EXPECTED 20-YEAR TREE HEIGHTS

By Conservation Tree and Shrub Groups

HOW TO USE:

General descriptions of conservation tree and shrub groups (CTSG) and the reasons for these groups are found on pages 1-8. A Major Land Resource Area (MLRA) map is located on page 9. Specific tree heights at twenty years by species for each group are found on pages 10-15 for MLRA 53A 53BB, 54, 58C 58D, 60B and 63A and on pages 16-21 for MLRA 55A, 55B, 56, and 102A. An asterisk (*) in the tables on pages 10-21 indicates additional varieties are suitable for the same sites as the listed "parent" species. Those approved cultivars, varieties, hybrid crosses, and subspecies are found on page 22. The legend for CTSG is found on pages 23-24. Footnotes are found on page 24.

GENERAL

Windbreaks are often planted on land that did not grow trees originally. Knowledge of how trees perform on such land can be gained only by observing and recording their performance after planting. Many favorite windbreak species are not indigenous to the areas in which they are planted. Some are not native to North America, as indicated by their common names: Russian olive, Amur honeysuckle, Siberian elm, Nanking cherry, and Siberian peashrub. Within this document, species that are native to at least some location in North Dakota are shown as {Native to ND}.

Each year millions of dollars are invested in windbreaks. Annual maintenance and renovation costs are also considerable. Planning windbreaks requires accurate and reliable information on soil-windbreak interpretations to assure adequate windbreak performance and to satisfy the human expectations.

Control of competing vegetation is essential for successful windbreak establishment. Supplemental moisture is often necessary in many soils in semiarid regions.

Soil properties such as texture, pH, salinity, and sodicity determine if a particular woody plant will do well on a given site. Coarse textured soils are often droughty and very fine textured soils can reduce root growth through reduced oxygen content or excess water. Soils with pH values exceeding 7.8 exhibit greatly reduced species adaptability and growth rates. Salinity affects tree growth to a greater degree than pH. Only a few species, such as Russian-olive or buffaloberry, can survive or do well on moderately saline soils (8-16 mmhos/cm). Over half the species climatically suited to North Dakota do poorly on slightly saline soils (4-8 mmhos/cm). Even very slightly saline soils (2-4 mmhos/cm) affect growth rates and ability of some trees to withstand additional stresses. Sodicity, in the absence of salinity, generally reduces the success of tree plantings because of the characteristic restrictive soil layers associated with sodicity.

SPECIES SUITABILITY

Each tree or shrub species has certain climatic and physiographic limits. Within these limits, a tree may be well or poorly suited because of soil characteristics. Conservation tree and shrub groups assure satisfactory individual species performance under specified conditions of soil, climate, and physiography. Species are grouped according to expected height growth at 20 years, given good management. Good management includes the control, or near control, of competing vegetation. It is assumed that by 20 years of age, a tree/shrub planting is providing the planned for benefits.

Conservation tree and shrub groups are a guide for selecting species best suited for different kinds of soils and for predicting height growth and effectiveness. They may be used to select plants for

windbreaks, recreation, wildlife plantings, ornamental or environmental plantings, afforestation, reforestation, and critical area plantings. To find which group a soil is assigned online: Go to FOTG; Click *FOTG – Go to Your State's FOTG* on the lower left side of the page; Click on *State (ND)*; Click on *County*; Use dropdown menu to select *Section II*; Click on *Soil Information*; Click a *county*; Click *Interpretive Table (county name)*; Find the CTSG for the design soil component.

Please note: When species are known to be adapted to North Dakota climatic conditions, but little is known about the range of soil conditions on which they can grow, the "Expected 20-Year Tree Heights" tables have shown them suitable for only the better tree or shrub growing soils.

Conservation Tree and Shrub Groups (CTSG)

All soil series, phases, or soil map units are placed in 10 groups of similar soils. All groups except group 10 are further divided into subgroups. In addition, all groups provide information by groupings of MLRAs. MLRAs 53A, 53B 54, 58C, 58D, 60B, and 63A (western third of ND) are grouped as one unit. MLRAs 55A, 55B, 56, and 102A (Eastern two thirds of ND) are grouped as another unit. Counties that are split by an MLRA or specific species limitation may use either interpretation.

Soils are grouped into the following 10 general groups. A short description of each group is given, including limitations or problems in establishment and growth.

Group 1

Description
These are deep, well drained to somewhat poorly drained soils that receive beneficial moisture from favorable landscape positions, flooding, runoff from adjacent land, or they have a beneficial seasonally high water table during the spring. Soils within this group are generally fine sandy loam to silty clay loam.

Limitations
High pH will have an effect on the selection of species on some soils in this group. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs. Salinity is none to slight. Occasionally, somewhat poorly drained soils may have excessive water for some species.

Subgroups (soil criteria for each CTSG located in National Forestry Manual)

GROUP	SOIL DEPTH (INCHES)	AVAILABLE WATER CAPACITY	$CACO_3$ EQUIVALENT (%, 0-16 IN.)	PH (0-16 IN.)	ELECTRICAL CONDUCTIVITY (MMHOS, 0-16 IN.) (salinity)	DEPTH TO GROWING SEASON WATER TABLE (IN.)
1	≥40	≥7.5	≤5	5.6 - 8.4	<4 (none to very slight)	≥36, <60
1K	≥40	≥7.5	>5, ≤15	6.5 – 8.4	<4 (none to very slight)	≥36, <60
1KK	≥40	≥7.5	>15, ≤40	6.5 – 8.4	<4 (none to very slight)	≥36, <60
1S	≥40	3.75 – 7.5	≤5	5.6 - 8.4	<4 (none to very slight)	≥36, <60

Representative Soils

CTSG-1 Arnegard, Embden, Gardena, Mandan, Svea
(Locations: flats, swales, concave landscape positions)

CTSG -1K Fairdale, Glendive, Haver, Haverlon,
(Locations: flats on flood plains)

CTSG-1KK Balton, Ortonville, Skagen
(Locations: knobs and knolls)

CTSG-1S Aylmer, Falsen, Foxhome, Hecla, Pelan
(low relief dune field, flats)

Group 2

Description

Soils in this group are deep, somewhat poorly drained, and excessively wet or ponded during the spring or overflow periods. They also include drained phases of poorly drained soils. Wetness limits the selection of species suitable for planting on these soils and may reduce the growth rate.

Limitations

Wetness, high pH, and drainage will have an effect on the selection of tree and shrub species for soils in this group. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs. Spring planting may be delayed because of wet conditions. Soil blowing is a concern on the sandy and organic soils.

Subgroups (soil criteria for each CTSG located in National Forestry Manual)

GROUP	SOIL DEPTH (INCHES)	AVAILABLE WATER CAPACITY	$CACO_3$ EQUIVALENT (%, 0-16 IN.)	PH (0-16 IN.)	ELECTRICAL CONDUCTIVITY (MMHOS, 0-16 IN.) (salinity)	DEPTH TO GROWING SEASON WATER TABLE (IN.)
2	≥40	≥2.0	≤5	5.6 – 8.4	<4 (none to very slight)	≥18, <36
2H	≥40	≥7.5	--	≤7.8	<4 (none to very slight)	≥18, <36
2K	≥40	≥2.0	>5, ≤15	6.5 – 8.4	<4 (none to very slight)	≥18, <36
2KK	≥40	≥2.0	>15, ≤40	6.5 – 8.4	<4 (none to very slight)	≥18, <36

Representative Soils

CTSG-2 Bantry, Fargo, Hamar, Minnewaukan, Tonka
(*Locations: low relief dune field, flats, drained depressions)*

CTSG-2H Eramosh, Markey, Rifle, Seeleville
(*Locations: bogs and fens)*

CTSG-2K Fossum, Grano, Lamoure, Mauvais
(Locations: Flood plains, micro highs, channels)

CTSG-2KK Bearden, Glyndon, Hamerly, Karlsruhe, Regan, Wyndmere
(Locations: flats and channels)

Group 3

Description
Soils in this group are deep, well-drained soils with loamy and silt loam textures and high available water capacity.

Limitations
Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs on these soils. Water erosion is a concern on the gently sloping to moderately steep areas.

Subgroups (soil criteria for each CTSG located in National Forestry Manual)

GROUP	SOIL DEPTH (INCHES)	AVAILABLE WATER CAPACITY	$CACO_3$ EQUIVALENT (%, 0-16 IN.)	PH (0-16 IN.)	ELECTRICAL CONDUCTIVITY (MMHOS, 0-16 IN.) (salinity)	DEPTH TO GROWING SEASON WATER TABLE (IN.)
3	≥40	≥7.5	≤5	5.6 – 8.4	<4 (none to very slight)	≥60

Representative Soils
CTSG-3 Arikara, Foreman, Heimdal, Shambo, Williams
(Locations: flats and rises)

Group 4

Description
Soils in this group are moderately deep and deep, have loamy surface textures with clayey subsoils, have slow or very slow permeability, and occur on uplands.

Limitations
High clay content and water availability have an effect on the selection of tree and shrub species for these soils. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs on these soils. Water erosion is a concern on the gently sloping to moderately steep areas.

Subgroups (soil criteria for each CTSG located in National Forestry Manual)

GROUP	SOIL DEPTH (INCHES)	AVAILABLE WATER CAPACITY	$CACO_3$ EQUIVALENT (%, 0-16 IN.)	PH (0-16 IN.)	ELECTRICAL. CONDUCTIVITY (MMHOS, 0-16 IN.) (salinity)	DEPTH TO GROWING SEASON WATER TABLE (IN.)
4	≥20	≥4.75	≤5	5.6 – 8.4	<4 (none to very slight)	≥60
4C	≥20	≥3.75	≤5--	5.6 – 7.8	<4 (none to very slight)	≥60
4CK	≥20	≥3.75	>5, ≤15	6.5 – 8.4	<4 (none to very slight)	≥60

Representative Soils:
CTSG-4 Aberdeen, Belfield, Cresbard, Savage, Zeeland
(Locations: flats)
CTSG-4C Lawther, Nutley, Regent, Rolla, Wahpeton, Wolfpoint
(Locations: flats and flood plains)
CTSG-4CK Cashel, Lohler, Hattie, Scorio

(Locations: flats on flood plains)

Group 5

Description
Soils in this group are deep, with loamy, fine sandy loam, and sandy loam texture.
(Locations: uplands, fans, and terraces)

Limitations
Competition from grass and weeds and abrasion from soil blowing are the principal concerns in establishing and managing trees and shrubs on these soils. Reduced available water later in the growing season reduces the number of trees suitable for these soils, compared to CTSG-3 soils.

Subgroups (soil criteria for each CTSG located in National Forestry Manual)

GROUP	SOIL DEPTH (INCHES)	AVAILABLE WATER CAPACITY	$CACO_3$ EQUIVALENT (%, 0-16 IN.)	PH (0-16 IN.)	ELECTRICAL CONDUCTIVITY (MMHOS, 0-16 IN.) (salinity)	DEPTH TO GROWING SEASON WATER TABLE (IN.)
5	≥40	≥4.75	3.75 - 7.5	5.6 – 8.4	<4 (none to very slight)	≥60
5K	≥40	≥3.75	3.75 - 7.5	6.5 – 8.4	<4 (none to very slight)	≥60

Representative Soils:
CTSG-5 Dickey, Inkster, Lihen loamy, Madock loamy, Parshall, Tally
(Locations: flats and hillslopes)
CTSG-5K Trembles, Trembles variant
(Locations: flats on flood plains)

Group 6

Description
Soils in this group are well-drained, mostly loamy textures, and moderately deep over sand, gravel, bedrock, and other layers that can severely restrict root growth. They have low or moderate available water capacity.

Limitations
Droughtiness will have an effect on the selection of tree and shrub species for use on these soils. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs on these soils. Water erosion is a concern on the gently sloping to moderately steep areas. Supplemental watering may be needed for establishment. *Note: Soils with only 20-24 inches of loam over sand and gravel exhibit reduced tree growth and vigor, and survival during drought.*

Subgroups (soil criteria for each CTSG located in National Forestry Manual)

GROUP	SOIL DEPTH (INCHES)	AVAILABLE WATER CAPACITY	$CACO_3$ EQUIVALENT (%, 0-16 IN.)	PH (0-16 IN.)	ELECTRICAL CONDUCTIVITY (MMHOS, 0-16 IN.) (salinity)	DEPTH TO GROWING SEASON WATER TABLE (IN.)
6D	20 - 40	≥3.75	≤5	5.6 – 7.8	<4 (none to very slight)	≥60
6DK	20 - 40	≥3.75	>5, ≤15	6.5 – 8.4	<4 (none to very slight)	≥60
6G	≥20	≥3.75	≤5	5.6 – 8.4	<4 (none to very slight)	≥60

6GK	≥40	≥2.0	>5, ≤15	6.5 – 8.4	<4 (none to very slight)	≥60

Representative Soils:

CTSG-6D: Amor, Edgely, Morton, Reeder, Vebar
(Locations: hillslopes)
CTSG-6DK Chama,
(Locations: Uplands - Moderately deep soils over bedrock or cemented layer)
CTSG-6G Arvilla, Brantford, Karlstad, Lehr, Renshaw, Vang
(Locations: flats and hillslopes)
CTSG-6GK Burgraff, Hoffmanville, Ridgelawn
(Locations: flats on flood plains and low terraces)

Group 7

Description
Soils in this group are deep, excessively to moderately well drained, sandy in texture, typically have low to very low available water capacity, and do not normally have adequate moisture.

Limitations
Drought conditions and abrasion from soil blowing are the principal concerns in establishing and managing trees and shrubs on these soils. Specialized site preparation (due to hummocky sand that is subject to blowouts) and specialized planting methods (vegetation between the rows is normally left undisturbed) are needed to establish trees and shrubs. Supplemental watering may be essential for successful establishment.

Subgroups (soil criteria for each CTSG located in National Forestry Manual)

GROUP	SOIL DEPTH (INCHES)	AVAILABLE WATER CAPACITY	$CACO_3$ EQUIVALENT (%, 0-16 IN.)	PH (0-16 IN.)	ELECTRICAL CONDUCTIVITY (MMHOS, 0-16 IN.) (salinity)	DEPTH TO GROWING SEASON WATER TABLE (IN.)
7	≥40	≥2.0	≤5	5.6 – 7.8	<4 (none to very slight)	≥60

Representative Soils:
CTSG-7 Banks, Dickey, Flaxton, Hanly, Lihen, Maddock, Telfer, Towner
(Locations: flats and hillslopes)

Group 8

Description
Soils in this group are calcareous at or near the surface. They do not receive beneficial moisture from run-on, flooding, or seasonal high water tables.

Limitations
High calcium content and competition from grass and weeds are the principal concerns in establishing and managing for trees and shrubs on these soils. Water erosion is a concern on gently sloping to moderately steep areas.

Subgroups (soil criteria for each CTSG located in National Forestry Manual)

GROUP	SOIL DEPTH (INCHES)	AVAILABLE WATER CAPACITY	$CACO_3$ EQUIVALENT (%, 0-16 IN.)	PH (0-16 IN.)	ELECTRICAL CONDUCTIVITY (MMHOS, 0-16 IN.) (salinity)	DEPTH TO GROWING SEASON WATER TABLE (IN.)
8K	≥40	≥7.5	>15, ≤40	5.6 – 7.8	<4 (none to very slight)	≥60

Representative Soils:
CTSG-8K Buse, Cherry, Langhei, Patent, Zahill, Zahl, and Zell
(*Locations: knobs, knolls , ridges)*

Group 9

Description
Salinity and/or sodicity affect soils in this group.

Limitations
Concentrations of salt will severely affect the establishment, vigor, and growth of trees and shrubs on these soils. Species shown as suitable for these soils may survive but the ability of the planting to form an effective windbreak within a reasonable time frame is greatly reduced. When possible, relocate planting off the CTSG-9 soils.

Subgroups (soil criteria for each CTSG located in National Forestry Manual)

GROUP	SOIL DEPTH (INCHES)	AVAILABLE WATER CAPACITY	SODIUM ADSORPTION RATIO (0-16 IN.)	PH (0-16 IN.)	ELECTRICAL CONDUCTIVITY (MMHOS, 0-16 IN.) (salinity)	DEPTH TO GROWING SEASON WATER TABLE (IN.)
9 / 9N	≥20	≥2.0	>13, <25	--	4-8 (very slight to slight)	≥60
9W	≥20	≥2.0	>13, <25	--	4-8 (very slight to slight)	≥18, ≤60

Representative Soils:
CTSG-9 & CTSG-9N Cavour, Daglum, Ekalaka, Letcher, Noonan, Portal
(Locations: flats, swales, hillslopes)

CTSG-9W Antler, Arnegard, Belfield, Parshall, Savage
(Locations: flats and swales)

Group 10

Description
Soils in this group have one or more characteristics, such as soil depth, texture, drainage, channeled phases, available water capacity, slope, or salt toxicity which severely limit planting, survival, or growth of trees and shrubs.

Limitations
Soils in this group are usually not recommended for farmstead and feedlot windbreaks, field windbreaks, afforestation, and plantings for recreation and wildlife. All soils on moderately steep to steep slopes (generally greater than 15%) and soils that are generally too wet, too shallow, or have other severely restrictive conditions fall into group 10.

Subgroups (soil criteria for each CTSG located in National Forestry Manual)

GROUP	SOIL DEPTH (INCHES)	AVAILABLE WATER CAPACITY	CALCIUM CARBONATE EQUIVALENT (%, 0-16 IN.)	PH (0-16 IN.)	ELECTRICAL CONDUCTIVITY (MMHOS, 0-16 IN.) (salinity)	DEPTH TO GROWING SEASON WATER TABLE (IN.)
10	<20	<2.0	>40	>8.4	>8 (moderate)	≥60

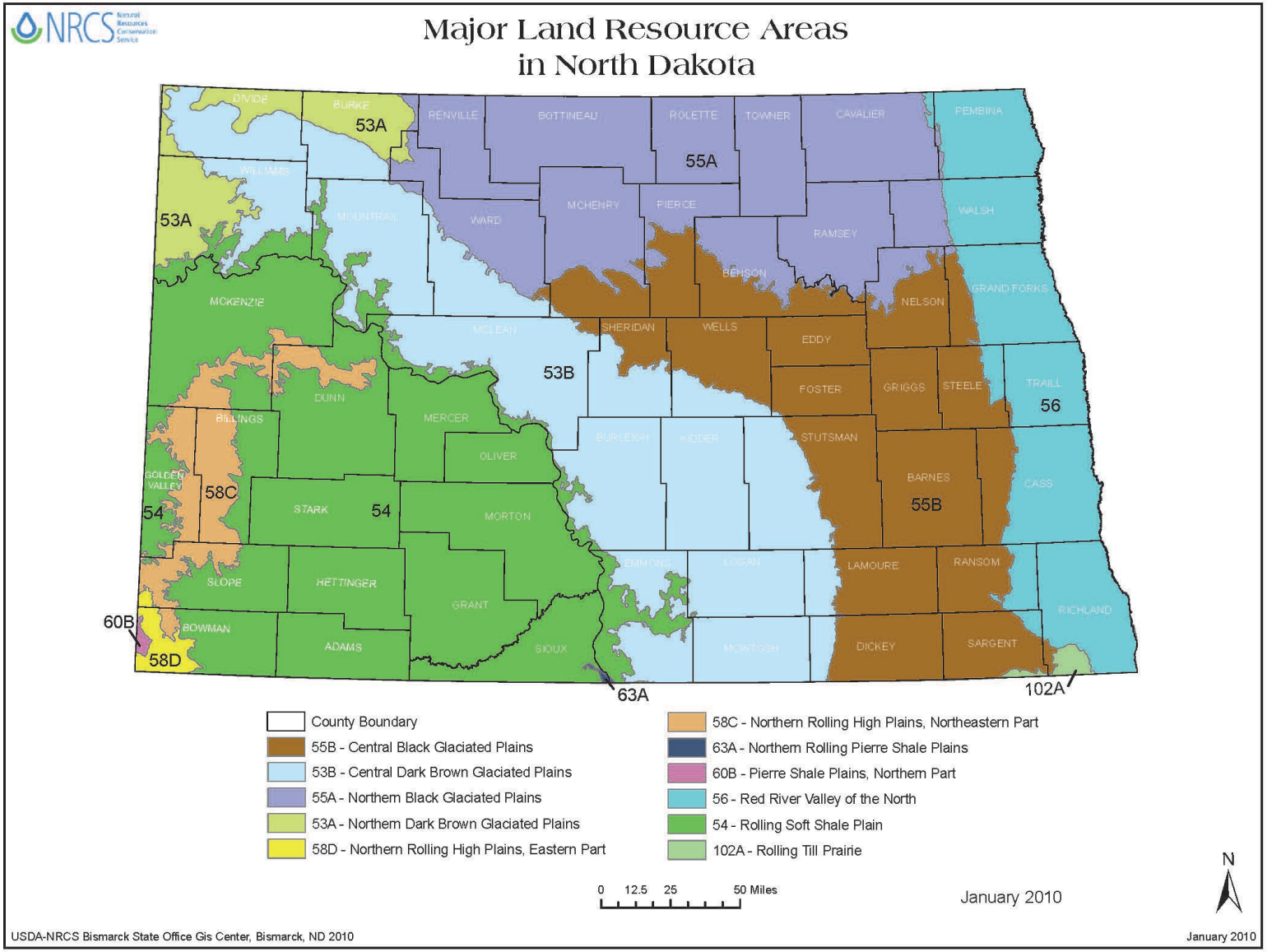
Conservation tree and shrub group 10 soils include:

- all shallow soils
- all undrained phases of very poorly drained soils
- all soils with less than 20 inches of loamy fine sand or coarser surface material
- all moderately and strongly saline soils
- all CTSG 2H, 3, 4, 5, 5K, 6D, 6DK, 6G, 9, 9N, 9W soils on slopes greater than 15%
- all CTSG 4C, 4CK, 8K soils on slopes greater than 9%
- all CTSG 7 soils on slopes greater than 6%

Onsite investigations may reveal that tree and shrub plantings can be made with special treatments to overcome the specific limitations making the soil a WSG-10 (hand planting, no till planting, mulching, supplemental water, or other specialized site treatments). The selection of species must be tailored to the soil conditions existing at each site. Limiting conditions and the specialized treatments required to overcome these limitations must be documented on the planting plan.

When an onsite investigation reveals that the site conditions, such as erosion risk, droughty conditions, or high pH can be modified and improved, species should be selected from the conservation tree and shrub group that the soil would most likely fall into after correcting the limiting factors. For example, for a shallow soil over bedrock, trees or shrubs would be selected from group 6; an excessively wet soil would most closely match group 2. Rarely can modification of onsite soil conditions be considered an appropriate long-term response.

Experience has shown that when windbreaks are placed on slopes greater than 15 percent, erosion control and moisture management measures need to be considered. Machine planting of windbreaks becomes limiting and the impact of slope on placement of windbreaks must also be considered in designing a windbreak. Even when establishment is successful, long-term survival and effectiveness is often reduced.


Major Land Resource Areas
in North Dakota
NRCS
DIVIDE
BURKE
RENVILLE
BOTTINEAU
ROLETTE
TOWNER
CAVALIER
PEMBINA
53A
55A
WILLIAMS
MOUNTRAIL
WARD
MCHENRY
PIERCE
RAMSEY
WALSH
BENSON
GRAND FORKS
NELSON
MCKENZIE
MCLEAN
SHERIDAN
WELLS
EDDY
53B
FOSTER
GRIGGS
STEELE
TRAILL
56
DUNN
BILLINGS
MERCER
BURLEIGH
KIDDER
STUTSMAN
OLIVER
GOLDEN VALLEY
58C
54
STARK
54
MORTON
BARNES
55B
CASS
SLOPE
HETTINGER
GRANT
EMMONS
LOGAN
LAMOURE
RANSOM
RICHLAND
60B
BOWMAN
ADAMS
SIOUX
MCINTOSH
DICKEY
SARGENT
58D
63A
102A
County Boundary
55B - Central Black Glaciated Plains
53B - Central Dark Brown Glaciated Plains
55A - Northern Black Glaciated Plains
53A - Northern Dark Brown Glaciated Plains
58D - Northern Rolling High Plains, Eastern Part
58C - Northern Rolling High Plains, Northeastern Part
63A - Northern Rolling Pierre Shale Plains
60B - Pierre Shale Plains, Northern Part
56 - Red River Valley of the North
54 - Rolling Soft Shale Plain
102A - Rolling Till Prairie
0 12.5 25 50 Miles
January 2010
N
USDA-NRCS Bismarck State Office Gis Center, Bismarck, ND 2010
January 2010

MLRA 53A, 53B, 54, 58C, 58D, 60B, 63A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Species Scientific Name*	Plant Symbol	CTSG 1	CTSG 1K	CTSG 1KK	CTSG 1S $	CTSG 2	CTSG 2K	CTSG 2KK	CTSG 2H	CTSG 3	CTSG 4, 4C, 4CK	CTSG 5, 5K	CTSG 6D, 6DK, 6G, 6GK	CTSG 7	CTSG 8K	CTSG 9, 9N	CTSG 9W	CTSG 10
DECIDUOUS SHRUBS																		
Russian Almond	PRTE5	4-6	3-4		2-3					4-6	4-5	3-4						
Height Relative Value		5	3		3					5	4	4						
Prunus tenella		xxx	xxx		xxx					xxx	xxx	xxx						
Buffaloberry, Silver	SHAR	8-12	8-12	7-10	7-10					8-11	6-9	6-9	4-5		3-5	3-5	3-5	
{Native to ND} Height Relative Value		10	10	9	9					9	8	8	6		4	4	4	
Shepherdia argentea		***	***	***	***					***	***	***	***		***	***	***	
Caragana (Peashrub, Siberian)	CAAR18	8-10	8-10		7-9	7-9	7-9	5-6		8-10	7-8	7-9	6-8		4-5	3-5		
Height Relative Value		9	9		8	8	8	6		9	8	8	7		4	4		
Caragana arborescens		***	***		***	***	***	***		***	***	***	***		***	***		
*** Cherry Mongolian**	PRFR2	5-6			4-5					4-6								
Height Relative Value		5			4					5								
Prunus fruticosa		xxx			xxx					xxx								
Cherry, Nanking 2/	PRTO80	6-8	5-7		5-7					5-7	4-6	3-5						
Height Relative Value		7	6		6					6	5	4						
Prunus tomentosa		xxx	xxx		xxx					xxx	xxx	xxx						
*** Chokecherry, Common**	PRVI	10-12	8-10	7-9	7-9	8-10	8-10			8-10	7-10	6-8	4-6					
{Native to ND} Height Relative Value		11	9	7	9	9	9			9	9	7	5					
Prunus virginiana		***	***	***	***	***	***			***	***	***	***					
*** Cotoneaster, European 12/**	COIN16	10-12	8-11		7-10	8-10	8-9			9-11	6-10	4-6						
Height Relative Value		11	10		9	10	8			10	8	5						
Cotoneaster integerrima		xxx	xxx		xxx	xxx	xxx			xxx	xxx	xxx						
Cotoneaster, Peking 12/	COAC2	6-8	5-7		4-6	7-8	7-8			5-7	5-7	4-6						
Height Relative Value		7	6		5	7	7			6	6	5						
Cotoneaster acutifolia		xxx	xxx		xxx	xxx	xxx			xxx	xxx	xxx						
Currant, Black	RIAM2	4-6			3-5	3-5				3-5								
{Native to ND} Height Relative Value		5			4	4				4								
Ribes americanum		***			***	***				***								
Currant, Golden	RIAU	5-7	4-6		3-5	3-5	4-6	3-5		5-6	3-5	3-5	3-5		3-4	3-4		
{Native to ND} Height Relative Value		6	5		4	4	5	4		5	4	4	4		3	3		
Ribes aureum		***	***		***	***	***	***		***	***	***	***		***	***		
Dogwood, Redosier	COSES	6-7	5-7		5-7	6-7	4-6		4-6	4-6	4-6							

MLRA 53A, 53B, 54, 58C, 58D, 60B, 63A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Species Scientific Name*	**Plant Symbol**	**CTSG 1**	**CTSG 1K**	**CTSG 1KK**	**CTSG 1S $**	**CTSG 2**	**CTSG 2K**	**CTSG 2KK**	**CTSG 2H**	**CTSG 3**	**CTSG 4, 4C, 4CK**	**CTSG 5, 5K**	**CTSG 6D, 6DK, 6G, 6GK**	**CTSG 7**	**CTSG 8K**	**CTSG 9, 9N**	**CTSG 9W**	**CTSG 10**
{Native to ND} Height Relative Value		7	6		6	7	5		5	5	5							
Cornus sericea		xxx	xxx		xxx	xxx	xxx		xxx	xxx	xxx							
Forsythia, `Meadowlark'	FORSY	6-10	5-7		4-6					7-9	4-6	5-7						
Height Relative Value		9	6		5					8	5	6						
Forsythia europa x F. ovata		xxx	xxx		xxx					xxx	xxx	xxx						
Honeysuckle, Blueleaf `Freedom'	LONIC	8-10	8-10		6-8					7-9	5-9	4-6	3-5		2-4	2-4		
Height Relative Value		9	9		7					8	8	5	4		3	3		
Lonicera korolkowii `Freedom'		xxx	xxx		xxx					xxx	xxx	xxx	xxx		xxx	xxx		
*** Honeysuckle, tatarian 4/**	LOTA	8-10	8-10	6-8	6-9	8-9	6-8	6-8		7-9	6-8	5-7	4-6		4-6	4-6		
Height Relative Value		9	9	7	8	9	8	7		9	8	6	5		5	5		
Lonicera tatarica		***	***	***	***	***	***	***		***	***	***	***		***	***		
Indigo, False	AMFR	6-8	5-7		4-6	6-8	5-7		2-3	4-6								
{Native to ND} Height Relative Value		7	6		5	5	6		3	3								
Amorpha fruticosa		xxx	xxx		xxx	xxx	xxx		xxx	xxx								
Juneberry (Saskatoon Serviceberry)	AMAL2	5-6			4-5	4-5				4-6	4-6							
{Native to ND} Height Relative Value		4			3	3				5	5							
Amelanchier alnifolia		xxx			xxx	xxx				xxx	xxx							
Lilac, Common	SYVU	8-10	8-10	8-9	7-9	8-10	8-9	8-9		7-9	7-9	6-8	4-6		4-6	3-5		
Height Relative Value		9	9	8	9	9	8	8		9	8	7	5		5	4		
Syringa vulgaris		***	***	***	***	***	***	***		***	***	***	***		***	***		
Lilac, Late	SYVI3	8-10	6-9		5-7	7-9	6-8			7-9	5-7							
Height Relative Value		9	8		6	9	7			9	6							
Syringa villosa		***	***		***	***	***			***	***							
Lilac, Peking	SYPE4	10-12	8-12	7-11	7-11	8-12	7-11	6-10		8-12	6-10	6-10						
Height Relative Value		11	10	9	9	10	9	9		10	9	9						
Syringa pekinensis		***	***	***	***	***	***	***		***	***	***						
Plum, American 2/	PRAM	5-8	4-6		4-7	4-6	4-6			6-8	5-7	4-6	4-6					
{Native to ND} Height Relative Value		6	5		6	5	5			7	6	5	5					
Prunus americana		***	***		***	***	***			***	***	***	***					
Rose, Hansen Hedge	ROSA5	4-5	4-5		4-5	4-5	4-5			4-5	3-5	3-4	2-4					
Height Relative Value		4	4		4	4	4			4	4	4	3					
Rosa rugosa 'Hansen'		***	***		***	***	***			***	***	***	***					
Rose, Woods	ROWO	4-5	4-5		4-5	4-5	4-5			4-5	3-5	3-4	2-4					

MLRA 53A, 53B, 54, 58C, 58D, 60B, 63A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Species Scientific Name*	**Plant Symbol**	**CTSG 1**	**CTSG 1K**	**CTSG 1KK**	**CTSG 1S $**	**CTSG 2**	**CTSG 2K**	**CTSG 2KK**	**CTSG 2H**	**CTSG 3**	**CTSG 4, 4C, 4CK**	**CTSG 5, 5K**	**CTSG 6D, 6DK, 6G, 6GK**	**CTSG 7**	**CTSG 8K**	**CTSG 9, 9N**	**CTSG 9W**	**CTSG 10**
{Native to ND} Height Relative Value *Rosa woodsii*		5 ***	5 ***		5 ***	5 ***	5 ***			4 ***	4 ***	4 ***	3 ***					
Sandcherry, Western 3/ {Native to ND} Height Relative Value *Prunus pumila besseyi*	PRPUB	4-6 5 xxx	3-4 4 xxx		3-4 4 xxx					4-6 5 xxx		3-5 4 xxx	2-4 3 xxx					
Sea-buckthorn (Seaberry) Height Relative Value *Hippophae rhamnoides*	HIRHBO	8-10 9 ***	8-10 9 ***	7-9 9 ***	7-9 9 ***	8-10 9 ***	7-9 9 ***	7-9 9 ***		6-9 8 ***	6-9 8 ***	5-7 6 ***			3-5 4 ***	3-5 4 ***	3-4 4 ***	
Silverberry {Native to ND} Height Relative Value *Elaeagnus commutata*	ELCO	5-7 6 ***	5-7 6 ***	5-7 6 ***	5-7 6 ***	5-7 6 ***	5-7 6 ***	5-7 6 ***		5-7 6 ***	5-7 6 ***	4-6 5 ***	4-5 4 ***		3-5 4 ***	3-5 4 ***	3-4 4 ***	
Snowberry 11/ {Native to ND} Height Relative Value *Symphoricarpos occidentalis*	SYOC	1-3 2 ***	1-3 2 ***			1-3 2 ***	1-3 2 ***			1-3 2 ***	1-3 2 ***	1-3 2 ***						
*** Sumac, Skunkbush** {Native to ND} Height Relative Value *Rhus trilobata*	RHTR	3-9 6 ***	3-7 6 ***	3-6 5 ***	3-6 5 ***					3-9 6 ***	3-7 5 ***	3-7 5 ***	3-5 4 ***			3-5 4 ***		
Viburnum, Nannyberry {Native to ND} Height Relative Value *Viburnum lentago*	VILE	10-14 12 xxx			9-13 11 xxx	8-10 9 xxx				8-10 9 xxx	5-7 6 xxx							
Willow, Bebbs {Native to ND} Height Relative Value *Salix bebbiana*	SABE2	12-15 14 ***	12-15 14 ***		13-16 15 ***	12-15 14 ***	12-15 14 ***		10-14 12 ***									
*** Willow, Purple-osier** Height Relative Value *Salix purpurea*	SAPU2	8-13 11 ***	8-13 11 ***		9-14 12 ***	8-13 11 ***	8-13 11 ***		8-13 11 ***									
Willow, Sandbar {Native to ND} Height Relative Value *Salix interior*	SAIN3	5-7 6 ***	5-7 6 ***		6-8 7 ***	5-7 6 ***	5-7 6 ***		5-7 6 ***									
DECIDUOUS TREES																		

MLRA 53A, 53B, 54, 58C, 58D, 60B, 63A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Species Scientific Name*	Plant Symbol	CTSG 1	CTSG 1K	CTSG 1KK	CTSG 1S $	CTSG 2	CTSG 2K	CTSG 2KK	CTSG 2H	CTSG 3	CTSG 4, 4C, 4CK	CTSG 5, 5K	CTSG 6D, 6DK, 6G, 6GK	CTSG 7	CTSG 8K	CTSG 9, 9N	CTSG 9W	CTSG 10
Apricot, Manchurian 2/	PRAR3	10-12			8-10	8-10				9-11	8-10	8-10						
Height Relative Value		11			9	9				10	9	9						
Prunus armeniaca spp		xxx			xxx	xxx				xxx	xxx	xxx						
*** Ash, Green**	FRPE	18-22	16-20	14-18	16-20	16-20	14-18	12-16		17-21	14-18	13-16	12-15		8-9	8-12		
{Native to ND} Height Relative Value		20	18	16	18	18	16	14		19	16	16	14		8	8		
Fraxinus pennsylvanica		***	***	***	***	***	***	***		***	***	***	***		***	***		
Aspen, Quaking	POTR5	25-30	20-25	16-20	25-30	20-25	16-20	14-18										
{Native to ND} Height Relative Value		27	23	18	27	23	18	16										
Populus tremuloides		xxx	xxx	xxx	xxx	xxx	xxx	xxx										
Boxelder	ACNE2	15-18	14-17	11-13	15-20	14-17	14-16	11-13		13-16								
{Native to ND} Height Relative Value		17	16	12	18	16	16	12		15								
Acer negundo		***	***	***	***	***	***	***		***								
Cherry, Black	PRSE2	18-20	15-17		15-18	15-17	10-12			15-18								
Height Relative Value		19	16		17	16	11			17								
Prunus serotina		xxx	xxx		xxx	xxx	xxx			xxx								
*** Cottonwood, Eastern**	PODE3	38-46	34-42		38-50	38-46	34-42											
{Native to ND} Height Relative Value		42	38		44	42	38											
Populus spp.		***	***		***	***	***											
*** Crabapple, Manchurian**	MAMA37	15-16	14-15		14-15					13-16	13-15	10-12						
Height Relative Value		15	14		14					14	14	11						
Malus mandsurica		xxx	xxx		xxx					xxx	xxx	xxx						
Crabapple, Siberian	MABA	15-16	14-15		14-15					13-16	13-15	10-12						
Height Relative Value		15	14		14					14	14	11						
Malus, baccata		xxx	xxx		xxx					xxx	xxx	xxx						
*** Elm, Siberian**	ULPU	24-30	22-28	17-20	22-28	18-20	17-20	13-16		22-27	16-20	20-25	16-20		10-12	9-11		
Height Relative Value		27	25	18	25	19	18	14		25	18	22	18		11	10		
Ulmus pumila		***	***	***	***	***	***	***		***	***	***	***		***	***		
Hackberry, Common	CEOC	18-22	16-20		14-17	16-20	14-18			17-21	15-17							
{Native to ND} Height Relative Value		20	18		16	18	16			19	16							
Celtis occidentalis		xxx	xxx		xxx	xxx	xxx			xxx	xxx							
*** Hawthorn, Arnold**	CRATA	12-16	10-12		10-12					9-11	8-10	8-12	7-9					
Height Relative Value		14	12		11					10	9	10	8					

MLRA 53A, 53B, 54, 58C, 58D, 60B, 63A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Species Scientific Name*	**Plant Symbol**	**CTSG 1**	**CTSG 1K**	**CTSG 1KK**	**CTSG 1S $**	**CTSG 2**	**CTSG 2K**	**CTSG 2KK**	**CTSG 2H**	**CTSG 3**	**CTSG 4, 4C, 4CK**	**CTSG 5, 5K**	**CTSG 6D, 6DK, 6G, 6GK**	**CTSG 7**	**CTSG 8K**	**CTSG 9, 9N**	**CTSG 9W**	**CTSG 10**
Cratageus anomala		xxx	xxx		xxx					xxx	xxx	xxx	xxx					
Hawthorn, Downy	CRMO2	10-12			8-10					9-11	6-8							
Height Relative Value		11			9					10	7							
Cratageus mollis		xxx			xxx					xxx	xxx							
*** Maple, Amur**	ACGI	10-12								9-10								
Height Relative Value		11								9								
Acer ginnala		xxx								xxx								
Maple, Tatarian	ACTA80	10-12								9-10								
Height Relative Value		11								9								
Acer tataricum		xxx								xxx								
Oak, Bur	QUMA2	17-20	15-18		15-18					17-20	14-17	12-15						
{Native to ND} Height Relative Value		19	16		17					18	16	13						
Quercus macrocarpa		xxx	xxx		xxx					xxx	xxx	xxx						
*** Pear, Ussurian (Harbin)**	PYUS2	15-17			13-16					15-17		10-12						
Height Relative Value		16			14					16		11						
Pyrus, ussuriensis		xxx			xxx					xxx		xxx						
*** Poplar, Hybrid Species**	POPUL	40-45			40-45	40-45												
Height Relative Value		42			43	43												
Populus spp.		xxx			xxx	xxx												
Poplar, White	POAL7	28-35	26-33		28-35	28-35	26-33			20-30								
Height Relative Value		31	30		32	32	31			26								
Populus alba		xxx	xxx		xxx	xxx	xxx			xxx								
Russian-olive (see footnote on page 22)	ELAN	~~13 16~~	~~12 15~~	-	~~12~~ 15	~~12 15~~	~~12 15~~	~~12 15~~		~~12 15~~	~~10 12~~	~~11 14~~	10-12		8-9	6-8	5-7	
Height Relative Value		~~15~~	~~14~~	-	~~14~~	~~13~~	~~13~~	~~13~~	-	~~13~~	~~11~~	~~12~~	11		8	7	6	
Elaeagnus angustifolia		zzz	zzz		zzz	zzz	zzz	zzz		zzz	zzz	zzz	***		***	***	***	
Willow, Laurel	SAPE4	20-25	15-20		20-28	20-28	15-20											
Height Relative Value		23	17		26	25	18											
Salix pentandra		xxx	xxx		xxx	xxx	xxx											
Willow, Missouri River (Heartleaf)	SAER	21-23	16-18		22-27	21-23	16-18		17-20									
{Native to ND} Height Relative Value		22	17		26	22	17		18									
Salix eriocephala		xxx	xxx		xxx	xxx	xxx		xxx									
Willow, Peachleaf	SAAM2	18-23	13-18		20-25	18-23	13-18		16-21									
{Native to ND} Height Relative Value		21	15		22	22	16		17									

MLRA 53A, 53B, 54, 58C, 58D, 60B, 63A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Species Scientific Name*	**Plant Symbol**	**CTSG 1**	**CTSG 1K**	**CTSG 1KK**	**CTSG 1S $**	**CTSG 2**	**CTSG 2K**	**CTSG 2KK**	**CTSG 2H**	**CTSG 3**	**CTSG 4, 4C, 4CK**	**CTSG 5, 5K**	**CTSG 6D, 6DK, 6G, 6GK**	**CTSG 7**	**CTSG 8K**	**CTSG 9, 9N**	**CTSG 9W**	**CTSG 10**
Salix amygdaloides		xxx	xxx		xxx	xxx	xxx		xxx									
*** Willow, White**	SAAL2	20-28	15-20		20-30	20-28	15-20		18-23									
Height Relative Value		26	17		27	26	17		20									
Salix alba		xxx	xxx		xxx	xxx	xxx		xxx									
CONIFERS																		
Juniper, Rocky Mountain	JUSC2	10-12	9-11	9-11	10-12	10-12	9-11	7-9		10-12	9-11	8-10	7-9	7-9	6-8	5-7		
{Native to ND} Height Relative Value		11	10	10	11	11	10	8		11	10	9	8	8	7	6		
Juniperus scopulorum		***	***	***	***	***	***	***		***	***	***	***	***	***	***		
Larch, Siberian	LASI3	14-18			14-18	14-18				13-17		12-15						
Height Relative Value		16			16	16				16		13						
Larix sibirica		xxx			xxx	xxx				xxx		xxx						
Pine, Ponderosa	PIPO	16-20	14-17	14-17	16-20					16-20		13-18	12-14	11-13	11-13	11-13		
{Native to ND} Height Relative Value		18	16	16	18					18		15	13	12	12	12		
Pinus ponderosa		***	***	***	***					***		***	***	***	***	***		
Pine Scotch	PISY	16-18	16-18		16-18					14-17		14-17	11-13					
Height Relative Value		17	17		17					16		15	12					
Pinus sylvestris		xxx	xxx		xxx					xxx		xxx	xxx					
Redcedar, Eastern	JUVI	10-12	9-11		10-12	10-12	9-11	7-9		10-12	9-11	8-10	7-9	7-9	6-8	5-7		
Height Relative Value		11	10		11	11	10	8		11	10	9	8	8	7	6		
Juniperus virginiana		***	***		***	***	***	***		***	***	***	***	***	***	***		
Spruce, Black Hills	PIGLD	16-20	9-11			16-20	14-18			15-19	10-15							
Height Relative Value		17	14			17	15			17	14							
Picea glauca var. densata		***	***			***	***			***	***							
Spruce, Colorado Blue	PIPU	16-20	14-18			16-20	14-18			15-19	10-15							
Height Relative Value		17	16			17	16			17	13							
Picea pungens		***	***			***	***			***	***							

$ Indicates that the plants shown as adapted to CTSG-1S soils will require irrigation or timely rains during the first 3-5 years after planting until root systems have reached the capillary fringe of the water table at 15-30 inches deep. Once trees or shrubs are established, the water table should provide adequate moisture except in times of severe drought that significantly lowers the water table.

MLRA 55A, 55B, 56, 102A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Scientific Name*	Plant Symbol	CTSG 1	CTSG 1K	CTSG 1KK	CTSG 1S $	CTSG 2	CTSG 2K	CTSG 2KK	CTSG 2H	CTSG 3	CTSG 4, 4C, 4CK	CTSG 5, 5K	CTSG 6D, 6DK 6G, 6GK	CTSG 7	CTSG 8K	CTSG 9, 9N	CTSG 9W	CTSG 10
DECIDUOUS SHRUBS																		
Russian Almond	PRTE5	4-6	3-4		3-4					4-6	4-5	3-4						
Height Relative Value		5	3		4					5	4	3						
Prunus tenella		xxx	xxx		xxx					xxx	xxx	xxx						
Buffaloberry, Silver	SHAR	11-13	8-12	7-10	11-13	11-13	8-12	7-10		10-12	7-10	7-9	4-6		4-5	4-5	4-5	
{Native to ND} Height Relative Value		12	10	8	12	12	10	8		11	8	8	5		4	4	4	
Shepherdia argentea		***	***	***	***	***	***	***		***	***	***	***		***	***	***	
Caragana (Peashrub, Siberian)	CAAR18	9-11	8-10	7-9	8-10					8-10	8-9	8-10	7-9	7-9	5-7	4-5		
Height Relative Value		10	9	8	9					9	8	9	8	8	6	4		
Caragana arborescens		***	***	***	***					***	***	***	***	***	***	***		
*** Cherry Mongolian**	PRFR2	5-6			4-5					4-6								
Height Relative Value		5			4					5								
Prunus fruticosa		xxx			xxx					xxx								
Cherry, Nanking 2/	PRTO80	6-8	5-7		5-7					5-7	5-7	3-5						
Height Relative Value		7	6		6					6	6	4						
Prunus tomentosa		xxx	xxx		xxx					xxx	xxx	xxx						
Chokeberry, Black	PHME13	4-8			4-8	3-6				3-6								
Height Relative Value		6			6	5				5								
Photinia melanocarpa		xxx			xxx	xxx				xxx								
*** Chokecherry, Common**	PRVI	11-14	9-12	8-10	9-12	9-11	9-11			10-12	8-10	8-10	7-9					
{Native to ND} Height Relative Value		12	10	9	10	10	10			11	9	9	8					
Prunus virginiana		***	***	***	***	***	***			***	***	***	***					
*** Cotoneaster, European 12/**	COIN16	10-12	8-11		8-10	9-11	8-10			9-11	6-8	6-7						
Height Relative Value		11	9		9	10	10			10	7	6						
Cotoneaster integerrima		xxx	xxx		xxx	xxx	xxx			xxx	xxx	xxx						
Cotoneaster, Peking 12/	COAC2	8-10	7-9		7-9	7-8	7-8			7-9	6-8	6-7						
Height Relative Value		9	8		8	7	7			8	7	6						
Cotoneaster acutifolia		xxx	xxx		xxx	xxx	xxx			xxx	xxx	xxx						
Cranberry, Highbush 6/	VIOPA2	6-10			5-8	5-8				6-8	5-8							
{Native to ND} Height Relative Value		8			6	6				7	7							
Viburnum trilobum		xxx			xxx	xxx				xxx	xxx							
Currant, Black	RIAM2	4-6			3-5	3-5				4-6								
{Native to ND} Height Relative Value		5			4	4				5								
Ribes americanum		***			***	***				***								
Currant, Golden	RIAU	5-7	4-6	4-5	4-6	4-5	4-5	3-5		5-6	4-6	3-6	3-5		3-4	3-4		

MLRA 55A, 55B, 56, 102A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Scientific Name*	Plant Symbol	CTSG 1	CTSG 1K	CTSG 1KK	CTSG 1S $	CTSG 2	CTSG 2K	CTSG 2KK	CTSG 2H	CTSG 3	CTSG 4, 4C, 4CK	CTSG 5, 5K	CTSG 6D, 6DK 6G, 6GK	CTSG 7	CTSG 8K	CTSG 9, 9N	CTSG 9W	CTSG 10
{Native to ND} Height Relative Value		6	5	4	5	4	4	4		5	5	4	4		3	3		
Ribes aureum		***	***	***	***	***	***	***		***	***	***	***		***	***		
Dogwood, Gray	CORA6	6-8			4-6	4-6			4-6	5-7	4-6							
{Native to ND} Height Relative Value		7			5	5			4	6	5							
Cornus racemosa		xxx			xxx	xxx			xxx	xxx	xxx							
Dogwood, Redosier	COSES	6-8	4-6		4-6	6-8	4-6		5-6	5-7	4-6							
{Native to ND} Height Relative Value		7	5		5	7	5		5	6	5							
Cornus sericea		xxx	xxx		xxx	xxx	xxx		xxx	xxx	xxx							
*** Dogwood, Silky**	COAM2	8-10			6-8	6-8			6-8	8-10	8-10							
Height Relative Value		9			7	7			7	9	9							
Cornus amomum		xxx			xxx	xxx	-	-	xxx	xxx	xxx							
Forsythia, `Meadowlark'	FORSY	7-11	6-8		5-9					7-9	5-7	5-7						
Height Relative Value		9	7		7					7	6	7						
Forsythia europa x F. ovata		xxx	xxx		xxx					xxx	xxx	xxx						
Hazel, American	COAM3	6-8	4-6		4-6					6-8								
{Native to ND} Height Relative Value		7	5		5					7								
Corylus americana		xxx	xxx		xxx	-	-	-		xxx								
Honeysuckle, Blueleaf `Freedom'	LONIC	8-10	7-9		7-9					7-9	6-8	5-7	4-6		4-5			
Height Relative Value		9	8		8					8	7	6	5		4			
Lonicera korolkowii `Freedom'		xxx	xxx		xxx					xxx	xxx	xxx	xxx		xxx			
*** Honeysuckle, tatarian 4/**	LOTA	8-10	7-9	6-8	7-9	7-9	7-9	6-8		8-10	6-8	5-7	5-7		5-6	4-5		
Height Relative Value		9	8	7	8	8	8	7		9	7	6	6		5	4		
Lonicera tatarica		***	***	***	***	***	***	***		***	***	***	***		***	***		
Indigo, False	AMFR	7-9	6-8		6-8	6-7	6-7		6-8	5-7	4-6							
{Native to ND} Height Relative Value		8	7		7	6	6		7	6	5							
Amorpha fruticosa		xxx	xxx		xxx	xxx	xxx		xxx	xxx	xxx							
Juneberry (Saskatoon Serviceberry)	AMAL2	6-8			5-7	5-7				5-7	5-6							
{Native to ND} Height Relative Value		7			6	6				6	5							
Amelanchier alnifolia		xxx			xxx	xxx	-	-		xxx	xxx							
Lilac, Common	SYVU	10-12	8-10	8-9	8-10	8-10	8-9	7-9		10-11	8-9	7-9	5-7		5-6	5-6		
Height Relative Value		11	9	8	9	9	8	8		10	8	8	6		5	5		
Syringa vulgaris		***	***	***	***	***	***	***		***	***	***	***		***	***		
Lilac, Late	SYVI3	10-12	8-10		8-10	7-9	6-8			8-11	7-9							
Height Relative Value		11	9		9	9	7			9	8							

MLRA 55A, 55B, 56, 102A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Scientific Name*	Plant Symbol	CTSG 1	CTSG 1K	CTSG 1KK	CTSG 1S $	CTSG 2	CTSG 2K	CTSG 2KK	CTSG 2H	CTSG 3	CTSG 4, 4C, 4CK	CTSG 5, 5K	CTSG 6D, 6DK 6G, 6GK	CTSG 7	CTSG 8K	CTSG 9, 9N	CTSG 9W	CTSG 10
Syringa villosa		***	***		***	***	***			***	***							
Lilac, Peking	SYPE4	12-15	10-13	9-12	10-13	10-13	9-12	8-10		10-13	10-13	8-10	6-8		5-7			
Height Relative Value		13	11	10	11	11	10	9		11	11	9	7		6			
Syringa pekinensis		***	***	***	***	***	***	***		***	***	***	***		***			
Plum, American 2/	PRAM	8-10	7-9		8-10	8-10	7-9			8-10	7-9	5-9	4-7					
{Native to ND} Height Relative Value		9	8		9	9	8			9	8	7	6					
Prunus americana		***	***		***	***	***	-		***	***	***	***					
Rose, Hansen Hedge	ROSA5	4-6	4-6		4-6	4-5	4-5			4-6	4-6	3-4	2-4					
Height Relative Value		5	5		5	4	4			5	5	3	3					
Rosa rugosa 'Hansen'		***	***		***	***	***			***	***	***	***					
Rose, Woods	ROWO	4-5	4-5		4-5	4-5	4-5			4-5	4-5	3-4	2-4					
{Native to ND} Height Relative Value		4	4		4	4	4			4	4	3	3					
Rosa woodsii		***	***		***	***	***			***	***	***	***					
Sandcherry, Western 3/	PRPUB	4-6	3-4		3-4					4-6		4-5	3-5	2-4				
{Native to ND} Height Relative Value		5	3		3					5		4	4	3				
Prunus pumila besseyi		xxx	xxx		xxx	-	-	-		xxx		xxx	xxx	xxx				
Sea-buckthorn (Seaberry)	HIRH8O	9-11	9-11	8-10	8-10	9-11	9-10	8-10		7-9	7-9	6-8			4-5	4-5	4-5	
Height Relative Value		10	10	9	9	10	9	9		8	8	7			4	4	4	
Hippophae rhamnoides		***	***	***	***	***	***	***		***	***	***			***	***	***	
Silverberry	ELCO	6-8	6-8	5-7	5-7	5-7	6-7	5-7		5-7	5-7	5-7	4-5		3-5	3-5	3-4	
{Native to ND} Height Relative Value		7	7	6	6	6	6	6		6	6	6	4		4	4	4	
Elaeagnus commutata		***	***	***	***	***	***	***		***	***	***	***		***	***	***	
Snowberry 11/	SYOC	1-3	1-3			1-3	1-3			1-3	1-3	1-3						
{Native to ND} Height Relative Value		2	2			2	2			2	2	2						
Symphoricarpos occidentalis		***	***			***	***	-		***	***	***						
*** Sumac, Aromatic**	RHAR4	5-10	4-7		4-7	5-8	4-7			5-8	4-7	4-7	3-6					
Height Relative Value		7	5		5	6	5			6	5	5	4					
Rhus aromatica		***	***		***	***	***	-		***	***	***	***					
*** Sumac, Skunkbush**	RHTR	3-7	3-6	3-6	3-6					3-6		3-6	2-5		3-6	2-5		
{Native to ND} Height Relative Value		5	4	4	4					4		4	3		4	3		
Rhus trilobata		***	***	***	***					***		***	***		***	***		
Sumac, Smooth	RHGL	8-12			6-10	6-10				5-10								
{Native to ND} Height Relative Value		10			8	8				7								
Rhus glabra		xxx			xxx	xxx	-	-		xxx								
Viburnum, Nannyberry	VILE	12-16			10-14	10-12				10-12	6-8							
{Native to ND} Height Relative Value		14			12	11				11	7							

MLRA 55A, 55B, 56, 102A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Scientific Name*	Plant Symbol	CTSG 1	CTSG 1K	CTSG 1KK	CTSG 1S $	CTSG 2	CTSG 2K	CTSG 2KK	CTSG 2H	CTSG 3	CTSG 4, 4C, 4CK	CTSG 5, 5K	CTSG 6D, 6DK 6G, 6GK	CTSG 7	CTSG 8K	CTSG 9, 9N	CTSG 9W	CTSG 10
Viburnum lentago		xxx			xxx	xxx				xxx	xxx							
Willow, Bebbs	SABE2	15-20	12-18		17-22	12-18	12-18		12-18		13/							
{Native to ND} Height Relative Value		17	15		19	15	15		15		17							
Salix bebbiana		***	***		***	***	***		***		***							
*** Willow, Purple-osier**	SAPU2	10-15	8-12		12-17	10-15	8-12			7-12	13/							
Height Relative Value		13	10		15	13	10			10	13							
Salix purpurea		***	***		***	***	***			***	***							
Willow, Sandbar	SAIN3	7-9	5-7		7-10	7-9	5-7			4-6	13/							
{Native to ND} Height Relative Value		8	6		9	8	6			5	8							
Salix interior		***	***		***	***	***			***	***							
DECIDUOUS TREES																		
Apricot, Manchurian 2/	PRAR3	12-14			10-12	10-12				11-13	10-12	10-12						
Height Relative Value		13			11	11				12	11	11						
Prunus armeniaca spp		xxx			xxx	xxx				xxx	xxx	xxx						
*** Ash, Green**	FRPE	21-26	19-24	17-21	16-21	18-23	17-21	16-20		20-25	16-20	15-19	14-18		14-18	9-13		
{Native to ND} Height Relative Value		23	21	19	18	20	19	18		22	18	17	16		16	11		
Fraxinus pennsylvanica		***	***	***	***	***	***	***		***	***	***	***		***	***		
Aspen, Quaking	POTR5	27-32	22-27	22-25	27-32	22-27	22-26	22-25			13/							
{Native to ND} Height Relative Value		30	25	24	30	25	24	24			30							
Populus tremuloides		***	***	***	***	***	***	***			***							
Basswood (American Linden) 6/	TIAM	20-25			18-20	15-20				15-21								
{Native to ND} Height Relative Value		22			19	18				18								
Tilia Americana		xxx			xxx	xxx				xxx								
Boxelder	ACNE2	20-25	18-23	16-20	16-21	16-21	18-22	16-20		19-24	13/							
{Native to ND} Height Relative Value		22	20	18	18	18	20	18		21	22							
Acer negundo		***	***	***	***	***	***	***		***	***							
Buckeye, Ohio	AEGL	15-20			12-18					12-18	11-17							
Height Relative Value		17			15					15	14							
Aesculus glabra		xxx			xxx					xxx	xxx							
Cherry, Black	PRSE2	20-25	15-20		18-22	15-20	12-14			15-20	12-14							
Height Relative Value		17	17		20	17	13			17	13							
Prunus serotine		xxx	xxx		xxx	xxx	xxx			xxx	xxx							
*** Cottonwood, Eastern**	PODE3	40-48	38-45		44-50	40-48	38-44				13/							
{Native to ND} Height Relative Value		44	42		46	44	44				44							
Populus spp.		***	***		***	***	***				***							

MLRA 55A, 55B, 56, 102A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Scientific Name*	Plant Symbol	CTSG 1	CTSG 1K	CTSG 1KK	CTSG 1S $	CTSG 2	CTSG 2K	CTSG 2KK	CTSG 2H	CTSG 3	CTSG 4, 4C, 4CK	CTSG 5, 5K	CTSG 6D, 6DK 6G, 6GK	CTSG 7	CTSG 8K	CTSG 9, 9N	CTSG 9W	CTSG 10
*** Crabapple, Manchurian**	MAMA37	18-20	15-17		15-17					16-18	15-17	12-15	9-12					
Height Relative Value		19	16		16					17	16	13	10					
Malus mandsurica		xxx	xxx		xxx					xxx	xxx	xxx	xxx					
Crabapple, Siberian	MABA	18-20	15-17		15-17					16-18	15-17	12-15	9-12					
Height Relative Value		19	16		16					17	16	13	10					
Malus, baccata		xxx	xxx		xxx					xxx	xxx	xxx	xxx					
*** Elm, Siberian**	ULPU	28-35	28-35	24-30	26-32	28-34	24-30	22-28		26-32	22-26	20-25	17-22		10-12	10-12		
Height Relative Value		31	31	27	29	30	27	25		29	24	22	19		11	11		
Ulmus pumila		***	***	***	***	***	***	***		***	***	***	***		***	***		
Hackberry, Common	CEOC	20-25	18-23		16-21	16-21	16-21			20-25	16-18	15-18						
{Native to ND} Height Relative Value		22	20		18	18	18			22	17	16						
Celtis occidentalis		xxx	xxx		xxx	xxx	xxx			xxx	xxx	xxx						
*** Hawthorn, Arnold**	CRAN6	14-18	12-14		12-16					10-12	8-10	10-12	8-10					
Height Relative Value		16	13		13					11	9	11	9					
Crataegus anomala		xxx	xxx		xxx					xxx	xxx	xxx	xxx					
Hawthorn, Downy	CRMO2	12-16	10-12		10-12					12-14	10-12	8-10						
Height Relative Value		14	11		11					13	11	9						
Cratageus mollis		xxx	xxx		xxx					xxx	xxx	xxx						
*** Maple, Amur**	ACGI	12-14								11-12								
Height Relative Value		13								11								
Acer ginnala		xxx								xxx								
Maple, Tatarian	ACTA80	12-14								11-12								
Height Relative Value		13								11								
Acer tataricum		xxx								xxx								
Oak, Bur	QUMA2	20-25	18-23		20-25					18-20	16-18	14-16						
{Native to ND} Height Relative Value		22	20		22					19	17	15						
Quercus macrocarpa		xxx	xxx		xxx					xxx	xxx	xxx						
*** Pear, Ussurian (Harbin)**	PYUS2	16-18			14-16					16-18		11-13						
Height Relative Value		17			15					17		12						
Pyrus, ussuriensis		xxx			xxx					xxx		xxx						
*** Poplar, Hybrid Species**	POPUL	40-48			41-50	40-48					13/							
Height Relative Value		44			45	44					44							
Populus spp.		xxx			xxx	xxx					xxx							
Poplar, White	POAL7	33-40	31-38		33-40	33-40	31-38			25-35								
Height Relative Value		37	33		37	37	33			30								
Populus alba		xxx	xxx		xxx	xxx	xxx			xxx								
Russian-olive (see footnote on page 22)	ELAN	~~15-19~~	~~13-17~~	~~13-17~~	~~13-17~~	~~12-15~~	~~13-17~~	~~13-17~~		~~15-19~~	~~12-15~~	~~11-14~~	11-14		11-14	8-10	6-8	

MLRA 55A, 55B, 56, 102A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Scientific Name*	Plant Symbol	CTSG 1	CTSG 1K	CTSG 1KK	CTSG 1S $	CTSG 2	CTSG 2K	CTSG 2KK	CTSG 2H	CTSG 3	CTSG 4, 4C, 4CK	CTSG 5, 5K	CTSG 6D, 6DK 6G, 6GK	CTSG 7	CTSG 8K	CTSG 9, 9N	CTSG 9W	CTSG 10
Height Relative Value		~~17~~	~~15~~	~~15~~	~~15~~	~~13~~	~~15~~	~~15~~		~~17~~	~~13~~	~~12~~	12		12	9	7	
Elaeagnus angustifolia		zzz	zzz	zzz	zzz	zzz	zzz	zzz		zzz	zzz	zzz	***		***	***	***	
Walnut, Black 1/ 6/ 9/	JUNI	22-28	18-24	17-21	20-26					17-21								
Height Relative Value		25	21	19	24					19								
Juglans nigra		xxx	xxx	xxx	xxx					xxx								
Willow, Laurel	SAPE4	25-30	20-25		28-35	25-30	20-25		20-25		13/							
Height Relative Value		27	23		31	27	23		23		27							
Salix pentandra		xxx	xxx		xxx	xxx	xxx		xxx		xxx							
Willow, Missouri River (Heartleaf)	SAER	25-30	20-25		28-35	25-30	20-25		20-25		13/							
{Native to ND} Height Relative Value		27	23		31	27	23		23		27							
Salix eriocephala		xxx	xxx		xxx	xxx	xxx		xxx		xxx							
Willow, Peachleaf	SAAM2	20-25	15-20		22-27	20-25	18-23		18-23		13/							
{Native to ND} Height Relative Value		23	17		25	23	20		20		23							
Salix amygdaloides		xxx	xxx		xxx	xxx	xxx		xxx		xxx							
*** Willow, White**	SAAL2	30-35	25-30		33-40	30-35	25-30		20-25		13/							
Height Relative Value		33	27		37	33	27		23		33							
Salix alba		xxx	xxx		xxx	xxx	xxx		xxx		xxx							
CONIFERS																		
Juniper, Rocky Mountain	JUSC2	11-13	10-12	10-11	11-13	10-11	10-11	8-10		12-15	10-12	9-11	8-10	7-9	6-9	6-9		
{Native to ND} Height Relative Value		12	11	10	11	10	10	9		13	11	10	9	8	7	7		
Juniperus scopulorum		***	***	***	***	***	***	***		***	***	***	***	***	***	***		
Larch, Siberian	LASI3	16-20			16-20					15-18		13-16						
Height Relative Value		18			18					16		14						
Larix sibirica		xxx			xxx	-				xxx		xxx						
Pine, Ponderosa	PIPO	18-22	15-17	15-17	16-18					18-22		15-20	14-16	12-15	11-14			
{Native to ND} Height Relative Value		20	16	16	17					20		17	15	13	12			
Pinus ponderosa		***	***	***	***	-				***		***	***	***	***			
Pine Scotch	PISY	18-20	15-18		16-18					15-18		15-18	12-14					
Height Relative Value		19	16		17					16		16	13					
Pinus sylvestris		xxx	xxx		xxx	-				xxx		xxx	xxx					
Redcedar, Eastern	JUVI	11-13	10-12	10-11	11-13	10-11	10-11	8-10		12-15	10-12	9-11	8-10	7-9	6-9	6-9		
Height Relative Value		12	11	10	11	10	10	9		13	11	10	9	8	7	7		
Juniperus virginiana		***	***	***	***	***	***	***		***	***	***	***	***	***	***		
Spruce, Black Hills	PIGLD	16-20	14-18		16-20	16-20	14-18			15-18	15-18	10-15						
Height Relative Value		18	16		18	17	16			16	16	13						
Picea glauca var. densata		***	***		***	***	***			***	***	***						

MLRA 55A, 55B, 56, 102A

*Approved cultivars/hybrids on page 25. ***Does well with good site prep & only 1-3 years post plant weed control. xxx Requires good site prep/weed control till canopy closure.

Species Common Name *Scientific Name*	Plant Symbol	CTSG 1	CTSG 1K	CTSG 1KK	CTSG 1S $	CTSG 2	CTSG 2K	CTSG 2KK	CTSG 2H	CTSG 3	CTSG 4, 4C, 4CK	CTSG 5, 5K	CTSG 6D, 6DK 6G, 6GK	CTSG 7	CTSG 8K	CTSG 9, 9N	CTSG 9W	CTSG 10
Spruce, Colorado Blue	PIPU	16-20	14-18		16-20	16-20	14-18			15-18	15-18	10-15						
Height Relative Value		18	16		18	17	16			16	16	13						
Picea pungens		***	***		***	***	***			***	***	***						

$ Indicates that the plants shown as adapted to CTSG 1S soils will require irrigation or timely rains during the first 3-5 years until root systems have reached the capillary fringe of the water table at 15-30 inches deep. Once established, the water table should provide adequate moisture except in times of severe drought that significantly lowers the water table.

Some species such as cottonwoods and willows are assumed to grow taller on the CTSG-1S soils than on the CTSG-1 soils due to unlimited water and their ability to grow on lower nutrient soils as long as water is available.

CULTIVARS, VARIETIES, HYBRID CROSSES AND SUB SPECIES

LEGEND
Common Name
Approved cultivars etc.

Shrubs

Almond, Russian
Prunus tenella 'Regal' 5/

Buffaloberry, Silver
Shepherdia argentea 'Sakakawea' 5/Cherry, Mongolian
Prunus fruticosa 'Scarlet' 5/

Chokeberry, Black
Aronia melanocarpa 'McKenzie' 5/

Chokecherry, Common
Prunus virginiana var. 'Schubert'

Cotoneaster, European
Cotoneaster integerrimus 'Centennial' 5/

Currant, American Black
Ribes americanum 'Riverview Germplasm' 5/

Dogwood, Silky
Cornus amomum 'Indigo'

Forsythia
Forsythia europea x F. ovata 'Meadowlark'

Honeysuckle, Blueleaf
Lonicera korolkowii 'Freedom'

Honeysuckle, Tatarian
Lonicera tatarica 'Arnolds Red'

Indigo, False
Amorpha fruiticosa 'Survivor' 5/

Lilac, Late
Syringa villosa 'Legacy' 5/

Plum, American
Prunus Americana 'Prairie Red' 5/

Sumac, Aromatic
Rhus aromatica 'Konza 5/ *'*

Sumac, Skunkbush
Rhus trilobata 'Bighorn' 5/

Willow, Purpleosier
Salix purpurea 'Streamco' (does not sucker)

Willow, Sandbar
Salix interior 'Silver Sands' 5/

Trees

Ash, Green
Fraxinus pennsylvanica 'Cardan' 5/

Cottonwood, Species
Populus x euroamericana (Siouxland Cottonwood) 7/

Crabapple, Manchurian
Malus mandshurica 'Midwest' 5/

Elm, Siberian
Ulmus pumila 'Dropmore'

Hackberry, Common
Celtis occidentalis 'Oahe' 5/
Celtis occidentalis 'Prairie Harvest' 5/

Hawthorn, Arnold
Crataegous anomala 'Homestead' 5/

Pear, Ussurian (Harbin)
Pyrus ussuriensis 'McDermand' 5/

Poplar, Hybrid
Populus x canescens (Tower Poplar)
Populus x jackii (Northwest Poplar)8/
Populus 'Walker'
Populus x euramericana (Robusta Poplar) 1/
Populus x euramericana (Imperial Poplar) 5/
Populus x euramericana (Norway Poplar) 1/
Populus x euramericana (Raverdeau)

Willow, White
Salix alba 'vitellina' (Golden Willow)
Salix alba 'chermesina' (Red Twig Willow)
Salix alba 'Flame' (Flame Willow) 9/

Legend For Conservation Tree & Shrub Groups

* This species of plant has cultivars, varieties, hybrid crosses, or sub species that are also appropriate for planting wherever the parent species is recommended. See the attached list for the approved cultivars, varieties, hybrid crosses, or sub species.

xxx This species is suitable for cultivated plantings only. Site preparation consists of complete control of competing vegetation prior to planting. Usually this vegetation control is completed the season before planting in order to harvest and store water in the soil. Chem fallow or tillage are common site preparation methods. Competing vegetation, especially vigorous sods are controlled throughout the life of the planting or until canopy closure. Control methods may consist of tillage, mulches, chemicals, or synthetic weed control fabrics.

*** This species is suitable for cultivated and noncultivated plantings. Noncultivated plantings are those plantings where little, if any, weed control is performed beyond the third year after planting.

Site preparation for noncultivated plantings may be performed a year before planting in order to store additional water, or it may be performed just before, or right at planting time (i.e. strip till, chemical burn down, scalping). Examples of noncultivated plantings are wildlife plantings, scattered shrub plantings, windbreak plantings where little weed control is anticipated, or plantings where onsite erosion potential is high. Noncultivated plantings would likely become fully sodded within 1-4 years after planting to trees or shrubs. Survival and vigor of a noncultivated planting will be reduced from the heights listed on pages 8-19.

ZZZ By ND NRCS policy Russian olive cannot be planted on these CTSG's.

Note: The difference between cultivated and noncultivated plantings is not the planting method used, but rather the extent and duration of weed control expected after the trees and shrubs have been planted.

No xxx or *** or tree height figures means the tree or shrub is **not suitable** for planting on those suitability groups.

Footnotes For Conservation Tree & Shrub Groups

1/ Suitable for plantings south of Interstate 94.

2/ This species has a serious decline in vigor in 10 years or less.

Species would benefit from coppice regeneration when showing decline.

3/ This species has a serious decline in vigor after 5 years.

Species would benefit from coppice regeneration when showing decline.

4/ This species has a high susceptibility to the honeysuckle aphid which results in witches broom and potential death of the plant. It is suitable, but some released varieties show greater aphid resistance.

5/ Variety released jointly by NRCS Plant Materials Center, Agricultural Research Service, and/or individual land grant Universities.

6/ This species is suitable for planting in the area listed only if planted where protected by mature windbreaks, forest stands, or microclimates protected by topographic features. Certain individual plants will do well and others will die. Generally slow-growing plants survive best.

7/ Though resistant to leaf blight (rusts) it is very susceptible to canker diseases and suffers severe dieback and death at an early age.

8/ Though somewhat resistant to canker diseases, it is very prone to leaf blight (rusts).

9/ This species should only be planted in MLRA 56.

10/ To reduce the negative effects of salinity, herbaceous vegetation should be maintained between the rows and to within a few feet of each tree or shrub. Bare soils will make the salinity problems worse.

11/ This plant is not suitable for windbreaks. It is too short to be effective.

12/ Subject to fire blight. Use cautiously, especially in areas where fire blight is prevalent.

13/ All of the willows, native cottonwood, hybrid poplars, and aspen can be considered for planting on specific individual CTSG 4 and 4C soils once an on-site evaluation has confirmed the presence of sufficient moisture to ensure establishment and long term survival. The following soils within MLRA 55 and 56 have the potential for cottonwood, hybrid poplars, aspen, and willow production pending investigation results: Wahpeton, Fargo, Fargo silty clay, Fargo clay, Grano-drained, Dovry poorly drained, and Ludden. Tree heights, for these particular species, found under CTSG-1 can be used for height estimates when planted on appropriate CTSG-4 and 4C soils. Willows, cottonwoods, hybrid poplars, or aspen are not to be planted on other CTSG 4 and 4C soils.

References:

Dirr, M. A. 1977. Manual of woody landscape plants: their identification, ornamental characteristics, culture, propagation and uses. Stipes Publishing Company. Champaign

Farrar, J. L. 1995. Trees of the northern United States and Canada. Iowa State University Press. Ames

Herman, D. E., C. M. Stange, v. C. Quam. 1996. North Dakota tree handbook. North Dakota State Soil Conservation Committee. Bismarck

Hoag, D. G. 1965. Trees and shrubs for the northern plains. North Dakota Institute for Regional Studies. Fargo

Lafromboise, R. Nursery manager. Towner State Nursery. Towner. (Personal communication.)

Logar, Robert, MT Technical Guide, Section II, Windbreak Interpretations, 2007.

Morgenson, G. 2001 Nursery manager. Lincoln-Oakes Nursery. Bismarck. (Personal communication.)

Rosendahl, C. O. 1955. Trees and shrubs of the upper Midwest. University of Minnesota Press. Minneapolis

Seiler, Steve, NRCS State Soil Scientist, (personal communications)

Stephens, H. A. 1973. Woody plants of the north central plains. The University Press of Kansas. Lawrence/Manhattan/Wichita

Tober, D. 2001. Plant material specialist. Natural Resources Conservation Service. Bismarck. (Personal communication.)
USDA-NRCS PLANTS Database. 2001. http://plants.usda.gov/.

Note: When differences existed between references, the PLANTS database was used for resolution.