Pecan is a large, beautiful tree that produces bountiful crops of delicious nuts. The largest member of the hickory family, pecan trees often grow to a height of over 70 feet with a spread of greater than 80 feet. Pecans have large, pinnately compound leaves with each leaf bearing seven to 13 leaflets. Nuts are borne on branch terminals in clusters of two to five. A fleshy green husk surrounds the nut during the growing season but splits open in October to reveal a light brown nut that is streaked with black mottles. As husks dry and wither, nuts fall freely from the tree.

Pecan nuts vary widely in size, shape, and shell thickness. Seedling pecan trees often produce small, thick-shelled nuts while trees grafted to improved cultivars produce large, thin-shelled nuts. Pecans are truly multipurpose trees. In the home landscape, these long-lived and sturdy trees provide ample shade and bright yellow fall color. Wildlife conservationists appreciate the food and cover pecan trees produce for squirrels, turkeys, and deer. In many areas of Missouri, wild pecan trees have been brought under cultivation to provide farmers with an additional source of income. Pecan trees have also been planted into orchards around the world, and pecan nuts have become a global commodity.

Three of the most important factors to consider for a new planting are:
- Soil types and soil qualities
- Water availability
- Cultivar selection
Failure to consider these factors can lead to poor tree growth and/or poor nut production.
Soil Requirements
Plant pecan trees in deep, well-drained soils. Native pecans grow primarily in the deep alluvial soils found along major rivers and streams. These soils are characterized by a clay loam to sandy loam texture, good internal drainage, and a static water table that ranges from 10 to 25 feet below the soil surface. Upland soils are suitable for pecan trees if they have at least three feet of friable, well-drained, topsoil and a sandy-clay or gravelly-clay subsoil that allows free penetration of both water and air.

An example of common upland soils in Missouri that have high potential for pecan production would be the deep, well drained, loess soils. In good upland soils, pecan roots grow throughout both topsoil and subsoil. Pecan trees will not perform well if planted on upland soils having a subsoil impervious to root growth or frequently droughty soils.

Pecan trees will grow and thrive in soils that range from slightly acid to slightly basic (pH 6.0 to 7.5). If trees are grown in sandy soils, or soils with a basic pH (7.0 and above), zinc foliar sprays are often necessary to prevent zinc deficiency.

Three valuable resources that can be used to determine the suitability of soils on a site for pecans are:
- Published NRCS county soil maps
- NRCS Web Soil Survey
- Actual soil sample results from a site

Water Requirements
Pecan trees will grow without irrigation in most areas of Missouri, but ample water throughout the growing season is necessary for maximum tree growth and consistent nut production. Even mild drought conditions can affect nut quality. A shortage of water early in the season causes nuts to be small, while a lack of water in August and September leads to poor kernel filling. Severe drought will cause nut abortion, premature defoliation, and a decrease in the subsequent year’s nut crop. To ensure annual crops of high quality nuts, supplemental irrigation should be considered.

Pecan trees growing in the major floodplains of Missouri are frequently subjected to seasonal flooding. Although pecan is widely known as a flood-tolerant species, trees can not endure water-saturated soils for an extended period of time during the growing season. However, if the flooding occurs when the trees are dormant there are fewer negative effects.

Cultivar Selection
Selecting the proper cultivars for your particular locality will help ensure that your pecan tree planting will be successful. When choosing pecan cultivars, several key characteristics should be considered. These include:
- Length of growing season
- Winter hardiness
- Productivity
- Flowering and pollination
- Nut size and quality
- Alternate bearing
- Disease resistance

Length of Growing Season
Pecan trees utilize the entire growing season to develop and mature their nut crop. To be successful in Missouri, a pecan cultivar must produce plump, well-filled nuts before the first fall freeze.
Nut maturity in pecan is indicated by the splitting of the shuck and separation of nut from shuck. Freezing temperatures before shuck split cause the shuck to remain firmly attached to the nut, so that it never opens. The kernels inside these nuts are often poorly developed or shriveled. This often happens to all the nuts on a tree when cultivars adapted to areas with long growing seasons are grown in areas with short growing seasons. It can also happen when cultivars adapted to areas with very warm growing seasons are grown in areas with cooler growing seasons.

The rate of kernel development in pecan is controlled genetically, but is also influenced by temperatures during the growing season. Summer heat, especially high nighttime temperatures, is necessary for proper nut development. Unusually cool summers will result in a delay of nut maturity. Variation in weather patterns will cause a pecan cultivar to mature on slightly different dates from year to year. To avoid losing a crop to fall freeze damage, it is best to choose cultivars that mature at least one week before the average date of first fall freeze.

**Winter Hardiness** Pecan trees growing in Missouri are often exposed to severe winter temperatures. "Northern" pecan cultivars have proven cold hardiness and are best adapted for growth in Missouri. These cultivars are termed "northern" because they originated in the northernmost reaches of the pecan tree's natural range. Only a few "southern" pecan cultivars are adapted for growth in the 'boothel' of Missouri.

**Productivity** The nut-producing capability of cultivars is a very important contributor to the profitability of a pecan planting. Some cultivars are much less productive than others on a given site over a period of time. There has been much more yield research done on "southern" cultivars than most of the "northern" cultivars. Two very important issues that can detract from long-term yield of quality pecans are disease susceptibility and alternate bearing.

**Alternate Bearing** When a cultivar tends to produce above average yields, followed by below average yields, it is said to be alternate bearing. Pecan cultivars with strong alternate bearing tendencies often produce large yields (‘on’ years) of somewhat lower quality nuts one season, followed by relatively small yields (‘off’ years) of higher quality nuts in another season. Alternate bearing becomes a severe problem when the nut quality is extremely poor in the ‘on’ years.

**Susceptibility to Disease** Pecan scab is often the most damaging disease a Midwestern pecan grower will face. It can reduce pecan yields to zero for some pecan cultivars without management. Page six of this publication will
Periods of pollen-shed and stigma receptivity for a single pecan cultivar usually occur at different times. Cultivars that shed their pollen before their stigmas become receptive are called ‘protandrous.’ Cultivars with stigmas that become receptive before pollen shedding are called ‘protogynous.’

A protandrous cultivar should be planted within 250 feet from a protogynous cultivar to ensure pollination of both cultivars. Planting large blocks of a single cultivar without very many pollinators nearby can reduce nut set and nut quality. In areas where native pecan trees are abundant, the pollination requirements may be met with pollen from surrounding native trees.
**Nut Size and Quality** Nut size and quality are important criteria for selecting cultivars, especially if nuts are grown for retail sale. Extra-large pecans attract the attention of some consumers who buy nuts with their eyes rather than their taste buds. Extremely large pecans can be poorly-filled and dry tasting. Sub-optimal growing conditions can exacerbate these problems for some of the cultivars that produce the largest nuts. Other consumers look for moderately sized nuts that are well-filled and have a sweet oily taste. High-quality pecans have more than 50% kernel, a high oil content, and a light straw-colored kernel.

**Recommended Cultivars** The state of Missouri can be divided into five zones of pecan cultivar adaptation (Figure 2). For best results, choose from among the cultivars recommended for your area (Table 1). Cultivar performance in any specific location in Missouri will also be influenced by local microclimatic conditions. If cold air seems to accumulate at your site, choose earlier ripening cultivars. For growers who like to experiment, there are several untested cultivars available for all adaptation zones. For more information on cultivar availability, contact Dr. Ron Revord at <r.revord@missouri.edu>.

![Figure 2: Missouri pecan cultivar adaptation zones](image-url)
Pecan Scab  Pecan scab is a fungal pathogen that can appear on the leaves, shucks, and twigs of pecan trees. It is capable of causing everything from slightly lower quality pecans to total crop loss. Very generally, areas with higher rainfall, humidity, and heat, are at the highest risk. Orchards that do not have adequate airflow, or are exceptionally moist and humid, often struggle with pecan scab the most. Additionally, cultivars that have some resistance to pecan scab do not always maintain that resistance forever. Consequently, the pecan scab ratings in Table 1 are only meant to be a snapshot of the cultivar's past and present. In the future, many of the ratings for some of the listed cultivars will slide towards being less resistant and more susceptible.

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Nut Weight (g)</th>
<th>Percent Kernel</th>
<th>Maturity Date 1</th>
<th>Flowering Type 2</th>
<th>Scab Rating 3</th>
<th>Adaptation Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warren 346</td>
<td>4.78</td>
<td>49.28</td>
<td>-27</td>
<td>I</td>
<td>R</td>
<td>1</td>
</tr>
<tr>
<td>Mullahy</td>
<td>5.77</td>
<td>43.77</td>
<td>-11</td>
<td>II</td>
<td>S</td>
<td>1,2</td>
</tr>
<tr>
<td>Osage</td>
<td>5.46</td>
<td>52.66</td>
<td>-10</td>
<td>I</td>
<td>R</td>
<td>2</td>
</tr>
<tr>
<td>Norton</td>
<td>6.67</td>
<td>43.55</td>
<td>-9</td>
<td>II</td>
<td>VR</td>
<td>2,3</td>
</tr>
<tr>
<td>Canton</td>
<td>7.86</td>
<td>47.95</td>
<td>-7</td>
<td>I</td>
<td>S</td>
<td>2,3</td>
</tr>
<tr>
<td>Shepard</td>
<td>5.90</td>
<td>51.12</td>
<td>-6</td>
<td>I</td>
<td>VR</td>
<td>2,3</td>
</tr>
<tr>
<td>Colby</td>
<td>7.02</td>
<td>44.15</td>
<td>-3</td>
<td>II</td>
<td>VS</td>
<td>2,3</td>
</tr>
<tr>
<td>Gardner</td>
<td>7.56</td>
<td>58.97</td>
<td>0</td>
<td>I</td>
<td>S</td>
<td>3,4,5</td>
</tr>
<tr>
<td>Pawnee</td>
<td>8.40</td>
<td>57.12</td>
<td>0</td>
<td>I</td>
<td>S</td>
<td>3,4,5</td>
</tr>
<tr>
<td>Faith</td>
<td>8.01</td>
<td>56.00</td>
<td>1</td>
<td>I</td>
<td>S</td>
<td>3,4,5</td>
</tr>
<tr>
<td>Posey</td>
<td>6.79</td>
<td>53.26</td>
<td>2</td>
<td>II</td>
<td>S</td>
<td>2,3,4</td>
</tr>
<tr>
<td>Hark</td>
<td>6.77</td>
<td>56.26</td>
<td>4</td>
<td>I</td>
<td>VR</td>
<td>2,3,4,5</td>
</tr>
<tr>
<td>Kanza</td>
<td>6.47</td>
<td>51.82</td>
<td>4</td>
<td>II</td>
<td>VR</td>
<td>2,3,4</td>
</tr>
<tr>
<td>Major</td>
<td>6.21</td>
<td>49.35</td>
<td>6</td>
<td>I</td>
<td>VR</td>
<td>2,3,4,5</td>
</tr>
<tr>
<td>Yates 68</td>
<td>5.98</td>
<td>56.01</td>
<td>9</td>
<td>I</td>
<td>VR</td>
<td>2,3,4</td>
</tr>
<tr>
<td>Jayhawk</td>
<td>6.31</td>
<td>51.71</td>
<td>10</td>
<td>II</td>
<td>R</td>
<td>3,4</td>
</tr>
<tr>
<td>Oswego</td>
<td>6.56</td>
<td>51.72</td>
<td>13</td>
<td>II</td>
<td>R</td>
<td>3,4,5</td>
</tr>
<tr>
<td>Giles</td>
<td>6.48</td>
<td>52.65</td>
<td>15</td>
<td>I</td>
<td>VS</td>
<td>3,4</td>
</tr>
<tr>
<td>Lakota</td>
<td>7.26</td>
<td>56.85</td>
<td>16</td>
<td>II</td>
<td>R</td>
<td>3,4,5</td>
</tr>
<tr>
<td>Greenriver</td>
<td>6.75</td>
<td>49.36</td>
<td>17</td>
<td>II</td>
<td>R</td>
<td>3,4,5</td>
</tr>
<tr>
<td>Stuart</td>
<td>8.48</td>
<td>46.42</td>
<td>22</td>
<td>II</td>
<td>S</td>
<td>5</td>
</tr>
<tr>
<td>Oconee</td>
<td>9.49</td>
<td>56.07</td>
<td>25</td>
<td>II</td>
<td>S</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 1: Pecan cultivars

1 Oct. 1 is the average date of shucksplit for Pawnee at Columbia, MO.

2 Type I = Protandrous, Type II = Protogynous

3 Scab ratings: VR=very resistant, R=resistant, S=susceptible, VS=very susceptible

*Very resistant cultivars require minimal to no fungicide applications at this time to perform well.

*Resistant cultivars may require minimal fungicide applications to perform well.

*Susceptible cultivars require fungicide applications but usually perform well with only one or two cover sprays.

*Very susceptible cultivars will likely require an intensive spray program to perform well in many areas.
Methods For Establishing Pecan Trees

Orchard Establishment Orchard establishment and design depends largely on a grower’s objectives, equipment, site, and available capital. A general recommendation is that trees should be planted in a grid no closer than 30 to 35 feet apart. When utilizing 30 or 35 foot (or very similar) spacing, a grower should be prepared to thin half of their trees in the future. Pecans can be established by planting grafted trees, by planting seedling trees then grafting two to three years later, or by planting nuts and grafting them three to four years later. Each of these methods offers advantages and disadvantages. Prospective pecan growers should choose the method suited to their skills and economic situation.

Grafted Trees Transplanting grafted trees of desired cultivars is the simplest way to establish a pecan orchard. Trees should start to bear nuts within five to seven years after transplanting. Unfortunately, some of the cultivars recommended for Missouri are not widely available in large numbers from commercial nurseries, making it difficult to obtain grafted trees. However, cultivars such as ‘Kanza’ and ‘Pawnee’ are widely available.

Seedlings Seedling pecan trees are widely available and can be purchased from seedling nurseries or from the Missouri Department of Conservation. Desired cultivars should be grafted to seedling trees two to three years after establishment.

Nut production should begin four to six years after grafting. Starting a pecan planting with seedlings offers the advantages of low initial costs and the opportunity to establish cultivars not available from commercial nurseries. Disadvantages include a delay in the onset of nut production and the time and expense of grafting your trees.

Nuts Pecan trees are easily grown from properly stratified nuts. To start your own trees, choose nuts that are well-filled. Nuts from early-maturing northern cultivars can make good cold-hardy seedlings. Stratify nuts in moist sand or peat moss by placing them in layers about 3 inches deep and holding them in a cool room or refrigerator (35° to 40°F) for 90 to 120 days. Be sure the nuts are kept moist throughout the stratification process to ensure uniform germination after planting.

Plant stratified seeds in the spring after the danger of frost passes. Seedlings can be grown in a nursery row and transplanted the following year or planted directly in the final tree location. Homegrown seedlings can take two to three years to grow large enough for grafting. Starting an orchard from seed has the same advantages and disadvantages as starting with seedlings.

Transplanting Pecan Trees

Bareroot Stock Transplant both grafted trees and seedling trees in March as soon as the soil can be easily dug. After receiving your trees, plant bareroot trees as soon as possible to
prevent roots from drying. Prune each tree before planting by trimming off about 1/3 of the top growth. Prune off broken or rotten roots and cut the tap root back to 24 inches. Taproot pruning of one-year-old seedlings is generally unnecessary.

Dig your planting hole large enough and deep enough to fit the entire root system. Hold the tree in position and fill soil in around the roots making sure the fibrous roots are spread out in their natural positions. The tree should be planted at the same depth as it was in the nursery. Water the tree after transplanting. Do not place soil amendments or fertilizers in the planting hole.

**Container Grown Stock** Transplant container grown pecan trees in early October or in March. Dig your planting hole twice as wide as the container but no deeper than the depth of the pot. After removing the tree from the container, check for a circling taproot. Use a pair of pruning shears to cut off the taproot at the point the root starts to circle. Next, gently pull out the smaller roots that are circling around the outside of the root ball. Place the tree in the planting hole and spread out the fine roots. Fill in the planting hole with topsoil. The tree should be planted at the same depth as it was in the container. However, be sure to cover the root ball and associated potting soil with about one inch of soil to keep the root ball from drying out. Be sure to water the tree thoroughly after planting.

**Weed Control** Weeds must be controlled in a five-foot area around the newly transplanted tree for maximum growth. Complete vegetation control can be achieved by shallow cultivation, application of herbicides, or by mulching. Your overall objectives, site conditions, and limitations (such as highly erodible soil) should be considered before beginning any endeavor. If the transplanted tree makes eight to 10 inches of new growth by early June, spread a half-cup of ammonium nitrate fertilizer around the tree over the entire weed-free area. Nitrogen applications to trees slow to establish themselves (less than eight inches of new growth) can cause a leaf burn and should be avoided. To ensure survival, keep the tree well watered throughout the growing season and especially during droughty periods.

**Care of Non-bearing Trees**

The goal of training a young pecan tree is to develop a strong trunk and healthy root system. Adequate soil moisture throughout the growing season and proper fertilization are keys to strong, vigorous tree growth. Water young pecan trees when conditions become dry by soaking the entire rooting zone deeply once a week. Apply nitrogen fertilizer twice a year, in March and in June, at the rate of one cup ammonium nitrate per inch of trunk diameter. Spread the fertilizer over the entire rooting area. Keep the area around the tree weed-free to ensure maximum benefit from water and fertilizer applications.

Tip pruning of branches helps shape the young pecan tree and promotes the formation of a strong trunk. Tip prune in early March by clipping off three to four inches from all terminal growth. When the tree starts its growth in early spring, these cuts force buds along the entire branch to break. This gives the tree a more dense appearance and greater leaf area. Tip prune again in mid-summer, but this time do not prune the central leader.

Cutting all lateral branches back stops their growth and channels their photosynthetic energy into strengthening the trunk. Lower lateral branches should be left on the tree until they are one inch in diameter. Remove these lower laterals as the tree grows until you have a tree with eight feet of clear trunk.
Care of Bearing Trees

Healthy, vigorous trees produce the highest quantity and quality of pecans. Maintaining a strong growing tree is also the best defense against attacks from insects and diseases. Water, fertilizer, and pest control are all important for healthy tree growth.

The importance of adequate soil moisture throughout the growing season has been discussed. Pecans require an average of one inch of water each week from budbreak to nut maturity. Two inches per week may be closer to optimum during the heat of the summer months. Natural rainfall can be supplemented by flood, sprinkler, or drip irrigation. Soil type also has an impact on irrigation levels and needs to be considered. Annual nut production relies on annual applications of nitrogen fertilizer. A general recommendation is to apply nitrogen just before bud-swell at the rate of 100 pounds actual nitrogen per acre. This total could also be split into spring and fall applications (i.e. 60 lbs applied in spring and 40 lbs applied in fall). Pecans grown on upland soils may require slightly higher nitrogen rates. The best way to customize fertilizer needs to your specific orchard is to have a soil test done and to have leaf samples of your pecans analyzed for nutrients. For more information on where you can have samples tested, contact your local extension office.

Rosette, a disorder caused by zinc deficiency, is more likely to be a problem when pecans are grown in soils with a pH above 7.0, or where soils are sandy with low organic matter. Severe zinc deficiency is relatively uncommon in Missouri, but very common in areas outside of the pecan’s native range (i.e. the western United States). Symptoms include a rosetting of the terminal growth and small, misshapen leaves. Insect and disease problems can severely limit the nut production of a pecan tree although no pests are serious enough to cause tree death. In Missouri, three insects pose the most serious threat to the pecan crop: pecan nut casebearer, hickory shuckworm, and pecan weevil. Pecan growers must learn how to identify the symptoms of pest damage and be able to take effective steps to control important pecan pests. Use the identification keys in this bulletin to help you identify common pecan pests and problems (Table 2).

A permanent groundcover of cool-season grasses and legumes should be established in the bearing pecan orchard. Once the trees start to bear, the shading of the tree canopy helps reduce the competitiveness of a groundcover. Keep this permanent ground cover mowed throughout the growing season. In the home orchard, a well-kept lawn grass serves as the groundcover.

The only pruning needed on bearing pecan trees is the removal of dead or injured limbs. In addition, remove low-hanging branches to allow free movement of people and machinery around the tree. If a pecan orchard is established at a 35-foot spacing, tree thinning will become necessary 10 to 30 years after grafting. Remove trees when the branches of adjacent trees are close to overlapping, or sooner. Delaying thinning too long is common and can reduce yields.

A pecan management schedule for Missouri can be found in Table 4.

Equipment for the Pecan Orchard

As with many agricultural endeavors, the proper equipment can make pecan growing easier and more efficient. The type of equipment purchased for maintaining a pecan orchard should be proportional to the size and age of the orchard. Suggestions for the types of equipment needed for pecan orchard management are given below in Table 3. Further details on harvest equipment are given on page 11 and some sources for pecan harvest equipment are given on page 15.
<table>
<thead>
<tr>
<th>Pest or Problem</th>
<th>Time Damage Initiated</th>
<th>Time Damage Observed</th>
<th>Damage Symptoms and Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pecan Scab</td>
<td>May</td>
<td>July</td>
<td>Black lesions on leaves and nuts; lesions may coalesce to cover entire nut; kernel quality severely reduced</td>
</tr>
<tr>
<td>Black Pecan Aphids</td>
<td>August</td>
<td>August</td>
<td>Yellow blotches on leaves; small black insects feeding on the underside of leaves</td>
</tr>
<tr>
<td>Yellow Woolly Aphids</td>
<td>July or August</td>
<td>July or August</td>
<td>Honeydew covering the surface of leaves; small yellow insects feeding on the underside of leaves</td>
</tr>
<tr>
<td>Walnut Caterpillar</td>
<td>June and August</td>
<td>June and August</td>
<td>Entire branches defoliated by a large colony of caterpillars; young larvae are dark red while mature</td>
</tr>
<tr>
<td>Fall Webworm</td>
<td>June and August</td>
<td>July 8 or Sept.</td>
<td>Large white webs enclosing frutings and helid with brownish-yellow caterpillars</td>
</tr>
<tr>
<td>Zinc Deficiency</td>
<td>April</td>
<td>June</td>
<td>Leaf 10 lesions no other appearance; leaves yellowish, mottled, narrow, and curled; reddish-brown spots may appear thin later drop</td>
</tr>
<tr>
<td>Casperaeae</td>
<td>June</td>
<td>June</td>
<td>Resembling sawdust (at the base of injured nuts) with small yellow insects feeding on the underside of leaves and insect frass (debris or excrement)</td>
</tr>
<tr>
<td>Lack of Pollination</td>
<td>May</td>
<td>June</td>
<td>Nut’s shrotly after pollination</td>
</tr>
<tr>
<td>Pecan Nut</td>
<td>April</td>
<td>May</td>
<td>Terminal of new growth wills; olive-green caterpillar tunnelling in pith of new shoot</td>
</tr>
<tr>
<td>Pecan Phylloxera</td>
<td>April</td>
<td>May</td>
<td>Cells on leaves and stems; gall filled with small aphid-like insects</td>
</tr>
<tr>
<td>Samelles</td>
<td>April</td>
<td>May</td>
<td>New leaves have shot leaf appearance</td>
</tr>
<tr>
<td>Bunch Disease</td>
<td>April</td>
<td>April</td>
<td>Witch’s-broom type growth that breaks bud a week before healthy branches</td>
</tr>
<tr>
<td>Spring Root Damage</td>
<td>April</td>
<td>April</td>
<td>New growth suddenly turns black</td>
</tr>
<tr>
<td>Pecan Weevil</td>
<td>August</td>
<td>Harvest</td>
<td>Completely deveing not kernel; white, light brown fibrous feeding inside nats; grubs exit nut through small round hole in shell after</td>
</tr>
<tr>
<td>Fall Freeze Damage</td>
<td>October</td>
<td>October</td>
<td>Shucks turn black suddenly and stick to nts.</td>
</tr>
<tr>
<td>Hickory Shankworm</td>
<td>September</td>
<td>August</td>
<td>Small, cream-colored caterpillars with red heads underneath in nut shucks; kernel quality reduced</td>
</tr>
</tbody>
</table>

Table 2: A field key for identifying common pests and problems of pecan trees in Missouri.
**Table 3: Equipment needed to manage pecan plantings in Missouri**

<table>
<thead>
<tr>
<th>Orchard Operation</th>
<th>Size of Pecan Planting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2 to 25 Trees</strong></td>
<td><strong>1 to 3 Acres</strong></td>
</tr>
<tr>
<td>General Use Horsepower</td>
<td>Lawn &amp; garden power tools</td>
</tr>
<tr>
<td>Planting Trees</td>
<td>Shovel</td>
</tr>
<tr>
<td>Weed Control</td>
<td>Hand sprayer</td>
</tr>
<tr>
<td>Orchard Floor Management - New Orchard</td>
<td>Lawn mower, tiller</td>
</tr>
<tr>
<td>Orchard Floor Management - Mature Orchard</td>
<td>Lawn mower</td>
</tr>
<tr>
<td>Pest Control - Non-Bearing Trees</td>
<td>Hand sprayer</td>
</tr>
<tr>
<td>Pest Control - Bearing Trees</td>
<td>5 hp garden sprayer</td>
</tr>
<tr>
<td>Nut Harvest</td>
<td>Poles to shake, hand gather nuts</td>
</tr>
</tbody>
</table>

**Harvest**
Well-adapted pecan cultivars begin splitting their shucks in late-September or early-October. Although the nut is fully mature at this time, it is still "green" and needs to dry further before being gathered. As the nut dries, the shucks will turn brownish-black and curl away from the nut, exposing the pecan. Pecans will fall from the tree when they are fully dry. Begin harvesting when the first nuts drop to the ground. At this point you can hasten the natural drop by shaking the tree or limbs. Pick pecans off the ground as soon as possible and store in a cool, dry place. There is a large variety of equipment that could be used for harvesting pecan trees.

Below are some of the equipment options for harvesting. Whether specific pieces of equipment are right for your operation will depend on the number of trees you have, how large the trees are, how much money you are willing to invest in equipment, and how much time you are willing to spend.

**Shaking Pecan Trees**
- Poles: used for tapping/shaking small-medium branches
- PTO-driven cable tree shakers: used for shaking small trunks or medium-sized branches
- PTO-driven hydraulic tree shakers: used for shaking small-large trunks
**Table 4: Pecan management schedule for Missouri**

<table>
<thead>
<tr>
<th>Month</th>
<th>Non-bearing Orchard</th>
<th>Bearing Orchard</th>
<th>Native Grove</th>
<th>Pest Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>February</td>
<td>Collect scionwood. Prune trees to central leader.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>Apply weed control. Plant stratified pecan seed.</td>
<td></td>
<td></td>
<td>Apply foliar zinc sprays to zinc deficient trees.</td>
</tr>
<tr>
<td>May</td>
<td>Graft trees with recommended cultivars.</td>
<td></td>
<td></td>
<td>Monitor casebearer populations with pheromone traps. Continue zinc sprays.</td>
</tr>
<tr>
<td>September</td>
<td>Establish cool season cover crops.</td>
<td>Prepare orchard for harvest.</td>
<td>Prepare orchard for harvest.</td>
<td>Control squirrels and crows with firearms and traps. Encourage hunting (in line with all applicable regulations).</td>
</tr>
<tr>
<td>October</td>
<td>Plant container grown trees.</td>
<td></td>
<td>Mark weak and unproductive trees for removal.</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>Collect nuts for stratification and planting next year.</td>
<td>Harvest promptly, clean and market nuts.</td>
<td>Harvest promptly, clean and market nuts.</td>
<td>Collect harvest samples to determine weevil damage.</td>
</tr>
<tr>
<td>December</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Harvesting Pecans Off the Ground**

- **Tarps**: if tarps are laid on the ground under the trees before they are shaken, then most of the nuts will fall onto the tarps.
- **Nut gatherers**: these tools usually consist of a wire basket on the end of a stick, which is rolled on the ground and picks up nuts that go through the basket wires. They are often rolled around by hand.
- **Small pull-behind harvesters**: these are lightweight and are not powered by motors or a tractor PTO. These are available in sizes that are small enough to be pushed by an individual up to sizes that will need to be pulled by a lawn mower or ATV.
- **Large pull-behind harvesters**: these are often used for medium-large scale pecan operations. Many of them are pulled behind tractors and powered via the tractor PTO.

There are many machines that don’t fit neatly into the previous mentioned categories. There are some harvesters that are similar to the larger pull-behind harvesters, but they are smaller with fewer features and lower nut holding capacity. They have their own independent motor, so they do not require a tractor PTO. Often they can be pulled behind larger ATV’s or lawn and garden tractors. Additionally, in some areas where pecan production is conducted on a very large scale, there are large specialty machines available for shaking and harvesting that are beyond the scope of this writing.

**Storage**

Over 70% of the pecan kernel is composed of unsaturated fats which can become rancid in room temperature storage. To maintain highest nut quality, shell out all your pecans and store the kernels in the freezer. Kept frozen, pecan kernels remain fresh for 2 years or more.

A PTO driven hydraulic pecan tree shaker facilitates the prompt harvest of the pecan crop.

A mix of northern pecans

Additional pecan resources are available on the UMCA website: [https://centerforagroforestry.org/landowners/resources](https://centerforagroforestry.org/landowners/resources)
Pecan Tree Materials Source List

Pecan trees can be established by planting seed nuts, planting seedling trees, or planting grafted trees. Both seedling trees and grafted trees can be purchased as either bareroot trees or container-grown trees. Given proper tree care, all tree establishment methods can result in a healthy, vigorous orchard. Orchards established by seed or seedling trees should be grafted one to three years after establishment. Some vendors of plant materials and grafting supplies are listed below.

Pecan Seed Nuts
Horticulture & Agroforestry Research Center
New Franklin, MO
660-848-2268
www.harc.missouri.edu/

Lovelace Seeds
Rob Lovelace
Elsberry, MO
573-898-2103
www.lovelaceseeds.com

Pecan Scionwood
King Hill Farms
Brunswick, MO
660-548-3972
www.kinghillpecans.com

Wilson Pecan Farm
Nevada, MO
417-667-8115

Nebraska Nut Growers Association
www.nebraskanutgrowers.org.

Missouri Nut Growers Association
www.missourinutgrowers.org.

Seedling Trees
Forrest Keeling Nursery
Elsberry, MO
800-356-2401
www.fknursery.com

Stark Brothers Nursery
Louisiana, MO
800-325-4180
www.starkbros.com

Missouri Dept. of Conservation Nursery
Licking, MO
573-674-3229
www.mdc.mo.gov/trees-plants/tree-seedlings/order-seedlings

Grafted Trees
Forrest Keeling Nursery
Elsberry, MO
800-356-2401
www.fknursery.com

Nolin River Nut Tree
Nursery Upton, KY
502-369-8551
www.nolinnursery.com

Stark Brothers Nursery
Louisiana, MO
800-325-4180
www.starkbros.com

Grafting Supplies
Forestry Suppliers, Inc.
Jackson, MS
800-647-5368
www.forestry-suppliers.com

Hummert International
Earth City, MO
800-325-3055
www.hummert.com

A.M. Leonard
Piqua, OH
800-543-8955
www.amleo.com
Additional Resources on Pecan Growing, Managing, and Marketing

*The Center for Agroforestry*
The website is an excellent source for information on many nut crops, including pecan.
www.centerforagroforestry.org

*Northern Pecan Blog*
This website is a collection of articles written by Dr. William Reid, pecan grower and researcher.
www.northernpecans.blogspot.com

*Noble Research Institute*
Conducts pecan research and outreach in Oklahoma. Some of the information is relevant to growers in Missouri.

*University of Georgia Pecan Grower Resources*
This website has some great information for growers in the southeastern U.S. Some of the information is relevant to growers in Missouri.
www.pecans.uga.edu

*Resources for Pecan Farming Equipment*

*Savage Equipment*
866-572-8243
Manufacturer of mechanized pecan management, harvesting, and processing equipment.
www.savageequipment.com

*Produce Tech*
450-994-4567
Distributor of harvesting equipment for fruit and nut trees.
www.producetech.com

Bag-A-Nut
904-641-3934
Producer of small-scale nut harvesting equipment.
www.baganut.com

Nut Wizard
888-321-9445
Producer of small-scale nut harvesting equipment.
www.nutwizard.com

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Twitter: @MUAgroforestry
Facebook: The Center for Agroforestry
YouTube: Mizzou Agroforestry
Instagram: @MUAgroforestry
LinkedIn: University of Missouri Center for Agroforestry

The Agroforestry Podcast
The UMCA’s podcast series exploring a wide range of agroforestry topics.
Listen wherever you get your podcasts.

The University of Missouri Extension Pecan Pest Management: Insects and Diseases guide (number MP711) provides additional information on pest management for pecan. The guide is available on the internet at extension.missouri.edu/publications/mp711 and can be downloaded for no charge.
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