

Graham County Gardening Newsletter

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Making Every Drop Count

Irrigation research and demonstration at Hubbell Trading Post

By Joanne Littlefield, 2006 Agricultural Experiment Station Research Report
The University of Arizona College of Agriculture and Life Sciences

When rains are sporadic, the urban-dwelling home gardener is able to drag a hose out to water the plants. And large-scale agriculture operations can order irrigation water time for delivery when the plants need it. It's those in-between growers and gardeners, though, who often struggle to bring in a crop during the dry and dusty desert growing season. For them, one viable solution is drip irrigation. Drip irrigation has been shown to be more efficient because it delivers water only to the plant's root system. The drawback is the cost of installing and maintaining drip tubing, emitters, timers and pumps.

Ed Martin, a University of Arizona irrigation specialist from the Department of Agriculture and Biosystems Engineering, is studying how the use of large holding vessels in a gravity system might more efficiently irrigate small plots and gardens on the Navajo Nation. For the past two years the College of Agriculture and Life Sciences (CALs) researcher has been looking at how gravity-fed irrigation systems compare with traditional surface systems in terms of yields, health of crops and more efficient use of water.

Two separate projects located at the Hubbell Trading Post on the Navajo reservation near Ganado are

providing valuable research data and the demonstration component lets local farmers and gardeners react to the techniques.

On the Navajo Nation, people haul large amounts of water to their homes and fields—sometimes up to 20 miles away, says Gerald Moore, CALs lead extension agent on the Navajo Nation.

“This project would fit right in with the way of life,” he says. Gravity-fed irrigation would enable Navajo farmers to use the hauled water to efficiently irrigate their gardens. “We are just talking about a small garden or backyard gardening—maybe 15 by 30 feet.”

(Continued on Page 2)

Workshops for the Home Gardener

Saturday, May 12 10:00 a.m. Composting

Saturday, June 9 10:00 a.m. Pond Maintenance & Yard Ornaments

Held at Edu-Venture Trail, University of Arizona, Safford Agricultural Center, 2134 Montierth Lane, Safford.

More Information: Call Karen Thomson 928-428-2611 or karent@ag.arizona.edu.

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Graham County

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Making Every Drop Count (continued from page 1)

A national historic site, the post was chosen for this project in part because of the number of visitors—193,000—who pass through its doors and over the grounds each year. Members of both the staff and the research team recognized the opportunity to teach about the crops grown on the Navajo Nation and how the use of a low-tech drip irrigation system can conserve resources.

Moore and another CALS extension agent from the Navajo Nation, Jeannie Benally, have been able to provide valuable feedback. Both have been involved with the Ganado Irrigation and Conservation Project, a comprehensive water management plan the Navajo Nation has been working on for the Ganado Irrigation District. With technical assistance from the Arizona Department of Water Resources, the U.S. Department of the Interior's Bureau of Reclamation and the University of Arizona, the project has been in the works since the late 1990's.

After the reconstruction of Ganado Lake was completed in 1995, new opportunities for crop irrigation techniques and education programs became available. The original dam was built in the 1880s.

Besides staff at the Hubbell Trading Post, other key consultants on the irrigation project include members of the Navajo Departments of Agriculture and Water Resources, the Ganado Irrigation District Farm Board.

The two gravity-fed irrigation systems investigated for the project go by the names "Hanging Bucket" and "Big Bucket." They are the brainchild of New York inventor Richard Chapin, who designed them to mirror the type of irrigation setup that would typically be used in the field.

The simplicity of the system is astounding for each row, a bucket

with holes punched in the bottom is hung more than three feet off the ground from a tree or pole. Drip tubing is attached to it that then extends down the rows, where it's covered or buried. Up to 10 rows can be placed on one bucket system. The bucket is filled periodically depending on weather conditions, and slowly waters the plants.

"The water for the system is either put into a small five-gallon bucket and hung from a stand or is placed in large 50-gallon drums that are raised up about four feet in the air," Martin says.

Because no power is required, the method is effective for more remote parts of the reservation. Chapin Watermatics sells the bucket kits to farmers in areas of the world where getting electricity and running water can be a challenge. Another plus is the ability to add fertilizer to the water buckets for slow release to the plants.

At the Hubbell Trading Post these systems were used to grow corn, an important food and ceremonial crop for the Navajo people. The public setting of the demonstration project attracted many people who wanted to harvest the corn the moment it was ready. Martin's challenge was to hold the crop long enough to get yield data. The analysis he conducted on total grains and biomass showed that both systems produced good yields in 2005.

Along with the demonstrations for the two sizes of buckets, the research team planted corn on a plot irrigated with a surface drip system that didn't perform nearly as well as the bucket system.

"With water going right to the crop, there is up to 90 percent efficiency," he says. In contrast, water efficiency for surface drip systems, where the drip tape is not buried, is about 60 – 70 percent.

Overall, the gravity-fed systems used less water than the surface irrigated drip system. At a 15.5 percent moisture rate, in 2005 they produced 69 bushels per acre with 26.1 inches using the bucket system; in the surface plot 85 bushels per acre were produced with 39 inches of water. "While we got more yield with surface plot irrigation, we were more efficient with the bucket drip," Martin says. The yield was 2.6 bushels per acre-inch of irrigation water applied with the bucket drip and 2.1 bushels per acre-inch of water applied with the surface irrigated plot.

Excessive water evaporation problems are decreased when the drip tape is either covered with mulch or slightly buried in the ground. A downside of the system—such as the buildup of algae and salts in the drip tubes—can be overcome with periodic maintenance.

The demonstration project already has begun to change some irrigation practices on the reservation. "Dine College did take to the idea, developing a system using 55-gallon drums as their big bucket," says Moore. "I think the idea of this bucket system is great."



Big Bucket



Hanging Bucket

Flower--Bottlebrush



Callistemon citrinus

Family: Myrtaceae

Temperature zone: USDA zones: 8b – 10, Sunset zones: 8 – 9, 11 – 24

Frost protection: 15 degrees F. If plant was winter killed, it may come back from the roots, if it was mulched.

Exposure: Full sun, heat tolerant

Origin: Southeastern Australia, 20 species

Growth Habits: Evergreen shrub, small tree to 10 – 25 feet depending on variety and how it is trained. Leaves elliptical, to 6" long by 1/2" wide, usually lemon scented. It has no known pests or diseases.

Water requirements: Needs little water once established, tolerates poor, well drained soils, but prefers acidic soils. Use fertilizer for acid loving plants if signs of chlorosis appear. Likes occasional deep watering.

Propagation: Seed propagation may not produce plant same as parent, sow in spring on soil surface. Semi hardwood cuttings in summer for reliable characteristics of parent plant.

Bark: Rough and light brown.

Flower: Red, flowers intermittently, most heavily in spring – summer.

Fruit: Brown

Wildlife value: Attracts birds, especially hummingbirds.

Insect: Ladybugs, Lady Beetles



Coleoptera: Coccinellidae

There are more than 450 types of ladybugs in the United States. They can range in color from red, orange or black; have no markings or as many as 15 spots. Some were imported from Australia to control aphids on orange trees, some came from other countries and some like *Hippodamia convergens* are native.

Young have 3 pair of legs, are blue/black with orange spots and elongated. Adults tend to be more oval in shape and have hard covers on their wings.

Adults and young feed on many soft-bodied insects. Aphids are a main food source, but they will also eat mealy bugs, spider mites, eggs of the Colorado potato beetle, European corn borer and leaf hoppers. One larva will eat about 400 aphids during its development and an adult can eat 5,000 in its lifetime.



Larva



Larva



Yellow Eggs on Leaf

Planting fennel, dill, cilantro, caraway, angelica, tansy, wild carrot, yarrow, cosmos, coreopsis, scented geraniums and dandelion will help keep them around as they eat the pollen of these and other plants.

There can be 5 – 6 generations per year. Females lay tiny, yellow oval clusters of 10 – 50 eggs near aphid colonies, laying up to 300 total in many clusters. Egg to adult takes 3 – 5 weeks. They overwinter as adults in cracks, leaf piles or bark of trees. They migrate before eating and laying eggs in spring. They may fly 100 miles in search of food, and fly about 15 miles per day.

Coloring is part of their protection. Red, orange and black warns birds that they are not tasty. They may even roll over and play “dead” because birds prefer live prey. They can also release a yellow substance from their joints that smells bad.

Keeping purchased ladybugs for release can be successful if:

*you release them after sunset or before sunrise as they navigate by the sun,

*pre-water the release area, they'll stay for a drink,

*chill in the refrigerator before release, they will crawl rather than fly in “cooler” temperatures,

*release them in an aphid-infected area that has a row cover over it. (continued on page 4)

Ladybugs (continued from Page 3)

Ladybugs that have over wintered have some tolerance to pesticides and may be less susceptible than active ladybugs. In any case, minimize the use of

broad spectrum insecticides with ladybugs present.

Source:
Entomology Notes—Michigan
Entomology Society note #6

Biological Control: A Guide to Natural Enemies in North America
The Garden Path

Loss of Eucalypts Trees in the Valley

Some years ago when the Valley was hit with snow and several days of cold weather, the eucalypts trees died. Nonetheless, more eucalypts trees were planted. What happened? We again have dead eucalypts trees in the Valley due to the snow and colder temperatures.

Most eucalypts are not tolerant of frost, or only tolerate light frosts down to -3 to -5 degrees C. The hardiest, are the so-called Snow Gums such as *Eucalyptus pauciflora* which is capable of withstanding cold and frost down to about -20 degrees C. Two sub-species, *E. pauciflora niphophila* and *E. pauciflora debeuzevillei* in particular are even harder and can tolerate even quite severe winters.

Several other species, especially from the high plateau and mountains of central Tasmania such as *E. coccifera*, *E. subcremulata*, and *E. gunnii* have produced extreme cold hardy forms and it is seed procured from these genetically hardy strains that are planted for ornament in colder parts of the world.

Source: Wikipedia

Cotton Advisory for Graham County. Why Would a Master Gardener Read It?

Beginning on April 9, a weekly Cotton Advisory has been posted at <http://cals.arizona.edu/crops/counties/graham/advisories/current.pdf> by Dr. Randall Norton, Graham County Interim Director, Director & Regional Specialist. There are at least two reasons that a Master Gardener would find the information to be interesting.

First, you should be knowledgeable about and interested in the major agriculture undertaking of the Gila Valley.

Secondly, the Advisory contains a Current Local Planting Conditions Update which discusses soil temperatures plus the Local Weather Forecast for the week. Soil temperatures at planting time are important to the Master Gardener as well as to the Cotton Farmer. The weather forecast pertains specifically to the Gila Valley.



Master Gardener Workshop Schedule

A new workshop has been added to the Master Gardener Workshops in the month of June--Pond Maintenance & Yard Ornaments. See the current schedule on the front page.

Then there will be no workshops in July and August. It is planned to resume in September. Watch for that listing around August.

In Your May Garden!

- Transplant eggplant and pepper plants through the 15th of the month.
- Plant sunflowers, watermelon, summer squash, okra, peanuts, pumpkin, radish, and sweet potato slips.
- Keep seedlings and young transplants well watered. Uniform moisture will prevent blossom end rot in peppers and tomatoes.
- Plant bedding plants such as ageratum, celosia, coreopsis, gloriosa daisy, impatiens, lobelia, marigolds, petunias, salvia, verbena and zinnias.
- Remove spent blooms (deadhead) to extend blooming season. When removing rose blooms, cut back to a leaf with at least 5 leaflets. Fertilize every 2 to 3 weeks with a high phosphorus fertilizer for continued blooming.
- Feed established lawns with a high nitrogen fertilizer. Repeat every 6 weeks through the growing season.
- When mowing, never remove more than one-third of the height of the grass at one time. Make sure your mower blade is sharp to avoid tearing the grass.
- Seeding of new Bermuda grass lawns can begin when overnight temperatures are above 65 degrees.
- Knock aphids off with a stream of water from your hose and then spray plants with insecticidal soap.
- Mulch trees with 3 – 4 inches of organic matter in tree wells for weed control and moisture retention. Keep the mulch pulled back from the bark of the tree to prevent infestations of mice, disease, and insects.

Edu-Venture Trail

Take time to visit the Edu-Venture Trail at the Safford Agriculture Center. Plants are in bloom, a new Herb Garden has been planted and the pond has been cleaned. All is beautiful at this time of the year. Plant markers provide names of plants that will grow well in the desert with a limited amount of water. A visit is well worth your time.

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Graham County Cooperative Extension: Interim County Director: Randall Norton

Phone: (928)428-2611

Fax: (928)428-7023

If we can be of service in providing objective information in agriculture, natural resources, youth, family, community resources, and related fields, please call us.

Send Comments or Questions by e-mail to:
dorinec@ag.arizona.edu or call 928-428-2611



Workshops for Home Gardeners at Safford Agricultural Center:

Composting

Saturday, May 12—10 a.m.

Pond Maintenance & Yard Ornaments

Saturday, June 9—10 a.m.

MASTER GARDENER MEETING, TUESDAY, JUNE 5
6:00 P.M., BLM CONFERENCE ROOM

**Safford Farmers Market, Firth Park
10th Ave. & Thatcher Blvd.
Or until sold out**

**June to end of September
Tuesdays: 8:30 to 11:30
Wednesdays: 1:00 to 5:00
Saturdays: 8:30 to 11:00**

**Highland Garden Conference, Apache Gold Casino,
San Carlos by Yavapai & Mohave Master Gardeners October 11 & 12**

Making Every Drop Count Article on front page. Bucket kits are used in 150 countries. For a full presentation of Bucket Kit Gardening, search Chapin Watermatics, then click on links, then Foundation, then Bucket Kit Gardening. The direct link did not work but this pathway will work.

**Graham County Cooperative Extension
2100 South Bowie Avenue
P. O. Box 127
Solomon, AZ 85551**

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