

Growing Your Own Oak Seedlings



People often have emotional ties to specific trees. Sometimes, as they age, a desire develops to reproduce and share historic or family legacy trees with future generations. Emotional ties to trees get stronger with age and stir a desire to grow seedlings from those special trees so that we can share their legacy and beauty with our children and grandchildren.

Growing your own oak seedlings, or any type of tree seedling, is not difficult and can make for an excellent project. Collecting acorns and growing seedlings makes a fine school project for kindergarten or elementary students. Charities or special interest groups may want to grow and sell seedlings from a memorable tree as a fund-raising project. Neighborhood groups may want to grow seedlings to plant along streets, in parks, and in other common areas. Environmentally conscious homeowners may want to plant long-lived oaks for their carbon sequestration ability or for their shade, which helps lower summer electrical costs. Landowners who simply want a few oaks for wildlife habitat, shade, or aesthetics might also want to grow their own seedlings.

First, you need to be able to tell the difference between red and white oaks, which are the two broad categories of oaks. Most oaks in Mississippi can be easily grouped into these two categories, and their general differences are listed in Table 1.

The most obvious differences between red and white oaks can be seen by examining the lobes, which are projections along the edges of leaves, and the sinuses, which are the areas between lobes (Figure 1). White oak leaf lobes are usually rounded without bristle tips, while red oak leaf lobes are typically bristle-tipped. White oaks produce acorns in only 1 year, while red oak acorns take 2 years to develop.

In this publication, we are going to show you how easy it is to grow your own oak seedlings in three easy steps:

1. Collect viable acorns.
2. Plant acorns and grow seedlings in a protected area.
3. Transplant seedlings to the desired planting area.

Table 1. General differences in leaves, acorns, and representative species between red and white oaks in Mississippi.

Characteristics	Red oaks	White oaks
Leaves	bristle-tipped, pointed lobes (usually, but not for a few species)	no bristle on lobe tips; rounded lobes
Acorns	2 years to mature; high tannins; spring germination	1 year to mature; lower tannins; fall germination
Representative species	cherrybark, southern red, Nuttall, Shumard, water, and willow	white, overcup, post, swamp chestnut, chinquapin

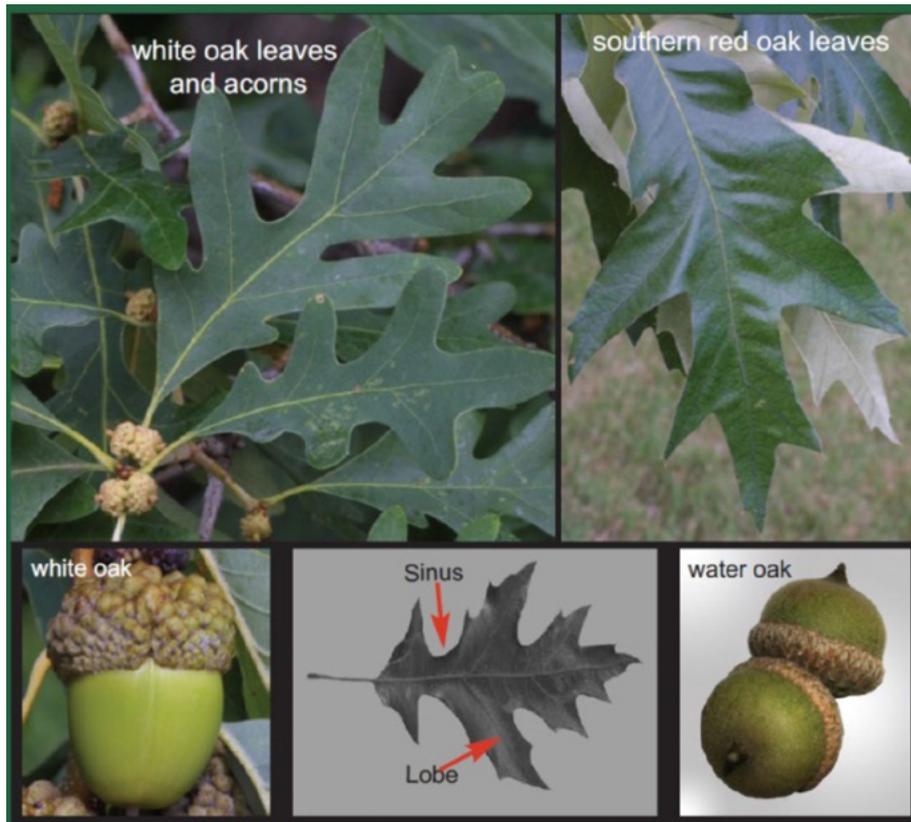


Figure 1. The differences between red and white oaks can be seen by examining their lobes and sinuses. Composite image by Linda W. Garnett.

Collection and Care of Viable Acorns

The number of acorns produced by both oak groups varies greatly from year to year because of weather conditions, nutrient availability, and acorn-feeding insects. Because of these factors, viable acorn production is very inconsistent for all species.

Fortunately, you can visibly judge the acorn crop on a selected tree during the spring. However, just because you see a lot of acorns does not mean that all will be viable and capable of producing a seedling. The following guidelines will help increase your chance of collecting viable acorns:

- Timing acorn collection is critical. Don't pick acorns from the tree; these are immature and may not produce seedlings. Ignore the first acorns that fall because they are often damaged or of poor quality. Wait until the majority of acorns are falling, and then gather a supply of them. However, don't wait too long to collect acorns because they begin to dry as soon as they fall. If the weather is hot and dry, it may take as few as 3 to 4 days to kill the seed (Bonner & Karralt, 2008). Acorns are also a favorite food for a variety of wildlife, including numerous rodents, birds, deer, turkeys, and squirrels,

and waiting too long could greatly reduce the number of available viable acorns.

- Try to collect two to three times as many acorns as the number of seedlings you want to plant. This will allow you to have an adequate number after removing acorns that are damaged or unsound, and it ensures an adequate supply in the event that germination rates are low.
- Collect acorns in buckets, and keep them cool and shaded to prevent drying and overheating. If the weather is warm and dry, spray acorns with water to avoid moisture loss.
- Visually examine acorns. The cap scar should be bright and feel firm under finger pressure (Figure 2). Excepting overcup oak, discard any acorns that still have the cap attached or that show rot, mold, or small holes, as these usually indicate damage.
- After your initial inspection, drop acorns (except for overcup oak acorns) into a large container of water. Discard acorns that float to the top because this indicates that the embryo has not fully developed or the seed is otherwise damaged. Soaking in water also helps keep the acorn from losing moisture and rehydrates acorns that may have dried somewhat during collection.



Figure 2. (Top) These water oak acorns show prominent cap scars. Bright white cap scars indicate viable acorns. (Bottom) The most significant acorn pest is the acorn weevil. It bores holes into acorns, and its larvae feed on them. Composite image by Linda W. Garnett.

Seed Dormancy and Stratification Differences

Seed dormancy between red and white oaks differs, so the process of storage and sowing can differ, as well. Seed dormancy is simply nature's way of delaying germination until more favorable conditions exist. As shown in Table 1, white oaks germinate in the fall, and red oaks germinate in the spring. Spring germination of a red oak acorn is the result of a process known as stratification, which breaks down the heavy seed coat, allowing the acorn to sprout.

Both red and white oaks can be sown immediately to outside seed beds after collection. However, red oak acorn germination will not occur until the spring following natural winter stratification.

- **White oak acorns**—These have no dormancy, and, as a result, white oak acorns can be seen with the radicle (emerging embryo) protruding from the seed while lying on top of the ground. If you have decided to sow in the spring, you can store these acorns by placing them in refrigeration at 34–40°F in cool, moist sand, but for no longer than 3 to 4 months.

- **Red oak acorns**—Unless immediately sown to an outside seedbed, the acorns need to be stratified to satisfy the dormancy requirement before sowing. Red oak acorn stratification requires cool, moist storage for 4 to 8 weeks, but they can be held in storage for up to 2½ years in specialized circumstances.

During storage, maintaining high moisture content is key to maintaining good acorn quality (Bonner, 2003). Start by placing moist acorns in plastic bags (4 to 10 mil thickness), which can either be sealed or partially left open and placed in a refrigerator. Temperature should be maintained slightly above freezing, with humidity above 30 percent. Airtight storage can be damaging, so bags or containers should not be thick enough to limit gas exchange. Keep acorns moist, but do not allow them to soak in excess water. Every 2 to 3 weeks, visually examine them for fungus or mold growth. Too much or too little moisture during storage will reduce germination.

Planting Acorns

Plant either type of acorn outside in a seedbed or in containers. It is much easier to use an outside seedbed because nature will provide the right conditions most of the time, and watering will be necessary only during dry periods.

Growing Oak Seedlings in a Seedbed

An outdoor seedbed is a good way to produce a large number of seedlings at once. Select an area that is well-drained and in full sun. Find a small space in a flowerbed that can be used for this purpose. Make sure the area is not subject to animal browsing. An abundant squirrel population is also very detrimental, as they will dig up acorns. In addition, deer are quite fond of young seedlings, as are moles, voles, rabbits, and other mammals.

Prepare the seedbed by tilling and incorporating organic material if improved drainage is needed. Plant acorns to a density of four to seven acorns per square foot and about an inch below the surface—deeper if the acorns are particularly large. A good rule of thumb for most seeds is to have planting depth three times the width of the seed.

Water your seedbed thoroughly after planting. In several days or weeks, the seed will germinate and shoots and leaves will emerge from the soil. Seedlings will not emerge at the same time; emergence will be spread over 1 to 2 weeks. Following emergence, remove smaller, inferior seedlings to encourage development of better seedlings. Make sure each seedling has enough space so that the entire stem is in full sunlight throughout the day. If rainfall is irregular, water seedlings at least once a week so that they do not dry out. Grass and other weeds must be removed as they emerge in the seedbed. If left unchecked, the seedlings will grow slowly or die under competition.

Growing Seedlings in Pots

Seedlings may also be propagated indoors or outdoors by planting in pots. For oaks, use pots that are at least 1 foot deep. This allows enough space for good taproot formation and production of numerous lateral roots. Ideally, walls of pots should have ribs to force lateral roots downward and eliminate root spiraling. Bottoms of pots should have sufficient drainage holes, or be nearly open, so roots will air prune as they emerge from the bottom.

Fill pots with a mixture of half potting soil and half topsoil from your yard or garden. You may also add approximately 1 teaspoon of a slow-release fertilizer like Osmocote, Nutricote, or Nursery Special to the soil mix.

Sow three acorns in each pot at a depth three times the acorn width, and orient the acorns lengthwise. Water once a week, but do not overwater. About 1 week after acorns germinate and seedlings emerge, clip inferior (smaller) seedlings, leaving only one dominant (largest) seedling in each individual pot. If a slow-release fertilizer was not added to the planting mix, you will need to water with a liquid fertilizer, such as Peter's or Miracle-Gro, at one-half the label rate every 6 weeks.

Indoor-grown oak seedlings should be placed outside around April in a partially shaded location for 4 to 6 weeks, allowing seedlings to acclimate to outdoor conditions. Afterward, they can be moved to a sunny location for maximum growth. Keep pots off the ground to allow for air pruning. If pots are in direct contact with soil, roots will penetrate into the soil and will be difficult to extract later. Water the pots if rainfall has not occurred for a few days.

Five-gallon pots can be used to grow oak seedlings if you want a sapling-sized tree to plant. These will take more soil media to fill the pots but will grow larger seedlings that are more suited to yards or open areas. Root spiraling is a major problem with any container, but especially in larger pots. A treatment called SpinOut can be applied to the inside of the pot. This will inhibit root tip growth and encourage root branching throughout the pot. The result will be a more fibrous root system with no root spiraling and typically better survival and growth. If this treatment is not used, spiraling roots will have to be pruned or straightened before planting.

Transplanting Seedlings

Do not dig seedlings up until after several frosts have occurred. This may be in December or January for north Mississippi or as late as February for south Mississippi. The cold weather will harden off seedlings so you can transplant them to their desired location.

Treat transplanted seedlings like any other plant: dig an appropriately sized hole, add organic matter (if necessary to promote drainage), water, and mulch. You may want to plant two to three seedlings in the desired location and later remove all but the most vigorous. In some areas, seedlings might need protection from animal damage such as deer browsing. Fences, tree shelters, and seedling sleeves can help prevent this. Seedling sleeves or shelters are available from forestry or garden suppliers.

Different species of oaks tend to grow at different rates. Slower growing species may only grow 20 feet in 10 to 12 years, while faster growing species may reach 30 to 40 feet over the same time. Tree growth depends on

soil type, nutrient and water availability, and the amount of light it receives. If seedlings are placed in an open-growing situation, height growth will be reduced because more energy is placed into producing a larger crown and diameter growth. In addition, a more open-grown oak tree will begin producing acorns at a much younger age. Consequently, if your objective is to grow oaks for wildlife, each tree should have considerable space for crown development, which will result in greater acorn production as the tree matures.

Especially for Students

Collecting and propagating tree seeds can be a good school or science fair project. Students can collect seeds from one or more trees to determine germination rates, weight and size variations, success under different stratification methods, comparisons of fall and spring sowing, comparisons of seedling development rates, and so on.

Younger students will enjoy learning about the wide variety of seeds found in trees. Seeds can be used to learn a variety of skills such as making comparisons, measuring size and weight, and observing color, texture, and smell. Children often enjoy growing their own special seedling to be planted in their family's yard. They may enjoy collecting seeds to establish an arboretum on school grounds. Student groups may propagate seedlings and sell them for fund-raising projects or plant them for community beautification.

Additional Information

All hardwood tree species have their own unique reproductive and seeding habits. You can modify guidelines presented in this publication to fit many different species of trees. Table 2 lists some common tree species found in Mississippi and information on propagation.

This table was created using information from two U.S. Forest Service websites relating to forest trees and seeds. One site contains the *Woody Plant Seed Manual* found at <https://rngr.net/publications/wpsm>. The chapters on seed propagation have good general—though very technical—information. You can find specifics on individual species by selecting the genera links and selecting the desired species. For instance, information on oaks is found in the genus *Quercus*, pines in *Pinus*, cottonwoods in *Populus*, and so on. *Agricultural Handbook 654 Silvics of North America* is another source of information for those desiring to collect tree seeds and grow seedlings. Find this publication at https://www.srs.fs.usda.gov/pubs/misc/ag_654/table_of_contents.htm. While the *Woody Plant Seed Manual* has information by genus, *Silvics of North America* has information by species. Instead of learning about hickories (*Carya*) in general, you can select the particular species such as shagbark hickory (*Carya ovata*). The species are listed by both common and scientific name.

Both books contain much information for teachers and students interested in biology, botany, and other similar fields of scientific study.

Table 2. Seedling propagation from seed for selected common tree species in Mississippi.

Common name <i>Scientific name</i>	Seed type	Collection time	Seed treatment	Stratification	Planting guidelines
Eastern redbud <i>Cercis canadensis</i>	Fruit pods with four to ten reddish to brown seeds.	After ripening—mid-summer to fall. Pull from tree.	Immerse seeds in boiling water for 15 seconds, then soak in cool water for 24 hours.	Place stratified seeds in moist sand in refrigerator for 5–8 weeks.	Plant in seedbeds in early April at a depth of 0.25–1.0 inch.
Red maple <i>Acer rubrum</i>	Double samara (winged seed).	April to July. Seeds can be shaken or pulled from trees.	None needed.	None needed.	Plant seeds in moist mineral soil before the seeds dry out.
Persimmon <i>Diospyros virginiana</i>	Berry with one to eight flat, brown seeds.	September to November. Gather fallen fruits from ground.	Store ripe fruits in plastic bags until pulp turns to juice and can be rinsed away. Air-dry 1–2 days.	Rinse seeds; store in plastic bag in refrigerator for 60–90 days. Soak seeds 2–3 days before planting.	Plant in spring or fall in shallow drills about 0.5 inch deep.
Flowering dogwood <i>Cornus florida</i>	Bright red drupe with one- to two-seeded stone.	September to late October. When fruit can be squeezed and stone popped out. Strip or shake fruit from branches.	Soften fruit by soaking in water; skim off pulp and floating (empty) stones.	Store in plastic bag in refrigerator for up to 120 days.	Plant in fall after collection and cleaning; or stratify and plant in spring to a depth of 0.25–0.5 inch.
Sassafras <i>Sassafras albidum</i>	Dark blue drupe.	Pick from tree or shake tree over sheets of plastic.	Rub fruits over hardware cloth to remove pulp; wash.	Store in plastic bag in refrigerator for 120 days.	Plant in rows 8–12 inches apart and cover with 0.25–0.5 inch of soil.
Southern magnolia <i>Magnolia grandiflora</i>	Rusty, conelike fruits with red seeds.	Pick from trees after fruit turns rusty brown.	Spread fruit to dry until seeds can be shaken out. Rub seeds over hardware cloth to remove flesh; rinse.	Fall sowing provides natural stratification; or store in plastic bags in refrigerator for 90–180 days.	Plant in rows 8–12 inches apart and cover with 0.25 inch of soil. Mulch. Seedlings need half shade during first summer.
Loblolly pine <i>Pinus taeda</i>	Female cones contain winged seeds.	October to November. Collect cones when sample cones float in water or when fallen cones are just beginning to crack and release seeds.	Air-dry cones on trays. When open, shake or knock cones to remove seeds. Rub seeds to remove wings.	Cleaned seeds may be stored in plastic bags in refrigerator for spring sowing.	For fall sowing, press seed into mineral soil and cover with a layer of chopped pine straw.
Sweet pecan <i>Carya illinoensis</i>	Nut with a husk that is thin-skinned and four-winged from the base.	September to October. Husks of sweet pecans split to the base at maturity. Nuts should be picked from the ground after shaking the trees or natural seedfall.	Studies show that larger nuts make larger seedlings, so sizing may be beneficial.	Stratify the nuts in cold, moist sand for 30–150 days at 33–39°F.	Either sow in the fall to avoid stratification or sow in the spring following stratification. Plant in rows 8–12 inches apart. Sow at a rate of 6–8 per foot or 10 per square foot. Plant the nut 0.75–1.5 inch deep.
Green ash <i>Fraxinus pennsylvanica</i>	Elongated, winged, single-seeded samaras that are found in clusters. The wing encloses about 50% of the seed.	Ash seed is usually collected in the fall when the color has faded from green to brown. Clusters of samaras can be picked by hand from the tree or shaken from the tree when dry.	Collected seed should be completely dried; there is no need to de-wing the seed. Seed should be stored at low moisture content at 41°F.	Cold stratification alone is sufficient for sources of southern green ash. For seed sources from the northern U.S., the combination of warm incubation before cold stratification is best.	Seed can be sown in the fall without stratification. For spring-sowing, stratified seed should be used. If the seed is to be drilled, each row should be 6–12 inches apart and sown at a rate of 25–30 seeds per square foot.

Sources: *Woody Plant Seed Manual* and *Silvics of North America*.

References

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