Pawpaw Planting Guide

Kentucky State University Cooperative Extension Program

Pawpaw Research Project, Community Research Service, Atwood Research Facility, Frankfort, KY 40601-2355

by Snake C. Jones[1], R. Neal Peterson[2], Terrih-Angelah Turner[3], Kirk W. Pomper,Ph.D.[4], and Desmond R. Layne, Ph.D.[5]

This bulletin was created to meet the increasing demand for information on cultivation of the native American pawpaw, *Asimina triloba*. Very little scientific research has been done on pawpaw. The advice given here is based partly on research and partly on the experiences of many pawpaw growers. These guidelines should help you to become a successful pawpaw grower.

Climate

The pawpaw is a tree of temperate humid growing zones, requiring warm to hot summers, mild to cold winters, and a minimum of 32 inches (81 cm) of rainfall spread rather evenly throughout the year, with the majority falling in spring and summer. It can be grown successfully in USDA plant hardiness zones 5 (-15^{o} F/-26^{o} C) through 8 (15^{o} F/-9^{o} C). Pawpaws grow wild over a wide range of latitude, from the Gulf Coastal plain to southern Michigan. However, the trees may not receive adequate chilling hours if planted too close to the Gulf Coast. Most named cultivars originated in the Midwest, which is the northern portion of the pawpaw's range. A national regional variety trial is underway to determine which varieties perform best in different parts of the country, and results should become available in the next several years. In the meantime, for best results, choose cultivars that were selected in a climatic zone and latitude similar to the area where they will be planted.

Site, soils, and habitat

Although the pawpaw is capable of fruiting in the shade, optimum yields are obtained in open exposure, with some protection from wind (on account of the large leaves). Germinating seedlings, however, will not survive under those conditions because they are extremely sensitive to full sunlight, which can kill them. (Containerized seedlings may be grown without shade **in a greenhouse**.) Shading for the first year, and sometimes the second, is normally required outside, and it is for this reason that pawpaws are almost always found in nature as an understory tree. The soil should be slightly acid (pH 5.5-7), deep, fertile, and well-drained. Good drainage is essential to success. Pawpaws will not thrive in heavy soil or waterlogged soil. In habit it is a small tree, seldom taller than 25 feet. Grown in full sun, the pawpaw tree develops a narrowly pyramidal shape with dense, drooping foliage down to the ground level. In the shade it has a more open branching habit with few lower limbs and horizontally held leaves.

Seed Propagation

Pawpaw seed is slow to germinate, but it is not difficult to grow seedlings if certain procedures are followed. **Do not allow the seed to freeze or dry out**, because this can destroy the immature, dormant embryo. If seeds are dried for 3 days at room temperature, the germination percentage can drop to less than 20%. To break dormancy, the seed must receive a period of cold, moist stratification for 70-100 days. This may be accomplished by sowing the seed late in the fall and letting it overwinter; the seed will germinate the following year in late July to late August. Another way is to stratify the seed in the refrigerator (32^o- 40^o F/0^o- 4^o C). In this case the cleaned seed should be stored in a plastic ziplock bag with a little moist sphagnum moss to keep the seed moist and suppress fungal and bacterial growth. After stratification the seed should be sown 1 inch (2.5 cm) deep in a well-aerated soil mix, pH 5.5-7, with an optimum temperature of 75^o- 85^oF (24^o- 29^o C). Use tall containers, such as tree pots (ht. 14"-18"/35-45 cm) or root trainers (ht. 10"/25 cm), to accommodate the long taproot. The seed will normally germinate in 2-3 weeks, and the shoot will emerge in about 2 months. Germination is *hypogeal:* the shoot emerges without any cotyledons. For the first two years, growth is slow as the root system establishes itself, but thereafter it accelerates. Trees normally begin to bear fruit when the saplings reach 6 feet, which usually requires five to eight years.

Vegetative or clonal propagation

Pawpaw clones are easily propagated by a number of grafting and budding techniques, such as whip-and-tongue, cleft, bark inlay, and chip budding. The only method that does not produce good results is T-budding. Softwood and hardwood cuttings have proved virtually impossible to root. Although it is common for a pawpaw to sucker from the roots, propagating a clone by transplanting root suckers is often not successful. Pawpaws are ordinarily quite difficult to transplant. They have fleshy, brittle roots with very few fine hairs. Experimentation has shown that, to be successful, transplantation should be done in the spring at the time that new growth commences, or soon after. (This is basically the same as for magnolia.) If many roots are lost, it may be desirable to prune the top to bring it into balance with the remaining roots. Grafted trees may bear fruit in as few as 3 years.

Purchasing trees

Pawpaw trees available from nurseries are generally either seedlings or grafted named cultivars. Seedling trees are typically one year old at time of purchase, and they are less expensive than grafted trees. Since seedlings are not identical to their parents, fruit quality cannot be guaranteed. Trees that have been grafted to named cultivars are usually 2 years old at time of purchase, and they are more expensive than seedling trees. Since they retain the clonal identity of the parent, fruit quality is assured, given adequate cultural conditions. If fruit production is desired, purchase at least two genetically different trees (i.e. two different cultivars, or at least two seedlings), to ensure that cross pollination can occur. Container-grown trees may have a higher establishment (survival) rate than field-dug trees; pawpaws have a long tap root and delicate root system that can be damaged by digging.

Caring for young trees

When planting trees, allow 8 feet (2.5m) between them. Water newly planted trees immediately after planting, and as needed throughout the growing season. Pawpaw trees require adequate soil moisture, especially in the first two years after planting. Transplant shock may be reduced by providing temporary partial shade to newly planted trees. Application of a balanced fertilizer (20N-20P-20K) every few weeks during the first half of the growing season may also improve growth and establishment of young trees.

Pollination: natural and artificial

Pollination can be a limiting factor in pawpaw fruit set. The flowers are *protogynous*, meaning that the stigma (the female receptive organ) ripens before the pollen, and is no longer receptive when the pollen is shed. Thus the flower is designed not to be self-pollinated. In addition, pawpaw trees are self-incompatible, usually 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 not efficient or dependable. Although it requires a little extra labor, hand pollination to ensure fruit set can be well worth the effort and can be done as follows: Using a small, flexible artist's brush, transfer a quantity of fresh pollen from the anthers of the flower of one clone to the ripe stigma of the flower of another clone. Pollen is ripe when the little ball of anthers is brown in color, loose and friable; 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. Do not overburden the tree with fruit, as this will stress the tree, resulting in smaller than normal fruit, and may cause limbs to break under excessive weight.

Pests

In its native habitat the pawpaw has few pests of any importance. The worst pest is *Talponia plummeriana*, the pawpaw peduncle borer, a small moth larva (about 5 mm long) that burrows into 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. Another pest is *Eurytides marcellus*, the zebra swallowtail butterfly, whose larvae feed 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 patches that are hard and black; this is a fungus infection, but it seldom has any effect on flavor or edibility. Deer will not eat the leaves or twigs, but they will eat fruit that has dropped on the ground. Male deer occasionally damage trees by rubbing their antlers on them in winter. Outside its native region, the pawpaw is sometimes reported to be plagued by pests, but this may be because of poor tree health resulting from the stress of improper soils and an unsuitable climate.

1. Research Assistant, Kentucky State University

2. Founder of the PawPaw Foundation, PO Box 23467, Washington, D.C. 20026

3. Undergraduate student, Kentucky State University

4. Principal Investigator of Horticulture, Kentucky State University, and Curator, USDA National Clonal Germplasm Repository for Asimina spp.

5. Assistant Professor, Clemson University, Department of Horticulture, Clemson, SC 29634-0375; President of the PawPaw Foundation

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Forsyth County Center
1450 Fairchild Road
Winston-Salem NC 27105

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