Quarterly Progress Report
Texas Water Development Board Contract
2004-358-005

Quarter No. 1 from 10-1-04 through 3-15-05

Overview

In this project, the Texas Water Resources Institute (TWRI) publicized and administered a wide-ranging request for proposals to encourage scientists and Extension professionals from the Texas A&M University System to compete for funds provided through the Texas Water Development Board.

TWRI announced the RFP in December 2004 and circulated it to all the universities in Texas that have academic programs in agriculture. In January 2005, TWDB staff and colleagues ranked and scored eligible proposals.

Listing of Funded Projects

1. James Bordovsky, Texas Agricultural Experiment Station at Plainview. "Equipment Installation for the Evaluation of Crop Row Direction and Offset Distance from Subsurface Drip Irrigation." $10,000.

2. John Jifon, Texas Agricultural Experiment Station at Weslaco. "On-Farm Volumetric Measurement of Irrigation Water Use as a Best Management Practice Tool for Water Conservation in Drip Irrigated Vegetables." $10,000.

3. Allen Knutson, Texas Agricultural Experiment Station at Dallas. "Implementing Biological Control of Saltcedar in the Upper Colorado River Watershed." $9.577.

4. Leonardo Lombardini, Texas A&M University Horticulture Science Department. "Irrigation Scheduling in Pecan Orchards Using a Soil Water Balance Model." $9,732.

5. G.J. Michels, Texas Agricultural Experiment Station at Bushland. "Biological Control of Saltcedar at Lake Meredith, Texas." $6,776.

6. Genhua Niu, Texas Agricultural Experiment Station at El Paso. "Determining Plant Water Use and Crop Coefficients of Selected Nursery and Landscape Plants." $9,425.

7. Genhua Niu, Texas Agricultural Experiment Station at El Paso. "Impacts of Drought on Salinity Tolerance of Landscape Woody Plants Irrigated with Reclaimed Wastewater." $9,425.

8. Bobby Stewart, West Texas A&M University. "Seeding Dryland Grain Sorghum in Clumps to Decrease Tillering and Increase Grain Yield." $9,500.

Progress/Activities

TWRI is now working with the Contracts and Grants Office of the Texas Agricultural Experiment Station to execute contracts for each project. When completed, copies of these contracts will be forwarded to TWDB. TWRI anticipates that all contracts will be completed and signed by April 15, 2005.

TWRI is now working with each project leader to develop work plans with specific timetables, deliverables and outcomes for each project. When completed, these work plans will be forwarded to TWDB.

The Institute will post proposal for each project on the Institutes Web site at http://twri.tamu.edu.

Throughout this process, TWRI publicize the work being accomplished through these projects in Institute newsletters and press releases developed by the Texas A&M University Agricultural Communications Department.

For each project, TWRI will work with Extension specialists and county Extension agents to ensure that stakeholders are aware of the research and, where practical, have opportunities to observe and participate in these studies. This will often include making local agencies, other stakeholders, and the public, aware of field days and demonstrations.

At the completion of each project, TWRI will work with project leaders to develop a final completion report for each study. These final reports will be published on the TWRI website and will be sent to TWDB in both printed form and as Acrobat PDF files.

Appendix A
Brief Abstracts for TWRI-funded Projects

1. James Bordovsky. "Equipment Installation for the Evaluation of Crop Row Direction and Offset Distance from Subsurface Drip Irrigation."

This project seeks to quantify how the use of drip tape irrigation laterals affect cotton germination, yield, and water use efficiency, The study will also examine how the lateral direction (i.e., perpendicular vs. parallel) of drip tape irrigation systems influences soil compaction, cotton germination, yield and water use efficiency. This project will be carried out on five acres at the Texas Agricultural Experiment Station (TAES) research site at Halfway, on the Texas High Plains. This state-of-the-art drip irrigation system will be installed in 2005 and the first crops will be irrigated with this drip technology in the 2006 growing season. Contact for Bordovsky: j-bordovsky@tamu.edu or 806-889-3315.

2. John Jifon, "On-Farm Volumetric Measurement of Irrigation Water Use as a Best Management Practice Tool for Water Conservation in Drip Irrigated Vegetables."

This project is a joint effort of John Jifon (the lead investigator) and Robert Wiedenfeld and Juan Enciso (all of the Texas A&M University Agricultural Research and Extension Center at Weslaco). The study will use water meters to precisely quantify water use in the fields of cooperating vegetable growers where subsurface drip tape is used to provide crop irrigation. Experiments will be conducted in vegetable production fields in the region's irrigation districts (i.e., Mercedes, Harlingen, etc.) and at the Texas A&M University Agricultural Research and Extension Center at Weslaco. Information gained from this project will provide accurate estimates of crop water use efficiency and will yield insights into the amount of water that can be saved through the use of drip irrigation. Initial studies will quantify the water use of musk melons, while subsequent experiments will describe the water use of peppers, onions, and other high value crops. The project hopes to show agricultural producers that sub-metering water applied for irrigation is affordable and will result in increased benefits. Contact for Jifon: jljifon@agprg.tamu.edu or 956-968-5585.

3. Allen Knutson. "Implementing Biological Control of Saltcedar in the Upper Colorado River Watershed." $9.577.

In this project, a biological control program will be developed and tested to suppress saltcedar infestations in West Texas. This project will evaluate the extent to which an exotic beetle may be effective in consuming saltcedar foliage. The idea is that removing saltcedar (an invasive species that consumes large amounts of water) has the potential to create additional water supplies for beneficial uses. This effort will release the saltcedar leaf beetle along saltcedar-infested areas and mud flats along the banks of the Colorado River in the vicinity of the town of Big Spring. Funds provided by TWDB will allow the research team to expand upon previous efforts and implement and monitor an extensive campaign to raise a viable stock of beetles, deploy them, and track their effectiveness at

lessening saltcedar populations. The beetles will be placed in cages in locations of the river basin where saltcedar is a pressing concern. The location of the beetles and their effectiveness in devouring saltcedar will be tracked with geographic information systems and global positioning systems. This work is a truly cooperative effort and will integrate a team of scientists from the Colorado River Municipal Water Authority, the U.S. Department of Agriculture Research Service (USDA-ARS), and Extension agents in Borden and Howard counties. Contact for Knutson: a-knutson@tamu.edu. 972-952-9222.

4. Leonardo Lombardini. "Irrigation Scheduling in Pecan Orchards Using a Soil Water Balance Model."

This proposal aims to develop an alternative method to schedule irrigation in pecan orchards through the use of a soil water balance model. Initial testing will be conducted at the Texas A&M University Pecan Experimental Orchard near College Station. Water content will be measured using soil moisture probes and access tubes will be placed near the trunks of pecan trees. The soil water balance model requires inputs about how much water the soil can hold, the volume of drainage that is expected, and the quantity of water available for root uptake. Once the model is developed, it will be validated in pecan orchards so it can be used in different regions and climate conditions. Through this study, researchers hope to better estimate processes that account for water availability and water use in pecan orchards, thus leading to best management practices for water conservation. This project will include close collaboration between Lombardini and researcher Bruno Basso of the University of Bassilicata in Italy. Contact for Lombardini: l-lombardini@tamu.edu or 979-458-8079.

5. G.J. Michels, "Biological Control of Saltcedar at Lake Meredith, Texas."

This project seeks to determine if the establishment of the saltcedar beetle (Diorhabda elongata) can be a successful biological control for saltcedar in the Canadian River near Lake Meredith. The study will also investigate the extent to which the use of this beetle may be a viable method to treat saltcedar at locations throughout the Canadian river watershed. Finally, this effort will initiate long-term studies to incorporate a set of technologies and management strategies to control saltcedar, including biological methods and the controlled burning of saltcedar trees. This study is a collaborative effort between TAES scientists and professionals with the U.S. Bureau of Reclamation and the U.S. Fish and Wildlife Service. Objectives of this study are to monitor sites where saltcedar beetles were released in 2004 to determine if populations of this insect have increased. The research team will also observe the extent to which the use of these beetles has impacted saltcedar concentrations. Throughout the summer of 2005, when numbers of saltcedar beetles are expected to increase, samples of beetles will be collected and their locations will be mapped. After partnering agencies (i.e., the Colorado River Municipal Water Authority and the National Park Service) carry out a controlled burn of saltcedar this summer, the researchers will test the extent to which these beetles colonize areas where this treatment has been applied. Results of this project can provide insights about the extent to which biological controls may hold promise for treating saltcedar throughout the Texas High Plains. TAES research assistants Johnny Bible and Vanessa Carney will

work with Michels in this effort. Contact for Michels: g-michels@tamu.edu or 806-354-5806.

6. Genhua Niu. “Determining Plant Water Use and Crop Coefficients of Selected Nursery and Landscape Plants.”

This project will be led by Genhua Niu of the Texas A&M University Agricultural Research and Extension Center in El Paso. Collaborators include researchers Raul Cabrera, Cynthia McKenney, and Wayne Mackay of the Texas A&M University Agricultural Research and Extension Center in Dallas. The objective of this study is to determine the water use and crop coefficients of selected landscape plants that are now commonly used in urban landscapes in Texas. The project will also compare how water use in landscape plants grown in El Paso may differ from plants used in landscapes used in the Dallas area. The investigation will also explore how the process of growing young plants in containers may affect water use. The study will monitor the water use of seven woody ornamental plants that are widely used in Texas landscapes. Monitoring data will be used to estimate evapotranspiration and to develop crop coefficients. Results will be disseminated to the nursery industry and consumers through reports, fact sheets, and reports. Contact for Niu: gniu@ag.tamu.edu or 915-859-9111.

7. Genhua Niu. “Impacts of Drought on Salinity Tolerance of Landscape Woody Plants Irrigated with Reclaimed Wastewater.”

The goal of this study is to evaluate the relative salinity tolerance and water use of selected shrubs and trees under well-irrigated and drought-stressed conditions. The project will evaluate salinity stress among a number of ornamental plants and trees including aromatic sumac, black cherry, hackberry, lacebark elm, Russian olive, sand cherry, sand plum, sawtooth oak, shumard oak, and smooth sumac. Seedlings will be potted into containers and subjected to four salinity treatments. Water use and plant growth will be monitored and measured. Evidence of salt stress will be documented. This project has a significant potential to benefit water users as well as water providers that are considering utilizing alternative sources of water with high salinity levels (i.e., reclaimed wastewater or brackish ground or surface water). Results of this project will provide data about how well these ornamental plants and trees thrive under fresh and saline water conditions as well as how water supplies of varying quality may affect plant survival and water use. Contact for Niu: gniu@ag.tamu.edu or 915-859-9111.

8. Bobby Stewart. “Seeding Dryland Grain Sorghum in Clumps to Decrease Tillering and Increase Grain Yield.”

In the process of plant growth, grain sorghum strands grown under dryland conditions often produce up to three tillers that plants utilize to obtain water and nutrients. However, dryland agricultural producers risk the threat that soil moisture may be lacking late in the growing season, thus increasing the possibility that grain sorghum tillers may produce little or no grain. The objective of this study is to determine if planting grain sorghum plants in clumps or groups may reduce tillering, thus perhaps reducing water use during

the vegetative growth stage and making more water available during the critically important grain-filling period. This investigation will be carried by Stewart, researcher Clay Robinson, and graduate student Sriama Krisnareddy in greenhouses on the campus of West Texas A&M University. Four cultivars of grain sorghum will be seeded in greenhouse containers. In some containers, plants will be grown in clumps while in others plants will be separated. Experiments will monitor water use, the extent to which tillers form, and various factors associated with plant growth. The study is expected to provide insights into how growing grain sorghum plants in clumps may affect tillering and water use. As more of the Texas High Plains considers shifting from irrigated to dryland or rainfed crop production, this study will provide agricultural producers with the knowledge they need to more successfully grow crops in water-limited circumstances. Contact for Stewart: 806-651-2299 or bstewart@mail.wtamu.edu.