Trees and Shrubs
for the
Red River Valley

Results of Performance Trials at Crookston, Minnesota

NRCS
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Plant Materials Center
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Acknowledgement

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Compiled by Michael Knudson, Forester
USDA, NRCS Plant Materials Center
Bismarck, North Dakota

Introduction

Soon after the Northern Plains was settled in the late 1800s, European immigrants and pioneers started planting trees to protect their buildings, livestock, and crops. There were laws passed encouraging, and sometimes requiring the planting of trees. The early residents used whatever seedlings were available locally to plant windbreaks. These were proven native plants that could survive the extremes of heat, cold, and drought common to the plains.

In 1913, the North Dakota legislature passed legislation authorizing the start of a tree nursery under the direction of the State Forester of the North Dakota State Forest Service. In 1916, the USDA Northern Great Plains Field Station at Mandan, North Dakota, began shelterbelt demonstration projects in several states in the Northern Plains. In the 1930s, the Soil Conservation Service (SCS) Nurseries began providing trees and shrubs for windbreaks. At that time, the recommended species were Russian olive (*Elaeagnus angustifolia)*, eastern red cedar (*Juniperus virginiana)*, ponderosa pine (*Pinus ponderosa)*, green ash (*Fraxinus pennsylvanica)*, cottonwood (*Populus deltoides)*, Siberian elm (*Ulmus pumila)*, caragana (*Caragana arborescens)*, and common lilac (*Syringa vulgaris)*.

In 1954, the SCS Plant Materials Center (PMC) at Bismarck was established. John McDermand served as the first SCS employee with plant materials responsibility. A principal task of the PMC was tree improvement. This consisted of seed source studies, selection of superior plants, progeny testing, and establishment of seed orchards. Many of the new tree and shrub species that John McDermand began evaluating were grown from seed collected at the Agriculture and Agri-Food Canada Arboretum at Morden, Manitoba. One of the first plants he collected there was the Ussurian or Harbin pear, which the Arboretum had received from South Dakota State University at Brookings. The Bismarck PMC named and released 'McDermand' Ussurian pear in honor of John McDermand in 1993.

In the spring of 1980, many of these promising selections were planted in the newly established Field Evaluation Planting (FEP) near the University of Minnesota campus at Crookston, Minnesota. The PMC staff, with the assistance of SCS Field Office staff, West Polk County Soil and Water Conservation District (WPCSWCD) staff, and Northwest Research and Outreach Center (NWROC) staff annually added new plants until 1996. A complete list of all species and seed sources (accessions) that were planted is recorded in Table 3 (page 9). Both private nurseries and other USDA agencies provided plants for testing.

Many of these accessions came from other countries, often via the USDA Agricultural Research Service Plant Introduction Stations and the Arboretum at Morden Research Center, operated by Agriculture and Agri-Food Canada at Morden, Manitoba. Many of these did not survive more than a few years. The survival of woody plants in the plains is greatly influenced by soil and climate. The soils at this site affected the survival and growth rates of many of these trees and shrubs. The last year the plants were evaluated was in 1999. The trees remaining in the planting at that time are listed in Table 4 (page 18).

In the period between 1980 and 1996, a total of 150 seed sources or accessions of 89 different species (taxa) were planted (Table 3, page 9). There can be great differences in performance between different accessions within a species. Only by observing these plants over a number of years, at several locations, is it possible to find the best plants for conservation.

Study Information

Cooperators

- USDA Natural Resources Conservation Service (NRCS), Plant Materials Center, Bismarck, North Dakota
- University of Minnesota, Northwest Research and Outreach Center, Crookston, Minnesota
- West Polk Soil and Water Conservation District, Crookston, Minnesota

Site Description

The FEP is located two miles north of Crookston, Minnesota, adjacent to the University of Minnesota-Crookston campus. The legal description is Section 19, T.150 N., R.46 W., Polk County. This site lies in Major Land Resource Area (MLRA) 056, the Red River Valley of the North. The elevation is about 890 feet above sea level. See Figure 1 for an aerial view of the study location.

Figure 1. Aerial map shows the location of the field evaluation planting within the drawn boundary.

Soils

The soils in the Red River valley developed under the natural vegetation of the tall grass prairie. The soil at this site is a Bearden silty clay loam. The Bearden soil series is somewhat poorly drained, dark colored, medium textured soil developed from calcareous, lacustrine clay. The black, friable silty clay loam surface soil is 7-9 inches thick, has a high organic matter, and is mildly to moderately alkaline. There is no developed subsoil. The surface layer is underlain by relatively unweathered calcareous sediment. This substance is a dark, grayish-brown silty clay loam. Permeability is moderately slow and available water capacity is high. Inherent fertility and organic matter are high and runoff is slow.

Bearden silty clay loam is in Minnesota windbreak suitability group 1K. These are calcareous soils with a surface pH of 7.5-8.5. The soil is well suited to farming and to trees. Controlling soil blowing, improving fertility, and maintaining tilth are the main concerns of management. These soils are on a lake plain that has a slight micro-relief of alternate ridges and shallow swales. A nutrient imbalance resulting from the strongly calcareous condition of this soil also influences use and management.

Climate

The climate at Crookston is subhumid, mid-continental, and characterized by wide variations in temperature from summer to winter. There is often variation in extremes of temperature from year to year. The average precipitation at Crookston is around 20 inches, but this can vary considerably from year to year, both in timing during the year and in total amounts. These variations in temperature and precipitation can have serious influence on tree growth. In 1980, the first year of planting at this site, the annual precipitation was a little over 14 inches. This was the driest year during the period from 1980-2000. Weather records for 1980 indicate that precipitation was below normal for the months of February through July. The records at the weather station in Crookston also indicate that the temperatures in the spring were well above normal. Many of the trees planted that first year did not get established.

In 1981, the temperatures were once again above average. This was the second warmest year in the previous 92-year history of climatological data at Crookston. During the 20-year period of this study, the highest annual precipitation was 27.37 inches in 1998. The plant hardiness zone in this part of Minnesota is 3b, with an average annual minimum temperature of -40^{o} to -30^{o} F.

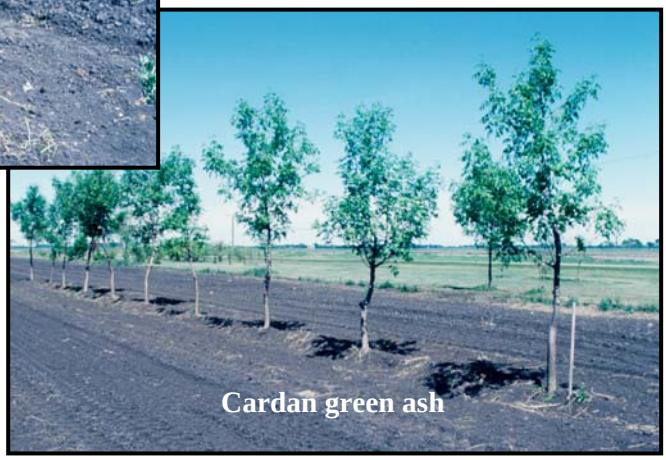
Planting Plan

The plots were not randomized or replicated but systematically arranged for ease of evaluation and demonstration purposes. The site is divided into 5 blocks (Figure 2, page 5). Block I consists of shrubs, Block II medium trees, Block III tall trees, Block IV conifers, and Block V poplars. Each block is arranged into single-row non-replicated plots. Generally, each plot contains 10 plants. The spacing is 20 feet between rows. The spacing between plants is 5 feet for shrubs, and 10 feet for trees. Row length is 100 feet. Like species and standards of comparison were planted in adjacent plots wherever possible.

Watering trees after planting

Harold Scholten installing tree protector

Sakakawea silver buffaloberry



Cardan green ash

Figure 2. Crookston FEP Map (Accessions marked in green were above average in vigor) **south ⇧**

	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13
Block 5			9058871 hybrid poplar	**9058872 hybrid poplar**	9063141 eastern cottonwood --- Assiniboine hybrid poplar	ND-3796 white poplar	Lydick eastern cottonwood	**Ashford eastern cottonwood**		**Platte eastern cottonwood**	9058899 Austree --- 9063140 native cottonwood		
Block 4	9076724 Russian olive --- 9069166 Russian olive	9076723 Siberian elm					ND-3787 northern white cedar		Mich-1841 northern white cedar	Mich-1468 northern white cedar	9058862 tamarack		
Block 3	**Cardan green ash**	**Oahe hackberry**	9047239 Ohio buckeye	SD-211 hackberry --- SD-75 hackberry	9069170 English oak --- **ND-3778 green ash**	**ND-647 black ash**	ND-428 black walnut	9047231 Russian olive	9057410 hackberry	9063115 green ash --- 9063116 black ash	9054820 Siberian elm --- 9016138 Siberian elm	9057412 bur oak	9057405 paper birch
Block 2	514677 American plum		9063143 red tatarian honeysuckle --- 9069080 Arnold's Red honeysuckle	Red Splendor flowering crabapple	9063126 Japanese elm	9063127 white ash	9063148 Amur corktree --- 9069129 Amur chokecherry	9069081 littleleaf linden	ND-19 Arnold hawthorn		9069128 Tatarian honeysuckle		ND-1567 hawthorn
Block 1	**Regal Russian almond** ND-313 honeysuckle **Schubert chokecherry**	common lilac --- ND-11 Amur honeysuckle	**Meadowlark Forsythia** --- 9063142 Japanese cherry	ND-170 European cotoneaster --- **Indigo silky dogwood**	Centennial European cotoneaster	**Sakakawea silver buffaloberry**	**Scarlet Mongolian cherry**	9047236 false indigo --- 9047238 sea buckthorn	**Silver Sands sandbar willow / Survivor false indigo**	**Legacy late lilac**	ND-2103 European cranberry --- ND-2507 pigmy caragana	**Streamco willow**	Hedgeking honeysuckle

Plot Maintenance

A clean, firm planting site was prepared by cultivation. All trees and shrubs were planted by hand in the spring. Replacements were planted the second year and third year as needed. In drought years, newly planted materials were watered by hand. The NWROC personnel cultivated the plots between rows. The WPSWCD took care of the with-in row maintenance. Some perennial weed problems developed, which were treated with glyphosate.

Dead trees were removed and damaged branches were pruned regularly. In the early 1980s, rabbits caused a lot of damage in the planting, especially on many of the newly planted conifers. Animal repellents were applied in the fall of 1980, 1981, and 1982 with little success. There was also considerable winter damage on many accessions.

Evaluations and Results

Information on planting date, survival, vigor, canopy width, and plant height were recorded starting in 1980. In the fall of each year since then, measurements were taken on selected plants. An evaluation schedule, based on year of planting, was followed for each accession. See Table 4 (page 18) for a record of trees surviving after 20 years.

In the 20-year period of 1980-1999, the extremes of temperature and precipitation, combined with a less than ideal soil, had a significant effect on plant survival. One of the key measures of performance is plant vigor, which is a combination of plant form and plant health. Fireblight is a serious problem for fruit trees on these poorly drained soils. Failure of individual accessions was often affected by adverse weather conditions in the first few years after planting. If these same accessions had been planted in years of adequate moisture, they would likely have performed much better. Failure at this site in this time period does not necessarily mean that a particular species should not be planted on other sites with better soils.

A number of accessions have done well. There were more shrubs than medium to tall trees which had above average vigor. Most medium to tall trees need well drained, or moderately well drained soils, to reach their full potential. Table 1 (page 7) lists some of the woody plants, which had above average vigor in the late 1990s. These accessions are shown in green on Figure 2 (page 5). In a brief field visit in 2005, most of these accessions still look good (see photos on page 8). There were a number of accessions which grew well their first 5-10 years, but later started to decline.

Information gathered from evaluation of these plants was used to help support the release of a number of trees and shrub varieties. Table 2 (page 7) lists accessions which performed well at the Crookston FEP and were released as commercial varieties by the Bismarck PMC.

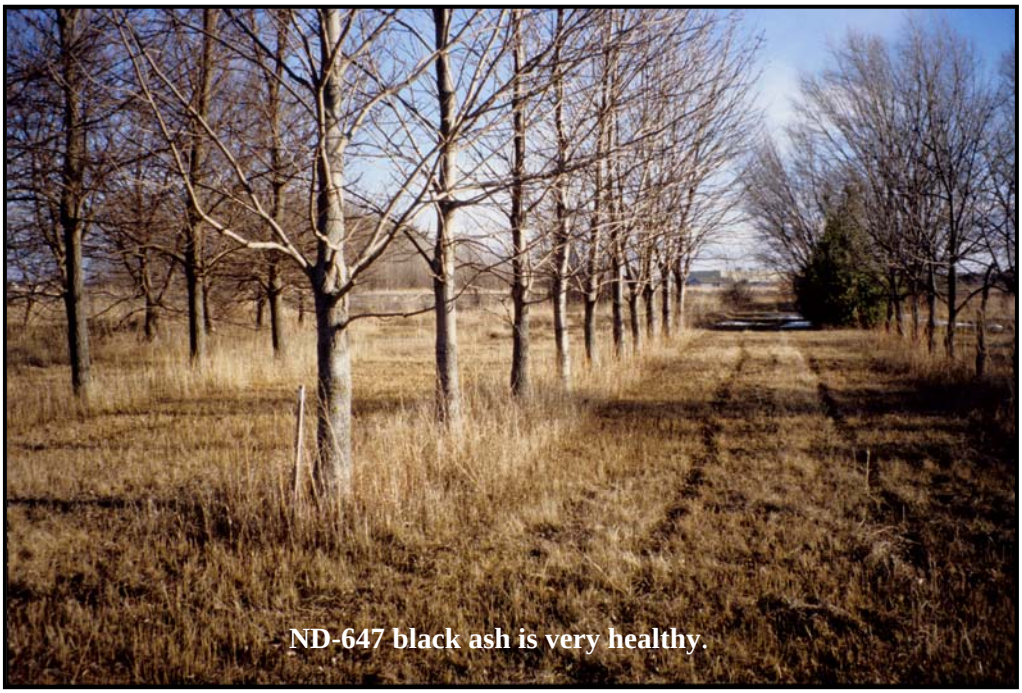
Table 1: Recommended Plants

Species	Uses
Schubert chokecherry	Landscaping, wildlife
Regal Russian almond	Landscaping, shelterbelts
Meadowlark Forsythia	Landscaping
Indigo silky dogwood	Landscaping, wildlife
Sakakawea silver buffaloberry	Shelterbelts, wildlife
Silver Sands sandbar willow	Riparian plantings
Cardan green ash	Shelterbelts
Oahe hackberry	Shelterbelts
ND-647 black ash	Shelterbelts
Ashford eastern cottonwood	Shelterbelts
Platte eastern cottonwood	Shelterbelts
Survivor false indigo	Riparian plantings, wildlife
Streamco willow	Riparian plantings, wildlife
Legacy late lilac	Landscaping, shelterbelts

Table 2: Tree and Shrub Releases (Bismarck PMC and cooperators)

Cultivar	Common Name	Year of Release
Cardan	Green ash	1979
Oahe	Hackberry	1984
Sakakawea	Silver buffaloberry	1984
Scarlet	Mongolian cherry	1984
Regal	Russian almond	1997
Silver Sands Germplasm	Sandbar willow	2005
Survivor Germplasm	False indigo	2005

Turtle Mountain source of white birch with eastern cottonwood in background.



ND-647 black ash is very healthy.

Table 3: Woody Planting Record at Crookston, Minnesota Field Evaluation Planting

Scientific Name	Accession	Common Name	Origin/Source	Year Planted	Year Removed/Remarks
Abies	9057427	Siberian fir	U of MN, St. Paul, MN	1981	1989, poorly adapted
Acer ginnala	ND-629	Amur maple	Asia/Morden, Manitoba	1980	1991, chlorotic
	Flame	Amur maple	Asia/PMC, Elsberry, MO	1980	1988, not adapted
Acer saccharinum	ND-3825	silver maple	Burleigh Co., ND	1983	1988, not adapted
	ND-3886	silver maple	Lawyer Nursery, Plains, MT	1983	1987, not adapted
Aesculus glabra	9047239	buckeye	Bismarck, ND (Haas)	1987	
Amorpha fruticosa	9047236	false indigo	Burleigh Co., ND/LON, Bismarck, ND	1987	
	Survivor	false indigo	PMC, Aberdeen, ID	1987	
Aronia melanocarpa	323957	chokeberry	Russia/ARS, Ames, IA	1988	1997, high pH soils
Berberis koreana	ND-3744	Korean barberry	Asia/NDSU, Fargo, ND	1988	1990, poorly adapted
Betula nigra	9063130	river birch	MN Forestry Association	1993	1995, high pH soils
Betula papyrifera	9063129	paper birch	MN Forestry Association	1993	1995, high pH soils
	9057405	paper birch	Turtle Mountains, ND Forest Service	1988	
Betula pendula	9076722	European white birch	Russia/ARS, Mandan, ND	1996	1997, poorly adapted
Caragana pygmaea	ND-2507	pygmy caragana	Asia/Bottineau, ND	1988	
Celtis occidentalis	Oahe	hackberry	SD/ARS, Mandan, ND	1980	
	SD-75	hackberry	Potter Co., SD	1981	
	SD-211	hackberry	Sanborn Co., SD	1981	
	9057410	hackberry	Denbigh, ND/NDFS, Towner, ND	1988	
	ND-471	hackberry	Research Station, Morden, Manitoba	1982	1986, not adapted

Scientific Name	Accession	Common Name	Origin/Source	Year Planted	Year Removed/Remarks
Cornus amomum	Indigo	silky dogwood	PMC, Rose Lake, MI	1983	
Corylus x	9076683	hybrid hazel	Badgersett Nursery, Preston, MN	1995	1997, poor stock
	9076684	hybrid hazel	Badgersett Nursery, Preston, MN	1995	1997, poor stock
Corylus americana	9057409	American hazel	Bottineau Co., ND/NDFS, Towner, ND	1988	1995, high pH soils
Cotoneaster integerrimus	ND-170	European cotoneaster	Asia/Kingsbury Co., SD	1990	
	ND-177	European cotoneaster	Asia/ARS, Cheyenne, WY	1986	
Crataegus	ND-1567	native hawthorn	Wells Co., ND	1988	
Crataegus arnoldiana	ND-19	Arnold hawthorn	Morden, Manitoba	1984	
Elaeagnus angustifolia	King Red	Russian olive	Russia/PMC, Tucson, AZ	1988	
	9076724	Russian olive	Russia/ARS, Mandan, ND	1996	
	9069166	Russian olive	Volgograd, Russia	1996	
Forsythia europea x ovata	Meadowlark	forsythia	Arnold Arboretum/NDSU, Fargo, ND	1989	
Fraxinus americana	9063127	white ash	WI/Lincoln-Oakes Nursery, Bismarck, ND	1992	
Fraxinus nigra	ND-647	black ash	Morden, Manitoba	1981	
	9063116	black ash	Itasca State Park, MN	1995	
Fraxinus pennsylvanica	Cardan	green ash	MT/ARS, Mandan, ND	1980	
	9063115	green ash	Itasca State Park, Park Rapids, MN	1995	
	ND-3778	green ash	Lee Nursery, Fertile, MN	1981	
Gleditsia triacanthos	ND-1863	honey locust	Brown Co., SD	1982	1987, not adapted
	ND-1879	honey locust	Woodward, OK	1980	1985, poorly adapted

Scientific Name	Accession	Common Name	Origin/Source	Year Planted	Year Removed/Remarks
Hippophae rhamnoides	9047238	seaberry	PFRA, Indianhead Nursery, Saskatchewan	1987	
Juglans nigra	ND-428	black walnut	NDSU, Fargo, ND	1985	
	9063098	black walnut	Big Sioux Nursery, Watertown, SD	1991	1995, winter injury
Larix laricina	9058862	tamarack	Chippewa Farms, MN	1990	1995, poor survival
Larix sibirica	ND-1729	Siberian larch	Asia/NDFS, Towner, ND	1987	1996, poorly adapted
	9057428	Siberian larch	Asia/U of MN, St. Paul, MN	1981	1985, poorly adapted
	SL-383-T	Siberian larch	Asia/USFS, Bottineau, ND	1980	1992, drought?
	ND-1765	Siberian larch	Asia/USFS, Bottineau, ND	1980	1994, poorly adapted
	ND-500	Siberian larch	Research Station, Morden, Manitoba	1980	1994, poorly adapted
	9057414	Siberian larch	Krasnoyarsk Krain, USSR	1988	1994, not adapted
	9057415	Siberian larch	Ivanouskaya oblast, USSR	1988	1992, drought?
	9057416	Siberian larch	Raivola, Finland	1988	1994, poorly adapted
	9057417	Siberian larch	Ural Mountains, USSR	1988	1994, poorly adapted
Lonicera korolkowii	Freedom	honeysuckle	U of MN, Lincoln-Oakes Nurs., Bismarck, ND	1990	1997, winter damage
Lonicera maackii	ND-11	Amur honeysuckle	Asia/Morden, Manitoba	1981	
	Cling-Red	Amur honeysuckle	Asia/PMC, Elsberry, MO	1987	1991, not winter hardy
	Rem-Red	Amur honeysuckle	Asia/Cape May, NJ	1988	1990, not winter hardy
Lonicera tatarica	9069080	Tatarian honeysuckle	Asia/Lee Nursery, Fertile, MN	1993	
	9063143	Tatarian honeysuckle	Asia/Schumacher Berry Farm, MN	1993	
	9069128	Tatarian honeysuckle	Asia/Big Sioux Nursery, Watertown, SD	1995	
Lonicera tatarica sibirica	ND-313	Tatarian honeysuckle	Asia/ARS, Cheyenne, WY	1980	
Lonicera xylosteoides	Hedge King	honeysuckle	Asia/Wedge Nursery, Albert Lea, MN	1988	
Malus	Magenta	crabapple	PMC, Rose Lake, MI	1992	1998, poorly adapted

Scientific Name	Accession	Common Name	Origin/Source	Year Planted	Year Removed/Remarks
Malus baccata	Red Splendor	Siberian crabapple	Lee Nursery, Fertile, MN	1981	
Malus mandshurica	Midwest	Manchurian crabapple	Asia/Morden, Manitoba	1981	1990, high pH soils
Malus sargentii	Roselow	Sargent's crabapple	PMC, Rose Lake, MI	1983	1988, not adapted
Phellodendron sachalinense	9063148	corktree	Clay Co., MN shelterbelt	1995	
Picea abies	ND-1724	Norway spruce	Europe/USFS, Lincoln, NE	1980	1981, rabbit damage
	?	Norway spruce	Europe/U of MN, Cloquet Forestry Center	1980	1981, rabbit damage
	ND-3791	Norway spruce	Europe/U of MN, St. Paul, MN	1981	1995, poorly adapted
Picea mariana	9058847	black spruce	U of Minnesota	1989	1995, poorly adapted
Pinus densiflora	ND-1720	Japanese red pine	Japan/USFS, Lincoln, NE	1980	1981, rabbit damage
Pinus nigra	ND-1715	Austrian black pine	Spain/USFS, Lincoln, NE	1980	1981, rabbit damage
Pinus nigra caramanica	ND-1714	Crimean pine	Balikesir, Turkey/USFA, Lincoln, NE	1980	1981, rabbit damage
Pinus nigra pallasiana	ND-1710	Crimean pine	Ilgaz, Turkey/USFS, Lincoln, NE	1980	1981, rabbit damage
	ND-1712	Crimean pine	Karsanti, Turkey/USFS, Lincoln, NE	1980	1981, rabbit damage
Pinus nigra x densiflora	ND-1716	hybrid pine	USFS, Lincoln, NE	1980	1981, rabbit damage
Pinus ponderosa	9057413	ponderosa pine	MT/NDFS, Bottineau, ND	1988	1990, not adapted
	9058865	ponderosa pine	U of MN, St. Paul, MN	1981	1995, poorly adapted
Pinus rigida	ND-1721	pitch pine	ME/USFS, Lincoln, NE	1980	1981, rabbit damage
Pinus sylvestris	ND-1717	Scots pine	Greece/USFS, Lincoln, NE	1980	1981, rabbit damage
	ND-1718	Scots pine	Turkey/USFA, Lincoln, NE	1980	1981, rabbit damage

Scientific Name	Accession	Common Name	Origin/Source	Year Planted	Year Removed/Remarks
Populus	Canam	hybrid Walker poplar	ARS, Mandan, ND	1990	1993, not adapted
	Manitou	hybrid poplar	ARS, Mandan, ND	1990	1993, not adapted
	14394	hybrid poplar	ARS, Mandan, ND	1991	1995, not adapted
	Assiniboine	hybrid poplar	PFRA, Indianhead, Sask.	1993	
	Raverdeau	hybrid poplar	Lee Nursery, Fertile, MN	1993	1994, poorly adapted
	Theves	hybrid poplar	Lee Nursery, Fertile, MN	1993	1994, poorly adapted
Populus x canadensis	Imperial	Carolina poplar	NRCS, PMC, Rose Lake, MI	1981	1985, poorly adapted
Populus alba	ND-3796	white poplar	McKenzie FEP, McKenzie, ND/PMC	1993	
Populus deltoides	9063141	eastern cottonwood	Lincoln-Oakes Nursery, Bismarck, ND	1993	
	Siouxland	eastern cottonwood	Lincoln-Oakes Nursery, Bismarck, ND	1981	1985, poorly adapted
	Lydick	eastern cottonwood	Dept. of Forestry, U of NE, Lincoln, NE	1982	
	Ashford	eastern cottonwood	Dept. of Forestry, U of NE, Lincoln, NE	1982	
	Platte	eastern cottonwood	Dept. of Forestry, U of NE, Lincoln, NE	1982	
	Mighty Mo	eastern cottonwood	Dept. of Forestry, U of NE, Lincoln, NE	1982	1985, not winter hardy
Populus deltoides x balsamifera	ND-3786	Northwest poplar	Lincoln-Oakes Nursery, Bismarck, ND	1981	1988, not adapted
Populus deltoides x nigra	14271	Walker poplar	ARS, Mandan, ND	1990	1993, poorly adapted
	14272	Walker poplar	ARS, Mandan, ND	1990	1993, poorly adapted
	14273	Walker poplar	ARS, Mandan, ND	1990	
	14274	Walker poplar	ARS, Mandan, ND	1990	
	9063146	Walker poplar	PFRA, Indianhead, Saskatchewan	1993	1997, high pH soils
	ND-3781	Robusta poplar	Lincoln-Oakes Nursery, Bismarck, ND	1981	1985, poorly adapted
	Nor'easter	hybrid poplar	Nebraska/NRCS, PMC, Bismarck, ND	1981	1985, poorly adapted
Populus laurifolia	ND-3779	Manchurian poplar	Asia/Lee Nursery, Fertile, MN	1981	1988, not adapted
Populus sargentii	9063140	plains cottonwood	ARS, Mandan, ND	1995	

Scientific Name	Accession	Common Name	Origin/Source	Year Planted	Year Removed/Remarks
Populus tremuloides	9069090	quaking aspen	Lee Nursery, Fertile, MN	1993	1993, poorly adapted
Prunus	9063142	Japanese cherry	Asia/Lincoln-Oakes Nursery, Bismarck, ND	1993	
	ND-1134	select plum	Hand Co., SD	1985	1999, high pH soil
Prunus americana	514677	native plum	PMC, Manhattan, KS	1990	
Prunus angustifolia	9049970	chickasaw plum	PMC, Manhattan, KS	1990	1996, not adapted
Prunus armeniaca	ND-2102	apricot	Asia/Hand County, SD	1986	1990, fireblight
Prunus fruticosa	Scarlet	Mongolian cherry	Asia/Morden, MB	1986	
Prunus maackii	9069129	Amur chokecherry	Asia/Big Sioux Nursery, Watertown, SD	1995	
Prunus padus	SD-131	mayday	Asia/Moody Co., SD	1986	1990, poorly adapted
Prunus tenella	Regal	Russian almond	Asia/ND Game & Fish/LON, Bismarck, ND	1980	
Prunus virginiana	Schubert	chokecherry	ARS, Mandan, ND	1980	
Pseudotsuga menziesii	9057426	Douglas fir	U of MN, St. Paul, MN	1981	1989, poorly adapted
	ND-1722	Douglas fir	Douglas Co., CO/USFS, Lincoln, NE	1980	1981, rabbit damage
Ptelea trifoliata	ND-624	common hoptree	Ramsey Co., ND (old nursery)	1982	1986, not adapted
Pyrus ussuriensis	McDermand	Ussurian pear	Manchuria/Morden, Manitoba	1980	1988, high pH soils
Quercus macrocarpa	9057412	bur oak	Foster Co., ND/NDFS, Towner, ND	1988	
	K-1407	bur oak	PMC, Manhattan, KS	1990	
	ND-630	bur oak	Barnes County, ND	1987	1989, not adapted

Scientific Name	Accession	Common Name	Origin/Source	Year Planted	Year Removed/Remarks
Quercus robur	9069170	English oak	Russia/ARS, Mandan, ND	1996	
Robinia pseudoacacia	ND-3804	black locust	Darby, MT/NDFS, Towner, ND	1982	1985, not winter hardy
Salix	ND-3773	willow	Norman Co., MN	1982	1988, poorly adapted
Salix fragilis	370126	crack willow	Russia/ARS, Glenn Dale, MD	1982	1988, not adapted
Salix humilis	ND-995	prairie willow	ARS, Ames, IA	1982	1989, drought
Salix interior	Silver Sands	sandbar willow	Charles City, IA/NDSU, Fargo, ND	1990	
Salix matsudana x alba	9058896 (C)	austree	Austree Inc., Pescadero, CA	1991	
	9058899	austree	Austree Inc., Pescadero, CA	1991	
	9058897	austree	Austree Inc., Pescadero, CA	1990	
Salix pentandra	Mich-433	laurel leaf willow	Europe/PMC, Rose Lake, MI	1982	1989, dieback, aphids
Salix purpurea	Streamco	purpleosier willow	Europe/ PMC, Big Flats, NY	1990	
Shepherdia argentea	Sakakawea	silver buffaloberry	Morden, Manitoba	1986	
Syringa pekinensis	ND-686	Pekin lilac	Asia/Lincoln-Oakes Nursery, Bismarck, ND	1982	1990, poorly adapted
Syringa villosa	Legacy	late lilac	China/Morden, Manitoba	1988	
Thuja occidentalis	ND-1723	northern white cedar	Canada/USFS, Lincoln, NE	1980	1981, rabbit damage
	Mich-1841	northern white cedar	PMC, Rose Lake, MI	1983	
	Mich-1468	northern white cedar	PMC, Rose Lake, MI	1983	
	ND-3787	northern white cedar	U of MN, St. Paul, MN	1981	
Tilia cordata	9069081	littleleaf linden	Europe/Lee Nursery, Fertile, MN	1993	

Scientific Name	Accession	Common Name	Origin/Source	Year Planted	Year Removed/Remarks
Ulmus japonica	9063126	Japanese elm	Manchuria/PFRA, Indianhead, Saskatchewan	1992	
Ulmus parvifolia	Elsmo	Chinese lacebark elm	Asia/PMC, Elsberry, MO	1990	1993, winter injury
Ulmus pumila	9016318	Siberian elm	Asia/PMC, Bridger, MT	1995	
	9054820	Siberian elm	Asia/PMC, Bridger, MT	1995	
	9076723	Siberian elm	Russia/ARS, Mandan, ND	1996	
Viburnum lentago	ND-21	nannyberry	ARS, Mandan, ND	1986	1990, high pH soils
Viburnum opulus	399414	European cranberry	Yugoslavia/ARS, Ames, IA	1988	

Key to Table 4. Plant data.

PLOT LOCATION = plot location of the plant material within the evaluation
ACCESSION NUMBER = any accession number, PI number or cultivar name assigned to the plant material
PLANT SYMBOL = plant symbol of the genus and species (asterisk indicates the symbol is not official)
GENUS/SPECIES = common name and scientific name of the plant material
ORIGIN/SOURCE = origin and/or source of the plant material
TRANS DATE = month and day the plant material was transplanted at the evaluation site
YR PLT = year the plant materials were transplanted at the evaluation site
YR REC = year of record
MATL PLTD = type of material planted, PLBR = bareroot, CONT = containerized
NO PLTS = number of plants planted in the plot
NO SRV = number of plants surviving
PCT SRV = percent of plants surviving
VI = plant vigor (1=excellent, 3=good, 5=fair, 7=poor, 9=very poor)
CAN COV (ft) = canopy cover measured in feet
PLT HT (ft) = plant height measured in feet

Table 4. Plant Data.

Project No.: 38I320K Field Evaluation of Woody Plant Materials, Crookston, Minnesota

Year of Record: 1999

PLOT LOCATION	ACCESSION NUMBER	PLANT SYMBOL	GENUS/SPECIES ORIGIN/SOURCE	TRANS DATE	YR PLT	YR REC	MATL PLTD	NO PLTS	NO SRV	PCT SRV	VI	CAN COV (ft)	PLT HT (ft)	REMARKS
1/01/1-5	'Schubert'	PRVI	chokecherry	29-Apr	80	80	PLBR-	5	2	40		5	20	
	9012608		*Prunus virginiana*			81	CONT		5	100		10	59	
			Lincoln-Oakes Nursery,			82			5	100		49	104	
			Bismarck, ND			83			5	100		81	139	
						84			5	100		95	168	
						86			5	100	3	197	230	
						89			5	100	1	336	334	
						94			5	100	1	511	475	
						99			5	100	1	642	617	
1/01/6-10	ND-313	LOTA	red tatarian honeysuckle	29-Apr	80	80	PLBR-	5	5	100		49	47	
	9005996		*Lonicera tatarica sibirica*			81	CONT		5	100		104	79	
	PI-477999		USDA, ARS, Cheyenne, WY			82			5	100		151	124	
			USDA, SCS, PMC, Bismarck, ND			83			5	100		180	147	
						84			5	100		173	150	
						86			4	80	6	220	159	
						87			4	80	6	234	178	
						89			4	80	6	269	159	
						94			2	40	4	475	283	
						99			2	40	4	415	339	
1/01/11-20	'Regal'	PRTE*	Russian almond	29-Apr	80	80	PLBR	10	9	90		25	45	
	ND-283		*Prunus tenella*			81			10	100		54	75	
	9006079		ND Game & Fish Department			82			10	100		108	98	
	PI-540442		USDA, SCS, PMC, Bismarck, ND			83			10	100		140	118	
						84			10	100		184	141	
						86			10	100	3	241	163	
						87			10	100	3	270	174	
						88			10	100	2	269	163	variation in plant
						89			9	90	2	313	165	height, leaf size and shape
						91			9	90	2	372	198	
						94			10	100	2	480	233	
						99			10	100	2	540	234	

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1/02/1-10	ND-11	LOMA6	amur honeysuckle	30-Apr	81	81	CONT	10	9	90		53	51	
	9005993		*Lonicera maackii*			82			9	90		93	73	
	PI-477998		Res. Sta., Morden, MB, Canada			83			10	100		116	93	
						84			10	100		130	123	
						85			10	100	4	174	156	
						87			10	100	2	230	198	
						88			10	100	3	232	205	
						90			10	100	3	288	228	
						95			9	90	4	352	282	
1/03/1-5	9063142	PRUNU	Japanese cherry	12-May	93	93	PLBR	5	5	100	4	30	35	
			Prunus			94			4	80	4	33	50	
			Bottineau FEP, ND			95			4	80	4	54	65	
			Lincoln-Oakes Nursery, Bismarck, ND			97			3	60	4	110	88	
						99			2	40	4	90	90	
1/03/11-20	'Meadowlark'	FOOV	forsythia	16-May	89	89	PLBR	9	8	89	1	46	53	
	9005886		*Forsythia ovata x europaea*			90			9	100	4	61	62	
			Lee Nursery, Fertile, MN			91			9	100	3	111	139	
						93			9	100	3	166	204	
						95			9	100	4	226	241	
						98			9	100	3	255	240	
1/04/1-10	'Indigo'	COAM	silky dogwood	4-May	83	83	PLBR	10	10	100		45	64	
	Mich-765		*Cornus amomum*			84			10	100		118	113	
	PI-468117		USDA, SCS, PMC, Rose Lake, MI			85			10	100	3	190	137	
						89			10	100	1	268	205	
						92			10	100	1	286	237	
						97			10	100	2	474	284	snow breakage on 7-10
1/04/11-20	ND-170	COIN16	cotoneaster	15-May	90	90	CONT	10	10	100	3	34	54	
	9005728		*Cotoneaster integerrimus*			91			10	100	4	65	67	look chlorotic
			USDA, SCS, PMC, Bismarck, ND			92			10	100	3	62	72	good fruit production on 4-7
						94			10	100	5	109	94	several are chlorotic
						96			9	90	6	113	93	good fruit, dieback
						99			6	60	5	156	110	some blight, good fruit prod.

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Year of Record: 1999

PLOT LOCATION	ACCESSION NUMBER	PLANT SYMBOL	GENUS/SPECIES ORIGIN/SOURCE	TRANS DATE	YR PLT	YR REC	MATL PLTD	NO PLTS	NO SRV	PCT SRV	VI	CAN COV (ft)	PLT HT (ft)	REMARKS
1/05/1-20	'Centennial'	COIN16	cotoneaster	1-May	86	86	PLBR	20	6	30	7	43	45	
	ND-177		*Cotoneaster integerrimus*			87			17	85	3	62	66	
	9005729		USDA, ARS, Cheyenne, WY			88			20	100	4	113	96	
	PI-113095		USDA, SCS, PMC, Bismarck, ND			90			19	95	5	234	168	
						92			17	85	2	108	107	all cut down due to fireblight
						95			16	94	5	258	194	minor fireblight on all
1/06/1-20	'Sakakawea'	SHAR	silver buffaloberry	1-May	86	86	PLBR	20	20	100	4	29	50	
	9006158		*Shepherdia argentea*			87			19	95	2	87	109	
	PI-478005		USDA, SCS, PMC, Bismarck, ND			88			18	90	2	125	148	
						90			18	90	2	268	271	
						92			18	90	1	349	339	
						95			18	90	1	459	447	
1/07/1-20	'Scarlet'	PRFR2	Mongolian cherry	1-May	86	86	PLBR	20	20	100	5	19	32	
	9006072		*Prunus fruticosa*			87			20	100	3	46	62	
	PI-478003		USDA, SCS, PMC, Bismarck, ND			88			20	100	2	63	73	
						90			20	100		142	107	
						92			20	100	2	180	130	
						95			20	100	1	335	160	
1/08/1-10	9047238	HIRH	sea buckthorn	29-Apr	87	87	PLBR	10	3	30	5	27	35	
			Hippophae rhamnoides			88			3	30	3	42	53	
			Indianhead Nursery			89			3	30	2	80	88	
			Lincoln-Oakes Nursery,			90			9	90	3	52	62	
			Bismarck, ND			91			9	90	3	90	102	
						93			9	90	3	196	197	
						96			9	90	4	342	278	
1/08/11-20	9047236	AMFR	false indigo	29-Apr	87	87	PLBR	10	10	100	2	58	72	
			Amorpha fruticosa			88			10	100	3	158	91	
			Lincoln-Oakes Nursery,			91			10	100	2	326	174	
			Bismarck, ND			93			10	100	3	396	194	
						95								tip dieback on all, winter injury?
						96			9	90	6	260	198	dieback on 4 & 5

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1/09/1-10	'Survivor'	AMFR	false indigo	29-Apr	87	87	PLBR	10	10	100	2	112	94	
	9008041		*Amorpha fruticosa*			88			10	100	2	188	114	
			USDA, SCS, PMC, Aberdeen, ID			89			10	100	1	258	132	
						91			10	100	2	356	177	
						93			10	100	2	447	211	
						95								tip dieback on all, winter injury?
						96			10	100	3	448	239	
1/09/11-20	'Silver Sands'	SAIN	sandbar willow	15-May	90	90	CONT	10	9	90	1	137	89	
	ND-3902		*Salix interior*			91			9	90	3	194	128	
	9035212		USDA, SCS, PMC, Bismarck, ND			92			10	100	2	232	154	
						94			7	70	2	423	258	
						96			7	70	2	599	334	sucker regrowth on 7,8,& 9
						99			10	100	2	500	380	suckers spread 3 rows over
1/10/1-20	'Legacy'	SYVI	late lilac	24-May	88	88	PLBR	20	20	100	3	20	39	
	ND-83		*Syringa villosa*			89			20	100	3	48	70	
	9006228		Res. Sta., Morden, MB, CA			90			20	100	3	75	91	
	PI-540443		Lincoln-Oakes Nursery,			92			20	100	2	145	153	
			Bismarck, ND			94			20	100	2	248	219	
						97			20	100	4	343	242	snow breakage on 5-20
1/11/1-10	ND-2507	CAPY	pigmy caragana	24-May	88	88	CONT	10	7	70	4	11	21	
	9047228		*Caragana pygmaea*			89			7	70	3	25	36	
			NDFS, Bottineau, ND			90			7	70	2	54	53	
			USDA, SCS, PMC, Bismarck, ND			92			7	70	2	106	87	
						94			6	60	2	173	128	
						97			6	60	3	212	142	
1/11/11-20	ND-2103	VIOP	highbush cranberry	24-May	88	88	CONT	10	2	20	9	10	28	
	PI-399414		*Viburnum opulus*			89			10	100	3	28	39	
			P. I. Sta., Ames, IA			90			7	70	3	46	47	
			NDSU Exp. Sta., Dickinson, ND			92			7	70	4	116	135	
						94			7	70	4	192	186	
						97			7	70	2	303	238	

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1/12/11-15	'Freedom'	LOKO	honeysuckle	15-May	90	90	CONT	5	5	100	2	110	101	
	9057424		*Lonicera korolkowii*			91			5	100	2	212	162	
			Lincoln-Oakes Nursery,			92			5	100	1	271	215	
			Bismarck, ND			94			5	100	2	426	294	
						96			5	100	5	451	275	tip damage on all, little fruit
1/12/16-20	'Streamco'	SAPU	purpleosier willow	15-May	90	90	PLBR	5	5	100	1	136	63	
	PI-434309		*Salix purpurea*			91			5	100	3	291	176	
			USDA, SCS, PMC, Big Flats, NY			92			5	100	1	355	220	
						94			5	100	1	599	354	
						96			5	100	1	700	430	
						99			5	100	1	900	512	
1/13/1-10	'Hedge King'	LOXY	honeysuckle	24-May	88	88	PLBR	10	4	40	9	21	29	
	9057407		*Lonicera xylosteoides*			89			10	100	2	37	48	no aphids
			Wedge Nursery, Albert Lea, MN			90			10	100	3	48	57	
						92			10	100	4	74	81	
						94			10	100	3	103	98	
						97			10	100	6	122	106	
2/01/6-10	PI-514677		plum	15-May	90	90	PLBR	5	5	100	2	43	66	
			Prunus americana			91			5	100	5	88	117	
			USDA, SCS, PMC, Manhattan, KS			92			5	100	4	136	143	
						94			4	80	3	311	241	
						96			5	100	4	364	270	chlorotic, winter injury
						99			2	40		560	360	
2/02/1-10	'Magenta'	MALUS	crabapple	12-May	92	92	PLBR	10	10	100	3	32	66	
	PI-514275		*Malus*			93			10	100	6	32	49	
			USDA, SCS, PMC, East Lansing, MI			94			9	90	6	23	51	several are chlorotic
						96			6	60	4	41	98	#4 chlorotic
						98			0	0				died out

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2/03/1-10	9069080	LOTA	red tatarian honeysuckle	12-May	93	93	PLBR	10	10	100	4	29	41	
	Arnolds Red		*Lonicera tatarica*			94			10	100	3	48	64	
			Lee Nursery, Fertile, MN			95			10	100	3	93	124	
						97			10	100	1	160	172	
						99			10	100	4	169	194	some chlorosis
2/03/11-20	9063143	LOTA	red tatarian honeysuckle	12-May	93	93	PLBR	10	10	100	4	27	52	
			Lonicera tatarica			94			8	80	2	62	78	
			Schumacher's Berry Farm/LON			95			10	100	4	74	92	
						97			10	100	4	159	162	
						99			10	100	4	174	188	
2/04/1-10	'Red Splendor'	MABA	flowering crabapple	30-Apr	81	81	PLBR	10	10	100		59	109	
	9006004		*Malus baccata*			82			10	100		129	145	
			Lee Nursery, Fertile, MN			83			10	100	4	188	199	
						84			10	100		252	245	
						85			10	100	3	286	271	
						87			8	80	3	332	293	
						88		removed plants 3,4, and 10 due to fireblight						
						89						fireblight plant 6		
						90			4	40	3	458	384	
						95			4	40	2	600	451	
2/05/1-10	9063126	ULJA	Japanese elm	12-May	92	92	CONT(P)	10	3	30	4	25	63	
			Ulmus japonica			93			7	70	4	36	47	
			Manchuria			94			5	50	4	60	77	
			PFRA, Indianhead, Saskatchewan			96			9	90	6	76	95	chlorotic, deer browse, girdles
						98			10	100	4	125	152	
2/06/1-10	9063127	FRAM	white ash	12-May	92	92	PLBR	10	10	100	3	28	56	
			Fraxinus americana			93			10	100	4	27	66	
			Wisconsin			94			10	100	7	28	46	
			Lincoln-Oakes Nursery, Bismarck, ND			96			10	100	7	56	85	deer browse, moderate dieback
						98			9	90	4	68	102	

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2/07/1-5	9069129	PRMA	amur chokecherry	27-Apr	95	95	PLBR	5	5	100	3	33	87	
			Prunus maackii			96			5	100	5	23	106	deer browse on 4 & 5
			Big Sioux Nursery, Watertown, SD			97			5	100	3	33	87	
						99			3	60	8	15	92	
2/07/6-10	9063148	PHAM	corktree	27-Apr	95	95	PLBR	5	5	100	3	21	35	
			Phellodendron amurense			96			5	100	5	29	54	
			Clay Co., MN			97			5	100	5	19	54	
						99			3	60	8	14	50	
2/08/1-10	9069081	TICO	littleleaf linden	12-May	93	93	PLBR	10	10	100	3	16	30	
			Tilia cordata			94			6	60	4	22	42	
			Lee Nursery, Fertile, MN			95			9	90	5	29	53	
						97			7	70	6	36	59	
						99			4	40	6	36	58	look bad, multi-stemmed bushes, deer?
2/09/1-10	ND-19	CRAR	Arnold hawthorn	2-May	84	84	CONT	10	8	80		9	18	
	9005731		*Crataegus arnoldiana*			85			5	50	6	11	23	
	503530		Morden, MB, Canada			86			5	50	3	32	43	
						87			5	50	4	43	65	
						88			5	50	4	54	102	
						89			5	50	6	91	124	slight rabbit browse,
						90			5	50	5	104	150	girdling plants 3,6
						93			5	50	3	185	250	
						98			5	50	2	390	396	
2/10/1-10	ND-1134	PRAM	hardy plum	2-May	85	85	PLBR	10	10	100	4	29	57	
	9047203		*Prunus americana*			86			8	80	4	63	83	
			Miller, SD			87			8	80	2	111	160	
			USDA, SCS, PMC, Bismarck, ND			89			8	80	3	251	239	
						91			6	60	3	283	252	
						94			5	50	6	199	215	
						99			0	0				removed

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2/11/1-10	9069128	LOTA	honeysuckle	27-Apr	95	95	CONT	10	9	90	5	32	37	
			Lonicera tatarica			96			10	100	5	29	49	wilt, blight on 3
			Big Sioux Nurs., Watertown, SD			97			8	80	6	60	95	
						99			7	70	6	66	118	
2/13/1-10	ND-1567	CRATA	hawthorn	24-May	88	88	CONT	10	10	100	3	22	46	
	9005751		*Crataegus*			89			10	100	5	33	42	
			Wells Co., ND			90			10	100	3	34	44	
			USDA, SCS, PMC, Bismarck, ND			92			10	100	4	51	61	
						94			10	100	4	82	108	
						97			10	100	4	185	194	
3/01/1-10	'Cardan'	FRPE	green ash	29-Apr	80	80	PLBR	10	10	100		33	91	
	9005895		*Fraxinus pennsylvanica*			81			10	100		54	137	
	PI-469226		Carlyle, MT			82			10	100		103	169	
			USDA, ARS, Mandan, ND			83			10	100		135	210	
			USDA, SCS, PMC, Bismarck, ND			84			10	100		174	270	
						86			10	100	3	234	305	
						89			10	100	3	239	430	
						94			10	100	3	406	582	
						99			10	100	2	900	760	good seed on 1
3/02/1-10	'Oahe'	CEOC	hackberry	29-Apr	80	80	PLBR	10	6	60		13	38	
	MDN-12003		*Celtis occidentalis*			81			10	100	8	14	46	
	9005725		USDA, ARS, Mandan, ND			82			10	100		42	50	
	PI-476982					83			10	100		100	92	
						84			10	100		139	141	
						86			9	90	4	175	193	
						88						severe frost damage		
						89			9	90	2	209	322	
						94			9	90	2	296	427	
						99			9	90	2	644	582	

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3/03/1-10	9047239	AEGL	Ohio buckeye	29-Apr	87	87	CONT	10	0	0				
			Aesculus glabra			88			9	90	5	11	17	
			USDA, SCS, PMC, Bismarck, ND			89			8	80	5	21	26	
						90			9	90	5	28	32	
						91			9	90	6	31	50	
						93			5	50	3	53	112	
3/04/1-5	SD-75	CEOC	hackberry	30-Apr	81	81	PLBR	5	4	80		9	46	
	9005713		*Celtis occidentalis*			82			5	100		17	35	
			Potter Co., SD			83			5	100		85	87	
						84			5	100		142	135	
						85			5	100	4	147	165	
						87			5	100	3	253	327	
						88						severe frost damage		
						90			5	100	2	308	455	
						95			5	100	3	508	659	
3/04/6-10	SD-211	CEOC	hackberry	30-Apr	81	81	PLBR	5	5	100		14	36	
	9005714		*Celtis occidentalis*			82			5	100		34	50	
			Sanborn Co., SD			83			5	100		124	106	
						84			5	100		200	173	
						85			5	100	3	166	191	
						87			5	100	3	239	278	
						90			5	100	3	274	428	
						95			5	100	2	538	586	
3/05/1-5	ND-3778	FRPE	green ash	30-Apr	81	81	PLBR	5	5	100		24	272	
	9029134		*Fraxinus pennsylvanica*			82			5	100		75	298	
			Lee Nursery, Fertile, MN			83			5	100		109	318	
						84			5	100		202	392	
						85			5	100	2	191	430	
						87			5	100	2	231	513	
						90			5	100	2	280	622	
						95			5	100	1	490	810	

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3/5/6-10	9069170	QURO2	English oak	14-May	96	96	PLBR	5	5	100	6	11	23	
			Quercus robur			97			5	100	6	11	23	
			Russia			98			4	80	7	10	12	
			USDA, ARS, Mandan, ND											
3/06/1-10	ND-647	FRNI	black ash	30-Apr	81	81	PLBR-	10	10	100		6	44	
	9005887		*Fraxinus nigra*			82	CONT		10	100		46	67	
			Res. Sta., Morden, MB, Canada			83			10	100		48	103	
						84			10	100		79	153	
						85			10	100	4	41	163	
						87			10	100	3	74	252	
						88					light frost damage			
						90			10	100	3	144	408	
						95			10	100	3	365	624	
3/07/1-10	ND-428	JUNI	black walnut	2-May	85	85	PLBR	10	10	100	3	11	27	
	9005970		*Juglans nigra*			86			10	100	3	47	54	
			USDA, SCS, PMC, Bismarck, ND			87			10	100	3	29	48	
						89			10	100	2	150	157	
						91			9	90	3	196	217	
						94			9	90	4	357	327	
						99			9	90	6	438	410	
3/09/1-10	9057410	CEOC	hackberry	24-May	88	88	CONT	10	9	90	4	14	26	
			Celtis occidentalis			89			7	70	3	44	56	
			Bottineau Co., ND			90			10	100	4	51	64	
			NDFS			92			10	100	4	119	135	
						94			9	90	5	122	210	
						97			9	90	4	162	296	
3/10/1-5	9063116	FRNI	black ash	27-Apr	95	95	CONT(P)	5	5	100	4	31	59	
			Fraxinus nigra			96			5	100	5	28	61	leaf blight
			Itasca State Park, MN			97			5	100	5	35	60	
						99			4	80	7	24	88	

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3/10/6-10	9063115	FRPE	green ash	27-Apr	95	95	CONT(S)	5	4	80	4	14	43	
			Fraxinus pennsylvanica			96			5	100	5	30	60	insect damage on 2
			Itasca State Park, MN			97			5	100	3	48	87	
						99			4	80	8	55	151	
3/11/1-5	9016138	ULPU	Siberian elm	27-Apr	95	95	PLBR	6	6	100	2	64	92	
			Ulmus pumila			96			5	100	5	73	124	deer browse on all
			USDA, NRCS, PMC, Bridger, MT			97			5	100	3	162	209	
						99			5	100	4	200	320	
3/11/6-10	9054820	ULPU	Siberian elm	27-Apr	95	95	PLBR	5	5	100	2	84	103	
			Ulmus pumila			96			5	100	3	78	180	deer browse on all,
			USDA, NRCS, PMC, Bridger, MT			97			5	100	3	213	234	dieback on main stem
						99			5	100	4	252	314	
3/12/1-10	9057412	QUMA	bur oak	24-May	88	88	CONT	10	9	90	3	16	40	
			Quercus macrocarpa			89			8	80	3	26	46	
			Foster Co., ND			90			8	80	3	27	34	
			NDFS			92			10	100	4	51	62	
						94			10	100	5	91	104	
						97			9	90	4	144	221	
3/13/1-10	9057405	BEPA	paper birch	24-May	88	88	CONT	9	7	78	3	19	61	
			Betula papyrifera			89			5	56	2	49	94	
			Turtle Mountains, ND			90			5	56	1	107	158	
			NDFS			92			5	56	4	177	203	
						94			5	56	3	284	386	
						97			3	33	5	352	410	dieback on 2
4/01/1-5	9069166	ELAN	Russian olive	14-May	96	96	CONT	5	3	60	4	30	37	
			Elaeagnus angustifolia			97			3	60	6	77	82	
			Russia			98			2	40	4	160	198	
			USDA, PMC, Bismarck, ND											

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4/01/6-10	9076724	ELAN	Russian olive	14-May	96	96	PLBR	5	5	100	3	97	105	
			Elaeagnus angustifolia			97			5	100	5	121	134	herbicide damage on 4,5
			Russia			98			3	60	3	220	272	
			USDA, ARS, Mandan, ND											
4/02/1-5	9076723	ULPU	Siberian elm	14-May	96	96	PLBR	5	5	100	4	52	71	insect damage, deer browse
			Ulmus pumila			97			5	100	4	130	123	herbicide damage on 4
			USDA, ARS, Mandan, ND			98			5	100	4	135	181	
4/07/1-10	ND-3787	THOC2	northern white cedar	30-Apr	81	81	CONT	10	8	80		28	43	
	9030295		*Thuja occidentalis*			82			10	100		32	35	
			U of MN, College of Forestry,			83			8	80	4	38	45	
			St. Paul, MN			84			8	80		55	69	
						85			10	100	5	55	61	
						87			9	90		116	128	
						90			9	90	3	139	201	
						95			9	90	2	247	387	
4/09/1-10	Mich-1841	THOC2	northern white cedar	4-May	83	83	PLBR	10	5	50	4	9	11	
	9005060		*Thuja occidentalis*			84			8	80		11	17	
			USDA, SCS, PMC, Rose Lake, MI			85			2	20	7	10	20	
						87			2	20		55	50	
						89			2	20	1	88	110	
						92			2	20	3	138	205	
						97			2	20		260	410	
4/10/1-10	Mich-1468	THOC2	northern white cedar	4-May	83	83	PLBR	10	6	60	4	18	22	
	9005059		*Thuja occidentalis*			84			10	100		28	32	
			USDA, SCS, PMC, Rose Lake, MI			85			10	100	7	23	33	
						87			10	100		52	64	
						89			9	90	3	92	110	
						92			9	90	4	114	136	
						97			9	90	4	236	298	

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4/11/1-10	9058862	LALA	tamarack	15-May	90	90		10	9	90	3	37	56	
			Larix laricina			91			8	80	6	24	46	
			Chippewa Farms, Grand Rapids, MN			92			4	40	4	38	74	
						94			3	30	4	63	172	
						96			3	30	4	132	273	
						99			3	30		178	372	
5/03/1-10	9058871	PDXP8	poplar hybrid	15-May	90	90	PLBR	10	10	100	3	82	114	
	14273		*Populus deltoides x P. nigra*			91			9	90	3	106	136	
			USDA, ARS, Mandan, ND			92			9	90	6	94	131	
						94			7	70	5	149	287	
						96			6	60	8	148	306	canker
						99			5	50	7	233	538	
5/04/1-10	9058872	PDXP8	poplar hybrid	15-May	90	90	PLBR	10	10	100	2	101	133	
	14274		*Populus deltoides x P. nigra*			91			10	100	2	135	207	
			USDA, ARS, Mandan, ND			92			10	100	3	165	254	
						94			10	100	3	298	468	
						96			10	100	2	325	776	
						99			10	100	2	750	1149	
5/05/1-5	9063147	POPUL	poplar hybrid	12-May	93	93	PLBR	5	4	80	6	5	31	
	Assiniboine		Populus			94			4	80	5	28	92	
			PFRA, Indianhead, Saskatchewan			95			4	80	4	92	160	
						97			5	100	5	133	250	
						99			5	100	4	155	436	
5/05/6-10	9063141	PODE	eastern cottonwood	12-May	93	93	PLBR	5	4	80	4	15	81	
			Populus deltoides			94			4	80	4	31	109	
			Lincoln-Oakes Nursery, Bismarck, ND			95			4	80	3	109	168	
						97			3	60	3	223	403	leaf rust on 2
						99			3	60	5	258	640	heavy leaf rust

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5/06/1-10	ND-3796	POAL	white poplar	12-May	93	93	CONT(P)	10	7	70	5	25	48	
	9030611		*Populus alba*			94			6	60	6	66	77	
			McKenzie FEP, McKenzie, ND			95			5	50	4	131	105	
						97			5	50	4	211	167	
						99			5	50	6	296	319	
5/07/1-10	'Lydick'	PODE3	eastern cottonwood	28-Apr	82	82	PLBR	10	9	90		41	61	
	9004457		*Populus deltoides*			83			7	70	4	129	133	
			UN, Dept. of For., Lincoln, NE			84			7	70		219	221	
						86			6	60	6	339	280	
						91			7	70	3	610	566	
						96			7	70			900	estimated height
5/08/1-10	'Ashford'	PODE3	eastern cottonwood	28-Apr	82	82	PLBR	10	10	100		50	81	
	9023430		*Populus deltoides*			83			10	100	4	120	140	
			UN, Dept. of For., Lincoln, NE			84			10	100		216	251	
						86			7	70	2	392	563	
						91			7	70	1	1036	986	
						96			7	70			1500	estimated height
5/10/1-10	'Platte'	PODE3	eastern cottonwood	28-Apr	82	82	PLBR	8	6	75		53	105	
	9021574		*Populus deltoides*			83		10	10	100	5	97	131	
			UN, Dept. of For., Lincoln, NE			84			7	70		196	248	
						86			7	70	3	376	527	
						91			7	70	1	896	1079	
						96			7	70			1500	estimated height
5/11/1-5	9063140	POSA	native cottonwood	27-Apr	95	95	CONT(P)	5	5	100	3	102	91	1 is chlorotic
	14305		*Populus sargentii*			96			4	80	4	105	163	2 is chlorotic
			USDA, ARS, Mandan, ND			97			4	80	7	154	169	1 is chlorotic, 2 has leaf rust
						99			4	80	4	194	375	
5/11/6-10	9058899		Austree	14-May	91	91	CONT	5	1	20	2	85	100	
			Salix matsudana x alba			92			3	30	4	58	142	
			Austree, Pescadero, CA			93			3	60	3	123	263	
						95			3	60	3	397	545	
						97			3	60	4	445	557	