



Pinal County Cooperative Extension Garden & Landscape Newsletter December 2007



GARDEN AND LANDSCAPE SHORT COURSE

If you are interested in learning more about the care of garden and landscape plants in our desert environment, this is for you.

Twice a year, in the spring and again in the fall, a series of the very popular Garden and Landscape Short Course is held in various locations throughout Pinal County. If you are having problems with any of your landscape plants, are new to the area and want to learn more about gardening and landscaping in the desert or if you simply want to upgrade your gardening skills, you may want to consider blocking out the time to join us for this learning opportunity.

Growing successful gardens and landscapes in Pinal County can be a formidable challenge. The desert environment mandates a completely different set of rules than those valid in other parts of the country. During the series, we will look at these rules, the plant palette appropriate for our area and the constraints that affect plant health and development. Using these concepts, we will then attempt to build a foundation of understanding that will help you make good management decisions.

—SHORT COURSE, PAGE 3

IRON CHLOROSIS CAN CREATE A PROBLEM IN LANDSCAPE PLANTS

As we enter into our normally brief cool weather season, it is a good idea to keep a watch out for iron chlorosis, a common winter problem in many garden and landscape plants.

Okay, okay, I know that we have talked about this problem before in this space, but we still get inquiries about the problem. In some plants, cool weather can bring on the onset of symptoms, so now is a good time to refresh our memories on what iron chlorosis is, and what can be done about it.

Chlorosis is a term used to describe the yellowing of plant parts, particularly the leaves. There are many factors that can cause yellowing in plants. Nitrogen and other nutrient deficiencies, insect feeding, herbicide damage, and viral infections can all cause yellowing symptoms. However, in this area, one of the most common yellowing conditions is the nutritional disorder called iron chlorosis.

Iron is one of the sixteen essential nutrients required by all plants for proper growth and development. In the plant, iron is used within individual plant cells to form chlorophyll, the molecule that captures energy from the sun and transforms it into energy-rich sugars during the process of photosynthesis. Without photosynthesis, plants can not grow.

Iron also serves as an activator for biochemical processes such as respiration and symbiotic nitrogen fixation. In short, iron is critical to the normal health and development of all plants.

While iron deficiency symptoms in plants are seen mainly in plant leaves, the real reason for its appearance can almost always be traced to the soil. All soils, especially the granite-rich soils of Pinal County, contain iron. The problem comes when local soil conditions make it difficult for the plant to pull the iron molecules from the soil.

—IRON CHLOROSIS, PAGE 4

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THE USE OF SULFUR IN DESERT SOILS

While it is found on just about every nursery or garden center shelf in Arizona, elemental sulfur may be one of the least understood of all gardening products available today. Here are a few tips for using it correctly.

In gardening, elemental sulfur has two main uses. The first use is as a nutrient or fertilizer for plants growing in sulfur-poor soils. The second use is as a soil additive to help reclaim poor quality soils and irrigation waters. Elemental sulfur, or soil sulfur as it is sometimes called, can play an important role in maintaining good plant health in desert soils, but it must be used correctly for best results.

First, the good news! Most desert soils in Arizona possess sufficient sulfur for good plant growth and there rarely is a need to specifically add sulfur as a fertilizer in home gardens and landscapes. This occurs as the native rocks break down during the weathering cycle releasing sulfur and other nutrients into the soil environment where they are picked up by the roots of plants and used in the process of growth and development.

In low sulfur soils, such as artificial potting soils, plant deficiency symptoms include a light green color of younger leaves with occasional dead spots in the leaf tissue. Unfortunately, these symptoms are also similar for other nutrient deficiencies and are easily confused. In these cases, an all-purpose complete fertilizer enhanced with micro nutrients may be a good choice for good plant health.

It is important to remember that elemental sulfur, in its natural form, cannot be used by plants as a nutrient. It must first be converted in the soil to the sulfate form through a naturally occurring process called oxidation. Oxidation occurs in aerated, moist soils when soil microorganisms change sulfur into sulfuric acid, which contains the sulfate ion. Once converted, plants can easily pick up and use the nutrient. Because the oxidation process is relatively slow, it may be best to use a sulfate-containing fertilizer, such as ammonium sulfate, for a quicker nutritional response.

The second use of sulfur is to help reclaim poor quality soils. This is the use that is most valuable in our area and where sulfur as a soil amendment really shines.

Poor quality soils can be quite damaging to non-adapted plants. The most common problems include high pH and high levels of sodium and bicarbonates. Sulfur, in the form of sulfuric acid, is valuable in solving each of these situations.

Sulfuric acid, by itself, is expensive and dangerous to use because of its corrosive capability. This is why it is not sold on the garden shelves, except in well diluted forms. The benefits of sulfuric acid, however, can still be achieved by adding powdered sulfur to the soil and allowing the safe oxidation conversion to take place. One of the drawbacks is the relatively slow pace in which the transformation occurs. Patience is required. However, the relatively slow speed of the process allows the benefits to be lengthened out over time giving a longer lasting effect.

Once the transformation occurs, the sulfuric acid actually does its work quite rapidly. Sulfuric acid acts to temporarily lower the high pH of alkaline soils and to help eliminate the buildup of sodium and other harmful chemicals in the soil. Regular additions of sulfur will ensure that the conversion process is continually occurring and continually providing the beneficial acidifying effect.

To eliminate sodium, an element essential to human health but harmful to plants, sulfur needs a little help from calcium, another element. Sulfuric acid combines with calcium to form gypsum which then works to chemically replace sodium in the soil. For the process to work, there must be enough calcium present to do the job. After the sodium is replaced in the soil with calcium, it is free to be leached out of the root zone by deep irrigation. If a soil does not contain sufficient calcium, no amount of sulfur will reclaim the soil. In low calcium soils, use gypsum first to get rid of the sodium and then add sulfur to help buffer the soil pH.

There are some dangers to using sulfur. The main caution is to prevent any sulfur dust from coming in contact with plant leaves and stems when the daytime temperatures are above 90° F. Sulfur can burn tender foliage and seriously set back plant growth. It is a good idea to incorporate the sulfur into the soil by raking or light tilling to ensure that the sulfur is not blown onto the leaves by the wind or splashed up by sprinklers or rain.

Another problem can occur when there is not good drainage of water through the soil. Sulfur in its various forms is another salt and high salt levels can damage roots and leaves of plants. Before adding any soil amendments, it is always a good idea to physically improve drainage by breaking up hardpans and caliche layers so that water can move freely down and out of the root zone.

Soil sulfur, is commonly used to overcome tough garden soil problems and to protect the long term health of landscape and garden plants. If used correctly, it can be a valuable tool in increasing the productivity of the arid desert soils of Pinal County.

The series consists of fourteen classes, each three hours long. There is one class held each week. Each class takes an in-depth look at a particular topic with practical, hands-on training in the principles that govern good plant health.

The first class always starts with a review of the basic laws of botany that govern plant growth and development. We do not spend a lot of time on shapes of leaves or cell biology. We prefer to spend most of our time on those basic rules that help us understand what we need to do to keep plants healthy. We try to keep the course practical and easy to understand.

I always tell my classes that I will never teach a scientific principle without giving at least one practical, everyday application in local gardens or landscapes. For example, a common question this time of year deals with frost damage.

The telephone call will usually go something like this. “I have a grapefruit tree where the leaves are drying up and falling to the ground. What disease is killing my tree?”

Well, it could be a disease, but those usually are seen in August, not December or January. More likely it is a frost or freeze problem. After a brief discussion to determine if cold weather could be the culprit, the conversation invariably drifts to the chances of tree survival. Here comes the basic rule of botany. “At the base of every leaf, there is a bud.” The practical application of this rule tells us that if the roots are in good shape and the twigs on the branches are still healthy, the chances are, in Southern Arizona at least, the buds in their own good time will sprout and the tree will live to fruit again. When you know the rules, it is easy to know what and what not to do.

By the way, it is possible for a grapefruit tree to show cold injury symptoms and an orange tree right next to it to be perfectly okay. Why is that? Grapefruit are more sensitive to cold temperatures than oranges.

Grapefruit will show injury at temperatures around 30°F. while oranges can usually tolerate temperatures down to around 26°F. Fruit cocktail citrus trees, trees with several citrus varieties grafted to one rootstock, make great thermometers, depending upon the cold sensitivity of the varieties attached to the tree. You can tell how low the thermometer dropped by noting which variety of citrus suffered freeze injury. However, I am getting off my topic.

Other classes in the series follow the same format. One session deals with soil, water and plant relations, a critical discussion that is essential to understanding why plants struggle so much in our environment. Many of the plant problems that we see can be traced back to the desert climate and the soils that have developed under its influence.

An in-depth review of citrus production is always one of the more popular classes. The class focuses on everything from variety selection to diseases to proper fertilization. This class alone makes the course worthwhile.

Other classes look at the proper care of landscape trees and shrubs, including proper planting, pruning and fertilization.

The course also includes sessions on important plant diseases, insects, weeds and other pests, along with discussions on how to maintain a healthy ecosystem in the garden or landscape. We also take a look at xeriscapes or the use of low water use plants in the landscape, as well as vegetables, flowers and other interesting topics.

The course costs \$78 per person and covers only the cost of a large reference notebook, travel costs for instructors and course supplies. If a couple would like to attend together and share the reference materials, the cost is \$98 for the two.

If you are interested we invite you to call, email or visit the University of Arizona Cooperative Extension office in Casa Grande, 820 E. Cottonwood Lane, Building C, in Casa Grande. The telephone is (520) 836-5221, Extension 202. You may email Theresa at tellswor@ag.arizona.edu.

Many people new to the area or those who have been here for a while but can't seem to figure out why their plants do not thrive are searching for answers. The Garden and Landscape Short Course, offered by the Pinal County office of the University of Arizona Cooperative Extension, fulfills these needs and more. We invite you to join with us and learn more about desert gardening and landscaping.

Our high pH, alkaline soils can chemically tie up iron and other nutrients in the soil and make it difficult for plants to absorb them through the roots. The higher the pH, the more difficult it is for plants to extract the nutrients. Some plants have a more difficult time than others extracting iron from the soil, even under the best of conditions. For these plants especially, high pH conditions cause severe problems.

In addition to high pH, iron chlorosis can be also be caused by poor aeration of the soil. Aeration refers to the amount of air which is found in the spaces between the individual soil particles and is essential for good plant health. The problem comes when soil compaction reduces the volume of space between the soil particles or when over watering keeps the spaces filled to the exclusion of air. Failure to reduce soil compaction and continued over watering will lead to iron deficiencies.

Symptoms of iron deficiency are fairly easy to recognize, even by the beginning gardener or landscape manager. Begin by carefully inspecting the younger leaves near the tips of the branches.

Look for pale to light green leaves where the veins of the leaves remain a darker green than the surrounding leaf tissue. This usually is the first hint of an iron deficiency problem. As the condition of the plant worsens, look for more intense yellowing of tissue but the veins of the leaves will almost always remain green. Only in extremely severe cases will the veins themselves turn yellow leaving the entire leaf a bright yellow color.

Leaf discoloration, called interveinal chlorosis, will be the first symptom seen. In severe, prolonged cases, twig dieback will also be seen and this can progress to death of entire limbs or plants.

Plants most often affected by iron chlorosis are grasses such as St. Augustine and sweet corn and some fruit trees and ornamentals like bottle brush, eucalyptus, pyracantha, peach, apricot and citrus. There are other plants that can suffer from iron chlorosis, but these seem to be among those most commonly affected.

The solution to iron chlorosis is usually straight forward. Iron is taken up by plants from the soil as

ferrous (Fe ++) ions. Ions are simply elements that have lost or gained one or more electrons and have a positive or negative charge, much like the poles of a magnet. It is these ionic charges that allow the plant to move the nutrient ions across cell membranes into the plant tissue.

Symptoms of iron chlorosis can often be resolved by adding iron-containing fertilizers into the plant environment, either through the soil, or by spraying the leaves. Which one is best? Well, that is the question.

Several years ago, we did an experiment on highly chlorotic pyracantha bushes. Both foliar (leaf applied) and soil applied iron fertilizer formulations were included in the experiment and the treatments were repeated several times on different shrubs. The study indicated that both types of iron fertilizers worked well. All of the treatments either reduced or eliminated the yellow symptoms. However, the foliar applied formulations seemed to green the plant up faster than the soil applied materials, but they did not keep the plants green as long as the soil applied materials did.

When making an iron fertilizer selection, one aspect to consider is how quickly one wants the plant to respond and another is how often one wants to repeat the application. Foliar sprays may need to be repeated twice a year in some situations, where soil applied formulations may need to be applied annually, perhaps even less. A good plan would be to alter foliar applied and soil applied formulations from application to application to get the benefits of both.

More important than the temporary greening up of plant tissues, is the resolution of the underlying problems that have caused the yellowing in the first place. The first, and most obvious factor to check is the watering frequency. Too frequent irrigation may keep the soil profile filled with water and not allow air to move into the soil. Cutting back on irrigation frequency is the first place to start.

Another challenge may be soil compaction. Sometimes desert soils physically compact from foot or wheel traffic around the plants. Sometimes clay or silt soils will lose their structure and collapse in on themselves forming compaction layers. Caliche, a

JUJUBE - THE LESS WELL-KNOWN FRUIT

Amid questions about citrus, peaches and apricots, occasionally I get asked about a lesser known, but equally useful fruit: the Chinese date or jujube. *Ziziphus jujuba* is the scientific name of this wonderful tree, but most people simply call it by its common name, the jujube. A member of the buckthorn family, it brings an interesting shape, deep green leaves and tasty fruit to a landscape. It is widely grown in hot, dry climates around the world.

The jujube makes an excellent landscape plant. It provides shade and has a canopy of leaves thick enough to make a good screen. It produces lush fruit that can be eaten fresh, dried like a date or candied. If you are into wood carving, you will just love the opportunities the wood provides. The wood from the jujube is reddish, close-grained, fine-textured, hard, tough, durable and polishes well. The wood can also be used to make furniture and other useful items. For the less artistically inclined, it makes great charcoal.

The jujube tree mixes well with lawns, shrubs and bedding plants but it strikes an especially attractive silhouette when planted all by itself. Over time it develops a graceful, gnarled shape that gives it character and individuality.

The tree grows at a slow to moderate rate until it reaches a mature size of fifteen to twenty feet tall and about ten to fifteen feet wide. These dimensions make this tree a little smaller than other trees commonly available for planting in local landscapes. Thus, the jujube is an ideal candidate for planting in smaller yards.

The tree is best identified from the structure of the leaves. Each glossy, bright green leaf has three prominent veins that run lengthwise along the leaf. Most leaves are about one to two inches long. In the fall, these same leaves turn a bright yellow color in anticipation of the winter season.

The flowers of the jujube appear in late spring and early summer. The many clusters of small, yellowish flowers produce the fruit that will ripen in the fall. The fruit is harvested for eating fresh off the tree when it begins to turn from yellow-green to reddish brown. The fruit will have a crisp texture and taste like a sweet apple. Once the fruit reaches the stage where it is completely brown and mushy, it is better for drying.

The fruit from seedling trees are generally smaller than the regular fruiting varieties. What are seedling trees, you ask? Seedling trees are trees that are still on their own roots. It is quite common horticulturally to graft fruit varieties, like peaches, apples and citrus, onto the trunk and roots of a different variety. This management step usually yields larger fruit and a more vigorous tree.

In the jujube, seedling fruit are usually about one-half to one inch long. Fruiting varieties that are grafted usually produce fruit from one and one-half inches to two inches long. So, if you choose to plant a jujube from seed, just remember that you may get smaller fruit. The two most commonly cultivated varieties

are 'Lang' with one and one-half to two-inch, oblong fruit and 'Li' which produces two-inch, round fruit. Both varieties produce better if both are planted next to each other for cross pollination, but 'Li' will produce some fruit if planted alone.

The jujube tree has roots that penetrate deeply into the soil. Because of this, it can access water that is normally unavailable to other, more shallow-rooted plants. When we irrigate the jujube tree, it is best to let the water run slowly over the ground so that it can fill the entire root zone. The tree will, however, tolerate drought and the hot, dry environment of the desert. It grows better in well-drained, fertile soils than it does in shallow, hard soils, but it does just fine in our salty, alkaline soils.

Unlike many of our frost sensitive fruit trees, like citrus, the jujube is rarely bothered by the cold weather found here in our warm deserts. Because the plant loses its leaves during the winter and flowers relatively late in the spring, frost doesn't bother it. However, in higher elevations, the tree will not produce much fruit where the summer growing season is short.

The jujube tree needs only a minimal amount of fertilizer each year to be happy. I would give it no more than one pound of actual nitrogen each year. If you use ammonium sulfate, 21-0-0, the year's total would come out to only five pounds of fertilizer for the entire year. This total should not be applied in anything less than three applications during the year. A good approach would be to apply one-third of the fertilizer in each of the months of February, May and August. Sprinkle the fertilizer onto the surface of the soil and then let the irrigation water slowly trickle onto the surface of the soil until it wets the entire area beneath the canopy of the tree. The water will move the nitrogen into the soil profile.

One drawback of the jujube is its tendency to produce sucker growth from the roots. These individual sprouts of little trees will eventually play havoc with lawn mower blades when they begin to be thick enough to cause problems. The tree is also quite susceptible to cotton root rot, otherwise known sometimes as Texas root rot. The sucker growth can be kept trimmed, of course, but there really is nothing to be done if root rot organisms are present in the soil. Root rot kills quickly and silently.

It is not necessary to do a lot of pruning to maintain the tree. The best time to prune is in winter during the months of late December, January and early February while the tree is dormant, that is, when the leaves are off the tree. Other than the need to cut out the occasional rubbing branch, to slightly shape the tree, to encourage the weeping habit or to reduce size, very little pruning is actually needed.

If you haven't guessed by now, I really think the jujube is a good fit for desert landscapes. Yes it has a few spines, but the shade, desert hardiness and fruit make up for that and the other few problems inherent to the jujube.

IRON CHLOROSIS, CONTINUED FROM PAGE 4

desert form of naturally occurring concrete, will consolidate and leave a hard layer with which roots have to deal.

Compaction layers, if not too severe, can often be reduced by drilling holes through the soil profile with a soil auger or with water pressure from a root feeder attached to a hose. These holes can be backfilled with sand which will speed the movement of water down through and into the soil. The holes also reduce the internal pressure within the soil profile and cause the soil to loosen in the vicinity of the holes. For these reasons, the more holes that can be dug in the area from the trunk of the tree to the outside edge of the plant, the better.

While compaction layers often can easily be reduced, there are some situations where nothing seems to work. One of these situations is when there is present a high concentration of caliche in the soil, and it is especially bad when that caliche seals together into hard concrete-like layers. In these situations, it is easier to select desert-adapted trees that will tolerate if not flourish under these conditions.

For example, consider the results of another experiment conducted under local conditions. Large, mature eucalyptus trees growing in heavy, caliche-saturated soil and suffering from severe leaf chlorosis and twig and limb dieback, were treated with several foliar, soil and vascular- injected iron fertilizer products. Because of the massive size of the trees and the difficult soil conditions, no reduction of symptoms could be achieved with any treatment, even at double and triple rates. Sometimes it is easier and less expensive to go with a different type of tree that can be more tolerant of the local conditions.

Finally, reduce the pH of the soil. All Arizona soils are alkaline, but some soils contain more salt and caliche than others. When present, accumulated salt and caliche can both quickly drive up the soil pH.

Over time, a good organic mulching program can go a long way in helping reduce pH problems in soil. Applications of compost or leaf mulch lightly spaded into flower or garden beds or spread on top of the soil under trees and shrubs and gently raked into the soil will help improve the structure of soils and release

organic acids into the soil profile. Remember that the microorganisms that break down organic matter do their best work when temperatures top 100°F and organic materials tend to disappear quickly under summer time conditions. Frequent applications may be needed through the growing season.

Another way to help reduce the soil pH is to apply horticultural grade sulfur to the soil. Soil sulfur can be found in most nurseries. It should be applied at label rates and gently raked into the soil just before the next irrigation. The water will turn the sulfur into sulfuric acid which will then work to help bring the soil pH from its alkaline condition to a neutral level preferred by most plants.

Iron chlorosis is just one of many conditions that cause problems for garden and landscape plants in the desert. By understanding why it occurs and how to reduce its impact, plant health and productivity can be improved.

If you have questions, you can reach one of the Master Gardeners at the Cooperative Extension office, 820 E. Cottonwood Lane, Building C, in Casa Grande. The telephone is (520) 836-5221 extension 204. The author's email address is gibsonrd@ag.arizona.edu.

If you wish to have this newsletter emailed to you, please email Theresa at tellswor@ag.arizona.edu and include G&L Newsletter in the subject line. This newsletter is also now available to view on our website at: www.cals.arizona.edu/pinal.

Richard D. Gibson

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Extension Agent, Agriculture

RDG/te

766 copies



Garden & Landscape Short Course to Begin in January 2008 at Various Locations throughout Pinal County



APACHE JUNCTION - Central Arizona College, Old West Highway, Room 441.
Tuesday, January 15, 2008, 1 pm to 4 pm.

ELOY - Robson Ranch
Wednesday, January 9, 2008, 9:30 am to 12:30 pm.

MARICOPA - Maricopa Agricultural Center, 37860 W. Smith-Enke
Thursday, January 10, 2008, 6:30 pm to 9:30 pm.

SADDLEBROOKE - Mountain View Country Club
Thursday, January 10, 2008, 9:30 am to 12:30pm.

The cost for the course is \$78.00 per person and \$98.00 per couple which includes the Master Gardener Manuel, Sunset Western Garden Book and handouts. If interested or if you have any questions, please call the U of A Extension Office at 520-836-5221 ext. 202 or toll free at 866-836-5221 ext. 202. You may also email Theresa at tellswor@ag.arizona.edu and use the key words "G&L Short Course" in the subject line.

*Have a Safe and
Happy Holiday Season!*

