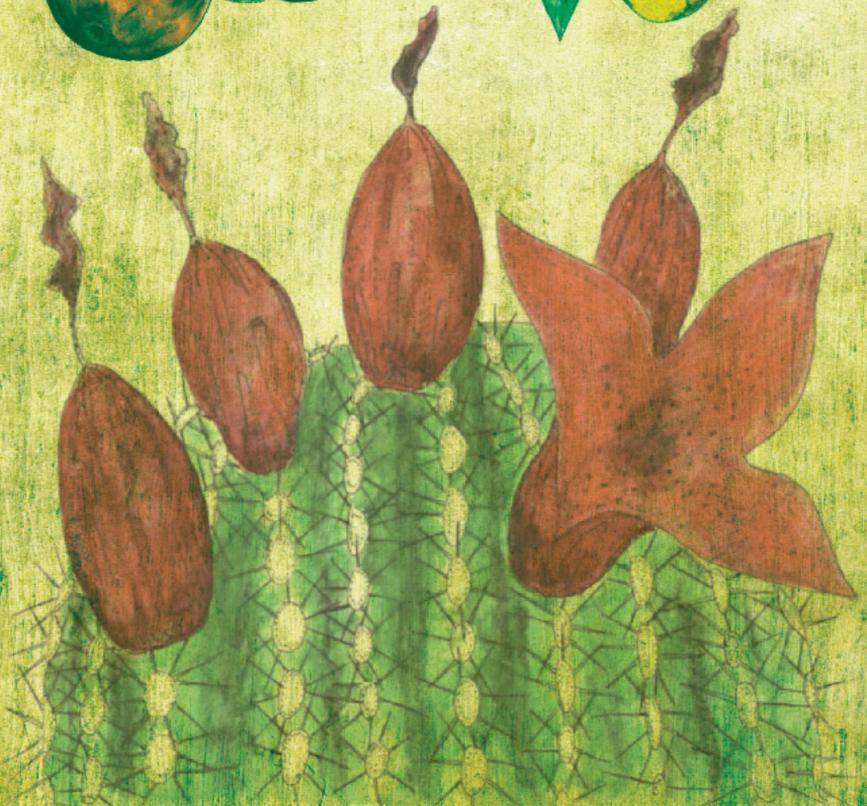
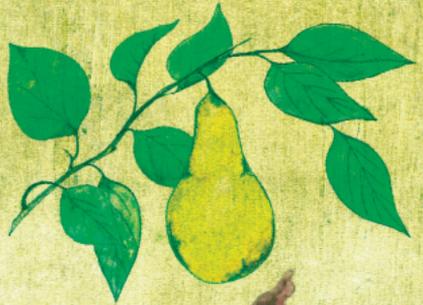




EDIBLE TREES

for Tucson



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The information in this section is excerpted from the LEAF Network's *Growing Edible Arizona Forests, An Illustrated Guide*. For more detailed information on choosing, planting, caring for and harvesting edible trees in Tucson, see leafnetworkaz.org.

CHOOSE YOUR TREES

Edible trees produce fruits, nuts, seeds and pods that suit human tastes. The trees selected in this booklet thrive in Tucson. Trees need water, the right soil, enough sun, shade and/or chill hours, pollination, space to grow, and care throughout their lifespans. Choose trees thoughtfully.

Tree water needs are key to choosing how many and what type of trees to plant. Tucson receives an average of 12 inches of rain per year. Hardy native edible trees can grow on rainfall alone, once established. Nonnative fruit and nut trees need supplemental water. To save drinking water, use on-site water sources, such as harvested rainwater from basins and rainwater collected in tanks. Harvesting graywater and air conditioning condensate water increase on-site water supplies. Be prepared to use tap water to supplement on-site sources. If you are using drip irrigation, adjust water seasonally according to the needs of the trees.

Soil conditions affect water retention, oxygen and nutrients available to tree roots, and the health of soil microbes. Arizona soils have low organic matter. Native trees can tolerate lower organic matter and higher salt, sand or clay content than nonnative fruit and nut trees. Most fruit and nut trees need well-drained soil around three feet deep. Trees grow best in a mixture of sand, silt, clay and organic material.

Microclimates are small, localized climatic conditions formed by sun, shade, wind, soil and water flow interacting with vegetation and structures in the landscape. These patterns can affect sunlight intensity, accumulated heat, wind and moisture. When choosing and placing trees, select the microclimates they prefer. Then harness and/or modify microclimates using tree and structure placement, irrigation, mulch, sun and frost protection and other strategies. In Tucson, winter sun and warmth shine on the south side of buildings and trees, with deep shade on the north side of buildings. In summer, it is hot and sunny everywhere. Hot, dry winds tend to blow from the west and southwest.

Chill hours are the number of hours wintering trees must spend between 32°F and 45°F to stimulate fruit development. For trees that have chill requirements, placing them on the north side of houses provides beneficial deep shade in winter.

Pollination is the transfer of pollen from the male to the female part of a flower, resulting in fruits, nuts, berries, seeds or pods. Know how your tree is pollinated.

- **Self pollinated:** blossoms pollinated by their own pollen or pollen from another flower on the same tree. Only one tree is needed.
- **Cross pollinated:** blossoms pollinated by another tree of the same variety or another variety of the same species. At least two trees are needed.
- **Animal and insect pollinated:** trees need moths, bats, birds or insects to pollinate flowers. Be careful with pesticides that could hurt pollinators.
- **Wind pollinated:** Pollen is transferred by the wind. At least two trees of the same species should be within 50 feet of each other.

Heights and widths of trees vary with tree age, planting environment, water supply and pruning. Knowing a tree's full potential size helps you determine spacing and quantity of trees for your site.

PLANT YOUR TREES

Improve soil, harvest water and create microclimates to provide the water, sun, shade and “chill” conditions your trees need to be healthy and productive in the desert.

Always find out and mark where utility lines are located.

Do not plant trees over buried utility lines or under overhead utility lines. Use extreme caution if you are digging near buried utility lines.

Plant the Water. Create passive water harvesting depressions for the mature size of trees and construct a smaller water harvesting basins for new trees. Plant the tree slightly high in the planting hole with a depressed basin around the drip edge of the tree. Keep water and mulch away from the tree trunk.

In Tucson, the best time to plant trees is during October and November. Native desert trees can also be planted in winter and during monsoons when humidity and soil moisture are high. Because extreme heat stresses new plantings, don't plant between late April and July.

Before you dig, CALL Arizona 811 (aka Blue Stake) to mark buried utility lines between the street and your property line. (It's free!)

Plant the Tree. Dig a hole twice as wide as the spread of the tree's roots but **only as deep as the root ball**. Widen the top few inches of the hole to create a shallow sunken basin about 3 feet in diameter. This will help catch water and allow moisture to filter in slowly to the tree's roots.



Place the tree in the planting hole with the root ball resting on the bottom. Fill soil around the tree and gently compress it to avoid air pockets around the roots. Water trees right after planting so the soil settles firmly.

Top basins with a layer of organic mulch 3 to 6 inches deep, mulch such as: leaves, wood chips, straw, etc. conserves soil moisture, suppresses weeds, reduces soil erosion and compaction, and provides nutrients. Keep organic mulch from piling up against the tree trunk. Add mulch over time to maintain a thick layer.

CARE for YOUR TREES

Watering. Keep newly planted trees well watered until the roots grow into adjacent soil. Water needs are highest in April through June and decrease during July to September monsoons. Water mature trees at, and slightly beyond, the tree's drip line. Check watering depth by pushing a metal rod or stick into the soil—the rod will stop at dry soil. Periodic deep watering, at least 6 inches down into the soil, encourages deep root growth and more resilient trees.



A large water harvesting basin sized to supply water at the drip line of a mature tree. The young tree can be planted with a smaller internal water harvesting basin to supply it as it grows toward this mature size. Plant the tree on a small mound.

Feeding. Native trees are good at using nutrients from poor soils and may not need additional inputs. Fruit and nut trees have good root systems to extract water and minerals, but soil nutrients can be used up producing large fruit yields. Periodically fertilize fruit and nut trees with compost and fresh mulch to encourage new growth and higher yields.

Pruning. While native trees do not need extensive pruning, proper shaping—especially of thorny trees—is important in public spaces. Pruning young fruit and nut trees can promote sturdy branches, distribute sunlight, create more airspace, control size and make trees easier to harvest. Prune within the first few years of growth to promote correct tree structure and early fruiting.

Extreme conditions. Tucson experiences extreme heat, drought, cold and storms. Plant cold-sensitive trees in warm microclimates away from cold air pockets. If freezing is forecasted, wrap sensitive trees in sheets, blankets, cardboard or fiberglass. Most fruit and nut trees prefer full sun, but intense sunlight can burn exposed bark, leaves and fruits. Plant sensitive trees on the

east side of hardy native trees or buildings. Hang shade cloth over sensitive trees in direct sun. Mulch to conserve soil moisture.

Tree Problems. To avoid diseases, grow trees in diverse systems and keep trees well irrigated, fertilized and harvested. Prune dead and diseased branches and burn or destroy diseased or pest-infested branches. Rake, chip and compost fallen leaves and branches. Plant understory species that attract beneficial insects to prey on any damaging insects. If rabbits, squirrels, or packrats are a problem, harvest fruits early, keep fruit and debris off the ground, hang bright lights at night and keep woodpiles away from trees. Harvest soft fruits early, place bags over fruits and hang shiny objects to deter birds. Interplant with bird-friendly trees to satisfy birds and people alike.

HARVEST *your* **TREES**

Safety first when harvesting trees!

Look up for power lines, roofs and overhead obstacles. Look down for holes, tools, cactus, rattlesnakes and other hazards. Sturdy gloves, eye coverings, long-sleeve shirts, long pants and closed-toed shoes can protect you from scratches, pokes and insects. If you manage a group harvest, pay extra attention to ladder and tool safety. Be aware that bacteria, mold, fungus, bird droppings and other materials can contaminate fruits, nuts, seeds and pods, so do not collect off the ground and do not harvest food with dark spots, mold or other problems. This is especially important for mesquite pods.

Harvest times. Harvest times vary with weather, sun and wind exposure, slope, elevation, variety and other factors. Keep your eyes on the trees to judge when to harvest. Mature soft fruits should be harvested right away to avoid decay and beat the birds to them.

Prepare and Preserve. Enjoying the produce from your trees is the fun part! To increase local health and food security, share surplus with family, neighbors. Celebrate the delicious bounty, history, culture and stories of your community's edible trees.

Apple

Malus ×domestica

Rosaceae



DESCRIPTION

The Apple is a delicious, diverse fruit with thousands of unique cultivars adapted for desert to alpine regions. Leaves are deciduous, dark green, simple, alternate and finely-serrated along the margins. Five-petaled, white to pink-tinged flowers are produced in spring simultaneously with leaf budding. Fruit matures in late summer to early winter with many distinct flavors, and may be red, yellow, green, pink, or russeted. Flesh is pale yellow to white to blushed pink.

ETHNOBOTANICAL NOTES

- Originated from a wild apple species native to Central Asia.
- Wild apple forests grow in the mountains of Kazakhstan and China.
- Apples are one of the most important fruit crops worldwide.
- In Tucson, try the Anna Apple and Dorsett Golden varieties.

PLANTING NOTES

Apples are a widely adapted fruit tree, with varieties suited for all regions of Arizona.

- Chill hours: Low-chill varieties need 200-400 hours; high-chill need 800-1,200 hours.

- Height: Standard height is 20+ feet at maturity; semi dwarf is 50-60% of a standard tree; and fully dwarf is 20-40% of a standard tree.
- Lifespan: 100+ years.
- Water needs: Moderate; trees need an inch of water each week during growing season.
- Soils: Grows best on deep, well-drained sites with soil pH of 6.5-7.
- Microclimate: Plant in areas that minimize late-spring frost.
- Pollination: Cross- and insect-pollinated.

CARE

- Prune when young to encourage good tree structure, and prune when older to improve tree shape, fruit quality, production, and light in the canopy.
- Planting disease-resistant cultivars, maintaining good hygiene in the orchard, and using beneficial insects and organic sprays can minimize damage from many apple diseases.

HARVEST

Harvest times extend from late summer for early ripening varieties to late fall for winter apples, though ripening and harvest vary depending on local climates. Apples are eaten fresh, cooked, dried, preserved, juiced, and fermented into alcoholic beverages.



Apricot

Prunus armeniaca

Rosaceae



DESCRIPTION

Apricots are a deciduous tree with erect growth and a spreading, dense canopy. Leaves are ovate with a rounded base and pointed tip, and are finely-serrated along margins. Five-petaled, white to pink flowers are produced singly or in pairs and appear before the leaves in spring. This drupe fruit is yellow to orange, smooth or covered in fine hairs, usually firm, and flavored sweet to tart. The single, almond-shaped seed within is enclosed in a smooth, hard shell with three ridges on the side.

ETHNOBOTANICAL NOTES

Three known centers of diversity: northern and central China; Tian-Shan Mountains to Hindu Kush and Kashmir in Central Asia; northeastern Iran to the Caucasus and central Turkey in the Near East.

PLANTING NOTES

Apricot trees grow best in moderate temperate regions with hot, dry summers, and few spring freezes, pests and diseases.

- Chill Hours: In Tucson try low-chill desert varieties such as the “Katy.”
- Height: 25-35 feet with a 20-foot canopy.

- Lifespan: 24-40 years
- Water Needs: Moderate; produce better with one inch per week in summer.
- Soils: Prefers well-drained soils with a neutral pH and high fertility.
- Microclimates: Need full sunlight. The trees are hardy to around -40°F; however, flowers are susceptible to late-spring frosts.
- Pollination: Self- and cross-pollinated.

CARE

- Prune when young to encourage good tree structure; prune older trees to improve tree shape, fruit quality, production, and light in the canopy.
- Pests and diseases may be controlled by planting disease-resistant cultivars and through good orchard practices.

HARVEST & PROCESSING

Apricots are most commonly eaten fresh, dried or canned. Historical methods of preservation in China include smoking apricots or drying in salt. Apricot jam is used in confections; apricots are also utilized in Middle Eastern dishes. Fruits can be fermented into wine or distilled into brandy. Oil extracted from the pits is used as a flavoring.



Bay Laurel

Laurus nobilis

Lauraceae



DESCRIPTION

An adaptable evergreen tree with dense foliage and shiny, grey bark. Leaves are pointed, elliptical, thick and leathery in texture, smooth along the margins; bright green and glossy when young, darker green when mature. The leaves are crushed to release aromatic oils.

ETHNOBOTANICAL NOTES

- Native to the Mediterranean region where laurel forests used to be widespread.
- Found in natural habitats of canyons, mountainsides, and near old, stone walls.
- Laurel is a symbol of peace, nobility and victory; branches were used to make head wreaths for emperors, generals and poets.
- Now grown commercially in Turkey, Algeria, Morocco, Portugal, Spain, Italy, France and Mexico.
- Cultivars include 'Aurea,' with yellowish young foliage; 'Angustifolia' or 'Willow-leaf bay,' with narrow lance-shaped leaves; and 'Undulata,' with wavy-leaf margins.

PLANTING NOTES

Bay laurel trees are slow-growing and do well in containers, hedges, as topiary sculptures, or as small shrubs to tall trees in gardens.

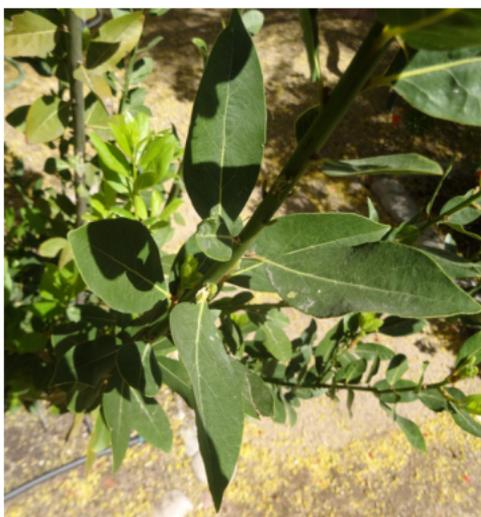
- Height: 40-60 feet in natural environments, 10-20 feet in gardens and yards.
- Lifespan: Up to a century.
- Water needs: Drought tolerant.
- Soils: Prefers well-drained soils.
- Microclimate: Partial sun, full sun, tolerates strong winds. Hardy to about 30°F. Cultivar 'Angustifolia' or 'willow leaf bay' is the most cold tolerant.
- Pollination: Male and female flowers occur on separate trees. Flowers must be cross-pollinated to produce viable seeds. Bees are the primary pollinators.

CARE

- Prune only to shape and remove dead or damaged wood. The trees may suffer cold or wind damage to the branches during winter, which can be pruned in the spring.
- Bay laurel is highly resistant to most pests and diseases.

HARVEST

Bay laurel leaves are used as a rich, aromatic flavoring for soups and stews. The leaves should be slow-cooked to impart their full flavor. The leaf is left whole so it can be retrieved before serving the dish. Bay laurel leaves are usually harvested in summer by trimming small branches off of the tree and then plucking the leaves from the branch. Leaves may be used fresh or dried. The dried fruit may also be used as a spice.



Carob

Ceratonia siliqua

Fabaceae



DESCRIPTION

The regal carob is an evergreen, spreading tree with a broad, semi-spherical crown. Sturdy trunks and branches have rough, grey-brown bark. Leaves are alternate and pinnate, at times with a terminal leaflet. Carob trees are dioecious, with male and female flowers produced on different trees. Only female trees produce pods, but male trees are needed for pollination. Carob trees flower in autumn; numerous small catkins are borne on spurs of old wood and arranged in a spiral along the floral axis. The elongated, leguminous pods may be straight or curved and take one year to develop. The ripe pods eventually fall to the ground, from September to

ETHNOBOTANICAL NOTES

- A wild carob relative is native to the Mediterranean region.
- Romans are thought to have domesticated carob trees.
- Carob cultivation peaked during the early Islamic period (approx. 600 CE).
- Carob beans were used for the carat weight unit for weighing gemstones.

PLANTING NOTES

- Chill hours: None required.
- Height: 30-feet tall with a canopy 25 feet.
- Lifespan: First seed crop produced in 6-7 years; trees live for 100+ years.
- Water needs: Very drought tolerant, though trees produce higher yields with irrigation.
- Soils: Grow on a range of soil types; tolerant of rocky, poor and saline soils. Carob root mycorrhiza fix nitrogen and make it available for other nearby plants.
- Microclimate: Choose sunny areas with adequate spacing, protect from harsh wind. Carob trees are adapted to mild, Mediterranean climates and are cold tolerant to around 20°F.
- Pollination: Trees have either male or female flowers, though limbs of male trees may be grafted onto female trees. Both are needed for pod development. Carob flowers are wind- and insect-pollinated.

CARE

Mature trees may require a light pruning to remove dead or diseased and damaged wood every 3-4 years.

HARVEST

Carob pods are used as a dark, naturally sweet, rich and flavorful chocolate substitute. The pods are ground or pounded into a fine powder, which is added to cold or heated milk and used in baking, syrups and beverages.



Kumquat

Rutaceae

Fortunella margarita and japonica



DESCRIPTION

Kumquats are evergreen citrus relatives and grow to a low-moderate size. Three different species of kumquat are grown for their fruit. The trees have a long, winter dormancy period and are considered to be *among the most cold-hardy of the citrus*, frost tolerant to 10°F.

ETHNOBOTANICAL NOTES

- Kumquats are native in the region from eastern Asia to southern China.
- They were introduced to Europe in 1846, and shortly thereafter to North America.
- Kumquats are currently cultivated in China, Taiwan, Southeast Asia, Japan, the Middle East, Europe (notably Corfu, Greece) and the southern United States.

PLANTING NOTES

- Chill hours: None required
- Height/Width: 8-15 feet tall; 5-10 feet wide
- Lifespan: 50+ years
- Water needs: Kumquat trees need about 4-6 inches of water per month in the summer; they are generally not drought tolerant.
- Kumquats grow well in pots.

- Soils: Prefers moist and well-drained soil, but will grow in various types of soil. Kumquats are prone to zinc deficiencies, which results in smaller leaves.
- Microclimates: The trees prefer sunny, open areas to reach full height and production.
- Pollination: The flowers are insect pollinated.

CARE

Kumquats need minimal pruning—only to remove dead and diseased wood and shape the tree for an open form. Trees may be prone to spider mites, white flies, scale insects, citrus viruses, stem blights, leaf spot and root rot.

HARVEST

Kumquat fruit has a gentle blend of both acidic flesh and a sweet rind; as such, the entire fruit, including the rind, may be eaten raw, cooked or candied, and can be used in jellies, marmalades and preserves, or as flavoring. To combine the flavors of the flesh and rind, squeeze and massage just before use. After ripening, the fruit gradually loses water content, becomes richer in flavor, and is then best for making preserves. Kumquat fruit is naturally high in pectin. Kumquats are typically harvested from November to April.



Elderberry *Adoxaceae*

Sambucus nigra and mexicana



DESCRIPTION

Elderberries are large, deciduous shrubs or small trees with dark- to bright-green, drooping, pinnately-compound leaves. Each leaf is composed on five to nine leaflets. Numerous small, white, perfect umbel-like or panicle flower clusters appear in early spring. The fruits mature in clusters of sweet, dark-blue berries. Only the flowers and berries are edible.

ETHNOBOTANICAL NOTES

- American elderberry species grow in all western states from west Texas, north into Canada, and south into northwest Mexico.
- Also European and Asian species of elderberry.
- Indigenous peoples across North America prize elderberry fruit. The small clusters of berries are gathered in large quantities throughout July and August to be dried for winter use, or cooked into rich sauces.
- Fruits are collected from the wild in the United States, Canada and Mexico, and commercially cultivated in Oregon.

PLANTING NOTES

Elderberry attracts beneficial insects and provides food and shelter for wildlife, especially birds. The shrub is a vigorous pioneer species and is often

used as a windbreak or living fence. Elderberry species grow from 10 feet to almost 10,000 feet in elevation.

- Chill hours: Unknown.
- Height/Width: 10-30 feet tall; 10 feet wide.
- Lifespan: 60 years.
- Water needs: 1 inch of water per week.
- Moderate drought tolerance. Drought deciduous.
- Soils: Prefers moist, rich, well-drained soils
- Microclimates: Grows in riparian and forest habitats; common in the Santa Catalina Mountains near Tucson.
- Pollination: Elderberry are cross pollinated and require another plant nearby.

CARE

Do not prune elderberry for the first two years. After that, trees may be pruned back in early spring and any dead branches removed to stimulate new, productive growth.

HARVEST

Blue or purple berries are gathered and made into elderberry wine, jam, syrup, sauces and pies. The berries are harvested in late summer (August-September) and made into juice by simmering the berries in water and then straining off the juice. The juice can be made into wine or a delicious cordial, or into syrup by adding sugar. Flower tops can also be harvested in early summer when shedding pollen, dipped in batter and fried like pancakes. Petals may be eaten raw or made into a fragrant and tasty tea. Caution should be used to collect only ripe berries and to remove stems and seeds, which contain cyanide-producing glycoside.



Fig

Ficus carica

Moraceae



DESCRIPTION

Fig trees are upright to pendulous, spreading or compact shrubs or small trees, with broad, palmate, deciduous leaves. Fig leaves are deeply divided into 3-7 lobes, which may be shallowly lobed and irregularly toothed along the margins. Trunks reach 7 inches in diameter, with multiple open branches. Branches and stems have milky sap. The fruit may be rounded to pear-shaped, and yellow-green to brown, bronze, red and dark-purple. Inside, numerous flowers are produced along the inner wall. The fleshy, fruit wall is pale-yellow to pink, red or purple. Fruits may have 30 to 1,600 seeds.

ETHNOBOTANICAL NOTES

- Fig trees thrive in Mediterranean climates: dry summers, warm winters, and little fall rains.
- Figs originated in southern Arabia and dispersed from there to Asia Minor, Syria, and the Mediterranean region.
- One of the first crops to be cultivated, figs appear in Sumerian records in 2900 BCE and Babylonian hymnals ~2000 BCE.
- Fig fruit have been found in Egyptian tombs, and references appear in the writings of Pliny, Cato and Theophrastus.
- Figs first arrived to England from 1525-1548. European figs then traveled to China, Japan, India, South Africa and Australia.

- The Spanish brought fig trees to the West Indies in 1520. They were widely established in Mexico by the late 17th century.

PLANTING NOTES

- Chill hours: Low chill requirements.
- Height/Width: 10-30 feet/15-50 feet.
- Lifespan: 30-40+ years.
- Water needs: Moderate; trees prefer 1 inch per week during growing season.
- Soils: Grow in a wide range of soil types.
- Microclimates: Fig trees are generally cold hardy to 10-20°F.
- Pollination: The “common” fig has female flowers that do not need cross pollination to set fruit, though some produce larger fruits if cross pollinated.

CARE

- Young trees must be trained to have strong support limbs to carry heavy crops. Pruning and removal of dead branches keep structural integrity, improve light penetration and promote growth.
- Pathogens include *Botrytis cinerea*, particularly in wet spring weather, and *Phomopsis cinerascens* that infects stem wounds and causes fig canker.
- Fig root-rotting fungi can affect trees and be highly persistent once established in the soil.

HARVEST

Figs are primarily eaten fresh, dried whole or as a paste. Fresh figs are often served with cream and sugar. Figs may be stewed or cooked in pies, puddings, cakes, bread and other baked goods, or added to ice cream. The whole fruits may also be preserved in sugar syrup or made into jam, marmalade or fig paste.



Netleaf Hackberry

Celtis reticulata

Ulmaceae



DESCRIPTION

Netleaf hackberry is a native tree generally occurring from 2,500-6,000 feet in elevation and hardy to -20°F. Hackberry trunks are well developed, with knobby, irregular growth forms on the trunks and branches, creating a strange, erratic shape to the trees. The bark is dark grey and deeply furrowed or warty on the lower trunks and lighter gray on the branches. Hackberry leaves are alternate with smooth margins, occasionally toothed near the leaf base. The leaves are slightly heart-shaped, rough in texture and dark green. Where the leaf connects to the stem, one side is often larger. Inconspicuous, small, green flowers appear in March and April with new leaves. Fruits are very small orange-red berries, sweet, edible, and spherical containing one seed. Fruits persist through the winter.

ETHNOBOTANICAL NOTES

- Netleaf hackberry is native to the western United States and northern Mexico.

PLANTING NOTES

Hackberry trees often grow as an over-story and are dominant in riparian woodlands. They occur in moist soil, along streams, canyons, washes, in the upper desert, desert grasslands and in

woodland zones.

- Chill hours: Unknown.
- Height/Width: 35 feet tall with a crown of equal diameter.
- Lifespan: 100-200 years.
- Water needs: Fairly drought tolerant.
- Soils: Prefers deep, well-drained, loamy soils.
- Microclimates: Grows best in full sun, but also does well in partial shade.
- Pollination: Wind pollinated.

CARE

- The trees have irregular growth patterns and the abrupt branches may be sharp and difficult to work around.
- The trees generally do not need pruning, except to shape to the space.

HARVEST

The faintly sweet, thin-fleshed berries may be eaten raw, made into preserves, or used as a seasoning for meat. However, the berries do not have much flesh, and are more important as food for birds and wildlife.



Ironwood

Olneya tesota

Fabaceae



DESCRIPTION

Ironwood are broad-crowned evergreen or drought-deciduous trees, native to the Sonoran Desert. They grow at elevations below 2,500 feet and are usually found along washes and xeroriparian corridors and on the lower foothills (*bajadas*) of desert mountains. The wood is finely grained and extremely dense (and does not float in water). Younger branches have sharp recurved thorns. The grey bark is smooth on younger branches and peeling on the older branches and trunks. Ironwood leaves are pinnately compound, oblong, grey-blue-green, and finely haired, and may occur singly and alternate or in clusters. Each leaflet may be slightly asymmetric, with the tips entire, blunted or notched. The foliage is dense and drought-deciduous. The white to pale-purple, heavily-scented flowers appear in June. They produce 1-8 seeded, light to red-brown, rounded, hairy leguminous pods.

ETHNOBOTANICAL NOTES

- Peoples of the Sonoran Desert used the wood for building and carving.
- Native Americans leached and cooked ironwood seeds to be eaten.

PLANTING NOTES

Ironwood trees are very slow growing and long-lived; their selection should be a careful, intentional addition to desert food forests.

Ironwood is a keystone species, and may be used as a nurse plant to protect other, more sensitive plants. In its natural environment, ironwood offers shade to many smaller desert plants and fixes nitrogen in the soil to improve fertility.

- Chill hours: None required.
- Height/Width: 15-45 feet in height with trunks 15-25 inches diameter.
- Lifespan: Certain individuals have lived for 1,500 years.
- Water needs: A xeroriparian species, but highly drought-tolerant.
- Soils: Tolerates a wide range of soils.
- Microclimates: Ironwood prefers full sun. Ironwood trees are frost sensitive; the stems will suffer damage below 20°F, but may grow in colder areas if sheltered.
- Pollination: Flowers are insect pollinated.

CARE

The trees are heavily thorned and should be carefully pruned if shaping is required or if used in public spaces.

HARVEST

Harvest ironwood pods when they are still gold-green and the seeds are tender. Ironwood seeds can be roasted and eaten, sprouted, or ground into flour.



Jujube

Ziziphus jujuba

Rhamnaceae



DESCRIPTION

Jujubes are small, deciduous trees with rough bark; the branches bear curved spines at each node. The glossy, dark-green leaves have three conspicuous longitudinal veins and finely-toothed margins. The roots produce shoots that may form a thicket over time. Small, perfect flowers are borne on the leaf axis of deciduous branches. Some varieties have sharp thorns. Jujube fruit have a somewhat dry and spongy texture and mild, sweet flavor. The fruit are dark-red to brown, spherical to plum-shaped to elongated, and contain a single seed.

ETHNOBOTANICAL NOTES

- The trees are indigenous and widely distributed in arid regions of southern Asia, and have naturalized on many continents.
- Jujubes were likely domesticated around 9000 BCE, and have been cultivated for at least 4,000 years in China.
- There are over 400 known cultivars.
- Jujubes were introduced to Texas in 1875.

PLANTING NOTES

Jujube trees grow best in areas with hot summers, though they can tolerate very cold winters. Jujubes are used as shade trees and pollinator attractants;

they also form thickets easily and may be used as hedges or windbreaks to protect other trees.

- Chill hours: 50-700 hours, depending on cultivar
- Height/Width: 20-40 feet tall, with a canopy diameter of 12 feet
- Lifespan: 100+ years
- Water needs: The trees are extremely drought tolerant. If soils are well drained, they may live in humid areas. In arid regions, irrigation will increase yields.
- Soils: Can tolerate a wide variety of soils
- Microclimates: Warm to hot summer, full sun, frost-tolerant to at least -10°F.
- Pollination: Most jujubes require cross pollination. Even the self-pollinating cultivars will produce higher yields if cross pollinated.

CARE

- Jujube trees require pruning to keep them shaped and to prevent suckering.
- Jujubes have few insect or disease problems.

HARVEST

The jujube fruits can be eaten fresh, dried, smoked, cooked or baked, like apples or dates. They can be made into sauce, fruit butter, jams and jellies. The fermented pulp can be used to make an alcoholic beverage. Harvest fruits from mid-summer until the end of the growing season. Fresh fruits do not keep well (about a week), but dried fruits can last for months in a cool, dry environment.



Loquat

Eriobotrya japonica

Rosaceae



DESCRIPTION

Loquats are subtropical, erect evergreen trees. The leaves are long, alternate, simple, and coarsely dentate with a shiny upper surface and a lower surface covered in fine, soft hairs. In autumn and early winter, numerous small, white flowers are borne on the ends of the branch tips. Loquat fruits are oblong to globe-shaped, white to yellow in color, succulent and fleshy like an apricot, with 1-8 smooth, large seeds. In its native habitat, the loquat tree grows from 3,000-7,000 feet in elevation.

ETHNOBOTANICAL NOTES

- The loquat is native to China and spread to Japan over 2,000 years ago.
- Loquat trees are adapted to subtropical to mild-temperature climates.
- Chinese immigrants are thought to have carried loquats to Hawaii.
- The tree was common as a small-fruited ornamental in California in the 1870s, and the improved variety, Giant, was for sale in nurseries by 1887.
- Loquats are now produced commercially in many countries, including China, Japan, Pakistan, Spain, Israel, Turkey and Brazil.

PLANTING NOTES

- Chill hours: None required.
- Height/Width: 20-30 feet height and span 15-20 feet in width.
- Lifespan: 100+ years.
- Water needs: Loquat trees are subtropical and require frequent, deep irrigation throughout the year.
- Soils: Grow in a variety of soil types.
- Microclimates: Well-established trees can take a temperature drop to 12°F; the killing temperature for the flower buds is about 19°F, and about 26°F for the mature flowers. Protect from harsh summer sun as extreme summer heat may be detrimental to the crop, and dry, hot winds can cause leaf scorch.
- Pollination: Flowers are pollinated by bees. Some types are self pollinated; some require cross pollination.

CARE

- Loquat trees are resistant to most diseases and insect damage, though they may be susceptible to fireblight, scale, insects, fruit flies and birds.
- Commercial orchards often bag the fruit to prevent damage. Prune only to shape the tree for your landscape or garden.

HARVEST

Loquat fruits should be allowed to ripen fully before harvesting. When ripe, the fruit develops a distinctive orange color and begins to soften. Fruits can be eaten fresh and used to make jam, jelly and chutney; they are delicious simmered in light sugar syrup.



Mesquite

Fabaceae

Prosopis velutina and pubescens



DESCRIPTION

Mesquites are desert-adapted, winter and drought-deciduous, spiny shrubs or trees; they may have a single trunk or be multi-stemmed with a rounded crown of twisting branches. The tiny leaves are bipinnately compound. The bark is furrowed and turns dark brown with age. Most mesquite species have long, stout, sharp spines that often occur in pairs. The perfect, pale-yellow flowers bloom on spike-like racemes (like catkins) from mid-March through May. The leguminous pods are long, fleshy, tan or mottled with several small, brown, hard seeds. Mesquite trees grow on hillsides, open plains, valleys and river bottoms, and along washes. Mesquite occurs primarily below 5,500 feet in elevation.

ETHNOBOTANICAL NOTES

- Mesquite are native to the southwestern U.S. and northern Mexico.
- Native Americans have long relied on the pods as a nutritious and important food source.

PLANTING NOTES

- Chill hours: None required.
- Height/Width: 30 feet tall and wide.
- Lifespan: Long-lived
- Water needs: Medium-low water use.
- Soils: The trees grow best in deep floodplain

soils found naturally near washes.

- Microclimates: Mesquite trees require full sun. They are frost tolerant to below 20°F.
- Pollination: Flowers are insect pollinated.

CARE

The trees are spiny, depending on species, and should be kept pruned to shape in public spaces.

HARVEST

The mesquite pod pulp (surrounding the seed) is edible. Harvest before the first rain of the summer, or long after the rainy season in the dry conditions of late summer and fall. Rain can cause a common soil fungus to grow on mesquite pods. Native trees are adapted to two rainy seasons (winter and summer), and typically go through two flowering phases, one in the spring (March-May) and the other after the monsoon (August). This results in two fruiting phases. Ripe pods range in color from yellowish tan to reddish (not green), and are dry and brittle. They come off the tree with little pulling. Store in paper bags until processing. Use a hammermill on the pods to crush and grind both the pith and the seeds, and sift out most of the debris. Mesquite pod flour is delicious in a wide array of baked goods. As a legume, it is gluten-free and rich in soluble fiber. Mesquite flour is also high in protein. Follow specific baking recommendations to incorporate mesquite flour into baking recipes.



Mulberry

Moraceae

Morus nigra, rubra, and alba



DESCRIPTION

Mulberries are deciduous trees and shrubs, with alternate, broad, many-lobed leaves. Red mulberry (*Morus rubra*) is the largest of the species, usually grown for fruit. Red mulberry leaves are sometimes lobed with blunt teeth, rough on upper surface and finely hairy underneath. Black mulberry (*M. nigra*) trees have rough and often unlobed leaves, and tend to grow as a shrub. White mulberry (*M. alba*) has generally thin, light green leaves, glabrous on the upper side and finely hairy underneath. The flowers of these species are dioecious or monoecious, cylindrical, wind-pollinated catkins. The fruit resembles a blackberry, sweet to somewhat tart, and the color ranges from white to red to black.

ETHNOBOTANICAL NOTES

- Red mulberry is native to eastern North America, from southern Canada to Florida and west to central Texas; many native peoples used it as a food source.
- Black mulberry is native to western Asia, where it was cultivated for thousands of years, and later transported to Greece, Rome, and the rest of Europe.
- White mulberry is native to central and eastern China, where it is grown for its leaves to feed silkworms.

PLANTING NOTES

Mulberry trees make a good overstory tree, attracting birds, wildlife and pollinators. Mulberry fruits can be messy, so avoid planting trees near driveways and sidewalks/walkways.

- Chill hours: 300-450 hours.
- Height/Width: 20-30 feet in height and canopy diameter.
- Lifespan: Some species live up to 300 years.
- Water needs: Medium water requirements once established. Trees should be given regular deep irrigation in the summer.
- Soils: Moist, well-drained soils.
- Microclimates: Mulberries prefer full sun but will tolerate partial (50%) shade. Some species/varieties hardy to 0°F.
- Pollination: Wind pollinated and self fertile, but cross pollination provides greater yields.

CARE

- Birds can be a serious pest; mulberries are often recommended as trees to distract birds from other fruit trees.
- Mulberry trees may be susceptible to popcorn disease, cankers, scale, and dieback.
- Young trees require training to develop a sturdy branch framework. Remove dead and over-crowded branches; mulberries heal poorly from large wounds, so avoid larger cuts.

HARVEST

Harvest fruits when they ripen in August to September. Fruits may be hand picked, or sheets can be laid down beneath the branches, and the tree given a good shake. Ripe fruits drop easily. Ripe mulberries are extremely perishable and will not keep more than a couple days even under refrigeration. The fruit is delicious; it may be eaten fresh, dried, or cooked into pies, jams, and jellies.

Olive

Olea europaea

Oleaceae



DESCRIPTION

Olive trees may be erect or shrubby in nature depending on early pruning; they are medium height, with an uneven, rounded, dense crown. Trees are evergreen with leaves persisting on the tree for two to three years. Leaves are simple, entire, lanceolate to elliptic, with smooth margins and a distinctive central vein. They are grey-green in color, with a waxy covering adapted to dry conditions. Flowers are borne on inflorescences of year-old wood. They produce small fruit with a single seed that may be pressed for oil or consumed after pickling. Olive fruit are small and round to ellipsoid with a single seed.

ETHNOBOTANICAL NOTES

- Originated in the Mediterranean region.
- Olive stones found in archaeological sites from 9000 BCE, but cultivation did not occur until 3000-4000 BCE.
- Olive cultivation and oil extraction were well established in ancient Greece; the trees and oil techniques spread with the Romans.
- Olive trees disseminated to the Americas during the Columbian Exchange. Spanish missionaries brought them to Mexico, California and the U.S. Southwest.

PLANTING NOTES

Natural growth form tends to be tight, with multiple trunks originating from the base. Olive trees must be trained through pruning to form a tree.

- Chill hours: 100-300 hours
- Height/Width: 30 feet tall and wide
- Lifespan: Trees may live to be as old as 1,500 years with an average lifespan of 500 years.
- Water needs: Trees require about 1 inch of water/week during the growing season.
- Soils: Olive trees do not tolerate wet soils, and grow best in well-drained, sandy soils with a pH of 5.5-8.5.
- Microclimates: Olive trees thrive in full sun. Trees are frost tolerant to 20°F. If temperatures drop lower, they will suffer stem damage. Olives are well adapted to a long, hot growing season and winter of at least three months of 35°F-60°F.
- Pollination: Olives are wind pollinated, and occasionally insect pollinated. Some cultivars have self-fertile flowers.

CARE

Prune olive trees when young to a single trunk with strong scaffold branches. Prune trees during the spring bloom. To reduce alternate bearing, remove more shoots from trees with heavy bloom and skip trees with light bloom. High-density olive trees are pruned to an open “vase” shape. Pests/diseases include peacock spot, olive knot; olive fruit fly, and black scale.

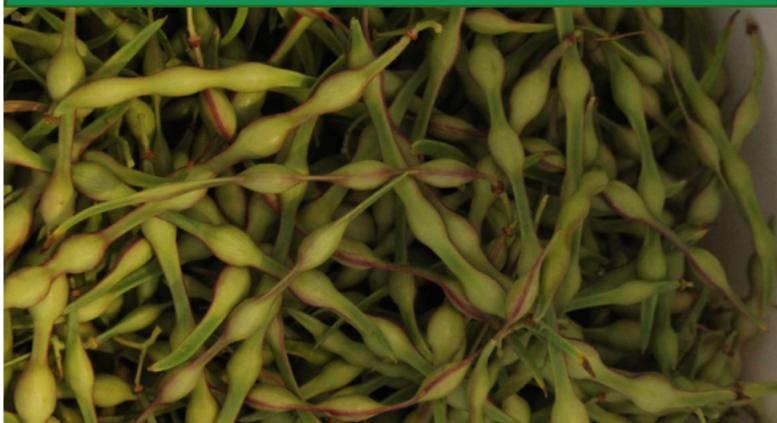
HARVEST

The olive harvest usually starts in October and can continue into the New Year. Traditional harvesting methods involve combing fruit out of trees or beating branches with sticks to induce fruit-fall. Tarps are spread beneath trees to collect the fruit. For curing, harvest when fruit is still green, just before the straw-yellow stage. For oil, harvest when the fruit has turned black on the outside, but the flesh is still green or yellow. Good fruit, harvested at the right time and processed promptly, makes good oil. Fruit should be processed within 24 hours.

Palo Verde

Fabaceae

Parkinsonia florida and *microphylla*



DESCRIPTION

Palo verde is a small, monoecious native tree with thin, green photosynthetic bark and a spreading crown. Palo verde trees have spiny, irregular branches and small, pinnately compound leaves. The leaves are bluish-green in blue palo verde (*Parkinsonia florida*) and yellow-green in the shrubbier foothills palo verde (*P. microphylla*). The leaves are drought deciduous, emerging after rainfall, falling during dry periods. In spring, yellow flowers emerge in clusters on the branchlets. Blue palo verdes can have a spectacular golden crown of flowers. The leguminous pods of both species are 2-3 inches long with small seeds.

ETHNOBOTANICAL NOTES

- Palo verde trees are native to the southwestern U.S. and Mexico.
- Native Americans used the seeds of both species as a food resource.
- The seeds may be eaten fresh or dried, though dried seeds must be soaked and cooked.
- Southwest tribes cooked ground seeds into porridge.

PLANTING NOTES

Palo verde trees grow in a wide variety of habitats, including slopes, ridges, bajadas, plains and

arroyos. Foothills palo verde can be found on slopes and plains, while blue palo verde prefers desert washes with ironwood and mesquite. Foothills is a slow growing, smaller shrub-like tree, while blues are moderate to fast-growing tall, spreading trees. They occur from sea level to 4,000 feet in elevation.

- Chill hours: None required.
- Height/Width: 25-30 feet in height.
- Lifespan: Long-lived.
- Water needs: Drought tolerant.
- Soils: Prefer well-drained soils.
- Microclimates: Plant in full sun; trees are hardy to 10°F. In natural environments, palo verde serve as nurse trees for other species.
- Pollination: Flowers are insect pollinated.

CARE

- Blue palo verdes require more pruning than foothills because they tend to spread and have more secondary branches. Pruning can include raising the crown base height to giving a more urban-friendly form.
- The trees are generally disease resistant; however, cultivated blue palo verde trees may be damaged by witches broom, mistletoe, and palo verde root rot.

HARVEST

The flowers and seeds of both species are edible. Harvest green and dry pods before the summer monsoon rains. Eat fresh or cooked. The green seeds should be sweet. Dry seeds are best eaten sprouted, or sprouted and then parched/roasted.



Pomegranate

Punica granatum

Punicaceae



DESCRIPTION

Pomegranates are short trees or multi-stemmed shrubs with a low crown base and open canopy. Branches are spiny with smooth, grey bark. Leaves are glabrous, simple, opposite, and oblong with smooth margins. Flowers initiate singly or in clusters on sheathed terminals. Flowers are firm, fleshy, vase-shaped, usually red or orange (though sometimes white), and appear April to July. The fruit has thick, leathery skin, and juicy capsules within called “arals” that contain the seeds. Fruit skin color ranges from pale yellow to green, orange, red and dark purple. Arals may be pale pink to dark red.

ETHNOBOTANICAL NOTES

- Pomegranates are native to the deserts of Iran, Central Asia and the Himalayas.
- Pomegranates spread along silk routes east to China and Japan and west to the Middle East, Mediterranean region, and Africa.
- The fruits were carried in caravans for their thirst-quenching juice.
- Pomegranates appear in Egyptian art and mythology, and in the Old Testament.
- In 1769, Spanish settlers brought the first pomegranates to California.

PLANTING NOTES

Pomegranates prefer arid environments in warm-temperate and subtropical regions, though some are adapted to colder, mountainous areas.

- Chill hours: 50-300 hours.
- Height/Width: 15 feet high; 10 feet wide.
- Lifespan: 30+ years.
- Water needs: Pomegranates can survive very dry conditions but will not produce fruit without adequate moisture. Over-watering causes fruit to split.
- Soils: Prefer rich, well-drained, sand-loam fertile soils. They will survive in heavy clay but will not tolerate saturated soils. Best grown in alkaline to slightly acidic soils.
- Microclimates: Pomegranates require full sun exposure and are hardy to 15°F. Pomegranates bloom late and are unlikely to be damaged by spring freezing, but early fall frosts can damage fruits. Whitewashing trunks can give protection during cold spells.
- Pollination: Self and cross pollinated.

CARE

- Pomegranates may be trained to a small tree with an open vase shape or to a multi-trunked shrub. Mature trees require light pruning of the canopy and removal of basal sprouts.
- Fruits are susceptible to the pomegranate butterfly, dry rot, and splitting, as well as birds, other insects and rodents. Leaves can be damaged by whiteflies, thrips, mealy bugs, stink bugs, and scale insects. Paper bags placed over fruits may protect them from herbivores.

HARVEST

Pomegranates are harvested just before full maturity; ripe fruit often split, exposing the interior arils to insects and rot. To check for ripeness, tap the fruit lightly, and listen for a slight metallic sound. Harvest by cutting the fruit from the plant. Arils can be eaten fresh in salads, meat dishes and desserts, or processed into juice. Pomegranates store best at 40-45°F with a high humidity, and keep up to 3 months.

Quince

Cydonia oblonga

Rosaceae



DESCRIPTION

Quinces are shrubs or small trees with an irregular, rounded or wide crown. They may form thickets if left unmanaged. Young branch shoots are covered in white felt-like hairs, while older branches have smooth, dark grey bark and may be pendulous. Quince leaves are alternate, dark green, glabrous, and oval-shaped with serrated margins. The leaves have a whitish felt on the underside. Flowers are single, large, white, perfect, and both insect and self-pollinated. They appear April to June. Fruits may be rounded and apple- or pear-shaped. The fruit skin is green, turning yellow at maturity, and is covered in fine, felt-like hairs. When the fruit is ripe, the hairs disappear. The interior pulp is yellow, tough, almost spongy, highly aromatic, and contains many seeds in a central core like an

ETHNOBOTANICAL NOTES

- Quinces are thought to have originated in western Asia.
- Populations of wild quinces occur in Central Asia and Eastern Europe.
- Quinces were planted in Crete and Greece and dedicated to the goddess Venus.
- Now a minor global fruit, cultivated in China, the Middle East, northern Africa,

southern Europe and Russia, Mexico, and Central and South America.

PLANTING NOTES

- Chill hours: 100-500 hours.
- Height/Width: 25 feet tall; 15-20 feet wide.
- Lifespan: 30-50 years.
- Water needs: Generally prefer moist soils. Irrigate with 1 inch of water per week in the growing season.
- Soils: Plant on well-drained, fertile soils. They do not grow well on soils with high pH.
- Microclimates: They require full sun exposure. Quinces are hardy to negative -15°F, flowers damaged in late spring frosts.
- Pollination: Quinces are insect pollinated and require cross pollination.

CARE

The shrub-like nature of quinces makes them difficult to train to a central leader; however, they may be pruned to an open-vase shape with two or three main scaffolds. Diseases include black spot, brown rot, fire blight and mildew.

HARVEST

Quinces have late ripening fruit and, in northern areas, often do not mature before frost damage occurs. They should be hand harvested, and while they may be eaten fresh, the fruit is most often cooked and used to make jellies and preserves, or fermented into alcohol. Quince fruits are high in natural pectin.



Saguaro

Carnegiea gigantea

Cactaceae



DESCRIPTION

Saguaro is an arborescent-stemmed cactus. Stems are simple and have one to several lateral curving, erect branches. Trunks have prominent ribs with rows of clumped, stout spines. Flowers are white and showy, and appear on the branch tips in spring. Saguaro fruits are red to purple, ellipsoid, oblong, and contain as many as 2,500 seeds. Saguaro cacti are a valuable resource for desert wildlife; birds depend on saguaros for water and nutrition in the driest, hottest times of year, just before the summer monsoons.

ETHNOBOTANICAL NOTES

- Saguaro occurs throughout most of the Sonoran Desert in southern Arizona and northwestern Mexico.
- Saguaro fruits were a major food staple of Southwestern tribes, and they have a unique cultural role in the Tohono O’odham tribe. Tohono O’odham peoples harvest and process saguaro fruits for food and wine in preparation for the annual rain ceremony. Saguaro ribs are used as building material for fences, *ramadas*, homes, and in ceremonial roundhouses. Symbols indicating important events are carved on saguaro ribs as “calendar sticks.”

PLANTING NOTES

Saguaro grows naturally in Sonoran desert scrub on mountain bajadas. In their natural habitat, saguaros may occur on all slopes and aspects, but most grow on south facing slopes. They grow at elevations from sea level to 4,000 feet.

- Chill hours: None required.
- Height/Width: 10-50 feet tall and 6-30 inches in diameter.
- Lifespan: 150-200 years.
- Water needs: A desert-adapted species that can tolerate long periods of drought.
- Soils: Prefer well-drained, shallow soils that are light, coarse textured, and rocky
- Microclimates: Saguaros are hardy to about 14°F. Young saguaros often sprout and grow under the protection of a “nurse tree.”
- Pollination: Nocturnal (nectar-feeding bats) and diurnal (bees and doves) insects and animals pollinate saguaro flowers.

CARE

Saguaros are susceptible to bacteria necrosis. Treat the affected area with a solution of 10% bleach and the wound will heal alone.

HARVEST

Fruits are traditionally harvested when dark red and ripe, just before the summer monsoons. The Tohono O’odham harvest saguaro fruit, called *ha:sañ bahidaj* during June and July with the a *ku’ipad*, a long stick made of one or several saguaro ribs tied together. The fruit can be processed into syrup, jellies, and wine. The saguaro seeds can be strained from the pulp, rinsed, dried, and ground into coarse flour.



Arizona Walnut

Juglans major

Juglandaceae



DESCRIPTION

Arizona walnut is a small to medium monoecious, deciduous tree with stout branches and a rounded crown. The bark is dark grey and coarsely ridged. Leaves are alternate, and pinnately compound, consisting of 9-13 lance-shaped leaflets that are serrated on the margins. Arizona walnut flowers are inconspicuous green female and yellow-brown male catkins that appear separately, but on the same tree. Fruit is 1-1.5 inches in diameter with a husk and black, thick, hard shell surrounding the seed or nut. Husks turn from light green to dark brown at maturity.

ETHNOBOTANICAL NOTES

- Native to Arizona, New Mexico, Oklahoma and Texas and northern Mexico.
- Native Americans harvested the edible nuts of Arizona walnut.

PLANTING NOTES

In natural habitats, Arizona walnut may be found in riparian areas and low valley flood plains and canyons, alongside streams, washes and riverbanks. They grow at the upper margin of the Sonoran desert-scrub, and in oak and pine woodlands.

- Chill hours: Unknown.
- Height/Width: 30-50 feet in height with a canopy diameter of 30 feet.
- Lifespan: Up to 400 years.
- Water needs: Tolerate some drought, but deep irrigation helps during growing season.
- Soils: In natural habitats, Arizona walnuts grow on rocky, coarse and sandy loam soils.
- Microclimates: They are hardy to about 0°F. As an overstory tree, Arizona walnut thrives in full sun and alluvial floodplain soils. They grow at elevations of 2,600-6,500 feet, and can grow up to 8,200 feet.
- Pollination: Wind pollinated. Male and female flowers occur at different times; self fertile but the separation in flowering timing promotes out-crossing.

CARE

As a native tree, Arizona walnuts require minimal pruning, but dead branches should be pruned over time. Arizona walnut is susceptible to walnut anthracnose, which defoliates trees. This fungus transmits easily to commercial walnut cultivars. Arizona walnut seedlings are susceptible to root and crown rots.

HARVEST

The walnuts fall in mid-summer to early fall; the husks dry and crumble off, leaving the round, dark black walnuts exposed. These must be cracked with a hammer, as the shells are very thick. Inside, the very small edible nut meats can be picked out with a sharp awl. The nuts have a distinct, rich flavor. They are wonderful added to baked goods and ice cream.



NATIVE EDIBLE *understory* PLANTS

Agave (*Agave spp.*)

Agaves are a spiny succulent with a basal leaf rosette of fleshy, upright, grey-green leaves, with jagged edges and thick spines. The Agave, or century plant, lives for 10-25 years before producing a magnificent flower stalk. Edible agave hearts may be collected in spring and summer—the leaves of mature agaves are cut off near their bases when the plant begins to send up its flower stalk and the central hearts roasted in pits. Be careful during the harvest, as the raw flesh of many agaves is caustic and can even blister the skin. The extracted juice may be consumed fresh as *aguamiel* (honey-water) or fermented into *pulque*. Steamed heads or central stalks are mashed and allowed to ferment with added liquid. After several days, the fluid is distilled into the potent liquor, *mescal*.



Barrel Cactus (*Ferocactus spp.*)

Barrel cacti are short and cylindrical with prominent ribs. The genus name means “fierce cactus.” The fishhook barrel has a wide, flat central spine that curves downward at the end, and many white, bristly radial spines. Orange, red or yellow flowers appear in clusters at the top of the plant from July to September. The fruits are elongated, yellow, fleshy and tart,



and filled with tiny black seeds. The fruit, seeds, flower buds, and the inner flesh of the barrel cactus may be eaten. The buds may be pickled in vinegar or brine, or fermented with salt and lactic acid. Fruits are mucilaginous and may be sliced lengthwise and dried slightly before use. The seeds may be lightly toasted and added to breads and cereals or ground into flour. The fruits can be made into chutney or candied by boiling and adding spices.

Chiltepin (*Capsicum annuum*)

Chiltepin plants are woody annual to perennial shrubs with widely branched stems. Leaves are teardrop shaped, entire, and arranged alternately on the stem.

The fruits may be spherical to slightly elongated or oval. Fruits are bright red to orange, very hot, and thin-fleshed. Chiltepin fruits are harvested from wild plants by hand and sundried. Chiltepins are popular in Southwestern



and northern Mexican cooking; they are crushed and added to salsas, soups and marinades. Green chiltepins may be pickled in vinegar. Chiltepins rank high on the Scoville scale (8 on a scale of 10) and are high in vitamins A and C.

Cholla (*Cylindropuntia* spp.)

Cholla are perennial, narrowly cylindrical, branched cacti. Flowers range from yellow to pink depending on the species and appear in early summer. Dry, yellow, lumpy fruits adhere to plants through the winter. Cholla buds can be harvested in late April and May. The unopened buds are covered in spines—brush these off by rolling the buds on a mesh screen or in gravel.



Harvested buds may be cooked in pits of coal or boiled in water until tender. Serve the cooked buds in soups or salads. The fruit of some chollas may be also harvested in late summer. Roll them in gravel to remove the spines, skin them, and eat fresh or cooked.

Desert hackberry (*Celtis pallida*)

These desert shrubs are irregularly shaped and semi-evergreen except in cold and drought periods. The leathery leaves are small, oval, bright green, and sparse. Flowers are greenish yellow and grey-green stems are heavily armed with spines. Desert hackberry fruits are small, bright orange, and have a single large seed in the center. The fruits ripen in late September, and may be eaten fresh, ground, mashed or shaped into small cakes and dried.



Ocotillo (*Fouquieria splendens*)

Ocotillo is a drought-deciduous shrub with wandlike stems that rise vertically from the root crown. The stems may be 10-20 feet tall, with spines along the length. Leaves emerge with rains and fall during periods of water stress. In Spring, scarlet flowers bloom before the leaves. The capsule fruits contain numerous, winged seeds. The flowers and faintly sweet nectar are edible. Ocotillo seeds may be ground into flour.



Passionfruit (*Passiflora foetida*)

This native passionfruit is an herbaceous, perennial vine. The vines are green, slender, and densely hairy with coiling tendrils. The leaves have irregularly saw-toothed margins and are green, hairy, alternate, deeply palmately lobed and roughly heartshaped. They release a bad odor when crushed. The flowers may appear from June to October, after monsoon rains. The flowers are fleshy, lavender blue and white at their base. The oval fruits are 1 inch diameter, yellow and ripening to red.



Prickly Pear (*Opuntia spp.*)

Prickly pear cacti have flat, fleshy pads, often with numerous spines. The fleshy, bright red-purple and distinctly flavored fruits may be eaten if care is taken to avoid glochids on the skin. The juice is expressed to make drinks, syrup, jelly or fermented into alcohol. Tender young pads can be harvested before spines harden.



The pads are nutritious, and the mucilage can reduce blood sugar to control adult-onset diabetes. The pads are eaten fire-roasted, stir-fried, chopped, added to soups or salads, and coated lightly in cornmeal and toasted.

Sonoran Desert oregano (*Lippia palmeri*; *Lippia graveolens*)

Sonoran wild oregano is a small shrub with pungent grey-green leaves. Fragrant white flowers bloom throughout the year, but are especially pronounced after summer rains. *Lippia palmeri* is native to the Sonoran Desert of the southwestern U.S. and northern Mexico; *Lippia graveolens* is native to the Texas and New Mexico south to Nicaragua. The leaves are widely used as a culinary herb in Mexico, and had special importance to Seri Indians as a spice and as a salt substitute.



Wild Grape (*Vitis arizonica*)

Arizona wild grapes are woody, perennial, deciduous vines. The many slender vines are branched with weak tendrils and grow more than 20 feet long. The grape leaves measure 1 to 5 inches long, with a similar or slightly larger width. Small flowers occur in 2 to 4 inch-long clusters. The tiny, purple grapes are juicy and thinskinned, and can be eaten fresh or juiced and fermented into wine.



Wild Mulberry

(*Morus celtidifolia*; *M. microphylla*)

These wild mulberry species are woody shrubs or small trees with numerous branches emerging from the root



base. The trunks and branches have grey, fissured bark. The leaves are ovate with serrated margins, and sometimes 3-5 lobed. Green and red-tinged flower catkins appear in April-May. Wild mulberry fruit is sweet and small.

Indigenous peoples utilized mulberries throughout the species' range and cultivated the shrubs for their fruit. Harvest wild mulberry fruits when they are ripe, soft, and pick easily. This may be from June to September, depending on local climate. Wild species do not yield the quantities of cultivated mulberries, though they are beneficial to wildlife.

Wolfberry (*Lycium spp.*)

Wolfberry are spiny, densely branched, deciduous, perennial shrubs. The spreading to erect plants can form dense thickets.

The leaves are alternate, simple, broadly oval, smooth along the margins, blue to gray-green, and somewhat thickened and fleshy.

Wolfberry flowers are monoecious, narrowly tubular, white to pale lavender, and appear in spring. Fruits are fleshy, orange-red, oval berries that hang like ornaments and ripen in early summer. Long a food source for Southwestern peoples, the ripe red berries may be eaten raw, cooked, or dried.



Yucca (*Yucca elata*)

Yucca is a native perennial shrub that can reach 30 feet high. Soap tree yucca plants have either a basal rosette or a rosette atop a trunk. The leaves have sharply pointed tips and narrow white margins and are long, green, narrowly linear, leathery, and produce white fiber along margins. Flowers of the soap tree yucca are loosely clustered at the tops of tall stalks. Gather young flowers in spring and boil them to remove bitterness. Use the cooked flowers in soups, salads, and vegetable dishes.



NONNATIVE *understory* PLANTS

Blackberry (*Rubus fruticosus*)

Blackberry vines are perennial with roots and crowns persisting year to year. Aboveground, biennial canes can be erect to trailing. They produce vegetative canes



the first year, fruit the second year, and then die to the ground. There are both crown-forming and rhizome-forming types with thorned and thornless varieties.

Blackberries may be eaten fresh, frozen, or processed into juice, jams, jellies, dairy, bakery, and cereal goods.

Gogi berry (*Lycium barbarum*; *L. chinense*)

Goji berry shrubs are perennial woody plants in the wolfberry family. *Lycium barbarum* is a deciduous shrub that grows to 18 feet tall.

Lycium chinense is a smaller shrub, growing to 6 feet tall. Both species have a long history of cultivation for food and medicine. Fruit are scarlet to orange-red berries, and mature from August to October.



Grape (*Vitis vinifera*)

Grape vines are woody, perennial, and deciduous.

They have a flexible trunk with branches that require



support, often in the form of trellises. The leaves are a modified heart shape with toothed margins often three to five lobes. Fruits form in clusters of juicy, thin-skinned berries that vary in color

from white, to red, purple, or black. Grapes may be eaten fresh or dried into raisins, processed into juice, fermented into wine and other alcoholic beverages. The juice can also be concentrated as a natural sweetener or made into preserves.

Passionfruit (*Passiflora edulis*)

The passionfruit vine is a shallow-rooted, woody perennial vine that climbs via tendrils. The alternate evergreen leaves are deeply 3-lobed when mature. Leaves are 3 to 8 inches long, finely toothed along the margins, deep green and glossy on the upper surface, paler and dull beneath, and may be tinged with red or purple.



Fragrant 5-petalled flowers appear singly, clasped by three large, green bracts and with a central crown of straight, white-tipped purple rays. Inside, the fruit cavity has an aromatic mass of membranous sacs. Each sac is filled with orange-colored, pulpy juice and small, hard, brown to black seeds. The flavor is tart to sweet, musky and guava-like. The fruit will quickly turn from green to deep purple (or yellow) when ripe and fall to the ground. They can either be picked when they change color or gathered from the ground. To store the fruit, carefully wash, dry, and place them in bags. They should last 2 to 3 weeks at 50 degrees F. The fruit is sweetest when slightly shriveled. Fruit is primarily eaten fresh or juiced, and the juice can also be concentrated into syrup.

Pineapple guava (*Acca sellowiana*)

Pineapple guava is a slow-growing evergreen shrub. The opposite, bluntly elliptical leaves are thick and leathery, smooth and glossy on the upper surface and silvery-hairy beneath. Flowers have four fleshy, oval, concave petals, white on the outside, and light purplered inside, with a cluster of erect, purple stamens. Pineapple



guava fruit is oblong and ripen October to January. The fruit emits a strong perfume. Pineapple guava fruit may be eaten raw or cooked. The fruit has an acidic yet sweet aromatic taste. The flesh and pulp (with seeds) are eaten raw as dessert or in salads, or made into pies, tarts, cakes, pastry fillings, puddings, and preserves. Peeled, halved fruits may be preserved in light syrups in glass jars or made into sauces, relishes, or beverages. Flowers can also be eaten raw; petals are sweet and crisp.

Spineless prickly pear (*Opuntia ficus-indica*)

The domesticated nearly spineless prickly pear, called “Indian fig” is an upright, single-trunked, segmented cactus.



The large blue-green pads bear few spines.

Flowers are borne atop the pads, yellow-orange, large and showy, and bloom late April to June.

Fruits are large and may be green, yellow-gold, to purple-red. Fleshy, green to purple-red fruits may be eaten; the flavor is sweet, but bland. The

tender young pads, called nopales are traditionally consumed. The pads are nutritious and have many health benefits. The pads are eaten roasted, stir-fried, chopped and coated lightly in cornmeal before toasted, and as added to salads and soups.



EDIBLE TREES *for* Tucson

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