

High on the Desert Cochise County Master Gardener Newsletter

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

Garden Basics: Introduction to Gardening in Cochise County and Ft. Huachuca—Part 2

About Fertilizers

If you choose native and non-native adapted plants there is less need to worry about fertilizers. However, there may be a need to purchase fertilizer to maintain gardens, exotic plants and turfgrass lawns. Here are a few things you need to know to assist you:

Nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur are the fertilizer macronutrients that plants require in the largest quantity for maximum growth.

Nitrogen, phosphorus, and potassium are the primary nutrients that are most likely to be lacking in our native soils.

Calcium, magnesium, and sulfur are secondary macronutrients but are usually present in sufficient quantities or are added coincidentally with other materials, such as irrigation water. Because our soils are alkaline you should not add lime to gardens or planting areas.

Always read and follow the application instructions printed on the box, bottle, or bag of fertilizer. This is probably the single most important thing that should be done before applying fertilizer to anything!

How to Read a Fertilizer Bag—

All fertilizers are labeled with three numbers which give the percentage by weight of **nitrogen (N)**, **phosphate (P)**, and **potassium (K)**. For example, if you have a 100-pound bag of fertilizer labeled 10-10-10, it contains 10 pounds of N, 10 pounds of P, and 10 pounds of K. The rest of the fertilizer's weight is filler.

What Type of Fertilizer Should Be Used?

The best fertilizer to use depends on many factors, such as the nutrients needed, soil structure, soil chemistry, the time of year, and the method of applying fertilizer. That's why it's important to ask yourself the following questions: what is the fertilizer for – a garden, a specific plant, a turfgrass lawn? If turfgrass, what kind is it – a cool season or warm season grass?

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If a specific plant is not doing well, what are the symptoms? Try to determine if it is really a fertilizer problem. If it is, you will then need to determine which fertilizer nutrients would best benefit the plant given the symptoms.

Organic Fertilizer—

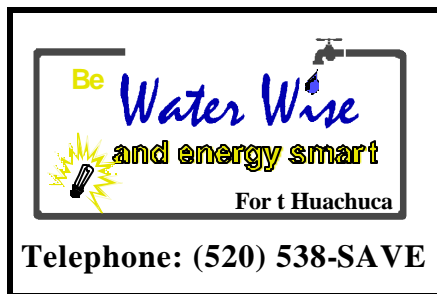
Plants cannot tell the difference between synthetic and organic fertilizer. Organic fertilizers are ones whose nutrients come from the remains of by-products of a once-living organism. Blood meal, bone meal, and all manures are examples of organic fertilizers. Generally, organic fertilizers release nutrients over a fairly long period of time. They depend on soil organisms to break them down to release nutrients making them most effective only when soil is moist and soil temperature is warm enough for soil organisms to be active. Compost is an excellent organic fertilizer.

Fertilizer Application—

When applying fertilizer, consider the soil type, timing of fertilizer application, type of plant or lawn, watering schedule, and the release rate of the fertilizer being applied.

For example:

- Sandy soils require more frequent application of nitrogen.
- Trees and shrubs may only need one good, well-placed fertilizer application every year or two. Crop plants may require fertilization every four weeks.
- Fruit plants will require more phosphorus.
- Fertilizer will draw water away from plant roots, so the



watering schedule may need to be adjusted so that plants do not become dehydrated.

- The soil around the root zone of plants should be moist before applying fertilizer so the roots are not “burned” by it.

Fertilizers with slow release rates may keep trees and shrubs growing until late in the summer making them susceptible to early frosts.

Ginger Maxey, Water & Energy Conservation Educator, and Cheri Melton, Plant & Landscape Technician from the Water Wise and Energy Smart Program, Ft. Huachuca, both Cochise County Master Gardeners

November Reminders

- ◆ A good time to install a drip system
- ◆ Replace summer mulch with fresh mulch
- ◆ Start a winter herb garden
- ◆ Protect plants from frost

(The bulletin **Frost and Frost Protection** is available from the **Cooperative Extension offices.**)

Cuttings 'N' Clippings

✱ The next regular meeting of Cochise County Master Gardeners is November 7, 5:00 p.m. at the Sierra Vista Library. Guest speaker will be Rick Koehler and there will also be a presentation from the participants to the Master Gardener University in August.

✱ On November 11 the Cochise County Master Gardeners will be taking care of their “Adopt-a-Wash” with a clean-up. For information, contact De Lewis at 458-4170. Remember, you will earn volunteer hours for this activity.

✱ The December 1 *Water Wise* Workshop is “*Toto, This Isn’t Kansas!*” a repeat, presented by Cado Daily, *Water Wise* Conservation Educator. The free workshop takes place at the U of A South Campus from 9—10 a.m.



International Water Harvesting Conference

Recently I had the great pleasure of attending the 10th Annual International Rainwater Catchment Systems Association (IRSCA) conference in Mannheim, Germany. This week-long conference provided me with plenty of new information, tremendous insight into water harvesting, and what the international community is doing in this field.

The conference included presentations on papers ranging from Urban Issues, Catchment in Humid and Semi-Arid Regions, Quality Issues, Agricultural Uses, and Legal and Political Aspects of Rainwater, and Greywater Harvesting. Attendance at the conference included developed countries such as Australia, Germany, Sweden, France, U.S., China, Japan, Jordan, and developing countries such as Ghana, Ethiopia, India, Uganda, Madagascar, Zimbabwe, and other African countries. The cultural mix was exhilarating. It was disappointing to note however, that the U.S., a developed country, was sorely lacking in representation—attendance as well as in paper presentation.

Why so much international attention to water harvesting? More than 400 representatives flew great distances and at considerable expense to attend this conference. Given every two years, IRSCA has been sponsoring this conference for twenty years. The answer was best summed up in a welcome speech given by a representative from the United Nations Environmental Programme: The U.N. is predicting that water will be the oil of the 21st century. In 25 years, they expect that two-thirds of the world's

population (approximately 2.5 billion people) will be without sufficient adequate water. We were encouraged to promote and share the skill of rainwater harvesting as it will be a most valuable if not the sole source of water for these effected people (hopefully not us, we all thought). However, for many of the attending countries, this statement is directly applicable.

But what about us? Despite the easy availability of water, we still need to assess this resource of rainwater. A 1,500 square foot roof, in a 1" rain will yield approximately 937 gallons of water. In the Sierra Vista area, our average annual rainfall is 15". This 1,500 sq. ft roof will yield about 14,000 gallons in one year. Tucson calculates that an average home landscape will use about 35,500 gallons of water a year. Granted the 14,000 gallons of rooftop water is about 40% of the landscape need, but it certainly is more than a drop in the bucket! And that isn't including the catchment yield from the ground surface.

Why is this important to us here in the Sierra Vista area? Although the latest studies indicate that we have adequate water in our aquifer (our sole source of water), the level of that aquifer is dropping. This can translate into lower well levels and sinking ground, as is happening in the Tucson and Phoenix areas. Just the other day, I heard a Tucson resident say as a matter of fact, "Of course we have ground subsidence—it is happening all over Tucson." Do we want to be a part of that chorus?

Now, for most of us, installing tanks to hold 7,000 gallons of water or more is impractical, but there is

still plenty we can do. If so much of the international community-developed and developing countries, are recognizing the potential of rainwater harvesting, why can't we too take advantage of a free, clean, dependable supply of water? Let's not get left out in the rain...or maybe we should!

For more information on rainwater harvesting, call the *Water Wise* Program at 458-8278 x 2141.

Cado Daily
Water Wise Conservation Educator

Free Seeds for Freedom Gardens

In response to the events of September 11th, the America the Beautiful Foundation (ABF) is providing \$1 million worth of flower, vegetable, and herb seeds to plant "Freedom Gardens" across America. Anyone who wishes to sponsor or start a Freedom Garden in their community can receive a grant of 100 to 1,000 free seed packets. For more details, go to www.freeseeds.org or call ABF toll-free at (800) 522-3557.



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Carolyn Gruenhagen
Editor

The Virtual Gardener—Composting

One of the biggest deficiencies of our desert soils is the lack of organic material. This lack expresses itself in several ways. Our heavy clay soils do not allow water to penetrate to levels where it can be used by plants; sandy soils drain so fast that the roots cannot grab the water before it is gone; and desert soils often fail to provide nutrients in forms that can be utilized by plants. A solution to all of these problems is to increase the organic content of our soils and composting is one of the best and least expensive ways to do it. Adding composted organic matter to the soil loosens and aerates it, allows the soil to take up water and release it slowly to plants, and supports a rich community of micro-organisms that break minerals into forms that can easily be taken up by plants.

One of the most complete and comprehensive Web sites on composting is hosted by Cornell University (http://www.cfe.cornell.edu/compost/Composting_homepage.html). Many Web sites on this subject take an anecdotal approach to the topic, but the Cornell site discusses the chemistry and physics behind the process.

For example, one of the problems I always have is knowing how much water to add to my compost pile, especially during these very dry times of the year. Cornell says that below 30 percent the decomposition processes that create compost virtually stop and below about 40 percent they are much reduced. On the flip side, moisture contents above about 60 percent create anaerobic conditions

that cause your compost pile to smell. The ideal moisture level is about 45 to 50 percent.

Another problem is maintaining the proper ratio of carbon-rich materials (“brown stuff”) to nitrogen-rich materials (“green stuff”) in your pile. Cornell recommends a 30:1 C:N ratio by weight and even includes formulas for estimating the ratio. The following table gives approximate data on carbon and nitrogen contents of common yard materials.

		% N (dry weight)	C:N ratio (wt to wt)	Moisture (net wt)
Grass clippings	Average	3.4	17	32
Leaves	Average	0.9	54	38
Shrub trimmings	Typical	1.0	53	15
Tree trimmings	Typical	3.1	16	70

One of the biggest problems for composters in Sierra Vista at certain times of the year is finding enough green stuff (nitrogen-rich materials) for the pile. A page at the Cornell site discusses using nitrogen fertilizers for this purpose. It says that organic nitrogen sources (green stuff) decompose slowly, releasing nitrogen at rates comparable to the rate of growth of microorganisms in the compost. Synthetic fertilizers, on the other hand, release nitrogen at very fast rates that exceed the ability of the microorganisms to use it. This is especially true during the colder months when lower temperatures slow down the growth rate of the microorganisms. As a result, more nitrogen is released than can be

taken up and the excess is released as ammonia gas. In order to preclude the formation of the ammonia gas (which can be detected with your nose) you should apply nitrogen fertilizers lightly in a series of applications over a period of time. Also, the total amount of fertilizer to be applied is much less than might be expected from its nitrogen content alone, although no research results are available to quantify the rates or amounts.

According to the Cornell Web site, you can estimate the health of your compost pile by its temperature. A healthy pile will heat to 100-120°F in two or three days and peak out at approximately 140°F. The highest temperatures will be maintained for several weeks and then the temperatures will begin to slowly decline. If temperatures do not reach these levels, you may not kill weed seeds, insect larvae, or pathogens that are in the pile. Conversely, temperatures much above these levels will kill the micro-organisms that make the compost. If you are really interested in knowing the exact temperature inside your pile, you can buy a special thermometer with a

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The Agent's Observations

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long probe for \$15-\$30. Alternatively you can stick a metal rod into the pile for a few seconds and estimate the temperature by feel with your hand. A water probe would work very well for this. REAL composters plunge their hand deep into the pile to estimate the temperature.

If you would like some less technical but very practical information on composting, check out the Master Composting Course Web site at <http://www.mastercomposter.com>

Until next time, happy surfing.

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I have been asked several times over the last year about news reports concerning monarch butterfly larvae eating pollen from bio-engineered corn plants. I have read a very well written summary article titled *The Monarch Butterfly Controversy: Science Interpretations of a Phenomenon* written by Anthony M. Shelton, Entomologist with Cornell University and Mark K. Sears, Environmental Biologist, University of Guelph in Canada. It can be located in *The Plant Journal*, (2001) 27(6), 483-488. Quotes below are from their report.

What started the controversy was a research paper submitted to the journal *Science* for publication but was rejected. It was resubmitted to *Nature* as *A Scientific Correspondence* and published as *Transgenic Pollen Harms Monarch Larvae*, *Nature*, 399, 214. The authors are J. Losey, L. Raynor, and M.E. Carter. As reported by Sheldon and Sears this study proposes a potential risk to monarch butterfly populations by pollen from corn engineered to express proteins from *Bacillus thuringiensis* (Bt). The authors concluded that Bt corn can cause mortality to monarch larva and lead to decreased populations. Prior to submission, Losey asked several people to review the article... reviewers recommended against publication because of methodological problems, lack of field data, and potential for misrepresentation of the study, but urged that a more

careful study, including field aspects, be conducted to address the questions the authors were asking. The authors decided to publish their findings. This report was picked up by the media. Opponents to genetic engineering viewed this report as proof of the unknown consequences of bio-engineered organisms.

This study was done in the laboratory, not as a field experiment. An unreported amount of pollen from bio-engineered and non-bio-engineered corn plants was sprinkled on milk weeds growing in pots. Monarch butterfly larva was then placed on the milk weed and allowed to feed for three days. Mortality counts were taken and reported.

It turns out that the Losey *et al.* (1999) study used the corn variety Bt11, which has toxin levels in pollen so low as to be at the limit of detectability...that's one of the reasons why the Losey *et al.* (1999) paper is strange. The corn pollen collected for the study was made up of 43% corn plant debris. It appears that this extraneous plant material was consumed by the monarch larva and caused significant mortality and reduced weight gain by >80%, of larvae exposed to contaminated versus uncontaminated pollen samples.

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After concerns by the biotechnology industry and the USDA, a consortium of scientific researchers from six universities assessed the potential risk to monarch populations from Bt corn pollen under natural environmental conditions. Many other studies have since been conducted to address the monarch butterfly larva consumption of Bt corn pollen. These studies, conducted in the field, produced much different results.

Bt plants were grown on 28.52 million acres in 2000. The EPA estimates that the use of Bt crops in the USA results in an annual reduction of >7.7 million

“acre treatments” of synthetic insecticides, mostly broad-spectrum insecticides which can affect non-target organisms and potentially lead to environmental and human health risks. It has been estimated that nearly \$2.7 billion (of insecticides) could be substituted with Bt biotechnology applications.

If anyone is interested in a copy of this summary report please contact the office so a copy can be mailed to you.

*Robert E. Call
Extension Agent, Horticulture*

Volunteers Wanted

The Cochise County Herbarium is looking for volunteers to help identify, mount and catalog plant specimens that have been collected over the last year in the County. The Cochise County Master Gardener Association donated money so that books and supplies could be purchased for the Herbarium's use. You will need to set up times for instruction and work because the materials are locked up at the U of A, South Campus. If you are interested in working on the project please contact Cecile Lumer at cecile@theriver.com