



Pecans

Matt Ernst¹

Introduction

The pecan tree (*Carya illinoensis*) is native to North America and Mexico. Pecans were long harvested for food before the arrival of European explorers, and pecan lumber became prized by furniture makers. The earliest native pecan groves are traced to the U.S. Mississippi River valley and Mexico's river valleys. American Indians and fur traders brought pecans east, and trade records exist for pecans that were shipped to Great Britain before 1800. Although southern pecan cultivars were improved in the 1800s, the commercial pecan industry did not develop until the 20th century, slower than other tree nut industries in California and the Pacific Northwest.¹

The pecan and Eastern black walnut are Kentucky's most significant nut crops. Commercial pecan plantings are located near Paducah and Henderson, and native pecan groves have long been harvested near the Mississippi River. Only northern pecan cultivars are recommended for cultivation in Kentucky, as the state's usual growing season is not long enough for southern pecan varieties to mature. The established popularity of pecans with consumers could offer potential for producers willing to carefully establish pecan plantings on appropriate sites.

Marketing

Pecans enjoy familiarity and popularity with consumers, and global demand for U.S.-grown pecans has increased in recent years. Ease of cracking many pecan cultivars makes in-shell sale of the nuts ideal for direct markets, including farmers markets, on-farm sales, roadside stands, and through Community Supported Agriculture (CSA) or other direct marketing channels.



Wholesale foodservice and retail food markets are well-established for pecans. Pecans are a hallmark of Southern and regional cuisine, and restaurants specializing in local foods may be willing to pay a premium for locally grown pecans. Pecans are also in demand by food manufacturers of all sizes for making candies, ice cream and baked goods. Small quantities of pecans have been sold, in the past, at Fairview Produce Auction, in western Kentucky.

Market Outlook

Tree nuts enjoy a positive consumer perception in the U.S. because of a fat and fiber profile that consumers perceive as part of a "healthy indulgence" or high-nutrition snack. Led by almonds, per capita consumption of the tree nut category (almonds, pecans, walnuts) has doubled, from about 2 pounds in 1990 to 4 pounds in 2015. Pecan



¹Matt Ernst is an independent contractor with the Center for Crop Diversification.

consumption in the U.S., however, remained at 0.5 pounds per person during the early 2000s and declined slightly, to 0.4 pounds per person, from 2010 to 2015. Per capita consumption is affected when production does not grow at the same rate as population; higher exports can also decrease the amount of a commodity available for domestic consumption.

Total U.S. pecan production, which fluctuates annually because of the alternate bearing nature of pecan trees, remained between 250 million and 300 million pounds from 2005 to 2015. The U.S. pecan industry is dominated by production from Georgia, New Mexico and Texas. These three states accounted for 77 percent of the 2015 pecan crop. Much of the annual change in production, as of 2016, is the result of changes in native and seedling pecan volumes; improved pecans, which command a higher average price, maintain similar annual volumes.

Average in-shell prices for U.S. pecans increased from 2004 to 2011, according to the USDA. Before 2004, season average prices ranged from about \$0.50 to \$1 per pound. From 2006 to 2015, the average price was about \$1.75, with a range of \$1.12 to \$2.43. The increase resulted from both domestic and export buyers willing to pay higher prices for a total pecan volume that remains similar, on average, from year to year. Pecan prices at the high end of this range were expected to continue in the 2016/17 season, despite lower export demand reported from some Asian markets. There is a wide range of producer prices paid for pecans, based on nut quality and other factors; potential new producers should determine what prices are likely to be paid by their target customer when projecting long-term profitability.

Production considerations

Cultivars

Selecting appropriate cultivars is imperative for successful pecan production in Kentucky, where only northern pecan cultivars will produce marketable crops in most years. Nut characteristics and disease resistance are important for cultivar selection. Desirable cultivars produce a crop with less than 80 nuts per pound, with kernels that are light straw-colored and easy to separate from the shell. Cultivars that produce more than two or three nuts per cluster offer yield advantages. Cold tolerance and resistance to key diseases, especially pecan scab, are desirable tree traits.

Improved northern pecan cultivars from the USDA pecan breeding program, such as ‘Kanza,’ combine pecan scab disease resistance with good yield potential and outstanding kernel characteristics.

Site selection and planting

Pecans and other nut trees grow best in deep, well-drained soil with medium to good fertility and a soil pH around 6.5. Select an orchard site according to the temperature and elevation requirements for specific cultivars. Northern pecans may not produce a mature nut crop at higher elevations with variable daytime and nighttime temperatures. Sites for nut orchard establishment should have soil with good water holding capacity. Supplemental watering or irrigation is recommended; irregular moisture affects pecan seedling health and growth.

Pecans may be planted from seed, seedlings, or grafted trees. Trees started from seeds or seedlings should be grafted to the desired variety. Grafted trees will produce nuts faster and, though more expensive, reduce labor time needed for grafting. Pecans require cross-pollination from another variety, and the correct varieties must be selected when laying out the planting to meet pollination requirements. Proper soil fertility, hole preparation and weed management will improve the likelihood of superior tree growth. Managing potential wildlife damage is an important consideration, as rabbits and rodents can impact young trees and deer are likely to damage growing trees. Appropriate measures should also be taken to protect young trees from sunscald.

Adjust soil fertility at least one month before planting, based on soil test recommendations. Increase fertilizer applications for each inch of trunk diameter, measured 5 inches above the ground, according to university recommendations. Apply fertilizer in late February, and apply lime as needed to keep soil pH above 6.0. Zinc, a very important trace element for nut trees, is best applied as a foliar spray but may also be applied to the soil. Weeds beneath the trees can be controlled through cultural methods, mechanical controls like mowing, and herbicide applications.

Establishing pecan trees requires care and expertise. Good advance planning, developing a proper site plan, and consulting and following industry and university recommendations can improve the chances of a nut

orchard's long-term productivity.

Pest management

Pecan scab is the major disease of pecan trees in Kentucky. The disease is caused by a fungus, *Cladosporium caryigenum*, which attacks growing tissue. Pecan scab appears first as small, circular olive to black spots on growing leaves, leaf petioles and nut shucks. Planting resistant varieties is the best control for scab. Fungicides may be required to manage pecan scab, especially in wet years. Other potentially significant diseases of pecan trees in Kentucky include crown gall, powdery mildew, shoestring root rot and bunch disease.

Pecan phylloxera, pecan weevil and stinkbugs present significant insect damage potential for pecans in Kentucky. The pecan phylloxera is related to aphids and produces a substance causing the tree to produce abnormal galls on new growth. Pecan weevil, which feeds directly on the pecan kernel, can potentially destroy a crop. Stinkbugs feed on the pecan kernels, causing dark sunken blemishes on the kernels. These pests, and other potentially damaging insects like scales and aphids, can be managed with integrated pest management practices and appropriate insecticide applications. Squirrels, crows, blue jays and deer can substantially reduce the nut harvest as nuts mature on the trees and drop to the ground.

Harvest and storage

Pecans may be harvested after the shucks split around the nut. Nut quality declines when nuts are left on the ground. Commercial pecan production utilizes mechanical tree shakers and nut collection equipment. Pecans should be dried after collection, to prevent molding or sprouting, and then refrigerated or frozen to preserve quality.

Labor requirements

Pecan production requires intensive labor for planting, pruning and harvest. Labor needs per acre may vary considerably for the pre-planting and planting years,

depending on site preparation. At least 20 hours per acre are estimated for planting, and wildlife control measures required at many Kentucky sites could add an additional 10 to 30 hours per acre during the establishment year. About 25 hours per acre per year are estimated, for maintenance and pruning, until trees reach bearing age. Only about five additional hours of labor are required in harvest years when using a mechanical shaker, sweeper and harvester. Less mechanization increases harvest labor requirements and reduces returns per acre. Post-harvest labor, such as packaging and grading, can also vary greatly according to the marketing channel.

Economic considerations

The major costs of establishing a pecan orchard planting are land, trees, an irrigation system, machinery and equipment, wildlife control and labor. Establishment variable costs (for preplant land preparation, planting,



and the year after planting) will fall in the \$1,500 range, according to annual pecan budgets modified for Kentucky production situations. This does not include the fixed costs of wildlife fencing and an irrigation system, which could add an additional \$500 to \$2,000 per acre, depending on existing farm resources and system selection. Annual maintenance costs, for the second to seventh year, may range from \$300 to \$1,000 in variable costs

and approximately \$350 in fixed costs. The total variable and fixed cost range, during the first seven years, may be a cumulative total of \$6,000 to \$11,500 per acre.

Pecans in Kentucky will not likely start generating positive economic returns until Year 8. Expenses during that year may range from about \$800 to \$1,400 per acre, varying based upon yield and harvest equipment and labor expenses. A yield of one-half a full-bearing crop will likely generate positive returns in Year 8, assuming a price of at least \$2 per pound. Yields will increase after Year 8, and returns to land, operator labor and management for an established

pecan planting are estimated at \$1,000 to \$1,500 per acre, assuming a nut price of at least \$2. It is likely that the total establishment costs of a pecan planting would be recouped 18 years after establishment, assuming conservative yield and return estimates. Nut yields may then continue to increase, and well-managed pecan plantings could generate higher returns per acre after Year 18.

Harvest costs are the biggest variable for long-term profitability. The purchase of mechanical harvest equipment can result in a substantial expense in the first harvest year but may result in labor efficiencies in subsequent years. According to an analysis published by Texas A&M University, the machinery costs for mechanical harvest are not much different whether harvesting 10 or 100 acres of pecans. Very small pecan plantings, marketed at premium prices, could potentially utilize hand harvest. New nut orchards could potentially benefit from purchase of used equipment, equipment leasing or sharing, or cooperative ownership of mechanical nut harvest equipment to realize long-term economic profits.

Selected Resources

- Nut Tree Growing in Kentucky (University of Kentucky Extension Publication ID-77) <http://www2.ca.uky.edu/agcomm/pubs/id/id77/id77.pdf>

- Establishing a Pecan Orchard (University of Georgia Cooperative Extension, 2017) <http://extension.uga.edu/publications/detail.cfm?number=B1314>
- Improved Pecans (Texas A&M Agrilife Extension, 2013) http://aggie-horticulture.tamu.edu/fruit-nut/files/2010/10/viewpdf_3111_21293.pdf
- The Pecan Tree (University of Florida IFAS Extension, 2015) <https://edis.ifas.ufl.edu/pdffiles/HS/HS22900.pdf>
- Fruit and Tree Nuts Outlook (USDA/ERS, September 2017) <https://www.ers.usda.gov/webdocs/publications/85287/fts-365.pdf?v=43007>

The Domestic Tree Nut, Industries An Economic Appraisal (USDA ERS Agricultural Economic Report No. 62, 1964) <https://naldc.nal.usda.gov/naldc/download.xhtml?id=CAT87201753&content=PDF>

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Reviewed by John Strang, UK Extension Fruit Specialist
Photos courtesy of John Strang

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