

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION
WINDBREAK/SHELTERBELT ESTABLISHMENT (380)

1. SCOPE

The work shall consist of planting/establishing a windbreak/shelterbelt for the purpose of managing atmospheric odors, particulate matter, or providing a management practice for wind flow, snow distribution, shelter for livestock and/or wildlife, or for energy conservation for buildings.

2. MATERIALS

The plant materials used for this practice shall meet the standards of the American Nursery and Landscape Association as provided in the association's publication "American Standard for Nursery Stock" (2004). Planting stock may be any of the following:

A. Container Grown Nursery Stock

- All container grown nursery stock shall be healthy, vigorous, well rooted, and established in the container in which it is growing. Container grown nursery stock shall have a well-established root system reaching the sides of the container to maintain a firm ball when the container is removed, but shall not have excessive root growth encircling the inside of the container.

B. Bare Root Nursery Stock

- All bare root trees shall have a well-branched root system characteristic of the species at the age of the seedlings.

C. Tubling Grown Nursery Stock

- Tublings are seedlings that are grown in small containers or "tubes". All tubling grown nursery stock shall be healthy, vigorous, well rooted, and established in the container in which it is growing. Tublings shall have a well-established root system reaching the sides of the container to maintain a firm ball when the container is removed, but shall not have excessive root growth encircling the inside of the container.

3. SITE PREPARATION

The site shall be prepared using acceptable methods including:

- A. Plowing,
- B. Disking,
- C. Pre-plant establishment of herbaceous cover between planned tree/shrub planting rows involving seed drills, broadcast seeders, cultipackers,
- D. Chemical weed control (follow all label requirements and recommendations as applicable). All pesticide recommendations must be made by a professional consultant with the appropriate state pesticide applicator certification following all manufacturers labeling.
- E. Hand scalping the areas where the trees/shrubs will be planted (micro-site preparation), and
- F. Other methods/activities which meet industry standards

4. TREE AND SHRUB SPACING FOR WINDBREAKS

Table 1. Number of Rows and Within Row Spacing to Achieve Desired Minimum Density

Example Plant Form	Spacing (ft)	# Rows	Density%	Remarks
Shrubs, leaf off for living snow fences (Choose any dense shrub from table 2)	4	1	>40	
Oaks, hackberry, in leaf off for living snow fences (Choose any deciduous tree from table 2)	14 – 18	1	40	
Deciduous trees, leaf off for living snow fences (Choose any deciduous tree from table 2)	14 – 18	2	No greater than 50 at crown height	
Hybrid poplars, in leaf off (See table 2)	14	2 – 3	No greater than 50 at crown height.	Established as supplemental rows until tallest trees approach required design height. Plant downwind of tallest tree rows.
Pines (Choose low to medium density pines from table 2)	<10	1	50	

Example Plant Form	Spacing (ft)	# Rows	Density%	Remarks
Oaks, hackberry, in full leaf (Choose any deciduous tree from table 2)	12	1	60	Adding rows will increase density
Dense conifers: spruces, junipers, firs, arborvitae (Choose very high to high density evergreen tree from table 2)	<10	1	60	
Dense conifers (Choose very high to high density evergreen tree from table 2)	12 – 20	2	60	For orchard perimeter: spacing will require a longer time period to achieve desired density. Note: proper cold air drainage may require pruning of lower branches of evergreens at the bottom of slopes.
Dense conifers (Choose very high to high density evergreen tree from table 2)	<10	2	>65	
Dense conifer row plus shrub row of 10 ft height or less (Choose very high to high density evergreen tree and shrub in leaf-off condition from table 2)	Conifers: <10 Shrubs: 4	2 rows total	60 at crown height; >60 at lower heights	
Two dense conifer rows plus shrub row of 10 ft height or less (Choose very high to high density evergreen trees plus any shrub in leaf-off condition from table 2)	Conifers: <10 Shrubs:4	3 rows total	>65 at lower and upper heights	Best for home, structure and/or livestock protection. Increase tree and shrub rows for areas of the state with large amounts of snowfall and/or open areas subject to wind events.
"Streamco" willow	2	2	50 – 70 density (leaf off) with 8 ft row spacing	Rooted cuttings

Table 2. Number of Rows and Within Row Spacing to Achieve Desired Minimum Density

Plant Form Height	In-Row Spacing (ft) for the 20 Year Design Height	Remarks	Minimum Between Row Spacing (ft)	Remarks
Shrubs < 10 ft in height	4 – 6	<i>Bush Cinquefoil</i> is no greater than 4 ft	10	A maximum between row spacing of 20 ft is allowed for powered maintenance equipment (i.e., mowers) or selected species requiring more sunlight.
Evergreen shrubs and trees 10 – 25 ft in height	<10		12	A maximum of 20 ft is allowed for between row spacing.
Deciduous trees and shrubs 10 – 25 ft in height	12 – 18 depending on desired density with leaf on or leaf off condition.		12	A maximum of 20 ft is allowed for between row spacing.
All coniferous trees greater than 25 ft in height (pine, juniper, spruce, fir, cedar)	8 – 12		16	A maximum of 20 ft is allowed for between row spacing.
Deciduous trees greater than 25 ft in height	10 – 18 depending on the desired density with leaf on or leaf off condition.	Use hybrid poplars as additional tree rows until tallest trees reach required height. Use 14 ft spacing.	16 – 20	A maximum of 20 ft is allowed for between row spacing.
Shrubs added for wildlife value after the minimum windbreak density has been met and been planned for.	Allow sunlight to reach bottom branches, space 2 – 8 ft depending on species.			

5. SPECIES APPROVED FOR PLANTING FOR WINDBREAKS/SHELTERBELTS IN NEW YORK

Table 3 – Approved Windbreak Species

Plant name	Shade Tolerance	Density (Single Plants)	Height at 20 Years	Mature Height	Soil ¹ Suitability	NY Plant Hardiness zone
Coniferous (Evergreen) Trees						
American holly <i>Ilex opaca</i>	Tolerant	High	20 ft	40 ft	W – P	5b – 7a
Austrian pine ² <i>Pinus nigra</i>	Intolerant	Low To Medium	35 ft	120 ft	E – P	4a – 7a
Douglas fir <i>Pseudotsuga menziesii</i>	Intermediate	Medium	40 ft	200 ft	W – MW	3b – 7a
Eastern hemlock <i>Tsuga Canadensis</i> [used as visual screen] (Does not tolerate windy, exposed sites)	Tolerant	Dense – if pruned repeatedly as a hedge	22 ft	105 ft	W – P	3b – 7a
Eastern red cedar ³ <i>Juniperus virginiana</i>	Very tolerant	Very high	25 ft	50 ft	E – SP	All
Northern white cedar <i>Thuja occidentalis L.</i>	Intermediate	Very high	25 ft	50 ft	W – P	3b – 7a
Norway spruce ² <i>Picea abies</i>	Intermediate	High	35 ft	130 ft	W – SP	All
Red pine <i>Pinus resinosa</i>	Intolerant	Low to Medium	30 ft	80 ft	E – MW	All
White pine <i>Pinus strobus</i>	Intermediate	Low To Medium	40 ft	150 ft	W – SP	3a – 7a

Plant name	Shade Tolerance	Density (Single Plants)	Height at 20 Years	Mature Height	Soil ¹ Suitability	NY Plant Hardiness zone
White spruce <i>Picea glauca</i>	Intermediate	High	30 ft	100 ft	W – SP	All
Deciduous Trees						
Blackgum <i>Nyssa sylvatica</i>	Tolerant	Medium – leaf on	30 ft	95 ft	W – P	5a – 7a
Black willow <i>Salix nigra</i>	Intolerant	Medium – leaf on	50 ft	100 ft	MW – P	All
Common hackberry <i>Celtis occidentalis</i>	Tolerant	Medium – leaf on	26 ft	60 ft	W – SP	All
Hawthorn, Arnold ⁴ <i>Crataegus x anomala sarg.</i>	Intolerant	Medium – leaf on	30 ft	30 ft	W – SP	All
Hawthorn, Brainerdii ⁴ <i>Crataegus brainerdii Sarg</i>	Intermediate	Medium – leaf on	30 ft	30 ft	W – P	All
Honeylocust (thornless) <i>Gleditsia triacanthos var. inermis</i>	Intolerant	Low to Medium – leaf on	35 ft	70 ft	W – SP	4a – 7a
Northern red oak <i>Quercus rubra</i>	Intermediate	Medium – leaf on	36 ft	81ft	W – MW	3b – 7a
Pin oak <i>Quercus palustris</i>	Intolerant	Medium – leaf on	40 ft	100 ft	MW – P	4b – 7a
Poplar, hybrid ² Use hybrids with disease resistance: Assiniboine, Canam, Praire Sky, Walker	Intolerant	Low to Medium – leaf on	80 ft	110 ft	W – SP	All
Red maple <i>Acer rubrum</i>	Intermediate	Medium – leaf on	35 ft	68 ft	W – P	All

Plant name	Shade Tolerance	Density (Single Plants)	Height at 20 Years	Mature Height	Soil ¹ Suitability	NY Plant Hardiness zone
White oak <i>Quercus alba</i>	Intermediate	Medium – leaf on	25 ft	100 ft	W – MW	4a – 7a
Swamp white oak <i>Quercus bicolor</i>	Intermediate	Medium – leaf on	30 ft	100 ft	SP – P acid soils	4a – 7a
Shrubs-Coniferous (Evergreen)						
Mugo pine ² <i>Pinus mugo</i>	Intermediate	High	Varies-cultivar choice is critical due to size variability	5 – 20 ft	E – MW	All
Shrubs-Deciduous						
American Cranberry <i>Viburnum Trilobum</i>	Tolerant	Dense – leaf on > 50% stem density leaf off	12 ft	12 ft	W – P	All
American hazelnut <i>Corylus americana</i>	Intermediate-will not fruit in shade	Medium – leaf on	10 ft	10 ft	MW – W	3b – 7a
Arrowwood <i>Viburnum dentatum</i>	Intermediate	Medium – leaf on	15 ft	15 ft	W – P	4b – 7a
Bush Cinquefoil <i>Potentilla fruticosa</i>	Intolerant	Dense – leaf on > 50% stem density leaf off	4.5 ft	4.5 ft	E – P	All
Dogwood, Gray <i>Cornus racemosa</i>	Tolerant	Medium – leaf on	10 ft	10 ft	E – SP	All
Dogwood, Redosier <i>Cornus sericea</i>	Intolerant	Medium – leaf on	12 ft	12 ft	W – P	All
Dogwood, Silky <i>Cornus amomum</i>	Intermediate	Medium – leaf on	10 ft	10 ft	W – P	All

Plant name	Shade Tolerance	Density (Single Plants)	Height at 20 Years	Mature Height	Soil ¹ Suitability	NY Plant Hardiness zone
Elderberry <i>Sambucus canadensis</i>	Very tolerant	Medium	12 ft	12 ft	E – P	3a
Heart leaved willow <i>Salix eriocephala</i>	Tolerant	Dense – leaf on >50% stem density leaf off	40 ft	40 ft	MW – P	3b – 7a
Nannyberry <i>Viburnum lentago</i>	Intermediate	Dense – leaf on > 50% stem density leaf off	28ft	28 ft	W – SP	3b – 7a
Ninebark <i>Physocarpus opulifolius</i>	Intolerant	Dense – leaf on > 50% stem density leaf off	10 ft	10 ft	E – P	3b – 7a
Purpleosier Willow ² 'Streamco' <i>Salix purpurea</i>	Intolerant	Dense – leaf on, 50 – 70% (leaf off) stem density with 8 foot row width	15 ft	15 ft	E – P	3a
Pussy willow <i>Salix discolor</i>	Intolerant	Medium – leaf on 40% (leaf off)	30 ft	30 ft	W – P	3a
Shining willow <i>Salix lucida</i>	Intermediate	Dense – leaf on >50% stem density leaf off	13 ft	13 ft	W – SP	3a
Silky willow <i>Salix sericea</i>	Intermediate	Dense – leaf on >50% stem density leaf off	12 ft	12 ft	W – P	3a
Winterberry <i>Ilex verticillata</i>	Intermediate	Dense – leaf on > 50% stem density leaf off	12 ft	12 ft	P – MW	3b

¹ E – excessively drained, W – well drained, MW – moderately well drained, SP – somewhat poorly drained, P – poorly drained.

² Non-native to NY.

³ Alternative host to cedar apple rust do not plant if this disease is a concern in your area (e.g., apple orchards in the area).

⁴ Alternative host to cedar quince rust, do not plant if this disease is a concern in your area (e.x., pear orchards in the area).