

PEOPLE AND PLANTS



ETHNOBOTANY TRAIL GUIDE



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AMERIND ETHNOBOTANY TRAIL GUIDE

Written & Illustrated by

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The Amerind Ethnobotany Trail is dedicated to

Michael Hard

*in grateful recognition for his support and encouragement of
the study of botany and natural history at the Amerind.*



What does the word “ethnobotany” mean?

Ethnobotany is the study of how people use plants, both wild species and “domesticated” plants.

Ethnobotanists are scientists usually trained in botany and anthropology and/or archaeology who study the plant uses of peoples during prehistoric times or of indigenous people in historic times and the present.

ABOUT THE TRAIL

Amerind's ethnobotany trail introduces you to 14 wild plants that grow on the museum property and would have been used by human inhabitants here. (You will also be seeing a set of bedrock grinding mortars at Station #10.) The entire trail is ¼ mile one-way, and mostly level. Follow the red arrows and numbers on the metal signs to take you through the 15 numbered stations; the map on the next page will also help you find your way. The first 6 stations can be accessed right from this parking lot; the next 3 stations are a very short walk up the path toward our picnic area. The last 6 stations are accessed from the picnic area, so you are welcome to drive around and park there if you don't want to walk the full path between museum and picnic area.

Wheelchair accessibility: The first 6 stations are wheel-chair accessible from the main museum parking lot. Stations #10, 11, 12, and 13 are wheelchair accessible from the picnic area parking lot.

At each station this guide will have a short section with this information for each plant:

- Common name(s) / Latin name
- Botanical Family
- Range map
- Habitat / plant association / elevation range
- Brief description of the uses by people

If you are interested in more details, this is followed by a longer descriptive section with:

- Information about detailed uses by people
 - Ecology and/or identification details
 - Which plants are still gathered here for current day use by local peoples
 - Artifacts in the Amerind museum collection made from a particular plant species
-
- **Please note:** The Amerind Museum does **not** recommend using wild plants for any purpose without expert advice and does not allow the collecting of any plants or plant parts on this property without prior permission.

PEOPLE AND PLANTS

Human life would not be possible without plants and yet we are seldom aware of the myriad ways we use them as we go about our daily lives. Food, of course, is the easiest way to see how plants are elemental in our lives, whether it's eating an apple, a piece of bread made from ground grain, or a steak from a cow fattened on corn. However, the connection between other commonplace objects we use and their plant source doesn't always spring quickly to mind: think of toilet paper, the frames of our house, drugs in our medicine cabinet, cooking oils, fragrances, spices, dyes, twine. Because we live in an industrialized society we are so removed from the procuring and processing of plant materials it is easy to take for granted how many times a day we use plants. As you explore the plants on this trail and the things they have provided for people, think about your own daily use of objects made from plants.

EARLY PEOPLES AT AMERIND

For most of human history people have not had the luxury of taking plants for granted. The first peoples to travel through Texas Canyon around 13,000 years ago were nomadic hunter-gatherers. These people relied on wild plants to supplement the resources they obtained by hunting a wide variety of animals. They would have been intimate with the qualities of every plant they encountered here as sources of materials for their food, shelter, fuel, medicine, clothing, utensils, and decorative and ceremonial objects. About 3000- 4000 years ago the first seeds of domesticated corn (maize) show up in the archaeological record of this region, followed by squash and beans, all three having been domesticated in central Mexico around 5000- 6000 years ago. In the southwestern US the use of domesticated plants did not radically alter the lifestyle of the semi-nomadic hunter gatherers here for the first 1000 years or so after introduction, but rather supplemented their reliance on wild plants and animals. People still continued to move around the landscape to take advantage of hunting and wild plant gathering in various seasons, returning to tend and harvest their fields at propitious times. Evidence of the first farmers on the Amerind property dates back about 1000 years ago to a handful of *Hohokam* pithouse villages. Early farmers everywhere in the Southwest continued to gather wild plants into the twentieth century, as important nutritional additions to the domesticated crops and for additional resources like medicines,



basket-making and construction materials, dyes, soap, etc. As you walk this landscape, nearly every plant you see around you was used in some way by people at one time or another. And still today, the descendants of some of these indigenous peoples come to Amerind to harvest particular plant materials. (You will be learning about these as you explore the plants on this trail.)

WHAT MAKES PLANTS USEFUL TO HUMANS

The qualities of plants that enable them to grow, reproduce, protect themselves, and remain healthy are the same qualities that make them useful to humans. The chemical building blocks of proteins, sugars, and fats that drive the metabolism and growth of all plants are essential to us as food. Plant chemicals that repel predators and insect pests and protect plants against microbes like bacteria, viruses, and fungus diseases also prove invaluable in performing those same services for us. Some of the anti-pest compounds are steroids that not only provide anti-inflammatory medicines for humans, but also soap and shampoo! You will see several examples of plants rich in these compounds. Other poisons plants produce to protect themselves provide us with narcotics, sedatives, stimulants, anesthetics, and other powerful drugs. Our modern pharmaceuticals still include many made from plants or artificially synthesized from plant compound formulas. Our perfumes and fragrances are often made from chemicals plants use to attract pollinators. Anti-oxidant plant pigments which protect plant tissues from UV damage by the sun, have been found to be important to humans for general health (think blueberries, wine from red grapes, bright yellow-orange vegetables, etc.) The structural qualities of cellulose and other cell structures that form the stems and trunks of plants not only provide us with important digestive fiber in our food, but are also an essential source of construction materials, firewood, and fibers for textiles, paper, twine and rope.

AMERIND'S SETTING

The Amerind is situated in an “ecotone” – an area where several different biological communities of plants and animals intersect with each other. At 4600’ – 5500’ in elevation, we are at the upper edges of the Sonoran and Chihuahuan Deserts and the lower edge of the Southwestern Oak Woodland. The property also has species representing the Semi-desert Grassland and Interior Chaparral plant communities and the desert riparian corridors. This creates a rich storehouse of many different plants that could be utilized by the human inhabitants of the surrounding areas. A highly biodiverse region such as this has more environmental stability which is a great advantage to people trying to survive through variable climate swings and natural disasters such as floods, fires, droughts, insect cycles, etc. If one species, for example, did not fruit in a given season because of late frosts, the biodiversity could ensure that there would be other species better adapted to the temperature swings.

TRAIL MAP



Station 1

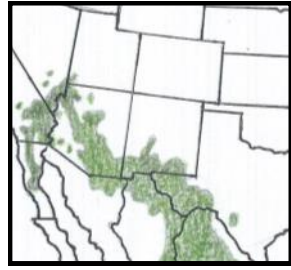
DESERT WILLOW, *Chilopsis linearis*

Catalpa Family, *Bignoniaceae*

Desert Riparian plant, 1500'-5000'

Uses: **food, medicine, fiber, construction, fuel**

- **Food:** edible flowers and seed pods
- **Medicine:** leaves and twigs for anti-fungals
- **Fiber:** bark for clothing, nets
- **Construction:** wood for houses, cradleboards, baskets; bows & other tools



Desert willow (not a true willow, but so-called because of similarly-shaped leaves) protects itself from fungus diseases by producing anti-fungal chemicals in its tissues, making it useful to people. Tea from boiled leaves and twigs made an anti-fungal tincture useful for yeast infections. The wood is valuable for cradleboards, baskets, and bows, being flexible and easily bent but durable. Desert willows are found along seasonal washes, where their very long roots can tap into underground moisture. If you are here in the early – mid summer you may see the very showy, pink and white flowers on this tree; later in the season you might see the long, slender seed pods.

Station 2

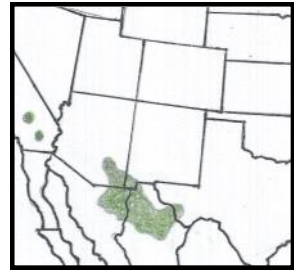
ARIZONA CYPRESS, *Cupressus arizonica*

Cypress Family, *Cupressaceae*

Southwestern Oak Woodland, 3500'-5500'

Uses: **medicine, fiber, construction, fuel**

- **Medicine:** leaves and twigs for anti-fungals, antiseptics, analgesics
- **Fiber:** shreddy bark for clothing, cord
- **Construction:** durable wood for all types of house construction, fence posts, tools, implements



This is a tree of the Borderlands, a species that evolved in the Sierra Madre Mountains of Mexico. The steep canyons of the Sky Island mountain ranges of SE Arizona are often lined with this noble tree, growing to 40' or more in our area. Trees

up in the cypress family, which also includes junipers, are long-lived because they produce chemicals that repel insects as well as fungus and other types of decay. This quality has made them useful to people around the world, not only for durable wood construction, but medicinal purposes. (We have 2 species of juniper on the Amerind.) Unlike the characteristic blue-tinged juniper berries, the cypress tree bears its seeds in woody cones which you will see on this tree.

A tincture from boiled fresh twigs produced a topical remedy for skin fungus, like ringworm. Baked twigs with their antiseptic properties were applied to damaged skin areas and burns. Pounded leaves were chewed to relieve toothache and boiled bark of related junipers relieved symptoms of spider bites and earache.

Both junipers and cypresses are revered for cultural associations with childbirth; leaves were burned to create a vapor that was inhaled during births. Shreddy bark on cypress and related juniper trees was pounded and made into clothing, including rash-resistant diapers. This particular cypress was planted at Amerind in 2009 by Mohawk Chief Jake Swamp as part of a public "Tree of Peace" ceremony. The *Tree of Peace Society* of the Iroquois Confederacy holds tree-planting ceremonies around the world to pass on a message of universal peace. The Arizona Cypress was chosen as our Peace Tree because of its long-life, noble stature, and health-giving qualities to indigenous peoples of this area.

Station 3

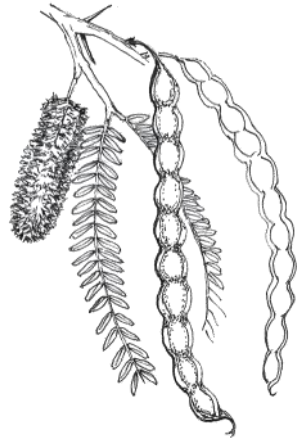
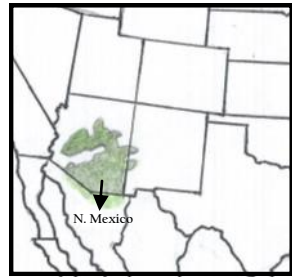
VELVET MESQUITE, *Prosopis velutina*

Legume family, *Fabaceae*

Semi-desert Grassland, up to 5000'

Uses: food, medicine, fiber, construction, fuel, dye

- Food: beans/seed pods
- Medicine: leaves, twigs, pitch
- Construction/tools/fuel: wood for shelters, all types of farming tools, weapons, household utensils, long-burning firewood
- Dye, Paint: black pitch for hair dye, pottery paint



Mesquite trees were a valuable source for just about everything humans could make from a single plant: food and drink, wood for construction and fuel, internal and external medicine, dye, chewing gum, fibers for baskets, cord, and other everyday objects. They were one of the most important plants in this area for indigenous people and are still used today by locals. Plants in the legume family have nitrogen-fixing bacteria on their roots, so their tissues, especially the seeds (called beans in the legumes), have high levels of nitrogen, a crucial building block for the amino acids that animals, including humans, need to synthesize protein for growth and health. The sugary pods around the beans were eaten raw, boiled to make molasses, dried and ground into flour for bread and porridge, or made into a fermented beverage. Beans were made into high protein stews and soups and made into cakes. Mesquite beans could be stored for use through much of the year, an important food source for people who had no refrigeration!

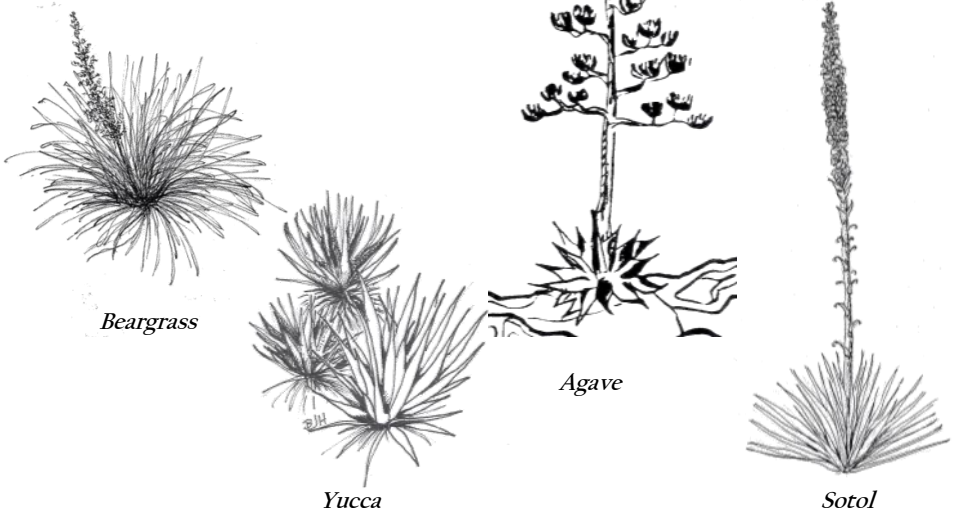
Mesquite plants protect themselves from predation and disease by producing chemicals in their resin that repel insects and microbes. This makes the wood excellent for long-lasting construction and other tissues like leaves and twigs useful for anti-septic and analgesic medicines. Leaves were ground up for eyewash and wound cleanser. Many plants that grow on arid soils take up alkaline salts into their tissues so leaves were also chewed to relieve acid stomach – a natural Alka-Selzer!

Think of the ways mesquite is still used today: flavorful charcoal for our BBQ's, beautiful, durable floors and furniture, and an alternative flour for the growing popularity of gluten-free products.

For the next station find #4 near the art gallery entrance.

Station 4

BIG FOUR SUPERSTORE



“BIG FOUR SUPERSTORE” is my nickname for a group of plants that has been one of the most important to humans in the Southwest for thousands of years. These include yuccas, agaves, sotol, and beargrass, all New World plants, consisting of four related genera in the Agave and Nolina families. We can think of these as superstores complete with pharmacy, clothing and housewares sections and even a liquor department! They provided medicine, fiber, soap and shampoo, food and drink, tools and building materials. People had a use for every part of these plants, and in some parts of the world they are still grown commercially for human use today. The durable fiber parts have preserved well in dry cave shelters of the region and archaeologists have recovered objects made of yucca over 9000 years ago .

All are rosette-forming, evergreen plants of arid or semi-arid habitats. The genus *Agave* has over 200 species distributed from the southwestern US to the Caribbean and northern South America. The genus *Yucca* has many fewer species but they are more widely distributed in North America, occurring as far north as Canada, south into Mexico and as far east as Georgia. The smaller Nolina family includes two southwestern genera, *Nolina* (common name beargrass) and *Dasyllirion*, (common name sotol). Two species of *Agave*, three of *Yucca*, and two of the Nolina family grow at the Amerind and you will be seeing all of them on this trail.

Qualities common to all four genera that make the plants so useful to humans are: long, durable leaf fibers; high concentrations of carbohydrates and sugars in the tissues; chemicals called *saponins* produced by the plants to protect themselves from pests and which provide many medicinal uses to people, as well as soaps.

Station 4

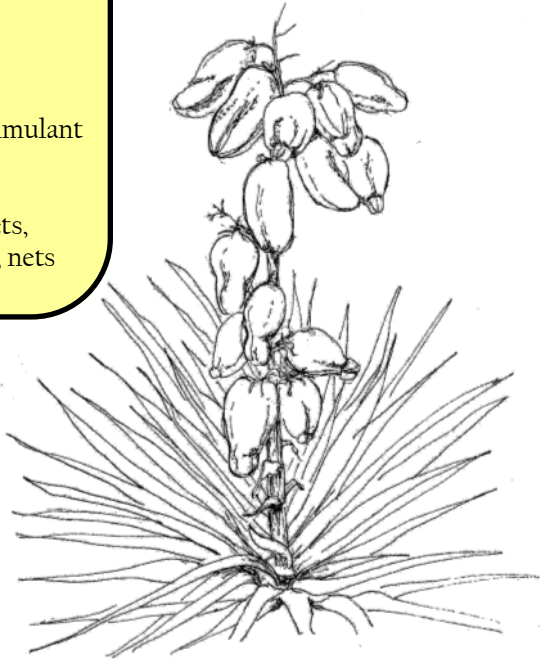
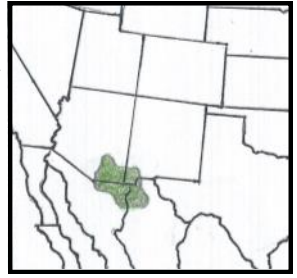
MOUNTAIN or SCHOTT'S YUCCA, *Yucca schottii*

Agave family, *Agavaceae*

Southwestern oak woodland, 4000'-7000'

Uses: food, medicine, fiber, soap & shampoo, construction

- **Food:** edible flowers, fruit, seeds
- **Medicine:** anti-inflammatories, stimulant tonics
- **Fiber:** strong, long fibers for baskets, clothing and sandals, rope and cord, nets



Schott's yuccas with ripe seed pods

Schott's yucca is a plant of the Sky Island mountain ranges, growing at higher elevations than most other yucca species. It is found only in the southwestern oak woodlands of southeast Arizona, southwest New Mexico, and northern Chihuahua and Sonora.

The seed pods of mountain yucca are fleshy, sweet fruits that attract mammals, their main seed dispersers, and provide people with a high carbohydrate food. Like other yuccas and agaves the plant produces the chemicals called saponins, a source of soap, and steroidal anti-inflammatory medicines.

Mountain yucca forms a rosette of smooth leaves edged with a brown stripe and can grow trunks up to 20 feet tall. (This young plant has not grown a trunk yet.) Because this plant is young, it also has not bloomed for the first time, so you do not see a dry flower stalk on the plant. Yuccas often do not bloom every year, but wait for 2 or 3 years or more to build up enough carbohydrate resources to fuel their reproduction. This is the most shade-tolerant yucca, and is commonly seen at in the Sky Island ranges of the Chiricahuas, Dragoons, Huachucas, and other nearby mountains, often growing in nearly full shade under large oak trees.

Station 5

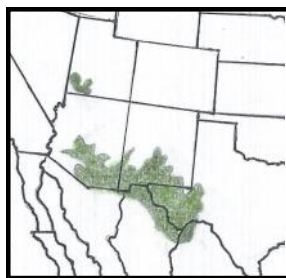
SOAPTREE YUCCA, PALMILLA, *Yucca elata*

Agave family, *Agavaceae*

Semi-desert grassland, 1500'-6000'

Uses: food, medicine, fiber, soap & shampoo, construction

- **Food:** flowers eaten raw or lightly cooked, good source of Vitamin C
- **Fiber:** major use of leaves for baskets, cord, thread, nets, mats, sandals and other clothing
- **Construction, implements:** durable wood of the long flower stalks used for all types of construction; leaves for thatching



The common name “soaptree” comes from the use of yuccas for soap and shampoo, as well as detergent for clothing and bedding. This soapy quality is from the chemicals called saponins contained in all parts of the plant, but especially concentrated in the roots. Yucca continues to be important as a ceremonial plant; ritual washing of hair or bodies with yucca soap is still performed by members of several tribes.

Basket weavers of the Tohono O’odham nation come to the Amerind to collect *Yucca elata* leaves for their basketweaving. In the summer the leaves at the center are gathered and bleached in the sun to form the “white yucca” for the background color of baskets. In winter the greener, outer leaves are gathered to create green design elements on the white background. You can see several examples of these baskets, some woven of leaves gathered at the Amerind, in our museum shop. The Amerind Museum collections contain prehistoric sandals, pieces of cord, and other yucca fiber objects woven over 1000 years ago, as well as many baskets of yucca. Yuccas are one of the few plants often represented in rock art of the Four Corners area.

Soaptree yucca is a plant of the desert grasslands and adapted to deep soils and cold, dry winters. The plants are usually 6'-15' tall, with flower stems rising high above the plant, facilitating seed dispersal by wind once the seed pods dry and pop open. This differs from the mountain yucca’s juicy seed pods held lower on the plant to attract animals. Also notice how the soaptree yucca’s leaves are much narrower and more flexible than those of the Schott’s yucca. The white filaments on the edges of these yucca leaves show the fibers that are woven into so many useful objects. After gathering, the leaves are soaked in water and then the green, fleshy part is pounded and/or scraped to release the fibers for weaving.

For station 6 cross the drive to the “Path to picnic area.”

Station 6

PARRY AGAVE, CENTURY PLANT, *Agave parryi*

Agave Family, *Agavaceae*

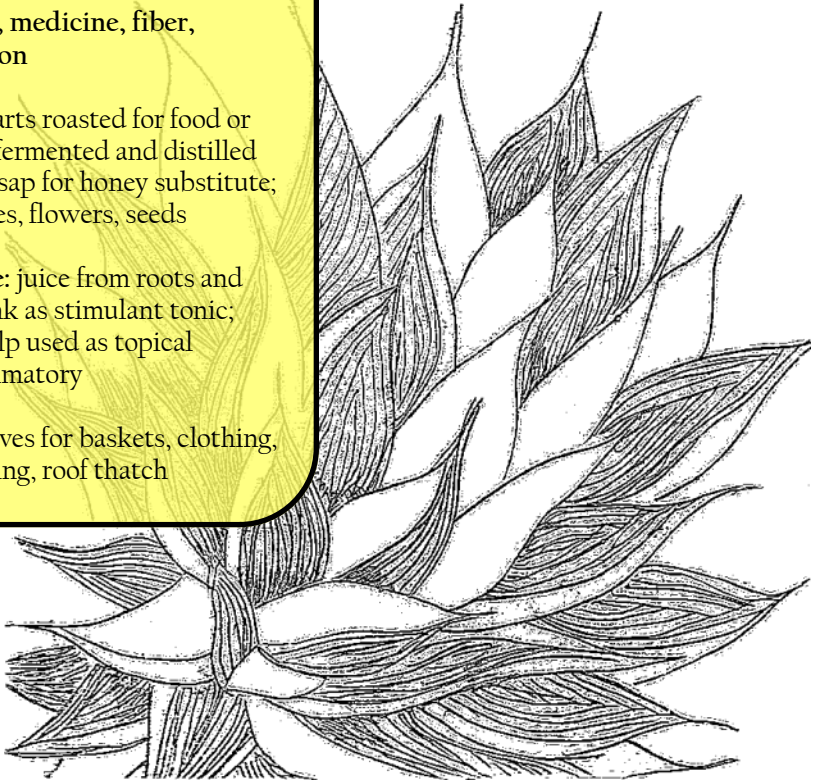
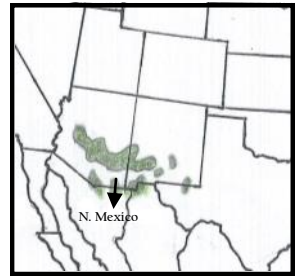
Southwestern oak woodland,
4500' - 8000'

Uses: food, medicine, fiber,
construction

- **Food:** hearts roasted for food or made into fermented and distilled beverages; sap for honey substitute; edible leaves, flowers, seeds

- **Medicine:** juice from roots and leaves drunk as stimulant tonic; mashed pulp used as topical anti-inflammatory

- **Fiber:** leaves for baskets, clothing, rope, bedding, roof thatch



Agaves are often called “Century Plants” because they take many years to flower – not exactly 100 years, usually 20 – 40, depending on conditions. These years are spent accumulating a huge reserve of carbohydrates in the heart at the base of the leaves to fuel the rapid growth of a large flower stalk and production of thousands of seeds. After this extraordinary undertaking, the plant’s resources are depleted and the individual agave dies.

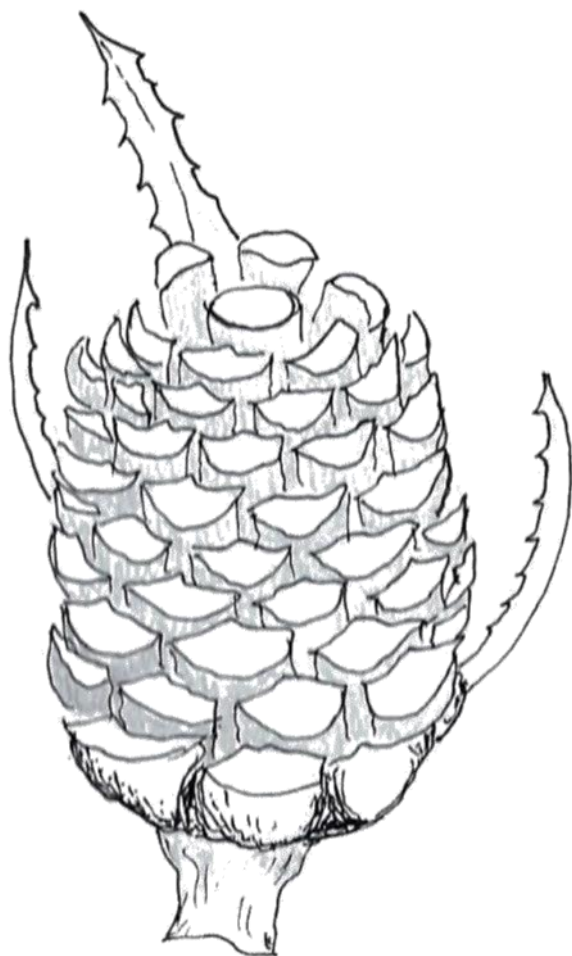
It is these carbohydrate-rich hearts that have provided high calorie food for people for over 1000 years. They are still used today by the Tohono O’odham people of southern Arizona. The high sugar content has also made them a choice plant for fermented and distilled beverages. This continues today with the production of tequila (made from *Agave tequiliana* in central Mexico) and many varieties of artisanal *mescals* throughout Mexico. The Mescalero Apaches got their name from

their reliance on agaves for food and beverages. Fermented beverages often have ritual, ceremonial significance for people world-wide, and the use of mescal in the southwest is a good example.

Agaves were one of the single most important plants to prehistoric peoples in the region, especially for food and fiber. Archaeologists have found evidence that the Hohokam people of the Tucson and Gila River Basins and northern Sonora, Mexico were actively “farming” agaves by planting them in rock-lined terraces on hillsides. The remains of their agave roasting pits and harvesting tools can still be seen. The use of agave in Mexico continues today for fiber, soap, food, steroids, industrial alcohol, and beverages.

Parry agave is the most common species of agave in the Sky Island mountain ranges, growing on hillsides often in the shade under the Southwestern oaks and pines. This is a plant restricted to the higher elevations of SE Arizona, SW New Mexico, and northern Sonora and Chihuahua.

Parry agaves often spread into large colonies of clones. The 2 Parry agaves you see here have different shape of leaves because they are 2 different subspecies. A subspecies “*huachucensis*,” is one of the Sky Island endemics, growing only in the Huachuca Mountains (near Sierra Vista, AZ). The 2 agaves here are protected by wire from javelina and other hungry critters who relish the sugar-rich hearts as much as humans do!



*Agave heart, leaves removed,
ready for roasting*

Station 7

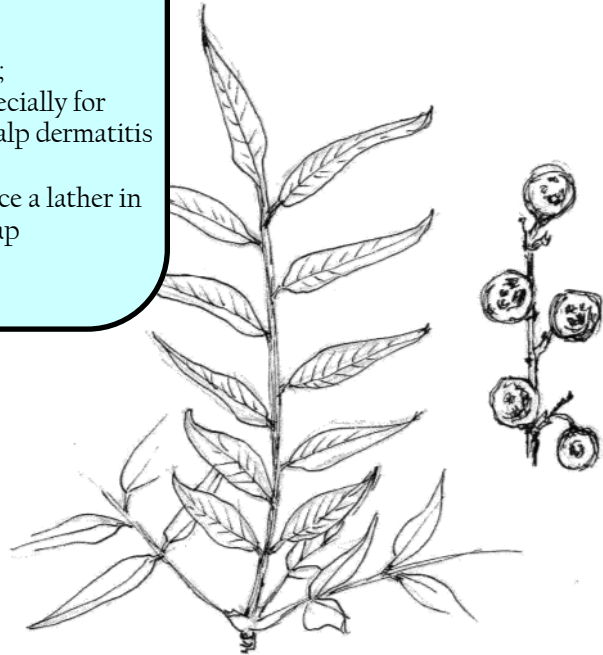
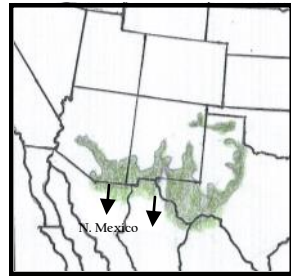
WESTERN SOAPBERRY, *Sapindus saponaria*

Soapberry Family, *Saponaceae*

Desert Riparian plant, 2500' - 6000

Uses: medicine, soap and shampoo, construction

- **Medicine:** laxative; analgesic; anti-inflammatory steroid, especially for acute arthritis; shampoo for scalp dermatitis
- **Soap:** berries and pulp produce a lather in water for clothing and handsoap



The Latin name comes from *sapo* meaning soap plus *indicus* meaning Indian. True to both its common and Latin names, the soapberry is loaded with saponins, the same chemical compounds that create soap in the yuccas. Native peoples in desert areas on both sides of the border have valued this plant for soap production.

Because saponins are poisonous in large quantities, the berries were thrown into pools to stun fish so they could be easily caught. This poisonous quality was also used by humans as a laxative when taken internally. Saponins are a perfect example of how many valuable plant chemicals can be used in certain preparations and/or quantities for medicinal effect and in other preparations and quantities for poisonous effects.

Trees of aridland washes, soapberries can grow up to 30 or 40' with abundant moisture, but survive well in drier areas with only occasional water. Look up into the branches of the several small soapberry trees along the trail near and here you may see the translucent yellow berries.

Station 8

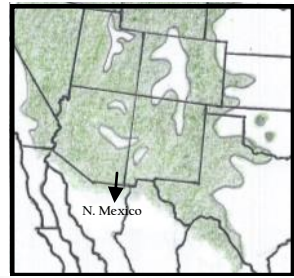
DESERT SALTBUUSH, *Atriplex polycarpa*, FOURWING SALTBUUSH, *Atriplex canescens*

Goosefoot family, *Chenopodiaceae*

Various habitats, sea-level to 7000' throughout the West

Uses: food, medicine, fiber, construction, fuel, dye

- **Food:** early leaves for greens, salty twigs for seasoning stew; parched seeds for the drink "pinole"; dried seeds ground into meal and flour; ashes as a soak to prepare corn
- **Medicine:** leaves and roots for cough medicine; roots or leaves for poultices for insect bites, toothache; leaf and stem ashes for hair scalp tonic; leaves for stomach problems
- **Dye:** leaves and blossoms make yellow for textiles; ashes color cornmeal dough bluish green
- **Fuel, Construction:** valued fuel source before introduction of metal tools and in areas without trees; household implements, tools, arrowtips



Fourwing seeds

This unpretentious shrub, highly adapted to sandy or saline soils in arid areas, was a storehouse of uses for people as far back as prehistoric times. The two plants you see on the left are desert saltbush (the plant on the right) which grows in dry, low elevation areas. Fourwing saltbush (the plant on the left) was especially valuable to prehistoric peoples in the Four Corners area. Archaeological sites there can still be distinguished from surrounding grassland by the profusion of fourwing saltbush outlining the tops of prehistoric walls. Male and female flowers are on separate plants; females of the fourwing species are recognized by the pale fruits with two pairs of papery "wings" containing the seeds.

Plants that grow on alkaline, desert soils often have high salt contents in their tissues that are useful for people. Leaves and twigs impart a salty flavor added to stews and soups; as we saw with mesquite leaves, the alkaline quality buffers stomach acid when leaves are chewed.

An extremely useful practice for the health of southwestern people was that of processing corn by soaking it with wet woodash from alkaline-soil plants, especially that of saltbush. This process makes niacin and amino acids available and was crucial in preventing niacin and protein-deficiency disease, which can result from a high corn diet.

Station 9

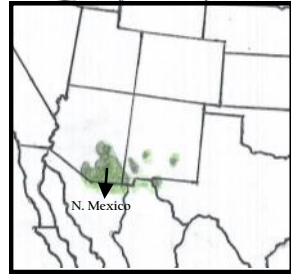
PALMER AGAVE, *Agave palmeri*

Agave Family, *Agavaceae*

Semi-desert grassland, Southwestern oak woodland, 4000' - 6000'

Uses: food, medicine, fiber, construction

- **Food:** hearts roasted for food or fermented beverages, often further distilled to make mescal and tequila; sap for honey substitute; edible leaves, flowers, seeds
- **Medicine:** roots and leaves made into fresh juice for stimulant tonic; mashed pulp for topical anti-inflammatory
- **Fiber:** leaves for baskets, clothing, rope, bedding, roof thatch



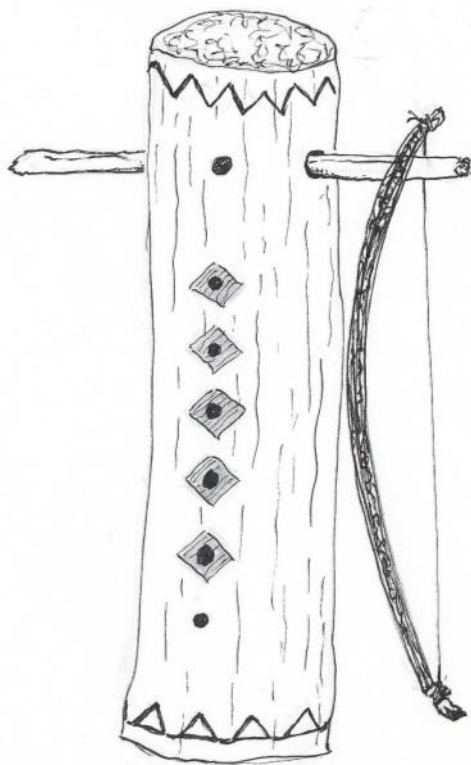
George Starr, Sr., age 91, Apache elder from San Carlos, plays a fiddle he made on a visit to Amerind in 2005. He gathered agave stalks on the property to make fiddles.



Look up the long rock behind this #9 sign to see a live agave rosette about 25 feet up the hill in front of you. Lying on the ground on this hill you will also find a number of old Palmer agave flower stalks. Notice the substantial size of the flower stalk on the right, which was cut with a saw, so you can see the dense nature of its wood, useful for many construction purposes by local people. One of the most unique agave items in the Amerind collection is an Apache fiddle, made from the hollowed out stalk of a Palmer agave and fitted with a string to be played with a small bow. You can see this fiddle in the upstairs exhibit on the Chiricahua Apaches.

Agaves, native only to the New World, were so valuable they were exported to Africa and Asia in the early twentieth century. Large plantations of agaves can still be seen growing in various Old World countries for the production of sisal bags, mats, rope, and sandals. The fibrous quality of agave can be seen on the older rosette of grey leaves.

Palmer agave is the largest agave in the region, with the longest leaf fibers, and is the common agave species found at the Amerind and its surrounding grassland region. Like all agaves, the palmer only flowers once in its lifetime and then dies. (Yucca, sotol, and beargrass also wait to build up large supplies of carbohydrate energy before flowering, but they bloom repeatedly throughout their lifetimes, although usually not every year.) The palmer agave flowers are held on high, long-branched stalks and their nectar is a crucial food source for lesser long-nosed and Mexican long-tongued bats that migrate here from Mexico in the summer to raise their young. Although the flowers can also be pollinated by birds and some insects, the bats are crucial pollinators of the palmer and parry agaves.

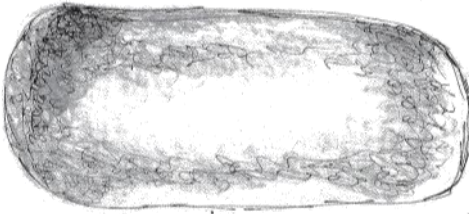


Apache Fiddle

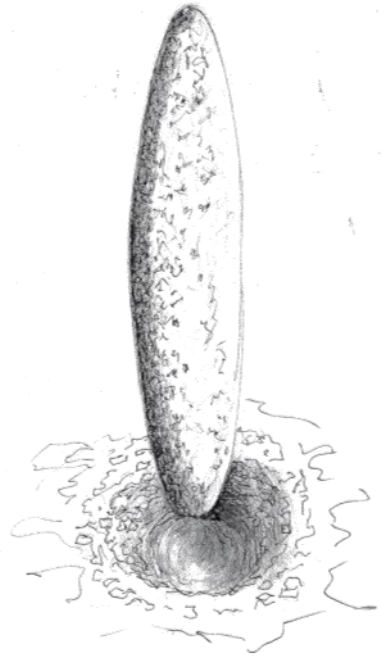
Now follow the rock-lined path to the picnic area, cross the drive after the restroom, and look for Station 10.

Station 10

BEDROCK GRINDING STONES



Mano



Pestle in mortar

The rounded depressions here in this large, flat rock are the result of repeated seed-grinding. Archaeologists cannot precisely date the use of any particular mortar or metate hole without the contextual information of an occupation site, but they do know that the technology of using stones to grind plant materials probably began in this area during the “Archaic” period, 8000-2000 years ago, and continued through the time of Apache occupation into the 1800’s. Likewise, we can’t say for sure exactly what people were grinding here, but it was most likely to have been oak acorns, mesquite beans, or other wild seeds and pods. After the introduction of corn into this area, they could have been grinding corn here.

Grinding was an important technological advance for the health of early peoples. Breaking down the hard husks and shells of acorns and other seeds accomplishes partial digestion, saving the body valuable energy that it takes to release nutrients from plant foods. Think of the ways we still use this technique today: rolled oats, wheat flour, cornmeal, shelled nuts, and ground spices. Seeds are an important human food because they contain the essential proteins, fats, and oils necessary for growth, whether it’s the growth of plant embryos or animal growth.

Looking closely at these grinding depressions you’ll see three round holes that are deeper than a wide, shallower oval. The round holes were produced by a long, narrow stone held vertically, “mortar and pestle” style. The wider depression – “metate” – is made by grinding a “mano” stone back and forth horizontally. There are many examples of bedrock mortars and metates on the Amerind property from early occupations and they can be found all over the Southwest.

Station II

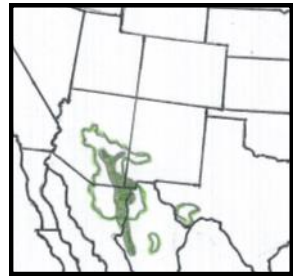
EMORY OAK, *Quercus emoryi*

Beech Family, *Fagaceae*

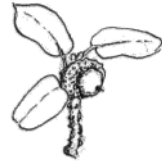
Southwestern oak woodland, 4000' - 7000'

Uses: food, construction and fuel, dyes, tanning of hides

- **Food:** acorns eaten raw, boiled, ground into flour, made into soups, stews, beverages
- **Construction:** durable, long-lasting wood for tools, house construction, many household implements
- **Household chemicals:** tannins in oak bark used for curing hides; dye for wool



Quercus emoryi - outline
Quercus toumeyii - shaded



Toumey oak (top)
Emory oak (bottom)

Acorns were an important food for indigenous people throughout North America because of their high protein content. In addition, after people started getting most of their calories from corn the acorns were a crucial source of lysine, an essential amino acid not present in corn. Lysine is a required building block of protein necessary to human health, but not found in many of the domesticated grains that became the staple diets of early farmers. Early people in this area also gathered piñon pine nuts, found at slightly higher elevations on the slopes of local mountains, a good source of lysine as well. Acorns from Emory oaks are a favored food for Apaches, and are still collected today.

The tannins used to cure hides are chemicals developed by oak tissues to repel insects and microorganisms, serving the dual purposes of killing the agents that rot animal skins and preventing subsequent deterioration. Oak wood is also extremely insect-resistant, which makes it useful as a long-lasting construction material. Being one of the few slow-growing tree species in the southwest, the dense wood makes an extremely useful fuel for fires.

The emory oak is one of several species of oaks, called *Madrean oaks*, that evolved in the Sierra Madre mountains of Mexico and found only in the Sky Island borderlands region. All of the Madrean oaks are evergreen, changing out their old leaves in the springtime for new ones. Here on the Amerind property we have 5 species, including the rare, endemic Toumey Oak found only between 4000' - 6000' in elevation in the Sky Island canyons of southeastern Arizona, a small portion of southwestern New Mexico, and extending nearby into Sonora, Mexico.

Station 12

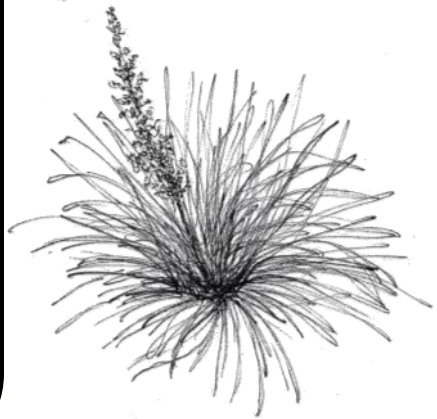
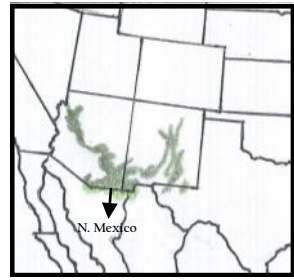
BEARGRASS, *Nolina microcarpa*

Nolina Family, *Nolinaceae*

Semi-desert grassland, 3000' - 6500'

Uses: food, medicine, fiber, construction

- **Food:** flower stalks and root crowns baked or boiled; seeds made into meal for flour and porridge
- **Medicine:** root decoction for pneumonia, rheumatism, anti-inflammatory
- **Fiber:** baskets, clothing, rope, bedding, roof thatch
- **Construction:** brooms, brushes, household implements



Beargrass is not technically a grass, but another member of the “Big Four” group. Like the yuccas and agaves, the saponin content of this plant provided medicine and the long leaves are good fiber material. Basket weavers of the Tohono O’odham nation come to Amerind every year to collect beargrass leaves. Before cutting the leaves they pay their respects to the plant for what it is about to give them. They use beargrass for the sturdy, inner structure of the baskets; then soap tree yucca leaves are wound around the beargrass coils. You can find fine examples of these beargrass/yucca baskets for sale in Amerind’s museum shop.

Station 13

SOTOL or DESERT SPOON, *Dasyllirion wheeleri*

Nolina Family, *Nolinaceae*

Semi-desert grassland, 4000'-6000'

Uses: food, medicine, fiber, construction

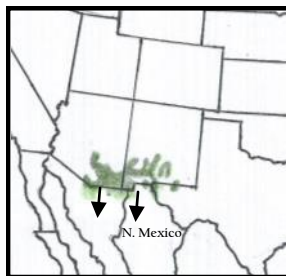
- **Food:** flower stalks and heart baked or boiled; hearts made into fermented and distilled beverages
- **Fiber:** baskets, clothing, rope, bedding, roof thatch
- **Construction, utensils:** durable, strong flower stalk used for cradleboards, spears, household implements & tools, ceremonial objects

The tall flower stalks, which rise as much as 15' above the basal rosette of leaves are durable enough to split and construct many items. Amerind's Apache collection includes cradleboards made of sotol wood. As recently as the twentieth century the Tohono O'odham people made plaited mats from sotol leaves.

"Sotol" is the Spanish word for the fermented, distilled beverage that is the state drink of Chihuahua, Mexico. It was an important part of religious ceremonies and rituals. "Desert spoon" refers to the scooped shape of the leaf base. *Dasyllirion* is a Chihuahuan desert region plant, restricted to SE Arizona, SW New Mexico, and northern Sonora, and west Texas.

To tell the soaptree yucca (that you saw by the art gallery) from the sotol plant, notice that the sotol has tiny teeth on both edges of the leaf, while the yucca has pale threads but no teeth on the edge. The flower stalk of the sotol looks like a compact bottle brush, while the soaptree yucca stalk is branched, holding large, dry pods.

The next two (and last) stations are up a slight, but not steep, rise. As you go toward Station 14, notice the many sotol plants growing on both sides of the path.



Station 14

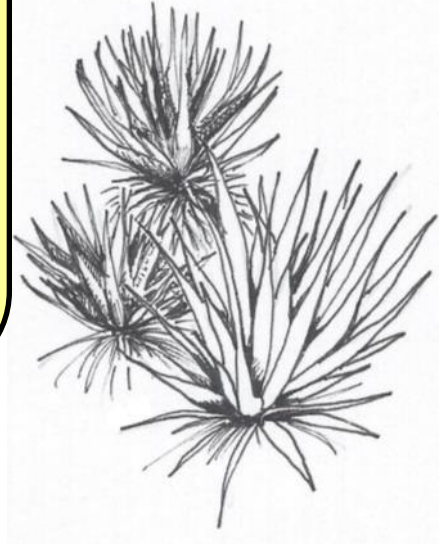
BANANA YUCCA, DATIL, *Yucca baccata*

Agave family, *Agavaceae*

Widespread throughout the arid west – grasslands, woodlands, canyon country, 3000' - 8000'

Uses: food, medicine, fiber, soap & shampoo, construction

- **Food:** edible seed pods, flowers, buds
- **Fiber:** root bark for decoration; leaves for baskets, mats, clothing, cord
- **Medicine, soap:** similar to other previous yucca uses



Banana yucca's common name is a good description of its sweet, fleshy seedpod, shaped a little more like a fat cucumber than a banana (similar to the schotts' yucca pod.) Besides being an easily-gathered source of calories in years of a good bloom and seed-set, the mashed pulp could be made into cakes and dried for storage or transport. These cakes were often preserved by being mixed with mescal from agaves (think of how we still use alcohol as a preservative today.) Methods of food preservation were especially important for nomadic peoples like the Apache. Banana yucca was commonly used by prehistoric peoples of the Four Corners region for sandals, mats, cord, baskets, and nets. It is the most tolerant of different elevations, cold temperatures, and habitats of our 3 yucca species, growing from 2000' to over 8000' in elevation. In colder regions it forms spreading clumps of cloning individuals; in warmer areas it may grow trunks similar to the soaptree yucca, but is distinguished by its very sharp, rigid leaves.

The root bark of this yucca provides a dark red fiber that is colorfast for baskets and textiles. The bark is gathered only by men and done in such a way that the plant is not damaged but continues to grow. Amerind has many fine examples of banana yucca root decoration by Tohono O'odham basketweavers in the museum's collection and you can often find some currently-made ones for sale in the museum shop. Because of the difficulty in gathering the root bark, these baskets are more expensive, but worth it!

Station 15

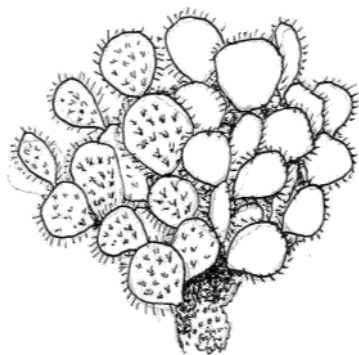
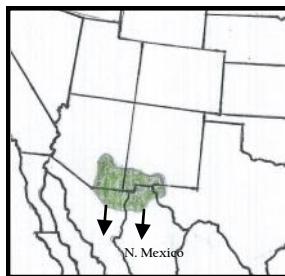
FISHHOOK BARREL or ARIZONA BARREL CACTUS, *Ferocactus wislizeni*

Cactus Family, *Cactaceae*

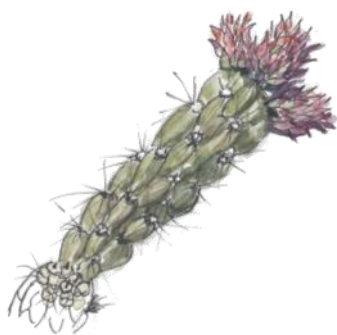
Sonoran & Chihuahan Deserts, Desert
Grassland, 1000' - 5000'

Uses: food, medicine, utensils

- **Food:** buds & flowers cooked; fruits & rind edible, raw or cooked; seeds crushed & made into gruel; interior pulp and fruits used to make "cactus candy"
- **Medicine:** pieces of stem with spines removed, roasted to be wrapped in cloth & applied to sore spots as soothing poultice
- **Utensils:** strong, curved spines used as fishhooks



Prickly Pear

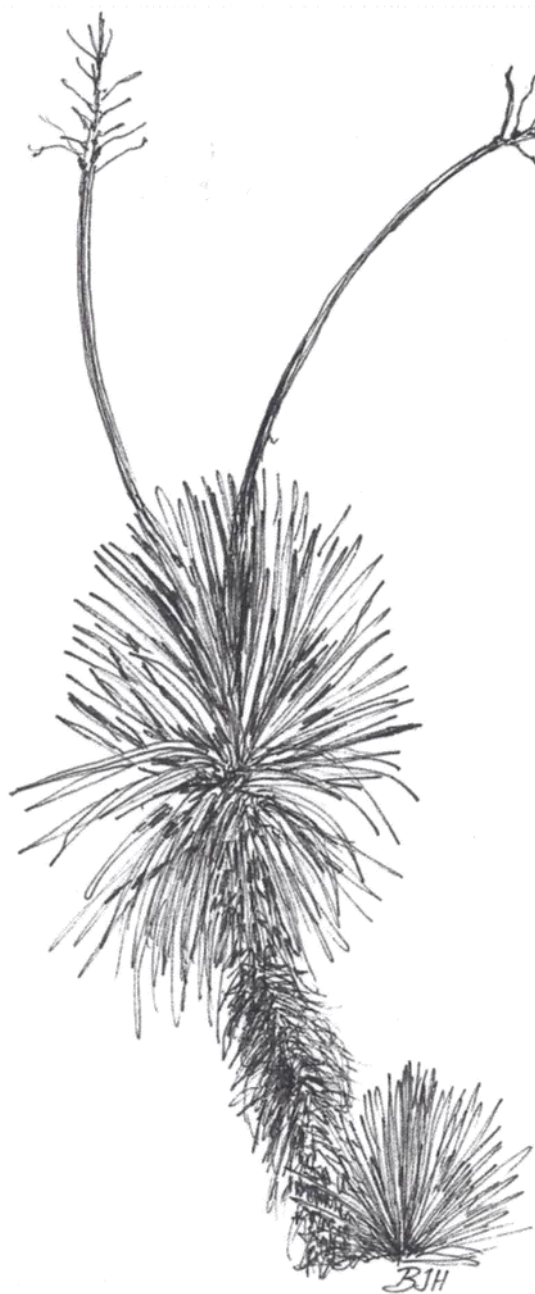


Cholla buds

The much-acclaimed use of barrel cacti for "water in the desert" is problematic. The interior of a barrel cactus is not filled with water, but a slimy pulp. Even though there are reported uses of this pulp by local tribes for emergency moisture in the case of dehydration, (especially among the Seri people of northwestern Mexico), the alkaline and toxic nature of the pulp is also known to cause headache, diarrhea, and extremity pains.

You may see two other large cacti species as you walk around the Amerind, both of which have been and continue to be important food sources for local peoples. The flower buds and fruits from prickly pear and cholla cacti provide not only a source of protein in the early season when corn crops are not ready, but also calcium, vitamin C, and bioflavonoids. Prickly pear pads have an edible mucilage that has been shown to reduce cholesterol and blood sugar in Type II diabetics and has also been used to strengthen adobe for construction. On your way back to the picnic area, look to your right near the banana yucca to see large specimens of our local prickly pear, Texas Pancake, *Opuntia chlorotica*, which prefers the rocky slopes. The cholla that grows in grassy areas of Amerind is the Cane Cholla, *Cylindropuntia spinosior*. The Tohono O'odham people still use cholla flower buds to make stews, soup, and flavor salads.

THIS MARKS THE END OF THE AMERIND ETHNOBOTANY TRAIL.
WE HOPE YOU ENJOYED YOUR TIME HERE!



elata *baccata* *schottii*

SUGGESTED READING FOR FURTHER INFORMATION, PHOTOS & ILLUSTRATIONS:

HOW INDIANS USED DESERT PLANTS, by James W. Cornett,
Nature Trails Press, 2002

50 COMMON EDIBLE & USEFUL PLANTS of the Southwest, by
David Yetman, Western National Parks Association, 2009

SHRUBS AND TREES OF THE SOUTHWEST UPLANDS, by
Francis H. Elmore, Western National Parks Association, 1976

SHRUBS AND TREES OF THE SOUTHWEST DESERTS, by Janice
Emily Bowers, Western National Parks Association, 1993

WILD PLANTS OF THE PUEBLO PROVINCE, Exploring Ancient
and Enduring Uses, by William Dunmire and Gail Tierney, Museum of
New Mexico Press, 1995

WILD PLANTS AND NATIVE PEOPLES OF THE FOUR
CORNERS, by William Dunmire and Gail Tierney, Museum of New
Mexico Press, 1997

A NATURAL HISTORY OF THE SONORAN DESERT, * Edited by
Steven J. Phillips and Patricia Wentworth Comus, Arizona-Sonora
Desert Museum Press, 2000

GATHERING THE DESERT, by Gary Paul Nabhan, University of
Arizona Press, 1986

Books marked with * are available for purchase in the Amerind Museum Shop.

ACKNOWLEDGEMENTS

Many thanks to Chris and Allan Wright for their generous donation to make this project possible; to Ellen Cohen for designing the trail markers and being willing to take on the job of our “trail steward”; to Drs. Marilyn Loveless and Paul Minnis for their expert editing, suggestions, and corrections; to Ron Bridgemon for his graphic design and lay-out expertise and his tireless acceptance of my constant last minute changes; to Cody Waits for his plant care and especially for rescuing the munched-upon parry agaves and replanting them successfully; and to John Ware for his continual encouragement and support of this project.