infrastructure for irrigation districts serving agriculture.*
- *Enforce the 1944 U.S.-Mexico Treaty at state and national levels.*
- *Look for new sources of water and new technology that will ease the uncertainty of Treaty rights, urbanization and drought.*
- *Raise awareness of the vital role irrigated agriculture plays in the RGV, to highlight successes and changes in irrigation efficiency, and to make a case for upgrades and investments in the water delivery system.*

## Conclusion

Discussion findings indicate a paradox for DMs. On the one hand, they know that saving water depends largely on costly infrastructure upgrades. On the other hand, they see rapid urbanization spelling doom for the entire agriculture industry in the RGV.

Recommended solutions from DMs parallel those of the growers. Invest in infrastructure. Enforce the 1944 U.S.-Mexico Treaty. Make implementing drip irrigation more affordable for growers. Ramp up communications and outreach to educate the public and decision-makers.



## Appendix D: Outreach



**A**griculture is the biggest driver of the economy in the Lower Rio Grande Valley. It's a \$28 billion industry that fuels thousands of jobs, supports many families, and feeds millions of mouths across our globe. Agriculture is also the number one user of water in the Valley, so imagine what might happen if we don't have enough water to irrigate our crops. The economy of the Valley could collapse from lack of water.

Agriculture researchers, with a focus on the Valley, have spent the better part of the 21st century testing and validating a wide range of water saving irrigation techniques and technologies on every crop grown in the region. Their ultimate goal was to find and demonstrate which practices save water and hold steady or increase net cash farm income. The results are in, and it's time to share.

That's why the good folks at the Texas Water Development Board have enlisted the Texas A&M AgriLife Extension Service, Texas Water Resources Institute (TWRI) and its project partners to deliver water conservation and efficiency programs to Valley growers and irrigation districts – based on the results of the past years' rigid testing in the lab, on the farm, in the district, and on the spreadsheet.

TWRI's Lower Rio Grande Valley Irrigation Education and Outreach program will spend the next year promoting water

conservation strategies among growers and irrigation district boards and managers. The programs will share the benefits and advantages of water conservation and water use efficiency of various on-farm irrigation and irrigation district water management practices, especially when compared to conventional practices.

TWRI's project partners include Texas A&M AgriLife Extension Service, Texas A&M AgriLife Research, Texas A&M University-Kingsville Citrus Center, Harlingen Irrigation District, WaterPR, and commodity group leaders in the Valley.

The project team will deliver six grower education programs in the LRGV—three irrigation training programs and three commodity-specific trainings for citrus, row crops, and vegetables. At each educational event, water conserving technology and practices, irrigation scheduling, available cost share opportunities (i.e. RCPP, EQIP, WQMPs), and other relevant information will be discussed. In addition, the project team will provide two educational programs for Irrigation District Directors and General Managers regarding use of SCADA, UAVs, on-farm BMPs, metering, automated gates, and better partnering with cost-share programs.

Adopting water conserving ag practices goes a long way toward implementing the 2016 Region M Water Plan, which calls for:

- 1) conserving water needed for future growth,



**2) ensuring the continued vitality of agriculture in the LRGV, and 3) positively affecting the Valley's economy and environment.**

Current water conservation methods such as narrow border flood, drip irrigation, and microspray have been shown to save between 26,200 and 49,000 acre-feet of water each year for the Texas citrus industry alone (Nelson et al. 2011, www.TexasAWE.org). But widespread adoption of such practices is needed to truly have an effect on fulfilling the ag water demand of 1.6 million acre-feet predicted by 2070.

According to the 2016 Region M Water Plan, an additional supply of 797,344 acre-feet per year will be needed by 2070 to support the municipal, irrigation and other water needs in the LRGV. Between 2020 and 2070, population in the region is expected to grow 106 percent. With increased municipal demands and less reliable water delivery from the Rio Grande, significant unmet irrigation needs are projected. Agricultural irrigation water demand makes up the largest share of current water demands but is projected to decrease due largely to urbanization. Water conservation by irrigation districts and growers is expected to provide 43 percent of future water needs projected for the Valley.

Given that most water rights reside with the Irrigation Districts, it is fundamental to have a partnership between farmers and irrigation districts. Further, Texas A&M AgriLife and Texas A&M

University Kingsville continue to work to develop, demonstrate, and release new methods for improving water resource management in this important region of the state. Watch for TWRI and Texas A&M AgriLife programs coming to a farm or a district near you. Make plans to participate and learn how irrigation water efficiency can offer growers proven ways to save water, enhance yields, and improve net cash farm income.

**For more information contact:  
Lucas Gregory, lfgregory@ag.tamu.edu**

The Texas Water Resources Institute, part of Texas A&M AgriLife Research, the Texas A&M AgriLife Extension Service, and the College of Agriculture and Life Sciences at Texas A&M University, fosters and communicates research and educational outreach programs focused on water resources and management issues in Texas and beyond.

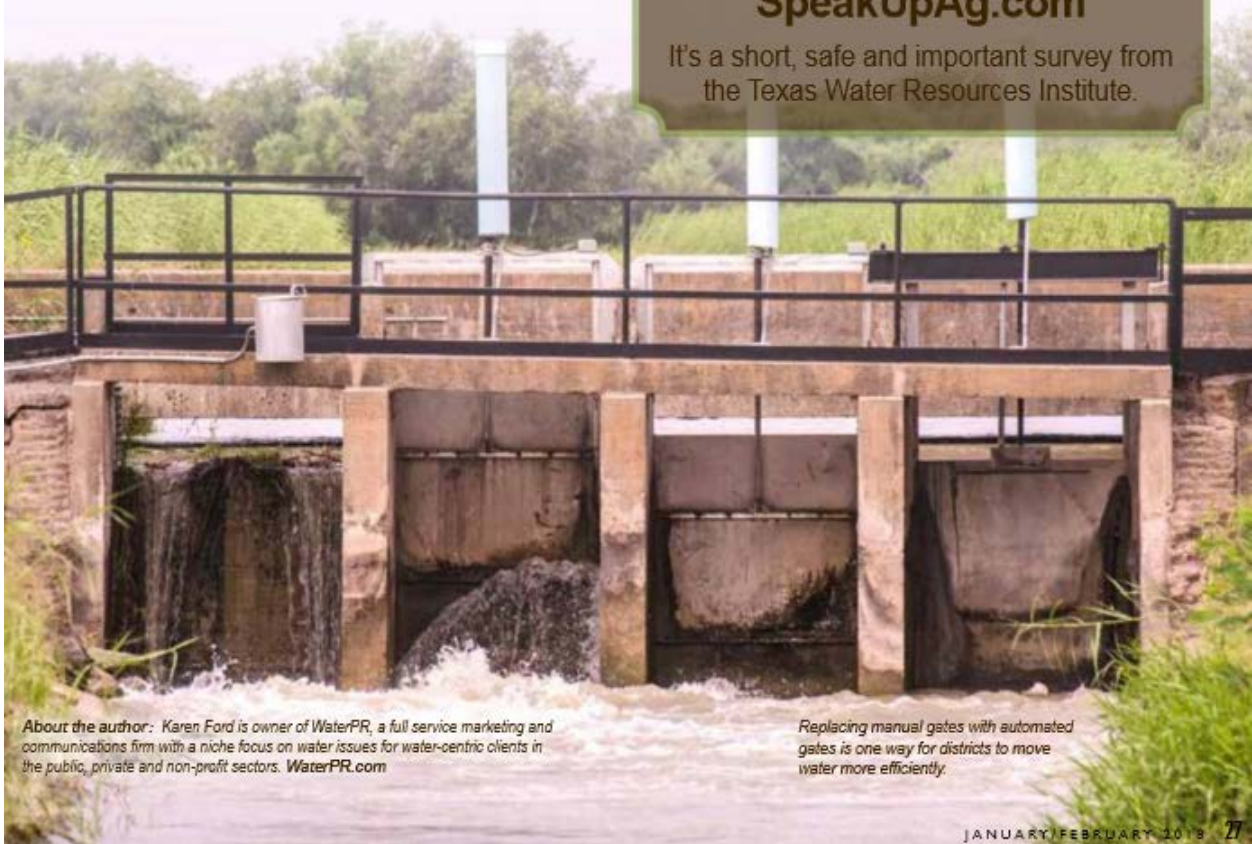
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*About the author: Karen Ford is owner of WaterPR, a full service marketing and communications firm with a niche focus on water issues for water-centric clients in the public, private and non-profit sectors. WaterPR.com*

*Replacing manual gates with automated gates is one way for districts to move water more efficiently.*





It is widely agreed that Texas' population will continue to expand, and water used for agriculture will face increasing pressures from other user groups. This is especially true in the Rio Grande Valley (RGV) with cities like Mission, McAllen and Brownsville growing most rapidly.

In the near future, both growers and irrigation districts will have to do more with less—less water that is. So a big question looms: *is it possible to maintain pack out rates and product quality while reducing irrigation water volumes?*

### The answer is YES.

And the solutions are relatively simple! Growers and researchers in the RGV worked together on a 10-year study to develop water efficient methods for cotton, citrus, sugar cane, corn and other row crops. The Texas Agriculture Water Efficiency project (Texas AWE), as implemented by the Harlingen Irrigation District, found a number of ways to reduce water use and increase crop yields, specifically in the Lower RGV.

### *What's an easily accessible way to share this irrigation efficiency information?*

Online of course! Video on YouTube was chosen as the platform to deliver irrigation efficiency research and demonstrations in the RGV to a broad audience. The "Agriculture Water Efficiency" YouTube channel is available to view now!

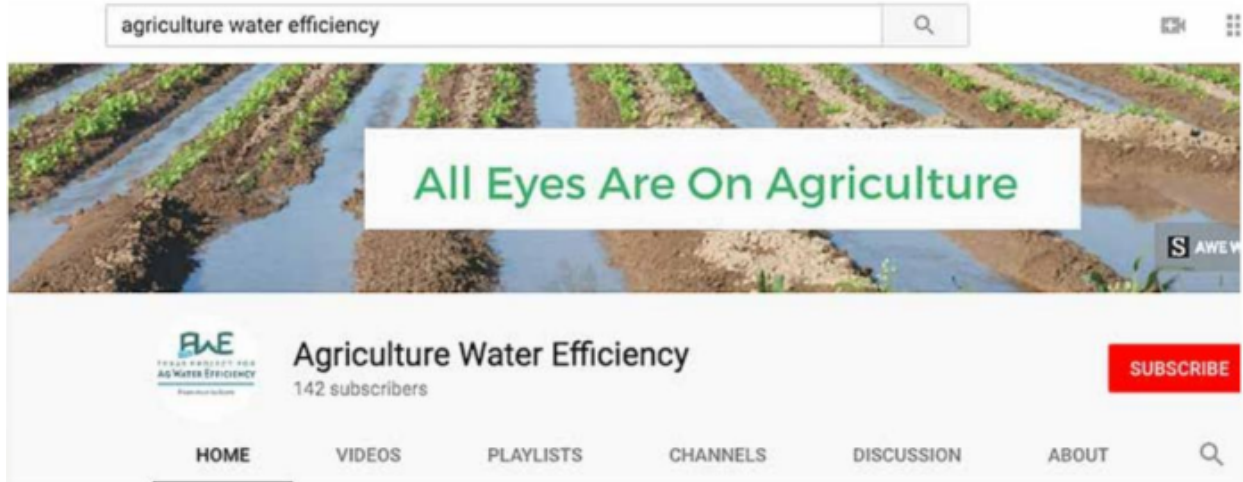
The methods highlighted on the YouTube channel are inexpensive and low maintenance. Cost efficiency and easy implementation were requirements of the watering practices during the 10-year study. Every grower can achieve simple

watering methods like surge irrigation in row crops, narrow border flood for citrus and orchard crops, and soil moisture monitoring for all crops.

The most popular video, "What is Surge Irrigation?" has 18,000 views from around the world. The surge irrigation technique uses a surge valve between two lengths of poly-pipe, and is a simple modification to furrow irrigation. The participating growers have shown that surge irrigation can use up to 52 percent less water than furrow flood irrigation in sugarcane, and 28 percent less water for seed corn. Two separate cotton studies demonstrated savings of 22 percent and 31 percent. This is something that growers can adopt now without major changes to current irrigation practices. Some even noticed a reduction in labor costs using surge irrigation.

Another YouTube video demonstrating the Narrow Border Flood (NBF) technique has more than 15,000 views across the globe. The NBF method uses about 30 percent less water than large pan flood irrigation commonly used in citrus and other laser-leveled orchards. The technique requires little to no investment in equipment and has been shown to produce higher yields and better quality fruit. Studies in the Lower RGV have shown that using NBF can result in greater income per acre. The projected annual average net cash farm income of \$1,730 per acre using NBF is more than double that associated with traditional flood irrigation.

YouTube viewers are watching the efficient irrigation methods demonstrated in the RGV from other places across the US, Australia, India, Saudi Arabia and many more countries. This information is timely and has proven useful for audiences far and wide. Go to YouTube and search for the Agriculture Water Efficiency channel now.



There is also information specifically for irrigation districts on the new YouTube channel. Water conservation and efficiency can best be achieved at the District level by using a mixture of water management best practices, automation, and technology. The channel shows how canals, automated gates, SCADA systems, and other parts of the water distribution system can save water.

Today, a team led by the Texas Water Resources Institute (TWRI), Texas A&M AgriLife Research and Extension and Texas A&M University – Kingsville Citrus Center is at work in the Valley, continuing education and outreach to growers and other irrigation districts first started by the Harlingen Irrigation District. Members of the team will be conducting focus groups this summer to learn more from local growers about best irrigation practices and common barriers to practice adoption. If you are a grower in the RGV interested in participating in these focus groups, please contact Karen Ford, [kford@waterpr.com](mailto:kford@waterpr.com).

The YouTube channel will be adding other videos in coming

months and years. If you're interested in sharing your water efficient farming practices, we'd love to highlight your operations on the YouTube channel. Please contact Karen Ford, [kford@waterpr.com](mailto:kford@waterpr.com).

The Texas Water Resources Institute, part of Texas A&M AgriLife Research, the Texas A&M AgriLife Extension Service, and the College of Agriculture and Life Sciences at Texas A&M University, fosters and communicates research and educational outreach programs focused on water resources and management issues in Texas and beyond.

**About the author:** *Sarah Houston works at WaterPR, a full-service marketing and communications firm with a niche focus on water issues. Houston spent 15 months traveling by bicycle throughout the US and Mexico connecting YouTube viewers to water sources and stories on farms and in cities. WaterPR.com*

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# Managing Salt Loading through Irrigation Practices

BY GIRISHA GANJEGUNTE, Ph.D. professor, Texas A&M University Department of Soil and Crop Sciences, Texas A&M AgrLife Center, El Paso and LUCAS GREGORY, Ph.D., senior research scientist, Texas Water Resources Institute

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Declining water quality in the Lower Rio Grande is an increasing concern for growers who rely on Rio Grande water for crop irrigation. Increasing salt content from natural and human influenced sources are the primary concern, but other contaminants such as bacteria are also problematic.

Salinity risks associated with irrigation are complex and include components such as salt concentration, sodicity hazard (measured by sodium adsorption ratio or exchangeable sodium percentage (in soil only)), and toxicity of specific ions such as boron, sodium and chlorides.

To help with salinity management, growers need to know their irrigation water's salt concentrations. Concentration of salts can be measured in two ways: (1) total dissolved solids (TDS) measured as mg/L or parts per million of salts in irrigation water or (2) specific conductance (also known as electrical conductivity (EC)). The latter is more commonly used and is a measure of water's ability to conduct electricity corrected to 25 degrees Celsius and is reported in units of micro-siemens/centimeter ( $\mu\text{S}/\text{cm}$ ). TDS is estimated from specific conductance readings by multiplying the value by 0.64. Effectively, each 1000  $\mu\text{S}/\text{cm}$  in specific conductance equals 640 ppm TDS. In irrigation water, specific conductance concentrations less than 250  $\mu\text{S}/\text{cm}$  are considered low salinity. Moderate salinity ranges from 250 to 750  $\mu\text{S}/\text{cm}$ , high values range from 750 to 2,250  $\mu\text{S}/\text{cm}$  and very high salinity is above 2,250  $\mu\text{S}/\text{cm}$ .

## Rio Grande Water Quality

In the Rio Grande, specific conductance values have always been variable due to hydrologic conditions and human influences. The last 20 years — Jan 1999 to Dec 2018 — (See Figure 1) have been no different. Specific conductance concentrations at the McAllen-Hidalgo International Bridge have ranged from 591 to 2,040  $\mu\text{S}/\text{cm}$  as reported by the Texas Commission on Environmental Quality. During this time, specific conductance has generally been trending upward; however, large variations in measured conductivity readings occur. Measured conductivity usually places the Rio Grande's quality in the high salinity category.

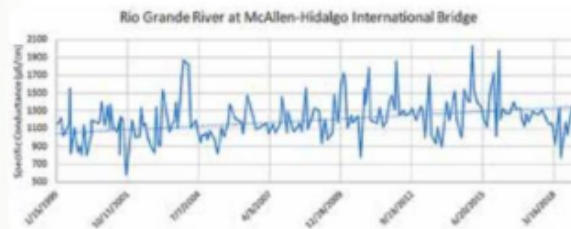


Figure 1. Long-term specific conductance concentrations at the McAllen-Hidalgo International Bridge

## Salt Loading

'Salt' loading refers to the amount of salts added to the root zone by irrigation water. Specific conductance of water applied determines how much salt loading a field receives. Increased salt loading affects a crop's growth potential and yields by reducing water uptake, reducing the availability of nutrients from fertilizers and burning leaf tips and plant parts exposed to salty water. Thus, it is important to control salt loading in irrigated fields to maintain healthy soils and higher crop yield potential.

## Irrigation-Based Salinity Management

Applying water in excess of crop needs to push salts below the effective root zone is a primary salinity management technique. The amount of additional water required to push salts below the root zone is called leaching fraction and is calculated based on the current salinity of soil, irrigation water salinity and crop salinity tolerance. An important requirement for leaching is to have soil with good drainage. However, this may not be a viable option in times of limited water availability.

## Improving Irrigation Efficiency

A simple approach to reduce the effects of 'salts' on irrigated cropland is to become more efficient with irrigation. The concept is simple: less water applied equals less salt applied. Using a typical specific conductance value seen in the Lower Rio Grande Valley (LRGV) of 1,300  $\mu\text{S}/\text{cm}$ , applying 1.5 acre-feet (AF) of irrigation water per acre per year adds 1.69 tons of salt per acre.



By decreasing irrigation volume to 1.0 AF per acre per year, salt loading is lowered to 1.12 tons per acre, a reduction of 0.57 tons per acre. While applying less water won't completely eliminate salt accumulation issues, it can slow the process. Using higher efficiency irrigation application techniques that apply less total water while meeting crop water needs can help.

### Irrigation Methods

Salt accumulation and distribution within the soil is highly dependent on the irrigation methods used. Generally, surface water application methods, such as flood/basin, furrow, sprinkler and surface drip, aid in pushing salts deeper into soils. Subtle variations in irrigation methods, such as flat bed, alternative furrow, sloping bed and skip/double row planting, can manipulate salin-

ity accumulation away from plant roots (Figure 2). Alternatively, subsurface drip irrigation leads to salt accumulation in the upper-root zone and can adversely affect crop growth if not properly managed. Beds and furrows come in many shapes and sizes. Sloping beds with seed placement at the top of the bed and furrows on 36- or 40-inch centers with irrigation applied in every furrow is common across the LRGV. In this scenario, salt accumulation largely occurs in the center of the bed where the plant and its roots are primarily located. If salt content is high enough, plant performance may suffer. Modifying bed dimensions, seed placement and irrigation approaches can mitigate salinization effects. The images in Figure 2 show common techniques for bedding, planting and irrigation modification to manage where salts accumulate relative to the crop.

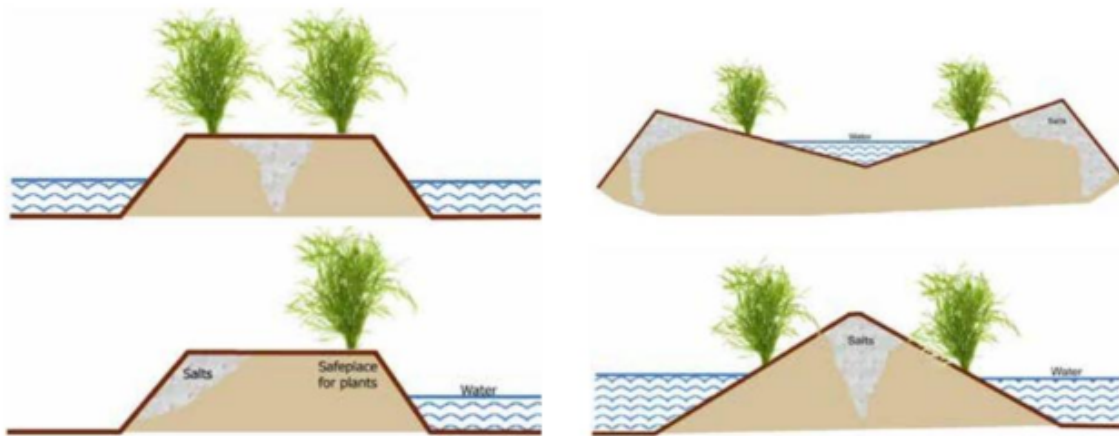


Figure 2. Clockwise from Top Left: Flat bed, double row planting, irrigate both furrows; sloping bed, single row planting on side of slope, skip-row irrigation; flat bed, single row planting, skip-row irrigation; sloping bed, double row planting, irrigate both furrows (Courtesy: Shahid, 2013).

The placement of drip lines either on the surface or sub-surface (Figure 3) also affects where salts accumulate. Similar to accumulation in furrows, salts will accumulate near the surface away from the drip line where water is applied. Surface drip lines create a plume of lower conductivity below and around the drip line. Salts accumulate between the lines near the surface. For

sub-surface drip, the depth below the surface affects where salts accumulate. Accumulation is highest between the lines near the surface, but some accumulation occurs directly above the line where plants are commonly planted. Ensuring that planting is done directly above the drip line can limit the effects of soil salinization on plant survival and performance.

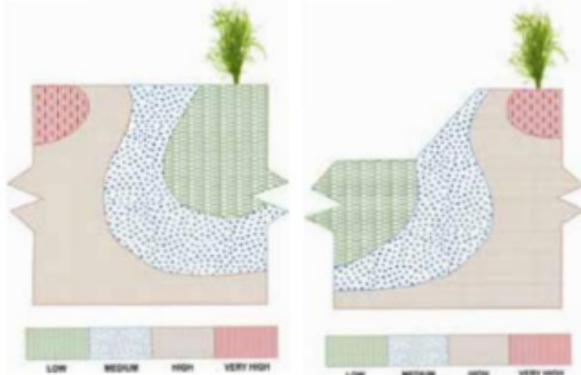


Figure 3. Salt accumulation plume under surface drip (left) and sub-surface drip installations (right). (Courtesy: Shahid, 2013)

### Less is Sometimes More

These techniques do not address the underlying issue — increasing salinity concentrations in the Rio Grande — but they do provide some ways to make the most of what you have.

Managing salt loading to your fields by applying less or making slight changes to how you apply your water may lead to improved, or at least sustain yields over time. Remember, before you can effectively manage salt accumulation, you have to know the specific conductance of your water and how much water you are applying to calculate how much salt you are applying to your fields.

## Citrus Center releases novel citrus irrigation video

October 7, 2020 / By Lucas Gregory / Citrus Center, Kingsville, irrigation, irrigation technology, water efficiency, TAMUK



The [Texas A&M-Kingsville Citrus Center](#) has developed a new video that describes a novel citrus irrigation approach that integrates multiple techniques into a planting and irrigation design ripe with plant health, yield, economic and water conservation benefits for the producer.

The new approach can be custom designed to best fit any citrus irrigation scenario and combines planting trees on raised beds and integrating permeable plastic tarping to cover the beds. Adding drip irrigation atop the beds and under the tarp combines for a high efficiency means to enhance irrigation efficiency in new citrus groves.

The primary benefit of this approach is saving precious irrigation water, but other benefits for growers include decreased disease and pest issues and better average yields and quality in the crop produced. In traditional flood irrigation settings, the combination of planting citrus trees on a raised bed with plastic tarp provides benefits to the crop by elevating the tree and keeping irrigation water off of the tree's trunk. This can reduce disease transference and potentially yield increased production.

Side-by-side trials shown in the video demonstrate a noticeable difference in tree vigor and production between flood irrigated raised bed trees with and without permeable plastic tarp. Jose Silva, general manager of Edinburg Citrus Grove Care, discussed the importance of permeable plastic tarp for weed suppression advantage over plantings without tarping, thus reducing water use, competition for nutrient resources and grower costs for weed control.

Integrating drip irrigation into the raised bed plantings with permeable plastic tarp has also proven effective in other ways. Growers that have implemented this approach have reported water savings of 25-35% compared to drip irrigated trees without permeable plastic tarp. An additional benefit of drip irrigation is that the grower has better control when water, and also nutrients, pesticides or other applied products, are delivered to the trees all with a lower water application than traditional flood irrigation.



Jud Flowers, owner and manager of Lone Star Citrus Growers in Mission, noted another benefit of drip irrigated, raised-bed elevated trees during summer months when south Texas is susceptible to hurricanes or heavy rainfall events. The drip irrigated orchards result in lower localized water tables than flood irrigated orchards, which in turn produces less risk to the orchard from long-standing water in the field after storm events.

Although drip irrigation combined with raised beds and permeable plastic tarp is an increased capital investment upfront, the many benefits it provides usually offset these costs in the long run. Weed control, irrigation water savings, and lower labor costs combined with commonly realized fruit yield and quality increases factor into the positive economic benefits that the grower can expect if they are considering this novel planting design for new citrus groves.

Adoption of this new raised-bed with permeable plastic tarp planting design by growers is occurring rapidly in the Lower Rio Grande Valley for those investing in new citrus orchards. [Shad Nelson, Ph.D.](#), professor and dean of the Dick and Mary Lewis Kleberg College of Agriculture and Natural Resources at Texas A&M Kingsville said, "raised-bed with permeable plastic tarp planting concept is adaptable to other orchard species as well, and has potential to greatly minimize weed and disease pressures, and enhance water savings and fruit production in other crops like pecans, olives, avocados, and other fruit and nut trees."

The video was produced as part of the Lower Rio Grande Valley Irrigation Education and Outreach program and the Development of a Novel Planting Design and Irrigation Strategy for Water Use Efficiency and Conservation in Citrus project, both funded by grants from the Texas Water Development Board.

Watch the video, titled [How raised-beds improve citrus irrigation efficiency](#), available on YouTube.





# NOVEL CITRUS IRRIGATION:

## *“How Raised-beds Improve Citrus Irrigation Efficiency”*

BY LUCAS GREGORY



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he Texas A&M Kingsville has developed a new video that describes a novel citrus irrigation approach that integrates multiple techniques into a planting and irrigation design ripe with plant health, yield, economic, and water conservation benefits for the producer. The new approach can be custom designed to best fit any citrus irrigation scenario and combines planting trees on raised beds and integrating permeable plastic tarping to cover the beds and drip irrigation atop the beds and under the tarp combines for a high efficiency means to enhance irrigation efficiency in new citrus groves.

The primary benefit of this approach is saving precious irrigation water, but other benefits for growers include decreased disease and pest issues and better average yields and quality in the crop produced. In traditional flood irrigation settings, the combination of planting citrus trees on a raised bed with permeable plastic tarp provides benefits to the crop by elevating the tree and keeping irrigation water off of the tree's trunk. This can reduce disease transference and potentially yield increased production.

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Integrating drip irrigation into the raised bed plantings with permeable plastic tarp has also proven effective in more ways than one. Growers that have implemented this approach have reported water savings of 25 - 35% compared to drip irrigated trees without permeable plastic tarp.

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**The video titled "How Raised-beds Improve Citrus Irrigation Efficiency" is available on YouTube at:**  
<https://www.youtube.com/watch?v=x-knybLF1JkE>