



Growing Pawpaws

TREE FRUIT
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The pawpaw is native to the eastern United States and grows wild over much of Indiana. Though most of the original habitat has been destroyed in the state, the pawpaw can still be found in abundance along rivers and streams and in woodlots.

The native pawpaw is botanically known as *Asimina triloba*. It is the only member of the *Annonaceae* family adapted to temperate zones. Several tropical and sub-tropical relatives, such as the cherimoya, atamoya, guanabana, and soursop, are important fruit crops.

The pawpaw is of interest as a unique and unusual fruit, but it is not cultivated widely. Many varieties have been named, most being selections from the wild. Many of the named varieties in existence today originated in Indiana, which is possibly the reason for the common nickname "Indiana Banana."

The fruit of the pawpaw tree has a unique and complex flavor, resembling that of tropical fruit, and a pronounced aroma that is fruity and floral. High-quality pawpaws compare favorably to pears, peaches, bananas, and mangos.

Climate

The pawpaw is a tree of temperate humid zones, requiring warm to hot summers, mild to cold winters, and roughly 32 inches (80 cm) of annual rainfall, with the majority falling in spring and summer. It is hardy to zone 5 (-15°F/-25°C). For best growth it requires a minimum of 160 frost-free days and roughly 2600 total growing degree-days to ripen the fruit. In practice, the exact amount of winter chilling and summer heat needed will depend on the adaptability of the cultivar being grown, since pawpaws are found natively over a wide range of latitude from the Gulf Coastal plain to southern Michigan. Most named cultivars originated in the Midwest, the northern part of the pawpaw's range.

Site, Soils, and Plant Habit

Although the pawpaw is capable of fruiting in the shade, it performs best on sites with full-sun exposure, but with some protection from wind (because of its large leaves). Seedlings, however, will not survive under full sun conditions because the young shoot is extremely sensitive to sunlight. Shading for the first year, and sometimes the second, is usually required. It is for this reason that in the wild pawpaws are primarily an understory tree.

Pawpaws grow best in slightly acid (pH 5.5-7.0), deep, fertile, and well-drained soils. Good drainage is essential to success. Pawpaws will grow in heavy soils but will not survive water-logged conditions.

In habit the tree is small, seldom taller than 25 feet (7.5m). Grown in full sun, the pawpaw tree develops a pyramidal shape, with dense, drooping foliage down to ground level. In the shade it has a more open branching habit, with few lower limbs and horizontally held leaves.

Plant Selection and Establishment

Pawpaws are available from nurseries as bare-root and container-grown trees. Container-grown trees have given the best results. The trees can also be transplanted from the wild or propagated in a variety of ways.

Extra care should be given trees for the first two years to promote growth as the root system establishes itself. Keep the plants well watered and partially shaded for the first year or two. Thereafter, growth accelerates and trees require little care. Fruit production normally begins when the trees reaches 6 feet (2m), usually after five to seven years.

Cultivars

At least four cultivars of pawpaw are available commercially in the United States: Overleese, Taytwo, Mary (Foos) Johnson, and Sunflower. At least another six cultivars exist that may be obtained

through amateur organizations such as the North American Fruit Explorers and Northern Nut Growers Association: Mitchell, Silver Creek, Rebecca's Gold, Wilson, Taylor, and Davis. Known cultivars grafted onto seedling rootstocks offer the best possibility of obtaining good fruit quality. Two or more genotypes are required for pollination and fruit set.

Transplanting

The pawpaw is very difficult to transplant. It would seem natural to propagate a clone by transplanting rootsuckers, since pawpaws commonly sucker from the roots, but in practice this is extremely difficult and usually ends in failure. The rootsuckers normally have no secondary roots for a great distance from the shoot. Without secondary roots, the shock of transplant is too great, and the root-sucker dies.

Seedling trees, on the other hand, have been successfully transplanted. Experience has shown that to be successful, seedlings should be transplanted in the spring, at the time that new growth commences or soon after. If many roots are damaged, it may be desirable to prune the top to bring it into balance with the remaining roots. While for many species a bare-root tree is sufficient for transplanting, it is not preferred for pawpaw.

Though difficult to transplant, once established, the pawpaw is vigorous and easy to maintain. The key to successful transplanting from the wild lies in five rules:

- Transplant seedlings for best results.
- Keep the roots and soil intact as much as possible.
- Transplant in the spring after budbreak, not in fall or winter.
- Plant in a well-drained site, and keep trees well watered the first year.
- Provide partial shading for the first year or two.

Vegetative Propagation

Pawpaws are easily propagated by a number of grafting and budding techniques, such as whip-and-tongue, cleft graft, bark inlay, and chip budding. T-budding, however, has not produced good results. Shoot cuttings have proven virtually impossible to root. Grafting scions of known cultivars or selections from the wild that exhibit desirable traits onto seedling rootstocks is one of the best method of establishing pawpaw trees.

Propagation by Seed

Pawpaw seed is slow to germinate, but germination is not difficult if certain precautions are followed. Do not allow the seed to dry out, because this eventually destroys the immature dormant embryo. To break dormancy, the seed must receive a period of cold temperatures (termed "stratification") lasting 90 to 120 days.

Stratification may be accomplished by sowing the seed outdoors in the garden bed in the fall and letting the seed overwinter there; the seed will germinate the following year in late July or August. Or the seed may be stratified in the refrigerator at 32-40°F (0-5°C). The seed should be stored in plastic bags containing slightly moistened sphagnum moss to keep the seed moist and to suppress fungal/bacterial growth. After 90-120 days, the seed should be removed from the refrigerator and sown in a well-aerated soil mix of pH 5.5-7.0 with an optimum temperature of 75-85°F (25-30°C). On average the root will emerge from the seed coat after 18 to 24 days, develop into a taproot about 10 inches (32cm) long, and then send up a shoot after 50-60 days. Germination is "hypogeal," meaning that the shoot emerges without cotyledons.

Culture of Pawpaws

Pollination and Fruit Set

Pollination is the major limitation to pawpaw fruit set. The flowers are "protogynous," meaning that the stigma (the female receptive organ) ripens before the pollen does and is no longer receptive when the pollen is shed. Thus, the flower's design insures that the flower will not pollinate itself. In addition, pawpaw trees are usually self-incompatible, requiring pollen from a genetically different tree in order to be fertilized. Finally, the natural pollinators of the pawpaw (various species of flies and beetles) are neither efficient nor dependable.

Although it requires a little extra labor, hand pollination can be well worth the effort. With a small, flexible artists brush, transfer a quantity of fresh pollen from the anthers of a flower of one clone to the ripe stigma of the flower of another clone. Pollen is ripe when the anthers are brown in color, loose, and crumbly, and pollen grains appear as yellow dust on the brush hairs. The stigma is ripe when the tips of the pistils are green and glossy, and the anther ball is still hard and green. Hand pollination can lead to excessive fruit set. Do not overcrop the tree by leaving too much fruit, because this stresses the tree, resulting in small fruit, reduced tree growth, and possible limb breakage.

Pests

In its native habitat the pawpaw has few pests of economic importance. The worst pest is *Talponia plummeriana*, the pawpaw peduncle borer, a small moth larva (about 5mm long) that burrows in the fleshy tissues of the flower, causing the flower to wither and drop. In some years this borer is capable of destroying the majority of blossoms.

Other pests include *Eurytides marcellus*, the Zebra Swallowtail Butterfly, whose larvae feeds exclusively on young pawpaw foliage, but never in great numbers. The adult butterfly is of such great beauty that this should be thought more a blessing than a curse. Sometimes the fruit surface may be covered with hard black patches that are caused by a fungus infection, but seldom does this have any effect on flavor or edibility. Deer do not feed on the leaves, twigs, or fruit.

Uses of Pawpaw Fruit

The primary use of pawpaws is for fresh eating. The easiest way to eat them is to cut them in half and scoop the flesh out with a spoon. The large seeds, scattered throughout the fruit, are easily separated from the flesh. In cooking, the pawpaw is best suited to recipes that require little or no heat. Because the pawpaw's flavor compounds are very volatile, prolonged heating or high temperatures destroy the characteristic flavor. Pawpaw works well in ice cream, sorbet, chiffon pie, and mousse, and combines well with mint. Because of its flavor resemblance to banana, it may be substituted in recipes for such things as banana bread.

Ripeness and Quality

Ripe pawpaws have a pronounced aroma that is fruity and floral. The flavor is sweet, fragrant, and complex, with a lingering aftertaste. When ripe, the fruits are soft, like a ripe avocado or peach. Visual clues of ripeness are sometimes subtle. The skin turns a lighter shade of green and may show some yellow. In the late stages of ripeness the skin develops brown blotches, streaks, and freckles like a banana. The flesh of a ripe pawpaw will be yellow, soft, and smooth, resembling custard.

Fruit can vary considerably in size, depending on the cultivar and the number of seeds in each fruit, but normally weighs between 5 ounces and 1 pound. Fruit shape is oblong to round, depending on the number of seeds.

Storage

Pawpaws are very perishable. Their respiration rate is higher than that of most fruits, and the respiration process emits quite a bit of moisture, heat, carbon dioxide, and ethylene (the fruit-ripening hormone). When completely ripe, pawpaws will last for only about two days at room temperature. Refrigerated at 40-45°F, the same fruits may last a week. If the fruits are not quite ripe, they may be refrigerated for about two weeks and then ripened at room temperature for several days. Storing pawpaws at less than 40°F is not recommended, since it often changes the flavor, producing undesirable flavors.

Nursery Sources for Pawpaws

Pawpaws are available from many nurseries. It is not possible to include all nurseries, and no discrimination or preference is intended by inclusion or exclusion from this list.

W. Atlee Burpee & Company
Warminster, PA 18974
(800) 333-5808
www.burpee.com

Hidden Springs Nursery
170 Hidden Springs Lane
Cookeville, TN 38501
(931) 268-2592

Campberry Farm
Doug Campbell
RR 1, Niagara-on-the-Lake
Ontario, L0S 1J0, Canada
(905) 935-6887

Corwin Davis
20865 Junction Road
Bellevue, MI 49021
(616) 781-7402
(*grafted varieties*)

Edible Landscaping
P.O. Box 77, 361 Spirit Ridge Lane
Afton, VA 22920
(804) 361-9134
www.eat-it.com

John H. Gordon Nursery
1385 Campbell Boulevard
Amherst, NY 14228
(716) 691-9371

Louisiana Nursery
12290 Mansfield Road
Keithville, LA 71047
(318) 925-0971
worlddome.com/lanursery.html

Northwoods Nursery/One Green World
28696 S. Cramer Road
Molalla, OR 97038
(503) 651-3005
www.onegreenworld.com
(*grafted varieties*)

Oikos Tree Crops
P.O. Box 19245
Kalamazoo, MI 49019
(616) 624-6233

Oregon Exotics Rare Fruit Nursery
1065 Messinger Road
Grants Pass, OR 97527
(541) 846-7578
www.exoticfruit.com

F. W. Schumacher Seed Co.
36 Spring Hill Road
Sandwich, MA 02563
(508) 888-0659
(*seed only*)

Lennilea Farm Nursery
R.D. 1 Box 683
Alburtis, PA 18011
(215) 845-2077

Sherwood's Greenhouses
P.O. Box 6
Shipley, LA 71073
(318) 377-3659

Tripple Brook Farm
37 Middle Road
Southampton, MA 01073
(413) 527-4626
www.tripplebrookfarm.com

For Additional Information

For more information about pawpaws contact your local county office of the Purdue University Cooperative Extension Service or The PawPaw Foundation, P.O. Box 23467, Washington, D.C., 20026, www.pawpaw.kysu.edu/ppf/.

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