



Arizona Barrel Cactus – *Ferocactus wislizeni*

Other common names: Candy barrel cactus, Fishhook barrel cactus, Southwestern barrel cactus Spanish: Biznaga, Bisnaga and Viznaga (not species specific)

The Arizona barrel cactus grows from flats to hills from 990 to 5,280 feet (300-1,600 m) elevation on a variety of soils. It is prevalent in the southwestern deserts of the United States from Arizona to El Paso, Texas. Even though it is frost sensitive, many survive up to 50 years and some even reach an age of 130 years. It is an evergreen succulent, belonging to the Cactaceae family.



Fig 1: Rare multi-headed *F. wislizeni* cactus in Arizona



Fig 2: *Ferocactus wislizeni* range map. USDA PLANTS Database. In Texas it is only found in the extreme west, near El Paso.



Fig 3: *Ferocactus wislizeni* can reach a height of 10 ft (3m) and a diameter 2 ft (~60 cm)

The Arizona barrel cactus is also called “Compass Barrel”, because larger plants tend to lean toward the south. This can cause them to fall over after a heavy rain. The cactus also likes to be placed this way when replanted, otherwise it will become twisted. Most cacti have no leaves; the green stem contains chlorophyll and takes over the photosynthesis – here CAM photosynthesis as an adaptation to the dry climate. It allows for Carbon Dioxide intake during the night.



Fig 5: 13–25 vertical ribs extend from the bottom to the top of the stem.

Spines are the modified leaves of the cactus. Of the four red-brown, heavy central spines of *F. wislizeni* one is hooked. There are many white, bristly radial spines, too.

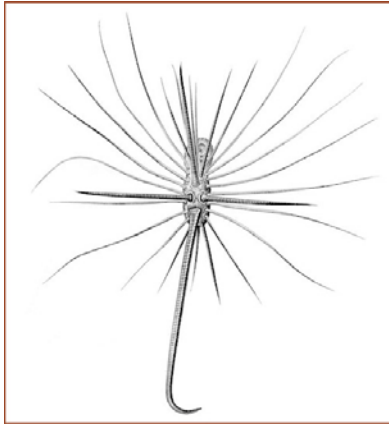


Fig 6: (left) Image from Botanical art of the Sonoran Desert: Paulus Roetter's drawing @ http://art-botanical.org/OLExhibit2013/Section7B_3.html

(down left) The ribs carrying the spines; (down right) Extra-floral nectar glands visited by ants.



Extra-floral nectar glands on the areoles, the growth points where the spines and flower buds originate from, attract ants that keep other insects off and help the cactus stay healthy. The flowers appear in a circle at the apex of the plant in late summer, from July to September. They are funnel-shaped and come in yellow, orange to red colors.



Fig 7: The buds are yellowish and the fresh fruits green. Both are scaly.



The ribs of the stem allow it to expand during the rains. The pulp inside the stem is white and stores the water; therefore these cacti are called “stem succulents”. During severe summer droughts the ribs fold up like an accordion and the whole plant may even sack in due to severe water loss.



Fig: *F. wislizeni* with fruits during a summer drought in the Organ Mountains near Las Cruces, NM.



Fig: A grazing animal opened this Arizona barrel cactus. The white pulp filling the inside is visible, but in this case it dried out.

The Arizona barrel cactus had and still has many uses. Not only people, also animals eat the pulp for its rich water content. However care has to be taken, when eating it on the empty stomach, since it may cause diarrhea. Another use of the cactus by Native Americans was as a cooking pot. They cut the top off, scooped the pulp out and placed

hot stones inside together with food. Also other parts of this cactus are edible. The buds and young flowers can be boiled in water to eat and older flowers are boiled and mashed for a drink. Until recently, the pulp was used for making cactus candy, which was so much liked that it almost led to the extinction of the barrel cactus and is therefore forbidden now. The seeds were dried, ground, boiled and eaten as mush, and boiled fruits – the seeds removed – can be prepared as chutney. The spines served the Native Americans as needles and fishhooks or even as jewelry rings.



Fig: Spines used as a needle and rings.

Photo from: National Park Services – Artifacts, Tonto National Monument

The fruits and seeds also serve as a food source for birds, deer, and rodents.



Fig: A cap of fruits on the cactus (left); halved fruits exposing the black seeds (right).

Future engineers, check out this novel approach to learn from the barrel cactus:

- design ideas of biomimicry @

<http://bouncingideas.wordpress.com/2011/12/14/learning-from-a-barrel-cactus/>

References:

- Arizona-Sonora Desert Museum @ <https://www.desertmuseum.org/kids/oz/long-fact-sheets/Fishhook%20Barrel%20Cactus.php>
- DesertUSA @ <http://www.desertusa.com/mag99/june/papr/barrelcactus.html>
- Lady Bird Johnson Wildflower Center @ http://www.wildflower.org/plants/result.php?id_plant=FEWI
- National Park Services – Artifacts, Tonto National Monument @ <http://www.nps.gov/media/photo/gallery.htm?id=CE6F7276-155D-451F-672CF0FE2BC8E85D&tagid=0&maxrows=20&startrow=21#>
- USDA forest service (FIWI) @ <http://www.fs.fed.us/database/feis/plants/cactus/ferwis/all.html#BOTANICAL%20AND%20ECOLOGICAL%20CHARACTERISTICS>



Chihuahuan Desert Education Coalition

Ferocactus wislizeni – Arizona Barrel Cactus

Questions:

- Name the plant family to which *Ferocactus wislizeni* belongs.
- Where on the plant are the flowers produced and during which time of the year?
- What color do the flowers have and what color the fruits?
- Which part of the Arizona Barrel Cactus does the photosynthesis?
- Which structures represent the leaves of a cactus?
- What importance did the cactus spines have for the indigenous people?
- Which parts of the Arizona Barrel Cactus can be used for food production?
- What is the function of the ribs on the Barrel Cactus?



Ferocactus wislizeni – Arizona Barrel Cactus

Questions & Answers:

- Name the plant family to which *Ferocactus wislizeni* belongs.
 - o Cactaceae
- Where on the plant are the flowers produced and during which time of the year?
 - o On the plant apex; from July - September
- What color do the flowers have and what color the fruits?
 - o The flowers come in yellow, orange to red colors; young fruits are green, later they become yellow
- Which part of the Arizona Barrel Cactus does the photosynthesis?
 - o The stem (it is green because of the chlorophyll)
- Which structures represent the leaves of a cactus?
 - o The spines
- What importance did the cactus spines have for the indigenous people?
 - o They were used as needles, fishhooks, and even rings to wear as jewelry
- Which parts of the Arizona Barrel Cactus can be used for food production?
 - o All parts; even the skin was used as a cooking pot.
- What is the function of the ribs on the Barrel Cactus?
 - o They allow the cactus to soak up water and expand.

Teacher, you may also want to get the teaching module provided by the National Park Service: Lesson on Adaptation @

<http://www.nps.gov/cham/forteachers/upload/barrel%20cactus%20lesson%20%28on-line%20version%29.pdf>



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