



Linking Edible Arizona Forests

Growing Edible Arizona Forests, An Illustrated Guide

Excerpt from leafnetworkaz.org

Edible Tree Guide

CHOOSE Planting Site and Design

- Soil

Soil

Soil conditions affect water retention, the oxygen and nutrients available to tree roots, and the health of soil microbes that aid trees. When walking your site, notice soils that look sandy, clayey or have caliche present, and notice places where leaves, twigs and animal scat collect and enrich soil. Think about what you know about the soil from holes dug in the past.

Good soils are the key to vigorous and healthy trees. After the correct tree has been selected, planting in existing good soils or working to help create good soils should be the next priority. See the table **Soil Types of Selected Edible Trees** below for information on soil needs for specific trees. See the **Edible Tree Directory** at leafnetworkaz.org for soils information on additional trees and understory plants.

Most fruit and nut trees need well-drained soil around three feet deep. Generally, trees grow best in a mixture of sand, silt, clay and organic material. However, some trees prefer sandy soils with fast drainage. Others grow better in silty or clayey soils that are high in organic matter and moisture.

Arizona soils have very low levels of organic matter, usually less than 1 percent due to the slow rates of organic matter production in arid environments. Native trees can often tolerate lower organic matter and higher salt, sand or clay content than fruit or nut trees. If you plan on planting nonnative fruit and nut trees, you will likely need to amend the soil with organic matter.

Shaking a few cups of soil in a glass jar and watching the particles settle can show you the balance between different sized grains of sand, silt and clay. For more detailed testing, contact your local Cooperative Extension specialist about how to have soil tested, what to test for and how to improve soil fertility. Collect soil samples from multiple locations if you are having it tested.

Soil Shake Test



For a quick soils test, shake soil and water in a jar. Heavy-grained gravels and sands will settle quickly. Smaller-grained clays and silts will settle slowly. Light organic material will float to the top.

Soil Types



Soil Treatment

The acidity of soil (referred to as pH) is critical to tree health and difficult to adjust after planting. Most fruit trees grow best in soil with a pH between 6.0 and 6.5. If your soil pH is below 6.0 (too acidic), you can raise the pH by adding lime (calcium carbonate). If soil pH is higher (alkaline), you can add gypsum or other soil amendments to lower the pH. Alkaline soils occur in some northern and southeastern parts of Arizona.

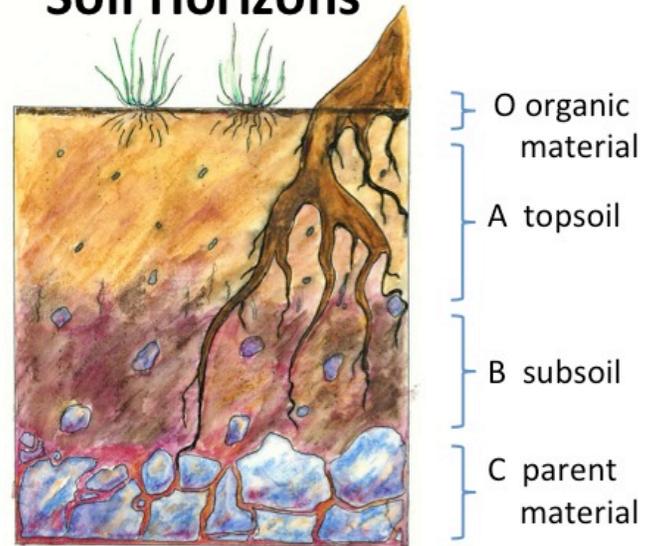
The soil's ability to drain water through the root area is called its *internal drainage factor*, and soils with good internal drainage will grow the healthiest edible trees. If soils are compacted and dense, loosen them around the area where trees will be planted so roots can grow more easily through the soil. Soils high in clay do not drain well, and adding sand or compost could improve drainage. Score the sides of the tree-planting holes so roots can more easily penetrate dense clay.

Soils that are too sandy drain quickly and will have trouble maintaining the moisture needed by tree roots. Sandy soils may also be low in organic matter and nutrients. Add well-composted organic matter to the sand in the planting hole to improve soil quality. Over time, adding mulch and compost to the surface will also increase water retention and soil nutrients.

Caliche soils are a frequent problem in Arizona. Caliche is a hard chalky white soil layer high in calcium carbonate. The calcium carbonate adheres soil particles together and prevents good drainage and root growth. Caliche has a high pH, which inhibits nutrient uptake. If caliche is present, you may need to crack caliche layers with a shovel, pick or bar before planting trees, and then add amendments. You can also dig the caliche out and backfill the hole with a balanced mix of sand, silt, clay and organic material.

In some cases, adding nutrients and amendments directly to the planting hole can burn young roots. Instead of putting amendments in the planting hole, till them into the top of the tree's soil to percolate slowly down.

Soil Horizons



RESOURCES

Find out more about soils on your site

- The National Resource Conservation Service (NRCS) has an online soil-mapping tool. Go to the site, zoom in to your region, then a specific location, and then draw a polygon around your site. This free online tool gives you general soil qualities that serve as a starting point to determine your specific soil types. **NRCS Web Soil Survey:** <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>
- You can also access published soil surveys for Arizona through the NRCS at: <http://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=AZ>
- Your site's geology can determine soil types. **Arizona Geological Survey:** <http://data.azgs.az.gov/geologic-map-of-arizona/>

Additional Resources

- Arizona Cooperative Extension, Master Gardener Manual, Soils, Ch. 2: <https://ag.arizona.edu/pubs/garden/mg/soils/soils.html>
- Arizona Cooperative Extension, Yavapai County, "Backyard Gardener — Soil Sampling and Analysis" by Jeff Schalaus: <https://ag.arizona.edu/yavapai/anr/hort/byg/archive/soilsamplingandanalysis2016.html>
- *Arizona Soils:* <http://www.library.arizona.edu/exhibits/swetc/azso/>
- Texas A & M Agrilife Extension Service Soil, Water and Forage Testing Laboratory: soiltesting.tamu.edu/
- Ohio State University, "Interpreting a Soil Test Report": ohioline.osu.edu/factsheet/AGF-514

SOIL TYPES FOR SELECTED EDIBLE TREES

Edible Tree	Preferred Soils
Almond	Almond trees prefer well-drained soils.
Apple	Apple trees do best on deep, well-drained sites with soil pH of 6.5-7. Avoid heavily compacted soils, very shallow sites, and water logged areas
Apricot	Apricots are most adapted to light, well-drained soils with neutral pH. Graft onto plum rootstocks for areas with heavy clay soils. Good soil fertility is required for fruit production, compost in spring before bloom.
Bay laurel	Bay laurel trees prefer well-drained soils, but can grow in a wide range of soil types.
Carob	Carob trees can withstand a wide range of soil types and are tolerant of rocky, poor soils, and to saline soils. They do not grow well on poorly drained soils.
Cherry	Cherries do best on well-drained loam and sandy loam soils with good water holding capacity and a pH of 5.5-7.5.
Cherry, wild black	Wild black cherry trees grow well on all soils except for the very wettest and very driest. The species can tolerate a range of soil types and soil drainage.
Citrus	Citrus trees can grow on a wide range of soil types from sand to loam to heavy clay as long as they are well drained. Ideal pH of 6-6.5. Different rootstocks prefer different soil type
Desert fan palm	Soils in natural desert fan palm oases are generally undeveloped and low in organic matter. Most soils supporting desert fan palms are high in pH.
Date palm	Date palms grow on a wide variety of soil types from sand to clay. They are very tolerant of saline conditions, but highly saline environments may reduce yield and fruit quality.
Elderberry	Elderberry trees prefer moist, rich, well-drained soils.
Fig	Fig trees can be grown on a wide range of soil types from sandy to heavy clay, with a pH between 6-7.8.
Guava	Guavas prefer soil with good drainage, high organic matter, and a pH range 5-7. Species is salt tolerant.
Hackberry, netleaf	Netleaf hackberry trees grows best in deep, well-drained soils.
Hawthorn	Hawthorns prefer well-drained, loamy soils. Hawthorns are adapted to a wide range of soil types from heavy clay to sand and can be grown on both acidic and basic soils.
Ironwood	Ironwood trees grow on sandy, rocky soils, with a pH of 7-8.5.
Joshua tree	Joshua trees thrive in any soil, but prefers a sandy loam.
Jujube	Jujubes can tolerate a wide variety of soil conditions.
Juniper	Junipers can grow in a wide range of soils. The species prefers well-drained soils, and does not tolerate alkaline soils
Loquat	Loquats grow in a variety of soils, from light sand to heavy clay. The trees need good drainage.

SOIL TYPES FOR SELECTED EDIBLE TREES, continued

Medlar	Medlars grow well in a wide range of soil types except for poorly drained or excessively dry. Rootstock choice can influence soil tolerance
Mesquite	Mesquites are highly adaptable; the trees grow best in deep, uniform soil, and are found naturally along washes
Mulberry	Mulberry trees prefer moist, well-drained soils that can be sandy to heavy clay.
Oak	Oaks grow best in fresh to moist soil. The substrate should be sandy-loamy, gritty-loamy or sandy clay and comparatively rich.
Olive	Olive trees do not tolerate wet winter soils, and grow best in well-drained, sandy soil. Soil pH of 5.5-8.5 is ideal.
Palo verde	Palo verde trees prefer well-drained soils.
Peach, Nectarine	Peaches and nectarines grow best in deep and well-drained soils with high nitrogen fertility, but can tolerate a range of soils. The trees do not do well in poorly drained soils unless grafted onto plum rootstock.
Pear, Asian pear	Pears grow on a wide range of soils, but prefer well-drained soils. They grow best with a soil pH range of 6.2-6.8.
Pecan	Pecans thrive in well-drained alluvium.
Persimmon	Persimmons are adapted to a wide variety of soil types. They are tolerant of wet soils and also do well on light sandy soils.
Pinyon pine	Pinyon pine can easily grow on dry, gravelly, and rocky soils. The trees are adapted to a wide range of soil types.
Pistachio	Pistachios are suited to deep, well-drained sandy loam soils with high pH. The trees are more salt tolerant than other nut crops.
Plum	Plums can grow on a variety of soil types, though selection of appropriate rootstocks will help them to thrive in different conditions. The trees thrive on moist, rich, well-drained loam soils, with a pH of 6.8-7.2.
Pomegranate	Pomegranates prefer good-draining rich, sand-loam fertile soils. They can be planted in heavy clay, but not in saturated soils. They grow in alkaline to slightly acidic soils.
Quince	Quinces prefer moist soils, well-drained, fertile soils. They do not grow well on high pH (8-9), as they are susceptible to lime-induced Chlorosis.
Saguaro	Saguaros grow on well-drained, shallow soils that are light, coarse textured, and rocky.
Sapote: white/yellow	Sapotes are tolerant of most well drained soils including sands to clays, to limestone-based soils, to high pH.
Walnut	Walnuts grow best in deep, fertile, well-drained loamy soils, but will grow in sand to clay. They tolerate a wide range of pH, but have a low salt tolerance.