Extension
University of Missouri

Missouri Direct-to-Consumer Pecan Planning Budget

This budget is designed to aid Missouri farmers by estimating the costs and returns for establishing and/or maintaining an orchard of improved cultivar pecans. Careful planning is necessary when considering a multigenerational perennial crop. Establishing a pecan orchard is a significant capital investment and will take several years to produce enough pecans to provide potential positive financial returns. Given the high costs of specialized equipment, you may consider scaling or choosing to work with a custom harvester to reduce your capital investments. Key budget assumptions are discussed below and can serve as a checklist in your planning process; these assumptions can be modified in the accompanying Pecan Budget workbook (XLSX).[1]

Pecan cultivar choice

Missouri's pecan industry has both native and improved cultivars. Given improved cultivars' advantages in potential yield, nut size, flavor and earlier age at first bearing, this budget assumes purchasing Type 1 and Type 2 flowering cultivars to provide adequate cross-pollination in a newly established orchard as pecans do not self-pollinate. Balancing scab resistance with yields, this budget models an orchard with 75% Kanza cultivars (Figure 1), as recommended by the University of Missouri's Center for Agroforestry. Kanza trees are a Type 2 protogynous flowering cultivar, are very resistant to scab, have a higher than average nut weight, and are suitable throughout most of Missouri south of U.S. Highway 36, excluding the extreme southeast corner of the state. The other 25% of trees in the orchard are assumed to be Pawnee, a Type 1 protandrous flowering cultivar. Pawnees are susceptible to scab but otherwise do well in Missouri. For more information on pecan pollination and production and details about recommended pecan cultivars across five zones in Missouri, see Growing Pecans in MO Update (PDF)[2] and Picturing Nut Size.[3]

Pecan trees are unlikely to self-pollinate because the male and female flowers on the same tree do not mature at the same time. Type 1 cultivars are protandrous, meaning their male flowers mature first, whereas Type 2 are protogynous, with their female flowers maturing first.

Figure 1. Kanza pecans produce large, high quality nuts with superior scab resistance.

Site selection

Pecan trees need adequate water to establish, prefer to access groundwater with their roots, and can tolerate periodic flooding. Although access to moisture is critical, a well-drained soil type is ideal to promote root development. Because pecans will have higher yields in areas with greater moisture availability, this budget assumes tree production is occurring in areas with alluvial soils with adequate water-holding capacity, such as the bottom land along rivers. Note, however, that use of a bottomland site comes with the risk of increased frost damage, which can severely impact yield.

A farm enterprise budget is an economic resource that attempts to include the full cash costs, as well as the opportunity costs of an enterprise. These budgets allocate equipment purchases to an enterprise proportionally or in whole. They also include opportunity costs that may or may not represent cash expenses to an operation — such as labor hours, land cash rent and interest rates.

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Site preparation

Pecan trees can be in production for 50 or more years. To maximize productivity and efficiency over the lifespan of the trees, adequately prepare the site of the orchard, as amendments will be much more difficult once trees are planted. This budget assumes subsoiling the land to manage deep compaction layers, one hour per acre of grading work to improve surface drainage, using a tandem disk for surface leveling, and seeding the understory to provide ground cover between the trees.

If you need a permanent irrigation system for your conditions, the site preparation year is the most effective time to install it. Fencing should be installed to reduce deer pressure, particularly for young trees. This budget includes a two-layered electrified high-tensile fence to economically exclude deer.

Orchard design and planting

This budget assumes 800 square feet per tree. Trees may be planted in various configurations to allow for intercropping. Wider row widths with shorter within-row spacing make orchard activities more efficient and provide greater intercropping opportunities. This budget assumes the alleyways between trees will be mowed; however, the orchard design can be modified to facilitate intercropping.

Pecan trees are planted in the spring before bud break. Space the trees 20 feet apart with 40 feet between rows. Planting — including watering, measuring and immediate site prep — takes about 15 minutes per tree. Table 1 summarizes the basic configuration and management strategy in the orchard modeled.

Table 1. Pecan orchard configuration.

Category	Unit	Quantity
Orchard size	acres	10
Initial tree density	square feet per tree	800
Tree population	trees per acre	54
Pollinator trees	percent of trees	25%
First orchard thinning	year of production	12
Trees removed	trees per acre	18
Second orchard thinning	year of production	40
Trees removed	trees per acre	9
Irrigation use		None

Thinning and pruning

Pecan trees require regular pruning to manage crop load and tree shape for optimal long-term yields. In years that optimal nut production is possible, high-performing cultivars can deplete tree reserves to increase nut set, causing severe yield decreases in later years. If the harvest looks exceptionally heavy, removing reproductive structures before nuts develop will increase later yields and improve the quality of the remaining nuts. Annual pruning of undesirable branches can make the orchard easier to operate and improve tree health.

Thinning the orchard is also necessary as trees grow (Figure 2). A mature stand of pecans may have half or fewer of the original trees remaining. This budget assumes that one-third of the trees are removed 12 years after planting and another nine trees are removed at Year 40, leaving half of the original 54 trees. Storms, diseases or other damaging events will result in thinning over several years rather than in a single year. When thinning, ensure adequate pollination by considering the placement of pollinator trees in the stand.

Figure 2. When bearing-aged pecan trees are dormant is a good time to view tree spacing and assess thinning needs. Trees should be spaced to allow good airflow and prevent canopies from touching.

Fertility management

Pecan trees require annual fertilizer applications for maximum yield. This budget assumes that in early years, light rates of nitrogen (N), 30 to 60 pounds per acre, will be applied near each tree to improve vegetative growth and help trees establish themselves in the orchard. Once bearing age is reached, applying 100 pounds of N or about 220 pounds of urea per acre in a broadcast application produces optimal yields. Use a soil test to apply phosphorous (P) and potassium (K), but 20 pounds of P and 30 pounds of K will generally replace the nutrients removed by an average-sized pecan crop.

Liming is also a critical part of managing orchard fertility. Applying lime to reach an ideal range of 6.0 to 7.0 at establishment is recommended, with maintenance

applications every three to five years thereafter based on soil test results. Plan to routinely assess nutrient deficiencies with soil and tissue tests before yield losses occur for this high-value crop.

Disease and pest management

Pecans face a variety of pests and diseases that can adversely affect both yield and nut quality. Various species of borers, stinkbugs and weevil pests as well as the fungus pecan scab are top concerns for pecan growers. In many cases, three to four applications of insecticide and three applications of fungicide will adequately control most pest and disease problems. For more information on pest control in pecan orchards, see MU Extension publication MP711, Pecan Pest Management: Insects and Diseases.[4]

Marketing

This budget assumes that a 10-acre established pecan farm will choose to market 100% of the pecan harvest as a cracked-and-blown product directly to customers. Pecans should be dried in a cool dry area and kept in cold storage to prolong shelf life. Marketing cracked-and-blown rather than fully shelled pecans allows the farm to reduce expenditures on necessary processing equipment and still receiving a higher retail price than selling whole pecans by the pound directly to consumers. Additional sorting and cleaning equipment and labor hours are required to sell a fully shelled product. At the time of publication, posted pecan prices varied; we chose a $6-per-pound retail price and include the flexibility to pivot to wholesale and to adjust prices on the input tab. Farms closer to urban areas may be able to sell all pecans with minimal marketing expenses. Farms closer to other pecan orchards may need to invest more in marketing their products. Established orchards often develop a list of regulars customers that may buy all or most of the harvest. This budget assumes that 3% of all sales revenue is spent on marketing. Estimate which costs might be relevant to your farm's preferred marketing channel with the help of MU Extension publication G647, Refining Market Channel Selections Based on Cost.[5]

Interest and opportunity costs

This budget assumes producers have an operating interest rate of 8%, which is applied to all operating costs under the assumption the producer uses a line of credit with the bank. It assumes a capital interest rate of 7% on all facility and equipment investments. The budget also includes an annual land charge of $100 per acre. The workbook (XLSX)[1] includes the ability to model the long-term opportunity costs of this crop. Opportunity costs represent the earning potential of capital invested into the orchard if it were used for some other purpose. Interested users should contact the authors for a more-detailed explanation.

Machinery and equipment

Pecan farming is a niche industry with few equipment brands, and relatively high specialized processing equipment costs. Harvesting pecans efficiently is difficult to do by hand. Hand labor may be adequate for many processes if you produce less than 1 acre of pecans. The equipment for orchard maintenance and harvesting, cleaning, processing and storing pecans is largely the same as you scale up the orchard from 5 to 50 acres. Thus, producers have an incentive to grow their orchards to the maximum size their equipment can manage, given labor and investment constraints, to maximize their equipment investment. Increasing scale may require switching or adding additional market channels.

Table 2 outlines the modeled equipment costs, based on 2025 prices, required to establish, maintain, harvest and process pecans on a 10-acre farm. The user is offered two choices: budget equipment or quality equipment. The budget equipment list includes used equipment with lower purchase prices and shorter lifespans. The quality equipment list includes a mix of new and used equipment. Details on these assumptions — price, useful life, salvage value, depreciation, interest, repair rate, and annual average repair costs — can be found in the workbook (XLSX).[1] The budget assumptions modeled in Table 3 assume a farm uses quality used equipment and harvests and processes the pecans in-house to sell a cracked and blown pecan. These assumptions can be modified and consider that older and less capable equipment may not have the same capabilities and efficiency as newer models. More details on managing a pecan orchard and a calendar of tasks can be found in the Growing Pecans in Missouri Update (PDF).[2]

Harvesting

Pecans must be shaken off a tree to be harvested. Shaking, gathering and cleaning an orchard requires the harvesting equipment described in Table 2. This budget compares the expected harvest revenue to expected harvest costs (i.e., labor and equipment) and triggers the start of harvest when revenues will exceed costs. Note that you could choose to hand harvest in earlier years with a rope shaker, but the model waits to invest in harvesting equipment or hiring a custom harvester until there is a sufficient yield to cover the cost of harvest and processing activities. Again, given the variability

Table 2. Machinery and equipment in pecan enterprise.

Item	Budget equipment price (dollars)	Quality equipment price (dollars)
General farm equipment, purchased year 1		
Tractor	10,000	23,000
Utility terrain vehicle (UTV)	8,000	13,000
Air blast sprayer	3,300	45,000
Weed sprayer	700	6,000
Rotary mower	3,000	20,000
Wagon/trailer 1	2,500	15,000
Wagon/trailer 2		2,500
25% of pickup	5,000	15,000
Water trailer	1,500	5,200
Harvesting equipment, purchased year 10		
Tractor 2	8,000	19,000
Limb rake	2,000	5,800
Tree shaker	1,500	7,200
Blower	1,200	6,000
Nut harvester	2,500	20,000
Cleaner	3,500	12,000
Processing equipment, purchased year 10		
Pecan crackers	15,000	30,000
Pecan shellers	3,000	5,200
Nut sizing tables	300	4,000
Cold storage	10,000	2,500
Total	**81,000**	**278,900**

in pecan yields, producers may purchase equipment in anticipation of a strong yield year, which may not happen.

Custom harvest services may be available in your area. When considering a custom harvester, expect yield and quality declines, as the timing of the harvest will vary based on the harvester's availability, your geographic location and the size of your orchard. Direct-to-consumer marketing usually incentivizes producers to bring their product to market earlier than their competitors, and owning equipment can offer more flexibility in harvest timing.

Pecan orchard labor

The establishment and maintenance of a pecan orchard is less labor intensive than that of other specialty crops. Establishing the orchard is estimated to require 29 hours an acre in Year 1 with half of this time spent planting the trees. Maintaining the orchard in the years before harvest requires 15 hours per acre per year — seven hours of pruning and eight hours of mowing. This time commitment continues annually during the orchard's lifespan. When harvest begins, the annual required labor hours increase to 20 to 37 hours per acre each year depending on the volume of nuts to be shaken, collected and processed. The budget assumes all labor is compensated at $18.50 per hour. You can modify the labor productivity assumptions and adjust expected labor costs per hour in the workbook (XLSX).[1]

Economics of pecan production

Table 3 presents planning budget estimates for a Missouri pecan orchard based on assumptions and prices in April 2025. Use the "Your estimate" columns in Table 3 to plan your pecan operation's costs and returns. Detailed assumptions and capital investments are summarized in Tables 1 and 2. Table 4 illustrates the potential returns to a 10-acre pecan operation, based on the assumptions of this model, carried forward 15 years. Year 15 is projected to be the first year that the orchard is profitable, so it is shown as an example of commercial production.

Long-term pecan model summary

Pecan yields can vary widely from year to year. Pecans are an alternate bearing crop, which means the tree tends to produce a greater than average yield one year and a lower than average yield the next year. Pecan yields also vary based on cultivar choice, soil types and the amount and timing of available moisture. The long-term model summary in the workbook (XLSX)[1] provides smoothed estimates of potential expected yields, costs and net income for 75 years after planting; your actual results will vary based on soil conditions, water availability, management, and pest and predator pressures.

At a production scale of 10 acres and based on the assumptions described in this guide, the farm is estimated to have some trees producing at least 10 pounds of pecans per tree by Year 10, triggering the start of harvest activities and revenue generation. Table 4 provides more detail about the production, revenue generation, and expenses of a 10-acre pecan farm for 20 years after establishment.

Table 3. Missouri 10-acre pecan budget, dollars per acre per year.

Item	Year 1 Planting	Your estimate	Years 2–9 Maintenance	Your estimate	Year 15 Commerical production	Your estimate
Pecan production (pounds per tree)	0		less than 10		30	
Income per acre						
Cracked and blown pecans – retail					3,602	
Operating costs per acre						
Establishment	2,530					
Soil tests	100		25		25	
Nitrogen	14		29		48	
Phosphorous	24		6		12	
Potassium	25		6		19	
Zinc sulfate	53		70		9	
Lime	60				15	
Broadcast herbicide	30		15			
Spot applied herbicide	40		30		30	
Fungicide			10		30	
Insecticide	105		105		140	
Labor	531		281		494	
Irrigation water	27		27			
Mowing	40		40		60	
Fuel and utilities	300		150		300	
Facility and equipment repair	150		150		502	
Marketing and promotion					108	
Professional services	10		10		10	
Miscellaneous	10		10		10	
Operating interest	324		77		72	
Total operating costs	4,372		1,041		1,884	
Ownership costs per acre						
Depreciation on equipment	394		394		787	
Interest on capital investments	194		194		389	
Land charge	100		100		100	
Overhead, taxes and insurance	200		200		200	
Total ownership costs	888		888		1,476	
Total cost per acre	5,260		1,929		3,360	
Income over operating cost per acre	**–4,372**		**–1,041**		**1,718**	
Income over total cost per acre	**–5,260**		**–1,929**		**242**	

Table 4. Pecan yields and economic outcomes on a 10-acre farm, by year in long-term model.

Production year	Tree population	Yield per tree (pounds)	Expected yield (pounds)	Annual revenue (dollars)	Total costs (dollars)	Net income (dollars)	Cumulative returns (dollars)
1	540	0.5	0	0	52,600	–52,600	–52,600
2	540	0.7	0	0	19,289	–19,289	–71,889
3	540	0.9	0	0	19,289	–19,289	–91,178
4	540	1.2	0	0	19,289	–19,289	–110,467
5	540	1.6	0	0	19,289	–19,289	–129,756
6	540	2.2	0	0	19,289	–19,289	–149,045
7	540	2.9	0	0	19,289	–19,289	–168,334
8	540	3.8	0	0	19,289	–19,289	–187,623
9	540	5.0	0	0	19,289	–19,289	–206,912
10	540	6.6	3,548	11,708	31,606	–19,898	–226,810
11	540	8.7	4,683	15,454	31,859	–16,405	–243,215
12	540	11.4	6,182	20,399	32,194	–11,794	–255,009
13	360	17.4	6,264	20,671	50,558	–29,887	–284,896
14	360	23.0	8,269	27,286	33,006	–5,720	–290,616
15	360	30.3	10,914	36,018	33,596	2,421	–288,194
16	360	40.0	14,407	47,543	34,376	13,167	–275,027
17	360	41.6	14,983	49,445	34,504	14,941	–260,086
18	360	43.3	15,583	51,423	34,638	16,785	–243,302
19	360	45.0	16,206	53,480	34,777	18,702	–224,600
20	360	46.8	16,854	55,619	34,922	20,697	–203,903

Note: All values except tree population represent the farm as a whole.

The long-term model is an oversimplification of an extremely variable process to raise new trees in an orchard to maturity. Use the information presented by this model as an example for what orchard performance could be, not an expectation for the orchard that is to be planted.

The budget assumes the orchard will be thinned twice, after which yields increase. In practice, the yield increase after thinning will occur over two to five years as trees compensate for the change in their environment, rather than one year, as the model allows. The model follows average yield data from a variety of sources but does not account for natural disasters, pest or disease outbreaks, or other events that have a dramatic impact on orchard productivity.

Modeled annual net income and cumulative returns for planning purposes

Annual net income, (revenue minus expenses) is estimated to be negative during years 1 through 14 while the orchard is growing and yields continue to increase to an average of 30 pounds per tree. During the first 14 years, the orchard is estimated to accumulate a deficit of $29,061 per acre from the costs of establishing and maintaining the enterprise.

The pecan enterprise is expected to continue to grow revenue over expenses, and the cumulative return to the enterprise is expected to be positive around year 27, when average yields are around 61 pounds per tree.

Pecans can remain productive for a long period. In the workbook (XLSX),[1] the budget outlines 75 years of production costs and estimated revenue both per acre and for the overall enterprise. Based on available

recommended management practices, cultivars and yield assumptions, we estimate a potential annual net income of around $3,700 per acre by Year 27, which continues to grow incrementally for another 35 years. Note that these assumptions are based on present day input costs, labor costs and retail prices as well as the structure of the current economy. Given that trees become a multigenerational farm investment, these estimates are provided for planning purposes only.

Web addresses

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