Lower Rio Grande Valley Irrigation Education and Outreach Program

Texas Water Development Board Project Contract No. 1613581996

Prepared by:
Lucas Gregory
Texas A&M AgriLife Extension Service, Texas Water Resources Institute
578 John Kimbrough Blvd., 2260 TAMU
College Station, Texas 77843-2260

Contributors:
Shad Nelson\textsuperscript{1}, Catherine Simpson\textsuperscript{1}, Mac Young\textsuperscript{2}, Ray Prewett\textsuperscript{3}, Karen Ford\textsuperscript{4}
\textsuperscript{1}Texas A&M University-Kingsville Citrus Center
\textsuperscript{2}Texas A&M AgriLife Extension Service – Retired
\textsuperscript{3}Independent Agriculture Issues Consultant
\textsuperscript{4}WaterPR

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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.
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.)
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).
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 25th, 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 25th 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.
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

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

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**

<table>
<thead>
<tr>
<th>Social Media Platform</th>
<th>Posts/Tweets</th>
<th>Reach</th>
<th>Engagements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>15</td>
<td>4,578</td>
<td>396</td>
</tr>
<tr>
<td>Twitter</td>
<td>27</td>
<td>17,104</td>
<td>206</td>
</tr>
<tr>
<td>Instagram</td>
<td>3</td>
<td>35</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**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 in increased video views.

![YouTube Video Views](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

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

*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
  o 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.
  o 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).
  o 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
Citrus grower education program slated for May 9 in Mission

Program will focus on practical aspects of new water conservation technologies

Contacts: Lucas Gregory, 979-845-7369, LGregory@ag.tamu.edu
Shad Nelson, 361-593-3712, shad.nelson@tamuk.edu
Brad Cowan, 956-383-1026, 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.

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.
“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.

-30-
Advances in Vegetable Irrigation

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

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 Vandevert, Sostena
10:00 am  Agency Resources and Cost share programs
-  EQIP and Other NRCS programs – Ot Longoria, NRCS – San Benito
-  319 and 503 program – Ronnie Ramirez, TSSWC9 – 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

Practical aspects of new water conservation technologies to be highlighted

Contact Lucas Gregory, 979-845-7669, LGregory@ag.tamu.edu
Brad Cowan, 956-383-1025, 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 Enrico, 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 unit.”

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.

-30-
Improving Cotton and Row Crop Yields with Efficient Irrigation

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 10th at: [http://twri.tamu.edu/irrigation](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
Brad Cowan, 956-383-1026, 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 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.

-30-
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. 18 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 Research (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 26-40 percent less time to place fuel and water, with a $10 per acre savings over traditional use of polypipe. Used on a regularly 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 programmed to eliminate tailwater runoff if needed.

“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.”

**Soil moisture sensors**

Kruz 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 $3.20 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.

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.”

Kruz 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.”

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 TVAC’s Lower Rio Grande Valley Irrigation Education and Outreach project, funded by the TVACB. 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, Hartlingen 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, NRCS, Corpus Christi
Rethink citrus irrigation if you are replanting

By Lucas Gregory

What 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-band 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://twin.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.
Irrigation Training Programs

Maverick County
Agricultural Irrigation Field Day

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

Contacts: Lucas Gregory, 979-845-7869, LFGregory@ag.tamu.edu
Oscar Galindo, 830-773-5064, 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.

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

Cameron County San Benito Annex: Extension Meeting Room
1390 W. Expressway 83, San Benito, TX
September 25th, 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 20th at http://twri.tamu.edu/irrigation

Program Agenda

12:15  Registration & Light Refreshments

12:30  Welcome and Introductions
Dr. Lucas Gregory, Texas Water Resources Institute

12:40  Irrigation Scheduling Tools and Approaches
Dr. Dana Porter, Texas A&M AgriLife Extension Service, Biological and Agricultural Engineering

1:15  Irrigation Management and Technologies Panel
Mr. Danny Sosebee, Netafim USA
Mr. Jeffery Kleypas, Toro Irrigation
Mr. Ken Whitley, Trelia, Inc.

2:00  Economics and Value of Irrigation Water
Dr. Luis Ribera, Texas A&M Agricultural Economics

2:30  Networking Break and Refreshments

2:45  TWDB TexMesonet Overview
Leyon Greene, Texas Water Development Board

3:00  NRCS Technical and Financial Assistance Opportunities
TBD, NRCS District Conservationist

3:10  TSSWCB Technical and Financial Assistance Opportunities
Mr. Ronnie Ramirez, TSSWCB Conservation Planner

3:20  Salinity Management in Irrigation Water
Dr. Girish Garejgurdeo, Texas A&M Soil and Crop Sciences

4:05  Chemigation and Fertigation Irrigation Options and Considerations for Growers
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 Closner Blvd. Edinburg, TX
September 26th, 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 20th 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 Kieyпас, 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 Ganjegunte, 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

SAN BENITO – The Texas Water Resources Institute, 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 and the Texas Water Development Board.
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.


— 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 WYTHER

Rio 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, 1320 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, Telis, Inc.; irrigation management and technologies panel.

- Dr. Luis Ribera, AgriLife Extension, Agricultural Economics; economics and value of irrigation water.

- Leyon Greene, TWDB, TWDB TexMasonet 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 Ganjegunte, 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

Irrigation Training Program for the Lower Rio Grande Valley

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
9th 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 Rodrigues, 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 Fliggs, 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?
Dr. Gay 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
- Dymax Inc
- Jain Irrigation, Inc.
- Amos Sales
- Triad Inc. (DomSurge Valves)
- Texas Water Development Board
- Ewing Irrigation
- Irrigation-Mart
- Netafim USA
- Delta Plastic
- Toro Micro-Irrigation
- Eco-Drip
- CropX
- Andros Engineering
- P&R Surge Systems, Inc
- SWISH

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 Agricultural Irrigation Association
Texas A&M Agrilife Extension

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, 361-6334
Matthew Rodrigues, County Extension Agent-Agriculture, Willacy County, 689-2412
Dr Gay 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 8th to reserve your seat. Contact Lucas Gregory at LFGregory@ag.tamu.edu or 979-845-7869 to RSVP.

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>8:00 – 8:30 am</td>
<td>Meet at Casa De Palmas Hotel 101 North Main St., McAllen, TX Park in Hotel Garage and meet at bus for tour</td>
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<tr>
<td>8:30 am</td>
<td>Depart hotel via bus</td>
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<tr>
<td>9:00 – 9:45 am</td>
<td>Tour the Old Hidalgo Pumphouse Museum 902 S. 2nd Street, Hidalgo, TX Self-guided tour of museum with historic pictures/captions and info about the rise of agriculture and early irrigation in RGV</td>
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<tr>
<td>10:00 am</td>
<td>Depart Old Hidalgo Pumphouse Museum via bus</td>
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<tr>
<td>10:30 am</td>
<td>Arrive at Vegetable Bldg, Texas A&amp;M Research &amp; Extension Center 2401 E. Business 83, Weslaco, TX</td>
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</table>
| 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 Palmars 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.
LRGV Irrigation Management Modernization
Challenges and Opportunities

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

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 Ganjegunte, 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 Klosterman, 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

Will focus on challenges, opportunities of system modernization

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

BY LUCAS GREGORY
AND KATHY WYTNE

An 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., 22061 N. Farm-to-Market Road 96.

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://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.

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 Axion 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.
Isaas 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. Girihsa Ganjugunte, 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 Hallbert 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.
Appendix C: Focus Group

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

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/

January 5, 2018

Producers, water district personnel requested to participate in survey

Writer: Paul Schattenberg, 210-859-5752, paschattenberg@ag.tamu.edu

Dr. Lucas Gregory, 979-845-7869, 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.

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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 Map. Here, we provide a brief recollection 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 next grant 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 practices understanding; discuss barriers to implementation
- Define growers’ 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 52 and an age range from 24 to 65 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 piling 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 do not affect prior generations as dramatically, including:

- Interest in global market contracting
- Higher volume of crop imports than exports
- Expectation that food products will be delivered “cheaper and cheaper”
- Shift in finance to a “cost upfront” model, where largest investment comes before the seed is in the ground
- The transition from family farms to corporate farms
- A feeling that no real support for farming occurs 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 expand 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 irrigate
- 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 free (due to need for small volumes of water over long periods of time vs large volume for short periods).

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 same and pressure for water efficiency 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 spell 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 rights 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.
- Revolve the “blanket allocation” and gradually increase the price with each irrigation cycle.
- Merge the current 16 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 barns”, “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 fair 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.

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**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. (This is a difficult task, but is crucial.)
8. Grower to grower outreach. Have growers host workshops. Partner with NRCS and other funding programs.
9. Develop more content for Texas A&M 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.
REVELATIONS ON AG & WATER PART TWO

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

This is the second article in a two-part series revealing the results of facilitated focus group discussions in August 2016—one with Rio Grande Valley (RGV) growers and the other with irrigation district managers. The project team sought to understand and synthesize discussions in 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 (IDM) in the RGV. We recap the project’s objectives and methodology and then share key findings and recommended solutions that were 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 impacts on municipal/industrial growth);
- Understand current knowledge of irrigation efficiency practices and obstacles 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-Ingleside Citrus Center in Weslaco, Texas, on August 16, 2016. Within the same week, those in-depth interviews were conducted with irrigation district managers unable to attend the focus group. A total of six DMs participated in a confidential setting in order to maximize comfort.

We note that each of the six participants represented a district that has recognized the need for water efficiency and infrastructure improvements and has 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 the dire need to upgrade their water management infrastructure and make improvements to aging infrastructure, but face three critical impediments:

   - Rapid urbanization. In some counties, good agricultural soils are being covered 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. These 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. Leaking a canal that’s been around for 50-100 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 grow 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 hateful opinion that urbanization would likely outpace 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 exploiting 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 implemented 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 a Limited Bais. 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 on 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 becomes more difficult.

Solutions: When asked for ways to make irrigated agriculture in the RGV more efficient, conserve water and 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 oozly infrastructure upgrades. On the other hand, they see rapid urbanization spilling 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.

By Karen Ford

16. AgMag THEAGMAC.ORG
Appendix D: Outreach

Irrigation Efficiency is the Future

By Karen Ford

Agriculture is the biggest driver of the economy in the Lower Rio Grande Valley. It's a $26 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 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 EMPS, 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 25,200 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 TWR 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.

**ATTENTION GROWERS & DISTRICT BOARDS/STAFF**

*We want to know what you think!*

Please participate in our online survey.

**SpeakUpAg.com**

It's a short, safe and important survey from the Texas Water Resources Institute.

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*About the author: Keran 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 peak cut 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 polylype, 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. 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.

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 U.S. and Mexico connecting YouTube viewers to water sources and stories on farms and in cities. WaterPR.com
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 AgriLife Center, El Paso and LUCAS GREGORY, Ph.D., senior research scientist, Texas Water Resources Institute

Contact: Girisha Ganjegunte, 915-859-1908 ext. 2 gganjegunte@ag.tamu.edu Lucas Gregory, 979-845-7869 lfgregory@ag.tamu.edu

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, toxicity (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 per centimeter (μS/cm). TDS is estimated from specific conductance readings by multiplying the value by 0.61. Effectively, each 1000 μS/cm in specific conductance equals 640 ppm TDS. In irrigation water, specific conductance concentrations less than 250 μS/cm are considered low salinity. Moderate salinity ranges from 250 to 750 μS/cm, high values range from 750 to 2,250 μS/cm and very high salinity is above 2,250 μS/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 561 to 2,040 μS/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.

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 effects 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 equates less salt applied. Using a typical specific conductance value seen in the Lower Rio Grande Valley (LRG) of 1,300 μS/cm, applying 1.5 acre-feet (AF) of irrigation water per acre per year adds 1.59 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/alternate row planting, can manipulate salt 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 48-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 slope; skip-row irrigation; flat bed, single row planting; skip-row irrigation; sloping bed; double row planting, irrigate both furrows. (Courtesy: Shapir, 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.

Less is Sometimes More

These techniques do not address the underlying issue — increasing salinity concentrations in the Hig Grados — 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.

Figure 3. Salt accumulation plume under surface drip (left) and sub-surface drip installations (right). (Courtesy: Shapir, 2013)
Citrus Center releases novel citrus irrigation video

October 7, 2020 / By Lucas Gregory / Citrus Center, Kingsville, irrigation, irrigation technology, water efficiency, TAMU-K

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 tarps 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 increase 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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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