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# Woody Cover Plantings for Wildlife

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DEPARTMENT OF NATURAL RESOURCES



**Without dense woody cover, winters can be a deadly gauntlet for many species of Minnesota farmland wildlife.**

**When temperatures plunge, winds howl, and blizzards fill most cover with snow, farmland wildlife survival often depends upon a well designed tree planting containing four or more rows of evergreens.**



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**MINNESOTA DEPARTMENT OF NATURAL RESOURCES**  
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**St. Paul, MN 55146**



**1985**

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# Introduction

**A**N IDEAL MOSAIC of protective woody cover plantings, cattail marshes, grain fields, and grasslands once existed across southern Minnesota. This habitat mixture produced a spectacular abundance of wildlife that was as much a part of the agricultural community as grain elevators, livestock and family farms. Many Minnesotans still relish memories of “hundreds of pheasants flushing from a farm grove” or waterfowl flocks “darkening the skies”.

Unfortunately, intensive farming practices along with major changes in federal farm policies during the 1960’s combined to dramatically alter the scene. Earlier mowing of alfalfa converted prime nesting areas into death traps. More and earlier fall plowing of grain stubble encouraged erosion and eliminated a wildlife food source. Soil Bank, a multi-year land retirement and soil protection program, was replaced by annual crop set-asides. The lush grass and legume cover that provided millions of acres of undisturbed nesting cover disappeared. Wetland drainage, as well as woodlot and shelterbelt clear-

ing, continued at alarming rates.

These trends, fueled by expanding grain exports, were destructive to wildlife and gained momentum through the 1970’s. By the end of that decade, millions of acres of the wildlife habitat had been converted to row crops.

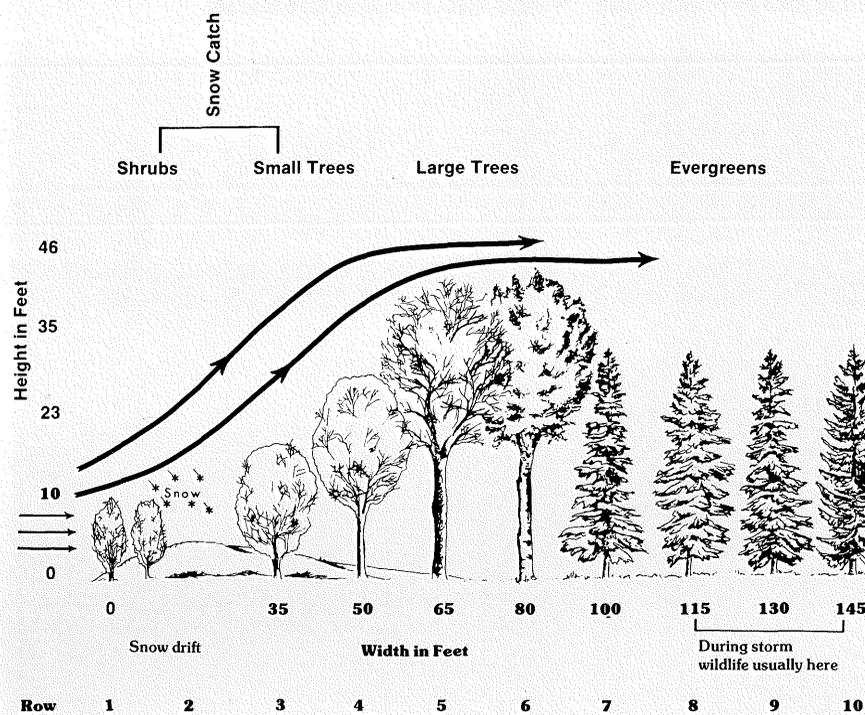
By the mid 1980’s the radical land use changes, magnified by Minnesota’s harsh winters, proved devastating to wildlife. Pheasant populations, for example, plummeted to only 15 percent of what they were in 1960. Many songbird and small mammal populations were similarly affected. Nesting success for upland nesting waterfowl, such as mallards, dropped sharply.

Because the demand for grain exports has lessened and the nation is focusing more attention on wise management of our soil, water and wildlife resources, there is now an excellent opportunity to restore the habitat mosaic so beneficial to wildlife.

Please join with other Minnesotans as our effort to replant and restore needed woody cover takes root.



Figure 2: Cross section of a 10-row shelterbelt.



If you only have room for:	Use one of these combinations
7 rows	1,2,3,4,6,7,8 or 1,2,3,5,6,7,8
6 rows	1,2,3,4,7,8 or 1,2,3,5,7,8
5 rows	1,3,4,7,8 or 1,2,4,7,8
4 rows	1,2,7,8 or 1,4,7,8
3 rows	1,7,8 or 1,3,7

The effectiveness of a shelterbelt is determined by four design factors: 1) snow catch, 2) height of the lift trees, 3) number of evergreen rows; and, 4) width of the belt from west to east and north to south (Fig. 2).

A well-designed snow catch virtually stops all the drifting snows without burying and damaging any of the inner rows of trees. It consists of two closely-planted (3-6 ft.) shrub rows, located at least 30 — and better still 50 — feet to the west and north of the remainder of the shelterbelt. Additional shrub rows can be planted to reduce snow drifting into the shelterbelt from the south.

Because the tallest lift trees can reduce wind speeds for approximately 20 times their height, a well-established planting provides adequate wind protection for at least 300 to

600 feet. Plantings can also reduce home heating costs by over 30 per cent when compared to unprotected farmsteads.

The inner most portion of the planting consists of at least 4 rows of evergreens which give year-round protection from winds that knife through adjacent deciduous species. For maximum protection, the shelterbelt should be at least 150-foot wide. Roadways or other obstacles, however, may not allow the planting of appropriate sized shelterbelts. If some rows must be eliminated use the guide in Table 1 to modify the design in Figure 2.

To allow normal farm machinery and snow removal operations, the inner most row should be no closer than 50 feet from the nearest building, feedlot or roadway. Shelterbelts

should also extend at least 50 feet beyond the most southerly and easterly buildings. This keeps snow drifts that develop near the end of the shelterbelts away from buildings. Spacing between and within rows are specifically designed to aid cultivation, provide adequate room for tree growth and maximize the effectiveness and longevity of the shelterbelt (Fig. 1).

Shelterbelts, like the one described, provide substantial benefits to wildlife. They have been proven to be very important nesting areas for 15 to 25 different species of song birds and critical wintering areas for many species of resident and wintering wildlife, particularly pheasants. Improperly designed shelterbelts, however, rapidly fill in with drifting snows, suffocating stressed wildlife seeking shelter.



**The Brown thrasher and the very prolific Mourning dove find woody cover plantings ideal nesting sites.**



**As wetlands fill with snow, dense woody plantings often provide the only alternative havens.**

## Wildlife Plantings

Woody cover plantings designed specifically for wildlife share most of the same characteristics as farmstead shelterbelts. Although the same combinations of shrubs and trees are used, they are planted in large blocks or arranged to conform to the terrain rather than the traditional L-shape of shelterbelts (Fig. 3).

A good wildlife planting has at least 10 rows, 150-feet wide and 200-feet long (about three-fourths of an acre) but is better if it has 16 rows, 200-feet wide and 800-feet long (three to four acres). Like the shelterbelt design, at least four rows of conifers are planted on the downwind side of the planting with dense shrubs on the windward side. Again, it is very important to plant a snow catch of at least one row of dense shrubs

30-50 feet upwind of the rest of the planting (Fig. 3). The addition of one or two shrub rows on the protected downwind side (east or south) provides preferred loafing and sunning areas.

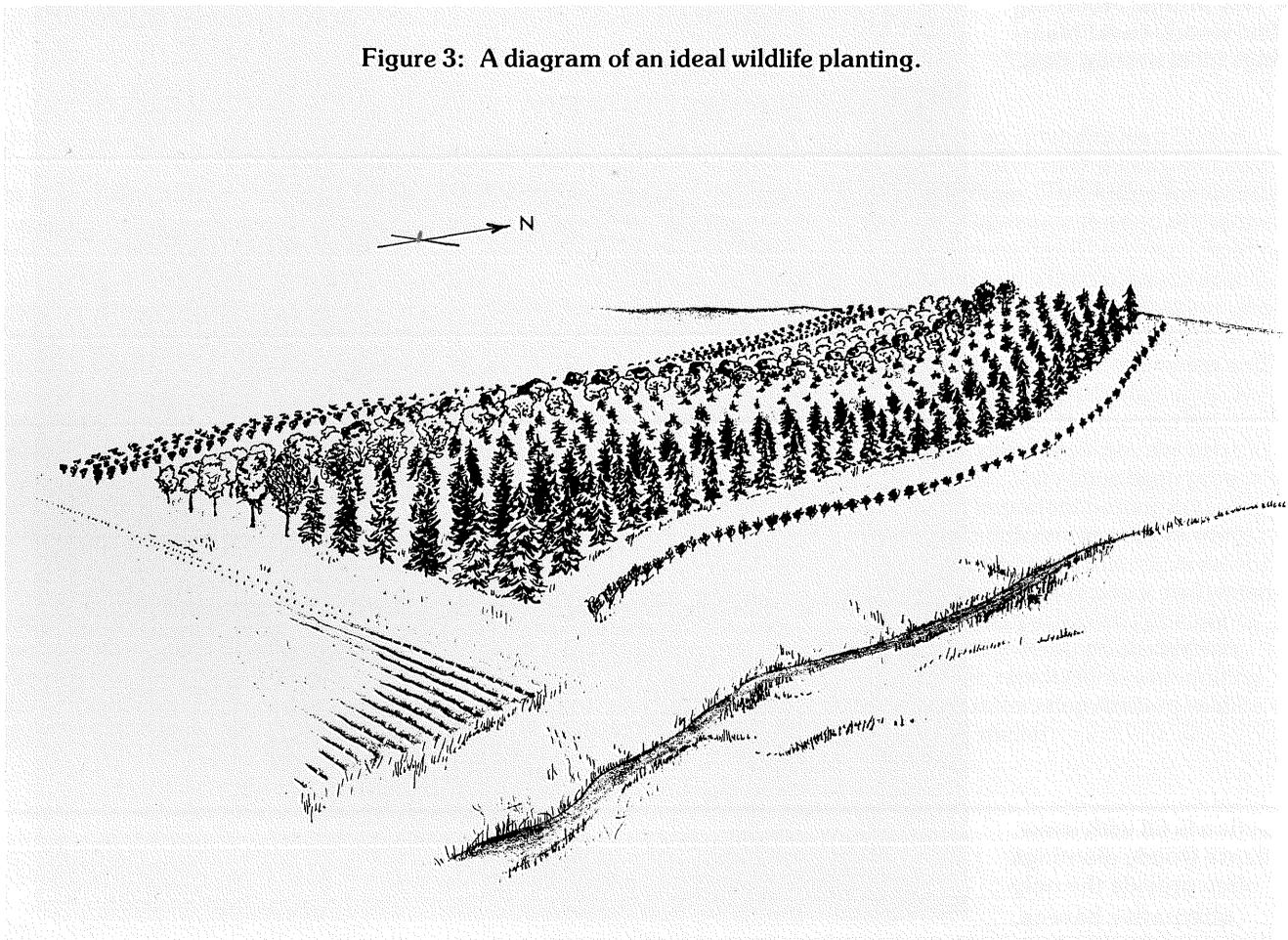
If space and planting stock are available, the 10-row minimum described in Figure 3 should be expanded using Table 2.

The effectiveness of any woody cover planting is greatly enhanced when a winter food source (corn or bean stubble, food plot or feeder crib) is within 100 yards and preferably downwind. This provides easy access to food with a minimum of exposure to winter weather and predators. During mild winters these plantings will help bring wildlife into spring in prime physical condition. During severe winters they mean the difference between life and death.

**Table 2**

<b>Number of Additional Rows</b>	<b>Type of Tree or Shrub</b>
1	conifer
2	both conifers
3-5	2 conifers plus 1-3 shrubs
6	2 conifers, 1 medium tree, 3 shrubs

**Figure 3: A diagram of an ideal wildlife planting.**





**Wildlife plantings can be established anywhere winter cover is required. Planting design should compliment the terrain, soils or other existing vegetation.**

## ***Field Windbreaks***

Field windbreaks are generally single or double rows of trees and/or shrubs that reduce but do not eliminate the effects of wind. The design (species composition and spacing) of a field windbreak is dependent on the purpose of the planting.

A windbreak designed to allow the even distribution of drifting snow across croplands is a narrow single row of large trees such as green ash. Such windbreaks have little value as winter wildlife habitat although they are used for nesting.

Windbreaks designed to greatly re-

duce soil erosion and evapotranspiration while providing wildlife habitat utilize single or double rows of shrub and tree mixtures. Both deciduous and conifer species are used. Windbreaks with a mixture of species are much more attractive to a wide array of wildlife species and have a greater chance of surviving a wide range of environmental impacts than those with only one species (i.e., Dutch elm disease impact on American elm).

The recommended spacing of windbreaks depends on the ability of the soil to withstand erosion and the height of the tree species used. The more erosion prone the soil or the

shorter the species, the closer the spacing between rows. Generally, more than one-quarter mile between rows is not recommended.

Field windbreaks can provide important landscape diversity that benefits wildlife. Numerous songbirds find these strips of trees, shrubs and grasses acceptable breeding areas while other species utilize them as travel lanes and loafing areas. Although they do not provide adequate cover for wildlife during winter storms, they can aid in reducing the amount of snow reaching the better winter cover areas such as wetlands and farmstead shelterbelts.



**Food plots near marshlands or woody cover plantings should be used to attract and sustain wintering wildlife.**



**Field windbreaks are an important tool for managing snow deposition. A properly placed single row of shrubs or trees can protect a wetland or 10-row shelterbelt. Windbreaks also provide important soil protection benefits.**

# Getting Started

**T**HE FIRST STEP in providing woody cover for wildlife is to determine what is needed in your project area. With the help of your Area Wildlife Manager, evaluate what currently exists: How many wintering areas are there? How large are they? Are they of adequate quality? Are they located near each other?

## How Many?

*There should be at least one but preferably two good wintering sites per section (one-square mile or 640 acres). Many wildlife species, like pheasants, live out their lives in an area less than 2-square miles and may periodically shift wintering areas to take advantage of food and avoid predators. The less a pheasant has to travel to find wintering areas, the better its chances for survival.*

It is critical to protect existing winter cover, such as wetlands, from destruction and wherever possible improve them by locating new woody plantings nearby. Establishing new winter cover plantings where none exist is equally important.

## How Large?

*Quality wintering areas must be at least one acre.*

Throughout southwestern and southcentral Minnesota, the lack of natural cover and the potential for exposure to strong winter winds dictates the need for larger woody cover plantings (at least two-four acres). But usually three 2-acre wildlife plantings are more beneficial than one 6-acre plot.

## How Good?

To be effective, good winter cover must stop drifting snow before it reaches the major portion of the

planting and reduce the force of the wind to less than 10 mph. One or two rows of densely planted shrubs, 30 to 50 feet upwind of the cover planting are needed to trap the drifting snow. Although dense stands of deciduous shrubs and/or trees dramatically modify wind velocities, conifers are needed to reduce the winds below 10 mph. Also only conifers, with their dense leaves and branches, can provide the overhead insulation needed by wildlife during the coldest months.

To further enhance a good planting, provide shrub rows on the south and east sides to catch snow and provide preferred loafing areas. Additional rows of dense conifers such as red cedar and spruce in the middle of larger planting (16 rows) provide extra protection for wintering wildlife.

## Location

Good woody cover plantings provide wildlife habitat almost anywhere. However, optimum benefits result only when other needed habitat components are available. Winter food, as previously mentioned, should be within 100 yards to minimize exposure to both predators and weather. Also upland nesting cover, such as undisturbed roadsides or grass-legume stands on retired croplands, should be located within one mile of the wintering area.

## Where There's A Need

Once a need has been identified within your project area, the next step is to locate a suitable site. If you do not own the land, contact the landowner and explain what you would like to do and why. Many farmers who have a personal interest in wildlife are willing to provide the area if they receive help in acquiring, planting and maintaining the trees and shrubs. Remember, the planting

and caring of trees coincides with the farmer's busiest time—spring.

Although cost sharing and technical assistance are often available from the Agricultural Stabilization and Conservation Service (ASCS), the Department of Natural Resources (DNR), Pheasants Forever and local sportsmens' clubs; the actual labor of planting often limits the participation of landowners.

Where no suitable cover currently exists, the previously discussed designs of shelterbelts and wildlife block plantings should be followed. Enhancing existing cover such as old farm groves, shrub or emergent wetlands, or other woody cover areas should not be ignored because most can be improved or rehabilitated. Evaluate these sites for the missing components of good winter cover. Often one or two shrub rows upwind and four or more rows of conifers on the lee side can convert a little used area into ideal winter cover. Consider the removal of trees only if necessary to create room for the additional rows. Make sure that the renovation will create at least the equivalent of a 10-row planting (150 ft. by 200 ft. minimum).

After the site has been selected, draw the planting plan on paper. If possible, obtain a copy of the most recent aerial photograph of the site from the ASCS office in your project county. Next, on a piece of graph paper, draw a diagram to scale of the shelterbelt or block planting. In the case of a farmstead shelterbelt, be certain to draw in all structures (barns, houses, shed, etc.). Check that the innermost row is at least 50 feet from the nearest building. The east and south ends must extend at least 50 feet past any buildings. Also, list the species and spacing to be used within each row. Even though the spacing between rows can be calculated from the diagram, noting the distance will make the plan much easier to use.



Private lands adjacent to public wildlife areas are key sites for woody cover plantings.

# Filling in the Details

**R**EGARDLESS OF the design, a successful woody cover project requires several basic steps: (1) selection and ordering planting stock, (2) proper preparation of planting site, (3) suitable planting techniques, and (4) proper care after planting.

## Planting Stock

When selecting shrub and tree species suitable for shelterbelt and wildlife block plantings refer to Table 3. The suggested species have a proven track record and are the most likely to perform up to expectations. Select at least six and preferably eight or more tree and shrub species for each shelterbelt. Remember, a shelterbelt with an array of plant species will attract a greater variety of wildlife and have a better chance of surviving a wide range of environmental conditions.

Local Soil and Water Conservation Districts (SWCD), the Division of Forestry (DNR) and commercial nurseries can provide most if not all of the species and the size of stock preferred for these types of plantings.

Be sure to purchase stock from reliable sources. The closer the source the more likely the stock will be acclimated to local conditions. Buying locally usually means quicker delivery and lower shipping costs.

Deciduous shrubs and trees should be ordered as two-year old seedlings, 14-16 inches in height. Conifers can be ordered as twice transplanted stock; often referred to as 2-2 or TTs. *Container grown and balled conifers, although more expensive, normally assure higher survival and faster initial growth rates.* Healthy, well-formed planting stock with full root systems are more likely to survive and achieve good growth during that critical first growing season.

From your planting diagram, determine how many trees and shrubs will be needed. Unless the supplier guarantees its stock, submit an order

**Table 3: Recommended species and spacing for shelterbelt and wildlife plantings.**

### **Shrubs** — spacing of plants within rows for shelterbelts and wildlife plants — 4 feet

Common Ninebark  
Cotoneasters  
Honeysuckles  
Late Lilac  
Redosier Dogwood  
Siberian Peashrub  
(caragana)  
Viburnums  
Nannyberry  
Wayfaringbush  
High Bush Cranberry

### **Small Trees** — spacing of plants within rows for shelterbelt and wildlife plantings — 8 feet (deciduous)

Washington Hawthorne — rust susceptible — do not plant with cedars  
American Plum  
Amur Maple  
Common Chokecherry  
Crabapples  
Russian-olive  
Mountain Ash  
Nanking Cherry  
Sandbar Willow

### **Tall Trees** — spacing of plants within rows for shelterbelts and wildlife plantings — 18 to 20 feet (deciduous)

Black Walnut  
Common Hackberry  
Eastern Cottonwood  
Green Ash  
Honey Locust  
Oaks  
Poplars  
Siberian Elm  
Boxelder  
Silver Maple  
White Ash  
Willows

### **Conifers / Evergreens** — spacing of plants within rows for shelterbelts and wildlife — 10 to 14 feet

Eastern Red Cedar  
Northern White Cedar  
Austrian Pine  
Black Hills Spruce  
Blue Spruce  
Douglas-Fir  
Jack Pine  
Red Pine  
Scotch Pine  
White Spruce

for 10 percent more than your plan requires to allow for replacement of dead, damaged and poor quality plants. Surplus plants can be placed in another area, such as a garden, and used later to fill in those losses. And lastly, avoid disappointment by ordering early—before December—for your early spring planting.

## Land Preparation

One of the most important factors in establishing woody cover is proper seedbed preparation. Summer fall-

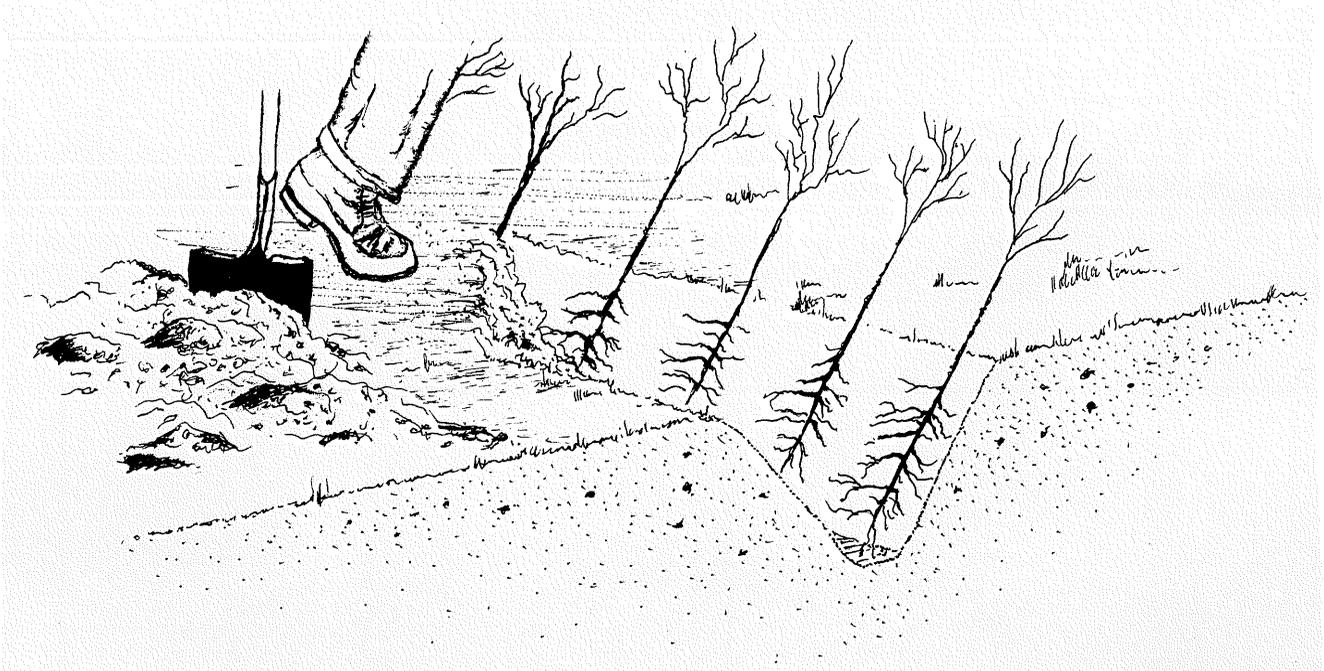
lowing, or maintaining the land in a cultivated crop, such as soybeans, the year before will help produce a weed free, loose seedbed. Grass or existing alfalfa fields are poor choices unless the soil has been plowed and disked for at least one year prior to planting. The dense grass, legume or broadleaf vegetation will rob the shrubs and trees of needed moisture.

Just prior to planting, apply a pre-emergent herbicide specifically approved for the tree species to be planted. Herbicide application for site preparation requires advice from trained professionals. Consult a DNR



Summer fallow provides an ideal condition for mechanical planting.

**Figure 4: Be sure to “heel in” bare root stock if planting is delayed for more than 48 hours.**



Forestry, SCS or SWCD technician or commercial nurseryman. This application should help reduce competition from unwanted plants.

Be sure to keep out horses, cattle, sheep, hogs and even chickens since livestock can seriously impact new plantings. Also leave enough room between the fence and the planting to allow for easy cultivation.

## **Planting Techniques**

The best time to plant is between the time the frost leaves the ground and May 15. If ordered well-in-advance (the previous December), the planting stock should arrive during this critical time.

Immediately after arrival, give all the plants a good soaking and place them in a cool shady site. If they will not be planted within 48 hours, place stock in cold storage (34° to 40 F°) or “heel in” the stock in a cool shady area (Fig. 4). When “heeling in” be sure to make the trench deep and long enough to cover the entire root system and part of the lower stem.

Keep the roots moist at all times.

Before planting, stake out the rows for proper location and spacing (refer to Table 3 for spacing of plants within rows). These markers will keep the tractor driver on the proper course when mechanical tree planters are used. Tree planters, often available through the local SWCDs or DNR District Forestry Offices, dramatically speed up this part of the planting process. When using planters set the trencher at the proper depth and keep the stock moist until it is in the ground.

When a tree planter is not available or when planting container grown conifers use the following hand planting techniques. First, dig a hole wide enough and deep enough to hold the entire root system without crowding (Figures 5-8). While holding the plant in an upright position, fill in the hole and firmly tamp the soil around the roots (tamping the soil helps eliminate air spaces that can dry out the roots). Plant the stock to the same depth as in the nursery (look

for the soil ring which is darker than the above ground portion of the stem). And lastly, form a depression in the soil around the stem to serve as a catch basin to hold moisture.

## **Care After Planting**

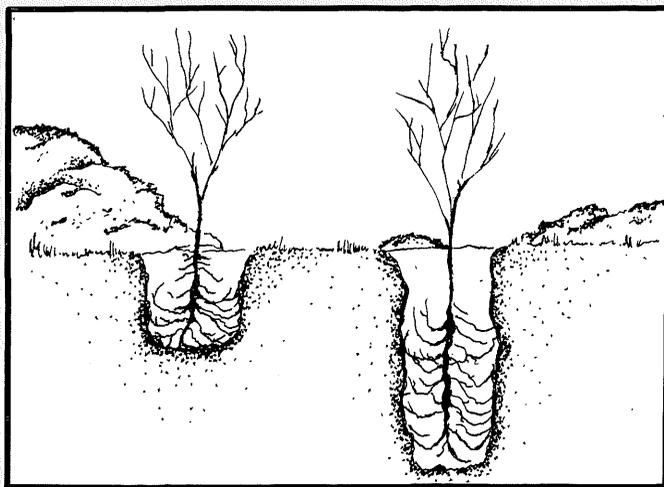
Cultivation and/or the proper application of herbicides for three to five years following planting is necessary for maximum tree survival and growth. Cultivation should be shallow and far enough away from the stock to avoid root damage. Cultivation within a 1½-foot radius of each plant should be restricted to hoeing, gasoline powered weed whips or mulching. Cultivation should be repeated at least three times during the growing season. The deciduous rows should be cultivated for three years and conifer rows three to five years.

If you herbicide, use a pre-emergent. Take extra care to avoid spraying any leaves of the newly planted shrubs and trees.

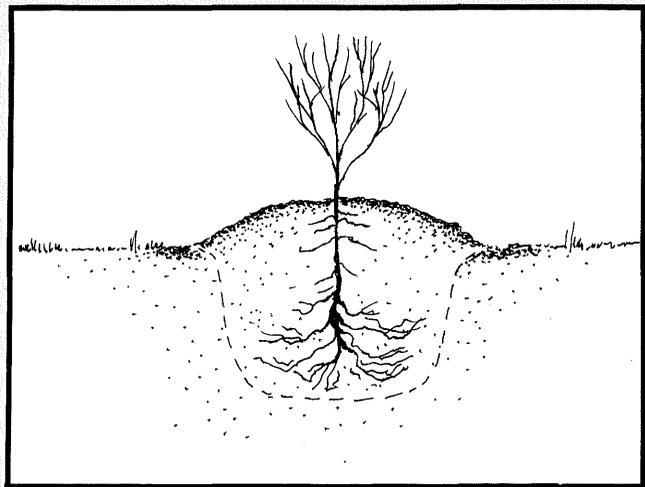
Like cultivation, watering is critical during the first two years of the planting. When watering is needed provide a good soaking once or twice a week. Light watering encourages root growth too near the surface making the plant susceptible to drought. Keeping the topsoil around the plant stem loose allows water to soak in rapidly thereby reducing evaporation losses.

New plantings of small trees are also susceptible to sunscald; particularly when there is inadequate moisture. Young trees can be protected from sunscald by placing a shingle or board about one foot away to the southwest side. These small shelters, left overwinter, will provide additional protection from wind burn and catch snow for added moisture in the spring.

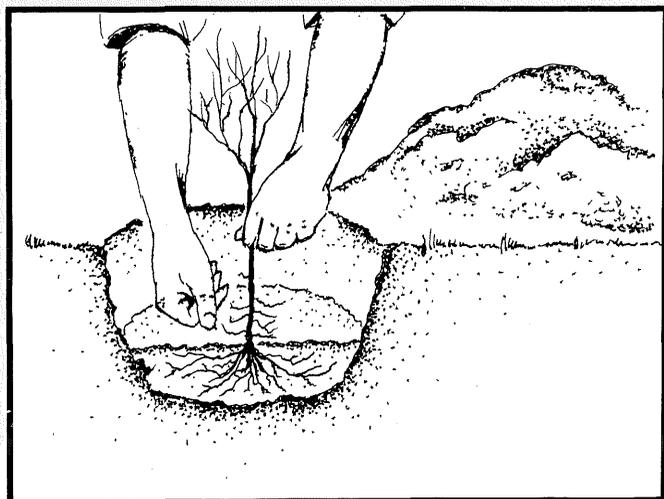
**Figure 5: Planting holes dug too shallow and too deep. Both are too narrow.**



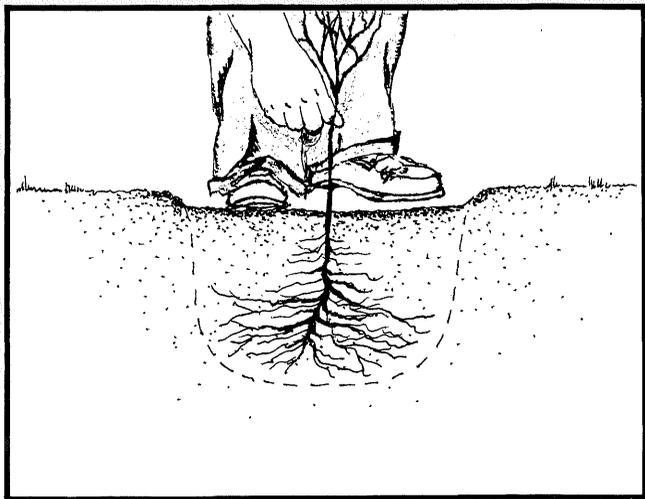
**Figure 6: Soil mounded too high.**



**Figure 7: A proper hole insures that roots are well spread.**



**Figure 8: Soil should be tamped down forming a slight depression.**



# Long Term Maintenance



Tree losses are serious. If discoloration, wilting or leaf losses appear, immediately contact your District Forester or commercial nurseryman.

**D**URING THE first five years after establishment, periodically walk throughout the cover planting watching for early signs of wilting, discoloration, or defoliation. All can cause a serious loss of trees and shrubs. Problems can be caused by site conditions, diseases, insects and rodents. Pocket gophers can threaten even well-established plantings. Losses can be particularly high during spring and fall when gophers are more likely to gnaw on roots causing extensive, unseen damage. Help in diagnosing tree problems is available from your DNR District Forester.

Do not prune young trees (less than four years old) except to correct growth deformities or to remove

damaged branches. Many books illustrating proper pruning methods are available from your public library.

Although the goal is to create a dense planting for winter storm protection, the removal of individual trees may be necessary if crowding will cause a loss of lower branches. This is of particular concern in the conifer rows. Dead deciduous trees and branches may be removed for safety reasons. Remember, however that dead snags also provide important wildlife habitat (e.g., woodpeckers).

Once the planting is well-established, (after about five years), cease all cultivation. At that time seed down the previously cultivated area to a grass-legume mixture. Once es-

tablished do not mow unless rodents (mice and voles) become a problem.

## *Need More Help?*

For additional information on the importance of shelterbelts and wildlife cover plantings, contact your local office of the DNR-Section of Wildlife, Soil and Water Conservation District (SWCD), or the Soil Conservation Service (SCS). Besides technical assistance, these agencies may offer cost-sharing.

Join the many Minnesotans who are improving our winter landscape for wildlife and people.



**Seeding grasses and legumes within cover plantings provides needed nesting cover and protects soil from erosion.**

