THE UNIVERSITY OF ARIZONA
Cooperative Extension

MAY 2020 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**

REDUCE ENERGY BILLS WITH SHADE TREES

When the full heat of summer arrives, there is nothing like a nice shade tree to cut the sun's rays and provide a nice place to sit outside and enjoy the evening breeze.

No matter how the weather vane swings in central Arizona, there is always one constant. Sooner or later, without fail, the thermometer will top 110 degrees F. Whether we like it or not, summer heat, and the cooling bills of summer, are constants of life in the desert.

Coping with these constants becomes an annual challenge for most. In the old days, before air conditioning was everywhere, people got through the day by using swamp coolers and then in the evening they would sit outside on the porch or under a shade tree as the temperatures of the day cooled. Sometimes, they would shoot a spray of water up into the canopy of the tree to help cool the evening breeze and make the evening more enjoyable. It may be time to take a page out of the past and reconsider the use of landscape trees and vines as a means of helping cool in and around the home.

Plants cool the environment by absorbing the sun's rays and screening them away from buildings and outdoor living areas. Unshaded walls absorb the heat from the sun's rays and transmit the heat to the interior of the building. Wise placement of shade trees and vines can result in significant reductions in the high cost of cooling homes and commercial buildings.

Consider these facts. A dense shade canopy will screen out at least eighty percent of the solar radiation that falls on a human being, an outdoor living area, or on a building. A wall in full sun transmits three times the heat of a shaded wall while an unshaded roof adds twice the heat of a shaded one to the interior of the structure. Shading can reduce maximum high temperatures inside a typical house by twenty percent. Even if we are using an air conditioner to cool the home, this can greatly reduce the amount of time the equipment needs to run, and the power needed to run it.

The bottom line is well established. Energy savings in shaded over unshaded homes can be significant. Other benefits that come from trees and shrubs in the landscape include a more pleasant and inviting outdoor living area and enhanced property values. All taken together, shading makes a lot of sense.

REDUCE ENERGY BILLS WITH SHADE TREES... CONTINUED ON PAGE 2

IN THIS ISSUE:

REDUCE ENERGY BILLS WITH SHADE TREES ... CONTINUED FROM PAGE 1

While most will agree that shading is a good way to reduce the cooling load within the home, the question of "how" can be a little more complicated. Here are a few tips to consider when planning shade in the landscape.

The ideal situation would be to have summer shade and winter sun falling on the home. Winter sun, again, helps heat the home and saves on heating bills during the winter. Summer shade reduces heat loading during the warm months. In order to obtain both of these benefits, it is important to choose deciduous trees, or trees that lose their leaves during winter. Evergreen trees and shrubs will give shade year-round and eliminate most heat gain during the winter.

Favorite deciduous shade trees include the moderate to low water requiring desert adapted trees like mesquite (*Prosopis* species), palo verde (*Parkinsonia* species) and sweet acacia (*Acacia farnesiana*). Heavy water users include elm (*Ulmus* species), ash (*Fraxinus* species), hackberry (*Celtis* species) and mulberry (*Morus* species). In an attempt to cut back on water consumption and allergens many people have shied away from these heavy water users, but the fact remains, the trees providing thicker shade are generally those that use the most water. When selecting a deciduous tree for home shading, the question of balance between water requirement and cooling benefits is a critical issue. The choice of tree also hinges upon owner preference and taste. Fortunately, the landscape industry provides plenty of choice when it comes to plant material.

If winter heating from solar gain is not considered essential, the choice of plants can be widened to include the evergreen plants. Evergreen or partially deciduous trees and shrubs that do well in the hot environment and provide good shade include the orchid tree (*Bauhinia* species), thevetia (*Thevetia peruviana*) and jacaranda (*Jacaranda mimosifolia*). Other plants include the carob (*Ceratonia siliqua*), bougainvillea (*Bougainvillea* species), Australian willow (*Geijera parviflora*), silk oak (*Grevillea robusta*) and bottletree (*Brachychiton populneus*).

In addition to planning for shade, do not forget to take two other key considerations into account. First, consider mature tree height when choosing your plant materials. In just a few short years, the perfect sized tree now may be a giant later on. Take care to select and place trees so that they at maturity will not block your or your neighbor's rooftop solar collectors, cause structural damage to buildings or roofs or invade sewer lines or septic systems.

Second, remember that the sun, and shadows cast by the sun, will move throughout the year. What may cover a part of the home in June, may not cover it in August or September as the sun makes its way back across the horizon towards the solstice. This is a key issue and should be considered when planting outdoor activity areas, vegetable gardens, and areas for sun- or shade-loving plants.

The desert Southwest receives more sunshine than any other part of the United States with Pinal County receiving more than eighty percent of possible sunshine each year. While the winter sun provides enough warmth to make outdoor activities pleasant and helps heat the interior of buildings, brilliant summer sunshine causes intense heat which limits human outdoor activity and pushes up the cooling bills.

Shading has long been a key tool for cooling homes and outdoor living areas even before the modern age. While modern conveniences have taken a lot of the sting out of living in the desert, shading continues to be an important tool in taking the sting out of opening the power bill.

Leaf Area Index

Since the leaf area index is an excellent measure of the health of any plant, all of us who grow or care for plants should know how to estimate this critical characteristic.

Let's say that you have a sick tree in your yard and you are trying to diagnose the problem. One of the very first steps that I take is to look critically at the leaves. I check how big they are compared to what is normal for that variety of plant. I want to know how many leaves there are on the tree compared to a normal load, and whether or not the leaves have any damaged areas. In so doing, I am estimating the leaf area index.

Simply stated, the leaf area index, or LAI, is a measure of the amount of healthy and productive leaf tissue in any given leaf. If a leaf is covered with brown, yellow, or brown spots, its ability to create energy from the sun will be greatly reduced. If a tree is filled with sick leaves, or has smaller or fewer leaves than normal, it is easy to see how this reduction of healthy and productive leaf tissue could affect the overall health of the plant.

Why is this important? The leaf is the energy manufacturing center of the plant. When the production capacity is down, and the plant is cranking along using up valuable stores of energy, eventually the plant energy supply could end up looking like a checking account balance where the outgo is greater than the income. We all know what that means! That checkbook balance is eventually going to go in the red and the checks written will no longer be good.

Likewise, when the amount of energy used in the plant to support growth and development is greater than the total amount of energy produced, the plant is eventually going to run out of energy and die. It is very common and we see this sad result all the time.

A reduction in the overall health of the leaves does not cause the plant to die overnight, of course. Generally, the result is a gradual reduction in healthy leaf tissue, with a little bit dying here and then a little more later on. Unless there is something really bad happening, like a fast-acting disease for example, a plant generally will not lose all of its leaves at one time. Instead, the effects are gradual as the plant descends ever downward into a deep well of trouble from which it is almost impossible to recover.

How can we tell just by looking at the plant when this is happening? As a plant runs short of energy, and the problems gets worse, there will be usually be certain symptoms that show up. When we start seeing those symptoms, it will pretty much be a dead giveaway that the plant is in energy decline. Leaves turn yellow or brown. Leaves fall from the plant. The plant is stunted and sickly looking. These are all common examples of symptoms where the energy levels of the plant are in decline.

Yes, I know. There can be a number of reasons why energy production drops in the leaves. We can forget to water and the plant runs dry. There may be something wrong with the roots, like a disease or an infestation of nematodes that restricts water absorption and movement. The plant may be short of nutrients because we have not fertilized. Salt damage may burn the edges of leaves. We could create a long list of reasons why energy production in any plant decreases. In most cases, no matter what the underlying problem may be, the ultimate effect is a reduction in the amount of healthy leaf tissue that can do the work. This brings us back to the concept of leaf area index.

If a leaf is healthy and green throughout, and if there are sufficient such leaves on the plant, we can safely assume that the plant is producing enough energy to cover its basics needs. In fact, there should be plenty of energy left over for the plant to store for future needs. In this case, the leaf area index is sufficiently high to provide the amounts of energy needed in the plant.

If, on the other hand, the leaves on a plant are mostly discolored or dead, the leaf area index will be low and we assume that the leaves are just not going to be producing energy at top efficiency. Over time, that can be a huge problem.

- **Leaf Area Index . . .** Continued on Page 4

Leaf Area Index . . . continued from pg.3

Science uses the concept of the leaf area index to precisely determine the ability of any given plant to produce through photosynthesis the energy needed for the plant to live a healthy and productive life. A plant with a high LAI is probably going to be successful, while one with a low LAI will probably struggle until the problem is fixed, or it dies, whichever comes first. For these reasons, it is important to be aware of the leaf area index and what it can tell us about the health of the plant.

While you and I will probably never take the time to do the precise calculations needed to create an actual leaf area index number, we can generally use an estimate to predict the overall success or failure of a given plant. Here is what I do.

When I approach a plant of interest, I first take a good look at the entire plant canopy and see if it has any of the symptoms of a low energy plant. If so, I focus in and take a good look at one of the leaves. It doesn't matter whether the plant is a houseplant on a kitchen counter, a tree out in the yard, or a favorite rose bush in that special nook in the garden. I just focus in on any one leaf and ask myself these three questions: 1) "How much of the leaf is green and healthy?" 2) "How much is yellow and sickly?" 3) "How much is brown and dead?"

The answers to these questions help me understand overall how well the plant is doing. If the entire leaf is green and looking good, I decide that its leaf area index and the energy production capacity of the leaf are okay. If a good portion of the leaf, say half or more, is looking bad, I know that the leaf area index is low and the leaf is probably not doing a good job of producing energy. If half of the leaves or more on the plant are similarly affected, that could be a significant problem for the plant overall. Once I know there is a problem, I can take appropriate action to find out the underlying cause, and then fix it.

By estimating the total leaf area index, we can get a feel for how a plant is really doing. If the plant is sickly and not doing well, a consideration of the LAI may give us insights as to what we can do to help solve the problem. If we choose to ignore the LAI, for any length of time, we may very well be sealing the death knell for the plant.

Irrigation Tips for the Summer Months

With the warm weather of summer coming just around the corner, remember to give your plants get enough water to survive the heat that is sure to come.

All plants in Arizona need water to survive our desert heat. Even the plants native to our desert, like saguaro and creosote bush, will need some water to survive, especially when they are planted and growing in a managed yard or landscape. Knowing how much water to give, and when, are key skills for any gardener in the desert.

In other parts of the world, and to some extent in the desert, rainfall is sufficient to sustain plants. Some homeowners in other parts of the country do not need to irrigate, at least very often. In the desert, we must irrigate if we want our plants to survive. I am not saying that our native plants, in normal rainfall years, cannot survive the heat of summer on rainfall alone. They can, but when a native plant is placed into a landscape, we change the root system and its capacity to pick up water from our weak rains is greatly diminished. For that reason, desert-adapted plants growing in our yards will need extra water. They will, in most but not all cases, need to be irrigated.

The delivery of irrigation water can be achieved in various ways. The early residents of our valleys first began to irrigate plants in fields and around homes using water brought from streams and rivers through ditches. Flood irrigation, it is called, and it is still used to some degree today in landscape situations. Every time we drag a hose from one place to another and letting the water run out around our plants, we are flood irrigating. Since the invention of diesel or electric irrigation pumps, we have begun to use groundwater in the same way. Unfortunately, flood irrigation is not a very efficient way to use our precious water supplies.

A more popular way today to irrigate gardens and landscapes is to use some type of automated irrigation system. It can be a drip, sprinkler, or bubbler system, but in each case, there is some type of tube running from the water source to the plant, some kind of way to let water to escape at strategic places around the plant, and a timer to turn the water flow on and off. These types of systems take a lot of the hassle out of irrigation, but they still need to be maintained properly.

Management and operation of these irrigation systems can be tricky, of course, and it is not just the mechanical skills necessary to make a drip system work. Salty water can quickly clog delivery systems. Parts and pieces can break down. Rodents or time can chew through or weaken plastic tubing. Emitter devices can pop out, and the list of potential problems goes on. Unless we are checking the system regularly, the system can, and does often let us down.

No matter how we do it, whether we drag a hose to flood irrigate, or use some type of system, it is important to do it right. So, the first tip for proper irrigation is to have a good plan, both for water delivery, and for system maintenance.

What are the rules for ensuring proper water delivery? Good irrigation generally boils down to getting enough water to the entire root zone at the proper time. Since the root system of most plants can extend well out away from the roots, we generally decide to irrigate all of the area extending out in a circle from the trunk to the outer edge of the branches. For palm trees whose roots tend to extend down straight into the soil, the area to be irrigated is much reduced as compared to a mesquite tree, but the principle is the same. Irrigate all of the soil out to the dripline of the tree.

Timing of irrigations is best decided by carefully monitoring the moisture level in the soil. Water disappears from the soil after an irrigation in two main ways: evaporation from the surface of the soil and absorption by the root systems of plants. The soil moisture content then can range from completely wet right after an irrigation to bone dry if we wait too long to apply the next irrigation. We do not want the soil to stay sloppy wet all time nor ever go bone dry. It is not good for plant health. For these reasons it is important to regularly monitor the soil moisture content of your soil. How is that done?

Irrigation Tips for the Summer Months. . . Continued on page 6

Irrigation Tips for the Summer Months - CONTINUED FROM PAGE 5

I like to dig down six inches into the soil with a hand trowel or shovel. I test the soil moisture level by feeling the soil sample with my hand and determining whether it leaves a wet outline on my hand or feels on the dry side. I then try to form a ball by firmly squeezing a handful of the soil. The final step is to make a ribbon of soil by pressing the soil between the thumb and forefinger and seeing if it holds together, kind of like what would happen if I were working with modeling clay.

With the previous information, I can make a decision as to when to irrigate. For sandy or coarse soils, I irrigate when the soil tends to stick together slightly but will not form a ball when it is squeezed in the hand. For silty soils, I choose to irrigate when a ball forms but its strength is weak and its appearance is crumbly. In clay soils, I irrigate when the soil is pliable, will form a ball, but is too dry to form a ribbon easily.

Water placement is also important. We have mentioned how far out from the trunk we should irrigate, but how deep should the water go? The entire root zone needs to be moistened to a depth as deep as the roots go down into the ground. If water penetration is too shallow, that is, if it does not down below the lowest roots, a salt layer could develop that could harm the roots. Think of the white ring that forms around irrigated plants in some soils. It is not just a ring though, it is also cup-shaped and goes from one side of the plant to the other. Proper irrigation keeps that ring out from, and below, the root zone.

Another effect of poor placement is shallow-rooted plants. Since roots tend not to grow into dry ground, shallow irrigations can keep the root system close to the surface of the soil and prone to health issues. In trees, shallow-rooted plants tend to blow over in a storm. To prevent these problems, make sure that the water surrounds the plant on all sides and reaches out to at least the edge of the canopy where most of the roots are located. I like to use a long screwdriver for this purpose. The probe slides easily into wet soil but gets progressively more difficult as the soil dries. Most trees need to be wetted at each irrigation down to a depth of about thirty-six inches or more. Shrubs can get by with an irrigation that reaches eighteen to twenty-four inches, and bedding plants are happy with a root zone of twelve inches.

Proper maintenance of systems will also be critical. It is important to regularly check the water emitters to make sure that they are not clogged up with sand or salt. It is also important to check for leaks and broken or worn tubing on a regular basis. If you are using a battery powered scheduling device, check to make sure the battery is not dead. I know that sounds silly, but really, come on, it happens.

Another key task when operating an irrigation system is to change the clock to match the water demand of the season. When the temperatures are cooler and the air more humid, such as what we experience in the cooler months, the demand for water will decrease sharply and the length of time between irrigations can be extended out. As the weather warms and the air dries, the demand will increase and the frequency of irrigations will have to increase. Plants receiving the amount of water necessary for good health in January will be severely stressed if the frequency of irrigations is not increased in July. Similarly, plants receiving in January the amount of water needed in July will be seriously over irrigated.

Irrigation is a critical step in growing healthy plants. Getting to know your soils and their capacity to hold water, along with mastering your irrigation system, are important tasks as we approach the summer months.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jeffrey C. Silvertooth, Associate Dean & Director, Economic Development & Extension, College of Agriculture and Life Sciences, The University of Arizona. The University of Arizona is an equal opportunity, affirmative action institution. The University does not discriminate on the basis of race, color, religion, sex, national origin, age, disability, veteran status, or sexual orientation in its programs and activities.

Using Rainwater in Gardens and Landscapes

In the desert, water is a precious resource and those who live here are always looking for good ways to make every drop count.

With the current drought fresh on all of our minds, and with the plentiful rainfall of this past winter, one thing is certain. Not only is rain hard to come by in these dry years, but when it does come, we often wish that we had the capacity to catch and put to good use the free water that falls from the sky.

Sometimes, when we are fortunate, many gallons of water fall onto hard surfaces like roofs, carport driveways, and patios during the winter wet season and the summer monsoon . A water catchment system to harvest this often wasted water is a good way to save money on the water bill. It is also helps us be good stewards of a very precious resource.

For centuries, people have struggled to survive in water-scarce environments. In so doing, unique systems have been devised to manage those limited water resources. One strategy has been to capture and concentrate rainfall to irrigate crops or to supply water for people and animals. This practice, known as water harvesting, offers some excellent possibilities for the home landscape.

The most important component of a rainfall harvesting system is rain. Desert environments are always short of this precious commodity and the drought cycles make it even more difficult. However, every little bit that can be captured can help keep plants healthy.

In Arizona, water harvesting for crop production is best suited in areas that receive more than 10 inches of rain annually and where summer temperatures do not exceed 100 degrees F. In Pinal county, annual rainfall averages between 8 and 12 inches annually, starting from the west side of the county and working east. Casa Grande averages 8.2 inches a year, Florence 9.8, and the San Pedro Valley between 10 and 12 depending upon the elevation. These figures are true during normal rainfall years. While some parts of Pinal County may be just under the 10 inch limit, others may be just above. Rain harvesting systems should work fairly well in our area

In addition to rainfall amounts, temperature also plays an important role because evaporation is directly tied to how hot it gets during the day. The hotter the day, the faster water will evaporate from a surface. Closed storage systems help prevent evaporation losses while the water is being kept for future use.

The other major component of a water harvesting system is a series of hard surfaces coupled with a delivery system to bring the water to the root zones of landscape plants. In higher rainfall areas, the storage facility becomes even more important as it accumulates and protects the excess harvested water.

Water harvesting systems capture water in three principal ways. These are described as water-spreading systems, diversion/terrace systems, and micro catchment systems. The first two probably do not have application in an urban setting as they involve diverting water from desert washes and applying it to cropping areas. The early cultures of Arizona were masters at these techniques and used them to good advantage.

Residential water harvesting systems utilize variations of the micro catchment system. The amount of water that can be collected depends upon the amount of rainfall received and the square footage of the catchment surface. There are many factors to be considered, including the influence of wind on how the rain falls and the pitch of a roof but a good rule of thumb is to expect about 0.623 gallons of water per square foot of hard surface during a one inch rain.

Using this conversion factor, a flat roof 1000 feet square could collect 623 gallons of rain water during a rainfall event of one inch. This would be enough to irrigate a line of plants along a well prepared drainage channel in a desert landscape. If a drip irrigation system with a good filter and a gravity pressure system were available, it could irrigate a larger area.

Using Rainwater in Gardens and Landscapes . . . Continued on Page 8

Using Rainwater in Gardens and Landscapes. . . continued from page 7

A typical residential water harvesting system uses several different types of hard surfaces to collect or channel rainwater. Rooftops, garage roofs, driveways and carports, sidewalks, tennis courts or other play surfaces and the ground surface itself can all be used.

Rainfall that is captured from rooftops can be concentrated with eave gutters and down spouts before being diverted to garden or storage areas. If the storage tank is at a high point on the property, a manual outlet valve could be opened to drain water by gravity flow but, if this is not possible a small sump pump will help deliver water to where it is needed.

Another benefit of roof top water harvesting is the cleanliness of the water. Roofs are usually fairly free of sand and other debris that could clog emitters in drip irrigation systems. The water coming from the roof should be checked, however, to make sure that it has not picked up anything that could damage the system. If so, the water will probably require just a minimum of filtering before it is used.

Surfaces at ground level can be constructed in such a way that water can be directed to appropriate locations within the landscape, such as the beginning of a water channel or to the wells around trees and shrubs. The complexity of the system will be directed by the terrain and type of plants in the landscape.

Land surfaces can be shaped and contoured to encourage runoff during rainstorms. If the planting is some distance from the collection area, planning and careful engineering can take the captured water to the desired location.

Micro catchment systems offer excellent possibilities to the home gardener and variations allow a diverse range of applications depending upon the particular need of the location. Water catchment can be as simple or as complicated as the landscape requires but good planning will always be a key to success when installing these systems.

Effective water harvesting concentrates rainwater runoff for use in irrigating landscape plants. Not only are they fun projects to occupy part of our gardening time but, once in place, we get the added benefit of seeing our landscape plants get watered automatically while we sit in our easy chairs and watch it rain.

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

Richard D. Gibson

Extension Agent, Agriculture

RDG/te/aw

57 mailed copies

227 emailed

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

Blog: *Booming Deserts*
ricksgardenspot.blogspot.com

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

Twitter: https://twitter.com/RickGibson4