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CREATE YOUR OWN MULCH

Instead of disposing of your yard wastes into the local landfill, why not turn those same wastes into life-saving garden mulches by chipping up those twigs, leaves, and branches into small pieces?

Spreading mulch around outdoor garden and landscape plants can help reduce your water bill and improve plant health. One reason for this is that mulching materials shield the surface of the soil from the sun. Heat gain during the day can cause all sorts of problems for plants. Surface mulches also help reduce evaporation. Plants with a layer of mulch covering their root systems do much better than plants without these benefits.

Mulches also help minimize or prevent salt problems. The accumulation of salt at the soil surface can cause the soil to crust over, hinder the emergence of young seedlings at germination, and contaminate irrigation water as it is applied to the soil. Dissolved salts easily enter plants through the roots as they absorb water and, moved up to the leaves, cause salt burn symptoms. By reducing water evaporation, mulching minimizes or prevents these types of problems.

A good surface mulch will help reduce weed problems when it is applied in a layer that is thick enough to smother germinating weed seeds. For most weedy plants that germinate, seed, and die in one year, this often means a mulch depth of at least two inches. For highly aggressive perennial weeds, such as Bermudagrass and nutsedge, mulching may only work for a short period during the growing season.

There are other reasons to use a good surface mulch. Many plants are damaged each year because soils are allowed to become too dry. Because mulches slow evaporation, and prevent or slow the growth of weeds that steal water, mulches help buffer the severe fluctuations of soil moisture that can occur between irrigations. This means that more water is available for the desirable plants for a longer period of time with less waste.

There is an added benefit. Organic mulches laid on the soil begin to decompose as microorganisms in the soil begin to work at the soil-mulch interface. As these materials begin to break down, nitrogen is often released into the soil. As a plant food, the release of nitrogen is a good thing. It is a slow process, but it does help.

Isn't there something better than chewed up tree branches as a mulch? While many different materials can be used as mulches, such as peat moss, composted leaves, straw, stones, plastic sheets or asphalt shingles, and many other materials, home-grown branches and other materials left over from pruning and gardening activities are easy to use

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and inexpensive. For the price of a little extra work and the right equipment, it is easy to see that there are unique benefits to making your own mulching materials.

While many arborist groups and some city disposal units use heavy duty shredders to chop up tree remains of just about any size, there are much smaller units designed to grind down branches from about one inch in diameter and smaller. When one considers that most of the branches pruned from trees are about this size, it makes it seem much easier to see this as a task that anyone can do.

There are many different types of shredders on the market. Look for one that is in your price range and has drawn good reviews by those who have previously purchased and used it. Select a shredder that is portable so that it can be moved from place to place around the yard. It will also need to have a good paddle to help push branches and small limbs through the grinding mechanism. I like to use a bucket strategically placed under the exit spout of the shredder so that I can easily carry the shredded remains to the point where I will use them in the yard.

There are "tricks to the trade," so to speak. First, these smaller shredders work much better if the branch is straight without a lot of bends and twists to get hung up on the intake port. It is also a good idea to trim side branches off of the main branch for the same reason. It speeds up the work and makes it easier to manage the chipping process. The more delays of this nature, the longer it takes to get the job done.

Of course, safety is an essential part of operating a garden shredder. First of all, it is important to read, study, and follow any safety rules placed in the operator's manual. The manual will warn you about loose, floppy clothing. Clothing that is loose or dangling could get stuck into the grinding mechanism and, well, you get the picture. For the same reason, it is important to heed the safety warnings and keep hands and feet our of the machine's business areas.

Branches working their way through the shredder sometimes start whipping around. This could be a problem for unprotected eyes. Even a rap on the head is not a fun experience. For safety, I like to cut the branches up into shorter lengths, say twelve to fourteen inches. They tend to feed through much easier and do not cause the problems that longer branches might pose. I never work without heavy gloves, eye protection, and a hard helmet. For those who might have a hearing problem, the grinders can be quite loud so it is a good idea to wear hearing protection.

Once you have your shredder set up, your protective equipment on, and a few free moments on your schedule, it is time to start making pellet-sized chunks of wood. It is simple enough, just start feeding the branches into the machine. I always keep a good set of pruning loppers and hand clippers close by for any last minute trimming that might be necessary. With that said, I find it much more efficient with my time to do all of the nipping and sizing before I ever turn on the machine.

It will not take long to finish up with a full bucket of small pieces of wood. What do you do with them? You have two choices. One, you can spread them directly around your landscape plants, or two, you can feed them into your compost system to break them down even further. There is a good feeling that comes from spreading mulch that you, yourself, have made from materials that otherwise would have gone into the landfill. Also, the benefits provided by the newly-minted mulches are just too good to pass up.

How Much Water Do My Landscape Plants Need?

It is a common question: “How much water do my landscape plants need?”

All plants in the desert need water, especially those that we plant in our yards. Even when they are desert-adapted, meaning that they normally grow in a dry desert somewhere, they will need some water because just the very fact that we modify root systems when we move a plant from one location to another, increases, in most cases, the plant‘s demand for water.

For example, both mesquites and ash trees normally grow along streams and rivers here in the deserts of Arizona, not out by themselves in dry areas without extra. When we plant either one in a yard, but give it no water, expecting it to get along by itself without attention, we will certainly run into problems. Those problems will be even worse if it is an ash tree because that tree has an even higher demand for water. If we want the benefits of shade and beauty from a tree or shrub, we have to give it enough water to satisfy its demands.

When someone asks for a fixed number of gallons of water to give each plant, it is generally because they want to make sure that they are giving the plant enough to keep it happy. A drip system can be set to deliver so much water in so much time and a finite number to enter in is convenient and easy. The problem comes from all of the variables. I could give a number, there are references that do, but it may not guarantee plant health and success because of these many different factors that enter into the equation. So, let’s not go there, shall we? Lets review some of the basic rules and then suggest best management practices as related to water demand.

First, a plant must have a healthy and growing root system to be successful. That means it needs to be growing out from the trunk of the tree and it is best if it is growing out in all directions from the tree. Since roots tend to grow into moist soil and not dry, it is important to irrigate the tree in a 360 degree circle around the tree and far enough out to provide a solid anchor for the tree. We generally say, irrigate out to the “dripline” of the tree so that the entire area of soil covered by the canopy of the tree gets wet. As a tree grows, so does the area needed to be irrigated since the growing tips of roots tend to be towards the outside edge of the tree. If I give you a specific number of gallons needed by the tree and the drip system only puts that in one or two places up close to the trunk the tree will generally be shallow and narrow-rooted because the roots tend to grow only into those wet spots

The second rule is the “balance of energy” rule. There must be a balance of energy between the upper portions of the plant, the branches and leaves, and the lower portions of the plant, the root system. If we create a plant with just a tiny root system because of where we place the irrigation water, typically there will only be a small, stunted top that looks like it has just given up and stopped growing. Again, irrigating out to the edge of the canopy in sufficient amounts to fill the entire root zone is the way to help the tree find health through balanced growth.

Third, it is always important to time the delivery of water correctly. Too many trees and shrubs end up dead because they receive so many gallons of water every so often without taking into account if the soil is dry, or if it is saturated with water. Plugging in a number without knowing soil conditions could lead to over irrigation and all of the challenges that sloppy wet soil brings.

To properly manage any irrigation system, including drip irrigation systems, it is important to know what is happening down in the soil. I like to dig down six inches into the soil and feel how wet the soil is with my hand before I turn on the water. A soil that leaves a wet outline on my hand and forms a tight ball when I squeeze it has plenty of water and I do not need to irrigate. One that is slightly moist and the soil ball crumbles when I open my hand and move my fingers is one that needs irrigation.

Fourth, water demand is a function of temperature and humidity. The hotter and dryer the atmosphere, the more water a plant will need to survive. The cooler and more humid the air, the less water will be needed. There is a difference in demand among all plants between winter and summer. There is also a demand for water based upon the

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elevation of the plant above sea level. A plant growing in Tucson will need less water than the same plant growing in Phoenix because of the elevation difference because the air is generally cooler at higher elevations. Those who live here in the summer will understand completely.

Finally, every plant has a different water need. A citrus tree needs more water than a saguaro and an ash tree needs more water than a citrus tree. We usually lump all plants into three water use categories, 1) high water use plants, 2) moderate water use plants, and 3) low water use plants. I would place an ash tree in the first category, citrus in the second, and desert plants in the third. Still, it is still important to remember that just because two plants are placed in the same water use category doesn't mean that they have the exact same water requirement. These are living things driven by their genetic makeup and there just is a lot of diversity in the plant world.

Okay, let's get down to business. Cacti, creosote bush, jojoba, and ocotillo have the lowest demand of all, but that does not mean that they might not need a drink of water occasionally. Even though they are extra low water use plants, during hot, dry summers, they may need a good irrigation once or twice during the summer just to keep them happy. They do not even need to be on an irrigation system unless they are on one all to themselves. If necessary, drag a hose over and give them a good soak.

Low water use plants that have leaves, like cassia, Texas ranger, and Mexican or red bird-of-paradise may need an irrigation every two to four weeks to help them stay happy. These can be placed on a drip system without much danger of damage. Even though they do not need the extra water, they will accept it. You may have to prune them back more frequently however.

Medium use plants, such as citrus, grapes, apples, plums, and other fruit trees may need to be irrigated every five to ten days during the summer, depending upon conditions. Not only will the tree suffer if it receives insufficient water, but the fruit will turn out with a lesser quality. It does not do much good to grow a fruit tree and then get small, dried out fruit.

The high water use plants most commonly seen in Southern Arizona include the mulberry tree, the ash tree, turf grasses, roses, and other plants with large, fleshy leaves. Without an irrigation every three to ten days, these plants can be severely damaged. Again, test your soil to make sure that your schedule matches their demand.

When we understand that all soils and all plants are not the same, and that different plants have different needs, we can then begin to properly manage the application of water. Our quest for healthy plants requires us to pay attention to details.

What Can Be Done About Ganoderma?

Heart rot in trees and shrubs is a common problem in our area but few really understand the depth of the problem.

Heart rot fungi infect and invade the internal tissues of tree trunks and branches and destroy the wood from inside out. If you think about the inside of a hollowed out tree, you will envision what I am talking about. The fungi as they do their thing dissolve and degrade the inner wood tissues leaving behind a crumbled and weakened spongy mass that eventually falls away leaving only vacant space behind. *Ganoderma*, common in the desert, is one of these fungi.

Let's start with the basics. What is a fungus? Members of the fungi kingdom of living organisms, as compared with plants or animals for example, are mostly microscopic life forms that include yeasts, molds, and mushrooms. It is important to remember that even though they are placed in the same category, there is still a lot of diversity between all of the members and one type of fungus may be entirely different than another.

This diversity is especially true in the fungi. Many of us are familiar with the fungus-caused root rots which are mainly one-celled water molds. Foot rot of citrus, which causes a general melting away of root tissue and eventual death of plants, is a common cause of citrus tree decline and death in our area. *Ganoderma* on the other hand is a fairly complex fungus in comparison and behaves entirely different in its growth and development.

Ganoderma is a strand-forming fungus, meaning that it can put multiple cells together to form strings of cells that under the microscope look like long threads. In the plant pathology world, these strands are called mycelia (plural) and mycelium (singular). The mycelium is the vegetative, or growing, part of the fungus and it has several different functions. It is the part of the fungus that plays the key role in the decomposition of plant material. It is directly involved in the growth and development of the fungus as it expands in size. It absorbs nutrients for fungus growth and development and it releases carbon dioxide back into the atmosphere for future use by plants.

When it comes time for the fungus to reproduce itself, the strands of mycelium twist and turn themselves into specialized fruiting structures. Some fungi form structures called sclerotia which are resting stages for the reproductive parts of the fungus. They are thick walled and stocked with food so that this part of the fungus can remain alive while it is waiting for the favorable conditions it needs to wake up and start growing. The dreaded cotton or Texas root rot is one of the plant diseases that reproduce in this manner.

The many different types of heart rot fungi are for the most part a little more complex in their reproductive process. *Ganoderma* heart rot fungi are a good example of fungi of this more complex reproductive strategy. The mycelium twisting and turning process in this case will form fruiting structures called conks that resemble shelves poking out from the trunks and branches of infested plants. These fruiting structures have a solid layer of tissue surrounding the internal workings of the conk with pin tip-sized holes on the bottom which allow the spores created in the fruiting structure to escape out into the atmosphere and blow with the wind to start a new generation of fungi. Thus, inside the trunk or limb, the fungus is growing and developing while it decomposes the wood of the tree. The part we see is the fruiting or reproductive structure only.

While all heart rot fungi form shelves or fruiting conks, some are smaller and less invasive. *Ganoderma*, on the other hand, is a very large and aggressive fungus. Its fruiting conks can be quite large and emerge from the roots of a diseased tree long after the top has been removed and hauled away. Not only is the size and persistence a problem, but it also can be a threat to other susceptible broad-leaved trees and shrubs when the conks raise themselves out of the soil to disburse its spores.

So, how do we prevent the spread of, and damage from, these heart rot fungi? There are several ways that we can protect our trees and shrubs from heart rot fungi, including *Ganoderma*. The most important, and easiest, way to protect plants is to prevent wounds, scrapes, and gouges to the bark of susceptible plants.

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There are many ways that trees can be damaged, of course. Pocket knives, car bumpers, lawn mowers, and string trimmers can all take a toll. The most common means of invasion however seem to be the broken branches of the monsoon season and pruning cuts. Proper thinning of landscape tree canopies can help reduce the broken branches, and pruning trees correctly, including using the right tools and making the cuts at the right time will help immensely to prevent heart rot infection. Of course, the fewer the pruning cuts made to a tree, the fewer the sites for successful invasion by fungal spores.

Many people choose to heavily prune trees each year, sometimes removing all limbs from the tree. Not only does this rob the tree of stored energy, the large number of big, gaping cuts to the tree open up the plant to heart rot. A better practice is to resolve to remove no more than 20 percent of the wood at any one time. I think it is also good to refrain from removing large branches unless absolutely essential for the same reasons.

What about using pruning sealers as a way to keep fungi out? The use of pastes, sprays, or paint to seal off a pruning cut has been debated for a number of years. In Arizona, research has shown that the use of pruning sealants can be more of a problem than a help. The sealants are designed to place a protective barrier over the cuts to keep fungal spores out. In Arizona, our dry weather tends to quickly dry the pruning cuts which them less susceptible to fungus spore invasion. Any fungal spores that might touch the surface of a cut usually do not have enough time to develop before the wood dries out.

The use of sealants tends to keep the cuts moist for some time and this results in a warm, moist, and dark condition underneath the seal. These conditions, of course, that are just right for fungus growth and development. For this reason, we would rather see the cuts left exposed to the air for quick healing.

If by chance a tree or shrub in the neighborhood becomes infested with heart rot fungi, it is always a good idea to remove the fruiting structures promptly so that the number of spores released to the environment are kept to a minimum. This may take cooperation among neighbors, but working together much can be achieved. Diseased trees may eventually need to be removed.

Heart rot fungi, and especially *Ganoderma*, can cause serious damage to susceptible trees and shrubs. Proper care and vigilance are the best ways to prevent damage to our valuable landscape plants.

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Cation and Anions in the Soil

One of the challenges that all desert gardeners face, but rarely understand, is the ebb and flow of cations and anions in the soil.

You might remember from your basic chemistry that everything that makes up the earth, and everything else for that matter, is made up of basic elements. An element is composed of a nucleus containing one or more positively charged protons and one or more electrons circling around the nucleus. Each element has a certain number of protons balanced by a similar number of negatively charged electrons.

The precise will say that the nucleus also contains neutrons, and they would be correct, but having no charge, they contribute nothing to our discussion. What matters is that each element has a certain number of positive protons and an equal number of negative electrons which balance the positives and the negatives and makes the element neutral as far as electronic charge is concerned.

Some elements have the ability to change the number of electrons circling around their nucleus. This of course is going to change the overall electronic balance in these elements. Elements that accept or give away electrons are called ions. However, the basic element wants to be neutral so it is always trying to get back to the status quo.

In these cases, it might be helpful to think of the electronic charges, both positive and negative, as the opposite ends of a bar magnet. One end has a positive charge and one a negative charge. When we try to push two positive or two negative ends together they repel or push each other apart. When we place a positive end of a magnet towards a negative end on a different magnet, the attract each other.

While thinking about the bar magnet example, we need to know that cations are ions with one or more positive charges, meaning that they have given away one or more electrons and want to get them back. Anions are ions with a negative charge and have too many electrons. They want to give them away.

How does all of this affect soils? Soil is composed of pieces of decomposed rock that happen to be small enough to support plant life. Sand particles are the largest, clay particles are the smallest and silt particles are intermediate in size. Due to the chemistry of soil particles, especially clays, sites of negative charge prickle out from their surfaces in all directions. These negative sites tend to attract ions with a positive charge, the cations. They also repel anions.

Concentrations of cations and anions in the soil solution affect plants in at least two different ways. First, they affect the nutrition status of plants. Second, they determine the salt hazard risk which can be significant to susceptible plants.

Because plants absorb many of their nutrients through a mechanism requiring the elements to be in ionic form, good plant nutrition is based upon the principles of electron charge and the formation of ions, both positive and negative. I do not want to get into too detailed a discussion here but uptake of nutrients by plants comes through a process where the root hairs mainly release positive hydrogen ions. These tend to kick other positive cations off of the soil particles allowing the roots to absorb the freed ions through a biological process called an ion pump. There are similar systems for the absorption of nitrate. We will talk more about these processes, and how they affect garden plants, at a later time.

Another way that cations and anions are important to plants is through salt hazard. Just as the presence of the right amount of cations and anions is important for good plant nutrition, too much of a good thing can be a problem. Cations and anions form salts. In concentrated and elevated amounts, they cause serious problems to plants.

Absorbed through the roots, salt forming cations and anions can burn tender leaves and other tissues when they concentrate in the plants. Some plants, like dates and cotton, are rarely affected by salt concentrations because they are tolerant, but others, like cantaloupes and citrus, are relatively intolerant and cab be harmed at low levels of concentration. The best way to avoid salt burn, then, is to maintain proper amounts of cations and anions in the soil. How do we do this? We make sure that we irrigate correctly.

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Our original discussion can help us understand why proper irrigation is so important. As water drains through the soil, it picks up anions because they are unattached, and any cations that are not attached to the soil, and moves them down and out to the edges of the wetted pattern. Thus, the highest concentrations of salts are going to be at the edge of where ever the irrigation water reaches. If we apply enough water to sink in about six inches, that is where the salt concentrations will be.

When we realize that a tree's roots will often extend down to three feet or more, you can see the potential for problems. The roots will be right in the middle of the salt zone and, absorbing them willy nilly, pump them right up to the leaves. Shrubs will extend their roots to two feet, and even bedding plants will send their roots down one foot into the soil. Deep irrigations are important to reduce salt hazards in soil.

As important as managing salts is to plants, there is also a similar but opposite problem, and that is the loss of nitrates from the soil by irrigation. You will remember that nitrate is an anion. Because of its negative charges, it is repelled by the soil particles and remains in the soil solution. Every time we irrigate, if we are not careful, we leach this important nitrogen source down and out of the root system.

You wonder then, what is the best recourse? Do I irrigate heavily to leach the salts, or do I water to preserve the nitrogen. It all boils down to what the anion and cation concentrations are in the soil. In general, the best management practice is to irrigate down to the bottom edge of the root zone, and no more. If the plant is a tree, irrigate to three feet. If it is a shrub, irrigate to two feet. For bedding and other shallow-rooted plants, irrigate to one foot. How will you know how deep your water is going? You will need to use a soil probe of some kind to test your water penetration.

There are many intricacies involved in growing healthy gardens and landscapes in the desert. An understanding of desert soils, and the chemistry involved, can go a long way in helping resolve some of those pesky, perplexing problems that limit plant success.

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.

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