



Planting and Care of Fine Hardwood Seedlings



Hardwood Tree Improvement and
Regeneration Center

Northern Research Station
USDA Forest Service

Department of Forestry and Natural Resources
Purdue University



Resources and Assistance Available for Planting Hardwood Seedlings

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Introduction

Successfully starting a tree plantation involves several steps, ideally starting with preparation a year or more before the seedlings are planted. The publication [Planning the Tree Planting Operation](#) (Meilan 2006, in the Hardwood Tree Improvement and Regeneration Center series *Planting and Care of Fine Hardwood Seedlings*) outlines the considerations and activities that precede planting as well as follow-up activities to help the plantation become established and thrive. Part of planning is finding sources of materials, information, and assistance. Planning, site preparation, planting, weed control, pruning, thinning, and managing the financing of each activity requires materials, advice, and assistance.

This publication provides resources to help landowners interested in planting trees for conservation find seedlings, tools, materials, professional advice and assistance, and potential financial incentives. The resources and contact information emphasize planting of hardwood seedlings in the Central Hardwood Region (Pijut 2003) and should not be considered an exhaustive list. Contacts for additional information are provided throughout the publication.

Professional Advice and Assistance

To implement a successful tree planting program, you first need professional advice and assistance to help create a plan. One study of conservation tree plantings found that plantings installed by professional foresters performed significantly better than plantings installed by landowners (Jacobs et al. 2004). Professional foresters are experts in planning and using the correct tools, materials, and techniques for installation and maintenance of plantings. That experience helps the landowner avoid mistakes that can result in poor performance of the plantation—or outright failure.

Several sources of professional assistance are available. Most states in the region have agencies that provide forest management and tree planting advice or assistance to private landowners. Many of these agencies offer on-site consultation, assist with plan preparation, refer tree planting contractors, and/or recommend public or private sources of seedlings to purchase. The services from forestry agencies may be free or fee-based. There may be a waiting period to get access to the services. See Table 1 for a listing of the Central Hardwood Region state forestry agency



Tuliptree planting with conifers in the understory. Photo courtesy of Lenny Farlee

contacts for forest management services, or visit the National Association of State Foresters website to find the state forester for your state (<http://www.stateforesters.org/about/who-we-are>).

Most states also have contact information of private, for-hire professional foresters (often referred to as consulting foresters), industry foresters, and professional tree-planting contractors who can provide a variety of tree planting and plantation management services to landowners. Local lists

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A well-thinned black walnut plantation. Photo courtesy of Lenny Farlee

of these professionals may be available from state forestry agencies, Cooperative Extension Service offices, and local Soil and Water Conservation District offices. A national listing of member consulting foresters is available from the Association of Consulting Foresters of America, Inc., 312 Montgomery Street, Suite 208, Alexandria, Virginia 22314, Phone: 703-548-0990, Fax: 703-548-6395, email: membership@acf-foresters.org or from the Association of Consulting Foresters website (<http://www.acf-foresters.org>).

Many of these professionals provide the full range of services associated with planting and maintaining hardwood seedlings. Professional foresters and tree planting contractors possess experience and understanding of the local conditions for tree planting, and have access to equipment and weed control materials that may not be readily available to the landowner.

If you want to plant seedlings yourself, professional foresters can give you guidance on selecting the correct species for your site and planting objectives, seedling spacing and arrangement, site preparation and weed control, and proper planting techniques for the tools you have available.

Landowners can obtain additional information on tree planting from the USDA Natural Resources Conservation Service (NRCS). The NRCS provides standards and specifications for tree planting under USDA programs, and may be able to provide job sheets with technical guidance on tree planting. In addition, as a landowner you can

contact the local NRCS office for information such as soil maps and detailed soils information for your property. The NRCS may also recommend tree species by soil type and seeding information for cover crops as well as technical assistance with erosion control. Find the nearest NRCS office from their website (<http://www.nrcs.usda.gov>) or in the phone book under US Government Offices, Department of Agriculture. Detailed soils information is available from the NRCS Web Soil Survey (<http://websoilsurvey.sc.egov.usda.gov/App/>) or as downloadable information at the NRCS soils information site (<http://www.nrcs.usda.gov/wps/portal/nrcs/site/soils/home/>).

The publication *Regenerating Hardwoods in the Central Hardwood Region: Soils* (Ponder and Pope 2003) outlines soil and site conditions that affect tree suitability and performance. The Cooperative Extension Service can provide practical information for planning and planting hardwood seedlings, as well as directions to local sources of assistance. Check your county government website and phone listings for the county office location and contact information. You'll find contact information for cooperative extension programs provided through Land Grant Universities around the nation at: <https://www.usda.gov/topics/rural/cooperative-research-and-extension-services>.

Be aware that creating a tree plantation can be a major commitment of time and energy, and results may vary depending on the quality of planning and work. It can also be highly rewarding, yielding many years of tangible and intangible benefits. Be sure to get professional help with planning and planting to increase your chances of success.

Financial Incentives for Tree Plantations

Another topic to explore early in the planning process is financial assistance and incentive programs for tree plantings. Several federal and state programs are available to landowners who meet program eligibility requirements and are willing to design and install their plantings to program specifications. In addition, some local government entities and nongovernmental organizations may also provide assistance for tree plantings that coincide with the goals of their organizations. Many programs do not cover costs incurred before you are approved for funding—so explore these options early in your planning process. Furthermore, most financial assistance



programs cover only a portion of the costs. Make sure you understand all payment conditions of any conservation program.

The primary contact points for USDA programs are the local USDA Service Centers that host NRCS and Farm Service Agency (FSA) offices (<https://offices.sc.egov.usda.gov/locator/app>). The NRCS and FSA office help you determine your eligibility for federal programs, assist you with the application process, and provide details on program requirements. Program eligibility requirements and funding levels can change from year to year. In addition, new programs may be added and old ones discontinued, so check with your forester or NRCS office regularly. Acceptance of financial assistance may have income tax implications, so ask the program manager how the funds are considered for tax purposes. Also, by accepting funds you may enter into a contract with the funding agency or organization, so be sure you understand your obligations.

Tree planting expenses may be eligible for advantageous tax deductions and amortization of expenses. Explanations and examples of options for the tax treatment of tree planting expenses



Black walnut and river birch trees, planted as trainers to improve form, in a mixed hardwood planting. Photo courtesy of HTIRC

can be found in the publication [Financial and Tax Aspects of Tree Planting](#) (Hoover 2012). Another source of up-to-date tax information for forest and tree plantation owners is the National Timber Tax website (<https://timbertax.org>).

Several states in the Central Hardwoods Region offer property tax reduction programs for landowners who plant conservation tree plantings or practice sustainable forest management on their property. Consult your state forestry agency about eligibility and application procedures. Some programs are paired with financial assistance for tree planting and forest management as well as technical assistance, so they can be advantageous to the landowner in multiple ways. Some programs also offer group certification of sustainable forest management. This certification could add an important advantage for marketing forest products, as many forest-product users look for materials from certified sustainable sources.

Sources of Seedlings

Planting stock for hardwood reforestation projects usually consists of bare-root seedlings or, less frequently, containerized seedlings in a variety of sizes (Fig. 1–3). Two publications, [Nursery Production of Hardwood Seedlings](#) (Jacobs 2003) and [Planting Hardwood Seedlings in the Central Hardwood Region](#) (Pijut 2003), in the *Planting and Care of Fine Hardwood Seedlings* series provide a discussion of seedling quality and production techniques, and considerations for selecting and planting seedlings. Proper use of terminology in advertisement and sale of seedlings is detailed in the publication [A Guide to Legal and Genetic Terminology Used in the Sale of Hardwood Seeds and Planting Stock](#) by Woeste and Woeste (2006) from this series.

Complete your selection and ordering of seedlings in the summer or fall the year before you plant. Order as soon as possible, as demand for seedlings often exceeds supply. Also, have a list of second choices for each of the species you intend to plant. This allows you to make suitable substitutions, if the nurseries have sold out of your first choice of species.

Seedlings are available from a variety of public and private nurseries across the Central Hardwood Region. Consider the source of the seedlings when you order. Seedlings from populations not climatically adapted to your planting area may not perform well or survive extremes of





Figure 1. Bare-root pecan seedlings showing superior lateral root development for the seedling on the right. (Bare-root seedlings are lifted and packed during the dormant season.) Photo courtesy of John Seifert



Figure 2. Containerized hardwood seedlings in the greenhouse. Photo courtesy of HTIRC



Figure 3. Large containerized hardwood seedlings, while difficult to handle and plant, may provide competitive advantages over smaller seedlings in some planting situations. Photo courtesy of Ron Rathfon

temperature. Species native to your area and produced from local seed sources are often the best choice for planting, since they are biologically and climatically adapted to the local environment. Exotic (nonnative) plant species have been used extensively for conservation plantings, but some of these species have become weeds that compete with native plants. With a large number of excellent native plant species for forest and wildlife management, there is no need to risk the problems exotic species can cause. [Native Hardwood Trees of the Central Hardwood Region](#) (Pijut 2005) provides site characteristics and native range information for tree species commonly encountered in the region. [Invasive Plant Species in Hardwood Tree Plantations](#) (Beasley and Pijut 2010) discusses invasive species that can threaten the establishment and growth of tree plantings.

Many states in the Central Hardwood Region have state-operated nurseries that offer seedlings to landowners for conservation and reforestation plantings. These nurseries usually provide seedlings at an attractive cost for reforestation efforts in the state. Some state programs may provide free seedlings for specific uses. State nurseries often use local seed sources, so the trees you purchase should be climatically adapted to your area. Some nurseries provide “improved” or “genetically selected” seedlings selected for improved growth, form, or disease-resistance characteristics.

Contact information for the state nursery programs in the Central Hardwood Region can be found at the Reforestation, Nurseries, and Genetics Resources website (<https://rngr.net>) or from state forestry agencies.

Private nurseries can also provide seedlings for tree plantations. Private nurseries may have different species, sizes of stock, or special services not available from state nurseries. Locate the private nurseries in your area by contacting your professional forester, Cooperative Extension Service office, or trade groups such as private nursery associations (often called Nursery and Landscape Associations) in your state. The Reforestation, Nurseries, and Genetics Resources website (<https://rngr.net/>) maintains a list of plant material suppliers, both public and private, that you can search by location or product type. Ornamental tree nurseries in your area may also provide information on availability of seedlings for tree plantings.



Equipment and Supplies

The type of equipment and supplies needed for a successful tree planting depends on factors including the type and size of seedlings to be planted, soil and site conditions, weed control techniques, and practices required to protect seedlings from wildlife damage. If you hire a tree-planting contractor, they should provide the tools and materials needed for the planting and follow-up maintenance work. If you decide to do the work, you may need specialized equipment and supplies not readily available at the local hardware or garden store. Some items you may need include tree planting bars (Fig. 4), seedling planting bags, stakes and flagging for plantation layout, herbicide sprayers (Fig. 5), herbicides, tree tubes, weed barriers, or fencing. These and other related items are available from forestry equipment companies. Three of the largest suppliers are:

Bailey's

1210 Commerce Ave., Suite B
Woodland, CA 95776
Phone: (800) 322-4539
E-mail: baileys@baileysonline.com
Web: <https://www.baileysonline.com>

Ben Meadows

Mail Orders: P.O. Box 5277
Janesville, WI 53547-5277
Phone: (800) 241-6401
E-mail: mail@benmeadows.com
Web: <http://www.benmeadows.com>

Forestry Suppliers, Inc.

205 West Rankin Street
P.O. Box 8397
Jackson, MS 39201
Phone: (800) 647-5368
E-mail: sales@forestry-suppliers.com
Web: <http://www.forestry-suppliers.com>



Figure 4. Some tools for hand-planting hardwood seedlings (left to right: Hoedad, KBC bar, and a shop-built tree planting bar). Photo by Lenny Farlee



Figure 5. Backpack sprayer for weed control treatments. Photo courtesy of Ron Rathfon





Figure 6. Tree tubes used to protect seedlings in a regeneration opening. Photo courtesy of Ron Rathfon



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Figure 7. A mechanical tree planter suitable for planting large bare-root seedlings. Photo courtesy of Lenny Farlee

Herbicides, pesticides, and fencing materials may also be available from agricultural supply, hardware, nursery, or garden stores. Be aware that some herbicides and pesticides are available only to licensed applicators, and all herbicides and pesticides should only be applied as directed on the label. Tree tubes or shelters (Fig. 6) can be used to protect seedlings from wildlife browsing and herbicide damage. Some suppliers of tree tubes are:

Blue-X

Blue-X® Enterprises, Inc.
8175 Alpine Ave, Suite D
Sacramento, CA 95826
Toll-Free: (888) 472-5839

tubemaster@growtube.com

<http://www.growtube.com/products/treeshelter/>

Plantra

1230 Eagan Industrial Road, Suite 100
Eagan, MN 55121
Toll Free: (800) 951-3806
Phone: (651) 686-6688
Fax: (651) 681-2067

<http://www.plantra.com/GrowTubesForTrees.aspx>

Tree Pro

3180 West 250 North
West Lafayette, IN 47906
Phone: (800) 875-8071 or (765) 463-1011
Fax: (765) 463-3157

E-mail: sales@treepro.com

Web: <http://www.treepro.com>

Treesentials Company

60 E. Plato Boulevard, Suite 130
Saint Paul, MN 55107
Phone: (800) 248-8239

E-mail: info@growtubes.com

Tree Sentry

Summit Environmental Group, LLC
114 Sylvania Ave.
P.O. Box 12267
Toledo, OH 43612

Phone: (419) 720-0185

Fax: (419) 720-0187

Web: <http://www.summitenvironmental.net>

Tubex USA

70 Old Hickory Blvd.
Old Hickory, TN 37138
615-847-7039

Email info@tubexusa.com

Web: <http://www.tubexusa.com>

You may also need fencing in some areas to prevent deer browsing damage to small seedlings. Several types of fencing are available, including plastic mesh and electrified fences. The publications [How to Build a Plastic Mesh Deer Exclusion Fence](#) (McKenna et al. 2014) and [Electric Fences for Preventing Browse Damage by White-tailed Deer](#) (Miller et al. 1992) outline some options for deer fence design, use, and construction.

Some county Soil and Water Conservation Districts (SWCDs) and other natural resources agencies or organizations may have equipment, such as tree planting bars and machines, seeders, or drills that can be rented for local use. Mechanical tree planters (Fig. 7) that are pulled behind a tractor can be rented from several sources, including some SWCDs and other conservation agencies or organizations. A tractor-pulled tree-planting machine and experienced crew can plant several thousand trees per day, making it the most efficient choice for large plantings on open ground. Check with the owner or manufacturer of the tree planter to determine the recommended tractor horsepower, hitch, and hydraulics setup required to operate the machine. Many professional tree planters use these machines as part of their tree-planting services.

Some manufacturers of tree-planting machines are:

Phil Brown Welding

4750 8 Mile Road NW
Conklin, MI 49403
Phone: (616) 784-3046
Fax: (616) 784-5852
Web: <http://www.philbrownwelding.com/index.php/tree-planter>

R.A. Whitfield Manufacturing Co.

6431 Mableton Parkway, S.W.
P.O. Box 188
Mableton, GA 30126
Phone: (770) 948-1212
Fax: (770) 948-0155
E-mail: treesone@mindspring.com
Web: <http://www.whitfieldforestry.com>

Trees Are Us

Tree Planters, Custom Planting & Weed Barrier Machines
7355 Gage Road
Hemingford, NE 69348
Phone: (308) 487-3995
Web: <http://www.treesareus.com/tree-planter>

Many companies sell products related to tree planting and maintenance. Your local forestry contacts can provide you with more information on special products that may be helpful to you in planting and maintaining your trees.

Insect, Disease, and Soil Diagnostic Services

Insect and disease issues may emerge in tree plantings, threatening tree growth and survival. Some common problems may be diagnosed locally by extension or forestry experts, while more complicated problems may require specialists and lab work. Many states provide plant pest diagnostic lab services through state land grant colleges and universities. Citizens needing diagnosis of plant insect and disease problems should contact the local Cooperative Extension Service office or their land grant university for information on sample submission and fees.

Land Grant University Website Directory:

<https://nifa.usda.gov/land-grant-colleges-and-universities-partner-website-directory>

Two Publications in the *Planting and Care of Fine Hardwood Seedlings* series provide information on common insect and disease issues in tree plantings:

[Diseases in Hardwood Tree Plantings](#) (Pijut 2006)

[Insects Affecting Hardwood Tree Plantings](#) (Barnd et al. 2008)

Soil testing for nutrient content, organic matter, pH, texture, and other characteristics important to plant growth are an important planning tool prior to planting and are part of a diagnostic program to maintain good tree condition and growth as the planting matures. Basic soil testing may be available through local Cooperative Extension Services, agricultural service companies and cooperatives, and public and private testing labs. Contact your local Cooperative Extension Service office about access to soil testing services.



Organizations for Tree Planting Enthusiasts

Tree planting and plantation management can become a fulfilling and enjoyable personal pastime or an investment or business venture. If you are a landowner interested in more intensive management and a greater depth of information and involvement, several organizations exist that can provide a venue for information gathering and sharing, knowledge and experience networks, and a chance to see how others have used tree plantings to meet their property objectives. This listing is not exhaustive, but should help you find a place to connect with other landowners, resource professionals, and business entities who are interested in hardwood tree planting and plantation management.

The American Chestnut Foundation

50 North Merrimon Avenue, Suite 115
Asheville, NC 28804
Phone: (828) 281-0047 Fax: 828-253-5373
E-mail: chestnut@acf.org
Web: <http://www.acf.org>

American Forests

1220 L Street, NW, Suite 750
Washington, DC 20005
Phone: (202) 737-1944
Web: <http://www.americanforests.org>

American Tree Farm System

2000 M Street, NW, Suite 550
Washington, D.C. 20036
Phone: (202) 765-3660
E-mail: info@treefarmssystem.org
Web: <http://www.treefarmssystem.org>

National Arbor Day Foundation

100 Arbor Avenue
Nebraska City, NE 68410
Phone: (888) 448-7337
Web: <http://www.arborday.org>

National Woodland Owners Association

374 Maple Ave. E., Suite 310
Vienna, VA 22180
Phone: (703) 255-2700
E-mail: info@woodlandowners.org
Web: <http://www.woodlandowners.org>

The Walnut Council

Wright Forestry Center
1007 N. 725 W.
West Lafayette, IN 47906-9431
Phone: (765) 583-3501
Web: <http://www.walnutcouncil.org>

Many state and local organizations in the Central Hardwood Region are interested in tree planting and forest stewardship. Your local foresters as well as the offices of the Cooperative Extension Service and Soil and Water Conservation District can provide contact information for groups of interest.

Cooperative Research and Extension Services:

<https://www.usda.gov/topics/rural/cooperative-research-and-extension-services>

Soil and Water Conservation Districts:

<http://www.nacdnet.org/>

The US Forest Service offers several programs and information sources for management of tree plantings and private forest lands.

US Forest Service Landowner Assistance Programs

Web: <http://www.fs.fed.us/spf/coop/programs/loa>

Tree planting can be a pursuit providing a legacy of benefits beyond our lifetime. Developing a network of sources for information, advice, and assistance will help you efficiently and effectively install and maintain your tree planting.

Conclusion

You'll find an abundance of information and assistance available to landowners interested in planting trees for conservation purposes. Plan ahead, seek professional assistance, and know where to find the required tools and materials to increase your chances of having a successful planting. It can be as simple as contacting a professional forester to take care of the entire planting process, or as involved as your time and energy allow. In either case, enjoy the many benefits tree plantings provide now and in the decades to come—after you carefully plan and implement your project.



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The full list of *Planting and Care of Fine Hardwood Seedlings* series publications is accessible from the Hardwood Tree Improvement and Regeneration website: <https://htirc.org/> and the Purdue University Department of Forestry and Natural Resources Extension website: <https://www.purdue.edu/fnr/extension/>

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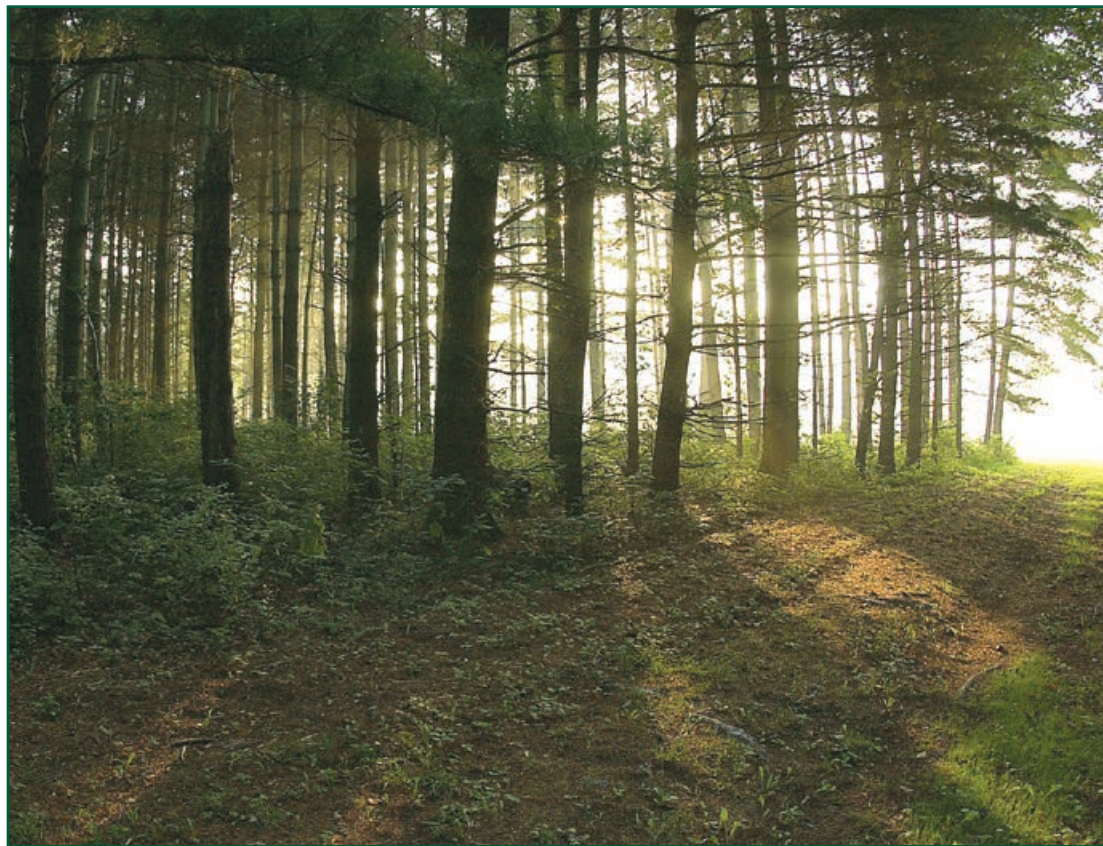
Table 1. State Forest Agencies in the Central Hardwood Region

State Forestry Agency		
Alabama Forestry Commission	Phone: (334) 240-9300	http://www.forestry.state.al.us
Arkansas Forestry Commission	Phone: (501) 296-1940	http://www.aad.arkansas.gov/arkansas-forestry-commission
Connecticut Forestry Division	Phone: (860) 424-3630	http://www.ct.gov/deep/cwp/view.asp?a=2697&q=322792&deepNav_GID=1631%20
Georgia Forestry Commission	Phone: (800) GA-TREES, (428-7337)	http://www.gatrees.org
Illinois Division of Forest Resources	Phone: (217) 782-6302	https://www.dnr.illinois.gov/conservation/Forestry
Indiana Division of Forestry	Phone: (317) 232-4105	http://www.in.gov/dnr/forestry
Iowa Bureau of Forestry	Phone: (515) 725-8451	http://www.iowadnr.gov/Conservation/Forestry
Kansas Forest Service	Phone: (785) 532-3300	http://www.kansasforests.org
Kentucky Division of Forestry	Phone: (502) 564-4496	http://forestry.ky.gov
Maryland Forest Service	Phone: (877) 620-8367	http://www.dnr.maryland.gov/forests
Michigan Department of Natural Resources	Phone: (517) 284-5900	http://www.michigan.gov/dnr
Minnesota Division of Forestry	Phone: (651) 296-6157	http://www.dnr.state.mn.us/forestry
Mississippi Forestry Commission	Phone: (601) 359-1386	http://www.mfc.ms.gov
Missouri Department of Conservation	Phone: (573) 751-4115	https://mdc.mo.gov/trees-plants
Nebraska Forest Service	Phone: (402) 472-2944	http://www.nfs.unl.edu
New Hampshire Division of Forests & Lands	Phone: (603) 271-2214	http://www.nhdfi.org
New Jersey Forest Service	Phone: (609) 292-2531	http://www.state.nj.us/dep/parksandforests/forest
New York Department of Environmental Conservation	Phone: (518) 402-9425	http://www.dec.ny.gov/lands/4972.html
North Carolina Division of Forest Resources	Phone: (919) 857-4801	http://ncforestservice.gov
Ohio Division of Forestry	Phone: (877) 247-8733	http://forestry.ohiodnr.gov
Oklahoma Forestry Services Division	Phone: (405) 522-6158	http://www.forestry.ok.gov
Pennsylvania Bureau of Forestry	Phone: (717) 787-2703	http://www.dcnr.state.pa.us/forestry
Tennessee Division of Forestry	Phone: (615) 837-5520	http://tennessee.gov/agriculture/section/forests
Virginia Department of Forestry	Phone: (434) 977-6555	http://www.dof.virginia.gov
West Virginia Division of Forestry	Phone: (304) 558-2788	http://www.wvforestry.com
Wisconsin Division of Forestry	Phone: (608) 264-6294	http://dnr.wi.gov/topic/forestry.html



NOTES





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