



Linking Edible Arizona Forests

Growing Edible Arizona Forests, An Illustrated Guide

Excerpt from *leafnetworkaz.org*

Edible Tree Guide

LEARN Values, Characteristics of Edible Trees

- Pollination Requirements for Trees

Pollination Requirements for Trees. Flowers of all edible tree species require pollination, which is the transfer of pollen from the male part of a flower (stamen and anthers) to the female part of a flower (pistil and stigma). Pollination fertilizes flowers so the tree can produce fruits, nuts, berries, seeds or pods. When selecting trees, find out how they are pollinated and use this information in determining what trees to plant and where to plant them. Start by reviewing the types of pollination below.

General types of pollination

Self-pollination: Tree blossoms pollinated by their own pollen or pollen from another flower on the same tree. These trees can be planted alone and still produce fruit, nuts, seeds or pods. However bees are often necessary to transfer the pollen. Examples of self-pollinated fruit trees are sour cherries, apricots and peaches. Small fruits, including raspberries and blackberries are also primarily self-pollinating.



Peach,
Self-
pollination

Cross-pollination: Tree blossoms pollinated by another tree of the same natural variety or cultivated variety (known as a cultivar), or another variety of the same species. Many need bees to transfer the pollen. For edible trees that require cross-pollination, it is best to have more than one variety of the same type of fruit tree in your yard, neighborhood or community. Keep in mind that different varieties may flower at different times—in early, mid- or late season, so plant those that bloom at the same time. Sweet cherries, pears and most apples require the presence of two different compatible varieties for pollination to result in fruit set.



Apple,
Cross-
Pollination

Animal and insect pollination: Tree blossoms that need moths, bats, birds or insects to pollinate flowers. Many fruit trees, such as peach, pear and apple require honeybees for pollination. Cacti and succulents are often pollinated by moths, bats and birds. Many of these pollinators are susceptible to insecticides and genetically modified plant pollen. Do not apply insecticides or other chemicals to plants that could damage pollinators. Be especially careful when treating “insect” problems, as you could unintentionally kill beneficial pollinator species.



Saguaro,
Animal
Pollination

Wind pollination: Tree blossoms that rely on pollen carried by the wind. For ensure sufficient pollen reaches flowers, several trees of the same species need to be planted within 50 feet of each other. Pinyon pine, juniper, pecan and pistachio are naturally wind pollinated.



Pinyon,
Wind
Pollination

Male and female trees: Trees that have male and female flowers on different trees (called dioecious plants), where only the female trees produce fruit. A male tree is needed in the vicinity to pollinate the female tree to ensure production. Date palms, carob, pistachio and persimmons are examples of *dioecious* trees. Make sure that you seek professional advice when ordering and planting these trees.



Date palm,
Male &
Female
Trees

Take pollination into account when selecting and planting trees

Review pollination information when choosing your edible trees. See the tables **Pollination Requirements for Edible Trees** and **Pollination Requirements for Edible Understory Plants** for lists how specific edible trees are pollinated. More information about pollination of Arizona edible trees is available at the **Edible Tree Directory** at leafnetworkaz.org. If your trees require cross-pollination, you may need to provide space for two different compatible natural or cultivated varieties of the same edible tree type. Even self-pollinating trees may produce higher yields if they are cross-pollinated. Look around your neighborhood and community—if other people are growing the same types of edible trees, these may be able to pollinate your tree. Special grafted trees may have two varieties grafted onto the same rootstock for effective pollination. Or some female trees may have limbs of male trees grafted onto them. Ask a Cooperative Extension or nursery specialist for more information about which trees to plant for cross-pollination and fruit set.

Notes on Hand-Pollination for Home Orchardists

In some cases, if pollinators are scarce or you want to increase yields, you can hand pollinate blossoms. But practice SAFETY FIRST if you are considering hand pollinating your tree. We recommend hand-pollination only in special circumstances, since it requires careful attention each spring when the blossoms open. Dwarf trees and container-grown trees are easiest and safest for homeowners to hand pollinate.

First, familiarize yourself with flower anatomy. Identify the multiple long (male) *stamens*, which have pollen-filled vessels (*anthers*) at their tips. Find the (female) *pistil*, which rises from the flower center as a thick, columnar structure with a sticky crown (*stigma*) for receiving pollen.

Wait until the trees are in full bloom and the flowers are fully open. Use a small artist's brush or cotton swab to hand pollinate the flowers on smaller trees. If trees are self-pollinating, touch the brush or swab to the flower's anthers, and then dab it on the stigma of the same flower or another flower on the same tree. To cross-pollinate, prune blossoms off of one tree and carry them to another tree of the same type that is also in full bloom. Using your brush, swab or simply the blossoms themselves, apply pollen from the anthers of the flowers in your hand to the stigmas of the flowers in the second tree.

If the tree is large, use a duster attached to a long pole. If trees are self-pollinating, touch the duster to the flower's anthers, then dab it on the stigma of the same flower or another flower on the same tree. To cross-pollinate, brush the duster on flowers of one tree, carry it a second tree. Continue this for successive days as more blossoms open. While professional growers of date palms often hand-pollinate the flowers on many female palms using pollen from a single male palm to make sure that each raceme of flowers is pollinated, these, and other tree types can be too tall for most home orchardists to effectively and safely pollinate.

POLLINATION REQUIREMENTS FOR EDIBLE TREES

Edible Tree	Pollination Codes and notes. S = Self Pollination; C =Cross pollinated; I = Insect Pollinated; W = Wind Pollinated; M/F = Male & Female Trees	
Almond	C, I	Cross-pollination by bees and other insects
Apple	C, I	Cross-pollination with another apple varieties, and insect pollinated..
Apricot	C/S, I	Insect pollinated. Many varieties are self-pollinated, but planting two varieties can increase yields
Bay laurel	C, I, M/F	Trees are <i>dioecious</i> with separate male and female trees. Both must be grown if seed is required. However, the leaves of the tree are most often used and can be harvested from any tree. Bees are the primary pollinators.
Carob	C, I/W, M/F	Typically <i>dioecious</i> , with separate male and female trees. Both wind and insect pollinated. Male or hermaphrodite trees can be interplanted or male limbs can be grafted onto female trees for pollination.
Cherry	C/S, I	All are insect pollinated. Sweet cherries and wild cherries require cross-pollination. Plant two or three varieties to ensure proper pollination. Sour cherries are self-pollinated.
Citrus: All Types	C/S, I	Flowers are self-pollinating and also may be cross-pollinated. Honey bees effective at pollinating flowers.
Desert fan palm	C/S, I	Primarily cross-pollinated by insects, but self-pollination can occur.
Date palm	C, I/W, M-F	<i>Dioecious</i> with separate male and female palms. Primarily wind pollinated, but can also be insect pollinated. Typically pollinated by hand to improve yield.
Elderberry	C/S, I	Self-pollinating, but produce more when cross-pollinated. Flowers pollinated by many insects, including honeybees, solitary bees and some flies and beetles.
Fig	C/S, I	Pollinated by a fig wasp that completes its lifecycle in caprifigs—a group of figs with both male and female flowers within fruits that are usually inedible. Caprifigs are necessary to pollinate commercially important Smyrna figs, which will dry and fall from trees while immature without pollination. Common figs, including Kadota, Adriatic, and Mission figs do not need pollination to set fruit, but will produce larger fruits with darker flesh if pollinated.
Guava	C/S, I	Depending on variety, guavas can be self or cross-pollinated. Bees are the primary pollinators.
Hackberry, netleaf	C, W	Wind pollinated and usually cross-pollinated.
Hawthorn	C/S, I	Insect pollinated. May be self-pollinated, but produce greater yields when cross-pollinated.
Ironwood	I	Insect pollinated.
Joshua tree	C, I	Cross pollinated by the yucca moth.
Jujube	C/S, I	Insect pollinated. While many are self-pollinating, yields are likely higher with cross-pollination.
Juniper	C, W, M/F	Wind pollinated. <i>Dioecious</i> with male or female trees. Requires one male to eight females for effective pollination.
Loquat	C/S, I	Pollinated by bees. Some are self-pollinated; some require cross-pollination.
Medlar	C, I	Insect pollinated, self-pollinated.
Mesquite	C, I	Insect pollinated, require cross-pollination
Mulberry	C/S, W	Wind pollinated. Self-fertile but cross-pollination provides greater yields.
Oak	S, W	Self-pollinated, wind pollinated.
Olive	C/S, W	Wind pollinated, rarely by insects. Flowers self pollinated or cross-pollinated depending on cultivar. Check before planting if only one tree is planned.
Palo verde	I	Insect pollinated; attracts bees.

Peach, nectarine	S, I	Self-pollinated, insect pollinated
Pear, Asian pear	C/S, I	Self-pollinated or cross-pollinated depending on variety, though most are cross-pollinated and need at least two varieties present to produce fruit. Insect pollinated. Honey bees and many native pollinators including several species of solitary bees serve as effective pollinators.
Pecan	S, W	Wind pollinated.
Persimmon	C, W/I, M/F	Fruit are pollinated by wind and insects; bees are important for fruit set. May be artificially pollinated. Asian persimmons can produce seedless fruit without pollination, though usually need more than one cultivar for effective, reliable fruit set. American persimmons need pollination except "Meader," which is self-fertile.
Pinyon pine	W	Wind pollinated.
Pistachio	C, W, M/F	<i>Dioecious</i> with separate male and female trees. A male tree is usually interplanted with female trees in commercial orchards. Wind pollinated. Strong desiccating winds in spring may interfere with pollination and reduce crop set.
Plum	C, I	European plums are generally self-fertile, whereas Japanese plums are insect-pollinated and require cross-pollination for fruit set. Wild plums flowers must be cross-pollinated by insects.
Pomegranate	C/S, I	Flowers are both self-fertile and cross-pollinated, and are pollinated by insects.
Quince	C, I	Flowers should be cross pollinated for good fruiting; they are insect pollinated.
Saguaro	C, I	Pollination conducted by nocturnal, nectar feeding bats, and diurnally by bees and doves
Sapote, white	C/S, I	Insect pollinated. Some varieties require cross-pollination for good fruit production.
Walnut	C/S, W	Wind pollinated; male and female flowers mature at different times. Walnuts are self-fertile but the separation in flowering timing promotes out-crossing.

POLLINATION REQUIREMENTS FOR UNDERSTORY PLANTS

Understory Plant	Pollination Codes and notes. S = Self Pollination; C =Cross pollinated; I = Insect Pollinated; W = Wind Pollinated; M/F = Male & Female Trees	
Agave	C, I	Different species adapted for pollination by insects, nectar-eating bats, and hummingbirds.
Barberry	C, I	Flowers have both male and female parts (“perfect”), pollinated by insects.
Barrel cactus	C/S, I	May be self-fertile, but fruit and seeds increase when flowers are cross-pollinated, usually by bees.
Blackberry	S	Most are self-fruitful and do not require pollinators.
Chiltepin	C/S, I	Flowers have both male and female parts (“perfect”), that are self-fertile, but insects can facilitate cross-pollination among plants.
Cholla	I	Pollinated by a few species of cacti-specialist bees
Currant	S/C, I	Self-pollinating, though many fruit better with cross-pollination. Insect pollinated.
Goji berry	I	Flowers have both male and female parts (“perfect”), pollinated by bees.
Gooseberry	C/S, I	Self-pollinating, though many fruit better with cross-pollination. Insect pollinated.
Grape	C/S, W/I	Different varieties can be self-fertile or cross-pollinated. Flowers are pollinated by wind and insects. Wild grape flowers contain nectar, suggesting that insect visitation is probable.
Hackberry, desert	I	Bees are the primary pollinators
Manzanita	I	Insect pollinated
Ocotillo	C/S, I	Insect and animal pollinated (hummingbirds and bees). In southern Arizona, ocotillo flowering coincides with northern migration of hummingbirds. Primarily cross-pollinated, with some self-pollination occurring.
Passion fruit	C/S, I	Have very diverse pollinator types. Depending on variety, self-pollinated or cross-pollinated. Purple passion fruit (<i>Passiflora edulis</i>) flowers are self-fertile, but pollination is best under humid conditions. Carpenter bees are more effective pollinator than honeybees.
Pineapple guava	C, I	Flowers have both male and female parts (“perfect”). Not self-pollinating and more than one variety should be planted to ensure fruit set.
Prickly pear	I	Insect pollinated.
Raspberry	C/S, I	Pollinated by bees and flies. Many cultivars are self-pollinating, while many wild raspberries are self-incompatible and require outcrossing.
Serviceberry, Utah	S,I	Self-pollinated by bees.
Sumac	C, I, M/F	Sumac bushes bloom in April and are bee pollinated. Flowers have both male and female parts (“perfect”), so both male and female plants must be grown if seed is required. The plant is not self-pollinating.
Wolfberry	I	Flowers visited by bees, butterflies and hummingbirds, all of which likely serve as pollinators.
Yucca	I	Some species pollinated at night by moths that simultaneously lay eggs in the ovary.