Outdoor plants must thread their way through many hazards during the hot months of summer in order to survive, but perhaps the most common, and most deadly, is simple dehydration.

Plants, as well as animals, must maintain vital levels of water within their systems to sustain life functions. Both desert adapted and imported plants will benefit from the addition of water although different species, according to how well they are adapted to desert environmental conditions, will require differing amounts of the life-giving fluid. Since excesses can be just as damaging to plants as deficiencies, proper irrigation becomes a top priority for desert gardeners at this time of the year.

Plants require water for several purposes. First, it is important to always remember that all living things, plants as well as animals, are largely composed of water. If water levels become deficient in living plant tissues, plant vitality will be, at best, diminished. In our busy world, it is easy to forget to turn on the faucet or properly adjust the timer in time to prevent serious injury to plants. Because of this, many plants suffer serious summer water stress damage.

Second, plants require water for cooling. The process of transpiration allows the plant to absorb water from the soil through the roots and transport it to other parts of the plant through special water conducting tissues. Some of the water reaching the leaves eventually evaporates and drifts out through tiny holes, called pores, into the outer atmosphere. This process of evaporation and diffusion cools the plant. Water deficient plants will have a warm feel to the leaves while non-deficient plants will feel cool to the touch.

Third, water is essential for proper plant nutrition. If root absorption and transport of water and nutrients doesn’t keep pace with the demands and consumption of the plant, the plants begin to heat up, wilt, and starve. Water is the medium that transports the nutrients from the roots to the leaves where most of the nutrients are used in the process of growth and in the formation of seeds.

The most common symptom of dehydration in Pinal County is leaf dessication, or wilting or drying. Symptoms include browning, blackening, and sometimes bleaching of leaf tissue that gradually progresses from the tips and edges to between the veins of affected leaves. In most cases, little can be done to improve the appearance of these tissues once damage has occurred. However, new damage can be prevented by maintaining good soil moisture and fertility in the future.
Most trees and shrubs will endure moderate amounts of leaf desiccation before they begin to show symptoms, although unseen damage in the form of loss of plant vigor and vitality can occur. Generally a light fertilization followed by deep watering will restore plant vigor.

Leaf wilting or drying usually appears first on inadequately-rooted or marginally-adapted plants. Shallow or limited rooting is very common in many landscapes and plants with this problem will show dessication symptoms quickly. The quick onset of these symptoms can be noticeably worsened by the hot, dry winds of summer.

Shallow-rooted trees such as the cottonwood and the mulberry, tender-leaved species such as the silk oak and the ash, and marginally adapted plants such as the rose are among the first to show dessication symptoms. Plants sitting on dry, compacted, salty, infertile, or chemically toxic soil are also often affected. Root-binding and caliche layers are other factors that can enhance these problems. Mature, older leaves usually show the symptoms first because of their longer exposure and because plants give nutrient priority to new growth.

When correcting plant dehydration, it is important not to go overboard. Over-watering can be just as hazardous as under watering. The most common disease problem caused by over watering is root rot caused by the water mold root rot fungi. Most of the water mold root rot fungi, like Pythium, Phytophthora and Rhizoctinia, do not work as fast as their first cousin, Texas or cotton root rot, but all can be devastating to plants. These fungal diseases can occur at any time in any season, although they are most commonly seen during the warm summer months. In moist soil environments, the disease organism proliferates and quickly engulfs the roots of susceptible plants. Many types of plants can be affected and death can occur within days of initial infection.

Root rot can, in most cases, be prevented by proper watering techniques. Do not water on a set schedule year round because plants require less water during the cool months than they do during the warm months. Watering at a summer rate in the winter will give the plant too much water than can lead to disease. Watering plants in the summer at a winter rate can quickly lead to dehydration. It is important to change the length of time that an irrigation period will run, and the number of times each week that water is applied, as the seasons change.

Varying the irrigation schedule so that plants get more water in the heat of the summer and less water in the cool of winter will go a long ways in preventing disease problems. For the same reason, it is also important to know the soil moisture conditions around trees and shrubs before the next irrigation is applied. If the soil is still wet when the next irrigation is made, disease may occur. Check the soil with a soil auger, shovel, or screwdriver to a depth of six inches and feel the soil with a hand to judge the amount of water in the soil. If the soil is still moist, hold off watering. If it is dry, give the plant a deep watering sufficient to fill the entire rooting zone and to leach out harmful salts.

Summer survival of landscape plants is a real concern in southern Arizona and Pinal County. Plants can suffer from drying winds, scorching heat, and the burning sun in the same way that animals and people do. Many of the plants that are grown in area landscapes have limited tolerance to hot weather conditions and these will take more care when compared with the less demanding desert adapted species. As we provide for our own endurance and comfort, let’s not neglect our plants.
Can you identify insect damage when you see it?

Correct identification of insect-related problems is critically important because it helps us make good decisions in the garden or landscape. When we know the insect, we can apply a treatment with some confidence that it will work.

The process of identification becomes a little complicated because other factors cause symptoms that can be confused with insect damage. Shortage of water, lack of nutrition, heat and cold, insects, and plant diseases all take their toll on plants. A common mistake is to blame a problem on insects when it is really a water stress problem; or, conversely, blame water stress when in reality it is an insect problem. Let me give an example.

You see wilting leaves on a squash plant. Your first thought logically would be a lack of water. After a closer look, we find a heavy populations of aphids sucking the life out of the plant. If you had just turned on the water to irrigate, you would have never have seen the real culprit until it was too late. To make good decisions, we need to be able to see all of the symptoms, sort them out as to possible cause, and then make qualified decisions.

Insects cause all kinds of damage to plants. As a result, we see all kinds of symptoms displayed in those plants. Let’s look at some of the more common insect-related symptoms and a good first step treatment to solve the problem.

Honeydew is the waste product of aphids and often takes the appearance of a wet sheen on the surface of leaves. This glossy sheen can often be seen from a distance of up to fifty feet away. Favorite targets of aphids include pines, citrus, arborvitae, pecan, Pittosporum, and Southern live oak. Solve aphid problems by washing them off frequently with a strong stream of water and wait for the beneficial insect predators to clean up the population.

Sooty mold is also a symptom of aphid feeding. Sooty mold is simply a black fungus growing on the sweet honeydew deposits covering leaves, stems, and twigs of plants. Other than shading sunlight away from the photosynthetic machinery of the leaves, it causes no real harm to the plant. Spray off the honeydew and sooty mold combination with water.

Stippling or bleaching of leaves is a common problem in grapes, ivy, and other plants. It is caused by the feeding of sucking insects, like leaf hoppers, aphids, or mites. Stippling is best described as many different and usually separate yellow spots on the surface of leaves. Each stipple is an actual feeding site of the insect. We can often tell how heavy the feeding stress by looking at the number of feeding sites: the more stiples there are, the heavier the feeding intensity. Sometimes there are so many feeding sites that the leaf takes on a bleached appearance and can even fall off the plant. We are seeing that situation right now in many grape arbors around the valley. Spraying with water sometimes works but these insects often display an uncanny ability to explode their populations and quickly get ahead of our control efforts. These may need an insecticide treatment to get them under control. Always follow label directions.

Galls come in various shapes, sizes, colors, and surface textures. Some can be brightly colored, some a dull grey. Some are smooth while others take on a warty or even a hairy appearance. These abnormal growth sites are the plants response to insect laying eggs in the plant tissue. Most galls are due to small wasps. Scabby spots or some distortions are caused by blister mites, including the Eriophid mite. Not much to be done here. Once you see the damage, the insect or mite is usually long gone.

Leaves curled downward, puckered, or distorted are more symptoms of sucking insects. Aphids are a common culprit and if you carefully search, cast shells of the insect can often be found in the folds of the leaf. Puckering distortion in citrus leaves is usually caused by the feeding of the thrips insect. We currently are watching leaf curling symptoms on a pomegranate tree. I am not sure what is causing it, but it just has to be a sucking insect of some kind.

- Recognizing Insect Damage to Plants... Continued on Page 4
The cortex of roots is gone; not dead, not shriveled, not sloughing off, just flat gone. The cortex is composed of the outer tissues of the root, the parts that cover the internal structures. When it is completely gone it usually is a sign of grubs or gophers. If it is a gopher, trap it out. Fortunately, we have not recently seen a lot of grub damage in the area.

Missing bark on twigs and small branches is usually the result of grasshoppers, blister beetles, or other tissue-eating insects. Most often they consume the leaves first and then start on the bark. Grasshopper control is pretty tough without using an insecticide. Fortunately, the drought has reduced their food sources which has prevented the development of large populations. As a result, damage has been light in most areas.

Holes in the foliage or fruit can often be traced to the feeding of chewing insects, like flea beetle or caterpillars. The flea beetle prefers the tissue of tender young leaves while the beet armyworm doesn’t care about the age of the tissue. It often eats the entire leaf. Leaf miners are larvae of a particular fly that eats out a tunnel inside the leaves of various plants, like citrus, squash, and melon. The grape leaf skeletonizer devours all but the outer covering of the upper side of the leaf and the larger water and sugar conducting tubes. *Bacillus thuringiensis* or B.t. for short works well on caterpillars. If the plant is vigorously growing, it can often outgrow any flea beetle damage.

Scales are pinhead-sized to larger sucking insects living under a hard, protective shell. They are generally white but can be rust-colored or dark. They come in many sizes and shapes and can be found on the bark, leaves, and fruit. Rub them off with your fingers.

Soft, white, fluffy-looking coverings are the protective sheaths of the cottony cushion scale, mealy bug, or cochineal scale. Some people mistake them for a fungus because of their appearance but they are actually insects. A good first step is to spray them off the plant if you can.

Wilted foliage can be caused by many factors but heavy infestations of sucking insects like squash bugs, aphids, and mealy bugs can often be a culprit. I like to try the water spray treatment first.

Borer holes in trunks or branches are mostly caused by secondary insect invasion; that is, insects drawn to the smell of dead and dying wood, not the living plant itself. Apple or flat-headed wood borer larvae chewing out oval-shaped holes are a good example. Round holes in the bark can be caused by woodpeckers pursuing insects under the bark or sapsuckers looking for a taste of sweet sugar. These holes are rarely very deep. Round holes that penetrate deeply into the wood deserve a call to our office for further evaluation.

It is important to know and understand the signs and symptoms of insect damage. By learning what they look like, knowing which insect caused them, and what the potential impact on the plant will be, it will be possible to figure out how to solve an insect problem.
The heat island effect in urban areas is known to cause increased temperatures. Since we live in a warm desert, we need to stop from time to time and reflect on what we can do to minimize its effects, especially as our communities continue to grow.

In a warm climate, the summer heat will always be a topic of intense interest, especially when we are locked in the throes of mid-summer temperatures. We aren’t the only ones that talk and worry about our heat. I just invited some of my Extension colleagues from around the west to come to southern Arizona some July to see our wealth of agricultural diversity and experience Arizona when food and fiber production is in high gear. They chose to go to Oregon instead. Was it Arizona that turned them off? I doubt it. They shied away from our heat.

High temperatures can be scary to those who are unfamiliar or unused to them. Even we natives tend to hole up and cool off during the hot parts of the day. It is just a fact of desert life. However, stop and think a bit. What would we do if the temperatures around our homes went even higher than usual; if they became the norm rather than just an anomaly? That is the promise of the heat island effect.

Have you ever found yourself in downtown Phoenix and wondered why it seemed hotter than home? The heat island effect is a natural phenomenon that causes daytime temperatures within cities to increase by up to 6°F. over temperatures in rural areas at the same time of the day. Nighttime temperature differences can be as much as 9 °F.

If the daytime temperature in rural areas, for example, hits 106 °F, which we would say is a pretty nice day for late June and July, the addition of another 6° turns a tolerable day into a 112°F scorcher. If the rural temperatures are higher, as we know that they can be, ... well, you can do the math. The heat island effect can make someone really feel the heat, so to speak.

Heat islands are caused, pure and simple, by urbanized development and growth. Roads, buildings and other hard surfaces, especially dark-colored surfaces, absorb and retain heat. Surface temperatures fifty to seventy ° hotter than normal soil surfaces are not uncommon. It is the accumulation of this heat, and its subsequent release back into the atmosphere, that leads to higher ambient temperatures in urban areas.

In a 2002 article in the scientific journal Urban Ecosystems, 6: 183-203 named “Urbanization and Warming of Phoenix (Arizona, USA): Impacts, Feedbacks and Mitigation”, the authors found that at Sky Harbor Airport, urbanization had increased the nighttime minimum temperature by 5 °C., or 9 °F., and the average daily temperatures by 3.1 °C, or 5.6 °F. Additional studies have recorded temperature increases in other cities.

High temperatures affect us in many ways. In addition to simple heat stress, other effects, proven or implied, include increased crime rates, higher cooling bills during the summer, additional stress on landscape plants, and higher insect pest activity.

Increases in crime rates in warmer weather have been seen and documented in many places. A mathematical formula has even been developed. Plugging in the 3.1 °C. increase in Phoenix into this formula tells us that the higher temperatures could mean an increase of an additional 25 violent crimes per 100,000 annually. There is some controversy over whether there is a downturn in the temperature-crime relationship at very high temperatures, so this effect needs more study.

Higher temperatures bring on a greater need for power to cool our homes, businesses, and public buildings to comfortable levels. Increasing demand generally means higher prices, and in times where the stress is severe, the imposition of a “brown-out” or even a complete short term loss of power is possible.

In our gardens and landscapes, increased heat can affect the overall health of plants and lead to specific problems, such as water stress, sunburn, and leaf tissue damage. Insect pests, such as whiteflies, whose life cycle is temperature driven, can cause significant problems when their fast growing populations overwhelm a plant’s natural defenses.
The increased heat can also affect local food and fiber production. Examples include the adverse effect of heat stress on dairy cows and the potential for heat injury to cotton boll production.

So, what can be done? Houston, Texas has an interesting program called “Cool Houston”. In their program, they advocate the use of cool roofs, cool paving and trees and other vegetation. You might want to check out their report at http://files.harc.edu/Projects/CoolHouston/CoolHoustonPlan.pdf

Roofs of buildings generally are completely exposed to the harsh sunlight, unless they are protected by the shade of large trees. The use of highly reflective, lighter colored roofing materials can help reduce temperatures by reflecting sunlight back into the atmosphere instead of allowing it to heat the roof, the interior of the attic, crawl spaces and even the interior of the building. Most roofing companies recommend this type of covering, especially for flat roofs.

Dark surfaces of streets and parking lots absorb considerable heat during the bright, sunny days and re-radiate the heat back into the atmosphere when the sunlight ends at sunset. Light-colored pavements tend to reflect sunlight and do not heat as much as darker colored pavements. There is a need to give these hard structure alternatives some thought.

Trees and shrubs are sure to help minimize heat gain in both public areas and in our home yards. Not only do they shade surfaces, they also give off water vapor. This process is known as transpiration and it cools not only the plants but surrounding areas as well. Most of us have noticed the difference in temperature at night as we enter agricultural zones from bare desert areas. It is the water vapor given off by plants as part of their essential life processes that cause this cooling effect. Even most low water use plants transpire water.

Not only do we need to plant more trees, but we can also take better care of those trees and shrubs that we already have. Healthy thriving trees give much better shade and transpire more effectively than those that are stressed or dying. Good management now, including the proper care of trees and shrubs, can give us huge returns later in lower cooling bills and in more comfortable living conditions.

Urban warming affects us all. The key effects include increased minimum daily temperatures throughout the year, a longer warm period, and shorter cool period within a given day and an extended hot season. While some warming may be impossible to avoid as urban growth overtakes the communities of Pinal County, there are some steps that can be taken to minimize the effects. All of us to get involved.
August 15 marks the beginning the fall gardening season. Are you ready to plant? If you are an experienced desert gardener, you will know that there are actually multiple key dates for fall vegetable and flower gardens. Mid-August is the time to plant cole crops, like broccoli and cauliflower. Long season sweet corn, those varieties that take 80 to 90 days to mature, can also go in at that time. If you are brave, and fortunate that the whitefly season is light, a fall planting of squash and melons can go in about the first of September. September 15th is the magic date to begin planting leafy vegetables, root crops, and most flowers.

Temperature and the length of day are the two guiding forces that determine when the seed of a particular variety should be put into the ground. Temperature is important because most plants have a maximum and a minimum limit above or below which they simply die. They also have a range of temperature where they do their best. Tomatoes, for example, do not set fruit well when the daytime temperatures go up above 90 ° F.

Day length is important because there must be enough hours of sunshine for the plant to effectively produce enough food through photosynthesis to support it clear through its growing cycle. In addition, many plants are sensitive to whether the days are lengthening or whether they are becoming shorter with each passing day. For these and other reasons, there is a preferred time to plant most garden plants. If we do not follow the guidelines, we often see dramatic failures in the garden.

Among the hazards of fall gardening, in addition to temperature and day length, are the various types of insect pests. The whitefly in particular is a difficult fall garden pest and favorite plants include squash, melon, pumpkin, and tomato. Their feeding can cause great stress on these plants. As temperatures cool off in the fall, whitefly populations begin to decline. Because of this some gardeners choose to delay planting until later in the fall.

If you are going to plant sweet corn, an August 15 plant date will allow you to select a variety that will harvest within 90 days but if you decide to wait until the temperatures go down a little, I would recommend that you go with a short season variety that matures within 60 to 70 days so that you do not experience damage from that late November frost that often causes havoc with cold weather sensitive crops. Be sure to check the seed packet for times to harvest before you purchase your seed. Cauliflower and broccoli are also planted by seed in the late summer for a fall and winter harvest. If you have to delay, choose to transplant in living plants or "sets."

For the other well-known vegetables like leaf and head lettuce, spinach, collards, radishes and turnips, plan to seed those on the September 15th date. Hold off on planting potatoes until November and early December. They need the moderate temperatures of spring to mature. Fall flowers, including petunias, sweet peas, geraniums, sweet alyssum, and a whole host of other colorful annuals go into the ground in September. Make sure to get rid of any Bermudagrass from the flower bed before planting because warm weather favors its growth. Nice in a lawn, Bermudagrass is a particularly frustrating weed.

Good soil preparation is critical in the garden. Before planting, the soil should first be well tilled by spading or with a mechanical tiller. Make sure that all of the clods are broken up and that the soil is leveled so water will not flow away from the plants.

A heavy application of compost or decomposed steer manure during soil preparation will improve water penetration, soften the soil, and reduce the number of clods that have to dealt with later on. It is also a good idea to add one half pound of ammonium phosphate (16-20-0) fertilizer per 100 square feet before tilling the soil to ensure plenty of nutrients for the tender young plants once they begin to grow. If you prefer an organic nitrogen source consider chicken manure, fish emulsion, or blood meal. Do not stress the germinating seeds and young seedlings for water during their early stages of growth. Regular light irrigations with a misting hose attachment, a sprinkler, or drip system will apply water uniformly to the garden without washing out the seeds.

All plants should be placed into the soil according to the instructions on the seed packets. The many different
vegetable and flower plants each have specific planting depth requirements. Placing seed at the correct depth is critical to the success of all garden and flower plants.

When preparing your soil for planting, do not forget to plan when and how you will continue to add compost to your garden. The small one-celled micro organisms that live in the soil do their best work breaking down the organic matter when the temperatures are warm. The hotter it is, the faster they work. Because of this, the compost added at the beginning of the season may be gone long before the longer growing plants are harvested, especially if the thermometer readings stay up above the century mark well into October.

To maintain good soil organic matter levels in my vegetable and flower gardens I like to top dress my seed beds with compost after the plants have germinated, emerged from the soil, and have gained at least two or three inches in height, depending upon the type of plant. If I have time, I may also add another layer mid season. Then, when I terminate the crop or flower bed in transition to the next planting, I till in the remaining compost plus the crop residues into the soil. This practice helps me to help maintain top quality soil conditions.

There are other gardening tasks that are important. One critical assignment is to make sure that irrigations occur as necessary throughout the season. Infrequent irrigations can lead to a slowing of plant growth and a loss of vigor. This can be a problem when the plant is at a critical stage of development, such as flowering or maturing fruit. In addition, do not forget to feed your garden plants occasionally with nitrogen fertilizers to keep them green and healthy.

With proper care and good timing, vegetable and flower gardens can provide both food and color for the coming outdoor season.

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 and leave a message, or call (520) 374-6263 to reach one of our volunteer Master Gardeners. When leaving a message, please clearly state your name and your telephone number. 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. You are also welcome to stop by our office at 820 E. Cottonwood Lane, Bldg. C in Casa Grande.

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

Richard D. Gibson
Extension Agent, Agriculture

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6:30pm to 9:30 pm

Salt River Project Bldg.
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9:00am to 12:00pm

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(520) 374-6263
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