



# Pawpaw

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## Introduction

Pawpaw (*Asimina triloba*) is a unique tree fruit native to the eastern United States. Its highly aromatic fruit has a sweet, almost tropical-like flavor. The large fruit is oblong and typically produced singly or in clusters of two to nine. Pawpaw fruit pulp can be eaten fresh or prepared in a variety of desserts. Kentucky is fortunate to have the USDA National Clonal Germplasm Repository for *Asimina* spp. located at Kentucky State University in Frankfort.

## Marketing

The primary outlets for fresh pawpaws in Kentucky are farmers markets and on-farm sales. Kentucky growers have also explored various niche market opportunities including sales to restaurants, especially those featuring local foods or Appalachian cuisines; pawpaw ice cream; pawpaw wine and beer; and pawpaw as an ingredient in preserves and baked goods. Processing pawpaws into pulp is seen as a critical step into developing a greater food market for this native crop. Some producers in Appalachia have successfully featured pawpaws in agritourism events, like festivals and special on-farm days.

Pawpaw is an unfamiliar fruit to many consumers, and education and point-of-purchase materials about eating and use can be especially helpful. Producers wishing to expand beyond farmers market sales could target specialty food retailers; research conducted by the UK Department of Agricultural Economics indicates there is strong interest for sampling pawpaw products among shoppers at gourmet and specialty food stores. A survey of consumers in Missouri indicated many would prefer farm-



ers markets and grocery stores as the place to purchase pawpaws.

## Market Outlook

Pawpaw has long been seen as a potentially high-value fruit. Pawpaws sold at Kentucky farmers markets are collected from small orchards or natural stands in the forest. Sellers often have difficulty finding sufficient pawpaws to meet the demand, indicating potential for increased cultivated production. Wild collected fruit can be small in size, have many seeds, and have a bitter aftertaste. Fruit from grafted trees of named varieties is of a higher quality, does not have a bitter aftertaste, and has greater market potential. Developing a supply of uniform, quality fruit will be needed for larger-scale commercialization.

Pawpaw may also be used as an ingredient in specialty and value-added foods, including juices, wine, beer, jam, ice creams and desserts. Researchers have



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also found naturally occurring compounds with insecticidal and anti-cancer properties in the bark, twigs and leaves. Harvesting pawpaw tissues to extract these chemicals could create income not dependent on pawpaw fruit sales.

## **Production considerations**

### *Cultivar selection*

Based on Kentucky State University research trials, the following named cultivars produced large fruit (over 5 ounces) and performed well in Kentucky: 'NC-1,' 'Overleese,' 'Potomac,' 'Shenandoah,' 'Sunflower,' 'Susquehanna' and 'Wabash.' Kentucky State University has also licensed and released two trademarked pawpaw cultivars, KSU-Atwood™ and KSU-Benson™. Most pawpaw cultivars are believed to be self-incompatible, requiring at least two genetically different trees for cross pollination and fruit set to occur.

### *Propagation*

Pawpaw can be propagated by seed that has undergone either a natural or artificial cold treatment (stratification) for 90 to 120 days. Actively growing seedlings that are about pencil width in stem diameter can be chip-budded or grafted with dormant buds (scionwood) collected from named varieties or superior trees. Transplanting trees from the wild or from the field is often unsuccessful because the deep tap root is easily damaged during digging. Plants grown in containers, however, transplant quite well. Container-grown trees purchased from nurseries are generally either seedlings or grafted named cultivars.

### *Site selection and planting*

Pawpaws prefer deep, fertile soils that are well drained and slightly acidic. Heavy or water-logged soils should be avoided. Trees that are less than 1½ feet tall should be shaded the first year with tree guards or tree shelters. Trees that are 1½ feet or taller do not require shading upon planting. Fruit production in mature trees is greatest in full sun. Pawpaw trees will need regular watering during the growing season. Supplemental fertilizer should be added annually in late winter or early spring.

Flies and beetles are thought to be the pollinators; however, since they are neither efficient nor dependable, hand pollination can be helpful to ensure plentiful fruit set for small home plantings.

### *Pest management*

Pawpaws are relatively disease-free and have few insect pests, which could make this a potential crop for organic production. Occasionally, Japanese beetles can damage vegetation. *Asimina* webworm, which feeds on leaves and stems in late summer, forming a web-like nest, has been seen by some growers in Kentucky. Pawpaw peduncle borer larvae feed on the stems of flowers, resulting in flower drop, and also have been found boring into twigs and fruit. *Phyllosticta*, a complex of several fungi, may produce a black, superficial growth that covers fruit and detracts from its appearance. It may also cause fruit cracking in severe cases. *Phyllosticta* can be especially troublesome on pawpaws in years of frequent rainfall. Weed control is particularly important during the first years of establishment when grasses and weeds can compete with pawpaws for water and nutrients.

### *Harvest and storage*

Trees started from seed will normally begin to bear fruit after five to eight years, while grafted trees may bear fruit three or four years after planting. The fruit is ripe when it is soft and gives slightly when gently squeezed. Ripe pawpaws also have a very strong aroma. Skin color, which is not a reliable indicator of ripeness, can vary from green to yellow-green. When fruit on an individual tree begin to ripen, pawpaws from that tree will need to be hand-harvested a minimum of every other day for a one- to two-week period. Fruit ready for harvest will give slightly when squeezed gently. Tree-ripened fruit has a shelf life of three to five days at room temperature, but can be stored from one to three weeks if refrigerated or frozen for up to a year.

### *Labor requirements*

Labor needs for pawpaw production are approximately 90 hours per acre (20 hours for mowing and management and 70 hours for pruning). Harvest requires a minimum of 250 hours per acre.

## **Economic Considerations**

Initial investments include land preparation, purchase of plants, installation of an irrigation system and tree establishment. The recommended planting density is 295 pawpaw trees per acre. Grafted trees may cost more than \$15 each. For grafted cultivars, partial crops may be obtained three or four years after planting; trees will bear a full crop five years after planting.

The time to recoup the establishment costs of a pawpaw planting are similar to other tree fruits, five to 10 years after planting, depending on yields and selling price.

Production costs (2018) for a mature pawpaw planting are estimated at \$1,650 per acre, with harvesting and marketing costs at \$6,200 per acre. These are estimated costs for a representative Kentucky planting and count a hired labor charge of \$12.50 for pruning and harvesting. Total variable costs per acre, including interest on operating capital, come to approximately \$8,400. Presuming gross returns of \$9,600 per acre, returns to land, capital and management are approximately \$2,200 per acre. These returns could be substantially higher than the assumed \$1.75 per pound wholesale price; pawpaws have sold at Kentucky farmers markets for \$3 per pound. However, profitability estimates for a minor crop such as pawpaws can vary widely, as marketing new crops is dependent on consumer acceptance, emerging market channels and superior product quality.

### Selected Resources

- Pawpaw Information Website (Kentucky State University) Includes: Pawpaw Planting Guide, Cultivars, Nurseries, FAQ, Pawpaw Research at KSU, and more <http://www.pawpaw.kysu.edu>
- Organic Production of Pawpaw (Kentucky State University, 2010) <http://www.pawpaw.kysu.edu/PDF/OrganicPawpawPBI-004.pdf>

- Pawpaw — A “Tropical” Fruit for Temperate Climates (ATTRA, 2017) <https://attra.ncat.org/attra-pub/summaries/summary.php?pub=9>
- Picking Up Pawpaws: An Evaluation of Consumer Willingness to Sample Unusual Regional Products (UK Department of Agricultural Economics research, 2013) <http://ageconsearch.umn.edu/record/158776?ln=en>
- Pawpaw: Production Trial and After Purchase Survey Findings (University of Missouri Center for Agroforestry, 2009) <http://www.centerforagroforestry.org/pubs/pawpaws.pdf>
- Container Production of Pawpaw Seedlings (Kentucky State University, 2003) <http://www.pawpaw.kysu.edu/PDF/PomperHT03c.pdf>
- Forest Production of Pawpaw (Kentucky State University, 2009) <http://www.pawpaw.kysu.edu/PDF/ForestPawpawPBI-003.pdf>
- Growing Pawpaws, HO-220 (Purdue University, 2001) <https://ag.purdue.edu/hla/pubs/HO/HO-220.pdf>

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*Photo courtesy of Kirk Pomper, Kentucky State University*

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