College of Agriculture and Life Sciences
Cooperative Extension
Pinal County

May 2018
Garden & Landscape Newsletter

U of A Cooperative Extension, Pinal County 820 E. Cottonwood Lane, Bldg. C., Casa Grande, AZ 85122
(520) 836-5221 **http://extension.arizona.edu/pinal**

Prepare For Hot Weather

As sorry as I am to say this, and you probably know what I am going to say, but hot weather is just around the corner. Is your garden ready?

Here it is just the first week of May and temperatures pushing the century mark are forecast for this week. Of course, in May we know that the high and low temperatures for most of the month will be up and down. When June arrives..., well, you know what's coming.

The month of June is almost always the warmest and driest of the year and the extreme heat and low humidity can seriously injure or kill most plants. Even desert-adapted plants, like cacti or desert legume trees and shrubs can be injured if they are not given at least some minimal care. Here are a few tips to get plants through this dangerous period.

First, always provide sufficient water to meet the particular demands of the plant. Palo Verde or ironwood trees, for example, will generally need less water than roses. Cacti need only an occasional irrigation, while a mulberry or ash tree will need to be watered every three or four days during the hot season. Always know, and provide, the relative amount of water needed by specific plants.

Second, be sure to place the water exactly where it is needed. Providing water only near the trunk of a large tree will not do the tree any good. Most of the feeder roots that collect water and nutrients are out at the extreme edges of the tree. For irrigation water to provide maximum benefit, it needs to be placed where the plant can make best use of the moisture.

Third, understand that water is critical for cooling plants. Most water absorbed by plant roots is used for transpiration, the loss of water vapor through the leaves. At the end of its trip through the plant, water enters open spaces between the cells of the leaves where it evaporates and exits the plant through tiny holes in the leaf called stomata. This movement of water vapor out of the plant acts much like an evaporative cooler by removing excess heat and leaving the leaf tissue cool to the touch. Supplying enough water to keep the transpiration process going is a critical step in protecting landscape plants in the desert. Insufficient water at any time during the growing season can seriously damage plants.

Prepare For Hot Weather ... Continued on Page 2

In This Issue:

Prepare For Hot Weather… Continued from page 1

Fourth, schedule irrigations carefully. Even though a particular plant may need a certain amount of water through the summer months, just about all plants will require their roots to be exposed to air at least some of the time. Water-logged, always-wet soils often lead to water mold root rot problems that can also seriously damage plants. When scheduling irrigations, be sure to allow the soil to dry somewhat so that air can return to the soil and give roots a chance to breathe.

Fifth, check all equipment on a regular basis. If you have a sprinkler or drip irrigation system, it is important to check each part every so often, to make sure if it is functioning properly. Check for clogged or misdirected sprinkler heads. Are drip emitters working correctly or do they need to be removed and cleaned? Sometimes plastic tubing or PVC pipe will develop leaks or sustain damage from animals or soil tillage. All repairs should be made as promptly as possible to avoid water stress to plants and to save money.

Sixth, control salts in the soil. All soils and waters in Arizona contain at least some dissolved salts with some being more salty than others. In the Casa Grande Valley, most water supplies are fairly good, but if care is not taken, salt can build up within the root zones of all plants no matter where they are located and cause major damage, depending upon the susceptibility of the plant and the overall concentration of salts.

Control salts by adding enough water to the soil to move the lower edge of the wetted pattern deep enough to reach beyond the lower roots. If you suspect that sodium may be a problem, an application of gypsum may be in order. With a drip system, irrigations may have to occur more frequently, perhaps every other day or so depending upon the type of emitters used, but water applied to the soil should still be deep and wide enough to leach extra salt from the root zone of plants.

Finally, check the soil moisture level frequently until you know the pattern for wetting and drying during the course of the irrigation cycle. Different soils require different amounts of water and one soil that can absorb large amounts of water, like sandy soils, may not hold true for other soils like clays that cannot absorb water quickly. Testing the soil is one way to know exactly what the moisture level is and to make good decisions about when and for how long to irrigate.

The best way to determine irrigation frequency, which is influenced by the temperature, type of soil and the evaporation rate of water from the soil surface, is to dig down about six inches into the ground and pick up a handful of soil. If the soil remains in a hard ball after it has been squeezed, it probably is still moist enough to support plant growth. If, however, the ball begins to crumble when the hand is opened or if the soil is starting to feel dry, it is time to water.

With this one quick and simple test, anyone can properly determine the correct irrigation frequency for the specific conditions in their own yard. Don't forget that the irrigation frequency that supports proper plant growth in the winter and spring will probably not be sufficient in the summer when temperatures go up dramatically.

The importance of maintaining good soil moisture in the root systems of all plants cannot be overstated. Throughout the county, there are far too many incidences of needless heat-injury to garden and landscape plants. It is needless because the severe injury of high temperatures could be avoided by following good plant care practices.

Hot weather can indeed be devastating to water-stressed plants, and, if we are not careful, plants can get stressed for water quickly in the dry heat of Arizona. With careful planning and by paying close attention to the conditions of our outdoor plants, summer damage can be held to a minimum.

Stock Tank Raised Bed Gardens

More and more people are finding that new or used livestock watering troughs make good raised bed gardens.

Growing vegetables and annual flowers in desert soils can be a huge challenge. Lack of organic content in the soil, salts, compaction, and pH all contribute to garden failures in our area and many who begin with high hopes often end in frustrating failure. While raised bed gardens can come in many shapes and sizes, many find the livestock watering trough a simple and easy way to overcome these challenges.

The Pima County Master Gardeners have been experimenting with livestock watering troughs for several years now and recommend them to those who wish to grow gardens without having to get down on their hands and knees to work the garden. In addition to helping overcome the challenges previously mentioned, they also slow down the vertebrate pests, such as ground squirrels, rabbits. Their slick sides prevent the animals from climbing up into the garden. However, the Master Gardeners do report that gardens growing in stock watering containers require different management strategies. Here are a few hints that they have learned along the way.

The watering trough can be circular or oblong; large or small, but in every case, it needs to have tall enough sides to allow plenty of root depth. The Master Gardeners prefer troughs three feet tall, rather than two. This seems right for several reasons. First, it allows sufficient space for deep root development. It is the roots that pick up the water and nutrients, anchor the plant in the soil, and allow storage of energy-loaded compounds created during photosynthesis. Every plant needs to maintain a balance of energy during the growing season and shallow, constricted root systems just don't have the capacity to get the job done. Deep, expansive root systems are critical for healthy and productive plant development.

Second, this size of trough also makes it harder for wild animals to jump up into the garden for a feast. Even javelina find it difficult to access the garden. The way they tromp and root around, this is a good thing.

Once you have selected the right sized trough for your purposes, it will be necessary to drill drainage holes in the bottom or the sides to let excess water drain out and away from the garden. Excess water will eventually back up into the root system and that is not good. Root diseases and salinity are two negative results that can take their toll on plants.

Since drainage is so critical for good plant health, the Master Gardeners tell me that when it comes to drainage issues, the more holes the better. They recommend holes about one inch in diameter covered with mesh or a pebble to prevent soil mixture from falling out of the garden. They typically use weed mesh commonly found in nurseries to line the bottom of their containers. Not only does this keep the soil in, but it also tends to keep weeds that might grow under the trough from growing up into the garden itself. Bermudagrass can be really sneaky.

It is also possible to drill holes in the sides of the trough down near the bottom. This arrangement can work for good drainage but the volunteers seem less than excited about doing it this way because sometimes the water simply drains down the sides of the trough and out the holes without moving across and wetting the soil profile. Something to think about.

To insure good drainage, the volunteers are now almost exclusively placing the trough up on bricks of some kind. They tend to prefer the large concrete blocks over the smaller decorative red bricks because they want the top of the garden rim to reach about waist high so that they do not have to bend over to work the garden. The bricks can be arranged so that there are no extra creases between the blocks where critters could squeeze through and

- **Stock Tanks Raised Bed Gardens. . .** Continued on Page 4

STOCK TANK RAISED BED GARDEN . . . CONTINUED FROM PG.3

set up housekeeping in the safe space underneath the garden. Setting the garden up in the air instead of placing the bottom of the trough right on the ground seems to improve drainage through the holes in the bottom of the trough.

Of course, if you are lucky enough to have an old trough hanging around, especially one where there are rusted out holes in the bottom, you will not need to drill fresh holes. In addition, old watering troughs look pretty cool also. Their well used look can add to the decor of a garden area, if that is what one wants or needs. Some may prefer the look of a shiny new trough fresh from the feed store show room floor, but if you have a friend in the livestock business, they might just have an old one laying around somewhere.

I asked the volunteers what type of soil they preferred. The reply was almost instantaneous. They liked to use almost straight organic potting mix over, say, a 50-50 mixture of sand and compost or garden mulch. That surprised me some. They said that because the well aerated soil kept fairly moist for the sake of the plants causes the mixture to break down fairly quickly through microbial action and they needed to replenish soil regularly. It is much easier to simply dump a couple of bags of potting soil mix into the gardens than it is to take the time to mix in a sand component and the potting mix works just as well. Some mixes already come with perlite or vermiculite mixed in which helps with drainage.

It is pretty much a requirement that a good drip irrigation system be used to provide the correct amount of water at the right time. A reliable drip system operated by a dependable timer will allow the garden to be watered at the right intervals, and ensure that the plants growing in the garden get the right amount of water and nutrients. Drip tubing can be inserted into the garden through one of the drainage holes to keep the equipment out of sight. Standard one or two gallon per hour drip emitters are usually plugged into spaghetti tubing for distribution across the surface of the garden.

Once the beds have been prepared, seeds can be planted or transplants set into the beds. Plant vine crops such as squash, melons and cucumbers in a single row down the middle of the beds so they have room to spread over the edges. Smaller plants like carrots, beans, and lettuce can be planted either in rows or scattered randomly across the bed. Just spread the seed evenly across the top of the bed and cover to the appropriate depth as indicated by the seed packet instructions. As the seeds grow, they will shade out emerging weed seeds and thereby reduce the need for weeding.

Sometimes agricultural fabric or other screening materials are draped on frames over the garden. It helps keep out insect pests during peak threat times and helps modify the climate under the covering to either warm the air or prevent sunburn of tender plants.

A final question I suspect that you are asking. What about heat accumulation from the warm summer sun shining right onto the metal sides. I asked that question also. The response kind of surprised me even though I have been watching their project for several years now. Apparently the moist soil and the high organic matter soil does not transmit heat well and they have seen no real problems in this area.

If you want to see the Pima Master Gardener watering trough gardens, as well as raised beds built out of many other types of materials, visit the Pima County Cooperative Extension gardens at 4210 North Campbell Road, Tucson, 85719. If you go on Thursday mornings between 8 am and 10 am, you can visit with the volunteers directly. They would love to show you around.

How to Use a Shovel and a Soil Probe to Manage Irrigation

Everyone interested in growing healthy gardens, trees, and shrubs should have, and use, a shovel and a soil probe.

Irrigation in desert lands is absolutely essential in order to keep garden and landscape plants healthy. Questions that are often asked about the process of delivering water to plants include how often a plant needs to be irrigated and the length of time that the water should run. These are really important questions, and the answer to each can be supplied by the correct use of a soil probe and a shovel.

Because the soils of Southern Arizona are quite diverse both horizontally across the face the land and also vertically down through the soil profile, the questions about proper irrigation can be difficult to answer in general terms. Think about the regular desert that we see outside of town. In some places there will be a ridge of smaller particle soils, such as clay or silt. Interspersed will be the occasional intermittent stream that we locally call a "wash." Those wash beds are normally filled with sand. This variability across the landscape matches the different types of soil that extend vertically down into the soil. For this reason, soil texture is one soil characteristic that plays a big role in the way we properly manage our gardens and landscapes, including the way we irrigate.

Soil texture is a measure of the different size of the particles making up the soil. The largest particles are called sand, and feel gritty between the fingers. Clay particles are the smallest and feel smooth, like modeling clay. Intermediate in size are the particles of silt. If a soil has a majority of particles that are large enough to be classified as sand, it has a sandy texture and we call it a sandy soil. If it has a majority of clay particles, it is a clay soil, and if it has a majority of silt-sized particles, it is a silty soil. A fairly uniform mixture of two or more of the three categories makes it a loam soil.

Sandy soils typically cannot hold as much water as silty or clay soils and will have to be irrigated more frequently. So, if you have a silt or clay soil in your yard, irrigations can be more spread out over time. To answer your question about how long you can go between irrigations, feel the soil. Take your shovel, or garden trowel if you prefer, and dig down six inches into the soil. About six inches down is where a large percentage of a plant's roots can be found. In this way, we sample the soil right in the middle of the root zone.

Once the hole has been dug, take up a handful of soil from the six inch depth, squeeze it in your hand, and see how good a ball it forms. If it is a tight ball that holds together well, we might call it muddy, and it leaves a wet outline on your hand, there is plenty of water in the soil. No irrigation is necessary. If the soil feels only slightly moist, and forms a weak ball in your hand that crumbles easily, that is the time to irrigate. You never want your soil at the six-inch level to go completely dry.

After a few times of checking your soil, you will begin to get a feel for how often you will need to irrigate. Remember though, that plants use more water during hot periods than cool periods and soil moisture will need to be replenished much more frequently in the summer than in the winter. .

The soil probe will come in handy when you want to know how long to run the irrigation water. Again, this will be a function of soil texture. A sandy soil, which holds less water, will need to be irrigated less time than a clay soil which holds quite a bit more.

All plants have a normal root zone, the depth and horizontal spread of the roots. Trees typically send their roots deeper into the soil than a shrub, and a shrub deeper than a bedding plant. So, to properly irrigate a garden or landscape plant, we often use the "1, 2, 3 Rule" which gives us a good estimation of how deep our water should penetrate into the soil to support and sustain garden and landscape plants.

Manage Irrigation . . . Continued on Page 6

MANAGE IRRIGATION - CONTINUED FROM PAGE 5

Most vegetable, flower, and groundcover plants will do just fine as long as the top one foot of soil, or twelve inches, is filled with water during an irrigation event. Shrubs should be irrigated to a depth of two feet, or twenty-four inches, and trees need to be irrigated to a depth of thirty-six inches, or three feet. If we do not provide enough water for plants, the roots will not grow to a sufficient depth and spread to properly anchor the plant in the ground nor pick up enough water and nutrients to support plant growth and development. In addition, deep irrigations are required to leach out harmful salts from the soil profile. For these reasons, we will need to make sure that every time we irrigate, winter or summer, that we fill the entire root zone.

To allow irrigation water to penetrate to the proper depth, we need to let the water run a until that depth is reached. A good soil probe or long screwdriver will help you decide when it has reached the correct depth. Depth of irrigation is critical to irrigation scheduling because shallow irrigated plants tend to use up the available water quicker than those that are deep irrigated.

How will you be able to determine depth of irrigation? It is fairly straightforward. When soil is moist, a probe will slip easily into the soil. When it hits dry ground, it will stop abruptly and go no further unless you beat on it with a hammer. I would not recommend this because to get the probe back you will have to dig it up. In the summer time especially, this is not so fun.

Once you determine that the tip of your probe is resting on dry soil and not a rock, simply place your fingers around the probe at the surface of the soil and pull the probe out. The length of the probe between its tip and your fingers is the depth of penetration. The, using the rule of 1, 2, 3, you can determine if the plant root zone has been properly wetted. How do you know if you hit a rock? Push the probe back and forth. If you feel a vibration through the probe that might be the probe scraping on a rock. Pull the probe out and move over a few inches and try again. If the probe is going down the same distances at each try, you can be pretty much sure that you have it right.

Soil probes are generally nothing more than a stout metal shaft with a handle molded or bent into one end. The opposite end can be beveled down into a sharp point. Now remember, the handle, no matter what the probe is made from, is extremely important. Just imagine. You are pushing the probe down into the soil and your hands slip, the unprotected end next to your abdomen enters into your vitals with a nasty poke and your day has changed considerably. It is never considered good form in the horticulture world to show up in the emergency room with a soil probe embedded in your gizzard. Remember safety first. In this case, safety requires a handle of some sort.

With a few simple tools and a little know-how, finding answers to those pesky irrigation questions gets a lot easier.

Galls on Plants: What Are They?

While galls on plants look strangely out of place on an otherwise perfectly formed branch or root, they aren't always bad.

A gall is a growth swelling that shows up on plants in response to some kind of outside stimulus, like insect nesting, disease infection, or nematode invasion. They can be helpful or harmful, large or small, and smooth- or rough-textured. Some types are found on the roots and some types are found on the stems. In all of this variety, one thing is for sure, there is a common question people will always ask: "What is that growing on my plant?"

Because it is a plant's response to something, we would classify the abnormal growth as a symptom. Sometimes it is the plant's response to a disease. In that case it means spells trouble. One type of gall, a root nodule caused by the presence of the *Rhizobium* bacteria, is good for the host plant because it takes nitrogen out of the air and makes it available for the host plant. Many other types of galls, however, are neither good or bad for the plant. They are just there. For these, we just ignore them.

Look for galls at or near places on the plant where growth is occurring. These sites normally are in the buds, either at the tips or in specific sites along the branch called nodes. When you slide your fingers along a branch the nodes usually feel like bumps.

This pattern of developing in the growth areas may or may not hold true for the roots. Sometimes the galls will form on the small lateral roots, roots growing off of the main roots, and sometimes they invade through the root hairs. Other gall-forming organisms gain entrance into the plant through wounds or other damaged areas. Every type of gall may have a different history or growth habit. That is one thing that makes them interesting to study.

Take crown gall for example. Crown gall is caused by a one-celled bacterium, *Agrobacterium tumefaciens*, that lives in the soil. It is fairly common and shows up regularly on landscape and garden trees and shrubs. It gains entrance into the plant through wounds in the bark. These wounds can be caused by mechanical means, such as string weed trimmers, gashes in the bark from lawn mowers, and the intense heat of the sun burning sensitive bark. Entry of the disease through the bud union of fruit trees and shrubs, including roses, is also a common way for the disease to spread.

Galls caused by this bacterium are can be large or tiny but are almost always bumpy and rough on the outside. They generally show up on the roots or right at the soil line near the crown of the plant. The crown is the place where the root tissue meets the trunk or stem of the plant.

First and foremost, we try to prevent this disease from ever getting into the plant because once it is in, it can never be eradicated out. There no products or practices that will take this bacteria out of a living plant once it gets in. Protecting the plant from injury is the best way to prevent the disease from spreading.

We strive to prevent injury to susceptible plants, especially right around the soil line. We try really hard to keep the bud union scar on citrus, deciduous fruit trees, and roses above the surface of the soil. We make sure that we do not bring in and plant diseased stock which already have the bacterium inside. All of these suggestions just boil down to good management techniques, that is, doing what is right for the plant.

Root-knot nematodes cause a different kind of gall on roots. Nematodes are microscopic round worms. Do not get them confused with beneficial earthworms, which are segmented. Roundworms are generally smooth-bodied and tiny. Some nematodes, like the root-knot nematode, generally are regarded as bad for a plant because of the

Galls on Plants. . Continued on Page 8

disease that they cause. Some, however, are beneficial as they prey on insects and other nematodes. Most nematodes are too big to fit within the tiny spaces between particles of clay or silt soils. For these reasons, they are found mostly in sandy soils.

The root-knot nematode, *Meloidogyne* sp., lives part of its life in the soil outside of the plant. After mating, the female nematode enters into the roots of susceptible plants, like cotton, tomatoes, carrots, and a whole bunch of other useful plants. Their presence causes the swellings in the roots that give them their name. Inside the galls, the female nematode lays her eggs from which tiny round worm emerge to make their way out into the soil once again. Root-knot nematode populations can be suppressed by using a technique called soil polarization, and by alternating susceptible plants with non-susceptible plants to prevent populations from building up to damaging levels.

The *Rhizobium* bacteria is a beneficial bacteria that helps feed legume plants, like beans, lentils, and peas by capturing nitrogen from the air and turning it into nitrate, the cake and ice cream of the plant world. The bacteria reside in nodules, a nice name for galls, in the form in the roots. These galls tend to be bumpy outgrowths of the roots. Did you ever wonder why the desert legumes, (mesquite, palo verde, and ironwood), generally do not need nitrogen fertilization? These kinds of bacteria are of the helpful kind.

Mistletoe infestations tend to cause swellings on branches where their roots, haustoria, enter into the plant tissue. These can become weak links in the branch where breakage can occur. The eriophyid mite has been quite active lately. Their feeding causes gall formation in the buds and nodes of plants. I would classify both of these in the harmful category.

In the benign category would definitely fall the wasp and midge-caused galls. These tiny animals lay their eggs in plant tissue and this stimulus causes the plant to create the protective covering around them. It is still unknown whether this stimulus is chemical, mechanical, or something else, but by the time we notice the galls, the insect is usually long gone. The galls that form on our decorative live oak trees are examples. With these, we do not have to do anything. They do not hurt the plant nor is there much we could do even if they did. If you are like me and enjoy studying insects and their life habits, they are fun to watch. If not, it is best to just ignore them.

There are many types of galls that form on plants and all of them are interesting to learn about. However, if you see a gall symptom showing up on your favorite plant, it is a good idea to get it checked out. If it is a problem, you may need to take corrective action.

If you have questions about this newsletter, have any plant related problems, or wish to have a publication sent to you, please call (520) 836-5221 x204 or (520) 374-6263 and leave a message. If you have a plant problem and are able to email a picture, please send a picture with any information you can provide about the plant, and your contact information to our diagnostic team at macmastergardener@gmail.com and a Master Gardener will contact you.

This newsletter is available to view on our website at: http://extension.arizona.edu/pinal

Richard D. Gibson

Extension Agent, Agriculture

RDG/te/sh/aw

59 mailed copies

262 emailed

Have a sick plant or just questions about caring for your plants?

Visit our Plant Diagnosis Clinic held
every third Thursday of month
from 9:00 to noon at the
U of A Cooperative Extension
820 E. Cottonwood Lane, Bldg. C
Casa Grande, AZ 85122

Or you may call the Maricopa Agricultural Center at (520) 374-6263 to speak to a Master Gardener.

If you are able to email a picture, please send it with any information you can provide about the plant, and your contact information to the diagnostic team at macmastergardener@gmail.com and a Master Gardener will contact you.

How to connect with **Rick Gibson online**…

Blog: *Booming Deserts*
ricksgardenspot.blogspot.com

Facebook:
https://www.facebook.com/PinalCountyGardenandLandscapeProgram

Twitter: https://twitter.com/RickGibson4