



THE UNIVERSITY OF ARIZONA

Cooperative Extension



MARCH 2020 Garden & Landscape Newsletter

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BOYCE THOMPSON ARBORETUM SPRING PLANT SALE

After the rains this winter, the wild flowers are in bloom across the desert and one of the best places to see them is at Boyce Thompson Arboretum near Superior.

There are many places to see wildflowers, of course. Most of the state parks have them just now coming into full display, and you can always check out the edges of the roads as you drive around. Still, I really like Boyce Thompson Arboretum. It is just a fun place to be. Plus, their annual plant sale is from March 14 through March 22. Both the wildflowers and the plants that you can purchase to spruce up your own yard are two good reasons to head for the Arboretum this weekend!

Many people find the spring plant sale as a good reason to make the Arboretum their destination. Do you enjoy hummingbirds? Many of their plants for sale are special favorites of these interesting birds. Looking to attract more butterflies to your yard? You guessed it! They have many species of plants available for sale that butterflies love. The sale is also a good place to pick up a unique or hard-to-find addition for your low water use garden or landscape.

Located just 45 minutes east of Mesa, the Arboretum is nestled up against Picket Post Mountain and the views while you are shopping, or wandering around looking at the wildflowers, are spectacular. Founded in 1925 and dedicated to instilling in people an appreciation for plants, this 323 acre botanical collection includes a wide range of habitats along nearly two miles of paths.

Many Arizona residents have come to love the cactus gardens, the Australian forest of towering Eucalyptus trees and the fragrant varieties of the herb garden which are only a few of the many displays that can inspire, awe and encourage the plant enthusiast. I have been there many times and still enjoy the visit every time I go. There is always something fresh to see.

If you go, take time to stroll through the collection of 3,200 different desert plants unique to the desert, where exotic species from around the world thrive alongside native Sonoran Desert plants. Short trails lead through the Sonoran and Chihuahuan desert areas, a cactus garden, several rich riparian areas, an Australian forest, and the herb and rose gardens. English, Spanish, French, German and Japanese trail guides are available for the scenic 1.5-mile loop through Queen Creek Canyon; handouts offer additional information on many of the other trails and gardens. I was there last

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week and the Queen Creek was running a full head of water through the Arboretum. Those of us native to the desert, where flowing water is scarce, find the musical noise of running water over a rocky creek bottom a pleasant experience.

Begin your tour at the Visitor Center, where an eight-minute video offers a brief history of the park and a preview of what's in store along the trails. This building also houses a bookstore and, of course, a wide variety of cacti, succulents and leafy plants which are available for purchase.

The cooling-tower exhibit at the visitor center creates a cool microclimate; its 30-foot tower functions as a giant evaporative cooler. For those who appreciate what it takes to keep a building cool during the summer, this is a must see!

Several trails branch off from the first part of the Main Trail, so you don't have to walk far to see the highlights, and much of the trail system is wheelchair-accessible. The Curandero/Sonoran Desert Trail showcases traditional herbal medicines of the Sonoran Desert. Curanderos are traditional healers in Mexico.

The historic Smith building, a short walk down the main trail, contains botanical exhibits and displays; and two display greenhouses feature cacti and other succulents that might not otherwise survive winter cold at the park's 2,400-foot elevation. The Smith Interpretive Center, between the display greenhouses, has exhibits on plants and the natural history of this corner of Arizona.

For the serious landscaper or gardener, the Arboretum is an ideal place to purchase unique plants. Many of the same mature plant species that are on display in the park can also be purchased on site. Many people get new landscaping ideas from the 2.5 acre Demonstration Garden. It shows various plants in the context of a functional landscape, complete with patios, walls, shade structures, vine arbors, walkways, and rock work. Interpretive signs help guide the homeowner through the processes of site analysis, basic design and plant selection, while introducing important concepts such as water harvesting, the mini-oasis and the challenges of salinity.

Forming a scenic backdrop and towering over the property at an elevation of 4,400 feet is nearby Picket Post Mountain. While there is no public access to the mountain from the arboretum trails, there is information available at the park about this historic area where a heliograph station, equipped with mirrors to flash the rays of the sun, operated atop its peak during the Apache wars of the 19th century.

More than 200 species of birds and 72 terrestrial animals have been seen about the grounds. Ayer Lake, and Queen Creek on the Main Trail, are good places to watch for wildlife; and you may even see endangered species such as the Gila topminnow and desert pupfish.

A shaded picnic area equipped with charcoal grills and near the main parking lot is available to visitors. So pack a lunch and take a drive to Boyce Thompson Arboretum, which was voted "Best Fall Day Trip For the Family" in the New Times Best of Phoenix readers' poll. It may be the best trip of the year!

Boyce Thompson Arboretum is open daily (except Christmas) from 8 am to 5 pm. Admission is just \$15.00 for adults and \$5.00 for children. Of course, the plant sale is in the parking lot and there is no charge to pick out that special plant.

The arboretum is situated at Highway 60 milepost 223, just three miles west of Superior, 45 miles east of Mesa. For additional information please call (602) 827-3000 or visit their website at btarboretum.org.

MONOCOTS AND DICOTS

If the terms monocot and dicot are not familiar to you, and if you as a gardener do not know how to tell them apart, our conversation today will be really important for you.

Sometimes, even with the best intentions, things can go wrong in the garden. Failures can occur for no apparent reason. There are various possibilities, of course, but many times these things happen because we do not understand the science. Our topic today is one of those. In several ways, a knowledge of the difference between monocots and dicots can mean the difference between success and failure in the garden.

Please let me set the stage. The plants that we use in our gardens and landscapes are usually the more complex of plants. We do not plant algae, moss, liverworts, and similar plants in our yards. We prefer the larger, more showy plants like the conifers and the flowering plants.

Conifers are different from peaches, apricots, and pears in that they produce their seeds in cones instead of flowers. The conifers include the pine trees, cypress shrubs, and junipers. The flowering plant group consists of all plants that produce their seeds in flowers. Other examples include roses, pumpkins, and pecans. Within the flowering plant group, monocots and dicots are the two major divisions.

Yes, I know. All botanists reading this will be thinking about a relatively new term called eudicots. Those up-to-date in the science will know that botanists have divided up the old dicot group into two additional groups, one of which is the eudicot group, but for the purpose of what we are talking about today, the old terms work just fine.

The “cot” part of each term comes from the word cotyledon, so we should probably define that structure next. A cotyledon is the part of the seed where the plant stores energy to sustain the baby plant when the seed begins to germinate. A germinating plant cannot feed itself using sunlight energy or sustain itself with water from the soil until the new plant gets its roots down into the soil and its leaves in the air. Packed with nutrient goodies, the cotyledon provides all the energy the baby plant needs until it can take care of itself.

A seed with one cotyledon is called a monocotyledon, mono meaning one, and a seed with two cotyledons, di-meaning two, is called a dicotyledon. We shorten the terms to monocot and dicot to make it easier and quicker to say. Remember, a seed with one cotyledon is a monocot and a seed with two cotyledons is a dicot. How will we know if a plant is a monocot or a dicot?

The easiest way to tell them apart is to check out the number of cotyledons within the seed. Soak the seed in water. Then, when the outer coating of the seed is soft and loose, it can be peeled off to reveal the inner parts of the seed. A monocot, like a sweet corn or a palm seed will have only one cotyledon. Dicots have two.

We count the number of cotyledons by trying to split the white-colored lump of the inner part of the seed into two equal pieces. A monocot will only mush between our fingers and not split into two groups, while a dicot plant seed will split easily into two parts. Think of a pinto bean or a pea seed that will easily split into two equal halves. “Split pea soup” is based upon the fact that the pea seed has two cotyledons.

The problem with soaking a seed, removing the seed coat, and counting cotyledons as a means of telling the difference between a monocot and a dicot plant is that the process kills the seed. When seeds are scarce or time is short, it is really not practical. Fortunately, there are quicker and less destructive ways to identify a plant. Here are two that I use all the time.

The first way is to count the number of petals in the flower. Monocot plants have flowers that have their several parts in multiples of three. For example, an agave flower has three petals, three sepals, and three male and female parts in

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the flower. A dicot plant will have flower parts in groups in multiples of four or five. That works pretty easy and fast when the number of petals is relatively low. When the number of petals goes up to the point where it is hard to count them all, such as in some rose flowers, it becomes a little tedious.

The other way of telling the difference between a monocot plant and a dicot is actually the easiest. This method uses the arrangement of the veins in the leaves. A monocot plant has its leaves arranged in parallel, or one beside another. Consider the corn leaf. If we take it and try to peel it apart, the sections come away in even pieces because the veins are arranged next to each other and side by side. Many woven baskets are made using monocot plant leaves because the leaves can be split into long and narrow pieces that are easily woven together.

Dicot plants have leaves with veins arranged in a netlike formation, in that they go in all different directions. If one tries to separate a dicot leaf into equal parts, failure is certain. Because the veins go in all different directions, it is impossible to split a an ash, citrus, or rose leaf into pieces that can be woven together. The arrangement of veins in the leaves makes it really easy to tell the difference between monocot and dicot plants.

“Why should I care,” you ask? There are many reasons. I will mention a few.

In the world of weed-killing chemistry, there are those that are nonselective. They kill everything that they touch. Think of vinegar or a soap solution. There are other herbicides, however, that are selective, meaning that they will only affect a monocot or a dicot, but not both.

If I have a grass lawn and I want to kill dandelions in the lawn, I can use a herbicide that will take out dandelion weeds, which are dicots, and not hurt the grass. When we get tired of pulling weeds, this can be really helpful. On the other hand, if I have a grass lawn intermixed with a clover or some other dicot plant that I want to keep, I cannot use the selective herbicide. Yes, it will not affect the grass, but it will take out the clover.

There are, however, other herbicides that are selective for monocot weeds and will not bother a dicot. Let’s say that I have a privet hedge, a dicot, with bermudagrass, a monocot, growing up through it. I want to take out the grassy weed without hurting my hedge. I can do that by carefully choosing a selective weed killer that will do the job.

What I cannot do, though, is kill bermudagrass growing up through an agave plant. It won’t work because both the bermudagrass and the agave are monocots and there is no selective herbicide that will take a monocot out of another monocot. Similarly, I cannot spray an herbicide to take a dicot weed out of a rose bush or citrus tree, for the same reason. A knowledge of the types of plants involved will help prevent mistakes.

Like I said before, there are many practical applications of this important principle but these are enough to indicate a need to learn to tell monocots and dicots apart. The easiest way is to check the veins of the leaves. If they are parallel to each other in a leaf, the plant will be a monocot. Grasses, sedges, and palms are classic examples. Plants with leaves that have the veins arranged like the strands of a hair net will be dicot plants.

As you walk around your garden, or down the street, practice identifying monocots and dicots. Pretty soon it will become second nature to you and you will have gained a skill that will help you do many things right in the yard.

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

ASH TREE VARIETIES

If you are looking for a good shade tree in your yard, you might want to consider one of the different ash trees.

The various types of ash tree provide good shade, are fairly hardy in desert environments, and come in various shapes and sizes. They are fast-growing trees that can reach full size in just a few years. They do require a little bit more water to keep them alive, especially during the summer months, but there are relatively few problems with the trees.

There are two species of ash that are native to Arizona. For this reason alone, they are relatively well adapted to the challenges of the desert. They are riparian trees however, which means that they normally grow along creeks and rivers where they get the extra water that they need in our arid climate. This is the reason why we need to provide that extra water necessary to keep them happy. There are also other species and varieties of ash that do equally well here.

In the low deserts, there are four main types of ash trees found in our urban landscapes. The first that we will consider is the most commonly planted and also one of the two native ash trees, the Arizona ash, *Fraxinus velutina*. The tree stands up nicely to our warm temperatures in the summer and our cold temperatures of winter. It does lose its leaves during the winter, so it makes a great shade tree on a southern exposure. The loss of leaves allows the winter sun to come through our windows for passive winter heating. The Arizona ash tends to reach about thirty feet in height. Since the leaf canopy tends to be wider nearer the ground than at the top of the tree, it tends to have a pyramidal shape. The lower canopy can reach thirty to forty feet wide.



Arizona Ash, Fraxinus velutina

Another favorite ash tree in the low desert is the evergreen ash or Shamel ash, *F. uhdei*. As its common name implies, it does tend to hang onto its leaves during the cooler months, but occasionally extra cold weather can knock the leaves off. Not to worry, the tree will grow new leaves when the warmer weather returns. It tends to grow to twenty-five to thirty feet tall.

The Modesto ash has also been a popular choice in the low desert. This tree is a hybrid related to the Arizona ash but it has been found to be more susceptible to the ash decline syndrome than other types. Many people are now going to the Fan-Tex ash which seems to be more stable and hardy.

The Fan-Tex ash, or the 'Rio Grande' variety seems to do quite well in the dry climate and alkaline soils and seems to be a better choice than the Modesto ash. It has larger leaves than the Arizona ash, which makes it even more shady, and can grow perhaps up to forty feet tall and thirty feet wide. The larger leaves and the overall hardiness have made this tree more popular as a landscape choice.

If you have an ash tree in your yard, and want to know which type you have, the best way is to look at the leaves. All of the ash trees have what is called as a compound leaf. That means that each leaf is divided into smaller leaflets that are separate from one another. In the Arizona ash, the leaf contains three to five individual leaflets which are about three inches long. In the Shamel ash, there are five to nine leaflets that can grow up to four inches long. The 'Rio Grande' ash the leaflets can be even longer.

Other low desert varieties include *F. angustifolia*, a seedless hybrid, *F. 'Fan West,'* and the Montebello ash. They are not as commonly seen in the trade as the varieties mentioned above, but are still recommended by some.

Now, what about the higher elevations in Pinal County? If you live in Oracle or other areas of the county that come close to the 5,000 foot elevation, there are a few other choices. The same ash species and varieties mentioned above, with the exception of the Montebello ash, will all still work at these cooler locations.

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In addition, there is another native ash, the little leaf ash, *F. greggii*, that will do well. It is a smaller tree growing only to twenty-five feet tall and about twenty feet wide, which could make it fit better in smaller yards. Again, it is only recommended for higher elevations.

Another species that could work well at the higher elevations is the white ash, *F. americana*. It is an eastern United States native so I am not sure how well it will do here, but is listed as a possibility for the higher elevations.

There are some problems with which all the ash trees must contend, but they are not all that common. I would not let a possible threat dissuade me from selecting an ash tree for my yard.

One of the possible problems is the ash whitefly. We have not had a lot of complaints in our area about this insect, but it has proven troublesome in other areas. It is a white insect with a fluttering flight pattern. The insect tends to gather in clusters on the underside of leaves. It is not only attracted to the ash tree, but has been found bothering other types of trees also. In most cases, the beneficial predatory insects tend to keep the populations of this pest fairly low and pesticide applications are generally not recommended because these insecticides would tend to kill off these beneficial friends.

Ash trees tend to be favorite hosts of mistletoe. Usually carried by birds, the seeds of this parasitic plant, once attached to the branch of a susceptible plant, can easily penetrate the bark of the tree and become an established plant. Mistletoe tends to steal water and nutrients from the host tree and can cause stunting and slower growth.

Verticillium wilt is caused by a fungus that lives in alkaline desert soils. It can invade the roots and clog up the water-conducting tubes within the plant and choke off the top of the plant for lack of water. Ash trees are occasionally susceptible to the disease.

Another problem with some ash trees is a complex called ash decline syndrome, which I mentioned above. No one knows yet what causes this problem so we do not know how to solve it. Symptoms include yellowing leaves that occasionally turn brown around the edges. Sometimes the leaves tend to green back up which can be confusing. Some plants, however die from the effect. The Modesto ash seems to be more susceptible than other varieties.

Established trees do well with an occasional application of fertilizer but are not really finicky when it comes to soil nutrition. They prefer well drained soils that do not keep their roots in a sloppy wet soup all the time. Most soils in Pinal County will provide the ash tree with a good home.

While the ash tree does require extra water during the summer months to keep it happy, it makes a great shade tree and, in the desert, what else can we say?

WATER DEMAND BY PLANTS

Not every plant needs the exact same amount of water as another to stay healthy. Because of this fact, it is important to know the needs of each of your plants in order to give them just the right amount.

When it comes to water demand, there are basically three different groups of plants. The first group include those plants that need lots of water. In fact, they need so much that they usually are found growing in a pond or marsh. These are the aquatic plants, or hydrophytes as they are sometimes called. “Hydro” refers to water and “phyte” refers to plants. If we have a water feature in our yard, like a fish pond, these are the plants that will grow there. If we let the pond go dry, there can be definite problems.

At the other extreme end of water demand are the plants that fall into the xerophyte group. The term “xero” means dry. These are the plants that can get by with little or no extra water and include many of our cacti and other succulents. They are well-adapted to our dry and hot desert conditions.

The in-between group of plants are called the mesophytes. The prefix “meso” means “middle” so these are the plants that do not like super wet conditions, nor super dry conditions. They will most often have large leaves and showy flowers because they grow in places where there is sufficient water to allow them to be extravagant with what to us is a precious resource. We like them as ornamentals because they look good and bring a non-desert feel to our yards. Unfortunately, we must give them extra water to keep them thriving.

There are many variations within each of these three groups, of course, but in general, as we look at landscape plant choices, we can pretty much figure out the plants that belong in each category. On occasion, we can find a landscape that only has plants from a single group, such as all aquatics or all cacti, but because we like variety, most landscapes tend to have plants from all three groups, sometimes in close proximity. Unless we have a good plan for proper irrigation, problems can arise.

For example, if we place a saguaro, a xerophyte, and a citrus tree, a mesophyte, on the same irrigation line and both receive the same amount of water, one of the plants will be perfectly happy while the other may either receive too much or too little water. That is not a good thing because the one receiving too much or too little could be severely damaged.

If we set the irrigation timer to provide the right amount of water for the saguaro, we will hopelessly provide too little water for the citrus tree. As a result, it will suffer. On the other hand, if we correctly meet the water demands of the citrus tree, we will provide way too much water to the saguaro and all kinds of bad things can happen for the saguaro. If we try to split the difference, we will underwater the citrus and still over water the saguaro and we have not solved anything.

There are many biological reasons for these differences which I think are important for us to understand. If we understand why something is important, then we can properly plan for the needs of individual plants.

Take the aquatic plants. Why is it that they can grow with their roots in sloppy wet soil all the time, while plants in the other groups would probably suffer root rot under the same conditions? The reason is that the aquatic plants have roots that are adapted to being in water and wet soil constantly. Low water use plants and moderate water use plants do not. However, they do have their own set of adaptations that help them survive their specific environments.

Let’s go back to the cacti and other xerophytes. These low water use plants can survive in high heat and low rainfall patterns by using a number of different adaptations that are not found generally in the mesophytes. Thick waxy cuticles are one of the main ways they accomplish this. The cuticle is the smooth, shiny outer covering of many leaves that give extra protection to the soft tissues underneath. Run your finger, carefully of course, along the outside of a saguaro cactus and you will feel the smooth surface of the waxy cuticle. The cuticle helps keep water stored inside the plant from evaporating away. These plants tend to have small leaves, or no leaves; small, dry fruit; and sometimes

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even a different way to assemble their food constructed during photosynthesis. All of these help the plant get along without a lot of extra water.

Do plants in the middle group have waxy cuticles? Yes, they do, but their cuticles tend to be thinner than the more desert hardy plants. Think about the leaf of a rose. The cuticle is there but it is rather thin. You may be thinking about the thick cuticle on a citrus leaf and wondering why it is in the middle group? The tissue of a citrus leaf is super sensitive to high heat and can be damaged quickly if the leaf does not have access to sufficient water to help keep it cool.

Knowing that different plants have different water needs, what should we do? It is important to keep in mind several botanical truths.

First, all plants, even the xerophyte low water use plants, require water. If we want the plants in our gardens and landscapes to succeed, they will need water from time to time. We just have to give the water at the right time, in the right amounts, and in the right way to meet the needs of the different plants. For this reason, it is important to know our plants and their specific needs.

Second, our irrigation schedules, no matter whether we are pulling a hose or operating an automatic system, must reflect the needs of our individual plants. We should never, ever irrigate a saguaro on the same schedule as a citrus tree.

Third, keep in mind that every plant is different, not just in the amounts of water that they need, but also in the way that their root systems are developed. If a plant tends to look water stressed all the time, or if it is growing way too aggressively for its botany, we may to kick the timing of our irrigations up or down depending upon what the plant is telling us.

Finally, we have to pay attention to our plants and the conditions under which they are growing. If we have a super wet rainy season, such as this past winter, we can cut back on the frequency of irrigation. That is, we can extend the time between our irrigations. We never want the soil around out plants to stay sloppy wet all the time, unless they are aquatic plants, of course.

There are many challenges to providing the right amount of water to our plants and at the right time but an understanding of the different plants growing in our yards can help us make good decisions.

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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