

FIELD EVALUATION OF WOODY PLANT MATERIALS AT DICKINSON BRANCH EXPERIMENT STATION, DICKINSON, NORTH DAKOTA

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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 North Dakota, South Dakota, and Minnesota, the three states served by the Plant Materials Center (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 Natural Resources Conservation Service, Plant Materials Center, Bismarck, North Dakota, in cooperation with the North Dakota State University, Dickinson Branch Experiment Station, Dickinson, North Dakota.

Location: This project is located one mile west of Dickinson, North Dakota, on the NDSU Dickinson Branch Experiment Station. Legal description: NE1/4 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 054, 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. Included in this group are nearly level to hilly soils of the Flaxton, Lihen, Livonia, Parshall, and Vebar series among others. These are well-drained, loamy and sandy soils. They are suited to windbreak and other plantings, but selection of species is limited. Erosion hazard is serious. The moderate available water capacity is the main limitation.

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.

Methods and Materials

Assembly:

Refer to the plot map for woody species currently planted at the site.

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. 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.

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. Recently, a Weed Badger has been used around the trees.

Pest Control:

Previous years: 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 - 1998: 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.

Evaluations and Measurements:

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. Data does not appear in this report but is available upon request from the PMC.

Results**Plant Performance:**

Currently, 84 accessions of 51 species are under evaluation. This site is 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 extended dry weather in 1990 and 1991, the original windbreak of spruce planted on the border died. A number of planted accessions have also died. Generally, the precipitation since that time has been slightly above normal. Many of the trees, especially the poplars have put on considerable growth. The larches have also performed well.

PLOT MAP

	Block 1A		Block 1B		Block 2	
Row 1	14272 poplar	14271 poplar	ND-1729 Siberian larch		ND-313 red tatarian honeysuckle	ND-1730 red tatarian honeysuckle
Row 2	14274 poplar	Manitou poplar	SL-383-T Siberian larch		ND-628 silverberry	Bighorn aromatic sumac
Row 3	14392 Walker poplar	Canam Walker poplar	ND-1765 Siberian larch		ND-26, 452 honeysuckle	ND-170 cotoneaster
Row 4	ND-3796 white poplar	Raverdeau poplar	ND-1763 Ponderosa pine	ND-1565 bristlecone pine	Bighorn skunkbush sumac	Regal Russian almond
Row 5	9069170 English oak	9069090 quaking aspen	9057413 Ponderosa pine	9063151 Dahurian larch	ND-11 amur honeysuckle	Centennial cotoneaster
Row 6	9063146 Walker poplar	Assiniboine poplar	9069172 Scotch pine	11737 Siberian elm	9069128 honeysuckle	
Row 7	9063141 eastern cottonwood	9076723 Siberian elm	408 Siberian elm	ND-3803 white poplar	9076737 black cherry	
Row 8	9016318 Siberian elm	9076725 smoothleaf elm	9076722 European white birch	9069171 Siberian elm	9063142 Japanese cherry	

Row 9	9069164 Scotch pine	9069168 Siberian larch	9063148 corktree	ND-21 nannyberry	Homestead Arnold hawthorn	
Row 10			9069081 littleleaf linden	9063126 Japanese elm	SD-131 mayday	9057438 salt tree
	Block 1A		Block 1B		Block 2	

PLOT MAP (continued)

Block 3				Block 4		
Midwest Manchurian crabapple		Red Splendor crabapple		SD-156 green ash	ND-1734 green ash	Row 1
ND-1731 Siberian crabapple		McDermant Ussurian pear		Cardan green ash	ND-1759 green ash	Row 2
Freedom honeysuckle	9063143 red tatarian honeysuckle	9008041 false indigo	Arnolds Red honeysuckle	ND-647 black ash	ND-1432 Ohio buckeye	Row 3
Konza aromatic sumac	Scarlet Mongolian cherry		'Legacy' late lilac	ND-1879 honeylocust		Row 4
Sakakawea silver		Magenta crabapple		9063116 black		Row 5

buffaloberry				ash		
9076726 tatarian maple		ND-1336 chokecherry		9063115 green ash		Row 6
				ND-989 Japanese elm		Row 7
ND-1134 plum		ND-629 amur maple		Oahe hackberry		Row 8
ND-1873 amur maple		ND-686 Pekin lilac		SD-75 hackberry		Row 9
9069129 amur chokecherry				3890 Russian olive		Row 10
Block 3				Block 4		

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