

MN 2000 EB 350 Rev. 1974.
1. Minnesota Extension Service
2. Extension Bulletin 350 rev. '74

UNIVERSITY OF MINNESOTA
DOCUMENTS
MAY 21 1974
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Planting Trees In Minnesota

AGRICULTURAL EXTENSION SERVICE
UNIVERSITY OF MINNESOTA

Contents

Sources of Planting Stock	3
Choice of Species	4
Site Preparation	5
Care and Handling of Stock	6
Planting Methods	7
Care of Plantations	8
Chemical Weed Control	11
Federal Assistance Programs	12

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 protection against wind and erosion.
- 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, Director of Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota 55108. We offer our programs and facilities to all people without regard to race, creed, color, sex, or national origin.

Planting Trees In Minnesota

WILLIAM R. MILES, MARVIN E. SMITH, AND DAYTON M. LARSEN

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 growing more wood than we are harvesting. This will change because as our population grows, the consumption of wood products increases. We will need more trees to supply this demand. Aspen and other low-value hardwoods account for most of the present surplus. However, there is a shortage of high-value species, such as the pines and spruces.

The area for growing our wood supply 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 some cases, this land is eligible for special 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 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 and transplant stock is available at reasonable costs. For current prices, contact your county extension agent, local forester, or Soil Conservation Service office. 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 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 don't 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, Minnesota 55155.

The following coniferous species usually are available each year: jack pine, ponderosa pine, Norway (red) 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, etc.) also are available. Coniferous species grown in state nurseries usually are 3-0 stock; i.e., they have grown 3 years in a seedbed and not in transplant beds. Occasionally, some 2-1 stock is available. These transplants have been growing 2 years in the seedbed 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 that is adapted to the site factors of moisture, soil qualities, and 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). Ponderosa pine, Norway spruce, and black walnut are species affected by climate. The likelihood of winterkill restricts planting of these species to 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 the 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 drainage, spruce, balsam fir, and northern white cedar are recommended. One of the best ways to check how trees will do on your land is to observe species growing naturally in the same vicinity (see the table).

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 Eastern redcedar
Dry§	Jack pine Scotch pine Ponderosa pine	Green ash American elm Eastern redcedar	Green ash American elm Eastern 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 classified 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.

Site Preparation

Many successful plantations have been established in fields that 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. The ground should be plowed, disced, and dragged, which is the type of preparation required for planting any crop. At the minimum, a couple of cross discings with a heavy brush disc may be sufficient preparation. 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. 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. Discing or bulldozing heavy brush 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 that are 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, Norway pine should be spaced from 6 to 10 feet apart. Christmas tree plantings ordi

narily 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.

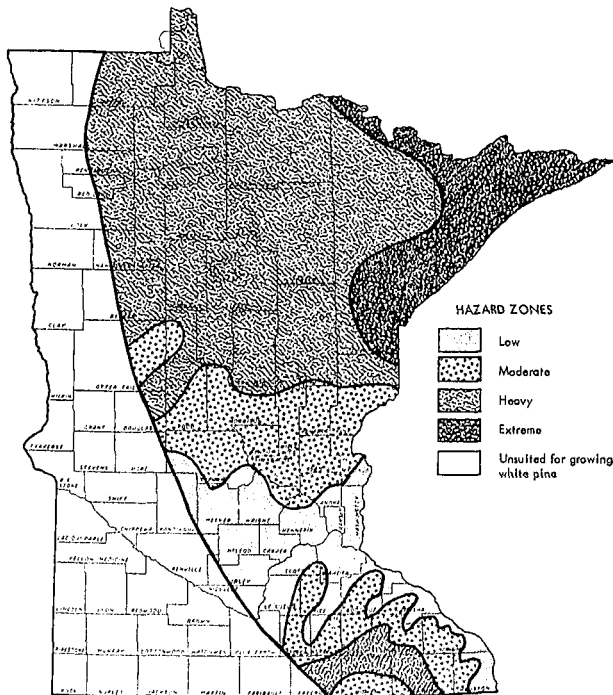
The following table shows the number of trees per acre at various spacings:

<i>Spacing (feet)</i>	<i>Trees per acre</i>
5 x 5	1,742
6 x 6	1,210
7 x 7	889
8 x 8	681
10 x 10	436

(See Extension Bulletin 196 for planting farmstead shelterbelt specifications.)

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



White pine blister rust hazard zones in Minnesota.

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, shady 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 often is 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 1).

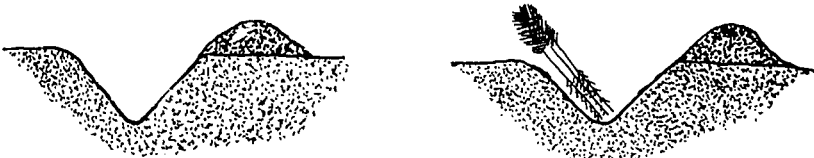
Place trees side by side in thin layers in the trench, then thoroughly pack dirt around roots. Water the trees daily. Trees may be left “heeled-in” for a week or more if you do the job well.

During planting, have plenty of water on hand so tree roots will be moist at all times. Use moss that seedlings were packed in to keep roots moist. 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.

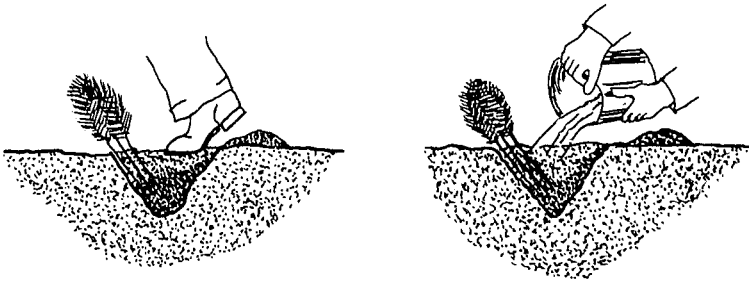
Planting Methods

Mechanical tree planters, introduced after World War II, have replaced hand planting in most cases. With a planting machine, you can plant trees at a

Figure 1. Heeling in seedlings to protect roots.



Left: Select a shady spot and dig a V shaped trench in soil that is moist. Right: Open a bundle of trees and spread the roots out evenly along one side of the trench.



Left: Stamp down the soil for a firm covering. Water the heeled-in trees each morning. Right: Drench well with water.

faster rate, more uniformly, and with less effort if the machine is operated and adjusted correctly.

Planting machines are available for loan to private landowners in nearly every county. County extension agents or Soil and Water Conservation Districts 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 2). 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 3).

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.

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. County agents and state foresters usually are 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 (see figure 4). It is a good idea to “scalp” off some of the sod where the tree is to be planted.

Make certain the hole is deep enough to accommodate the seedling's entire root system (see figure 5). Plant the seedlings at the ground line at the same depth as they grew in the nursery. This can be determined by the “root collar”—a slight swelling on the stem just above the roots. Pack the soil firmly to eliminate air pockets around the roots. This can be done by stamping your foot alongside the seedling.

Under ideal conditions, it requires an 8-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.

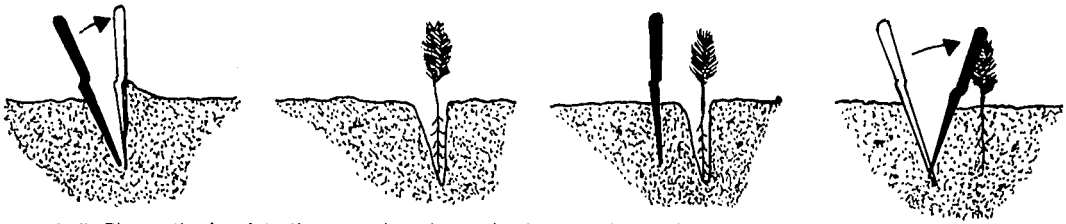
Fires are foremost among dangers to a plantation, especially if trees are planted along a road. Firebreaks give a measure of protection and should be built and maintained around the plantation. They can be cleared with a plow or disc and should be at least 8 to 10 feet wide. Disc occasionally to keep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



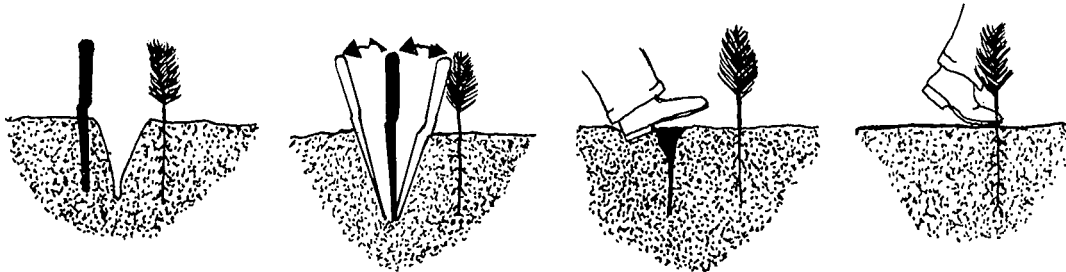
Figure 2. Three point hydraulic lift controls planting depth.

Figure 3. Self-contained system on planter regulates depth of planting.





Left: Plunge the bar into the ground at the angle shown and push it forward to an upright position. Center, left: Place the seedling against the flat side of the planting hole. Center, right: Plunge the bar into the ground 3 inches from the seedling. Right: Push the handle of the bar forward to pack the soil at the top of the roots.



Left: To close the hole, plunge the bar into the ground 3 inches from the last hole. Center, left: Work the bar forward, then pull it backward, filling the hole. Center, right: To fill the last hole, tramp in the loose soil with your heel. Right: Stamp down any loose earth around the seedling to prevent air pockets.

Figure 4. Using a planting bar following furrowing.

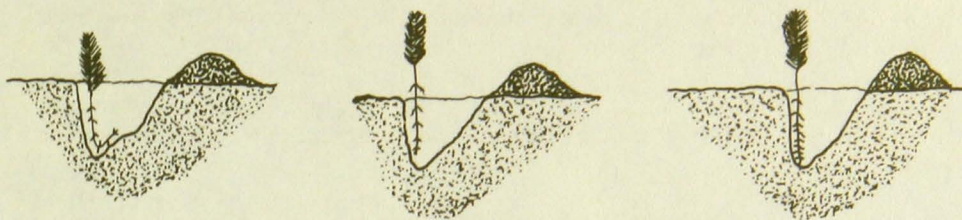
Sometimes trees are plagued by insect and disease infestations. Owners should check their plantations periodically for disease symptoms or insect outbreaks. Most insect damage is first noticeable in late June or early July. Various kinds of sawflies, budworms, or tip weevils are the most common types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

Horses and livestock should be kept out of plantations. Deer also may browse on young seedlings, and mice frequently girdle young trees during the winter. 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 most noticeable in the fall and spring when animal activity is at its peak. Gophers feed on roots and trees can be easily pulled out of the ground (see figure 6). 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 55108.



Left: **Incorrect.** Note how the root is curled up. Curling prevents proper growth. The tree will die. Center: **Incorrect.** Some roots are exposed to the air. A slight tug will uproot the seedling. Right: **Correct.** Place the seedling in the hole at the same depth it grew in the nursery.

Figure 5. Placing seedlings at the proper depth.

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 preemergence 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 rates are 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).

Figure 6. Gopher damage to the roots of a pine tree.



Amizine — a combination of a postemergence herbicide and simazine. This combination is particularly effective in cleaning up plantations that 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. Do not spray amizine on any tree foliage. Use a directed spray to prevent contact with the 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 that 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.

Casaron is also a pre-emergent type of herbicide. Whereas simazine may be applied in either spring or fall, casaron works best when applied in the fall. The granular form is recommended. When casaron is applied after frost and freezing temperatures have occurred, no soil incorporation is necessary.

Where you intend to cultivate between the tree rows, economical weed control can be obtained by applying simazin or casaron in a 4-foot band over the tree row. If you treat narrower bands, tall weeds will fall across the treated strip and cover the trees.

Governmental 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 (ASCS). 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 planting method and site characteristics. 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. The Division checks 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.

This bulletin covers only general information about tree planting. The extension foresters or county extension agents can give additional facts about tree planting to fit your particular case.