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Planting Trees In Minnesota

AGRICULTURAL EXTENSION SERVICE
UNIVERSITY OF MINNESOTA

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CONTENTS

Introduction	3
Sources of Planting Stock	3
Choice of Species	4
Site Preparation	6
Care and Handling of Stock	7
Planting Methods	7
Care of Plantations	10
Chemical Weed Control	11
Federal Assistance Programs	12

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WHY PLANT TREES?

- For production of forest products such as posts, poles, piling, pulpwood, and sawlogs
- To increase the value of your land
- To restore idle acres to useful purpose
- To establish wildlife habitat
- To create beauty
- For production of Christmas trees
- To assist in converting brushy areas and low-value timber types to less plentiful and more valuable softwood timber species such as pine and spruce

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Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Roland H. Abraham, Acting Director of Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota 55101.



Trees are one of Minnesota's most valuable and beautiful resources.

Planting Trees In Minnesota

Larsen • Miles • Smith

Introduction

A casual observer might conclude that most of Minnesota's forested areas are amply covered with trees. However, closer examination would reveal that much of this land is covered with brush. A considerable portion is either stocked with too few trees or an overabundance of low-value tree species, intermingled with abandoned fields.

We are now growing more wood than we are able to harvest. Aspen and other low-value hardwoods account for most of the surplus. There actually is a shortage of high-value species, such as the pines and spruces. As our population grows, the consumption of wood products increases. We will need more trees to supply this demand.

The area for growing our wood supply, however, is gradually decreasing. New power lines, roads, home sites, industrial sites, and recreation areas are whittling away our wood-growing areas. In the future we will have to grow trees more efficiently.

Whether you plant trees for the production of Christmas trees or long-term products such as posts, pulpwood, or sawlogs, growing trees increases the value of your land. In most cases, this land is eligible for preferential tax treatment under the Minnesota Tree Growth Law. This law provides a long-term, constant tax rate based on the value of the trees.

Sources of Planting Stock

Planting stock for general forestry and wildlife purposes is available at nurseries operated by the Minnesota Division of Lands and Forestry located at Willow River, Forest Lake, and Badoura.

Tree seedlings are available for the purpose of afforestation or reforestation, windbreaks, shelterbelts, erosion control, soil and water conservation, or for food and cover for wildlife. They may not be used to raise fruit for human consumption or be planted for ornamental purposes. They cannot be given away or resold with roots attached (Minnesota Laws 1947, Chapter 94).

Seedling stock costs \$1.20 per hundred. Transplant stock, available in limited quantities, is priced at \$3.00 per hundred. The different species must be ordered in multiples of 100 and a total of 500 trees is the minimum number that can be ordered.

The Division accepts orders on and after September 1 for trees that will be delivered the following spring. Orders are accepted on a "first come, first served" basis. Many people fail to get the type and number of trees they want because they fail to submit their orders early. Place your order early to avoid this.

The Division also provides a special application form for ordering planting stock. These can be obtained at County Agents' offices, State Forestry stations, County Agricultural Stabilization and Conservation offices or by writing to the Division of Lands and Forestry, Centennial Building, St. Paul 55101.

The following coniferous species are usually available each year: jack pine, ponderosa pine, Norway (Red) pine, Scotch pine, white pine, white spruce, black spruce, and white cedar. Deciduous species usually available are silver maple, green ash, Caragana, and black walnut. Some years, limited amounts of different species (Colorado blue spruce, balsam fir, hybrid poplar, elm, etc.) are also available. Coniferous species grown in state nurseries are usually 3-0 stock (i.e., they have grown 3 years in a seed bed and not in transplant beds). Occasionally, some 2-1 stock is available. These transplants have been growing 2 years in the seed bed and 1 year in the transplant bed.

Trees can be delivered from the nursery in different ways. They may be shipped by express (collect) or you can pick them up at the nursery. Many counties make provisions for delivery by county truck or custom haulers. Check with your county agent to determine what method is used in your area.

Several commercially operated nurseries in the Upper Great Lakes region supply forest tree seedlings in various sizes and grades. Names and locations of these nurseries can be obtained from county extension offices.

Choice of Species

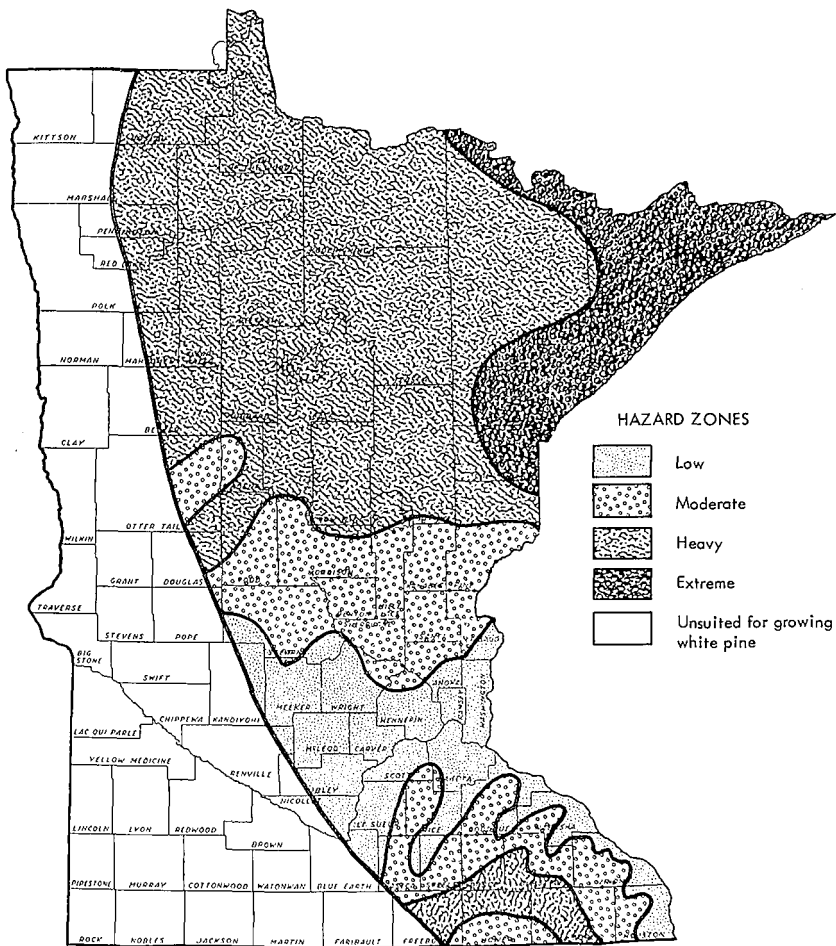
The general site and the soil and moisture requirements of each species should be considered carefully. One or more species of conifers usually can be grown in the soil types of Minnesota forest regions. The various deciduous (broad-leaved) species are more demanding in their requirements.

Planting success hinges on selecting a species which is adapted to the site factors of (1) moisture, (2) soil qualities, and (3) competition with other vegetation. Other factors that affect planting success are the amount of exposure to wind and sun; the possibility of animal, insect, or disease damage; and the species' ability to endure our severe winter climate.

White pine cannot be recommended for planting in some parts of Minnesota because of the virtual certainty of white pine blister rust infection (see map). Norway spruce and black walnut are species affected by climate. The likelihood of winterkill restricts planting of these species mainly in the central and southern regions of the state.

Matching a tree with its planting site is particularly important when the species is not native. For example, both Scotch pine, introduced from Europe, and ponderosa pine, native in western United States, may winterkill unless the original seed is carefully selected.

In general, pines grow better in sandy soils than in fine-textured soils, while the opposite is true of broad-leaved hardwoods. On fine-textured soils with poor



White pine blister rust hazard zones in Minnesota.

drainage, spruce, balsam fir, and cedar are recommended. One of the best ways to check how trees will do on your land is to observe others of the same kind that grow naturally in the same vicinity (see table 1).

Site Preparation

Many successful plantations have been established in fields which have had no special preparation prior to planting. Generally, most fields with sandy or sandy loam soil require no preparation. However, fields containing fine-textured soils and a thick sod cover or dense, tall grass should be worked up the year prior to planting. A couple of cross discings with a heavy brush disk may be sufficient preparation. On more difficult sites, the ground should be plowed, disced, and

Table 1. What should I plant?

Moisture condition	Soil Texture		
	Sandy¶ (coarse)	Loamy (medium)	Clayey** (fine)
Wet*	Willows Cottonwood	Willows Cottonwood	Willows Cottonwood
Moist†	Red pine White pine Black spruce White spruce	Black walnut Cottonwood Silver maple Colorado spruce White spruce White pine	Cottonwood American elm Green ash Silver maple Colorado spruce White spruce
Moderately dry‡	Ponderosa pine Jack pine Scotch pine Red pine	Green ash American elm White spruce Ponderosa pine	Green ash American elm Silver maple Cottonwood E. redcedar
Dry§	Jack pine Scotch pine Ponderosa pine	Green ash American elm E. redcedar	Green ash American elm E. redcedar

* Subject to standing water from a few hours to a few weeks.

† The most moist sites in the forested part of the state exclusive of bogs and other sites classed as wet. This would include north-facing slopes having deep soils in southeastern Minnesota, areas where water tables are between 3 and 8 feet below the surface, etc.

‡ The nonforested part of the state in general, exclusive of river bottoms. Also level areas where water tables are beyond 8 feet in the drier forested parts of the state. Other similar sites.

§ Water tables below 12 feet in the nonforested parts of the state. Driest sites in the forested parts of the state such as southwestern facing slopes in southeastern Minnesota. Shallow soils less than 3 feet in depth.

¶ At least two-thirds sand.

** At least one-third clay.

dragged: the type of preparation required for planting any crop. Applying one of the newer chemical weed killers, either the previous fall or at planting time, should be considered.

Get rid of brush before planting starts. Tree seedlings that are crowded or shaded by brush have a poor chance of surviving. Chemical brush killers provide one of the best and most economical ways to get rid of brush. Heavy brush discing or bulldozing when the ground is frozen is another quick way to eliminate brush, but any roots left in the ground will resprout. Cutting brush is wasted effort: cut stems send up new sprouts, twice as numerous and more vigorous than previous stems. However, cutting brush and followup chemical control can be very effective in brush elimination.

In choosing the most desirable spacing, you should consider the tree's growth habits, the purpose for which the tree is planted, and the presence of any natural reproduction where you intend to plant. For a timber stand, it is recommended that Norway pine be spaced from 6 to 8 feet apart. Christmas tree plantings ordinarily are spaced at 6 foot intervals. If they are spaced closer, the lower branches do not have enough room to develop properly. Where some natural reproduction is present or openings in hardwood stands occur, adopt spacing as circumstances indicate.

The following table shows the number of trees per acre at various spacings:

Spacing (feet)	Trees per acre
3 x 3	4,840
4 x 4	2,722
5 x 5	1,742
6 x 6	1,210
7 x 7	889
8 x 8	681

Care and Handling of Stock

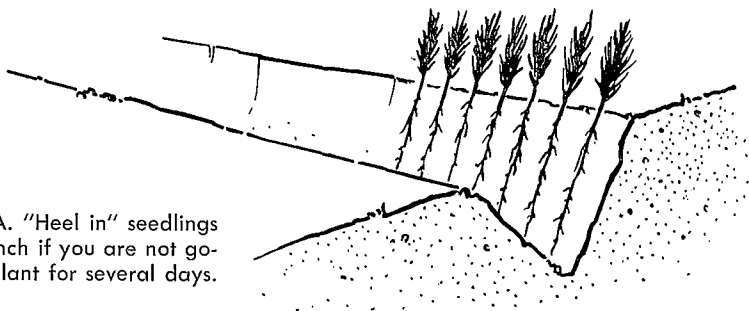
Forest planting stock usually is shipped in bundles of 500 to 1,000 trees. They are packed tightly in wet peat moss or cedar tow to keep them from drying out in transit. If you plant within a day or two, it is unnecessary to open the bundle until you start planting. However, it is a good idea to pour some water into the ends of the bundles and store them in a cool place.

Spring is the best time to plant—as soon as the frost is out of the ground. The soil is moist, the climate mild, and trees establish themselves quickly. With a full growing season ahead, they get a good start on competing weeds and brush. Planting forest trees in the fall is often less successful.

When your trees are delivered: (1) Pick them up promptly upon notice of arrival; (2) Give them a good soaking without delay (Do not leave trees in the wrapped package more than 2 or 3 days because they may dry out, heat, or mildew); and (3) If you are not going to plant the trees for several days, "heel in" the trees in a trench—preferably in a cool, shady place. Make the trench long and deep enough for the entire root system and part of the lower stems (see figure A).

Cut the ends and one side of the trench straight and slope the other side. Place trees side by side in thin layers in the trench, then thoroughly pack dirt around roots. Water the trees daily. Trees may be left "heeled in" for a week or more, if you do the job well.

Figure A. "Heel in" seedlings in a trench if you are not going to plant for several days.



During planting have plenty of water on hand so tree roots will be moist at all times. Remember: DRY ROOTS MEAN DEAD TREES. Handle each tree carefully to avoid skinning the bark, breaking the tips, or injuring the roots in any way.

Planting Methods

The introduction of mechanical tree planters after World War II has replaced hand planting in most cases. With a planting machine, you can plant trees at a faster rate, more uniformly, and with less effort, if the machine is operated and adjusted correctly.

Presently, planting machines are available for loan to private landowners in nearly every county. County extension agents and Soil Conservation District farm planners have assumed responsibility for scheduling use of this equipment. A nominal fee usually is charged to pay for maintenance and repair costs.

There are two major types of tree-planting machines. One is attached to an ordinary farm tractor having a three-point hydraulic lift hitch that regulates planting depth (see figure B). The other type is pulled with a tractor and operates independently of the hydraulic system; depth of planting is controlled by a mechanical system on the tree planter itself (see figure C).

Those available on loan are relatively lightweight (approximately 500 pounds) and ordinarily are used only for open field planting. The landowner must furnish the tractor and labor. A three-man crew is the most efficient—one man on the tractor, another on the planter, and a third opening bundles and supplying trees another scourge. There are repellants on the market designed to discourage ani-

On long rows where a minimum of time is spent turning around, it is possible to plant 1,000 trees an hour. The machines are simple to use and, with a little practice, the operator can become proficient at planting.

Some private operators do custom planting. Their rates vary considerably, but the average rate is about \$12 to \$15 per thousand trees planted. County agents and state foresters are usually familiar with the people doing this type of work in their areas.

Tree planting machines cannot be used on all sites. Hand planting must be resorted to on sites where there are stumps, rocks, steep slopes, low areas, and brush or tree cover. A variety of tools can be used to plant a tree: shovel, grub hoe, mattock, or planting bar. It is a good idea to "scalp" off some of the sod where the tree is to be planted.



Figure B. Three point hydraulic lift controls planting depth.

Figure C. Self-contained system on planter regulates depth of planting.



Make certain the hole is deep enough to accommodate the seedling's entire root system. Plant the seedlings at the ground line. This line is usually quite noticeable on young trees. Pack the soil firmly to eliminate air pockets around the roots. This can be done by stamping your foot alongside the seedling (see figure D).

Under ideal conditions, it requires an eight-hour day to plant 500 to 800 trees by hand. As a general rule, fertilization is not required. In occasional instances, some symptom of nutrient deficiency might show up, often as foliage discoloration. If this occurs, consult with your county agent or soil conservationist.

Care of Plantations

A plantation of trees is an investment of time, labor, and money. However, it offers the possibility of future financial returns. For this reason, you should protect and care for your plantation as it grows to maturity.

Fires are foremost among dangers to a plantation, especially if trees are planted along a road. Firebreaks give a measure of protection and should be built and maintained around the plantation. They can be cleared with a plow or disc and should be at least 8 to 10 feet wide. Disc occasionally to keep them free of grass and weeds, especially during the spring and fall fire seasons.

Sometimes trees are plagued by insect and disease infestations. Owners should check their plantations periodically for disease symptoms or insect outbreaks. Most insect damage is first noticeable in late June or early July. Various kinds of sawflies, budworms, or tip weevils are the most common types of insects that attack coniferous trees.

Look for loss of needles or bending leaders. Get in touch with a local forester to identify the insect and make control recommendations. Spraying with one of the common insecticides (DDT, Malathion, or Sevin) often does a good job of controlling insects.

Cattle should be kept out of plantations. Deer also may browse on young seedlings; mice frequently girdle young trees during the winter; and rabbits are another scourge. There are repellants on the market designed to discourage animals from browsing young seedlings. Varying degrees of success with chemicals have been reported.

Pocket gophers may kill well-established conifers and hardwoods. They are a serious threat to plantations in all parts of the state except for extreme northeastern Minnesota. Losses are more noticeable in the fall and spring when the animal activity is at its peak. Gophers feed on roots and trees can be easily pulled

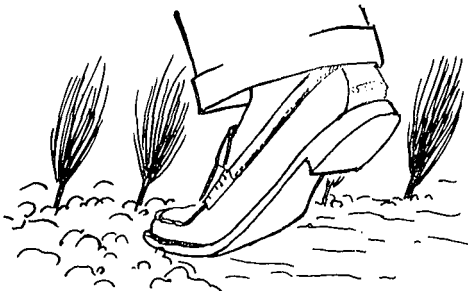


Figure D. Pack the dirt around young seedlings firmly with your foot to eliminate harmful air pockets. Be certain to water them daily.

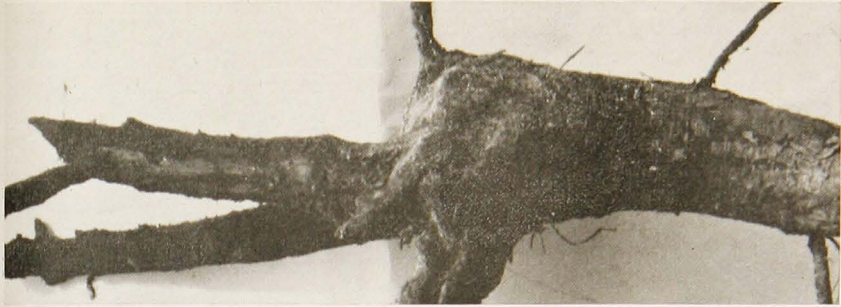


Figure E. Gopher damage to the roots of a pine tree.

out of the ground (see figure E). The more obvious symptoms of damage by gophers are dried, pale green foliage and trees that lean to one side.

For suggestions on controlling gophers, see Fish and Wildlife Leaflet 307, "Controlling Pocket Gophers." Copies are available at your local county extension office or the Department of Entomology, Fisheries, and Wildlife; University of Minnesota, St. Paul, Minnesota 55101.

Chemical Weed Control

The development of new, selective chemical herbicides offers an effective method of controlling weeds and grasses in plantations. These materials relieve the landowner of the time-consuming task of cultivation.

Simazine—a preemergent weed killer for controlling most grasses and broad-leaved weeds. Safe to use around most trees and shrubs. However, it is not recommended on any species of poplar, cottonwood, or willow.

Apply simazine before weeds emerge. In established plantings, apply the chemical in late fall or early spring. In new plantings or clean-tilled ground, make applications during or after tree planting, before weeds emerge.

Treatment may be a band or broadcast application. Center bands over the tree in 4-foot widths. If you use narrower bands, tall weeds will fall across the treated strip and cover the trees.

A per-acre rate of 4 pounds active ingredient of either simazine 80W or 4G (equivalent to 5 pounds of the wettable powder and 100 pounds of the granular as purchased) is recommended on fine-textured soils and soils with a high organic matter content. On coarse sandy soils, apply 2 pounds active ingredient per acre (equivalent to 2½ pounds of the wettable powder and 50 pounds of the granular as purchased). These are rates for ground area actually treated.

Do not use simazine more than once a year. It is not recommended on trees under 3 years of age (or less than 3-0 stock).

Amizine—a combination of a postemergent herbicide and simazine. This combination is particularly effective in cleaning up plantations which are overgrown with weeds and grasses.

Apply amizine on growing weeds during the early part of the growing season or before weeds have matured and gone to seed. Unlike simazine, do not spray

amizine on any tree foliage. Use a directed spray to prevent contact with leaves and needles of your trees.

A recommended rate for amizine in tree plantings is 7 pounds of actual material (as purchased) in 100 gallons of water per acre of area treated.

The usual method of applying amizine is to make band applications between tree rows. You can apply it with a boom spray which has nozzles 4 to 6 inches above ground and is designed to cover a 2-foot swath up to the tree bases. Use a low-pressure, cone-shaped, coarse spray directed away from tree foliage.

Federal Assistance Programs

The federal government provides cost sharing or incentive payments for certain conservation practices on privately owned lands. Tree planting and site preparation for tree planting are two practices for which cost sharing is allowed. This program is administered by the Agricultural Stabilization and Conservation Service. You can obtain information on how to participate in these programs at offices located in county seats.

Payments for these practices differ from year to year. They also vary according to the method of planting and characteristics of the site. Certain specifications—spacing, choice of species, and selection of site—must be met. The Minnesota Division of Lands and Forestry is responsible for checking your land to determine whether tree planting is applicable. Then they check again after planting to insure that the job was done according to standards set up for the practice.

To be eligible for ASCS cost sharing, make application *before* you start the project. For cost sharing on tree planting, you are urged to make application in person at the county ASCS office when you order your trees. The best time to do this is during fall so that arrangements and delivery are completed in time for spring planting. The ASCS office manager will be glad to explain any program details to you.

The information in this pamphlet covers only general information about tree planting. The extension forester or county extension agents can give additional facts about tree planting to fit your particular case.
