

## Saguaro Fun Facts!!!

### Plant Fact Sheet: Saguaro Cactus

#### Identifying Features

The saguaro cactus (*Carnegiea gigantea*) is one of the defining plants of the Sonoran Desert. These plants are large, tree-like columnar cacti that develop branches (or arms) as they age, although some never grow arms. These arms generally bend upward and can number over 25. Saguaros are covered with protective spines, white flowers in the late spring, and red fruit in summer.

#### Habitat

Saguaros are found exclusively in the Sonoran Desert. The most important factors for growth are water and temperature. If the elevation is too high, the cold weather and frost can kill the saguaro. Although the the Sonoran Desert experiences both winter and summer rains, it is thought that the Saguaro obtains most of its moisture during the summer rainy season.

#### Range

You find this cactus in southern Arizona and western Sonora, Mexico. At the northern portion of their range they are more plentiful on the warmer south facing slopes. A few stray plants can also be found in southeast California.

#### Wild Status

The saguaro is not currently listed as threatened or endangered. Arizona has strict regulations about the harvesting, collection or destruction of this species.

#### Life Span

With the right growing conditions, it is estimated that saguaros can live to be as much as 150-200 years old.

#### Size

Saguaro are very slow growing cactus. A 10 year old plant might only be 1.5 inches tall. Saguaro can grow to be between 40-60 feet tall (12-18m). When rain is plentiful and the saguaro is fully hydrated it can weigh between 3200-4800 pounds.

#### Quick Facts

- The saguaro is the largest cactus in the United States.
- Most of the saguaros roots are only 4-6 inches deep and radiate out as far from the plant as it is tall. There is one deep root, or tap root that extends down into the ground more than 2 feet.
- After the saguaro dies its woody ribs can be used to build roofs, fences, and parts of furniture. The holes that birds nested in or "saguaro boots" can be found among the dead saguaros. Native Americans used these as water containers long before the canteen was available.

#### Comparison

Compare with the [Desert Bloodwood Tree](#) of the Australian Desert.



# 11 Things You Didn't Know About Saguaro Cacti

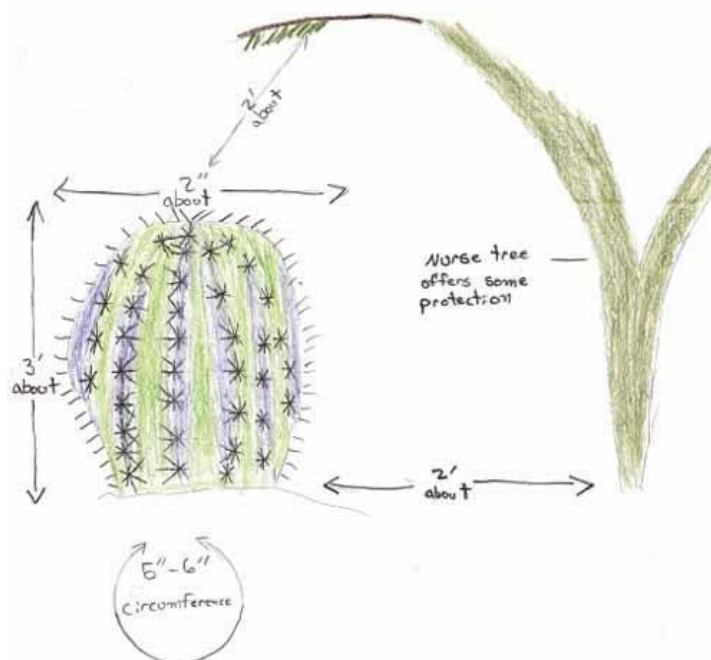
Science Friday's [broadcast](#) in Phoenix, Arizona, got us thinking more about a popular desert fixture—the saguaro cactus, a huge plant with a big appetite for water. Did you know that...

1. Saguaros are the largest cactus species in the U.S.—they can [grow](#) more than 40 feet tall. (The largest species in North America is the giant cardon cactus, which grows in parts of Mexico.)
2. A typical saguaro can live between 100-200 years. (That said, “We are not entirely sure of the true age of some of the largest individuals,” says Kevin Hultine, a plant physiologist at [Phoenix's Desert Botanical Garden](#).)
3. A fully-grown saguaro can [weigh](#) more than a ton.
4. Depending on how much water they amass, saguaros can shrink or swell in girth by 20-25 percent over the course of a year, according to Hultine.
5. Saguaros have an intricate root system. A single “[taproot](#)” grows straight down about five feet to access water that's stored deep underground. A saguaro's main roots, however, extend like a maze about three inches under the surface to easily collect rainwater.  
Saguaro cactus, Saguaro National Park (Rincon Mountain District), Arizona. Image: SonoranDesertNPS/flickr/CC BY-2.0
6. Despite the spines, which prevent hungry animals from feasting on their tissues, saguaros serve as “hotels” for birds such as [Gila woodpeckers](#), which carve out nest holes in the plants. These birds typically wait several months before moving in to give the pulp of the cactus time to dry and create a solid casing around the cavity. “Saguaros are characterized as foundation species because they support so many other species in the ecosystem,” says Hultine.
7. The saguaro's bloom is Arizona's [state flower](#).
8. The saguaro was given its scientific name, *Carnegiea gigantea*, in honor of industrialist Andrew Carnegie, whose Carnegie Institution established the Desert Botanical Laboratory in Tucson, Arizona, in 1903.
9. Saguaros don't always assume the familiar, forked silhouette of cowboy lore—a small number appear “[crested](#)” by a fan-like structure referred to as a cristate. But these “are very rare,” notes Hultine.
10. Saguaros are culturally important to the Tohono O'odham Nation. These Native Americans harvest ripe saguaro fruit in the spring to make wines, jams, and jellies. Saguaro wine is ritually consumed during Nawait l'i, a Tohono O'odham [rain ceremony](#).
11. Saguaros—which make for expensive lawn adornments—have become black market commodities, with [poachers](#) raking in a few thousand dollars for their hauls. “This has been one of the major traditional threats to saguaro,” according to Hultine.



The saguaro cactus, *Cereus giganteus* or *Carnegiea gigantea*, meaning gigantic candle, is found only in the Sonoran Desert, which is in southern Arizona and northern Mexico. There it stands quietly towering over its desert friends, watching and waiting ever so peacefully. Although it may look simple and strange to the eye, it is actually very complicated and diverse in every way, shape, and form. Come along with me now as I tell you about my adventures with the saguaro cactus.

I have lived around saguaro cactuses all my life in Tucson, Arizona, and have seen this cactus in all its different shapes and sizes. They can grow to be almost 80 feet tall and weigh as much as several tons. Knowing that the saguaro cactus commonly lives to be about 200 years old, I realized that all these different shapes and sizes must represent the cactus at its various stages of life. I then began to wonder, what are the stages of life of the saguaro cactus? To find this out, I decided to explore the hillsides of Sabino Mountain and the foothills of the Santa Catalina Mountains near the Sabino Canyon Recreation Area and the Coronado National Forest.

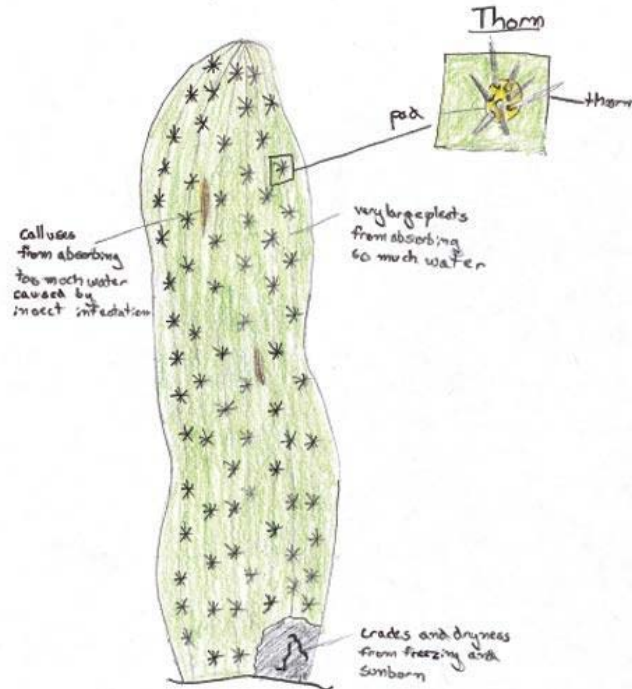


During my hikes and observations, I believe that I was able to find every life stage of the saguaro except for its earliest stage as a seedling. Through research, I confirmed that these seedlings are virtually impossible to find because they grow inconspicuously among rocks and under scrubby "nurse" trees. Saguaros can produce thousands of tiny black seeds the size of a pinhead in one bright red fruit, and as many as 40 million seeds in a lifetime, but perhaps only one will actually survive to become a fully grown cactus. This is part of the reason a "nurse" tree is so important to the life of a saguaro. The tree helps protect the cactus from the hot desert sun and from winter freezes. It also hides it from animals that might eat it, and helps it to retain moisture.



Although I did not find any seedlings, I was able to find a group of small saguaros underneath a nurse tree. I noticed that the smallest cactus was covered with so many spines that it would have been virtually impossible to touch its skin without getting poked. This may make it less likely to become a meal for desert animals. The accordion-like external ribs on this small saguaro were purple instead of green. This seemed to be true only on cactuses at this stage of life, and I began to wonder if this was due to their youth. This cactus was about two inches wide, three inches tall, and five to six inches around in circumference. Using this information, I calculated that this saguaro could be about 12 to 15 years old.

As I looked around for more small saguaros under nurse trees, I realized that all the little saguaros I had seen previously had been under palo verde trees. Could it be that all nurse trees are palo verde trees? I began to look for more nurse trees. After a long search, I finally found a saguaro underneath a creosote bush. However, this was the only other type of nurse tree I found. To see if my conclusion was correct, I did some research and found out that saguaro nurse plants are usually palo verde trees, creosote bushes, and sometimes mesquite trees.



After observing the miniature cactuses with their nurse plants, I began to look at taller cactuses without any arms. This saguaro, in my observation, has accordion-like pleats that are spread far apart and provide room for me to touch its thick, waxy, green skin. This skin helps the saguaro retain moisture. As it takes in water, its accordion pleats expand so that it can store the water within its large, sponge-like stem. This is what makes the saguaro a succulent. Succulents have special roots, stems, or leaves that soak up and store water. This cactus had taken in so much water that its pleats had practically disappeared. It had many more spiny thorns at the top where the pleats come closer together, which probably help to protect the newer growth from frost and animal damage. It had developed brown calluses due to injury from insect infestation. Some of the cactuses at this stage, which were about 10 to 15 feet tall, were still next to their nurse trees, but you could see that the trees were slowly dying. As a saguaro grows, its roots spread out as wide as the cactus is tall, eventually taking over the root system of the nurse tree. The saguaro's roots grow only a few inches below the ground, so that when it rains they can soak up as much water as possible before the water reaches underground aquifers.

After looking at all of these cactuses and understanding how they store water, I began to wonder how these cactuses use this water as food and nourishment. I realize that they do not have leaves like trees, so I did not think they could use the process of photosynthesis. I decided to do a little research on the matter and see what I could come up with. It turned out that saguaros do use photosynthesis, and that their thorns are actually adapted leaves. Saguaros make their own food with soaked-up water and carbon dioxide. The water travels up into the saguaro's stem. In the stem, chlorophyll is stored. Chlorophyll makes the cactus green and takes in the energy of sunlight. With



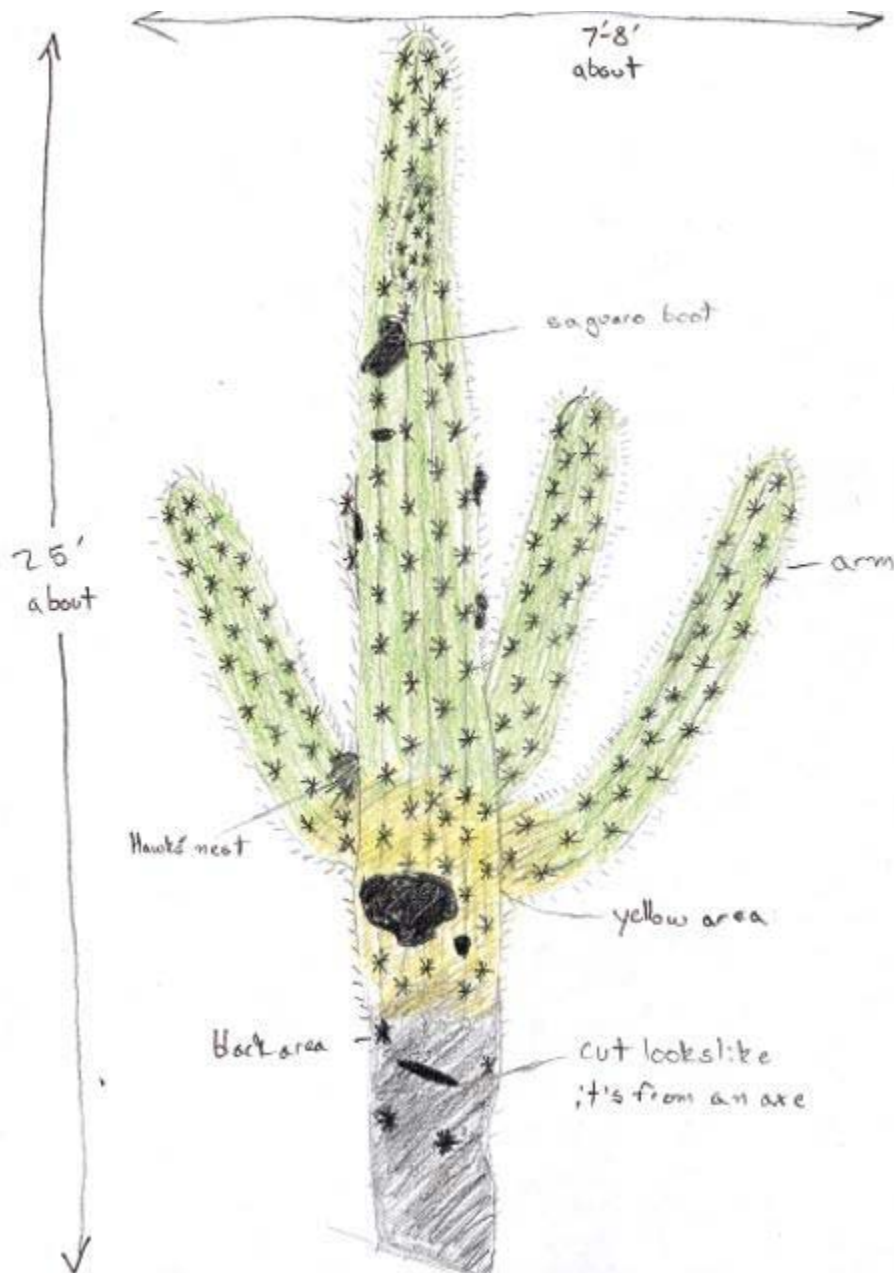
this energy, chlorophyll changes water and carbon dioxide into food. This is the process of photosynthesis.



The next series of observations I wanted to make was to look at tall cactuses with arms. It seemed that I was able to find more of these older cactuses than younger ones. One of these older saguaros especially interested me. I noticed that its skin was black and dead at the bottom, and toward the top it turned to yellow and then to green. On the arms there was a large nest made out of big twigs. Because of its size, I suspected that it was a hawk's nest. There were five arms protruding from the cactus, and it had lots of holes and cuts in it. The holes I could see in the saguaro were nests, probably made by gila woodpeckers and possibly occupied by desert cactus wrens and elf owls. The saguaro forms a hard lining around those nests, which are called saguaro boots. I could see the outer edges of these brown boots on the surface of the cactus. One particular cut, located in the black area, looked as if someone had taken an axe to it. This saguaro was probably 25 to 30 feet tall and around 100 years old. Because saguaros grow so slowly, it might take 50 to 75 years for them to grow their first arms. Arms are important to them because they store extra water. After 100 years, they usually have several arms. After 200 years they have many arms.

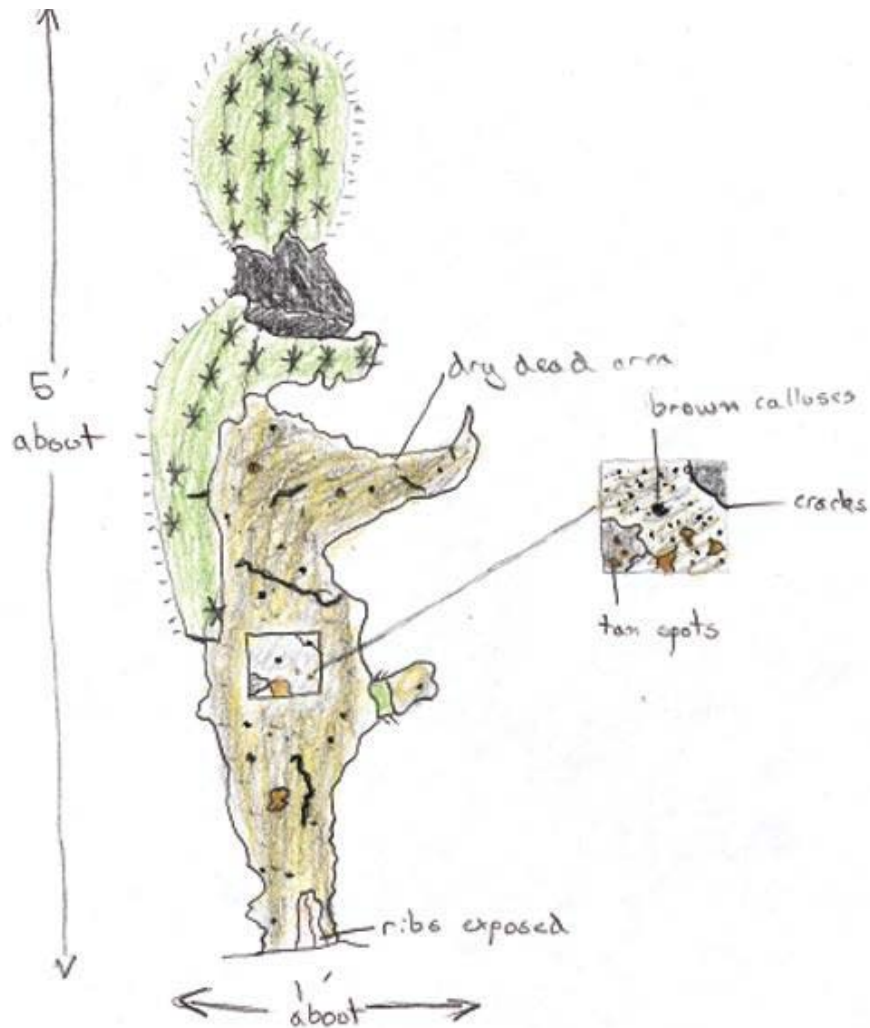
Finally, I came upon an upright saguaro in which the bottom four feet were dead and black, and the rest of the saguaro was just ribs. What amazed me was how the ribs were bound perfectly together in a circle, stopping anything from coming in. Also, the skin was not even connected to anything anymore, so you could have lifted the skin casing right off the saguaro. On the inside, I noticed that it was filled with a powdery yellow substance. I wondered what that powdery substance was. I thought this must be the dry remains of the flesh of the cactus. After doing a little research, I found out that

the powdery substance is like a big sponge when saturated with water and is used to store water to keep the saguaro alive.



I saw many decomposing cactuses lying on the ground with their ribs exposed. After the whole saguaro has decomposed, all that is left are the ribs, which lie on the ground in small piles. I could not believe how many rib piles I found throughout the hills. One group of ribs was still intact and you could easily see the outline of the saguaro. The way that the arm connected to the body was incredible. The arm was connected to two or three of the ribs, and the ribs twisted a little bit at the bottom, making them look like a spiraling staircase. Also, on some of the ribs were round knots with holes in them, like the knots you find on trees.

After doing all these observations, I went back and looked through my journal and pictures. I began to realize that most of the cactuses had black dead skin on the bottom. I then found a dying cactus that was completely black and decayed at the bottom. The bottom looked as though it had been eaten away, but the top and a little bit of the side were still somewhat thriving and intact. This cactus had been eaten away so much that it mostly no longer had its form. It also had several cracks and bits of dead skin lying on the ground all around it.



At first I began to worry. What if this was a disease and the saguaro cactuses are dying out? I began to come up with some theories. Maybe animals were eating the flesh of the saguaro. Maybe the sun was damaging the saguaros. However, if the sun was damaging them, how come the damage was only at the bottom? Maybe the saguaros all had a disease that was slowly causing decay. I decided to do some research to find out the answers to these puzzling questions.

One book said that saguaros are vulnerable to bacteria and yeast infections, which can be carried by the wind or insects. Another book said that sunburn and frost damage



cause a skin condition that is sometimes called "epidermal browning" and that is still not fully understood. Yet another book said that a type of moth tunnels into the saguaro, making a kind of black ooze spill out of it. This is called bacterial necrosis. If it spreads inside, the cactus may eventually decay and fall apart. I was worried that the saguaro cactus might be endangered. However, all of my research books reassured me that the saguaros are not in danger of extinction.

I'm glad to know that saguaros are protected under Arizona state law. They are considered vulnerable to both theft and vandalism and are therefore safeguarded as a state treasure. They cannot be moved from any land, public or private, without special permits, and illegal movement of them is punishable by law.

After spending all this time with the saguaro cactus, I felt as if I had gained another friend. I learned that saguaros are much more complex than the naked eye can see. I also learned that saguaros are a lot like humans in the sense that no two saguaros are the same. Lastly, I learned that being a scientist is a lot of work, but also a lot of fun. I hope you enjoyed hearing about my adventures with the saguaro cactus, and that you learned something about these rare and beautiful cactuses.

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