A-1245 (Revised)

2007 North Dakota FORAGE CROP Variety Performance

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This publication contains forage yield and quality information on selected alfalfa and annual forage crop varieties tested by North Dakota State University; Agricultural Research Service Northern Great Plains Research Center, Mandan, N.D.; and Eastern Montana Research Station, Sidney, Mont., in 2004-2006.

Information contained in this publication is from research conducted by the following agronomists at the North Dakota Research Extension Centers, Eastern Montana Research Center and USDA-Agricultural Research Service:

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John Hendrickson and John Berdahl, USDA-ARS, Mandan

Mark Halvorson, Minot

Neil Riveland, Williston

Joyce Eckhoff, EMRS, Sidney, Mont.

Additional variety information may be found on the NDSU Web site at *www.ag.ndsu.nodak.edu/aginfo/variety/index.htm*. Contact the NDSU Main Station, Research Extension Centers or Extension Service county offices for more detailed and site-specific information on alfalfa and forage crop variety performance and production recommendations.

NDSU

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Introduction

In 2005, alfalfa and alfalfa-grass mixed hay were produced on 1,650,000 acres and annual forages and grass hays were produced on an additional 1,380,000 acres in North Dakota (Ag Statistics No. 75, June 2006). This forage base is important to the livestock industry and the economic well-being of North Dakota.

Annually, producers seed approximately 107,000 acres of alfalfa in addition to annual forages. Forage growers need to select varieties based on yield and quality performance for their specific area. Varieties best suited for western North Dakota dryland conditions are different from varieties adapted for irrigated and higher rainfall areas of the state. Specific field and management conditions will affect the performance of these varieties; therefore, time and money spent on selecting the most suitable variety will be rewarded with higher yields and a net increase in profits.

This publication summarizes information gleaned from university and USDA-Agricultural Research Service trials related to forage variety performance for North Dakota. Additional data and information from the North Dakota Research Extension Centers can be found at *www.ag.ndsu.nodak.edu/aginfo/variety/index.htm, www.ag.ndsu.nodak.edu/plantsci/vtrial/vtrial.htm* and *www.ag.ndsu.nodak.edu/plantsci/forage/index.htm* (click on alfalfa).

Variety selection is only a part of the process producers should use for successfully growing a forage crop. A thorough understanding of all aspects of crop management is required. Additional information and recommendations on all aspects of forage crop management, including stand establishment, soil fertility, pest management, harvesting, forage quality and grazing, can be found in other NDSU Extension Service publications.

Variety Comparisons

Statistical analysis of variety comparisons is provided to growers to aid in the selection process in this publication, as well as at listed Web sites above. The Least Significant Difference (LSD) value provides a number producers can use to determine if one variety is significantly higher yielding than another variety under the conditions in which these varieties were tested. If the difference in yield between two varieties being compared does not exceed the LSD value, then the producer should have little confidence that there is a real difference in yield between these two varieties due to varietal performance. In addition, the Coefficient of Variation (CV) is listed. The CV provides additional information about the degree of precision with which the varieties are compared and is a good indication of the reliability of the trial. The lower the CV value, the more reliable the trial.

Growing Conditions 2004-2006

Winterkill

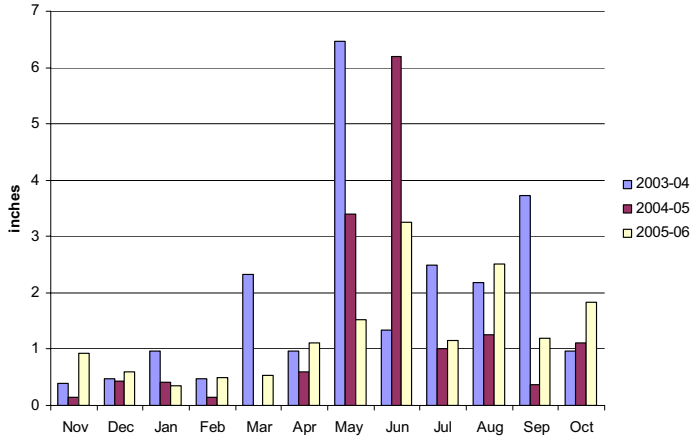
Winterkill can be a problem in alfalfa grown in North Dakota but has not been a widely reported problem the last two years. Fall dormancy has been used to select varieties thought to be more winter hardy and capable of withstanding severe winter conditions. Fall dormancy and winter survival ratings are listed in Table 1 for those alfalfa varieties reported in this publication. Fall dormancy ratings are a measure of the variety's recovery rate in the fall. Older varieties with a high fall dormancy rating generally recover faster from cutting but are often less winter hardy than varieties with a low score. Newer varieties have broken this relationship so there are varieties with a 3, 4 or 5 fall dormancy rating, but winter survival ratings less than 2. Winter survival scores can range from 1 for superior winter survival to 6 for complete winterkill. A variety with a winter survival score of 2 is significantly more winter hardy than a score of 3. Though conditions in North Dakota often will differ from the states where the winter survival score are derived,

these ratings should provide a useful guideline for North Dakota producers. If alfalfa fields have slow green up or thin stands after a normal winter, producers should consider selecting a variety with a lower winter survival score.

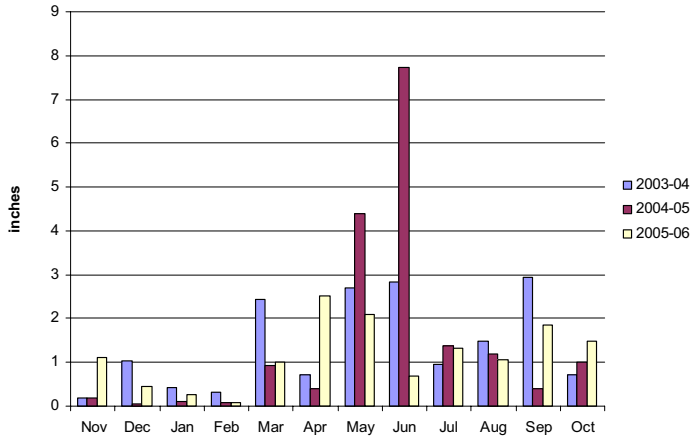
Precipitation

Precipitation varies by location and year. Alfalfa is grown under irrigation at both Carrington and Sidney, Mont., and supplemental water is applied to meet evapotranspiration needs. At all other locations reporting, alfalfa is grown without supplemental water. Also, all annual forages reported in this publication are grown under dryland conditions.

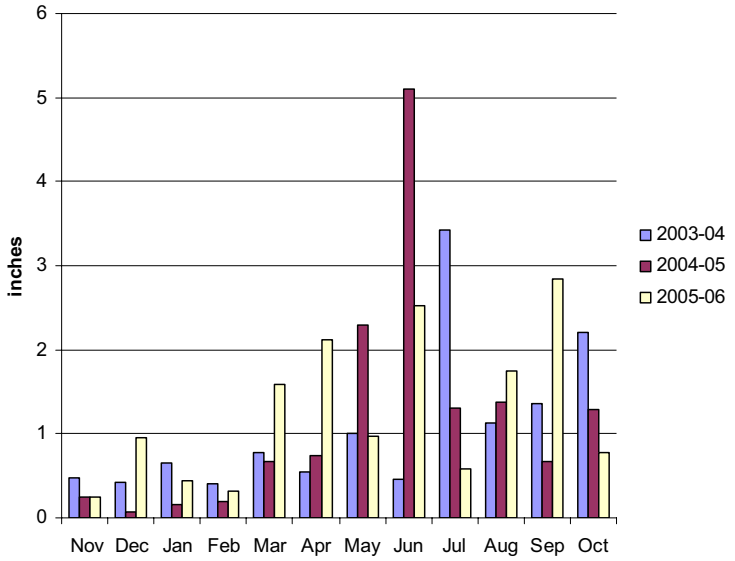
Carrington precipitation



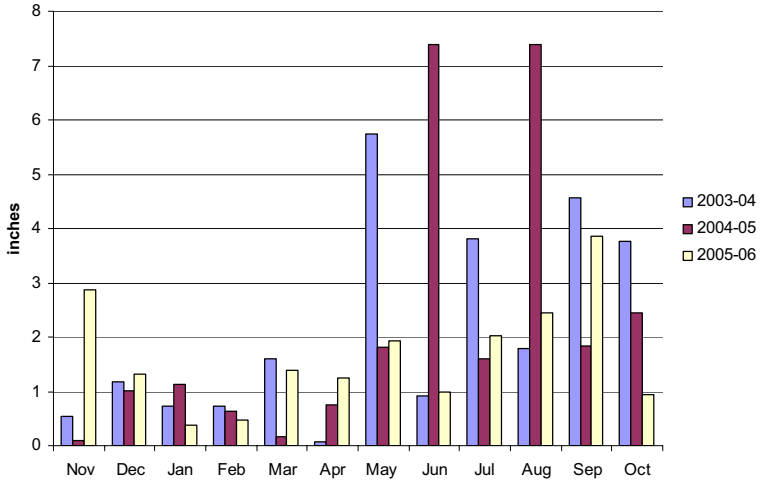
Dickinson precipitation



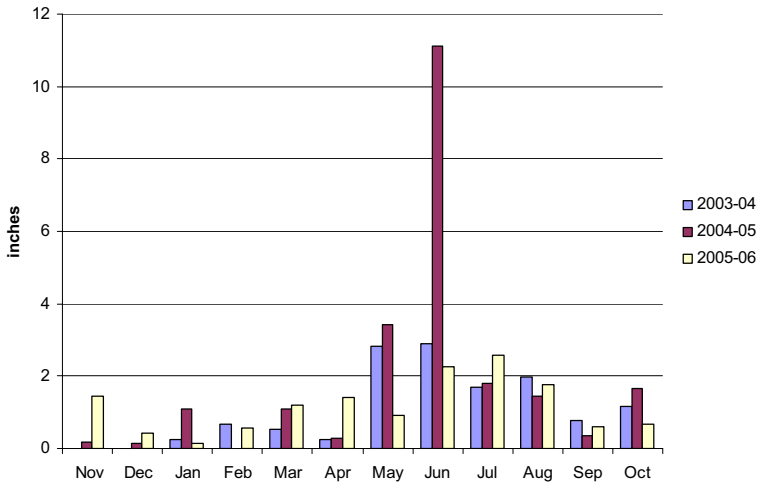
Hettinger precipitation



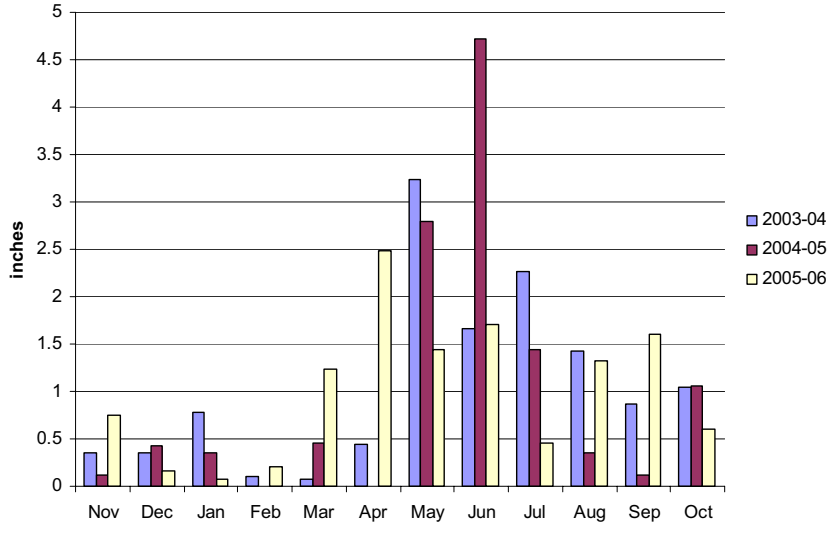
Fargo precipitation



Minot precipitation



Williston precipitation



Alfalfa Performance Tests

Relative yield performance of alfalfa varieties in Table 1 are compared to either Vernal at North Dakota locations or to Ladak 65 at Sidney, Mont., grown in the same trial in the same year. When two or more trials containing the same variety were grown at the same location, the relative yields are averaged. Specific data for each trial, including planting date and number of cuttings, can be found on the Web sites listed on Page 3. Varieties with a yield index greater than 100 percent tended to yield more than the check variety. Varieties with a yield index less than 100 percent tended to yield less than the check variety. Varieties tend to yield most the year after seeding. Therefore, compare only varieties with multiple site-years to ensure that data from more than the first year is included in the mean. Higher site-year averages indicate greater confidence. This is important because of variation in weather from one year to the next, in soil type, etc. Thus, a variety with yield stability over a broad range of conditions most likely will perform well regardless of soil type and growing condition differences.

(see Table 1)

Table 1. Selected alfalfa varieties reported in this publication.

					Dryland												Irrigated				
					Dickinson			Fargo			Minot			Williston			Carrington			Sidney, MT[4]	
Variety	Approval or release date	Agent or origin	Fall dormancy rating[1]	Winter survival rating[2]	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005
					Yield % of Vernal															Yield % of Ladak 65	
361HY	2005	BioPlant Research	4	-						96								107	94		
381HY				-				101	107	102								100	96		
4A421	2003	Mycogen Seeds	4	2.5				102	105	100							97	96	103		
5151	1991	Pioneer Hi-Bred International Inc	1	-																	
5246*	1991	Pioneer Hi-Bred International Inc	3	-																	
53Q60	1998	Pioneer Hi-Bred International Inc	3	3.0				97													
53V08	1998	Pioneer Hi-Bred International Inc	3	-																	
54H91	2002	Pioneer Hi-Bred International Inc	4	3.0				104	106												
54Q25	2002	Pioneer Hi-Bred International Inc	4	-				98	98	103							98				102
54V46	2003	Pioneer Hi-Bred International Inc	4	3.0				100	106	102							101				
54V54	2001	Pioneer Hi-Bred International Inc	4	2.5				99													
620	1993	Garst Seed Company	2	2.5				102	106	101							111				
6200HT	2003	Garst Seed Company	3	2.0				106	104	99											
631	1992	Garst Seed Company	4	3.5																	
6400HT	2003	Garst Seed Company	4	2.4				102	100	96	110	92	74				106				106
6415	2004	Garst Seed Company	4	2.5						97											
6420	1999	Garst Seed Company	4	-																120	121
6443RR[3]	2005	Garst Seed Company	4	-						87											
645-II	2000	Garst Seed Company	3	-				100	104	95							103				
A30-06	2000	PGI Alfalfa	3.5	2.0						93	119	112	118							118	
Abound	1998	Monsanto	3	2.5																111	
AC Yellowhead (SCMF3713)	2005	Agriculture and Agri-Food Canada	1	-																	
Alaska Syn A	exp	University of Alaska/USDA-ARS	1	-																	
Alfagraze	1989	University of Georgia	2	-																	
Alliant	1999	Monsanto	4	2.8																116	
AmeriGraze 401 +Z	1996	America's Alfalfa	4	-																	
AmeriStand 201+Z	2000	America's Alfalfa	2	1.7																	
AmeriStand 403T	2001	America's Alfalfa	4	2.0				100	109	99				99	92	96				120	125
Anik	1975	Agriculture and Agri-Food Canada	1	-																	
Ascend 552	2002	Kussmaul Seed Company	-	-																129	
B-36	exp	USDA-ARS	3	-																	
Boulder	2003	Forage Genetics/Syngenta	4	-																	106
Bullseye	2002	ABI	4	-						98											
C-27	exp	USDA-ARS/Colorado Exp Station	1	-																	
C-31	exp	USDA-ARS/Colorado Exp Station	1	-																	
Cimaron VL 410 (9900)	2008	Great Plains Research Company	4	-				102	89	105										124	
CK2000		Great Plains Research Company		-				99	112												
Cooper	2004	MT State U /Thomas Helm	3	-																113	112
DAK34-17RR[3]	2005	Dekalb	3	-						85											
Dakota	2002	Great Plains Research Company	4	3.5																	
DK134	1999	Monsanto	3	2.5																	
DKA42-15	2001	Monsanto	4	2.5																126	
DS204 HYB	2002	Dairyland Seed Co. Inc.	4	-						93								111	100		
eXtreme	2003	LG Seeds	3	-				103	104	102											
Feast+EV	1999	Garst/AgriPro Brand Seeds	3	2.0				102	102												

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Variety	Approval or release date	Agent or origin	Fall dormancy rating[1]	Winter survival rating[2]	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005
					Yield % of Vernal															Yield % of Ladak 65	
GoldLeaf	2001	Cascade Hybrid	3	3.0							86	104	97								
Goliath	1998	Allied Seed LLC	4	-																111	
Haymaker II Supreme	1997	Kusemaul Seed Company	3	-										96	100	102					
HybriForce-400	2001	Dairyland Seed Co. Inc.	4	3.0				100	103											122	119
HybriForce-420/wet	2003	Dairyland Seed Co. Inc.	4	3.0				106	107	105							98			124	115
IChg04	exp	Great Plains Research Company		-														111	101		
Impressive (FGI31Q109)	2006	Forage Genetics/ UAP	3	-														93	100		
Innovator+Z	1994	America's Alfalfa	3	2.5																	
Ladak 65	1965	Westland	3	-																100	100
Ladak DL	2004	ABI	3	-																115	121
LegenDairy YPQ	2000	Croplan Genetics	3	-				107	107		114	96	85	97	97	104					
Lightning Xtra	2004	Forage Genetics/Preferred Seeds	4	-																	105
Magnum V	1995	Dairyland Seed Co. Inc.	4	3.0																	
Mandan 3851	exp	USDA-ARS	1	-																	
Mariner II	2000	Allied Seed LLC	3	2.0																121	
Masterpiece	2000	JR Simplot Company	4	-																	
Maxigraze GT	1996	Croplan Genetics	2	2.0										96	105	104					
MegaTon 3.0	-	PGI Alfalfa Inc	-	-				105	106												
Melton (MT9321)	2005	Montana State University	4	-																	
Millennia	1998	United Agri Products Inc	4	-																	
Monument II	2000	Green Genes Inc	3	3.0																118	
Mountaineer 2.0 (4M124)	2004	Croplan Genetics	5	-										104	97	103					
Plumas	1996	Integra	4	-																112	119
Rangelander	1980	Agriculture and Agri-Food Canada	1	-	101	104	97														
REA 401T	2001	REA Hybrids	4	2.5										99	110	99					
Rebel	2000	Target Seed LLC	4	-																120	110
Rebound 5.0	2005	Cropland Genetics	4	2.5																	106
Reliance	2000	Allied Seed LLC	3	2.5																121	
Riley	1977	Kansas Ag Experiment Station (Public)	4	-																92	
Roamer	1967	Agriculture Canada		-																	
Rugged	2002	Target Seed LLC	3	1.5																124	129
Select	1999	United Agri Products Inc	4	-																	
Shaw	2001	MSU/USDA NRCS MT Plant Materials Center (Public)	3	-																114	111
Somerset	2000	Syngenta	3	2.5				97	100	93											
Spredor 3	1994	Northrup-King	1	-	87	93	93														
Sustain		Kusemaul Seed Company		-										90	105	106					
Trac Max		Gold Country Seed Company	4	-							105	138	118								
Travios	1963	South Dakota State University	2	-	77	102	99														
Ultra	1986	Integra	-	-																	
Vernal	1953	WI AES/USDA (Public)	2	2.0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100		
Winter Crown	1999	BioPlant Research	3	-																	
WL319HQ	2002	W-L Research Inc	3	2.0				104	99	93	114	92	82					97	98	122	119
WL325HQ		W-L Research Inc	3	3.0																	
WL327	1999	W-L Research Inc	4	-				97												113	

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					Dickinson			Fargo			Minot			Williston			Carrington			Sidney, MT[4]	
Variety	Approval or release date	Agent or origin	Fall dormancy rating[1]	Winter survival rating[2]	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005
					Yield % of Vernal															Yield % of Ladak 65	
WL342	2001	W-L Research Inc	4	-				95													
Wrangler	1984	NE AES/USDA (Public)	2	-																114	110
X202		United Agri Products Inc		-						92								96	98		
XTRA-3	2002	Forage Genetics/Wilbur Ellis	4	-																117	113
ZG9415	1996	ABI Alfalfa	2	-																	
ZG9830	1996	ABI	-	1.5																	
ZS-0441GX-1		ABI		-						97											

[1] Fall dormancy scale: 1 = least fall growth; 9 = greatest fall growth.

[2] Winter survival index is determined in University of Wisconsin and University of Minnesota trials, courtesy of Dr. Dan Undersander, UW: 1 = superior winter survival, 2 = very good, 3 = good, 4 = adequate, 5 = low, 6 = no winter survival

[3] Roundup Ready™ varieties

[4] Ladak 65 is the comparison variety at Sidney, MT.

* Discontinued

Roundup Ready Alfalfa

Roundup Ready alfalfa was licensed in June 2005 and seed made available to producers. Roundup Ready alfalfa varieties were bred to be resistant to glyphosate, providing producers another herbicide option for controlling weeds during establishment and in crop weed control during subsequent years. Adaptability of these varieties to North Dakota conditions have been evaluated for only one year in NDSU trials, and no general trends have been established in terms of productivity compared to standard varieties. The cost of seed, as well as other costs for establishing and maintaining alfalfa, should be considered when comparing Roundup Ready and conventional alfalfa varieties. Roundup Ready alfalfa cannot be terminated with glyphosate. Management systems relying on glyphosate to terminate alfalfa will need to consider eliminating the competition from Roundup Ready alfalfa varieties in subsequent crops with either tillage or some other registered herbicide product. Products registered for the control of weeds in alfalfa can be found in the "2007 North Dakota Weed Control Guide" *(www.ag.ndsu.edu/weeds/).*

Salt-tolerant Alfalfa

Producers in western North Dakota have shown interest in establishing alfalfa in salt-affected soils. Alfalfa, like many legumes of economic importance in North Dakota, is sensitive to salt, thus adversely affecting germination and growth in these salt-affected soils. A few varieties have shown some tolerance to salt in National Alfalfa Variety Review Board Standard Tests comparing performance in NaCl solutions (Table 2). These tests include germination, whole plant or both. NaCl solutions are used to identify those varieties with the potential to germinate and grow in salt-affected soils but do not necessarily indicate actual performance under field conditions. Field salts are highly variable, therefore performance data are limited. Salt-tolerant alfalfa may provide the desired effect for a period of time, but if salt concentrations increase, even salt-tolerant alfalfa will be affected adversely by salt. Producers need to understand the underlying causes of increasing salt levels and develop management practices that address reduction or elimination of the problem.

Table 2. Alfalfa germination of selected varieties at various concentrations of NaCl.

	---------- % NaCl[2] ----------			
Variety	1.00	1.25	1.50	1.75
	---------- % ----------			
Bullseye	94.7[a]	77.1[a]	17.5[b]	7.5[a]
Rugged	89.7[a]	65.0[b]	57.8[a]	0.0[a]
Shaw	80.6[b]	5.0[e]	18.4[b]	0.0[a]
Ameristand 403T	79.5[b]	39.0[c]	14.3[bc]	0.0[a]
WL325HQ	70.5[c]	33.3[cd]	6.5[c]	0.0[a]
Affinity +Z	56.7[d]	24.4[d]	4.2[c]	0.0[a]
Vernal	2.6[e]	6.7[e]	0.0[c]	0.0[a]

[1] Courtesy of S. Smith, University of Arizona, Tucson, and Don Miller, Target Seed Inc, Parma, Idaho
[2]Sea water is approximately 3%.
Means in columns followed by the same letter(s) are not significantly different ($P \leq 0.05$).

Grazing-tolerant Alfalfa

Persistence of alfalfa under grazing by livestock in the northern Great Plains can be short-lived. The combination of stress created by continuous grazing, as well as cold temperatures, will reduce alfalfa plant populations over time. Recent research illustrates the need for producers to emphasize not only grazing tolerance but also climatic adaptability when choosing a variety (Table 3). Plant populations of varieties developed from warmer regions declined more than varieties with both good winter survival and grazing tolerance. Producers should choose varieties that are not only grazing tolerant but can withstand the climatic conditions in the region.

Table 3. Survival of selected alfalfa varieties planted July 1996 and continuously grazed during the growing season from July 1997 through September 2000 at Mandan. Hedrickson and Berdahl, USDA, ARS, 2003.

Variety	Sept. 2000 Survival	May 2001 Survival
	------- % -------	
AC Yellowhead	93.1 [a]	90.3 [a]
Alaska Syn A	83.3[ab]	79.2 [ab]
Anik	81.9[ab]	77.8 [ab]
C-31	84.7[ab]	77.8 [abc]
Mandan 3851	86.1[a]	73.6 [abc]
Travois	85.8[ab]	73.6 [abc]
Spredor 3	84.7[a]	58.3[abcd]
Rangelander	70.3[ab]	56.9[abcd]
C-27	61.1[ab]	55.6[abcd]
Pioneer 5151	80.6[ab]	51.4 [bcd]
Ladak 65	72.2[ab]	45.8 [bcd]
Mandan Grasshopper Preference	63.9[ab]	44.4 [bcd]
B-36	83.1 [a]	37.5 [cd]
ZG9415	75.0[ab]	26.4 [d]
Alfagraze	69.4[ab]	26.4 [d]
Vernal	45.8 [b]	23.6 [d]

Means in columns followed by the same letter(s) are not significantly different ($P \leq 0.05$).

Traffic-resistant Alfalfa

No significant differences in alfalfa varieties have been detected in traffic trials at Fargo. Trials initially seeded in 2004 and 2005 had a traffic treatment applied on half of all plots. The traffic treatment was one pass with a medium-sized tractor five days after harvest. Forage yields averaged 1 ton/acre less in 2005, when the traffic treatment was applied. The reduction in yield from traffic in 2006 was much less than in 2005, when the forage yield was reduced 0.4 ton/acre with traffic. Statistical analysis of the yield data from these trails indicate no significant yield performance advantage of one variety over another when exposed to traffic.

Annual Forages

Producers have found annual forages, both cool and warm season, useful in meeting feed requirements in North Dakota. Producing annual forages helps spread production risks, as well as make up for shortfalls when other sources fail to meet producers' needs.

Annual forage variety trials grown at Carrington, Dickinson, Hettinger, Langdon, Minot and Williston were evaluated and their performance reported in this publication. Additional information on other species and mixtures of species, as well as quality information found in the extensive trials conducted by the NDSU Research Extension Centers on cool-season and warm-season forages, can be reviewed at the Web site at *www.ag.ndsu.nodak.edu/aginfo/variety/index.htm*.

Annual Forage Species and Growing Season

Prior to variety selection, producers should consider both rotational requirements and date of planting. If intensive cool-season cereal rotations, for example wheat-wheat or wheat-barley, have been used extensively, producers should consider a warm-season forage species. Inclusion of warm-season species can increase water-use efficiency and break disease and insect cycles common in intense cool-season rotations. Also, warm-season forage species provide another opportunity to plant when optimum planting dates for cool-season forage species has passed. After determining the species to seed, producers then can narrow their search for an annual forage variety.

Annual forage varieties and their characteristics are listed in Tables 4 to 9. Of the spring-type cereal varieties tested and reported in this publication, Table 4 lists barley varieties; Table 5 lists oat; and Table 6 lists spring triticale, emmer and spelt varieties. Yield data for the spring-type cereals can be found in Table 11. Winter-type cereal varietal characteristics of triticale, rye, spelt and wheat are found in Table 7. Yield data from these winter-type cereals can be found in Table 13. Table 8 lists warm-season varietal characteristics of millet and sorghum-sudan, while Table 10 shows yield data for these varieties. Annual legume varietal characteristics such as field pea and lentil are listed in Table 9 with yield data reported in Table 14.

Planting and Harvest Dates

Planting and harvest dates/growth stages at each location are provided in Table 10. Fertility, rotational sequence and other agronomic data specific to the trial and location can be found in the individual forage trial reports posted on the Web.

Cereal and Legume Mixed Forages

Specific cereal and legume mixtures are not reported in this publication. A number of species and variety mixtures are reported in some of the individual forage trial reports on the Web. In general, cereal and legume mixtures will not yield more than the cereal component of the mixture if the cereal was grown by itself. The protein content of cereal and legume mixtures will not be as high as the protein content of the legume forage if it were grown by itself but is intermediate between the protein content of the individual components of cereal and legume. Variety characteristics are provided to assist producers in matching varieties for a desired result.

(see Tables 4-14)

Table 4. Characteristics of barley varieties reported in this publication

Variety	Year released	Agent or origin	2- or 6-rowed	Awn type	Maturity	Plant height	Straw strength	Leaf rust[2]	Stem rust[2]	Powdery mildew[2]	Barley yellow dwarf[2]	Leaf blight[2]	Loose smut[2]	Covered smut[2]	Ergot[2]	Scald[2]	Net blotch[2]	Spot blotch[2]
Belford	1943	Washington State University	6	hooded	medium	tall	Poor											
Bestford	2003	Western Plant Breeders	6	hooded	late	tall												
Bowman	1984	NDSU	2	S-awned	early	med-short	Medium		S				S				S-MS	MS-S
Chopper	1993	Wisconsin Ag Experiment Station																
Conlon	1996	NDSU	2	S-awned	early	med-short				R								
Dillon	2000	Westbred	6	hooded			Good									S	MS	MS
Drummond	2000	North Dakota State University	6	S-awned	early	med-short												
Harrington	1986	University of Sask	2	R-awned	very-late	medium	Med-Weak		S				S				MS	S
Haybet	1989	Montana Agricultural Experiment Station	2	hooded	early	medium	Poor											
Hays	2003	Montana Agricultural Experiment Station	2	hooded	medium	med-short									S			
Horsford	1880	F.H. Horsford, Charlotte, Vemont	6	hooded	medium								S	S	S			
Logan	1995	NDSU - ARS	2	S-awned	medium	medium	Good	S	S	R	S		S			S	MR	MR
Moravian 37	2000	Coors Brewing Company	2	R-awned	med-late	med-short			S				S			S	S	S
Rawson	2005	NDSU	2	R-awned	medium	medium	Medium		S				S				MS	MR
Robust	1983	Minnesota	6	awned	early	medium												
Stockford	2005	Westbred	2	hooded	medium	medium		-		-	S							
Valier	1999	Montana Agricultural Experiment Station	2	R-awned	medium	medium												
Washford	1997	Washington State University Agricultural Research Center/Idaho Agricultural Experiment Station	6	hooded	mid-late		Fair						S					
Westford	1988	Westbred	6	hooded	late	tall	Good	MR	S	MR	MR	MR			S			

[1] A slight level of ergot may be found in hooded barleys in some areas. This is caused by the inability of the plant to completely fertilize all florets. Any non-fertilized floret tends to stay open which allows fungus spores to enter the florets. S-awned = smooth awned. R-awned = rough awned

[2] Disease ratings: S = suceptible, MS = moderately suceptible, MR = moderately resistant, R = resistant.

Table 5. Characteristics of oat varieties report in this publication.

Variety	Year released	Agent or origin	Kernel color	Height	Straw strength[1]	Maturity	Stem rust[1]	Crown rust[1]	Barley yellow dwarf[2]
AC Assiniboia	1995	Can. Proven Seed	Red	med	strong	late	S	R	T
AC Ronald	2001	Can. Proven Seed	White	m short	v strong	late	S	R	T
Derby	1988	University of Saskatchewan	White	m tall	weak	medium	S	S	
Ebeltoft	1999	NDSU	White	tall	strong	very late	S	MR/MS	S
Ensiler	1992	Wisconsin Ag Exp Station							MT
Everleaf 114	2005	Pulse, USA	Black	med	strong	medium+	R/MR	MS	T
Everleaf 126	2005	Pulse, USA	Black	med	strong	very late	MR/MS	MR	T
Forage Plus	2003	Wisconsin Ag Exp Station		tall	strong	late			
HiFi	2001	NDSU	White	tall	strong	late	MR/MS	R	T
Jerry	1994	NDSU	White	tall	strong	medium	S	MS	MT
Killdeer	2000	NDSU	White	med	strong	medium	S	MS	MT
Maverick	2002	Idaho & Montana Ag Exp Station	White	short					
Monico	2001	Idaho, Montana, and Colorado Ag Exp Sta.	White	tall		medium			
Morton	2001	NDSU	White	tall	v strong	late	S	R	MT
Otana	1977	Montana Ag Exp Station	White	m tall	m weak	late	S	S	T
Paul	1994	NDSU	Naked	v tall	strong	late	R	R/MR	T
Souris	2006	NDSU	White	med	strong	medium	MS	R	MS
Stark	2004	NDSU	Naked	tall	m strong	late	R	MR/MS	T
Whitestone	1994	NDSU	White	short	strong	late	S	MS	MT

1 Straw strength: m weak = moderately week, m strong = moderately strong, v strong = very strong

[1] Stem and crown rust ratings: S = susceptible, MS = moderately susceptible, MR = moderately resistant, R = resistant

[2] Barley yellow dwarf ratings: S = suceptible, MS = moderately suscpetible, MT = moderately tolerant, T = tolerant

Table 6. Characteristics of selected cereals, triticale, emmer, and spelt reported in this publication.

Variety	Approval or relase date	Agent or Origin	Awn-type	Leaf diseases[1]	WSMV[1]	Ergot risk	Height	Chaff	Maturity[2]
Triticale									
Buxom	1995	Elliot Plant Breeding	Awned			Medium	tall		early
Lazer		Elliot Plant Breeding	Awned			High	tall		
Maxlee	2004	Elliot Plant Breeding	Awned						v late
Parade	2004	Elliot Plant Breeding	Awned						v late
Samberely	2004	Elliot Plant Breeding	Awned						v late
Standswell	1998	Elliot Plant Breeding	Awned			High	tall		medium
Red 1									
Trical 2700	1993	Resource Seeds	Awned				med-tall	white	medium
Emmer									
Lucile	1999	Montana State University	Awned	MR	S	Low	med-tall	white	late
Spelt									
SK3P	2005	Montana State University	Awnless	MR	S	Low	med-tall		late

[1] Disease ratings: S = susceptible, MR = moderately resistant.

[2] Maturity: v late = very late.

Table 7. Selected winter-type cereals; rye, spelt, tritcale, and wheat; reported in this publicaiton.

Variety	Release date	Origin or Agent	Awn-type	Leaf diseases	Stem strength	Height	Winter survival[1]	Maturity
Rye								
Muskateer	1980	Canada	Awned	NA	Medium	Tall	Excellent	Med-early
Rymin	1973	MN	Awned	NA	Strong	Tall	Excellent	Late
Spelt								
Frank	2000	MT	Awnless	NA	Medium	Tall	Fair	Late
Triticale								
Boreal	2000	Elliot Plant Breeding/Pulse USA	Awned		Strong	Tall	Good	
Frostat	1999	Elliot Plant Breeding/Legume Logic	Awnless		Strong	Tall	Fair	
Windrift	2000	Elliot Plant Breeding/Pulse USA	Awned		Strong	Tall	Good	
Wheat								
Elkhorn	1995	ND	Awned	MR	Medium	Medium	Excellent	Medium
Jerry	2001	ND	Awned	MR	Strong	Medium	Excellent	Medium

[1] Winter survival Poor - based on comparison within species Poor = below average, Fair = average, Good = better than average, Excellent = no or little winter-kill

Table 8. Warm-season forage varieties reported in this publication.

Variety	Year released	Origin or Agent	Maturity[1]	Height[2]	Lodging
Japanese millet					
Common			medium	short-med	Good
Pearl millet					
Mil Hy 300			med-late	med-tall	Good
PP102M		Albertlea Seed House	med-late	med-tall	Good
Tifleaf 3		USDA-ARS GA	med-late	short	Good
Proso millet					
Cerise	1976	Nebraska Agricultural Experiment Station	v early	medium	fair
Foxtail millet					
Manta		South Dakota	early	medium	Good
Golden German			late	medium	Good
Sorghum-sudan					
Grazex II	1990	Sharp Bros. Seed Co./Buffalo Brand	med-late	Tall	Good
Highland Sweet		Croplan Genetics	med-late	Tall	Good
Nutri+ BMR		Production Plus + Seeds	med-late	Tall	Good
Sweetleaf II			med-late	Tall	Good
Sudan grass					
Piper	1951	Wisconsin Agriculture Experiment Station	med-late	Tall	Good

[1] Maturity: v early = very early, med-late = medium late.

[2] short-med = short to medium, med-tall = medium to tall.

Table 9. Characteristics of selected annual legumes reported in this publication.

Variety	Year released	Agent or origin	Growth habit		Flower	Cotyledon	Seed coat	Maturity	Vine length	Lodging	Powdery mildew[1]	Mycosphaerella blight[1]	Fusarium wilt[1]	Seed size
Field Pea														
Forager	2003	Wyoming Agricultural Experiment Station/Nebraska AgricItural Experiment Station/Legume Logic	Indeterminate	Vine	Purple	Yellow	Green-brown	Early	Tall	Poor	MR	NA	NA	Medium
Journey	2002	ProGene LLC/Legume Logic	Indeterminate	Vine/full leaf	White	Green	Green	Late	Tall	Poor	MR	MR	NA	Medium
Arvika		Legume Logic	Indeterminate	Vine/full leaf	Purple	Yellow	Purple-brown	Late	Tall	Poor	MR	NA	NA	Small
Admiral	2002	Danesco/Legume Logic	Determinate	Semi-leafless	White	Yellow	White	Early	Medium	Good	R	MS	MS	Medium
Kibir	2007	Elliot Plant Breeding/Legume Logic	Indeterminate	Vine/full leaf	Purple	Yellow	Purple-brown	Late	Tall	Poor	MR	NA	NA	Small
Sonata		Pulse USA									R			
Trapper		Canada	Indeterminate	Vine/full leaf	White	Yellow	White	Late	Tall	Poor	S	S	S	Small
Lentil														
Indianhead		Saskatchewan Agriculture and Food	Indeterminate	NA	Purple	Yellow	Black	Medium	Short	Fair				Small

1 Disease ratings: S = suceptible, MS = moderately susceptible, MR = moderately resistant, R = resistant.

Table 10. Planting and harvest date/growth stage for annual forages.

Location	Year	------ Winter Cereals ------ Planting	Harvest	------ Spring Cereals ------ Planting	Harvest	- Annual legumes - Planting	Harvest	---- Warm-season cereals ---- Planting	Harvest
Carrington	2004[a]	19-Sep	Rye: flowering Triticale: flowering Wheat:flowering Spelt: milk	18-May	Oat: milk Barley, awned: 4 days post heading, awnless: soft dough Triticale: headed/flowering	-	-	4-Jun	Proso: heading Barley: soft dough Oat: milk Others: vegetative
	2004[b]	-	-	18-May	Awned: 4 days post heading Awnless: soft dough	-	-	-	-
	2005[a]	29-Sep	Rye: flowering Triticale: flowering Wheat: flowering Spelt: milk	17-May	Oat: milk Barley, awned: 4 days post heading, awnless: soft dough Triticale: flowering	-	-	2-Jun	Proso: heading Barley: soft dough Oat: milk Others: vegetative
	2005[b]	-	-	29-Apr	Awned: 4 days post heading Awnless: soft dough	-	-	-	-
	2006[a]	-	-	18-May	Oat: milk Barley, awned: 4 days post heading, awnless: soft dough	18-May	5-Jul	29-May	Proso, German & Foxtail: heading Others: vegetative
	2006[b]	-	-	20-Apr	Awned: 4 days post heading Awnless: soft dough	-	-	-	-
Dickinson	2004[a]	-	-	23-Apr	Soft dough	-	-	-	-
	2004[b]	-	-	23-Apr	Soft dough	-	-	-	-
Hettinger	2004	-	-	5-Apr	14-Jul	-	-	-	-
	2005	-	-	4-Apr	11-Jul	-	-	-	-
	2006[a]	29-Sep	26-Jun	17-Apr	26-Jun	-	-	-	-
	2006[b]	-	-	11-May	3-Jul	-	-	-	-
Langdon	2005	-	-	16-May	late milk/ early dough	-	-	31-May	early heading/ headed
	2006	-	-	9-May	Oat: milk Barley: soft dough	-	-	31-May	early heading/ headed
Minot	2004	-	-	4-May	22-Jul	-	-	3-Jun	16-Sep
	2005	-	-	17-May	26-Jul	-	-	16-Jun	8-Sep
	2006	-	-	26-May	3-Aug	-	-	7-Jun	3-Aug
Williston	2004	-	-	10-May	Barley: 21-Jul Oat: 21-Jul & 27-Jul	-	-	-	-
	2005	-	-	23-May	Barley: 26-Jul Oat: 19-Jul			-	-
	2006	-	-	16-May	12-Jul	16-May	12-Jul	-	-

[ab] Corresponds to trials summarized in annual forage tables.

Table 11. Cool-season spring-seeded cereal forage yields in tons per acre.

	----- Carrington -----						Dickinson		----Hettinger----				Langdon		-------Minot-------			----- Williston -----		
Variety	**2004**		**2005**		**2006**		**2004**		**2004**	**2005**	**2006**		**2005**	**2006**	**2004**	**2005**	**2006**	**2004**	**2005**	**2006**
Barley	a	b	a	b	a	b	a	b			a	b								
Bestford	-	4.1	-	3.4	-	2.6	1.1	-	2.1	2.4	2.0	-	-	-	-	-	-	-	-	-
Bowman	-	-	-	3.3	-	2.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conlon	-	-	-	-	-	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drummond	-	-	-	-	-	-	-	-	-	-	1.9	-	-	-	-	-	-	-	-	-
Harrington	-	-	-	-	-	-	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Haybet	3.5	3.6	2.9	3.0	3.0	2.6	1.4	1.3	-	3.7	2.3	-	2.1	4.3	3.2	3.6	2.6	3.1	2.7	1.6
Hays	3.8	3.6	3.0	3.6	3.9	2.5	1.2	1.2	-	-	-	1.4	2.2	5.0	2.8	4.3	-	3.3	3.0	1.7
Horsford	-	2.9	-	2.9	-	2.1	-	-	-	-	-	-	-	-	-	-	-	-	-	1.1
Logan	-	3.0	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-
Moravian 37	-	-	-	-	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.5	-	-	-	-
Robust	-	2.4	-	2.8	-	1.9	-	-	-	-	-	-	-	-	-	-	-	2.8	-	-
Stockford	-	-	-	-	-	-	-	-	-	4.0	2.3	-	-	-	-	-	-	-	-	-
Valier	-	-	-	-	-	-	1.6	-	-	-	-	-	-	-	-	-	-	-	-	-
Westford	-	4.2	-	3.4	-	2.9	1.1	-	2.2	2.3	2.2	-	-	-	-	-	-	-	-	1.3
Oat																				
AC Assiniboia	-	-	-	-	-	-	-	1.1	-	-	-	-	-	-	-	-	-	-	-	-
AC Ronald	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-
Ebeltoft	-	-	-	-	-	-	-	1.1	-	-	-	-	-	-	-	-	-	-	-	-
Ensiler	-	-	-	-	-	-	-	1.2	-	-	-	-	-	-	-	-	-	-	-	-
Everleaf 114	3.8	-	3.3	-	-	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-
Everleaf 126	4.3	-	3.6	-	-	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-
Forage Plus	4.3	-	3.8	-	-	-	-	1.3	-	-	-	-	3.0	-	2.5	4.5	-	3.2	2.7	-
HiFi	-	-	-	-	-	-	-	1.2	-	-	-	-	-	-	-	-	-	-	-	-
Jerry	3.7	-	3.4	-	3.0	-	-	1.1	-	-	-	-	1.8	-	3.5	3.7	1.9	3.3	2.3	1.5
Killdeer	-	-	-	-	-	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-
Maverick	-	-	-	-	-	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-
Monico	-	-	-	-	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Morton	-	-	-	-	-	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-
Otana	-	-	-	-	-	-	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Paul	4.0	-	3.6	-	3.5	-	1.5	1.2	-	-	-	-	-	4.4	-	-	2.2	-	-	1.3
Souris	-	-	-	-	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stark	-	-	4.1	-	3.4	-	-	1.3	-	-	-	-	-	4.6	-	-	2.5	-	-	1.3
Monida	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-
Triticale																				
Buxom	2.9	-	2.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lazer	2.7	-	1.9	-	-	-	-	-	-	-	-	-	-	-	-	1.4	-	-	-	0.34
Maxlee	-	-	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parade	-	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Red 1	-	-	-	-	-	-	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Trical 2700	-	-	-	-	-	-	-	-	-	-	-	0.7	-	-	-	-	-	-	-	-
Samberely	-	-	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Standswell	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mean	3.5	3.4	2.9	3.2	2.6	2.4	1.3	1.2	2.2	3.1	2.2	1.2	3.7	4.6	3.1	1.8	1.9	2.8	2.5	1.1
CV,%	6.9	12.4	11.4	6.1	11.8	10.3	15.5	18.0	11.8	13.8	7.8	21.0	14.9	9.9	23.2	25.3	25.3	8.0	13.7	16.3
LSD 0.05	0.3	0.6	0.5	0.3	0.4	0.3	0.3	0.3	NS	0.6	0.3	0.4	0.8	NS	NS	0.7	0.7	0.3	0.5	0.3

Table 12. Warm-season forage crop yield in tons per acre.

	---Carrington---			Langdon		---Minot---	
Variety	**2004**	**2005**	**2006**	**2005**	**2006**	**2004**	**2006**
Foxtail millet							
Manta	-	-	2.6	-	-	-	2.8
Golden German	-	-	3.7	-	-	-	2.4
Japanese millet							
Common Japanese	-	-	3.6	-	-	-	3.3
Pearl millet							
Mil-Hy 300	-	2.8	-	3.4	-	-	-
Common Pearl	2.4	-	-	-	-	-	1.6
Tifleaf	1.7	-	-	-	-	-	-
Proso millet							
Cerise	2.8	2.3	2.2	2.6	2.6	2.0	-
Common Red Proso	-	-	-	-	-	-	2.3
Sorghum-sudan							
Grazex II	-	-	3.9	-	4.1	-	2.5
Highland Sweet	-	3.4	-	4.4	-	2.5	-
Nutri+ BMR	-	3.3	4.4	3.6	-	-	2.4
NutriPlus	3.3	-	-	-	-	-	-
Sweetleaf II	-	3.9	-	-	-	-	-
Sudan grass							
Piper	4.4	4.1	3.9	4.4	3.5	2.3	2.6
Mean	5.6	3.0	3.1	3.7	3.1	2.1	2.2
CV,%	16.1	20.7	20.3	14.9	17.4	11.8	14.0
LSD 0.05	0.7	0.9	0.9	0.8	0.9	0.5	0.5

Table 13. Fall-seeded winter cereal forage yields in tons per acre.

	----- Carrington -----				Hettinger
Variety	**2004**	**2005**	**2005**	**2006**	**2006**
Triticale					
Boreal	-	-	3.5	1.9	-
Frostat	2.4	2.0	3.0	1.5	-
Windrift	-	-	3.2	1.9	-
Wheat					
Elkhorn	2.7	3.0	-	1.6	-
Jerry	-	-	-	1.7	-
Ransom	-	-	-	-	1.4
Willow Creek	-	-	-	-	1.7
Spelt					
Frank	3.6	3.0	-	2.6	-
Rye					
Muskateer	1.8	2.7	-	1.2	-
Rymin	-	-	-	1.3	-
Mean	2.6	2.7	2.5	1.8	1.2
CV,%	9.4	17.7	7.5	9.6	21.0
LSD 0.05	0.4	0.8	0.3	0.2	0.4

Table 14. Spring-seeded annual legume forage yield in tons per acre.

	Carrington	Williston
Variety	**2006**	**2006**
Pea		
Admiral	2.2	-
Arvika	1.9	0.8
Journey	1.7	-
Sonata	1.8	-
Lentil		
Indianhead	1.8	0.4
Mean	2.6	1.1
CV,%	11.8	16.3
LSD 0.05	0.4	0.3

For more information on this and other topics, see: www.ag.ndsu.edu

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