A PLACE AT MOTHER EARTH'S TABLE

EDIBLE WILD PLANTS OF THE RIO GRANDE REGION

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1. Cecilia Hoaquin, A Hopland Pomo, collecting seed with a seed beater, 1924. Photograph by Edward Curtis courtesy of the Smithsonian Institution.
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INTRODUCTION

Few discoveries liven up a hike or walk than finding an edible wild treat along the way. Flavorful wild strawberries, tart raspberries, sweet piñon nuts, and rich wild walnuts consumed on the spot are tasty reminders that delicious foods are not limited to stores and restaurants. But what today is a brief treat for us has a much deeper and richer history in which it and other wild plants collectively provided the main source of sustenance for countless generations of people who made their living in the Southwest for thousands of years before maize, beans, and squash arrived.

For thousands of years people who lived off the land sampled and experimented with the many plants they encountered on their journeys. They searched for plants that nurtured the body and soul as well as those that could be used to sustain life in dire times of drought and famine. This vital information was encoded in stories and lessons that were passed from parent to child, equipping each new generation with the best available tools for survival in an environment that could be both benevolent and harsh. More recently, newcomers to the Southwest brought with them their own foods and cultural knowledge, with the sharing of these traditions and the selective integration of plants from each the inevitable benefit.

But with the arrival of mass-produced and cheap foods and the suppression of traditional knowledge in boarding schools and by people who saw no value in the carefully accumulated plant wisdom, the transmission of this vital knowledge began to fail as people were encouraged and forced to abandon traditional ways. Words for plants began to be forgotten, prime collecting sites were destroyed or denied access, jobs and other activities made it hard to find the time to gather and process wild foods, and traditional diets gave way to a new one based on the more easily obtained 20th century processed foods, all with serious consequences as we are discovering today.

Our purpose here at the Maxwell Museum is to provide an opportunity to celebrate traditional wild plant knowledge of cultures past and present and the benefits these plants offer to all of us. New scientific information shows that what we have in some cases come to call weeds actually contain nutrients and benefits that can help with some of the most serious health problems we face today. We need to expand our culinary horizons beyond the usual pizza, soda, and burgers that require little effort to get and are less than nutritious. The weeds you are pulling from your yard and garden may well be delicious and nutritious free foods that can be incorporated into your seasonal diet.

We invite you to explore these and other wild foods in their basic form and in new modern versions, beginning with this small selection today. This booklet contains additional resources for information on these and other plant foods that can be found in bookstores and libraries and on line at some excellent websites. This is also an opportunity to share stories about traditional foods with family members and friends. Ask your parents, grandparents or elders about the foods they enjoyed when they were small that came from the land. Write down the recipes as part of your family history so that they can be used now and in the future. In this way these threads of past knowledge will survive the present and connect us to the future, ensuring that this precious knowledge is not lost.

WHERE DO WE FIND EDIBLE WILD PLANTS?

New Mexico has a rich and diverse flora that contains more than 3,400 wild plant species. They occur in various combinations on the landscape that are dictated by several factors including temperature, moisture, soil chemistry, and exposure to the sun. While some plants have a broad tolerance for a wide range of growing conditions and are found in different habitats, many others are limited and occur as communities that share environmental restrictions. Often times they form distinctive biotic communities such as desert grassland, piñon-juniper woodland, pine forests, and riverine galleries. Important components of these communities are perennial plants like trees and shrubs that flower and bear fruit every year or nearly so. Mixed in are annual plants that sprout from a seed, bloom just once, produce their fruit and then die.

Southwestern plants also tend to grow in two major seasonal pulses. Cool season plants like mustards, agave and ricegrass grow during the late winter and spring months, producing foliage, flowers and seeds during the cool part of the year. Warm season plants like sunflowers, amaranth, dropseed grass and purslane or verdulagas grow during the summer and fall months, with the summer rains a major trigger for their growth. Cool season wild plants are especially important to hunter-gatherers, as they provide the first fresh foods as winter ends, a time when stored food supplies can run short or be depleted, and have often meant the difference between survival and starvation. Warm season plants provide foods that may be stored to help sustain people during the winter.

Consideration of all of these factors forms the basis for the seasonal round or annual journey that hunter-gatherers make to obtain sufficient food plants for the year. Plant foods can comprise 30 to 60 percent of most hunter-gatherer diets, providing the baseline sustenance to which meat can be added as it is obtained. Perennials offers certain advantages to gatherers who can return to the same location year after year for the harvest at an acorn grove, piñon forest, sumac stand, or prickly pear patch. They can be monitored by scouts to determine when the optimal arrival time will be, or, if the crop failed or is insufficient, to select a more profitable alternative for the people to visit. This is especially important for nut crops like acorn and piñon, which do not produce large quantities in successive years. An interval of one to five or six years may separate bountiful nut crops, so it would have been imperative to know in advance when those bumper crops were imminent. Annuals can be ephemeral and unpredictable in terms of where they grow and their population density depending on how and where their seeds have been distributed. What is there in abundance one year may be completely gone the next. Gatherers prefer denser stands of useful plants, especially seed plants, because they are more efficient to harvest and a larger yield can be obtained for the effort expended. Scattered plants require more work and the potential return may not justify the time required to reach each plant.

2. Southern Paiute women carrying burden baskets and winnowing baskets. Photograph by J.K. Hillers, 1873 courtesy of the Smithsonian Institution

In order to survive, hunter-gatherers had to be superb botanists and ecologists, knowing where to be on the landscape at a given time during the year to exploit each plant as it became available. Castetter and Opler (1937:10-11) observed that the Chiricahua Apache:

"moved with the seasonal changes of weather, and followed the wild food harvests as they occurred . . . When colder weather came he removed to a lower altitude; in summer he was in the highlands again. When the mesquite and screwbean ripened on the flats, parties of Apache were there to gather them; when the hawthorn hips were ready in the highlands, Apache were nearby to take them. These people knew nature's calendar by heart, and no matter whether a grass seed ripened or a certain animal's fur or flesh was at its best at a particular time, the Apache was present to share in the harvest."

The arrival of maize and squash in the Southwest some 4,000 years ago initiated a period of change during which people increasingly devoted more time to food production and so were no longer obliged to follow the gatherer's seasonal round. Villages were established in optimal locations for water, good farmland and other resources. Although maize, beans and squash became staple foods, wild foods continued to play an important role in local diets. Gathering parties often traveled considerable distances to other locations and vegetation zones where prized wild foods such as acorns, piñon nuts, mesquite beans and agave could be collected and processed in large quantities for immediate consumption and brought home for winter storage.

Another place to find wild plant foods is right at home in man-made or anthropogenic environments. Fallow fields, trash dumps or middens, paths, canal banks, and roadsides all offer open land from which the local plants have been removed, creating prime real estate for opportunistic weedy colonizers. People also managed their local environments to promote the production of wild foods. Strategies included controlled burns that cleared out patches so that desirable annuals could germinate, and, in the process, also attract favorite game animals such as deer.

3. Hopi corn field with "weedy"amaranths

Seeds could be deliberately planted in cleared plots that concentrated the resource in a convenient place chosen by the owner much closer to home or in small plots covered with small stones and pebbles that acted as a rock mulch to conserve precious soil moisture. Farmers also selectively weeded their fields and field margins, leaving many useful plants to grow among the corn. Some of them, like goosefoot or quelites and amaranth or bledo, provided two crops, offering tender young shoots and leaves as the plants grew and abundant starchy seeds when they matured.

4. Pebble mulch plot at Ancestral Pueblo site of Poshuingue, New Mexico (in foreground)

While wild plants were vital to hunter-gatherers, they were important to farmers as well, providing diversity to a maize-dominated diet, important nutritional supplements that complemented the maize-beans-squash diet, and fall-back foods in the event of crop losses or hard times.

How were wild plants collected, processed and prepared?

Traditional collectors utilized a suite of tools that allowed them to efficiently gather and process wild plants. Among the most common implements are digging sticks for rooting out buried bulbs and tubers; chisels or short poles for uprooting the painfully armed agave plants; tongs like giant tweezers to safely collect cactus flower buds and fruits; and long poles with a small cross-piece affixed at the top for dislodging pine cones and tall cactus fruits that would otherwise be well beyond reach. These wooden tools were often made of hard woods such as oak and juniper. Some could be made expediently at the gathering site, but others were an essential part of a woman's tool kit that she carried from place to place. Other equipment was made using basketry techniques that provided lightweight containers and tools that were integral to moving over the landscape. Burden baskets carried on the back were indispensible for carrying possessions as well as transporting seeds, agave heads, and other foods during gathering. Small paddle-shaped baskets with a handle called "seed beaters" were used to strike ripe seed heads over the burden basket as the collector walked through the patch. Shallow baskets were also used for winnowing out unwanted chaff and for parching or toasting seeds and nuts. Hot coals were added to the contents and skillfully moved about rapidly to toast or parch the seeds and not scorch them or the basket. Coarsely woven shallow baskets served as colanders and sifters.

5. Three winnowing trays from California

6. Apache burden basket

7. Ancestral Pueblo digging stick Chaco Canyon

Stone tools were also important. Large tabular slabs were sharpened along one edge to create the mescal knife used to sever the leaves from the agave heart; these were later eagerly replaced with metal knives with longer handles. Perhaps the best-known stone tools are the grinding stones called "metates" and their accompanying hand stones or "manos" that were used to reduce seeds and nuts into meal and flour. These tools converted the hard seeds into meal or flour that was more easily cooked and eaten. Not very portable due to their weight, sets of these have been found by archaeologists in concealed pits and under trees at resource processing localities where their owners could reuse them during each year's visit. Sometimes the grinding would take place in mortars worn into bedrock using elongated pestle stones at gathering locations that were revisited so many times that the round mortar holes are several inches to a foot deep. Seeds, acorns and mesquite beans were processed this way. Some of these bedrock mortar sites contain dozens of the grinding holes; seeing them you can imagine several women processing the food together, with laughter and gossip making the tedious task pass more quickly. Wooden mortars made from sections of cottonwood trunks and pestles were also used to process mesquite beans, which contain enough sugar to make them sticky and difficult to process on a flat metate.

8. Grinding slab and mano with rice grass seeds

9. Mescal knife with flaked lower edge

How do we know about the use of wild plant foods in the past?

Finding out how plants were used in the past is a bit like a CSI investigation. We have no witnesses to talk with, and no books or pictures to consult, so we must find the clues that are left at the archaeological sites. Archaeologists who carry out these studies are called paleoethnobotanists or archaeobotanists.

Preservation of fragile plant remains is the biggest factor in successfully understanding past foodways. If the site is a cave or rock shelter, the materials inside have a better chance of being protected from exposure to the destructive effects of moisture from snow and rain and the items stored or left behind are often surprisingly well-preserved. Intact ears of maize, squash rinds and stems, beans, and an extensive array of economically important wild plants have been recovered from such environments, along with a wealth of perishable remains such as sandals, baskets, cordage, mats, bows and arrows, and much more. However, such rich sites are rare, as most archaeological sites are out in the open where animal activity, insects, fungi, often harsh soil chemicals, and repeated exposure to the elements act to decompose fragile plant remains fairly quickly. While this sounds like there would be nothing left to study, a surprising mechanism has preserved amazing stories concealed in the dirt.

What at first glance seems like it would be the most destructive process of all actually works to save plant materials for hundreds and even thousands of years. Carbonization is the process by which plant remains are burned so completely that no organic material remains that can be attacked by destructive organisms. Plant parts that come into contact with extreme heat have the best chance of undergoing carbonization, so features such as hearths, cooking pits, roasting pits, and trash deposits or middens where cooking pit contents and accidentally burned food were tossed out are the best places to look. Whereas large items such as corn cobs and kernels might be easily seen, most of the burned items are too small for the naked eye of even the most careful excavator to spot. An ingenious procedure called water flotation is used to recover these tiny specimens. Soil from within features used in food preparation (hearths, roasting pits, ash pits) is put into a bucket of water for a brief period of time, allowing the lighter buoyant carbonized items to float to the surface while the sediment, rocks, bones, potsherds and other heavy materials sink. The water containing the floating items is poured into a fine mesh collection sheet and dried. The materials are then examined with a microscope at low magnification where they are identified and sorted into categories by type. Flotation has revolutionized our understanding of past wild plant use by revealing the presence and distributions of previously invisible remains such as the tiny seeds of tansy mustard, amaranth, purslane, chenopods, tobacco and dropseed grass, as well as nutshell fragments, corn kernels and cob parts, beans, and tiny pieces of squash rind. This information allows archaeobotanists to reconstruct a much richer view of the site inhabitants' economy and to address issues such as local subsistence practices; diet breadth and nutrition; the function of various feature types; the seasonality of the occupation; trade and exchange products; and the timing of the arrival of agriculture in the Southwest.

These plant remains that can be seen with no or low magnification are called macrofossils. Desiccated ancient feces or coprolites are another source of macrofossils that, while distasteful to some, provide us with unequalled and unequivocal information on what foods people actually consumed. Remains that require high magnification are called microfossils. Some of these include pollen grains; phytoliths, the silica bodies contained in the cells of certain plant groups; diagnostic crystals located in some plant species' tissues; and starch grains left on processing tools and in food residues. Archaeological data can also be compared to the documented ways that contemporary traditional societies use and prepare plants and plant products, a process called ethnographic analogy.

10. Water flotation process for archaeological setiment samples using Flote-Tech machine

Why should we include wild plants in our modern menus?

Wild plant foods are not simply relics of the past. New uses for traditional foods are being found that give them relevance in today's modern world. Examples include benefits for diabetics and people with celiac disease, and the incorporation of these foods into new cuisines and the diets of people seeking a healthy lifestyle.

Diabetes refers to a group of diseases that have in common the body's inability to produce appropriate levels of insulin needed to metabolize the sugar (glucose) obtained from carbohydrates. Outside sources of insulin are required to manage the sugar to avoid the high levels of blood glucose that can trigger a coma. Changes in diet, exercise, and blood pressure can help to control or even stop the disease. It is a leading cause of strokes and cardiovascular disease, blindness, kidney failure, and nerve damage resulting in amputations. Diabetes causes more than 600 deaths a year in New Mexico. An estimated total of about 150,300 New Mexicans have the disease, which translates into approximately 1 in 10 adults. For reasons that are not yet understood, Native Americans and Hispanics are at significantly greater risk for developing the disease.

Skyrocketing rates of diabetes are becoming a global public health crisis. They are linked to a modern western lifestyle that offers abundant highly processed food that is often high in fat and calories. Such a diet along with no exercise results in obesity, diabetes, and other serious problems. The global impact of this lifestyle can be seen in countries that have recently adopted it, only to find that, as traditional foods and activities are replaced, their citizens now exhibit the same unhealthy symptoms. In recent years, scientific attention has focused on traditional diets to determine their benefits and potential roles in reducing and preventing diabetes. Not surprisingly, studies showed that many native crops and wild foods are rich in minerals, vitamins, and protein. Some also contain large quantities of the dietary fiber that digests slowly, keeping the blood sugar from rapidly soaring to the dangerously high spike that happens after eating a donut, frybread, or ice cream. These good low glycemic or "slow-release" foods were very often those that had been replaced by white bread, canned fruit, sweets, and sugary drinks, all of which are high glycemic foods that digest quickly. The O'odham or Pima, Native Americans who live in southern Arizona, have one of the highest diabetes rates in the world, with 38 to 50 percent of communities' members having the disease. By restoring high fiber foods like tepary beans, prickly pear pads, mesquite, and plantago seeds to a healthier diet and more exercise, many O'odham have been able to greatly reduce or even eliminate their diabetes

A helpful tool that ranks foods on how they affect blood glucose levels is the glycemic index. The value number is increasingly found on product packaging to help diabetics and others make healthy choices. Values over 100 indicate a fast release of glucose that will spike the blood sugar, whereas values less than 100 are slower release foods that will have much less effect on blood sugar levels. Values less than 55 are the lowest. As an example, agave nectar has a glycemic index (GI) number of 27, making it a great sugar substitute for diabetics.

11. Field of commercially grown ricegrass in Montana

Another dietary problem that can be helped by traditional foods is celiac disease. It is a digestive disease that damages the small intestine and interferes with the absorption of nutrients from food, leading to malnutrition. People who have celiac disease cannot tolerate gluten, a protein in wheat, rye, and barley. The symptoms are quite variable but can involve considerable chronic intestinal distress, anemia, osteoporosis, fatigue, arthritis, depression, and more. Because of this, it has been difficult to diagnose but a blood test can now be done to confirm the diagnosis. More than 2 million Americans have the disease, working out to about 1 in 133 people.

Treatment consists of immediately altering the diet to eliminate the harmful protein sources, a challenging task. Imagine not being able to eat a sandwich, cereal, bagel, crackers, pasta, pizza or cookies! As a result, considerable interest in alternative grains has developed. Several New World plants have helped to fill the void, including amaranth, quinoa, corn, wild rice, and potatoes, along with rice, millet, soy and buckwheat. Some of our wild plant foods have shown promise as alternative grain crops, the best of which is ricegrass. It is now commercially grown in Montana and is gaining popularity as a gluten-free food. Demand for these products will continue to grow as more and more people are diagnosed and seek good alternatives.

Traditional cultivated and wild foods have now caught the attention of talented and inventive chefs who are incorporating their flavors and textures into a new cuisine that blends Native American foods into delicious new creations that draw appreciative diners to their restaurants. Cookbooks written by these innovative chefs make it possible for us to experiment at home with ingredients that we could gather or purchase at local farmers' markets or ethnic grocery stores. Using these plants is a part of being locavores who support using fresh locally produced foods that not only provide good nutrition and interesting new flavors but are good for the planet as well.

By trying new foods and making positive changes in our lifestyles, we can do our part to make sure that both we and Mother Earth are healthy. So now it's time to begin. Take your place at Mother Earth's table and sample some of the wonderful foods and beverages that are rooted in the lands around us, waiting patiently to be rediscovered and appreciated once again!

A CAUTIONARY NOTE REGARDING COLLECTING WILD PLANTS:

When gathering wild plants to eat, it is very important to make sure that the identifications are absolutely correct to avoid eating a harmful or poisonous plant and getting sick. Use good local field guides, learn from an experienced elder or teacher, or take samples first to places where experts can help you such as the local County Extension office, the University of New Mexico Herbarium, a meeting of the New Mexico Native Plant Society, and the Rio Grande Botanic Garden.

If you do find plants you want to collect, please do not take too much. Wild plant populations can easily be overharvested, harming their ability to reproduce and even causing local extinction. Careful, respectful gathering will ensure that the plants can continue to provide for people for many years to come.

12. White Mountain Apache Burden Basket

WILD PLANT GUIDE

AGAVE

Common Name: **Agave; Mescal; Century Plant**
Scientific Name: **Agave spp.; A. palmeri; A. parryi**
Family: **Agavaceae**

13. Agave Plant

Description:

The agave is NOT a cactus. It is a low-growing succulent plant consisting of a rosette of long pointed leaves ending in a terminal spine. Most have small very sharp marginal prickles or "teeth" along the leaf edges. After several years the plant produces a single long flower stalk in the late spring, after which it dies. It is found primarily on dry rocky slopes at elevations above 4,000 feet (1,219 m) in grassland and woodland communities. Several species do well in Albuquerque yards as ornamentals.

14. Agave plant with flower stock

Ethnobotany:

Agave is one of the most important economic plants of the Southwest. It provides long leaf fibers for rope and string, straight stalks for roofing material and the body for Apache violins, and a delectable very sweet food, "mescal", that was highly prized by the people within whose territories it grew and was a valuable article of trade. It is this food that gives the Mescalero Apache their name.

Prior to the arrival of Europeans who brought with them sugar and honey bees, mescal was the primary source of sweetness in the region. The plants must be cooked prior to eating, as they contain poisonous calcium oxalate crystals that are neutralized by heat. The plants are selected for harvest when they prepare to send up the flower stalk, as the plant creates a large reserve of sugar to sustain the rapid growth of the stalk. The plant is pried out of the ground using a wooden chisel that is 3-4 feet long to avoid contact with the painful spines and teeth

15. Agave "cabeza" showing heart and leaf bases

The leaves are trimmed away from the short stem, leaving a heart or "cabeza" that resembles a pineapple in appearance. A roasting pit is prepared in which a large fire with a layer of rocks on top is allowed to burn down to coals. Usually a protective layer of vegetation is placed over the superheated rocks, followed by the cabezas, which are mounded high. Another layer of moist greens covers the agaves, followed by a thick layer of earth that completes the oven. The pit is left to steam for 1 to 3 days, depending on the size, number of hearts, and tradition. At the proper time the pit is uncovered, and each participant claims her cabezas, which are now soft, darker in color and very sweet, sometimes smelling like molasses

16. Placing Mescal Photograph by Edward Curtis courtesy of Smithsonian Institution. NAA Neg. No. 76-4669

The hearts are then processed by removing the leaf bases and pounding the soft fiberless core into a pulp that is then sun-dried in large sheets. This product could be stored for years, another very valuable feature for a wild food. Pieces could be broken off as needed. The fibrous leaf bases could be dried, crushed to release the juice, or chewed like sugar cane until the sweet flavor was gone, after which the fiber wad, or quid, is expectorated.

17. Cooked Agave heart and leaves

Currently, the most popular agave product is tequila, which is made by distilling the juice obtained from the cooked hearts, a process introduced by the Spanish. Mezcal, another beverage, is fermented agave juice obtained by cutting out the flower stalk, creating a basin-like depression in the plant, and extracting the sweet juice that collects in it. Agave nectar, the unfermented juice that is cooked down into a light sweet syrup, is a relatively new product that is rapidly gaining in popularity as an alternative to sugar.

18. Mrs. Jewett Wright forming a sheet of mescal. 1931/36 Photograph by Grenville Goodwin courtesy of Arizona State Museum.

Archaeobotany:

Agave has been found in many forms that reveal its importance to traditional people. Circular rock-ringed roasting pits that can range in size from a few feet in diameter to more than 20 feet across are commonly found in agave country. Flotation samples from the pit contents can yield the carbonized terminal spines, marginal teeth, and fibers that confirm the use of the pit for cooking agave.

19. Agave plant with tequila & Agave Nectar

Shapeless blobs of charred sugar-rich sap that copiously exudes from the cabezas during cooking can also be found as can pieces of the young stalk bases left on some of the hearts. A distinctive artifact, the mescal knife, has also been found associated with processing areas in the southern Southwest. The large, often tabular rocks have a long flaked sharp edge that was used to sever the leaves from the hearts.

Protected settings can yield leaves, spines, teeth, and fibers along with manufactured items such as cordage, rope, and pre-threaded needles made by cutting the terminal spine part way through the leaf, leaving the remainder attached to the leaf fibers. Sometimes, one of the most abundant artifacts is the quid, which can number in the hundreds. Quids have recently made the news due to the extraction of DNA from a sample that offered exciting new insights into the movement of early agricultural population groups in the Southwest and northern Mexico.

20. Carbonized Agave marginal teeth macrofossils

Health and Nutrition:

In addition to its great preservation qualities, agave offers excellent nutritional benefits. The heart pulp contains 347 calories/100 gm, 4.56 % protein, 81% carbohydrate, and 1.06% fat. It is also an excellent source of calcium, a critical nutrient that is difficult to obtain for people who do not drink milk after they are weaned (Ross 1941). Agave nectar is 1.25 times sweeter than sugar so less is needed. It is a better food for diabetics because it has a low glycemic index of 30 and a glycemic load of 9.6, values that indicate it will not make blood sugar spike. A tablespoon contains 60 calories.

21. Cooked Agave leaf base

CHIA

Common Name: **Chia, Sage**
Scientific Name: **Salvia columbariae, S. hispanica**
Family: **Mint family (Lamiaceae)**


22. S. columbariae, native chia of southern Southwest and California

Description:

Herbaceous annuals with slender square stems, aromatic leaves, and clusters of small purple or blue flowers that form at intervals along the stem (S. columbariae) or in terminal spikes (S. hispanica). The small oval seeds are produced in groups of four, and are dark mottled or white in color. S. columbariae is a cool weather plant; the seeds are available in late spring and early summer. It is found below 3500 ft (1067 m) in sandy washes.


23. Commercial field ofS. Hispanica Aztec Chia

Ethnobotany:

The name "chia" (from the Aztec "Chian") has been applied to a number of Mint family plants whose small seeds were avidly collected for food and drink, but is now largely restricted to 2 species: S. columbariae in California, Arizona and New Mexico, and S. hispanica in Mexico. The most unusual feature of the seeds is their production of mucilage after immersion in water. The gelled seeds were made into a refreshing drink by many Native American groups that was widely adopted by Hispanics and Anglos. The seeds could be used raw or parched, either in seed form or ground into meal that could be added to other grains. Their high protein and oil content made them popular foods for travel or endurance events where a few pinches of seeds or meal could provide a long day's energy. So important were the seeds that patches of the plants were regularly burned to maintain high densities by more than 35 Native American groups. Dense patches could yield several quarts of seeds in a few hours. The mucilage was also used to remove foreign objects in the eye by putting a seed under the eyelid for the gel to capture.

Among the Aztecs, chia (S. hispanica) was one of their most important agricultural crops, being one of the four major tribute items sent to the Emperor Moctezuma every year. The seeds were extensively used for food, beverages, medicines, and as a source of oil. This oil was used in cooking, cosmetics, and as the key ingredient in paints and varnish. The exceptional clarity and bright colors seen in the surviving hand-painted Aztec codices or books are due to the application of chia oil varnish, which does not yellow with age. Chia production and consumption was almost completely eradicated by the Spanish because of its association with "pagan religious practices".


24. Chia seeds

Archaeobotany:

Small numbers of the carbonized seeds have been recovered in southern Arizona Hohokam sites in hearths and middens. In California, quantities of seeds were left as burial accompaniments by the Chumash.

Health and Nutrition:

Primarily known for the popular Chia Pet planters, chia is now emerging as a nutritional powerhouse resulting in increasing commercial production of S. hispanica to meet demand. Rich in protein and oil, a 100 gm portion contains 330 calories, 21 gm of protein, 42 gm of carbohydrate, and 33 gm of fat. The oil is an excellent source of Omega-3 fatty acids with a higher level than flax seed. Due to the abundant mucilage the seeds use to increase access to water during germination, it is high in dietary fiber at 41 gm, 36 gm of which are insoluble, making is a low glycemic food. It is an excellent source of several minerals and vitamins, with exceptionally high levels of calcium (more than 2 glasses of milk), phosphorus, potassium, magnesium, iron and zinc. Chia also has higher antioxidant levels than blueberries. New research shows that soaking the seeds in water for 12-24 hours nearly triples them.


25.Chia seed mucilage

CHIMAJÁ

Common Name: **Wild celery; Chimajá**
Scientific Name: **Cymopterus fendleri**
Family: **Carrot Family (Apiaceae)**

Description:

Wild celery is an unobtrusive small root perennial that sprouts several shiny green leaves in the early spring. The leaves rarely exceed 2.5 inches long and have a triangular dissected blade. The bright yellow flowers emerge later in clusters that resemble inverted umbrellas called umbels that are perched on stalks. Umbels are a characteristic feature of this family, which contains many aromatic herbs and spices. The plants prefer rocky soils in which to grow.

26. Chimajá plant

Ethnobotany:

Chimajá has 2 edible parts: leaves with a strong celery taste and slender starchy roots. The leaves are collected during March and April, preferably "before they flower and become bitter" as one Hispanic lady told Huckell. The leaves may be used fresh or preserved by drying or freezing for later consumption. They are delicious eaten raw, dipped in salt as an appetizer, as a seasoning for cooked foods or simply added to scrambled eggs and onions.

The plant produces 2 roots, a readily accessed upper root that is connected to a second deeper root that tends to be more difficult to reach and is often left behind to produce new growth the following spring. The starchy roots have a slight celery flavor. They were an important food for early Hispanic settlers; kids often dug the roots up and ate them raw.

A related species (C. pupureus) known as wild parsley but also called chimajá was formerly used in bars as an additive to whiskey to be taken as a digestive or "bitters", a recipe developed in the 1850s. In Los Lunas, a mix of chimajá flowers, whiskey, and sugar was aged for 2 years resulting in a popular cordial called "mestela" that was served on special occasions.

27. Excavating edible root

Archaeobotany:

No archaeological evidence is available for this plant, largely due to the absence of durable plant parts and the widespread consumption of the leaves and roots raw or boiled.

Health and Nutrition:

Dried wild celery leaves are packed with nutrients. A 100 gram portion contains 189 calories, 36 gm of protein, 44 gm of fiber and 5 gm of fat. Rich in minerals, the leaves contain significant quantities of sodium, potassium, calcium, magnesium, phosphorus, iron, zinc, and copper. They are particularly rich in potassium at 6,254 mg and calcium at 3,106 mg. The calcium value far exceeds the daily adult requirement of 1000 gm . For comparison, milk, considered an excellent source of calcium, has 300 mg in an 8 oz serving.

28. Complete plant with starchy root

COTA

Common Name: **Navajo Tea; Indian Tea; Cota; Green thread**
Scientific Name: **Thelesperma spp.; T. megapotamicum, T. filifolium,**
Family: **Sunflower Family (Asteraceae)**

Description:

An herbaceous root perennial less than 3 feet (80 cm) tall that can be seen along roadsides and in open and disturbed soils. The foliage is divided into linear segments, giving rise to the common name "green thread". Long delicate nodding stems terminate with a head of tiny yellow flowers. The plants bloom from May into October. Cota has a slender taproot from which it sprouts new growth in the spring. It can be sustainably harvested by cutting some of the stems off above the root.

29. Cota flowers

Ethnobotany:

Cota make a delicious reddish brown colored tea with a slightly sweet flavor and distinctive aroma. In the Southwest it has been widely enjoyed by Native Americans, Hispanics, and Anglos and is now gaining popularity among a broader audience of herbal tea aficionados. The tea may be sold in packages of chopped stems, leaves and flowers, or in bundles of folded dried stems. Dried plants can be stored indefinitely. Bundle sizes vary and are rarely described; an exception comes from Zuñi Tradition Bearer Rita Edaakie, who tells us that a bundle contains approximately 12 stalks and will make 10 cups of tea. She also notes that at Zuñi, 2 types of cota are recognized, one of which is associated with boys and the other with girls. Mothers-to-be who wish to have a boy or girl drink tea made from the appropriate type to help ensure the desired result.

The tea has been used medicinally in the Hispanic community to reduce fever, ease babies' chafed skin, and as a diuretic. It has also served as a dye for Navajo weavers and Hopi wicker plaque makers.

30. Threadlike linear leaves

Archaeobotany:

The archaeobotanical record is mute on the ancient use of the plant. As a delicate herb that is boiled to achieve the desired product, the likelihood of preservation is very low. However, the widespread popularity of the tea among contemporary societies suggests a practice that is deeply rooted in time.

Health and Nutrition:

Nutritional analyses of 2 kinds of cota indicate that tea made from the plants contributes small quantities of potassium, calcium, and magnesium to the diet (Wolfe et al Table 2).

31. Dyed churro wool

DROP SEED GRASS

Common Name: **Dropseed grass; Zacaton**
Scientific Name: **Sporobolus spp.; S. cryptandrus**
Family: **Grass Family (Poaceae)**

32. S. cryptandrus plant

Description:

Native dropseeds are perennial bunchgrasses that are found in a variety of habitats, with sandy hills, plains and waste places common locations. The flowering tops, or panicles, have their branches either pressed close to the stem or open; the branches bear many small florets each of which contains a tiny seed that falls easily from the chaffy scales. They tend to be more than 2 feet (0.61 m) in height. One of the most common species, S. cryptandrus, sand dropseed, is found throughout New Mexico. It has a lengthy flowering and fruiting season that extends from spring well into the fall.

Ethnobotany:

Dropseeds have been used by the Navajo, Hopi, Apache, O'odham (Pima), Tohono O'odham (Papago), and Paiute, and were considered a staple or very important food by these groups. The production of quantities of seeds that easily threshed free drew gatherers to locations where the plants were abundant. The tiny seed size of less than a millimeter appears to have been offset by the large amounts that could be gathered in optimal conditions. However, as Castetter and Underhill were told by a Tohono O'odham consultant: "We would work all day and feel as though we had done so much and there would be about a cupful". Another attractive feature of this grass can be seen in S. cyptandrus, which is one of the dropseeds in which the panicle emerges only part way from it's protective leaf sheath. This acts to retain a significant amount of seeds on the plant that can be harvested throughout the winter months, providing a source of quality food during the lean time of year. The seeds were threshed, winnowed, and parched or sundried prior to storage. The O'odham also used the stems to make hair brushes.

33. S. cryptandrus florets

Archaeobotany:

The tiny seeds of Sporobolus genera are commonly found in archaeobotanical assemblages throughout the Southwest in Ancestral Pueblo, Hohokam sites, and others. They are found in a wide range of contexts, suggesting common use. However, their frequent recovery from burned house interiors may reflect the use of the plants for thatching that rained seeds onto the structure floor.

34. S. cryptandrus seeds

Health and Nutrition:

Nutritional information for dropseed seeds is not readily available.

MESQUITE

Common Name: **Mesquite; Screwbean mesquite, Tornillo**
Scientific Name: **Prosopis spp., P. pubescens**
Family: **Bean Family (Fabaceae)**

35. Mesquite tree with man standing by trunk

Description:

Mesquites are spiny shrubs or trees with leaves that are subdivided into small opposed leaflets. Cylindrical fuzzy flower clusters produce long, flattened straw-colored beans in the summer and fall. It is common on sandy plains and along streams and washes up to 5500 feet (1676 m). The northernmost natural extent of mesquite is Socorro, although the trees will grow in Albuquerque. The unique spiraled pod of one species (P. pubescens) resulted ir the name screwbean.

36. Mesquite beans, endocarps, and seeds

Ethnobotany:

Mesquite was a staple food for many groups, especially riverine cultures like the O'odham (Pima) and Mojave, who gathered huge quantities from the extensive mesquite forests that formerly lined the rivers. The reliability of a good crop almost every year increased their value. The beans were parched or sun- dried and stored in enormous woven rooftop or platform granaries They were pounded to release the seeds and boney endocarps or seed cases from the thick fruit wall to make meal or flour. The sweet meal was made into mush, gruel (atole de pechita), a water-based beverage, or cakes that could be dried for long-term storage. The protein-rich seeds were also parched and eaten. In the early spring, very young green pods could be briefly cooked for a sweet snowpea-like vegetable.

Mesquite wood was extensively used for tools and for fuel because it is dense and hard. It has become very popular as a barbeque fuel, imparting a unique flavor to grilled foods. The Seri Indians of northern Mexico produce popular carved animals from the rich brown wood. The exuded gum was also used as an adhesive and hair dye.

37. Screw bean Mesqite

37. Screw bean close up

Archaeobotany:

Carbonized seeds are commonly recovered from southern Arizona Hohokam sites and Jornada Mogollon sites in southwestern New Mexico. Beans and endocarps are also recovered from domestic and trash contexts. A very unusual discovery of a small pile of carbonized immature green beans was made in a burned Hohokam pithouse in central Arizona.

Health and Nutrition:

Mesquite bean meal is an energy-rich food, containing 368 calories per 100 gm portion. Fresh bean material yields 232 calories, with 8 gm of protein, 2 gm of fat, 48 gm of carbohydrates, and 33 gm of fiber. Carbohydrate content varies with maturation level, reaching roughly 80 percent in mature beans. The seeds are high in protein, ranging from 27 to 32 percent. Mesquite meal cakes have a glycemic index of 25, making them a good slow release food.

38. Locally made Mesquite jelly and syrup

MUSTARDS

Common Name: **Tansy Mustard; London rocket**
Scientific Name: **Descurainia spp.; Sisymbrium irio**
Family: Mustard **Family (Brassicaceae)**

39. Tansy mustard plant

Description:

Tansy mustard is a delicate-looking native annual herb that grows during the winter and early spring. The gray leaves are finely divided. The flowering heads bear tiny bright yellow flowers with the distinctive 4 petals arranged in a cross shape that characterizes this plant family. The small short banana-shaped fruits that develop in mid- to late spring contain tiny bright orange seeds. London rocket also grows in the late winter and early spring. The leaves are broad, barely divided, and a glossy bright green. It, too, produces small bright yellow flowers followed by long slender fruits containing orange seeds. Both plants favor disturbed ground such as yards, roadsides, and vacant lots. Tansy mustard can form extensive stands on open dry sandy soils after good winter rains.

Ethnobotany:

A number of annual mustards offered 2 crops: tender small young plants and leaves cooked as fresh greens and the seeds that could be made into beverages and used whole or ground into flour or meal. Of these, tansy mustard appears to have been the most widely exploited. The young plants were boiled or pit-steamed by many groups for food. Puebloans boiled down the plants into a thick black paste that was used to decorate pottery with black designs. The addition of lead pigment to the ground oily seeds resulted in the unique glaze colors found on late prehistoric pottery. The seeds were widely used mixed with water and sugar or salt to make a popular drink with a thicker texture, as they also produce a gel just like chia and plantain. Whole or ground seeds have been added to other grains as a condiment for variations of mush or gruel. Because of the mucilage the seeds exude, they, too, were used like chia seeds to remove eye irritants.

London rocket is a European introduction that also produces large quantities of tiny orange seeds. It has been incorporated into the wild food inventory by the O'odham and other groups because the seeds can be used in the same ways as the native species and they are readily available. In Iran, London rocket seeds (Khak shir) are used to make a popular drink that is similar to our Southwestern beverage . The seeds are soaked in water overnight and sugar is added to taste.

40. London rocket

Archaeobotany:

The popularity of tansy mustard is reflected in the recovery of carbonized seeds from sites all over the Southwest that span several thousand years. In southern Arizona several cases have been unearthed in which large quantities of seeds were found in storage vessels. Sometimes the seeds are found fused into large masses, some of which have smooth convex sides indicating that they were inside a pot when they burned.

41. Tansy mustard seeds

42. 600 year old Carbonized Tansy mustard seeds from southern Arizona Hohokam site

Health and Nutrition:

Nutritional information for tansy mustard seeds varies considerably; one source says they consist of 23 percent protein, 13 percent fat, and 71 percent carbohydrate. There are approximately 554 calories per 100 gm portion. The presence of seed mucilage would indicate that the seeds are a low glycemic food.

PIÑON

Common Name: **Piñon Pine**
Scientific Name: **Pinus edulis**
Family: **Pine Family (Pinaceae)**

Description:

A small conifer or cone-bearing tree 10-40 feet (3-12 m) high with needle leaves arranged in bundles of 2. The small round cones mature over 3 growing seasons, ripening in September and October, when the cones dry out and open, releasing the half-inch long chocolate brown nuts. Large nut crops are produced at intervals of 2 to 5 years. The trees are found on mesas, plateaus and lower mountain slopes at 5000 to 7000 feet (1524-2134 m), grading from mixed piñon-juniper woodland to pure piñon forest as elevation increases.

43. Piñon tree

Ethnobotany:

Piñon nuts have been one of the most popular wild plant foods of the west. It is one of a small handful of wild plant foods that still draws people out on gathering trips to get a large supply. In the past, people would return to favorite gathering spots and set up camp for 1 of more weeks, processing the nuts until all of the burden baskets, gunny sacks or containers were filled. Seeds could be gathered from the ground, or shaken from the trees to the ground or tarps, or even taken from packrat nests, but at times the cones were collected before they opened in order to beat out squirrels and other eager competitors. The green cones were roasted to melt the abundant pitch and open the cone scales. The cleaned nuts were roasted and either stored or shelled and eaten as is or ground into meal for cakes, soup, and gruel. Studies show that for every 100 pounds of cones collected, workers obtain 28 pounds of seeds.

44. Mature cones in upper branches

The abundant pitch produced at wound sites has been used in a variety of ways: to waterproof baskets, as an adhesive, as an ingredient in pottery paint, as an antiseptic, and for chewing. Hispanics have used trementina to treat headaches, hemorrhoids, and in an ointment to draw out infection.

Archaeobotany:

Evidence for the use of pine nuts comes from carbonized cones, cone scales, nuts, and nutshell fragments . Piñon remains dating back several thousand years to the Early Archaic have been found in Utah. They appear consistently through the prehistoric period in the region, particularly at upland sites with ready access to the nuts.

45. Mature cone with nuts

Health and Nutrition:

Piñon nuts are prized as a high energy food. A 100 gm sample contains 671 calories. Nut constituents include 15 gm of protein, 65 gm of fat, 7 gm of carbohydrate, and 5 gm of fiber It is a good source of potassium, and contains small amounts of calcium, vitamin A, iron and phosphorus. The nuts also contain all 20 essential amino acids. Another study states that 1 pound of shelled nuts provides 2880 calories, nearly the same food energy as a pound of butter.

46. Nuts and roasted shelled piñones

PLANTAGO

Common Name: **Indian Wheat; Plantain; Woolly Plantain; Plantago**
Scientific Name: **Plantago spp.; P. patagonica (= P. purshii)**
Family: **Plantain Family (Plantaginaceae)**


47. Plantago plant

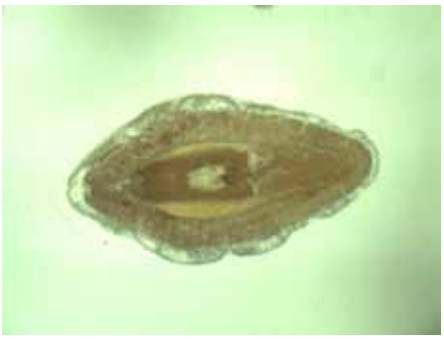
Description:

Native plantains are short herbaceous cool season annuals that are found over much of New Mexico. A local example is the widespread woolly plantain, which has upright hairy linear leaves 3 to several inches long that are arranged around flower stalks bearing a dense terminal spike of small white flowers. The oval seeds have one flat surface and are about 2 to 3 mm long. Seeds are produced from late spring through late summer. It is widespread, growing on dry plains and hills at elevations up to 7,000 feet (2134 m).


48. Plantago seeds

Ethnobotany:

Plantains produce large quantities of seeds that have been gathered by several groups for food and medicinal uses. The most conspicuous attribute of plantago seeds is the copious amount of mucilage produced after immersion in water; they are 20 percent mucilage by weight. Woolly plantain has been used for food and medicine. The O'odham (Pima) prepared a thick drink by boiling the seeds. The Havasupai, Zuñi, and Navajo consumed the seeds either whole or ground into meal. Medicinal uses centered on a range of intestinal problems but also were used for headaches, suppressing the appetite and to make a person more agreeable. As with other gelatinous seeds, a plantain seed could be put in the eye to remove an irritant. Two species, P. ovata and P. psyllium, are the sources of Metamucil and other commercial laxatives. P. ovata has the highest mucilage content of all the plantagos at 25 percent of the seed weight. P. major, a European introduction that has spread throughout the United States, has been incorporated into many traditional healing systems primarily as a poultice for a variety of ailments.


49. Plantago seed exuding mucilage

Archaeobotany:

Carbonized plantain seeds are occasionally present in modest quantities in Southwestern prehistoric sites, extending back in time at least 2,000 years in the northern part of the region, predating the emergence of the Ancestral Pueblo culture. It is more visible in the Hohokam territory in southern Arizona, where it is found more frequently but still in small quantities. It is probably underrepresented in the archaeobotanical record given its abundance on the landscape.

50. Plantago seeds sold commercially as laxative

Health and Nutrition:

At present, nutrition data are not readily available for wild plantain seeds. Looking at some information for psyllium seed husks, the milled outermost cell layer of the seed that is the source of the mucilage, the overwhelming constituent is carbohydrate that is mostly insoluble fiber. A small amount of protein and very little fat round out the total. The high fiber content make psyllium a low glycemic food.

PRICKLY PEAR

Common Name: **Prickly Pear; Nopal**
Scientific Name: **Opuntia spp.**
Family: **Cactus Family (Cactaceae)**

51. Prickly Pear plant

Description:

A very distinctive perennial succulent consisting of jointed stems that are strongly flattened, each of which has numerous small spine-bearing locations on the faces and edges. New pads and colorful flowers from which egg-shaped red fruits develop are formed along the pad margins. Young pad growth occurs in the spring and early summer. Fruits mature in the summer. Prickly pears are found throughout the state at elevations up to 7500 feet (2286 m).

Ethnobotany:

This plant produces 2 foods: juicy fruits and green pads. Often produced in large quantities, the fruits have been gathered by many cultures who enjoy the sweet flavor. Fruits were eaten raw and cooked, or could be dried. Today the fruits are harvested commercially to produce jelly and syrups. Many varieties have been developed in Mexico where the fresh fruits or tunas are sold in markets and exported to other countries. Each fruit contains a core mass of hard disc-shaped seeds that are usually discarded but were also eaten after parching and grinding.

51. a. Prickly Pear seeds from two species

Young stems 6 to 8 inches (15-20 cm) long have been widely consumed as a vegetable; mature pads are inedible due to a dense network of fibrous vasculature. Thin tender spineless pads have been developed in Mexico and are now sold fresh in US markets as are canned sliced pads. After trimming the margins and removing the spine clusters, the pads can be sliced and eaten raw or boiled. Like okra and chia, the pads contain abundant mucilage. The split heated pads have been used medicinally as poultices for rheumatism.

52. Churro wool dyed with prickly pear fruit

Archaeobotany:

Carbonized seeds are frequently recovered from archaeological sites throughout the Southwest, an indication of the fruit's enduring popularity. Prehistoric use of the pads appears to extend back more than 5,000 years based on macrofossils from Utah caves. Carbonized spine clusters may indicate roasting or scorching to remove the spines, a common practice. Coprolite data from Four Corners region sites including Mesa Verde and Chaco Canyon indicate that prickly pear is one of the most consistently eaten wild plant foods for hundreds of years.

Health and Nutrition:

The fruits are a low calorie food at 41 per 100 gm portion, with 0.73 gm protein, 0.51 gm fat, 10 gm carbohydrate, and 4 gm dietary fiber. They also provide modest amounts of calcium, potassium, magnesium, vitamin C and beta carotene. Thanks to the high mucilage content, the pads are a low glycemic food with a value of 7. Cooked pads contain 15 calories per 100 gm portion along with 3 gm carbohydrate, 0 gm fat, moderate quantities of vitamins A and C, calcium, potassium, magnesium and manganese.

53. fresh prickly pear pads sliced to cook

RICEGRASS

Common Name: **Indian Ricegrass**
Scientific Name: **Achnatherum hymenoides (= Oryzopsis hymenoides)**
Family: **Grass Family (Poaceae)**

54. Ricegrass plant

Description:

A perennial bunchgrass that grows up to about 2 feet (60 cm) tall. The open inflorescence has long slender branches that end in a single plump fuzzy floret with a short beak. It grows throughout the West in very sandy soils on open plains and dunes up to 7,000 feet (2134 m) It is a cool season grass, producing grains in early summer.

Ethnobotany:

Ricegrass has been an invaluable resource for many Southwestern groups. The exceptionally large grain size for a wild grass, the relative ease with which the chaff can be removed, availability during the often lean times of early summer, and the tendency of the plants to occur in extensive, often dense stands ideal for harvesting ensured ricegrass's popularity. It has been used by the Navajo, Hopi, Zuñi, Apache, and others. While the outer chaffy scales were easily removed, the last pair are tightly wrapped around the grain, requiring parching to remove them. The seeds could then be stored or ground into meal to make cakes, gruel or mush. Puebloans have turned to ricegrass as an emergency food during hard times. It was planted and tended by the Owens Valley Paiute of the Great Basin who often harvested large crops. It is now commercially grown in Montana to supply gluten-free products.

55. Ricegrass fruiting heads

Archaeobotany:

Evidence for ricegrass use dating back several thousand years has been identified in Early Archaic caves in the northern Southwest. The carbonized florets and seeds consistently appear in archaeological sites through time into the late prehistoric period, a reflection of the plant's status as a regional staple food.

56. & 57. Ricegrass "seeds" and florets

Health and Nutrition:

Ricegrass is an excellent source of nutrients. A 100 gm portion has 380 calories, of which just 30 are from fat. It contains 17 gm of protein, 3 gm of fat, 70 gm of carbohydrate, and 24 gm of dietary fiber, along with significant quantities of calcium and iron. Ricegrass is also a gluten free food.

58. Western Shoshone gather bunches Indian rice grass into a large pile and thresh it with sticks. Photograph by Julian Steward, courtesy of the Univesity of Illinois Archives.

59. Jenny Washburn separates Indian rice grass seed from chaff with a broad flat winnowing tray. Photograph by Julian Steward courtesy of the University of Illinois Archive.

SUMAC

Common Name: **Sumac; Lemonade Bush; Lemita**
Scientific Name: **Rhus trilobata**
Family: **Cashew Family (Anacardiaceae)**

Description:

A dense perennial shrub reaching as high as 10 feet (3 m). The deciduous leaflets are arranged in groups of 3. The tiny yellowish flowers are replaced by clusters of bright red globose fruits covered with sticky hairs. The fruits ripen in the late summer and fall. This plant is related to cashew nuts, pistachios, mango, and poison oak.

60. Sumac shrub

Ethnobotany:

The many species of sumac that are found coast to coast in North America have been used by all cultures who have encountered them. They are universally appreciated to this day for their tart fruits, from which a refreshing substitute for lemonade can be made by steeping the crushed raw or ground fresh fruits in water and adding a sweetener. Ground dried fruits were also stored for later use. Until sugar and honey became available, most people drank the tart beverage as is, with the exception of groups who either traded for or had agave in their territory such as the Yavapai and Apache who added pieces of cooked mescal to sweeten their drink. The fruits contain tannin and were used by the Hopi as a mordant for dying wool. Long straight flexible stems obtained from young plants or deliberately burned or pruned plants were widely used to make baskets and cradle boards.

61. Leaves and fruit cluster

Sumac (R. coriaria) is an important condiment and flavoring in Middle Eastern cuisine. The ground fruits are used to flavor rice, lentil dishes and meats. The meal is inexpensive and readily available in ethnic markets.

Archaeobotany:

Carbonized pits are occasionally found in Southwestern archaeological sites. The preferred preparation methods of either directly soaking the raw fruits in water or grinding them into meal greatly diminishes the opportunity for preservation. Sumac baskets, some of them several thousands of years old, have been recovered from cave sites.

62. Whole and ground fruits

Health and Nutrition:

Sumac fruits provide a number of important nutrients. A 100 gram serving of fresh fruits contains 328 calories, 9 gm of protein, 16 gm of fat and 37 gm of carbohydrates. They are a good source of minerals and vitamins, with significant amounts of sodium, phosphorus, calcium, magnesium, potassium, iron, and zinc. They also contain more than 10,000 IU of vitamin A and 29 mg of vitamin C.

63. Shoots from pruned base preferred for basketry

64. Navajo Wedding basket made with Sumac rods

RESOURCES

A more detailed list may be found at the Maxwell Mueum's website: http://maxwellmuseum.unm.edu

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National Institute of Diabetes and Digestive and Kidney Health: http://www2.niddk.nih.gov/

The Glycemic Index Website: http: http://www.glycemicindex.com

USDA NRCS Plants Database: http://plants.usda.gov/

Ethnobotany Events

Living Desert Zoo and Gardens State Park Annual Mescal Roast, in May, Carlesbad, NM: http://www.emnrd.state.nm.us/prd/Mescal-Roast.htm

Malki Museum Agave Harvest and Roast annual event, Banning, CA: http://www.malkimuseum.org/

Some Albuquerque Sources for Products:

Talin International Market, Café Istanboul, El Mezquite Market, Pro Mexican Market, Persian Market

Mail Order Products:

Omega 3 Chia Seeds http://www.chiagrowers.org/index.html

Montina Ricegrass Flour http://www.amazinggrains.com

A & J Family Farms Mesquite and Prickly Pear products http://www.socorro-nm.com/A&J-farms.htm

Sadaf Foods http://www.sadaf.com

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