



Pinal County Cooperative Extension Garden & Landscape Newsletter August 2008



SIX SIMPLE SOIL TESTS THAT YOU CAN DO YOURSELF

You planted a tree, shrub, rosebush or groundcover in your yard, and it died.

It was the healthiest plant you could find. You prepared the planting hole according to the best information available. You watered and fertilized it diligently. You were excited when it put out its first leaf of new growth; and, now you are devastated.

Never fun, and often expensive, dead and dying plants are no joking matter. There are many possible reasons, of course. A lack of water in the hot summer is deadly to plants. So also is too much water. It can lead to rotting roots.

In many cases, however, the causes of dead and dying plants can often be traced back to the soil itself. To be specific, there are five common soil problems that can, and often do lead to serious plant health issues.

Caliche is an accumulation of lime, or calcium carbonate. It is a natural and common mineral in the desert and, in a refined form, is a basic component of concrete. Caliche can be found in the soil as small crumbs, thick or thin lenses, or solid sheets. It is grey in color and it is hard, very hard. If you have ever tried to dig through it, you will know what I mean.

Salinity, a buildup of naturally occurring salts in the soil, is also a common problem. Some salts, in beneficial amounts, are considered to be plant nutrients. Magnesium, zinc and boron are examples. When these and other salt forming chemicals reach toxic levels in the soil, however, they can seriously injure or kill sensitive plants. We solve high salt concentration problems by leaching with extra water during an irrigation event to wash the salts down and out of the root zone.

The only exception to this rule is sodium. Sodium salt is a special case because it ties itself chemically to the individual soil particles and does not readily wash off during irrigations. Sodium in large amounts is especially toxic to plants.

Soils saturated with sodium take on unique characteristics. Because the alkali salt causes the soil particles to separate and act individually, the soil particles with the least disturbance can easily billow up into the air and create clouds of dust. Water often sits on the surface of these soils without sinking in until it evaporates. Sometimes the water will penetrate less than an inch into the soil. The soil also becomes quite sticky and readily clings to shoes, hands and clothing. Gypsum, as an amendment, is the solution for sodium problems.

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TIME TO PLANT A FALL VEGETABLE GARDEN

Today, August 15, is the first official day of the fall gardening season. Why not spend a few minutes outdoors this evening and put a few seeds in the ground?

I can hear your response as I write. "Is this guy crazy?", you say. "It is 100 plus degrees outside, it takes too much expensive water to grow a garden and it is cheaper and easier to buy my produce in the supermarket. Plus, I definitely do not want to go out and get all sweaty and hot for a few paltry veggies!"

If that is what you are thinking, I would submit that you may not be considering all the facts. You may be forgetting that fruits and vegetables straight from the garden taste much better than produce that has been sitting in refrigerated boxes or placed on a grocery shelf for a period of time. You may also be forgetting that vitamins and minerals begin to degrade as soon as the produce is harvested. I am sure that we can agree that homegrown fruits and vegetables bring their own higher quality and taste to your kitchen counter.

As for other issues that may be keeping you on the couch instead of in the garden, there are answers, good answers, to your concerns. For example, let's take the late summer heat question.

When we live here long enough to discover that there is definitely a difference between 105 and 115 degrees F., we find ways to coexist with the hot weather. In gardening, we have a number of choices.

We can choose to work outdoors in the early morning hours, or later in the evening when the temperatures start coming down. We can shorten our intervals in the garden, doing a little here and a little there, and avoid overheating through long, continuous exercise. We can work a little in the garden and then reward ourselves by jumping into the pool, sitting in the shade of a tree and drinking ice cold lemonade or getting in a water fight with the kids. We just have to cultivate a different mind set.

Gardening does not have to be backbreaking or painstaking. Exercise, we will agree, is good. Most of us need a little more than we are getting, and gardening is a good way to work unused

muscles, tendons and joints. Medical and exercise professionals would tell us that less intensive exercise on multiple days is much better for us than rigorous exercise limited to one day a week, or, worse, one day a month. So, spread the hard labor out a little and make gardening enjoyable, instead of a pain.

You may be worried about the expense, or the advisability of using extra water, a precious resource in the desert, to grow a home garden. There are answers here also.

We can use tried and proven drip irrigation technology to reduce water use down to a bare minimum. We can grow square foot gardens, use raised bed systems or even grow vegetables in containers to minimize the cost of seed, fertilizers and water. There are many ways that we can be efficient in using our gardening resources.

Why do we suggest planting in August, of all times? The complicated answer is simply, "Fall weather is just around the corner."

"Fall weather!", you say. "Rick, for crying out loud, it's August! It's 110 degrees outside!" Thanks for reminding me, but I did say the answer was a little complicated. Let me give you the shortened version.

First, we have to consider the relationship between the length of the growing season and the correct growing temperature requirements for each vegetable. Most vegetable seasons last between ninety and one hundred and twenty days. That means that it takes from three to four months from planting to harvest. Well, okay, radishes and leaf lettuce won't take that long to harvest, I know, but that is why we plant those later, in September. Let's not split hairs here, we have to stay focused to get through this.

Added to the growing season issue, we have to remember that each vegetable has a preferred range of temperatures in which it does best. In general, most vegetables like to grow between 70 and 85 degrees. So, why plant now when it is so hot?

We plant now so that the germinating seeds have the benefit of the warmer soil temperatures.

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THE SAGUARO BRINGS THE QUIET BEAUTY OF THE DESERT TO LANDSCAPES

The saguaro cactus offers many benefits as a landscape plant. It also brings a few challenges; but many people select the giant saguaro as a key addition to their low water use landscapes because it reflects, like no other plant, the quiet beauty of the desert.

Saguaro cacti are native to, and found only in, the Sonoran Desert of Southern Arizona, Northern Mexico and Southeastern California. Nowhere else in the world do they live in a wild, unattended state. They are so distinctive that many people associate their silhouette with “the desert”, any kind of desert. In the landscape, they bring interest, focus and variety.

In order to enjoy the benefits and minimize the challenges presented by this spectacular plant, it is important to know a little about the plant itself. It truly is unique in its characteristics.

The saguaro cactus grows very slowly. While it may eventually reach up to fifty feet tall, in the wild it may be only three feet tall after thirty years. Under irrigation, however, the plant may reach ten to twelve feet in as many years.

The massive trunk may develop as many as fifty branches, but this is abnormal. Most saguaros after they reach twelve to fifteen feet in height will develop between one and five branches.

The plant gains strength from woody ribs that extend from the base of the plant to the very top. These ribs are arranged in a circular pattern and are inside the ridges seen from the exterior of the plant. These are what give the plant a pleated, accordion look.

The cactus stores water in times of plenty for use when water is not available to the plant. The central core of the plant is made of a spongy material and water is stored in these tissues. As the plant picks up water through its massive but shallow root system and ships it off for storage, the trunk will swell in girth. As water is used, the circumference of the trunk will shrink accordingly. Too little water and the plant can die. Too much water and it can pop its skin in longitudinal cracks between the ribs. This is not a good thing since disease organisms can gain entry to the moist and warm interior of the plant through the cracks.

All growth occurs only at the upper tip of the main trunk, and at the tips of the arms. A plant does not “grow up” by extending the height of the old tissues from previous growth. Rather, all extension of size comes within a narrow band of tissue concentrated at the tips of these stems. New arms will arise from areoles, the points on the plant where spines are concentrated.

The saguaro produces magnificent white flowers at the tips of the previous year’s growth. The flowers are between three and four inches across and appear in the late spring. These flowers typically open at night and continue through the afternoon of the following day. A native bat is key to pollination of the flowers.

The saguaro fruit are edible and sweet. They are oval, between two and three inches in diameter, and split open in early summer to reveal bright red to reddish purple pulp. If the fruit doesn’t develop appropriately, chances are the flower didn’t get pollinated.

Young saguaros are not well protected by spines in their early years and seedlings that have germinated in the open often do not survive. They seem to be prized by small mammals, including mice, ground squirrels and rabbits. When you plant a small saguaro, it may be important to protect the plant with a narrow mesh fence if small animals seem to be a threat.

Most saguaros that survive in the wild have been fortunate to germinate and begin life in a spot that makes it difficult for animals to find them. This can be in the cleft of a rock or within the protective canopy of a tree. It is quite common to see saguaro cacti growing up through the canopy of larger trees and shrubs. Because of their protective role, these trees are often called “nurse trees” and may often coexist with the saguaros for many years. Young saguaro seedlings in the wild are said to have about a twenty million to one chance of growing to maturity.

Nesting holes pecked into the saguaro by Gila woodpeckers and gilded flickers do not seem to do long term damage to the cactus. The saguaro quickly forms a hard, corky layer around the perimeter of the cavity which seals off the soft, moist interior of the plant to the harsh outside

—Saguaro, Continued on Page 7

JOJOBA IN THE LANDSCAPE

If you need a hardy, fast-growing, low water use, easy-care shrub to screen out dust, soften a building foundation or define a particular part of the yard, consider the little-used jojoba bush.

The jojoba bush, *Simmondsia chinensis*, sometimes called goatnut, is a plant native to the desert areas of Arizona, Northern Mexico and Southern California. Because it is adapted to our low rainfall climate, it can survive for long periods of time without frequent irrigation, but when it is given ample water, it will grow fast and tall. This particular ability, to withstand long periods of drought without suffering severe damage, and yet grow quickly and profusely when water is available, makes it quite versatile as a landscape plant.

A row of jojoba plants, given frequent, deep irrigations, can form a dense, tall landscape screen to blunt the ferocity of a summer dust storm or hide an unsightly work or storage area. On the other hand, a jojoba bush given infrequent water will remain quite small and can easily be shaped to provide a short hedge or specimen plant for a more formal garden. It also works well to hide building foundations and soften corners. The possibilities are limited only by the imagination. All of this is possible on the very skimpiest demand for water.

This great flexibility is also aided by the growth habit and overall appearance of the plant. The jojoba forms a dense, stiff-branched bush that naturally spreads to between three and six feet in all directions. Given sufficient water, it sometimes can reach sixteen feet or more. The dull, gray-green, leather leaves are about one to two inches long and perhaps one-half inch wide. The bush forms a dense canopy that makes it an excellent choice as a screening or foundation plant.

The jojoba is relatively pest and problem-free. Most insects do not seem attracted to it, including the ever-present whitefly. It is moderately susceptible to verticillium wilt and Texas root rot, but the incidence of infection seems to be quite low. Powdery mildew and heart rot, common problems with many other landscape plants does not seem to affect the jojoba. Spider mite infestations are a possibility but they are easily controlled by washing off the leaves with a strong stream of water.

About the only drawback is the lack of showy flowers, but this is true of many other landscape plants. Jojoba bushes do produce flowers, but they are quite small and inconspicuous. However, the positive characteristics of the plant outweighs by far this minor drawback.

One interesting aspect of the jojoba is that all plants are dioecious, that is, the male flowers and the female flowers are borne on separate plants. Since a male plant will not produce fruit, by planting all male plants, the mess of cleaning up the large seeds after maturity is avoided. This can be a real plus in the landscape.

On the other hand, many people like to collect the jojoba nuts and use them either to propagate new plants or for food. If the nuts are desired, it will be necessary to plant both the male and female plants to ensure proper flower pollination.

The brown fruit are about three-fourths of an inch long, have a filbert-like taste and have been used for years by people and animals for food. Unless properly cured, however, the fruit will have a slightly bitter taste.

The seed contains a fairly high oil content and can be used **before** as a replacement for sperm whale oil. In the late 1970's and early 1980's, jojoba was common planted on farms locally to provide oil for commercial purposes. Unfortunately, other less expensive methods of producing commercial oil supplies were developed and the plantations withered for lack of demand.

Jojoba bushes can be grown from seed. After harvest, lightly score the outer seed shell with a sharp knife, deep enough to penetrate the hard, outer shell, but not deep enough to damage the embryo and seed leaves that are just underneath. Give the seed a sandy potting soil and enough water to keep the area around the seed moist. The plants can be slow to get started, but patience during the early stages will be rewarded.

In most cases, when germinated, more than fifty percent of the seeds will result in male plants, which can be a problem if you are wanting to harvest the nuts. Making it even more difficult, it is impossible to tell the sex of young plants until they

—Jojoba, Continued on Page 6

Another common problem is soil pH. Soil pH is a measure of the acidity or alkalinity of the soil. It is measured on a scale of 1 to 14 with 7 being neutral. A pH under 7 results in a progressively acid soil-water complex while a pH over seven is considered to be alkaline. A soil or water pH that is over 8.0 or under 6.5 can be toxic to plants, as well as inhibit the uptake of nutrients by the plant. Caliche and sodium are quite alkaline and are a leading cause of high pH soils in our area.

Soil compaction occurs when the soil is compressed by foot, animal or vehicle traffic. Anyone who has noticed the lack of grass growing under a child's swing set or in the ruts of a dirt road will understand the difficulty in growing plants in compacted soil.

Finally, desert soils are notoriously short of available nitrogen, an essential plant nutrient. Generally other nutrients like copper, potassium and manganese are plentiful in our desert soils and we do not need to worry about feeding these nutrients when the plants are growing in native soils. Without regular applications of nitrogen, however, most non-native, introduced plants will not thrive.

So, how do we know if we have these soil problems in our yards? Here are six simple tests that anyone can do at home without having to be a soils expert or purchase a lot of expensive gadgets or materials.

Dig a hole. Using a pick and shovel, it is time to get a little exercise. Dig a hole right where you are thinking about planting a tree or shrub. The hole should be no deeper than the depth of the container and a little larger than it is wide. Your actual planting hole will be much wider, of course. Up to five times the diameter of the container in which the tree or shrub is planted is the recommendation, but loosening the soil for good root growth can come later. For now, let's keep the size of the hole manageable.

The next step is to fill the hole with water and then time how long it takes for the water to sink into the ground, that is, to disappear. Most soils should drain within thirty minutes to one hour. Suspect caliche, sodium or compaction problems if it takes longer. Do not plant anything at that site until you

figure out and fix the problem. Drainage problems are a major cause of tree death in our area.

Shake the jar. Soil texture is a measure of sand, silt and clay in a soil. The more sand in the soil, the quicker a soil will drain. That is good. The more sand in a soil, the more frequently we have to irrigate. That can be bad.

Likewise, the more clay we have in a soil, the slower it drains. That can be bad. The more clay in a soil, the more water it will have available for plants. That can be good. A soil with a mixture of sand and clay is generally the best kind of soil for gardens and landscapes because it resists compaction and allows water to move easily through the soil profile.

To perform the test, fill a clear glass quart jar half full of soil. I like to take my samples about six inches deep. It avoids a lot of problems and gives me a good estimate of conditions in the root zone. Now, add water to the jar but do not fill it completely. There needs to be enough room for the water to slosh around. Filling the container up to the neck should be just fine. Seal the jar with a lid and shake it vigorously. Hint: do not do this over your expensive carpet. Sometimes the lid does not seal tightly with the rim of the jar.

Once the soil is totally mixed with the water, set the jar down and wait a few minutes. The sand in the soil will settle first, followed by silt and clay. A good garden soil will be about one half sand and one half silt and clay.

Probe for water. Using a soil probe, measure how deep the water penetrates the soil during an irrigation event. I like to use a long screwdriver. Where the soil is moist, the screwdriver will slip easily into the ground. When it hits dry soil, it will stop abruptly. With the probe in the ground, place your fingers at the soil level and remove the probe. Measure the distance between your fingers and the tip of the probe.

How deep should the water go? Use the "1-2-3 Rule". Water small plants, such as ground covers, cacti and annuals to a depth of one foot. Water medium plants such as shrubs to a depth of two feet. Large plants, such as trees, should be watered to a depth of three feet. Do not forget to

—SIMPLE SOIL TESTS, Continued from Page 5

soak the entire root zone. Most roots will fall inside a circle drawn at the edge of each plant's canopy. Lose a shoe? If you have a soil that resists water penetration and tends to pull the shoe off of your foot when you walk on it, think sodium. It is probably a good idea to treat the soil with an application of gypsum.

Watch for the fizz. Caliche is known to have a basic pH, that is, a pH well over the neutral point of 7 on the pH scale. Because of this, any acid coming in contact with the mineral will cause the caliche to bubble and fizz. Soil scientists use a drop of concentrated acid, like hydrochloric acid, placed onto a soil sample to tell quickly and accurately whether caliche is present.

I personally do not like to carry concentrated acids with me because of the danger of caustic burns, so I use mild acids like vinegar, lemon or lime juice. Because they are not strong acids, I have to look carefully to see the fizzing action, but they do work..

Leaves turn yellow? This is not specifically a soil test per se, but it is what we call in technical jargon, a bioassay. We use the plant itself to conduct the test. Look at the plant in question. If the older leaves down below the tip of the branch turn yellow while the new, upper leaves stay green, chances are you need to feed the plant with nitrogen during, or just before, the next irrigation. Ammonium sulfate, 21-0-0, is a good choice because the dissolved nitrogen will sink into the soil with water.

If the new leaves at the tips of the branches turn light green to yellow while the older leaves stay green, it may be an iron deficiency. Nitrogen and iron are the nutrients most commonly deficient, or unavailable, in desert soils.

We have listed the most common soil problems found in the desert and simple diagnostic tests that anyone can do. I hope that you will remember this basic rule of desert gardening: Problem soils can, and do, cause significant stress to garden and landscape plants. By knowing the more common soil problems and simple diagnostic tests that can be quickly done by the gardener, viable solutions to garden problems can be found.

—JOJOBA, Continued from Page 4

actually produce flowers. If space is tight and a definite mix of male and female plants is desired, it might be a better idea to propagate new plants from semi-hardwood cuttings taken from bushes of a known sex.

After the young seedling or new cutting has developed roots and is growing on its own, it is time to put the young plant in its own place in the landscape. It will be important to keep the soil moist but not saturated until new growth occurs. Once in the ground and established, jojoba plants should be watered deeply but infrequently. Unirrigated plants that are not getting enough water will often suffer some twig dieback and leaf thinning, but this will come only after much stress.

The jojoba is quite frost tolerant and will withstand temperatures down to 15° F. when mature. Early on, young seedlings may need some protection on the coldest nights.

If you would like to see a mature jojoba plant up close, check out the planter box on the east side of the County Administration Complex right outside the County Supervisor and Cooperative Extension offices in Casa Grande. These bushes were planted in 1979 and have reached an impressive size. They seem capable of growing even taller!

The jojoba is probably one of the most underutilized of all the native plants that can successfully be adapted to the home or commercial landscape. Given just a little care, jojoba plants can fill a unique niche and provide a desert touch to any landscape.

Trade names used in this publication are for identification only and do not imply endorsement of products named or criticism of similar products not mentioned.

environment. Once the woodpecker or flicker is finished with the nest, other birds often move in. Some saguaros have so many bird nests in them that they look like a bird apartment complex.

A naturally occurring disease that can be quite deadly is the necrosis of the giant saguaro. It mainly affects older plants but can also be seen in younger specimens occasionally as well. The disease is caused by an *Erwinia* bacterium and causes a soft-rot symptom in the saguaro. It has also been found in rotting cholla, prickly-pear, barrel, and organ-pipe cacti. It has been isolated from naturally infected plants from Texas and Mexico, as well as Arizona.

The symptoms may appear at one or more positions on the trunk or branches of saguaros at any time during the year. The first external indicators of bacterial necrosis are usually circular darkening and softening spots on the plant tissue surface. In time, the infected area usually enlarges, becomes purplish-black, and splits open. If such an opening occurs, a dark, odorous material will frequently "leak" from the plant. At other times, the soft areas dry and crack, revealing the dark, dry remains of diseased tissues.

If conditions are favorable, the plant can confine the disease to a "pocket" by forming a barrier of protective tissue around the affected area. If this tissue does not rapidly form or if it is breached in some way, the infection will spread and could end in the death of the entire plant.

It is somewhat difficult for the owner of a giant saguaro to treat a diseased cactus once the symptoms have begun to spread. At early stages, it is possible to remove the diseased tissue and disinfect the area with a weak bleach solution, but there is much danger of spreading the disease to other parts of the plant unless the person applying the treatment takes great care.

While the land owner is justifiably saddened by the loss of a giant saguaro, it may be of some consolation to view the rot as a natural part of the desert environment. The active rot is a wet spot in a dry place and many desert dwellers depend upon these diseased plants for moisture. In addition, calloused over dry-rot pockets in surviving saguaros can offer places of refuge for birds and other animals.

New transplants may need to be irrigated monthly during dry times but it is important not to over water during the winter months as the tender roots may rot in the cold, wet soil. It is important to remember that saguaro roots are concentrated in the top few inches of soil, spreading as wide as the cactus is tall.

Once established, saguaros generally don't need watering and will usually survive on rainfall alone. A good way to test whether or not the plant may need an irrigation is to squeeze the tissue covering one of the ribs of the plant between the thumb and forefinger. If the tissue is soft, the cactus could use a good watering, but if it is hard, it has sufficient water stored.

Saguaros overloaded with too much water become top-heavy and, without a supporting root structure, can topple over in a wind storm. Their tremendous weight can offer a serious threat to buildings, fences, cars and people as they fall, so it is important to check the plants regularly for signs of movement, such as an increasing tendency to lean off center, or other problems. It is generally not a good idea to saturate the soil around a saguaro with water just before a storm since this can soften the soil and make it more difficult for the roots to remain anchored in the soil.

Saguaros do not need fertilization. Those growing in the wild survive quite well on what little bit nature provides. In addition, they possess a metabolism different from other plants which gives them the ability to survive without assistance in these harsh conditions.

The saguaro is a magnificent, desert-adapted cactus which can fill many niches in a low water use landscape. They are relatively problem free when compared with other types of landscape plants and they can be expected to live for a long time, if treated appropriately. Many of the taller saguaros growing in the desert are well over a hundred years old. However, there is no guarantee that any saguaro, like any other living thing, will survive for as long as we think it should. With proper care though, they should give many years of service.

—FALL GARDEN, Continued From Page 2

Warmer soils speed up seed germination and aid in seedling growth and development. Warmer temperatures also help speed the vegetative growth of the plant. A strong, supporting plant frame is absolutely necessary in order for the plant to properly flower and produce fruit, like tomatoes, or edible parts, like broccoli flower heads.

Finally, we have to consider day length sensitivities. Some plants are sensitive to the shortening days that occur after the longest day of the year in June. As the day shortens, they either wake up and decide to flower, or, they tend to shut down and finish their season. Onions are true day length sensitive plants. They have to go through a shortening day schedule to know when it is time to flower and produce bulbs. Other plants, like squash, are sensitive to the decreasing temperatures and the number of hours of sunlight each day. As temperatures and sunlight hours go down, so does their ability to grow and produce fruit. Ever wondered why squash plants in the late fall are shorter and more compact than squash grown in the spring? There you go!

These and other factors play critical roles in the productivity of vegetable plants grown for a fall crop in the deserts of Southern Arizona and govern the recommended planting dates. For each vegetable that does well as a fall planted crop, there is a definite time in which seed should go into the ground. For many plants grown from seed, that date is August 15, today.

So, lets get out there this evening when it cools off a little, and get ready to plant. If you haven't already, spade or rototill the soil to loosen it for good root penetration. At the same time work in a little manure or compost to help keep the seed bed loose and soft through germination. It would be a good idea to add some ammonium phosphate (16-20-0) for good nutrition. Then, install your drip irrigation system and you are ready to plant your favorite vegetable varieties.

Fresh, homegrown vegetables not only provide a healthy addition to the dinner table, but they also give us an opportunity to exercise in the fresh air. Most perceived obstacles can be easily overcome with a little know how, and, it is possible to work smarter, not harder. This will translate into fun

instead of drudgery. So, come on! Even if it is just one seed in one pot, let's plant a fall garden today!

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. The author's email address is gibsonrd@ag.arizona.edu.

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will start in September***

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