Rio Grande Basin Initiative

OUTCOMES

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Texas A&M Agriculture
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New Mexico State University
College of Agriculture and Home Economics

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Pulling the Plug

Grass carp and chemicals used to control aquatic weeds

by
Danielle Supercinski

Demonstrations to control non-native aquatic weeds have been instituted with collaborating irrigation districts in the Lower Rio Grande Valley to unclog and manage weed-infested irrigation canals and conserve water.

Species such as hydrilla (*Hydrilla verticillata*), water lettuce (*Pistia stratiotes*) and water hyacinth (*Eichornia crassipes*) are most commonly found in the Lower Rio Grande Valley, and they cause numerous problems in irrigation canals.

According to Dr. Michael Masser, professor and Texas Cooperative Extension fisheries specialist in the Department of Wildlife and Fisheries Sciences at College Station, hydrilla is the most problematic of these aquatic weeds because it severely plugs canals. Therefore, irrigation districts and producers have to pump more water so it will lay down the hydrilla to push water over it, resulting in increased pumping costs, Masser said. In addition, there is more percolation and seepage losses.

These aquatic weeds create other issues as well. They form small pools of water in the vegetation that then serve as breeding grounds for mosquitoes, which is problematic with the West Nile Virus situation, he said. In addition, water hyacinth is also known to cause an increase in water evaporation, known as evapotranspiration, causing a higher loss of irrigation water.

Triploid grass carp are used to control hydrilla that clog irrigation canals and other water bodies.

There is a myriad of treatment options. "Historically, there was just physical or mechanical removal of aquatic weeds plugging canals. Now we've come along with (triploid) grass carp and herbicides," Masser said.

To control and manage these aquatic weeds, as well as conserve water, Masser has sought effective controls of these plants.

In April 2002, Masser began his first demonstration under the "Environment, Ecology and Water Quality Protection" task of the Rio Grande Basin Initiative. The first demonstrations utilized triploid grass carp to control hydrilla at Brownsville Irrigation District and Hidalgo County Irrigation District No. 1.

In 2005, Masser started additional hydrilla projects with Santa Cruz Irrigation District No. 15 and Hidalgo County Irrigation Districts No. 1 and No. 2. Currently, approximately five grass carp demonstrations are ongoing.

"The bottom line from these demonstrations is that grass carp readily consume hydrilla and offer long-term (5 to 7 years), economical control," he said.

Triploid grass carp have been scientifically proven to be the most effective biological control for hydrilla. As "triploid," genetically altered grass carp, their life expectancy is 10 to 12 years with an estimated 20 percent annual mortality rate, he said. They also are infertile and do not reproduce.

"We see losses every year past about year three," Masser said. "We've only had to do a little supplemental restocking because of districts draining canals and canals rupturing; of course there is always a loss of fish when there is no water. Also, by year five we have to do some restocking – the fish are getting really large and not eating much causing the cumulative mortality issue."

At other locations, hyacinth and lettuce have been controlled using chemical herbicides.

"Other researchers have tried biological control on hyacinth, but that is equivalent to treating fleas on a

Reward herbicide treatments were used to control water lettuce (left) at Cameron County Irrigation District No. 6. Within three days after treatment all plants contacted were killed (right), representing an approximate 16,000 gallon per day savings.

dog; it slows the hyacinth down but doesn't control it. You can see damage (to hyacinth) everywhere, but it's not controlling it," Masser said. "There is no good biological control for water hyacinth or lettuce; therefore, we use herbicides to control them."

Water lettuce demonstrations with herbicide control began in 2003 and continued into 2004 with Cameron Irrigation District No. 6. Reward™ herbicide was used, and all plants contacted by the herbicide were killed within three days.

"This represents a water savings by reducing plant transpiration of 30 percent," Masser said. "In this case, this would represent a water savings of approximately 20,000 gallons per day."

Prior to using grass carp and herbicides, irrigation districts removed these aquatic weeds by mechanical methods. Mechanical control proved to be very expensive – several thousand dollars an acre – and labor intensive, whereas biological control is much cheaper.

"Mechanical control is like mowing the grass; (weeds) keep coming back, so you don't get good control," Masser said. "Compared to grass carp on a per acre basis, we're not spending $200 an acre."

Irrigation districts have saved in excess of $500,000 per year from on-going demonstrations of the biological control of submerged aquatic weeds in canals and resacas, he said. Removal of submerged aquatics has reduced labor costs, pumping costs and water loss from evapotranspiration and percolation/ seepage from the canals.

"For example, Hidalgo County Irrigation District No. 1 was spending more than $130,000 per year on mechanical control," Masser said. "After one stocking of grass carp, the hydrilla was under control in about three months."

Masser sends an annual newsletter to irrigation districts with recent demonstrations and their progress and results. As far as planned demonstrations in the future, "it is up to the districts and depends on whoever takes advantage of it," he said.

"I plead with the irrigation districts to please utilize me; that is what I'm here for," Masser said. "I make several trips a year to the Lower Valley to work with the people and irrigation districts to help with their aquatic weed problems. I enjoy working in the Valley and would be glad to take on some more demonstrations. As an Extension specialist, I'm available to everyone."

Masser has also built the AQUAPLANTS Web site that is available for anyone who is unsure of what aquatic weed is in their canal. By looking on the Web site and working with Masser, irrigation district managers or landowners can make sure they know what plant they're dealing with and identify how best to manage it. The pages can easily be printed off to use as a reference. Visit the AQUAPLANTS Web site at http://aquaplant.tamu.edu.

Silvery Minnow Preservation

Graduate prepares photo essay of RGBI project and progress

by
Sara Alarcon

In efforts to preserve the silvery minnow of the Rio Grande, Michelle Marusek, a recent graduate of Fine Arts, has been tailing Dr. David Cowley, professor in the Department of Fishery and Wildlife Sciences at NMSU, and his students. Cowley's RGBI project, "Agricultural Irrigation Systems and Conservation of Native Fishes," is focused on recovering the silvery minnow in the Middle Rio Grande Conservancy District around the Albuquerque area.

Marusek is preparing a photo essay of Cowley's project and progress. Many photos were taken while Cowley and his students worked to develop refugial fish habitats. The photo essay is a work in progress with hopes of publication in 2007.

A portion of this photo essay is currently on display at the NMSU College of Agriculture and Home Economics dean's office. For additional silvery minnow project photos please visit Marusek's Web site at http://nmsu.edu/~marusek.

The photos accompanying this article are a few examples selected from the photo essay.

When stretches of the Rio Grande go dry, biologist Michael Hatch of the Silvery Minnow Rescue Operation oxygenates Rio Grande water containing silvery minnows so they can be relocated to a stretch of the Rio Grande that is still flowing.

Biologist Michael Hatch inspects the contents of a net he pulled through the small finger of the Rio Grande remaining in the riverbed.

Dr. David Cowley, professor at NMSU's Department of Fishery and Wildlife Sciences, conducts a species survey in a drainage canal near the Isleta Reach. His findings suggest the Rio Grande silvery minnow makes a year-round home of the drainage canals.

NMSU Department of Fishery and Wildlife Sciences students record the temperature of a drainage canal where Rio Grande silvery minnows were collected.

Award Winning Project

RGBI closes out 2006 like a champ

by
Danielle Supercinski

Several award nominations were submitted for the *Efficient Irrigation for Water Conservation in the Rio Grande Basin* project, also known as RGBI, toward the end of 2006, and we are pleased to announce that RGBI has won two award categories.

Drs. Juan Enciso, Ari Michelsen, Giovanni Piccinni, Edward Rister, Zhuping Sheng and Bob Wiedenfeld were selected by the Texas Water Resources Institute (TWRI) Awards Committee to represent the research side of RGBI. This research team was nominated for and won the *2006 TAMUS Vice Chancellor's Awards in Excellence: Award in Research* for their numerous project efforts and accomplishments. These representatives received the award at the 2007 Texas A&M Agriculture Conference award ceremony on Jan. 9, 2007.

RGBI was also nominated for and won the U.S. Department of Agriculture–Cooperative State Research, Education and Extension Service (USDA–CSREES) *National Water Program 2007 Awards in the Outstanding Integrated Activities for Water Resources*. The award was presented to Drs. Allan Jones and Bill Harris of TWRI and Craig Runyan of NMSU at the USDA–CSREES National Water Conference in Savannah, GA, Jan. 30, 2007.

The selected recipients accepted these awards on behalf of all RGBI participants and collaborators. RGBI is a winner because of the hard work, dedication and collaboration of all participants involved in the project working with each other and other universities, agencies and individuals to make this project a success. Congratulations to all RGBI participants!

(L to R) Drs. Elsa Murano (Vice Chancellor for Agriculture and Life Sciences), Bob Wiedenfeld, Ed Rister, Juan Enciso, Zhuping Sheng, Ari Michelsen, Giovanni Piccinni and Bill Dugas (associate director for operations, Texas Agricultural Experiment Station).

Optimizing Beneficial Water Use

Joint effort studying ag water consumption in Southern New Mexico

by
Nargiza Rakhimova

In a region with limited fresh water resources, the growing population in Southern New Mexico is facing fierce competition for water.

According to the Elephant Butte Irrigation District (EBID), which serves 90,640 acres of agricultural and urban water users, irrigation is the largest consumer of water, yet the consumptive use by agricultural crops is often not reliably quantified. As the demand for water to meet municipal, recreational, irrigation and environmental requirements is increasing, it is becoming extremely important to plan and prepare for future water use.

Therefore, more accurate estimates of agricultural consumption or evapotranspiration (ET, the true loss from a hydrologic basin) are necessary.

A research team at New Mexico State University, led by Dr. Zohrab Samani and Dr. Salim Bawazir, civil engineering professors; Dr. Rhonda Skaggs, agriculture economics professor; undergraduate civil engineering student Brad Kirksey, and Max Bleiweiss, scientist for the Center for Applied Remote Sensing Agriculture, Meteorology and Environment, is tackling this research problem.

*See **Water Use** on page 7*

New Mexico Woody Landscape Manual

Plant information to be used in interactive, searchable database

by
Leeann DeMouche

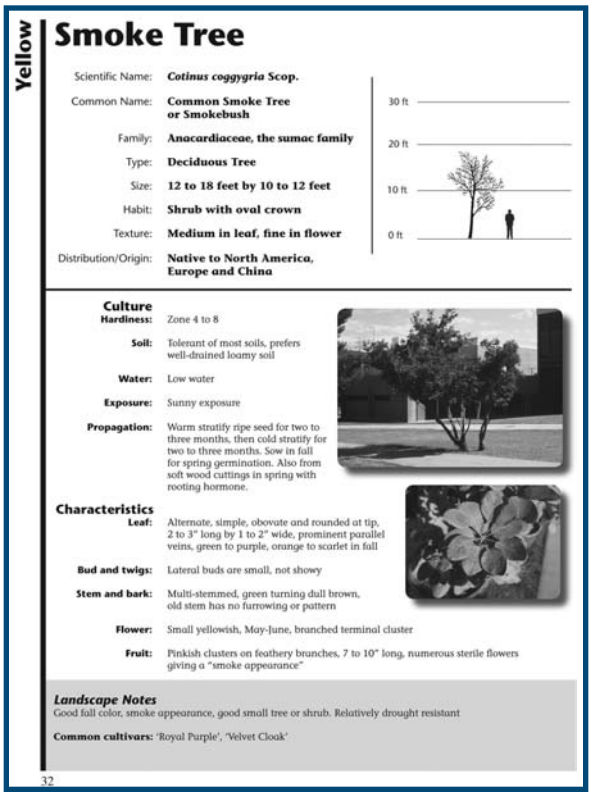
New Mexico State University's (NMSU) current landscape horticulture and garden design courses on ornamental plants will be receiving a new online manual for students in August 2007, sponsored by the Rio Grande Basin Initiative.

For the past year Dr. Rolston St. Hilaire, assistant professor for plant and environmental sciences at NMSU, has been working with Kerry Krumirne, landscape designer and former Las Cruces nursery owner, to develop and produce a high quality image database that provides definitive identification and use of common landscape trees and shrubs suitable for water conserving landscapes. The manual is being produced in both print and electronic forms. Students will be able to access a secure Web site and download the electronic and interactive course manual.

The manual's courses, which will lead the student to receiving a bachelor of science in the College of Agriculture and Home Economics Horticulture Degree (Landscape Design Option), includes Plant Materials classes I & II. Presently, the manual used in the courses includes two bound paper texts with no plant images. Students currently access plant images via a separate image database. The new manual will include a graphic design layout for landscape and a colored graphic picture of the plants. Each plant will be identified by scientific and common name with additional information on culture, characteristics and landscape notes.

"Landscape horticulture, as a career and a hobby, is growing dramatically," St. Hilaire said. "The market for our course material is greatly needed in the arid western states. Using the Internet, we can extend an excellent educational experience to our students at NMSU and other satellite landscape programs across New Mexico."

What's in store for the future? St. Hilaire hopes that the plant information he is collecting will be used on an interactive, searchable database that will assist not only his students, but landscape architects, master gardeners, landscape designers and the general public.


Yellow

Smoke Tree

Scientific Name: ***Cotinus coggygria* Scop.**
Common Name: **Common Smoke Tree or Smokebush**
Family: **Anacardiaceae, the sumac family**
Type: **Deciduous Tree**
Size: **12 to 18 feet by 10 to 12 feet**
Habit: **Shrub with oval crown**
Texture: **Medium in leaf, fine in flower**
Distribution/Origin: **Native to North America, Europe and China**

30 ft
20 ft
10 ft
0 ft

Culture
Hardiness: Zone 4 to 8
Soil: Tolerant of most soils, prefers well-drained loamy soil
Water: Low water
Exposure: Sunny exposure
Propagation: Warm stratify ripe seed for two to three months, then cold stratify for two to three months. Sow in fall for spring germination. Also from soft wood cuttings in spring with rooting hormone.

Characteristics
Leaf: Alternate, simple, obovate and rounded at tip, 2 to 3" long by 1 to 2" wide, prominent parallel veins, green to purple, orange to scarlet in fall
Bud and twigs: Lateral buds are small, not showy
Stem and bark: Multi-stemmed, green turning dull brown, old stem has no furrowing or pattern
Flower: Small yellowish, May-June, branched terminal cluster
Fruit: Pinkish clusters on feathery branches, 7 to 10" long, numerous sterile flowers giving a "smoke appearance"

Landscape Notes
Good fall color, smoke appearance, good small tree or shrub. Relatively drought resistant

Common cultivars: 'Royal Purple', 'Velvet Cloak'

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The new manual includes photos of landscape plants along with their identification by scientific name and common name, and information on culture, characteristics and landscape notes.

RGBI Conference Reminder

by
Danielle Supercinski

The annual Rio Grande Basin Initiatives Conference will be held at South Padre Island, Texas, May 14 to 17, 2007 at the Radisson Resort.

This will be another joint meeting of Texas and New Mexico Agricultural Experiment Stations and Cooperative Extension, Texas State University System and the University of Texas at Austin. Early registration and hotel reservations must be made by Friday, April 13.

Continue to visit the conference Web site at http://riogrande-conference.tamu.edu as more information will be posted as the event gets closer.

Water Use

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The team uses state-of-the-art technology (eddy covariance technique) to measure pecan and cotton ET on the ground. They also quantify the consumptive use of water by crops throughout New Mexico's Lower Rio Grande region using 2002 remote sensing data.

This research is also receiving collaborative support through the National Science Foundation-Experimental Program to Stimulate Competitive Research (NSF-EPSCoR), New Mexico's Office of State Engineer, Governor Richardson's Water Innovation Fund II Project and the New Mexico Water Resources Research Institute.

According to Samani, the preliminary outcomes of this collaborative, field-level research have already produced interest.

"Last November our poster with the results of the crop ET study for Dona Ana County received second place in the 19th annual EPSCoR National Conference at Lexington, Kentucky," Samani said. "Brad Kirksey, the only undergraduate student to compete in the conference, received an Award of Excellence for outstanding research."

The team believes that this innovative research will provide invaluable knowledge about water consumption in Southern New Mexico. The team plans to extend their research to other regions and vegetation types.

Faces of RGBI

Economists can save you money

by

Danielle Supercinski

Economists play an integral part in RGBI by working to save irrigation districts (IDs), municipal water suppliers, stakeholders and farmers money. Spreadsheet models, surveys, workshops and publications are just a few of the tools produced by Texas and New Mexico RGBI economists to determine effects on the cost of delivering water and how much money can be saved by making economic adjustments.

RGBI economists include Dr. Ron Lacewell, Dr. Ari Michelsen, Dr. Luis Ribera, Dr. Edward Rister and Allen Sturdivant for Texas; and Leeann DeMouche, Rhonda Skaggs and Frank Ward for New Mexico.

These economic teams work together through RGBI tasks 1 and 3, "Irrigation District Studies" and "Institutional Incentives for Efficient Water Use." Some of their numerous efforts and accomplishments to date can be found online at http://riogrande.tamu.edu under "Featured Articles."

Thank you, economists, for all your efforts and keep up the good work!

Dr. Ronald Lacewell

Dr. Ari Michelsen

Dr. Luis Ribera

Dr. Edward Rister

Allen Sturdivant

Leeann DeMouche

Dr. Rhonda Skaggs

Dr. Frank Ward

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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