FIELD EVALUATION PLANTING: TECHNICAL REPORT - 1986-1987

Project 38I316K North Dakota State University, Dickinson Branch Experiment Station, Dickinson, North Dakota

Project 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 stages served by the Center. 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 Soil 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: NE¼ 5, T139N., R96W., 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 the 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° 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° F. Climatic data for 1986-1987 recorded at Dickinson Branch Experiment Station, Dickinson, North Dakota is shown in Table 10.

Methods and Materials

Assembly: Refer to Table 11 for a list of woody species planted from 1978 through 1987.

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 four 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 1 contains conifers spaced 5 feet within row. Block 2 contains shrubs and small trees spaced 5 feet within row. Block 3 contains medium sized trees, spaced 10 feet within row. Block 4 contains tall trees spaced 10 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 tree and shrubs were hand planted using approved forestry methods.

Planting Date: Refer to Table 11 for a list of woody species planted from 1978 through 1987. Replacement stock is planted the year after establishment 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 minimal of hand hoeing was done to control weeds in rows.

Pest Control: Previous years: No animal repellent or insecticide was applied in 1978. In the fall of 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 - 1987: 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.

Crop Residue Management: No cover crop has been established.

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. Replacements were used when available.

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.

Plant performance data was reported in September 1986 and October 1987. Survival, vigor, canopy cover and height, and special remarks were recorded for all hardwoods and remaining conifers. Not all data appears in this report.

Results

Plant Performance: Currently 61 accessions of 35 species are under evaluation. This site is fairly well maintained by the Dickinson Experiment Station. Some weed competition has occurred within row because hand hoeing has been minimal. A favorable microclimate is provided by surrounding shelterbelts. This undoubtly reduces exposure to hostile temperatures and brisk winds deminishing the opportunity for dessication and winter injury. Annual rainfall amounts are similar to Bismarck. Like most of the region, spring temperatures were well above normal but late summer and fall temperatures were far below average in 1985. The most significant feature the past 6 years was the extensive girdling of apricot, crabapple and other fruit trees by rabbits in 1980 which killed or severely set back many plants. Deer continue to rub many of the conifers, resulting in broken stems and leaders. Mean data for individual accessions of trees and shrubs is shown in Table 11. The following accessions exhibit potential for further evaluation:

Accession Number	**Genus/Species Origin/Source**	**Plot Location**
ND-1765 5980T	Siberian larch Larix sibirica USDA, FS, Shelterbelt Lab., Bottineau, ND	1/03/1-10
ND-628 5887T	Silverberry Elaeagnus commutata Wells, Co., ND	2/02/1-10
'Red Splendor' 6004T	Flowering crabapple Malus sp. x Lee Nursery, Fertile, MN	3/01/6-10
ND-14 PI-478004	Harbin pear Pyrus ussuriensis Res. Sta. Morden, MB, Canada SCS, PMC, Bismarck, ND	3/02/6-10

Accession Number	Genus/Species Origin/Source	Plot Location
ND-1336 6088T	Chokecherry Prunus virginiana Mercer Co., Stanton, ND	3/06/6-10
ND-629 5645T	Amur maple Acer ginnala Res. Sta., Morden, MB, Canada	3/08/6-10
ND-1873 5648T	Amur maple Acer ginnala Lincoln-Oakes Nursery, Bismarck, ND	3/09/1-5
SD-156 5890T	Green ash Fraxinus pennsylvanica Deuel Co., Clear Lake, SD	4/01/1-5
ND-1759 5893T	Green ash SD-156 x MDN-12002 Fraxinus pennsylvanica USDA, SCS, PMC, Bismarck, ND	4/02/6-10
ND-647 5887T	Black ash Fraxinus nigra Res. Sta., Morden, MB, Canada	4/03/1-5
ND-1879 11850T	Honeylocust Gleditsia triacanthos ARS Field Station, Woodward, OK	4/04/1-5
ND-283	Russian almond Prunus tenella ND Game and Fish Dept.	2/04/11-20

Project No.: 38I316K North Dakota State University, Dickinson Branch Experiment Station, Dickinson, North Dakota

Table No. 10: 1986-1987 Weather Summary - Official Station - Dickinson, North Dakota

						Precipitation					
		Mean Temperature								Deviation From Normal	
Month		**1986**	**1987**	**Normal**		**1986**	**1987**	**Normal**		**1986**	**1987**
		----------°F----------				----------Inches----------					
January		22.9	24.7	9.3		0.42	0.07	0.34		0.08	-0.27
February		12.6	29.5	16.2		0.70	0.43	0.40		0.30	0.03
March		38.5	29.8	25.4		0.19	2.06	0.57		0.38	1.49
April		39.6	49.6	40.5		2.33	0.13	1.73		0.60	-1.60
May		52.2	58.6	53.0		2.84	2.28	2.53		0.31	-0.25
June		65.2	67.1	62.2		2.58	1.46	3.69		-1.11	-2.23
July		64.5	69.7	68.6		3.92	5.13	2.08		1.84	3.05
August		63.8	64.1	67.4		0.54	2.40	1.86		-1.32	0.54
September		51.5	59.5	55.9		4.61	1.01	1.51		3.10	-0.50
October		44.4	43.8	45.0		0.36	0.24	0.85		-0.49	-0.61
November		22.2	37.4	28.3		1.40	0.22	0.45		0.95	-0.23
December		24.2	26.5	15.6		0.06	0.01	0.41		-0.35	-0.40
Annual		41.8	46.7	40.6		19.95	15.44	16.42		3.53	-0.98

	1986	**1987**
Last Frost (28°)		April 21
First Frost (28°)		October 2
Frost Free Period		163 days

USDA, SCS, PMC, Bismarck, North Dakota

210 – Project No.: 38I316K

Project Title: Field Evaluation of Woody Plant Materials (FEP)

Location: North Dakota State University, Dickinson Branch Experiment Station, Dickinson, North Dakota

Major Land Resource Area: 054

202 – Soil Series Texture: Parshall fine sandy loam

201 – Year of Record: 1986 – 1987

211-PLOT-LOCATION		304-MATL-PLTD	(Establishment, material planted)
23,1-ACC-NO	(Prime-PMC-control number,	306-AGE	(Age of stock)
02-PLANT-SYMBOL	PI number)	305-NO-PLTS	(Number of plants)
12-COMMON-NAME		310-NO-PLT-SRV	(Number of plants surviving)
04-GENUS-NAME		363-PCT-SRV	(Percent survival)
05-SPECIES-NAME		337-VI	(Vigor, plant)
29,30-COLL-SITE-STATE, COUNTY	(Origin/source)	347-CO	(Resistance to cold)
209-TRANS-DATE	(Transplant date)	359-CAN-COV	(Canopy cover, cm)
201-YR-REC	(Year of record)	360-PLT-HT	(Plant height, cm)
212-YR-PLT	(Year planted)	-AD	(Animal damage)
		364-REMARKS	

Evaluation Rating System

Vigor	**Amount of Injury**
1 = Excellent	1 = None
3 = Good	3 = Slight
5 = Fair	5 = Moderate
7 = Poor	7 = Severe
9 = Very Poor	9 = Very Severe

Table 11. 38I316K Field Evaluation of Woody Plant Materials – Dickinson, ND – 1986-1987

211 Plot Location	23 Accession Number	02 Plant Symbol	04 05 Genus/Species Origin/Source	209 Trans Date	212 Yr Plt	201 Yr Rec	304 Matl Pltd	306 Age	305 No Plts	310 No Plt Srv	363 Pct Srv	337 V I	347 C O	359 Can Cov	360 Plt Ht	364 Remarks
1/01/1-10	ND-1729	LASI*	Siberian larch	05/16	78	78	PLBR	1-0	10	9	90	3		21	62	replt-plt #9
	5979T		Larix sibirica			79				10	100			22	44	
			NDFS State Nursery			80				10	100	4	1	33	55	
			Towner, ND			82				8	80	8		29	46	
						83				6	60	7	3	33	74	#1 mowed off,
						84				6	60	4		39	91	mod. rodent
						87				6	60	6		90	197	dam.
1/02/1-10	SL-383-T	LASI*	Siberian larch	05/16	78	78	PLBR	1-0	10	10	100	3		17	68	
	Pallet No.		Larix sibirica			79				10	100			24	49	
	2392		USDA, FS,			80				10	100	4	1	43	62	
	5976T		Shelterbelt Lab.,			82				9	90	6		47	69	
			Bottineau, ND			83				9	90	6	3	61	119	#1 mowed off,
			Denbigh Ex. Forest			84				8	80	2		78	170	mod. rodent
						87				8	80	2		181	306	dam
1/03/1-10	ND-1765	LASI*	Siberian larch	05/17	78	78	PLBR	2-0	10	10	100	3		17	44	
	5980T		Larix sibirica			79				10	100			33	48	
			USDA, FS,			80				10	100	4	1	55	81	
			Shelterbelt Lab.,			82				10	100	5		63	122	
			Bottineau, ND			83				10	100	5	2	79	148	mod. rodent
						84				10	100	4		110	187	dam., Best
						87				9	90	2		214	334	accession of larch
1/04/1-5	ND-1763	PIPO*	Ponderosa pine	05/16	78	78	CONT	1-1	5	5	100	1		14	53	
	6043T		Pinus ponderosa			79				4	80			14	34	
			USDA, FS,			80				5	100	4	5	46	61	replt-plt #3
			Shelterbelt Lab.,			82				4	80	7		74	134	
			Bottineau, ND			83				4	80	5	3	88	111	animal damage
			757-5 Todd Co., SD			84				4	80	3		116	149	
						87				3	60	3		158	228	

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211 Plot Location	23 Accession Number	02 Plant Symbol	04 05 Genus/Species Origin/Source	209 Trans Date	212 Yr Plt	201 Yr Rec	304 Matl Pltd	306 Age	305 No Plts	310 No Plt Srv	363 Pct Srv	337 V I	347 C O	359 Can Cov	360 Plt Ht	364 Remarks
1/04/6-10	ND-1565 6036T	PIAR	Bristle cone pine Pinus aristata USDA, FS, Shelterbelt Lab., Bottineau, ND	05/16	78	78 79 80 82 83 84 87	CONT	1-1	5	5 5 5 1 4 2 2	100 100 100 20 80 40 40	3 5 5 8 3 6	 3 4 	14 20 32 65 29 58 70	17 19 23 90 24 55 62	 mower damage on plt #3
1/06/1-10	ND-1863 5909T	GLTR	Honeylocust Gleditsia triacanthos Brown Co., SD USDA, SCS, PMC, Bismarck, ND	05/12	82	82 83 84 86	PLBR	2-0	10	9 9 9 0	90 90 90 0	5 4 6	 4 	33 64 44	46 91 79	 slight-moderate winter injury
1/08/1-5	ND-3825 34904T	ACSA2	Silver maple Acer saccharinum Bismarck, ND	06/01	83	83 84 85 86 87	PLBR		5	 5 0 5 5	 100 0 100 100	 5 3 4	 	 8 75	 39 121	 replants
1/08/6-10	ND-3886 3519T	ACSA2	Silver maple Acer saccharinum Bismarck, ND	06/01	83	83 84 85 87	CONT		5	 4 3 3	 80 60 60	 4 6 3	 	 43 43 200	 101 82 222	
1/09/1-5	ND-3925 39998T	PRPE3	Hardy peach Prunus persica Meade Co., SD USDA, SCS, PMC, Bismarck, ND	05/07	86	86 87	PLBR	2-0	5	2 2	40 40	3 	 	70 180	68 118	
1/09/6-10	ND-21 34900T	VILE	Nannyberry Viburnum lentago USDA, ARS, Mandan, ND USDA, SCS, PMC, Bismarck, ND	05/07	86	86 87	PLBR	2-0	5	5 5	100 100	3 3	 	15 21	46 58	

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2/01/1-10	ND-313 5996T PI-477999	LOTAS*	Red tatarian honeysuckle Lonicera tatarica sibirica USDA, ARS, Cheyenne, WY USDA, SCS, PMC, Bismarck, ND	05/17	78	78 79 80 82 83 84 87	PLBR	2-0	10	9 9 10 10 10 10 10	90 90 100 100 100 100 100	1 3 4 3 4 3	 3 	47 62 98 162 181 225 172	48 72 73 136 166 167 204	 Replt-plt #9 good fruit mod-sev insect defoliation, honeysuckle aphid
2/01/11-20	ND-1730 5994T	LOTAS*	Red tatarian honeysuckle Lonicera tatarica sibirica Lincoln-Oakes Nursery, Bismarck, ND	05/17	78	78 79 80 82 83 84 87	PLBR	2-0	10	10 10 10 10 10 10 10	100 100 100 100 100 100 100	1 1 4 3 5 3	 3 	48 66 104 181 204 234 198	51 84 90 160 197 200 218	 good vigor slt. insect def. good fruit prod. snow damage 12,13,15,18,19-APHID Damage
2/02/1-10	ND-628 5877T	ELCO*	Silverberry Elaeagnus commutata Wells Co., ND	05/17	78	78 79 80 82 83 84 87	PLBR	2-0	10	10 10 10 10 10 10 10	100 100 100 100 100 100 100	1 1 5 5 4 4	 1 2 	29 83 124 151 192 217 177	52 94 97 145 170 159 182	 suckering snow damage 8, 9, 10
2/02/11-20	WY-843 'Bighorn' 4646T PI-483445	RHTR	Skunkbush sumac Rhus trilobata USDA, SCS, PMC, Bismarck, ND Bighorn Co., WY	05/17	78	78 79 80 82 83 84 87	PLBR	2-0	10	7 10 10 10 10 10 10	70 100 100 100 100 100 100	2 3 3 3 3 2	 3 	52 107 152 232 272 350 360	43 78 82 153 193 185 224	replt-plts #16,17,18 leaf spot, snow damage 1,2,3

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2/03/1-10	ND-26 11852T	LONIC	Honeysuckle Lonicera sp. USDA, ARS Mandan, ND	05/2	79	79 80 81 83 84	PLBR	2-0	10	10 10 10 10 10	100 100 100 100 100	 5 4 4	 3 	35 60 79 136 149	42 51 87 145 164	 leaf spot witches broom on plts #3, 5, 8 mod. ins. defol. grasshoppers aphid damage
2/03/11-15	ND-452 19978T	LOXYM*	Honeysuckle Lonicera xylosteum mollis USDA, ARS, Cheyenne, WY USDA, SCS, PMC, Bismarck, ND	05/2	79	79 80 81 83 84	PLBR	2-0	5	5 5 5 5 5	100 100 100 100 100	 3 4 3	 3 	37 71 99 169 198	39 47 88 168 168	 witches broom (1, 2, 3) slight leaf spot, leaf blight, aphid damage
2/04/1-10	WY-843 'Bighorn' 4646T PI-483445	RHTR	Skunkbush sumac Rhus trilobata USDA, SCS, PMC, Bismarck, ND Bighorn Co., WY	05/2	79	79 80 81 83 84	PLBR	2-0	10	10 10 10 10 10	100 100 100 100 100	 5 3 3	 3 	30 73 78 181 215	34 43 64 137 140	 few pests
2/04/11-20	PM-ND-283 6079T	PRTE*	Russian almond Prunus tenella ND Game & Fish Dept. USDA, SCS, PMC, Bismarck, ND	05/08	80	80 81 82 83 84 86	PLBR	2-0	10	10 7 10 8 10 9	100 70 100 80 100 90	5 4 4 4 4.4	 2 	23 28 54 119 115 159	68 44 69 108 112 136	 replt-plt #11, 15, 20 few pests

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2/05/1-10	ND-11 5993T PI-477998	LOMA6	Amur honeysuckle Lonicera maackii Res. Sta. Morden, MB, Canada	05/07	81	81 82 83 84 87	CONT	0-1	10	10 10 6 10 10	100 100 60 100 100	 4 6 4 3	 3 	20 42 50 64 160	19 44 54 56 170	 slight insect defol. (grass- hoppers)
2/05/11-20	ND-177 5729T	COIN	Cotoneaster Cotoneaster integerrima Lincoln-Oakes Nursery Bismarck, ND	05/08	85	85 86 87	PLBR	2-0	10	 8 7	 80 70	 4.3 3	 	 69 121	 68 100	no data
2/06/1-5	ND-995 PI-303584	SAHU	Prairie willow Salix humilis USDA, PI Sta., Ames, IA	05/12	82	82 83 84 86	PLBR- CONT	1-2	5	4 4 5 5	80 80 100 100	4 4 4 3	 3 	58 155 192 315	66 125 124 245	 mod. grasshopper damage. Replt-plt. #4
2/06/6-10	PI-370126	SAFR	Crack willow Salix fragilis USDA, PI Sta. Ames, IA	05/12	82	82 83 84 86	PLBR- CONT	0-1	5	5 4 5 5	100 80 100 100	4 3 3 	 3 	33 106 184 410	48 133 170 319	 good growth, few pests Replt-plt #5
2/07/1-10	ND-624 6094T	PTTR	Common hoptree Ptelea trifoliata Ramsey Co., ND USDA, SCS, PMC, Bismarck, ND	05/12	82	82 83 84 86	PLBR	2-0	10	9 9 10 10	90 90 100 100	5 3 3 3.8	 4 	24 37 50 174	33 64 79 148	 good growth Replt. plt. #7
2/08/1-5	'Indigo' Mich-765 PI-468117	COAM2	Silky dogwood Cornus amomum USDA, SCS, PMC, East Lansing, MI	06/01	83	83 84 85 87	PLBR		5	 4 3 3	 80 60 60	 2 8.3 2.7	 	 55 65 177	 56 52 117	

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2/08/6-10	'Roselow'	MASA*	Sargent crabapple	06/01	83	83	PLBR		5							
	Mich-1339		Malus sargentii			84				5	100	4		27	40	
	5026T		USDA, SCS, PMC,			85				4	80	6.8		31	36	
			East Lansing, MI			87				4	80	4.3		88	104	
2/09/1-10	ND-20	CRAR	Arnold hawthorn	05/09	84	84	CONT	0-2	10	10	100	4.1		20	10	
	5731T		Crataegus arnoldiana			86				10	100	3.6		52	82	
			USDA, SCS, PMC,													
			Bismarck, ND													
2/10/1-10	SD-131	PRPA5	Mayday	05/08	85	85	PLBR	2-0	10							no data
	6073T		Prunus padus			86				10	100	3.1		46	85	
			Brookings, Co., SD			87				10	100	3		70	142	
			USDA, SCS, PMC,													
			Bismarck, ND													
3/01/1-5	'Midwest'	MABAM*	Manchurian crabapple	05/17	78	78	PLBR	2-0	5	3	60	2		16	60	Replt-plts #2,5
	6003T		Malus baccata			79				5	100			27	64	
	PI-478000		mandshurica			80				5	100	3		58	85	
			Echo Manchuria/Res. Sta.			82				5	100	3		144	169	
			Morden, MB, Canada			83				5	100	2	2	183	211	fall webworm plt
			USDA, SCS, PMC,			84				5	100	4		236	260	#1, few pests,
			Bismarck, ND			87				5	100	3		288	347	good vigor
																snow dam. 1,2
3/01/6-10	'Red	MABA*	Flowering crabapple	05/17	78	78	PLBR	2-0	5	5	100	2		48	66	
	Splendor'		Malus sp. x			79				5	100			76	117	
	6004T		Lee Nursery, Fertile, MN			80				5	100	2		108	143	
						82				5	100	3		181	256	
						83				5	100	3	3	214	278	good growth,
						84				5	100	3		262	333	good fruit prod.
						87				5	100	2		314	373	few pests
																snow damage 1,2
																fall webworm 3,5

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3/02/1-5	ND-1731 6001T	MABA*	Siberian crabapple Malus baccata Lincoln-Oakes Nursery, Bismarck, ND	05/17	78	78 79 80 82 83 84 87	PLBR	2-0	5	4 5 5 5 5 5 5	80 100 100 100 100 100 100	2 3 3 2 2 3	 3 	58 84 125 178 228 309 323	68 95 125 249 321 329 424	replt-plt #3 good growth & vigor, few pests fall webworm 1,4
3/02/6-10	ND-14 1095T PI-478004	PYUS*	Harbin pear Pyrus ussuriensis Harbin, Manchuria/Res. Sta. Morden, MB, Canada USDA, SCS, PMC, Bismarck, ND	05/17	78	78 79 80 82 83 84 87	PLBR	2-0	5	5 5 5 5 5 5 5	100 100 100 100 100 100 100	6 1 3 1 2 	 2 	27 56 91 195 243 282 377	76 111 139 272 335 377 482	 good growth & vigor snow damage #4
3/03/1-5	SD-132 6064T	PRAR*	Apricot Prunus armeniaca USDA, SCS, PMC, Bismarck, ND Brookings Co., SD	05/17	78	78 79 80 82 83 84 86	PLBR	2-0	5	2 5 5 5 5 5 0	40 100 100 100 100 100 0	1 3 5 3 3 	 2 	57 98 165 159 256 270 	111 135 147 183 313 340 	replt-plts #2, 3, 4 good recovery from rodent injury, multi- stemmed
3/03/1-5	'Cardinal' PI-421800	ELUM	Autumn olive Elaeagnus umbellata USDA, SCS, PMC, Elsberry, MO	05/06	87	87	PLBR		5	2	40			20	40	

Table 11. 38I316K Field Evaluation of Woody Plant Materials – Dickinson, ND – 1986-1987 (Continued):

211 Plot Location	23 Accession Number	02 Plant Symbol	04 05 Genus/Species Origin/Source	209 Trans Date	212 Yr Plt	201 Yr Rec	304 Matl Pltd	306 Age	305 No Plts	310 No Plt Srv	363 Pct Srv	337 V I	347 C O	359 Can Cov	360 Plt Ht	364 Remarks
3/03/6-10	SD-133 6065T	PRAR*	Apricot Prunus armeniaca USDA, SCS, PMC, Bismarck, ND Brookings Co., SD	05/17	78	78 79 80 82 83 84 86	PLBR	2-0	5	1 3 3 3 3 3 0	20 60 60 60 60 60 0	5 4 6 5 5	 2 	66 78 163 185 280 197	79 67 152 185 275 210	replt-plts #6, 7, 8,10 good recovery multi-stemmed
3/03/6-10	'Redwing' PI-477008	ELUM	Autumn olive Elaeagnus umbellata USDA, SCS, PMC, Rose Lake, MI	05/06	87	87	PLBR		5	0	0					
3/03/11-15	9008041		False indigo Amorpha fruticosa USDA, SCS, PMC, Aberdeen, ID	05/06	87	87	PLBR		5	4	80			41	51	
3/03/16-20	9047236		False indigo Amorpha fruticosa Lincoln-Oakes Nursery, Bismarck, ND	05/06	87	87	PLBR		5	4	80			35	54	
3/04/1-5	SD-134 6066T	PRAR*	Apricot Prunus armeniaca USDA, SCS, PMC, Bismarck, ND Brookings Co., SD	05/17	78	78 79 80 82 83 84 86	PLBR	2-0	5	5 5 5 5 4 3 0	100 100 100 100 80 60 0	2 1 7 5 5	 3 	67 158 230 124 235 170	104 204 258 146 239 192	 resprouts- multi-stemmed
3/04/1-5	'Konza' PI-477981		Aromatic sumac Rhus aromatica	05/06	87	87	CONT		5	4	80			51	77	

Table 11. 38I316K Field Evaluation of Woody Plant Materials – Dickinson, ND – 1986-1987 (Continued):

211 Plot Location	23 Accession Number	02 Plant Symbol	04 05 Genus/Species Origin/Source	209 Trans Date	212 Yr Plt	201 Yr Rec	304 Matl Pltd	306 Age	305 No Plts	310 No Plt Srv	363 Pct Srv	337 V I	347 C O	359 Can Cov	360 Plt Ht	364 Remarks
3/04/6-10	'Mantoy' 6069T	PRAR*	Apricot Prunus armeniaca USDA, SCS, PMC, Bismarck, ND USDA, ARS, Mandan, ND	05/17	78	78 79 80 82 83 84 86	PLBR	2-0	5	3 5 5 5 5 5 0	60 100 100 100 100 100 0	2 4 6 4 5	 3 	57 151 195 195 283 185	68 150 185 212 267 221	replt-plts #6, 10 resprouts-multi-stemmed, good recovery except plts #3, 4
3/04/6-10	'Cling-Red' PI-483450		Amur honeysuckle Lonicera maackii USDA, SCS, PMC, Elsberry, MO	05/06	87	87	PLBR		5	2	40			25	32	
3/04/11-15	9047238		Sea buckthorn Hippophae rhamnoides	05/06	87	87	PLBR		5	0	0					
3/05/1-5	ND-1178 6070T	PRAR*	Apricot Prunus armeniaca Walsh Co., ND	05/17	78	78 79 80 82 83 84 86	PLBR	2-0	5	4 5 5 4 4 4 0	80 100 100 80 80 80 0	2 3 7 5 5 	 3 	55 165 198 168 278 248	99 165 207 161 249 259	replt-plt #2 multi-stemmed

WATER LOSS BY EVAPOTRANSPIRATION FROM SPRING BARLEY IN RELATION TO PLANT DEVELOPMENT STAGE, NORTH DAKOTA 1983-1988.

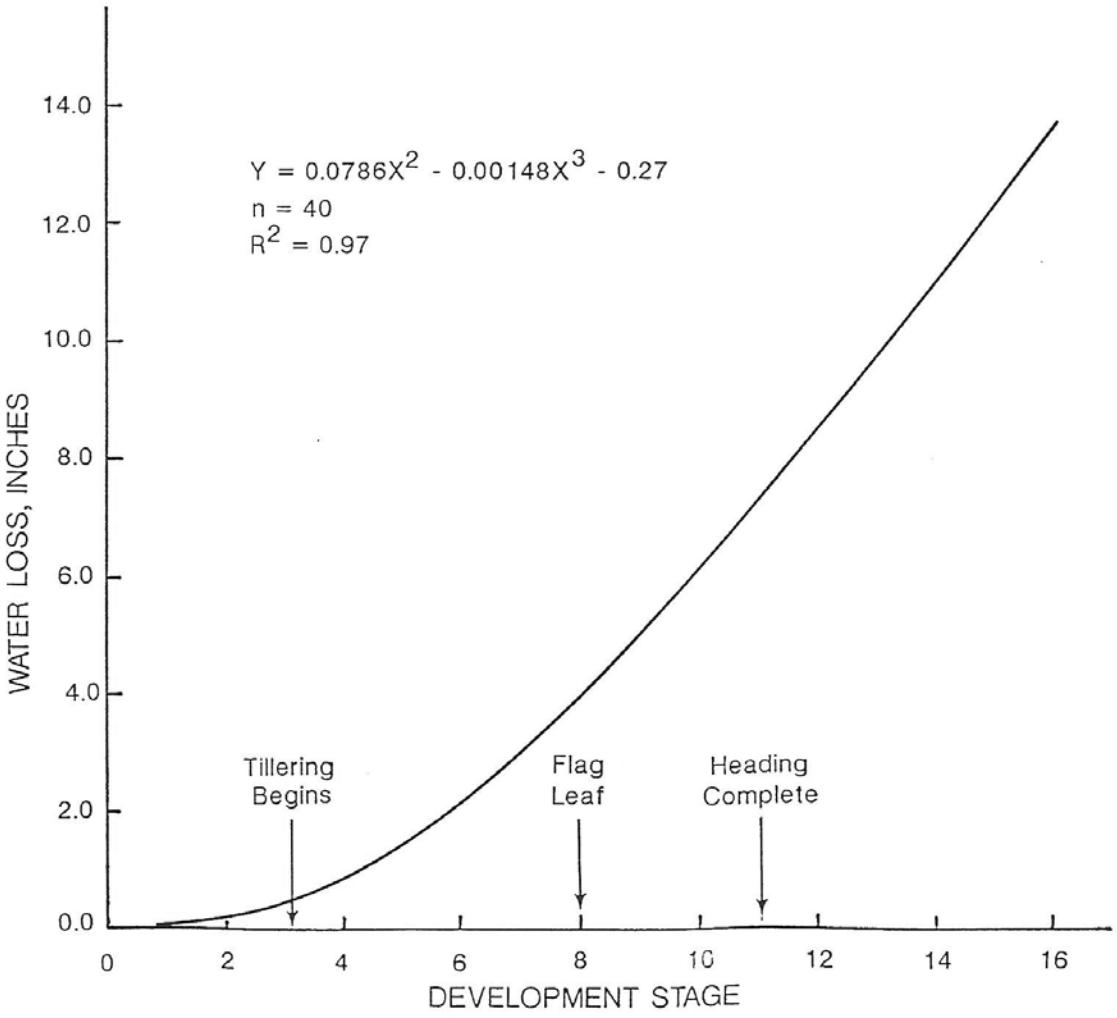
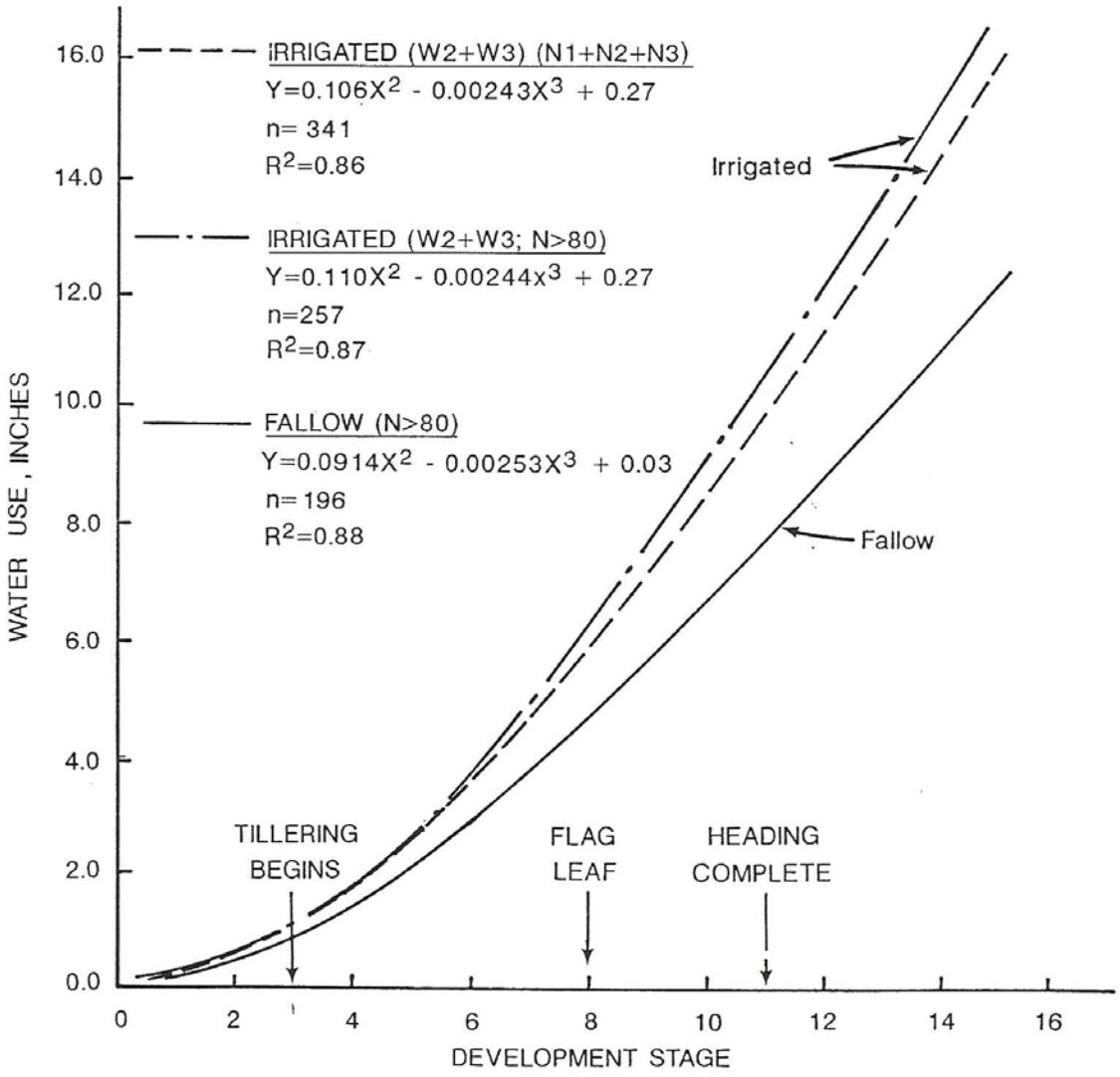


FIGURE 2. WATER USE BY EVAPOTRANSPIRATION FROM SPRING WHEAT IN RELATION TO PLANT DEVELOPMENT STAGE, NORTH DAKOTA, 1979-1987.



NORTHERN GREAT PLAINS RESEARCH LABORATORY
USDA/ARS
MANDAN, ND

Differences in Available Soil Water Content between Planting and Harvest of Spring-Sown Barley, Mandan, ND

Year[1/]	Soil Depth, Feet					
	0-1	1-2	2-3	3-4	4-5	5-6
	inches water					
1983	0.30	1.48	1.43	1.00	0.33	0.38
1984	1.98	1.71	1.81	1.64	0.56	0.33
1987	-0.24[2/]	1.70	1.29	0.53	0.16	0.05
1988	1.46	1.32	1.73	0.72	0.14	-0.03
Avg.	0.88	1.55	1.57	0.97	0.30	0.18

1/ Barley cultivars wre Bedford and Larker in 1983, and Azure in 1984, 1987, and 1988. Soil type was Williams loam.

2/ The minus sign means more water was present at harvest than at planting, because of rain shortly before harvest. Prior to the rain near harvest, there were 1.24 inches less water present at this depth than was present at planting.

United States Department of Agriculture
Agricultural Research Service
Northern Plains Area
Northern Great Plains Research Laboratory
Highway 6 South
P.O. Box 459
Mandan, North Dakota 58554

December 29, 1988

Mr. Thomas J. Conlon
Dickinson Station
P. O. Box 1117
Dickinson, ND 58601

Dear ~~Jack~~:

Enclosed are the agronomic data (Table 1) from the wheat and barley variety trials conducted on the station in 1988. The seed is supplied by the Dickinson Station. As in previous years, the trial is planted on summerfallow at a rate of about one milion viable seeds per acre. Planting date was April 25, in six-inch row spacing.

Protein concentration has not been measured at this date.

Table 2 shows the 1988 data of the water removal from the soil by barley, and the amount of rain between measurement dates of soil water content. Table 3 shows the same measurement for spring wheat in 1988.

Figure 2 shows the average water use by spring wheat grown on a well-drained soil by plant development stage over the period of 1979-1987. This will be published in ND Agric. Exp. Sta. Bulletin 519 scheduled for printing in January, 1989.

Item "X" shows data from barley trials (including 1988) of water content difference between planting and harvest, illustrating the soil depths from which water is removed. Item "Y" provides the same information for barley (1983-1988) as Figure 2 does for wheat (1979-1987).

Note how water use by wheat and barley essentially coincide over the growing season when grown on summerfallow.

We will send the protein data when the analysis is done. We are about six months behind in the laboratory because of equipment breakdown.

Call is you have any questions.

Sincerely,

ARMAND BAUER
Soil Scientist

Enclosures

Table 1. Agronomic Characteristics of Spring Wheat and Spring Barley Cultivars Grown at Mandan, ND, 1988

	Measurement						
Cultivar	**POP** **no/m²**	**HEA** **no/m²**	**HGT** **cm**	**TWT** **lbs./bu**	**THO** **mg**	**YIE** **bu/ac**	**HEP** **no**
Azure	185	458	47	47.4	29.78	15.0	2.5
Bowman	222	927	46	49.1	34.66	38.1	4.2
Gallatin	197	769	53	48.3	28.89	27.5	3.9
Morex	189	380	47	46.7	28.44	21.5	2.0
Robust	200	426	44	46.4	28.35	18.2	2.1
Arra 1/	173	500	41	41.4	27.85	13.8	2.1
Datal 1/	197	695	47	40.2	21.60	14.8	3.5
Otal 1/	87	367	51	42.4	23.19	13.3	4.2
LSD 2/	26	29	3	3.1	3.22	6.9	
Alex	158	327	58	57.9	24.26	16.1	2.1
Amidon	180	275	55	57.9	24.25	19.0	1.5
Challenger	185	247	41	56.5	22.49	14.3	1.3
Cutlass	169	301	45	56.5	20.94	13.7	1.8
Keif	151	266	49	56.9	23.41	16.5	1.8
Len	171	283	46	57.8	23.15	12.3	1.7
Nordic	144	252	45	58.7	27.27	17.5	1.8
Wheaton	174	229	41	55.7	23.10	14.9	1.3
LSD 2/	19	20	5	1.1	1.43	2.3	

POP = Plant population pre 3-leaf stage.
HEA = Head population @ harvest.
HGT = Height at harvest.
TWT = Test weight.
THO = 1000 kernel weight.
YIE = Grain yield, combine.
HEP = Heads per plant.

1/ These are from Alaska.

2/ The difference between any two values in the column above must be at least this large to be significant at the 95% confidence level.

$no/m^2 * 0.836 = no/yard^2$
cm * 0.394 = inches

Table 2. Available Soil Water by Foot-Increments to Six Feet and Rainfall/Irrigation Applied between Dates of Soil Water Measurement on Spring Barley, Mandan, ND, 1988

Planted 4/25/88
Emerge 5/06/88

Date mo/day	DS[1/]	Soil Depth - Feet 0-1	1-2	2-3	3-4	4-5	5-6	Rain inches
		-- -- - - - - - - - - - - inches available water - - - - - - - - - - - - - - - - -						
								0.52[2/]
5/06	0.5	1.37	1.88	2.08	1.78	1.80	1.90	
								0.04
5/10	1.6	1.33	1.86	2.02	1.80	1.77	1.87	
								0.12
5/19	3.8	1.18	1.88	2.06	1.80	1.84	1.93	
								0.00
5/25	5.4	0.70	1.87	2.07	1.84	1.87	2.02	
								0.16
6/01	7.0	0.28	1.65	1.96	1.80	1.84	1.95	
								0.00
6/07	8.4	-0.11	1.00	1.78	1.78	1.87	1.95	
								2.01[3/]
6/15	9.8	0.59	0.48	1.29	1.70	1.84	1.99	
								2.55[4/]
6/21	11.9	0.11	0.42	0.97	1.44	1.74	1.91	
								1.61[4/]
6/28	13.5	0.94	0.40	0.74	1.34	1.80	1.99	
								2.05
7/05	14.0	1.31	0.86	0.66	1.28	1.72	1.96	
								0.00
7/12	14.6	0.17	0.68	0.65	1.16	1.74	1.94	
								0.00
7/20	15.0	-0.09	0.56	0.35	1.06	1.66	1.93	
	"Used"	1.46	1.32	1.73	0.72	0.14	-----	9.06

1/ Development stage, Haun scale, average 5 barley varieties. Stages on 5/10 and 5/19 estimated from regression.
2/ Planting to 5/06.
3/ Rain was 0.40 inches; the remainder is from irrigation.
4/ All from irrigation.
5/ Received 0.08 inches rain on 7/20.

Total water = 14.43 inches
(5) Average yield = 24.1 bu/ac

Table 3. Available Soil Water by Foot-Increments to Six Feet and Rainfall Amounts between Dates of Soil Water Measurement on Spring Wheat, Mandan, ND, 1988

Planted 4/25/88
Emerge 5/07/88

Date mo/day	DS[1/]	Soil Depth - Feet 0-1	1-2	2-3	3-4	4-5	5-6	Rain inches
		- - - - - - - - - - - - inches available water - - - - - - - - - - - - -						
								0.52[2/]
5/06		1.18	1.77	2.01	1.81	1.72	1.64	
								0.04
5/10		1.18	1.72	2.00	1.80	1.74	1.63	
								0.12
5/19		1.09	1.78	2.01	1.81	1.76	1.67	
								0.00
5/25		1.02	1.77	2.03	1.86	1.79	1.71	
								0.16
6/01		0.52	1.60	1.96	1.84	1.77	1.68	
								0.00
6/07		0.00	1.05	1.83	1.80	1.81	1.70	
								0.40
6/15		0.30	0.45	1.40	1.76	1.75	1.73	
								0.00
6/21		-0.07	0.32	0.93	1.54	1.68	1.62	
								0.00
6/28		-0.06	0.24	0.59	1.26	1.74	1.70	
								2.05
7/05		1.09	0.24	0.47	1.14	1.61	1.65	
								0.00
7/12		0.16	0.24	0.45	0.99	1.59	1.66	
								0.00[3/]
7/20		-0.10	0.21	0.43	0.85	1.49	1.62	
	"Used"	1.28	1.56	1.58	0.96	0.23	0.02	3.29

1/ Development stage.
2/ Planting to 5/06.
3/ 0.08 inches recorded on 7/20.

Total water = 8.92 inches
Average Yield = 15.5 bu/ac

Table 11. 38I316K Field Evaluation of Woody Plant Materials – Dickinson, ND – 1986-1987 (Continued):

211 Plot Location	23 Accession Number	02 Plant Symbol	04 05 Genus/Species Origin/Source	209 Trans Date	212 Yr Plt	201 Yr Rec	304 Matl Pltd	306 Age	305 No Plts	310 No Plt Srv	363 Pct Srv	337 V I	347 C O	359 Can Cov	360 Plt Ht	364 Remarks
3/05/6-10	ND-416 6067T	PRAR*	Apricot Prunus armeniaca USDA, SCS, PMC, Bismarck, ND Burleigh Co., ND	05/17	78	78 79 80 82 83 84 86	PLBR	2-0	5	5 5 5 5 3 2 0	100 100 100 100 60 40 0	1 1 7 5 5	 3 	62 149 232 142 257 238	103 192 225 137 273 248	 rodent damage multi-stemmed
3/06/1-10	'Flame' PI-483442		Amur maple Acer ginnala	05/06	87	87	PLBR		10	2	20			25	60	
3/06/1-5	ND-423 6068T	PRAR*	Apricot Prunus armeniaca USDA, SCS, PMC, Bismarck, ND Stark Co., ND	05/17	78	78 79 80 82 83 84 86	PLBR	2-0	5	3 5 5 5 5 4 0	60 100 100 100 100 80 0	5 5 7 6 4 	 	25 69 132 155 163 146	58 116 163 190 240 224	replt-plts #4,5 plts #2-4 are multi-stemmed (are all resprouts) wind dam. on plt #1.
3/06/6-10	ND-1336 6088T	PRVI	Chokecherry Prunus virginiana Mercer Co., ND	05/17	78	78 79 80 82 83 84 87	PLBR	2-0	5	5 5 5 5 5 5 5	100 100 100 100 100 100 100	2 2 3 2 2 2	 2 	28 98 181 259 327 352 401	74 154 196 313 349 368 441	 slight powdery mildew, good vigor. webworm 1,2,4,5

Table 11. 38I316K Field Evaluation of Woody Plant Materials – Dickinson, ND – 1986-1987 (Continued):

211 Plot Location	23 Accession Number	02 Plant Symbol	04 05 Genus/Species Origin/Source	209 Trans Date	212 Yr Plt	201 Yr Rec	304 Matl Pltd	306 Age	305 No Plts	310 No Plt Srv	363 Pct Srv	337 V I	347 C O	359 Can Cov	360 Plt Ht	364 Remarks
3/07/1-5	ND-1732 6090T	PRVI	Chokecherry Prunus virginiana Lincoln-Oakes Nursery, Bismarck, ND	05/17	78	78 79 80 82 83 84 87	PLBR	2-0	5	5 5 5 5 5 5 5	100 100 100 100 100 100 100	2 3 4 4 3 4	 2 	18 77 112 247 317 344 514	67 141 169 293 331 352 405	 fall webworm slight aphid dam. shothole, leaf blight webworm 1,2,3,4
3/07/6-10	'Schubert' 12608T	PRVI	Chokecherry Prunus virginiana USDA, ARS, Mandan, ND USDA, SCS, PMC, Bismarck, ND	05/17	78	78 79 80 82 83 84 87	PLBR	2-0	3 5 	2 2 2 5 5 5 5	66 66 66 100 100 100 100	5 7 6 5 4 4	 2 	22 20 53 116 145 171 237	39 30 75 169 198 275 358	 replt-plts #8,9 replt-plts #8,9, 10 slight fall webworm, elm cont. on plt #4 webworm 6, 9, 10
3/08/1-5	ND-1134 47203T	PRAM	Plum Prunus americana Miller, SD USDA, SCS, PMC, Bismarck, ND	05/08	85	85 86 87	PLBR	2-0	5	 5 3	 100 60	 8.2 4.3	 	 14 57	 40 90	no data
3/08/6-10	ND-629 5645T PI-477992	ACGI	Amur maple Acer ginnala Res. Sta. Morden, MB, Canada	05/2	79	79 80 81 83 84	PLBR	2-0	5	5 0 4 4 4	100 80 80 80	 3 4	 1 	31 39 184 301	47 58 183 229	

Table 11. 38I316K Field Evaluation of Woody Plant Materials – Dickinson, ND – 1986-1987 (Continued):

211 Plot Location	23 Accession Number	02 Plant Symbol	04 05 Genus/Species Origin/Source	209 Trans Date	212 Yr Plt	201 Yr Rec	304 Matl Pltd	306 Age	305 No Plts	310 No Plt Srv	363 Pct Srv	337 V I	347 C O	359 Can Cov	360 Plt Ht	364 Remarks
3/09/1-5	ND-1873 5648T	ACGI	Amur maple Acer ginnala Lincoln-Oakes Nursery, Bismarck, ND	05/2	79	79 80 81 83 84	PLBR	2-0	5	5 5 5 5 5	100 100 100 100 100	 3 2 3	 1	49 86 128 220 305	66 91 132 227 267	 good seed prod.
3/09/6-10	ND-686 6225T PI-478008	SYAMJ*	Pekin lilac Syringa pekinensis ND Game & Fish Dept.	05/2	79	79 80 81 83 84	PLBR	2-0	5	5 2 2 3 5	100 40 40 60 100	 7 5 5	 3	22 45 47 102 93	71 81 85 117 87	 replt-plt #4
3/10/1-5	ND-3773 21576T	SALIX	Willow Salix sp. Norman Co., MN USDA, SCS, PMC, Bismarck, ND	05/12	82	82 83 84 85 86	PLBR	0-1	5	3 2 3 4 3	60 40 60 80 60	7 8 4 6.5 5.6	 3 	11 13 28 30 97	22 33 45 45 90	 replt-plt #2
3/10/6-10	Mich-433 5049T	SAPE	Laurel willow Salix pentandra USDA, SCS, Rose Lake PMC, East Lansing, MI	05/12	82	82 83 84 86	PLBR	0-1	5	5 5 5 5	100 100 100 100	5 5 4 2.8	 3 	13 32 65 234	38 62 78 222	
4/01/1-5	SD-156 5890T	FRPE	Green ash Fraxinus pennsylvanica Deuel Co., SD	05/17	78	78 79 80 82 83 84 87	PLBR	2-0	5	5 5 5 5 5 5 5	100 100 100 100 100 100 100	1 2 3 3 3 3	 2 	16 39 68 171 221 245 262	79 111 134 232 296 328 432	 slight leaf scorch snow damage #1

Table 11. 38I316K Field Evaluation of Woody Plant Materials – Dickinson, ND – 1986-1987 (Continued):

211 Plot Location	23 Accession Number	02 Plant Symbol	04 05 Genus/Species Origin/Source	209 Trans Date	212 Yr Plt	201 Yr Rec	304 Matl Pltd	306 Age	305 No Plts	310 No Plt Srv	363 Pct Srv	337 V I	347 C O	359 Can Cov	360 Plt Ht	364 Remarks
4/01/6-10	ND-1734	FRPE	Green ash	05/17	78	78	PLBR	2-0	5	5	100	2		11	63	
	5891T		Fraxinus			79				5	100			31	95	
			pennsylvanica			80				5	100	4		57	113	
			Lincoln-Oakes			82				5	100	4		143	222	
			Nursery,			83				5	100	4	2	173	268	Competition from
			Bismarck, ND			84				5	100	4		195	313	shelterbelt at
						87				5	100	4		217	421	N-end.
4/02/1-5	'Cardan'	FRPE	Green ash	05/17	78	78	PLBR	2-0	5	5	100	2		9	71	
	MDN-12002		Fraxinus			79				5	100			52	105	
	5895T		pennsylvanica			80				5	100	3		91	154	
	PI-469226		USDA, ARS,			82				5	100	3		228	308	
			Mandan, ND			83				5	100	2	2	255	348	good vigor
			Wibaux Co., MT			84				5	100	3		295	420	
						87				5	100	3		289	552	
4/02/6-10	ND-1759	FRPE	Green ash	05/17	78	78	PLBR	2-0	5	5	100	1		12	77	
	5893T		Fraxinus			79				5	100			48	124	
			pennsylvanica			80				5	100	3		93	158	
			SD-156 x MDN-			82				5	100	4		176	246	
			12002			83				5	100	3	2	242	326	competition from
			USDA, SCS, PMC,			84				5	100	3		271	408	shelterbelt at
			Bismarck, ND			87				5	100	3		275	481	N-end.
4/03/1-5	ND-647	FRNI	Black ash	05/17	78	78	PLBR	2-0	5	5	100	1		4	28	
	5887T		Fraxinus nigra			79				5	100			13	58	
			Res. Sta. Morden,			80				5	100	6		37	83	
			MB, Canada			82				5	100	4		126	243	
						83				5	100	4	3	147	319	heat stress
						84				5	100	4		127	347	leaf scorch
						87				5	100	3		171	562	

Table 11. 38I316K Field Evaluation of Woody Plant Materials – Dickinson, ND – 1986-1987 (Continued):

211 Plot Location	23 Accession Number	02 Plant Symbol	04 05 Genus/Species Origin/Source	209 Trans Date	212 Yr Plt	201 Yr Rec	304 Matl Pltd	306 Age	305 No Plts	310 No Plt Srv	363 Pct Srv	337 V I	347 C O	359 Can Cov	360 Plt Ht	364 Remarks
4/03/6-10	ND-1432 5658T	AEGL	Ohio buckeye Aesculus glabra Res. Sta. Morden, MB, Canada	05/17	78	78	PLBR	2-0	5	3	60	8		1	7	replt-plt #7
						79				3	60			4	14	
						80				3	60	9		14	12	
						82				1	20	6		45	65	
						83				1	20	6	4	50	70	
						84				1	20	6		100	100	
						87				1	20	6		190	165	
4/04/1-5	ND-1879 11850T	GLSI	Honeylocust Gleditsia triacanthos Woodward, OK USDA, ARS, Mandan, ND	05/08	80	80	PLBR-CONT	2-1	5	1	20	9		10	15	
						81				2	40			4	25	
						82				5	100	4		43	68	replt-plts #1,3,5
						83				5	100	2	2	75	118	good vigor
						84				5	100	3		98	174	
						86				5	100	3		229	276	
4/04/6-10	ND-548 5969T	JUMA*	Manchurian walnut Juglans mandshurica Res. Sta. Morden, MB, Canada	05/17	78	78	PLBR	2-0	5	4	80	3		4	19	
						79				3	60			24	40	
						80				3	60	8		43	46	
						82				3	60	6		168	110	
						83				3	60	7	6	202	133	leaf scorch
						84				3	60	5		150	117	low vigor
						87				3	60			212	180	girdling
04/05/1-5	ND-1170 6009T	MOAL	Mulberry Morus alba Burleigh Co., ND	05/17	78	78	PLBR	2-0	5	5	100	1		89	119	
						79				5	100			178	182	
						80				5	100	7		241	236	
						82				5	100	3		420	325	
						83				5	100	3	5	482	404	mod. frost
						84				5	100	7		448	396	injury
						86				0	0					winter injury

Table 11. 38I316K Field Evaluation of Woody Plant Materials – Dickinson, ND – 1986-1987 (Continued):

211 Plot Location	23 Accession Number	02 Plant Symbol	04 05 Genus/Species Origin/Source	209 Trans Date	212 Yr Plt	201 Yr Rec	304 Matl Pltd	306 Age	305 No Plts	310 No Plt Srv	363 Pct Srv	337 V I	347 C O	359 Can Cov	360 Plt Ht	364 Remarks
4/05/6-10	ND-363	ELAN	Russian olive	05/17	78	78	PLBR	2-0	5	5	100	2		70	68	
	5866T		Elaeagnus angustifolia			79				5	100			150	147	
			Burleigh, Co., ND			80				5	100	3		179	158	
						82				5	100	4		240	296	
						83				5	100	4	2	332	343	shelterbelt
						84				5	100	4		387	400	comp. on S-end
						87				5	100	4		314	463	
4/06/1-5	ND-364	ELAN	Russian olive	05/17	78	78	PLBR	2-0	5	5	100	1		89	88	
	5867T		Elaeagnus angustifolia			79				5	100			211	180	
			Burleigh Co., ND			80				5	100	1		291	255	
						82				5	100	2		375	400	
						83				5	100	2	2	477	477	good vigor
						84				5	100	3		560	515	
						87				5	100	3		404	557	
4/06/6-10	ND-1735	ELAN	Russian olive	05/17	78	78	PLBR	2-0	5	5	100	2		79	80	
	5874T		Elaeagnus angustifolia			79				5	100			172	172	
			Lincoln-Oakes Nursery,			80				5	100	4		226	217	
			Bismarck, ND			82				5	100	4		335	441	
						83				5	100	3	2	386	396	shelterbelt
						84				5	100	4		432	440	compet. on S-end
						87				5	100	3		383	516	
4/07/1-5	ND-541	ELAN	Russian olive	05/17	78	78	PLBR	2-0	5	5	100	1		88	80	
	5868T		Elaeagnus angustifolia			79				5	100			185	166	
			Haakon Co., SD			80				5	100	4		251	236	
						82				5	100	3		390	360	
						83				5	100	3	2	479	476	good vigor and
						84				5	100	3		522	522	growth
						87				5	100	3		395	575	

Table 11. 38I316K Field Evaluation of Woody Plant Materials – Dickinson, ND – 1986-1987 (Continued):

211 Plot Location	23 Accession Number	02 Plant Symbol	04 05 Genus/Species Origin/Source	209 Trans Date	212 Yr Plt	201 Yr Rec	304 Matl Pltd	306 Age	305 No Plts	310 No Plt Srv	363 Pct Srv	337 V I	347 C O	359 Can Cov	360 Plt Ht	364 Remarks
04/07/6-10	PM-ND-1843 11840T	ELAN	Russian olive Elaeagnus angustifolia Res. Sta. Morden, MB, Canada	05/08	80	80 81 82 83 84 86	PLBR	2-0	5	5 5 5 5 5 5	100 100 100 100 100 100	5 4 4 4 2.8	 2 	45 45 144 230 317 374	47 68 153 214 254 334	 shelterbelt comp. on S-end
4/09/1-10	'Oahe' MDN-12003 T05725 PI-476981	CEOC	Hackberry Celtis occidentalis USDA, ARS, Mandan, ND	05/08	80	80 81 82 83 84 86	PLBR	2-0	10	10 9 8 8 7 4	100 90 80 80 70 40	 6 6 4 3.3	 	15 2 40 57 89 279	61 14 48 92 139 313	
4/10/1-10	PM-SD-75 5713T	CEOC	Hackberry Celtis occidentalis Potter, Co., SD	05/07	81	81 82 83 84 85 87	PLBR	2-0	10	10 7 6 7 6 7	100 70 60 70 60 70	 6 3 5 4 4	 2 	2 28 87 106 204 247	37 44 92 124 181 317	 replt plt. #1
4/11/1-5	ND-3890 35200T	ELAN	Russian olive Elaeagnus angustifolia Lawyer Nursery, Plains, MT	06/01	83	83 84 85 87	PLBR		5	 5 4 4	 100 80 80	 4 3 4	 	 73 130 276	 91 145 300	