



High on the Desert Cochise County Master Gardener Newsletter

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The University of Arizona and U.S. Department of Agriculture Cooperating

The Virtual Gardener— What is Master Gardening? Part 2

Last month I discussed the origins of the Cooperative Extension System. This month I want to continue in this theme and discuss the Cooperative Extension Master Gardener Program.

The system created by the Smith-Lever Act was called the **Cooperative Extension** because it represented a cooperative partnership between federal, state, and local governments working together to extend the benefits of land grant college and university research directly to the people. To accomplish this mission, the act created a corps of extension agents to act as the bridge between researchers and citizens. The agents were to be assigned to the Land Grant schools but stationed directly in the counties.

In the early 20th century, a few agents working in rural counties could easily serve the sparse population of farmers and ranchers residing there. But as the country became more urbanized in the last half of the century, agents began receiving more and more requests for advice and assistance from home gardeners in urban communities. Soon the volume of requests became overwhelming.

One agent, Dr. David Gibby working in Washington State, found it impossible to answer all the requests he received and began to consider how he could resolve the problem. He decided to try recruiting volunteers to help him. He placed an advertisement in a local newspaper offering a simple proposition. If volunteers would agree to donate a certain number of hours helping him, he would give them intensive, university-level training in horticulture. The response was overwhelming. Soon other agents learned about Gibby's program and copied it. The Master Gardener Program was born. Today there are nearly **100,000 Master Gardeners** in every state and territory who collectively contribute over \$100 million in voluntary services each year.

Although Master Gardener training programs differ slightly from area to area, the core curriculum is roughly the same everywhere. The Arizona Master Gardener Manual gives a good overview of what is taught here in Arizona. Master Gardeners are taught both the science and the practice of horticulture. They learn what plants to select for local

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COLLEGE OF AGRICULTURE
AND LIFE SCIENCES
COOPERATIVE EXTENSION
Cochise County

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conditions, how to install them, feed and water them, diagnose and treat their health problems, and much, much more. They are also trained to be good stewards of the environment.

Only after successfully completing the training and serving a probationary “internship,” can a volunteer be certified as a Master Gardener. To remain certified, a volunteer not only must donate time to the Cooperative Extension, but complete annual continuing education requirements as well. Requirements to become a Master Gardener in Cochise County can be found [here](#).

The advisory service offered by Master Gardeners is not only authoritative but costs you nothing. Unlike much of the advice you may receive from sales representatives in local stores, Master Gardeners provide unbiased information backed by scientific research.

So how do you tap into this source of horticultural expertise? Contact your local Cooperative Extension Office. In Cochise County, you can find contact information on the Master Gardener [website](#). Also watch for local events—plant clinics, plant sales, seminars, *etc.*—sponsored by, or participated in, by Master Gardeners. Or spend some time perusing our website.

Before I wrap this up this month, I would like to solicit your support. Please help get the word out that Master Gardeners are a home gardener’s best friend.

Until next time, happy surfing!

Gary Gruenhagen,
Master Gardener
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Cuttings 'N' Clippings

✿ For more information on the Cochise County Master Gardeners, go to the web site at:

<http://cals.arizona.edu/cochise/mg/>

or contact Valerie at:

valeriedavidson@email.arizona.edu

You can also follow them on Facebook at:

www.Facebook.com/CochiseCountyMasterGardeners

✿ The Master Gardeners are at the Sierra Vista Farmers Market on the **first Thursday of each month** to answer questions and offer resources for common garden and landscape problems.

✿ The May 7 Water Wise presentation will be *Designing with Succulents*. The time is 9:00—10:30 AM at the UASV. Greg Corman a landscape designer will talk about enhancing the desert landscape with an exquisite array of low water succulents. Check out the Water Wise web site to see what else is happening in 2016 at:

<http://waterwise.arizona.edu/>

✿ The Cochise Chapter of the Arizona Native Plant Society’s next monthly program will be held in September. Field trips may be held this summer. For information follow them on their web site:

<http://www.aznps.com/chapters/cochise.php>

or Facebook:

<https://www.facebook.com/AZNPSCochise/>

May Reminders

- ◆ **Deep water**
- ◆ **Plant warm season crops**
- ◆ **Check tree ties**
- ◆ **Control pests**
- ◆ **Control weeds**

Food for thought:

842 million people in the world don’t have enough food.

70% the estimated percentage that food production needs to increase by 2050 to feed a growing population, which is why so many organizations are collaborating to help make balanced meals more accessible.

Over **200** universities worldwide offer degrees in advanced agricultural sciences, cultivating the experts of tomorrow.

By 2050, it’s estimated that agricultural technologies could increase crop output by **67%** and cut food prices by roughly half.

Over the next **50** years, farmers will need to produce more food than has been produced during all human history.

- Discover.Monsanto.com

Did You Know . . .

you can get an electronic notification when a new Cochise County Master Gardener Newsletter is posted on-line? Send an email to Valerie at: valeriedavidson@email.arizona.edu or give her a call at: (520) 458-8278 Ext 2141 with your request.

Ready, Set . . . Grow!

I recently attended a meeting coordinated by the Arizona Department of Water Resources in Willcox, Arizona with the focus on Arizona's Water Initiative for the Co-chise Planning Area. I brought up the subject of "precision irrigation" during a table discussion amongst community members. It quickly became clear that people define it differently. In fact, the immediate thought that came to their minds was drip irrigation, even though in my mind, it was different. It was because of this I felt the need to further research the subject.

In my search to define the subject I found an article that summed it up nicely in that "drip irrigation is often regarded as epitomizing precise irrigation because of its ability to control application rate and timing." (Defining precision irrigation: A new approach to irrigation management by Smith & Baillie, 2015). However, because this is a relatively new agricultural concept, in scientific literature there is still no commonly accepted definition of the term. According to Smith and Baillie (2015), "There is a common element to all of the definitions, involving the 'differential irrigation' treatment of field variation as opposed to the 'uniform irrigation' treatment that underlies traditional irrigation management."

For example, rather than irrigating every plant in a field with the same amount of water "as in flood, furrow, or classic drip lines," individual plants receive the amount necessary. As an at-home example, say it's time to water the house plants. If you had three pots of ivy sitting next to each other in your home and two of them were dry but the third was moist, you would not

water all three with the same amount. The same is true in a field setting. The trick is to know which individual plants in the field need water, how much, and when.

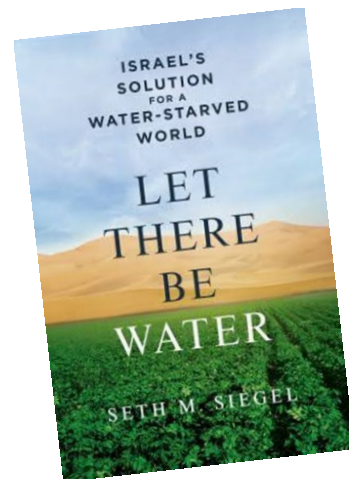
It would be agreed then that precision irrigation is applying water to individual plants based on their moisture status (utilizing technology) rather than applying water to a whole field without considering which plants may need more moisture versus those that do not. But perhaps it is a bit more than this.

When I reference precision irrigation, my definition of this is an incorporation of new technologies and irrigation engineering to apply the water when needed and the quantity necessary to replace what is used so the plant can stay alive and productive. I think of the work I was involved in during my bachelors where I assisted a doctoral candidate using soil moisture sensors, location specific weather station (equipped with rain gauge, thermometer, and anemometer), and evapotranspiration rates of the plant, and then these combined measurements were used by "smart" irrigation controllers to be turned on and for a quantified duration for water to reach the root zone. To give a very brief summary of the results, even though one irrigation controller irrigated significantly less water, the plant (in this case tall fescue) was never stressed for water.

In my opinion, innovators, scientists, and communities alike are being progressive in the efforts of water conservation but also in developing strategies so our water delivery methods become more precise. After all, even with drip irrigation, one could still use excessive amounts of water. Therefore, precision irrigation

isn't just about a specific technology, rather it involves a holistic approach and one that is adaptive to specific locations and crop needs. Precision irrigation is a "learning system," one that uses not only optimal management of the spatio-temporal components of irrigation but also optimal performance of the delivery system taking into account the crop, water, and soil. It seems our group at the water meeting were all talking about "precision irrigation" after all, just different methods of it.

We may still be a ways from nailing down the best equipment and technologies to use in our efforts in precision irrigation engineering and agriculture, especially when it comes to cost, but at least we are considering and testing the technologies so that we can all make informed decisions.



Speaking about technologies, it would be prudent to end here by passing along a book referral by Cado

Daily. She informed me about *Let There Be Water: Israel's Solution for a Water-Starved World* by Seth M. Siegel and how drip irrigation came to exist. Thank you Cado!

Happy Gardening Friends.

Joshua Sherman, M.S.,
Commercial Horticulture Area Agent

A Book Review: *Arizona Rare Plants Field Guide*

In 1998 and 1999, a team of 26 botanists who called themselves very plainly, the “Arizona Rare Plant Committee,” convened to create a field guide to the rare native plants of Arizona. The committee included representatives from the Navajo nation, a bouquet of federal and state agencies, as well as academia, and nongovernmental organizations including the spectacular Desert Botanical Garden in Phoenix.

As you can imagine, the second issue they tackled was how to define “rare.” Botanists are staid individuals. The committee stuck to well recognized criteria used by experts. But, being Arizonans, they didn’t want to be held to rigid norms. They confessed that:

“There are species in this book that might not fit comfortably into any categorization scheme. These species serve as reminders that categories of rarity are artificial constructs that imperfectly fit the natural world.”

Good for them!

The committee looked at over 4,000 “taxa” of plants. “Taxa” is the plural of taxon, a unit used in biological classification. Taxa are arranged in a hierarchy from kingdom to subspecies. So a taxon ordinarily includes several taxa of “lower rank.” In the classification of plants, for example, certain taxonomic categories are universally recognized. In descending order, these are phylum (or division), class, order, family, genus, species, and subspecies. In botany the term “cultivar” is also applied to a recognizable variant that originates under cultivation. Of course, none of the rare plants are cultivars.

After looking at a lot of taxa, and “after lengthy discussions,” (you can

only imagine the intense debates!) the Arizona Rare Plant Committee selected 140 to feature in this field guide. For portability and to make it easier to update, the committee manufactured this book in a small three ring binder. The binder is an easily recognizable turquoise, no doubt to reflect the importance of this color to the ancients and to modern day Arizonans. So far as I can tell, there have been no updates to this book.

The Arizona Rare Plant Committee was an immensely practical bunch. To use some slang, they “sliced and diced” the 140 taxa to help readers learn where and under what conditions they were to be generally found and whose job (e.g. tribe, federal, or state agency) it is to protect them. The taxa are also listed by county. In Cochise County the committee found 35 plants that are rare. Only Coconino County has more. It has 43 listed.

But best of all, the field guide contains a pen and ink drawing of the leaf and the entire plant, as well as a full color photo of the live plant. And in the case of *Agave murpheyi*, the field guide includes a photo of a dead plant “fallen inflorescence.” That means the plant died while flowering.

Although we have *Agave murpheyi* in abundance in Cochise County, this is not mentioned in the book. My guess is that the committee wanted to tell folks where to generally find some of the plants, but not get bogged down listing all of the areas where various rare taxa are found in Arizona.

Each entry in the book also includes a map of generally where in the state the plant might be found. As I said, the Arizona Rare Plant Committee was a practical bunch. They wanted to



give fellow botanists a fair shot at finding these rare plants so they could examine them in their natural setting. But the committee also protected the plants by not disclosing latitude and longitude co-ordinates.

Those who read my, ahem, widely acclaimed magnum opus on agaves published in 2007 in this esteemed journal, will remember that agaves are one of my favorite native plants. The committee concluded that six taxa of agaves are rare in Arizona: *Agave delamateri*; *Agave murpheyi*; *Agave parviflor*; *Agave schottii*, Engelman var. *treleasei*; *Agave sp. nov*; and *Agave x arizonica*. The maps in the book tell me where I might see these beauties in the wild.

The hard copy of this field guide is itself a bit “rare.” I first encountered this book on the shelf of the Southwest Collection at the Sierra Vista Public Library just a few weeks ago. I had asked a librarian to help me find books on botany after taking Cochise County Extension Agent Joshua Sherman’s great class on botanical names at the 2016 High Desert Gardening & Landscaping Conference.

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It's a Bloomin' Cochise County Native Plant of the Month—Gems of the Desert

A Peek into the Cochise Cactus Calendar for May

The infrequent **Woven-spine Pineapple Cactus** (*Echinomastis intertextus*) with its unusual white flowers and pink stigmas is long past; likewise it's protected sister **Needle-spine Pineapple** (*E. erectocentrus*). The wide flat **Heyder Pincushion** (*Mammillaria heyderi*), often flush with the ground, is finishing with its crown of pinkish to greenish flowering. I call this unique cactus Milky Nipple because if pricked it exudes a white milky juice.

Claret Cup or **Scarlet Hedgehog Cactus** (*Echinocereus coccineus*, *C. triglochidiatus*) are names that encom-



pass a complex and controversial

group of species/varieties which, however, all have similar red flowers and growth habit, and which we will talk about as one.

Those growing close to me are full of buds today (still 10 days 'til May), also open flowers as well as many past. This beautiful hummingbird plant will be blooming at the higher elevations for a good while longer. It grows in a very wide elevational range, from 3,000 to 9,000', from desert scrub and oak/juniper grassland, up through piñon to Douglas fir, true fir, spruce *etc.*, it usually chooses rocky slopes and canyons, most frequently above drainages. Single spiny stems or massive clumps of 30 to 80 stems are often found nestled in, or hanging onto, rocky ledges. The narrow tubular flow-

er is just the right size and shape to accommodate a hummer's bill and head. The pink or purple (rarely yellow) pollen is held tightly against the pistil in the tube outlined above with small petals, unlike the pink or magenta hedgehogs whose spreading stamens and abundant pollen creates a bright field in the middle of a bowl of large petals (rather than tube) for pollinating bees to brush and run through in collecting pollen.

The spiny **Pink Hedgehog** (*Echinocereus fasciculatus*) is past, but the less spiny, more naked **Fendler Hedgehog** (*E. fendleri*) will be glorious in May with its magenta blooms visible from a distance. Their siblings, the **Rainbows** (*E. rigidissimus* and *pectinatus*) sometimes appear in May but often later.

The **Bisbee Beehive** (*Coryphantha vivipara*) with its largish pink flowers blooms after rain, but doesn't necessarily have to wait for the monsoons. I have seen it in late May.

The charming **Arizona Fishhook Pincushion** (*Mammillaria grahamii*) is perhaps our most rain responsive local cactus. Watch for it if it rains this month—it should bloom a week after a heavy rain. Clustered populations on rocky desert slopes of small round cacti with wreaths of small pink flowers, it will bloom repeatedly during the monsoons, and I have photos from as early as late May. This is one cactus that will give you a second chance, and a third, if you've missed it the first time.

I am throwing out these possibilities because with climate up for grabs, anything could happen and old expectations and schedules won't necessarily hold. We need to keep our eyes open. But the **Prickly Pears** and **Chollas** WILL be riotous this month!

The **Arizona Queen-of-the-Night**, **Reina de la Noche** (*Peniocereus greggii*) is our most intoxicatingly fragrant night bloomer and usually appears here in late May. The extremely long floral tube covered on the outside



with tufts of long black hair-like spines invites hawk (sphinx) moths to sip nectar in the darkening evenings—it is perhaps the only creature with a proboscis long enough to do that. I have heard it said that bats may pollinate the Queen, but I have never seen one on her and wonder...? In the morning before the petals close, the Queen hosts a massive buzzing party of bees for an intense pollen harvest. Afterwards the long tube slumps and withers as the ovary swells and matures into a shiny crimson oval fruit with black dots (areoles)—a sweet festive invitation to hungry birds who will defecate seeds and fertilizer beneath the branches of host plants like mesquite, creosote, and tarbush to name a few. The body of this night-blooming cereus is spindly and flimsy for a cactus, and often leans on host branches for support. The stems can be decimated by cactus weevils, pack rats, javelinas, excessively cold temperatures, or drought. Its survival secret lies in the large and very round, turnip-shaped tuberous root (specimens have been found as heavy as 85

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(Cochise Cactus Calendar continued from page 5)

lbs.) which, unfortunately, javelinas will occasionally dig. This reservoir of nutrients and water will sprout new stems when the weather is promising. The Queen comes closer to being a deciduous perennial than any other cactus and can seem to disappear then reappear later.

Our native *Peniocereus greggii* has the same medicinal properties as the more tropical and vining *Selenicereus grandiflorus* (*spinulosus*) from Mexico. Eclectic physicians were using it in the early 1900's as a heart medicine, especially for palpitations, nervous cardiac conditions, and any symptom aggravated by poor circulation. It slows and strengthens the heartbeat. The stems are still used medicinally today, as are those of our Queen, whose Apache name means 'pain in the heart.'

Cochise County Master
Gardener Newsletter Editor
Carolyn Gruenhagen

Reproductive issues are foremost in research on plant climate change survival. This cactus is not self-compatible and must be cross-pollinated in order to produce viable seed. And, unlike chollas and prickly pears that reproduce vegetatively (grow roots from nearly any dropped part and don't really need pollination for species success), la Reina is dependent on seed to create new plants, and producing seed is dependent on

one family of moths with very long tongues—a large and successful group (think of tomato hornworms) yet one that is vulnerable in areas where pesticide use is common.

The tendency for a population of *Peniocereus* to mature and open many flowers simultaneously, many on one night, makes it more likely that cross-pollination will occur. The blooming will come in waves, repeated several times over the period of a few weeks. It's not just one night a year! This slender columnar is easily grown from seed, and can be less easily reproduced from cuttings. Seedlings and mature plants are available from native plant nurseries in Tucson.

As habitat shrinks and climate changes, we might consider sequestering several of these in our home habitat—for ecology, for its magic, its medicine, and for its beauty.

MiMi Kamp, Guest Author

jumi@theriver.com

Herbalist, Plant Illustrator, Cochise
County Herbarium Curator, taxonomist and consultant

(A Book Review continued from page 4)

Please permit me to take a small diversion here. In Josh Sherman's class I learned that my botanical name is *Gentioideae azureus mollis pumilis teresa*. That's Latin for: I'm from the *Gent* subfamily, with blue eyes, soft hair, and short stature, and I'm called *teresa* for more specificity. Take this class if you get the chance. It was tremendous fun—the best way to learn botanical names that I've ever encountered.

The Dewey Decimal Number of the *Arizona Rare Plant Field Guide* in the Southwest Collection at the Sierra Vista Library is: SW 581.5 ARI. If your local library branch doesn't have it, any library can get this book for you by using an interlibrary loan. The Native Plant Society of Arizona also put the book online at:

<http://www.aznps.com/rareplants.php>. You can even reproduce the entire book because the Arizona Rare Plant Committee asserted no copyrights. So far as I can tell, after the initial printing of this book in 2000, the committee made no more hard copies nor updates. But you can still find a few used copies in bookstores and at Amazon.com.

Many times while hiking with my husband and friends, we will run across a "new" plant. We wonder whether it is rare, or whether we just hadn't been paying enough attention to observe it before. Now we have one more tool to help us learn more about all the plants in our breathtakingly beautiful mountains and stunning grasslands. Check out this book. For those who love plants, it will be "just the facts, ma'am," but a really good read.

Terrie Gent, Master Gardener

(Editor's Note: There are four copies in the Cochise County library system. Copies can be easily transferred between branches.)