Good tree planting practices include good planting stock, a well-selected and properly prepared site, proper planting methods, and adequate protection and care of the tree seedlings before and after planting. Failure in any of these planting practices often results in unsatisfactory survival or growth or even in complete failure.

Before you order seedlings, ask yourself these questions:

- Which trees will grow well in my area?
- What species are best for my planting purposes?
- Will this species grow in my soil?
- How many trees can I plant and properly care for?
- How and when do I order my trees?

This guide helps answer these questions. If you are planning a large planting or a commercial planting, seek advice from a professional forester. Contact the University Outreach and Extension center in your county or the State Forester, Missouri Department of Conservation, Jefferson City. MU publication G5999, Forestry Assistance for Landowners, provides additional information.

Which trees grow well in my area?

Trees survive and grow best when planted under conditions similar to those where they occur naturally. Missouri is part of the great central hardwood forest region. More than 160 species of trees are found in the state. Trees preferring similar conditions form forest communities.

Soils and climate create four broad tree-growing areas in the state. These areas, shown in Figure 1, denote major changes in general tree-growing conditions that should be considered when selecting species. However, within each major area many varying sites must be considered individually for species selection.

Ozark area (A). The most heavily wooded part of the state, the Ozark area once was nearly all forested. The area now is largely a mix of open pasture land and forest. The soils are often thin and rocky. This area has the greatest diversity of tree and shrub species in Missouri, and much of this area can be used to grow trees for wildlife and commercial forest products. It may be necessary to eliminate or control undesirable sprouts and other competing woody growth. Desirable species typically found on the better sites include scarlet, northern red, shumard, black, and white oak. Shagbark hickory, white ash, blackgum, river birch, eastern redbud, and shortleaf pine are other common species. In the eastern Ozarks, cherrybark oak, sweetgum and tulip poplar are common. Shrub species include flowering dogwood, aromatic sumac, hazelnut, redbud, ninebark, wild plum and deciduous holly. Site preparation in old fields often can be done by mowing or burning before planting.

River-Border area (B). Areas bordering the Missouri and Mississippi Rivers and their tributaries are a high-priority area for tree planting. Many good sites exist for the production of high-quality hardwood species, especially along the big rivers. Tree and shrub plantings can slow flood waters and protect valuable farmland from damaging floods, erosion and sand deposits. Soils are deep, fertile, river deposits. Typically
on the lower ground, common species include cottonwood, silver maple, hackberry, sycamore and green ash. On higher ground: pecan, pin oak, black walnut, swamp white oak, northern red oak, and persimmon are among the dominant species. It is essential to prepare the sites properly before planting, especially in the bottomlands. Follow planting with regular weed control using mowing, disking, or chemicals, until trees are at least 4 to 6 feet tall. Survival and growth will be severely limited by competition from heavy weed growth.

**Southeast Lowlands area (C).** This area includes the flat lowlands with deep river deposited soil and Crowleys Ridge, a very hilly area of deep rich soils. Nearly all of this area was once forested. Lowlands species included baldcypress, hackberry, cottonwood, silver maple, sycamore, pin oak, willow oak, overcup oak, sweetgum, and green ash. On the higher ground: tulip poplar, white ash, American beech, and a variety of hickory species are common. Site preparation and weed control are similar to the River-Border area.

**Northern and Western Prairie areas (D).** In general, the soils and climate conditions of these areas are not as favorable to tree growth as the rest of Missouri. Site and species selection are very important, and after-planting care needs special emphasis. Common species in the uplands include bur, white, swamp white, shumard, black and northern red oaks, also Kentucky coffeetree, basswood, white and green ash, and black walnut. Sycamore, pecan, pin oak, green ash, silver maple, shellbark hickory, hackberry and cottonwood are common lowlands species. There are many opportunities for flood protection plantings along streams and rivers in the areas. Wildlife food and cover plantings are moderately successful and much needed.

### What species are best for my needs?

All trees have their uses. Uses include wood products, shade or ornamental beauty, food and shelter for birds and animals, protection of soil, and modification of temperature or noise levels. All trees filter the air and produce oxygen. Table 1 shows common uses of some of the major species planted in Missouri.

#### Trees of Missouri

**Aromatic sumac.** This shrub, which grows up to 8 feet in height, can be found throughout Missouri except the extreme northwestern and southwestern portions of the state. The red fruit ripens from June through August and is eaten by many birds, including wild turkey. The low, spreading form and brilliant fall color make this an attractive shrub for windbreak and ornamental plantings.

**Baldcypress.** Baldcypress occurs naturally in deep swamps in area C, the southeast lowlands, which are usually flooded for long periods of time. It is a tree of considerable beauty and has been planted as an ornamental tree statewide on a variety of sites. In old age, the tree generally has a broad fluted or buttressed base, a smooth slowly tapering trunk and a broad, flat top. Its bark is cinnamon-red, and the leaves are small and arranged in featherlike fashion along two sides of small branchlets. The branchlets fall in the autumn with the leaves still attached. The wood is very durable.

**Blackgum.** Blackgum occurs naturally south of the Missouri River, but has been successfully planted statewide. It is found growing in deep soils along streams and in moist upland soils. The dark purple fruit is eaten by many birds and other wildlife. The leaves are shiny and dark green and turn a brilliant scarlet red in the fall. This tree is often affected by heart rot, making the tree useful for wildlife species that need dens for nesting and shelter.

**Black locust.** This Missouri native produces fragrant white or cream-colored flowers and has very hard, strong, durable wood. Its primary uses are for posts, erosion control, fuel wood and, because it is a legume with fibrous roots, soil improvement. Its branches are armed with pairs of short, sharp spines. Because black locust spreads easily from root runners, it can become a nuisance. On poor soils it is usually attacked by locust borers. It is found in areas A, B, and D but does best on fertile, moist soils of limestone origin.

**Black oak.** Found throughout the state, black oak can tolerate dry rocky ridges and upper slopes, but will also make good growth on better quality sites. The lumber is generally low quality and is used for pallets, railroad ties, rough lumber and flooring. This oak is a consistent producer of acorns. The acorn is about ¾ inch long and is eaten by a variety of wildlife.

**Black walnut.** On an individual tree basis, black walnut is one of the most valuable commercial species in the United States. Its wood is prized for a great variety of uses, including furniture, gunstocks and veneers. Its fruit, a nut, also provides many products and is a staple diet for squirrels.

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For further information

**Extension Publications (1-800-292-0969)**

SB 767 Trees of Missouri, C. Settergren and R.E. McDermott, University Extension, 1995

Selecting Landscape Plants series:
- G6800 Shade Trees
- G6805 Flowering Trees
- G6810 Uncommon Trees for Specimen Plantings
- G6815 Needled Evergreens
- G6820 Broad-Leaved Evergreens
- G6830 Deciduous Shrubs

**Missouri Department of Conservation**
Forestry Division
P.O. Box 180
Jefferson City, MO 65102-0180

Oaks and Hickories of Missouri
Missouri Conservation Trees and Shrubs
Table 1. Primary uses of major tree species in Missouri.

<table>
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<tr>
<th>Tree or shrub</th>
<th>Wood products</th>
<th>Wildlife food and cover</th>
<th>Windbreaks</th>
<th>Erosion control</th>
<th>Ornamental or shade</th>
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Walnut is found statewide, but it is typically a good-site tree and develops best on deep, well-drained, moist and fertile soil and does especially well on deep loams, loess soil and fertile alluvial deposits. On wet bottomland or dry ridges and slopes, it grows slowly. Under natural conditions, abundant seed crops are produced irregularly, perhaps twice in five years. It commonly invades abandoned fields and pastures. Grasses thrive under its light shade, making it a popular tree for agroforestry purposes. See MU publication G5020, *Black Walnut Agroforestry*. If nut production is desired, wide spacings are necessary.

**Bur oak.** This large oak is found naturally on fertile, well-drained soils statewide. The acorn is large, up to 11/2 inches in diameter and half to three-quarters enclosed in a fringed cap. The bark is thick, almost corky, insulating the tree from fire. The wood is used like white oak for lumber, barrel staves, fuelwood, railroad ties, etc.

**Cherrybark oak.** This is a large oak found on ridges and high ground in the southeast lowland area of the state. The name derives from the scaly, reddish-tinged bark’s resemblance to the bark of a black cherry. For timber quality, cherrybark oak is one of the most preferred of the lowland red oaks. You should consult a forester before undertaking any extensive planting of this species outside of area C.

**Cottonwood.** Found along the streams throughout the state, cottonwood is a large, spreading tree with shiny, triangular leaves that turn yellow in the fall. Female trees produce large quantities of cottonlike seeds. It is sometimes used as an ornamental where large spaces exist because it grows rapidly and requires minimum care. It does become large and brittle and is relatively short lived. Its roots can damage basements, pavement and drainage lines.

Cottonwood develops best in deep, silty, sandy or clay-loam soils that are moist but well-aerated. It will survive deep sedimentation. It can be grown from planted cuttings or seedlings.

**Deciduous holly.** Also known as possumhaw, this small tree occurs on a variety of sites in areas A, B, and C and in southern portions of area D. The male and female flowers are borne on separate plants, and the bright red berries on the females are a striking bit of color on the winter landscape. The fruit is also favored by a variety of birds. This, in conjunction with its site adaptability, makes deciduous holly desirable for wildlife and ornamental plantings statewide.

**Flowering dogwood.** Missouri’s state tree is conspicuous in the early spring by its large, showy, white, petal-like, bracts that give the appearance of large spreading flowers. Birds, squirrels and other animals relish the fruit, a scarlet drupe.

Flowering dogwood is a small tree commonly found in the understory of a woodland. It is shade tolerant, and although found naturally south of Missouri River, it can be grown statewide if give plenty of shade (on selected sites). It will tolerate neither flooding nor very dry sites.

**Gray dogwood.** A small, almost shrublike, dogwood that does well on a variety of sites from rocky upland glades to moist prairie areas statewide. Gray dogwood forms thickets by underground suckers. The foliage takes on a purplish hue in autumn with clusters of white fruit borne on red stems, giving this species ornamental as well as wildlife food and cover value.

**Green ash.** Often planted as a shade tree, green ash grows rapidly. It is a moderately large tree distributed throughout the state. Although it is a bottomland species, it is tolerant of many site conditions. Its wood is inferior to white ash but is used for many of the same purposes in the lumber industry.

**Hackberry.** One of Missouri’s most common species, hackberry is closely related to the elms. Its bark is grayish in color, rough, with unique warty projections. In rich bottomlands, where it is commonly found, it may grow to 125 feet in height.

Hackberry often hosts a disease that causes profuse clumps of twig growth called “witches brooms” and hosts several species of gall-forming insects. Still, many people consider hackberry a desirable shade tree. It is tolerant of the growth conditions found in urban communities. The galls and the fleshy, purple berrylike fruit furnish food for squirrels and birds.

**Hawthorn (species).** The official Missouri state flower is the hawthorn. About 50 different species of hawthorn are found statewide. Typically, most are small trees that are rarely taller than 25 feet. If open grown, the trees are often as wide as they are tall. Nearly all species appear in late April thru May. Many birds and mammals eat the red fruits. Widely planted for windbreaks, as an ornamental, and for wildlife. Many species are susceptible to infection from cedar apple rust. This fungus creates rusty orange spots on the leaves and may deform branches and fruits.

**Hazelnut.** This 5- to 10-foot-tall shrub that occurs in tickets on many different sites statewide. The nuts, which are also known as Filberts, are a favorite of a wide range of wildlife from blue jays to deer as well a people. The nuts are often consumed by wildlife before they fully mature. The foliage of this species can be quite attractive in the autumn.

**Kentucky coffee tree.** Found widely scattered throughout the state, the Kentucky coffee tree is most common in western Missouri. It rarely grows in pure stands and is usually found growing on low, rich bottomlands, or moist hillsides along with a variety of other hardwoods. This tree is a legume and the large dark purple pods will often hang on the tree through the winter. The seedpod contains three to five hard marble-sized seeds. The male and female flowers are found on separate trees. Since the tree is scattered, it is of little timber value, but wildlife eat the seedpods. It is sometimes planted as an ornamental because of the heavy
twigs and distinctive shape in the winter. It will grow to a height of 85 feet on good sites. This species derives its name from the fact that its beans were once roasted and brewed. The dark drink did not taste like coffee, but it was used as a substitute for coffee.

**Ninebark.** This 4- to 8-foot-tall shrub has numerous small, white flowers in umbrella-like clusters. Fruit is a small dry bladder. Bark on older branches is papery and shredded. The tree produces yellow-green autumn foliage. It is tolerant of many soils and thrives in semishade as well as in the sun. Ninebark is best used in the background of a shrub border for an unclipped hedge.

**Northern red oak.** Found statewide, commonly on shallow, rocky soils, this red oak prefers well-drained loam or clay-loam sites. It is found most frequently on northern and easterly aspects, lower and middle slopes, coves and ravines and valley floors. Its acorn crops are important food for squirrel, deer, turkey and other birds and animals. It is an important timber product species. The brilliant red color of its autumn leaves and its symmetrical form have made it a widely used shade tree where space is not limited.

**Osage orange.** Although probably not native to Missouri, Osage orange has become naturalized through its use in fencerow plantings. It is found most commonly on deep rich soil, but in Missouri it grows on a variety of soils. It is extremely hardy and durable, making it suitable for fence posts. It is useful for farm windbreaks, wildlife food and cover, and erosion control. Its shallow root system competes efficiently for available moisture with other plants.

**Pecan.** A favorite nut, timber and shade tree of Missouri, the pecan occurs naturally in areas along certain large streams and rivers throughout the state. It is common on well-drained loam soils not subject to prolonged overflow, such as first bottom alluvial soils. It also occurs on certain heavy-textured bottomland soils and some cool, protected slopes. Nut production in native pecans begins when trees are about 20 years old, with optimum seed bearing age from 75 to 200 years. Pecan trees often attain large sizes.

**Persimmon.** This small to medium-sized tree is found on a variety of sites throughout Missouri. It can be found on dry uplands and in rich bottomlands. The male and female flowers are found on separate trees. The fruit can be eaten by humans and is an important fall food for many wildlife species. The wood is one of the hardest of all woods and is used for golf club heads. The bark is dark and broken into deep thick square blocks. The leaves are smooth edged, shiny dark green.

**Pin oak.** This wetland tree grows in the bottomlands and borders of swamps but also occurs on poorly drained soils and in fencerows and along draws in nearly every county in the state. Because it is one of the fastest growing oaks and will survive on a variety of soils, it is used extensively as a windbreak and ornamental tree. Pin oak has a single, upright stem with numerous long, tough branches, the middle horizontal, and the upper ascending. It produces very knotty, low-grade lumber.

**Redbud.** This small tree occurs under taller trees, on the border of fields, on hillsides and in valleys throughout the state. Its stout branches usually form a wide, flat top. The conspicuous, bright purplish-red pea-shaped flowers are numerous and colorful in the early spring. These flowers and the heart-shaped leaves make redbud desirable for ornamental plantings. Its diameter seldom exceeds 8 inches or its height 25 feet.

**Redcedar.** One of the most versatile trees in Missouri, redcedar is found in every county in the state on nearly all classes and conditions of soil. It seems to thrive on barren soils where few trees are found. It is relatively slow growing on most sites and generally a medium-sized tree. Its heartwood is red, durable and aromatic and is used in cedar chests, closets and novelty items. Its dense evergreen foliage makes it a valuable windbreak, screen or hedge tree. The pale blue, berry-like fruit is a favorite winter food for birds. They tend to scatter the seeds widely, causing invasion of the tree into pastures and other areas where it may not be wanted.

Redcedar has few fatal insect and disease enemies but does host bagworm, spider mites and cedar-apple rust. It is also susceptible to damage by even light fires.

**River birch.** The only birch native to Missouri, this is a common lowland and riverbank species. It is a medium-sized tree commonly found in clumps of several trunks. The bark is thin and papery and light pinkish or tan in color.

**Shellbark hickory.** This species, sometimes called big shagbark hickory, is the largest of the hickories. Shellbark is found on the fertile bottomlands throughout Missouri, except it is absent from the Ozarks. While it has similar bark to shagbark hickory it can be identified by the larger leaves, greater number of leaflets, orange twigs and large nuts. This is the largest and best tasting of the native hickory nuts. The wood is very strong, hard, and shock resistant and is one of the best woods for tool handles. On good bottomland sites, this tree can grow more than 100 feet tall.

**Shortleaf pine.** This is the only pine native to Missouri. Its natural range lies in area A, for the most part on thin upland slopes or ridgetop soils of sandstone origin. It is an important timber species, used largely for lumber, paper pulp and treated posts. Scattered stands of young shortleaf pine furnish valuable wildlife cover.

When planted out of its range, susceptibility to insects and disease increases. In many cases, when seed is available, larger areas may be seeded, under a forester’s direction, more economically than they can be planted. Shortleaf pine should be planted south of the Missouri River but only on selected sites in area C or D. Avoid shaded locations and claypan soils. It prefers acid soils.
Shrub lespedesa. This perennial, woody shrub legume furnishes high-quality food for birds, including quail. Rabbits will browse the plant during the winter, but it will sprout back the next spring. Plants should be set 2 feet apart within rows that are 3 feet apart.

Shumard oak. This oak is one of the largest of the southern red oaks. It is similar in appearance to northern red oak. Native to the southern two-thirds of Missouri, it is found along drainages and broad river bottoms and in upland sites. It can be found in, and will tolerate, a broader range of planting sites than northern red oak. The acorn is smaller and the cap slightly deeper than that of red oak. The wood is commercially valuable and this species makes a handsome shade tree where there is plenty of space. Red fall leaf color and symmetrical form make this a desirable shade tree. This species should be more widely planted along with other oaks in reforestation projects.

Silver (soft) maple. Silver maple will grow in many different soil types but occurs naturally where there is a good moisture supply throughout the growing season — usually on alluvial soils or soils with imperfect drainage. Silver maple grows rapidly and has been much planted as a shade tree. It has a disadvantage of brittle limbs subject to wind and ice breakage. Also several insects and diseases cause problems. Its silvery leaves turn yellow in the fall.

Silver maple is used for timber products, windbreaks and streambank protection. It can be planted statewide.

Sweetgum. This is a timber species whose natural range in Missouri is on rich river bottoms, in swamps subject to frequent overflows, and on drier uplands along streams in area C. However, sweetgum adapts to many soils and sites and has been planted statewide for many purposes. It is resistant to insects and disease but susceptible to fire.

It is a popular ornamental tree because of its adaptability, its star-shaped leaf (ranging in fall color from pale yellow to deep bronze) and its ball-like fruit that persists through the winter. Sweetgum is also tolerant of city environments.

Sycamore. One of the fastest growing trees, sycamore attains large size and is found statewide. It has large leaves and distinctive white and brown bark attractive in winter and summer. Its outer bark yearly flakes off in large patches, exposing the nearly white underbark. Because of its high resistance to industrial fumes, it has been used extensively for shade tree plantings at industrial sites where space permits. It is commonly found along streams and in rich bottomlands but does not appear where surface drainage immediately around the tree is poor. It is highly susceptible to anthracnose and canker disease. Low-value timber products are produced from sycamore.

White ash. This large tree prefers deep moist soil but will grow on a variety of sites. The wood is valuable for handles, bats and other striking tools.

White oak. This is one of the most common and best-loved Missouri trees. A large tree, it grows best on loamy, well-drained soils in protected coves and on cool slopes, but it is found on a many different of sites. White oak wood is used in barrels, furniture and a number of other products. Although it is difficult to transplant, white oak becomes a large shade tree once established. Its leaves turn red in the fall.

White pine. A major timber species in much of the United States, white pine was introduced in Missouri as an ornamental. It is a large, long-lived, symmetrical tree with delicate five-needled foliage. White pine is sometimes used for Christmas trees and in windbreaks.

White pine is more tolerant of shade than many other pines. It is susceptible to air pollution, bagworm, winter injury and deer browsing. It does poorly on wet sites.

Wild (American) plum. A small tree 10 to 20 feet tall, commonly occurring in thickets throughout the state. One of the first trees to bloom in the spring with showy white flowers. The fruit is edible. An excellent wildlife food and cover and erosion control plant.

Willow oak. This moisture-loving oak is native to the Missouri bootheel and surrounding counties north to St. Louis. It does best on poorly drained sites. It will tolerate swamp areas and upland sites with heavy clay soils. The name derives from the unusual leaves for an oak — they look just like willow leaves. This tree is often planted statewide for an ornamental because of the unusual leaves and fast growth. The acorn is one of the smaller of the native oaks and is heavily used by waterfowl and other wildlife. Mature willow oak can grow to 80 feet in height.

Witch hazel. This is a large shrub, up to 10 feet tall, found in and along dry, rocky streambeds in southern and central Missouri. It is reputed to have strange powers ranging from medicinal uses to water witching. This shrub is important for wildlife food and cover and for controlling erosion along streams. This is one of the earliest flowering plants in the state, often flowering in January and February. The flowers are small and yellow with ribbon-like petals.

Yellow (tulip) poplar. This tree receives its name from the yellow color of its heartwood and its attractive tulip-like flowers. It is native to deep, moist soils along streams and to cool north slopes in area C. Best growth occurs on soils with deep, well-drained surface layers overlaying loamy or moderately fine-textured subsoils with a good supply of available moisture. Tulip poplar should not be planted on flat-lying, poorly drained soils with shallow depth to tight subsoils. Deep, fertile, moist soils in second bottoms, north slopes and coves in areas C, B and A are best planting opportunities.

Where space permits, yellow poplar is often planted as a shade tree or ornamental. Its leaves turn yellow in the fall. It is usually free from serious insect or disease
problems but is easily damaged by ice, cattle and wildlife.

**Will this species grow in my soil?**

Make note of soil type and present ground cover. Most trees and shrubs available for planting have definite soil, moisture and light requirements for best growth. Take special note of soils that have shallow impervious layers (such as claypans) or soils that are poorly drained. Trees differ greatly in soil moisture requirements, but few trees can stand poor drainage. If drainage is poor in the top 18 inches of soil, expect poor growth and even death of most species.

Poor soil drainage can sometimes be predicted from soil maps but usually is determined at the proposed planting site. Dig small holes (or use a soil auger) 18 inches deep throughout the field. Yellow, brown, or red soil is usually well drained. Soil that is gray or “wet-looking,” or where water seeps into the hole is poorly drained. Poor drainage is also indicated by clay hardpan or subsoil often spotted (mottled) with bright colors at depths less than 18 inches.

**How many trees can I plant and properly maintain?**

Determine the total area to be planted to trees and how much time and funds can be spent on tree planting and maintenance each year. If you plan to plant a large number of trees, determine whether a tree planting machine can be used or whether the trees must be planted by hand. Two people can hand-plant about 800 trees in open agricultural land in an 8-hour day. An experienced three-person crew, operating a tractor and mechanical tree planter, can plant 1,000 trees an hour under the same conditions. See MU publication G5009, *Mechanical Tree Planters*.

If a tree planter can be used and is desired, consult your area resource forester, University Outreach and Extension center, soil conservation district, or private consulting forester for information on the availability of a planting machine.

The following table shows the number of trees required per acre at different spacings.

<table>
<thead>
<tr>
<th>Tree spacing (feet)</th>
<th>Trees per acre</th>
<th>Tree spacing (feet)</th>
<th>Trees per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 x 6</td>
<td>1,210</td>
<td>10 x 10</td>
<td>436</td>
</tr>
<tr>
<td>7 x 7</td>
<td>889</td>
<td>12 x 12</td>
<td>302</td>
</tr>
<tr>
<td>8 x 8</td>
<td>538</td>
<td>20 x 20</td>
<td>108</td>
</tr>
</tbody>
</table>

**How and when do I order my trees?**

Several private nurseries carry seedling trees and shrubs for conservation plantings. A partial list of these nurseries may be obtained by writing to

- Extension Forester
  The School of Natural Resources
  Room 203, ABNR Building
  University of Missouri-Columbia
  Columbia, MO 65211-7270

Persons interested in purchasing trees and shrubs from the state nursery should contact their University Outreach and Extension center, or write to

- Nursery Superintendent
  George O. White Forest Nursery
  14027 Shafer Road
  Licking, MO 65542

Either contact will provide a list of the seedlings available and a nursery seedling order form. Order blanks usually are available in the late fall or early winter for the next spring planting. In filling applications for seedlings, the state nursery operates on a “first ordered – first served” basis. Since it may be impossible to fill late orders for some species, it is a good practice to order early. Delivery procedures are explained on the seedling order form.

**What about cost-sharing on tree planting?**

At various times, cost-sharing for planting trees becomes available. If application for cost-sharing is made at the designated time before the trees are planted, you may receive financial assistance. Specifications must be followed and the planting must be approved by a technical forester.

See MU publication G5999, *Forestry Assistance for Landowners*, for more information on which organizations to ask about the availability of cost-sharing assistance.