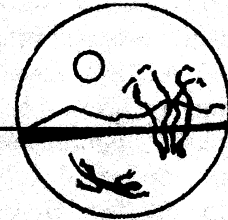


# High on the Desert

Cochise County Master Gardener

## Newsletter



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

### Garden Basics: High Desert Garden Fair

Join the Cochise County Master Gardeners Association on our next adventure — The High Desert Garden Fair, Saturday, September 12, 9:00 am to 3:00 pm, at The University of Arizona Sierra Vista Campus, 1140 N. Colombo. Free to the public, the fair will provide information and products to make outdoor and gardening lifestyles more enjoyable.

Among the numerous vendors attending will be Bisbee/ACE Hardware Nursery, Arizona Soap Company, Diamond JK Nursery, Desert Blossom, Kazzam Nature Center, San Pedro House—Books and Gifts, Recycling Info Booth, Sierra Vista Area Gardeners Club, Spadefoot Nursery, Southeastern Arizona Bird Observatory, Sustainable Systems Support, Third World Hand Arts, Turner Trucking Landscape Materials, The University of Arizona Bookstore, Valley Rentals, *Water-Wise*, Zamp County Nursery, Dick and Jane's Vegetable Stand, and Cochise County Master Gardeners Association with water

probes, t-shirts, and a Desert Landscaping CD-ROM for sale. You will also be able to tour the Plant Sciences Center located at the U. of A. campus.

There will be three free seminars during the day. Learn about *Proper Planting Techniques* from 9:30 am to 10:30 am. During the presentation, Master Gardener, DeForest Lewis, will show you how it's done by planting a plant on the U. of A. grounds. Sandy Anderson will talk about beneficial snakes for the garden in her *Rapturous Reptiles* seminar from 11:30 am to 12:30 pm. There will be snakes on display. From 1:30 pm to 2:30 pm, learn about native plants of the high desert at the *Natives - Naturally!* seminar. Additionally, the Sierra Vista Area Gardeners Club will be giving their own gardening presentations throughout the day at their booth. Learn how to collect and save seeds from the garden at 10:00 - 10:30; 12:45 - 1:15; and 2:30 - 3:00 and plant propagation techniques will be demonstrated at 10:45 - 11:15; 11:45 - 12:15; and 12:45 - 1:15.

**See you there!**

Cheri Melton  
Master Gardener

### Meeting Reminder

Cochise County Master Gardeners Association meets September 2, 5:00 pm at the Mona Bishop Gallery Room at the Sierra Vista Library. Discussions will include: the High Desert Garden Fair, the San Pedro House project, National Public Lands Day—the Buffalo Soldier Trail project, and the 1999 High Desert Gardening & Landscaping Conference. All Master Gardeners and Associates are invited to attend.

### Fall Plant Sales

October 3 & 4

Tucson Botanical Gardens  
Tohono Chul Park, Tucson  
Desert Survivors, Tucson

October 16 - November 1  
Boyce Thompson Arboretum,  
Superior

October 24 & 25  
Desert Botanical Garden, Phoenix



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## THE VIRTUAL GARDENER-

### How Much Water is Enough?

When we finished last month, we had discovered how to find values for potential evapotranspiration (ETo) using AZMET data. This month I want to discuss how we can put that information to practical use. Specifically, I want to answer the question: How much water is enough? Before I continue, however, I want to emphasize that my purpose is not to explain a "by the numbers" system for watering your plants. Rather, I want you to develop a feel for how much water it takes to keep your plants happy and healthy.

The ETo values we learned about last month provide the basis for determining how much water has been removed by evapotranspiration. These numbers show the predicted amount of water in inches that a reference crop (turf grass) would use during a certain period of time. Of course unless your plants happen to be the same as the reference crop, they may not use water at the same rate as the reference, so you must multiply the listed ETo values by a correction factor called a *crop coefficient* to predict how much your particular

plants would have used. A good source of data on crop coefficients has been compiled by the United Nations Food and Agriculture Organization (FAO) and can be found at:

<http://agen.tamu.edu/wqit/petnet/tools/crop/cropcoe2.html>

The crop coefficients shown in the FAO reference even take into account the stage of growth of the crop—initial growth, mid-season growth, and late season growth because plants use water at different rates throughout their life cycles. Table 1 shows a few samples of the kind of data available at the Web site.

Suppose you are growing tomatoes. According to the FAO figures, the crop coefficient for tomatoes at mid-season is 1.2. That means that you must multiply the ETo values obtained from the Bonita AZMET site by 1.2 in order to calculate how much water your tomatoes are using. For example, the ETo values given for the first week of August at Bonita are shown in the second column of Table 2 and the corrected values for tomatoes are shown in the third column.

What these numbers are telling us is that during the first seven days in August 2.11 inches of water would have had to be added

to your tomatoes to make up for what was lost due to evapotranspiration. If any rain had fallen during that period, you could subtract that from the total. In the case of the Bonita AZMET site, a total of 0.02 inches of rain fell during the period so only 2.09 inches of water irrigation water would have been required to make up for what was used. To get an idea of how many gallons are represented by 2.09 inches, we have to do a little arithmetic.

One square foot is 12 inches on a side and represents 12 inches X 12 inches = 144 square inches of area. To cover that area with 1 inch of water, requires 144 square inches X 1 inch = 144 cubic inches of water. Since there are 231 cubic inches of water in a gallon, we can calculate that 144 cubic inches of water represents 144 cubic inches/231 cubic inches per gallon = 0.62 gallons of water. In other words, it takes a little over one-half gallon of water to supply 1 inch of water to a square foot of soil.

Since my tomatoes are planted in 4 feet by 4 feet squares, each square covers 16 square feet. Supplying 2.09 inches of water to a square would require 16 square feet X 2.09 inches X 0.62 gallons per square foot or about 22 gallons of irrigation water. This of course assumes that all of the water I

delivered was available to the tomato plants.

Does this mean that if I had poured 22 gallons of water on each of my tomato squares after a week, without watering

(Continued on next page)

Crop	Early Season	Mid-Season	Late Season
Beans, green	0.40	1.00	0.90
Carrots	0.50	1.10	0.80
Celery	0.35	1.10	1.00
Corn, sweet	0.40	1.15	1.05
Cucumber	0.35	0.95	0.75
Eggplant	0.40	1.05	0.85
Melons	0.40	1.00	0.75
Peppers	0.35	1.05	0.85
Radish	0.30	0.85	0.80
Tomato	0.40	1.20	0.65

Table 1. Some Representative Values of Crop Coefficients for Arid Climates

my tomatoes would be perfect? Of course not. First, all of the water I supplied would not have reached the thirsty roots of my tomatoes. Second, my tomatoes might have expired of thirst if I had not watered them for a week. And third, the soil in my garden probably has different water holding characteristics than the soil at Bonita so might require greater or lesser amounts of water than the ETo values would indicate. What the numbers give me is a place to start. I should apply this much water and watch to see what happens. If the plants wilt, then I need to increase the amount a little. If the soil remains soggy, I can probably decrease the amount a little.

Hopefully this discussion has given you a little insight into how much water is enough. Until next month, happy surfing.

Gary A. Gruenhagen, Master Gardener ([gruenha@sinosa.com](mailto:gruenha@sinosa.com))

Date	ETo	1.2 X ETo
1 Aug	0.19	0.23
2 Aug	0.20	0.24
3 Aug	0.24	0.29
4 Aug	0.29	0.35
5 Aug	0.28	0.34
6 Aug	0.28	0.34
7 Aug	0.27	0.32

**Table 2. Adjusted ET Values for Tomatoes**



## SEPTEMBER REMINDERS

- Keep on watering!
- You can always plant something – try cool season veggies
- Start shopping for bulbs (*Bulbs for Southern Arizona* bulletin is available from the Cooperative Extension offices)

## Cuttings 'N' Clippings

- Cochise County Master Gardeners meet the first Wednesday of each month in the Mona Bishop room at the Sierra Vista Library, 5:00 pm.
- National Public Lands Day will be celebrated in Sierra Vista on September 26. Many activities are planned. Contact City Hall for details.

## San Pedro House Urban Wildlife Habitat Demonstration Landscape Project

The Bureau of Land Management (BLM) received a grant to landscape the area around the San Pedro House, part of the San Pedro Riparian National Conservation Area. The purpose of the grant was to provide a beautifully landscaped area that will reduce dust, require no watering once established, use native plants, be beneficial to wildlife, and to serve as a demonstration garden where the public can get ideas. The Cochise County Master Gardeners Association received a letter in June requesting their assistance and they have provided BLM with a final landscape design. The plants are being ordered and the grounds are being prepped for planting. On September 19 & 20,

planting will begin at 6:30 am until it's too hot to continue! If you would like to volunteer, please, bring whatever tools you may have to include a shovel, rake, pick, watering can, and wheelbarrow. And don't forget water, sunscreen and a hat. A short seminar will be presented on planting techniques and why the plants that will be used were chosen and their attributes.

This project is open to everyone—non-master gardeners and Master Gardeners alike so please come join us for a weekend of fun! The dedication of the site will take place September 26th for National Public Lands Day. For more information contact the Cooperative Extension Office.

*Robert E. Call*

Robert E. Call,  
Extension Agent, Horticulture

Carolyn Gruenhagen,  
Newsletter Editor

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## Monsoon Rains Have Hidden Benefits For Plants

The loud crackle and thunderous boom of lightning is now a familiar sound as our Monsoon season is in full swing! But have you ever noticed that our summer storms bring more than just much needed rainfall? The desert, and plants in general, just seem greener after a thunderstorm. And the reason: with the rain comes a wealth of life giving plant nutrients.

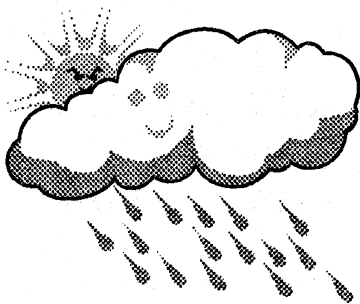
Lightening is a potent fertilizing agent. Every time it strikes nitrogen in the atmosphere is combined with hydrogen or oxygen to form ammonium and nitrate, two forms of nitrogen. The nitrogen then goes into solution in atmospheric moisture and is washed to the ground in rainfall. Plants then absorb nitrogen from the ground and utilize it for growth. Since it is a key constituent in chlorophyll, the green pigment of plants, nitrogen causes a greening of the plant.

Physicists estimate that roughly 250,000 tons of nitrogen are produced by about 1,800 thunderstorms that occur on Earth every day. Our summer thunderstorms can release significant amounts of nitrogen for plant growth here in Tucson. That causes a significant part of the greening of plants we notice after a storm. But other constituents of rain also contribute to this greening!

In theory, rain water is pure. It is formed from evaporation of moisture largely from the ocean, but also from inland bodies of water, the soil, plants, and even animals. Condensation returns it to earth; but not before it picks up some hitch-hikers. Sulfur is one of these.

It is possible for rain to provide as much as 40 pounds of sulfur per acre per year. Less in our desert environment, but still when the rains come so to does the sulfur. Sulfur is an important constituent in the formation of plant amino acids.

Dust is something we have no shortage of here in the Southwest, but dust although a nuisance indoors can be beneficial. Dust is often carried thousands of miles on the upper air currents, and comes down to earth during rain storms.



Dust carries with it a number of mineral nutrients necessary for plant growth. It also contains beneficial micro organisms which enhance plant growth. The solubilized nutrients can quickly influence the color of foliage. Micro organisms aid in the breakdown of organic compounds into plant nutrients. They also create symbiotic relationships with plant roots which aid in the uptake of nutrients. All this translates into a rapid "green-up" of plants!

The level of soil benefiting elements and micro organisms is related to the origin of such dust. Ashes from forest fires contain potash, an essential plant nutrient. Debris from volcanos, which can travel world-wide contains a wealth of essential minerals for plant growth.

The number of thunderstorms we enjoy in the Tucson area are limited, however the beneficial effects of rainstorms can be

bottled; or at least barreled, for later use. Rainwater can easily be trapped and stored for later use. The easiest way is to attach barrels to the down spouts from roof gutters. Large plastic garbage cans work well. Use a dark color, like green or gray, to keep the light out. Keep the lid on tight to keep out light, bugs, and critters. This will keep the water fresh and prevent stagnation from algae and bacteria. Cut a hole in the lid, large enough to put the downspout through and seal the crack with caulking or duct tape. A valved exit pipe at the bottom of the barrel allows you to attach a drip system or hose for irrigating plants. If you want, you can connect several rain barrels to collect more water. PVC piping from the top of one barrel to another will allow water to overflow from the first barrel into the next. You can connect a number of barrels this way. Barrels can be screened with shrubs if appearance is a priority.

During a typical Monsoon season, the roof of an average size house can collect as much as 4,000 gallons of rain water! You can collect as much water as you wish, depending on the number of barrels you use. An overflow pipe well allow the excess to escape. A rule of thumb for the Tucson area is to have one plastic trash container (32 gallon capacity) for each 6 feet length of gutter.

Rainwater does have real benefits for plants. So, if after the next thunderstorm you notice everything looks greener; it's not your imagination! It's just Mother Nature working her special magic.

*John Begeman  
Extension Agent, Pima County*

*(Editor's note: In addition to his Extension duties, Begeman writes a weekly column for the Arizona Daily Star. This article is reprinted with the author's permission.)*

# Late Summer Reading . . .

## A Book Review

The Eye Witness Series of Garden Handbooks  
Publisher: DK Publishing, Inc., 95 Madison Ave., New York, NY

I first noticed this series of books at a Tucson discount store. There were several: *Annuals*, *Perennials*, *Roses*, and *Herbs*. Since then I have also seen *Garden Herbs*, *Trees*, and *Shrubs*. Prices have ranged from \$8.99 in Tucson to the \$15.00 to \$20.00 range locally.

The books are well organized, informative, and best of all, a color picture of each species discussed is printed on heavy, glossy paper. I have invested in two: *Perennials* and *Herbs*. The herbs book contains pictures, descriptions and information on 700 herbs from around the world. It is aimed toward people interested in medicinal uses, but includes culinary information. The book starts with illustrated information about each part of the plant which may be useful. Two pages each are devoted to roots, seeds and fruits, bark and wood, leaves and stems, and flowers. Several pages are devoted to each category of use for herbs, such as cooking or healing. Each description includes habitat and coded information concerning which plant parts are used. The photographs are annotated so you know what you are seeing. Characteristics of the plant are provided, such as when and how many blooms. Species with



multiple useful varieties are grouped, with both general and specific information, and numerous photographs. There are also small "filler" articles, such as drying or harvesting leaves. The *Garden Herbs* book has fewer entries and leans more toward culinary applications.

The perennials book is similar, except that the organization of the book is keyed to plant size, bloom season and color. This can be a little frustrating at first to those accustomed to the *Western Garden Book* listing by botanical name, but the index is great and other qualities of the publication quickly make up for minor changes required by the user. The color pictures include multiple photographs of varieties of more popular species. Each plant description has lots of information in an uncluttered format.

The only major drawback I have found is that the books are somewhat specialized. You won't find trees and perennials in the same volume. However, if you are concentrating on one aspect of your garden and need an informative well-prepared reference, the Eye-witness publications I have seen are worth serious consideration.

Gretchen Kent  
Master Gardener Associate

## The Agent's Observations

**Q** Why are my Afghan pine (*Pinus eldarica*) tree's needles turning brown and falling off? The trees are deep watered on a regular basis. There are no signs of damage from

insects or disease. What can I do about this problem?

**A** During the summer months with high temperatures many pine tree species will naturally shed some of their older needles. However, if the new terminal growth is turning brown, then some action needs to be taken to remedy the situation. **Control:** Normal, proper watering should continue throughout the growing season. Some think that the monsoon rains produce enough water for good growth. This is usually not the case. Rain is inconsistent both in timing and amount. Another watering problem is with larger pine trees. When young trees are planted, a drip system or other watering system is installed to supply the needs of a young tree. Perhaps one or two emitters are placed near the trunk. This is sufficient while the tree is young, but not as the tree grows older. Emitters must be doubled up or replaced with higher flow emitters and spread out laterally to encourage extended root growth. I have seen mature evergreen trees blown over by a storm when the ground was wet. Always the tree has had an underdeveloped root system. The cause was poor water application that did not encourage extended root growth.

**Q** I have a Golden Delicious apple tree with irregular large spots on the leaves. In some places the spots are turning brown and dying. Some of these affected leaves are falling to the ground. What is causing this and what can be done to stop it in the future?

(Continued on next page)

Address Correction Requested

**A** The apple tree is experiencing necrotic leaf blotch, also called leaf spot or leaf drop. Golden Delicious is particularly susceptible and this condition is restricted to this cultivar and others with its "blood-line." This disorder is characterized by irregular necrotic blotches in mature leaves that develop rapidly, usually within 12 to 24 hours. The leaf first turns pale green and yellow and then darkens to a deep brown. The size of the affected area remains constant once visible symptoms appear. The size of the necrotic area is restricted by larger veins which are not affected. Mature leaves, in the mid-shoot region, are usually affected first. Young vigorous trees appear less severely affected than older,

more slowly growing trees. Leaf fall can be rapid once symptoms occur, sometimes within 4 to 7 days. Severity of the disease varies greatly from year to year. Variation can be great among trees in the same orchard or yard. Necrotic leaf blotch is a physiological disorder related to air temperature, light intensity, and soil moisture. It is most severe when a cool, rainy period of 4 to 5 days precedes several hot sunny days. A hormonal imbalance is thought



to be the cause since symptoms are enhanced by gibberellin (a plant hormone that is needed for cell enlargement) and inhibited by abscisic acid (another plant hormone that causes leaf and fruit fall).

**Control:** Zinc oxide applied every two weeks from bud break until harvest is effective in reducing disease incidences. Also, healthy, vigorous trees produced by good watering, fertilizing, fruit thinning, and pruning practices contribute to decreased incidences of necrotic leaf blotch.

**Source:** *Compendium of Apple and Pear Diseases*, 1991. The American Phytopathological Society, Page 88.

*Robert E. Call*  
Extension Agent, Horticulture