Succulent Agave and Yucca Species Make Great Landscape Plants

Agave and yucca plants are easy to grow, add variety to otherwise boring landscapes, and require very little water. These interesting desert natives are classified among the many succulent plants.

Succulent plants, think cacti and aloes, have thick leaves and stems that hold water and harvest sunlight energy in ways that allow the plants to grow in conditions where many others could not. Because of their shape and colors, they help give diversity and form to any landscape. Best of all, they are especially useful in low water use landscape designs. If there is a low traffic area in the yard that needs a little extra to set it off right, consider one of the succulents to give it that finished desert appearance.

Among the various succulent plants available to desert gardeners are the many species of the genera Agave and Yucca, most of which are well-adapted to the harsh desert climate. Both species have thick, fleshy sword-shaped or strap-shaped leaves coming from a central core and central flower stalks that come out of the terminal to support white or creamy white flowers. These plants make great specimen plants that attract the gaze and give an authentic feel to desert landscapes.

Since the native agaves and yuccas grow at elevations a little higher than the low deserts of Pinal County, they will need frequent irrigations to stay happy. If they are given a good soaking once a month during the hot season, they should be happy. Agave and yucca plants prefer soil with good drainage and do not flourish when their roots are kept continually wet. For this reason, it is a good idea to make sure that the soil dries out regularly between irrigations to ensure good root health. It is also a good idea to group these plants with other plants that have a similar water requirement to ensure proper irrigation.

Agaves and yuccas can also be grown in combination with various softer-leaved foliage plants to give a tropical atmosphere. Taller species make striking silhouettes and even the shorter species provide an important vertical effect when in bloom.

Young plants of some species can be used as indoor plants and will do quite well in hot, sunny windows. For indoor use, buy plants in gallon size or smaller containers and plan to set them outdoors when the plants become too large for the space available.

In This Issue:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Succulent Agave and Yucca Species Make Great Landscape Plants</td>
<td>1</td>
</tr>
<tr>
<td>Iron Chlorosis Can Create a Problem in Landscape Plants</td>
<td>3</td>
</tr>
<tr>
<td>Spring Wildflowers</td>
<td>5</td>
</tr>
<tr>
<td>Understanding the Bougainvillea</td>
<td>7</td>
</tr>
</tbody>
</table>
The spiny nature of some of these plants, especially some of the agaves, makes them unsuitable for high traffic areas. Some species have especially sharp-tipped spines on the ends of the leaves that can do serious damage to skin or eyes, so these plants are best placed in areas where people and pets are not apt to walk. In fact, if there is a spot in the landscape where foot traffic is to be discouraged, such as along a fence, near a fragile area, or any other place from which you might want to keep people away, these armed plants are the ticket.

The spines also make it hard to clear out weeds and trash that might be entwined among the leaves. Plants located near a bermudagrass lawn may be frequently invaded by this hard to control weed and since some succulents are closely related to grasses and sedges, the use of selective weed killers would not an option. The gardener is left with few alternatives to keep these plants looking their best. Some people find it necessary to clip the spines at the tips and margins of the leaves with fingernail clippers or pruning shears to protect passers by and to gain access to clean out weeds near the center of the plant.

The only real insect threat to these plants is the agave snout weevil, a one-inch long black beetle with a long nose. The adult weevils are active during the warm months of early summer and finish their life cycle by laying their eggs at the base of a leaf. The young larvae burrow into the soft tissue of the plant and introduce a harmful bacterium that rots away moist plant cells. It is upon this decomposed organic material that the larvae feed.

Heavy infestations of the weevil can lead to a rapid breakdown of important water and nutrient conducting tissues which in turn causes a gradual drying of the plant. The first symptoms will be a general wilting of lower leaves, but over time, the entire plant eventually dries out. Once the plant is dead, the plant usually can easily be pushed over by hand.

Agave snout weevil can be controlled with a liquid insecticide application labeled for landscape use every two weeks during the months of May through July when the adults are active. Apply the insecticide to the base of the leaves to kill the adults. Granule formulations can be added to the soil underneath the plant to kill larvae.

Other pests of succulent plants are cottontail rabbits and the antelope jack rabbits native to the desert. Vertebrate pests can be screened or walled out for the protection of the plants.

The century plant, *Agave americana*, is very popular. Its large size and its blue-green color make it a favorite in our area. The plant gets its name from the mistaken idea that it flowers only after 100 years of life. These plants actually flower after 10 to 15 years with a large central stalk that is, in itself, impressive. Other agaves include the *A. filafera, A. parryi, A. victoriae-reginae*, and *A. vilmoriniana*, the octopus agave.


Many of these different species may be grown in containers which allows greater flexibility for the landscape. It is important to select a pot that fits the size of the plant so that they do not get root bound. The added benefit is that a potted plant can be moved if desired to a different location. However, if you decide to move a plant, make sure that it is oriented so that the side of the plant that was facing south previously is again facing south in its new location. These plants develop extra layers of tissue on the south-facing side that they do not form on the north-facing side to help them withstand sunburn.

For those who crave a lush but water stingy landscape, agave and yucca succulents can spice up any desert landscape and give it that finished look.
Overwatering and high pH soils can lead to a condition of nutritional deficiency known as iron chlorosis.

Chlorosis is a term used to describe the yellowing of plant parts, particularly the leaves. There are many factors that can cause yellowing in plants. Nitrogen and other nutrient deficiencies, insect feeding, herbicide damage, and viral infections can all cause yellowing symptoms. However, in this area, one of the most common yellowing conditions is the nutritional disorder called iron chlorosis.

Iron is one of the sixteen essential nutrients required by all plants for proper growth and development. In the plant, iron is used within individual plant cells to form chlorophyll, the molecule that captures energy from the sun and transforms it into energy-rich sugars during the process of photosynthesis. Without photosynthesis, plants can not grow.

Iron also serves as an activator for biochemical processes such as respiration and symbiotic nitrogen fixation. In short, iron is critical to the normal health and development of all plants.

While iron deficiency symptoms in plants are seen mainly in plant leaves, the real reason for its appearance can almost always be traced to the soil. All soils, especially the granite-rich soils of Pinal County, contain iron. The problem comes when local soil conditions make it difficult for the plant to pull the iron molecules from the soil.

Our high pH, alkaline soils can chemically tie up iron and other nutrients in the soil and make it difficult for plants to absorb them through the roots. The higher the pH, the more difficult it is for plants to extract the nutrients. Some plants have a more difficult time than others extracting iron from the soil, even under the best of conditions. For these plants especially, high pH conditions cause severe problems.

In addition to high pH, iron chlorosis can be also be caused by poor aeration of the soil. Aeration refers to the amount of air which is found in the spaces between the individual soil particles and is essential for good plant health. The problem comes when soil compaction reduces the volume of space between the soil particles or when over watering keeps the spaces filled to the exclusion of air. Failure to reduce soil compaction and continued over watering will lead to iron deficiencies.

Symptoms of iron deficiency are fairly easy to recognize, even by the beginning gardener or landscape manager. Begin by carefully inspecting the younger leaves near the tips of the branches. Look for pale to light green leaves where the veins of the leaves remain a darker green than the surrounding leaf tissue. This usually is the first hint of an iron deficiency problem. As the condition of the plant worsens, look for more intense yellowing of tissue but the veins of the leaves will almost always remain green. Only in extremely severe cases will the veins themselves turn yellow leaving the entire leaf a bright yellow color.

Leaf discoloration, called interveinal chlorosis, will be the first symptom seen. In severe, prolonged cases, twig dieback will also be seen and this can progress to death of entire limbs or plants.

Plants most often affected by iron chlorosis are grasses such as St. Augustine and sweet corn and some fruit trees and ornamentals like bottle brush, eucalyptus, pyracantha, peach, apricot and citrus. There are other plants that can suffer from iron chlorosis, but these seem to be among those most commonly affected.

The solution to iron chlorosis is usually straight forward. Iron is taken up by plants from the soil as ferrous (Fe++) ions. Ions are simply elements that have lost or gained one or more electrons and have a positive or negative charge, much like the poles of a magnet. It is these ionic charges that allow the plant to move the nutrient ions across cell membranes into the plant tissue.

Symptoms of iron chlorosis can often be resolved by adding iron-containing fertilizers into the plant environment, either through the soil, or by spraying the leaves. Which one is best? Well, that is the question.

Several years ago, we did an experiment on highly chlorotic pyracantha bushes. Both foliar (leaf applied) and soil applied iron fertilizer formulations were included in the experiment and the treatments were repeated several times on different
shrubs. The study indicated that both types of iron fertilizers worked well. All of the treatments either reduced or eliminated the yellow symptoms. However, the foliar applied formulations seemed to green the plant up faster than the soil applied materials, but they did not keep the plants green as long as the soil applied materials did.

When making an iron fertilizer selection, one aspect to consider is how quickly one wants the plant to respond and another is how often one wants to repeat the application. Foliar sprays may need to be repeated twice a year in some situations, where soil applied formulations may need to be applied annually, perhaps even less. A good plan would be to alternate foliar applied and soil applied formulations from application to application to get the benefits of both.

More important than the temporary greening up of plant tissues, is the resolution of the underlying problems that have caused the yellowing in the first place. The first, and most obvious factor to check is the watering frequency. Too frequent irrigation may keep the soil profile filled with water and not allow air to move into the soil. Cutting back on irrigation frequency is the first place to start.

Another challenge may be soil compaction. Sometimes desert soils physically compact from foot or wheel traffic around the plants. Sometimes clay or silt soils will lose their structure and collapse in on themselves forming compaction layers. Caliche, a desert form of naturally occurring concrete, will consolidate and leave a hard layer with which roots have to deal.

Compaction layers, if not too severe, can often be reduced by drilling holes through the soil profile with a soil auger or with water pressure from a root feeder attached to a hose. These holes can be backfilled with sand which will speed the movement of water down through and into the soil. The holes also reduce the internal pressure within the soil profile and cause the soil to loosen in the vicinity of the holes. For these reasons, the more holes that can be dug in the area from the trunk of the tree to the outside edge of the plant, the better.

While compaction layers often can easily be reduced, there are some situations where nothing seems to work. One of these situations is when there is present a high concentration of caliche in the soil, and it is especially bad when that caliche seals together into hard concrete-like layers. In these situations, it is easier to select desert-adapted trees that will tolerate if not flourish under these conditions.

For example, consider the results of another experiment conducted under local conditions. Large, mature eucalyptus trees growing in heavy, caliche-saturated soil and suffering from severe leaf chlorosis and twig and limb dieback, were treated with several foliar, soil and vascular-injected iron fertilizer products. Because of the massive size of the trees and the difficult soil conditions, no reduction of symptoms could be achieved with any treatment, even at double and triple rates. Sometimes it is easier and less expensive to go with a different type of tree that can be more tolerant of the local conditions.

Finally, reduce the pH of the soil. All Arizona soils are alkaline, but some soils contain more salt and caliche than others. When present, accumulated salt and caliche can both quickly drive up the soil pH.

Over time, a good organic mulching program can go a long way in helping reduce pH problems in soil. Applications of compost or leaf mulch lightly spaded into flower or garden beds or spread on top of the soil under trees and shrubs and gently raked into the soil will help improve the structure of soils and release organic acids into the soil profile. Remember that the microorganisms that break down organic matter do their best work when temperatures top 100 degrees Fahrenheit and organic materials tend to disappear quickly under summer time conditions. Frequent applications may be needed through the growing season.

Another way to help reduce the soil pH is to apply horticultural grade sulfur to the soil. Soil sulfur can be found in most nurseries. It should be applied at label rates and gently raked into the soil just before the next irrigation. The water will turn the sulfur into sulfuric acid which will then work to help bring the soil pH from its alkaline condition to a neutral level preferred by most plants.

Iron chlorosis is just one of many conditions that cause problems for garden and landscape plants in the desert. By understanding why it occurs and how to reduce its impact, plant health and productivity can be improved.
Ample and timely winter rains that begin in November and come at two week intervals during the winter months almost always bring about a lavish display of desert wildflowers in the spring. While we have not had the right sequence rains to make this year a truly spectacular year, the flowers this year are worth getting out and taking a look.

A spectacular year for wildflowers means that the desert is awash in color. The flanks of desert mountains, such as Picacho Peak for example, cascade gold, blue, and yellow. The desert floors, not just the sides of highways, are colonized by flows of color. Just as there are spectacular years, there also are bad years when you can hardly find flowers anywhere. This, however, is a good year.

Pinal County is a great place to see desert wildflowers. The best displays are usually found on the slopes of rocky hillsides and along paved roads. Rocks, pebbles and gravel help mulch the desert soils and slow evaporation. Paved roads shed water to the sides and irrigate young seedlings. The extra moisture works to the advantage of the wildflowers which need regular moisture to carry them through to maturity.

Where should you go to find wildflowers? Highway 79 from Florence Junction to Oracle Junction is usually a good place to see wildflowers. You sometimes can also find a decent display along US 60 from Apache Junction to Superior, and along most other paved roads in the county for that matter. Boyce Thompson Arboretum in Superior and Picacho Peak State Park between Eloy and Redrock are great places to see the flowers up close and personal. Last week I drove Park Link Drive coming back from the Oracle area and there is a nice display of lupines along the sides of the road west of Owl Head Ranch Road for about five miles. As the weather warms, we will see more flowers at the higher elevations.

If you are planning to head out, let me give you a few tips to better enjoy the beautiful but fleeting displays. These tips were first given in a similar column back in March of 2013.

First, make the experience more enjoyable by learning the names and a little basic information about the flowers you see. Unless you are really into botany, it will be hard to know them all, but start with the more common flowers and work from there. Take some kind of a reference book with you to help you identify and learn about that particular flower. A good field guide, preferably with color pictures, will prove to be an invaluable friend. Botanical gardens and arboreums often have educational displays that describe these plants. They might even have sections on display where nameplates identify wildflower plants. Another choice would be to join in on a tag-along tour guided by a native plant expert. I like to learn as much about the plant as I can.

Second, don’t just look at color alone. Be aware also of the various arrays of textures, the interaction of the flowers with the natural environment and how the various colors intermingle with one another to present a full, broad picture. Look also at the structure of the flower; how the petals are arranged and if they have more than one color in the bloom. Artists have long known that to truly replicate the scene on canvas, they have to pay attention to the way light filters through the plant parts, particularly the petals. Wildflower blooms are often intricate mixtures of colors and textures that often go unnoticed when we focus on only one piece of the puzzle.

For added enjoyment, I recommend that you also pay attention to how the flower fits into its native environment. Why did it attract your attention? What is it that made you look at it, and how did you feel when you did? For example, a desert marigold along the side of a road attracts the eye, gives a sense of color and fits into a larger plant community. A single desert marigold growing next to a large granite boulder may give a totally different feel or view. Your first thought may be one of isolation, or solitude and quiet. A pocket notebook is a handy place to jot down your observations so that you can go back during the heat of the summer and remember a great Arizona experience.

Finally, learn a new flower each time you go out. Over one hundred different species of wildflowers have been identified in our area alone and the search is always on for new and different varieties. Many flower enthusiasts keep a record of the species that they see each year. They consider this as part of the fun of searching for and identifying

**Spring Wildflowers**

---

*Continued on Page 6*
these beautiful plants. They compare their lists from year to year to see what has changed and then share what they have found with friends and acquaintances. This interchange of ideas from season to season not only makes for good conversation, it also helps to truly begin to understand the fragile, intricate web of life in the desert.

Of the many species that can be found locally, some become old friends because they are seen just about every year. Others may be new acquaintances. The more common varieties include the gold-colored California poppy, the deep blue lupine, the yellow desert marigold, the purple filaree and the orange globemallow. We expect to see these flowers whenever there is even a hint of effective moisture. However, it is fun to also look for the less common species like the rock purslane, evening primrose and scarlet pimpernel.

Many people capture the beauty of the desert in their own yards by planting wildflowers in desert landscapes and then giving them extra water during dry winters to ensure that the flowers will germinate, grow and produce seed for the next year. There are many yards that have spectacular displays even during the driest of years.

Most wildflowers can be planted from seed and are fairly easy to grow. They do not need fertilizer or special care other than regular and frequent irrigations. Seed of some of the more common varieties, such as the California poppy, can be purchased from nurseries, but it is too late this year to plant them. Wildflower mixes are usually planted in November for a spring bloom.

Some seed companies specialize in native plants. Seed for individual species as well as blends can be ordered through their catalogues. Again, extra irrigation, beginning in the late fall and continuing through the flower season, will produce a bumper crop even in low rainfall years.

Wildflowers are fleeting, at best. Soon the rains will stop, the summer heat will return, the desert will enter its summer dormant state and the displays will be finished until the next time the winter rains come early and frequent. No one can predict when that will be. Now is the time to soak in the sights and tuck away the memories while the displays last.
A popular low water use plant that gives lots of color in the landscape is bougainvillea.

Native to Brazil, the bougainvillea has become popular through most of the western hemisphere and in other parts of the world. In more tropical zones where frost is not such a disruptive force, bougainvilleas are used extensively as hedges and arbors. In central Mexico, bougainvillea plants have covered entire walls and garden structures that are at least 12 feet tall or more. While they generally do not, as a rule, reach that size in our area, they will provide good service if given the right care.

The beautiful ‘flowers’ that provide such vibrant colors are not really flowers at all. The true flowers of bougainvillea are relatively small structures that are, for the most part, inconspicuous. The showy bracts that surround these flowers, however, deliver striking color for much of the year. The color of the bracts, and the vigor and growth habit of the plant vary with the particular variety.

In Pinal County, the plant is usually used as an evergreen, shrubby vine, although it will serve admirably as a potted outdoor plant. The most common limitation to the size of the plant is frost. It is highly susceptible to freeze injury and this tends to limit its size. Left to its own devices, the plant can and has in various locations become a sizable, spreading tree. For this to happen in our area, however, it would most assuredly need to be protected by an indoor, heated atrium or greenhouse.

In the cooler elevations of the county, bougainvillea may be grown in pots and displayed in full sun during the spring, summer and fall months when there is no danger of frost. When cold weather arrives, the plants can be moved into a warm, protected area.

Bougainvillea must be planted with care because the roots do not knit well into a firm root ball. If they are removed from their containers by grabbing the trunk and simply jerking it out, the jolt may be fatal to the tender root hairs. In most cases, the container should be placed in the hole first and then cut the bottom carefully away from the sides of the container. The new plant can then be gently and safely slipped out of the container.

During the planting process, be ready to fill in around the edges with fresh soil to prevent the root ball from shredding. While replacing soil around the roots, it is a good idea to run water into the hole to avoid deadly air pockets and to keep the roots moist. The planting hole should be no deeper than the size of the container since we want the soil in the container to match the level of the soil in the new location.

Once planted, bougainvillea is easy to care for. It will do well in almost any type of soil as long as there is moderate drainage. It should be planted in a location where it can receive as much sunlight during the day as possible. It should also be fertilized only lightly with a nitrogen-rich fertilizer once or twice a year, usually in the spring and late summer. Over-fertilization forces vegetative growth and cuts down on flowering. It also makes the plant more susceptible to winter injury during cold weather.

Early on a bougainvillea needs little attention but as the vine begins to grow, increasing amounts of pruning will be necessary. The vine will tolerate very well the considerable pruning that will be necessary to shape and train the vine to the desired form, whether as a fence vine or a cool, shady arbor.

Occasionally the plant is reluctant to bloom. Insufficient sunlight or excessive watering and fertilizer seem to be the most common causes of this disappointing malady. Slightly hungry and thirsty plants are more likely to bloom than those that are continually pampered.

Unfortunately, the bougainvillea is extremely susceptible to frost and freeze injury. The hard freezes of winter tend to leave many plants devastated and ugly. While it is a temptation to get out the pruning shears and clippers and start trimming, it may be in the overall best interest of the plant to hold off on such drastic action. The bougainvillea will

**UNDERSTANDING THE BOUGAINVILLEA**

...continued on page 8
definitely surprise anyone who tries to decide what is dead and what is alive after a frosty winter. Much of what seems
dead and ugly, is simply just dormant and waiting for the warm temperatures yet to come.

I know many of you are anxious to spruce up your bougainvillea now that spring weather is returning. With freeze-
damaged bougainvillea, the best course of action is to wait until the new growth starts coming out late in the spring.
Any dead wood that may exist on the vine will be quite brittle and easy to remove. By waiting, the danger of removing
healthy wood will be much less than if pruning is done at this time.

If the look of the vine is just too much to stand and something just has to be done, it is possible to tell the difference
between wood that is alive and dead. Use a thumbnail or pocket knife to scratch the outer bark of a branch or twig. If
the wood underneath is green and moist, it is still alive. If it is dry and brown, it is dead. Be careful, however, it is far
too easy to think ‘dead’, make the cut, and then find that you have just trimmed perfectly good wood from the vine.
Some pruning will be required.

To minimize freeze injury, bougainvillea can be planted against a protected west or south wall where radiated heat
picked up during the day can provide at least some protection on a cold night. Roof overhangs also tend to protect the
shrub to some extent. Finding and using these microclimates can make a big difference in the amount of work needed
to protect them from cold weather injury. Freeze protection can become a burdensome chore for some, but it will be
necessary to cover up these plants on frosty nights with a sheet or some other cloth cover large enough to effectively
shield the plant.

Coverings during freeze or frost events should be suspended over the entire plant, extending completely to the
ground. This will effectively entrap the protective warmth that radiates upward from the ground after warm, sunny
days and exclude the descending cold of the winter nights. Be sure and remove the plant covering early in the morning
but never before air temperatures climb well above 32°F. This helps keep the plant hardy to winter conditions and
allows the ground to recharge its solar storage for the next evening.

The bougainvillea is a beautiful plant that does well in Pinal County. With proper planning and care, it will provide
years of color to any landscape.

If you have questions about this newsletter or any plant related problems, please call (520) 836-5221 x204 and leave a
message for one of our volunteer Master Gardeners. When leaving a message, please clearly state your name and
your telephone number. If you wish to have a publication sent to you, please leave your name and a mailing address.
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

65 mailed copies
274 emailed
SPRING PLANT SALE
March 5, 2016
8am to noon
Maricopa Agricultural Center
37860 West Smith-Enke Road
Maricopa, AZ 85238

Variety of plants include:
Tomatoes, peppers, lettuce, melons, eggplant, squash, herbs and more!!

In case of rain, we will set up in the covered parking lot of the MAC building.

Master Gardeners will be available to answer questions.
For event information, please contact:
Master Gardener Office: (520) 374-6263
Master Gardener Email: mastergardener@gmail.com

How to connect with Rick Gibson online…

Blog: Booming Deserts
ricksgardenspot.blogspot.com

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

Twitter:
https://twitter.com/RickGibson4