



Saguaro Horticulture

Habitats For Wild And Cultivated Saguaro

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The saguaro cactus (*Carnegiea gigantea*) is an iconic symbol of Arizona and the greater American Southwest. The saguaro flower is Arizona's State Flower. Silhouettes of saguaro appear on the standard Arizona automobile license plate. Saguaro cacti are the largest cacti in the United States, sometimes exceeding 60 feet in height and standing taller than any other plant in their native habitat. Arizona's two largest metropolitan areas, Phoenix and Tucson, feature saguaro cacti in urban natural areas and planted landscapes (Figure 1).

Saguaro seen in urban landscapes may have been planted or naturally occurring on the site. An important difference between naturally occurring saguaro and planted saguaro can exist in the root system. Saguaro roots may have been severely trimmed during transplanting. Poor planting and ineffective establishment techniques are challenges for transplanted saguaro.

Choosing To Grow Saguaro

Reasons To Grow Saguaro

There are a number of good reasons to select a saguaro for your landscape if you live in southern Arizona within the natural range of the plant. In this region of the Sonoran Desert the saguaro is a native plant that is easy to grow. When

a properly chosen saguaro is planted correctly it can be easy to establish, and after establishment it can require little to no care or watering. The saguaro is emblematic of our region and it is rarely grown to maturity in good health outside our region. A dramatic plant, a saguaro makes a great focal point or accent in a xeriscape or cactus garden. Saguaro can be grown in Phoenix, Tucson, Yuma and nearby desert areas without worries of cold damage which may harm other tall cacti. Saguaro have a small footprint in a landscape. A modest-sized yard can potentially hold several saguaro. The saguaro is perhaps the cleanest tree you can include in a landscape, dropping only spent flowers and fruits for a short span of the year. The saguaro provides flowers in early summer (Figure 2) which attract wildlife, particularly bats and white-winged doves (Yetman et al. 2020). The flowers are followed by fruits which are delicious and will attract more wildlife (Banks 2008) (Figure 3).



Figure 1. Saguaro in an urban landscape in downtown Tucson, Arizona.



Figure 2. Saguaro in bloom.



Figure 3. White-winged dove (*Zenaida asiatica*) feeding on saguaro fruit pulp.

Drawbacks To Growing Saguaro

Including a saguaro in your landscape has downsides that should be kept in mind. Saguaro can be expensive, sometimes priced at \$100 per foot in height. They are slow-growing. The weight of the plant creates difficulty and hazard in moving and planting larger saguaro. A saguaro may weigh 100 pounds per linear foot (Arizona Game and Fish Department 2019). Saguaro are more difficult to manage, move or remove than most other landscape cacti. While physiologically tough, saguaro are vulnerable to disfiguring damage. Damage to a saguaro may heal, but the plant will not recover its visual appearance, or will do so only over decades. There has been an unfortunate but common practice of planting saguaro too deep. This usually results in failure to establish, followed by desiccation or death by bacterial necrosis. Saguaro do not mix well with turf and heavily irrigated landscapes. In such situations the saguaro can be overwatered, resulting in bloating, splitting and rot. A falling saguaro is dangerous to lives and property (Figure 4). Automobiles crushed by fallen saguaro have made the news and are featured on humorous postcards depicting the unique hazards of Arizona. Saguaro fruit may be good to eat, but many birds and insects have the same intention. Don't expect to eat fruit from your saguaro unless you are crafty with screening the fruits from birds and insects. When a saguaro is old and tall enough to produce fruits they appear high on the plant and out of reach of the average person.



Figure 4. A fallen saguaro in an urban landscape.

Choosing A Site For A Saguaro

Do you have the right landscape for a saguaro? A saguaro require a sunny spot. Saguaro can tolerate a lot of heat, including reflected heat from pavement and walls (this does not include heat from a grill or barbecue pit). Keep a saguaro a suitable distance from structures and utilities. Remember the saguaro is likely to grow arms and will require space to extend them. If the saguaro stem or arms contact a structure or impede human activity, it is an issue. Don't plan on sawing off the arms of a saguaro to make it fit a location. Nevertheless, if removing an arm is necessary, it can be done. It will not usually cause the plant to be off-balance nor immediately re-grow a replacement arm in the same direction. Saguaro and other spiny plants are best avoided for landscaping close to a swimming pool, as the spines are hazardous to humans and inflatable pool toys. There are many spineless yet sun-loving plants suited for poolside landscapes. A saguaro is best placed with native desert vegetation or a xeriscape planting some distance from paths and activity areas, to protect both you and the plant. Do not place saguaro on a property line. An arm may grow into the neighboring property. While the reach is not particularly far, it becomes an inflexible obstruction on the neighboring property. Avoid planting saguaro along a driveway or parking area. A falling saguaro or a falling arm is heavy enough to crush a vehicle, and arms can prevent taller vehicles such as recreational vehicles from using the space. Don't utilize saguaro in a formal configuration of symmetrical or repeating columns. The cacti may not grow at the same pace and will break symmetry once arms are produced.

Saguaro can prosper in a range of well-drained soils containing sand, silt or loam, including gravelly and rocky soil. Poorly-drained clay soils do not suit a saguaro, and they rarely grow on such sites in nature (Banks 2008). Saguaro should not be planted in depressions or low spots where water pools in a landscape. They are ideal for high spots such as atop berms, as long as the soil is firm and supportive. Saguaro should be kept away from heavily irrigated situations

and high-water use plants. Keep them away from lawns, fruit trees, vegetable gardens, and large leafy trees such as sycamore, ash or pecan. Saguaro are not well suited for flood-irrigated landscapes. Instead, plant saguaro among lightly irrigated desert-adapted landscaping. They are also a good choice for landscapes without irrigation and watered only by rainfall, sometimes called “rain gardens.”

A saguaro is a long-term investment for a landscape. Place one in the best-suited site. Evaluate the site for the future growth and size of the saguaro, together with the growth of other nearby plants. Give the saguaro room to grow. Consider how it might be removed, if necessary, even if that will hopefully be decades in the future.

Natural And Spontaneous Saguaro

Some properties include natural areas with naturally-occurring saguaro. A larger saguaro may pre-date the development of the property. These might be old plants which are nearing the end of their natural lifespan, which can exceed 200 years (Banks 2008). They may have suffered the impact of construction and installation of utilities and roadways. Developers prefer to leave saguaro on site when possible, and this is supported by native plant ordinances in many municipalities (Arizona Game and Fish Department 2019). New saguaro seedlings may germinate in urban areas, but this can be expected to be infrequent and will follow the natural process. The emergence of a young saguaro is rarely seen in vacant lots and alleyways lacking native trees and shrubs. The appearance of young saguaro is more common in lightly irrigated xeriscape and cactus gardens, and even among container-grown cacti and succulents (Figure 5). Saguaro seeds have been deposited in these settings by animals, chiefly birds, which ate saguaro fruit. Possibly saguaro seeds have arrived with soil or gravel used for planting. Supplemental irrigation has provided the seedlings with reliable water to get started.

The seedling stage is the most delicate part of the saguaro lifecycle. Only infrequently will ideal weather conditions allow saguaro seedlings to survive the first few years of life in nature.



Figure 5. Saguaro seedlings are often encountered as “weeds” germinating with container-grown cacti and succulents grown outdoors in southern Arizona.

This episodic recruitment of new plants results in observable size cohorts of saguaro in the natural landscape (Orum et al. 2016). Seedling vulnerability is a limiting factor influencing the natural distribution of saguaro. Saguaro planted as young adults are tougher and explain how adult saguaro may be seen in cultivation outdoors in some regions where they would not grow naturally.

Regions Where Saguaro May Be Grown

Arizona

Saguaro grow in USDA Hardiness Zones 9a-10a, and may be found in protected sites within Zone 8b. The natural range of saguaro includes most of the southern half of Arizona at elevations below 3600 ft., and most of the central and western portions of Sonora, Mexico. The saguaro has no sizeable natural range beyond these regions. Saguaro can naturally occur at higher elevations of 4000 to 5000 feet, but they become restricted to favorable microclimates on steep south-facing slopes (Arizona Game and Fish Department 2019). Suitable Arizona cities and towns for outdoor saguaro cultivation include Ajo, Apache Junction, Buckeye, Casa Grande, Gila Bend, Lake Havasu City, Marana, Mesa, Nogales, Parker, Phoenix, Queen Creek, Scottsdale, Sells, Superior, Tempe, Tucson, Wickenburg, Wikieup and Yuma, as well as comparable regions near and between these vicinities. If saguaro grows wild in the region, there should be little difficulty cultivating them in the area, barring local unsuitable sites such as clay soils, drainage basins and wetlands.

No region in Arizona is too warm and dry for saguaro. The western border of Arizona is the hottest and driest part of the state. Rainfall in the Yuma area can be less than 3 inches per year (Banks 2008). Saguaro are infrequent in this area, and are less likely to produce arms (Banks 2008) (Figure 6). Very low recruitment of seedlings results in few adult saguaro. But planted saguaro can prosper in southwestern Arizona.



Figure 6. Desert environment near Ehrenberg, in southwest Arizona. Saguaro are infrequent, because saguaro seedling recruitment is low.

Much of Arizona, over half the land area of the state, experiences cold winter weather prohibiting the natural occurrence of saguaro. Saguaro populations experience severe die-off of individuals when temperature does not rise above freezing during the day, or when night temperatures fall well below freezing on consecutive nights (Yetman et al. 2020). Catastrophic freeze events for saguaro occur when the minimum temperature falls below the range of 17°F to 22°F for a duration of 15 to 20 hours (Orum et al. 2016).

Around the margins of its natural range, saguaro can be attempted in outdoor landscapes in places such as Bisbee, Camp Verde, Cottonwood, Bullhead City, Globe, Jerome, Kingman, Oracle, Safford, and Sierra Vista. A healthy young plant in the 2-4 foot range should be planted in a favorable site provided with an unshaded southern exposure where sun, particularly early in the morning, can warm the plant. Avoid planting in low spots or drainages where cold air will collect (Arizona Game and Fish Department 2019). The welfare of saguaro in colder sites can be enhanced by covering stem tips with a cap, or wrapping the whole plant during cold winter nights. Various fabric coverings including horticultural frost cloth may be used. Stem coverings may be left on the plant for weeks or even months, with attention they do not blow off in the wind. Coverings should be removed before growth resumes in spring. Strings of electric lights, which emit low levels of heat, can be wrapped around saguaro, offering additional protection against cold, when combined with stem tip coverings. This supplemental caretaking can effectively extend the range of saguaro in horticulture, but it may not guarantee saguaro survival during exceptional winter cold events such as those experienced in Arizona during the winters of 2011 and 2013.

The northern and far eastern parts of Arizona, and elevations above 5000 ft (Arizona Game and Fish Department 2019) experience cold conditions beyond the tolerance of saguaro. Protecting stem tips is insufficient during excessive or prolonged cold weather. Saguaro are unlikely to be successfully cultivated outdoors in places such as Crown King, Flagstaff, Holbrook, Kayenta, Page, Payson, Prescott, Sedona, Show Low, Springerville, St Johns, Summerhaven, Tuba City and Willcox.

California

A few saguaro naturally grow in California very close to the Arizona border. Saguaro can be expected to be reasonable prospects for cultivation in Blythe, El Centro, Indio, Palm Springs (Figure 7), Riverside, the Coachella Valley and the Borrego Springs area (Chris McDonald, pers. comm.). Saguaro don't occur naturally in these desert regions west of Arizona because summer temperatures may be too hot, combined with an absence of summer rainfall (Yetman et al. 2020). Otherwise, the climate is suitably free of dangerous freezes. Coastal cities such as Los Angeles, San Diego and Santa Barbara may not become hot enough in summer for saguaro. Mature saguaro only grow during the hot weather of the Sonoran Desert summer and fall (Yetman et al. 2020). California's southern coast region does not present a danger of freezing, but winter



Figure 7. Healthy saguaro cultivated in an outdoor cactus garden at the Living Desert Zoo and Gardens, in Palm Desert, California.

rain may present a challenge to saguaro. Warmer and drier microclimates around California's southern coast may yield some favorable sites. Mojave Desert cities in California, such as Barstow, Ridgecrest and Victorville experience cold winters which may exceed saguaro tolerance. Saguaro can be successfully cultivated in Bakersfield, California and may be seen cultivated at the California Living Museum. Other parts of the San Joaquin Valley in California may be equally suitable.

Nevada

Saguaro have been successfully cultivated in Las Vegas and adjacent cities in southern Nevada, such as Overton and Pahrump (ML Robinson, pers. comm.). North of this region, Nevada experiences winters too cold for saguaro.

New Mexico

Saguaro are reported to have been cultivated outdoors in Las Cruces and Truth or Consequences. They are successful until the occurrence of extremely cold winter events such as seen in 2011, when temperatures dropped to a range of -5F to -12F. This damaged or killed saguaro in these locations (Jeffrey Anderson, pers. comm.).

Texas

Saguaro have been successfully cultivated to maturity in El Paso. Plants grew as high as 25 feet tall and produced arms. These saguaro appear to have been eliminated by the catastrophic cold winter of 2011, during which the daily high temperatures did not rise above freezing for six consecutive days. Other sites in Texas where saguaro are reported to have been successfully cultivated outdoors include Langtry and San Ygnacio. They are likely to be successful in cultivation along the Rio Grande border region from Presidio to the Lower Rio Grande Valley Region (Matt Johnson, pers. comm.).

Utah

Utah is mostly too cold for outdoor saguaro cultivation. Saguaro are featured in St. George, Utah at the Red Hills Desert Garden, but have not grown to maturity (Red Hills Desert Garden 2020).

Outside The United States

Saguaro are native to Sonora, Mexico and easily cultivated in desert regions within the state. Other desert regions of Mexico show good potential for saguaro cultivation. Arid desert environments in other countries may have potential for saguaro cultivation. However, the saguaro is not as versatile or adaptable as many other columnar cacti in cultivation. Mature saguaro are rarely encountered outside the Sonoran Desert region, despite the wide availability of seeds and the ease of their germination.

Conservatory Cultivation

Saguaro perform poorly long-term under greenhouse cultivation in northerly latitudes (Figure 8). Mature saguaro only grow during the hot weather of the Sonoran Desert summer and fall (Yetman et al. 2020). Conservatories may not effectively duplicate this temperature regime. It is also possible that conservatories desiring an iconic saguaro are prone to shipping in large specimens with arms, which are vulnerable to damage in shipment and are poor prospects for establishment. Remarkably better success in greenhouse cultivation may be achieved with columnar cacti of subtropical origin from genera such as *Cereus*, *Myrtillocactus*, *Pilosocereus* and *Stenocereus*. Many species in these genera prove adaptable to greenhouse cultivation in northerly latitudes.



Figure 8. Saguaro cultivated in the Conservatory of the United States Botanic Garden in Washington D.C. Stems are narrow and shrunken as compared to healthy plants.

Saguaro Substitutes

The Argentine saguaro, *Echinopsis terscheckii* (synonym *Trichocereus terscheckii*) bears a close resemblance to the saguaro of the Sonoran Desert. The Argentine plant has a thinner maximum girth of stems and branches, a different branching and flowering pattern, different fruits, and a paler yellow-green color to its stems (Figure 9). It has been claimed to be more cold-tolerant than saguaro. Generally, saguaro is the hardiest of the large columnar cacti, and it is this hardiness which has allowed it to expand its range farther north than any other large columnar cactus. Cacti from South America's Andes Mountains may experience colder temperature extremes, but their proximity to the Equator ensures a regular daytime warmup. Their cold is deeper but shorter in duration.

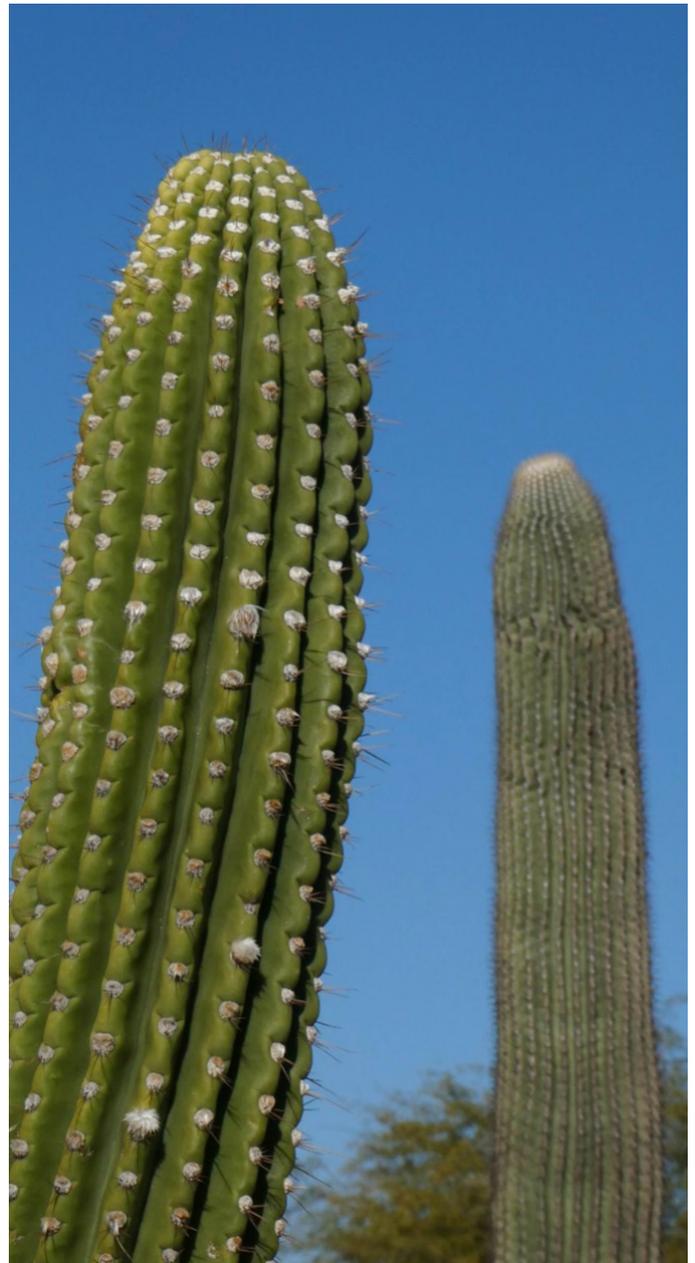


Figure 9. A stem of the Argentine saguaro (*Echinopsis terscheckii*) in the foreground, with a saguaro stem in the background.

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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Ed Martin, Associate Dean & Director, Extension & Economic Development, College of Agriculture Life Sciences, The University of Arizona.

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