Rio Grande Basin Initiative

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Giant Cane Invasion

Researchers and economists investigate biological controls

by
Danielle Supercinski

Researchers are investigating biological controls for giant cane (*Arundo donax*), a non-native invasive weed, which has formed dense thickets lining Lower Rio Grande Basin waterways, exhibiting a fast growth rate and consuming large quantities of already limited water supplies.

"Giant cane presents a severe threat to agro-ecosystems and riparian areas where it chokes river sides and irrigation channels, consumes excessive amounts of water, displaces native plants and reduces wildlife habitat," said Dr. John Goolsby, research entomologist with the U.S. Department of Agriculture–Agricultural Research Service (USDA–ARS) at Weslaco.

"In addition, giant cane serves as a protective cover to those that would enter the United States illegally, including potentially those who would harm the country," said Dr. Ron Lacewell, economist with the Texas A&M University (TAMU) Department of Agricultural Economics.

Giant cane can thrive in dry ditches and flooded drainages with varying water resource availability. Despite its proximity to water resources, direct estimates of giant cane water consumption are lacking.

"There is a strong need to quantify transpiration in this species and to better understand how stresses such as herbivory and drought alters water consumption," said Dr. Georgianne Moore, assistant professor in the TAMU Department of Ecosystem Science and Management.

Giant cane (Arundo donax), a non-native invasive weed, forms dense thickets lining Lower Rio Grande Basin waterways, quickly spreading and consuming large quantities of water.

A team of scientists and specialists are conducting giant cane work in the Rio Grande Valley with various collaborative ties.

Moore's research focuses on conserving water through biological control of giant cane in the Lower Rio Grande Valley as a component of the *Efficient Irrigation* Rio Grande Basin Initiative (RGBI) project. During 2006-2007, year one of the RGBI giant cane project, researchers reared prospective biological agents for giant cane, and graduate student David Watts began work to estimate daily water loss per unit area in infested plants. In addition, he is measuring transpiration rates of existing giant cane stands within the riparian area of the Rio Grande Basin to determine the amount of water used. In the future, successful use of biological control may lessen the impact giant cane has on the landscape, both in terms of reduced competition with native plants and reduced water consumption.

Other researchers and specialists are also focusing on the problems giant cane is causing for the basin. Goolsby and his research team are researching three beneficial insects – *Tetramesa romana* (wasp), *Cryptonevra* (fly) and *Rhizaspidiotus donacis* (root scale) – for potential biological control of the plant.

"Three prospective agents collected from Europe are being reared in quarantine facilities in Texas," Moore said. "Rhizomes from giant cane have been collected in the Lower Rio Grande Valley and are being propagated in pots for greenhouse experiments."

Moore said insect agents successfully fed on potted giant cane in the initial trials. Sufficient-sized colonies of the wasp in particular have been gathered to conduct greenhouse experiments, which began in spring 2007.

"The focus of year two of this project will be to expand current greenhouse and field studies to investigate the interactions between herbivory and

Emily Seawright, agricultural economics student technician, uses a microscope to examine one of the insects being studied to biologically control giant cane.

drought," Moore said. "We will also investigate temporal variability in transpiration and productivity throughout the growing season. This is an important next step toward predicting water use under the wide range of growing conditions in the Rio Grande Basin and toward finding an effective biological control agent."

Department of Agricultural Economics personnel are conducting additional RGBI efforts on giant cane. The economists include Dr. Ron Lacewell, assistant vice chancellor for agriculture and life sciences; Dr. Ed Rister, professor and associate department head; Allen Sturdivant, Extension associate–risk management; and Emily Seawright, student technician. Texas Cooperative Extension, Texas Agricultural Experiment Station and Texas Water Resources Institute are also key collaborators in these efforts.

RGBI economists are developing growth models representing the plant's height, density and area of spread to project future cane infestations without any control. Subsequent to the development of these models, a monetary value associated with the water loss, due to uncontrolled growth of giant cane, will be estimated.

"After the safety and efficacy of the beneficial insects have been fully researched, projections will be estimated of the reduction in giant cane growth due to the biological control," Seawright said. "Subsequently, the net water savings with the control of giant cane will be calculated, allowing the potential value of introducing the beneficial organisms into the Rio Grande Basin to be determined."

Economists anticipate estimating the potential lost economic activity to the Basin from the giant cane invasion, and the economic and financial benefits (dollars per acre-foot) of adding water to the agro-ecosystem through management of this exotic weed via beneficial pests.

"Giant cane's water consumption prevents the potential use of water toward agricultural crops which produce economic activity," Sturdivant said. "The estimated net costs and benefits of a management program, which adds water (by reducing giant cane), can be calculated and compared to other measures that add (or save) water."

In collaboration with USDA–ARS, the economists will investigate and perform economic analyses associated with a potential management program for controlling giant cane. Currently, research on these topics is under way through RGBI, USDA–ARS and numerous other researchers with an explicit objective to save/add water to the region by reducing giant cane.

Infected giant cane samples from Europe are transported to Texas for testing by Dr. John Goolsby, USDA-Agricultural Research Service at Weslaco.

Photos courtesy of Georgianne Moore, Allen Sturdivant and Ed Rister

New Mexico CoCoRaHS

Volunteers measure and map precipitation in their community

by
Leeann DeMouche

New Mexico's unique geography and climate have allowed the state to become one of the most productive agricultural regions in the United States. The mountains of Colorado and New Mexico capture and store winter precipitation that is then used for summer irrigation in upper and lower valleys along the Rio Grande.

New Mexico's Rio Grande Basin is experiencing rapid population growth, development of the rural countryside and decreasing municipal groundwater supplies. Residential or lifestyle agriculture is widespread in the areas irrigated by the Rio Grande and is practiced by both newcomers and residents whose roots in the region are hundreds of years old.

In New Mexico, it is well-known that there is a great deal of geographic variability in precipitation from individual storms, particularly the thunderstorm/thundershower type of precipitation that occurs during the summer. In fact, it is not at all uncommon for one area of a large field or landscape to receive rain while an adjacent area remains dry. This complicates soil-water balance calculation and plans for efficient and effective irrigation application. A network of rain gauges are fostered to assist this irrigation monitoring process.

Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) volunteers at a CoCoRaHS picnic held in Albuquerque, NM, hosted by New Mexico State University.

CoCoRaHS, the Community Collaborative Rain, Hail and Snow Network, is a grassroots volunteer network of backyard weather observers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow) in their local communities. By using low-cost measurement tools, stressing training and education, and using an interactive Web site, CoCoRaHS hopes to provide the highest quality data for natural resource, education and research applications (Doesken, 2005). The goal of the NMSU College of Agriculture and Home Economics Water Task Force Cooperative Extension team is to work closely with the New Mexico State Climatology Center and the Colorado State University Climatology Center assisting with the development and implementation of the CoCoRaHS program in New Mexico.

The reliability of a network of rain gauges for a particular rainfall event depends on the coverage area and the number of precipitation gauges. This simply translates to the number of rain gauges per unit area. The more rain gauges per unit area, the more reliable the estimate of precipitation or irrigation for the soil-water balance, and thus better input for the decision regarding irrigation applications.

An important feature of the CoCoRaHS network is its simplicity. Participants use a standard 4-inch diameter rain gauge to measure precipitation. Volunteers receive training and complex instructions on measuring rain, hail and snow using his or her rain gauge. These observations are submitted each day to the project's Web site (www.cocorahs.org), where they are processed and mapped by climate analysts. In addition to the daily precipitation observations, volunteers can submit reports of intense rain or hail during major storms. These reports are then sent directly to the appropriate National Weather Service (NWS) office where they can be used for the issuance and verification of flood and severe thunderstorm warnings.

In addition to providing potential life saving infor-

Rain gauges are placed in CoCoRaHS volunteer's yards to measure the amount of precipitation at their location.

mation, CoCoRaHS data is used by engineers, hydrologists, weather forecasters, city planners, emergency managers, attorneys, teachers, historians and others for such applications as flood forecasting, drought monitoring, precipitation verification (e.g., forecast models and radar estimated precipitation) and climate trends. This volunteer network offers information that would not otherwise be available.

Official NWS sites in New Mexico consist of 15 Automated Surface Observing Systems (ASOS) and approximately 200 Cooperative Observer Program locations (COOP). While precipitation observations from COOP stations are typically considered more reliable because they are read manually, the network suffers from relatively poor spatial resolution.

The CoCoRaHS network is not intended to replace the current weather observation system but to provide additional data for a more accurate picture. Official weather observing sites in New Mexico are often separated by distances of 20 miles or more and do not capture individual storms. Due to the small scale of individual storms and the high variability of topography and precipitation in our state, our goal is to have a rain gauge every square mile within the metropolitan areas and as many as possible in the rural communities. Because of the simplicity and low cost of the equipment (approximately $29 per gauge), CoCoRaHS is an economically feasible option for filling in the gaps between official weather observing sites in New Mexico.

The primary objectives for the New Mexico CoCoRaHS network are to increase the density of precipitation data available throughout the state by encouraging volunteer weather observing and providing accurate high-quality precipitation data for the many end users on a timely basis. These objectives overlap with those of the 2003 New Mexico State Water Plan.

Presently, CoCoRaHS has more than 600 observers throughout New Mexico. CoCoRaHS is now into its third year of the program, and future training and placement of rain gauges will focus on rangeland and rural communities. Presently participants are working with NWS to supply rain gauge data to those areas where radar coverage is nominal to none.

The Rio Grande Basin Initiative has been a supporter of this project along with the New Mexico Floodplain Managers Association, Office of the State Engineer, Governor's Drought Task Force and NWS.

Photos courtesy of Deborah Bathke

Preserving an American Legacy

Windmills used for water in remote, arid areas

by
Craig Runyan

Whether supplying water for the homestead or to livestock on the range, the traditional water pumping windmill has been a key factor in enabling generations of farm and ranch families to secure a living from the land. The American windmill is an icon of the tenacity and endurance found in those who make unlivable lands useful and productive.

For many years, NMSU has helped to preserve the legacy and understanding of the modern American windmill. The annual NMSU Windmill Technology Workshop is a three to four day technical training that covers applications, site selection, wellhead construction, groundwater protection, mill

*See **Windmills** on page 7*

Communicating Outcomes

Results, accomplishments and collaborations presented and discussed

by

Danielle Supercinski

Sunny, warm weather greeted those attending the Annual Joint Rio Grande Basin Initiatives Conference held May 15-17 at South Padre Island, Texas with 170 attendees.

Right away Kenneth White, newly retired Uvalde County agricultural Extension agent, found out that this was not a formal event. He was arrested by the Cameron County sheriff and a deputy and escorted to the front of the conference room for "**breaking the law by wearing a tie in South Padre**." Thankfully he didn't have to serve hard time or pay a fine; they just cut his tie off for him.

Conference welcomes and introductions followed including comments from Brad Rein of USDA–Cooperative Research, Education and Extension Service; Bill Dugas of Texas Agricultural Experiment Station; Roland Smith of Texas Cooperative Extension; LeRoy Daugherty of New Mexico Agricultural Experiment Station; Gerald Chacon of New Mexico Cooperative Extension Service; Kevin Urbanczyk and Walter Rast of Texas State University System; Craig Runyan of New Mexico State University; and Bill Harris of The Texas A&M University System Texas Water Resources Institute.

A new session was added to this year's agenda focusing on collaboration. This allowed selected participants to highlight some of the major partnerships and projects with other agencies, organizations and universities to demonstrate how collaborating produces greater results.

Throughout the rest of the conference, project participants made presentations highlighting their project efforts and results. The conference served as a time where all members of Texas and New Mexico Agricultural Experiment Stations and Cooperative Extension and the Texas State University System projects could be brought up-to-date on the efforts of other project members. This meeting also provided time for members of the various universities and agencies to visit with one another and discuss possible future collaborations.

The conference ended with a four-stop field tour on Thursday afternoon. Sites visited included Cameron County Irrigation District No. 2, the Southmost Desalination Facility, the Seawater Desalination Plant and the Agricultural Demonstration Initiative.

Eric Leigh won the photo contest for his photo of a rock weir built on the Rio Grande near the Los Fresnos Irrigation District's river pump. This photo was used on the cover of the accomplishment report, agenda and the front of the last "Outcomes" newsletter.

Posters were displayed and judged throughout the conference. Poster contest winners were:

1st place – *Maximizing On-Farm Irrigation Use Efficiency for Water Conservation in the Lower Rio Grande Valley: Irrigation Scheduling and Improvement of Water Delivery Systems* by Xavier Peries, Juan Enciso, J. Morales, Tom McLemore and Wayne Halbert

2nd place – *RGBI Ag Economists – Bringing Economics, Finance Accounting and Computer Modeling to Water Planning in the Lower Rio Grande Valley* by Allen Sturdivant, Ed Rister and Ron Lacewell

3rd place – *In-Home Water Conservation Demonstration Project* by Janie Harris

Special thanks went to Allen Sturdivant for his help in planning the pre-conference fishing activities as well as the field tour stops.

The conference power points and wrap-up information are posted at http://riogrande-conference.tamu.edu/wrapup/2007/.

Photos courtesy of Danielle Supercinski

Windmills

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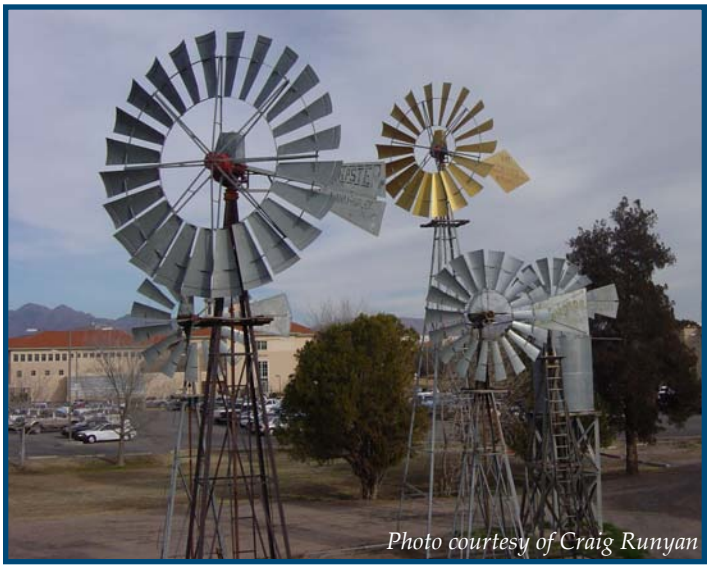
construction and set-up, maintenance, repair and troubleshooting. Hands-on training is a large part of the workshop. Workshop students come from diverse backgrounds around the nation and the world.

The RGBI co-sponsored the 2007 Windmill Technology Workshop. For the first time in its long history, this year's workshop was not held at the Windmill Technology Center on NMSU's main campus, but at the Aermotor Windmill Company manufacturing plant in San Angelo, Texas. In addition to the classroom and field training, students saw how the only remaining American-made windmill is manufactured.

Pioneers called it 'getting water from a turnip.' Today it's called drought mitigation. But any way you shake it, for well over a century, windmills have been the means and the essence of watering remote, arid and sometimes very inhospitable land.



The NMSU Windmill Technology Center is typically the site of annual training and certification workshops.

Faces of RGBI

Student's "can do" attitude benefits project

by
Craig Runyan

One of the more gratifying aspects of our profession is to work with young adults as they develop professionally and then move on to a promising future. For those students who have been exemplary in their employment one can question who gained the most from the experience; student or employer.

In the case of Sara Alarcon's work with NMSU, the RGBI has been the beneficiary. In her relatively short tenure helping to manage RGBI and other NMSU water programs, Sara demonstrated an impressive capacity to manage multiple assignments effectively and efficiently. From conference planning to fiscal accounting, she could be relied on to do well, and she always performs with a smile on her face. She has contributed several articles on NMSU project efforts to this newsletter as well.

Sara's positive "can do" attitude has helped secure her recent employment with Beringer Vineyards located in Northern California's Napa Valley. She will be coordinating the Health, Safety and Environmental programs. There's no question that Beringer's gain is the RGBI's loss. Thanks, Sara for all your hard work and commitment to the project. Good luck and happy trails.

Increasing Irrigation Efficiency in the Rio Grande Basin through Research and Education

Through Extension and research efforts, the Texas Agricultural Experiment Station and Texas Cooperative Extension and counterparts at New Mexico State University are implementing strategies for meeting present and future water demands in the Rio Grande Basin. These strategies expand the efficient use of available water and create new water supplies. This federally funded initiative is administered by the Texas Water Resources Institute and the New Mexico State University Water Task Force with funds from the Cooperative State Research, Education and Extension Service.

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