

## Introduction

This document provides minimum design requirements and guidance for planting trees and shrubs for the intended purpose(s) and includes sections on species selection, planting stock/seed, planting/seeding rates, site preparation, planting methods, planting dates, and maintenance.

## Species Selection

The Minnesota Conservation Tree/Shrub Suitability Group (CTSG) document (found in Section 2 of the Field Office Technical Guide in Soils-Statewide Official Data and County Reports, Conservation Tree and Shrub Groups folder) will be used as a guide to determine recommended trees and shrub species. Base selection of listed species on local site conditions (soil type, slope, aspect, geographic location, etc.), landowner objectives, professional judgement, and availability of planting stock/seed.

### Considerations for Species Selection

- Use native tree and shrub species and/or non-invasive, non-native species (e.g., Scots Pine) unless approved by MN NRCS State Forester. Do not plant trees on the state's invasive species list:  
[MN Department of Agriculture Noxious and Invasive Weed Program](#)  
[MN DNR Invasive Terrestrial Plants](#)
- MN NRCS will not cost-share the planting of Eastern red cedar.
- Avoid selecting species with extensive disease or insect threats (e.g., white or black ash).
- Select the appropriate species based on shade tolerance, determined by site conditions (open, partial shade, or shade).
- Avoid using plants which may be alternate hosts to undesirable pests.
- Consider species diversity to reduce loss due to species-specific pests. If feasible, plantings should consist of four or more species with individual plants suited to the site's moisture status. No single species should make up more than 25% of the total number of species planted.
- Consider the effects of sunscald, winter burn, and winter desiccation when selecting evergreens for exposed plantings.
- Consider using only hardwood species for poorly drained sites.
- Consider selecting species with less sensitivity to herbicide runoff or spray drift from adjoining fields.

## Planting Stock or Seed

Select suitable planting stock or seed based on the objective of the tree/shrub planting. All planting stock and seed should be purchased from nurseries that are known to be using regionally adapted seed, seedlings, or cuttings. Order trees and shrubs well in advance of anticipated planting time to ensure desired species will be available.

**Bare Root:** Use large diameter seedlings with well branched, fibrous root systems. Discard any diseased or damaged seedlings. For underplanting hardwoods, use stock at least 3/8 inch in stem diameter.

**Plugs:** Plugs are well-suited for establishing native plant communities and for planting on steep slopes. They have higher survival rates than bare-root and are easier to transport. One-year old plug container seedlings must have root volumes of at least 3 cubic inches for conifers and 7 cubic inches for hardwoods.

**Cuttings:** (Cottonwood, willow, elderberry, etc.) Use cuttings prepared during the dormant season from wood of the previous season's growth. Take cuttings from healthy, moderately vigorous plants growing in full sunlight. At least two buds should be included in the cutting. The minimum size of cuttings should be 1/4 inch in diameter and 8 inches in length.

**Container Grown:** Use healthy, well-developed plants. Discard any diseased or damaged material.

- Small: 1 quart up to 2 gallons
- Large: 2 gallons or larger

**Balled and Burlapped:** Use plant stock that is 18 inches or taller for shrubs and 48 inches or taller for trees.

Do not use plants with cracked or broken root balls. Avoid plants with root systems visible on the root ball surface and that encircle the trunk.

**Direct Seeding:** Use viable, mature seed, collected from quality seed bearing trees, either from the ground or directly off the tree. Collected seed should be from within 100 miles, north to south, of the planting site. Acceptable hardwood species for direct seeding include native maple, oak, hickory, black cherry, hackberry, basswood, and black walnut. *Direct seeding is not recommended for sites with severe competition from existing vegetation (e.g., dense sod, reed canary grass).*

### Care of Planting Stock

Protect stock from desiccation during temporary storage and delivery to the planting site. Keep all types of planting stock stored in a cool environment (< 50 degrees F), out of direct sunlight and wind.

**Bare Root:** Promptly examine seedlings in the shipping container and water or re-wrap in moist packing material. Survival can be increased by dipping roots in a commercial water-absorbing gel before planting or by soaking seedlings in water one to two hours before planting. If planting is delayed for more than five days, keep seedlings in shipping container and place in cold storage at 35 to 45 degrees F.

**Plugs:** Store plugs in a cool area, typically between 33-34 degrees F. keep the roots moist, but not soggy. Plant within a week of receiving the stock.

**Cuttings:** Place cuttings in moist sand or paper, sphagnum moss, or plastic bags and store in a cool place (34 to 40 degrees F).

**Container Grown:** Keep in the original container and keep soil moist. Thoroughly water plants two days before planting. This will facilitate removal from containers during planting.

**Balled and Burlapped:** Keep the root ball moist by watering slowly from the top. Wet the foliage occasionally. Balled and burlapped planting stock can be held temporarily by placing soil or mulch around the entire ball of the tree and keeping it moist.

**Direct Seeding:** Keep seeds cool and stratify if necessary. If seeds are field collected, place seeds in porous bags to prevent heat buildup. If seed is stored, surface air-dry the seed first, place in 4 mil plastic bags and store in a cold environment, air temperature between 33 and 40 degrees. Do not allow seeds to mold. Maintain seed moisture content between 30% to 50%.

### Planting or Seeding Rates

Tree/shrub planting or seeding rates vary depending on the purpose of the planting and the type of stock.

#### Seedlings: Bare-root, Plugs, and Cuttings

General planting rates:

Seedlings (bare-root or plugs and cuttings):

- Timber production:
  - Hardwoods – 544-900/ac
  - Conifers – 600-1000/ac
- Wildlife Plantings: 302-1200/ac. Certain Wildlife plantings may require densities outside this range. Contact the NRCS State Forester or Biologist for guidance.
- Oak Savanna: 25-60/ac (See CPS Restoration of Rare or Declining Natural Communities (643))
- Supplemental/enrichment underplanting: 200-300/ac, evenly distributed over the area needing treatment.
- Erosion Control: 1000-1200/ac
- Shrubs: 727 – 1742/ac
- For other applications or approval of planting densities outside these listed ranges, contact the NRCS State Forester or Biologist.

**Table 1.** Plants per acre by spacing.

Spacing (feet)	Plants/ Acre	Spacing (feet)	Plants/Acre
5 x 5	1742	10 x 10	436
6 x 6	1210	10 x 12	363
6 x 8	907	11 x 11	360
6 x 10	726	12 x 12	302
7 x 7	889	14 x 14	222
7 x 10	622	16 x 16	170
8 x 8	680	18 x 18	134
8 x 10	544	20 x 20	109
9 x 9	538	30 x 30	48

**Larger Stock: Containerized and Balled and Burlapped:**

Planting rates will vary according to the individual site plan. Base rates on the following:

- 20+ per acre if natural regeneration is expected.
- 50+ per acre if natural regeneration is not expected.

**Table 2.** Spacing between and within rows by plant type and 20-year height

Plant Type / 20-year Height	Minimum/Maximum Spacing <i>Between Rows</i>	Minimum/Maximum Spacing <i>Within Rows</i>
Shrubs < 10 feet tall	10 - 16 ft	3-8 ft.
Shrubs and trees 10 – 25 feet tall	12 - 20 ft	8-16 ft
Hardwood trees > 25 feet tall	16 - 30 ft	10-30 ft
Medium evergreen trees 16 – 40 feet tall	16 - 20 ft	8-20 ft
Large evergreen trees > 40 feet tall	20 - 30 ft*	20-30 ft*

\*Spruce (*Picea*) species should be spaced 25' (minimum) - 30' due to needle cast disease

**Planting Rate Considerations**

- Agroforestry – Base plant spacing on the type of agroforestry practice being developed. Closer spacing results in providing protection in the shortest period. Where appropriate, the narrowest spacing can be used, with a thinning required to achieve the ultimate spacing.
- Biofuel – Planting rate of 436 – 1210 plants/acre.
- Saw logs, poles (conifer), and posts (hardwood) - Plant a minimum of 544 plants per acre.

**Table 3.** Minimum recommended tree spacing for common wood products\*

Purpose	Spacing (ft)	Trees/Ac
Sawlogs (hardwood)	10 x 10	436
Sawlogs (conifers)	9 x 9	538
Posts (hardwoods)	8 x 8	680
Poles (conifers)	8 x 8	680
Short rotation woody crops	8 x 8	680
Treating waste	10 x 6	725
Biofuels	6 x 6	1210
Christmas Trees	6 x 6	1210

\*Plant spacing may vary to accommodate the need for weed control measures and equipment as well as other objectives of the planting. Document reasons why spacing is different from these guidelines.

**Direct Seeding**

The direct seeding rates below are based on estimated percentage germination and survival and on the desired number of trees per acre, which has been determined to be a minimum of 3,000 and up to 8,000.

Row Seeding: Plant 2500- 4000 seed per acre. Plant heavy seeded species in an open trench 2-3 inches deep. Deeper planting is recommended if the soil surface is dry. Once seeded, compact rows to provide good contact between the soil and seed.

**Table 4.** Direct Seeding, Row Planting rates to achieve ~3000 seeds/acre.

Row Spacing	Seed Spacing	Seed/Acre
6 ft	2.4 ft	3025
8 ft	1.8 ft	3025
10 ft	1.5 ft	2900
12 ft	1.2 ft	3025
14 ft	1.0 ft	3100

Broadcast Seeding: Broadcast 5,000 – 15,000 seeds/acre depending on the species planted. Broadcast over the entire acreage, heavy seeded species should be disked in 2-3 inches, then cultipack to obtain a firm soil to seed contact. Broadcast light seeded species and lightly disk, drag, or cultipack seed into ¼ to ½ inches deep.

**Table 5.** Direct seedings for common MN species. \*

<b>Deciduous/Hardwood (Broadcast)</b>			
Species	Bushels per Acre	Species	Pounds per Acre
Red oak	1-2 bu/ac	Sugar Maple	¼ – ½ lb/ac
White oak	¼ -1 bu/ac	Ash (green, white, black – not recommended at this time)	¼ - ½ lb/ac
Bur oak	½ - 1 bu/ac	Black cherry	¼ - ½ lb/ac
Black walnut	10-20 bu/ac	Hackberry	¼ - ½ lb/ac
Shagbark hickory (within its range)	¼ - ½ bu/ac	Kentucky Coffeetree	5-10 lbs/ac
Swamp white oak (lowland sites)	¼ - ½ bu/ac		
		<b>Shrubs</b>	
		Grey or Red-osier dogwood	¼ lb/ac
		Highbush cranberry	¼ lb/ac
		Chokecherry	¼ lb/ac
		Wild plum	¼ lb/ac
<b>Conifers/Non-hardwood (Aerial)</b>			
Species	Seeds/Pound	Rate/Acre	
Red Pine	52,000	8 oz	
Jack Pine	131,000	3 oz	
White Pine	27,000	16 oz	
White Spruce	225,000	1.8 oz	
Black Spruce	404,000	1 oz	
Cedar	346,000	1 oz	
Birch	1,400,000	0.25 oz	

\*Based on Forest Development Manual (12/98, MN), assumes 25,000 seeds per acre for conifers. If seeding a combination of species, use lower rates for each species. ([MN DNR Direct Seeding](#)).

## Site Preparation

Proper site preparation is critical and should be sufficient for stand establishment. Select the appropriate site preparation techniques according to site conditions and limitations.

When direct seeding, till the site to create a firm, weed free seedbed.

Where subsurface drains (tile lines) cross a tree/shrub planting, and where these drains will remain functional, sealed conduits will be installed through the planting and extend a minimum of 100 feet from rows of large trees (capable of reaching heights greater than 60 feet) and 75 feet from all other trees and shrubs. Trees and shrubs will not be planted within 50 feet of either side of subsurface drains.

If soil erosion is a concern, control erosion with mulches, plant residues, contour planting, or other appropriate measures. Use non-competitive cover crops between planted rows on critical erosive slopes.

Mitigate compaction by deep ripping or aeration equipment.

## Planting Methods

Choose a planting method that is appropriate for existing site conditions and species capabilities. Timing and use of equipment will be appropriate for the site and soil conditions. When mechanical planting is used, rows should follow the contour and must have additional wheel packing. Thoroughly mix species throughout the planting for forest health.

### Bare Root

Plant seedlings upright at the same depth or slightly deeper (one inch) than the stock was grown in the nursery or container. The root collar must not be visible after planting. Plant seedlings so the main root is straight down, not doubled or sharply bent. Firmly pack soil around the roots, leaving no air pockets. Properly planted seedlings should resist gentle lifting pressure. Check each planted row for proper planting depth and root position and for adequate soil packing around the roots.

### Plugs

Gently loosen the root plug before planting, put them in the ground so that the soil line of the plug matches the surface of the ground.

### Cuttings

Plant cuttings leaving a single bud above ground.

### Container Grown, Balled and Burlapped

Dig a hole two to three times the width of the container or root ball and about the same depth of the container or root ball. Loosen the sides of the hole and the root ball before planting. All packing materials (basket, Burlapped, bag, container, etc.) will be removed before planting. If roots circle the container, use a knife to slice an "X" across the bottom of the root ball and four vertical slices on the sides of the root ball. Place stock at the same depth it grew at the nursery and firmly pack soil around roots to eliminate air pockets. Water should be applied generously.

### Direct Seeding

Seeding can be done either by hand dispersal or broadcasting. Large seeds such as oaks, walnuts and hickory should be seeded at least one inch deep. Lighter seeds, such as maple, should be seeded ¼ inch deep. Care must be taken to completely cover the seed and achieve good seed to soil contact by cultipacking, rolling, or dragging the entire site.

Use one or more of the following methods:

- **Broadcast:** Broadcast the seed evenly over the planting area and cover seeds with mineral soil.
- **Strip:** Broadcast the seed evenly over the prepared strips and cover seeds with mineral soil.
- **Spot:** Plant two to five seeds per spot. Cover seeds with mineral soil.
- **Machine:** Ensure seeds are covered with mineral soil.
- **Natural regeneration:** The use of a natural seed source may be used under the following conditions:
  - Sites that are within 200 feet of existing mature woodlands and adjacent to desirable seed sources on two sides.
  - Areas that experience flooding that make plantings unlikely to succeed.
  - Depression areas that are too wet to machine or hand plant.
  - Sites that are likely to be invaded by soft-mast species that would likely out-compete planted hard mast species.

## Planting Dates

Follow the planting dates below for the appropriate planting stock/seed. **Do not plant in frozen soil.** For spring plantings, plant as early as possible, when soil moisture is typically higher.

### Bare Root

Deciduous: March 15 – May 31 or October 15 until the ground is frozen

Conifers: March 15 – May 31

### Cuttings

March 15 – May 31

Plant as soon as possible after materials arrive. Soak in water for 12 to 24 hours before planting. Plant cuttings within two days of collection or arrival. Avoid planting on hot, windy days. A cool, cloudy day is preferred.

### Container Grown, Balled and Burlapped

Container grown and balled and burlapped stock can be planted any time of the year when the ground is not frozen if soil moisture is sufficient.

### Direct Seeding

Seed can be planted anytime from October through April when soil conditions allow. Fall seeding eliminates the need for stratification. Spring seeding may reduce rodent and insect damage. Acorns of most species in the white oak group have little or no dormancy and should be planted as soon as possible after collection in the fall.

## Tree Protection

Protect tree and shrub plantings, seeded areas, and naturally regenerated areas, from unacceptable adverse impacts of pests, wildlife, livestock, and/or fire. Protect from pests, as necessary, by applying integrated pest management techniques for pest prevention, avoidance, monitoring, and suppression.

- Bud Caps (conifers): poly mesh or paper material to protect the terminal bud.
- Mesh Tree Tubes: 3/8" diameter x 48" tall stake with a 48" Vexar or other open weave tubular tree shelter.
- Solid Tree Tube: 3/4" x 3/4" x 48" wood stake with a 4" x 48" solid type tree tube.
- Woven Wire with Steel Posts (individual tree): 6' steel t post with 48", 12.5 gauge, galvanized woven wire.
- Woven Wire with Steel Posts (perimeter fencing for natural regeneration): 10' steel T posts, 96', 12.5 gauge, galvanized woven wire. Wooden posts and wildlife gates as needed.

## Maintenance after Planting or Seeding

- Burn or mow the area periodically, if needed to maintain the health of the plant community. Do not conduct maintenance practices and activities during the primary reproductive period of wildlife. Exceptions can be considered to maintain the health of the vegetative community if such exceptions do not conflict with agency requirements.
- Control access by vehicles and/or equipment, as well as livestock, during or after tree/shrub establishment to protect new plants and minimize erosion, compaction, and other site impacts.
- Inspect the site at an appropriate time following planting, seeding, and/or natural regeneration to determine whether the survival rate for tree and shrubs meets practice and client objectives. Replant or provide supplemental planting when survival is not adequate (below 80% of initial planting rate).
- Inspect the trees and shrubs periodically, and protect them from adverse impacts of insects, diseases, competing vegetation, fire, livestock, wildlife, non-functioning tree shelters and/or weed barriers, etc. If needed, control competing vegetation until the desired trees/shrubs are established.
- Control plant species on the Federal or State invasive species and noxious weed lists. If needed, apply nutrients to maintain vigor of desirable trees/shrubs.

## Establishment

- Establishment is measured on surviving plants 3 years after planting and following bud break in the spring of the 4<sup>th</sup> year. At this point plants should be "free-to-grow" which means the plants are above immediate competition from adjacent vegetation and are vigorous and likely to survive.
- Natural regeneration will result in a minimum of 300 stems/acre of woody plants (including any stock seeded and planted) after the 3<sup>rd</sup> growing season to be considered successful. If natural regeneration has not produced the above criterion, additional planting will be required to establish a minimum rate of 300 stems/acre of woody plants.
- Refer to Table 6 below for 1<sup>st</sup> year survival criteria by practice.

**Table 6.** Survival criteria by practice

<b>1<sup>st</sup> Year Survival Criteria for Tree/Shrub Plantings</b> (1 <sup>st</sup> year following the planting year and after “leaf out” which is when new leaves or needles erupt and elongate after bud break.)	
<b>Practice</b>	<b>Survival Percent or Number</b>
<ul style="list-style-type: none"> <li>• Windbreak/Shelterbelt Establishment and/or Renovation (380)</li> <li>• Alley Cropping (311)</li> <li>• Tree/Shrub Establishment (612) (linear plantings for practices in this section only)</li> <li>• Hedge Row Planting (422)</li> </ul>	90% of all trees and shrubs planted with no two adjacent within-row or between-row plants missing or dead.
<ul style="list-style-type: none"> <li>• Riparian Forest Buffer (391)</li> <li>• Tree/Shrub Establishment (612) (non-linear plantings* and linear plantings not for windbreaks)</li> <li>• Streambank/Shoreline Protection (580)</li> <li>• Silvopasture (381)</li> <li>• Restoration of Rare or Declining Natural Communities - Oak Savannah and bottomland forest only (643)</li> </ul>	A minimum of 200 plants/ac for basic cover requirements or 75% of the original planting rate if specific plant densities were recommended. Surviving plants should be evenly distributed over the planting area.
<ul style="list-style-type: none"> <li>• Wetland Wildlife Habitat Management (644)</li> <li>• Upland Wildlife Habitat Management (645)</li> </ul>	A minimum of 150 plants/ac for basic cover requirements or 50% of the original planting rate if specific plant densities are needed. * Surviving plants should be evenly spaced over the planting area.

\*If natural regeneration is used, refer to the survival rates and establishment criteria in that section of this document.

### Additional Specifications

**Reducing Nutrients and Pollutants:** Plant trees directly on the contaminated site or between the contamination source and the threatened waterbody. Species in MN that have fast-growing characteristics include hybrid poplar and aspens (*Populus* spp.) and hybrid willows (*Salix* spp.) Other species of known waste treatment benefits may be used. Consult the CTSG for soils and other site-specific tree selection guidelines. Waste includes biosolids, animal waste, excess fertilizers, metals, petroleum products, and pesticides. Use a minimum spacing of 10 x 6 or 725 trees per acre. Direct seeding and natural regeneration will not be used for this specification.

**Restoring or Maintaining Native Plant Communities:** Plant trees and utilize silvicultural prescriptions in accordance with [MN DNR Native Plant Communities](#) Classification System and Native Plant Community Conservation Ranks (PDF). Utilize the CTSG to ensure that species are compatible with soils and other site-specific components.

**Wildlife Habitat:** Refer to Table 8 for recommended species for establishing wildlife habitats in conjunction with consulting the CTSG for site specific recommendations. Plantings are most effective when located next to a winter food source.

**Sequestering and Storing Carbon:** The species and plant communities that attain biomass more quickly will sequester carbon faster but are generally short-lived species, while slower growing but long-lived species will sequester more carbon over extensive periods of time. Pay particular attention to the landowners’ objectives when recommending plants for this purpose. The rate of carbon sequestration is enhanced as trees and/or shrubs mature and soil organic matter increases. Select plants from the CTSG or Ecological Site Descriptions (ESDs) to select plants that are adapted to the site and establish at the appropriate planting or seeding rate recommended for maximum carbon storage rates.

### Conserve Energy

### Livestock Shelter

## References

Direct Seeding: Refer to [MN DNR Direct Seeding of Native Hardwood Trees](#) for more information regarding direct seeding.

Planting Methods: Refer to [MN DNR Planting Trees and Seedlings](#) for additional information and visual guides.

Maintenance and Protection: Refer to [MN DNR Caring for Trees](#) for additional information regarding tree care and protection.

Assisted Tree Migration: [UMN Ext Climate Ready Woodlands](#)

Fall Planting of Bare Root Seedlings:

Grass and Weed Control for Tree and Shrub Seedlings:

## Addendum

**For the following tables, trees species recommendations are not exclusive. Please refer to the CTSG as a guide to determine recommended tree and shrub species. Base selection of listed species on local site conditions (soil type, slope, aspect, geographic location, etc.), landowner objectives, professional judgement, and availability of planting stock/seed.**

**Table 7.** Woody species recommended for Establishing Forest Riparian Buffers

Relative ranking values: V = Very high; H = High; M = Medium; L = Low						
Common Name	Scientific Name	Flooding Tolerance	Large Debris	Shade Value	Wildlife Merit	Potential Mature Height (ft)
American Cranberry Bush	<i>Viburnum trilobum</i>	H-M	L	L	H	16
American Plum	<i>Prunus americana</i>	L-M	L	L	H	10
Arrowwood	<i>Viburnum dentatum</i>	H	L	L	H	8
Ash, green	<i>Fraxinus pennsylvanica</i>	M	M	M	M	60
, white	<i>F. americana</i>	M	M	M	M	80
, black	<i>F. nigra</i>	H-M	M	M	M	70
Aspen, quaking	<i>Populus tremuloides</i>	L	M	M	H	80
Birch, white	<i>Betula papyrifera</i>	M-H	M	M	H	70
, river	<i>B. nigra</i>	M-H	M	M	M	70
, yellow	<i>B. alleghaniensis</i>	M-H	H	M	H	60
Basswood	<i>Tilia americana</i>	L-M	H	H	L	100
Black chokeberry	<i>Aronia melanocarpa</i>	M	L	L	H	30
Cedar, white	<i>Thuja occidentalis</i>	H-M	M	H	H	50
Chokecherry	<i>Prunus virginiana</i>	L-M	L	L	H	30
Cottonwood, Eastern	<i>Populus deltoides</i>	H-V	H	H-V	M	100
Dogwood, red osier	<i>Cornus sericea</i>	H	L	L	M	10
, silky	<i>C. amomum</i>	H	L	L	M	10
, gray	<i>C. racemosa</i>	M	L	L	M	10
False indigo	<i>Amorpha fruticosa</i>	H	L	L	L	18
Fir, balsam	<i>Abies balsamea</i>	M-H	M	M	H	60
Hackberry,	<i>Celtis occidentalis</i>	M	M-H	H	H	100

common						
Hawthorn, cockspur	<i>Crataegus crusgalli</i>	M	L	L	H	25
Hazelnut, American	<i>Corylus americana</i>	M	L	L	H	25
Maple, silver, red	<i>Acer saccharinum</i> <i>A. rubrum</i>	H H	H H	H H	M M-H	95 70
Nannyberry	<i>Viburnum lentago</i>	M	L	L	H	14
Ninebark, common	<i>Physocarpus opulifolius</i>	L	L	L	H-M	10
Oak, bur, northern pin, red, swamp white	<i>Quercus macrocarpa</i> <i>Q. ellipsoidalis</i> <i>Q. rubrum</i> <i>Q. bicolor</i>	H-M M-L L H	H H H M	H H H H	H H H H	80 75 80 70
Pine, jack, red, white	<i>Pinus banksiana</i> <i>P. resinosa</i> <i>P. strobus</i>	L M M	L H H	M M H	L M H	80 80 100
Spruce, black, white	<i>Picea mariana</i> <i>P. abies</i>	H-V M-L	M H	M M-H	M-H H	70 80
Serviceberry (Juneberry)	<i>Amelanchier laevis</i>	M-L	L	L	H	12
Tamarack (Larch)	<i>Larix laricina</i>	H-M	H	M	M	75
Willow, black, sandbar, peachleaf	<i>Salix nigra</i> <i>S. exigua</i> <i>S. amygdaloides</i>	H H-V H	M L L	H L L	M L L	60 8 25
Winterberry	<i>Ilex verticillate</i>	H	L	L	H	9

Table 8. Woody species recommended for wildlife plantings.

Species		Tree Rating Zone1	Food	Cover	Nest
<b>Conifers</b>					
Balsam fir	<i>Abies balsamea</i>	1-4	F, W	X	
Black spruce	<i>Picea mariana</i>	1-4, 5	F, W	X	X
Cedar, N. white	<i>Thuja occidentalis</i>	1-4	F, W	X	X
Pine, E. white, Jack, Red	<i>Pinus strobus</i> <i>P. banksiana</i> <i>P. resinosa</i>	1-4, 6 1-4 1-3	F, W F, W F, W	X X X	X X X
Tamarack	<i>Larix laricina</i>	1-4	F, W	X	
White spruce	<i>Picea glauca</i>	1-5	F, W	X	X
<b>Deciduous Trees</b>					
Aspen, Bigtooth, Quaking	<i>Populus grandidentata</i> <i>P. tremuloides</i>	1-6 1-6	F, W F, W		X X
Birch, paper, yellow	<i>Betula papyrifera</i> <i>B. alleghaniensis</i>	1-4, 6 1-4, 6	F, W F, W		
Bitternut hickory	<i>Carya cordiformis</i>	1,2,4,6	F, W	X	X
Black walnut	<i>Juglans nigra</i>	1,6	F, W	X	X
Cherry, black, pin	<i>Prunus serotina</i> <i>P. pennsylvanica</i>	1-6 1-6	S, F S, F		
E. cottonwood, native	<i>Populus deltoides</i>	1-6	F, W		
Green ash	<i>Fraxinus pennsylvanica</i>	1-6	F, W		
Hackberry	<i>Celtis occidentalis</i>	1-6	W		
Maple, mountain, red, sugar	<i>Acer spicatum</i> <i>A. Rubrum</i> <i>A. saccharum</i>	1-3 1-4, 6 1-6	S, F S, F, W S, F, W		X X X
Oak, bur, N. pin, N. red, swamp white, white	<i>Quercus macrocarpa</i> <i>Q. ellipsoidalis</i> <i>Q. rubra</i> <i>Q. bicolor</i> <i>Q. alba</i>	1-6 1-6 1-4, 6 1, 2, 4, 6 1, 2, 4, 6	F, W F, W F, W F, W F, W	X X X X X	X X X X X

Shagbark hickory	<i>Carya ovata</i>	1, 2	F, W	X	X
Willows – native	<i>Salix spp.</i>	1-6	F, W		X
<b>Deciduous Shrubs</b>					
American plum	<i>Prunus americana</i>	1-6	S, F	X	X
American hazelnut	<i>Corylus americana</i>	1-5	W	X	X
<b>Arrow-wood</b>					
Chokeberry	<i>Aronia melanocarpa</i>	1-3	W	X	
Chokecherry	<i>Prunus virginiana</i>	1-6	S	X	
Dogwood, gray	<i>Cornus racemosa</i>	1-6	F	X	X
, red osier	<i>C. stolonifera</i>	1-6	F	X	X
, silky	<i>C. amomum</i>	1,2, 6	F	X	X
False indigo	<i>Amorpha fruticosa</i>	1, 2, 4-6	F	X	
Hawthorn	<i>Crataegus spp.</i>	1-4, 6	W	X	X
Highbush cranberry	<i>Viburnum trilobum</i>	1-6	F, W	X	
Nannyberry	<i>Viburnum lentago</i>	1-6	F, W	X	
Ninebark	<i>Physocarpus opulifolius</i>	1-3	F, W	X	
Serviceberry	<i>Amelanchier alnifolia</i>	2-6	S	X	X
Silver buffaloberry	<i>Sheperdia argentea</i>	5, 6	S	X	X
Sumac, smooth	<i>Rhus glabra</i>	1-6	W		
, staghorn	<i>R. typhina</i>	1-3	W		
<b>Food availability codes: S = Summer; F = Fall; W = Winter</b>					

**Wildlife Tree Rating Zones**

(trees and shrubs native to MN ecological regions)

