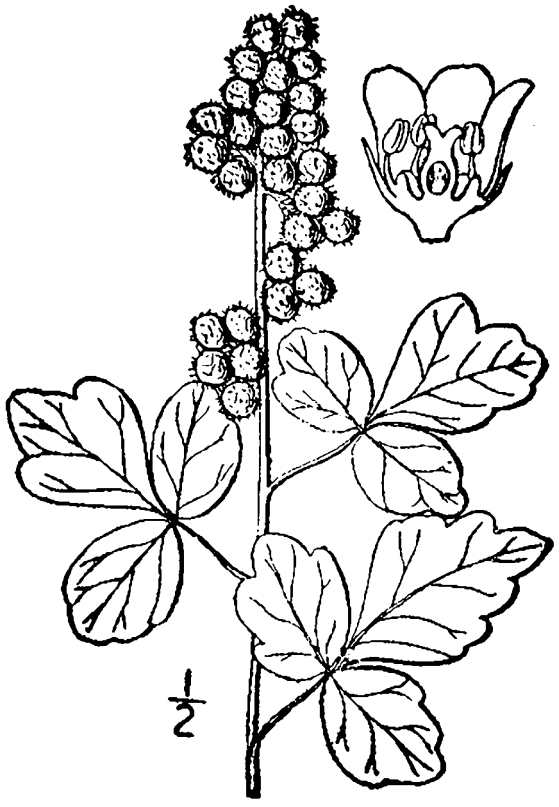
United States Department of Agriculture
Natural Resources Conservation Service

Plant Materials Center
Bismarck, North Dakota

Technical Report, 2007

Part 2 of 2: Trees and Shrubs



Skunkbush sumac
Rhus trilobata

USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. *An illustrated flora of the northern United States, Canada and the British Possessions*. Vol. 2: 483.

Helping People Help the Land

United States Department of Agriculture
Natural Resources Conservation Service
Bismarck Plant Materials Center

Technical Report

Trees and Shrubs

2007

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PART II

TABLE OF CONTENTS

INTRODUCTION

Objectives and Functions

The USDA Natural Resources Conservation Service (NRCS), Plant Materials Center (PMC), Bismarck, North Dakota, primarily serves the States of North Dakota, South Dakota, and Minnesota. Activities are directed toward meeting the needs and priorities set forth in the three States' long-range programs.

The objectives and functions of the Plant Materials Center are to:

1. Identify, select, and improve plants to meet the resource conservation needs of the three States.

2. Determine techniques for successful propagation and establishment of these plants.

3. Assemble and comparatively evaluate materials on and off the Center.

4. Make comparative field plantings for final testing of promising plants and techniques with conservation districts and cooperators.

5. Work with universities, experiment stations, and other State and Federal agencies to cooperatively release improved conservation plants.

6. Produce limited quantities of foundation or foundation quality seed. This seed is made available to conservation districts, state seed certifying organizations, commercial seed growers, or other agencies for establishing seed increase fields or seed orchards.

7. Encourage conservation districts, commercial seed growers, and commercial and state nurseries to produce adapted plant materials and named cultivars.

8. Promote these materials in conservation programs.

One of the major objectives of the PMC is to improve the quality and quantity of native and introduced trees and shrubs available for field and farmstead windbreaks, erosion control on cropland and critical areas, surface mine reclamation, recreation areas, wildlife habitat, and barrier plantings.

The NRCS has agreements with soil conservation districts, State universities, and other State and Federal agencies at 8 locations in North Dakota, South Dakota, and Minnesota to provide cooperative off-center sites with long-term land tenure for testing woody plant materials. These agreements provide sites for assembly and initial evaluation of trees and shrubs under diverse soil and climatic conditions. They represent major land resource areas and key windbreak suitability groups. Initial evaluations are recorded on individual spaced plants or rows under uniform culture and management conditions.

PLANT MATERIALS CENTER LONG RANGE PLAN
BISMARCK, NORTH DAKOTA
2006-2010

I. Introduction

The mission of the Plant Materials Program is to develop and transfer effective state-of-the-art plant science technology to meet customer and resource needs. The purpose of the Plant Materials Program is to carry out specialized activities in resource conservation, as part of the overall program of the Natural Resources Conservation Service (NRCS). It is the responsibility of the Plant Materials Center (PMC) to:

1. Assemble, test, and release plant materials for conservation use.
2. Determine techniques for the successful use and management of conservation species.
3. Facilitate the commercial increase of conservation species.
4. Provide for the development and transfer of applied plant science technology to solve conservation problems.
5. Promote the use of plant science technology to meet the goals and objectives of the USDA and NRCS Strategic Plans.

The PMC Long Range Plan (LRP) identifies, guides, and directs PMC operation toward solving high-priority resource problems identified in the States' PMC LRP. The PMC LRP is consistent with goals and objectives identified in the NRCS Strategic Plan, National Plant Materials Program Strategic Plan, and State Strategic Plans. Recommended action items and specific products are identified in individual State Annual Plans which are reviewed and updated annually.

II. Long Range Plan Development

The LRP is in accordance with the revised National Plant Materials Manual, Part 540.22. This plan acts as a guide for directing PMC activities within Minnesota, North Dakota, and South Dakota. NRCS representatives from all three states met in Fargo, North Dakota, on March 8, 2006, to determine the basis for this plan. Feedback in the form of survey questionnaires was received from various NRCS offices, conservation districts, and partners in the three States. The *"Plant Materials Program Strategic Plan Survey Responses"* publication (2/7/05) was also used to provide insight and guidance to the decision making process.

General Description of the Service Area

Climate – USDA Plant Hardiness Zones 2, 3, 4, and 5 are within the area serviced. Precipitation is quite varied both in annual amount and in seasonal distribution, and predominantly occurs in the form of rainfall. Long-term average annual precipitation varies from 12 inches to 35 inches. The growing season ranges from 95 days to 155 days. The titles of the four Land Resource Regions include:

- Northern Great Plains Spring Wheat
- Western Great Plains Range and Irrigated
- Central Feed Grains and Livestock
- Northern Lake States Forest and Forage

A detailed description of the major land resource areas, land use, and climate may be found in the reference *"Land Resource Regions and Major Land Resource Areas of the United States,"* Agricultural Handbook 296.

III. Goals

Three broad-based goals have been identified.

Goal 1:

- Identify and evaluate plants and develop technology for their successful establishment and maintenance to solve natural resource problems.

Goal 2:

- Provide plant materials and plant technology that are economically feasible for solving conservation problems and to meet emerging energy and environmental needs.

Goal 3:

- Provide equal access for all Americans to the Plant Materials Program. All products and services must be delivered fairly and equitably. Promote the increased use of plant materials to address human health, safety, cultural, and aesthetic issues.

IV. Plant Materials Priorities and Resource Concerns

Native Prairie Ecosystems Restoration

- Identify additional species and develop sources.
- Develop establishment and management protocol.
- Market PMC releases.

Warm-Season Grass Promotion and Development

- Promote economic as well as conservation benefits.
- Promote the benefits of big bluestem.
- Promote proven management techniques to minimize invasive species.
- Select a switchgrass or other native species as alternatives to smooth bromegrass in grassed waterways.

Tree and Shrub Related Technology

- Increase species diversity in windbreaks.
- Identify/develop additional tall tree species.
- Identify/develop additional native shrub species.
- Identify and promote alternatives for invasive species.

Wetland and Riparian Plant Materials

- Identify/develop additional species.
- Develop establishment and management protocol.

Saline/Alkaline Tolerant Plant Materials

- Develop and distribute information.

Filter Strips/Nutrient Management

- Develop/promote effective plants for nutrient uptake.

Streambank and Lakeshore Stabilization

- Develop establishment and management protocol.

Information, Education, and Outreach

- Promote the value of PMC releases.
- Identify and promote perennial plants for wildlife food plots.
- Remarket older plant releases.
- Target specific outreach opportunities to non-traditional clientele.

Alternative and Specialized Use of Conservation Plants

- Utilize agroforestry technology.
- Recognize alternative income species.
- Promote switchgrass as a biomass fuel for energy savings.

Urban Conservation

- Provide information on effective species/varieties.
- Promote native landscaping as low energy and reduced maintenance.
- Sell the economic as well as the environmental benefits.

V. Partners and Cooperators

Plant Materials Program activities are conducted in cooperation with universities, State and Federal agencies, industries, conservation groups, soil and water conservation districts and associations, and others. The primary customers are the NRCS field offices in Minnesota, North Dakota, and South Dakota. Improved plant materials will be released with cooperating agencies, Agricultural Experiment Stations, and State crop improvement associations. Seed growers and conservation nurseries will be kept informed of the availability of new plants and production techniques.

Approved by: Bismarck Plant Materials Center Advisory Committee

8/31/06

WILLIAM HUNT, NRCS State Conservationist, St. Paul, Minnesota **Date**

8/31/06

JANET OERTLY, NRCS State Conservationist, Huron, South Dakota **Date**

8-31-06

J.R. FLORES, NRCS State Conservationist, Bismarck, North Dakota **Date**

Location

The Bismarck Plant Materials Center is located in south central North Dakota, near the center of the North American landmass. It is on the east bank of the Missouri River in a shallow basin 7 miles wide and 11 miles long. Elevation is 1,647 feet, latitude 46°46'N and longitude 100°45'W.

Physical Facilities and Evaluation Sites

The PMC does not own land but manages a total of approximately 138 acres split among three separate sites (1-3) within 25 miles of each other. Off-center evaluation sites are located in Minnesota, South Dakota, and North Dakota (4).

1. Lincoln-Oakes Nursery, Bismarck, North Dakota. The USDA Natural Resources Conservation Service, Plant Materials Center operates under a cooperative working agreement with the North Dakota Association of Soil Conservation Districts (NDASCD). The Association owns and operates the Lincoln-Oakes Nursery which in turn provides the PMC with 70 acres of land located on the nursery. This site is primarily used by the PMC for foundation quality grass seed production. The PMC shares a building site with the Nursery, with the NRCS buildings located on the north part of the acreage. Buildings include an office, greenhouse, lathhouse, machine storage shed (housing tree and seed storage refrigeration units), seed cleaning building, chemical storage shed, and a second equipment storage building containing a small shop.

2. North Dakota Game and Fish Department, McKenzie, North Dakota. The Department, under cooperative agreement, provided the PMC with a 24-acre tract on the McKenzie Slough Game Management Area. Since 1972, this site has been used for the initial evaluation of woody plant material established in single row, non-replicated plots. The agreement has expired, but this location is now used for long-term observation of plant performance, as well as seed collection. No new plantings will be made.

3. USDI Fish and Wildlife Service (FWS), Apple Creek Township, Burleigh County, North Dakota. The FWS has granted the use of 42 acres on a Waterfowl Production Area (WPA) near Apple Creek for woody test plantations and seed orchards. Three large assemblies of native shrubs, including chokecherry, buffaloberry, and hawthorn are established on this site. In 1995, an additional 5-acre tract was added. This is an initial evaluation site for untested material. This WPA is also the site of an 8.58-acre seed orchard.

4. Six other off-center evaluation sites, located in the three-state area, are cooperative with various state and federal agencies. These locations provide long-term testing sites for trees, shrubs, and grasses evaluated under uniform culture and management. Refer to map, page 12.

Soils

At the PMC, the soil type is a Mandan silt loam. The Mandan series typically consists of deep, well-drained soils formed in silty sediments on uplands and terraces. The surface layer is dark grayish-brown and grayish-brown silt loam 20 inches thick. The subsoil is grayish-brown silt loam 9 inches thick. The underlying material is 28 inches of light brownish-gray silt loam over light brownish-gray loam. Slopes range 0 to 7 percent. Ordinarily, surface runoff is medium and fertility is high. Controlling erosion is the major concern in management. Both soil blowing and water erosion are hazards. This soil is well-suited to small grain, corn, and alfalfa. Capability unit IIe5, windbreak group 3.

Climatological Information and Weather Summary

Climate of the area is semiarid, typically continental in character. During the summer, there are a few hot and humid days, but the winters are quite cold and fairly long. The relative humidity during the summer is generally low, and high temperature and high humidity are seldom experienced together.

Normal precipitation is 16.84 inches per year. Refer to Table AV-1 on page 153 for 2007 weather data. More than 75 percent of this falls during the six-month period of April through September, and 50 percent normally falls in May, June, and July. Most summer precipitation occurs during thunderstorms that occur about 34 days per year. Damaging hail occurs about once in 10 years.

The winter season begins in late November and continues until late March. Nearly all winter precipitation is snow, often associated with strong winds and low temperatures. Snow has been reported for all months except July and August. Occasional winter blizzards can be severe.

Temperatures range from an average mean of 6.7 degrees F in January to a mean of 70.4 degrees F in July. During short periods, the temperatures may climb as high as 100 degrees F in summer or drop as low as -40 degrees F in winter. Frequent clear and partly cloudy days contribute to a high percentage of possible sunshine, with the total annual average about 2,700 hours out of a possible 4,470 hours. The average wind speed is a little less than 11 miles per hour, with a prevailing direction from the west-northwest. April and May are the windiest months. The average freeze-free period is 134 days from mid-May to late September.

REGIONAL DESCRIPTION

REGIONAL DESCRIPTION: TECHNICAL REPORT – 2007

Major Land Resource Areas

The three States served by the PMC, North Dakota, South Dakota, and Minnesota, include portions of 23 Major Land Resource Areas in four Land Resource Regions. They are the Northern Great Plains Spring Wheat Region, Western Great Plains Range and Irrigated Region, Northern Lake States Forest and Forage Region, and the Central Feed Grains and Livestock Region.

Potential Natural Vegetation

Most of central and western North and South Dakota support a mixed grass prairie of predominantly western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), needleandthread (*Hesperostipa comata*), slender wheatgrass (*Elymus trachycaulus*), and prairie junegrass (*Koeleria macrantha*). Little bluestem (*Schizachyrium scoparium*), sideoats grama (*Bouteloua curtipendula*), plains muhly (*Muhlenbergia cuspidata*), sedge (*Carex*), and blue grama (*Bouteloua gracilis*) are the principal climax species on xeric soils, steeper eroded slopes or thin uplands. Prairie sandreed (*Calamovilfa longifolia*) is important on sandy soils throughout the region. Moist sites support such species as big bluestem (*Andropogon gerardii*) and prairie cordgrass (*Spartina pectinata*). Whitetop (*Scolochloa festucacea*), bulrushes (*Scirpus*), and common reed (*Phragmites australus*) are typical of lowland meadows and marshes. Western snowberry (*Symphoricarpos occidentalis*), rose (*Rosa*), buffaloberry (*Shepherdia argentea*), and chokecherry (*Prunus virginiana*) are abundant shrubs in draws and narrow valleys. Rocky mountain juniper (*Juniperus scopulorum*) is common in the western Badlands. Eastern South Dakota, southern Minnesota, and the Red River Valley support vegetation dominated by tall grass prairie species; principally big bluestem, switchgrass (*Panicum virgatum*), and Indiangrass (*Sorghastrum nutans*). Other important species include little bluestem, prairie dropseed (*Sporobolus heterolepis*), porcupine grass (*Stipa spartea*), green needlegrass, and prairie cordgrass. Bur oak (*Quercus macrocarpa*), basswood (*Tilia americana*), hackberry (*Celtis occidentalis*), cottonwood (*Populus deltoides*), and willow (*Salix*) follow major draws and floodplains.

Two distinct forested regions occur within the three-State area. The first is the Black Hills of South Dakota where Ponderosa pine forest (*Pinus ponderosa*) and pine/oak savannas dominate. The second is the northern and eastern sections of Minnesota, which support mixed hardwood and conifer forests. Principal species include oak (*Quercus*), maple (*Acer*), elm (*Ulmus americana*), aspen (*Populus*), jackpine (*Pinus banksiana*), red pine (*Pinus resinosa*), and balsam fir (*Abies balsamea*). Black spruce (*Picea mariana*), tamarack (*Larix laricina*), and white cedar (*Thuja occidentalis*) are typical of lowlands and swamps.

Climate and Species Adaptation

North Dakota and Minnesota are the two coldest States in the nation excluding Alaska. Mean annual temperatures range from 36 degrees F to 48 degrees F for all reporting stations. Plant hardiness zones (USDA) vary from 2 to 5 with mean minimum temperatures between -10 degrees F and -50 degrees F. Annual precipitation varies from 13 inches in western North Dakota to 30 inches or more in southeast Minnesota. Growing seasons are short, averaging from 110 to 150 days. The central and western Dakotas are principally semiarid in nature while the eastern Dakotas and Minnesota are considered subhumid.

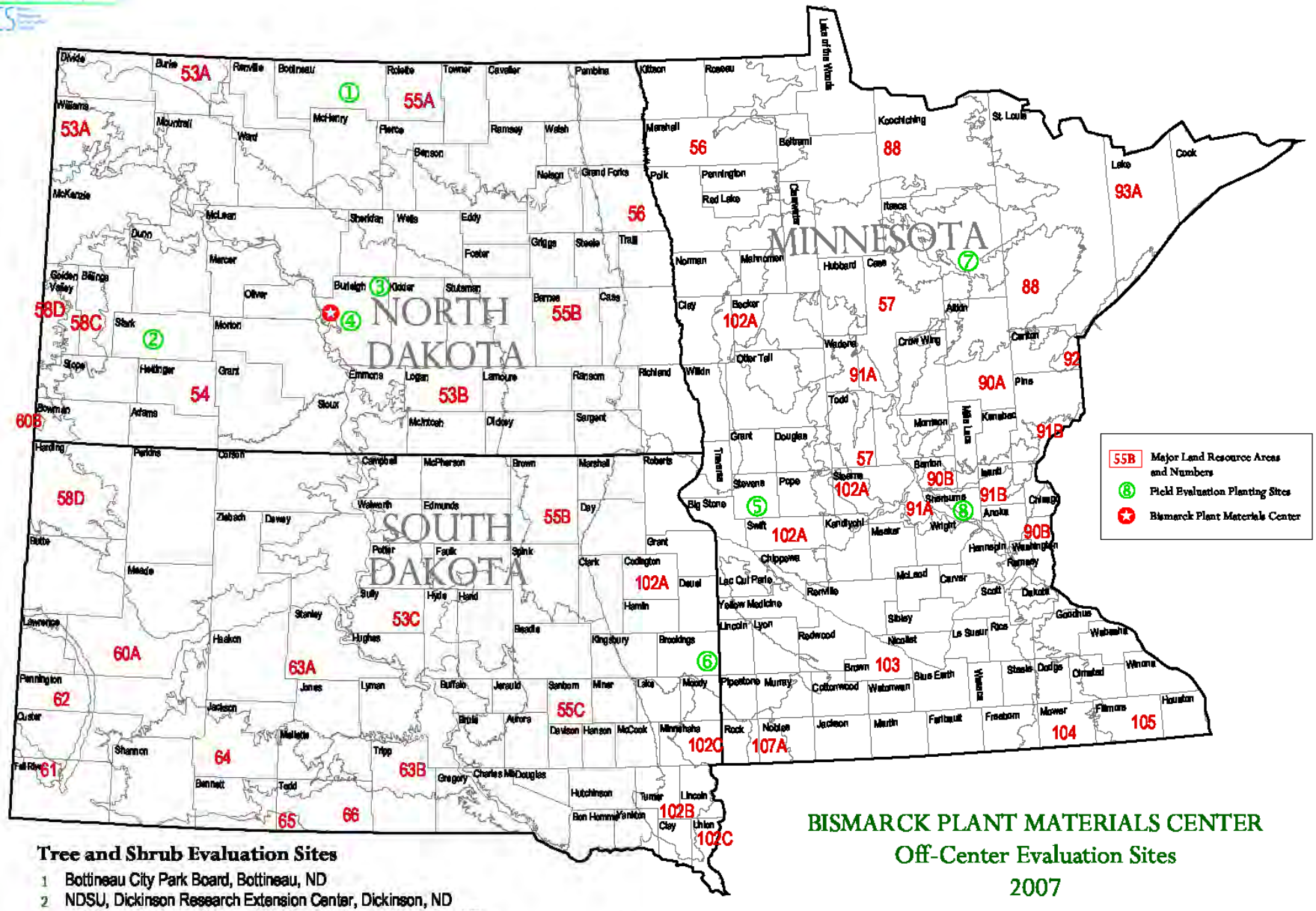
Because of cold and drought, the diversity of woody species is severely limited, especially in the Dakotas. The scarcity of native tall tree species for windbreaks has relegated at least a portion of the tree improvement effort in the Northern Great Plains to improving upon existing cultivars of native species or increasing survival and pest resistance of hardy exotics such as Siberian elm. Species from Siberia, Russia, Manchuria, or Mongolia are among the most viable introductions for prairie plantings where precipitation is generally less than 20 inches

annually. There is generally little shortage of shrub species for shelterbelt, barrier, or wildlife plantings except in the most hostile environments or specific cases related to pest resistance.

The short growing season limits the potential annual growth rate of trees. Late spring frosts can decimate fruit set of early flowering fruit trees following a week or so of warm temperatures. However, hardy native shrubs like plum, chokecherry, and hawthorn are well adapted and regularly produce abundant crops. Indigenous species may rely on a secondary bud flush to produce foliage in some years. Winter dessication of needle leaved evergreens is not uncommon on exposed sites, making conifer establishment a challenge for vast areas of the Northern Plains. Symptoms of winter injury on hardwoods may be as mild as tip dieback on exterior limbs to complete death of above ground stems and subsequent resprouting. Damaged trees are ideal sites for insects and disease infection.

The importance of adapted seed sources and the need for provenance tests is especially critical in the extreme and variable environment of the Northern Plains. In the three-State region served by the PMC, winter hardy, drought, and pest resistant cultivars are in demand by the nursery trade. Seed sources from regions further south frequently express superior growth rates but are more susceptible to winter injury.

MAPS



BISMARCK PLANT MATERIALS CENTER
Off-Center Evaluation Sites
2007

Tree and Shrub Evaluation Sites

1 Bottineau City Park Board, Bottineau, ND
2 NDSU, Dickinson Research Extension Center, Dickinson, ND
4 USDI Fish & Wildlife Service, Apple Creek Twp., Burleigh Co., ND
5 Univ. of Minn., West Central Research & Outreach Center, Morris, MN
6 Eastern South Dakota Soil & Water Research Farm, Brookings, SD
7 Univ. of Minn., North Central Research & Outreach Center, Grand Rapids, MN
8 Univ. of Minn., Sand Plain Research Farm, Becker, MN

Herbaceous/Misc. Plants Evaluation Sites

3 North Dakota Game & Fish Department, Burleigh Co., ND

N

USDA-NRCS Bismarck State Office GIS Center, Bismarck, ND 2008

Revised March 2008

ASSEMBLY AND INITIAL EVALUATION

Off-Center Evaluation Plantings

OFF-CENTER EVALUATION PLANTINGS: TECHNICAL REPORT – 2007

Study 38I308K Bottineau City Park Board, Bottineau, North Dakota.

Study Title: Field Evaluation of Woody Plant Materials.

Introduction: There is a need to evaluate the performance of shrub and tree species/cultivars for windbreaks, wildlife, and recreational plantings under diverse soil and climatic conditions. To meet this need, field evaluation planting sites representative of the major land resource areas were located in the three states served by the PMC. These sites provide planting locations under long-term land tenure for assemblies of trees and shrubs to be evaluated under uniform culture and management. New material can be added on an annual basis. Comparisons are then made with previously released cultivars and area of adaptation determined.

Objective: The objective is to assemble and evaluate woody plant materials for conservation use. Superior cultivars will be selected and released for increase by commercial nurseries.

Cooperators: The USDA Natural Resources Conservation Service, Plant Materials Center, Bismarck, North Dakota, in cooperation with the Bottineau City Park Board and the Turtle Mountain Soil Conservation District. Expires July 19, 2009, unless agreement is extended.

Location: This project is located within the city limits of Bottineau, on land operated by the Bottineau City Park Board. Legal description: SE 1/4 sec. 25, T. 162 N., R. 75 W., Bottineau County, North Dakota. A sign has been erected to notify visitors.

Major Land Resource Area: The site is located in Major Land Resource Area 55A, Black Glaciated Plains. This nearly level glacial plain is bordered by rolling morainic hills along the western edge. Local relief is low in most areas. Elevation is 1,100 to 2,000 feet. Twenty-five percent of the area is rangeland.

Soils: There are three different soils mapping units in the planting sites: Barnes Svea Tonka complex (12), Hamerly loam (19), and Vallers loam (21). This was once a landfill site.

The Barnes-Svea complex (12) consists of deep, moderately well-drained and well-drained, loam to clay loam material formed in calcareous glacial till on till plains and moraines. The surface layer is black loam or clay loam 7 to 9 inches thick. The subsoil is olive dark brown loam or mottled clay loam. Substratum is olive brown loam or grayish-brown clay loam. Permeability is moderately slow and water holding capacity is good. Slopes are 0-1 percent. The Barnes soils belong to windbreak suitability group 3. The Svea soils belong to the windbreak suitability group 1. They are well-drained, moderately deep to deep loamy soils. If moisture is conserved, these soils are well-suited to all types of windbreaks and other plantings. Wind and water erosion are the only hazards.

The Hamerly series (19) consists of very deep, somewhat poorly or moderately well-drained soils that formed in calcareous loamy glacial till. Permeability is moderate in the upper horizons and moderate or moderately slow in the lower horizons. These soils are on flats on till floored lake plains and on convex slopes surrounding shallow depressions and on slight rises on till plains. They have slopes ranging from 0 to 6 percent.

The Vallers series (21) consists of deep, poorly drained soils that formed in calcerous loamy glacial till on glacial moraines. These soils have moderately slow permeability. Slopes range from 0 to 3 percent.

Climate: For MLRA 055A, the average annual precipitation is 14 to 20 inches; with wide fluctuations year to year. Rainfall is highest from late spring to early autumn. Winter precipitation is snow. The average annual temperature is 36 to 41 degrees F. The average freeze-free period is 100 to 145 days,

increasing from north to south. The plant hardiness zone is 3a, with an average annual minimum temperature of -40 to -30 degrees F. Climatic data for 2007 recorded at Bottineau, North Dakota, is shown in Table BO-1.

Methods and Materials

Assembly: Refer to Table BO-2 for a list of woody species planted from 1978 through 2007.

Planting Plan: The plots are not randomized or replicated but systematically arranged for ease of evaluation and demonstration purposes. The evaluation planting originally consisted of four planting blocks. Block I had a total of 45 rows which are no longer being evaluated. Blocks II and III are located several hundred yards north of Block I (See Figure BO-1). Rows run north-south. Block IV is located to the west of Block II, but is no longer evaluated. The single non-replicated plots consist of 1 to 5 plants. Spacing between rows is 10 to 20 feet. Standards of comparison are used when available.

Plot Preparation: A clean, firm planting site was prepared annually by disking and harrowing.

Planting Method: All trees and shrubs were hand planted using approved forestry methods.

Planting Date: Refer to Table BO-2 for planting dates of species planted from 1978 through 2007. Replacements are planted the year after establishment if available.

Fertilization: No fertilizer has been applied to planting area.

Weed Control: No herbicide was applied to any plot during year of establishment. Quackgrass was treated with Glyphosate in Block III in the spring 1985. Weeds were controlled in Blocks II and III by clean cultivation between and within rows. Two to three tillage operations were used in the months of May through August. No hand hoeing has been done in the past five years. A permanent sod cover of ryegrass was established in Block I in 1981.

1994: All blocks were spot sprayed with glyphosate in June. In July, a rotary tree cultivator (attached to JD2240) was used between trees within rows. In September, the thistles were sprayed with Stinger. In October, Casaron was applied at a rate of 150 lb/ac in Blocks II and III.

1995: Roundup was used to spot spray in July.

Biological Control: No insecticides or animal repellents were applied.

Irrigation: Each year, newly planted materials were watered by hand. No water was applied following year of establishment.

Crop Residue Management: No cover crop has been planted in Blocks II and III. Block I is in permanent sod. The grass is mowed annually.

Silvicultural Practices: Dead trees and broken branches have been cut and removed for sanitation. A minimum of pruning was done in 1980 to improve tractor accessibility in rows 1 through 19.

In September 1981 and 1982, and May 1985 and 1986, extensive roguing and pruning of dead or diseased trees and branches were done on Block I. Contaminating species were cut and removed. All mulberry and honeylocust sustained severe winter injury and were removed in 1985. In September 1989, all Russian olive accessions in Block I were removed.

In 2001, a number of accessions in Block III were removed to make room for new material.

In 2007, a number of accessions were cut, but stumps need to be removed.

Evaluations and Measurements: Records of planting date, survival, vigor, cold hardiness, canopy width, and height have been maintained since 1974. Selected data appears in this report. Additional data can be requested from the PMC. Plant performance data is recorded during the growing season for three years. After the third year, data is gathered according to a specific schedule. Notes are recorded on survival, vigor, canopy width, plant height, and seed amount. Annual summary reports have been prepared since 2006 and can be requested from the PMC.

Results

Plant Performance: Eighty-five accessions of 62 species are currently under evaluation. Overall, weeds have been adequately maintained at this site. While this site does receive added protection from surrounding shelterbelts and benefits from an improved microclimate within city limits, it remains our coldest (most northern) testing location. As such, winter injury to southern seed sources is often the most striking feature. The years 1988 and 1989 were extremely dry. Many of the new accessions planted in those years did not become established. In 1999, most of the land was leased to the Bottineau City Park Board. Mean data for individual accessions of trees and shrubs are recorded in Table BO-2. The following accessions exhibit potential for further evaluation and use:

Accession Number	Genus/Species Origin/Source	Plot Location
ND-21 9034900 PI-560908	nannyberry *Viburnum lentago* USDA, ARS, Mandan, ND	II/03/N-S
PI-323957	black chokeberry *Photinia melanocarpa* P.I. Station, Ames, IA	II/05/1-5
ND-170 9005728	European cotoneaster *Cotoneaster integerrimus* USDA, NRCS, PMC, Bismarck, ND	II/02/16-20
9057409	American hazel *Corylus americana* Turtle Mountains, Bottineau, ND NDFS	II/04/11-15
9047238	seaberry *Hippophae rhamnoides* PFRA, Indianhead, Saskatchewan	II/02/1-5
'Meadowlark'	forsythia *Forsythia ovata x europaea* Lee Nursery, Fertile, MN	II/04/1-5

Figure BO-1. Bottineau Woody Field Evaluation Planting - Plot Layout

Block II (95 feet long)				Row No.
	ND-428 black walnut	Flame amur maple	9082712 bittersweet	1
ND-170 E. cotoneaster	90047236 false indigo	9008041 false indigo	9047238 seaberry	2
<---------- ND-21 nannyberry ---------->				3
ND-3744 Korean barberry	9057409 American hazel		Meadowlark forsythia	4
<---------- Magenta crabapple ---------->		ND-2106 hardy almond	323957 chokeberry	5
<---------- 9063098 black walnut ---------->		<---------- Midwest crabapple ---------->		6
			Freedom honeysuckle	7
<---------- ND-3796 white poplar ---------->		<---------- 9063141 native cottonwood ---------->		8
<---------- ND-1843 Russian olive ---------->		<---------- McDermand Ussurian pear ---------->		9
<---------- ND-1759 green ash ---------->		<---------- Cardan green ash ---------->		10
<---------- ND-686 Pekin lilac ---------->		<---------- ND-3207 green ash ---------->		11
<---------- Raverdeau poplar ---------->		<---------- ND-3779 Manchurian poplar ---------->		12
<---------- 9008183 Sheridan source common chokecherry ---------->		<---------- 9069081 littleleaf linden ---------->		13
<---------- Assiniboine poplar ---------->				14
<---------- ND-3899 willow ---------->		<---------- 370126 crack willow ---------->		15
<---------- ND-3898 Harbin pear ---------->		<---------- 9069090 quaking aspen ---------->		16
<---------- 9057410 hackberry ---------->		<---------- ND-3825 silver maple ---------->		17
		<---------- 9057412 bur oak ---------->		18
<---------- 9063115 green ash ---------->		<---------- 9063116 black ash ---------->		19
				20
				21
		revised 6/07	North ---------->	

Figure BO-1 (continued)

Row	**Block III (60 feet long)**	
No.		
1	<---------- 9069164 Scots pine ---------->	
2	<---------- 9076719 Scots pine ---------->	
3	<---------- 9076718 Scots pine ---------->	
4	ND-81 sloe	ND-46 juneberry|Success juneberry
5	Bighorn skunkbush sumac	ND-629 amur maple
6	<---------- ND-26 honeysuckle ---------->	
7	<---------- ND-11 amur honeysuckle ---------->	
8	<---------- Regal Russian almond ---------->	
9	9082684 smooth sumac	9082738 gray dogwood
10	Arnolds Red honeysuckle	9063143 tatarian honeysuckle
11	9069129 Amur chokecherry	9069128 tatarian honeysuckle
12a	9082747 American cranberrybush	ND-633 false indigo
12b	9082687 black currant	9091964 skunkbush sumac
13		9076686 roundleaf hawthorn
14	9082885 quaking aspen	9091969 Russian peashrub
15	Indigo silky dogwood	ND-3889 dogwood
16	Roselow Sargents crabapple	ND-3888 cotoneaster
17	ND-3887 caragana	ND-3892 tatarian honeysuckle
18	ND-3893 American plum	ND-3894 sandcherry
19	Centennial cotoneaster	ND-3896 Nanking cherry
20	ND-3900 late lilac	ND-3901 common lilac
21	ND-1134 select plum	
	North ---------->	revised 6/07

Table No. BO-1: 2007 Weather Summary - Official Station - Bottineau, North Dakota					
	Mean Temperature		Precipitation (inches)		
	(degrees Fahrenheit)		Actual		Deviation from Normal
Month	**2007**	**Normal***	**2007**	**Normal***	**2007**
January	7.6	3.0	0.22	0.49	-0.27
February	2.3	10.5	0.21	0.46	-0.25
March	28.3	22.9	2.02	0.79	1.23
April	41.3	39.7	0.08	1.22	-1.14
May	54.1	53.8	3.49	2.16	1.33
June	64.1	62.4	4.10	3.29	0.81
July	72.1	66.7	1.40	3.04	-1.64
August	64.8	65.5	1.06	2.62	-1.56
September	56.6	54.4	0.41	1.94	-1.53
October	45.0	41.4	0.40	1.27	-0.87
November	24.9	23.2	0.50	0.66	-0.16
December	7.9	8.5	0.54	0.51	0.03
Annual	**39.1**	**37.7**	**14.43**	**18.45**	**-4.02**
M=missing data					
*National Climate Data Center 1971-2000 Monthly Normals					

	2007
Last Frost (28 degrees)	14-Apr
First Frost (28 degrees)	14-Sep
Frost Free Period	152 days

Key to Table BO-2. 38I308K Field Evaluation of Woody Plant Materials – Bottineau, North Dakota
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 BO-2.
Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
sign	9082706	ROSA	prairie rose	16-May	03	03		5	5	100	4	1.0	0.9	
			Rosa			04			5	100	3	1.6	1.5	
			Lincoln-Oakes Nursery, Bismarck, ND											
II/I/1-5	9082712	CESC	bittersweet	14-May	02	02	PLBR	5	5	100	4	0.7	1.3	
			Celastrus scandens			03			5	100	5	0.6	0.7	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	4	0.7	1.8	suckers on 4,5
						06			5	100	4	1.0	1.3	
II/01/6-10	'Flame'	ACGI	amur maple	5-May	87	87	PLBR	5	4	80	4	0.9	1.6	
	PI-483442		*Acer ginnala*			88			3	60	4	2.1	2.7	
			USDA, SCS, PMC, Elsberry, MO			89			5	100	4	1.7	2.5	
						91			3	60	3	5.6	5.3	
						93			3	60		6.2	6.7	
						96			3	60	3	7.2	9.4	
						01			3	60	3	14.5	12.3	
						06			3	60	3	17.5	14.3	
II/01/11-15	ND-428	JUNI	black walnut	6-May	85	85	PLBR	2	2	100	4	0.8	0.9	
	9005970		*Juglans nigra*			86			1	50	2	1.6	2.0	
			NDSU, Fargo, ND			87			1	50	4	3.4	2.1	
						89			1	50	5	6.6	4.3	
						91			1	50	3	8.9	6.7	
						94			1	50		11.8	9.8	
						99			1	50	3	13.5	16.7	
						04			1	50	3	21.5	21.3	
II/02/1-5	9047238	HIRH80	seaberry	5-May	87	87	PLBR	5	2	40	4	1.0	2.0	
			Hippophae rhamnoides			88			2	40	4	1.9	3.4	
			PFRA, Indianhead, Saskatchewan			89			2	40	4	1.6	3.2	
			Lincoln-Oakes Nursery, Bismarck, ND			91			4	80	3	2.2	3.1	
						93			4	80	4	3.5	4.8	
						96			5	100		5.1	6.4	heavy fruit crop, sprout
						02			4	80	2	12.5	9.8	
						06			3	60	4	15.0	11.2	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
II/02/6-10	'Survivor'	AMFR	false indigo	5-May	87	87	PLBR	5	5	100	5	1.9	1.9	
	9008041		*Amorpha fruticosa*			88			3	60	3	3.6	3.0	
			USDA, SCS, PMC, Aberdeen, ID			89			3	60	3	4.1	3.5	
						91			5	100	3	5.7	4.3	
						93			5	100	3	5.0	5.0	
						96			5	100	2	11.8	8.5	solid
						01			5	100	3	14.5	6.0	
						06			5	100	4	12.0	10.0	many other volunteers
II/02/11-15	9047236	AMFR	false indigo	5-May	87	87	PLBR	5	5	100	4	1.2	1.9	
			Amorpha fruticosa			88			5	100	4	2.4	2.4	
			Lincoln-Oakes Nursery,			89			5	100	3	3.9	2.9	
			Bismarck, ND			91			5	100	3	6.5	3.3	
						93			5	100	4	6.9	4.3	
						96			5	100	3	11.8	6.1	
						01			5	100	3	14.5	6.0	
						06			1	20	4	12.0	5.5	overgrown chokecherry
II/02/16-20	ND-170	COIN16	European cotoneaster	8-May	90	90	CONT	5	5	100		0.5	1.0	
	9005728		*Cotoneaster integerrimus*			91			5	100	3	1.5	1.8	
			USDA, SCS, PMC, Bismarck, ND			92			5	100	3	2.1	2.2	4 plts have fruit
						94			5	100	3	3.8	3.1	
						96			5	100	2	6.6	3.8	heavy fruit crop
						99			5	100	2	8.2	4.9	
						04			5	100	1	12.5	6.2	
II/03/1-10	ND-21	VILE	nannyberry	5-May	86	86	PLBR	10	10	100	3	0.3	0.6	
	9034900		*Viburnum lentago*			87			5	50	4	0.5	1.2	
	PI-560908		USDA, ARS, Mandan, ND			88			10	100	5	0.6	1.2	
			USDA, SCS, PMC, Bismarck, ND			90			6	60		0.8	1.5	
						92			6	60	3	1.7	2.5	
						95			6	60	2	4.6	4.9	
						00			6	60	2	6.7	7.6	
						05			6	60	2	7.9	8.5	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
II/04/1-5	'Meadowlark'	FOOV80	forsythia	8-May	89	89	PLBR	5	5	100	7	0.2	0.5	
	9005886		*Forsythia ovata X europaea*			90			2	20		0.5	0.7	
			Lee Nursery, Fertile, MN			91			4	80	4	1.3	1.5	
			NDSU, Fargo, ND			93			4	80	4	2.2	3.3	
						95			4	80	4	3.7	4.3	
						98			4	80	2	5.9	5.5	
						03			4	80	3	8.0	7.7	
II/04/11-15	9057409	COAM3	American hazel	10-May	88	88	PLBR	5	0	0				
			Corylus americana			89			5	100	4	0.9	1.3	
			Turtle Mountains			90			4	80	3	1.0	1.1	
			NDFS, Bottineau, ND			92			4	80	3	1.5	1.5	
						94			4	80	3	2.5	2.5	
						97			4	80	2	3.9	3.0	
						05			4	80	1	6.6	6.2	
						07			4	80	2	8.0	9.0	
II/04/16-20	ND-3744	BEKO	Korean barberry	10-May	88	88	CONT	5	0	0				
	9019577		*Berberis koreana*			89			2	40		0.5	0.6	
			NDSU			90			2	40	6	0.3	0.9	
			McKenzie FEP, ND			92			2	40	4	1.5	1.6	
						94			2	40	4	2.3	3.1	
						97			2	40	5	2.3	2.3	
						02			1	20	2	6.0	5.0	
						07			1	20	3	7.5	6.5	
II/05/1-5	PI-323957	PHME13	black chokeberry	10-May	88	88	CONT	5	0	0				drought
			Photinia melanocarpa			89			5	100		0.6	1.5	
			P.I. Sta., Ames, IA			90			5	100	3	1.1	1.4	
			USDA, SCS, PMC, Bismarck, ND			92			5	100	3	1.8	1.8	
						94			5	100	2	2.6	2.9	2 plants have fruit
						97			5	100	6	3.7	2.1	dieback on all plants
						02			5	100	3	4.0	5.3	
						07			5	100	3	5.5	5.5	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
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II/05/6-10	ND-2106	PRUNU	hardy almond	8-May	90	90	CONT	5	2	40		0.6	0.8	
	9047151		*Prunus*			91			2	40	4	1.6	1.6	
			USDA, SCS, PMC, Bismarck, ND			92			2	40	4	1.7	1.6	
						94			2	40	3	2.8	3.1	
						96			2	40	4	4.5	4.0	
						99			2	40	4	5.2	4.6	
						04			2	40	2	8.5	7.0	
II/05/11-15	'Magenta'	MALUS	crabapple	12-May	92	92	PLBR	5	3	60	7	0.3	0.6	
	PI-514275		*Malus*			93			4	80	5	0.9	1.4	
			USDA, SCS, PMC, E. Lansing, MI			94			5	100	5	0.9	1.8	
						96			5	100	4	2.9	3.6	
						98			5	100	5	4.1	5.0	
						01			4	80	3	7.9	9.0	
						06			4	80	3	8.8	10.6	
II/06/1-5	'Midwest'	MAMA37	Manchurian crabapple	27-Apr	82	82	PLBR	5	5	100	3	1.5	2.2	
	9006003		*Malus mandshurica*			83			4	80	3	3.4	3.9	good vigor
	PI-478000		Res. Sta., Morden, MB, Canada			84			4	80	3	5.0	5.0	spring frost damage
			USDA, SCS, PMC, Bismarck, ND			86			4	80	3	8.2	6.9	
						88			4	80	3	10.8	8.5	
						91			3	60	3	13.8	10.4	
						96			3	60	2	17.4	12.4	
						01			3	60	3	24.0	14.5	
						06			3	60	4	18.0	15.0	
II/06/6-10	9063098	JUNI	black walnut	6-May	91	91	PLBR	5	5	100	4	1.0	1.8	
			Juglans nigra			92			5	100	4	0.7	2.2	Tubex on all
			Big Sioux Nursery, Watertown, SD			93			5	100	4	1.2	3.0	
						95			5	100	3	2.5	4.3	
						97			5	100	3	3.0	5.0	
						00			5	100		6.4	9.5	Tubex removed
						05			5	100	4	11.8	12.8	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
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II/07/1-5	'Freedom'	LOKO	honeysuckle	8-May	90	90	PLBR	5	5	100	4	1.3	1.5	
	9057424		*Lonicera korolkowii*			91			5	100	3	4.4	4.0	
			Lincoln-Oakes Nursery, Bismarck, ND			92			5	100	3	4.1	3.4	all have fruit, all have
						94			5	100	2	5.6	6.6	some tip dieback
						97			5	100	5	11.3	8.9	
						99			5	100		11.8	10.5	
						04			5	100	3	17.0	12.0	slight dieback
II/07/6-10	'Streamco'	SAPU	purpleosier willow	8-May	90	90	PLBR	5	5	100	4	1.0	1.7	
	PI-434309		*Salix purpurea*			91			3	60	4	3.5	1.5	
			USDA, SCS, PMC, Big Flats, NY			92			3	60	4	2.9	1.8	
						94			2	40	4	4.7	4.3	
						96			2	40	4	9.4	6.6	
						99			2	40	3	10.5	8.4	
						07			0	0				removed due to poor performance
II/7/6-10	9057406	RORU	rugosa rose	14-May	02	02	CONT	5	5	100	5	0.6	1.2	
			Rosa rugosa			03			2	40	8	0.2	0.4	
			Lincoln-Oakes Nursery, Bismarck, ND			04			2	40	7	0.4	0.8	
						06			2	40	6	0.6	0.8	
II/08/1-5	9063141	PODE3	eastern cottonwood	11-May	93	93	PLBR	5	5	100	3	1.3	3.0	
			Populus deltoides			94			5	100	3	3.2	5.6	
			Lincoln-Oakes Nursery, Bismarck, ND			95			5	100	1	6.7	9.9	
						97			5	100	2	9.3	16.3	
						99			5	100		10.8	23.2	
						02			5	100	4	11.5	20.8	
						07			2	40	3	17.8	35.9	
II/08/6-10	9030611	POAL7	white poplar	11-May	93	93	CONT(P)	5	3	60	5	1.4	1.2	plt 3,4 had competition from
	ND-3796		*Populus alba*			94			2	40	4	1.3	2.3	apricot sprouts
			Turner Co., SD			95			2	40	2	6.2	5.8	
			McKenzie FEP, ND			97			2	40	2	6.5	8.7	
						99			2	40	3	13.6	17.2	
						02			2	40		11.0	17.6	
						07			2	40		14.0	24.1	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
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II/09/1-5	'McDermand'	PYUS2	Ussurian pear	6-May	81	81	CONT	5	5	100	4	0.9	2.0	
	ND-14		*Pyrus ussuriensis*			82			5	100	4	2.3	3.5	
	9006095		Res. Sta., Morden, MB, Canada			83			5	100	4	2.6	5.2	
	PI-478004					85			5	100	4	5.5	8.1	
						87			5	100	4	7.2	10.4	
						88			5	100	4	9.7	11.2	
						90			5	100	3	9.8	11.8	
						95			5	100	4	11.7	17.0	
						00			5	100	3	14.4	18.6	
						05			5	100	3	17.0	18.6	
II/09/6-11	ND-1843	ELAN	Russian olive	6-May	81	81	CONT	5	4	80	4	3.4	3.6	
	9011840		*Elaeagnus angustifolia*			82			4	80	4	7.1	6.0	
			Res. Sta., Morden, MB, Canada			83			4	80	5	7.2	8.0	
						85			2	40	4	9.2	9.2	moderate canker
						87			2	40	3	14.7	12.4	severe tractor damage on 1
						90			3	60		12.7	14.4	
						95			3	60	5	15.2	18.9	
						00			3	60	5	16.9	22.2	
						05			3	60	4	16.7	21.6	some dead stems on 3
						07			0	0				removed
II/10/1-5	'Cardan'	FRPE	green ash	6-May	81	81	CONT	5	5	100	3	1.3	3.0	
	9005895		*Fraxinus pennsylvanica*			82			5	100	3	3.9	5.7	
	PI-469226		Carlyle, MT			83			5	100	4	5.0	7.0	severe ash plant bug
						85			5	100	3	8.4	11.5	
						87			5	100	3	10.9	14.4	
						90			5	100	4	11.1	16.3	
						95			5	100	3	11.5	20.0	
						00			5	100	3	13.5	24.3	
						05			5	100	2	24.6	28.7	
						06			5	100	2	18.0	26.7	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
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II/10/6-10	ND-1759	FRPE	green ash	6-May	81	81	PLBR	5	5	100	3	1.3	2.8	
	9005893		*Fraxinus pennsylvanica*			82			5	100	3	3.5	5.6	
			SD-156 X 'Cardan'			83			5	100	5	3.7	6.7	severe ash plant bug, leaf rust
			USDA, SCS, PMC, Bismarck, ND			85			5	100	3	7.0	11.0	
						87			5	100	4	10.3	14.9	
						90			4	80		11.6	17.5	
						95			5	100	4	13.1	20.9	
						00			5	100	3	15.2	24.9	
						05			5	100	3	24.6	26.4	
II/11/1-5	ND-3207	FRPE	green ash	27-Apr	82	82	PLBR	5	5	100	3	1.1	3.8	
	9011849		*Fraxinus pennsylvanica*			83			5	100	5	1.9	5.5	moderate ash plant
			Hettinger Co., ND			84			5	100	2	3.6	6.4	bug, leaf rust
						86			5	100	3	8.2	10.2	
						88			5	100	3	8.9	12.2	
						91			5	100	4	10.8	15.0	
						96			5	100	3	12.4	19.4	
						01			5	100	3	17.7	22.8	
II/11/6-10	ND-686	SYREP	pekin lilac	27-Apr	82	82	PLBR	5	2	40		1.1	1.2	
	9006225		*Syringa reticulata* ssp. *pekinensis*			83			2	40	5	1.9	2.4	
	PI-478008		Res. Sta., Morden, MB, Canada			84			5	100	6	1.4	1.7	
			USDA, SCS, PMC, Bismarck, ND			86			3	60	3	4.1	3.5	
						88			2	40	4	7.7	7.3	
						91			3	60	3	6.7	7.1	
						96			2	40	5	10.9	11.9	
						01			2	40	3	16.0	15.5	
						06			2	40	3	12.8	17.9	

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II/12/1-5	ND-3779	POLA82	Manchurian poplar	27-Apr	82	82	CONT	5	5	100	3	3.1	4.2	
	9029137		*Populus laurifolia*			83			5	100	1	5.9	8.6	good-excellent growth and
			Lee Nursery, Fertile, MN			84			5	100	1	8.3	14.0	vigor
						86			5	100	2	11.2	19.5	
						88			5	100	3	12.8	22.3	
						91			5	100	4	13.5	25.2	
						96			5	100	3	15.7	30.7	
						01			5	100	3	20.0	35.0	
						06			2	40	4	19.8	37.1	
II/12/6-10	'Raverdeau'	POPUL	hybrid poplar	12-May	93	93	PLBR	5	5	100	3	1.0	3.0	
	9069085		*Populus*			94			5	100	3	1.6	4.7	
			Lee Nursery, Fertile, MN			95			5	100	3	5.1	7.8	
						97			5	100	3	6.9	13.0	
						99			5	100	3	9.3	23.0	
						02			5	100	4	10.2	24.3	
						07			5	100	6	10.0	22.0	
II/13/1-5	9069081	TICO2	littleleaf linden	12-May	93	93	PLBR	5	5	100	5	0.8	1.2	
			Tilia cordata			94			4	80	4	1.5	1.7	
			Lee Nursery, Fertile, MN			95			5	100	3	2.5	1.9	
						97			3	60	5	2.6	2.0	
						99			3	60	4	3.8	4.6	
						02			3	60	5	6.5	5.8	
II/13/6-10	9008183	PRVI	common chokecherry	3-May	05	05	PLBR	5	5	100	5	0.7	1.9	
			Prunus virginiana			06			5	100	4	1.2	2.3	
			Lincoln-Oakes Nursery, Bismarck, ND			07			4	80	3	2.2	4.4	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
II/14/1-5	'Imperial'	POCA19	Carolina poplar	27-Apr	82	82	CONT	5	5	100	3	2.3	4.7	
	PI-432347		*Populus X canadensis*			83			5	100	1	6.4	9.2	excellent growth and vigor,
			USDA, SCS, PMC, Rose Lake, MI			84			5	100	1	9.2	14.6	looks very good
						86			5	100	2	11.2	19.6	
						88			5	100	3	13.5	23.0	
						91			5	100	4	13.9	21.2	
						96			5	100	4	17.4	26.2	
						01			5	100	4	28.0	34.0	
						07			0	0				plants mostly all dead
II/14/6-10	'Assiniboine'	POPUL	hybrid poplar	12-May	93	93	PLBR	5	4	80	6	0.5	1.6	
	9063147		*Populus*			94			5	100	5	1.0	2.8	
			PFRA, Indianhead, Saskatchewan			95			5	100	3	2.8	4.4	
						97			4	80	5	4.3	7.5	
						99			4	80	4	5.0	15.1	
						02			4	80	4	6.5	18.4	
						07			3	60	4	10.3	24.2	
II/15/1-5	PI-370126	SAFR	crack willow	27-Apr	82	82	CONT	5	5	100	3	3.0	3.1	
			Salix fragilis			83			5	100	3	6.6	6.1	
			P.I. Sta., Glendale, MD			84			5	100	2	8.8	7.4	spring frost damage,
			USDA, SCS, PMC, Bismarck, ND			86			5	100	2	9.4	8.9	looks good
						88			5	100	3	12.3	10.8	
						91			5	100	4	12.8	10.7	
						96			4	80		12.4	12.7	
						01			4	80	4	13.0	13.8	
						07			0	0				removed
II/15/6-10	ND-3899	SALIX	willow	25-May	83	83	PLBR	5	5	100	4	1.7	3.0	
	9035209		*Salix*			84			5	100	5	5.9	4.3	
			Lawyer Nursery, Plains, MT			85			5	100	3	7.5	7.2	
						87			5	100	4	14.0	13.8	
						89			5	100	4	10.5	14.4	
						92			5	100	5	12.5	16.3	
						97			4	80	4	20.3	21.1	
						02			3	60	4	26.7	17.3	
						07			0	0				removed

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
II/16/1-5	9069060	POTR5	quaking aspen	12-May	93	93	PLBR	5	0	0				did not establish
			Populus tremuloides			94			5	100	4	1.1	3.1	replants
			Lee Nursery, Fertile, MN			95			4	80	2	3.3	5.2	
						97			4	80	2	3.8	6.6	
						99			4	80	3	5.1	11.0	
						02			4	80	3	6.1	14.2	
						07			3	60	3	8.3	18.8	
II/16/6-10	ND-3898	PYUS2	Ussurian pear	25-May	83	83	PLBR	5	1	20	5	0.3	1.5	
	9035208		*Pyrus ussuriensis*			84			4	80	5	0.9	1.2	
			Lawyer Nursery, Plains, MT			85			5	100	4	1.1	2.3	
						87			3	60	3	4.2	5.9	
						89			3	60	4	5.4	7.3	
						92			3	60		9.0	10.7	
						97			3	60	8	15.9	13.1	
						02			3	60	5	12.2	14.2	
						07			3	60		13.0	15.0	
II/17/1-5	ND-3825	ACSA2	silver maple	25-May	83	83	CONT	5	5	100	5	0.3	1.0	
	9034904		*Acer saccharinum*			84			5	100		0.4	1.1	
			Bismarck, ND			85			3	60	5	0.8	2.1	
						86			2	40	2	2.2	4.6	
						87			4	80	4	3.5	4.7	
						89			2	40	6	4.6	5.7	
						92			2	40	4	9.5	11.2	
						97			2	40	5	21.0	17.6	
						02			2	40	5	20.5	18.4	
						07			2	40	6	20.0	15.0	
II/17/6-10	9057410	CEOC	hackberry	10-May	88	88	CONT	5	4	80		0.3	0.7	
			Celtis occidentalis			89			1	20		0.7	0.8	
			Bottineau Co., ND			90			5	100		0.6	1.1	
			NDFS			92			5	100	4	1.5	2.8	Tubex on 4 of trees
						94			5	100	4	3.4	4.6	
						97			5	100	3	6.8	9.0	
						02			5	100		8.8	13.6	
						07			5	100		12.6	16.8	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
II/18/1-5	9057412	QUMA2	bur oak	10-May	88	88	CONT	5	1	20		0.5	1.0	
			Quercus macrocarpa			89			1	20		0.5	0.7	
			Foster Co., ND			90			5	100	7	0.4	0.9	
			NDFS			92			4	80	7	0.5	1.0	
						94			4	80	4	1.1	1.9	
						97			4	80	2	1.8	4.0	
						02			4	80	4	7.0	8.8	
						07			4	80	3	8.8	12.4	
II/18/6-10	ND-3890	ELAN	Russian olive	25-May	83	83	PLBR	5	3	60	4	0.4	1.6	poor quality stock
	9035200		*Elaeagnus angustifolia*			84			2	40	4	3.9	4.1	
			Lawyer Nursery, Plains, MT			85			2	40	4	5.5	5.6	
						87			2	40	4	8.5	7.3	
						89			2	40		9.7	9.6	
						92			2	40	5	13.6	12.9	
						97			2	40	8	10.5	10.8	
						07			0	0				removed
II/19/1-5	9063116	FRNI	black ash	5-May	94	94	CONT	5	5	100	4	0.9	1.4	
			Fraxinus nigra			95			5	100	3	1.6	3.6	
			Itasca State Park, MN			96			5	100	3	2.2	4.8	
						99			5	100	5	2.6	7.5	
						00			5	100	3	2.4	8.8	
						03			5	100	3	4.3	12.6	
II/19/6-10	9063115	FRPE	green ash	5-May	94	94	CONT	5	5	100	4	0.7	1.3	
			Fraxinus pennsylvanica			95			5	100	3	1.4	2.9	
			Itasca State Park, MN			96			5	100	4	2.2	4.0	cut off
						99			5	100	5	3.3	6.3	
						00			5	100	5	3.8	8.1	
						03			5	100	2	6.9	13.3	
III/01/1-5	9069164	PISYM	Scots pine	14-May	02	02	CONT	5	3	60	3	1.0	2.4	
			Pinus sylvestris var. *mongolica*			03			4	80	4	1.0	2.4	
			PRC, Heilongjiang Province			04			4	80	3	1.3	3.0	
						06			5	100	4	1.9	3.8	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
III/02/1-5	9076719	PISYM	Scots pine	14-May	02	02	CONT	5	3	60	3	1.0	2.2	
			Pinus sylvestris var. *mongolica*			03			4	80	4	0.7	2.3	
			PRC, Heilongjiang Province			04			2	40	4	0.6	2.9	
						06			4	80	4	1.3	3.2	
III/03/1-5	9076718	PISYM	Scots pine	14-May	02	02	CONT	5	3	60	3	1.4	2.2	
			Pinus sylvestris var. *mongolica*			03			5	100	3	1.1	2.5	
			PRC, Heilongjiang Province			04			5	100	3	1.1	3.0	
						06			4	80	3	2.8	5.1	
III/04/1-3	ND-81	PRSP	sloe	24-May	78	78	PLBR	3	2	67	3	0.8	1.2	
	9006078		*Prunus spinosa*			79			2	67	3	2.1	2.0	
			Res. Sta., Morden, MB, Canada			80			2	67	6	2.1	1.7	
						82			2	67	5	4.3	5.2	
						83			2	67	4	5.2	6.0	mildew
						84			2	67	5	5.9	6.2	
						87			2	67		8.5	7.9	
						92			2	57	5	6.4	7.4	
						97			1	33	4	14.4	10.3	
						02			1	33	3	15.0	9.5	
						07			1	33	3	17.0	12.0	
III/04/6	ND-46	AMAL2	juneberry	24-May	78	78	PLBR	1	1	100	3	1.2	0.9	
	9005661		*Amelanchier alnifolia*			79			1	100	3	2.1	1.6	
			Towner Co., ND			80			1	100	7	2.0	1.5	
						82			1	100	4	3.6	3.0	
						83			1	100	4	4.1	3.0	
						84			1	100	3	5.1	3.1	
						87			1	100	3	6.1	3.8	
						92			1	100	4	7.1	4.3	
						97			1	100	3	9.8	6.2	
						07			0	0				

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
III/04/7-10	'Success'	AMAL2	juneberry	24-Apr	78	78	PLBR	4	4	100	3	1.3	1.0	
	9005662		*Amelanchier alnifolia*			79			4	100	3	1.9	1.6	
			USDA, SCS, PMC, Bismarck, ND			80			3	75	4	2.9	2.1	
						82			3	75	3	4.2	3.8	
						83			3	75	3	4.8	3.8	slight leaf rust
						84			3	75	3	5.0	4.3	
						87			4	100	4	5.9	4.8	
						92			4	100	3	7.2	5.9	
						97			4	100	3	9.0	7.1	
						02								mostly new shoots
						07			0	0				
III/05/1-5	'Bighorn'	RHTR	skunkbush sumac	24-May	79	79	PLBR	5	4	80		0.4	0.8	
	WY-843		*Rhus trilobata*			80			4	80	4	2.5	3.0	
	9004646		Bighorn Co., WY			81			4	80	4	5.2	3.9	
	PI-483445		USDA, SCS, PMC, Bismarck, ND			83			2	40	5	7.9	5.0	
						85			2	40	2	8.7	4.9	
						88			2	40	3	11.5	7.5	
						93			2	40		16.4	7.7	
						98			2	40	6	15.9	8.4	
III/05/6-7	ND-629	ACGI	amur maple	24-May	78	78	PLBR	2	2	100	1	2.5	2.5	
	9005645		*Acer ginnala*			79			2	100	1	6.4	4.9	
	PI-477992		Res. Sta., Morden, MB, Canada			80			2	100	3	7.7	6.3	
						82			2	100	4	13.5	10.8	
						83			2	100	4	12.2	11.7	tractor damage, 2,4-D damage
						84			2	100	3	17.1	12.6	
						87			2	100	3	20.3	17.7	
						92			2	100	2	28.1	20.5	
						97			2	100	2	32.8	24.0	
						02			1	50		34.0	21.8	
						07								needs removal

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
III/06/1-8	ND-26	LONIC	honeysuckle	24-May	79	79	PLBR	8	8	100		1.4	1.5	
	9011852		*Lonicera*			80			8	100	5	2.3	2.6	
			USDA, ARS, Mandan, ND			81		9	9	100	5	3.7	4.0	
						83		8	8	100	4	5.6	5.7	excellent fruit,
						85			8	100	3	7.9	7.1	slight honeysuckle aphid,
						88			8	100	4	9.0	8.2	witches broom, mildew
						93			7	88		14.6	9.5	
						98			7	88	5	13.5	10.2	
						03			7	88		10.8	11.0	
III/07/1-10	ND-11	LOMA6	amur honeysuckle	6-May	81	81	CONT	10	10	100	5	1.6	1.5	
	9005993		*Lonicera maackii*			82			10	100	4	3.7	3.0	
	PI-477998		Res. Sta., Morden, MB, Canada			83			10	100	4	4.1	3.5	leaf wilt,
						85			10	100	3	5.9	4.7	leaf scorch
						87			10	100	3	8.2	7.0	
						88			10	100	3	7.7	6.3	
						90			10	100	4	9.2	6.8	
						95			10	100	3	9.8	8.3	
						00			10	100	4	11.9	9.8	
						05			10	100	3	11.2	10.5	
III/08/1-10	'Regal'	PRTE5	Russian almond	6-May	81	81	CONT	10	10	100	4	1.2	2.5	
	ND-283		*Prunus tenella*			82			10	100	4	3.1	3.4	
	9006079		NDG&F Dept.			83			10	100	3	3.9	3.8	
	PI-540442					85			10	100	4	5.9	5.0	
						87			10	100	4	7.4	5.3	
						88			10	100	4	7.9	5.3	
						90			10	100	3	7.9	5.6	
						95			10	100	3	11.3	6.1	
						00			10	100	3	13.5	7.3	
						05			10	100	2	15.4	6.6	
III/09/1-5	9082684	RHGL	smooth sumac	16-May	03	03		5	2	40	5	0.8	1.0	poor stock
			Rhus glabra			04			2	40	3	0.7	1.5	
			Lincoln-Oakes Nursery, Bismarck, ND			05			2	40	4	0.7	1.4	
						07			1	20	7	0.5	1.5	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
III/09/6-10	9082738	CORA6	gray dogwood	6-May	03	03		5	5	100	4	0.7	1.5	
			Cornus racemosa			04			5	100	3	0.7	1.9	
			Wisconsin			05			5	100	3	1.0	2.0	
			Lincoln-Oakes Nursery, Bismarck, ND			07			5	100	4	1.0	1.7	
III/10/1-5	'Arnolds Red'	LOTA	red tatarian honeysuckle	12-May	93	93	PLBR	5	4	80	4	1.0	1.5	
	9069080		*Lonicera tatarica*			94			4	80	4	1.6	2.1	
			Lee Nursery, Fertile, MN			95			5	100	4	2.5	3.1	
						97			5	100	4	3.9	4.6	
						99			5	100	4	4.3	5.4	
						02			5	100	4	5.5	6.9	alot of fruit on all
						07			5	100	4	9.0	9.6	
III/10/6-10	9063143	LOTA	red tatarian honeysuckle	12-May	93	93	PLBR	5	5	100	4	1.2	1.4	
			Lonicera tatarica			94			5	100	5	1.2	1.9	
			Iowa			95			5	100	4	3.5	3.7	
			Lincoln-Oakes Nursery, Bismarck, ND			97			5	100	3	5.3	5.5	
						99			5	100	2	6.0	7.3	
						02			5	100	2	7.5	8.8	
						07			5	100	2	11.5	10.5	
III/11/1-5	9069129	PRMA80	Amur chokecherry	11-May	94	94	PLBR	5	3	60	2	1.9	3.2	
			Prunus maackii			95			5	100	2	3.3	5.1	
			Big Sioux Nursery, Watertown, SD			96			5	100	3	5.1	6.6	
						98			5	100	2	6.6	8.2	
						00			5	100	1	6.2	12.3	
						03			5	100	2	11.7	13.1	
III/11/6-10	9069128	LOTA	red tatarian honeysuckle	11-May	94	94	PLBR	5	4	80	5	1.0	1.0	
			Lonicera tatarica			95			5	100	4	2.9	3.1	
			Big Sioux Nursery, Watertown, SD			96			5	100	4	3.4	4.7	herbicide damage
						98			5	100	3	5.8	7.1	
						00			5	100	2	5.3	10.7	
						03			5	100	4	8.6	12.7	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
III/12a/1-5	9082747	VIOPA	American cranberrybush *Viburnum opulus* var. *americanum* Bottineau County, ND USDA, NRCS, PMC, Bismarck, ND		07	07	POTD	5	4	80	5	0.5	0.9	
III/12b/1-5	9082687		black currant *Ribes americanum* South Dakota Big Sioux Nursery, Watertown, SD		07	07	CONT	5	5	100	3	0.8	1.2	
III/12b/6-10	9091964		skunkbush sumac *Rhus trilobata* Harding County, SD USDA, NRCS, PMC, Bismarck, ND		07	07	CONT	5	3	100	3	0.9	1.3	weed competition 3,4
III/13/6-10	9076686	CRCH	roundleaf hawthorn	26-May	04	04		5	5	100	4	0.4	0.7	caged
			Crataegus chrysocarpa			05			5	100	4	0.8	1.1	
			Lincoln-Oakes Nursery, Bismarck, ND			06			5	100	3	1.0	1.5	
III/14/1-5	9082885	POTR5	quaking aspen	26-May	04	04		5	5	100	4	0.3	2.2	
			Populus tremuloides			05			5	100	4	0.6	2.2	
			NDFS Nursery, Towner, ND			06			2	40	4	1.0	2.8	
III/14/6-10	90911969	CAFR80	Russian peashrub	3-May	05	05		5	5	100	3	0.7	3.1	
			Caragana frutex			06				100	4	0.8	3.0	
			Big Sioux Nursery, Watertown, SD			07			5	100	4	1.0	3.2	

5

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
III/15/1-5	'Indigo'	COAM2	silky dogwood	25-May	83	83	PLBR	5	5	100	4	0.7	1.3	
	Mich-765		*Cornus amomum*			84			5	100	4	2.0	1.9	
	9004971		USDA, SCS, PMC, Rose Lake, MI			85			5	100	3	3.0	3.0	
	PI-468117					87			4	80	4	6.2	4.3	
						89			4	80	4	5.0	4.5	
						92			4	80	5	5.6	4.9	
						97			4	80	4	9.8	7.2	
						02			4	80	3	10.5	8.3	
						07			4	80		11.5	8.0	
III/15/6-10	ND-3889	COST4	dogwood	25-May	83	83	PLBR	5	4	80	6	0.5	1.1	
	9035199		*Cornus stolonifera*			84			3	60	4	0.9	1.8	
			Lawyer Nursery, Plains, MT			85			3	60	3	2.7	2.7	
						87			3	60	4	5.7	3.7	
						89			2	40	4	5.8	4.4	
						92			2	40	2	7.6	5.8	
						97			2	40	2	7.6	5.8	
						02			3	60	4	10.5	6.3	
						07						13.0	5.5	a thicket, cannot see individuals
III/16/1-5	'Roselow'	MASA9	Sargent crabapple	25-May	83	83	PLBR	5	5	100	4	0.7	1.2	
	Mich-1339		*Malus sargentii*			84			5	100	3	1.5	1.7	1 chlorotic
	9005026		USDA, SCS, PMC, Rose Lake, MI			85			5	100	4	1.7	2.3	
	PI-477986					87			4	80	4	3.1	3.6	
						89			4	80	4	3.8	4.1	
						92			1	20	4	5.4	4.9	
						97			1	20	5	9.0	6.6	
						02			1	20	4	11.0	10.5	
						07			0	0				volunteer chokecherry & boxelder

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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
III/16/6-10	ND-3888	COAC*	cotoneaster	25-May	83	83	PLBR	5	5	100	4	1.0	1.4	
	9035198		*Cotoneaster acutifolia*			84			5	100	4	1.5	1.9	
			Lawyer Nursery, Plains, MT			85			5	100	4	2.4	2.9	
						87			5	100	4	5.5	4.3	
						89			5	100	3	6.0	5.3	
						92			5	100	3	9.8	7.0	
						97			5	100	5	8.9	7.5	
						02			5	100	3	11.0	9.7	
						07			5	100	3	11.0	8.0	some dieback but lots of fruit
III/17/1-5	ND-3887	CAAR18	caragana	25-May	83	83	PLBR	5	5	100	4	0.5	1.3	
	9035197		*Caragana arborescens*			84			5	100	5	0.8	1.9	
			Lawyer Nursery, Plains, MT			85			5	100	4	1.4	2.8	
						87			4	80	4	4.3	6.2	
						89			5	100	4	5.2	7.1	
						92			5	100	3	7.3	9.8	
						97			5	100	3	14.6	13.1	
						02			5	100	3	15.5	14.8	
						07			5	100	4	17.0	16.5	leggy
III/17/6-10	ND-3892	LOTA	red tatarian honeysuckle	25-May	83	83	PLBR	5	5	100	6	0.6	1.2	
	9035202		*Lonicera tatarica sibirica*			84			5	100	5	1.1	1.9	leaf wilt, aphid
			Lawyer Nursery, Plains, MT			85			5	100	3	2.3	2.7	
						87			5	100	4	5.3	5.2	
						89			5	100	4	6.1	6.2	
						92			5	100	4	6.8	8.5	
						97			5	100	4	14.3	10.9	
						02			5	100	4		12.8	
						07			5	100	4	19.0	15.3	

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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
III/18/1-5	ND-3893	PRAM	American plum	25-May	83	83	PLBR	5	4	80	6	0.5	1.8	
	9035203		*Prunus americana*			84			5	100	5	0.9	1.8	
			Lawyer Nursery, Plains, MT			85			5	100	4	1.2	2.4	
						87			5	100	4	4.8	5.6	
						89			5	100	4	6.9	7.8	
						92			5	100	3	8.3	9.5	
						97			5	100	4	15.5	12.3	
						02			5	100	5	15.0	13.5	
						07			5	100	3	18.0	11.8	
III/19/1-5	'Centennial'	COIN16	European cotoneaster	6-May	85	85	PLBR	5	5	100	3	0.6	1.1	
	ND-177		*Cotoneaster integerrimus*			86			5	100	3	1.8	2.3	
	9005729		USDA, SCS, PMC, Bismarck, ND			87			5	100	3	4.4	3.6	
	PI-113095					89			5	100	4	5.9	5.4	
						91			4	80	3	10.8	6.6	
						94			4	80	3	11.8	8.7	
						99			3	60	4	9.6	10.4	
						04			5	100	6	11.0	9.0	fireblight
III/19/6-10	ND-3896	PRTO80	nanking cherry	25-May	83	83	PLBR	5	3	60	8	0.3	0.5	poor quality stock,
	9035206		*Prunus tomentosa*			84			4	80	6	0.3	0.9	failed to establish,
			Lawyer Nursery, Plains, MT			85			4	80	3	0.7	1.3	5 cultivated out
						87			2	40	4	3.0	4.0	
						89			2	40	3	4.4	5.2	
						92			2	40	4	7.0	5.6	
						97			2	40	6	6.9	5.0	
						02			2	40	4	9.0	8.5	
						07			2	40	5	7.0	7.0	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
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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
III/20/1-5	ND-3900	SYVI3	late lilac	25-May	83	83	CONT	5	5	100	8	0.3	1.0	heat stress,
	9035210		*Syringa villosa*			84			3	60	9	0.4	0.8	poor quality stock
			Lawyer Nursery, Plains, MT			85			4	80	4	0.5	1.2	
						86			5	100	3	1.3	1.9	
						87			3	60				
						89			5	100	4	2.4	3.2	
						92			4	80	4	4.6	5.6	
						97			4	80	4	10.2	8.5	
						02			4	80	4	9.5	10.5	
						07			4	80	3	10.0	11.5	
III/20/6-10	ND-3901	SYVU	common lilac	25-May	83	83	CONT	5	5	100	8	0.3	0.5	severe weed competition,
	9035211		*Syringa vulgaris*			84			4	80	7	0.3	0.5	moisture stress,
			Lawyer Nursery, Plains, MT			85			4	80	4	0.5	0.7	5 cultivated out
						87			4	80	4	1.7	2.3	
						89			4	80	4	3.1	3.5	
						92			4	80	4	5.4	5.6	
						97			4	80	2	9.2	9.5	
						02			5	100	2	10.5	10.5	
						07			4	80	6	10.0	9.5	
III/21/1-5	'Prairie Red'	PRUNU	plum	6-May	85	85	PLBR	5	3	60	6	0.4	1.6	
	ND-1134		*Prunus*			86			3	60	4	1.1	2.3	
	9047203		Miller, SD			87			2	40	4	2.7	3.2	
			USDA, SCS, PMC, Bismarck, ND			88			3	60	4	3.2	4.1	
						89			3	60	4	5.0	6.5	
						91			3	60	3	8.0	8.5	
						94			3	60		9.8	9.1	
						99			3	60	3	15.7	12.5	
						04			3	60	4	17.0	13.0	

Project No.: 38I308K Field Evaluation of Woody Plant Materials, Bottineau, North Dakota
Year of Record: 2007

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
III/21/6-10	SD-131	PRPA5	mayday	6-May	85	85	PLBR	5	5	100	2	0.6	1.4	
	9006073		*Prunus padus*			86			5	100	2	1.5	2.5	
	PI-536048		Brookings Co., SD			87			4	80	4	2.1	3.4	
			USDA, SCS, PMC, Bismarck, ND			88			5	100	4	2.5	4.0	
						89			5	100	4	4.3	5.7	
						91			5	100	3	6.7	7.7	
						94			5	100	4	7.0	9.7	
						99			5	100	4	12.1	14.6	black knot
						07			0	0				mostly dead; removed

OFF-CENTER EVALUATIONS: TECHNICAL REPORT – 2007

Study 38I316K North Dakota State University, Dickinson Research Extension Center, Dickinson, North Dakota.

Study Title: Field Evaluation of Woody Plant Materials.

Introduction: There is a need to evaluate the performance of shrub and tree species/cultivars for windbreaks, wildlife, and recreational plantings under diverse soil and climatic conditions. To meet this need, field evaluation planting sites representative of the major land resource areas were located in the three states served by the PMC. These sites provide planting locations under long-term land tenure, for assemblies of trees and shrubs to be evaluated under uniform culture and management. New material can be added on an annual basis. Comparisons are then made with previously released cultivars and area of adaptation determined.

Objective: The objective is to assemble and evaluate woody plant materials for conservation use. Superior cultivars will be selected and released for increase by commercial nurseries.

Cooperators: The USDA Natural Resources Conservation Service, Plant Materials Center, Bismarck, North Dakota, in cooperation with the North Dakota State University, Dickinson Research Extension Center, Dickinson, North Dakota. Expires January 20, 2010, unless agreement is extended.

Location: This project is located on the west edge of Dickinson, North Dakota, on the NDSU Dickinson Branch Experiment Station. Legal description: NE 1/4 sec. 5, T. 139 N., R. 96 W., Stark County, North Dakota.

Major Land Resource Area: The site is located in Major Land Resource Area 54, Rolling Soft Shale Plain. This moderately dissected rolling plain is underlain by calcareous shales and sandstones. Strongly dissected areas of sharp local relief or badland topography border major streams and valleys in some areas. Elevation is 1,800 to 3,100 feet. Sixty percent of the area is rangeland.

Soils: The soil type is a Parshall fine sandy loam. The Parshall series consists of deep, well-drained soils formed in fine sandy loam alluvium on terraces and outwash plains and in upland swales. The surface layer and subsoil is dark grayish-brown fine sandy loam. The underlying material is dark grayish-brown fine sandy loam and loamy fine sand. Permeability is moderately rapid. The available water capacity is moderate. Organic matter is high and fertility is medium. This soil is in North Dakota windbreak suitability group 5.

Climate: For MLRA 054, the average annual precipitation is 13 to 19 inches; increasing from west to east for this semiarid area. Rainfall is highest from late spring to midsummer and very low during the rest of the year. Winter precipitation is snow. Average annual temperature is 40 to 45 degrees F. Average freeze-free period is 110 to 135 days. The plant hardiness zone is 4a, with an average annual minimum temperature of -30 to -20 degrees F. Climatic data for 2007 recorded at Dickinson Research Extension Center, Dickinson, North Dakota, is shown in Table DI-1.

Methods and Materials

Assembly: Refer to Table DI-2 for a list of woody species planted from 1978 through 2007.

Planting Plan: Plots are not randomized or replicated but systematically arranged for ease of evaluation and demonstration purposes. The planting site is approximately 500 feet long and 200 feet wide. The area is divided into five blocks. Each block consists of single row, non-replicated plots. Each plot contains a minimum of 5 plants. Row length is 100 feet and spacing between rows is 20 feet. Block 1A contains

primarily poplar accessions. Block 1B contains conifers. Block 2 contains shrubs and small trees. Block 3 contains medium sized trees. Block 4 contains tall trees. Refer to the plot map in Figure DI-1. All trees are spaced ten feet within row and shrubs are spaced five feet within row. All rows run from west to east. Like species and standards of comparison are established in adjacent plots whenever possible.

Plot Preparation: A clean, firm planting site is prepared annually by disking and harrowing.

Planting Method: All trees and shrubs were hand planted using approved forestry methods.

Planting Date: Refer to Table DI-2 for planting dates of woody species planted from 1978 through 2006. Replacement stock is planted after establishment year if available.

Fertilization: No fertilizer has been applied to planting area.

Weed Control: No herbicide has been applied to any plot during year of establishment or in succeeding years. Weeds were controlled by clean cultivating between rows, within row, and in fallow areas. Four to six tillage operations were performed each year in the months of May through August. A minimum of hand hoeing was done to control weeds in rows.

Pest Control: No animal repellent or insecticide was applied in 1978. In the fall 1979, an animal repellent, Arasan 50, was sprayed on fruit trees to discourage rodent damage.

1980-1981: On November 6, 1980, and October 29, 1981, Arasan 50 was applied to the trunks and lower limbs of fruit trees to deter rodents from damaging bark and cambium. Conifers also received this spray treatment to discourage animal browse. No insecticides were applied.

1982-1995: No animal repellents or insecticides have been applied.

Irrigation: Each year, newly planted materials were watered with a portable tank. No water was added following year of establishment. During the drought years of 1988-1991, the trees were watered in the summer.

Crop Residue Management: During 1990 and 1991, a cover crop was maintained to prevent soil erosion.

Silvicultural Practices: Extensive pruning was done in 1979-1980 to reshape trees damaged by animals. Dead trees and broken branches were cut and removed each year for sanitation. In 1988, some Russian olive accessions were treated with Tordon, using a hypo-hatchet, with unsuccessful results. In 1989, those treated accessions were cut down, but resprouted. These trees were removed by tractor in 1993. In June 2001, a front end loader was used to remove poorly performing accessions. Because of damage caused by a snowstorm in October 2005, considerable pruning was done on the trees, both in the fall and in the spring of 2006. The most damage at the site occurred in the southeast corner where the hackberry trees are planted. A number of the hybrid poplars have started to die. Trees have been cut, but stumps still remain.

Evaluations and Measurements

Previous years: Records of planting date, survival, vigor, canopy width, height, cold hardiness, animal damage, insect damage, disease symptoms, and unusual or outstanding features have been maintained since 1978 and are listed in Table DI-2. Plant performance data is recorded during the growing season for the first three years. After the third year, data is gathered according to a specific schedule. Select data appears in this report. Annual summary reports have been prepared since 2006 and can be requested from the PMC.

Results

Plant Performance: Currently, 95 accessions of 66 species are under evaluation. This site is fairly well maintained by the Dickinson Experiment Station. Very little weed competition has occurred within row. A favorable microclimate is provided by surrounding shelterbelts. This undoubtedly reduces exposure to extreme temperatures and winds and desiccation and winter injury. Annual rainfall amounts are similar to Bismarck. The drought years of 1988 and 1989 have severely hampered establishment and performance. With the continued dry weather in 1990 and 1991, much of the original windbreak of spruce planted on the border died out. A number of planted accessions also died. After the drought, precipitation was above normal for several years. The soils at the plot are a Parshall fine sandy loam, which is in Windbreak Suitability Group (WSG) 5. Some of the trees planted here, such as the hybrid poplars that were planted in 1990 grew very well initially, especially with years of above average rainfall in 1993-1995. Now they have reached a point where they need to be removed. The white poplar seems to be more drought-resistant. Also, the closely related quaking aspen seems to be doing better than the hybrid poplars. Other trees that are growing well on this fine sandy loam are many of the conifers, especially the Siberian larch and ponderosa pine. The following accessions exhibit potential for further evaluation and use:

Accession Number	Genus/Species Origin/Source	Plot Location
ND-1765 9005980	Siberian larch *Larix sibirica* USDA, FS, Shelterbelt Lab., Bottineau, ND	1/03/1-10
ND-1873 9005648	Amur maple *Acer ginnala* Lincoln-Oakes Nursery, Bismarck, ND	3/09/1-5
SD-156 9005890	green ash *Fraxinus pennsylvanica* Deuel Co., Clear Lake, SD	4/01/1-5
ND-1879 9011850 PI-503531	honeylocust *Gleditsia triacanthos* ARS Field Station, Woodward, OK	4/04/1-5
SD-75 9005713	hackberry *Celtis occidentalis* Potter Co., SD	4/9/1-10
9069090	quaking aspen *Populus tremuloides* Lee Nursery, Fertile, MN	1A/5/6-10
9069168	Siberian larch *Larix siberica* Altai Region, Russia	1A/09/6-10
9057413	Ponderosa pine *Pinus ponderosa* Glendive, MT NDFS	1B/05/1-5

Accession Number	Genus/Species Origin/Source	Plot Location
ND-3803	white poplar *Populus alba* USDA, NRCS, PMC, Bismarck, ND	1B/07/6-10
9063148	corktree *Phellodendron sachalinense* Clay Co., MN	1B/09/1-5
9076737	black cherry *Prunus serotina* Apple Valley OCEP, ND Lincoln-Oakes Nursery, Bismarck, ND	II/07/1-5

Figure DI-1. Dickinson FEP plot map

	Block 1A		Block 1B		Block 2		Block 3				Block 4	
Row 1	14272 poplar	14271 poplar	ND-1729 Siberian larch		ND-313 red tatarian honeysuckle	ND-1730 red tatarian honeysuckle	'Midwest' Manchurian crabapple		'Red Splendor' crabapple		SD-156 green ash	ND-1734 green ash
Row 2	9082885 aspen	9082619 green ash	SL-383-T Siberian larch		9082684 smooth sumac	9008183 Sheridan source chockecherry	ND-1731 Siberian crabapple		'McDermand' Ussurian pear		'Cardan' green ash	ND-1759 green ash
Row 3	14392 Walker poplar	Canam Walker poplar	ND-1765 Siberian larch		ND-26 honeysuckle/ ND-452 honeysuckle	ND-170 cotoneaster	'Freedom' honey-suckle	9063143 red tatarian honey-suckle	Survivor false indigo	'Arnolds Red' honey-suckle	ND-647 black ash	ND-1432 Ohio buckeye
Row 4	ND-3796 white poplar	Raverdeau poplar	ND-1763 ponderosa pine	ND-1565 bristlecone pine	9082711 winterberry euonymus	'Regal' Russian almond	'Konza' aromatic sumac	'Scarlet' Mongolian cherry		'Legacy' late lilac	ND-1879 honeylocust	
Row 5	9082640 Gambel oak	9069090 quaking aspen	9057413 ponderosa pine	9069169 Siberian pine	ND-11 amur honeysuckle	'Centennial' cotoneaster	'Sakakawea' silver buffaloberry		'Magenta' crabapple		9063116 black ash	
Row 6	9063146 Walker Poplar	Assiniboine poplar	9069172 Scots pine	Silverscape R. olive X silverberry	9057406 rugosa rose	9082638 western blue elderberry	9076726 tatarian maple		9091969 Russian peashrub		9063115 green ash	9076724 Russian olive
Row 7	9063141 eastern cottonwood			ND-3803 white poplar	9076737 black cherry	323957 chokeberry	9076686 roundleaf hawthorn		9082653 skunkbush sumac		ND-989 Japanese elm	9069166 Russian olive
Row 8	Hunter ponderosa pine	Bridger-Select juniper	9092140 Korean Mtn. Ash	9082687 black currant	9063142 Japanese cherry	9082713 Siberian peach	'Prairie Red' plum		ND-629 amur maple		'Oahe' hackberry	
Row 9	9069164 Scots pine	9069168 Siberian larch	9063148 corktree	ND-21 nannyberry	'Homestead' Arnold hawthorn		ND-1873 amur maple		ND-686 Pekin lilac		SD-75 hackberry	
Row 10	9082641 pinyon pine	9082889 mugo pine	9069081 littleleaf linden	9063126 Japanese elm	mayday/ common juniper	salt tree/ bittersweet	9069129 amur chokecherry					9057410 hackberry
	Block 1A		**Block 1B**		**Block 2**		**Block 3**				**Block 4**	

updated 05/07

Table No. DI-1: 2007 Weather Summary - Official Station - Dickinson, North Dakota					
	Mean Temperature (degrees Fahrenheit)		Precipitation (inches) Actual		Deviation from Normal
Month	**2007**	**Normal***	**2007**	**Normal***	**2007**
January	18.5	12.0	0.10	0.35	-0.25
February	14.0	18.9	0.54	0.37	0.17
March	36.0	28.7	0.56	0.67	-0.11
April	39.7	41.3	1.41	1.63	-0.22
May	54.4	53.4	4.16	2.24	1.92
June	64.0	62.4	1.64	3.57	-1.93
July	75.0	68.1	1.11	2.20	-1.09
August	68.2	67.3	1.64	1.65	-0.01
September	58.5	55.4	1.40	1.62	-0.22
October	45.6	43.3	0.43	1.31	-0.88
November	31.1	27.3	0.02	0.63	-0.61
December	18.3	16.2	0.13	0.37	-0.24
Annual	**43.6**	**41.2**	**13.14**	**16.61**	**-3.47**
*National Climate Data Center 1971-2000 Monthly Normals					
		2007			
Last Frost (28 degrees)		14-Apr			
First Frost (28 degrees)		14-Sep			
Frost Free Period		152 days			

Key to Table DI-2. 38I316K Field Evaluation of Woody Plant Materials – Dickinson, North Dakota

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 DI-2.
Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
IA/01/1-5	9058870	PDXP8	poplar	9-May	90	90	PLBR	5	5	100	1	1.5	3.3	
	14272		*Populus deltoides x P. nigra*			91			5	100	3	2.3	4.1	
			USDA, ARS, Mandan, ND			92			5	100	5	3.6	5.0	
			Lincoln-Oakes Nursery, Bismarck, ND			94			5	100	2	7.2	14.7	
						96			5	100	2	10.0	24.6	
						99			5	100	2	10.6	35.6	
						04			5	100	6	7.5	16.2	one cut off & resprouting
						07			0	0				removed
IA/01/6-10	9058869	PDXP8	poplar	9-May	90	90	PLBR	5	5	100	3	1.1	3.1	
	14271		*Populus deltoides x P. nigra*			91			1	20	6	0.3	1.8	
			USDA, ARS, Mandan, ND			92			5	20	4	1.7	3.5	
			Lincoln-Oakes Nursery, Bismarck, ND			94			5	100	3	5.6	10.6	
						96			5	100	4	8.8	17.4	
						99			5	100	2	9.9	30.7	
						04			5	100	5	9.2	24.0	
						07			0	0				removed
IA/02/1-5	9082885	POTR5	aspen	11-May	04	04		5	5	100	4	0.8	1.9	browsed off regrowing
			Populus tremuloides			05			3	60	3	2.1	3.5	
			NDFS Nursery, Towner, ND			06			5	100	4	2.0	2.7	
1A/02/6-10	9082619	FRPE	green ash	16-May	02	02	CONT	5	5	100	5	0.5	0.8	3,5 browsed by rabbit
			Fraxinus pennsylvanica			03			3	60	4	0.5	1.3	
			Jordan, MT			04			5	100	3	0.9	2.4	
			Valley Nursery, Helena, MT			06			5	100	3	2.1	4.3	
IA/03/1-5	'Manitou'	POPUL	poplar	9-May	90	90	PLBR	5	5	100	2	1.7	3.0	
	9058874		*Populus*			91			5	100	4	2.5	4.1	
	14392		USDA, ARS, Mandan, ND			92			5	100	4	1.6	3.2	
			Lincoln-Oakes Nursery, Bismarck, ND			94			5	100	2	9.5	16.2	
						96			5	100	3	11.7	24.6	anthracnose on leaves,
						99			5	100	3	12.2	35.2	leaves dropping on all trees
						04			5	100	5	11.8	24.6	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
IA/03/6-10	'CanAm'	POPUL	poplar	9-May	90	90	PLBR	5	5	100	3	1.2	3.7	
	9058873		*Populus*			91			1	20	5	1.0	2.0	
	14390		USDA, ARS, Mandan, ND			92			5	100	4	1.6	3.2	
			Lincoln-Oakes Nursery, Bismarck, ND			94			5	100	3	5.9	11.0	
						96			5	100	4	10.8	16.7	
						99			5	100	4	9.7	30.1	
						05			4	80	4	14.4	29.3	
IA/04/1-5	9030611	POAL7	white poplar	15-May	92	92	CONT(P)	5	4	80	4	1.6	1.6	
	ND-3796		*Populus alba*			93			5	100	2	3.8	3.7	
			Turner Co., SD			94			4	80	3	6.3	5.9	
			USDA, NRCS, PMC, Bismarck, ND			96			4	80	6	8.7	7.7	dieback on all trees
						98			4	80	3	14.4	13.3	
						02			4	80	7	17.0	13.5	dieback from freezing on all
						06			4	80		16.0	15.2	
IA/04/6-10	'Raverdeau'	POPUL	hybrid poplar	10-May	93	93	PLBR	5	5	100	3	1.2	2.3	
	9069085		*Populus*			94			5	100	3	3.9	6.3	
			Lee Nursery, Fertile, MN			95			5	100	2	8.0	12.6	
						97			5	100	3	11.9	16.8	
						99			5	100	4	9.3	27.1	
						02			5	100	7	12.0	15.0	dieback from freezing on all
						07			0	0				mostly dead, need removal
IA/05/1-5	9082640	QUGA	Gambel oak	13-May	99	99	CONT	5	5	100	3	0.8	1.6	
			Quercus gambelii			00			3	60	4	0.9	1.2	
			Lincoln-Oakes Nursery, Bismarck, ND			01			3	60	3	2.1	2.3	
						03			3	60	3	0.9	1.9	browsed
						05			3	60	5	1.2	2.0	
IA/05/6-10	9069090	POTR5	quaking aspen	15-May	93	93	PLBR	5	4	80	5	0.8	1.7	
			Populus tremuloides			94			5	100	3	1.7	4.1	
			Lee Nursery, Fertile, MN			95			5	100	3	3.4	6.2	
						97			5	100	2	5.8	9.9	
						99			5	100	3	8.8	17.3	very colorful fall foliage
						02			5	100	1	12.5	22.6	almost white bark on 5
						07			5	100	2	15.5	25.8	slight dieback 2,5

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
IA/06/1-5	'Walker'	POPUL	hybrid poplar	10-May	93	93	PLBR	5	5	100	6	0.2	1.1	
	9063146		*Populus*			94			5	100	4	2.3	4.7	
			PFRA, Indianhead, Saskatchewan, Canada			95			5	100	2	6.0	10.8	
						97			5	100	2	11.3	20.8	moderate leaf rust
						99			5	100	3	9.4	30.3	
						02			5	100	5	13.0	28.4	
						07			0	0				removed
IA/06/6-10	'Assiniboine'	POPUL	hybrid poplar	10-May	93	93	PLBR	5	5	100	4	0.5	1.8	
	9063147		*Populus*			94			5	100	3	3.7	6.1	
			PFRA, Indianhead, Saskatchewan, Canada			95			5	100	3	7.9	11.4	
						97			5	100	4	11.7	17.1	
						99			5	100	3	11.5	27.8	
						02			5	100	3	14.0	31.4	leaf disease on all
						07			5	100	5	11.3	25.2	dead branches on 1
IA/07/1-5	9063141	PODE3	eastern cottonwood	10-May	93	93	PLBR	5	5	100	3	1.6	3.4	
			Populus deltoides			94			5	100	2	5.6	9.0	
			Lincoln-Oakes Nursery, Bismarck, ND			95			5	100	3	8.1	13.7	severe leaf rust
						97			5	100	2	15.7	22.4	
						99			5	100	2	13.5	31.8	
						02			5	100	2	18.0	37.4	2,3,4,5 have some leaf disease
						07			5	100	4	17.5	39.0	
IA/08/1-5	'Hunter Germplasm'	PIPOS	ponderosa pine	17-May	05	05		5	5	100	4	0.9	1.3	
			Pinus ponderosa var. *scopulorum*			06			5	100	3	1.1	1.8	
	9081843		USDA, NRCS, Bridger, MT			07			5	100	4	1.1	1.8	
1A/08/6-10	'Bridger-Select'	JUSC2	Rocky Mountain juniper	17-May	05	05		5	5	100	5	0.7	1.0	one mowed off
	9078631		*Juniperus scopulorum*			06			5	100	4	1.0	1.6	
			Bridger PMC, MT			07			4	80	3	1.1	1.9	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
IA/09/1-5	9069164	PISY	Scots pine	4-May	98	98	CONT	5	4	80	4	0.8	1.2	
			Pinus sylvestris var. *mongolica*			99			4	80	4	1.0	1.5	
			Heilongjiang Province, China			00			4	80	3	1.6	2.0	
			USDA, NRCS, PMC, Bismarck, ND			02			4	80	3	3.0	4.0	
						04			5	100	3	4.2	5.7	
						07			5	100	3	7.5	10.4	
IA/09/6-10	9069168	LASI	Siberian larch	4-May	98	98	CONT	5	4	80	4	0.6	1.3	
			Larix sibirica			99			5	100	3	1.0	1.8	
			Altai region, Russia			00			1	20	2	1.4	2.8	
			USDA, NRCS, PMC, Bismarck, ND			02			1	20	1	3.0	6.5	
						04			1	20	1	4.5	9.0	
						07			1	20	2	8.0	10.2	
IA/10/1-5	9082641	PIED	Pinyon pine	13-May	99	99	CONT	5	5	100	3	0.9	1.4	
			Pinus edulis			00			1	20	3	1.0	1.2	
			Lincoln-Oakes Nursery, Bismarck, ND			01			1	20	3	1.3	1.3	
						03			1	20	2	1.3	1.8	
						05			1	20	6	1.5	1.8	
IA/10/6-10	9082889	PIMU80	Mugo pine	11-May	04	04		5	1	20	3	0.8	1.3	
			Pinus mugo			05			2	40	6	0.8	0.7	
			Big Sioux Nursery, Watertown SD			06			3	60	4	1.2	1.0	
IB/01/1-10	ND-1729	LASI*	Siberian larch	16-May	78	78	PLBR	10	9	90	3	0.7	2.0	
	9005979		*Larix sibirica*			79			10	100		0.7	1.4	
			NDFS State Nursery, Towner, ND			80			10	100	4	1.1	1.8	
						82			8	80	8	1.0	1.5	
						83			6	60	7	1.1	2.4	1 mowed off, moderate rodent
						84			6	60	4	1.3	3.0	damage
						87			6	60	6	3.0	6.5	
						92			5	50	4	7.7	11.4	
						97			5	50	2	13.1	17.9	
						02			5	50	2	17.5	25.8	
						07			5	50	4	16.0	26.2	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
IB/02/1-10	SL-383-T	LASI*	Siberian larch	17-May	78	78	PLBR	10	10	100	3	0.6	2.2	
	Pallet No.		*Larix sibirica*			79			10	100		0.8	1.6	
	2392		Denbigh Exp. Forest			80			10	100	4	1.4	2.0	
	9005976		USDA, FS, Shelterbelt Lab.,			82			9	90	6	1.5	2.3	
			Bottineau, ND			83			9	90	6	2.0	3.9	1 mowed off, moderate rodent
						84			8	80	2	2.6	5.6	damage
						87			8	80	2	5.9	10.0	
						92			8	80	8	9.9	16.4	
						97			8	80	1	16.2	23.3	
						02			8	80	2	19.0	32.0	
						07			8	80	3	17.0	31.3	
IB/03/1-10	ND-1765	LASI*	Siberian larch	17-May	78	78	PLBR	10	10	100	3	0.6	1.4	
	9005980		*Larix sibirica*			79			10	100		1.1	1.6	
			USDA, FS, Shelterbelt Lab.,			80			10	100	4	1.8	2.7	
			Bottineau, ND			82			10	100	5	2.1	4.0	
						83			10	100	5	2.6	4.9	moderate rodent damage, best
						84			10	100	4	3.6	6.1	accession of larch
						87			9	90	2	7.0	11.0	
						92			9	90	2	10.4	17.5	
						97			9	90	2	15.6	24.2	
						02			9	90	2	22.0	32.0	
						07			9	90	3	21.0	30.2	dense canopy
IB/04/1-5	ND-1763	PIPO	ponderosa pine	16-May	78	78	CONT	5	5	100	1	0.5	1.7	
	9006043		*Pinus ponderosa*			79			4	80		0.5	1.1	
			757-5 Todd Co., SD			80			5	100	4	1.5	2.0	
			USDA, FS, Shelterbelt Lab.,			82			4	80	7	2.4	4.4	
			Bottineau, ND			83			4	80	5	2.9	3.6	animal damage
						84			4	80	3	3.8	4.9	
						87			3	60	3	5.2	7.5	
						92			3	60	3	9.1	14.0	
						97			3	60	1	15.4	21.7	
						02			3	60	3	21.0	33.0	
						07			3	60		21.0	34.2	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
IB/04/6-10	ND-1565	PIAR	bristle cone pine	16-May	78	78	CONT	5	5	100	3	0.5	0.6	
	9006036		*Pinus aristata*			79			5	100		0.7	0.6	
			USDA, FS, Shelterbelt Lab.,			80			5	100	5	1.0	0.8	
			Bottineau, ND			82			1	20	5	2.1	3.0	
						83			4	80	8	1.0	0.8	mower damage on plt 3
						84			2	40	3	1.9	1.8	
						87			2	40	6	2.3	2.0	
						92			1	20	5	5.4	3.9	
						97			1	20	1	8.2	7.7	
						02			1	20	3	16.5	10.5	
						07			1	20	3	11.0	13.5	
IB/05/1-5	9057413	PIPO	ponderosa pine	11-May	88	88	CONT	5	2	40	4	0.3	1.1	
			Pinus ponderosa			89			2	40	4	0.7	1.4	
			Glendive, MT			90			4	80	4	0.8	1.5	
			NDFS			92			4	80	4	1.2	2.2	
						94			4	80	4	3.0	4.2	
						97			4	80	2	7.2	9.3	
						02			4	80	2	12.5	20.9	
						07			4	80	2	14.3	26.9	
IB/05/6-10	9069169	PINUS	Siberian pine	14-May	03	03		5	5	100				
			Pinus sibirica			04			5	100	3	0.6	0.8	
			Altai			05			5	100	4	1.0	0.9	
			USDA, NRCS, PMC, Bismarck, ND			07			5	100	3	0.8	1.0	
IB/06/1-5	9069172	PISY	Scots pine	6-May	97	97	CONT	5	5	100	2	0.5	1.2	
			Pinus sylvestris			98			4	80	3	1.2	1.7	
			Altai region, Russia			99			5	100	1	1.3	2.6	
			USDA, NRCS, PMC, Bismarck, ND			01			5	100	2	2.5	4.9	
						03			5	100	3	4.2	7.7	
						06			5	100	3	6.4	12.4	
IB/6/6-10	9092054	ELAEA	Russian olive/silverberry hybrid			06	CONT	5	2	40	7	0.3	0.9	5 chewed by rabbits
			Elaeagnus X 'Jefmorg'			07			0	0				
			Lincoln-Oakes Nursery, Bismarck, ND											

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
IB/07/6-10	ND-3803	POAL7	white poplar	24-May	94	94	CONT	5	5	100	3	2.0	3.1	
	9030612		*Populus alba*			95			4	80	2	6.2	6.5	
			USDA, PMC, Bismarck, ND			96			4	80	5	4.4	4.4	
						98			4	80	3	11.2	11.1	
						00			4	80	2	14.0	17.3	
						03			4	80	2	19.4	21.1	
IB/08/1-5	9092140		Korean mountain ash	9-May	07	07	PLBR	5	0	0				
			Sorbus alnifolia											
			Big Sioux Nursery, Watertown, SD											
IB/08/6-10	9082687		black currant	9-May	07	07		5	0	0				
			Ribes americanum											
			Big Sioux Nursery, Watertown, SD											
IB/09/1-5	9063148	PHSA	corktree	4-May	95	95	CONT	5	5	100	4	0.7	1.3	
			Phellodendron sachalinense			96			4	80	3	1.7	2.2	
			Clay Co., MN			97			4	80	3	2.6	2.9	
						99			3	60	2	5.2	5.7	some hail damage
						01			3	60	3	10.8	8.3	
						05			3	60	2	14.8	11.3	
IB/09/6-10	ND-21	VILE	nannyberry	7-May	86	86	PLBR	5	5	100	3	0.5	1.5	
	9034900		*Viburnum lentago*			87			5	100	3	0.7	1.9	
			USDA, ARS, Mandan, ND			88			5	100	3	1.5	2.7	
			USDA, NRCS, PMC, Bismarck, ND			90			5	100	3	2.7	3.8	
						92			5	100	3	4.2	4.7	
						95			5	100	2	6.5	7.4	fruit on 1,2,4,5
						00			5	100	5	9.7	10.3	
						05			5	100	4	12.0	11.2	leaves quite dry on 1

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
IB/10/1-5	9069081	TICO	littleleaf linden	10-May	93	93	CONT(P)	5	5	100	5	0.7	1.3	weedy
			Tilia cordata			94			5	100	4	0.6	1.2	
			Lee Nursery, Fertile, MN			95			5	100	4	2.1	2.8	
						97			5	100	4	4.0	4.0	
						99			5	100	3	6.9	7.4	
						02			5	100	3	10.5	11.6	
						07			5	100	4	13.0	16.0	
IB/10/6-10	9063126	ULJA80	Japanese elm	15-May	92	92	CONT(P)	5	3	60	4	1.7	1.7	
			Ulmus japonica			94			3	60	3	4.2	4.5	
			Manchuria			96			5	100	4	5.9	6.3	5 is sucker
			PFRA, Indianhead, Saskatchewan, Canada			98			4	80	5	12.0	10.7	dieback on 2,3,4
						01			4	80	4	14.8	11.7	all have dead branches
						06			4	80	4	16.0	12.9	dieback on 3,4; severe on 3
II/01/1-10	ND-313	LOTAS*	red tatarian honeysuckle	17-May	78	78	PLBR	10	9	90	1	1.5	1.6	
	9005996		*Lonicera tatarica sibirica*			79			9	90		2.0	2.4	
	PI-477999		USDA, ARS, Cheyenne, WY			80			10	100	3	3.2	2.4	
			USDA, NRCS, PMC, Bismarck, ND			82			10	100	4	5.3	4.5	
						83			10	100	3	5.9	5.4	good fruit
						84			10	100	4	7.4	5.5	moderate-severe insect
						87			10	100	3	5.6	6.7	defoliation, honeysuckle aphid
						92			10	100	5	6.8	7.3	
						97			10	100	5	15.3	9.0	
						02			10	100	3	15.5	11.6	
						07			10	100	7	14.0	10.5	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
II/01/11-20	ND-1730	LOTAS*	red tatarian honeysuckle	17-May	78	78	PLBR	10	10	100	1	1.6	1.7	
	9005994		*Lonicera tatarica sibirica*			79			10	100		2.2	2.8	
			Lincoln-Oakes Nursery,			80			10	100	1	3.4	3.0	
			Bismarck, ND			82			10	100	4	5.9	5.2	
						83			10	100	3	6.7	6.5	good vigor
						84			10	100	5	7.7	6.6	slight insect defoliation
						87			10	100	3	6.5	7.2	good fruit production,
						92			9	90	6	6.4	7.1	snow damage, aphid damage
						97			9	90	5	15.3	8.2	
						02			10	100	3	15.5	11.5	
						07			10	100	8	11.5	9.5	
II/02/1-5	9082684	RHGL	smooth sumac	14-May	03	03		5						weedy, poor survival
			Rhus glabra			04			5	100	3	3.0	2.6	
			Lincoln-Oakes Nursery, Bismarck, ND			05			5	100	4	4.8	3.6	
						07			5	100	2	6.0	6.0	
ll/02/6-10	9008183	PRVI	common chokecherry	17-May	05	05		5	4	100	4	1.0	2.3	
			Prunus virginiana			06			4	100	4	2.2	3.2	
			Lincoln-Oakes Nursery, Bismarck ND			07			4	100	3	2.4	3.4	
II/03/1-10	ND-26	LONIC	honeysuckle	2-May	79	79	PLBR	10	10	100		1.1	1.4	
	9011852		*Lonicera*			80			10	100	5	2.0	1.7	
			USDA, ARS, Mandan, ND			81			10	100		2.6	2.9	
						83			10	100	4	4.5	4.8	leaf spot
						84			10	100	4	4.9	5.4	witches broom on plts 3,5,8
						88			10	100	4	7.5	7.0	moderate insect defoliation,
						93			10	100	5	10.5	9.0	grasshoppers, aphid damage
						98			10	100	4	15.4	10.5	aphid damage on 3
						03			10	100	4	21.0	11.8	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
II/03/11-15	ND-452	LOXYM*	honeysuckle	2-May	79	79	PLBR	5	5	100		1.2	1.3	
	9019978		*Lonicera xylosteum mollis*			80			5	100	3	2.3	1.5	
			USDA, ARS, Cheyenne, WY			81			5	100		3.2	2.9	
			USDA, NRCS, PMC, Bismarck, ND			83			5	100	4	5.5	5.5	witches broom on 1,2,3
						84			5	100	3	6.5	5.5	slight leaf spot, leaf
						88			5	100	5	7.5	6.7	blight, aphid damage
						93			5	100	6	9.3	7.6	
						98			5	100	6	11.5	8.4	severe aphid damage on 1,2
II/03/16-20	ND-170	COIN	cotoneaster	9-May	90	90	CONT	5						
	9005728		*Cotoneaster integerrimus*			91			4	80	6	0.8	1.5	
			USDA, NRCS, PMC, Bismarck, ND			92			4	80	6	1.5	1.4	
						94			4	80	4	4.1	3.0	
						96			4	80	4	5.5	3.5	
						99			4	80	4	5.1	3.5	
						04			4	80	5	6.5	4.5	fireblight on 2, 3
II/04/1-5	9082711	EUBU6	winterberry euonymus	16-May	02	02	PLBR	5	4	80	4	1.0	1.7	
			Euonymus bungeanus			03			4	80	5	0.9	2.0	
			Lincoln-Oakes Nursery, Bismarck, ND			04			4	80	5	0.4	0.9	cut off #4
						06			4	80	5	0.3	1.4	2 chewed off, 3 heavily browsed
II/04/11-20	'Regal'	PRTE80	Russian almond	8-May	80	80	PLBR	10	10	100	5	0.8	2.2	
	ND-283		*Prunus tenella*			81			7	70		0.9	1.4	
	9006079		ND Game & Fish Dept.			82			10	100	4	1.8	2.3	
	PI-540442		USDA, NRCS, PMC, Bismarck, ND			83			8	80	4	3.9	3.5	few pests
						84			10	100	4	3.8	3.7	
						86			9	90	4	5.2	4.5	
						88			9	90	3	6.0	4.7	
						89			9	90	4	4.2	4.8	
						94			9	90	4	6.6	4.3	
						99			5		3	13.1	6.6	
						04			10	100	3	13.0	7.0	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
II/05/1-10	ND-11	LOMA6	amur honeysuckle	7-May	81	81	CONT	10	10	100		0.7	0.6	
	9005993		*Lonicera maackii*			82			10	100	4	1.4	1.4	
	PI-477998		Res. Sta., Morden, MB, Canada			83			6	60	6	1.6	1.8	slight insect
						84			10	100	4	2.1	1.8	defoliation (grasshoppers)
						86			10	100	4	4.2	4.6	
						87			10	100	3	8.5	5.6	
						88			10	100	4	7.4	5.6	
						90			10	100	4	5.7	5.7	
						95			10	100	4	7.1	8.5	
						00			10	100	4	8.4	10.0	
						05			10	100	2	16.1	12.2	
II/05/11-20	'Centennial'	COIN	cotoneaster	8-May	85	85	PLBR	10						no data
	ND-177		*Cotoneaster integerrimus*			86			8	80	4	2.3	2.2	
	9005729		Lincoln-Oakes Nursery, Bismarck, ND			87			7	70	3	4.0	3.3	
	PI-113095					88			10	100	4	3.2	3.0	
						89			8	80	4	4.5	3.5	
						91			7	70	5	5.3	4.3	
						94			7	70	4	7.5	7.6	
						99			7	70	4	12.5	10.2	
						04			7	70	5	12.0	10.5	fireblight on all 5
II/06/1-5	9057406	RORU	rugosa rose	16-May	02	02	CONT	5	5	100	5	1.0	1.4	
			Rosa rugosa			03			3	60	3	0.8	1.0	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	3	1.8	1.6	
						06			5	100	4	3.2	2.4	
II/06/11-15	9082638	SANIC5	western blue elderberry	13-May	99	99	CONT	5						
			Sambucus nigra ssp. *caerulea*			00			5	100	4	1.5	2.9	
			Lincoln-Oakes Nursery, Bismarck, ND			01			5	100	3	4.9	5.5	
						03			5	100	2	7.0	6.0	
						05			5	100	4	12.7	9.0	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
II/07/1-5	9076737	PRSE2	black cherry	6-May	97	97	PLBR	5	4	80	3	1.1	1.7	
			Prunus serotina			98			5	100	4	2.8	3.0	
			Apple Valley FEP, ND			00			5	100	3	6.6	7.9	
			Lincoln-Oakes Nursery, Bismarck, ND			03			5	100	2	12.4	12.5	
						06			5	100	2	16.0	15.0	
II/07/6-10	323957	PHME13	black chokeberry	23-May	00	00	PLBR	5	5	100	3	0.9	1.7	
			Photinia melanocarpa			01			5	100	4	1.8	1.7	
			Lincoln-Oakes Nursery, Bismarck, ND			02			5	100	3	0.9	1.7	
						04			5	100	3	4.3	3.6	
						06			5	100	2	5.4	4.6	
II/08/1-5	9063142	PRUNU	Japanese cherry	10-May	93	93	PLBR	5	5	100	4	1.2	2.0	
			Prunus			94			5	100	4	1.7	2.6	
			Bottineau FEP, ND			95			4	80	4	2.6	3.0	
			Lincoln-Oakes Nursery, Bismarck, ND			97			3	60	6	1.6	2.3	
						99			2	40	4	3.0	3.3	
						02			2	40	5	5.1	3.0	1,4 have some dieback
						07			2	40	4	4.8	4.9	
II/08/6-10	9082713	PRPEP2	Siberian peach	16-May	02	02	PLBR	5	5	100	2	1.6	2.7	
			Prunus persica var. *persica*			03			5	100	4	4.1	4.0	
			Lincoln-Oakes Nursery, Bismarck, ND			04			4	80	2	6.1	5.8	
						06			4	80	4	7.8	6.8	
II/09/1-10	'Homestead'	CRAN6	Arnold hawthorn	9-May	84	84	CONT	10	10	100	4	0.7	0.3	
	ND-20		*Crataegus X anomala*			86			10	100	4	1.7	2.7	
	9005731		USDA, NRCS, PMC, Bismarck, ND			88			10	100	3	3.8	4.8	
	PI-503530					90			10	100	4	4.0	6.0	
						93			9	90	3	6.2	8.9	
						98			9	90	2	13.1	13.0	
						03			9	90	2	18.0	15.4	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
II/10/1-5	SD-131	PRPA5	mayday	8-May	85	85	PLBR	10						no data
	9006073		*Prunus padus*			86			10	100	3	1.5	2.8	
	PI-536048		Brookings Co., SD			87			10	100	3	2.3	4.7	
			USDA, NRCS, PMC, Bismarck, ND			89			10	100	4	6.0	7.6	
						91			3	30	5	5.6	8.7	
						94			3	30	4	11.0	14.1	
						99			3	30	2	14.8	19.6	
						04			1	10	8	20.5	20.3	
II/10/2-6	ND-3742	JUNIP	common juniper	4-May	06	06	CONT	5	5	100	4	1.6	1.0	
	9019593		*Juniperus communis*			07			4	80	5	0.8	0.7	
II/10/6-10	9057438	HAHA8	Siberian salt tree	11-May	94	94	CONT	5	1	20	3	0.3	1.1	
			Halimodendron halidendron			95			4	80	4	0.6	1.3	
			PFRA, Indianhead, Saskatchewan, Canada			96			4	80	4	0.8	1.6	soil shallow to bedrock
						98			5	60	5	0.9	2.0	
						03			1	20	2	1.8	3.5	many pods left from 2002
II/10/11-15	9082712	CESC	bittersweet	16-May	02	02	PLBR	5	4	80	4	0.4	1.1	
			Celastrus scandens			03			5	100	4	0.7	1.7	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	3	0.7	1.4	
						06			5	100	3	2.0	2.1	
III/01/1-5	'Midwest'	MAMA37	Manchurian crabapple	17-May	78	78	PLBR	5	3	60	2	0.5	2.0	
	9006003		*Malus mandshurica*			79			5	100		0.9	2.1	
	PI-478000		Echo Manchuria/Res. Sta.			80			5	100	3	1.9	2.8	
			Morden, MB, Canada			82			5	100	3	4.7	5.5	
			USDA, NRCS, PMC, Bismarck, ND			83			5	100	2	6.0	6.9	fall webworm on 1, few
						84			5	100	4	7.7	8.5	pests, good vigor,
						87			5	100	3	9.4	11.4	snow damage on 1,2,3
						92			2	40	8	6.0	7.3	
						97			2	40	3	13.8	13.9	
						02			2	40	4	15.5	14.6	
						07			2	40	8	12.0	12.9	many dead branches

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
III/01/6-10	'Red Splendor' 9006004	MABA*	flowering crabapple *Malus X* Lee Nursery, Fertile, MN	17-May	78	78	PLBR	5	5	100	2	1.6	2.2	
						79			5	100		2.5	3.8	
						80			5	100	2	3.5	4.7	
						82			5	100	3	5.9	8.4	
						83			5	100	3	7.0	9.1	good fruit production, few pests
						84			5	100	3	8.6	10.9	snow damage 1,2; webworm 3,5
						87			5	100	2	10.3	12.2	
						92			5	100	6	9.3	11.2	
						97			5	100	4	13.8	14.0	
						02			5	100	4	14.5	15.6	
						07			5	100	6	13.0	14.1	
III/02/1-5	ND-1731 9006001	MABA*	Siberian crabapple *Malus baccata* Lincoln-Oakes Nursery, Bismarck, ND	17-May	78	78	PLBR	5	4	80	2	1.9	2.2	
						79			5	100		2.8	3.1	
						80			5	100	3	4.1	4.1	
						82			5	100	3	5.8	8.2	
						83			5	100	2	7.5	10.5	good growth & vigor,
						84			5	100	2	10.1	10.8	few pests, fall webworm
						87			5	100	3	10.6	13.9	on 1,4,5
						92			5	100	6	9.2	13.7	
						97			5	100	6	13.7	14.4	
						02			5	100	5	15.5	16.8	
						07			4	80	6	12.5	16.5	
III/02/6-10	'McDermand' ND-14 9006095 PI-478004	PYUS2	Ussurian pear *Pyrus ussuriensis* Harbin, Manchuria/Res. Sta. Morden, MB, Canada USDA, NRCS, PMC, Bismarck, ND	17-May	78	78	PLBR	5	5	100	6	0.9	2.5	
						79			5	100		1.8	3.6	
						80			5	100	1	3.0	4.6	
						82			5	100	3	6.4	8.9	
						83			5	100	1	8.0	11.0	good growth & vigor
						84			5	100	2	9.3	12.4	
						87			5	100		12.4	15.8	snow damage on 4
						92			5	100	6	10.9	13.2	
						97			5	100	2	18.7	17.2	
						02			5	100	2	25.0	22.0	
						07			4	80	7	21.0	21.6	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
III/03/1-5	'Freedom'	LOKO2	honeysuckle	9-May	90	90	PLBR	5	5	100	5	1.0	1.1	
	9057424		*Lonicera korolkowii*			91			5	100	4	1.4	1.6	
			Univ. of MN			92			5	100	3	3.3	3.1	
						94			5	100	3	6.6	6.1	
						96			5	100	3	8.5	7.8	minor dieback
						99			5	100	2	14.1	11.2	
						04			5	100	2	17.0	12.3	
III/03/6-10	9063143	LOTA	tatarian honeysuckle	10-May	93	93	PLBR	5	5	100	4	1.1	1.4	
			Lonicera tatarica			94			5	100	3	1.1	1.8	
			Iowa			95			5	100	4	2.2	2.8	
			Lincoln-Oakes Nursery, Bismarck, ND			97			5	100	3	3.5	4.2	
						99			5	100	4	4.3	6.1	
						02			5	100	3	6.5	6.5	
						07			5	100	5	6.0	9.3	
III/03/11-15	'Survivor'	AMFR	false indigo	6-May	87	87	PLBR	5	4	80		1.3	1.7	
	9008041		*Amorpha fruticosa*			88			5	100	5	2.8	2.1	
			USDA, NRCS, PMC, Aberdeen, ID			89			5	100	5	3.1	2.7	
						91			5	100	4	5.3	3.3	
						93			5	100	3	7.0	4.3	
						96			5	100	4	6.6	5.0	
						01			5	100	3	11.0	5.0	
						06								mostly dead, overgrown with other volunteers
III/03/16-20	'Arnolds Red'	LOTA	red tatarian honeysuckle	10-May	93	93	PLBR	5	5	100	4	0.9	1.1	
	9069080		*Lonicera tatarica*			94			5	100	4	1.3	1.9	
			Lee Nursery, Fertile, MN			95			5	100	3	2.3	3.1	
						97			5	100	3	3.6	4.7	
						99			5	100	3	4.5	6.5	
						02			5	100	4	6.5	7.0	
						07			5	100	3	6.0	8.3	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
III/04/1-5	'Konza'	RHAR4	aromatic sumac	6-May	87	87	PLBR	5	4	80		1.7	2.5	
	PI-477981		*Rhus aromatica*			88			4	80	3	3.4	3.1	
			USDA, NRCS, PMC, Manhattan, KS			89			4	80	4	3.8	3.7	
						91			4	80	3	5.7	4.4	
						93			4	80	2	9.6	6.3	
						96			4	80	4	9.2	6.7	
						01			4	80	1	16.0	8.0	solid thicket
						06			5	100	3	17.0	8.0	
III/04/6-15	'Scarlet'	PRFR2	Mongolian cherry	9-May	90	90	PLBR	10	9	90	3	0.6	1.6	
	PI-478003		*Prunus fruticosa*			91			9	90	5	0.8	1.3	
			USDA, NRCS, PMC, Bismarck, ND			92			9	90	4	1.3	1.7	
						94			9	90	4	2.2	2.3	
						96			8	80	4	3.1	2.6	
						99			3	30	3	5.2	3.3	
						04								orignal row gone, suckers on each side
III/04/16-20	'Legacy'	SYVI3	late lilac	11-May	88	88	PLBR	5	2	40	6	1.0	1.7	
	ND-83		*Syringa villosa*			89			2	40	6	0.4	1.1	
	9006228		USDA, NRCS, PMC, Bismarck, ND			90			5	100	5	0.7	1.1	
	PI-540443		Lincoln-Oakes Nursery, Bismarck, ND			92			3	60	4	1.9	1.9	
						94			3	60	3	4.2	4.4	
						97			3	60	3	8.1	6.9	
						02			3	60	2	11.0	10.0	
						07			3	60		11.0	9.8	
III/05/1-10	'Sakakawea'	SHAR	silver buffaloberry	9-May	90	90	PLBR	10	3	30	3	0.7	2.2	
	ND-10		*Shepherdia argentea*			91			4	40	4	0.5	1.9	
	PI-478005		USDA, NRCS, PMC, Bismarck, ND			92			8	80	4	0.9	1.7	
						94			8	80	3	3.0	3.7	
						96			8	80	2	5.9	7.0	
						99			8	80	3	8.4	11.3	
						04			8	80	3	13.0	11.8	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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
III/05/11-15	'Magenta'	MALUS	crabapple	15-May	92	92	PLBR	5	5	100	5	0.5	1.1	
	PI-514275		*Malus* sp.			93			4	80	3	1.6	3.0	
			USDA, NRCS, PMC, E. Lansing, MI			94			5	100	3	2.2	3.6	
						96			5	100	5	3.9	5.2	fireblight on 2,3,5; dieback on 1
						98			5	100	3	4.4	6.9	webworms on 4
						01			5	100	4	9.0	10.0	
						07			4	80	2	16.0	15.2	
III/06/1-5	9076726	ACTA80	tatarian maple	13-May	96	96	PLBR	5	5	100	3	1.0	0.9	
			Acer tataricum			97			5	100	5	2.2	1.7	
			USDA, ARS, Mandan, ND			98			5	100	4	2.8	2.0	
						00			5	100	3	3.5	2.3	
						02			5	100	4	5.5	4.0	Canada thistle 1
						05			4	80		8.2	6.5	
lll/06/6-10	9091969	CAFR80	Russian peashrub	17-May	05	05		5	5	100	4	0.8	3.4	
			Caragana frutex			06			5	100	6	0.6	2.6	
			Big Sioux Nursery, Watertown, SD			07			5	100	5	0.9	2.6	
III/07/1-5	9076686	CRCH	roundleaf hawthorn	11-May	04	04		5	2	40	6	0.3	0.4	#5 browsed
			Crataegus chrysocarpa			05			1	20	8	0.2	0.2	
			Lincoln-Oakes Nursery, Bismarck, ND			06			4	80	6	0.2	0.9	
III/07/6-10	9082653	RHTR	skunkbush sumac	14-May	03	03		5	5	100				
			Rhus trilobata			04			5	100	3	1.4	1.4	
			Harding Co., SD			05			4	80	4	2.0	1.5	
			USDA, NRCS, PMC, Bismarck, ND			06			5	100	3	3.4	2.0	
						07			5	3		3.6	2.4	
III/08/1-5	'Prairie Red'	PRUNU	plum	8-May	85	85	PLBR	5						no data
	ND-1134		*Prunus*			86			5	100	8	0.5	1.3	
	9047203		Miller, SD			87			3	60	4	1.9	3.0	
			USDA, NRCS, PMC, Bismarck, ND			89			3	60	5	3.5	4.1	
						91			2	40	4	6.6	5.7	
						94			2	40	4	8.5	7.9	
						99			2	40	3	11.5	10.0	
						04			1	10	2	17.0	11.0	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
Year of Record: 2007

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III/08/6-10	ND-629	ACGI	amur maple	2-May	79	79	PLBR	5	5	100		1.0	1.5	
	9005645		*Acer ginnala*			80			0					
	PI-477992		Res. Sta., Morden, MB, Canada			81			4	80		1.3	1.9	
						83			4	80	3	6.0	6.0	
						84			4	80	4	9.9	7.5	
						88			4	80	4	13.0	10.8	
						93			3	60	5	13.1	12.0	
						98			3	60	3	18.4	17.4	
						03			3	60	3	24.5	16.4	
III/09/1-5	ND-1873	ACGI	amur maple	2-May	79	79	PLBR	5	5	100		1.6	2.2	
	9005648		*Acer ginnala*			80			5	100	3	2.8	3.0	
			Lincoln-Oakes Nursery, Bismarck, ND			81			5	100		4.2	4.3	
						83			5	100	2	7.2	7.4	good seed production
						84			5	100	3	10.0	8.8	
						88			5	100	4	13.2	11.7	
						93			5	100	4	10.0	9.9	
						98			5	100	3	16.1	13.4	
						03			5	100	3	19.9	14.6	
III/09/6-10	ND-686	SYREP	pekin lilac	2-May	79	79	PLBR	5	5	100		0.7	2.3	
	9006225		*Syringa reticulata* ssp. *pekinensis*			80			2	40	7	1.5	2.7	
	PI-478008		ND Game & Fish Dept.			81			2	40		1.5	2.8	
						83			3	60	5	3.3	3.8	
						84			5	100	5	3.1	2.9	
						88			3	60	4	8.3	8.3	
						93			3	60	4	10.1	9.9	
						98			3	60	3	15.5	14.2	
						03			3	60	3	18.5	16.5	
III/10/1-5	9069129	PRMA	Amur chokecherry	11-May	94	94	PLBR	5	5	100	4	0.7	2.2	
			Prunus maackii			96			5	100	2	4.1	6.4	
			Big Sioux Nursery, Watertown, SD			98			5	100	3	7.7	10.7	
						00			5	100	4	9.1	12.7	
						03			5	100	4	11.2	12.5	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
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IV/01/1-5	SD-156	FRPE	green ash	17-May	78	78	PLBR	5	5	100	1	0.5	2.6	
	9005890		*Fraxinus pennsylvanica*			79			5	100		1.3	3.6	
			Deuel Co., SD			80			5	100	2	2.2	4.4	
						82			5	100	3	5.6	7.6	
						83			5	100	3	7.3	9.7	slight leaf scorch
						84			5	100	3	8.0	10.8	
						87			5	100	3	8.6	14.2	snow damage on 1
						92			5	100	4	8.9	15.8	
						97			5	100	4	13.5	18.3	
						02			5	100	6	17.0	25.5	
						07			5	100	5	18.8	25.8	
IV/01/6-10	ND-1734	FRPE	green ash	17-May	78	78	PLBR	5	5	100	2	0.4	2.1	
	9005891		*Fraxinus pennsylvanica*			79			5	100		1.0	3.1	
			Lincoln-Oakes Nursery, Bismarck, ND			80			5	100	4	1.9	3.7	
						82			5	100	4	4.7	7.3	
						83			5	100	4	5.7	8.8	competition from
						84			5	100	4	6.4	10.3	shelterbelt at east end
						87			5	100	4	7.1	13.8	
						92			5	100	5	8.3	14.0	
						97			5	100	4	12.8	20.3	
						07			5	100	5	15.0	24.8	
IV/02/1-5	'Cardan'	FRPE	green ash	17-May	78	78	PLBR	5	5	100	2	0.3	2.3	
	MDN-12002		*Fraxinus pennsylvanica*			79			5	100		1.7	3.4	
	9005895		Wibaux Co., MT			80			5	100	3	3.0	5.1	
	PI-469226		USDA, ARS, Mandan, ND			82			5	100	3	7.5	10.1	
						83			5	100	2	8.4	11.4	good vigor
						84			5	100	3	9.7	13.8	
						87			5	100	3	9.5	18.1	
						92			5	100	3	10.9	22.5	
						97			5	100	3	15.1	25.1	
						07			5	100	3	20.0	33.3	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
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IV/02/6-10	ND-1759	FRPE	green ash	17-May	78	78	PLBR	5	5	100	1	0.4	2.5	
	9005893		*Fraxinus pennsylvanica*			79			5	100		1.6	4.1	
			SD-156 X MDN-12002			80			5	100	3	3.1	5.2	
			USDA, NRCS, PMC, Bismarck, nD			82			5	100	4	5.8	8.1	
						83			5	100	3	7.9	10.7	competition from
						84			5	100	3	8.9	13.4	shelterbelt at north end
						87			5	100	3	9.0	15.8	
						92			5	100	3	10.2	19.0	
						97			5	100	2	15.6	25.1	
						02			5	100	3	17.0	29.4	
						07			5	100		20.0	30.2	
IV/03/1-5	ND-647	FRNI	black ash	17-May	78	78	PLBR	5	5	100	1	0.1	0.9	
	9005887		*Fraxinus nigra*			79			5	100		0.4	1.9	
			Res. Sta., Morden, MB, Canada			80			5	100	6	1.2	2.7	
						82			5	100	4	4.1	8.0	
						83			5	100	4	4.8	10.5	heat stress
						84			5	100	4	4.2	11.4	leaf scorch
						87			5	100	3	5.6	18.4	sun scald
						92			5	100	7	5.6	15.2	
						97			5	100	5	12.3	19.3	
						02			5	100	3	14.0	26.8	
						07			5	100	5	14.5	29.1	
IV/03/6-10	ND-1432	AEGL	Ohio buckeye	17-May	78	78	PLBR	5	3	60	8	0.0	0.2	
	9005658		*Aesculus glabra*			79			3	60		0.1	0.5	
			Res. Sta., Morden, MB, Canada			80			3	60	9	0.5	0.4	
						82			1	20	6	1.5	2.1	
						83			1	20	6	1.6	2.3	
						84			1	20	6	3.3	3.3	
						87			1	20	6	6.2	5.4	
						92			1	20	5	7.9	7.2	
						97			1	20		12.8	10.5	
						02			1	20	4	12.5	15.5	
						07			1	20		14.5	15.5	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
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IV/04/1-5	ND-1879	GLSI	honeylocust	8-May	80	80	PLBR-	5	1	20	9	0.3	0.5	
	9011850		*Gleditsia triacanthos*			81	CONT		2	40		0.1	0.8	
	PI-503531		Woodward, OK			82			5	100	4	1.4	2.2	
			USDA, ARS, Mandan, ND			83			5	100	2	2.5	3.9	good vigor
						84			5	100	3	3.2	5.7	
						86			5	100	3	7.5	9.1	
						89			4	80	4	8.1	12.8	
						95			5	100	4	16.4	17.4	
						04			5	100	3	19.2	26.5	
IV/05/1-5	9063116	FRNI	black ash	11-May	94	94	CONT	5	5	100	4	0.3	1.2	
			Fraxinus nigra			95			5	100	4	0.9	1.4	
			Itasca State Park, MN			96			4	80	4	1.1	1.7	broken leader on 4
						98			4	80	3	2.0	3.6	
						00			4	80	4	3.2	6.5	
						03			3	60	4	5.3	10.2	
IV/06/1-5	9063115	FRPE	green ash	11-May	94	94	CONT	5	5	100	3	0.7	1.7	
			Fraxinus pennsylvanica			95			5	100	3	1.5	3.3	
			Itasca State Park, MN			96			5	100	2	2.5	4.5	
						98			5	100	2	7.1	9.7	
						00			5	100	3	8.9	13.4	
						03			5	100		13.6	19.4	
IV/06/6-10	9076724	ELAN	Russian olive	13-May	96	96	PLBR	5	4	80	3	2.2	2.3	
			Elaeagnus angustifolia			97			4	80	3	3.3	3.4	
			USDA, ARS, Mandan, ND			98			4	80	3	5.4	5.5	
						00			4	80	4	7.9	8.4	
						02			4	80	5	11.0	9.5	needs a new stake
						05			4	80	4	11.7	12.5	
IV/07/1-5	9019624	ULJA80	Japanese elm	11-May	94	94	CONT	5	4	80	4	1.0	1.4	
	ND-989		*Ulmus japonica*			95			5	100	3	2.8	3.6	
			USDA ARS, Mandan, ND			96			4	80	3	5.6	6.2	
						98			4	80	4	9.8	9.7	
						00			4	80	2	8.3	11.8	
						03			3	60	5	11.7	13.3	

Project No.: 38I316K Field Evaluation of Woody Plant Materials, Dickinson, North Dakota
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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
IV/07/6-10	9069166	ELAN	Russian olive	13-May	96	96	CONT(S)	5	1	20	5	0.5	0.7	1-4 destroyed by cultivation
			Elaeagnus angustifolia			97			4	80	3	1.0	1.3	
			USDA, ARS, Mandan, ND			98			2	40	6	1.4	3.0	
						00			2	40	5	2.3	4.1	
						02			2	40	6	4.8	7.5	
						05			2	40	5	6.6	8.2	
IV/08/1-10	'Oahe'	CEOC	hackberry	8-May	80	80	PLBR	10	10	100		0.5	2.0	
	MDN-12003		*Celtis occidentalis*			81			9	90		0.1	0.5	
	9005725		USDA, ARS, Mandan, ND			82			8	80	6	1.3	1.6	
	PI-476982					83			8	80	6	1.9	3.0	
						84			7	70	4	2.9	4.6	
						86			4	40	3	9.2	10.3	
						89			5	50	4	8.7	11.7	
						95			5	50	4	14.3	19.0	
						99			5	50	5	14.0	20.3	
						04			5	50	4	16.8	25.4	
IV/09/1-10	SD-75	CEOC	hackberry	7-May	81	81	PLBR	10	10	100		0.1	1.2	
	9005713		*Celtis occidentalis*			82			7	70	6	0.9	1.4	
			Potter Co., SD			83			6	60	3	2.9	3.0	
						84			7	70	5	3.5	4.1	
						85			6	60	4	6.7	5.9	
						87			7	70	4	8.1	10.4	
						90			7	70	4	9.2	12.3	
						95			7	70	3	12.7	19.7	
						00			7	70	3	14.4	23.1	
						05			7	70	3	22.2	26.0	
IV/10/6-10	9057410	CEOC	hackberry	11-May	88	88	CONT	5	2	40	8	0.2	0.2	
			Celtis occidentalis			89			1	20	8	0.2	0.5	
			Bottineau Co., ND			90			3	60	8	0.2	0.7	
			NDFS			92			4	80	7	0.5	0.5	
						94			2	40	6	1.0	2.4	
						97			2	40	4	3.5	5.6	
						02			2	40	6	4.0	6.8	
						07			2	40	5	5.0	10.3	

OFF-CENTER EVALUATIONS: TECHNICAL REPORT – 2007

Study 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota.

Study Title: Field Evaluation of Woody Plant Materials.

Introduction: There is a need to evaluate the performance of shrub and tree species/cultivars for windbreaks, wildlife, and recreational plantings under diverse soil and climatic conditions. To meet this need, field evaluation planting sites representative of the major land resource areas were located in the three states served by the PMC. These sites provide planting locations under long-term land tenure, for assemblies of trees and shrubs to be evaluated under uniform culture and management. New material can be added on an annual basis. Comparisons are then made with previously released cultivars and area of adaptation determined.

Objective: The objective is to assemble and evaluate woody plant materials for conservation use. Superior cultivars will be selected and released for increase by commercial nurseries.

Cooperators: The USDA Natural Resources Conservation Service, Plant Materials Center, Bismarck, North Dakota, in cooperation with University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota. Expires July 28, 2008, unless agreement is extended.

Location: Morris, Minnesota. Legal description: Sec. 31, T. 125 N., R. 41 W., Stevens County, Minnesota.

Major Land Resource Area: The site is located in Major Land Resource Area 102A, Rolling Till Prairie. This is nearly level to rolling glacial plain mantled by loess except in the north. Slopes are long, smooth, and gentle except the hilly to steep slopes bordering some of the larger stream valleys. Relief is mainly in a few feet to a few tens of feet. Elevation is 1,000 to 2,000 feet.

Soils: The soils at this site are Barnes-Buse loams (BbB2). These series consist of deep, well-drained soils formed in loamy calcareous glacial till under prairie grasses on moraines and uplands. For Barnes, the surface layer is black loam 7 inches thick. The subsoil is dark brown and olive-brown loam 12 inches thick and the substratum is olive-brown loam. For Buse, the surface is very dark gray loam 7 inches thick. The underlying material is light brownish-gray and light yellowish-brown loam. These soils are in conservation tree/shrub group 3.

The Barnes soil makes up 60 to 70 percent of the mapped area. Runoff is medium, erosion hazard moderate, and fertility medium. Slopes are 2 to 6 percent.

The Barnes soils in this group are well-drained, moderately deep to deep loamy soils. If moisture is conserved, these soils are well-suited to all types of windbreaks and other plantings. Wind and water erosion are the only hazards.

The Buse soils in this group are deep, well-drained, and loamy. Available water capacity is high, but excessive runoff restricts water intake and the amount of moisture available to trees and shrubs. These soils are not suited to field windbreaks, but are suited to wildlife, recreation, and beautification plantings. Species and planting sites should be carefully selected.

Climate: For MLRA 102A, the average annual precipitation is 20 to 30 inches; increasing from north to south and from west to east. About three-fourths falls from midspring to early autumn. The sparse winter precipitation is snow. The average annual temperature is 40 to 50 degrees F, increasing from north to south. The average freeze-free period is 140 to 160 days. The plant hardiness zone is 4a with an average

annual minimum temperature of -30 to -20 degrees F. Climatic data recorded at Morris, Minnesota, for 2007 is shown in Table MO-1.

Methods and Materials

Assembly: Refer to Table MO-2 for a list of woody species planted from 1978 through 2007.

Planting Plan: The plots are not randomized or replicated but organized systematically for evaluation and demonstration purposes. The site is divided into 4 blocks. Block 1 is planted to shrubs, Block 2 medium trees, Block 3 tall trees, and Block 4 conifers (Refer to Figure MO-1 for the plot map). Each block is arranged into single row, non-replicated plots. Each plot contains from 1 to 20 plants. Spacing is 20 feet between rows and 5 feet within row for shrubs; 10 feet within row for medium-tall trees. Row length is 100 feet. Like species and standards of comparison are planted in adjacent plots whenever possible.

Plot Preparation: A clean, firm planting site is prepared annually by disking.

Planting Method: All trees and shrubs were hand planted using approved forestry methods.

Planting Date: Refer to Table MO-2 for planting dates of woody species planted from 1978 through 2006. Replacements are planted the year after establishment if available.

Fertilization: No fertilizer has been applied to planting area.

Weed Control: Herbicides and mechanical weed control measures were applied to control weeds between and within rows and in fallow areas. Hand hoeing was done as needed to control weeds in rows.

Biological Control: No insecticides have been applied. In some years, an animal repellent, Arasan 50, has been applied to discourage rodents from damaging tree trunks and lower limbs.

Irrigation: Each year, newly planted materials were hand watered from a portable tank. No water was added following year of establishment.

Crop Residue Management: No cover crop has been seeded. A mixture of 50 percent Bad River blue grama and 50 percent Pierre sideoats grama was broadcast seeded on May 7, 2002.

Silvicultural Practices: Dead trees and broken branches were cut and removed annually for sanitation. All the Russian olive accessions have been removed. All new plants are mulched with wood chips. Major renovation occurred in 1997 when a backhoe was used to remove dead and poor performing entries.

Evaluations and Measurements: Records of planting date, survival, vigor, canopy width, and plant height have been maintained since 1978. Cold hardiness, insect and disease resistance, and animal damage were considered. Plant performance data is recorded during the growing season for three years. After the third year, data is gathered according to a specific schedule. Select data appears in this report. A report summarizing the first 25 years of evaluation was published in 2003. Annual summary reports have been prepared since 2006 and can be requested from the PMC.

Results

Plant Performance: One hundred twenty-eight accessions of 90 species are currently under evaluation. In 1995, evaluation of the conifers in Block 4 was discontinued due to poor adaptation to the heavy soils. This site receives slight to moderate weed competition. Rainfall and humidity are higher than evaluation sites in the Dakotas. This compensates somewhat for increased competition, but increases the disease

potential for species adapted to semiarid regions. Mean data for individual accessions of trees and shrubs is shown in Table MO-2. The following accessions exhibit potential for further evaluation and use.

Accession Number	Genus/Species Origin/Source	Plot Location
ND-170 9005728	cotoneaster *Cotoneaster integerrimus* USDA, NRCS, PMC, Bismarck, ND	01/07/11-20
ND-21 PI-560908	nannyberry *Viburnum lentago* USDA, ARS, Mandan, ND	02/07/1-10
ND-647 9005887	black ash *Fraxinus nigra* Res. Sta., Morden, MB, Canada	03/05/1-10
9057409	American hazel *Corylus americana* Turtle Mountains, Bottineau Co., ND NDFS	1/19/1-10
9076722	European white birch *Betula pendula* Russia USDA, ARS, Mandan, ND	II/16/1-5
ND-2103 PI-399414	European cranberrybush *Viburnum opulus* P.I. Station, Ames, IA/Yugoslavia NDSU Experiment Station, Dickinson, ND	I/17/11-20
9082642	wayfaring tree *Viburnum lantana* Lincoln-Oakes Nursery, Bismarck, ND	I/03/11-20
9076718	Scots pine *Pinus sylvestris* var. *mongolica* USDA, NRCS, PMC, Bismarck, ND	II/14/1-5
9076719	Scots pine *Pinus sylvestris* var. *mongolica* USDA, NRCS, PMC, Bismarck, ND	II14/6-10
9082687	black currant *Ribes americanum* Big Sioux Nursery, Watertown, SD	I/9/11-15
9082631	Japanese birch *Betula platyphylla* Lawyer Nursery, Plains, MT	II/12/1-5

Accession Number	Genus/Species Origin/Source	Plot Location
SD-156 9005890	green ash *Fraxinus pennsylvanica* Deuel Co., Clear Lake, SD	III/01/1-10
SD-75 9005713	hackberry *Celtis occidentalis* Potter Co., SD	III/16/1-5
SD-211 9005714	hackberry *Celtis occidentalis* Sanborn Co., SD	III/16/6-10

Figure MO-1. Morris Woody Field Evaluation Planting – Plot Layout

				<---------- N	
BLOCK II MEDIUM TREES			**BLOCK I SHRUBS**		**Row**
open	open		<----------	Centennial cotoneaster	1
(leave open) ---------->			9063143 t. honeysuckle	Arnolds Red honeysuckle	2
<----------	ND-1731 S. crabapple		9082642 wayfaring tree	9082632 Mongolian peashrub	3
<----------	McDermand pear		<----------	Scarlet Mongolian cherry	4
<----------	Streamco willow		peashrub|9008183 chokecherry	9069128 r.t. honeysuckle	5
open	open		<----------	Legacy late lilac	6
<----------	ND-21 nannyberry		rugosa rose | redleaf rose	ND-170 cotoneaster	7
Libbon willow | Staghorn sumac	Meyer's spruce		leadplant | 9091971 chokeberry	Euonymus |ironwood	8
9069129 amur chokecherry	nannyberry | olive hybrid		black currant | bittersweet	ND-3902 sandbar willow	9
<----------	ND-2102 apricot		<----------	Regal Russian almond	10
'Cathedral' elm	Korean Mtn. ash		Freedom honeysuckle|Rosetree	ND-11 amur honeysuckle	11
9091974 red oak	9082631 Japanese birch		gray dogwood|Caragana frutex	Indigo silky dogwood	12
9091973 red oak	9082635 black locust		M.gooseberry|prairie rose	(leave open)	13
9076719 Scotch pine	9076718 Scotch pine		smooth sumac| gray dogwood	ninebark | MO plum	14
9069163 Dahurian larch	9076737 black cherry		Am. hazelnut| r.l. hawthorn	MO Am.hazelnut | pin cherry	15
9069121 mayday	9076722 European white birch		ND-3744 Korean barberry	chokeberry | Konza sumac	16
9076725 smoothbark elm	9069170 English oak		ND-2103 highbush cranberry	Meadowlark forsythia	17
9082610 Siberian larch	9069168 Siberian larch		9091976 arrowwood | apricot	ND-2507 pigmy caragana	18
9092051 catalpa	9063126 Japanese elm		Hedgeking honeysuckle	9057409 American hazel	19
9092052 swamp white oak	9082666 black birch				20
<----------	Flame amur maple				21
<----------	ND-1752 amur maple				22
<----------	ND-629 amur maple				23
<----------	ND-1873 amur maple				24
ND-686 Pekin lilac	open				25
<----------	Homestead Arnold hawthorn				26
<----------	open				27
<----------roadway---------->			<----------roadway---------->		
				(revised 6/07)	

Figure MO-1(continued). Morris Woody Field Evaluation Planting – Plot Layout

	← N	
BLOCK III TALL TREES		**Row**
<----------	SD-156 green ash	1
ND-1734 green ash	ND-1753 green ash	2
<----------	Cardan green ash	3
<----------	ND-1759 green ash	4
<----------	ND-647 black ash	5
9063120 Ohio buckeye	ND-1432 Ohio buckeye	6
<----------	9057410 hackberry	7
open |	9063148 corktree	8
9082674 sugar maple| open	9082668 European ash | open	9
(leave open)	Clone C Austree	10
14272 poplar	14271 poplar	11
14274 poplar	14273 poplar	12
9082667 gray birch | open	Canam hybrid poplar	13
9076746 Ohio buckeye	9082892 white poplar | open	14
<----------	Oahe hackberry	15
SD-211 hackberry	SD-75 hackberry	16
9082650 Soongarica poplar	9082675 Manchurian ash	17
9063098 black walnut	9076723 Siberian elm	18
9076724 Russian olive	open	19
9069166 Russian olive	open	20
ND-428 black walnut	9054820 Siberian elm	21

Table No. MO-1: 2007 Weather Summary - Official Station - Morris, Minnesota					
	Mean Temperature		Precipitation (inches)		
	(degrees Fahrenheit)		Actual		Deviation from Normal
Month	**2007**	**Normal***	**2007**	**Normal***	**2007**
January	14.9	8.4	0.18	0.85	-0.67
February	6.9	15.4	1.82	0.69	1.13
March	31.2	28.1	1.38	1.52	-0.14
April	41.0	44.1	3.79	2.01	1.78
May	60.5	57.9	2.35	2.84	-0.49
June	68.8	66.9	4.20	3.97	0.23
July	71.9	71.1	0.94	3.95	-3.01
August	66.8	69.0	2.68	3.30	-0.62
September	60.9	59.0	5.50	2.16	3.34
October	49.4	46.1	5.17	2.30	2.87
November	30.6	29.0	0.01	1.22	-1.21
December	9.7	14.6	1.01	0.58	0.43
Annual	**42.7**	**42.5**	**29.03**	**25.39**	**3.64**
*National Climate Data Center 1971-2000 Monthly Normals					
		2007			
Last Frost (28 degrees)		13-Apr			
First Frost (28 degrees)		28-Oct			
Frost Free Period		197 days			

Key to Table MO-2. 38I318K Field Evaluation of Woody Plant Materials – Morris, Minnesota

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 MO-2.
Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
I/01/1-20	'Centennial'	COIN*	cotoneaster	10-May	78	78	PLBR	20	12	60	3	1.4	1.5	
	ND-177		*Cotoneaster integerrimus*			79			17	85	4	3.5	3.2	
	9005729		USDA, ARS, Cheyenne, WY			80			17	85		5.2	3.4	
	PI-113095		USDA, NRCS, PMC, Bismarck, ND			82			17	85		9.7	5.9	
						83			17	85		11.1	6.6	
						84			17	85	2	12.6	7.4	
						87			17	85	2	14.6	9.7	
						92			17	85	1	16.5	9.4	
						97			17	85	1	21.3	12.0	
						02				85		24.0	11.0	
						07								severe contamination, need removal
I/02/1-10	'Arnolds Red'	LOTA	red tatarian honeysuckle	27-Apr	93	93	PLBR	10	10	100	4	0.9	1.2	
	9069080		*Lonicera tatarica sibirica*			94			8	80	5	1.8	2.3	
			Lee Nursery, Fertile, MN			95			10	100	4	2.3	3.5	
						97			10	100	2	5.1	5.9	
						99			10	100	4	5.6	7.0	
						02			10	100	3	6.8	8.4	
						07			10	100	3	10.0	12.5	
I/02/11-20	9063143	LOTA	red tatarian honeysuckle	27-Apr	93	93	PLBR	10	9	90	5	0.9	1.5	
			Lonicera tatarica sibirica			94			9	90	4	1.7	2.4	
			Iowa			95			9	90	5	2.9	3.6	
			Lincoln-Oakes Nursery, Bismarck, ND			97			10	100	2	5.2	5.8	
						99			9	90	3	6.1	6.9	
						02			9	90	3		8.7	
						07			9	90	3	11.0	10.6	
1/03/1-10	9082632	CAIN	Mongolian peashrub	29-Apr	99	99	PLBR	10	9	90	5	1.0	1.3	
			Caragana intermedia			00			9	90	4	2.5	1.8	
			Lawyer Nursery, Plains, MT			01			9	90	5.1	3.8	3.1	
						03			7	70	4	4.6	3.8	
						05			7	70	4	5.1	5.0	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
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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
1/03/11-20	9082642	VILE	wayfaring tree	29-Apr	99	99	PLBR	10	10	100	4	0.7	1.2	
			Viburnum lantana			00			10	100	2	2.0	2.4	
			Lincoln-Oakes Nursery, Bismarck, ND			01			10	100	3	3.3	3.6	
						03			10	100	4	4.0	4.9	
						05			10	100	4	5.7	4.5	red color 4, unusual fruit 6, pruned 10
I/04/1-20	'Scarlet'	PRFR2	Mongolian cherry	10-May	78	78	PLBR	20	20	100	3	0.7	1.3	some dead on 8,
	ND-3		*Prunus fruticosa*			79			19	95	4	1.9	2.3	
	9006072		Res. Sta. Morden, Manitoba, Canada			80			20	100		3.0	3.2	
	PI-478003		USDA, NRCS, PMC, Bismarck, ND			82			20	100	4	4.7	4.6	
						83			20	100		5.6	4.9	
						84			20	100	3	6.4	5.6	
						87			19	95	1	7.6	6.6	
						92			20	100	1	12.3	7.9	
						97			20	100	2	17.1	10.5	stand weakening
						02			18	90		18.0		
						07								severe contamination, needs removal
I/05/1-10	9069128	LOTA	red tatarian honeysuckle	26-Apr	95	95	PLBR	10	10	100	6	1.1	2.2	
			Lonicera tatarica			96			10	100	3	3.1	3.5	blight on 2, mites on 4
			Big Sioux Nursery, Watertown, SD			97			10	100	1	5.3	6.8	very uniform
						99			10	100	2	6.3	9.3	
						01			10	100	3	8.3	1.2	
						04			10	100	3	10.3	14.8	
I/5/6-10	9008183	PRVI	common chokecherry	11-May	05	05		5	5	100	5	0.5	1.5	
			Prunus virginiana			06			5	100	6	0.7	1.6	
			Lincoln-Oakes Nursery, Bismarck, ND			07			5	100	4	0.5	1.3	3 browsed
1/05/15-20	9082663	CAMI	littleleaf peashrub	2-May	00	00		5	5	100	4	1.3	2.7	
			Caragana microphylla			01			5	100	4	2.0	4.0	
			Lawyer Nursery, Plains, MT			02			5	100	4	3.4	4.6	
						05			5	100		4.9	5.7	
						06			5	100	4	5.9	5.5	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
I/06/1-20	'Legacy'	SYVI	late lilac	4-May	88	88	PLBR	20	12	60	4	0.5	1.4	
	ND-83		*Syringa villosa*			89			20	100	3	0.9	1.7	
	9006228		Res. Sta., Morden, Manitoba, Canada			90			18	90	4	1.8	2.5	
	PI-540443		Lincoln-Oakes Nursery, Bismarck, ND			92			20	100	3	3.8	4.0	seed production in all plants
						94			20	100	3	6.3	6.3	
						97			20	100	2	12.1	8.6	snow damage on 9-12,14
						02			19	95		17.3	11.0	variation in height
						07			20	100	3	18.0	12.0	
I/07/1-10	ND-170	COIN80	cotoneaster	1-May	90	90	CONT	10	9	90	3	1.5	1.9	
	9005728		*Cotoneaster integerrimus*			91			10	100	3	2.7	2.4	
			USDA, NRCS, PMC, Bismarck, ND			92			10	100	3	4.6	3.0	fruit production on all
						94			10	100	2	7.2	4.1	
						96			10	100	4	8.7	4.8	
						99			9	90	5	8.5	4.5	fireblight on all, contamination
						04			6	60	6	7.0	7.0	serious contam.; half dead, fire blight
I/07/11-15	9057406	RORU	rugosa rose		01	01	PLBR	5	5	100	4	1.7	1.7	
			Rosa rugosa			02			5	100	4	2.5	1.9	
			Lincoln-Oakes Nursery, Bismarck, ND			03			5	100	4	3.4	1.8	
						05			3	60	5	3.8	3.0	chlorosis, some dead
						07			2	40	4	4.6	2.9	
I/07/16-20	9082685	RORU2	redleaf rose		01	01	PLBR	5	5	100	3	1.6	1.4	
			Rosa rubrifolia			02			5	100	1	2.8	2.5	
			Lincoln-Oakes Nursery, Bismarck, ND			03			5	100	6	3.5	3.3	
						05			5	100	5	3.4	3.1	sparse leaves
						07			5	100	6	3.2	3.6	
1/08/1-5	9082739	OSVI	ironwood	May	07	07		5	5	100	7	0.3	0.7	browsed
			Ostrya virginiana											
			Sertoma Park, Bismarck, ND											
			USDA, NRCS, PMC, Bismarck, ND											

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I/8/6-10	9082711	EUBU6	winterberry euonymus	7-May	02	02	PLBR	5	5	100	7	0.5	0.5	mowed
			Euonymus bungeanus			03			5	100	8	0.6	0.9	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	4	0.9	1.8	browse on all
						06			5	100	3	2.2	3.5	
I/8/11-15	9091971	PHME13	black chokeberry	11-May	05	05		5	5	100	3	1.7	2.1	
			Photinia melanocarpa			06			5	100	4	1.1	1.5	
			Bailey Nurseries, Inc., St. Paul, MN			07			5	100	5	0.9	1.4	browsed
I/8/16-20	9082678	AMCA6	leadplant	7-May	02	02	PLBR	5	5	100	6	0.6	1.5	
			Amorpha canescens			03			5	100	4	1.0	0.8	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	4	1.7	1.9	
						06			5	100	4	2.3	2.1	
I/09/1-10	'Silver Sands'	SAIN3	sandbar willow	1-May	90	90	CONT	10	10	100	2	4.4	3.5	
	ND-3902		*Salix interior*			91			10	100	2	6.8	5.0	
	9035212		NDSU			92			9	90	1	9.9	7.5	
			McKenzie Slough FEP			94			10	100	1	19.1	11.2	
						96			10	100		24.3	13.1	
						99			10	100	2	30.5	16.1	good growth and vigor
						04			10	100		30.0	16.0	minimum dieback
I/9/11-15	9082712	CESC	bittersweet	7-May	02	02	PLBR	5	5	100		0.8	1.2	mowed
			Celastrus scandens			03			5	100	3	1.2	2.0	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	3	1.7	3.1	suckers
						06			5	100		3.4	2.7	
I/9/11-15	9082687	RIAM	black currant		01	01	PLBR	5	5	100	4	0.8	1.5	
			Ribes americanum			02			5	100		2.6	2.0	browsed
			Big Sioux Nursery, Watertown, SD			03			5	100	3	3.8	2.4	
						05			5	100	2	4.4	2.6	
						07			5	100	2	5.3	3.1	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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I/10/1-20	'Regal'	PRTE*	Russian almond	29-Apr	80	80	PLBR	20	19	95		0.7	1.8	
	ND-283		*Prunus tenella*			81			20	100		1.8	2.7	
	9006079		ND Game & Fish Dept.			82			17	85	5	2.5	3.3	
	PI-540442		USDA, NRCS, PMC, Bismarck, ND			83			17	85		3.5	3.6	
			Increase Block			84			19	95	2	4.8	4.0	
						87			17	85	2	6.6	5.7	
						88			17	85	3	7.1	5.8	
						89			17	85	4	7.9	6.0	variable leaf size, color,
						94			20	100	3	12.0	6.8	form
						99			20	100		15.1	6.7	
I/11/1-10	ND-11	LOMA6	amur honeysuckle	28-Apr	81	81	CONT	10	10	100		0.7	1.1	
	9005993		*Lonicera maackii*			82			10	100	6	0.9	1.2	
	PI-477998		Res. Sta., Morden, Manitoba, Canada			83			9	90		1.6	1.8	
						84			10	100	3	3.7	3.1	
						85			10	100	4	4.9	4.7	
						87			10	100	2	7.3	6.8	
						88			9	90	2	8.9	7.0	excellent, heavy fruit crop,
						90			9	90	3	10.2	7.8	mildew on leaves
						95			9	90	3	14.0	10.4	
						00			9	90		18.1	13.8	
						05			8	80		20.0	12.8	good seed; some mildew
1/11/11-15	9082634	PRTI	rose tree of China	29-Apr	99	99	PLBR	5	4	80	5	1.1	1.7	
			Prunus triloba			00			4	80	6	2.1	1.7	
			Lawyer Nursery, Plains, MT			01			2	40	3	4.0	3.6	
						03			2	40	3	6.4	5.4	
						05			2	40	3	8.8	6.8	dieback on 2
1/11/16-20	'Freedom'	LOKO2	honeysuckle		03	03	PLBR	5	5	100	3	3.5	3.4	
			Lonicera korolkowii			04			5	100	2	4.7	5.4	
			Lincoln-Oakes Nursery, Bismarck,ND			05			5	100	2	6.0	5.6	
						07			5	100	3	6.5	6.2	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
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I/12/1-10	'Indigo'	COAM2	silky dogwood	3-May	83	83	PLBR	10	9	90		0.9	1.8	
	Mich-765		*Cornus amomum*			84			10	100	2	3.8	3.1	
	9004971		USDA, NRCS, PMC, Rose Lake, MI			85			10	100	2	5.6	4.9	
	PI-468117					87			10	100	1	10.0	7.4	
						92			10	100	2	13.5	9.3	
						97			10	100	1	21.3	10.5	excellent
1/12/11-15	9091969	CAFR80	Russian peashrub	May	07	07		5	5	100	6	0.4	1.5	
			Caragana frutex											
			Big Sioux Nursery, Watertown, SD											
1/12/16-20	9082738	CORA6	gray dogwood		03	03	PLBR	5	5	100	4	0.5	1.3	
			Cornus racemosa			04			5	100	4	1.0	1.5	browse on all
			Wisconsin			05			5	100	3	2.0	1.9	
			Lincoln-Oakes Nursery, Bismarck, ND			07			5	100	4	2.9	2.6	
1/13/10-15	9082706	ROAR3	prairie rose		03	03	PLBR	5	5	100	3	1.2	1.0	
			Rosa arkansana			04			5	100		1.6	1.8	
			Bismarck			05			5	100	5	2.2	1.8	1 mowed, 5 wood rose contam.
			Lincoln-Oakes Nursery, Bismarck, ND			07			4	80		0.9	0.9	5 wood rose contamination
1/13/16-20	9082746	RIMI	Missouri gooseberry		03	03	PLBR	5	5	100	3	1.4	1.2	
			Ribes missouriense			04			5	100	4	2.5	3.0	fall color, burgundy
			Big Sioux River			05			5	100	4	3.6	3.1	red, good color
			Big Sioux Nursery, Watertown, SD											
I/14/1-5	9082889	PIMU80	mugo pine	19-May	04	04	PLBR	5	2	40	4	1.0	1.1	
			Pinus mugo			05			4	80	6	0.7	1.0	replaced 1-3
			Big Sioux Nursery, Watertown, SD			06			3	60	3	0.9	1.3	5 upright
I/14/6-10	9082891	PHOP	common ninebark	19-May	04	04	PLBR	5	5	100	5	0.6	1.1	browse on 1
			Physocarpus opulifolius			05			4	80	4	3.5	2.8	
			Big Sioux Nursery, Watertown, SD			06			4	80	3	2.5	2.9	leaf blight on 1
I/14/11-15	9082890	CORA6	gray dogwood	19-May	04	04	PLBR	5	5	100	5	0.5	1.3	heavy leaf spot
			Cornus racemosa			05			5	100	5	1.5	1.5	heavy leaf spot
			Big Sioux Nursery, Watertown, SD			06			5	100	5	1.5	2.1	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
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1/14/16-20	9082684	RHGL	smooth sumac		03	03	PLBR	5	2	40	4	1.5	1.4	
			Rhus glabra			04			3	60		1.8	2.0	
			Lincoln-Oakes Nursery, Bismarck,ND			05			5	100	5	1.5	2.2	leaf spot
						07			5	100	3	5.6	4.3	
I/15/1-5	9091967	PRPE2	pin cherry	11-May	05	05		5	5	100	4	0.9	1.8	
			Prunus pensylvanica			06				100	5	0.5	1.6	
			Big Sioux Nursery, Watertown, SD			07			4	80	6	0.3	1.1	
I/15/6-10	9091975	AMELA	serviceberry	11-May	05	05		5	5	100	5	0.9	1.5	
			Amelanchier lamarckii			06		5	5	100	7	0.3	0.8	heavy browse 1
			Lincoln-Oakes Nursery, Bismarck ND			07			0	0				removed
I/15/6-10	9083247	COAM	American hazelnut	May	07	07			3	60	5	0.3	0.6	
			Corylus americana											
			USDA, NRCS, PMC, Elsberry, MO											
I/15/11-15	9076686	CRCH	roundleaf hawthorn	19-May	04	04		5	5	100	5	0.4	0.6	
			Crataegus chrysocarpa			05			5	100	4	0.8	1.0	deer browse
			Lincoln-Oakes Nursery, Bismarck ND			06			5	100	6	0.5	1.1	chlorosis, browse 1
I/15/16-20	9082888	COAM3	American hazelnut	19-May	04	04		5	5	100	4	0.6	1.2	
			Corylus americana			05			5	100	5	0.9	1.3	scald on leaves
			Lincoln-Oakes Nursery, Bismarck ND			06			5	100	4	1.1	1.3	
I/16/1-5	'Konza'	RHAR	aromatic sumac	28-Apr	87	87	CONT	5	5	100		0.8	1.2	
	PI-477981		*Rhus aromatica*			88			5	100	3	1.2	1.7	
			USDA, NRCS, PMC, Manhattan, KS			89			3	60	2	3.1	2.8	
						91			2	40	2	6.6	4.3	
						93			2	40	3	9.8	5.8	
						96			2	40	4	13.5	6.1	
						01			1	20	3	12.0	8.5	
						06			1	20	3	16.0	9.0	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
I/16/11-20	ND-3744	BEKO	Korean barberry	4-May	88	88	CONT	10	0	0				
	9019577		*Berberis koreana*			89			10	100	4	0.7	0.9	
			NDSU			90			10	100	3	1.4	2.0	
			McKenzie FEP, ND			92			10	100	4	3.5	3.0	
						94			10	100	3	4.5	4.8	
						97			10	100	3	6.8	5.7	
						02			10	100		10.5	8.5	
						07			8	80		11.0	9.0	
I/17/1-10	'Meadowlark'	FOOV	forsythia	4-May	88	88	CONT	10	9	90	4	1.2	1.4	
	9005886		*Forsythia ovata x europaea*			89			10	100	1	3.1	2.6	
			P.I. Sta., Ames, IA			90			9	90	2	4.4	4.2	
			Lincoln-Oakes Nursery, Bismarck, ND			92			9	90	2	6.0	6.6	
						94			9	90	1	9.1	7.8	
						97			10	100	1	14.3	9.5	very uniform
						02			9	90	2	16.0	11.0	uniform
						07			9	90	2	18.0	13.0	very uniform
I/17/11-20	ND-2103	VIOP	European cranberrybush	4-May	88	88	POTD	10	0	0				
	PI-399414		*Viburnum opulus*			89			8	80	3	0.7	1.0	
			P.I. Sta., Ames, IA			90			5	50	3	1.7	2.2	
			NDSU, Exp. Sta., Dickinson, ND			92			4	40	3	3.6	4.3	
						94			4	40	4	6.5	6.4	
						97			4	40	1	12.0	8.0	
						02			4	40	2	15.0	11.8	
						07			4	40	2	19.5	14.3	
I/18/1-10	ND-2507	CAPY	pigmy caragana	4-May	88	88	POTD	10	9	90	7	0.2	0.5	
	9047228		*Caragana pygmaea*			89			6	60	5	0.6	0.8	
			NDFS, Bottineau, ND			90			8	80	3	0.9	1.2	
			USDA, NRCS, PMC, Bismarck, ND			92			7	70	3	2.8	2.3	
						94			7	70	3	4.2	3.6	
						97			7	70	3	6.4	4.3	
						02			4	40	4	7.5	5.3	
						07			3	30	7	9.3	5.1	7 stem mold

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
1/18/6-10	9082895	PRAR3	apricot	May	07	07		5	1	20	8	0.3	0.3	
			Prunus armeniaca											
			Rod O'Clair, Jamestown, ND											
			USDA, NRCS, PMC, Bismarck, ND											
I/18/11-15	9091976	VIDE	arrowwood viburnum	11-May	05	05		5	5	100	4	0.8	1.4	
			Viburnum dentatum			06			5	100	4	0.7	1.4	all browsed
			Lincoln-Oakes Nursery, Bismarck, ND			07			3	60	4	1.2	1.4	all browsed
I/19/1-10	9057409	COAM3	American hazel	4-May	88	88	PLBR	10	1	10	9	0.2	1.1	
			Corylus americana			89			8	80	4	0.6	1.1	
			Turtle Mtns., Bottineau Co., ND			90			6	60	5	1.1	1.2	
			NDFS			92			6	60	3	2.0	2.0	
						94			6	60	3	4.1	3.8	
						97			6	60	1	7.0	5.8	
						02			6	60	4	11.5	8.5	
						07			6	60	4	13.0	10.3	
I/19/11-20	'Hedge King'	LOXY	honeysuckle	4-May	88	88	PLBR	10	8	80	7	0.5	0.9	
	9057407		*Lonicera xylosteoides*			89			9	90	5	0.7	1.0	
			Wedge Nursery, Albert Lea, MN			90			8	80	3	1.1	1.2	
						92			8	80	3	1.5	1.8	
						94			8	80	5	1.8	2.3	
						97			8	80	1	2.4	3.2	
						02			5	50	5	3.8	5.6	
						07			5	50	5	4.0	5.0	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
II/03/1-10	ND-1731	MABA	Siberian crabapple	10-May	78	78	PLBR	10	10	100	5	1.0	2.2	standard
	9006001		*Malus baccata*			79			10	100	3	2.2	3.1	
			Lincoln-Oakes Nursery, Bismarck, ND			80			10	100		3.9	5.0	
						82			10	100		5.5	8.0	
						83			9	90		6.2	8.7	fire blight
						84			9	90	7	8.1	10.4	
						87			9	90	4	11.2	14.2	
						88			9	90	4	13.1	13.9	
						92			9	90	4	16.7	15.4	
						97			9	90	1	27.2	19.7	
						02			9	90	3	32.0	28.0	
						07			9	90	3	36.0	25.8	1 not Siberian
II/04/1-10	'McDermand'	PYUS	Ussurian pear	10-May	78	78	PLBR	10	10	100	5	0.7	2.0	
	ND-14		*Pyrus ussuriensis*			79			10	100	5	1.6	2.6	
	9006095		Harbin Manchuria/Res. Sta.			80			10	100		2.2	4.1	
	PI-478004		Morden, Manitoba, Canada			82			10	100		2.9	5.2	
			USDA, NRCS, PMC, Bismarck, ND			83			6	60		4.0	6.9	
						84			6	60		5.0	8.4	
						87			6	60	5	7.9	11.9	
						88			6	60	3	11.6	13.9	
						92			6	60	3	16.3	16.4	
						97			6	60	1	24.6	23.0	
						02			6	60	1	26.0	26.0	
						07			6	60	3	30.0	30.0	
II/05/1-10	'Streamco'	SAPU2	purpleosier willow	1-May	90	90	PLBR	10	10	100	3	5.2	2.6	
	434309		*Salix purpurea*			91			10	100	3	7.5	4.1	
			USDA, NRCS, PMC, Big Flats, NY			92			10	100	4	10.7	8.3	tipping by deer
						94			10	100	2	17.1	12.1	
						96			10	100		9.5	15.4	
						99			10	100	2	22.0	17.7	
						04			10	100	4	27.0	19.0	deer browse line

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
II/07/1-10	ND-21	VILE	nannyberry	29-Apr	86	86	PLBR	10	10	100		0.8	1.5	
	9034900		*Viburnum lentago*			87			10	100	3	1.4	2.9	
			USDA, ARS, Mandan, ND			88			10	100	3	2.1	3.8	
						90			10	100	3	4.5	5.0	
						92			10	100	3	5.4	6.2	some suckering on all
						95			10	100	2	7.7	7.8	
						00			10	100	3	10.5	10.1	mildew
						05			10	100	3	13.0	13.0	average moderate mildew
II/8/1-5	9082609	PICEA	Meyer's spruce		01	01	CONT	5	4	80	5	0.5	0.7	
			Picea meyeri			02			4	80	2	0.7	0.9	
			Itasca Greenhouse, Inc.			03			4	80	3	1.3	1.4	
						05			4	80	5	2.0	2.7	
						07			4	80	4	3.4	3.8	
II/08/6-10	9076741	SAMA13	Libbon willow	30-Apr	96	96	HDCU	5	5	100	4	2.6	2.4	severe deer browse
			Salix matsudana x			97			5	100	9	1.9	2.5	
			George Libbon, Stevens Co., MN			98			3	60	7	2.7	3.8	
						00			1	20	2	13.4	22.3	
						02			1	20	3	18.0	26.0	compact growth
						06			1	20	2	30.0	39.3	
II/8/6-10	9092053	RHTY	staghorn sumac	3-May	06	06	PLBR	5	3	60	4	1.6	1.9	
			Rhus typhina			07			3	60	3	3.5	4.1	
			Lincoln-Oakes Nursery, Bismarck, ND											
II/09/1-5	9092053	ELAEA	Russian olive/Silverberry hybrid	3-May	06	06	PLBR	5	5	100	2	1.3	3.1	
			Elaeagnus X 'Jefmorg'			07			5	100	2	5.3	5.7	
			Lincoln-Oakes Nursery, Bismarck, ND											
II/09/6-10	9069129	PRMA	amur chokecherry	26-Apr	95	95	PLBR	5	5	100	3	0.9	2.0	
			Prunus maackii			96			4	80	3	1.3	2.4	deer browse on all
			Big Sioux Nursery, Watertown, SD			97			4	80	4	1.6	3.1	browsed
						99			3	60	5	2.0	3.6	browsed
						01			3	60	4	5.0	8.6	
						04			6	60	4	7.8	13.3	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
II/09/6-10	'Prairie Red'	PRUNU	plum	3-May	06	06			5	100	8	0.5	1.1	
	ND-1134		*Prunus* sp.			07			0	0				removed
	9047203		Big Sioux Nursery, Watertown, SD											
II/9/6-10	9092141	VILE	nannyberry	May	07	07		5	5	100	5	0.3	1.1	
			Viburnum lentago											
			Schumacher's, Heron Lake, MN											
II/10/1-10	ND-2102	PRAR3	apricot	29-Apr	86	86	PLBR	10	10	100		1.2	1.6	
	9036029		*Prunus armeniaca*			87			10	100	3	2.5	3.1	
			Hand Co., SD			88			10	100	5	3.2	4.3	
						90			10	100	3	5.9	7.1	
						92			10	100	4	9.2	11.3	canker, deer browse on all
						95			10	100	3	13.9	14.4	
						00			8	80	5	18.4	15.1	
						05			6	60		27.5	17.8	
II/11/1-5	9082885	POTR5	aspen	19-May	04	04	PLBR	5	2	40	7	0.3	1.5	
			Populus tremuloides			05			5	100	5	0.6	1.6	
			NDFS Nursery, Towner, ND			06			5	100		0.4	1.7	1 black leaves
						07			0	0				removed
II/11/1-5	9092140	SOAL9	Korean mountain ash	May	07	07		5	5	100	6	0.3	0.9	browsed
			Sorbus alnifolia											
			Big Sioux Nursery, Watertown, SD											
II/11/6-10	9082886	POTR5	aspen	19-May	04	04	PLBR	5	5	100	5	0.3	1.3	leaf deep on all
			Populus tremuloides			05			5	100		0.2	0.7	
			Lincoln-Oakes Nursery, Bismarck, ND			06			3	60	8	0.3	0.7	
						07			0	0				removed
II/11/6-10	'Cathedral'	ULMUS	Siberian/Japanese elm cross	May	07	07		5	5	100	3	3.6	8.3	
	9092142		*Ulmus X* 'cathedral'											
			Bailey Nursery, Inc., St. Paul, MN											
			S & B Nursery, Bismarck, ND											

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
II/12/1-5	9082631	BEPLJ	Japanese birch	29-Apr	99	99	PLBR	5	5	100	3	0.7	2.6	
			Betula platyphylla japonica			00			5	100	3	3.3	4.4	
			Lawyer Nursery, Plains, MT			01			5	100	2	5.7	7.5	
						03			5	100	3	8.5	13.1	
						05			5	100	3	9.4	16.5	
II/12/5-10	9091974	QURU	red oak	11-May	05	05		5	5	100	4	0.4	1.5	chlorotic
			Quercus rubra			06			5	100	5		1.9	3 top dead
			Lincoln-Oakes Nursery, Bismarck, ND			07			5	100	4		2.0	in tubex
II/13/1-5	9082635	ROPS	black locust	29-Apr	99	99	PLBR	5	5	100	3	2.4	4.2	
			Robinia pseudoacacia			00			5	100	5	2.7	3.9	
			Lawyer Nursery, Plains,MT			01			5	100	6	3.8	4.5	
						03			2	40	6	10.0	8.9	
						06			2	40	3	18.3	17.9	multi-stemmed
II/13/6-10	9091973	QURU	red oak	11-May	05	05		5	5	100	5	0.5	1.4	
			Quercus rubra			06			5	100			1.5	1,3 dead top; leaf disease on all
			Lincoln-Oakes Nursery, Bismarck, ND			07			4	80	5		1.3	2,3 dieback, all in tubex
II/14/1-5	9076718	PISYM	Scots pine	29-Apr	99	99	CONT	5	5	100	3	0.7	1.2	
			Pinus sylvestris var. *mongolica*			00			5	100	3	1.5	1.8	
			USDA, NRCS, PMC, Bismarck, ND			01			5	100	2	2.5	3.0	
						03			5	100	3	5.0	6.8	
						05			5	100	2	7.2	10.6	
II/14/6-10	9076719	PISYM	Scots pine	29-Apr	99	99	CONT	5	5	100	2	1.0	1.3	
			Pinus sylvestris var. *mongolica*			00			5	100	3	1.6	1.9	
			USDA, NRCS, PMC, Bismarck, ND			01			5	100	2	2.3	2.9	
						03			5	100	3	4.8	6.0	
						05			5	100	3	7.2	10.0	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
II/15/1-5	9076737	PRSE	black cherry	12-May	97	97	PLBR	5	4	80	8	0.3	0.5	
			Prunus serotina			98			2	40	8	0.8	0.8	
			Apple Valley FEP			99			1	20		1.8	2.3	
			Lincoln-Oakes Nursery, Bismarck, ND			00			1	20	5	4.1	4.3	
						01			1	20		5.5	6.5	
						03			1	20	3	8.0	12.0	
						06			1	20	2	11.5	17.2	
II/15/6-10	9069163	LARIX	Dahurian larch	2-May	00	00		5	5	100	7	0.8	1.1	
			Larix olgensis			01			4	80	6	0.9	1.6	
			USDA, NRCS, PMC, Bismarck, ND			02			3	60	2	1.5	2.0	
						04			3	60		2.2	3.1	
						06			3	60	5	4.1	4.5	deer rub
II/16/1-5	9076722	BEPE3	European white birch	30-Apr	96	96	PLBR	5	5	100	3	2.4	2.8	
			Betula pendula			97			5	100	2	3.5	4.6	
			Russia			98			4	80	3	7.0	9.2	
			USDA, ARS, Mandan, ND			00			5	100	2	10.2	15.8	
						02			5	100	3	16.0	21.0	
						05			5	100	2	14.8	27.5	
II/16/6-10	9069121	PRPA5	mayday	30-Apr	96	96	CONT	5	5	100	4	0.5	0.9	
			Prunus padus			97			5	100	3	0.8	1.2	
			Norway			98			5	100	7	1.1	1.2	
			USDA, NRCS, PMC, Bismarck, ND			00			2	40	3	2.8	3.9	
						02			2	40	4	4.2	6.6	
						05			2	40	4	5.4	9.5	
II/17/1-5	9069170	QURO2	English oak	30-Apr	96	96	PLBR	5	4	80	4	0.9	1.0	
			Quercus robur			97			5	100	3	1.1	1.3	
			Russia			98			5	100	6	1.2	1.3	
			USDA, ARS, Mandan, ND			00			5	100	7	1.0	1.1	
						02			4	80	8	2.4	2.6	
						05			4	80	6	3.3	4.5	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
II/17/6-10	9076725	ULCA	smoothbark elm	30-Apr	96	96	PLBR	5	5	100	4	2.3	2.0	deer browse on all
			Ulmus carpinifolia			97			5	100	2	3.6	2.5	all browsed
			Russia			98			5	100	4	5.3	3.9	
			USDA, ARS, Mandan, ND			00			3	60	3	8.9	11.8	
						02			3	60	4	15.0	17.7	
						05			2	40	2	23.5	27.5	good form on both
II/18/1-5	9069168	LASI	Siberian larch	2-May	00	00	CONT	5	5	100	5	0.6	1.4	
			Larix sibirica			01			4	80	4	0.9	1.8	
			USDA, NRCS, PMC, Bismarck, ND			02			4	80	3	1.3	2.3	
						04			3	60	5	2.6	3.8	deer rub
II/18/6-10	9082610	LASI	Siberian larch	2-May	00	00	CONT	5	5	100	6	0.6	1.1	
			Larix sibirica			01			4	80	5	0.8	1.2	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	5	1.1	1.4	
						04			5	100	5	1.2	2.4	
						06			5	100	5	2.1	2.2	
II/19/1-5	9063126	ULJA	Japanese elm	28-Apr	92	92	CONT	5	5	100	4	1.1	1.3	
			Ulmus japonica			93			4	80	3	1.3	1.2	
			Manchuria			94			4	80	5	2.6	2.2	
			PRFA, Indianhead, Saskatchewan, Canada			96			4	80	4	4.3	3.2	deer browse 1, leaf blight 3
						98			4	80	5	4.2	4.9	
						01			4	80	5	7.8	8.1	heavy browse
						06			4	80	4	11.1	12.9	
II/19/6-10	9092051	CASP8	northern catalpa	3-May	06	06	PLBR	5	5	100	3	0.6	0.9	leaf edge burn
			Catalpa speciosa			07			5	100	5	0.4	0.9	
			Big Sioux Nursery, Watertown, SD											
II/20/1-5	9082666	BEDA	black birch		01	01	PLBR	5	5	100	2	2.0	1.9	
			Betula davurica			02			5	100	3	2.8	3.0	
			Lawyer Nursery, Plains, MT			03			4	80	4	4.4	5.2	
						05			4	80	5	5.7	8.3	
						07			4	80	4	7.6	12.1	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
II/20/6-10	9092052	QUBI	swamp white oak	3-May	06	06	PLBR	5	5	100	3	0.7	1.1	
			Quercus bicolor			07			5	100	4	0.5	1.0	browsed
			Lincoln-Oakes Nursery, Bismarck, ND											
II/21/1-10	'Flame'	ACGI	amur maple	29-Apr	80	80	PLBR	10	10	100	5	2.8	3.3	
	MI-891		*Acer ginnala*			81			10	100		4.7	4.6	
	9005157		USDA, NRCS, PMC, Elsberry, MO			82			10	100		6.5	6.0	
						83			10	100		7.0	6.3	
						84			9	90	4	12.2	8.6	chlorosis
						87			8	80	2	16.8	12.9	
						92			8	80	3	22.2	15.8	
						97			7	70	2	26.2	18.4	
						02			5	50	4	31.0	23.5	
						07			0	0				mostly dead, need to remove
II/22/1-10	ND-1752	ACGI	amur maple	23-May	78	78	PLBR	10	9	90	5	0.6	1.2	standard
	9005646		*Acer ginnala*			79			8	80	4	1.9	2.6	
			Gurney Seed & Nursery Co., Yankton, SD			80			10	100	6	3.2	3.4	
						82			8	80		8.1	7.0	
						83			8	80		11.0	8.1	
						84			8	80	2	12.9	10.5	chlorosis
						87			8	80	2	16.5	13.1	
						92			8	80	2	20.4	15.2	
						97			8	80	4	20.8	20.0	
						02			6	60	5	16.3	17.7	
II/22/11-20	ND-629	ACGI	amur maple	14-May	79	79	PLBR	10	10	100	3	0.9	1.8	
	9005645		*Acer ginnala*			80			10	100	5	2.2	3.5	
	PI-477992		Res. Sta. Morden, Manitoba, Canada			81			10	100		4.3	5.1	
						83			10	100		7.2	7.1	
						84			9	90	3	12.5	9.7	
						85			9	90	3	13.5	10.7	chlorosis
						87			9	90	3	16.9	13.7	
						93			9	90	3	21.2	17.3	
						98			9	90	5	23.7	20.2	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
II/23/1-10	ND-1873	ACGI	amur maple	15-May	79	79	PLBR	10	9	90	3	0.7	1.4	
	9005648		*Acer ginnala*			80			10	100	6	1.2	2.3	
			Lincoln-Oakes Nursery, Bismarck, ND			81			10	100		2.2	0.3	
						83			10	100		3.8	3.7	
						84			9	90	4	6.2	5.2	
						85			8	80	6	8.0	6.5	
						87			8	80	5	9.9	9.1	
						88			8	80	4	9.9	8.8	
						93			8	80	4	14.3	13.2	
						98			8	80	6	14.2	14.7	
						04			2	20		22.5	19.5	chlorotic
II/24/1-10	ND-686	SYREP	pekin lilac	14-May	79	79	PLBR	10	9	90	4	0.5	1.0	
	9006225		*Syringa reticulata* ssp. *pekinensis*			80			10	100	7	0.6	1.0	
	PI-478008		Res. Sta., Morden, Manitoba, Canada			81			9	90		1.2	1.3	
			USDA, NRCS, PMC, Bismarck, ND			83			9	90		2.5	2.5	
						84			9	90	4	4.0	3.2	
						85			6	60	4	6.6	5.4	
						88			6	60		8.9	8.0	
						93			6	60	2	15.7	13.5	
						98			6	60	3	17.4	14.4	
II/26/1-10	ND-19	CRAR	Arnold hawthorn	1-May	84	84	CONT	10	10	100	3	0.5	1.0	
	9005731		*Crataegus arnoldiana*			85			10	100	3	0.8	1.3	
			Res. Sta., Morden, Manitoba, Canada			86			10	100		1.1	1.7	
						87			10	100	3	1.4	2.1	
						88			10	100	5	1.6	2.8	
						90			10	100	4	2.9	4.1	
						93			10	100	4	4.5	7.0	
						98			10	100	6	6.7	9.8	
						04			10	100	5	7.4	9.9	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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III/01/1-10	SD-156	FRPE	green ash	10-May	78	78	PLBR	10	8	80	3	0.8	2.5	
	9005890		*Fraxinus pennsylvanica*			79			10	100	5	2.3	2.7	
			Deuel Co., Clear Lake, SD			80			10	100		2.7	4.7	
						82			10	100		6.8	8.9	
						83			10	100		6.5	9.9	
						84			10	100		8.3	12.4	
						87			10	100	2	11.6	18.2	
						92			10	100	2	15.7	23.8	
						97			10	100	1	24.9	31.3	
						02			10	100	3	32.0	46.0	
						07			10	100	2	40.0	52.0	
III/02/1-5	ND-1753	FRPE	green ash	10-May	78	78	PLBR	5	5	100	2	0.9	2.3	standard
	9005892		*Fraxinus pennsylvanica*			79			5	100	5	2.3	3.2	
			Gurney Seed & Nursery Co., Yankton, SD			80			5	100		3.2	4.9	
						82			5	100		5.8	8.7	
						83			5	100		5.7	9.8	
						84			5	100		7.3	12.0	
						87			5	100	2	10.7	18.6	
						92			5	100	3	14.2	24.0	
						97			5	100	2	24.0	32.2	
						02			4	80	4	30.0	45.0	
						07			4	80	4	35.0	51.0	
III/02/6-10	ND-1734	FRPE	green ash	10-May	78	78	PLBR	5	5	100	3	0.8	2.0	standard
	9005891		*Fraxinus pennsylvanica*			79			5	100	5	1.7	2.4	
			Lincoln-Oakes Nursery, Bismarck, ND			80			5	100		2.1	4.0	
						82			5	100		5.1	8.4	
						83			5	100		4.4	9.4	
						84			5	100		6.2	12.0	
						87			5	100	3	10.6	18.2	
						92			5	100	1	14.6	23.7	
						97			5	100	3	17.4	30.0	
						02			5	100	3	30.0	46.0	
						07			5	100	4	35.0	51.0	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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III/03/1-10	'Cardan'	FRPE	green ash	10-May	78	78	PLBR	10	10	100	2	0.7	2.3	
	MDN-12002		*Fraxinus pennsylvanica*			79			10	100	5	1.9	3.2	
	9005895		Carlyle, MT			80			10	100		2.7	4.8	
	PI-469226		USDA, ARS, Mandan, ND			82			10	100		5.8	8.7	
						83			10	100		5.1	9.7	
						84			10	100		6.5	11.5	
						87			10	100	3	11.3	17.7	
						92			10	100	2	15.4	23.5	
						97			10	100	3	17.7	30.1	
						02			10	100	3	30.0	46.0	
						07			10	100	4	35.0	46.0	
III/04/1-10	ND-1759	FRPE	green ash	10-May	78	78	PLBR	10	10	100	2	0.8	2.2	
	9005893		*Fraxinus pennsylvanica*			79			10	100	6	1.7	2.7	
			PM-SD-156 X MDN-12002			80			10	100		2.4	4.4	
			USDA, NRCS, PMC, Bismarck, ND			82			10	100		3.9	7.6	
						83			9	90		4.7	9.1	
						84			9	90		5.8	11.3	regrowth on 5
						87			9	90	3	10.6	16.9	
						92			9	90	1	14.4	23.5	
						97			9	90		17.9	31.2	
						02			9	90	3	30.0	46.0	
						07			9	90	4	30.0	46.0	
III/05/1-10	ND-647	FRNI	black ash	10-May	78	78	PLBR	10	8	80	5	0.5	1.0	
	9005887		*Fraxinus nigra*			79			9	90	9	0.8	0.9	
			Res. Sta. Morden, Manitoba, Canada			80			9	90	7	0.7	1.3	
						82			8	80		2.2	3.7	
						83			8	80		2.7	4.6	
						84			6	60		2.4	7.3	
						87			6	60	3	4.6	12.1	
						92			5	50	2	10.1	20.0	
						97			5	50	3	18.2	25.5	
						02			5	50	3	25.0	40.0	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
III/06/1-10	ND-1432	AEGL	Ohio buckeye	10-May	78	78	PLBR	10	7	70	7	0.3	0.7	
	9005658		*Aesculus glabra*			79			1	10	9	0.7	0.7	
			Res. Sta. Morden, Manitoba, Canada			80			1	10	5	0.7	1.0	
						82			1	10		2.0	3.1	
						83			1	10		1.6	4.4	
						84			1	10		2.3	5.7	
						87			1	10	2	5.9	9.8	
						92			1	10	1	11.6	13.6	
						97			1	10	2	15.1	16.2	
						02			1	10	2	20.0	20.0	
						07			1	10	2	21.0	25.0	
III/06/6-10	9063120	AEGL	Ohio buckeye	29-Apr	99	99	CONT	5	5	100	7	0.2	0.8	
			Aesculus glabra			00			2	40	8	0.1	0.4	
			USDA, NRCS, PMC, Bismarck, ND			01			1	20	8	0.8	1.0	
						03			1	20	6	2.0	2.0	
						05			1	20		1.6	1.6	
III/07/1-10	9057410	CEOC	hackberry	4-May	88	88	CONT	10	10	100	5	0.6	1.0	
			Celtis occidentalis			89			9	90	5	0.6	0.9	browsing
			Bottineau Co., ND			90			8	80	4	1.1	1.6	
			NDFS			92			8	80	5	1.2	1.8	
						94			8	80	4	1.6	2.8	
						97			7	70	6	1.6	2.1	deer browse on all
						02			7	70	5	3.5	4.4	
						07			6	60	5	4.5	7.2	deer browse on all
III/08/1-5	9063148	PHSA	corktree	26-Apr	95	95	CONT(I	5	5	100	4	0.2	1.0	
			Phellodendron sachalinense			96			5	100	3	3.0	3.2	deer browse on 1
			Clay Co., MN			97			5	100	1	4.3	5.0	
						99			5	100	4	11.4	8.8	
						01			5	100	3	14.5	12.7	
						04			5	100	4	21.0	17.5	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
III/9/1-5	9082668	FREX	European ash	2-May	00	00	CONT	5	5	100	6	0.6	2.1	
			Fraxinus excelsior			01			5	100	6	1.1	1.8	browsed
			Lawyer Nursery, Plains, MT			02			5	100	5	1.8	2.8	
						04			5	100	6	1.1	2.0	
						06			5	100	6	1.4	2.6	
III/9/6-10	9082674	ACSA	sugar maple	2-May	00	00	CONT	5	5	100	8	0.3	1.1	
			Acer saccharum			01			5	100	9	0.2	1.2	
			Lincoln-Oakes Nursery, Bismarck, ND			02			2	40	8	0.5	0.5	
						04			2	40		0.9	1.1	
						06			1	20	8	0.8	0.8	
III/10/1-5	9058896	SALIX	Austree	1-May	90	90	PLBR	5	2	40	3	1.8	4.1	
	Clone C		*Salix matsudana x alba*			91			3	60	4	2.7	5.2	
			Austree, Inc., Pescadero, CA			92			3	60	3	4.1	7.7	
						94			3	60	6	9.2	13.5	
						97			2	40	2	19.8	30.8	
						99			2	40	2	23.1	39.4	
						04			2	40	3	30.0	49.0	
III/11/1-5	9058869	PDXP8	poplar	1-May	90	90	PLBR	5	5	100	3	2.1	4.9	
	14271		*Populus deltoides x P. nigra*			91			5	100	3	4.4	7.3	
	'Italica' #78102		USDA, ARS, Mandan, ND			92			5	100	3	5.8	10.3	
			Lincoln-Oakes Nursery, Bismarck, ND			94			5	100	3	10.6	18.8	
						96			5	100	3	14.0	30.4	
						99			5	100	2	15.1	44.9	
						04			5	100	4	18.0	58.6	
III/11/6-10	9058870	PDXP8	poplar	1-May	90	90	PLBR	5	5	100	3	3.1	5.0	
	14272		*Populus deltoides x P. nigra*			91			5	100	5	4.1	6.5	
	'Italica' #78101		USDA, ARS, Mandan, ND			92			5	100	5	5.9	9.8	
			Lincoln-Oakes Nursery, Bismarck, ND			94			4	80	4	10.0	17.0	
						96			4	80	4	13.6	24.4	
						99			4	80	3	14.8	42.6	
						04			4	80	3	21.0	63.3	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
III/12/1-5	9058871	PDXP8	poplar	1-May	90	90	PLBR	5	5	100	2	2.8	5.1	
	14273		*Populus deltoides x P. nigra*			91			5	100	3	6.0	9.6	
	'Italica' #7899		USDA, ARS, Mandan, ND			92			5	100	3	9.0	13.7	
			Lincoln-Oakes Nursery, Bismarck, ND			94			5	100	3	15.3	22.2	
						96			5	100	3	17.4	33.4	
						99			5	100	2	19.0	45.9	
						04			5	100	3	21.0	61.2	
III/12/6-10	9058872	PDXP8	poplar	1-May	90	90	PLBR	5	5	100	3	3.7	4.6	
	14274		*Populus deltoides x P. nigra*			91			5	100	3	7.5	9.1	
	'Italica' #7873		USDA, ARS, Mandan, ND			92			5	100	3	8.5	10.4	
			Lincoln-Oakes Nursery, Bismarck, ND			94			5	100	5	12.7	18.2	
						96			5	100	5	15.5	26.8	leaf spot on 1
						99			5	100		14.4	40.3	
						04			3	60	5	20.0	34.7	
III/13/1-5	'Canam'	POPUL	poplar	1-May	90	90	PLBR	5	5	100	4	3.1	4.2	
	9058873		*Populus*			91			5	100	5	6.0	8.8	
	14390		USDA, ARS, Mandan, ND			92			5	100	4	5.6	9.7	
			Lincoln-Oakes Nursery, Bismarck, ND			94			3	60	6	9.4	19.2	
						96			3	60	6	11.2	24.0	
						99			3	60	4	12.0	36.5	
						04			3	60	3	18.0	54.7	
III/14/1-5	9082982	POAL	white poplar	19-May	04	04	PLBR	5	5	100	3	0.6	1.7	
			Populus alba			05			5	100	6	1.0	1.7	
			Big Sioux Nursery, Watertown, SD			06			4	80	4	1.3	1.9	
III/14/6-10	9076746	AEGL	Ohio buckeye	2-May	00	00	CONT	5	5	100	7	0.3	0.7	
			Aesculus glabra			01			3	60		0.0	0.9	
			USDA, NRCS, PMC, Bismarck, ND			02			3	60	4	1.5	1.5	
						04			3	60	3	2.0	2.7	
						06			3	60	3	3.7	4.5	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
III/15/1-10	'Oahe'	CEOC	hackberry	29-Apr	80	80	PLBR	10	10	100	6	0.4	1.9	
	MDN-12003		*Celtis occidentalis*			81			10	100		1.4	2.1	
	9005725		USDA, ARS, Mandan, ND			82			10	100		3.0	3.6	
	PI-476982					83			10	100		4.9	5.2	
						84			10	100	3	5.3	7.3	
						86			10	100	4	9.4	10.1	
						89			10	100	2	13.5	15.8	plt 2 stunted, deer browse
						94			10	100	3	14.5	20.7	
						99			10	100	2	18.0	26.4	
						04			10	100	3	18.0	32.2	
III/16/1-5	SD-75	CEOC	hackberry	28-Apr	81	81	PLBR	5	5	100		0.7	1.8	
	9005713		*Celtis occidentalis*			82			4	80		3.6	3.4	
			Potter Co., SD			83			5	100		5.2	4.0	
						84			5	100	4	5.1	6.5	
						85			5	100	5	5.6	7.6	
						87			5	100	3	10.9	12.6	
						90			5	100	4	12.5	15.0	
						95			5	100	2	16.7	24.4	
						00			5	100	3	20.0	27.2	
						05			5	100	2	21.0	35.0	average
III/16/6-10	SD-211	CEOC	hackberry	28-Apr	81	81	PLBR	5	4	80		0.5	0.8	
	9005714		*Celtis occidentalis*			82			5	100		2.6	2.0	
			Sanborn Co., SD			83			5	100		5.1	4.6	
						84			5	100	4	3.7	6.3	Plt 7 broken down
						85			5	100	5	7.4	7.4	
						87			5	100	2	12.7	13.3	
						90			5	100	4	14.7	15.1	
						95			5	100	2	19.5	23.2	
						00			5	100	2	25.9	27.6	
						05			5	100	3	21.0	39.0	average

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
III/17/1-5	9082675	FRMA	Manchurian ash	2-May	00	00	CONT	5	5	100	7	0.4	1.3	
			Fraxinus mandshurica			01			5	100	7	0.7	1.3	heavily browsed
			Lincoln-Oakes Nursery, Bismarck, ND			02			5	100	5	1.5	2.0	browsed
						04			5	100	5	1.0	2.4	browse
						06			5	100	5	1.2	3.0	dead leaves on 3
III/17/6-10	9082650	POPUL	Soongarica poplar	2-May	00	00	CONT	5	4	80	4	1.1	1.8	
			Populus			01			5	100	6	1.6	2.7	
			Valley Nursery, Helena, MT			02			5	100	5	2.2	3.5	
						04			5	100	6	2.2	3.3	leader deer rubbed on 4
						06			4	80		2.4	2.6	
III/18/1-5	9076723	ULPU	Siberian elm	30-Apr	96	96	PLBR	5	5	100	3	2.3	2.5	deer browse on all
			Ulmus pumila			97			5	100	3	3.6	3.6	deer browse on all
			USSR			98			5	100	5	5.7	5.4	
			USDA, ARS, Mandan, ND			00			2	20	3	17.1	13.5	
						02			2	40	3	24.5	19.0	
						05			2	40	4	25.0	30.5	
III/18/6-10	9063098	JUNI	black walnut	21-May	91	91	PLBR	5	5	100	5	0.9	1.8	
			Juglans nigra			92			5	100	6	0.8	1.8	
			Big Sioux Nursery, Watertown, SD			93			5	100	6	0.9	1.6	
						94			4	80	3	3.3	3.2	
						95			4	80	4	3.0	3.4	
						97			4	80	5	5.5	5.2	poor site
						00			4	80	4	11.1	10.0	
						05			3	60		17.0	30.0	
III/19/6-10	9076724	ELAN	Russian olive	30-Apr	96	96	PLBR	5	5	100	3	4.6	3.8	
			Elaeagnus angustifolia			97			5	100	1	7.6	6.2	
			USSR			98			5	100		10.5	8.7	
						00			5	100	4	14.6	14.3	
						02			4	80	4	18.0	17.0	
						05			4	80	5		18.3	

Project No.: 38I318K University of Minnesota, West Central Research and Outreach Center, Morris, Minnesota
Year of Record: 2007

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
III/20/6-10	9069166	ELAN	Russian olive	30-Apr	96	96	PLBR	5	5	100	3	1.8	2.6	
			Elaeagnus angustifolia			97			5	100	4	3.4	4.0	very poor site,
			USSR			98			5	100	4	6.7	7.2	mech. damage on 4
			USDA, ARS, Mandan, ND			00			4	80	5	12.7	14.1	
						02			4	80	6	12.8	16.8	
						05			1	20	3	18.0	24.0	
III/21/1-5	9054820	ULPU	Siberian elm	26-Apr	95	95	PLBR	5	5	100	3	1.7	2.2	deer browse on all
			Ulmus pumila			96			5	100	3	3.8	3.8	
			USDA, NRCS, PMC, Bridger, MT			97			5	100	3	5.7	5.7	deer browse on all
						99			5	100	3	9.9	12.3	
						01			5	100	4	13.6	16.0	
						04			5	100	4	16.0	18.8	browse
III/21/1-10	ND-428	JUNI	black walnut	30-Apr	85	85	PLBR	10	10	100	4	0.5	0.9	
	9005970		*Juglans nigra*			86			5	50		1.2	1.1	
			USDA, NRCS, PMC, Bismarck, ND			87			5	50		0.4	0.9	
						89			4	40	4	2.6	2.1	
						91			4	40	4	4.3	4.1	
						94			3	30	4	8.3	5.8	
						99			2	20		15.6	15.6	
						04			2	20	6	24.0	21.5	

OFF-CENTER EVALUATIONS: TECHNICAL REPORT – 2007

Study 38I346K University of Minnesota, North Central Research and Outreach Center, Grand Rapids, Minnesota.

Study Title: Field Evaluation of Woody Plant Materials.

Introduction: There is a need to evaluate the performance of shrub and tree species/cultivars for windbreaks, wildlife, and recreational plantings under diverse soil and climatic conditions. To meet this need, field evaluation planting sites representative of the major land resource areas are located in the three states served by the PMC. These sites provide planting locations under long-term land tenure for assemblies of trees and shrubs to be evaluated under uniform culture and management. New material can be added on an annual basis. Comparisons are made with previously released cultivars and area of adaptation determined.

Objective: The objective is to assemble and evaluate woody plant materials for conservation use. Superior cultivars will be selected and released for increase by commercial nurseries.

Cooperators: The USDA Natural Resources Conservation Service, Plant Materials Center, Bismarck, North Dakota, in cooperation with the University of Minnesota, North Central Research and Outreach Center, Grand Rapids, Minnesota. Expires June 13, 2011, unless agreement is extended.

Location: University of Minnesota, North Central Experiment Station, Grand Rapids, Minnesota. Legal Description: NW ¼ SW ¼ sec. 14, T. 55 N., R. 25 W.

Major Land Resource Area: This site is located in Major Land Resource Area 88, Northern Minnesota Glacial Lake Basins. More than 80 percent of this area is forested, with the remainder used for growing feed grains and forage. The area is nearly level, with elevations ranging from 980 to 1,300 feet.

Soils: The soils at this site are Morph and Rosy very fine sandy loams. The Morph very fine sandy loam is poorly drained, with seasonal high water table at a depth of 1-3 feet. The Rosy very fine sandy loam is moderately well drained, with a seasonal high water table at a depth of 3-5 feet. These are woodland soils. These soils are well suited to aspen, balsam fir, and black ash. Morph soil is in the Conservation Tree/Shrub Suitability Group 2, and Rosy soil is in Group 3.

Climate: The average annual precipitation for MLRA 88 is from 20 to 27 inches, with 40 to 50 inches of snowfall in the winter. The average annual temperature is 35 to 40 degrees F, with an average freeze-free period of 95 to 105 days. The plant hardiness zone for this site is 3, with an average annual minimum temperature of -30 to -40 degrees F. Climatic data for 2007 at Grand Rapids, Minnesota, the nearest official weather station, is shown in Table GR-1.

Methods and Materials

Assembly: Refer to Table GR-2 for a list of woody species planted from 1998 to 2007. Some of the accessions were moved from the old site.

Planting Plan: The plots are not randomized or replicated but organized systematically for evaluation and demonstration purposes. The site is divided into four blocks (refer to Figure GR-1). Block 1 is planted to shrubs, Block 2 to medium trees, Block 3 to tall trees, and Block 4 to conifers. Each block is arranged into single row, non-replicated plots. Each plot contains 1 to 10 plants. Spacing is 20 feet between rows and 5 feet within row for shrubs and 10 feet within row for trees. Row length is 100 feet. Like species and standards of comparison are planted in adjacent plots whenever possible.

Plot Preparation: A clean, firm planting site was prepared by application of Glyphosate and roto-tilling.

Planting Method: All trees and shrubs were hand planted using approved forestry methods. Accessions from the old FEP were moved using a tree spade.

Planting Date: Refer to Table GR-2 for planting dates of woody species planted from 1998 to 2007.

Fertilization: No fertilizer has been applied to the planting area.

Weed Control: Mechanical weed control, rotary mowing between row, and rototilling and hand hoeing in row.

Biological Control: No insecticides have been applied. There has been some damage by deer browsing.

Irrigation: Trees were not watered at time of establishment.

Crop Residue Management: No cover crop has been seeded; a perennial grass cover is maintained between rows.

Silvicultural Practices: Minor pruning has been done each year to remove dead or damaged branches.

Evaluations and Measurements: Plant performance data is recorded during the growing season for the first three years. After the third year, data is gathered according to a specific schedule. The trees and shrubs were evaluated for survival, canopy width, plant height, vigor, insect and disease, and animal damage. Select data appears in this report. Annual summary reports have been prepared since 2006 and can be requested from the PMC.

Results

Plant Performance: Eighty-two accessions of 66 species have been evaluated. Maintenance on this site is good. The previous site was poorly drained causing lack of vigor in many species. Due to those site conditions, that study was terminated 12/31/95 and relocated to a more suitable site. The following accessions exhibit potential for further evaluation and use:

Accession Number	Genus/Species Origin/Source	Plot Location
ND-2103 PI-399414	European cranberrybush *Viburnum opulus* P.I. Station, Ames, IA USDA, NRCS, PMC, Bismarck, ND	II/07/1-5
PI-323957	black chokeberry *Photinia melanocarpa* P. I. Station, Ames, IA USDA, NRCS, PMC, Bismarck, ND	II/06/11-20
ND-21 9034900	nannyberry *Viburnum lentago* USDA, NRCS, PMC, Bismarck, ND Lincoln-Oakes Nursery, Bismarck, ND	III/05/1-9

Accession Number	Genus/Species Origin/Source	Plot Location
ND-428 9005970	black walnut *Juglans nigra* NDSU/USDA, NRCS, PMC, Bismarck, ND	IV/5/6-10
9063158	Scots pine *Pinus sylvestris* var. *mongolica* China NRCS, PMC, Bismarck, ND	I/5/1-5
9063126	Japanese elm *Ulmus japonica* PFRA, Indianhead, Saskatchewan, Canada NRCS, PMC, Bismarck, ND	IV/3/1-5
ND-3791 9030302	Norway spruce *Picea abies* U of MN, St. Paul, MN Grand Rapids, MN FEP	I/6/6-10
9063151	Dahurian larch *Larix olgensis* China NRCS, PMC, Bismarck, ND	II/6/1-5
9069170	English oak *Quercus robur* Russia USDA, ARS, Mandan, ND	IV/3/6-10
9058847	black spruce *Picea mariana* U of MN, Cloquet, MN Grand Rapids, MN OCEP	I/4/1-8
9063156	Scots pine *Pinus sylvestris* Russia, Altai region USDA, NRCS, PMC, Bismarck, ND	1/5/6-10
9069164	Scots pine *Pinus sylvestris* China USDA, NRCS, PMC, Bismarck, ND	1/7/6-10
9063143	red tatarian honeysuckle *Lonicera tatarica* Grand Rapids, MN OCEP	II/6/1-10

Accession Number	Genus/Species Origin/Source	Plot Location
9006094	wafer ash *Ptelea trifoliata* Lincoln-Oakes Nursery, Bismarck, ND	II/7/6-10
9063115	green ash *Fraxinus pennsylvanica* Itasca State Park, MN USDA, NRCS, PMC, Bismarck, ND	IV/2/6-10

Figure GR-1. Grand Rapids Woody Field Evaluation Planting – Plot Layout

Row	BLOCK I CONIFERS		BLOCK II SHRUBS		
12					
11					
10					
9	9019593 juniper	9082609 Meyer's spruce	winterberry|bittersweet|leadplant|gr dogwood|Freedom hnysuckle|r.l.hawthorn|ninebark		
8	9069162 Dahurian larch	9069163 Dahurian larch	cranberrybush/silky willow	Siberian dogwood | gray dogwood | nannyberry	
7	9069172 Scotch pine	9069164 Scotch pine	ND-2103 Euro.Cranberrybush	hazel hybrids|Bailey chokeberry	
6	9063151 Dahurian larch	ND-3791 Norway spruce	9063143 r.t.honeysuckle	323957 chokeberry	
5	9063158 scotch pine	9063156 scotch pine	ND-3902 sandbar willow	9019576 juneberry	
4	<----------9058847 black spruce ---------->		redleaf rose|rugosa rose	9076734 sea buckthorn	
3	9069168 Siberian larch	9082610 Siberian larch	ND-83 late lilac	9008041 false indigo	
2	open (too wet)	9082611 Siberian larch	Centennial cotoneaster	Indigo silky dogwood	
1	open (too wet)	9076718 Scotch pine	Arnolds Red | Regal Russian almond		

Row	BLOCK III MEDIUM TREES		BLOCK IV TALL TREES		
12					
11					
10					
9					
8		arrowwood|open			
7	9082631 Japanese birch	ND-624 wafer ash	9082639 N. pin oak	9092051 northern catalpa	open
6	9076737 black cherry	Shadblow svcbry|Sheridan chokeche	9082630 Norway maple	9082633 black ash	9092052 swamp white oak
5	<----------ND-21 nannyberry---------->		9057412 bur oak	9005970 black walnut	9082674 sugar maple
4	9076722 Euro. white birch	9047209 chokecherry	9076742 butternut	9076743 chestnut	9082667 gray birch
3	Midwest Manch. crabapple	9069129 amur chokecherry	9063126 Japanese elm	9069170 English oak	9082675 Manchurian ash
2	McDermand Ussurian pear	Magenta crabapple	9069177 bur oak	9063115 green ash	9082650 S. poplar
1	Homestead a. hawthorn	9082739 ironwood	Oahe hackberry	Cardan green ash	9082892 white poplar

revised 6/07

Table No. GR-1: 2007 Weather Summary - Official Station - Grand Rapids, Minnesota					
	Mean Temperature		Precipitation (inches)		
	(degrees Fahrenheit)		Actual		Deviation from Normal
Month	**2007**	**Normal***	**2007**	**Normal***	**2007**
January	14.0	6.4	0.17	1.01	-0.84
February	8.0	14.0	0.97	0.61	0.36
March	31.3	26.4	2.53	1.25	1.28
April	40.9	41.1	2.87	1.84	1.03
May	57.7	54.3	2.25	2.90	-0.65
June	66.8	62.9	3.15	4.60	-1.45
July	69.8	67.4	1.53	4.60	-3.07
August	65.7	65.0	1.60	3.70	-2.10
September	57.2	54.9	6.05	3.08	2.97
October	48.3	43.7	4.37	2.74	1.63
November	29.2	26.9	0.32	1.59	-1.27
December	12.0	12.1	1.69	0.86	0.83
Annual	**41.7**	**39.6**	**27.50**	**28.78**	**-1.28**
*National Climate Data Center 1971-2000 Monthly Normals					
M=missing data					
		2007			
Last Frost (32 degrees)		16-May			
First Frost (32 degrees)		12-Sep			
Frost Free Period		118			

Key to Table GR-2. 38I346K Field Evaluation of Woody Plant Materials – Grand Rapids, Minnesota

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 GR-2.
Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
I/1/6-10	9076718	PISYM	Scots pine	25-May	99	99	CONT	5	5	100	2	0.8	1.0	healthy plants, good bud set
			Pinus sylvestris var. *mongolica*			00			5	100	2	1.4	1.9	
			China			01			5	100	2	2.7	3.5	
			USDA, NRCS, PMC, Bismarck, ND			03			5	100	3	4.2	5.8	
						05			5	100	4	6.3	9.0	
I/2/6-10	9082611	LASI	Siberian larch	30-Apr	98	98	CONT(S)	5	5	100	3	0.4	1.0	
			Larix sibirica			99			4	80	4	0.8	1.4	needle tips brown
			NDFS, Towner, ND			00			3	60	5	1.1	2.0	
						02			3	60	4	2.3	3.6	
						04			3	60	4	2.9	7.4	
						07			3	60	2	5.1	9.8	
I/3/1-5	9069168	LASI	Siberian larch	30-Apr	98	98	CONT(P)	5	0	0				
			Larix sibirica			99			4	80	6	1.0	1.8	
			Russia			00			4	80	2	1.0	2.5	
			USDA, NRCS, PMC, Bismarck, ND			04			4	80	4	4.6	8.6	
						07			4	80	3	9.1	17.3	
I/3/6-9	9082610	LASI	Siberian larch	30-Apr	98	98	CONT(S)	4	4	100	3	0.6	1.4	
			Larix sibirica			99			4	100	4	1.2	1.8	
			NDFS, Towner, ND			00			4	80	2	1.8	2.9	
						02			4	80		4.2	5.6	
						04			4	80	3	6.1	9.7	
						07			4	80	3	9.5	16.7	
I/4/1-8	9058847	PIMA	black spruce	29-May	96	96	tree	8	8	100	4	3.1	5.8	
			Picea mariana			97	spade by		8	100	2	3.5	6.6	light seed production on all
			U of MN, Cloquet, MN			98	IRRRB		8	100	2	4.1	7.3	light cone production
			Grand Rapids, MN FEP			00			8	100	2	5.8	10.6	all have cones
						02			8	100	2	5.8	10.6	
						05			8	100	2	8.8	17.4	mod-heavy cones

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
I/5/1-5	9063158	PISYM	Scots pine	15-May	96	96	CONT(S)	5	5	100	3	0.6	0.8	
			Pinus sylvestris var. *mongolica*			97			5	100	1	1.1	1.4	
			China			98			5	100	1	1.7	2.3	
			USDA, NRCS, PMC, Bismarck, ND			00			5	100	2	4.3	5.1	
						02			5	100	2	4.3	5.1	
						05			5	100	2	10.2	14.7	
I/5/6-10	9063156	PISY	Scots pine	15-May	96	96	CONT(S)	5	5	100	3	0.7	0.8	
			Pinus sylvestris			97			5	100	2	1.1	1.3	
			Russia, Altai region			98			5	100	1	1.9	2.3	
			USDA, NRCS, PMC, Bismarck, ND			00			5	100	2	4.7	5.8	
						02			5	100	2	4.7	5.8	
						05			5	100	2	8.9	15.8	double stem 4,5
I/6/1-5	9063151	LAOL	Dahurian larch	15-May	96	96	PLBR	5	5	100	4	0.7	1.6	
			Larix olgensis			97			5	100	3	1.6	2.3	
			China			98			5	100	2	3.1	4.2	
			USDA, NRCS, PMC, Bismarck, ND			00			5	100	3	6.0	8.4	
						02			5	100	3	6.0	8.4	
						05			5	100	2	12.5	20.6	
I/6/6-10	ND-3791	PIAB	Norway spruce	29-May	96	96	tree	5	5	100	3	5.0	7.7	
	9030302		*Picea abies*			97	spade by		5	100	2	5.5	8.6	
			U of MN, St. Paul, MN			98	IRRRB		5	100	2	6.0	10.2	few cones
			Grand Rapids, MN FEP			00			5	100	2	8.9	15.3	
						02			5	100	2	8.9	15.3	
						05			5	100	2	14.4	21.9	
I/7/1-5	9069172	PISY	Scots pine	15-May	97	97	CONT(P)	5	5	100	3	0.5	0.6	
			Pinus sylvestris			98			5	100	3	1.0	1.3	
			Altai Region, Russia			99			5	100	3	1.9	2.2	
			USDA, NRCS, PMC, Bismarck, ND			01			5	100	3	4.0	6.1	
						03			5	100	3	6.8	9.6	
						05			5	100	2	11.2	13.8	

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
I/7/6-10	9069164	PISY	Scots pine	30-Apr	98	98	CONT(P)	5	5	100	3	0.6	1.1	
			Pinus sylvestris var. *mongolica*			99			5	100	3	1.5	1.9	
			China			00			5	100	3	2.7	3.3	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	3	5.2	6.3	
						05			5	100	2	9.3	12.3	few cones
						07			5	100	2	13.1	16.1	
I/8/1-5	9069162	LAOL	Dahurian larch	30-Apr	98	98	CONT(P)	5	4	80	3	1.7	2.3	
			Larix olgensis			99			5	100	3	2.0	2.7	
			China			00			5	100	3	2.8	4.4	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	3	5.6	8.2	
						04			5	100	3	8.7	13.5	dead leader 2,5
						07			5	100	2	12.7	21.2	
I/8/6-10	9069163	LAOL	Dahurian larch	30-Apr	98	98	CONT(P)	5	1	20	5	1.1	2.0	
			Larix olgensis			99			2	40	4	1.6	2.8	
			China			00			5	100	6	1.3	3.3	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	4	3.7	5.0	
						04			5	100	3	6.9	10.2	
						07			5	100	3	11.6	21.9	
I/9/1-5	9019593	JUCO6	common juniper	24-May	05	05		5	5	100	3	1.3	1.0	
			Juniperus communis			06			5	100	4	1.4	1.0	
			Wilton Mine site, Wilton, ND			07			5	100		1.1	0.9	
1/9/6-10	9082609	PICEA	Meyer spruce	18-May	01	01		5	5	100	3	0.9	0.9	
			Picea meyeri			02			5	100	6	1.0	1.0	
			Itasca Greenhouse, Cohasset, MN			03			5	100	3	1.2	1.4	
						05			5	100	2	2.5	2.3	
						07			5	100	3	4.0	4.3	
II/1/1-5	'Arnolds Red' 9069080	LOTA	red tatarian honeysuckle	15-May	96	96	CONT(P)	5	2	40	3	1.4	1.9	
			Lonicera tatarica			97			2	40	1	2.1	2.6	
			Lee Nursery, Fertile, MN			98			2	40	1	3.3	4.4	
			USDA, NRCS, PMC, Bismarck, ND			00			2	40	2	4.5	6.2	
						02			2	40	2	4.5	6.2	
						05			2	40	5	6.8	8.7	

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
II/1/6-20	'Regal'	PRTE	Russian almond	15-May	96	96	PLBR	15	15	100	4	0.7	1.7	
	9006079		*Prunus tenella*			97			15	100	4	0.9	1.5	pear slug on 7,12,14
	PI-540042		USDA, NRCS, PMC, Bismarck, ND			98			15	100	5	1.1	1.9	blight on 8
			Lincoln-Oakes Nursery, Bismarck, ND			00			15	100	5	2.8	2.5	lots of almonds on 12
						02			8	54	4	4.5	3.5	some plants are going out
						05			8	54	5	6.8	4.5	
II/2/1-10	'Centennial'	COIN16	European cotoneaster	15-May	96	96	PLBR	10	9	90	4	1.0	1.9	leaf wilt and spotty on 6
	PI-113095		*Cotoneaster integerrimus*			97			6	60	4	2.0	2.3	pear slug on all
	9005729		USDA, NRCS, PMC, Bismarck, ND			98			6	60	4	4.8	4.0	
			Lincoln-Oakes Nursery, Bismarck, ND			00			6	60	4	7.7	6.8	lots of fruit on 2-5,7
						02			7	70	2	11.5	8.0	heavy fruit
						05			5	50	3	12.2	8.9	good fruit
II/2/11-20	'Indigo'	COAM2	silky dogwood	15-May	96	96	PLBR	10	6	60	3	1.4	1.9	
			Cornus amomum			97			7	70	2	4.2	3.3	
			USDA, NRCS, PMC, Rose Lake, MI			98			7	70	2	7.4	5.1	
			Lincoln-Oakes Nursery, Bismarck, ND			00			7	70	1	11.1	8.0	heavy fruit on all
						02			7	70	2	13.5	10.0	excellent vigor
						05			7	70	2	14.0	11.8	good fruit, dense inrow suckering
II/3/1-10	'Legacy'	SYVI3	late lilac	15-May	96	96	PLBR	10	10	100	4	0.6	1.4	
	ND-83		*Syringa villosa*			97			10	100	4	0.7	1.2	
	PI-540443		USDA, NRCS, PMC, Bismarck, ND			98			10	100	4	1.6	2.1	chlorosis on all, caused
			Lincoln-Oakes Nursery, Bismarck, ND			00			10	100	5	4.1	4.3	by drainage
						02			10	100	4	7.0	6.8	variable height
						05			10	100		8.4	7.5	variable height, vigor
II/3/11-20	'Survivor Germplasm'	AMFR	false indigo	15-May	96	96	PLBR	10	10	100	3	1.5	2.6	3,4 chlorotic
	9008041		*Amorpha fruticosa*			97			10	100	3	2.6	2.6	
			USDA, NRCS, PMC, Aberdeen, ID			98			10	100	3	5.1	3.6	
			USDA, NRCS, PMC, Bismarck, ND			00			9	90	2	9.0	4.7	
			Lincoln-Oakes Nursery, Bismarck, ND			02			10	100	3	11.0	5.5	annual dieback/ good regrowth
						05			10	100	4	5.0	5.0	decline, winterkill, fair regrowth

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
II/4/1-5	9082685	RORU2	redleaf rose	18-May	01	01	PLBR	5	5	100	5	0.9	1.7	
			Rosa rubrifolia			02			5	100	4	1.2	2.2	1 not red
			Lincoln-Oakes Nursery, Bismarck, ND			03			5	100	5	1.6	2.8	
						05			4	80	4	3.5	4.5	dieback on 2
						07			3	60		3.0	3.8	
II/4/6-10	9057406	RORU	rugosa rose	18-May	01	01	PLBR	5	5	100	6	1.0	1.0	
			Rosa rugosa			02			4	80	4	1.6	1.9	
			Lincoln-Oakes Nursery, Bismarck, ND			03			4	80	4	2.0	2.2	
						05			4	80		4.5	3.4	4,5 winter dieback
						07			4	80		5.9	3.7	
II/4/11-20	9076734	HIRH80	seaberry	15-May	96	96	PLBR	10	10	100	4	0.6	1.1	
			Hippophae rhamnoides			97			10	100	4	0.9	1.4	
			Lincoln-Oakes Nursery, Bismarck, ND			98			10	100	5	1.4	2.1	
						00			10	100	3	4.0	4.4	
						02			9	90	2	8.5	8.3	good vigor, some short
						05			7	70	4	11.0	10.4	varied height
II/5/1-10	'Silver Sands Germplasm' ND-3902 9035212	SAIN3	sandbar willow	15-May	96	96	CONT(S)	10	9	90	3	3.1	3.5	
			Salix interior			97			10	100	1	5.2	4.5	leaf rust all, no suckering yet
			USDA, NRCS, PMC, Bismarck, ND			98			10	100	1	8.4	7.4	
						00			10	100	1	11.8	8.8	
						02			10	100	2	15.0	11.0	excellent vigor
						05			8	80	4	11.3	9.8	25% winterkill
II/5/11-20	9019576	AMAL2	juneberry	15-May	96	96	PLBR	10	9	90	3	1.0	1.2	
			Amelanchier alnifolia			97			10	100	2	1.6	1.7	
			Lincoln-Oakes Nursery, Bismarck, ND			98			10	100	3	3.0	2.2	powdery mildew on 5,6
						00			10	100	4	5.0	3.0	
						02			10	100	4	4.5	3.8	browsed
						05			10	100		7.0	4.4	average fruit, leaf rust on 20%

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
II/6/1-10	9063143	LOTA	red tatarian honeysuckle	29-May	96	96	hand	10	10	100	5	1.5	2.0	
			Lonicera tatarica			97	transplant		10	100	5	1.6	2.4	severe girdling by rabbits
			Grand Rapids FEP			98	from FEP		10	100	3	2.3	2.7	
						00			10	100	3	4.1	5.0	
						02			10	100	2	5.5	7.5	excellent vigor
						05			10	100	2	9.2	8.9	excellent vigor
II/6/11-20	PI-323957	PHME13	black chokeberry	29-May	96	96	tree	9	9	90	3	1.9	1.8	
			Photinia melanocarpa			97	spade		9	90	3	2.1	2.1	pear slug on 5-9
			PI Station, Ames, IA			98	by IRRRB		10	100	2	2.6	2.4	
			old FEP site, Grand Rapids, MN			00			9	90	2	4.1	3.7	
						02			8	95	1	7.2	4.5	excellent vigor
						05			8	95	3	7.3	6.7	
II/7/1-5	ND-2103	VIOP	European cranberrybush	29-May	96	96	tree	10	5	100	3	3.6	2.7	
			Viburnum opulus			97	spade		5	100	3	4.2	3.9	leaf spot on 3,4
			P.I. Station, Ames, IA			98	by IRRRB		5	100	1	2.4	2.4	leaf spot on all
			old FEP site, Grand Rapids, MN			00			5	100	2	5.9	6.0	
						02			5	100	5	5.8	6.2	2 dieback
						05			4	80	4	5.7	6.2	
II/7/11-20	10 new	CORYL	hazel hybrids	29-May	96	96	CONT	10	10	100	4	0.3	0.4	leaf damage on 6,7,8
	accessions		*Corylus*			97			10	100	4	0.7	1.2	
			Badgersett Research Farm, Canton, MN			98			10	100	4	1.8	2.1	
						00			10	100	3	4.0	4.2	
						02			10	100	4	5.6	5.1	variable heights
						05			10	100	5	5.8	6.7	
II/7/21-25	9091971	PHME13	black chokeberry	24-May	05	05		5						data missing
			Photinia melanocarpa			06			5	100	3	1.9	2.6	
			Bailey Nurseries, St. Paul, MN			07			5	100	3	1.8	2.5	
II/8/1-10	9082623	CARAG	Mongolian peashrub	25-May	99	99	PLBR	10	9	90	4	0.6	1.2	
			Caragana intermedia			00			10	100	4	0.9	1.5	
			Lawyer Nursery, Plains, MT			01			8	80	4	1.4	2.1	
						03			8	80	5	2.1	2.6	
						05			2	20		2.4	3.4	

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
II/8/1-5	9082747	VIOPA2	American cranberrybush	15-May	06	06	CONT	5	5	100	3	0.7	1.2	
			Viburnum opulus var. *americanum*			07			4	80	6	0.4	0.8	
			Bottineau Co., ND											
			USDA, NRCS, PMC, Bismarck, ND											
II/8/6-10	9069052	SALIX	silky willow	15-May	06	06		5	4	80	4	1.0	1.5	
	Riverbend germplasm		*Salix*			07			4	80	5	0.6	1.4	
			USDA, NRCS, PMC, East Lansing, MI											
II/8/11-15	9082664	COAL	Siberian dogwood	10-May	00	00	PLBR	5	5	100	3	0.7	2.5	
			Cornus alba 'sibirica'			01			5	100	3	3.7	2.5	
			Lawyer Nursery, Plains, MT			02			5	100		4.8	3.8	
						04			5	100	3	6.6	5.5	
						06			5	100	5	8.0	6.1	
ll/8/16-20	9082738	CORA6	gray dogwood			03	PLBR	5	5	100	3	1.1	1.8	
			Cornus racemosa			04			5	100		1.8	2.2	
			Wisconsin (Lawyer)			07			5	100	4	2.1	2.9	
			Lincoln-Oakes Nursery, Bismarck, ND											
II/8/16-20	9092141	VILE	nannyberry	May	07	07		5	5	100	3	0.3	1.7	
			Viburnum lentago											
			Schumacher's, Heron Lake, MN											
II/9/1-5	9082711	EUBU6	winterberrry euonymus		02	02	PBLR	5	5	100	4	1.0	2.6	
			Euonymus bungeanus			03			5	100	5	1.1	2.2	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	3	2.0	2.9	dieback 5
						06			5	100		3.4	3.9	
II/9/6-10	9082712	CESC	bittersweet		02	02	PLBR	5	5	100	2	1.0	1.4	
			Celastrus scandens			03			5	100	4	0.8	1.7	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	3	0.8	2.2	
						06			3	60		2.3	2.6	

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
ll/9/11-15	9082678	AMCA6	leadplant		02	02	PLBR	5	5	100	6	0.7	0.8	
			Amorpha canescens			03			4	80	5	0.7	1.1	
			Lincoln-Oakes Nursery, Bismarck, ND			04			4	80		0.8	1.3	
						06			4	80		1.7	2.1	
II/9/16-20	9082890	CORA6	gray dogwood		04	04	PLBR	5	5	100	3	0.8	1.9	
			Cornus racemosa			05			5	100	4	1.8	2.7	
			Big Sioux Nursery, Watertown, SD			06			5	100	4	1.6	2.4	
ll/9/21-25	'Freedom'	LOKO	honeysuckle		03	03	PLBR	5	4	80	3	2.2	2.5	
			Lonicera korolkowii			04			4	80		3.2	3.3	
			Lincoln-Oakes Nursery, Bismarck, ND			05			4	80	3	5.1	5.4	
II/9/26-30	9076686	CRCH	roundleaf hawthorn	25-May	04	04	PLBR	5	2	40	4	0.4	1.1	
			Crataegus chrysocarpa			05			3	60	5	0.9	1.8	
			Lincoln-Oakes Nursery, Bismarck, ND			06			5	100	5	1.1	1.7	
II/9/31-35	9082891	PHOP	common ninebark	25-May	04	04	PLBR	4	4	100		0.7	1.9	
			Physocarpus opulifolius			05			4	100			3.8	
			Big Sioux Nursery, Watertown, SD			06			4	100	2.6	5.9	5.0	
III/1/1-5	'Homestead'	CRAN6	arnold hawthorn	15-May	96	96	PLBR	5	5	100	3	1.0	1.6	
	PI-503530		*Crataegus X anomala*			97			5	100	3	1.6	2.3	pear slug 1,2,5
			NRCS, PMC, Bismarck, ND			98			5	100	3	2.8	4.1	
			Lincoln-Oakes Nursery, Bismarck, ND			00			5	100	2	5.8	8.7	
						02			5	100	2	9.0	11.0	very nice fruit on all, no apple rust
						05			5	100	2	10.0	14.5	
III/1/6-10	9069165	BEPE	European birch	30-Apr	98	98	CONT(P)	5	0	0				
			Betula pendula			99			5	100	3	1.0	1.6	
			Russia			00			5	100	3	3.2	4.7	
						02			5	100	3	8.0	12.5	brown leaves on 5
						04			5	100	3	11.3	15.0	
						06			0	0				removed

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
III/1/6-10	9082739	OSVI	ironwood	May	07	07		5	5	100	3	0.4	1.3	3,5 browsed
			Ostrya virginiana											
			Sertoma Park, Bismarck, ND											
			USDA, NRCS, PMC, Bismarck, ND											
III/2/1-5	'McDermand'	PYUS2	Ussurian pear	15-May	96	96	PLBR	5	5	100	3	1.2	2.4	leaf miner on 5
	PI-478004		*Pyrus ussuriensis*			97			5	100	3	1.8	3.2	
			USDA, NRCS, PMC, Bismarck, ND			98			5	100	3	3.2	5.2	
			Lincoln-Oakes Nursery, Bismarck, ND			00			5	100	3	7.0	9.8	
						02			5	100	3	9.5	12.3	no fruit on 2
						05			5	100	2	15.0	19.4	
III/2/6-10	'Magenta'	MABA	hybrid crabapple	15-May	96	96	PLBR	5	5	100	4	0.9	1.9	
			Malus sp.			97			5	100	3	1.8	2.5	
			USDA, NRCS, PMC, East Lansing, MI			98			5	100	4	3.1	3.7	
						00			5	100	4	6.0	6.7	
						02			5	100	4	8.0	9.1	1 heavy fruit, 3 poor, 4 blue fruit
						05			5	100	5	9.6	12.9	5 half dead
III/3/1-5	'Midwest'	MAMA37	Manchurian crabapple	15-May	96	96	PLBR	5	5	100	4	1.4	2.3	
	PI-478000		*Malus mandshurica*			97			5	100	1	3.1	3.4	
			USDA, NRCS, PMC, Bismarck, ND			98			5	100	2	5.2	5.5	
			Lincoln-Oakes Nursery, Bismarck, ND			00			5	100	3	10.1	10.1	
						02			5	100	3	13.7	14.2	1 broke main stem, 3 v. good fruit
						05			5	100	3	12.8	16.3	
III/3/6-10	9069129	PRMA9	amur chokecherry	15-May	96	96	CONT(P)	5	5	100	3	2.5	3.4	mech. damage on 4
			Prunus maackii			97			5	100	2	3.2	4.0	
			Big Sioux Nursery, Watertown, SD			98			5	100	3	4.4	6.1	
						00			5	100	3	7.5	9.6	
						02			5	100	3	11.9	13.8	4- nice form
						05			5	100	2	12.4	18.8	clean leaves, no disease

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
III/4/1-5	9076722	BEPE3	European white birch	15-May	96	96	PLBR	5	5	100	4	2.5	3.6	leaf miner on 3
			Betula pendula			97			5	100	3	4.0	5.0	
			USDA, ARS, Mandan, ND			98			5	100	2	7.0	7.8	
						00			5	100	3	12.2	13.3	
						02			5	100	3	15.0	17.7	
						05			5	100	5	12.4	22.5	dead tops on 3 and 4
III/4/6-10	9047209	PRVI	chokecherry	15-May	96	96	PLBR	5	5	100	5	0.9	1.9	
			Prunus virginiana			97			5	100	3	1.5	2.4	shot hole on 1
			Lincoln-Oakes Nursery, Bismarck, ND			98			5	100	4	2.7	4.0	2 suckering
						00			5	100	5	4.9	6.7	shot hole on 1, blackknot on 3
						02			5	100	4	8.6	10.2	1&3 leaf dmg; 2,3,4,5 blackknot
						05			4	80	6	8.5	14.8	blackknot & shot hole disease
III/5/1-9	ND-21	VILE	nannyberry	29-May	96	96	tree	9	9	100	4	3.0	5.3	leaf rust on 2
	9034900		*Viburnum lentago*			97	spade by		9	100	4	3.4	5.2	mod-severe leaf rust on all
			USDA, NRCS, PMC, Bismarck, ND			98	IRRRB		9	100	3	3.6	5.2	
			Grand Rapids, MN FEP			00			9	100	4	4.5	5.8	
						02			8	89	4	5.4	6.1	fruit on 1
						05			8	89	4	5.4	8.1	powder mildew on 3 & 4
III/6/1-5	9076737	PRSE2	black cherry	15-May	97	97	PLBR	5	5	100	3	0.9	1.5	
			Prunus serotina			98			5	100	4	2.7	3.5	
			Apple Valley FEP			99			5	100	4	3.9	4.8	leaf spot
			Lincoln-Oakes Nursery, Bismarck, ND			01			5	100	4	6.4	7.5	
						03			5	100	3	8.0	11.3	
						07			5	100	3	12.7	15.8	
III/6/6-10	9091975	AMELA	serviceberry	24-May	05	05		5	5	100	3	0.9	2.3	1 browsed
			Amelanchier lamarckii			06			5	100	4	10.5	14.4	
			Lincoln-Oakes Nursery, Bismarck, ND			07			5	100	5	1.3	2.8	all podery mildew; 4 brown leaves
III/6/11-15	9008183	PRVI	common chokecherry	24-May	05	05		5	5	100	3	1.0	2.5	
			Prunus virginiana			06			5	100	3	1.0	2.8	
			Lincoln-Oakes Nursery,Bismarck, ND			07			5	100	4	1.2	4.1	black knot on 2,4

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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III/7/1-5	9082631	BEPLJ	Japanese birch	25-May	99	99	PLBR	5	4	80	2	1.1	3.0	
			Betula platyphylla var. *japonica*			00			5	100	3	3.2	5.0	
			USDA, NRCS, PMC, Bismarck, ND			01			5	100	2	6.5	8.0	
						03			3	100	3	10.6	17.2	
						05			5	100	1	12.2	19.2	no disease
III/7/6-10	9006094	PTTR	wafer ash	25-May	99	99	PLBR	5	5	100	2	1.1	2.0	very healthy, glossy leaves
	ND-624		*Ptelea trifoliata*			00			5	100	2	1.9	2.5	
			Lincoln-Oakes Nursery, Bismarck, ND			01			5	100	3	4.3	4.1	
						03			5	100	3	7.0	5.8	
						05			4	80	3	7.0	7.5	no disease
III/8/6-10	9091976	VIDE	arrowwood viburnum	24-May	05	05		5	3	60	3	1.0	1.9	Two are dead with leaves on
			Viburnum dentatum			06			5	100	8	0.3	1.8	
			Lincoln-Oakes Nursery, Bismarck, ND			07			2	40	8	0.3	0.5	
IV/1/1-5	'Oahe'	CEOC	hackberry	15-May	96	96	PLBR	5	5	100	4	1.1	2.4	
	PI-476982		*Celtis occidentalis*			97			5	100	3	1.6	2.4	
			NRCS, PMC, Bismarck, ND			98			5	100	4	3.1	3.9	
			Lincoln-Oakes Nursery, Bismarck, ND			00			5	100	4	5.6	7.4	
						02			5	100	3	8.2	11.6	1 very nice tree; 2,3,5 leaf
						05			5	100	3	8.6	14.8	high variation
IV/1/6-10	'Cardan'	FRPE	green ash	15-May	96	96	PLBR	5	5	100	3	1.1	2.1	spot; 3 dead leaf tips
			Fraxinus pennsylvanica			97			5	100	2	1.9	3.4	
			NRCS, PMC, Bismarck, ND			98			5	100	4	3.9	5.3	
			Lincoln-Oakes Nursery, Bismarck, ND			00			5	100	3	8.9	10.2	
						02			5	100	3	13.5	15.3	slight defoliation on all
						05			5	100	3	11.2	21.2	
IV/1/11/15	9082892	POAL7	white poplar	25-May	04	04	PLBR	5	5	100	5	0.6	1.9	
			Populus alba			05			5	100	4	2.1	4.2	
			Big Sioux Nursery, Watertown, SD			06			5	100	5	4.8	7.4	

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
IV/2/1-5	9069177	QUMA2	bur oak	30-Apr	98	98	CONT(P)	5	5	100	6	0.6	0.8	
			Quercus macrocarpa			99			4	80	6	1.5	2.0	
			E.T. Jacobson, MN			00			5	100	5	1.9	2.5	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	6	3.7	4.3	remove per Mike O.
						04			5	100	6	4.3	6.3	
						07			5	100	4	7.0	9.3	
IV/2/6-10	9063115	FRPE	green ash	15-May	96	96	CONT(P)	5	5	100	5	0.7	1.4	
			Fraxinus pennsylvanica			97			5	100	3	0.9	2.3	
			Itasca State Park, MN			98			5	100	4	3.4	4.3	
			USDA, NRCS, PMC, Bismarck, ND			00			5	100	2	7.1	10.9	
						02			5	100	2	11.7	15.8	
						05			5	100	2	12.4	22.5	
IV/2/11-15	9082650	POPUL	Soongarica poplar	10-May	00	00	CONT	5	5	100	3	1.4	3.5	
			Populus			01			5	100	3	5.2	7.8	5 blew over, roots curled
			Valley Nursery, Helena, MT			02			5	100	2	8.5	12.7	
						05			5	100	3		28.1	
						06			5	100	3	12.9	31.7	3 top missing
IV/3/1-5	9063126	ULJA	Japanese elm	15-May	96	96	CONT(P)	5	5	100	3	3.0	3.0	
			Ulmus japonica			97			5	100	2	4.7	4.5	
			PFRA, Indianhead, Saskatchewan, Canada			98			5	100	2	7.7	6.3	
			USDA, NRCS, PMC, Bismarck, ND			00			5	100	2	12.5	11.8	
						02			5	100	2	15.5	14.5	
						05			5	100	2	20.0	20.1	
IV/3/6-10	9069170	QURO2	English oak	15-May	96	96	PLBR	5	5	100	4	0.7	0.9	
			Quercus robur			97			5	100	3	1.2	1.5	deer browse on 1,3,4,5
			Russia			98			5	100	3	3.6	3.6	
			USDA, ARS, Mandan, ND			00			5	100	3	8.1	10.4	
						02			5	100	2	10.6	15.2	
						05			5	100	2	14.2	20.7	

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
IV/3/11-15	9082675	FRMA5	Manchurian ash	10-May	00	00	PLBR	5	5	100		0.7	2.1	
			Fraxinus mandshurica			01			4	80	4	1.5	2.4	
			Lincoln-Oakes Nursery, Bismarck, ND			02			4	80	4	1.5	2.4	leaf spots on 3
						04			4	80	3	2.4	7.5	leaf wilt on 3, double leader 4,5
						06			4	80	4	4.9	11.4	
IV/4/1-5	9076742	JUCI	butternut	29-May	96	96	CONT	5	4	80	5	0.8	1.6	
			Juglans cinerea			97			3	60	3	0.7	1.7	
			Aitkin Co., MN			98			4	80	4	2.4	1.9	
			Itasca Greenhouse, Cohasset, MN			00			4	80	5	4.2	3.9	
						02			4	80	4	6.9	6.6	
						05			4	80	4	10.2	11.8	
IV/4/6-10	9076743	CADE12	chestnut	29-May	96	96	CONT	5	2	40	3	1.0	1.5	
			Castanea dentata			97			2	40	3	0.7	1.8	
			Itasca Greenhouse, Cohasset, MN			98			2	40	3	1.7	2.2	
						00			2	40	4	3.3	4.2	
						02			2	40	4	5.2	6.2	
						05			2	40	7	4.5	9.4	struggling
IV/4/11-15	9082667	BEPO	gray birch	10-May	00	00		5	5	100	4	1.2	3.2	
			Betula populifera			01			4	80	4	3.4	4.5	
			Lawyer Nursery, Plains, MT			02			4	80	4	3.4	4.5	
						04			4	80	4	8.1	12.3	
						06			4	80	2	11.6	18.3	
IV/5/1-5	9057412	QUMA2	bur oak	29-May	96	96	tree	4	4	100	4	2.0	2.5	
			Quercus macrocarpa			97	spade by		4	100	3	2.4	3.3	
			Foster Co., ND			98	IRRRB		4	100	3	5.2	5.3	
			USDA, NRCS, PMC, Bismarck, ND			00			4	100	3	8.0	7.9	
						02			4	100	3	9.6	10.2	
						05			4	100	4	10.2	13.6	

Project No.: 38I346K Field Evaluation of Woody Plant Materials, Grand Rapids, Minnesota
Year of Record: 2007

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
IV/5/6-10	9005970	JUNI	black walnut	29-May	96	96	tree	5	5	100	5	2.8	2.9	
			Juglans nigra			97	spade by		5	100	2	1.7	2.6	
			NDSU			98	IRRRB		5	100	3	5.3	4.4	
			USDA, NRCS, PMC, Bismarck, ND			00			5	100	3	7.3	6.6	
						02			5	100	3	8.6	8.8	
						05			5	100	4	8.2	12.3	
IV/5/11-15	9082674	ACSA3	sugar maple	10-May	00	00	PLBR	5	5	100	3	1.0	1.8	
			Acer saccharum			01			2	40	5	1.5	1.8	
			Polk Co., MN			02			5	100	6	1.4	2.0	
			Lincoln-Oakes Nursery, Bismarck, ND			04			4	80	4	1.8	4.3	
						06			3	60	5	3.4	7.2	
IV/6/1-5	9082630	ACPL	Norway maple	25-May	99	99	PLBR	5	5	100	5	0.4	1.4	leaf rust
			Acer platanoides			00			5	100	5	0.6	1.4	
			Lawyer Nursery, Plains, MT			01			5	100	5	1.2	1.6	
						03			5	100	5	1.4	1.6	
						05			5	100	6	2.8	3.1	
IV/6/5-10	9082633	FRNI	black ash	25-May	99	99	PLBR	5	5	100	6	0.5	1.0	
			Fraxinus nigra			00			5	100	5	0.8	1.3	
			Lawyer Nursery, Plains, MT			01			4	80	4	1.4	2.0	
						03			4	80	3	2.3	3.1	
						05			4	80 ?		3.3	5.8	
IV/6/11-15	9092052	QUBI	swamp white oak	15-May	06	06	PLBR	5	5	100	3	0.8	1.4	
			Quercus bicolor			07			4	80	5	0.5	1.1	
			Lincoln-Oakes Nursery, Bismarck, ND											
IV/7/6-10	9092051	CASP8	northern catalpa	15-May	06	06	PLBR	5	5	100		0.6	0.8	
			Catalpa speciosa			07			5	100	6	0.3	0.7	
			Big Sioux Nursery, Watertown, SD											

OFF-CENTER EVALUATION PLANTINGS: TECHNICAL REPORT – 2007

Study 38I347K University of Minnesota, Sand Plain Experimental Research Farm, Becker, Minnesota.

Study Title: Field Evaluation of Woody Plant Materials.

Introduction: There is a need to evaluate the performance of shrub and tree species/cultivars for windbreaks, wildlife, and recreational plantings under diverse soil and climatic conditions. To meet this need, field evaluation planting sites representative of the major land resource areas are located in the three states served by the PMC. These sites provide planting locations under long-term land tenure for assemblies of trees and shrubs to be evaluated under uniform culture and management. New material can be added on an annual basis. Comparisons are made with previously released cultivars and area of adaptation determined.

Objective: The objective is to assemble and evaluate woody plant materials for conservation use. Superior cultivars will be selected and released for increase by commercial nurseries.

Cooperators: The USDA Natural Resources Conservation Service, Plant Materials Center, Bismarck, North Dakota, in cooperation with the University of Minnesota, Sand Plain Experimental Research Farm, Becker, Minnesota. Expires August 9, 2010, unless agreement is extended.

Location: University of Minnesota, Sand Plain Experimental Research Farm, Becker, Minnesota. Legal Description: NW 1/4 SW 1/4 sec. 31, T. 34 N., R. 28 W.

Major Land Resource Area: This site is located in Major Land Resource Area 91, Wisconsin and Minnesota Sandy Outwash. About 90 percent of this area is in farms. The area is nearly level, with elevations averaging around 980 feet above sea level.

Soils: The soils at this site are a Hubbard-Mosford complex. Hubbard is formed from leached coarse and medium sand outwash. Drought and wind erosion are major management problems. Hubbard and Mosford soils are in Conservation Tree/Shrub Suitability Group 7.

Climate: The average annual precipitation for Sherburne County is 26 to 30 inches. The average annual temperature is 40 to 45 degrees F, with an average freeze-free period of 135 days. The plant hardiness zone for this site is 3, with an average annual minimum temperature of -30 to -40 degrees F. Climatic data for 2007 at the nearest official weather station, Becker, Minnesota, is shown in Table BE-1.

Methods and Materials

Assembly: Refer to Table BE-2 for a list of woody species planted from 1998 to 2007.

Planting Plan: The plots are not randomized or replicated but organized systematically for evaluation and demonstration purposes (Figure BE-1). The site is divided into four blocks (refer to Figure BE-2). Block 1 is planted to shrubs, Block 2 to medium trees, Block 3 to tall trees, and Block 4 to conifers. Each block is arranged into single row, non-replicated plots. Each plot contains 1 to 10 plants. Spacing is 20 feet between rows and 5 feet within row for shrubs and 10 feet within row for trees. Row length is 100 feet. Like species and standards of comparison are planted in adjacent plots whenever possible.

Plot Preparation: A clean, firm planting site was prepared by roto-tilling.

Planting Method: All trees and shrubs were hand planted using approved forestry methods.

Planting Date: Refer to Table BE-2 for planting dates of woody species planted from 1998 to 2007.

Fertilization: No fertilizer has been applied to the planting area.

Weed Control: Mechanical weed control, rotary mowing between row, and rototilling and hand hoeing in row.

Biological Control: No insecticides have been applied. There has been very minor deer browse damage.

Irrigation: Trees have been hand watered at time of planting.

Crop Residue Management: On May 20, 2003, Block I (shrubs) was seeded to a cover of 50 percent Bad River blue grama and 50 percent Pierre sideoats grama.

Silvicultural Practices: Minor pruning has been done each year to remove dead or damaged branches.

Evaluations and Measurements: Plant performance data is recorded during the growing season for three years. After the third year, data is gathered according to a specific schedule. The trees and shrubs were evaluated for survival, canopy width, plant height, vigor, insect and disease, and animal damage. Select data appears in this report. Annual summary reports have been prepared since 2006 and can be requested from the PMC.

Results

Plant Performance: One hundred and seven accessions of 87 species are being evaluated. Maintenance on this site is excellent. The following accessions exhibit potential for further evaluation and use.

Accession Number	Genus/Species Origin/Source	Plot Location
'Schubert'	chokecherry *Prunus virginiana* Lincoln-Oakes Nursery, Bismarck, ND	II/1/6-10
9069164	Scots pine *Pinus sylvestris* var. *mongolica* China USDA, NRCS, PMC, Bismarck, ND	IV/3/6-10
9069162	Dahurian larch *Larix olgensis* China USDA, NRCS, PMC, Bismarck, ND	IV/2/6-10
323957	black chokeberry *Photina melanocarpa* Lincoln-Oakes Nursery, Bismarck, ND	IA/3/1-5
ND-170	European cotoneaster *Cotoneaster integerrimus* USDA, NRCS, PMC, Bismarck, ND Lincoln-Oakes Nursery, Bismarck, ND	I/5/11-20
9082667	gray birch *Betula populifera* Lawyer Nursery, Plains, MT	II/9/1-5

Figure BE-1.

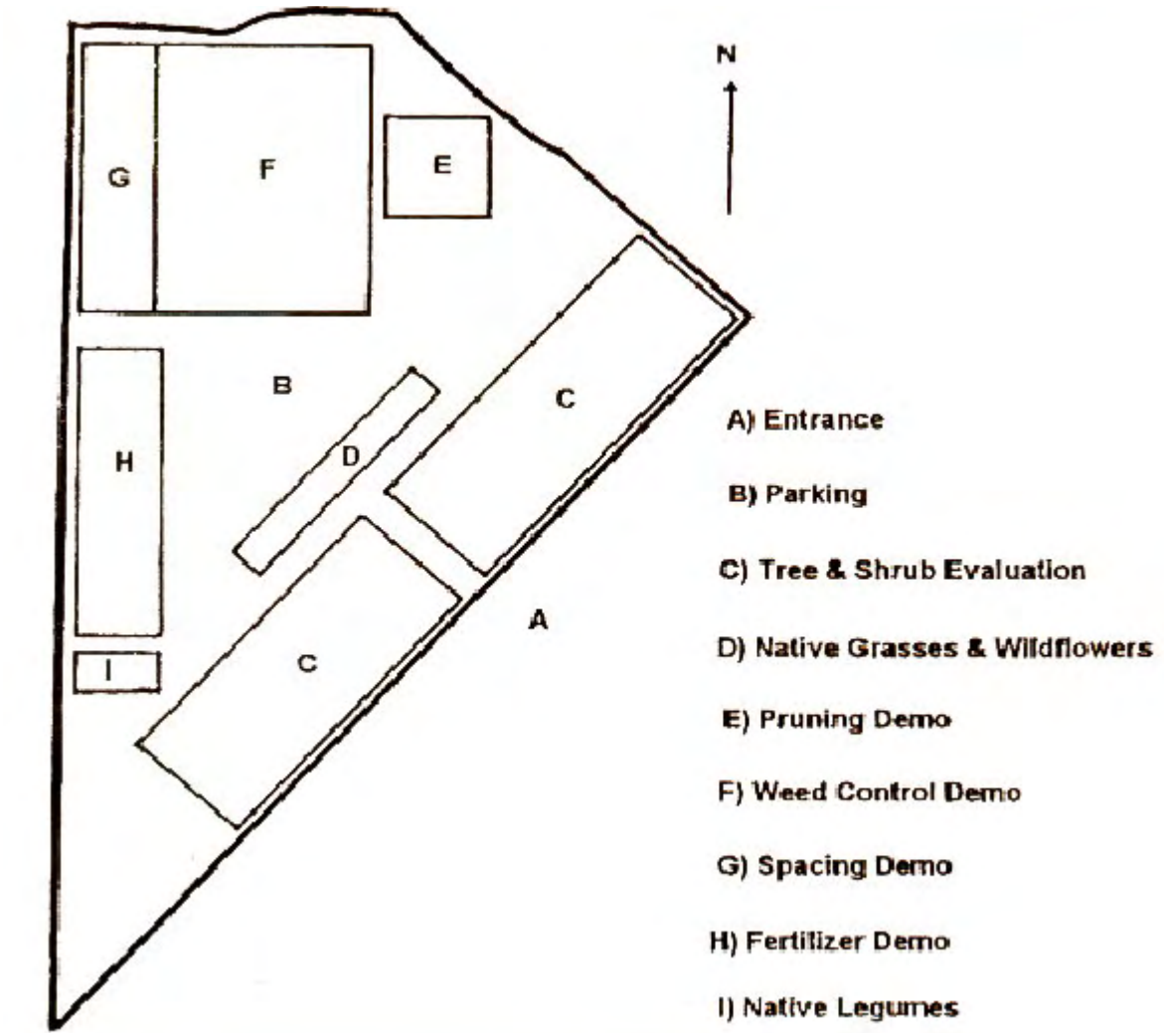
N
G
F
E
B
C
H
D
A
C
I
A) Entrance
B) Parking
C) Tree & Shrub Evaluation
D) Native Grasses & Wildflowers
E) Pruning Demo
F) Weed Control Demo
G) Spacing Demo
H) Fertilizer Demo
I) Native Legumes

Figure BE-2. Becker Woody Field Evaluation Planting – Plot Layout

Row	BLOCK IV CONIFERS			
5				
4	9069172 Scotch pine	Canaan fir		
3	9069163 Dahurian larch	9069164 Scotch pine		
2	9069168 Siberian larch	9069162 Dahurian larch		
1	9082610 Siberian larch	9082611 Siberian larch		
Row	**BLOCK III TALL TREES**			
14	9082739 ironwood	Korean Mtn. ash		
13	9082639 northern pin oak	cedar		
12	9082886 aspen (LON)	Scotch pine		
11	ND-686 Pekin lilac	9076725 smoothbark elm		
10	9082885 aspen (Towner)	9082633 black ash		
9	9082609 Meyer's spruce	9076722 E. white birch		
8	9076735 Ohio buckeye	9076737 black cherry		
7	9069178 red pine	9076731 bur oak		
6	Hunter ponderosa pine	9063148 amur corktree		
5	9063127 white ash	9076730 silver maple		
4	9063115 green ash	9063116 black ash		
3	Cardan green ash	9019586 green ash		
2	Oahe hackberry	9019578 hackberry		
1	9076739 oak hybrid	9069177 bur oak		
Row	**BLOCK II MEDIUM TALL TREES**			
9	9082667 gray birch	9092051 northern catalpa		
8	9092052 swamp white oak	9082675 Manchurian ash		
7	9069129 amur chokecherry	9082666 black birch		
6	Homestead arnold hawthorn	9069121 mayday		
5	McDermand Ussurian pear	9076733 nannyberry		
4	ND614 Kentucky coffeetree	9092055 Am. chestnut		
3	9047209 chokecherry	ND-1733 plum		
2	9030971 amur maple	Schubert chokecherry		
1	Roselow sarg. crabapple	Midwest Manch. crabapple	**BLOCK 1A SHRUBS**	
Row	**BLOCK I SHRUBS**		apricot|Caragana frutex|skunkbush sumac|	
10	ND-83 late lilac	9019621 lilac	TigerEyes sumac | nannyberry | MO hazelnut | MO plum	
9	Scarlet Mongolian cherry	9019579 Sib. pea shrub	com. ninebark|Am. hazelnut|ND-1134 plum|staghorn sumac	
8	Konza aromatic sumac	Regal Russian almond	mugo pine|seaberry|wayfaring bush|roundleaf hawthorn	
7	9019576 juneberry	Shadblow svcbry|arrowwood	pr. rose|M. gooseberry	pin cherry|b.l. honeysuckle
6	9019581 Pekin cotoneaster	9019605 sand cherry	leadplant|chokeberry	chokecherry|Red River pr.cordgr.
5	Centennial E. cotoneaster	ND-170 Euro. cotoneaster	Nero chokbry|Viking ch.	winterberry E.| bittersweet
4			redleaf rose|rugosa rose	black currant|cupplant
3	9076729 gray dogwood		chokeberry|Sib.dogwood	slough sedge | sweetgrass
2	9019580 redosier dogwood	Indigo silky dogwood	9008041 false indigo	9082632 Mong. pea shrub
1	Arnolds Red honeysuckle	9063143 r.t. honeysuckle	9019611 golden currant	ND-3902 sandbar willow

revised 6/07

Table No. BE-1: 2007 Weather Summary - Official Station - Elk River, Minnesota					
	Mean Temperature		Precipitation (inches)		
	(degrees Fahrenheit)		Actual		Deviation from Normal
Month	**2007**	**Normal****	**2007**	**Normal***	**2007**
January	M	11.1	1.91	0.86	1.05
February	M	18.6	1.22	0.69	0.53
March	34.2	30.5	2.47	1.75	0.72
April	44.8	45.6	3.28	2.49	0.79
May	61.8	58.7	1.80	3.45	-1.65
June	71.8	66.7	2.11	4.51	-2.40
July	74.6	71.1	2.61	4.22	-1.61
August	70.2	68.7	4.14	4.26	-0.12
September	62.0	59.5	4.09	3.14	0.95
October	52.3	47.8	6.43	2.21	4.22
November	33.6	30.9	0.02	1.89	-1.87
December	14.6	16.8	1.49	0.83	0.66
Annual	**M**	**43.8**	**31.57**	**30.30**	**1.27**
*National Climate Data Center 1971-2000 Monthly Normals					
**Mean Temperature normal is not available for Elk River, nearby Santiago normal is shown					
M=missing data					
		2007			
Last Frost (32 degrees)		15-Apr			
First Frost (32 degrees)		28-Oct			

Key to Table BE-2. 38I347K Field Evaluation of Woody Plant Materials – Becker, Minnesota

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 BE-2.
Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
I/1/1-10	'Arnolds Red'	LOTA	red tatarian honeysuckle	1-May	96	96	CONT(P)	10	10	100	4	2.0	2.1	
	9069080		*Lonicera tatarica*			97			10	100	5	1.8	2.1	
			Lee Nursery, Fertile, MN			98			10	100	2	2.6	4.1	
			USDA, NRCS, PMC, Bismarck, ND			00			10	100	4	4.4	5.3	
						02			10	100	3	4.8	6.1	All fair fruit; yellow leaf tips
						05			10	100	4	5.0	7.3	
I/1/11-20	'Hawkeye'	LOTA	red tatarian honeysuckle	1-May	96	96	CONT(P)	10	10	100	3	1.7	1.9	
	9063143		*Lonicera tatarica*			97			10	100	4	1.5	2.4	
			Iowa			98			10	100	2	2.2	3.0	
			Lincoln-Oakes Nursery, Bismarck, ND			00			10	100	2	5.1	5.2	
			USDA, NRCS, PMC, Bismarck, ND			02			10	100	2	5.8	6.5	
						05			10	100	3	6.7	7.7	good vigor
I/2/1-10	9019580	COST	redosier dogwood	1-May	96	96	PLBR	10	10	100	3	1.2	2.5	browse on 3,4
			Cornus stolonifera			97			9	90	2	2.6	3.0	
			Lincoln-Oakes Nursery, Bismarck, ND			98			9	90	2	5.1	4.0	
						00			9	90		8.4	5.8	
						02			10	100	1	7.7	5.6	some leaf rust throughout all
						05			9	90	3	9.0	6.9	
I/2/11-20	'Indigo'	COAM	silky dogwood	1-May	96	96	PLBR	10	10	100	4	1.7	2.1	
	468117		*Cornus amomum*			97			9	90	2	3.2	2.9	
			USDA, NRCS, PMC, E. Lansing, MI			98			9	90	1	7.2	4.8	
						00			9	90	2	9.6	6.4	
						02			9	90	3	9.8	7.3	
						05			10	100	5	10.5	7.3	dieback on 1,2; resprout on 4
I/3/1-10	9076729	CORA	gray dogwood	1-May	96	96	PLBR	10	10	100	3	1.4	1.9	browse on 2,3
			Cornus racemosa			97			10	100	3	2.2	2.8	
			Lincoln-Oakes Nursery, Bismarck, ND			98			10	100	2	5.4	4.9	
						00			10	100	2	7.8	6.5	
						02			10	100	2	8.0	7.4	
						05			10	100	4	7.0	7.5	

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
I/3/11-20	'Sakakawea'	SHAR	silver buffaloberry	1-May	96	96	PLBR	10	10	100	3	0.7	1.7	
	478005		*Shepherdia argentea*			97			9	90	5	0.9	2.0	
			USDA, NRCS, PMC, Bismarck, ND			98			9	90	4	2.1	3.0	
			Lincoln-Oakes Nursery, Bismarck, ND			00			9	90	4	4.7	4.9	
						02			9	90	3	5.4	5.6	
						05			7	70	6	6.0	5.4	poor vigor
						07			0	0				not adapted
I/4/1-10	9019618	SHAR	silver buffaloberry	1-May	96	96	PLBR	10	10	100	3	1.0	1.6	
			Shepherdia argentea			97			10	100	6	1.0	2.0	
			North Dakota			98			10	100	4	2.3	2.7	top kill on 2
			Lincoln-Oakes Nursery, Bismarck, ND			00			10	100	4	4.6	4.2	
						02			10	100	3	5.7	5.0	
						05			10	100	7	5.0	4.5	1 is mostly dead
						07			0	0				not adapted
I/4/11-20	9063123	SHAR	silver buffaloberry	1-May	96	96	PLBR	10	10	100	4	1.0	1.6	
			Shepherdia argentea			97			10	100	5	1.1	1.9	chlorosis on 10
			USDA, NRCS, PMC, Bismarck, ND			98			10	100	4	2.6	3.1	
			Lincoln-Oakes Nursery, Bismarck, ND			00			10	100	3	5.8	5.4	
						02			9	90	3	6.6	5.9	
						05			8	80	6	5.5	4.9	
						07			0	0				not adapted
I/5/1-10	'Centennial'	COIN16	European cotoneaster	1-May	96	96	PLBR	10	10	100	5	1.6	1.6	browse on 7
	113095		*Cotoneaster intergerrimus*			97			9	90	4	1.6	1.6	some dieback on 2,7
	9005729		USDA, NRCS, PMC, Bismarck, ND			98			9	90	4	4.0	3.9	
			Lincoln-Oakes Nursery, Bismarck, ND			00			9	90	3	8.5	5.2	
						02			9	90	3	8.6	6.0	
						05			10	100	2	9.5	5.5	excellent fruit
I/5/11-20	ND-170	COIN16	European cotoneaster	1-May	96	96	PLBR	10	10	100	3	1.8	2.0	
	9005728		*Cotoneaster intergerrimus*			97			10	100	5	2.1	2.0	leaf spots
			USDA, NRCS, PMC, Bismarck, ND			98			10	100	4	3.7	2.9	
			Lincoln-Oakes Nursery, Bismarck, ND			00			10	100	2	7.3	4.1	
						02			10	100	2	7.2	4.5	
						05			10	100	3	6.3	4.5	

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
I/6/1-10	9019581	COAC	Pekin cotoneaster	1-May	96	96	PLBR	10	10	100	5	1.0	1.6	
			Cotoneaster acutifolia			97			10	100	3	1.7	2.2	dieback
			Lincoln-Oakes Nursery, Bismarck, ND			98			10	100	3	3.9	3.6	
						00			10	100	3	6.3	4.9	
						02			10	100	3	6.9	5.6	
						05			10	100	5	6.5	5.5	fireblight on 6,7
I/6/11-20	9019605	PRBE	sand cherry	1-May	96	96	PLBR	10	10	100	3	1.8	2.4	
			Prunus besseyi			97			10	100	3	4.2	2.7	powdery mildew on 2,4,7,9
			Lincoln-Oakes Nursery, Bismarck, ND			98			10	100	4	5.9	2.9	fungus
						00			10	100	3	8.5	3.6	
						02			10	100	3	7.9	3.9	
						05			10	100	3	9.0	4.1	highly variable
I/7/1-10	9019576	AMAL	juneberry	1-May	96	96	PLBR	10	10	100	5	1.0	1.0	
			Amelanchier alnifolia			97			10	100	5	1.4	1.3	
			Lincoln-Oakes Nursery, Bismarck, ND			98			10	100	4	1.7	1.7	
						00			10	100	3	5.2	2.4	
						02			10	100	3	6.1	2.8	
						05			10	100	4	5.5	3.3	all are grown together
1/7/6-10	9091975	AMELA	serviceberry	12-May	05	05		5	5	100	6	0.6	1.2	1,4 browsed
			Amelanchier lamarckii			06			4	80	7	0.4	1.0	
			Lincoln-Oakes Nursery, Bismarck ND			07			4	80	4	0.6	1.4	
1/7/11-15	9091976	VIDE	arrowwood viburnum	12-May	05	05		5	5	100	6	0.6	1.7	dead leaves on 1,4
			Viburnum dentatum			06			2	40	5	0.8	1.4	
			Lincoln-Oakes Nursery, Bismarck, ND			07			4	80	4	1.3	2.1	
I/8/1-10	'Konza'	RHAR	aromatic sumac	1-May	96	96	PLBR	10	7	70	6	0.7	1.1	
	477981		*Rhus aromatica*			97			7	70	4	1.9	1.9	top dieback - winter injury
			NRCS, PMC, Manhattan, KS			98			7	70	3	5.2	3.5	leaf fungus on 5,6,7,9
			Lincoln-Oakes Nursery, Bismarck, ND			00			7	70		8.3	4.2	
						02			7	70	4	9.2	4.8	
						05			9	90	4	9.5	5.1	

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
I/8/11-20	'Regal'	PRTE	Russian almond	1-May	96	96	PLBR	10	10	100	5	0.7	1.7	
	540442		*Prunus tenella*			97			10	100	4	1.1	2.1	all suckering except 5
	9006079		NRCS, PMC, Bismarck, ND			98			10	100	5	1.7	2.2	
			Lincoln-Oakes Nursery, Bismarck, ND			00			10	100	4	32.6	2.3	
						02			10	100	4	4.1	2.4	
						05			10	100	5	4.0	2.5	highly variable
I/9/1-10	'Scarlet'	PRFR	Mongolian cherry	1-May	96	96	PLBR	10	10	100	3	1.1	1.3	
	478003		*Prunus fruticosa*			97			10	100	4	1.6	1.8	severe rabbit damage on 1
			NRCS, PMC, Bismarck, ND			98			10	100	3	2.9	2.7	all suckering
			Lincoln-Oakes Nursery, Bismarck, ND			00			10	100	3	6.8	3.2	
						02			10	100	2	6.8	3.8	
						05			10	100	4	7.3	4.4	variable heights
I/9/11-20	9019579	CAAR	Siberian pea shrub	1-May	96	96	PLBR	10	10	100	5	0.8	2.0	browse on all
			Caragana arborescens			97			10	100	6	1.1	2.5	
			Lincoln-Oakes Nursery, Bismarck, ND			98			10	100	5	2.0	3.7	insect damage 4,5
						00			10	100	4	4.2	5.0	
						02			10	100	3	6.1	6.2	
						05			10	100	5	6.5	6.9	leaf defoliation
I/10/1-10	'Legacy'	SYVI	late (villosa) lilac	1-May	96	96	PLBR	10	10	100	6	0.6	1.1	resprout on 7,9
	ND-83		*Syringa villosa*			97			10	100	10	0.7	1.3	
	540443		NRCS, PMC, Bismarck, ND			98			10	100	4	1.3	1.9	
	9006228		Lincoln-Oakes Nursery, Bismarck, ND			00			10	100	4	3.5	3.2	
						02			10	100	4	4.6	4.1	
						05			10	100	5	4.5	4.2	variable heights
I/10/11-20	9019621	SYVU	common lilac	1-May	96	96	PLBR	10	10	100	5	1.0	1.6	better than late lilac
			Syringa vulgaris			97			10	100	5	1.1	2.2	mildew on 1,8
			Lincoln-Oakes Nursery, Bismarck, ND			98			10	100	3	1.9	2.9	
						00			10	100	4	4.1	4.0	
						02			10	100	3	5.2	5.2	
						05			10	100	4	5.3	6.3	variable heights

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
IA/1/1-10	9019611	RIAU	golden currant	1-May	96	96	PLBR	10	10	100	4	1.2	2.1	
			Ribes aureum			97			10	100	6	2.0	2.4	
			Lincoln-Oakes Nursery, Bismarck, ND			98			10	100	7	3.0	3.7	
						00			10	100	3	5.2	4.2	
						02			10	100	4	5.6	4.4	
						05			10	100	5	4.7	4.5	leaves mostly gone-leaf spot
IA/1/11-20	'Silver Sands Germplasm' ND-3902 9035212	SAIN	sandbar willow	1-May	96	96	CONT(S)	10	0	0				
			Salix interior			97			3	30	5	1.1	2.0	
			USDA, NRCS, PMC, Bismarck, ND			98			8	80	6	0.8	1.3	rabbit browse on all
						00			10	100	2	8.4	5.2	
						02			10	100	2	9.1	6.4	
						05			10	100	2	9.0	7.5	
IA/2/1-10	'Survivor Germplasm' 9008041	AMFR	false indigo	1-May	96	96	PLBR	10	10	100	3	2.3	2.7	browse on all
			Amorpha fruticosa			97			10	100	4	3.0	2.2	
			NRCS, PMC, Bismarck, ND			98			10	100	3	6.3	3.6	
			Lincoln-Oakes Nursery, Bismarck, ND			00			10	100	3	8.2	4.4	
						02			10	100	3	9.6	5.0	
						05			10	100	2	10.0	5.5	
1A/2/11-20	9082632	CAIN	Mongolian peashrub	29-Apr	99	99	PLBR	10	10	100	3	0.8	1.0	
			Caragana intermedia			00			10	100	3	2.1	1.7	
			Lawyer Nursery, Plains, MT			01			9	90	4	3.6	2.6	
						03			9	90	4	4.8	3.4	
						05			9	90	3	6.0	3.9	
1A/3/1-5	323957	PHME13	black chokeberry	3-May	00	00	PLBR	5	5	100	2	1.6	1.7	
			Photinia melanocarpa			01			5	100	3	2.3	2.4	
			Lincoln-Oakes Nursery, Bismarck, ND			02			5	100	2	3.6	2.9	
						04			5	100	2	4.1	3.2	
						06			5	100	2	6.4	4.2	

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
1A/3/6-10	9082664	COAL	Siberian dogwood	5-May	00	00	PLBR	5	5	100	2	1.5	2.7	
			Cornus alba 'sibirica'			01			5	100	3	3.9	3.1	
			Lawyer Nursery, Plains, MT			02			5	100	2	5.8	4.4	
						04			5	100	3	5.6	5.3	
						06			5	100	4	6.8	5.3	
IA/4/1-5	9082685	RORU2	redleaf rose	16-May	01	01	PLBR	5	5	100	3	1.8	1.7	
			Rosa rubrifolia			02			5	100	3	2.3	2.8	
			Lincoln-Oakes Nursery, Bismarck, ND			03			5	100	4	2.6	2.6	
						05			5	100	5	2.0	2.3	dieback on all
						07			5	100	5	2.5	1.9	
1A/4/6-10	9057406	RORU	rugosa rose	16-May	01	01	PLBR	5	5	100	4	1.2	1.2	
			Rosa rugosa			02			5	100	3	2.7	2.0	
			Lincoln-Oakes Nursery, Bismarck, ND			03			5	100	3	3.6	2.2	
						05			5	100	3	5.3	3.0	good vigor
						07			5	100	2	7.6	3.5	
1A/4/11-15	9082687	RIAM2	black currant	16-May	01	01	PLBR	5	5	100		1.5	1.9	
			Ribes americanum			02			5	100	3	4.0	2.6	
			Big Sioux Nursery, Watertown, SD			03			5	100	3	3.6	3.2	
						05			5	100	3	5.5	3.5	
						07			5	100	3	5.9	3.9	
1A/4/16-20	9082714	SIPEP	cupplant		02	02	CONT	5	5	100	3	0.6	0.3	
			Silphium perfoliatum			03			5	100	3	1.1	3.5	
			USDA, NRCS, PMC, Bismarck, ND			04			5	100				all five okay, height varies
						06			5	100			3.5	all five okay, flowering
1A/5/1-5	'Nero'	PHME13	chokeberry		02	02	PLBR	5	5	100	3	1.0	1.5	
	9082719		*Photinia melanocarpa*			03			5	100	4	1.4	1.9	
			Northwoods Nursery, Molalla, OR			04			5	100	4	1.7	2.0	
						06			5	100	3	3.2	3.0	

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
1A/5/6-10	'Viking'	PHME13	chokeberry		02	02	PLBR	5	5	100	3	1.1	1.4	
	9082720		*Photinia melanocarpa*			03			5	100	3	1.8	2.0	
			Northwoods Nursery, Molalla, OR			04			5	100	3	2.3	2.1	
						06			5	100	2	4.0	3.2	
1A/5/11-15	9082711	EUBU6	winterberry euonymus		02	02	PLBR	5	5	100	3	0.5	2.6	
			Euonymus bungeanus			03			5	100	3	1.4	3.0	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	4	2.6	3.2	3 has seed
						06			5	100	4	4.1	4.1	dark pink fruit on 3
1A/5/16/20	9082712	CESC	bittersweet		02	02	PLBR	5	5	100	3	0.5	1.0	
			Celastrus scandens			03			5	100	3	1.2	2.4	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	4	1.2	3.2	berries on 4
						06			5	100	3	2.6	3.4	
1A/6/1-5	9082678	AMCA6	leadplant		02	02	PLBR	5	5	100	2	0.6	1.0	
			Amorpha canescens			03			5	100		1.4	1.3	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	4	1.5	1.3	
						06			5	100	3	1.9	2.2	
1A/6/6-10	9091971	PHME13	black chokeberry	12-May	05	05		5	5	100	3	1.5	2.1	
			Photinia melanocarpa			06			5	100	2	2.1	2.4	
			Bailey Nurseries, Inc.			07			5	100	3	3.2	2.7	
1A/6/11-15	9008183	PRVI	common chokecherry	12-May	05	05		5	5	100	3	0.8	1.8	
			Prunus virginiana			06			5	100	5	1.5	2.6	
			Lincoln-Oakes Nursery, Bismarck, ND			07			5	100	3	2.2	3.8	1,5 yellow leaves; 3 powdery mildew
1A/7/1-5	9082706	ROAR	prairie rose		03	03		5	5	100	4	1.2	1.2	
			Rosa arkansana			04			5	100	6	0.7	0.6	
			Bismarck, ND			05			3	60	5	2.3	1.3	
			Lincoln-Oakes Nursery, Bismarck, ND			07			3	60	3	2.3	1.3	

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
1A/7/6-10	9082746	RIMI	Missouri gooseberry		03	03	PLBR	5	5	100	6	1.4	1.4	
			Ribes missouriensis			04			5	100	5	1.4	1.6	
			Big Sioux River, Watertown, SD			05			5	100		2.5	2.0	
			Big Sioux Nursery, Watertown, SD			07			5	100	7	1.9	1.7	severe leaf spot on all
1A/7/11-15	9091967	PRPE2	pin cherry	12-May	05	05		5	5	100	3	1.5	2.2	
			Prunus pensylvanica			06			5	100	4	2.5	3.1	
			Big Sioux Nursery, Watertown, SD			07			5	100	3	4.2	3.8	
1A/7/16-20	'Freedom'	LOKO	blueleaf honeysuckle		03	03	PLBR	5	5	100	4	2.2	2.2	
			Loniceral korolkowii			04			5	100	3	4.7	4.0	
			Lincoln-Oakes Nursery, Bismarck, ND			05			5	100	2	5.5	4.9	clean leaves, no disease
1A/8/1-5	9082889	PIMU80	Mugo pine	12-May	04	04	PLBR	5	5					no measurements taken
			Pinus mugo			05			4	80	5	0.4	0.4	
			Big Sioux Nursery, Watertown, SD			06			4	80	4	0.9	0.7	
1A/8/6-10	9082887	HIRH80	seaberry	20-May	04	04	PLBR	5	5	100	4	0.6	1.6	
			Hippophae rhamnoides			05			5	100	4	1.1	1.6	
			Lincoln-Oakes Nursery, Bismarck, ND			06			4	80	4	1.5	1.9	
1A/8/11-15	9082642	VILA	wayfaring bush	20-May	04	04	PLBR	5	5	100	5	0.9	1.3	
			Viburnum lantana			05			5	100	5	0.8	1.2	
			Lincoln-Oakes Nursery, Bismarck, ND			06			5	100	4	0.8	1.2	winter injury on 4,5
1A/8/16-20	9076686	CRCH	roundleaf hawthorn	20-May	04	04	PLBR	5	4	80	4	0.6	0.7	
			Crataegus chrysocarpa			05			5	100	4	0.8	0.9	
			Lincoln-Oakes Nursery, Bismarck, ND			06			5	100	5	1.0	1.4	cedar apple rust on all, wooly aphids on 3
1A/9/1-5	9082891	PHOP	common ninebark	20-May	04	04	PLBR	5	5	100	3	1.3	1.6	
			Physocarpus opulifolius			05			5	100	4	2.5	1.9	
			Big Sioux Nursery, Watertown, SD			06			5	100	3	4.6	3.2	
1A/9/6-10	9082888	COAM3	American hazelnut	20-May	04	04	PLBR	5	4	80	4	0.7	1.1	
			Corylus americana			05			5	100	4	1.0	1.5	
			Lincoln-Oakes Nursery, Bismarck, ND			06			5	100	3	1.6	1.7	

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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IA/9/11-15	Prairie Red'	PRUNU	hybrid plum	4-May	06	06	PLBR	5	5	100	3	0.8	1.6	
	9047203		*Prunus* sp.			07			5	100	3	1.0	1.8	
			Big Sioux Nursery, Watertown, SD											
IA/9/16-20	9092053	RHTY	staghorn sumac	4-May	06	06	PLBR	5	5	100	2	3.9	3.9	
			Rhus typhina			07			5	100	4	4.5	5.1	
			Lincoln-Oakes Nursery, Bismarck, ND											
IA/10/1-5	9092143	RHTY	staghorn sumac	May	07	07		5	1	20	3	1.5	1.0	
			Rhus typhina											
			S&B Nursery, Bismarck, ND (Bailey's, St. Paul, MN)											
1A/10/6-10	9092141	VILE	nannyberry	May	07	07		5	5	100	3	0.5	1.6	2,3,5 powdery mildew
			Viburnum lentago											
			Schumacher's Nursery, Heron Lake, MN											
IA/10/11-15	'Sun Harvest'	COAM3	American hazelnut	May	07	07		5	3	60	4	0.4	1.8	
			Coylus americana											
			USDA, NRCS, PMC, Elsberry, MO											
IA/10/16-20	'Midwest	PRAM	American plum	May	07	07		5	3	60	4	0.4	1.3	
			Prunus americana											
	9083241 Premium'		USDA, NRCS, PMC, Elsberry, MO											
IA/11/1-5	9082895	PRAR3	apricot	May	07	07		5	3	60	4	0.9	1.0	
			Prunus armeniaca											
			Rod O'Clair, Jamestown, ND											
			USDA, NRCS, PMC, Bismarck, ND											
IA/11/6-10	9091969	CAFR80	Russian peashrub	May	07	07		5	5	100	4	0.3	1.4	
			Caragana frutex											
			Big Sioux Nursery, Watertown, SD											
IA/11/11-15	9091964	RHTR	skunkbush sumac	May	07	07		5	5	100	2	0.9	1.8	
			Rhus trilobata											
			Cave Hills, SD											
			USDA, NRCS, PMC, Bismarck, ND											

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
II/1/1-5	'Roselow'	MASA	Sargent crabapple	1-May	96	96	PLBR	5	4	80	4	1.4	2.0	browse on 4
	PI-477986		*Malus sargentii*			97			4	80	2	2.0	2.3	
			USDA, NRCS, PMC, East Lansing, MI			98			4	80	3	3.5	3.4	
			Lincoln-Oakes Nursery, Bismarck, ND			00			4	80	3	6.7	5.5	
						02			4	80	3	7.1	6.9	no leaf diseases
						05			4	80	3	6.0	8.1	
II/1/6-10	'Midwest'	MAMA37	Manchurian crabapple	1-May	96	96	PLBR	5	5	100	3	1.6	2.5	browse on 1,3
	478000		*Malus mandshurica*			97			5	100	2	3.4	3.6	
			USDA, NRCS, PMC, Bismarck, ND			98			5	100	1	5.0	6.4	
			Lincoln-Oakes Nursery, Bismarck, ND			00			5	100	3	7.8	9.1	
						02			5	100	2	9.0	10.2	
						05			5	100	3	9.8	13.3	
II/2/1-5	9030971	ACGI	amur maple	1-May	96	96	PLBR	5	5	100	3	1.1	1.8	
			Acer ginnala			97			5	100	2	1.6	1.9	
			Lincoln-Oakes Nursery, Bismarck, ND			98			5	100	2	3.1	4.1	
						00			5	100	4	7.9	7.0	
						02			5	100	3	9.2	8.1	
						05			5	100	3	10.0	13.9	
II/1/6-10	'Schubert'	PRVI	chokecherry	1-May	96	96	PLBR	5	5	100	4	0.7	2.1	
	9012608		*Prunus virginiana*			97			5	100	1	1.5	2.6	
			Lincoln-Oakes Nursery, Bismarck, ND			98			5	100	1	2.4	3.5	
						00			5	100	2	5.8	6.5	
						02			5	100	2	8.1	9.0	
						05			5	100	2	10.0	11.8	
II/3/1-5	9047209	PRVI	chokecherry	1-May	96	96	PLBR	5	5	100	3	0.7	2.0	
			Prunus virginiana			97			5	100	3	1.5	3.5	insect damage on 4
			Lincoln-Oakes Nursery, Bismarck, ND			98			5	100	1	2.5	5.3	some suckers on 3,4
						00			5	100	4	6.8	8.1	
						02			5	100	3	9.1	10.8	
						05			5	100	3	12.0	13.2	yellow fruit on 1

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
II/3/6-10	ND-1733	PRAM	plum	1-May	96	96	PLBR	5	5	100	3	1.3	2.4	
	9006060		*Prunus americana*			97			5	100	3	2.8	3.4	insect, disease damage
			Lincoln-Oakes Nursery, Bismarck, ND			98			5	100	3	4.0	6.3	
						00			5	100	3	10.7	9.0	
						02			5	100	2	11.4	10.5	
						05			5	100	4	9.9	11.9	
II/4/1-5	ND-614	GYDI	Kentucky coffeetree	29-Apr	99	99	CONT	5	5	100	4	1.5	1.8	
			Gymnocladus dioicus			00			5	100	2	1.6	2.6	
			MCKenzie FEP, ND			01			5	100	3	2.9	3.4	
			USDA, NRCS, PMC, Bismarck, ND			03			5	100	4	2.8	4.4	
						05			5	100		1.5	4.0	
II/4/6-10	9092055	CADE12	American chestnut	4-May	06	06	POTD	5	2	40	8	0.4	0.9	
			Castanea dentata			07			1	20	8	0.3	0.8	
			Itasca Greenhouse, Cohasset, MN											
II/5/1-5	'McDermand'	PYUS	Ussurian pear	1-May	96	96	PLBR	5	5	100	3	1.0	2.5	browse on 1
	478004		*Pyrus ussuriensis*			97			5	100	3	2.4	3.3	leaf damage
			NRCS, PMC, Bismarck, ND			98			5	100	2	2.9	5.2	
			Lincoln-Oakes Nursery, Bismarck, ND			00			5	100	3	7.3	9.4	
						02			5	100	3	10.0	11.8	
						05			5	100	4	12.0	13.6	
II/5/6-10	9076733	VILE	nannyberry	1-May	96	96	PLBR	5	5	100	5	0.3	0.7	
			Viburnum lentago			97			5	100	5	0.8	1.3	
			Turtle Mountains, ND			98			5	100	3	1.3	2.9	mildew on leaves
			Lincoln-Oakes Nursery, Bismarck, ND			00			5	100	4	3.9	4.7	
						02			5	100	5	4.4	5.4	
						05			5	100	4	3.8	5.8	red color on 3-5
II/6/1-5	'Homestead'	CRAN6	Arnold hawthorn	1-May	96	96	PLBR	5	5	100	5	0.5	1.5	browse on 3,5
	9005731		*Crataegus X anomala*			97			4	80	7	0.4	1.4	
			NRCS, PMC, Bismarck, ND			98			4	80	8	0.3	1.4	severe rabbit damage - all
			Lincoln-Oakes Nursery, Bismarck, ND			00			4	80	7	1.2	1.6	
						02			4	80	6	2.2	2.5	
						05			2	40	6	1.8	3.0	

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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II/6/6-10	9069121	PRPA	mayday	1-May	96	96	PLBR	5	5	100	5	0.4	0.6	browse on 4,5
			Prunus padus			97			5	100	4	1.1	1.7	
			Norway			98			5	100	3	1.6	3.2	insect damage on 3,4
			USDA, NRCS, PMC, Bismarck, ND			00			5	100	3	3.7	6.1	
						02			5	100	3	5.4	9.2	
						05			5	100	4	5.7	10.3	
II/7/1-5	9069129	PRMA	amur chokecherry	1-May	96	96	CONT(P)	5	5	100	1	2.2	4.1	
			Prunus maackii			97			5	100	1	4.4	5.6	
			Big Sioux Nursery, Watertown, SD			98			5	100	1	6.3	8.6	moderate deer rub
			USDA, NRCS, PMC, Bismarck, ND			00			5	100	2	10.6	11.5	
						02			5	100	3	13.2	12.4	
						05			5	100	4	11.5	11.9	3 is mostly dead
II/7/6-10	9082666	BETUL	Asian black birch	16-May	01	01	CONT	5	5	100	3	1.0	1.3	
			Betula davurica			02			5	100	3	2.3	2.9	
			Lawyer Nursery, Plains, MT			03			5	100	3	3.2	5.4	
						05			5	100	4	4.0	7.9	1 is browsed
						07			5	100	4	5.8	9.7	
II/8/1-5	9092052	QUBI	swamp white oak	4-May	06	06	PLBR	5	4	80	3	0.6	1.2	5 chewed off
			Quercus bicolor			07			4	80	3	0.8	1.3	
			Lincoln-Oakes Nursery, Bismarck, ND											
II/8/6-10	9082675	FRMA	Manchurian ash	3-May	00	00	PLBR	5	5	100	2	0.8	2.2	
			Fraxinus mandshurica			01			5	100	4	1.2	2.3	
			Lincoln-Oakes Nursery Bismarck, ND			02			5	100	4	2.0	4.0	
						04			5	100	5	1.9	5.7	
						06			5	100	5	2.6	6.4	
II/9/1-5	9082667	BEPO	gray birch	3-May	00	00	PLBR	5	5	100	2	1.3	3.6	
			Betula populifera			01			5	100		3.7	6.4	
			Lawyer Nursery, Plains, MT			02			5	100	2	5.4	9.8	
						04			5	100	3	8.1	14.5	
						06			5	100	3	9.6	16.4	drought stress

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
II/9/6-10	9092051	CASP8	northern catalpa	4-May	06	06	PLBR	5	5	100	3	0.6	0.8	
			Catalpa speciosa			07			4	80	3	0.8	1.0	
			Big Sioux Nursery, Watertown, SD											
III/1/1-5	9076739	QUERC	oak hybrid	30-Apr	98	98	CONT(P)	5	5	100	4	0.6	1.7	
			Quercus			99			4	80	6	1.2	2.4	browse on 4
			E.T. Jacobson, MN			00			4	80	3	2.4	3.9	
			USDA, NRCS, PMC, Bismarck, ND			02			4	80	5	3.9	6.2	
						04			4	80	6	4.5	7.3	acorns on 3
						07			4	80	4	6.6	8.3	
III/1/6-10	9069177	QUMA	bur oak	30-Apr	98	98	CONT(P)	5	5	100	6	0.5	1.0	browse on 3
			Quercus macrocarpa			99			4	80	6	0.8	1.2	
			E.T. Jacobson, MN			00			5	100	5	1.4	1.7	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	5	3.9	4.8	
						04			5	100	5	3.2	5.4	stem gall on 5
						07			5	100	5	4.7	6.6	
III/2/1-5	'Oahe'	CEOC	hackberry	1-May	96	96	PLBR	5	5	100	5	1.0	2.7	
	476982		*Celtis occidentalis*			97			5	100	5	1.7	2.7	4 browsed
			NRCS, PMC, Bismarck, ND			98			5	100	5	2.1	3.7	
			Lincoln-Oakes Nursery, Bismarck, ND			00			5	100	4	6.6	8.1	
						02			5	100	4	7.9	11.7	
						05			5	100	4	7.6	13.4	
III/2/6-10	9019578	CEOC	hackberry	1-May	96	96	PLBR	5	5	100	6	0.5	1.7	browse on 2,3,5
			Celtis occidentalis			97			5	100	6	1.7	2.8	browse on 3,4,5
			Lincoln-Oakes Nursery, Bismarck, ND			98			5	100	4	2.5	3.9	
						00			5	100	4	6.2	7.1	
						02			5	100	4	10.3	13.2	leaf gall
						05			5	100	4	10.4	14.7	

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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III/3/1-5	'Cardan'	FRPE	green ash	1-May	96	96	PLBR	5	4	80	5	0.4	1.6	
	469226		*Fraxinus pennsylvanica*			97			5	100	3	1.4	2.2	
			NRCS, PMC, Bismarck, ND			98			5	100	4	3.0	4.1	
			Lincoln-Oakes Nursery, Bismarck, ND			00			5	100	4	7.6	8.1	
						02			5	100	4	9.4	12.4	
						05			5	100	4	10.2	14.9	
III/3/6-10	9019586	FRPE	green ash	1-May	96	96	PLBR	5	5	100	3	1.0	2.6	
			Fraxinus pennsylvanica			97			5	100	3	2.8	3.7	2 browsed
			Lincoln-Oakes Nursery, Bismarck, ND			98			5	100	3	5.3	6.7	
						00			5	100	3	9.3	11.2	
						02			5	100	3	11.5	14.9	
						04			5	100	3	10.4	17.1	
						05			5	100	3	12.4	18.3	
III/4/1-5	9063115	FRPE	green ash	1-May	96	96	CONT(P)	5	5	100	5	0.2	0.9	browse on 1,2,3,5
			Fraxinus pennsylvanica			97			5	100	3	1.0	2.0	leaf damage on 2
			Itasca State Park, MN			98			5	100	4	2.3	3.9	
			USDA, NRCS, PMC, Bismarck, ND			00			5	100	3	6.3	7.5	
						02			5	100	4	9.2	13.8	
						05			5	100	4	9.1	17.1	
III/4/6-10	9063116	FRNI	black ash	1-May	96	96	CONT(P)	5	5	100	5	0.3	1.3	browse on 2
			Fraxinus nigra			97			2	40	7	0.7	1.0	browse on 1
			Itasca State Park, MN			98			2	40	6	1.5	2.3	
			USDA, NRCS, PMC, Bismarck, ND			00			2	40	4	2.4	5.4	
						02			2	40	5	4.2	8.6	
						05			2	40	6	4.1	9.9	leaves yellowing-stress
III/5/1-5	9063127	FRAM	white ash	1-May	96	96	PLBR	5	5	100	5	0.2	1.4	
			Fraxinus americana			97			5	100	4	1.6	2.3	slight insect damage on 2
			Wisconsin			98			5	100	4	2.1	3.8	
			Lincoln-Oakes Nursery, Bismarck, ND			00			5	100	5	4.5	8.9	
						02			5	100	4	7.6	12.9	
						05			5	100	4	7.3	14.9	

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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III/5/6-10	9076730	ACSA	silver maple	1-May	96	96	PLBR	5	5	100	3	1.2	3.1	
			Acer saccharinum			97			5	100	1	3.8	5.2	
			Lincoln-Oakes Nursery, Bismarck, ND			98			5	100	3	8.7	9.5	
						00			5	100	3	14.2	15.7	
						02			5	100	4	13.3	16.9	
						05			5	100	4	12.9	19.0	broke off stump sprout on 2
III/6/1-5	'Hunter Germplasm' 9081843	PIPOS	ponderosa pine	12-May	05	05		5	5	100	2	0.6	1.2	
			Pinus ponderosa var. *scopulorum*			06			5	100	2	1.2	1.6	
			USDA, ARS, Bridger, MT			07			5	100	2	2.1	2.5	
III/6/6-10	9063148	PHAM	amur corktree	1-May	96	96	CONT(P)	5	5	100	5	0.4	1.2	browse on 5
			Phellodendron amurense			97			5	100	3	2.8	2.6	
			Clay County, MN			98			5	100	3	4.9	4.8	
			USDA, NRCS, PMC, Bismarck, ND			00			5	100	3	8.5	6.8	
						02			5	100	3	10.4	8.7	
						05			5	100	4	10.5	9.9	tractor damage on trunk of 5
III/7/1-5	9069178	PIRE	red pine	29-Apr	99	99		5	5	100	4	1.0	1.3	
			Pinus resinosa			00			5	100	4	1.0	1.3	
			USDA, NRCS, PMC, Bismarck, ND			01			5	100	3	2.9	3.0	
						03			5	100	3	4.7	5.4	
						05			5	100	2	6.2	8.5	
III/7/6-10	9076731	QUMA	bur oak	1-May	96	96	PLBR	5	5	100	5	0.2	1.3	browse on 1,2
			Quercus macrocarpa			97			4	80	6	0.8	1.3	
			Black Hills, SD			98			4	80	5	1.6	2.1	mod-severe rabbit damage
						00			4	80	4	2.6	4.3	
						02			4	80	5	4.3	6.5	leaf spot
						05			4	80	5	4.8	6.9	acorns, leaf spot on all; top dieback on 5

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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III/8/1-5	9076735	AEGL	Ohio buckeye	1-May	96	96	PLBR	5	5	100	4	0.2	0.6	
			Aesculus glabra			97			5	100	8	0.7	0.6	
			Lincoln-Oakes Nursery, Bismarck, ND			98			5	100	6	0.7	1.0	
						00			5	100	4	1.6	1.5	
						02			5	100	6	1.9	1.8	
						05			5	100	6	1.0	1.4	leaf burns/dieback on all
III/8/6-10	9076737	PRSE	black cherry	1-May	96	96	PLBR	5	4	80	3	1.0	1.9	
			Prunus serotina			97			4	80	4	1.9	2.2	
			Apple Valley FEP			98			4	80	3	4.3	5.0	
			Lincoln-Oakes Nursery, Bismarck, ND			00			4	80	3	8.7	10.1	
						02			4	80	3	11.1	12.9	
						05			4	80	4	10.8	15.1	
III/9/1-5	9082609	PICEA	Meyer's spruce	16-May	01	01	CONT	5	3	60	5	0.8	0.7	
			Picea meyeri			02			3	60		1.0	0.9	
			Itasca Greenhouse, Cohasset, MN			03			3	60		1.2	1.1	
						05			3	60	3	1.6	1.4	
						07			3	60	5	2.2	1.6	
III/9/6-10	9076722	BEPE	European white birch	1-May	96	96	PLBR	5	5	100	1	3.2	4.4	
			Betula pendula			97			5	100	2	4.6	6.1	
			Russia			98			5	100	1	7.5	11.1	
			USDA, ARS, Mandan, ND			00			5	100	2	12.5	17.2	
						02			5	100	4	10.8	20.2	
						05			5	100	5	9.6	20.8	dead tops on 1, 3, 5
III/10/1-5	9082885	POTR5	aspen	20-May	04	04	PLBR	5	3	60	4	0.7	2.1	
			Populus tremuloides			05			4	80	5	1.1	1.9	
			NDFS Nursery, Towner, ND			06			5	100		1.4	2.2	
III/10/6-10	9082633	FRNI	black ash	29-Apr	99	99		5	5	100	6	0.3	0.7	browse on 4
			Fraxinus nigra			00			4	80	4	0.9	1.0	
			Lawyer Nursery, Plains, MT			01			4	80	4	1.0	2.1	
						03			4	80	4	1.1	3.2	
						05			4	80	5	1.7	3.5	

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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III/11/1-5	ND-686	SYREP	Pekin lilac	1-May	96	96	PLBR	5	5	100	3	2.3	2.9	
	478008		*Syringa reticulata* ssp. *pekinensis*			97			4	80	5	2.4	2.3	winter damage
			Lincoln-Oakes Nursery, Bismarck, ND			98			4	80	3	4.6	3.7	
						00			4	80	4	6.9	5.9	
						02			4	80		8.1	6.9	
						05			4	80	6	7.0	6.9	
III/11/6-10	9076725	ULCA	smooth bark elm	1-May	96	96	PLBR	5	5	100	3	2.6	3.1	
			Ulmus carpinifolia			97			5	100	6	3.5	3.6	sev. rabbit damage 1,3,4,5
			Russia			98			5	100	3	5.1	5.6	rabbit damage on trunk 3,4
			USDA, ARS, Mandan, ND			00			5	100	4	9.0	9.1	
						02			5	100	4	12.5	13.9	
						05			5	100	4	11.4	17.2	
III/12/1-5	9082886	POTR5	aspen	20-May	04	04	PLBR	5	5	100	4	0.8	2.0	
			Populus tremuloides			05			5	100	5	1.1	2.2	
			Lincoln-Oakes Nursery, Bismarck, ND			06			4	80		1.9	2.3	
III/13/1-5	9082639	QUEL	northern pin oak	29-Apr	99	99	PLBR	5	2	40	8	0.3	0.5	
			Quercus ellipsoidalis			00			2	40	6	1.1	0.9	
			Lincoln-Oakes Nursery, Bismarck, ND			01			2	40	6	1.0	2.5	
						03			2	40	4	2.4	4.1	
						05			2	40	?	2.3	5.6	leaf galls, army worms/galls
III/14/1-5	9063152	BEPL	Japanese birch	30-Apr	98	98	CONT(S)	5	3	60	4	0.9	1.6	
			Betula platyphylla			99			5	100	4	1.5	2.9	browse on 2
			NDFS Nursery, Towner, ND			00			5	100	4	3.4	5.7	
						02			5	100	3	6.4	12.6	
						04			5	100	3	10.9	11.6	
						07			0	0				removed
III/14/1-5	9082739	OSVI	ironwood	May	07	07		5	2	40	4	0.9	2.1	
			Ostrya virginiana											
			Sertoma Park, Bismarck, ND											
			USDA, NRCS, PMC, Bismarck, ND											

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
III/14/6-10	9082631	BEPL	Japanese birch	7-May	99	99	PLBR	5	3	60		1.5	3.5	
			Betula platyphylla			00			5	100	4	3.1	4.9	
			Lawyer Nursery, Plains, MT			01			5	100	3	4.7	8.0	
						03			5	100	3	7.1	14.4	
						05			5	100	4	8.2	15.8	top dying on 4
						07			0	0				removed
III/14/6-10	9092140	SOAL9	Korean mountain ash	May	07	07		5	4	80	7	0.3	0.9	
			Sorbus alnifolia											
			Big Sioux Nursery, Watertown, SD											
IV/1/1-5	9082610	LASI	Siberian larch	30-Apr	98	98	CONT(S)	5	5	100	4	0.5	1.0	
			Larix sibirica			99			5	100	6	0.8	1.5	
			NDFS Nursery, Towner, ND			00			5	100	5	1.3	2.1	
						02			5	100	4	3.1	5.0	
						04			5	100	5	3.9	6.9	
						07			5	100	3	6.5	11.2	
IV/1/6-10	9082611	LASI	Siberian larch	30-Apr	98	98	CONT(S)	5	5	100	3	0.5	1.2	
			Larix sibirica			99			5	100	6	0.7	1.4	
			NDFS Nursery, Towner, ND			00			5	100	5	1.0	1.6	
						02			5	100	5	1.8	2.7	
						04			5	100	5	2.4	3.7	
						07			5	100	5	3.9	6.6	
IV/2/1-5	9069168	LASI	Siberian larch	30-Apr	98	98	CONT(P)	5	1	20	4	0.3	1.3	
			Larix sibirica			99			4	80	6	0.7	1.4	
			Russia			00			4	80	5	1.1	1.9	
			USDA, NRCS, PMC, Bismarck, ND			02			4	80	4	2.6	4.0	
						04			4	80	4	3.2	6.6	
						07			4	80	2	6.8	11.9	

Project No.: 38I347K Field Evaluation of Woody Plant Materials, Becker, Minnesota
Year of Record: 2007

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
IV/2/6-10	9069162	LARIX	Dahurian larch	30-Apr	98	98	CONT(P)	5	3	60	3	0.9	1.7	
			Larix olgensis			99			4	80	4	2.1	2.2	
			China			00			5	100	4	2.9	3.6	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	3	5.4	5.9	
						04			5	100	3	7.0	8.1	chlorotic, no leader on 4
						07			5	100	3	9.6	11.0	3 top dieback, deer damage 4
IV/3/1-5	9069163	LARIX	Dahurian larch	30-Apr	98	98	CONT(P)	5	0	0				
			Larix olgensis			99			1	20	5	1.0	2.0	
			China			00			4	80	5	1.3	2.0	
			USDA, NRCS, PMC, Bismarck, ND			02			4	80	5	2.6	3.8	
						04			4	80	6	4.2	6.8	
						07			3	60	3	9.2	13.8	
IV/3/6-10	9069164	PISYM	Scots pine	30-Apr	98	98	CONT(P)	5	2	40	4	0.6	1.0	
			Pinus sylvestris var. *mongolica*			99			5	100	4	1.3	1.8	
			China			00			5	100	3	2.4	2.7	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	3	5.2	6.2	
						04			5	100	3	7.9	10.9	
						07			5	100	3	14.5	16.3	
IV/4/1-5	9069172	PISY	Scots pine	30-Apr	98	98	CONT(P)	5	0	0				
			Pinus sylvestris			99			5	100	3	1.4	2.1	
			Russia			00			5	100	3	2.2	2.9	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	3	5.1	6.2	
						04			5	100	3	7.7	10.9	
						07			2	40	3	13.0	13.6	

OFF-CENTER EVALUATION PLANTINGS: TECHNICAL REPORT – 2007

Study 38A345K Apple Creek Township, Burleigh County, North Dakota

Study Title: Field Evaluation of Woody Plant Materials

Introduction: There is a need for tree cultivars with superior winter hardiness, growth rate, and resistance to disease and insects for use in field and farmstead windbreaks as well as recreational, wildlife, and beautification plantings. Shrub species are needed to supplement or replace those currently being used for field windbreaks, multiple-row windbreaks and in recreational, wildlife, barrier, and beautification plantings and developments. Many tree and shrub varieties commercially available are not adapted or have characteristics that make them unsuitable for use in the Northern Great Plains. The Apple Valley site serves as the new central or initial screening location for any and all new woody materials that come through the plant materials evaluation system at Bismarck.

Objective: The objective is to assemble and evaluate woody plant materials for conservation use in the Northern Great Plains. The goal of this and other OCEPs is to provide, under uniform culture and management, a diversity of long-term testing locations for the comparative field evaluation of new cultivars, standards, and promising accessions obtained from local, regional, and foreign sources.

Cooperators: The USDA Natural Resources Conservation Service, Plant Materials Center, Bismarck, North Dakota, in cooperation with the USDI Fish and Wildlife Service.

Location: Waterfowl Production Area, approximately 5 miles east and 1 mile south of Bismarck, North Dakota, on Old Highway 10. Legal Description: N 1/2 sec. 1, T. 138 N., R.79 W.; S ½ sec. 31, T. 139N., R. 78 W.

Major Land Resource Area: The site is located in Major Land Resource Area 53B, Central Dark Brown Glaciated Plains. Most soils are derived from calcareous glacial till. Elevation is 1,500 to 3,000 feet. The gently rolling plain includes some areas of kames and moraines that have irregular topography. Forty percent of the area is rangeland.

Soils: There are four different soils mapping units in the planting area:

RoA - Roseglen silt loam, 0 to 3 percent slope.
PaA - Parshall, fine sandy loam or sandy loam, 0 to 3 percent slope.
TeC, TeA - Telfer fine sandy loams or sandy loam, 3 to 6 percent slope.
Ty, Tyl – Tally fine sandy loam or sandy loam, 0 to 3 percent slope.

The Roseglen series consists of deep, moderately well-drained soils formed in loamy sediments on glacial lake plains. The surface layer is dark grayish-brown silt loam 8 inches thick. The subsoil is dark grayish-brown and grayish-brown silt loam 26 inches thick. The substratum is light yellowish-brown and light brownish-gray silt loam. Permeability is moderate. Available water capacity, the organic matter content, and fertility are high. Slopes are 0-9 percent. These soils are in North Dakota windbreak suitability group 1.

The Parshall series consists of deep, well-drained soils formed in fine sandy loam alluvium on terraces and outwash plains and in upland swales. The surface layer is dark grayish-brown fine sandy loam 14 inches thick. The subsoil is dark grayish-brown, very friable fine sandy loam in the upper 17 inches and grayish-brown fine sandy loam in the lower 6 inches. The underlying material is light brownish-gray fine sandy loam in the upper 12 inches and grayish-brown sandy loam buried surface layer in the lower 13 inches. Permeability is moderately rapid. The available water capacity is moderate. The organic matter content is

high and fertility is medium. Slopes are 0-15 percent. These soils are in North Dakota windbreak suitability group 5.

The Telfer series consists of deep, excessively and somewhat excessively drained soils formed in sandy sediments in terraces and uplands. The surface layer is dark grayish-brown loamy sand 6 inches thick. The next 8 inches is grayish-brown fine sand. The underlying material is light olive brown fine sand. Permeability is rapid. Available water capacity is low. Organic matter content is moderate and fertility is low. Slopes are 0-20 percent. These soils are in North Dakota windbreak suitability group 7.

The Tally series consists of deep, well-drained soils that formed in material derived from eolian deposits, alluvium, or glacial outwash material. These soils are on terraces, fans, and foot slopes of hills in uplands. The upper 14 inches is a dark brown sandy loam. The next horizons, down to 38 inches, are a brown sandy loam. These soils are in North Dakota windbreak suitability group 5.

Climate: MLRA 53B. The average annual precipitation is 15 to 18 inches; highest in the growing season. Rainfall is low and somewhat erratic. The average annual temperature is 40 to 60 degrees F. Average freeze-free period is 105 to 140 days. The plant hardiness zone is 3b with an average annual minimum temperature of -40 to -30 degrees F. For the 2007 weather summary at Bismarck, see Table AV-1.

Assembly: Refer to Table AV-2 for a list of woody species planted from 1997-2006.

Planting Plan: These plots are not randomized or replicated but are organized in a systematic design for evaluation and demonstration purposes (see Figure AV-1). There are 4 blocks prepared. Block I is for shrubs; Block II is for small trees; Block III is primarily conifers; and Block IV is tall trees. Fallow strips are rototilled one year before planting. All trees are planted by hand.

Planting Date: Refer to Table AV-2 for planting dates of woody species planted from 1997-2006.

Weed Control: 1997-2007: Grass strips between rows were kept mowed and mechanical cultivation was performed within the rows. Hand hoeing was done as needed. Pendimethalin herbicide was applied on April 26, 2006. The plot was mowed short in September 2007.

Plot Maintenance: 1997-2006: Pruning was done as needed to remove dead and broken limbs. Dead trees were removed. A few trees have had cages constructed around them to stop deer rubbing. During extended dry spells, water was hauled from Bismarck and applied to some of the smallest trees.

Evaluation and Measurements: 1998-2007: Plant performance data is recorded on one or more accessions during the growing season for three years. After the third year, data is gathered according to a specific schedule. Records of planting date, survival, vigor, fruit (seed) amount, canopy width, plant height, winter injury, disease symptoms, and insect damage have been maintained since 1998. Select data appears in this report. Additional information can be requested from the PMC.

Results

Plant Performance: This site currently contains 62 species, with a total of 77 different accessions.

Figure AV-1. APPLE VALLEY WOODY FIELD EVALUATION PLANTING

	BLOCK 1 SHRUBS		BLOCK 2 MEDIUM TREES		
1	'Sakakawea'|'Legacy'|'Scarlet'|'Prairie Red'		'McDermand'|'Midwest'|'Homestead'|'Survivor'	'Silver Sands' 9082678 leadplant	1
2	384493 bearberry honeysuckle	9076749 juniper | 9082724 buffaloberry	9076748 tat.maple|Russ. almond	9019593 juniper | 9082726 beaked hazel	2
3	9082615 pale dogwood	|9082651 skunkbush sumac	9063120 Ohio buckeye	9082638 western blue elderberry	3
4	9082647 Bud's yellow dogwood	9082623 Mongolian peashrub	9082642 wayfaring tree	9008183 chokecherry | 9091976 arrowwood	4
5	9082648 spoil ax	9019622 spoil ax	9082649 nannyberry	ND-624 hoptree	5
6	9082663 little leaf peashrub	9082676 rose peashrub	'Viking' chokeberry| serviceberry	9091978 white poplar | 9082667 gray birch	6
7	9082673 three leaf sumac	9082653 skunkbush sumac	'Nero' chokeberry| pin cherry	|9076746 Ohio buckeye	7
8	9082685 redleaf rose	9057406 rugosa rose	9082746 Missouri gooseberry	9091971 chokeberry | 9091977 chokeberry	8
9	9082687 American currant	9091969 Russian pea shrub	9082738 gray dogwood	9082711 winterberry	9
10	9092054 Silverscape	9082747 American cranberry	'Freedom' honeysuckle|r.l. hawthorn	common ninebark|	10
11			Am. hazelnut|seaberry	Amur chokecherry|gray dogwood|chokeberry	11
Row	200 ft		200 ft		Row
	BLOCK 3 TALL TREES		**BLOCK 4 TALL TREES**		
1	'Oahe'|'Cardan'|	| bittersweet			1
2	'Hunter' ponderosa pine	9063156 Scots pine		9063152 Japanese birch	2
3	9069162 Dahurian larch	9082611 Siberian larch	9069177 bur oak	9076739 hybrid oak	3
4	9082610 Siberian larch	9069168 Siberian larch	9069170 English oak		4
5	9069163 Dahurian larch	9069164 Scots pine	9082636 black cottonwood	9076737 black cherry	5
6	9076718 Scots pine	9069173 Scots pine	9082886 aspen	9082885 aspen	6
7	9076719 Scots pine	9069178 red pine	9082631 Japanese birch	9082650 Soongarica poplar	7
8	9082889 mugo pine	'Bridger-Select' juniper	9082713 Siberian peach	9091968 Kentucky coffeetree	8
9	9069169 Siberian pine	ND-500 Siberian larch	9082619 green ash	ND-614 Kentucky coffeetree	9

revised 6/06

Table No. AV-1: 2007 Weather Summary - Official Station - Bismarck, North Dakota					
	Mean Temperature		Precipitation (inches)		
	(degrees Fahrenheit)		Actual		Deviation from Normal
Month	**2007**	**Normal***	**2007**	**Normal***	**2007**
January	14.7	10.2	0.13	0.45	-0.32
February	8.9	18.1	0.75	0.51	0.24
March	36.6	29.7	1.18	0.85	0.33
April	42.1	43.3	0.80	1.46	-0.66
May	57.4	56.0	5.42	2.22	3.20
June	67.0	64.7	3.32	2.59	0.73
July	75.5	70.4	1.25	2.58	-1.33
August	67.2	69.0	3.26	2.15	1.11
September	59.5	57.7	1.77	1.61	0.16
October	47.0	45.2	0.83	1.28	-0.45
November	31.1	28.0	0.13	0.70	-0.57
December	15.0	15.2	0.23	0.44	-0.21
Annual	**43.5**	**42.3**	**19.07**	**16.84**	**2.23**
*National Climate Data Center 1971-2000 Monthly Normals					
		2007			
Last Frost (28 degrees)		17-Apr			
First Frost (28 degrees)		12-Oct			
Frost Free Period		177 days			

Key to Table AV-2. 38A345K Field Evaluation of Woody Plant Materials – Apple Valley, North Dakota

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 AV-2.
Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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
1/2/1-5	384493	LOCA	bearberry honeysuckle	6-May	98	98	CONT	5	5	100	4	1.4	0.7	
			Lonicera caerulea			99			5	100	4	1.4	0.7	
			USDA, NRCS, PMC, Bismarck, ND			00			5	100	3	1.8	0.9	
						02			4	80	5	1.6	0.9	
						04			4	80	4	1.9	1.0	
						07			4	80	4	2.7	1.4	
1/2/6-8	9076749	JUNIP	juniper hybrid	6-May	98	98	CONT	3	3	100	2	1.3	0.7	
			Juniperus sp.			99			3	100	2	2.8	0.7	
			USDA, ARS, P.I. Station, Ames, IA			00			3	100	2	3.6	0.9	
						02			3	100	1	6.1	0.6	
						04			3	100	1	4.9	0.8	
						07			3	100	1	5.3	1.2	
1/2/09	9082724	SHAR	buffaloberry	13-May	02	02	CONT	3	1	33	7	0.2	0.5	
			Shepherdia argentea			03			1	33	4	0.6	1.8	
			USDA, ARS, P.I. Station, Ames, IA			04			1	33	3	1.0	1.8	transplanted May 20, 2005
						06			1	33	3	1.0	2.2	
						07			1	33	3	1.5	2.8	
1/3/1-5	9082615	COAMO	pale dogwood	29-May	98	98	CONT	5	5	100	5	0.9	1.5	1-3 browsed
			Cornus amomum ssp. *obliqua*			99			5	100	3	2.1	2.0	1-3 browsed
			USDA, ARS, P.I. Station, Ames, IA			00			5	100	3	4.1	3.0	
						02			3	60	3	4.3	4.2	
						04			3	60	4	4.0	3.8	dieback on all
						07			3	60	5	3.4	2.8	
1/3/7-10	9082651	RHTR	skunkbush sumac	20-May	05	05	CONT	4	4	100	3	2.4	1.6	
			Rhus trilobata			06			4	100	4	2.3	1.5	
			N. Cave Hills, SD			07			3	75	3	3.4	2.3	

Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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
1/4/1-5	9082647	COSES	Bud's yellow dogwood	12-May	99	99	CONT	5	4	80	4	1.1	1.6	1 browsed
			Cornus sericea ssp. *sericea*			00			4	80	3	2.4	2.8	
			USDA, ARS, P.I. Station, Ames, IA			01			4	80	4	2.6	2.3	winter damage
						03			3	60	4	2.8	2.5	1 mostly dead
						05			2	40	6	2.8	2.0	lots of dead stems on 5
						07			0	0				not adapted
1/4/6-10	9082632	CAIN	Mongolian peashrub	18-May	99	99	PLBR	5	5	80	4	1.2	1.4	
			Caragana intermedia			00			4	80	3	2.4	2.5	
			Lawyer Nursery, Plains, MT			01			2	40	2	4.1	3.4	
						04			2	40	2	8.3	5.9	
						05			2	40	2	9.8	6.2	
						07			2	40	2	11.0	6.8	
1/5/1-5	9082648	SESU	spoilax	14-May	99	99	CONT	5	5	80	4	1.2	1.5	
			Securinga suffruticosa			00			5	100	3	2.8	2.6	
			USDA, ARS, P.I. Station, Ames, IA			01			5	100	3	4.0	3.0	
						03			5	100	2	6.4	4.5	
						05			5	100	2	7.1	4.9	nice yellow fall color
						07			5	100	3	7.4	5.6	stem dieback, seed produced
1/5/6-10	9019622	SESU	spoilax	14-May	99	99	CONT	5	5	100	4	1.0	1.2	
			Securinga suffruticosa			00			5	100	4	2.2	2.2	
			USDA, ARS, P.I. Station, Ames, IA			01			5	100	5	2.7	2.2	
			NDG&F Dept., McKenzie GMA, McKenzie, ND			03			4	80	4	4.8	3.8	
						05			4	80	4	6.7	4.4	nice yellow fall color
						07			4	80	4	5.8	4.9	
1/6/1-5	9082663	CAMI	little leaf peashrub	8-May	00	00	PLBR	5	5	100	4	1.5	1.4	
			Caragana microphylla			01			5	100	4	1.8	1.8	
			Lawyer Nursery, Plains, MT			02			5	100	4	1.8	1.8	
						04			5	100	3	5.7	4.5	
						06			5	100	2	7.5	5.5	
						07			5	100	2	9.0	5.8	some dieback, seed produced

Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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
1/6/6-10	9082676	CARO	rose peashrub	8-May	00	00	CONT	5	5	100	5	2.0	2.5	
			Caragana rosea			01			3	60	3	2.8	3.2	
			P.I. Station, Ames, IA			02			3	60	4	3.5	3.4	
						04			3	60	4	4.9	3.9	dieback on 2
						05			3	60	4	5.2	4.2	
						07			3	60	6	4.8	4.2	half of bush died 2
1/7/1-5	9082673	RHTR	three leaf sumac	25-Apr	00	00	PLBR	5	5	100	3	1.8	2.4	
			Rhus trilobata			01			5	100	4	2.9	2.8	
			Lewis and Clark County, MT			02			5	100	3	4.9	3.3	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	4	5.2	3.9	slight dieback on 1,2,3
						06			5	100	3	6.8	4.3	
						07			5	100	3	7.4	5.1	fruit 2-5
1/7/6-10	9082653	RHTR	skunkbush sumac	12-May	03	03	CONT	5	5	100	3	1.5	1.3	
			Rhus trilobata			04			5	100	3	2.5	1.8	
			Harding Co., SD			05			5	100	3	4.4	2.4	
			USDA, NRCS, PMC, Bismarck, ND			07			5	100	3	5.6	3.2	
1/8/1-5	9082685	RORU	redleaf rose	23-May	01	01	PLBR	5	4	80	4	1.8	1.9	
			Rosa rubrifolia			02			4	80	4	2.3	1.9	
			Lincoln-Oakes Nursery, Bismarck, ND			03			4	80	3	3.2	2.8	
						05			4	80	7	2.4	2.1	many dead stems
						07			4	80	8	1.8	2.6	
1/8/6-10	9057406	RORU	rugosa rose	23-May	01	01	PLBR	5	5	100	5	1.4	1.4	
			Rosa rugosa			02			5	100	5	2.1	1.1	
			Lincoln-Oakes Nursery, Bismarck, ND			03			5	100	3	2.9	1.5	
						05			3	60	4	2.3	1.9	
						07			3	60	5	2.3	2.2	
1/9/1-5	9082687	RIAM	American currant	24-May	01	01	PLBR	5	3	60	5	0.9	0.8	
			Ribes americanum			02			3	60	6	1.3	1.5	
			Big Sioux Nursery, Watertown, SD			03			5	100	4	1.8	1.5	
						05			5	100	3	3.7	2.0	
						07			5	100	3	5.2	2.4	

Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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
1/9/6-10	9091969	CAFR80	Russian peashrub	20-May	05	05	PLBR	5	5	100	5	0.7	2.7	
			Caragana frutex			06			5	100	4	0.8	2.6	some dieback on 4,5
			Big Sioux Nursery, Watertown, SD			07			5	100	5	0.4	2.8	
1/10/1-5	'Silverscape'	ELAEA	Russian olive/silverberry hybrid	17-May	06	06	POTD	5	1	20	6	0.3	1.0	
			Elaeagnus X 'Jefmorg'			07			1	20	4	0.8	1.3	
			Lincoln-Oakes Nursery, Bismarck, ND											
2/1	9082678	AMCA6	leadplant	15-May	02	02	PLBR	5	3	60	5	0.7	0.8	
			Amorpha canescens			03			5	100	5	1.1	1.1	
			USDA, NRCS, PMC, Bismarck, ND			04			4	80	4	1.8	1.5	
						06			4	80	4	2.6	2.1	
2/2/1-3	9076748	ACTAG	tatarian maple	May	97	98	CONT	3	3	100	3	1.4	1.8	
			Acer tataricum ssp. *ginnala*			99			3	100	3	2.4	2.1	nice red leaf color
			USDA, ARS, P.I. Station, Ames, IA			00			3	100	3	3.1	3.6	
						02			3	100	3	4.7	4.3	some dieback
						04			3	100	3	5.2	5.3	
						06			3	100	3	4.9	5.1	nice leaf color 1,2; some dieback 3
2/2/4-8	9082884	PRTE5	Russian almond	May	04	04	CONT	5	2	40	4	0.8	1.2	several suckers,
			Prunus tenella			05			4	80	5	0.9	0.9	only a few leaves
			USDA, ARS, P.I. Station, Ames, IA			06			4	80	4	1.1	1.1	
2/2/9-11	9019593	JUCO6	common juniper	17-May	06	06	CONT	3	3	100	3	1.0	0.8	
			Juniperus communis			07			3	100	2	1.9	1.2	
			Wilton Mine, ND/McKenzie FEP											
			USDA, NRCS, PMC, Bismarck, ND											
2/2/11-13	9082726	COCO6	beaked hazel	15-May	02	02	PLBR	3	2	67	6	0.5	1.5	
			Corylus cornuta			03			2	67	6	0.7	0.8	
			Bottineau Co., ND			04			1	33	5	1.0	1.0	some dieback
						06			2	67	4	0.9	1.0	some dieback
						07			2	67	4	1.0	1.0	

Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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
2/3/1-5	9063120	AEGL	Ohio buckeye	12-May	99	99	CONT	5	3	60	4	0.7	1.3	
			Aesculus glabra			00			4	80	4	0.5	1.3	
			Ransom County, ND			01			3	60	5	0.5	1.4	
			USDA, NRCS, PMC, Bismarck, ND			03			2	40	4	2.0	2.7	
						05			2	40	4	3.5	4.1	
						07			2	40	2	5.8	6.1	
2/3/6-10	9082638	SACE	western blue elderberry	18-May	99	99	PLBR	5	5	100	2	2.0	1.9	
			Sambucus nigra ssp. *caerulea*			00			5	100	3	4.7	4.8	
			Lincoln-Oakes Nursery, Bismarck, ND			01			5	100	3	5.2	4.1	
						03			5	100	2	7.8	7.4	
						05			5	100	3	9.0	8.7	
						07			5	100	3	12.0	10.5	
2/4/1-5	9082642	VILA	wayfaring tree	18-May	99	99	PLBR	5	5	100	4	0.9	1.2	
			Viburnum lantana			00			3	100	3	2.0	2.6	
			Lincoln-Oakes Nursery, Bismarck, ND			01			5	100	4	2.6	2.6	
						03			5	100	4	3.4	2.7	
						05			5	100	3	3.9	3.6	
						07			5	100	3	4.6	4.1	
2/4/6-10	9008183	PRVI	chokecherry	20-May	05	05	PLBR	5	5	100	3	0.9	2.1	
			Prunus virginiana			06			5	100	4	1.4	2.8	
			Lincoln-Oakes Nursery, Bismarck, ND			07			5	100	2	2.0	4.6	
2/4/11-15	9091976	VIDE	Arrowwood viburnum	20-May	05	05	PLBR	5	5	100	3	0.8	1.9	1 has some suckers,
			Viburnum dentatum			06			4	80	6	0.8	1.2	5 has a couple of suckers
			Lincoln-Oakes Nursery, Bismarck, ND			07			1	20	4	1.0	1.8	
2/5/1-5	9082649	VILE	nannyberry	18-May	99	99	CONT	5	5	100	4	0.9	1.3	1 has mildew on leaves
			Viburnum lentago			00			5	100	4	1.1	2.0	
			Lincoln-Oakes Nursery, Bismarck, ND			01			5	100	3	1.6	2.6	
						03			5	100	3	3.5	4.2	
						05			5	100	3	4.0	4.7	
						07			5	100	3	5.2	5.8	

Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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
2/5/6-10	9006094	PTTR	wafer ash	18-May	99	99	PLBR	5	5	100	4	0.8	1.8	
			Ptelea trifoliata			00			5	100	4	2.0	3.4	4 broke off
			Lincoln-Oakes Nursery, Bismarck, ND			01			5	100	4	3.3	4.3	
						03			5	100	4	4.4	5.2	dead stems on all
						05			5	100	4	5.5	5.4	sprouts 4; diff. form on 5
						07			5	100	4	6.0	6.7	some dieback 2,3
2/6/1-5	'Viking'	PHME13	chokeberry	13-May	02	02	PLBR	5	4	80	5	1.3	1.3	
	9082720		*Photinia melanocarpa*			03			4	80	4	1.7	1.6	
			Northwoods Nurs., Mollala, OR			04			4	80	4	2.3	1.9	2 spreading out, 3 browsed
						06			4	80	2	3.2	2.9	some deer browse 3,4
						07			4	80	3	3.9	3.8	fruit 2.3
2/6/5-9	9091975	AMLA	serviceberry	20-May	05	05	PLBR	5	3	60	5	0.8	1.5	1,2 poor, not recorded
			Amelanchier lamarckii			06			5	100	5	0.8	1.4	dieback 3,4
			Lincoln-Oakes Nursery, Bismarck, ND			07			5	100	5	1.0	1.5	
2/6/6-10	9082667	BEPO	gray birch	8-May	00	00	PLBR	5	3	60	3	1.3	3.7	
			Betula populifera			01			2	40	4	1.6	3.0	
			Lawyer Nursery, Plains, MT			02			2	40	4	2.0	2.3	
						04			2	40	5	4.2	4.2	
						06			2	40	6	5.4	5.4	multiple stemmed
						07			2	40	4	6.1	7.0	4 multi-stemmed
2/6/10-12	9091978	POAL7	white poplar	20-May	05	05	CONT	3	3	100	3	1.8	3.7	deer rub
			Populus alba			06			3	100	4	2.7	3.3	multiple stems on all plants
			ARS, Ames, IA			07			3	100	3	4.6	5.4	
2/7/1-5	'Nero'	PHME13	chokeberry	13-May	02	02	PLBR	5	4	80	6	0.9	1.2	
	9082719		*Photinia melanocarpa*			03			3	60	4	1.3	1.7	
			Northwoods Nursery, Mollala, OR			04			3	60	4	1.8	1.7	1 browsed, 3 some fruit
						06			2	40	4	2.8	2.6	
						07			2	40	4	2.3	2.9	
2/7/5-9	9091967	PRPE2	pin cherry	20-May	05	05	PLBR	5	5	100	4	0.8	1.9	
			Prunus pensylvanica			06			5	100	4	1.7	2.2	
			Big Sioux Nursery, Watertown, SD			07			5	100	3	1.6	2.7	

Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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
2/7/6-10	9076746	AEGL	Ohio buckeye	8-May	00	00	CONT	5	4	80	4	0.3	1.2	
			Aesculus glabra			01			4	80	5	0.3	1.1	
			Ransom County, ND			02			3	60	8	0.3	1.4	
			USDA, NRCS, PMC, Bismarck, ND			04			3	60	4	1.5	1.8	
						06			3	60	5	1.4	2.7	
						07			3	60	4	1.6	3.3	
2/8/1-5	9082746	RIMI	Missouri gooseberry	2-May	03	03		5	5	100	3	1.7	1.8	
			Ribes missouriense			04			5	100	3	2.7	2.0	
			Big Sioux Nursery, Watertown, SD			05			5	100	3	2.9	2.5	
						07			5	100	4	3.8	3.2	
2/8/6-10	9091971	PHME13	chokeberry	20-May	05	05	PLBR	5	5	100	4	1.5	1.7	fairly upright stems
			Photinia melanocarpa			06			5	100	4	1.8	1.8	
			Bailey Nursery, St. Paul, MN			07			5	100	3	2.0	2.0	
2/8/11-15	'Morton'	PHME13	chokeberry	20-May	05	05	CONT	5	5	100	4	1.8	1.6	sprawling growth form
	9091977		*Photinia melanocarpa*			06			5	100	4	1.6	1.5	a few berries on 3
			USDA, ARS, Ames, IA			07			5	100	4	1.9	2.0	
2/9/1-5	9082738	CORA6	gray dogwood	2-May	03	03	PLBR	5	5	100	5	0.8	1.5	
			Cornus racemosa			04			5	100	5	1.0	1.3	slight dieback on all
			Lincoln-Oakes Nursery, Bismarck, ND			05			4	80	6	1.0	1.3	some dieback on 5
						07			4	80	4	1.1	1.4	
2/9/6-10	9082711	EUBU6	winterberry euonymus	23-May	02	02	PLBR	5	5	100	7	0.8	2.0	3 has new little leaves
			Euonymus bungeanus			03			5	100	5	1.0	2.0	
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	3	1.6	2.7	
						06			5	100	3	3.6	3.8	
						07			5	100	2	4.0	4.6	1 lots of fruit, 3 colorful leaves, 4 bright pink fruit
2/10/1-5	'Freedom'	LOKO	honeysuckle	12-May	03	03		5	5	100	4	2.4	2.3	
	9057424		*Lonicera korolkowii*			04			4	80	3	3.5	2.7	
			University of Minnesota, St. Paul, MN			05			4	80	3	3.1	3.4	
						07			4	80	2	6.5	6.1	

Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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
2/10/6-10	9076686	CRCH	roundleaf hawthorn	6-May	04	04	PLBR	5	4	80	7	3.0	0.5	
			Crataegus chrysocarpa			05			3	60	6	0.6	1.0	
			Lincoln-Oakes Nursery, Bismarck, ND			06			5	100	4	1.0	1.4	
2/10/11-16	9082891	PHOP	common ninebark	6-May	04	04	PLBR	5	4	80	4	1.1	1.6	
			Physocarpus opulifolius			05			3	60	5	1.1	1.1	grass coming into plot
			Big Sioux Nursery, Watertown, SD			06			3	60	4	1.1	1.1	
2/11/1-5	9082888	COAM3	American hazelnut	6-May	04	04	PLBR	5	5	100	4	0.7	0.8	
			Corylus americana			05			4	80	6	0.4	0.6	
			Lincoln-Oakes Nursery, Bismarck, ND			06			4	80	7	0.4	0.4	
2/11/6-10	9082887	HIRH80	seaberry	6-May	04	04	PLBR	5	5	100	5	0.6	1.4	4 is browsed
			Hippophae rhamnoides			05			3	60	5	1.0	1.6	
			Lincoln-Oakes Nursery, Bismarck, ND			06			4	80	3	1.9	2.6	some dieback 2
2/11/11-15	9082853	PRMA9	Amur chokecherry	6-May	04	04	PLBR	5	2	40	4	0.8	1.0	dieback on both
			Prunus maackii			05			3	60	3	0.9	1.8	
			Lincoln-Oakes Nursery, Bismarck, ND			06			4	80	4	1.1	2.1	
2/11/16-20	323957	PHME13	black chokeberry	23-May	06	06	PLBR	5	5	100	4	1.1	1.2	
			Photinia melanocarpa			07			5	100	5	1.3	1.3	
			Big Sioux Nursery, Watertown, SD											
3/1	9082712	CESC	bittersweet	23-May	02	02		5	5	100	5	1.0	1.0	
			Celastrus scandens			03			4	80	4	0.9	1.3	
			Lincoln-Oakes Nursery, Bismarck, ND			04			4	80	3	1.6	1.5	
						06			5	100	3	2.8	2.5	
						07			5	100	3	2.6	2.4	spreading
3/2/1-5	9081843	PIPO	ponderosa pine	16-May	05	05	CONT	5	5	100	3	0.7	1.0	
	'Hunter'		*Pinus ponderosa*			06			5	100	3	1.2	1.4	multiple leader on 3
			USDA, NRCS, PMC, Bridger, MT			07			5	100	2	1.5	2.4	

Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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
3/2/6-10	9063156	PISYM	Scots pine	May	97	98	CONT	5	5	100	2	1.6	2.0	double leader on 3,5
			Pinus sylvestris var. *mongolica*			99			5	100	3	2.4	2.4	deer damage on 1; 4 caged
			PRC, Bayan Co., Heishan Forest Farm			00			5	100	3	3.3	3.6	
						02			5	100	2	5.0	6.4	deer damage 2, poor form 5
						04			5	100	2	6.4	9.0	
						06			5	100	2	9.3	11.7	
3/3/1-5	9069162	LAOL	Dahurian larch	May	98	98	CONT	5	4	80	4	0.7	1.2	
			Larix olgensis			99			5	100	3	1.2	1.9	
			PRC, An-Tu Co., Ji-lin Province			00			5	100	2	2.8	4.2	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	4	3.4	3.4	dieback 2,5; two leaders 3
						04			5	100	5	4.1	3.9	
						07			2	40	5	4.1	3.0	trees all broke off by cows
3/3/6-10	9082611	LASI	Siberian larch	6-May	98	98	CONT	5	4	80	4	0.7	1.2	deer damage 4
			Larix sibirica			99			4	80	4	1.1	1.5	
			Minusinsk, Khakaskaya Obl., Siberia			00			5	100	4	1.2	1.8	
			USDA, ARS, Mandan, ND/NDFS Nursery, Towner, ND			02			4	80	5	1.8	1.6	
						04			5	100	5	1.6	2.2	
						07			4	80	4	2.4	3.1	
3/4/1-5	9082610	LASI	Siberian larch	6-May	98	98	CONT	5	5	100	4	0.7	1.3	
			Larix sibirica			99			5	100	4	1.1	1.8	
			East Kazakhstan			00			5	100	4	1.2	2.1	
			USDA, ARS, Mandan, ND/NDFS Nursery, Towner, ND			02			5	100	4	1.6	2.4	
						04			5	100	4	1.7	2.9	
						07			4	80	5	2.3	3.1	
3/4/6-10	9069168	LASI	Siberian larch	29-May	98	98	CONT	5	5	100	5	0.7	1.5	
			Larix sibirica			99			5	100	4	1.0	1.9	
			Dr. Helmut Mattis, Altai			00			5	100	3	1.7	2.9	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	4	2.6	3.0	
						04			5	100	3	3.7	4.9	
						07			4	80	3	4.1	5.9	

Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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
3/5/6-10	9069164	PISYM	Scots pine	29-May	98	98	CONT	5	5	100	4	0.8	1.4	
			Pinus sylvestris var. *mongolica*			99			5	100	2	1.4	2.0	
			PRC, Heilongjiang Province			00			5	100	3	2.2	2.9	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	3	3.6	4.8	
						04			5	100	2	5.3	6.7	poor form on 1
						07			5	100	2	7.9	10.8	
3/6/1-5	9076718	PISYM	Scots pine	12-May	99	99	CONT	5	5	100	4	0.7	1.0	
			Pinus sylvestris var. *mongolica*			00			5	100	3	1.4	1.6	
			PRC, Heilongjiang Province			01			5	100	4	1.6	2.5	
			USDA, NRCS, PMC, Bismarck, ND			03			5	100	3	3.1	3.8	
						05			5	100	3	4.3	5.4	yellow-green needles on all
						07			5	100	3	6.2	8.6	
3/6/6-10	9069173	PISY	Scots pine	12-May	99	99	CONT	5	5	100	3	0.7	1.4	
			Pinus sylvestris			00			5	100	3	1.4	2.0	
			Kamyshin, Russia			01			4	80	4	1.4	2.1	
			USDA, NRCS, PMC, Bismarck, ND			03			4	80	4	2.8	3.7	
						04			4	80	2	4.1	5.8	needles with very little yellow coloring
3/7/1-5	9076719	PISYM	Scots pine	14-May	99	99	CONT	5	5	100	3	0.9	1.5	
			Pinus sylvestris var. *mongolica*			00			5	100	2	1.5	2.2	
			PRC, Heilongjiang Province			01			5	100	3	2.2	3.2	
			USDA, NRCS, PMC, Bismarck, ND			03			5	100	3	3.7	4.5	
						05			5	100	2	5.2	6.6	
						07			5	80	2	6.0	8.6	
3/7/6-10	9069178	PIRE	red pine	14-May	99	99	CONT	5	5	100	4	0.6	1.1	
			Pinus resinosa			00			5	100	4	1.0	1.5	
			Walker, MN			01			5	100	4	1.1	1.9	
			USDA, NRCS, PMC, Bismarck, ND			03			4	80	4	1.8	2.5	
						05			3	60	4	2.2	3.4	4 is bent over

Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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3/8/1-5	9082889	PIMU80	Mugo pine	6-May	04	04		5	0	0				
			Pinus mugo			05		5	3	60	4	0.6	0.6	replanted in 2005
			Big Sioux Nursery, Watertown SD			06			3	60	5	0.8	0.8	
3/8/6-10	9078631	JUSC2	Rocky Mountain juniper	16-May	05	05	CONT	5	5	100	3	0.8	1.3	
	'Bridger Select'		*Juniperus scopulorum*			06			5	100	3	1.3	1.9	
			USDA, NRCS, PMC, Bridger, MT			07			5	100	2	1.6	2.9	
3/9/1-5	9069169	PINUS	Siberian pine	24-May	01	01								
			Pinus sibirica			02								replants in 2002
			Dr. Mattis, Altai, Russia			04	CONT		3	60	4	0.5	0.7	replanted in 2003
						05			2	40	4	0.6	0.8	
						07			2	40	5	0.6	0.9	
3/9/6-10	ND-500	LASI3	Siberian larch	16-May	05	05	CONT	5	5	100	4	0.8	1.1	5 was mowed off
			Larix sibirica			06			3	60	4	1.0	1.5	some dieback on 3
			USDA, NRCS, PMC, Bismarck, ND			07			3	60	5	1.0	1.6	
4/2/6-10	9063152	BEPL	Japanese birch	6-May	98	98	CONT	5	4	80	3	1.0	2.1	5 browsed
			Betula platyphylla			99			4	80	2	3.0	4.0	
			PRC, Kedong Co., Heilongjiang			00			4	80	2	4.5	5.9	
						02			4	80	4	5.8	6.1	3 poor form
						04			4	80	4	4.5	6.3	1 broken by cows;
						07			3	60	5	4.3	4.3	3 broken branches
4/3/1-5	9069177	QUMA	bur oak	6-May	98	98	PLBR	5	4	80	6	0.5	1.0	
			Quercus macrocarpa			99			4	80	4	1.2	1.2	
			E.T. Jacobson, Walker, MN			00			5	100	5	1.2	1.8	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	5	1.9	2.3	
						04			5	100	4	1.5	2.7	2 has broken branches
						07			5	100	2	2.0	4.4	

Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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
4/3/6-10	9076739	QUERC	hybrid oak	6-May	98	98	PLBR	5	4	80	8	0.4	0.9	
			Quercus			99			4	80	6	0.7	0.8	
			E.T. Jacobson, Walker, MN			00			3	60	5	1.3	2.0	
			USDA, NRCS, PMC, Bismarck, ND			02			3	60	5	2.1	2.1	
						04			3	60	4	1.0	2.3	
						07			3	60	5	1.8	2.4	
4/4/1-5	9069170	QURO	English oak	29-May	98	98	CONT	5	5	100	6	0.6	0.9	
			Quercus robur			99			5	100	4	1.4	1.2	
			400 K North of Volgograd, Russia			00			5	100	5	2.0	1.7	
			USDA, NRCS, PMC, Bismarck, ND			02			5	100	4	2.6	2.6	dieback on 2
						04			5	100	4	2.0	2.6	
						07			5	100	4	3.7	3.8	
4/5/6-10	9076737	PRSE2	black cherry	6-May	04	04	PLBR	5	5	100	4	1.0	1.9	1 bent, 3 broken branches
			Prunus serotina			05			3	60	3	1.9	3.0	broken branches on 3
			Lincoln-Oakes Nursery, Bismarck, ND			06			2	40	4	2.4	3.8	
4/6/1-5	9082886	POTR5	aspen	6-May	04	04	PLBR	5	5	100	4	0.6	1.5	
			Populus tremuloides			05			5	100	4	1.4	2.3	some top dieback on 1,
			Lincoln-Oakes Nursery, Bismarck, ND			06			4	80	3	3.1	3.8	dieback on 5
4/6/6-10	9082885	POTR5	aspen	6-May	04	04	PLBR	5	4	80	5	0.3	1.5	
			Populus tremuloides			05			3	60	3	1.3	2.3	
			NDFS Nursery, Towner, ND			06			3	60	3	2.0	3.4	
4/7/1-5	9082631	BEPL	Japanese birch	8-May	00	00	CONT	5	5	100	3	1.6	4.4	branches broke on 2
			Betula platyphylla japonica			01			5	100	6	1.4	1.7	
			Lawyer Nursery, Plains, MT			02			4	80	5	2.2	2.4	
						04			2	40	4	2.0	2.5	
						06			1	20	5	4.0	4.8	multiple stemmed
						07			0	0				poorly adapted

Project No.: 38A345K Field Evaluation of Woody Plant Materials, Apple Valley, ND
Year of Record: 2007

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
4/7/6-10	9082650	POPUL	Soongarica poplar	15-May	00	00	CONT	5	5	100	4	1.7	3.0	
			Populus			01			5	100	3	2.9	4.2	
			Valley Nursery, Helena, MT			02			5	100	4	4.2	5.4	many stems on 1
						04			5	100	4	4.0	4.6	dieback on 4,5
						06			4	80	5	4.8	5.4	severe dieback every year
4/8/1-5	9082713	PRPEP2	Siberian peach	23-May	02	02	PLBR	5	4	80	4	2.6	2.6	
			Prunus persica			03			5	100	3	3.2	3.6	some dieback
			Lincoln-Oakes Nursery, Bismarck, ND			04			5	100	5	2.7	3.2	dieback on all 5
						06			4	80	4	3.5	4.2	severe dieback every year
						07			4	80	6	3.0	4.1	
4/8/6-10	9091968	GYDI	Kentucky coffeetree	16-May	05	05	PLBR	5	5	100	4	0.3	1.4	
			Gymnocladus dioicus			06			5	100	4	0.9	1.6	dieback on 5
			Big Sioux Nursery, Watertown, SD			07			5	100	4	0.4	1.2	
4/9/1-5	9082619	FRPE	green ash	24-May	01	01	CONT	5	5	100	4	0.5	1.4	
			Fraxinus pennsylvanica			02			5	100	3	1.2	2.0	
			Jordan, MT/Valley Nursery, Helena, MT			03			5	100	4	1.7	2.4	
						05			5	100	5	1.6	2.6	multi-stemmed
						07			5	100	4	2.2	2.8	poor form 1,2,3
4/9/6-10	ND-614	GYDI	Kentucky coffeetree	16-Apr	02	02	CONT	5	4	80	5	0.7	1.9	
	9005910		*Gymnocladus dioicus*			03			2	40	4	1.0	2.2	
			Union County, South Dakota			04			2	40	6	0.9	1.4	dieback on 4
						06			1	20	2	2.3	4.0	
						07			1	20	3	1.3	4.0	

OFF-CENTER EVALUATION PLANTING: TECHNICAL REPORT 2007

Study NDPMC-T-0201-CP

Study Title: Eastern South Dakota Soil & Water Research Farm, Brookings, South Dakota

Purpose: The purpose of the farm is to find solutions to national and regional concerns related to soil and water conservation and the efficiency and sustainability of agricultural production. Research and technology transfer activities on the farm are conducted by a partnership including: USDA Agricultural Research Service, USDA- Natural Resources Conservation Service, South Dakota State University, South Dakota Agricultural Experiment Station, the Brookings County Conservation District, as well as 14 other County Conservation Districts from eastern South Dakota.

History: The Eastern South Dakota Soil and Water Research Farm, Inc. is a non-profit organization consisting of a Board of Directors elected from each of 15 Soil and Water Conservation Districts in eastern South Dakota. Brookings, Codington, Clark, Day, Deuel, Hamlin, Kingsbury, Lake, Lincoln, Marshall, McCook, Minnehaha, Minor, Moody, and Turner Soil and Water Conservation Districts are represented on the Board of Directors. The purpose of the corporation is to promote research of efficient farm production practices that conserve soil and water resources.

The corporation purchased 100 acres of land in Lake County, SD near the community of Madison in 1959. This land was leased to the USDA Agricultural Research Service. The work performed at the Madison farm included evaluation of the erosion of different soil types, development of tillage practices to conserve soil and water, determination of efficient crop production methods, and modeling plant-insect interactions. Research was conducted by scientists from the North Central Soil and Water Conservation Laboratory, ARS, Morris, MN; the Northern Grain Insects Research Laboratory, ARS, Brookings, SD; and the South Dakota State Agricultural Experiment Station.

In an effort to improve program efficiency and facilitate productive cooperative research programs that would more effectively solve some of the problems that are associated with agriculture in eastern South Dakota, the Board of Directors decided to relocate the research farm closer to the research laboratories. The Madison research farm was sold in 1987, and the Corporation purchased another tract of land in Brookings County.

The Brookings Research Farm consists of 80 acres located approximately one mile north of the campus of South Dakota State University. The soils on this farm are characteristic of those found in northeastern South Dakota and west central Minnesota and are similar to soils common to the northern Corn Belt. A new building was constructed in 2006. Some trees were removed during the construction.

Methods and Materials

Assembly: The first tree planting trials were started in 2000 when 16 species were planted. An additional six species were planted in 2001. These trials were used to showcase different types of tree species and various weed control methods. Currently, 27 accessions of 26 different species are being evaluated.

In 2004, the PMC staff became involved in planting some additional tree and shrub accessions that will be evaluated on an annual basis. Refer to Table BR-2 for entries planted from 2004-2007.

For the 2007 weather summary at Brookings, see Table BR-1.

Planting Plan: The layout of the evaluation plots is shown in Figure BR-1 and Figure BR-2. The tree and shrub plots are in the northeastern area of the Research Farm.

Site Preparation: Strips to be planted are chemically killed with glyphosate, and then tree fabric is laid down.

Planting Method: All trees and shrubs were planted by hand.

Weed Control/Plot Management:

Evaluations and Measurement: The plots were evaluated on August 13, 2007. Plant performance data is recorded during the growing season for three years. After the third year, data is gathered according to a specific schedule. Records of planting date, survival, vigor, fruit (seed) amount, canopy width, plant height, winter injury, disease symptoms, and insect damage are recorded. Select data appears in this report. Annual summary reports have been prepared since 2006 and can be requested from the PMC.

Figure BR-1.

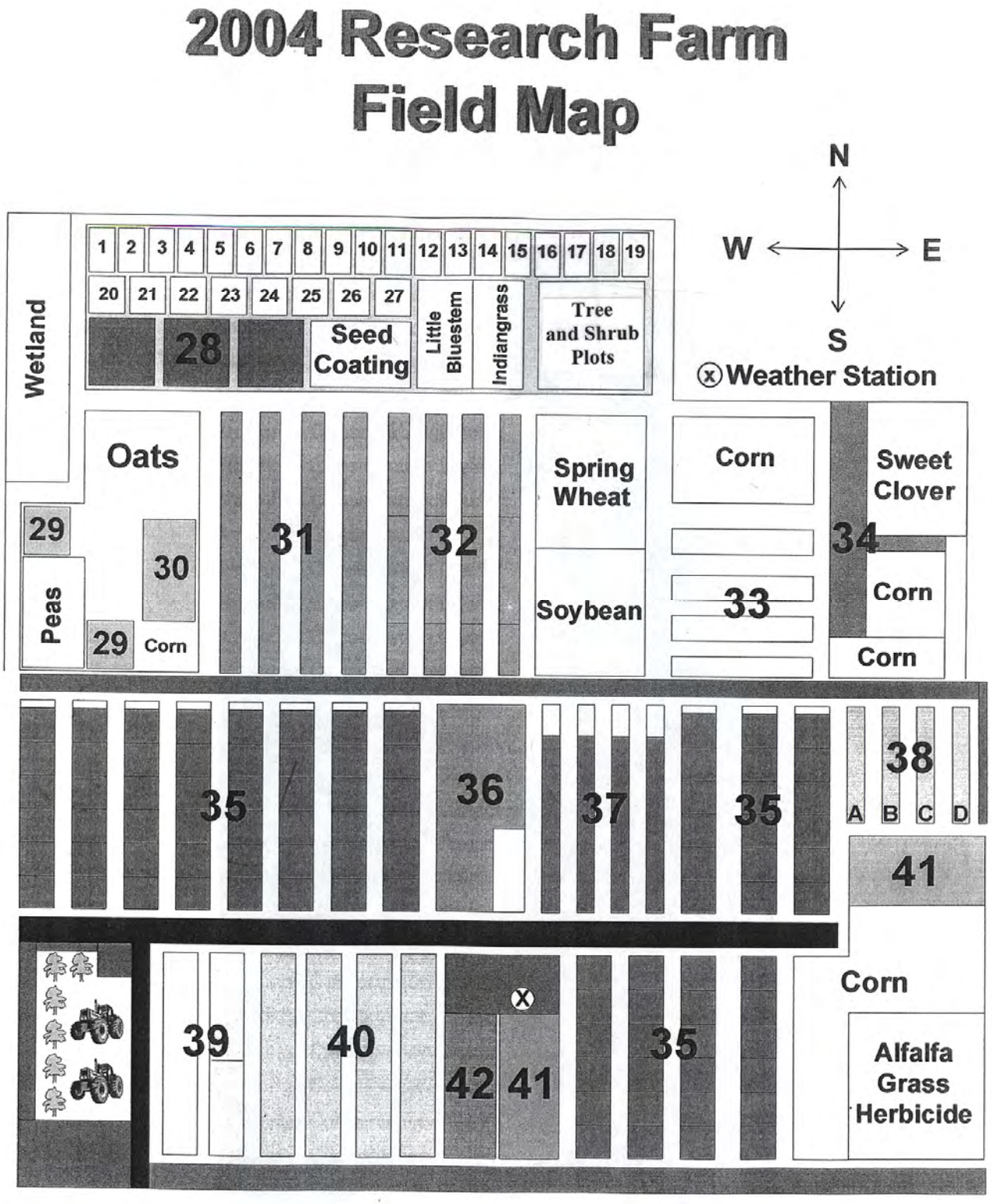

2004 Research Farm
Field Map
N
W
E
S
Weather Station
Wetland
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27
28
Seed Coating
Little Bluestem
Indiangrass
Tree and Shrub Plots
Oats
29
30
31
32
Spring Wheat
Soybean
Corn
33
Sweet Clover
34
Corn
Corn
Peas
29
Corn
35
36
37
35
38
A B C D
41
Corn
39
40
42
41
35
Alfalfa
Grass
Herbicide

Figure BR-2.

USDA-NRCS, BISMARCK PLANT MATERIALS CENTER TREE AND SHRUB EVALUATION PLOTS
EASTERN SOUTH DAKOTA SOIL AND WATER RESEARCH FARM, BROOKINGS, SD

Short to Medium Shrubs (south side)

Row 1

(S) 1. **(east end)** Mugo pine (9082889), introduced evergreen with conservation potential from Big Sioux Nursery.
2. Common ninebark (9082891), native species from Iowa grown by Big Sioux Nursery.
3. Wayfaring bush (9082642), introduced species grown by Lincoln-Oakes Nurseries from long-lived specimens growing at the Oakes Nursery.
4. Seaberry (9082887), introduced suckering shrub silver in color with orange fruit high in vitamin C content.
5. American hazelnut (9082888), native species from North Dakota grown by Lincoln-Oakes Nurseries.
6. American currant (9082687), native species from South Dakota grown by Big Sioux Nursery.
7. Missouri gooseberry (9082746), native species from South Dakota grown by Big Sioux Nursery.
8. Gray dogwood (9082890), native species from Minnesota grown by Big Sioux Nursery.
9. Gray dogwood (9082738), native species from Wisconsin grown by Lincoln-Oakes Nurseries.
10. Roundleaf hawthorn (9076686), natives species from South Dakota selected by the Bismarck Plant Materials Center.
11. **(west end)** Pin cherry (9091967), native seed source from the Black Hills from Big Sioux Nursery.

Row 2

1. **(east end)** Arrowwood viburnum (9091976), Iowa seed source from Lincoln-Oakes Nursery.
2. Winterberry (9082711), original source from NDSU.
3. Shadblow serviceberry (9091975), commercial source from Lincoln-Oakes Nursery.
4. Chokeberry (9091971), from Bailey Nursery.
5. Chokecherry (9008183), Sheridan County, North Dakota, selected by Bismarck PMC for western-X resistance and high quality fruit yield.
6. Russian peashrub (9091969), suckering species from Big Sioux Nursery.
7. Common juniper (9019593) originates from Wilton Mine, Wilton, ND. Grown by PMC.
8. 'Silverscape' olive hybrid (9092054), Russian olive/silverberry hybrid. Grown by Lincoln-Oakes Nurseries.
9. Staghorn sumac (9092053), seed source from New York grown by Lincoln-Oakes Nurseries.
10. Ironwood (9082739) seed source from Sertoma Park, Bismarck, ND.
11. **(west end)** Skunkbush sumac (9091964) native species from Cave Hills, SD, grown by PMC.

Row 3

1. **(east end)** Cathedral Siberian/Japanese elm X (9092142), S&B Nursery, Bismarck/Bailey's Nursery, St. Paul, MN

Row 4

2. Apricot (9082895), origin Rod O'Clair's yard, Jamestown, ND, grown by PMC.

Medium to Tall Trees (north side)

Row 1

(T) (spaded) 1. **(east end)** Amur chokecherry (9082853), introduced from China. Bronze colored bark and is non-suckering. Grown by Lincoln-Oakes.
(spaded) 2. Black cherry (9076737), native to most of the eastern half of the U. S. Grown by Lincoln-Oakes Nurseries.
Nannyberry (9092141), commercial source Schumacher's, Heron Lake, MN
Korean mountain ash (9092140), commercial source Big Sioux Nursery, Watertown, SD

Row 2

1. **(east end)** Juniper (Bridger-Select), from Bridger PMC, Montana.
2. Ponderosa pine (Hunter), from Bridger PMC, Montana.

Row 3

1. **(east end)** Northern catalpa (9092051), comercial source from Big Sioux Nursery.

Table No. BR-1: 2007 Weather Summary - Official Station - Brookings, South Dakota					
	Mean Temperature		Precipitation (inches)		
	(degrees Fahrenheit)		Actual		Deviation from Normal
Month	**2007**	**Normal***	**2007**	**Normal***	**2007**
January	16.8	10.9	0.28	0.34	-0.06
February	9.5	17.9	0.49	0.40	0.09
March	34.2	30.1	1.73	1.29	0.44
April	40.9	44.2	3.62	2.03	1.59
May	60.7	56.7	1.86	2.95	-1.09
June	68.1	66.1	2.99	4.23	-1.24
July	71.7	70.7	0.14	3.11	-2.97
August	68.4	68.6	6.45	2.94	3.51
September	60.6	59.1	1.20	2.48	-1.28
October	50.5	46.3	3.49	1.78	1.71
November	32.1	30.0	0.02	1.00	-0.98
December	13.3	16.3	0.59	0.26	0.33
Annual	**43.9**	**43.1**	**22.86**	**22.81**	**0.05**
M=missing data					
*National Climate Data Center 1971-2000 Monthly Normals					
		2007			
Last Frost (28 degrees)		15-Apr			
First Frost (28 degrees)		23-Oct			
Frost Free Period		190 days			

Key to Table BR-2. 38I347K Field Evaluation of Woody Plant Materials – Brookings, South Dakota

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 BR-2.
Study No.: NDPMC-T-0201-CP, Field Evaluation of Woody Plant Materials, Brookings, SD
Year of Record: 2007

PLOT LOCATION	ACCESSION NUMBER	PLANT SYMBOL	GENUS/SPECIES ORIGIN/SOURCE	NO SRV	PCT SRV	VI	CAN COV (ft)	PLT HT (ft)	REMARKS
S1-1	9082889	PIMU80	mugo pine	4	80	5	0.9	1.1	
			Pinus mugo	5	100	4	1.0	0.7	replant 3
			Big Sioux Nursery, Watertown, SD	5	100	3	1.4	0.8	1 open form
S1-2	9082891	PHOP	common ninebank	5	100	2	1.4	1.9	
			Physocarpus opulifolius	5	100	2	3.7	3.5	
			Big Sioux Nursery, Watertown, SD	5	100	3	5.0	5.0	1 blight on leaves, 4 good seed
S1-3	9082642	VILA	wayfaring bush	5	100	3	0.7	1.2	
			Viburnum lantana	5	100	3	1.3	1.7	leaf burn on all
			Lincoln-Oakes Nursery, Bismarck, ND	5	100	3	2.0	2.6	
S1-4	9082887	HIRH80	seaberry	5	100	3	0.9	2.2	
			Hippophae rhamnoides	5	100	3	1.9	2.9	
			Lincoln-Oakes Nursery, Bismarck, ND	5	100	3	3.3	4.1	
S1-5	9082888	COAM3	American hazelnut	5	100	7	0.3	0.6	1 browsed off
			Corylus americana	5	100	5	0.6	0.7	leaf burn on all
			Lincoln-Oakes Nursery, Bismarck, ND	5	100	3	1.0	1.4	
S1-6	9082687	RIAM	American currant	5	100	2	1.2	1.8	
			Ribes americana	5	100	3	4.0	2.6	mildew spot on all
			Bix Sioux Nursery, Watertown, SD	5	100	3	5.0	3.2	1,2 blight, leaf drop
S1-7	9082746	RIMI	Missouri gooseberry	5	100	3	1.8	1.7	
			Ribes missouriense	5	100	3	3.1	2.5	red fall color on all
			Big Sioux Nursery, Watertown, SD	5	100	3	3.8	3.3	3-5 some leaf drop, blight
S1-8	9082890	CORA6	gray dogwood	5	100	4	0.8	1.3	3 browsed
			Cornus racemosa	5	100	3	1.4	1.9	leaf spot on 5
			Big Sioux Nursery, Watertown, SD	5	100	3	2.2	2.6	1,2,5 leaf spot
S1-9	9082738	CORA6	gray dogwood	5	100	2	1.1	2.4	
			Cornus racemosa	5	100	3	1.9	2.8	leaf spot on 1 and 5
			Lincoln-Oakes Nursery, Bismarck, ND	5	100	2	3.4	3.8	1 bad leaf spot

Study No.: NDPMC-T-0201-CP, Field Evaluation of Woody Plant Materials, Brookings, SD
Year of Record: 2007

PLOT LOCATION	ACCESSION NUMBER	PLANT SYMBOL	GENUS/SPECIES ORIGIN/SOURCE	NO SRV	PCT SRV	VI	CAN COV	PLT HT (ft)	HT (ft)	REMARKS
S1-10	9076686	CRCH	roundleaf hawthorn	5	100	4	0.4	0.5		heavily browsed
			Crataegus chrysocarpa	4	80	4	0.7	1.3		browsed
			Lincoln-Oakes Nursery, Bismarck, ND	5	100	5	1.0	2.0		1 white aphid
S1-11	9091967	PRPE2	pin cherry	5	100	3	2.9	2.9		5 close spacing
			Prunus pensylvanica	5	100	3	4.2	4.1		4,5 leaf spot
			Big Sioux Nursery, Watertown, SD	5	100	3	4.3	5.0		
S2-1	9091976	VIDE	arrowwood viburnum	5	100	3	0.9	2.2		1 and 4 has fruit
			Viburnum dentatum	5	100	3	2.2	2.6		clean leaves, no disease
			Lincoln-Oakes Nursery, Bismarck, ND	5	100	3	3.1	3.3		no fruit
S2-2	9082711	EUBU6	winterberry	5	100	4	0.7	1.2		
			Euonymus bungeanus	5	100	4	1.1	1.5		
			Lincoln-Oakes Nursery, Bismarck, ND	5	100	4	2.1	2.7		
S2-3	9091975	AMELA	serviceberry	5	100	4	0.9	1.9		leaves chewed on
			Amelanchier lamarckii	5	100	3	3.0	2.9		
			Lincoln-Oakes Nursery, Bismarck, ND	5	100	2	3.9	3.8		
S2-4	9091971	PHME13	black chokeberry	5	100	3	1.5	2.1		fruit on all
			Photinia melanocarpa	5	100	3	2.2	2.7		
			Bailey Nurseries, Inc.	5	100	2	2.7	3.3		
S2-5	9008183	PRVI	common chokecherry	5	100	3	0.7	2.5		
			Prunus virginiana	5	100	3	2.0	4.0		shot hole on all
			Lincoln-Oakes Nursery, Bismarck, ND	5	100	3	2.6	5.4		shot hole on all
S2-6	9091969	CAFR80	Russian peashrub	5	100	4	0.5	2.2		
			Caragana frutex	5	100	6	0.4	1.3		
			Big Sioux Nursery, Watertown, SD	5	100	6	0.5	1.5		deer browse on all
S2-7	9019593	JUNIP	common juniper	5	100	3	2.6	0.8		
			Juniperus sp.	5	100	2	3.9	0.8		
			Wilton Mine, ND/McKenzie FEP, ND							

Study No.: NDPMC-T-0201-CP, Field Evaluation of Woody Plant Materials, Brookings, SD
Year of Record: 2007

PLOT LOCATION	ACCESSION NUMBER	PLANT SYMBOL	GENUS/SPECIES ORIGIN/SOURCE	NO SRV	PCT SRV	VI	CAN COV	PLT HT (ft)	REMARKS
S2-8	9092054	ELAEA	Russian olive/silverberry hybrid	2	40	2	3.1	4.3	2,3,5 recently dead, canker?
	'Silverscape'		*Elaeagnus X* 'Jefmorg'	4	80	6	1.4	2.6	
			Lincoln-Oakes Nursery, Bismarck, ND						
S2-9	9092053	RHTY	staghorn sumac	5	100	3	3.8	5.0	clean leaves, no disease
			Rhus typhina	5	100	5	4.8	6.2	
			Lincoln-Oakes Nursery, Bismarck, ND						
S2-10	9082739	OSVI	ironwood	5	100		0.7	1.4	rabbit damage 1,5
			Ostrya virginiana						
			Sertoma Park, Bismarck, ND						
			USDA, NRCS, PMC, Bismarck, ND						
S2-11	9091964	RHTR	skunkbush sumac	5	100	3	0.8	1.3	
			Rhus trilobata						
			Cave Hills, SD						
			USDA, NRCS, PMC, Bismarck, ND						
S3-1	'Cathedral' 9092142	ULMUS	Siberian/Japanese elm cross	5	100	4	1.6	8.6	no leaves on 1
			Ulmus X 'Cathedral'						
			S& B Nursery, Bismarck, ND (Bailey's)						
		VILE	nannyberry	5	100	2	0.5	1.4	
			Viburnum lentago						
			Schumacher's, Heron Lake, MN						
S4-2 9092141	9082895	PRAR3	apricot	3	60	7	0.5	1.0	
			Prunus armeniaca						
			Rod O'Clair, Jamestown, ND						
			USDA, NRCS, PMC, Bismarck, ND						
	9092140	SOAL9	Korean mountain ash	5	100	6	0.4	1.2	rabbits 1,5; no leaves 1,4
			Sorbus alnifolia						
			Big Sioux Nursery, Watertown, SD						

Study No.: NDPMC-T-0201-CP, Field Evaluation of Woody Plant Materials, Brookings, SD
Year of Record: 2007

PLOT LOCATION	ACCESSION NUMBER	PLANT SYMBOL	GENUS/SPECIES ORIGIN/SOURCE	NO SRV	PCT SRV	VI	CAN COV	PLT HT (ft)	HT (ft)	REMARKS
T1-1	9082853	PRMA9	amur chokecherry	5	100	3	1.4	2.6		
			Prunus maackii	4	80	4	2.4	4.3		
			Lincoln-Oakes Nursery, Bismarck, ND	5	100	3	3.3	5.4		
				5	100	4	3.4	5.3		
T1-2	9076737	PRSE2	black cherry	5	100	3	1.4	2.3		
			Prunus serotina	5	100	4	2.4	4.1		
			Lincoln-Oakes Nursery, Bismarck, ND	5	100	4	4.6	5.9		
				5	100	6	4.0	5.3		
T2-1	'Bridger Select'	JUSC2	Rocky Mountain juniper	5	100	2	0.8	1.5		good color
	9078631		*Juniperus scopulorum*	5	100	2	1.5	2.8		
			USDA, NRCS, Bridger, MT	4	80	2	1.9	3.2		
T2-2	Hunter	PIPO	ponderosa pine	5	100	3	0.6	1.2		
	germplasm		*Pinus ponderosa*	5	100	2	1.3	1.8		
	9081843		USDA, NRCS, Bridger, MT	5	100	2	1.6	2.1		

ASSEMBLY AND INITIAL EVALUATION

Major Seed Source Studies and Assemblies

MAJOR SEED SOURCE STUDIES AND ASSEMBLIES: TECHNICAL REPORT - 2007

Study 38I013J/38A127J Apple Creek Township, Burleigh County, North Dakota

Study Title: Evaluation of Hawthorn, *Crataegus*.

Introduction: Hawthorns are thorny shrubs or small trees. This large and diverse genus is widely distributed throughout the north temperate zone. The dense, compact form and red fruit make it valuable for wildlife nesting, food, and cover. Hawthorn can be used for shrub rows in multiple row windbreaks, surface mine revegetation, critical area plantings, recreational area developments, wildlife habitat, natural areas, and barrier plantings. Three species are indigenous to North and South Dakota. They are fleshy (*C. macracantha*), round leaved (*C. chrysocarpa*), and downy hawthorn (*C. mollis*). Interspecific hybrids of fleshy and round leaved hawthorn may be found. Fireblight and cedar apple rusts are problems.

Objective: The objective is to assemble, comparatively evaluate, select, increase, and release one or more adapted cultivars of hawthorn. Criteria for selection will include growth rate, form, disease and insect resistance, survival, and fruit production. Seed orchards will be established to produce seed for commercial increase.

Cooperators: The USDA Natural Resources Conservation Service, Plant Materials Center, Bismarck, North Dakota, in cooperation with the USDI Fish and Wildlife Service.

Location: Waterfowl Production Area, approximately 5 miles east and 1 mile south of Bismarck, North Dakota, on Old Highway 10. Legal description: N 1/2 sec. 1, T. 138 N., R. 79 W.; S 1/2 sec. 31, T. 139 N., R. 78 W. Elevation is approximately 1,700 ft.

Major Land Resource Area: The site is located in Major Land Resource Area 53B, Central Dark Brown Glaciated Plains. Most soils are derived from calcareous glacial till. The gently rolling plain includes some areas of kames and moraines that have irregular topography. Forty percent of the area is rangeland.

Soils: There are seven different soils mapping units in the planting area:

R, RB - Roseglen silt loam or loam, 0 to 3 percent slope.
P, PB - Parshall, fine sandy loams or sandy loam, 0 to 3 and 3 to 6 percent slope.
TeB - Telfer fine sandy loams or sandy loam, 3 to 6 percent slope.
Ty, Tyl - Tally fine sandy loam or sandy loam, 0 to 3 percent slope.

The Roseglen series consists of deep, moderately well-drained soils formed in loamy sediments on glacial lake plains. The surface layer is dark grayish-brown silt loam 8 inches thick. The subsoil is dark grayish-brown and grayish-brown silt loam 26 inches thick. The substratum is light yellowish-brown and light brownish-gray silt loam. Permeability is moderate. Available water capacity, the organic matter content, and fertility are high. Slopes are 0-9 percent.

These soils are in North Dakota windbreak suitability group 1. Soil moisture is favorable for the growth and survival of trees and shrubs. These soils are well suited to all types of windbreaks and other plantings. Soil blowing is a serious hazard on some soils.

The Parshall series consists of deep, well-drained soils formed in fine sandy loam alluvium on terraces and outwash plains and in upland swales. The surface layer is dark grayish-brown fine sandy loam 14 inches thick. The subsoil is dark grayish-brown, very friable fine sandy loam in the upper 17 inches and grayish-brown fine sandy loam in the lower 6 inches. The underlying material is light brownish-gray fine sandy loam in the upper 12 inches and grayish-brown sandy loam buried surface layer in the lower 13 inches.

Permeability is moderately rapid. The available water capacity is moderate. The organic matter content is high and fertility is medium. Slopes are 0-15 percent.

These soils are in North Dakota windbreak suitability group 5. These are well-drained loams and sandy soils. These soils are suited to windbreak and other plantings, but selection of species is limited. The erosion hazard is serious.

The Telfer series consists of deep, excessively and somewhat excessively drained soils formed in sandy sediments in terraces and uplands. The surface layer is dark grayish-brown loamy sand 6 inches thick. The next 8 inches is grayish-brown fine sand. The underlying material is light olive brown fine sand. Permeability is rapid. Available water capacity is low. Organic matter content is moderate and fertility is low. Slopes are 0-20 percent.

These soils are in North Dakota windbreak suitability group 7. These soils are deep, sandy, and somewhat excessively drained. These soils are suited to plantings for wildlife, recreation, and beautification but optimum survival, growth, and vigor of the plants should not be expected. Soil blowing is a serious hazard.

The Tally series consists of deep, well-drained soils that formed in material derived from eolian deposits, alluvium, or glacial outwash material. These soils are on terraces, fans, and foot slopes of hills in uplands. The upper 14 inches is a dark brown sandy loam. The next horizons, down to 38 inches, are a brown sandy loam.

These soils are in North Dakota windbreak suitability group 5. These are well-drained, loamy, and sandy soils. These soils are suited to windbreak and other plantings, but selection of species is limited. The erosion hazard is serious.

Climate: MLRA 53B. The average annual precipitation is 15 to 18 inches; highest in the growing season. Rainfall is low and somewhat erratic. The average annual temperature is 40 to 60 degrees F. Average freeze-free period is 105 to 140 days. The plant hardiness zone is 3b with an average annual minimum temperature of -40 to -30 degrees F. For the 2007 weather summary, see Table AV-1 on page 148.

Method and Materials

Assembly: The assembly was initiated in 1976 and completed in 1977. One hundred thirty-nine accessions were collected by NRCS field personnel from native stands in North Dakota and South Dakota. Included were Major Land Resource Areas 53, 54, 55, 58, 60, 61, and 63. In addition, 45 accessions were obtained from the Canada Agriculture Research Station, Morden, Manitoba, Canada.

Seed Processing: Collected fruit was processed upon receipt at the PMC. The processing consisted of macerating and washing fruit to separate the pulp from the seed. The cleaned seed was dried, weighed, and placed in sealed, cool, dry storage (45 to 60 degrees F, 30 percent relative humidity). Six pounds of fruit yielded one pound of seed.

Seedling Establishment: 1978: Approximately 5,000 seeds of each accession were planted 1/2-inch deep with 30-inch row spacing using a tractor mounted belt seeder on October 13. The area was covered with a heavy layer of wood fiber mulch and kept moist. A study was conducted to determine a faster, more reliable method of promoting germination (1978 Annual Technical Report). It was determined that a 90-day warm period (70 to 80 degrees F) followed by 140 days of cold (34 to 38 degrees F) in moist, sometimes dry soil, was the best method.

1979: On May 10-11, approximately 2,000 seeds of each accession were placed in small plastic trays containing a moist mixture of one part soil, one part perlite, and two parts peat moss. The trays were

placed in the PMC greenhouse at 70 to 80 degrees F and kept moist until September 25. This provided the necessary 90-day warm stratification. Next, the trays were moved to cold storage and kept at 32 to 34 degrees F until spring to fulfill the required cold stratification period.

The fall 1978 field seeded accessions of hawthorn showed no signs of germination during the year.

1980: In May, trays of cold stratified seed were removed from cold storage and placed in the PMC greenhouse. The resulting seedlings were transplanted into 'Styrobloc' containers and placed in the PMC lathhouse under sprinkler irrigation. Dead seedlings were replaced until transplant seedlings were no longer available. In October 1980, all plants were placed in the PMC tree storage cooler. Containers were later taken from the cooler in December and set in the greenhouse to provide an additional growing period for the seedlings.

1981: After the seedlings were moved to the greenhouse in December 1980, a reaction to short day length and/or insufficient cold stratification caused the plants to enter a dormant stage. Buds swelled, but no further growth was initiated in the greenhouse. Attempts to break bud dormancy during the winter (1980-1981) by increasing day length with artificial lighting proved unsuccessful. Seedlings were returned to the cooler on February 19 for an additional cold period, then moved back to the greenhouse in early May. Within one week new growth was initiated. According to publications concerning nursery practice, hawthorn may require a period of high humidity in order to break bud. Covering the plants with a layer of plastic and wet packing material for 10 days under warm temperatures (50 to 60 degrees F) will hasten the process.

At the end of May, all containers were placed in the lathhouse for the summer growing season. Seedlings ranged in height from 4 to 8 inches by October. Four inches of shingletow was spread over the plants for protection during outdoor winter storage. Rodent repellent and poison was applied to deter mice.

1982: All seedlings were sprinkler irrigated and fertilized on a regular schedule during the year. Plants averaged in height from 7 to 23 inches. All plants were prepared for winter by treating with animal repellent and covering with shingletow.

Planting plan: The test plantation is a randomized block design with some blocks incomplete; four plants per plot with five replications. Spacing is 14 feet between rows and 10 feet within row. An additional outside row was planted to offset border effects.

Plot preparation: A clean, firm planting site was prepared by disking and harrowing.

Planting method: All seedlings were planted using approved forestry methods.

Planting date: May 25, 1983. Replacements planted in May 1984.

Fertilization: No fertilizer has been applied to the planting area.

Weed control: No herbicide was applied to any plot during the year of establishment or in succeeding years. Mechanical control was by clean cultivating between rows, within row, and in fallow areas. Four to six tillage operations were performed each year in the months of May through August. Hand hoeing was done as needed to control weeds in row.

1985-1988: In addition to hand hoeing and tillage, a mechanical within row tree cultivator was used twice during the summer.

1989: Due to drought conditions, the cover crop seeded in 1988 was only mowed, not tilled. A mechanical within row tree cultivator was used within the rows.

1990-1992: In addition to tillage between rows, a mechanical within row tree cultivator was used twice during the summer.

Biological control: No insecticides have been applied. Animal repellent was applied in the fall 1983 and 1984 to discourage rodent damage. Plastic net tubes were placed over the seedlings to protect them from deer and rabbit browse. No repellent was applied in 1985. In 1987, the hawthorn was sprayed with Bonide repellent.

Irrigation: None.

Crop residue management: Each year in September a winter cover crop of oats or rye was seeded between rows. During the drought, the present cover was kept mowed to prevent soil blowing. In 1993, a permanent cover of sideoats grama, blue grama and black medic was established.

Silvicultural practices: Mechanically damaged limbs were cut and removed each year for sanitation. Weak or diseased specimens have not been treated or cleared as of 1989 in order to preserve the integrity of the evaluation process.

Evaluation and Measurement: 1983: Planting date, survival, and plant height were recorded on September 4.

1984: Plant performance was recorded in September. Notes were taken on survival, canopy width, and plant height.

1985: In addition to reporting survival, canopy width, and plant height, plants were individually scored for vigor and animal browse.

1986-1987: Plants were evaluated for survival, vigor, plant height, crown width, and disease and insect resistance.

1988: Survival, vigor, resistance to disease and insects, and extent of animal damage were rated using the HP-71B data recorder.

1989: Plants were rated for vigor and fruit production.

1990: Due to drought, no evaluations were made.

1991: Survival and vigor were rated. Plant specimens of superior accessions were collected for identification.

1992: Survival, vigor, and fruit amount were rated. Plant specimens were collected.

1993: Plant specimens were collected.

1993-1997: Grass was mowed between rows several times each year. Within-row weed control was done with a rotary tree cultivator. Wormwood and Canada thistle were spot sprayed with Roundup (Banvel).

1998-2001: Grass mowed between rows. Wormwood and thistle were sprayed.

Results

Plant performance: 1983: A total of 1,452 plants were planted with a survival rate of 98 percent. Moisture was adequate for plant establishment, weed control was excellent, and little animal damage was noted.

1984: Available replacements were planted in May. All seedlings became established and performed well.

1985: Of the original 139 accessions, 75 of the native and 31 of the introduced are established in the plantation. Refer to Tables CRAT-1 and CRAT-2. Survival rate continued to be 98 percent. Despite growth reduction from moderate deer browse, growth rates averaged 15 cm/year with a range of 0 to 23. Maximum recorded height was 100 cm. (3.5 feet). Introduced species rate higher in vigor than native sources at this early age. No significant insect or disease problems were noted. Any geographic trends in size or growth rate are not yet obvious.

1986: Some accessions have heights in excess of 125 cm. (4.0 feet).

1987: One of the tallest, most uniform accessions is ND-1566 from Norman County, Minnesota, with heights reaching up to 155 cm. (5.2 feet). Many of the plants continue to be browsed by deer.

1988: More accessions are starting to express their vigor by putting on excellent growth. A few of the introduced hawthorn accessions produced some fruit. A total of 990 native hawthorn plants and 442 introduced hawthorn plants are alive.

1989: More plants are growing beyond the reach of the deer. Eighteen percent of the native hawthorn produced fruit while only thirteen percent of the introduced plants did. Only three accessions have lost all four trees in a plot.

1991: The native hawthorn has performed better than the introduced hawthorn. There are 972 native hawthorn plants alive, for a survival of 95 percent. There are 369 introduced hawthorn still living, which is 77 percent of the original planting. Three superior accessions from South Dakota (ND-1628, ND-1538, ND-1694) were identified by Dr. J. B. Phipps, University of Western Ontario, as *Crataegus chrysocarpa* or round leaved hawthorn. ND-1566 was identified as *Crataegus mollis*.

1992-1993: Sixteen more accessions have been identified by Dr. J. B. Phipps. Most of them are of a complex of the two common hawthorn species of the Northern Great Plains, *C. chrysocarpa* and *C. macracantha* (See Table CRAT-3).

1995: Twelve round leaved hawthorn (*C. chrysocarpa*) were moved from Apple Valley and planted randomly in a row at the PMC. These trees included the following five accessions: ND-1694 (Butte County, SD), ND-1695 (Marshall County, SD), ND-1538 (Day County, SD), ND-1628 (Hamlin County, SD), and ND-1544 (Harding County, SD). This row of trees has been assigned the accession number 9076678. This phase of the hawthorn study has been assigned the number 38A127J. Seed was then collected from these trees at the PMC. The hawthorn has a good taproot and is quite drought resistant.

1996: Ten hawthorn trees were moved from Apple Valley to the PMC. Three of them did not survive through the summer. Strong winds caused them to tip shortly after they were transplanted, causing several trees to die.

1997: No trees were moved in 1997.

1998-1999: In 1998, eight more trees were moved from Apple Valley to the PMC. Seed was collected from these trees. Some of this seed was provided to Lincoln-Oakes Nursery to grow seedlings for field plantings.

2000-2001: Seed continues to be harvested. No seedlings have been grown yet.

2002: Seed was collected.

2003: No seed was collected. Seedlings will be available for distribution in 2004.

2004: Seed was collected. Forty-five seedlings were sent for field evaluation plantings.

2005: A very large seed crop was harvested.

2006: Four hundred twenty-five seedlings were sent for field plantings in the three-state area.

2007: One hundred fifty seedlings were shipped to North Dakota and Minnesota for field plantings. Evaluations indicate that rabbits are a problem.

Table CRAT-1. Native hawthorn accessions established in test plantation (Burleigh Co., North Dakota).

Accession	County	State
ND-1523	Crook	WY
ND-1524	Meade	SD
ND-1525	Lawrence	SD
ND-1526	Crook	WY
ND-1533	Crook	WY
ND-1534	Meade	SD
ND-1535	Oliver	ND
ND-1538	Day	SD
ND-1539	Burleigh	ND
ND-1544	Harding	SD
ND-1548	Meade	SD
ND-1549	Aurora	SD
ND-1555	Wells	ND
ND-1566	Norman	MN
ND-1567	Wells	ND
ND-1570	Marshall	ND
ND-1571	Stutsman	ND
ND-1572	Stutsman	ND
ND-1574	McLean	ND
ND-1576	McLean	ND
ND-1577	Morton	ND
ND-1579	Ransom	ND
ND-1580	Morton	ND
ND-1581	Oliver	ND
ND-1582	Oliver	ND
ND-1591	Ziebach	SD
ND-1593	Deuel	SD
ND-1594	Pennington	SD
ND-1596	Deuel	SD
ND-1609	Campbell	SD
ND-1611	Washabaugh	SD
ND-1614	Dickey	ND
ND-1616	Brown	SD
ND-1617	Brown	SD
ND-1618	Brown	SD
ND-1619	Marshall	SD
ND-1620	Deuel	SD
ND-1621	Roberts	SD
ND-1623	Day	SD
ND-1624	Day	SD
ND-1625	Day	SD
ND-1626	Day	SD
ND-1627	Day	SD
ND-1628	Hamlin	SD
ND-1629	Brookings	SD
ND-1632	Stark	ND
ND-1640	Lake	SD
ND-1642	Fall River	SD
ND-1643	Brookings	SD
ND-1644	Wells	ND
ND-1645	Ramsey	ND
ND-1646	Wells	ND
ND-1667	Carson	SD
ND-1669	Kidder	ND
ND-1670	Kidder	ND
ND-1671	Dunn	ND
ND-1673	Perkins	SD
ND-1679	Spink	SD
ND-1680	Logan	ND
ND-1681	Dickey	ND
ND-1683	McPherson	SD
ND-1685	Kidder	ND
ND-1687	Dickey	ND
ND-1689	Crook	WY
ND-1690	Jerauld	SD
ND-1691	Hand	SD
ND-1693	Beadle	SD
ND-1694	Butte	SD
ND-1695	Marshall	SD
ND-1696	Sheridan	ND
ND-1704	Grant	SD
ND-1709	Gregory	SD
ND-1727	Marshall	SD
ND-1728	Marshall	SD
ND-1856	Grand Forks	ND

TOTAL: 75 Accessions

Table CRAT-2. Introduced hawthorn species/accessions received from the Canada Agriculture Research Station, Morden, Manitoba, and established in test plantation (Burleigh County, North Dakota).

Accession	Species**	Common Name
ND-20, ND-1433	arnoldiana	Arnold
ND-658	canadensis	Canada
ND-659	chlorosarca	blackfruit
ND-661	champlainensis	Champlain
ND-665	pedicellata	Ontario
ND-667, ND-1512	rivularis	river
ND-666	punctata	dotted
ND-762	caesia	--
ND-1018	edulis	--
ND-1503	ambigua	Russian
ND-1505	coccinea	scarlet
ND-1506	florentaria	--
ND-1507	floribunda	--
ND-1508	franmea	--
ND-1509	mordenensis	Morden
ND-1510	nudiflora	--
ND-1513	scabrida	Brainard
ND-1514	skinners dwarf	skinners dwarf
ND-1515	submollis	Quebec
ND-1651	dunbarii	--
ND-1653	coccinoides	Kansas
ND-1654	dahurica	--
ND-1656	submollis/arnoldiana	--
ND-1657	erythropoda	Cerro
ND-1658	strigosa	--
ND-1659	prunifolia	--
ND-1660	rivularis/skinners dwarf	--
ND-1661	intricata	Biltmore
ND-1662	macrosperma	--

TOTAL: 29 Species, 31 Accessions

* 14 additional species (individual seed lots) did not germinate or survive transplanting.
**all are genus *Crataegus*

Table CRAT-3. Promising native hawthorn accessions.

Accession	Origin	Scientific Name
ND-1533	Crook Co., WY	*C. chrysocarpa*
ND-1544	Harding Co., SD	*C. chrysocarpa*
ND-1694	Butte Co.,, SD	*C. chrysocarpa*
ND-1695	Marshall Co., SD	*C. chrysocarpa*
ND-1619	Marshall Co., SD	
ND-1727	Marshall Co., SD	*C. chrysocarpa,* with some *C. macracantha* characters
ND-1728	Marshall Co., SD	*C. chrysocarpa*, with some *C. macracantha* characters
ND-1538	Day Co., SD	*C. chrysocarpa*
ND-1627	Day Co., SD	intermediate between *C. chrysocarpa* and *C. macracantha*
ND-1624	Day Co., SD	*C. macracantha*
ND-1596	Deuel Co., SD	*C. chrysocarpa*
ND-1620	Deuel Co., SD	*C. chrysocarpa*
ND-1628	Hamlin Co., SD	*C. chrysocarpa*
ND-1679	Spink Co., SD	*C. chrysocarpa*
ND-1539	Burleigh Co., ND	*C. chrysocarpa*
ND-1696	Sheridan Co., ND	intermediate between *C. chrysocarpa* and *C. macracantha*
ND-1856	Grand Forks Co., ND	intermediate between *C. chrysocarpa* and *C. macracantha*
ND-1566	Norman Co., MN	*C. mollis*

Study 38I015J Apple Creek Township, Burleigh County, North Dakota

Study Title: Evaluation of chokecherry, *Prunus virginiana* L. (North Dakota).

Introduction: Common chokecherry is a winter hardy, drought resistant, native tall shrub or small tree. The shrubby, thicket-forming growth is well suited for wildlife nesting and cover. The twigs, foliage, buds, and fruit are relished by a wide variety of bird and mammal species. It is recommended for outer row plantings of multiple row windbreaks and single row field windbreaks where a dense barrier is desired. Other potential uses include recreational area developments, surface mine revegetation, and rangeland rehabilitation. However, chokecherry is susceptible to several serious diseases including Western-X disease, black knot, and leaf spots.

Objective: The objective is to assemble, comparatively evaluate, select, and release an adapted cultivar and/or cultivars of common chokecherry. Criteria for selection will include growth rate, survival, form, rate of spread, insect and disease resistance, and fruit production. Seed orchards will be established to produce seed for commercial increase.

Cooperators: The USDA Natural Resources Conservation Service, Plant Materials Center, Bismarck, North Dakota, in cooperation with the USDI Fish and Wildlife Service.

Location: Waterfowl Production Area, approximately 5 miles east and 1 mile south of Bismarck, North Dakota, on Old Highway 10. Legal description: N 1/2 sec. 1, T. 138 N., R. 79 W.; S 1/2 sec. 31, T. 139 N., R. 78 W. Elevation is approximately 1700 feet.

Major Land Resource Area: The site is located in Major Land Resource Area 53B, Central Dark Brown Glaciated Plains. Most soils are derived from calcareous glacial till. The gently rolling plain includes some areas of kames and moraines that have irregular topography. Forty percent of the area is rangeland.

Soils: There are eight different soils mapping units in the planting area:

Ta, TaB - Tansem, loam or silt loam, 0 to 3 percent slope.
PI, PB, PBI - Parshall, fine sandy loam or sandy loam, 0 to 3 and 3 to 6 percent slope.
R, R2, RB - Roseglen, loam or silt loam, 0 to 3 percent slope.

The Tansem series consists of deep, well-drained soils formed in loamy sediments on glacial lake plains. The surface layer is dark grayish-brown silt loam 5 inches thick. The subsoil is grayish-brown and light olive brown silt loam 8 inches thick. The substratum is light yellowish-brown and pale yellow silt loam, which is varved in the lower part. Permeability is moderate. Available moisture capacity is high. Organic matter content is moderate and fertility is medium. Slopes are 1-10 percent.

These soils are in North Dakota windbreak suitability group 3. If the moisture is conserved, these soils are well suited to all types of windbreaks and other plantings. Wind and water erosion are the only hazards.

The Roseglen series consists of deep, moderately well-drained soils formed in loamy sediments on glacial lake plains. The surface layer is dark grayish-brown silt loam 8 inches thick. The subsoil is dark grayish-brown and grayish-brown silt loam 26 inches thick. The substratum is light yellowish-brown and light brownish-gray silt loam. Permeability is moderate. Available water capacity, the organic matter content, and fertility are high. Slopes are 0-9 percent.

These soils are found in North Dakota windbreak suitability group 1. In this group are nearly level to sloping soils of the Arnegard, Grail, Grassna, Havelon, Lohler, Magnus, Roseglen, and Straw series. Soil

moisture is favorable for the growth and survival of tree and shrubs. These soils are well suited to all types of windbreaks and other plantings. Soil blowing is a serious hazard on some soils.

The Parshall series consists of deep, well-drained soils formed in fine sandy loam alluvium on terraces and outwash plains and in upland swales. The surface layer is dark grayish-brown fine sandy loam 14 inches thick. The subsoil is dark grayish-brown, very friable fine sandy loam in the upper 17 inches and grayish-brown fine sandy loam in the lower 6 inches. The underlying material is light brownish-gray fine sandy loam in the upper 12 inches and grayish-brown sandy loam buried surface layer in the lower 13 inches. Permeability is moderately rapid. The available water capacity is moderate. The organic matter content is high and fertility is medium. Slopes are 0 to 15 percent.

These soils are in North Dakota windbreak suitability group 5. These are well-drained loams and sandy soils. These soils are suited to windbreak and other plantings, but selection of species is limited. The erosion hazard is serious.

Climate: MLRA 53B. The average annual precipitation is 15 to 18 inches; highest in the growing season. Rainfall is low and somewhat erratic. The average annual temperature is 40 to 60 degrees F. Average freeze-free period is 105 to 140 days. The plant hardiness zone is 3b with an average annual minimum temperature of -40 to -30 degrees F. For the 2007 weather summary, see Table AV-1 on page 148.

Methods and Materials

Assembly: The assembly was initiated and completed in 1979. A total of 179 accessions were collected from native stands in North Dakota, South Dakota, and Minnesota. Collection of fruit was made by NRCS field office personnel July through September 1979 and sent to the PMC.

Seed Processing: Collected fruit was processed upon receipt at the PMC. The technique consisted of macerating and washing the fruit to separate the pulp from the seed. The clean seed was dried, weighed, and placed in sealed, cool, dry storage (45 to 60 degrees F, 30 percent relative humidity). Six pounds of fruit yielded one pound of clean seed.

Seedling Establishment: 1979: A containerized method of growing the seedlings was used. A 150-day cold stratification is needed for the germination of chokecherry. In December 1979, 1,000 seeds of each accession were stratified in a moist mixture of one part soil (silty loam), one part perlite, and two parts ground peat moss. The seeds and mixture were placed in small trays at 34 degrees F for 150 days.

1980: In May 1980, the trays were removed from cold stratification and placed in the PMC greenhouse. The seedlings produced were transplanted into 'Styrobloc' containers and placed in the PMC lathhouse area under sprinkler irrigation. Dead seedlings were replaced until transplant seedlings were no longer available. In November, all seedlings were treated with animal repellent, covered with a 6 to 8 inch layer of shingletow for insulation, and stored in the lathhouse over winter. Mouse bait was added for rodent control.

1981: Because of the poor seed germination experienced for some accessions in 1980, additional seed from 31 accessions was stratified (July 17 to December 31, 1980) and planted in plastic trays. Seedlings were then transplanted into 'Styrobloc' containers in November and December 1980, and January 1981. These plants were raised in the greenhouse during the remainder of the winter to allow for a catch-up period of growth. Seedlings were moved into the lathhouse in May 1981.

Overwinter survival of one-year-old seedlings was excellent. No rodent damage was observed. Apparently, leaving the containers outdoors over winter re-stratified seed still remaining in the soil mixture, causing additional germination in May 1981. Although most new seedlings were thinned or removed, some were left to provide additional stock for those accessions which lacked sufficient numbers

in 1980. Because overall growth in containers has been relatively slow, the seedlings were kept in 'Styrobloc' containers one additional year before transplanting to the field in the spring 1983. It was anticipated that the size difference between 2-0 and 3-0 stock would be minimal, but future evaluations will be needed to consider this factor. Plants averaged in size between 6 and 8 inches.

All seedlings were sprinkler irrigated and fertilized on a regular schedule during the year. In November, all materials were treated with animal repellent and covered with shingletow in the lathhouse. Additional insulation protection was provided by several inches of snow.

1982: All seedlings were sprinkler irrigated and fertilized on a regular schedule during the year. Plants averaged in size between 6 to 16 inches in height. All plants were prepared for winter by treating with animal repellent and covering with shingletow.

Planting plan: Test plantation is a randomized block design with some blocks incomplete; four plants per plot with five replications. Spacing is 14 feet between rows and 10 feet within row. An additional outer row was planted to offset border effects. 'Schubert' chokecherry was included as the standard of comparison.

Plot preparation: A clean, firm planting site was prepared by disking and harrowing.

Planting method: All seedlings were planted using the approved forestry methods.

Planting date: May 19, 1983. Replacements were planted in May 1984.

Fertilization: No fertilizer has been applied to planting area.

Weed control: No herbicide was applied to any plot during year of establishment. Mechanical control was by clean cultivating between rows, within rows, and in fallow areas. Four to six tillage operations were performed each year in the months of May through August. Hand hoeing was done as needed to control weeds in row.

1985-1988: In addition to hand hoeing and tillage, a mechanical within row tree cultivator was used twice during the summer. In spring 1987, simazine was applied as a liquid with a pull-type sprayer for within row weed control.

1989: Due to drought conditions, the cover crop seeded in 1988 was only mowed, not tilled. A mechanical within row tree cultivator was used within the rows.

1990-1992: Annual cover crop seeded. Within row cultivation was discontinued to encourage sprouting.

1993-2001: Grass was mowed between rows several times annually. Wormwood and Canada thistle were spot sprayed with Roundup.

Biological control: Malathion has been applied at the recommended rate to control webworms (spot treatment with hand sprayer). Animal repellent was applied in the fall 1983 to discourage rodent damage. In July 1987, a truck mounted sprayer was used to apply malathion to ugly nest caterpillar damage.

Irrigation: None.

Crop residue management: Each year in September, a winter cover crop of oats or rye is seeded between the rows. During the drought years (1988-1990), the area was not worked in order to prevent soil blowing and moisture loss. Weeds were mowed to prevent seed production. In 1993, a permanent cover of sideoats grama, blue grama and black medic was established.

Silvicultural practices: Mechanically damaged limbs were cut and removed each year for sanitation. Weak or diseased trees have not been treated or cleared in order to preserve the integrity of the evaluation process.

Evaluation and Measurement: 1983: Planting date, survival, and plant height were recorded.

1984: Plant performance was recorded in September. Notes were taken on survival, canopy width, and plant height.

1985: In addition to reporting survival, canopy width, and plant height, trees were visually scored for vigor and rate of spread (multi-stem versus tree-like habit).

1986: Plants were evaluated for survival, vigor, plant height, crown width, and disease resistance.

1987: In addition to the above elements, plants were also scored for rate of spread.

1988: Plants were scored for survival, vigor, and seed (fruit) amount.

1989: Plants were rated in May for flowering period. In August, selected trees were rated for form.

1991: Plants were scored for survival and vigor.

1993: Plants were rated for survival and disease resistance in Replications 1 through 4 by Jim Walla and Y.H. Guo of NDSU, and Dallas Dockter, biological aid at the PMC.

1994: Selected plants were rated for disease resistance.

1997: Selected plants were rated for disease symptoms.

2000: All surviving plants were rated.

Results

Plant performance: 1983: A total of 3,100 plants were planted with a survival rate of 95 percent. Moisture was adequate for plant establishment, weed control was excellent, and little animal damage was noted.

1984: Available replacements were planted in May. All plants became established and performed well. Webworm infestation was severe causing significant defoliation to a large percentage of trees.

1985: Of the original 179 accessions, 160 are established in the plantation. Refer to Table PRVI-ND-1. The cecropia moth caterpillar (*Hyalophora cecropia*) caused significant damage to seven percent of the trees in 1985. Leaf spot was prevalent throughout the plantation. A few individuals already express symptoms of black knot. The presence of webworm was minimal. Both tree-like and dense spreading forms are apparent. Early growth rates are highly variable, ranging from 33 to 71 centimeters per year. Heights up to 225 centimeters (7.5 feet) have been recorded. Survival in 1985 totaled 95 percent. Differences in size and growth rates based on north-south latitudinal origin are not apparent at this early age.

1986: Heights reached up to 290 centimeters (9.5 feet).

1987: Heights reached up to 360 centimeters (12 feet). Sixteen (16) accessions had at least one tree showing symptoms of Western-X disease. Other disease and insect problems included some black knot, webworms, and stem cankers. There was also some very minor simazine damage observed.

1988: Plants that had symptoms of Western-X disease in 1987 did not show any symptoms in 1988. A very heavy fruit crop developed. Some trees are as tall as 14 feet.

1989: Based on data collected in 1987 and 1988 on the chokecherry at Apple Valley, two populations were identified out of the assembly. The first population consisted of profusely suckering plants. These were plants that rated 1 or 2 for suckering, on a 1-9 scale, where 1 was many stems and 9 was a single stem. The second population identified consisted of plants with very few suckers. A total of 101 plants were rated 8 or 9 in 1987, from a total of 71 accessions. A few chokecherry plants died this year. This has been the second year of severe drought. Some of these trees were ones weakened by disease. Some plant specimens were collected by James Walla, Plant Pathologist, NDSU, Fargo, North Dakota. The plant specimens (three from the McKenzie FEP and one from the chokecherry assembly) have tested positive for Western-X disease. All four of these plants had shown symptoms of this disease, such as premature yellowing of the leaves, and much reduced annual growth. This results in a distinct rosetting at the tips of the branches.

1991: Due to prolonged drought plus disease, the chokecherry plants have declined in vigor, especially the trees planted in Replications 1, 2, and 3. Survival by replication is listed in Table PRVI-ND-2. Included in the mortality are many of the plants previously identified as having very little sprouting. Plants that do not sprout may not be able to respond to improved moisture conditions after being weakened.

1993: In the survey of Replications 1-4 in August, Jim Walla identified 65 trees as showing some resistance to the X-disease. This was based on the physical appearance of the plants (Table PRVI-ND-3). Further observations in following years will be needed to see if these few plants continue to show resistance. A polyclonal antibody was developed at NDSU to allow confirmation of whether plants are infected with XMLO (mycoplasma-like organism), the cause of X-disease. Using the polyclonal antibody, with backup by electron microscopy and antibodies, and a DNA probe, XMLO was confirmed to be the cause of the disease. The polyclonal antibody needs further testing to determine its usefulness in screening plants for infection.

1994: Personnel from NDSU made controlled crossings of selected chokecherry plants. These crossings were between apparently disease resistant plants and susceptible plants. The plants were injected with oxytetracycline to prevent fruit abortion and to encourage flower bud formation in 1995. Most of the fruit did not mature. Of the controlled crossings, only one plant developed mature fruit.

1997: Western-X disease is caused by a specialized type of bacterium called a phytoplasma. It is suspected that the phytoplasma is spread from infected plants to healthy plants by leafhoppers. In 1997, an inventory of leafhoppers was taken at the Apple Valley planting by personnel from PFRA at Indianhead, Saskatchewan. These insects have not yet been analyzed for the presence of Western-X disease.

2000: Survival and vigor notes were taken on August 22, 2000.

2003: For a number of years, NDSU staff has been growing clones of selected chokecherry from tissue gathered from the Apple Valley planting. In June, many of these chokecherry plants were established in a replicated crossing block at Lincoln-Oakes Nursery (Table PRVI-ND-4). There were insufficient plants to make a complete block. In future years, the block will be filled in. Each clone was planted in 3-plant plots, with one control and two plants grafted with susceptible plant tissue.

2004: Several more clones were planted in June, 2004. Lincoln-Oakes Nursery performed the maintenance on the block. The plants were evaluated in the fall for survival and vigor.

2005: Additional clones were planted in July, 2005. Also plants of some clones were replaced due to incomplete survival. Lincoln-Oakes Nursery maintained the plots. Evaluations were made in September 2005 on survival and vigor. The block (see Table PRVI-ND-4) is still incomplete.

2006: Additional clones were planted in June 2006. The block is still incomplete.

Table PRVI-ND-1. Accessions of chokecherry established in test plantation (Burleigh County, North Dakota).

Accession	County	State
ND-1941	Burleigh	ND
ND-1949	Golden Valley	ND
ND-1958	Sargent	ND
ND-1970	Slope	ND
ND-1971	McLean	ND
ND-1973	Grand Forks	ND
ND-1980	Grant	ND
ND-1982	Emmons	ND
ND-1989	Morton	ND
ND-1990	Pembina	ND
ND-1992	Cass	ND
ND-2001	Traill	ND
ND-2009	McHenry	ND
ND-2010	Sheridan	ND
ND-2012	Foster	ND
ND-2013	Mercer	ND
ND-2015	Ward	ND
ND-2018	Barnes	ND
ND-2019	Slope	ND
ND-2029	Logan	ND
ND-2034	Ramsey	ND
ND-2035	Nelson	ND
ND-2036	Bottineau	ND
ND-2039	Stark	ND
ND-2040	Billings	ND
ND-2041	Griggs	ND
ND-2042	Benson	ND
ND-2047	Oliver	ND
ND-2055	Wells	ND
ND-2056	Benson	ND
ND-2061	Towner	ND
ND-2069	Mclntosh	ND
ND-2070	Steele	ND
ND-2097	Ramsey	ND
ND-3001	Stutsman	ND
ND-3635	Dunn	ND
ND-3641	Pierce	ND
ND-3644	Williams	ND
ND-3666	Mountrail	ND
ND-3674	Cavalier	ND
ND-3677	Wells	ND

TOTAL (North Dakota): 41 Accessions

ND-1904	Mellette	SD
ND-1905	Minnehaha	SD
ND-1908	Walworth	SD
ND-1910	Potter	SD
ND-1917	Sully	SD
ND-1918	Stanley	SD
ND-1919	Hughes	SD
ND-1920	Campbell	SD
ND-1921	Kingsbury	SD
ND-1922	Hamlin	SD
ND-1927	Buffalo	SD
ND-1930	Haakon	SD
ND-1935	Day	SD
ND-1940	Gregory	SD
ND-1945	Tripp	SD
ND-1957	Lawrence	SD
ND-1959	McCook	SD
ND-196I	Hughes	SD
ND-1962	Hyde	SD
ND-1968	Clay	SD
ND-1969	Pennington	SD
ND-I985	Sanborn	SD
ND-1994	Lake (pin cherry)	SD
ND-1996	Bon Homme	SD
ND-2002	Ziebach	SD
ND-2004	Brown	SD
ND-2005	McPherson	SD
ND-2006	McPherson	SD
ND-2007	Tripp	SD
ND-2022	Bennett	SD
ND-2025	Jerauld	SD
ND-2028	Spink	SD
ND-2032	Codington	SD
ND-2063	Marshall	SD
ND-2067	Roberts	SD
ND-2077	Perkins	SD
ND-3626	Faulk	SD
ND-3633	Dewey	SD
ND-3671	Lyman	SD

TOTAL (South Dakota): 38 accessions

ND-1893	Dakota	MN
ND-1894	Watonwan	MN
ND-1895	Freeborn	MN
ND-1896	Waseca	MN
ND-1897	Rock	MN
ND-1898	Big Stone	MN
ND-1899	Jackson	MN
ND-1900	Lincoln	MN
ND-1901	Brown	MN
ND-1902	Pipestone	MN
ND-1903	Scott	MN
ND-1906	Cottonwood	MN

Accession	County	State
ND-1907	Murray	MN
ND-1909	Ramsey	MN
ND-1911	Sibley	MN
ND-1912	Carver	MN
ND-1913	LeSueur	MN
ND-1914	Lyon	MN
ND-1916	Blue Earth	MN
ND-1925	Martin	MN
ND-1929	Mahnomen	MN
ND-1931	Norman	MN
ND-1932	Mower	MN
ND-1933	Traverse	MN
ND-1934	Pope	MN
ND-1936	Swift	MN
ND-1938	Fairbault (pin cherry)	MN
ND-1939	Mille Lacs	MN
ND-1947	Nobles	MN
ND-1948	Kanabec	MN
ND-1951	Meeker	MN
ND-1952	Fillmore	MN
ND-1954	Grant	MN
ND-1955	Stearns	MN
ND-1956	Houston	MN
ND-1964	Douglas	MN
ND-1965	Clay	MN
ND-1966	Chisago	MN
ND-1974	East Polk	MN
ND-1975	Wadena	MN
ND-1976	West Polk	MN
ND-1977	Yellow Medicine	MN
ND-1978	Lake of the Woods	MN
ND-1979	Redwood	MN
ND-1981	Ottertail	MN
ND-1983	Sherburne	MN
ND-1984	Becker	MN
ND-1987	Red Lake	MN
ND-1988	Pennington	MN
ND-1993	Stearns	MN
ND-1998	Todd	MN
ND-1999	McLeod	MN
ND-2000	Carlton	MN
ND-2003	Morrison	MN
ND-2016	Benton	MN
ND-2017	Hubbard	MN
ND-2020	Kandiyohi	MN
ND-2021	Kittson	MN
ND-2024	Winona	MN
ND-2027	Marshall	MN
ND-2030	Cass	MN
ND-2031	Clearwater	MN
ND-2044	Crow Wing	MN
ND-2045	Stevens	MN
ND-2048	Washington	MN
ND-2049	Wabasha	MN
ND-2051	Steele	MN
ND-2052	Rice	MN
ND-2053	Clay	MN
ND-2057	Ottertail	MN
ND-2062	Koochiching	MN
ND-2060	Beltrami	MN
ND-2065	Anoka (pin cherry)	MN
ND-2072	Aitkin	MN
ND-3003	Pine	MN
ND-3004	Itasca	MN
ND-3636	Cook	MN
ND-3637	Ramsey	MN
ND-3643	Stearns	MN
ND-3665	Lake	MN
ND-3675	St. Louis	MN

TOTAL (Minnesota): 79 Accessions

ND-2363	(unknown origin)
ND-2400	(unknown origin)

TOTAL (3 States): 160 Accessions

Table PRVI-ND-2. Survival in the Chokecherry Assembly at Apple Valley, 1991, following 3 years of below normal precipitation.

	Trees Planted 1983	**Trees Surviving 1991**	**Percent Survival**
Rep 1	672	466	69
Rep 2	660	472	72
Rep 3	648	423	65
Rep 4	640	561	88
Rep 5	616	527	86
TOTAL	**3236**	**2449**	**76**

Table PRVI-ND-3. Numbers of trees showing resistance to x-disease in replications 1, 2, 3, and 4 in 1993.

Accession	Origin	Rep. 1	Rep. 2	Rep. 3	Rep. 4
ND-2400	unknown	1	4		
ND-1982	Emmons Co., ND	4			
ND-2010	Sheridan Co., ND	1	1	1	
ND-1980	Grant Co., ND		1		
ND-2013	Mercer Co., ND		4	2	1
ND-2055	Wells Co., ND		1		
ND-2056	Benson Co., ND		1		
ND-1949	Golden Valley Co., ND			1	2
ND-2015	Ward Co., ND			1	1
ND-2029	Logan Co., ND		1	1	
ND-3674	Cavalier Co., ND			1	1
ND-1941	Burleigh Co., ND				1
ND-1970	Slope Co., ND				1
ND-2069	McIntosh Co., ND				1
ND-3644	Williams Co., ND				3
ND-1921	Kingsbury Co., SD		1		
ND-1908	Walworth Co., SD			2	1
ND-1918	Stanley Co., SD			1	
ND-2006	McPherson Co., SD			2	2
ND-1921	Kingsbury Co., SD				2
ND-1945	Tripp Co., SD				1
ND-1969	Pennington Co., SD				1
ND-2002	Ziebach Co., SD				1
ND-2022	Bennett Co., SD				4
ND-2025	Jerauld Co., SD				1
ND-2028	Spink Co., SD				1
ND-2032	Codington Co., SD				2
ND-2077	Perkins Co., SD				1
ND-1964	Douglas Co., MN			2	
ND-1947	Nobles Co., MN				1
ND-2016	Benton Co., MN				1
ND-3675	St. Louis Co., MN				1

Table PRVI-ND-4. Chokecherry planting plan at Lincoln-Oakes Nursery, Bismarck, ND.

BLOCK 1								
Row	I	II	III	IV	V	VI	VII	VIII
	7 a	D c	R b	QQ c	JJ b	4 a	19 b	U c
	7 c	D b	R a	QQ b	JJ c	4 b	19 a	U b
	7 b	D a	R c	QQ a	JJ a	4 c	19 c	U a
	BB c	17 b	GG b	NN b	Q c	3 a	E a	21 b
	BB a	17 c	GG c	NN a	Q b	3 c	E b	21 c
	BB b	17 a	GG a	NN c	Q a	3 b	E c	21 a
	CC c	10 b	P c	N c	I b	8 b	23 b	
	CC a	10 c	P a	N b	I a	8 c	23 a	
	CC b	10 a	P b	N a	I c	8 a	23 c	
	W c	S c	2 a	H b	OO c	AA b	B b	
	W a	S b	2 c	H a	OO a	AA c	B a	
	W b	S a	2 b	H c	OO b	AA a	B c	
BLOCK 2								
Row	I	II	III	IV	V	VI	VII	VIII
	OO b	P c	JJ a	GG a	AA a	3 a	N b	QQ c
	OO c	P a	JJ b	GG b	AA c	3 c	N c	QQ b
	OO a	P b	JJ c	GG c	AA b	3 b	N a	QQ a
	17 b	BB a	4 a	8 b	Q b	23 c	S b	I b
	17 a	BB b	4 b	8 c	Q c	23 b	S c	I c
	17 c	BB c	4 c	8 a	Q a	23 a	S a	I a
	R c	2 c	E a	W c	19 b	10 c	CC c	
	R a	2 b	E c	W a	19 c	10 b	CC a	
	R b	2 a	E b	W b	19 a	10 a	CC b	
	NN b	U b	B b	7 a	21 c	D b	H c	
	NN c	U c	B c	7 b	21 a	D c	H a	
	NN a	U a	B a	7 c	21 b	D a	H b	
BLOCK 3								
Row	I	II	III	IV	V	VI	VII	VIII
	4 c	H c	N b	D b	E a	JJ a	P b	S b
	4 a	H b	N a	D c	E c	JJ b	P a	S a
	4 b	H a	N c	D a	E b	JJ c	P c	S c
	CC a	Q b	QQ a	7 c	10 b	BB b	AA b	17 c
	CC b	Q a	QQ b	7 b	10 c	BB a	AA c	17 b
	CC c	Q c	QQ c	7 a	10 a	BB c	AA a	17 a
	OO c	U c	W a	R b	GG c	2 b	I c	
	OO a	U b	W b	R a	GG a	2 a	I b	
	OO b	U a	W c	R c	GG b	2 c	I a	
	8 a	B b	19 c	23 b	21 c	3 b	NN c	
	8 b	B a	19 a	23 a	21 b	3 a	NN b	
	8 c	B c	19 b	23 c	21 a	3 c	NN a	

BLOCK 4								
Row	I	II	III	IV	V	VI	VII	VIII
	BB a	B a	QQ c	AA b	17 c	23 c	21 a	10 b
	BB c	B c	QQ b	AA a	17 a	23 a	21 b	10 a
	BB b	B b	QQ a	AA c	17 b	23 b	21 c	10 c
	2 b	U c	GG c	19 c	W c	I c	S a	7 a
	2 c	U b	GG a	19 a	W b	I b	S c	7 b
	2 a	U a	GG b	19 b	W a	I a	S b	7 c
	E b	H c	N b	CC b	QQ c	R c	4 c	
	E c	H a	N a	CC c	QQ b	R b	4 b	
	E a	H b	N c	CC a	QQ a	R a	4 a	
	D c	P a	8 a	JJ a	3 a	NN b	OO a	
	D a	P c	8 c	JJ b	3 c	NN c	OO b	
	D b	P b	8 b	JJ c	3 b	NN a	OO c	

BLOCK 5								
Row	I	II	III	IV	V	VI	VII	VIII
	8 b	23 b	B b	JJ b	GG a	AA b	10 a	NN a
	8 a	23 a	B c	JJ a	GG b	AA c	10 c	NN b
	8 c	23 c	B a	JJ c	GG c	AA a	10 b	NN c
	I c	BB c	N b	R b	QQ b	2 b	D a	P b
	I b	BB b	N c	R a	QQ c	2 c	D b	P a
	I a	BB a	N a	R c	QQ a	2 a	D c	P c
	OO a	W c	CC a	E b	21 c	S a	7 b	
	OO c	W b	CC c	E c	21 a	S c	7 a	
	OO b	W a	CC b	E a	21 b	S b	7 c	
	U b	Q b	17 a	19 c	3 b	H a	4 c	
	U c	Q c	17 c	19 b	3 c	H c	4 b	
	U a	Q a	17 b	19 a	3 a	H b	4 a	

BLOCK 6								
Row	I	II	III	IV	V	VI	VII	VIII
	N c	7 b	JJ c	I b	19 b	OO b	AA a	GG a
	N a	7 a	JJ b	I a	19 a	OO c	AA c	GG b
	N b	7 c	JJ a	I c	19 c	OO a	AA b	GG c
	2 c	BB b	4 b	R a	CC b	W a	NN b	S b
	2 b	BB c	4 a	R b	CC c	W c	NN c	S c
	2 a	BB a	4 c	R c	CC a	W b	NN a	S a
	10 b	D c	QQ b	P b	Q b	17 a	B a	
	10 c	D b	QQ a	P a	Q a	17 c	B b	
	10 a	D a	QQ c	P c	Q c	17 b	B c	
	8 b	23 b	21 b	E a	3 b	U a	H c	
	8 a	23 c	21 c	E c	3 c	U b	H b	
	8 c	23 a	21 a	E b	3 a	U c	H a	

MAJOR SEED SOURCE STUDIES AND ASSEMBLIES: TECHNICAL REPORT – 2007

Study NDPMC-T-0008-WL

Study Title: Native Shrubs for Conservation, Skunkbush sumac *Rhus trilobata*

Introduction: Skunkbush sumac is a native shrub which has been used to a limited extent in wildlife plantings, as well as other conservation plantings. It does have potential for use in riparian plantings. In 1979 the variety 'Bighorn' was released by the New Mexico PMC. This accession originated from Basin, Wyoming, where the precipitation is 6.7 inches. There is some indication Bighorn skunkbush sumac is affected by rust when planted in areas of higher precipitation.

Objective: The PMC would like to find a selection from the Dakotas, east of the Badlands. This species has been reported to occur as far east as Emmons County, ND. There is a need for a selection which is adapted to more humid climates than the original Bighorn source. Seed sources from the most northern and most eastern ecotypes will be collected.

Cooperators: USDA, NRCS Plant Materials Center and Lincoln-Oakes Nursery, Bismarck, ND.

Species Description: Skunkbush sumac is a deciduous, flowering native shrub. It grows 2 to 12 feet tall, but averages about 4 feet tall. It has a taproot and a fibrous root system. Roots are deep and extensively branched with somewhat shallow, spreading woody rhizomes. It sprouts readily from the root crown, especially after a severe disturbance. It is unlikely to reproduce vegetatively in the absence of disturbance. This sumac is reported to be dioecious. It is animal-pollinated, presumably by small mammals. It reportedly has low seed production. It is estimated that only 5 to 15 percent of the flowers on the female plants actually produce seed. Acute drought may shorten twig growth and prevent fruit production. Sumac is tolerant of most soil textures, but prefers well-drained sites. It is intolerant of flooding and high-water tables.

Collection/Assembly: In September 1999, seed collections were made at 2 sites in the Cave Hills area of Harding County, SD. In September 2004, another collection was made, which was a composite of the two sites collected in 1999. In 2006, some collections were made in a number of locations, but possibly due to the drought, only small amounts were found. In South Dakota, seed was collected in Sully, Lyman, Todd, Ziebach, and Jones County. In North Dakota, seed was collected in Billings, Dunn, Slope, Golden Valley, and McKenzie County. One collection was also made in Powder River County, MT. In 2007, seed was collected in South Dakota from Corson and Sully Counties. North Dakota collections were from Dunn, McKenzie, Oliver, Slope, and Morton Counties.

Seedlings were grown of the Cave Hills collections. In the spring of 2001, only a few seedlings of 9082651 (north Cave Hills) were still alive. Survival of 9082653 (south Cave Hills) was much better. In 2003 seedlings of 9082653 were planted in the Off-Center Evaluation Sites at Dickinson and Apple Valley. They are performing well.

SELECTION AND INCREASE

SELECTION AND INCREASE: TECHNICAL REPORT – 2007

Promising Woody Plant Material

The following accessions show potential for further evaluation:

Accession Number	Genus/species	Origin/source
ND-428 9005970	black walnut *Juglans nigra*	NDSU, Fargo, ND
ND-500 9005977	Siberian larch *Larix sibirica*	Res. Sta., Morden, MB, Canada
ND-1030 9005657	Ohio buckeye *Aesculus glabra*	Murray Co., MN
PI-323957	black chokeberry *Photinia melanocarpa*	P.I. Sta., Ames, IA
SD-13 9005888	green ash *Fraxinus pennsylvanica*	Potter Co., SD
SD-156 9005890	green ash *Fraxinus pennsylvanica*	Deuel Co., SD
ND-647 9005887	black ash *Fraxinus nigra*	Res. Sta., Morden, MB, Canada
ND-630 9006096	bur oak *Quercus macrocarpa*	Barnes Co., ND
Mich-768 9012606	horizontal juniper *Juniperus horizontalis*	USDA-NRCS, PMC, East Lansing, MI
ND-21 9034900	nannyberry *Viburnum lentago*	USDA, ARS, Mandan, ND
Dart's Golden 9019601	dwarf ninebark *Physocarpus opulifolius*	P.I. Station, Ames, IA
ND-170 9005728	cotoneaster *Cotoneaster integerrimus*	Kingsbury Co., SD

SELECTION AND INCREASE: TECHNICAL REPORT – 2007

Final Evaluation and Release Schedule

Genus/Species:	***Aronia melanocarpa***
Common Name:	**black chokeberry**
Accession/PI Number:	**PI-323957**
Source:	USDA, ARS, Plant Introduction Station, Ames, IA
Outstanding characteristics:	Winter hardiness, disease and insect resistance, excellent fruit production, fall color, and does not sucker
Anticipated Release Cooperators:	North Dakota, South Dakota, and Minnesota Agricultural Experiment Stations
Intended Use:	farmstead windbreaks, wildlife, recreational and urban plantings, and agroforestry applications such as fruit orchards

Genus/Species:	***Ribes americanum***
Common Name:	**American black currant**
Accession/PI Number:	**9082687**
Source:	Native collection by Big Sioux Nursery staff along the Big Sioux River near Watertown, South Dakota
Outstanding characteristics:	Excellent establishment, vigorous growth, disease and insect resistance, excellent fruit production, attractive fall color
Anticipated Release Cooperators:	North Dakota, South Dakota, and Minnesota Agricultural Experiment Stations and the South Dakota Association of Conservation Districts
Intended Use:	Wildlife and recreational plantings, farmstead windbreaks, and agroforestry applications such as fruit orchards

Genus/Species:	***Crataegus chrysocarpa***
Common Name:	**hawthorn, roundleaf or fireberry**
Accession/PI Number:	**9076678**
Source:	A composite of seed from selected native plants from 5 counties in South Dakota, including Butte, Marchall, Day, Hamlin, and Harding. The original plants were evaluated and selected from a large replicated nursery.
Outstanding characteristics:	Excellent survival on a variety of sites with excellent fruit production and a long life span
Anticipated Release Cooperators:	North Dakota, South Dakota, and Minnesota Agricultural Experiment Stations
Intended Use:	Wildlife and recreational plantings, farmstead windbreaks, and agroforestry applications such as fruit orchards.

Genus/Species:	***Celtis occidentalis***
Common Name:	**hackberry**
Accession/PI Number:	**9034596, ND-3878**
Source:	The original plants were selected from a large, replicated nursery at the ARS Northern Great Plains Research Laboratory, at Mandan, North Dakota. This accession was originally collected by James Ayen from native trees belonging to Roger Wagner. The site was along the Red Lake River near Fisher, Minnesota in Polk County.
Outstanding characteristics:	This selection is a northern origin source with early maturity and exceptional winter hardiness. Growth rates are equal to or greater than many other more southern sources. Seed production is excellent.
Anticipated Release Cooperators:	North Dakota, South Dakota, and Minnesota Agricultural Experiment Stations
Intended Use:	Wildlife and recreational plantings, farmstead windbreaks

SELECTION AND INCREASE: TECHNICAL REPORT – 2007

Seed Orchard, Apple Creek Township, Burleigh County, North Dakota.

Introduction: An adequate source of seed is essential for the production and promotion of seed propagated cultivars. Certified tree seed from promising selections must be available for advanced evaluations, progeny testing, and commercial nursery production in limited quantity. This can be accomplished by designating seed production areas and establishing seed orchards that are properly designed, isolated, and maintained. Sites should be selected on the basis of soils, location, accessibility, and ease of management.

Objectives: To provide an abundant local source of tree seed of released varieties and promising selections.

Cooperators: The USDA Natural Resources Conservation Service, Plant Materials Center, Bismarck, North Dakota, in cooperation with the USDI Fish and Wildlife Service, Burleigh County, Bismarck, North Dakota.

Location: Waterfowl Production Area, approximately 5 miles east and 1 mile south of Bismarck, North Dakota on Old Highway 10. Legal description: N 1/2 of sec. 1, T. 138 N., R. 79 W.; S 1/2 of sec.31, T. 139 N., R. 78 W. Elevation is approximately 1,700 feet.

Major Land Resource Area: The site is located in Major Land Resource Area 053B, Dark Brown Glaciated Plain. Most soils are derived from calcareous glacial till. The gently rolling plain includes some areas of kames and moraines that have irregular topography. Forty percent of the area is rangeland.

Soils: There are seven different soils mapping units in the planting area:
R - Roseglen loam or silt loam, 0 to 3 percent slope.
RB - Roseglen loam or silt loam, 3 to 6 percent slope.
Ta, Ta2 - Tansem loam or silt loam, 0 to 3 percent slope.
TaB, TaB2 - Tansem loam or silt loam, 3 to 6 percent slope.
P, Pl - Parshall, fine sandy loam or sandy loam, 0 to 3 percent slope.
TeB - Telfer fine sandy loam or sandy loam, 3 to 6 percent slope.
Tyl - Tally fine sandy loam or sandy loam, 0 to 3 percent slope.

The Tansem series consists of deep, well-drained soils formed in loamy sediments on glacial lake plains. The surface layer is dark grayish-brown Silt loam 5 inches thick. The subsoil is grayish-brown and light olive brown silt loam 8 inches thick. The substratum is light yellowish-brown and pale yellow silt loam, which is varved in lower part. Permeability is moderate. Available moisture capacity is high. Organic matter content is moderate and fertility is medium. Slopes are 1-10 percent. These soils are in North Dakota windbreak suitability group 3.

The Roseglen series consists of deep, moderately well-drained soils formed in loamy sediments on glacial lake plains. The surface layer is dark grayish-brown silt loam 8 inches thick. The subsoil is dark grayish-brown and grayish-brown silt loam 26 inches thick. The substratum is light yellowish-brown and light brownish-gray silt loam. Permeability is moderate. Available water capacity, the organic matter content, and fertility are high. Slopes are 0-9 percent. These soils are in North Dakota windbreak suitability group 1.

The Parshall series consists of deep, well-drained soils formed in fine sandy loam alluvium on terraces and outwash plains and in upland swales. The surface layer is dark grayish-brown fine sandy loam 14 inches thick. The subsoil is dark grayish-brown, very friable fine sandy loam in the upper 17 inches and grayish-brown fine sandy loam in the lower 6 inches. The underlying material is light brownish-gray fine sandy loam in the upper 12 inches and grayish-brown sandy loam buried surface layer in the lower 13 inches.

Permeability is moderately rapid. The available water capacity is moderate. The organic matter content is high and fertility is medium. Slopes are 0-15 percent. These soils are in North Dakota windbreak suitability group 5.

Climate: MLRA 053. The average annual precipitation is 15 to 18 inches; highest in the growing season. Rainfall is low and somewhat erratic. The average annual temperature is 40 to 60 degrees F. Average freeze-free period is 105 to 140 days. The plant hardiness zone is 3b with an average annual minimum temperature of -40 to -30 F. For the 2007 weather summary, see Table AV-1 on page 148. The nearest official station is at Bismarck, North Dakota.

Methods and Materials

Assembly: Refer to Table SDIN-AV-1 for status of woody species planted.

Planting plan: The seed increase planting site consists of blocks 1, 2, 3, and 4 (Figure SDIN-AV-1). Rows are 250 feet long. Spacing is 25 feet between rows and 10 feet within row for trees; 5 feet within row for shrubs.

Plot preparation: A clean, firm planting site was prepared annually by disking, and harrowing.

Planting method: All trees and shrubs were planted using approved forestry methods.

Planting date: Refer to Table SDIN-AV-1 for year of planting from 1979 through 1988.

Fertilization: No fertilizer has been applied to planting area.

Weed control: No herbicide was applied to any plot during year of establishment or in succeeding years. Mechanical control was by clean cultivating between rows and in fallow areas. A specialized within row tree cultivator was used twice annually beginning in 1985. Two to four tillage operations were performed each year during the months of May through August. Hand hoeing was done as needed to control weeds in row. Some spot spraying of weeds is done annually. A small patch of leafy spurge is being closely monitored.

Biological control: No insecticides have been applied. Animal repellant (Arasan-50 Red) was applied in the fall of 1979-82 to discourage rodent damage. Wire cages had been placed around the 'Midwest' Manchurian crabapple to control deer browse. In 1987, wire cages were taken off the crabapple and placed on the 'Oahe' hackberry and 'Scarlet' Mongolian cherry. In 1991, the cages on the Oahe were raised up to four feet. Tubex were placed on the 'Homestead' Arnold hawthorn. In 1994, wire cages were installed on the 'Homestead' Arnold hawthorn to protect them from deer. Cages have been removed from the hackberry and the hawthorn.

Irrigation: Each year, newly planted materials were watered by hand. In 1980, water was added once a week due to extreme dry conditions.

Crop residue management: From 1980 through 1985, a winter cover crop of oats was seeded between rows in September. No cover crop was seeded in previous years. In 1986 and 1988, a rye cover crop was seeded. Due to dry conditions, the cover crop seeded in 1988 was not worked up; it was mowed. In 1993, a permanent cover of sideoats grama, blue grama, and black medic was established. Grass was mowed between rows, and some within-row weed control was done with a rotary cultivator (1993-1997). Weeds were spot sprayed and grass was mowed between rows (2000-2005).

Silvicultural practices: Dead trees and broken branches were cut and removed each year for sanitation. Any new growth below graft union was removed. In 1991, most of the Midwest crabapple and the Oahe hackberry received some minor pruning to remove multiple stems and excess lower branches.

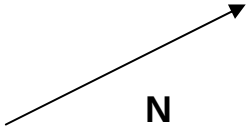
Seed harvest: Amounts of seed harvested in 1985 through 2007 are recorded in Table SDIN-AV-1.

Figure SDIN-AV-1.

Apple Valley Seed Orchard

(N½ sec. 1, T. 138 N., R. 79 W.)

Row #	Block 1	Block 2
1		
2	Bighorn	McDermand
3	Skunkbush	Ussurian
4	Sumac	Pear
5	(mostly dead)	
6		
7	ND-313	
8	Red Tatarian	Midwest
9	Honeysuckle	Manchurian
10	ND-629	Crabapple
11	Amur maple	
12	SD-131	
13	Mayday	Cardan
14	Sakakawea	Green
15	Silver buffaloberry	Ash
16	Centennial	
17	Cotoneaster	
18	Scarlet	Oahe
19	Mongolian cherry	Hackberry
20	ND-1134	
21	Select plum	



Block 4
Legacy
Late lilac
Regal
Russian almond

Block 3
Homestead
Arnold
Hawthorn

Table SDIN-AV-1. Seed Orchard Harvest, 1985-2007.

Block/ Rows	Accession	Species	Year Planted	Year of Harvest	Clean Weight (lbs)	Remarks
1/10-11	ND-629	amur maple	1980	1985	3.0	plants vary in height
				1988	10.5	
				1989	6.0	
1/14-15	'Sakakawea'	buffaloberry	1985	1989	0.26	
				1993	7.0	
				1995	0.18	
				1998	6.0	
1/16-17	'Centennial'	European cotoneaster	1985	1988	0.76	
				1989	27.0	
				1993	34.0	
				1994	13.0	
				2006	1.1	
1/20-21	ND-1134	select plum	1985	1993	0.33	not adapted to soils
				1994	4.1	
2/1-6	'McDermand'	Ussurian pear	1979	1993	1.4	
				1998	9.0	
2/7-11	'Midwest'	Manchurian crabapple	1980	1989	4.5	
				1993	2.5	
				1995	0.15	
				1999	1.0	
2/12-15	'Cardan'	green ash	1980	1985	1.75	
				1987	131.0	
				1988	0.9	
				1989	3.5	
				1991	18.5	
				1992	282.0	
				1993	12.0	
				1997	6.0	
				1998	37.0	
				1999	6.0	
				2000	4.0	
				2003	7.75	
				2007	17.35	
2/17-21	'Oahe'	hackberry	1981	2000	1.0	caged from deer
				2007	1.8	
3	'Homestead'	hawthorn	1988	1998	0.25	caged from deer
4	'Regal'	Russian almond	1988	1996	13.0	
				1997	21.0	