

The background of the entire cover is a close-up photograph of numerous ancient, round, flatbreads. These breads are heavily textured, showing a mix of brown, tan, and grey tones, suggesting they are made from ancient grains and have been preserved for a long time. They are piled together, filling the entire frame.

# *PREHISTORIC & EARLY HISTORIC FOOD CROP DIVERSITY*

NOURISHING TUCSON, A UNESCO  
CITY OF GASTRONOMY

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# INTRODUCTION

In December 2015, Tucson, Arizona joined the UNESCO Creative Cities Network as the first City of Gastronomy designated in the U.S. In the months that followed, local, national and international attention was directed to the 4100 year antiquity of food cultivation documented in the Tucson Basin—an agricultural tradition as long or longer than that in any metro area north of Mexico. In addition, the UNESCO designation generated renewed interest in the remarkable survival of diverse food crops and the traditional culinary and horticultural knowledge associated with them. Both the crops themselves and time-tried knowledge for managing them may have enhanced relevance to our food security in the face of climate change.

On the same day as the UNESCO designation, the University of Arizona established the Center of Regional Food Studies to serve as the college's official partner to the City of Tucson in documenting, researching and educating the public regarding Tucson's historic foodways and recent innovations in its food systems. What better starting place that to remind Tucson's citizenry and visitors of the distinctive food crop species and varieties of its "foodshed" that underlie the culinary history of the region?

The many social, cultural and economic issues relating to concepts of heritage foods, heirloom vegetables and local food sovereignty remain highly debated and for some, deeply contested. For that reason, we have not attempted to iconize or reify any concept of "heritage" or "heirloom crop" in this publication that might inadvertently undervalue, ignore or dismiss the many other expressions of biological and cultural diversity in our food system. The attached descriptions and summary table presented here are but the first steps in Tucson's own assessment of how to better identify, safeguard, take pride and pleasure in the many horticultural and culinary assessments that it has historically shared with surrounding communities and cultures. Many of these assets are not restricted to the Tucson Basin, and deserve attention and care wherever and with whomever they occur.

We welcome your comments, suggestions and corrections to this preliminary inventory.



## GRAINS AND LEGUMES

### **AMARANTH, ALEGRIA, GUEGI, HUATLE** (*Amaranthus cruentus* and *A. hypochondriacus*).

Domesticated over four thousand years ago in tropical Mexico, amaranths were traded northward and grown in the Tucson Basin by late prehistoric times. These multi-purpose crops produce a small cereal-like grain that is rich in lysine, tender, spinach-like leaves rich in calcium and iron, and in some cases, red dyes used in coloring corn breads such as *piki* wafers. Old varieties remain vulnerable.

**BARLEY, CEBADA** (*Hordeum pusillum* and *H. vulgare*). Prehistorically, a semi-domesticated little-leaf barley (*Hordeum pusillum*) was grown in both Arizona and New Mexico. The cultivated forms once grown in the Tucson Basin are now extinct north of the border, although Nabhan found weedy forms still growing in the floodwater fields of the western O'odham in the 1980s. The domesticated barley from Asia (*Hordeum vulgare*) was introduced to San Gabriel on the Rio Grande near present-day San Juan Pueblo in 1600, and to the fields on the Santa Cruz floodplain surrounding the mission of Tumacacori, Arizona in 1701. In both watersheds, barley was grown as a grain for breads and porridges, and for animal feed, well into the 1950s. The original varieties introduced by the Spanish may now be extinct.



**GRAIN CHENOPOD, HUAZONTLE (*Chenopodium berlandieri*).** Grown prehistorically in the U.S. Southwest and Mexico, this plant produces leafy greens, an edible flower stalk with a flavor reminiscent of Brussel sprouts, and a seed ground into a quinoa-like flour. Its seeds recovered from archaeological sites in the Tucson area are difficult to tell from its wild relative, lambsquarters, but both have likely been used since the mid- to late-prehistoric eras. According to Amadeo Rea, it was grown by the River Pima of central Arizona into the late nineteenth century, when the irrigation supplies were usurped by Mormons upstream. It remains in cultivation in the Sierra Madre foothills of western Chihuahua, but can be considered endangered there and extinct north of the border.

**CORN/MAIZ (*Zea mays*)**

Probably domesticated along the Rio Balsas of southern Mexico 8000-9000 years ago, corn reached the Tucson Basin 4100 years ago, before being grown at nearly any other known site in the present-day U.S. Corn has not only provided staples and fermented beverages in the Tucson Basin, but also has many ritual uses. Various kernel colors are selected for ritual symbolism and for feast foods, while their pollen is collected for ceremonial and medicinal purposes. Some, like Chapalote, went extinct north of the Mexican border but have been reintroduced; the others are increasingly rare and vulnerable.

**SONORAN PANICGRASS, SONORAN MILLET, SAGUI (*Panicum hirticaule* var. *sonorum*).** A golden-seeded millet-like grain produced on multi-headed grass stems reaching three to four feet in height, Sonoran panic-grass is a semi-domesticated cereal unique to the U.S. /Mexico borderland states. Prehistoric caches of the seeds have been found by archaeologists from the Colorado River all the way to the Santa Cruz near Tucson, in both Hohokam and Patayan ruins. A few samples have been recovered archaeologically in the Tucson Basin. Its flour is light, pleasant-tasting and excellent for tamales and tortillas. Sagui was historically cultivated by Colorado River tribes of Arizona, Sonora, and Baja California, and by others in the Sierra Madre in Chihuahua and Sonora. The damming of the Colorado River drove it into extinction in the United States, but it has precariously persisted as a cultivated grain among the Guarijio of Chihuahua. Endangered.

**SORGHUM, SORGO, MILOMAIZ, HEGARI (*Sorghum bicolor*).** Originally from Africa, this multi-purpose crop was introduced to the Tucson Basin in the early 1800s as a forage, broom fiber, grain, sugar, and syrup. This heat-and-drought hardy plant is prolific. The stalks are chewed or pressed for their sweet juices, and Navajos continue to make beautiful juniper-handled brooms from their seed stalks. Hegari has become increasingly rare as other improved varieties replace it.

**WHEAT, TRIGO (*Triticum aestivum*).** Bread wheats were introduced from the Mediterranean to Sonora by 1630 and to southern Arizona around 1690. They were eagerly adopted as the major winter crop in Baja California, then Sonora, California, and Arizona, not replacing but complementing corn. White Sonora, a soft white bread wheat, was planted in November or December, and harvested in May or June. The O'odham, Yoemem and neighboring Sonorans developed enormous wheat flour tortillas which they wrapped around beans or meats before deep-frying, creating the now world-famous *chimichanga*. During the Civil War, the Gila and Santa Cruz valley fields of the Pima and Maricopa O'odham produced millions of pounds of bread meat that supplied nearly all Yankee and Rebel troops west of the Mississippi watershed with their grain. Damming of rivers, usurpment of farmlands, and demise of grinding mills has ended the traditional wheat era in the region. White Sonora, once rare, is on the rebound, as is Pima Club to a lesser extent.

**FAVA BEAN, BROAD BEAN, HABA (*Vicia faba*).** These large-seeded legumes were introduced by the Spanish to the Southwest before 1630, and were established around the missions of Santa Cruz watershed by 1706. They were soon adopted by both indigenous and Hispanic farmers for cool season agriculture. The large seeds are eaten both green and dry. Favas are efficient nitrogen fixers of all the annual legumes, making them a good cover crop. Southwestern land races are now rare.



**GARBANZO, CHICKPEA (*Cicer arietinum*).** These legumes, originally from the Fertile Crescent, were introduced by the Spanish into the Southwest along the Rio Grande by 1630 and spread to the Santa Cruz and other watersheds by 1700. Native Americans and Hispanics historically ate the beans green and dried. Uncommon in the Southwest.

**COWPEA, BLACK-EYED PEA, YORIMUNI (*Vigna unguiculata*).** Heat-tolerant legumes introduced to the Tucson Basin by Padre Kino in 1690, cowpeas are good producers in the low, drought-prone deserts. They are eaten green (immature) in goat cheese soups, or dried, shelled, and boiled. The O'odham dry pea has recently been revived by O'odham farmers associated with the San Xavier Co-op south of Tucson. The Chinese introduced yard long beans of this same species, selling them in the Tucson area between 1870 and 1930. Vulnerable.

**JACK BEAN, FRIJOLON, WHITE AZTEC (*Canavalia ensiformis*).** Arising from purple flowers, these large, white flattened beans are produced in enormous papery pods that reach eighteen inches in length. The jack bean was grown prehistorically by Prehistoric Puebloan, Hohokam, and Salado. The jack bean persisted in present-day Arizona in just a few indigenous communities into the twentieth century, but has since died out, perhaps due to its high water demand, its need for long days, and its small percentages of an amino acid, canavanine, that becomes toxic when eaten in large doses. Although the original land races are extinct in the Tucson Basin, new introductions are occasionally grown today in Baja California, New Mexico and Colorado. Endangered.

**LENTIL, LENTEJA (*Lens culinaris*).** Lentils were introduced into northern New Mexico before 1630, and into Arizona and Sonora by 1690. They became an important winter and spring crop, to be harvested in May. The tan and gray-brown lentils of the Tucson Basin are relatively large compared to others from northern Mexico. Formerly grown by O'odham on both sides of the border, they have become rare as drought and land use changes have diminished O'odham dry farming during the cool season. Rare.

**LIMA BEAN, FRIJOL ALUBIA, SIEVA (*Phaseolus lunatus*).** Undoubtedly the most delicious lima beans in North America, these desert land races have been cultivated in the Santa Cruz and Colorado watersheds since prehistoric times. These lima varieties are broad, flat beans that are colorfully mottled. They are eaten ceremonially as sprouts in underground *kivas*, or the dried seeds are boiled and baked. These lima varieties are tolerant of salt and alkaline soils, and their resistance to root-knot nematodes historically saved the Southern California lima bean industry from dying due to this pest. All Sonoran Desert land races are rare, and several merit endangered status, although the Pima and San Xavier O'odham have begun efforts to revive their traditions.

**PEA, CHICHARRO (*Pisum sativum*).** These winter and spring legumes of Asia and the Mediterranean were introduced to San Gabriel (north of Española) around 1600 by early Spanish colonists of New Mexico, and around 1730 to central Sonora. Smooth-skinned yellow-green dry peas were introduced and adapted to the Sonoran Desert in the seventeenth century. These winter legumes are both nitrogen-fixing and resistant to Texas Root Rot, and were therefore used in rotations to reduce the rot's effects on cotton and other crops. Although seldom grown anymore by the O'odham and River Pima, some Anglo and Hispanic farmers maintain them as a cover crop in their rotations to reduce root rot in their fields. They are excellent for soups and stews. Uncommon.

**TEPARY BEAN, TEPARI, YORIMUNI (*Phaseolus acutifolius*).** The center of diversity of tepary beans is in driest, hottest stretches of the Sonoran Desert, although they were first domesticated in the subtropics of Mexico. They have been recovered from prehistoric sites in the Tucson Basin, and promoted by the University of Arizona's College of Agriculture since 1912. All varieties share a distinctive, nutty texture and sweet flavor reminiscent of molasses or maple sugar. Tepary beans mature quickly and root deeply to avoid drought, and most land races are tolerant of high heat and alkaline soils. Of the roughly fifty-six historic land races found in the region a century ago, only eight of them have survived, in addition to the Dorado and Blanco selections made by W.D. Hood of Coolidge Arizona in the 1970s. Although saved from extinction as a cultivated species, several land races of tepary beans remain threatened.





## VEGETABLES

**BITTER GOURD, BALSAM PEAR, BALSAMO (*Mormodica charantia*).** This edible but bitter, cucumber-shaped gourd or melon was introduced to the Tucson Basin sometimes between the 1870s and the time of statehood for Arizona in 1912. It is an annual vine that climbs while producing dark green to yellow-orange fruit. The fruit are picked when immature to be cooked in curries or pickled. The mature fruits are both bitter and poisonous. The young stems and leaves can also be eaten. Rare.

**CHILE PEPPER, CHILE (*Capsicum annuum*).** One of Native American and Hispanic contributions to the savory cuisines of the world, the chiles of this region are not merely grown for their heat, but for their varying shapes, sizes, colors, pungency, fragrances and flavors. Chiles were domesticated in the Puebla-Oaxaca region of Mesoamerica 6000 years ago, but did not reach into regions north of the present-day U.S./Mexico border until after 1500. The cultivated varieties are used fresh, sub-dried as whole pods, or smoked, then ground into chile powder. Unfortunately, recent introductions of improved chile cultivars have been grown alongside the land races, facilitating cross-pollination, which has “swamped out” some of the original traits of heirloom chiles. Paul Bosland and Eric Votava project that as much as a fifth of Southwestern land races have already been genetically contaminated by gene flow from improved cultivars. Vulnerable to further genetic contamination.

**CHILTEPIN, CHILE PEQUIN (*Capsicum annuum* var. *glabriusculum*).** This wild relative of domesticated chiles has been harvested, consumed, culturally dispersed, protected, and cultivated for centuries on a small-scale in southern Arizona. The northernmost limits of its natural distribution is thirty miles south of Tucson near Tubac and Tumacacori, where wild harvests persisted into the 1970s. Historically, dried chiltepin fruit were traded northward as far as the Grand Canyon. Yoemem (Yaqui), O’odham and some Sonoran immigrants to Tucson actively cultivate and select this chile for cold hardiness, piquancy and flavor. It is grown both as an annual and as a perennial, and well-protected plants can live for more than a quarter century. Common, but vulnerable to increasingly frequent droughts and freezes.

**CHINESE BROCCOLI, GAI LAN, KAI LAM (*Brassica oleracea* var. *alboglabra*).** This vegetable has kale-like oblong grey-green leaves as well as floral clusters which resemble broccoli. Its ultimate origins are unknown, but it appears that Portuguese sailors widely dispersed this cabbage relative throughout Asia, and that Chinese farmers and day laborers brought it to the west coast of North America. It arrived in the Tucson Basin soon after the 1870s. Its crisp texture and slightly bitter flavor favor its use as a cooked vegetable in stir fries, often cooked with oyster sauce. Rare here.

**CHINESE FLOWERING CABBAGE, PAK CHOY SUM (*Brassica rapa* var. *parachinensis*).** Yet another Chinese introduction to the western region of North America, this annual resembles a non-heading cabbage or *pak choy*. It likely originated in Southeast Asia, but has spread to all parts of the world. It is still grown among farmers of Chinese descent in Arizona and Sonora nearly a century and a half after their ancestors introduced it to irrigated gardens and fields in the desert surrounding Tucson. The first variety introduced to the Tucson Basin is likely now rare.

**FUZZY MELON, WAX GOURD, CALABAZA BLANCA, MAO GUA, DON GUA (*Benincasa hispida* var. *chiequa*).** This creeping vine produces small, cucumber-like fruits that are hairy and slightly waxy. They are ancient cultigens from Southeastern Asia, with no close wild relatives remaining there. The flowers, leaves, and mature fruit are all eaten in soups, stews and curries, while the young fruit are pickled or eaten raw like cucumbers. They were introduced to the Santa Cruz River valley sometime after the 1870s by Chinese market gardeners, who sold them in Oriental corner groceries in downtown Tucson. The first variety of this gourd introduced to the Tucson Basin is also likely to be rare today.





**GARLIC, AJO (*Allium sativum*).** Now an essential ingredient of salsas and other traditional foods of the Tucson Basin, the bitingly sharp pink and purple softneck garlic varieties still found in Sonora and southern Arizona were brought in as cultivated perennials by Spanish and Arab immigrants three centuries ago, and have become wild in some parts of the region. Still common.

**MELON (*Cucumis melo*).** Melons were among the earliest Spanish introductions to the Santa Cruz, Gila and Colorado watersheds, sometime before 1700 AD. Cassava-like, cantaloupe, and Persian varieties appear to have been introduced to the Tucson Basin prior to Arizona statehood. Today, the fruits are more varied than they were historically, with orange, green, or white flesh and skins that are smooth, ribbed, or netted. This may be due to intentional selection or genetic contamination through accidental hybridization with modern improved cultivars. Vulnerable.

**ONION, CEBOLLA (*Allium cepa*).** Introduced by the Spanish to San Gabriel on the Rio Grande around 1600, and to the Kino Missions in Sonora and Arizona by 1700, sweet yellow onions and shallots quickly became essential plantings in winter and spring gardens throughout Chile Pepper Nation. The so-called l'ittoi onion in cultivation is not derived from a native wild onion of the same O'odham name that grows below Baboquivari Peak; it is a shallot introduced from the Old World, and is now one of the most heat-tolerant onions grown year-around in the Tucson Basin. For decades in the twentieth century, a sweet yellow onion was grown in Cochise County, Arizona for the Tucson market. Still common from Tucson to Ajo, Arizona.

**SQUASH, PUMPKIN, CALABAZA (*Cucurbita* spp.)** Squash fruits have blessed the Tucson Basin for roughly four millennia, and their different species and varieties vary in shape, color, flavor, and culinary use. Flowers, seeds, and tips of vines are all edible. All fruits can be eaten when small and immature as summer squash, or when mature, as winter squash. Oddly, native heirlooms of the first pumpkin to arrive in the region, which were akin to acorn squashes (*C. pepo*), are most likely extinct north of the border, and restricted to the high

sierras south of the border. Green-striped cushaws (*C. argyrosperma*) and the big cheese pumpkin or segualca (*C. moshata*) are old varieties still common in Tucson marketplaces, while the winter pumpkin or Hubbard squash (*C. maxima*) was likely introduced to Tucson by Chinese railroad workers or the military in the 1870s. Most land races of our region are still common.



**SUNFLOWER, GIRASOL (*Helianthus annuus*).** Domesticated in northeastern Mexico or the adjacent U.S. border area, sunflowers were initially introduced in prehistoric times to the Mississippi watershed, but came to the Tucson Basin in late prehistoric times. The seeds are eaten raw or roasted, pressed for oil, planted as an ornamental or used for bird feed. Although old varieties from the Tucson Basin are now extinct, purple-black varieties from the Colorado Plateau are sometimes grown by basket weavers living in southern Arizona. By the 1970s, there had been genetic contamination through accidental hybridization with modern improved cultivars such as Mammoth Russian. Vulnerable and increasingly rare as a food and dye crop.

**TOMATILLO, MILTOMATE (*Physalis philadelphica* var. *philadelphica*).** Wild versus domesticated tomatillos, the small green “husk tomatoes,” are difficult to tell apart in the archaeological record. However, early historic cultivation is known in the region and it is likely that some of the prehistoric seeds found in the Tucson Basin were either intentionally tended or harvested from weeds. One native Southwestern land race persists, but others are recent introductions from Mexico. They are used to make traditional and savory green salsas and stews. True tomatoes were introduced in mid-to late historic periods, some of them from Europe. Tomatillos, in contrast, are more closely related to “Chinese lantern” ground cherries and Cape gooseberries. Uncommon.



**WATERMELON, SANDIA (*Citrullus lanatus*).** An African native introduced by the Spanish to Mexico, watermelon seed was rapidly traded northward, reaching the Santa Cruz, Gila, and Colorado watersheds prior to explorer Oñate's arrival in 1598, and prior to Kino in the Tucson Basin in 1690. Fruits vary in size and color of flesh and rind, with yellow and pink ones historically important in this region. Seeds are eaten and used for their oil. Old varieties are uncommon but vulnerable to outcrossing.

**WATER SPINACH, BATATA ACUATICA, ONG CHOY, KANGKONG, WENG CAI (*Ipomoea aquatica*).** This semi-aquatic plant with trailing stems can be grown as an annual or perennial. Resembling a sweet potato vine, it has arrow-shaped leaves and pinkish-white flowers. It may have originated in India or Africa, but has spread to coastal wetland agriculture around the world. Its leaves and stems are cooked like spinach, while its fresh leaves are also eaten in salads. Late in the nineteenth century, Chinese immigrants to the Tucson Basin began to grow this plant in tail-water ponds on the edge of irrigated fields, or in the wettest places within their dooryard gardens. They were sold in corner grocery stores run by Chinese merchants. Rare or extinct in our region.

## Cultivated Perennial (Mostly Orchard) Crops

**AGAVES, MAGUEY, MESCAL, INCLUDING THE HOHOKAM AGAVE, (*Agave murpheyi*) AND HUACHUCA AGAVE (*Agave parryi* var. *huachucensis*).** Close kin of the blue tequila agave, these agaves have been cultivated or harvested from the wild for many centuries, and pit-roasted for food and drink. Their cultivation stretches from Sonora northward to the Mogollon Rim in central Arizona. Another species, the bacanora agave (*Agave angustifolia*.), was apparently harvested, roasted, and fermented south of the border, but distilled, bottled and distributed in Tucson by Julius Goldbaum in the late nineteenth and early twentieth centuries. Prohibition made this illegal, although bootleg *bacanora* clandestinely remained in trade between Arizona and Sonora. The smoky, complex flavors of mescals are making a comeback in the global marketplace, but commercial products are seldom as good as the home-brewed artisanal ones made by bootleggers. Uncommon in the wild, and rarely used for food or drink anymore.

**ALMOND, ALMENDRA (*Prunus dulcis*).** Almonds first came into the Southwest in a delivery to Juan de Oñate at San Gabriel on the Rio Grande of New Mexico in 1698. The Mission Almond, first described in 1891, jumped from Texas and New Mexico over to Arizona and California much later, where they persist to this day. They have been an essential element of Arabic-influenced cuisines in the region for centuries. Rare to uncommon

**APPLE, MANZANO (*Malus x domestica*).** Apples were first introduced to Manzano New Mexico in 1633 and to the Kino missions of Arizona and Sonora before 1706. Border explorer John Bartlett saw apples, along with pears and peaches in an orchard at a hacienda west of Tucson in 1852. Numerous Spanish-introduced "manzanita Mexicana" apple seedling varieties of some antiquity remain in Hispanic orchards elsewhere in the region, but most are unnamed and are now rare.



**APRICOT, CHABACANO, ALBARICOQUE (*Prunus armenica*).** Apricots were brought from the Mediterranean to the Rio Grande in the 1630s, and to the Hopi Mesas and Sonoran missions not long after that. They are hard, long-lived trees that produce many seedling apricot varieties that go unnamed. Mormon seedling varieties have proliferated around many Arizona homesteads and ranch houses. Common.

**CHERRY, CAPULIN, CEREZO (*Prunus avium* and *P. salicifolia*).** Many wild cherries occur in North America, but domesticated cherries from the Old World were introduced to the New Mexican Pueblos of the Tewa Indians by 1630. In the late nineteenth century, Archbishop Lamy of Santa Fe disseminated an oxheart cherry variety throughout the Southwest that produced two harvests of fruits per season; Lamy's closest friend, Fr. Joseph Machebeuf likely carried this and other fruit varieties from Santa Fe to Tucson when he was charged with rebuilding the Cathedral of Saint Augustine. The Mexican sand cherry or capulín has also been grown in southern Arizona since early historic periods. Rare or uncommon north of the border.

**CHOLLA CACTUS, STAGHORN x BUCKHORN CHOLLA HYBRID, CHOYA (*Cylindropuntia versicolor* x *echinocarpa*).** Numerous species of cholla cacti have been tended and sometimes cultivated for their tender flower buds in house yards by O'odham and other residents of southern Arizona, northern Sonora, and New Mexico. However, one of the most curious cholla cacti is a hybrid which occurs only between Tucson and Sells that is particularly esteemed for the size and flavor of its tender buds. Cholla buds continue to be harvested in the spring, and after their spines and glochids are brushed off with brooms and screens. They are either pit-roasted or boiled, then sun-dried for later use. The hybrids with the best cactus buds for eating have been cultivated in dooryard gardens for centuries. Uncommon.

**CITRUS, INCLUDING MEXICAN LIME, LIMON (*Citrus aurantifolia*), LEMON-ORANGE, NARANJA-LIMA (*Citrus limetoides* SOUR ORANGE, NARANJA AGRIA (*C. x aurantium*), SWEET LIME, LIMON CHICHONA (*C. limetoides*), PUMMELO, POMELO (*C. maxima*), CITRON, CIDRA (*C. medica*) ORANGE, NARANJA (*C. sinensis*).** These citrus species and some of the hybrids originally came from the Asian tropics, including from India. Several cross-breeding citrus varieties spread across North Africa into Spain and Portugal and then to the Canary

Islands. They were brought to the Americas by Spanish and Portuguese explorers in the early part of the sixteenth century where they have continued to hybridize and generate new cultivars. They are frost-sensitive, and typically require irrigation, but they are heat tolerant. The Mexican Limón and other citrus were introduced to Sonora and Arizona missions around 1700. Uncommon for the most part.

**DATE, DATIL (*Phoenix dactylifera*).** Date palms from the Middle East and North Africa were introduced to Hermosillo by 1700, and rapidly spread to desert oases in northern Sonora and southern Arizona. The varietal diversity in southern Arizona and California was augmented in the early 1900s by several collection expeditions to North Africa. The Black Sphinx variety occurs only in southern Arizona, and this rare sport was discovered by Roy Franklin in 1922 as a chance seedling that grew up around Hayani date cuttings at the Sphinx Ranch plantation in Phoenix, where some 23 date varieties had been brought from Arabia in 1917. The owners, the Brophy and McChesney families, propagated it by crown separation, and by 1931, they tended 156 Black Sphinx date palms in their plantation. It soon became one of two highly-prized and expensive varieties in Arizona, and has been lauded by the likes of President Dwight D. Eisenhower and Alice Waters of Chez Panisse in Berkeley. Endangered.

**FIG, HIGO, HIGUERA (*Ficus carica*).** While three edible species of wild figs occur within the Sonoran Desert, domesticated figs were not introduced into the region until 1668 at El Paso, the early 1700s at Tumacacori, and 1795 at the Alta California missions. The O'odham name for figs, *suuna*, came to them through Spanish from Arabs and Berbers of North Africa, where the terms *tuun*, *tiin*, or *tuna* referred to figs, dates or olives at different points and places in history. They are tolerant of heat, drought and alkaline soils. The Black Mission fig is among the oldest and best known in the Tucson Basin. Still common.

**GRAPES, UVA, PARRA (*Vitis vinifera*).** The wild Arizona grape (*Vitis arizonica*) is abundant in the well-watered canyons of the Tucson Basin, where it is still used as a rootstock and to make jellies. Domesticated Mission grapes arrived in the region at Socorro, New Mexico in 1620 and spread throughout the region. Many other varieties were introduced as well, and over two dozen are commercially cultivated in the eastern Tucson Basin near Vail, southward toward the Sonoita Plains. Both Arizona wild grapes and cultivated Mission grapes are common and not in danger.





**JUJUBE, CHINESE DATE, DATIL CHINO (*Zizyphus jujube*)** This small tree or shrub with date-like fruit arrived in the Mediterranean region from China during the height of the Roman Empire. By 1837 it had to the Eastern seaboard and quickly diffused westward; Chinese railroad workers also brought it with them to California and northern Mexico in the 1870s, including a cultivar that was officially named Giant in 1887. In 1908, plant explorer Frank Meyer introduced many additional superior varieties directly from China. Jujubes remain present in many of the barrios around downtown Tucson where Mexican and Chinese railroad workers lived and first planted these trees over 130 years ago. Some of these jujubes have become wild as volunteers in Tucson neighborhoods. Common.

**LOQUAT, NISPERO (*Eriobotrya japonica*).** Originally from China, this small evergreen tree with long, leathery leaves is sometimes called Chinese plum or medlar. Its Spanish name, *nispero*, was originally applied to the Mediterranean medlar, which was introduced to the Southwest in the 17<sup>th</sup> century, but did not persist. Like the jujube, the loquat is thought to have been introduced to Tucson by Chinese railroad workers in the 1880s. It had become well-established as a garden plant in California by the 1860s. Common.

**OLIVE, OLIVA, ACEITUNA (*Olivea europea*).** Olives from the Mediterranean were introduced by the 1690s to Baja California, and by the 1750s to Arizona and California. These original Mission olives are frost-sensitive, but heat-tolerant and long-lived. Historic trees of this variety and others persist in the Tucson Basin, as do northern African introductions of several distinctive varieties planted on the University of Arizona by its former dean of agriculture, Robert Forbes, around World War I. Mission olives are now uncommon to rare.



**PEACH, DURAZNO, MELACOTON (*Prunus persica*).** Peaches were first introduced to the Rio Grande before 1630 and to the Hopi Mesas by the mid-1600s; they did not arrive in Arizona or Alta California until 1795. Peaches of an unknown variety were observed near Tucson by John Bartlett in 1852. Old varieties are rare.

**PLUM, DAMSON, PRUNE, CIRUELA, (*Prunus* spp).** Although several species of wild plums are now grown in the Tucson Basin, the larger plums domesticated in the Old World were not introduced to the region until approximately 1600, when they arrived with Oñate at San Gabriel on the Rio Grande. They were similar to the Damson or Damascene type, good for drying as prunes, to be salted and eaten as *saladitos*. The Potawatomi plum (*P. munsoniana*)—a Midwestern native brought westward on the Mormon Trail—is grown in hedgerows edging Mormon settlements throughout Arizona and Utah. Uncommon.

**POMEGRANATE, GRANADA (*Punica granatum*).** A small fruit tree or multi-stemmed shrub tolerant of drought, heat and alkaline soils, the pomegranate came from the Middle East via Spain to Sonora in the 1690s, and then spread northward. Several additional varieties were introduced in the early twentieth century and persisted for decades around abandoned homesteads. A new pomegranate industry is developing in Southeastern Arizona based on the health benefits of pomegranate anti-oxidants. The first varieties introduced to the Tucson Basin are now likely to be rare.

**PRICKLY PEAR, NOPAL, TUNA (*Opuntia engelmannii* and *O. ficus-indica*).** It appears that prickly pear cacti were historically harvested more for their edible red and purple fruit than for the vegetable-like pads in the Tucson Basin. Although it is difficult to identify which species of prickly pear occur in the archaeological record and whether they were wild or cultivated, virtually every culture in the border states—including the non-agricultural Seri of Sonora—have dispersed, transplanted and tended their favorite prickly pears for centuries, if not millennia. Extensive and incredible dense stands of Engelmann's prickly pear persist in the Tucson Basin on the flanks of the Santa Rita Mountains, not far from where some of the most abundant evidence of seasonal encampments have been documented by archaeologists. Common.

**QUINCE, MEMBRILLO (*Cydonia oblonga*).**

Although this species is native to the Caucasus region of Asia, it was introduced into the English-speaking world by 1275 A.D., and became a major raw material for marmalades in England by the sixteenth century. Because all quince cultivation declined as soft fruit became more storable in the nineteenth century, little is known of the origins of particular varieties. However, it was introduced into Tucson Basin by Spanish missionaries from the Mission Dolores in Sonora in 1689, and has become a culturally important fruit in many Hispanic communities in the Southwest. It persists as a feral plant around homesteads, mining camps and springs throughout southern Arizona. Uncommon but not threatened.

**WOLFBERRY, GOJI, SALICIESO (*Lycium* cf. *berlandieri* & other species, including *L. barbarum* and *L. chinense*).** New World relatives of the goji berry domesticated in China, wolfberries are consistently found growing on or around prehistoric and historic ruins of Native American settlements centuries after their abandonment. Several species appear to have transplanted, tolerated, protected, or cultivated in the Southwest, but *L. berlandieri* is among the most prominent in the Tucson Basin. Its fruit were eaten fresh, dried in the sun, or boiled down into a heavy syrup for year-around storage and use. Through the 1980s, Pima Indian families would harvest hundreds of pounds of wolfberries in the spring for freezing or syrup making. Native wolfberries are common in the Tucson Basin, but the earliest Chinese goji berries have likely been lost.

**TURKEY, PAVO, GUAJALOTE, COCONO (*Melleagris gallopavo*).** Known from prehistoric times in the borderlands states, domesticated turkeys, like macaws, may have regularly been imported from the south through the great trade center of Casas Grandes (Paquimé). Some archaeologists suggest that the wild Merriam's turkey found on the edges of the Tucson Basin is actually a feral domesticated breed from abandoned prehistoric populations brought up from Mesoamerica, which then hybridized with Gould's turkey. Their feathers have also been used ceremonially and in woven robes. This free-range fowl gleaned grasshoppers from Native American fields. Several varieties are still kept and eaten in southern Arizona.

**CATTLE, GANADO MAYOR (*Bos bos*.)** Derived from the Spanish criollo cattle brought to Vera Cruz in 1540, which then rapidly dispersed northward to the Rio Grande, the Criollo land race of cattle were introduced to the Sonoran Desert near Loreto, Baja California around 1690. They rapidly adapted to the brackish waters and desert conditions on the peninsula as *chinampas*, and to the thornscrub and mesquite grasslands of Sonora, Chihuahua and Arizona as *criollo corriente*. In Texas, they were bred and selected to be the widespread American land race, Texas longhorn. The North American Corriente Association has helped to register and promote the breed for calf-roping and bull-dogging competitions and for meat production throughout the Southwest. More recently, Jornada Experimental Range has been collaborating with southeastern Arizona ranchers on ecological and nutritional studies to highlight the unique adaptations on line-bred Criollos. Steaks and burgers from the most ancient lineage of cattle to reach North America have recently been featured in several Tucson restaurants. While Corrientes are increasing in number, the purer stock of Criollos left in the Sierra Madre are uncommon or threatened.

**SHEEP, BORREGO, CORDERO (*Ovis aries*).** While both Merino and Churra land races were introduced to Mexico just as early as cattle and goats, the *ganado menor* (sheep and goats) outnumbered cattle in Chile Pepper Nation for the first two centuries after they arrived with the Spanish. Once widespread, the Navajo-Churro Sheep are derived from the Churra land races of northern Spain. These sheep are the oldest extant breed native to North America. After the Pueblo Revolt in 1682, they adapted to the semi-arid conditions of the Rio Grande and Colorado Plateau. Their double fleece comes in at least eight different colors and their wool soon became the source of weaving industries among the Hispanic and Indian rug weavers of Chile Pepper Nation. Their meat is also highly prized for its lean, grassy flavors that seldom get overpowered by a musk, even when the animals are mature. Only 500 individuals survived into the 1970s, when tribes, universities and non-profits joined together to recover the breed. Today, more than 5,000 individuals are registered through the Navajo-Churro Sheep Association, and Slow Food is working with four other organizations on a Navajo-Churro Sheep Presidium to benefit native sheepherders. They are raised within 75 miles of Tucson, and are recovering as part of a regional food tradition, but still vulnerable.





# TUCSON'S EXTANT, PREHISTORIC, OR HISTORIC FOOD CROP VARIETIES

Scientific name	Common Name	Parts used	Spanish name	Native names
<i>Achnatherum hymenoides</i>	Indian ricegrass	Seed (grain)		A'ud
<i>Agave murpheyi</i>	Hohokam agave	Meristem, leaf bases	Mezcal, Mescal, Maguey	A'ud
<i>Agave parry var. huachucensis</i>	Huachuca agave	Meristem, leaf bases		
<i>Amaranthus cruentus</i>	Coxcomb amaranth	Seed (psuedo-cereal), greens	Bledos, Quelite	Cuhukkia
<i>Amaranthus hypochondriacus</i>	Grain amaranth	Seed (psuedo-cereal), greens	Huatle, Alegria, Quelite	Guegui, Cuhukkia
<i>Canavalia ensiformis</i>	Jackbean	Seed (bean)	Frijolón, Frijolillo, Haba blanca	
<i>Chenopodium berlandieri</i>	Grain chenopod, Huazontle	Florets, seed ((psuedo-cereal),	Huazontle, Chual, Bledo	Chu'al
<i>Cucurbita argyrosperma</i>	Green-striped cushaw	Flowers, fruit flesh, seed	Calabaza Arota	Ha:l mamad, O'am ha:l
<i>Cucurbita moschata</i>	Big cheese pumpkin	Flowers, fruit flesh, seed	Calabaza Segualca	Shapijk?
<i>Cylindropuntia versicolor x echinocarpa</i>	Cholla cactus	Flower buds	Choya	Ciolim, Ha:nam
<i>Helianthus annuus</i>	Sunflower	Seeds (achenes)	Girasol	Hi:wai
<i>Hordeum pusillum</i>	Little barley	Seed (grain)	Cebada silvestre	Sha'i, Washai
<i>Lycium cf. berlandieri</i>	Wolfberry	Fruit	Salicieso, Bachata, Joso	Koawul, Kuawul
<i>Opuntia engelmannii</i>	Prickly pear	Fruit	Tuna	I:bhai
<i>Opuntia ficus-indica</i>	Prickly pear	Fruit , Pads	Nopal de Castilla	Naw
<i>Panicum hirticaule</i>	Sonoran panicgrass	Seed (grain)	Sagüi, Mijo,	Sagui
<i>Phaseolus acutifolius</i>	Tepary bean, black	Seed (bean)	Tépari negro, Yorimuni	S-cuk bawi

Scientific name	Common Name	Parts used	Spanish name	Native names
<i>Phaseolus acutifolius</i>	Tepary bean, yellow-brown	Seed (bean)	Tépari amarillo, Yorimuni	O'am bawi
<i>Phaseolus acutifolius</i>	Tepary bean, white	Seed (bean)	Tépari blanco, Yorimuni	S-tota bawi
<i>Phaseolus lunatus</i>	Lima bean, mottled	Seed (bean)	Lima, Sieva	Hawul
<i>Phaseolus vulgaris</i>	Common bean, red or pink	Seed (bean)	Frijol rosado	S-wegi mu:ñ, Wepegi mu:ñ,
<i>Phaseolus vulgaris</i>	Common bean, yellow or sulfur	Seed (bean)	Frijol bayo, Frijol amarillo	S-oam mu:ñ
<i>Zea mays</i>	Chapalote flinty popcorn	Seed (cereal) flour or popped, husk	Chapalote, Maíz reventador	
<i>Zea mays</i>	60-day 8-rowed flour or flint corn	Seed (cereal) flour, fermented, dried/ cracked or or fresh, husk	Harinoso de Ocho, Maíz onaveño	S-moik hu:ni, S-kauk hu:ni
<i>Zea mays</i>	Prehistoric popcorn	Seed (cereal) flour, fermented, dried/ cracked or fresh, husk	Maíz reventador, Maíz palomero	Hu:ni
<i>Zea mays</i>	Mexican June dent corn	Seed (cereal) used for tamales & pozole	Maíz Tuxpeño	Ju:kam hu:ni





# HISTORIC/MISSION ERA TO PRE-STATEHOOD

## HERBACEOUS CROPS

Scientific name	Common name	Parts used	Spanish name	Native names
<i>Allium cepa</i>	Shallot/I'toi's onion	Bulb, shoots	Cebollín, Cebolla multiplicadora	I'toi ciwol
<i>Allium sativum</i>	Sonoran pink-m or rose-tinged garlic	Bulb, shoots	Ajo Rosado	A:shos
<i>Benincasa hispida</i> var. chiequa	Fuzzy melon, Wax gourd	Young fruit	Calabaza blanca	Mao gua, Dong gua
<i>Brassica oleracea</i> var. alboglabra	Chinese broccoli, Chinese kale	Fleshy flower buds, Stalks	Bróculi chino	Gai lan, , Kai lam, Kai laam
<i>Brassica rapa</i> var. parachinensis	Chinese flowering cabbage	Leaves, stems, flower buds	Coliflor	Pak choy sum. Bok choy
<i>Capsicum annuum</i> var. glabriusculum	Chiltepin	Fruit	Chiltepin, chile piquín	Ali ko'okol, cocori
<i>Capsicum annuum</i>	Patagonia chile	Fruit	Chile	Ko'okol, cocori
<i>Cicer arietinum</i>	Garbanzo, Chickpea	Seed (bean)	Garbanzo	Galwash
<i>Citrullus lanatus</i>	Watermelon	Fruit, seeds	Sandía	Sacobari
<i>Cucumis melo</i>	Melon	Fruit	Melón	Ge;li ba:sho
<i>Cucurbita maxima</i>	Hubbard squash, Winter squash	Fruit	Calabaza grande, Sun gua	Nam gua, Sun gua
<i>Hordeum vulgare</i>	Barley	Seed (grain)	Cebada	Siwa:yo
<i>Ipomaea aquatica</i>	Water spinach	Leaves, stems	Batata acuática	Ong choy, Kangkong
<i>Lens culinaris</i>	Lentil	Seed (bean)	Lenteja	Lanjeki, La:nji
<i>Lycium barbarum</i> or <i>L. chinense</i>	Chinese boxthorn, Goji	Leaves, fruit	Frutilla	Gou qi cai
<i>Momordica charantia</i>	Bitter melon, Balsam pear	Leaves, stems, young fruit	Bálsamo	Fu qua, Ku gua
<i>Pisum sativum</i>	Papago (dry) pea	Seed (bean)	Alverjón, Chicharo, Guisante	Wihol
<i>Sorghum bicolor</i>	Hegari sorghum	Seed (grain)	Sorgo, Milomaíz, Hegari	Huuñ ka:nu, S-to:ta chucul huuñ
<i>Triticum aestivum</i>	White Sonora wheat	Seed (grain)	Trigo flor o Sonora blanco	'S-moik pilkañ, Tiikom, Tiligo
<i>Triticum aestivum</i>	Pima club wheat	Seed (grain)	Trigo Pima	Olas pilkañ
<i>Vicia faba</i>	Fava (broad) bean	Seed (bean)	Haba	'Aba
<i>Vigna unguiculata</i>	Black-eyed pea, Yard-long bean	Seed (bean)	Yorimuni	U'us baw, U'us mu:ñ, Dou jia, Jiang dou



# HISTORIC/MISSION ERA TREE CROPS

Scientific name	Common name	Parts used	Spanish name	Native names
Citrus x aurantifolia	Mexican (Key) lime	Fruit, juice, flowers (azahar)	Limón colima	
Citrus limetiioides	Lemon-orange	Fruit, juice, flowers (azahar)	Naranja-lima	
Citrus X aurantium	Sour orange, Seville orange	Fruit, juice, rind, flowers (azahar)	Naranja agria, Naranja amarga	Siw nalash
Citrus limon	Lemon	Fruit, juice, flowers (azahar)	Limón real	Limo:n
Citrus limettioides	Sweet lime	Fruit, juice, flowers (azahar)	Lima dulce, Lima chichona	
Citrus maxima	Pummelo, Grapefruit	Fruit, juice, flowers (azahar)	Pomelo, Toronja	
Citrus medica	Citron	Fruit, juice, Rind, flowers (azahar)	Cidra, Limón de Judea	
Citrus sinensis	Orange, sweet	Fruit, juice, flowers (azahar)	Naranja dulce	Nalash
Cydonia Oblonga	Quince	Fruit, seeds, pectin	Membrillo	Mimbli:yo
Eriobotrya japonica	Loquat	Fruit	Níspero, Míspero	
Ficus carica	Mission fig	Fruit, leaves	Higuera, Higo	Su:na
Malus x domestica	Apple	Fruit, juice, cider	Manzana	Manisa:na, Ablis
Olea europea	Mission olive	Fruit, oil	Olivo, Aceituna	Tu: na
Phoenix dactylifera	Date, Black Sphinx	Fruit, fronds	Dátil	Chukut shoshol
Ziziphus jujuba	Jujube, Chinese date	Fruit	Dátil chino, Azufaiño chino	Da zao
Prunus avium & other species	Cherry	Fruit	Capul	
Prunus armeniaca	Apricot	Fruit	Chabacano, Albaricoque	Wiragogi
Prunus domestica	Plum, Damson, Prune	Fruit	Ciruela Damacena	
Prunus dulcis	Almond, Mission	Nut	Almendra	
Prunus persica	Peach	Fruit	Durazno, Melocotón	Julashan, Nulash
Punica granatum	Red pomegranate	Fruit, juice	Granada colorada	S-wegi galniyo
Punica granatum	White pomegranate	Fruit, juice	Granada blanca	S-tota galniyo
Pyrus communis	Pear	Fruit	Pera	Pilhas
Vitis vinifera	Mission grape	Fruit, leaves	Uva misionera	U:dwis





# LIVESTOCK

Scientific name	Common name	Part used	Spanish name	Native names
<i>Bos bos</i>	Criollo cattle	Hides, meat, bloodmeal, bonemeal	Ganado criollo, Ganado corriente	Haiwani
<i>Melleagris gallopavo</i>	Domestic turkey	Feathers, meat	Guajalote, Chigüi, Cócono, Güijolo	Tohwa, Kokono
<i>Ovis aries</i>	Churro sheep	Fleece, mutton, horns	Borrego churro, Oveja	Kahwal, Kahwul



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