

EDIBLE LANDSCAPES SURVEY

Students identify native food plants growing in their schoolyard or the school neighborhood and create a class field guide to edible landscapes in the vicinity.

OBJECTIVES

Students will be able to:

- Identify eight native plant species from the Tucson area.
- Describe what foods are derived from these plants and when they are in season.

ARIZONA ACADEMIC STANDARDS

Science Strand 1, Concept 4

Science Strand 3 Concept 1, 4, 5

Science Strand 4, Concept 3

VOCABULARY

- Native
- Natural resource

BACKGROUND

The diet of native peoples in our region before the arrival of Europeans would largely have consisted of plant material, both cultivated and harvested from native plants, supplemented by wild game.

Archaeological evidence from the Tucson area indicates that native people were cultivating corn, beans, and squash here at least 4,000 years ago. Corn was first grown in central Mexico at least 7,000 years ago. Traders and travelers brought new commodities and innovations like corn with them, spreading this knowledge to new regions where it could be adapted for local use. The combined planting of corn, beans, and squash, often called the “Three Sisters,” became widespread in many native cultures in this region. Different native groups developed varieties that survived in their particular climatic conditions. Tepary beans, developed by the Tohono O’odham, are extremely drought adapted and can go from seed to flowering plant to seed again in about 60 days with very little water. In the summer monsoon, the Tohono O’odham took advantage of runoff from heavy storms to water these crops. These seeds can be purchased at Native Seeds/SEARCH for cooking or to grow them in a schoolyard or personal garden.

In addition to crops, seasonally available native foods were harvested, eaten fresh, and processed and stored for use beyond the growing season. Many of the foods highlighted in the Sonoran Supermarket class and materials grow in schoolyards,

backyards, and public lands around Tucson. The classroom field guide will focus on the following common perennial plants: agaves; mesquite, palo verde, and ironwood trees; and prickly pear, cholla, and saguaro cacti. We have included some background for teachers who may wish to harvest and process these native foods for classroom use in the Tucson area (see “Native Foods Processing - Tips for Teachers” at the end of this activity description.) Where noted, some of these products are also available for purchase.

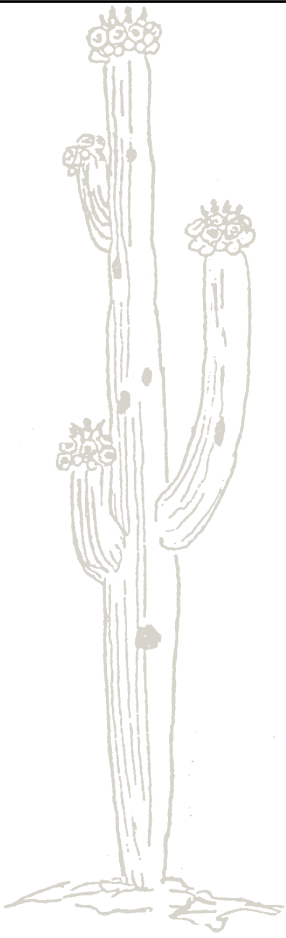
Agaves: Agaves were used extensively by native peoples throughout the Southwest and northwestern Mexico for fibers and food. Students may have heard of agave nectar, a modern derivative that utilizes the sugars native people have garnered from the heart of the agave for thousands of years. Before it



flowers, the agave plant stores prodigious amounts of sugar to fuel the growth of its flowering stalk. Native people pit roasted agave hearts

to caramelize the sugars and neutralize the caustic enzymes associated with the plant. The sweet, smoky tasting *mescal* could be eaten (the sugars chewed and sucked from the fibrous mass) or fermented into alcoholic beverages. Roasted agave *mescal* can be purchased in the produce department at many of the Food City stores in Tucson. Agave nectar is fructose that has been processed from the heart of the agave into syrup –

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MATERIALS:

Field guides to regional plants (see resources page in introduction to teachers or school library)

Pima Community College Plant Identification Key, (wc.pima.edu/Bfiero/tucsonecology/plants/plants_home.htm)

Desert Museum Digital Library (www.digitallibrary.desertmuseum.org)

a centrifugal process that would not have been achieved with earlier technologies – and would not have been a traditional sweetener in our region.

Most students recognize aloe and often mistake agave for aloe. Aloe is a South African plant that has been brought to the region and used extensively for its skin healing properties.

Mesquite Trees: One of several species of legume (bean) trees in our desert region, mesquite are a rich source of food, construction material, fuel wood, and other products. There are three species native to the region, Velvet (*Prosopis velutina*), Honey (*P. glandulosa*), and Screwbean (*P. pubescens*) mesquites, as well as a South American varieties used as landscape plants. Velvet mesquite is the most common around Tucson and the species we will focus on for the plant guide. It produces sweet seed pods after the spring and summer monsoon rains. The ground



flour of these pods was a mainstay in native diets in the region, and bedrock mortars – grinding stones where this flour was processed – are evident in many nearby protected natural areas including Saguaro National Park, Catalina State Park, and Sabino Canyon.

Palo Verde Trees: Also legume family members, two native species of Palo Verde trees, the Foothill (*Parkinsonia microphylla*) and Blue (*P. florida*) Palo Verde, produce edible seeds akin to green peas or soybeans when eaten tender and young. They are harvested in late April and May and can be eaten raw or preserved for later use. Another species, the Mexican Palo Verde (*P. aculeata*), is not native to southern Arizona and is not a traditional native food source, although it is common today in landscapes around Tucson.

Ironwood Trees: Ironwood (*Olneya tesota*) trees are frost sensitive, long-lived trees in the legume family. They flower in the hot, dry foreshummer in May in a profusion of lavender-colored blossoms, turning into seeds late May and June. Their seeds are edible when tender and young, and also when dried and mature.

Cholla Cactus: The buds of cholla cacti are harvested just before opening and are a delicious source of calcium and phytonutrients. In the Tucson area, two species of cholla cacti, Buckhorn (*Cylindropuntia acanthocarpa*) and Staghorn (*Cylindropuntia versicolor*) chollas, are especially preferred for their great quantity of flowers and relatively minimal spines. These bloom in early to mid-April and produce a variety of col-



ors from reds to purples to yellows and oranges.

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Prickly Pear Cactus: Prickly pear cacti provide edible fruits and stems (pads.) The pads can be eaten while young, tender, and less fibrous. Growing season begins as temperatures warm in spring and continues throughout the summer with the monsoon rains. They have a flavor akin to green beans and okra. While the preferred species to use in this process is *Opuntia ficus indica* (see description below,) young pads on the native prickly pear, *Opuntia engelmannii*, can be used as well. The latter contain more oxalic acid than the former, which can cause stomach discomfort when eaten raw.

Prickly pear fruits, from which the plant derives its common name, can also be eaten. *O. engelmannii* fruit are bright reddish purple and ripen in August.



Students will easily recognize the large “Indian fig” prickly pear (*Opuntia ficus-indica*) that grows in many Tucson backyards. This is another example of foods that spread from further south – this is a variety that grows in central Mexico. Like the native prickly pears, it produces edible stems and fruits, but with its minimal spines, it is much easier to process. It is from a wetter region, however, and doesn’t survive here without supplemental water. This plant is common in backyards around Tucson where many people harvest and de-spine the tender young pads to cook and eat as *no-palitos*, underscoring the importance of native foods to the cultural traditions of the region today.

Saguaro Cactus: Saguaro cactus plants predictably produce hundreds of fruits during the hottest, driest time of year, the foreshadowing drought of June. The fruits are a storehouse of concentrated sugars, protein and fat



-rich seeds, and quenching moisture for countless desert animals, including humans.

Tohono

O’odham oral traditions depict the saguaro as a human being, it is such an important mainstay in the traditional diet and cultural identity of the region. Native people harvested the fruits with long poles made of saguaro cactus ribs and cooked it and strained it to make syrup, jams, ceremonial wine, and seeds for hot cereals and flour. The fruits of saguaros and other columnar cacti such as organ pipes were the only source of sugar in the native diet prior to the arrival of the Spanish to the region in the 1500’s.

DOING THE ACTIVITY

Part 1

1. Explain to the students that they will be discovering the edible landscape in their schoolyard or school neighborhood and making a class field guide to nearby native food plants.
2. Present the list of plants that they will be learning to identify.
3. Distribute field guides and/or use online resources to recognize the characteristics that will help them identify these species.
4. Tour the school grounds or neighborhood to have them find examples of the species.

Part 2

Divide them into teams to have them complete a page for their field guide that includes the following details:

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EXTENSION

Picture: a color photograph of the plant (the Desert Museum Digital Library, see resources above, has a huge collection of photographs available for public use.)

Name: the species' common name and scientific name

Identification: brief description of plant (i.e. tree, shrub, or cactus); bark color and texture; leaf shape and color; flower color, shape, and month(s) found; fruit shape, color, and month(s) found.

Uses as Food Plant: What parts of the plant are used and how?

Other Uses: Are there any other uses besides food, i.e. sap used to mend pottery, leaves made into a tea for stomachache, etc.

Comments: if the students discover something else of interest about the plant, they can add it here i.e. the saguaro cactus flower is the Arizona State Flower.

Determine which area the guide will cover and include a map of where the plant can be found on the school grounds or nearby neighborhood. You may want the school guide to direct users on a particular route to showcase certain specimens.

1. Have your students give guided edible landscape tours to other classes or parents.
2. Plant a native foods garden or landscape. Include native plants as well as cultivars like beans, corn, squash, and chilies.
3. Have a native foods feast, inviting families to sample foods the class prepares. You and your students may become so zealous about procuring these resources that you will look beyond the schoolyard. Neighbors may be enlisted to become local "supermarkets" – just ask first. County and city natural resource parks allow harvesting of native foods that do not result in damage to the plant. to sample foods the class prepares. You and your students may become so zealous about procuring these resources that you will look beyond the schoolyard. Neighbors may be enlisted to become local "supermarkets" – just ask first. County and city natural resource parks allow harvesting of native foods that do not result in damage to the plant..

NATIVE FOODS PROCESSING - TIPS FOR TEACHERS

MESQUITE BEANS

The sweet pods of velvet mesquite can be ground into flour and eaten as a kind of porridge or drink, integrated into tortillas, or used in a variety of baked goods. Gather pods when dry and still on the tree – they should pull off easily and give a sharp snap when broken in half. It is possible to process the pods into flour in a blender and coffee grinder, but the hard seeds are tough on these kitchen instruments and the small batches are impractical. Desert Harvesters owns a hammer mill that travels to several mesquite milling events throughout southern Arizona in November where you can bring your mesquite pods and have them ground. Check their website for harvesting tips and milling events,

www.desertharvesters.org. You can also buy prepared flour at the Native Seeds/SEARCH store, 3061 North Campbell Avenue, Tucson, AZ 85719, and at some of the regional farmers markets around town.

PALO VERDE BEANS

Collect the pods from the tree when green and while the seeds are tender, green, and sweet (they can be eaten raw, so sample as many as you'd like.) Blanch them, pods and all, in boiling water for about five minutes to arrest maturation of the seeds. Husk them and eat them or freeze them in their pods for future use, thawing and husking them as needed. Sprinkle them on salads, make a three bean salad, and more.

IRONWOOD BEANS

The harvest season for ironwood is very brief. Newly developing seeds are edible, but as they mature, they quickly gain an acerbic, alum-like quality. If you encounter this, wait a few weeks, checking the plants often for the pods to mature to a dark, cinnamon brown. Harvest these pods while still on the plant, or place a blanket on the ground and shake the pods onto it. The dried seeds inside have a peanutty flavor and texture and can be eaten directly from the pod or frozen for later use. See

www.desertharvesters.org for more information.

CHOLLA CACTUS BUDS

To process, harvest buds just before opening. Brush with creosote or desert broom cutting to remove many of the glochids (small spines) then pluck off with tongs. Put into a basket or bucket or atop a metal screen laid flat and brush further with a finer broom. Cook the buds in boiling water for five to ten minutes and strain to add to salads, rices, and other dishes. Or cook with scrambled eggs. Freeze, dry, or pickle remaining buds for future use.

PRICKLY PEAR FRUITS AND PADS

Many prickly pear products are available for purchase throughout Tucson and beyond at farmer's markets, Food City, the Native Seeds/SEARCH outlet store, the Desert Museum gift shop, and more. But they are also readily found and easy to harvest when in season.

Harvest pads of *O. ficus indica* when young and tender. To harvest pads, grasp a pad with tongs and cut just above the joint with a knife. Lay it flat on a cutting board and shave each areole (spine-bearing bump) by sweeping laterally away from you with a knife. Dice cleaned pads into ½ to 1 inch strips and boil to neutralize the oxalic acid. Drain and rinse. You may notice some sliminess in the rinse water. This mucilage is a common characteristic of drought

adapted plants and is linked to low glycemic index foods that slowly release blood sugars into the body.

To process *O. engelmannii* fruits, choose ripe fruit and brush while still on plant with a creosote or desert broom branch to remove many of the small spines (glochids.) Pull off with tongs then rinse whole fruits with a hose or in the sink. Fruits can be processed into juice for use in jellies, drinks, popicles, and more. See recipes at www.desertharvesters.org. Process by chopping fruits and cooking them in a little water to release the seeds from the pulp, then strain the liquid through cheese cloth or clean, porous fabric. Or simply pick fruits and stick them in a freezer bag overnight, then thaw them in a cheese cloth or fabric lined colander, mashing them with a potato masher to release the juices. A word of caution: many tribes have reported flu-like symptoms after consuming large quantities of uncooked fruit or juice. We recommend cooking it or only using small amounts of raw juice in your uncooked drinks and other recipes.

SAGUARO FRUITS

Saguaro cacti are protected, and as such, should only be harvested on private land. Schoolyard or neighborhood saguaros would give students an opportunity to taste the sweet, moist fruit pulp and seeds. Pods are not eaten, only the seed mass and pulp. Fruits can be harvested when closed and just blushing pink to red, or after the pods have opened. Fruits not devoured by hungry birds and allowed to air dry produce delicious, crunchy fruit leather.

Because saguaros do not reproduce until around 70 years of age, and large stands of privately-owned saguaro forests are not common, saguaro fruit products have never been a popular commercial crop like prickly pear. Various organizations, including the Desert Museum, offer harvesting classes each summer during the harvest season. Check www.desertmuseum.org for more information.