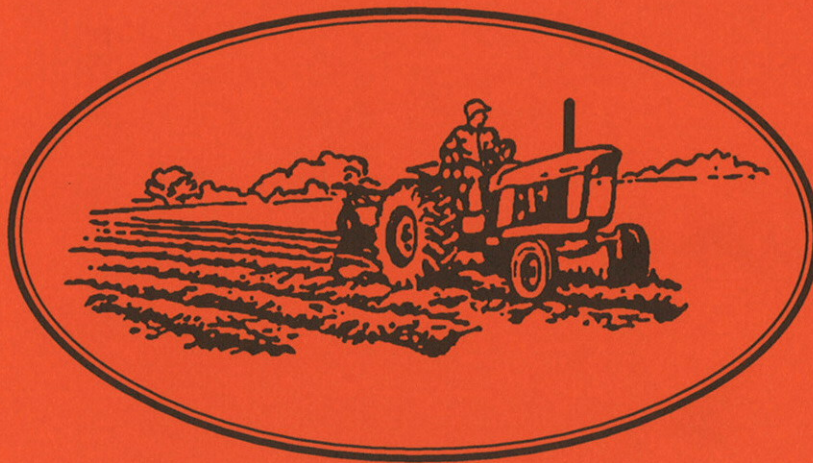


SIXTEENTH
ANNUAL

REPORT NO. 16

WESTERN DAKOTA

CROPS DAY RESEARCH REPORT



**HETTINGER ARMORY
DECEMBER 16, 1999**

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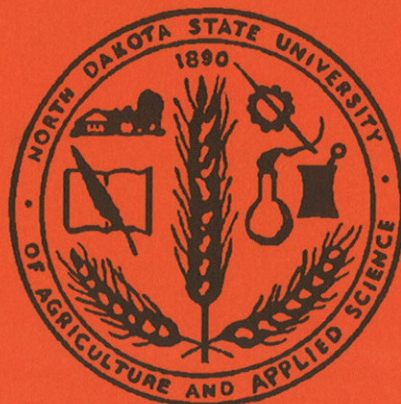
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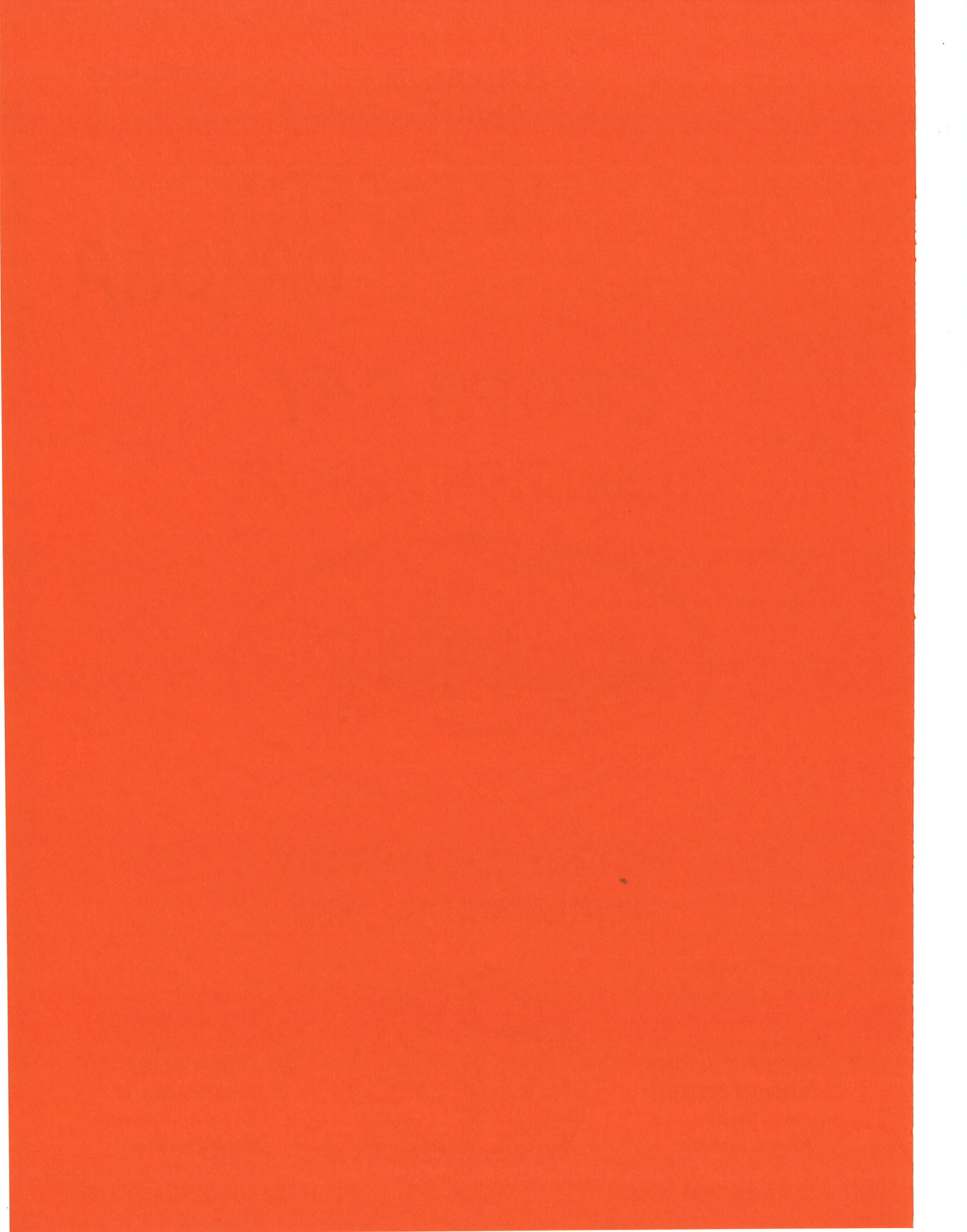
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16th Annual Western Dakota Crops Day
December 16, 1999
Hettinger Armory

MST

9:00 am Registration

Coffee and doughnuts. Free time to view exhibits and visit with Ag. Industry Program Sponsors.

10:00 Earlybird Drawing

10:30 Opening Announcements

10:45 Crop Variety Updates and Highlights of Ongoing Crop Production Research

Roger Ashley, Extension Agronomist, Dickinson

Pat Carr, Agronomist, Dickinson Research Extension Center

Eric Eriksmoen, Agronomist, Hettinger Research Extension Center

12:00 Lunch

Provided by Program Sponsors. Free time to visit with sponsors.

1:00 Ag Industry Update

1:45 Garbanzo Beans in Western North Dakota

Ambrose Hoff, Stone Mill Inc., Richardton, ND.

3:00 Conclusion

Drawing for door prizes, coffee and opportunity to visit with sponsors.

11:00 - 6:00 Health and Screenings Fair

West River Health Services, Adams Co. Extension Service and Dakota Corners Health Coalition.

Acknowledgments

The Hettinger and Dickinson Research Extension Centers gratefully acknowledge and thank the following companies and organizations for their financial support and participation in this year's Western Dakota Crops Day. Those listed below have provided for the noon meal and have sponsored the event in total. We thank them for their commitment and support.

1999 Western Dakota Crops Day Sponsors

Hettinger Chamber of Commerce	Northern Sun / ADM
Zeneca Ag. Products	Kaystar Seeds
Hettinger Farmers Union Oil	Stone Mill Inc.
Croplan Genetics	Legume Logic
Dow AgroSciences	Proseed
Pioneer Hi-Bred	Cargill Hybrid Seeds
North Dakota Farmers Union	Interstate Payco Seeds
Scranton Equity Exchange	ND Barley Council
Farm Credit Services of Mandan	ND State Seed Dept.

We also acknowledge and thank the following individuals for their willingness to cooperate with us at off-station plot sites and in providing us with materials for this publication. Their participation has enabled us to compile the enclosed information which would not otherwise be possible.

Daryl Birdsall, New Leipzig
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Northern Great Plains Research Center, Mandan
Amos Gietzen, Glen Ullin
Ted Reich, Beulah
Pat Doll, Hannover
Roger Ashley, Dickinson Res. Extension Center
Dr. Joyce Eckhoff, E. Montana Ag. Research Station
Harvey Peterson, Golden Valley Co. Extension Service
Dave Bertelsen, Wibaux Co. Extension Service
Amy Dukart, NDSU Extension Summer Intern

We also thank area County Extension Services and area County Crop Improvement Associations for their financial assistance in the printing costs of this publication.

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Interpreting Statistical Analysis

Field research involves the testing of one or more variables such as crop varieties, fertilizers, tillage methods, etc. Field testing of such variables are conducted in order to determine which variety, tillage method, or fertilizer etc. is best for the particular area of production. The main objectives of crop production research are to determine the best means of producing the crop and how to maximize yield and economic return from farming.

Agricultural researchers use statistics as a tool to help differentiate production variables so that real and meaningful conclusions can be drawn from a relatively large amount of data.

One of these tools is the Coefficient of Variability (C.V.). This statistic gives an indication of the amount of variation in an experimental trial and is a measure of the precision or effectiveness of the trial and the procedures used in conducting it. Attempts are made to control human error and some environmental conditions such as soil variability by replicating the variable in question. For example, there were four plots (replications) of the variety 2398 grown in the Hettinger HRSW variety trial. The plots are mixed and dispersed throughout the trial to help eliminated differences that might be a result of soil or other variations. The numbers that you see in the tables are an average of all four replications. The C.V. for yield in the 1999 Hettinger HRSW trial was 6.2% meaning that there was an 6.2 percent average variation between high and low yields among replications. In summation, a trial with a C.V. of 6 is more precise and more can be concluded from it than a trial with a C.V. of 16.

Another important statistical tool is the Least Significant Difference or LSD. If the yield of variety A exceeds variety B by more than the LSD value, you can conclude that under like environmental conditions, variety A is expected to significantly out-yield variety B. The LSD value allows you to separate varieties, tillage practices, or any other variable and determine whether or not they are actually different. The LSD 1% value is always larger and gives you more precision than the LSD 5% value. Little confidence can be placed in variety or treatment differences unless the results differ by more than the LSD value.

Trial Information

Dickinson Research and Extension Center

Trial	Location	Previous Crop	Seeding Rate
			pls/ac
SMALL GRAINS			
Barley	Dickinson	Fallow	1,200,000
Durum	Dickinson	Fallow	1,200,000
Spring wheat	Dickinson	Pea	1,200,000
Winter wheat	Dickinson	Oat	75 lbs*
Winter rye	Dickinson	Oat	75 lbs*
Oat	Dickinson	Pea	1,000,000
OTHER CROPS			
Chickpea	Dickinson	Spring wheat	120-180 lbs*
Corn	Dickinson	Winter wheat	20,000
Field Pea (all trials)	Dickinson	Spring wheat	325,000
Lentil	Dickinson	Spring wheat	550,000
Safflower	Dickinson	Spring wheat	400,000
Cool Season Forage	Dickinson	Barley	Various

* Rate is seed planted

Trial Fertility Information

Dickinson Research and Extension Center

Trial	Location	Soil test results				Fertilizer applied		
		N	P	K	OM	N	P ₂ O ₅	Form(s)
		lb/ac	ppm	ppm	%	lb/acre		
SMALL GRAINS								
Barley	Dickinson	92	24	-	2.6	84	-	21-0-0-24
Durum	Dickinson	92	24	-	2.6	84	-	21-0-0-24
Spring wheat	Dickinson	32	6	-	3.0	102	44	34-0-0, 0-44-0
Winter wheat	Dickinson	31	5	170	2.2	104	26	34-0-0, 11-52-0
Winter rye	Dickinson	31	5	170	2.2	104	26	34-0-0, 11-52-0
Oat	Dickinson	48	16	-	2.9	109	118	21-0-0-24, 0-44-0
OTHER CROPS								
Chickpea	Dickinson	40	11	-	2.4	-	44	0-44-0
Corn	Dickinson	28	11	-	2.7	122	44	34-0-0, 0-44-0
Field Pea	Dickinson	40	11	-	2.4	-	44	0-44-0
Lentil	Dickinson	40	11	-	2.4	-	44	0-44-0
Safflower	Dickinson	40	11	-	2.4	110	44	34-0-0, 0-44-0
Cool Season Forage	Dickinson	12	9	-	3.8	-	-	-

Month	Max Temp		Min Temp		Precip		Small Grains GDD ¹		Corn GDD ²	
	Long term 1897-1998	Current Year	Long term 1897-1998	Current Year	Long term 1897-1998	Current Year	Long term 1897-1998	Current Year	Long term 1897-1998	Current Year
	°F	°F	°F	°F	in.	in.				
November-98	39.54	40.17	16.73	22.03	0.49	1.06				
December-98	27.54	33.19	5.60	8.19	0.39	0.25				
January	22.40	24.29	-0.31	-0.71	0.51	0.71				
February	26.68	38.07	3.56	19.71	0.40	0.52				
March	37.89	47.74	14.79	23.77	0.73	0.01				
April	55.05	53.10	28.65	29.60	1.45	1.48	377	373	272	271
May	66.96	62.48	39.61	38.65	2.30	3.94	647	647	407	384
June	75.39	73.20	49.24	48.07	3.63	1.99	903	866	569	556
July	82.49	81.65	53.52	52.52	2.18	0.99	1140	1114	529	541
August	81.39	81.90	50.95	52.87	1.75	3.23	1084	1104	329	262
September	71.15	66.97	40.99	37.57	1.36	2.25	740	627		
October	57.92	58.07	30.17	27.45	0.96	0.32				
Mean	53.70	55.07	27.79	29.98	16.15	16.75	4891	4731	2106	2014
Total										

¹ Small grains GDD, is growing degree days calculated with 95°F maximum temperature and 32°F base temperature.

² Corn GDD is growing degree days calculated with 86°F maximum temperature and 50°F base temperature.

Source: Dickinson Research Extension Center, Data compiled by Jim Nelson; Animal Scientist, Roger Ashley; Extension Agronomist and Lisa Vance; Information Processing Specialist.

Growing Conditions

Hettinger Research Extension Center

1999

The 1999 growing season will be remembered as a wet year that included all the problems associated with wet conditions; delays in planting and harvesting, weeds, diseases and insects. The Fall of 1998 sustained mild temperatures, a late frost and moist weather conditions. The station recorded 4 ½ inches of rain during October, followed by mild weather throughout November. Hard red winter wheat trials were planted on the last day of September and went into freeze up in excellent condition. Dormant seeded trials (HRWW and Canola) were planted during the first week of December and soil freeze up occurred shortly thereafter. The winter months were generally open with little snow cover and mild temperatures. Frost under black fallow went out during the last week of February.

March was dry and cool. Some field work was being done during the end of March and first week of April. A blizzard during the second week of April delayed field work for a couple of weeks. Rain showers and windy conditions throughout May caused sporadic planting and left many growers unable to apply their pre-emergence burn down prior to crop emergence. Small grain planting in some areas continued through June as well as most of the areas row crops.

A hail storm with strong winds on June 26 caused severe crop losses to the west of Hettinger and just nicked the research plots causing minor damage, although the buckwheat trials were completely destroyed. The sunflower trials located east of Reeder sustained moderated damage resulting in a short crop with reduced yields.

Rainfall was abundant throughout the growing season with April and May each receiving over 2 inches and the months of June, July and August each receiving over 3 inches. The mid-season rains and warm temperatures caused ideal conditions for small grain foliar diseases. Leaf rust, tan spot and septoria were severe in some commonly grown varieties and resulted in severe yield losses. Ascochyta blight was common and severe in most chickpea fields causing poor quality and severely reducing yields. Late season rainfall caused grain sprouting, poor grain quality and delays in harvest.

Reports of insect problems were abundant. Early season army worms caused severe damage to several alfalfa and canola fields. A few areas reported heavy grasshopper populations. Reports of European corn borers in corn and millet, aphids in canola and stem weevils in sunflowers were also common.

All trials at the Hettinger Research Center were planted with a no-till drill. Alternative crops were planted into HRSW stubble and small grain trials were planted into either field pea or soybean stubble. Soil fertility was determined and fertilizer was applied according to specific yield goals for each crop. Urea (46-0-0) was the primary nitrogen source used and was applied with a no-till drill prior to planting. Diammonium phosphate (18-46-0) was applied directly with most seed at planting.

All HRSW, durum and barley trials were treated post emergence for both grass weeds (foxtails and wild oats) and for broadleaf weeds (kochia, Russian thistle and wild buckwheat). All broadleaf crops were treated with a pre-emergence burn down, and with a post emergence treatment for grass weeds and broadleaf weeds when possible.

WEATHER DATA SUMMARY
HETTINGER

Precipitation

Precipitation (inches)	1996-97	1997-98	1998-99	44 year average
Sept. - Dec.	6.95	1.58	6.32	3.32
Jan. - March	0.55	2.77	1.25	1.30
April	3.68	0.64	2.30	1.68
May	1.16	1.53	2.32	2.65
June	3.79	3.56	3.84	3.44
July	1.16	1.67	3.30	2.00
August	0.73	1.82	3.36	1.68
Total	18.02	13.57	22.69	16.07

Air Temperature

Average Temperature F	1996	1997	1998	1999	44 year average
April	38.7	34.8	45.6	41.8	42.4
May	48.8	52.0	56.0	53.5	54.2
June	65.5	65.9	57.8	61.2	63.8
July	67.2	68.0	69.7	69.9	69.8
August	70.4	68.0	71.7	68.5	68.6
September	56.8	60.1	65.3	53.3	57.2

Growing Degree Units - Corn

Growing Degree Units (50-86)	1996	1997	1998	1999	33 year average
May	148	226	309	230	332
June	457	480	312	381	424
July	550	574	644	574	500
August	591	543	663	565	536
September	276	412	469	259	385
Total	2022	2235	2397	2009	2177

Frost Free Days

	28 F	32 F	Normal 32 F
Date of last frost	May 8	May 12	May 18
Date of first frost	Sep 15	Sep 10	Sep 20
Frost free days	130	121	125

Table 1. 2000 North Dakota hard red spring wheat variety description, agronomic traits.

Variety	Agent or Origin ¹	Year Released	Beard	Height	Straw Strength	Maturity	Reaction to Disease ²				
							Stem Rust	Leaf Rust	Foliar Disease	Root Rot	Head (Scab)
Coteau	ND	1978	yes	med.	m.strg.	med.	R	NA	M	MS	MS
Stoa	ND	1984	yes	med.	m.strg.	m.early	R	MR	MS	M	MS
Butte 86	ND	1986	yes	med.	m.strg.	early	R	MS	MS	MS	MS
Amidon	ND	1988	yes	med.	med.	med.	R	R	M	MR	S
Grandin	ND	1989	yes	s.dwf.	strg.	early	R	MS	S	M	S
Gus	ND	1989	yes	s.dwf.	strg.	m.early	R	MR	M	M	VS
2370	NDSURF	1990	yes	s.dwf.	v.strg	m.early	R	NA	S	S	MS*
2375	NDSURF	1990	yes	s.dwf.	med.	m.early	R	S	S	M	MS*
Sharp	SD	1990	yes	med.	med.	early	R	MS	MS	S	MS*
AC Barrie	Can	1994	no	med.	med.	med.	R	S	M	M	M
Kulm	ND	1994	yes	med.	strg.	early	R	MR	MS	MS	S
2398	NDSURF	1995	yes	s.dwf.	strg.	m.late	R	S	MR	MS	VS
Ernest	ND	1995	yes	med.	med.	med.	R	MS	MS	MR	S
Glupro	ND	1995	yes	tall	med.	m.late	R	MS	N/A	N/A	VS
Gunner	AgriPro	1995	yes	med.	m.strg.	med.	R	MS	MR	S	M
Hamer	AgriPro	1995	yes	s.dwf.	v.strg.	med.	R	MR	M	N/A	S
Lars	AgriPro	1995	yes	s.dwf.	v.strg.	med.	R	R	MR	N/A	S
McNeal	MT	1995	yes	med.	strg.	m.early	MS	S	M	M	VS
Russ	SD	1995	yes	med.	med.	m.early	R	R	S	S	S*
Trenton	ND	1995	yes	med.	med.	med.	R	MR	MS	S	S*
Verde	MN	1995	yes	s.dwf.	strg.	med.	R	R	MR	M	MS*
AC Splendor	Cargil Can	1996	no	med.	med.	early	R	NA	S	N/A	VS
AC Cora	Can	1996	no	med.	med.	med.	R	NA	M	N/A	S*
AC Majestic	Cargil Can	1996	no	med.	med.	med.	R	MS	MR	N/A	S*
BacUp	MN	1996	yes	med.	med.	early	R	MR	S	N/A	MR
Keene	ND	1996	yes	med.	med.	med.	R	R	MR	M	S
Oxen	SD	1996	yes	s.dwf.	strg.	m.early	R	R	S	N/A	S
Sharpshooter	WPB	1996	yes	med.	med	early	R	MR	MS	N/A	MS
AC Cadillac	Can	1997	no	med.	med.	med.	R	MS	MS	N/A	S
Forge	SD	1997	yes	s.dwf.	m.strg.	early	R	MS	MR	N/A	MS
Nora	AgriPro	1997	yes	s.dwf.	strg.	med.	R	MS	MS	S	S
Argent ³	ND	1998	yes	s.dwf.	strg.	early	R	S	S	S	S
Hagar	Agripro	1998	yes	s.dwf.	strg.	med.	R	MS	N/A	N/A	S
HJ98	MN	1998	yes	s.dwf.	strg.	m.early	R	MS	N/A	N/A	MS
Ingot	SD	1998	yes	s.dwf.	med.	early	R	MS	S	N/A	S
Dandy	N. Star G.	1998	yes	sdwf	v.strg.	early	R	MS	N/A	N/A	S
Mckenzie	Terra Int.	1998	yes	med.	med.	m.early	R	R	N/A	N/A	S
Parshall	ND	1999	yes	med.	srtg.	m.early	R ⁴	MR	M	N/A	M
Reeder	ND	1999	yes	s.dwf	strg.	m.early	R	MR	M	N/A	S
McVey	MN	1999	yes	med.	med.	med.	R	MS	S	N/A	MS
Ivan	Agripro	1999	yes	s.dwf	v.strg.	med.	R	MR	S	N/A	MS
Ember	SDSU	1999	yes	s.dwf	med.	m.early	R	MS	S	N/A	MS
Aurora	N. Star G.	1999	yes	s.dwf	strg	m.early	R	R	N/A	N/A	N/A
Mercury	N. Star G.	1999	yes	s.dwf	strg	m.early	R	MR	N/A	N/A	N/A

1 Refers to agent or developer: NDSURF = North Dakota State University Research Foundation; CDC = Crop Development Center, University of Saskatchewan; Can = Agriculture Canada.; N. Star G.= North Star Genetics.

2 R = resistant; MR = moderately resistant; M = intermediate; MS = moderately susceptible; S = susceptible; VS = very Susceptible. * Yield and/or quality often higher than expected based on visual head blight symptoms.

3 Argent is a hard white wheat with good bread making qualities.

4 MR in artificially induced epidemics.

Table 3. 1998 analytical milling and baking data from field plot variety trials at Carrington, Casselton, Dickinson, Hettinger, Langdon, Minot and Williston. NDSU Department of Cereal Science.

VARIETY	Test Weight	Falling Number	Protein 14% MB	Four Extract	Farinogram	Absorbance	Loaf Volume
	lb/bu	Second	%	%	CLASS	%	CC
2375	60.6	480	14.3	70.0	5.7	61.7	1026
AC BARRIE	60.4	457	15.7	71.0	5.9	60.6	1079
ARGENT	60.8	418	15.1	70.7	6.4	63.4	1109
BUTTE 86	60.2	434	15.0	69.0	5.0	64.2	1013
FORGE	61.9	457	14.2	69.2	6.6	62.1	1003
GRANDIN	59.5	427	14.9	70.5	6.4	62.8	1052
GUNNER	61.7	470	15.7	70.0	5.7	62.9	1056
HAMER	60.4	477	14.3	70.7	6.3	60.4	1052
HJ98	60.2	418	13.6	70.9	7.6	59.9	1057
INGOT	63.0	417	14.8	69.5	5.3	62.4	1047
IVAN	60.7	418	13.3	70.1	6.1	58.8	942
KEENE	61.8	415	14.7	69.2	5.7	64.2	1021
NORA	59.6	445	15.3	67.7	6.6	63.0	1014
OXEN	60.1	415	14.4	69.6	6.7	61.1	1023
PARSHALL	61.8	419	14.8	69.9	6.4	62.3	1063
REEDER	61.2	417	14.5	68.7	5.9	62.2	1011
RUSS	60.3	434	14.5	69.2	6.3	63.3	1037
SHARP	61.8	429	14.9	69.0	4.9	62.5	1020
SHARPSHOOTER	62.5	432	14.5	70.0	4.9	61.7	1011
TRENTON	60.4	404	14.8	70.1	7.3	62.1	1056

Table 4. Analytical milling and baking data from field plot variety trials, two year average 1997-1998. NDSU Department of Cereal Science.

VARIETY	Test Weight	Falling Number	Protein 14% MB	Flour Extract	Farinogram	Absorbance	Loaf Volume
	lb/bu	Second	%	%	CLASS	%	CC
2375	60.1	455	14.7	69.9	5.4	62.4	1034
AC BARRIE	60.4	442	15.6	71.5	5.8	61.1	1083
ARGENT	60.5	401	15.6	70.6	6.2	64.3	1114
BUTTE 86	59.8	417	15.2	69.1	4.7	64.2	1036
GRANDIN	60.0	408	15.2	70.6	6.2	63.4	1069
GUNNER	61.5	451	16.0	69.9	5.7	64.0	1067
HAMER	59.9	461	14.6	70.9	6.0	60.8	1052
HJ98	59.3	405	14.4	71.0	7.3	61.2	1084
KEENE	61.3	373	15.0	69.3	5.5	64.8	1055
OXEN	59.4	405	14.9	70.0	6.7	62.0	1063
PARSHALL	61.3	409	15.3	69.8	6.4	63.0	1096
REEDER	60.4	415	15.0	68.9	5.9	62.5	1043
RUSS	59.8	411	14.7	69.8	6.2	63.9	1052
SHARP	61.5	416	15.0	69.6	4.8	62.9	1034
SHARPSHOOTER	62.2	421	14.7	70.7	4.8	62.2	1016

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield			Average Yield	
					1997	1998	1999	2 year	3 year
		in	lbs/bu	%	-----bu/ac-----				
Reeder	69	33	59.8	13.7	90.2	81.5	82.5	82.0	84.7
2398	71	32	58.0	13.2	85.8	84.7	73.7	79.2	81.4
HJ98	70	32	56.7	12.1	83.3	83.4	75.1	79.2	80.6
Lars	71	28	57.2	12.5	75.7	84.2	78.0	81.1	79.3
Verde	72	31	59.1	12.8	79.4	76.2	81.8	79.0	79.1
Hager	71	32	57.8	13.2	78.7	79.9	75.3	77.6	78.0
Oxen	68	31	58.0	12.6	79.4	68.5	81.5	75.0	76.5
Forge	65	35	60.4	12.2	70.6	81.0	76.5	78.8	76.0
Hamer	70	30	59.0	13.6	70.3	75.7	80.1	77.9	75.4
Nora	70	29	57.2	14.5	77.0	76.2	70.6	73.4	74.6
Russ	70	36	58.3	13.6	76.7	76.9	67.8	72.4	73.8
Trenton	70	38	59.5	14.2	81.4	77.4	61.6	69.5	73.5
Parshall	69	38	61.4	14.5	77.8	73.6	68.5	71.0	73.3
AC Cadillac	70	41	60.2	14.5	76.8	79.0	63.8	71.4	73.2
Keene	70	38	60.7	13.9	72.6	78.1	68.7	73.4	73.1
Gunner	71	34	60.4	14.8	81.2	71.7	66.5	69.1	73.1
Sharp	67	37	59.9	13.8	78.6	72.7	65.9	69.3	72.4
2371	70	31	55.9	13.4	71.8	75.1	67.8	71.4	71.6
2375	69	34	58.9	14.2	71.5	77.5	64.8	71.2	71.3
Argent HWSW	70	34	59.2	13.5	76.4	70.6	65.8	68.2	70.9
Amidon	70	36	59.1	13.8	79.3	71.8	61.4	66.6	70.8
Ernest	72	37	59.1	14.1	74.7	69.6	65.8	67.7	70.0
Ingot	65	39	61.2	13.5	78.7	64.1	67.0	65.6	69.9
Kulm	69	37	61.6	14.1	68.5	73.2	66.8	70.0	69.5
Butte 86	68	36	59.0	13.7	71.1	72.6	63.9	68.2	69.2
AC Barrie	71	36	58.8	14.4	78.3	73.5	55.2	64.4	69.0
Sharpshooter	67	36	60.0	13.8	65.5	75.3	65.6	70.4	68.8
Grandin	70	33	57.1	13.9	71.1	71.7	59.2	65.4	67.3
Majestic	74	39	56.7	15.2	66.2	66.9	47.9	57.4	60.3
Ivan	72	29	59.9	12.4		82.8	87.3	85.0	
Ember	67	33	60.6	12.7		78.0	72.3	75.2	
McVey	71	33	56.4	12.7		73.4	74.5	74.0	
Scholar	71	34	57.0	14.0		75.2	53.2	64.2	
Continued									

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield			Average Yield	
					1997	1998	1999	2 year	3 year
		in	lbs/bu	%	-----bu/ac-----				
Norpro	70	31	58.8	13.7			86.3		
Mercury	70	29	59.2	12.8			81.9		
Aurora	72	28	56.4	13.3			77.7		
McKenzie	68	36	58.9	14.3			74.7		
Dandy	70	35	59.0	14.0			69.0		
Conan	70	31	58.4	13.1			67.1		
377S HWSW	69	31	54.5	13.4			55.9		
Trial Mean	70	34	58.9	13.6	74.2	73.9	70.0	--	--
C.V. %	1.0	4.2	1.1	--	8.1	8.7	6.2	--	--
LSD .05	1	2	0.9	--	9.8	8.9	6.0	--	--
LSD .01	1	3	1.2	--	13.0	11.8	7.9	--	--

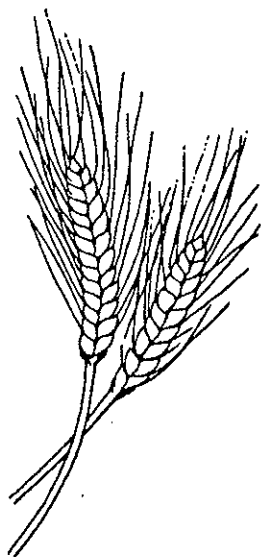
Planting Date: April 14, 1999

Harvest Date: August 9, 1999

Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).

Yields are adjusted to 12% moisture.

Previous crop: 1997 & 98 = fallow, 1999 = field pea.



Variety	Days to Head	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield			Returns	Average Yield	
						1997	1998	1999		2 Year	3 Year
						-----bu/ac-----				\$/ac	----bu/ac----
			in	lbs/bu	%						
Semidwarf											
377S	59	18,407	30	52.2	15.7	--	--	47.8	145.69	--	--
Argent	60	14,253	36	60.4	16.6	36.2	63.7	45.6	158.29	54.7	48.5
Aurora	63	17,307	28	56.0	15.1	--	--	51.8	165.09	--	--
Conan	60	14,234	29	62.1	14.9	--	--	44.6	143.90	--	--
Dandy	61	14,089	35	61.8	15.9	53.6	54.6	51.8	174.98	53.2	53.3
Forge	58	15,566	35	61.3	15.5	40.4	67.7	53.9	189.42	60.8	54.0
Grandin	62	14,960	35	56.4	16.4	42.1	64.2	48.9	164.10	56.6	51.7
Hagar	62	14,347	30	57.5	15.6	49.3	73.2	45.9	151.25	59.6	56.1
HJ98	61	16,669	31	57.6	15.2	43.0	67.6	51.2	160.62	59.4	53.9
Ivan	63	16,787	29	56.0	14.7	--	75.2	52.9	154.75	64.0	--
Lars	62	15,507	27	55.4	15.2	42.9	71.8	51.3	167.98	61.5	55.3
McVey	64	15,792	33	55.7	15.7	--	72.7	51.6	176.31	62.2	--
Nora	61	14,223	27	58.4	17.0	38.0	60.8	46.9	166.01	53.8	48.6
Norpro	60	15,588	30	58.8	14.4	--	--	54.9	155.56	--	--
Oxen	59	14,975	30	58.4	15.5	48.2	68.6	53.6	185.33	61.1	56.8
Reeder	61	14,578	32	60.0	15.7	57.3	67.9	48.7	140.85	58.3	58.0
Verde	63	15,888	31	60.0	15.5	45.2	64.8	48.4	178.74	56.6	52.8
2375	60	14,338	32	62.2	16.2	31.1	68.2	47.1	157.68	57.6	48.8
2398	63	14,357	32	60.9	15.9	48.0	72.9	47.9	170.53	60.4	56.3
Trial Mean	61	15,385	34	59.6	15.8	44.5	65.0	47.9	159.47	--	--
C.V. %	1.8	6.7	7.1	2.8	2.9	29.6	9.3	8.0	9.0	--	--
LSD .05	2	1,446	3.4	2.3	0.9	NS	8.4	5.4	28.76	--	--

Planting Date: April 28

Harvest Date: August 10

Returns were calculated by multiplying the 1999 yield by protein premium or discount paid at the Southwest Grain Terminal located at Gladstone on August 26, for all plots in two of the four blocks included in the experiment (grain protein concentration was determined for plots in only two out of four blocks because of budgetary constraints). The price paid on this date was \$2.79/bu, assuming that grain protein concentration was 14%. An additional \$.04/bu was paid for each additional 0.25% increase in grain protein up to 15% protein, where an additional \$0.30/bu was paid. An additional \$0.02/bu was paid for each additional 0.2% increase in grain protein up to 16%, above which an additional premium was not paid. Grain was discounted \$0.12/bu for each 0.25% reduction in grain protein from 14% to 13%. Grain was discounted an additional \$0.05/bu for each 0.25% reduction in grain protein from 13% to 11%, below which an additional discount was not assigned. Returns factored in discounts for grain with a test weight < 58 lb/bu [-\$0.01/bu for 0.5 lb/bu between 58 and 57 lb/bu; -\$0.02/bu for 0.5 lb/bu between 57 and 55 lb/bu; -\$0.03/bu for 0.5 lb/bu between 55 and 50 lb/bu; and -\$0.04/bu for 0.5 lb/bu between 50 and 46 lb/bu].

Variety	Days to Head	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield			Returns	Average Yield	
						1997	1998	1999		2 Year	3 Year
			in	lbs/bu	%	-----bu/ac-----			\$/ac	----bu/ac----	
Conventional											
AC Abbey	62	17,504	35	53.2	16.3	--	--	43.3	132.16	--	--
AC Barrie	62	15,781	37	60.5	16.4	49.6	54.5	47.8	167.68	51.1	50.6
AC Cadillac	61	14,962	40	63.6	16.3	48.2	61.3	50.6	178.45	55.9	53.4
AC Intrepid	59	13,483	37	58.1	15.8	--	--	50.0	144.23	--	--
Amidon	62	15,065	37	60.2	14.7	53.7	66.7	50.2	144.99	58.5	56.9
Butte 86	59	14,616	33	60.5	15.9	47.4	67.3	44.8	160.34	56.0	53.2
Ember	60	17,086	33	59.3	15.7	--	71.4	51.5	165.77	61.5	--
Ernest	62	15,822	37	61.2	16.7	44.1	69.2	45.3	154.12	57.3	52.9
Gunner	63	16,941	36	61.3	16.6	52.3	60.6	47.4	163.79	54.0	53.4
Ingot	58	15,467	38	64.5	15.7	45.4	63.6	54.6	190.69	59.1	54.5
Keene	63	15,750	40	62.0	15.3	54.6	62.2	49.1	159.25	55.6	55.3
Kulm	60	15,351	36	64.3	16.2	34.3	61.9	51.7	183.38	56.8	49.3
Majestic	64	16,516	39	59.4	16.3	37.7	59.9	43.9	154.99	51.9	47.2
McKenzie	59	15,694	36	58.8	15.9	--	--	48.3	166.92	--	--
Mercury	60	13,975	27	59.8	15.3	--	--	47.2	149.16	--	--
Parshall	61	15,255	37	61.4	16.3	47.4	65.5	45.1	147.23	55.3	52.7
Prodigy	63	16,415	40	57.4	17.5	--	--	43.9	150.19	--	--
Russ	61	16,018	37	57.3	15.9	42.9	68.3	53.1	179.03	60.7	54.8
Scholar	61	15,371	35	58.4	16.3	--	62.2	44.4	153.10	53.3	--
Sharp	59	13,785	36	62.2	15.6	37.6	63.4	48.0	179.55	55.7	49.7
Trenton	62	14,629	41	58.3	15.8	41.6	69.5	46.7	171.77	58.1	52.6
Trial Mean	61	15,385	34	59.6	15.8	44.5	65.0	47.9	159.47	--	--
C.V. %	1.8	6.7	7.1	2.8	2.9	29.6	9.3	8.0	9.0	--	--
LSD .05	2	1,446	3.4	2.3	0.9	NS	8.4	5.4	28.76	--	--

Planting Date: April 28

Harvest Date: August 10

Returns were calculated by multiplying the 1999 yield by protein premium or discount paid at the Southwest Grain Terminal located at Gladstone on August 26, for all plots in two of the four blocks included in the experiment (grain protein concentration was determined for plots in only two out of four blocks because of budgetary constraints). The price paid on this date was \$2.79/bu, assuming that grain protein concentration was 14%. An additional \$.04/bu was paid for each additional 0.25% increase in grain protein up to 15% protein, where an additional \$0.30/bu was paid. An additional \$0.02/bu was paid for each additional 0.2% increase in grain protein up to 16%, above which an additional premium was not paid. Grain was discounted \$0.12/bu for each 0.25% reduction in grain protein from 14% to 13%. Grain was discounted an additional \$0.05/bu for each 0.25% reduction in grain protein from 13% to 11%, below which an additional discount was not assigned. Returns factored in discounts for grain with a test weight < 58 lb/bu [-\$.01/bu for 0.5 lb/bu between 58 and 57 lb/bu; -\$.02/bu for 0.5 lb/bu between 57 and 55 lb/bu; -\$.03/bu for 0.5 lb/bu between 55 and 50 lb/bu; and -\$.04/bu for 0.5 lb/bu between 50 and 46 lb/bu].

Hard Red Spring Wheat - No-till Recrop

Scranton

Variety	Plant Height	Test Weight	Protein	----- Grain Yield -----			Average Yield	
				1997	1998	1999	2 year	3 year
	in	lbs/bu	%	-----bu/ac-----				
Oxen	28	55.8	12.6	47.7	35.1	41.1	38.1	41.3
2398	29	56.9	12.1	47.5	35.0	35.6	35.3	39.4
Forge	31	59.6	12.4	42.6	29.2	36.0	32.6	35.9
Keene	32	59.3	13.1	38.6	32.1	33.4	32.8	34.7
Trenton	33	58.7	13.2	41.8	32.9	27.7	30.3	34.1
Ernest	33	57.7	13.3	41.8	26.3	32.2	29.2	33.4
2375	30	57.5	12.7	41.3	27.6	31.0	29.3	33.3
Grandin	29	56.4	13.5	36.4	27.5	27.6	27.6	30.5
Argent HWSW	30	59.1	13.3		31.6	29.9	30.8	
Reeder	30	59.9	12.3			40.1		
HJ98	29	56.2	12.6			36.6		
Parshall	36	59.4	13.2			34.6		
Trial Mean	31	58.0	12.9	42.9	31.0	33.8	--	--
C.V. %	6.3	0.9	--	10.6	9.8	10.1	--	--
LSD .05	3	0.9	--	7.6	4.4	5.8	--	--
LSD .01	4	1.3	--	NS	5.9	7.9	--	--

Planting Date: April 28, 1999

Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).

Yields are adjusted to 12% moisture.

NS = no statistical difference between varieties.

Harvest Date: August 17, 1999

Previous Crop: 1997 = Fallow

1998 = HRSW

1999 = HRSW

Hard Red Spring Wheat - No-till Recrop

Regent

Variety	Plant Height	Test Weight	Protein	----- Grain Yield -----			Average Yield	
				1996	1998	1999	2 year	3 year
	in	lbs/bu	%	-----bu/ac-----				
2398	30	56.1	15.4	43.0	39.5	55.6	47.6	46.0
2375	33	57.4	15.1	37.8	37.3	59.0	48.2	44.7
Keene	38	57.6	15.3	32.1	38.5	50.5	44.5	40.4
Ernest	35	56.5	16.2	36.1	34.0	46.1	40.0	38.7
Trenton	35	55.9	16.0	37.8	37.8	39.3	38.6	38.3
Grandin	33	53.8	15.7	36.1	29.8	40.6	35.2	35.5
Forge	35	56.8	14.3		39.0	55.4	47.2	
Oxen	31	54.8	14.8		37.2	56.0	46.6	
Argent HWSW	33	56.0	16.4		33.4	45.3	39.4	
HJ98	31	55.1	14.9			59.6		
Reeder	31	57.3	16.3			51.0		
Parshall	36	57.1	16.1			47.2		
Trial Mean	33	56.2	15.5	36.7	35.9	50.5	--	--
C.V. %	6.5	1.4	--	6.7	7.9	8.7	--	--
LSD .05	4	1.4	--	3.5	4.1	7.4	--	--
LSD .01	5	1.8	--	4.8	5.5	10.0	--	--

Planting Date: April 28, 1999
 Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
 Yields are adjusted to 12% moisture.

Harvest Date: August 17, 1999
 Previous Crop: 1996 = Fallow
 1998 = HRSW
 1999 = HRSW

Hard Red Spring Wheat - No-till Recrop

New Leipzig

Variety	Plant Height	Test Weight	Protein	----- Grain Yield -----			Average Yield	
				1997	1998	1999	2 year	3 year
	in	lbs/bu	%	-----bu/ac-----				
Oxen	34	54.7	13.3	60.2	36.4	54.5	45.4	50.4
2375	34	58.2	13.4	62.3	31.4	45.7	38.6	46.5
Forge	37	58.0	13.9	56.1	28.3	51.8	40.0	45.4
Keene	41	59.4	14.3	64.6	26.2	44.9	35.6	45.2
2398	33	55.7	13.3	60.5	31.9	41.4	36.6	44.6
Trenton	41	57.2	14.0	62.1	27.5	39.6	33.6	43.1
Ernest	38	57.0	14.7	59.5	29.7	36.6	33.2	41.9
Grandin	35	54.2	15.5	59.5	27.8	31.0	29.4	39.4
Argent HWSW	35	54.6	14.6		28.8	33.1	31.0	
Reeder	33	57.7	13.8			53.1		
HJ98	32	55.2	13.0			50.2		
Parshall	40	59.8	15.2			42.3		
Trial Mean	36	56.8	14.1	61.2	29.7	43.7	--	--
C.V. %	4.2	2.3	--	6.4	9.9	8.1	--	--
LSD .05	2	1.9	--	6.6	4.4	5.1	--	--
LSD .01	3	2.5	--	8.9	6.0	6.8	--	--

Planting Date: April 30, 1999

Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).

Yields are adjusted to 12% moisture.

Harvest Date: August 17, 1999

Previous Crop: 1997 = Fallow

1998 = HRSW

1999 = HRSW

Hard Red Spring Wheat - No-till Recrop

Selfridge

Variety	Plant Height	Test Weight	Protein	----- Grain Yield -----			Average Yield	
				1997	1998	1999	2 year	3 year
	in	lbs/bu	%	-----bu/ac-----				
2398	33	55.1	11.4	38.1	58.9	38.0	48.4	45.0
Oxen	31	54.5	11.6	30.9	52.7	49.0	50.8	44.2
Trenton	41	59.2	11.5	39.4	52.2	39.6	54.9	43.7
Forge	35	60.0	10.7	27.2	56.4	46.3	51.4	43.3
Keene	40	60.4	12.3	31.5	50.5	46.4	48.4	42.8
2375	35	57.8	11.9	29.5	55.4	42.6	49.0	42.5
Ernest	38	57.8	11.5	33.4	47.0	36.8	41.9	39.1
Grandin	33	55.7	11.6	22.8	45.3	26.6	36.0	31.6
Argent HWSW	35	57.8	12.1		43.0	31.6	37.3	
Reeder	35	58.0	11.7			44.9		
Parshall	38	60.8	11.8			44.4		
HJ98	31	55.0	11.2			40.4		
Trial Mean	35	57.7	11.6	31.6	50.3	40.5	--	--
C.V. %	5.1	0.8	--	18.5	7.0	8.1	--	--
LSD .05	3	0.7	--	8.4	6.0	4.7	--	--
LSD .01	3	0.9	--	NS	8.1	6.3	--	--

Planting Date: April 29, 1999
 Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
 Yields are adjusted to 12% moisture.
 NS = no statistical difference between varieties.

Harvest Date: August 18, 1999
 Previous Crop: 1997 = HRSW
 1998 = HRSW
 1999 = Sunflower

Hard Red Spring Wheat - No-till Recrop

Mandan

Variety	Plant Height	Test Weight	Protein	----- Grain Yield -----			----- Average Yield -----	
				1997	1998	1999	2 year	3 year
	in	lbs/bu	%	-----bu/ac-----				
Forge	36	58.1	13.1	37.8	56.3	45.6	51.0	46.6
2375	32	57.1	12.5	38.4	55.2	39.2	47.2	44.3
2398	32	53.7	12.7	29.3	58.8	38.5	48.6	42.2
Oxen	32	53.1	11.6	37.3	52.6	36.0	44.3	42.0
Trenton	42	58.4	12.3	27.8	52.0	44.1	48.0	41.3
Keene	40	59.1	12.4	32.6	50.4	39.8	45.1	40.9
Ernest	39	57.4	12.1	28.7	46.9	34.9	40.9	36.8
Grandin	33	53.2	14.2	32.5	45.2	23.4	34.3	33.7
Argent HWSW	35	56.5	12.9		42.9	36.8	39.8	
Reeder	33	57.7	12.6			46.9		
HJ98	30	55.3	12.1			44.1		
Parshall	36	60.2	13.4			42.9		
Trial Mean	35	56.6	12.7	34.0	50.2	39.3	--	--
C.V. %	5.6	1.6	--	20.7	7.0	12.5	--	--
LSD .05	3	1.6	--	NS	6.0	8.3	--	--
LSD .01	4	2.1	--	NS	8.0	11.3	--	--

Planting Date: April 29, 1999

Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).

Yields are adjusted to 12% moisture.

NS = no statistical difference between varieties.

Harvest Date: August 18, 1999

Previous Crop: 1997 = Corn

1998 = HRSW

1999 = Rye

Variety	Seeds per Pound	Test Weight	Protein	Grain Yield		% of Grandin	2 Year Average
				1998	1999		
		lbs/bu	%	----bu/ac----			bu/ac
2371	16,068	58.2	15.3	--	30.8	105	--
2375	15,055	59.0	14.5	49.9	30.1	102	40.0
2398	16,579	55.2	14.2	51.9	23.6	80	37.7
AC Barrie	18,705	53.2	15.4	41.0	23.3	79	32.2
Argent	14,463	58.7	15.4	--	32.0	109	--
Butte 86	14,714	60.0	14.3	47.1	32.2	109	39.7
Ernest	16,414	59.1	14.8	44.1	28.6	97	36.4
Forge	15,722	60.6	14.4	--	36.6	124	--
Grandin	15,993	57.1	15.3	46.4	29.5	100	37.9
Ingot	17,647	57.2	14.3	--	27.2	92	--
Ivan	15,218	64.4	13.4	--	36.7	125	--
Keene	16,302	62.3	15.8	43.3	36.5	124	39.9
Oxen	17,125	59.5	14.9	57.1	36.1	123	46.6
Russ	15,726	60.8	15.3	49.9	36.5	124	43.2
Trenton	15,377	65.7	15.3	--	36.1	123	--
Trial Mean	16,004	59.4	--	47.8	31.7	--	--
C.V. %	4.7	3.8	--	7.7	12.5	--	--
LSD .05	1,245	3.7	--	5.3	6.6	--	--

Planting Date: May 26
Harvest Date: September 7

Variety	Seeds per Pound	Test Weight	Protein	Grain Yield		% of Grandin	2 Year Average
				1998	1999		
		lbs/bu	%	----bu/ac----			bu/ac
2371	17,644	56.0	17.0	--	22.4	112	--
2375	14,680	60.2	15.1	26.7	21.8	109	24.3
2398	14,845	58.7	15.8	27.3	22.6	113	25.0
AC Barrie	18,099	56.7	17.0	23.1	15.8	79	19.4
Argent	14,528	60.5	16.9	--	20.8	104	--
Butte 86	15,653	60.2	15.2	23.9	19.7	99	21.8
Ernest	16,834	58.8	16.6	26.0	23.9	119	24.9
Forge	16,165	61.0	15.7	--	27.9	139	--
Grandin	14,356	59.8	16.2	24.2	20.0	100	22.1
Ingot	17,790	61.5	16.6	--	24.6	123	--
Ivan	17,538	59.7	15.2	--	23.9	120	--
Keene	16,472	60.0	15.9	25.9	25.2	126	25.6
Oxen	17,501	58.2	16.7	24.7	26.3	132	25.5
Russ	16,338	58.8	16.4	24.6	23.0	115	23.8
Trenton	15,377	59.0	16.6	--	24.8	124	--
Trial Mean	16,254	59.3	--	25.0	22.9	--	--
C.V. %	5.5	1.5	--	7.2	16.7	--	--
LSD .05	1,489	1.5	--	2.6	NS	--	--

Planting Date: May 26
Harvest Date: August 31

Variety	Seeds per Pound	Test Weight lbs/bu	Protein %	Grain Yield		% of Grandin	2 Year Average bu/ac
				1998 ----bu/ac----	1999		
2371	18,611	52.5	16.0	--	7.6	75	--
2375	15,791	55.8	14.3	48.1	13.0	128	30.6
2398	17,164	53.2	14.8	43.5	12.2	120	27.8
AC Barrie	20,610	51.5	16.2	39.0	7.5	73	23.2
Argent	18,083	52.8	15.6	--	12.2	120	--
Butte 86	16,547	55.5	14.8	46.9	12.0	118	29.5
Ernest	17,497	54.3	15.2	43.7	12.5	123	28.1
Forge	16,844	56.8	14.1	--	16.0	157	--
Grandin	16,519	53.2	16.0	38.0	10.2	100	24.1
Ingot	18,501	56.2	14.6	--	14.6	144	--
Ivan	16,839	56.0	14.5	--	18.3	180	--
Keene	16,676	57.0	15.1	43.0	14.3	140	28.6
Oxen	17,614	54.7	14.9	50.7	17.7	174	34.2
Russ	16,775	55.3	15.6	46.7	18.7	184	32.7
Trenton	16,576	56.2	15.2	--	13.5	132	--
Trial Mean	17,377	54.7	--	44.1	13.3	--	--
C.V. %	6.6	1.3	--	7.2	24.0	--	--
LSD .05	1,929	1.2	--	4.6	NS	--	--

Planting Date: May 27

Harvest Date: September 7

*Trial received hail damage.

Hard Red Spring Wheat - Fallow**Wibaux, MT**

Variety	Height, Inches	Grain Protein	Test Weight	Yield bu/acre	\$/acre¹ +/- McNeal
Amidon	33	13.6	58.0	38.6	58.39
Parshall	31	12.7	61.1	40.3	56.80
Norpro	25	13.2	59.2	37.5	49.33
Reeder	29	13.0	59.7	37.6	46.63
Grandin	30	13.8	58.2	35.6	46.62
Ernest	30	13.7	58.5	35.2	44.59
Scholar	32	13.1	59.7	34.8	33.16
Ivan	25	11.5	58.8	35.8	28.67
Hagar	25	13.1	58.4	32.6	22.58
Newana	26	11.8	58.0	34.0	20.56
Conan	27	13.4	59.9	30.8	19.47
Lew	33	13.3	59.1	30.4	14.74
McNeal	27	11.8	58.4	29.5	0.00
McVey	26	13.4	56.7	26.8	-0.49
377S *	28	13.2	57.3	35.0	**
Argent *	31	14.3	59.6	33.7	**
Average	28.4	13.0	58.6	34.1	
P Value	0.000	0.005	0.000	0.002	
CV (S/Mean)	5.5	5.9	0.9	9.8	
CV (SE/Mean)	3.2	3.4	0.5	5.6	
LSD 0.05	2.6	1.3	0.9	5.5	

Planted: May 25, 1999
Harvested: September 9, 1999
Cooperator: David Maus

* Hard White Spring Wheat

** No average price for hard white wheat available at this time

¹ Wheat prices summarized by Gregg Carlson, NARC, Havre, MT, from 5-year average of daily market values for PNW, supplied by the Montana Wheat and Barley Committee

Observations by Amy Dukart, NDSU Extension Summer Intern

Variety	Leaf Rust	Tan Spot	Septoria	Stem Magot	Other Diseases	
	---- % Flag Leaf Infection ----			%		
2375	30	10	10	0	Smut	
Butte 86	5	10	25	0	Smut	
Amidon	0	3	20	4	Smut	Ergot
Grandin	50	1	25	3		
Sharp	15	5	25	2		
2371	30	15	15	1		
Kulm	15	10	15	1		
Hamer	1	10	5	0		
Lars	1	25	10	1		
AC Barrie	25	10	40	2		
Verde	5	15	15	2	Scab	
2398	30	15	10	1	Smut	
Trenton	35	5	5	2		
Russ	5	5	35	0		
Oxen	10	10	10	1	Smut	
Gunner	15	15	3	1	Smut	
Keene	0	15	0	2	Smut	
Nora	20	25	0	3		
Forge	20	20	20	1		
Majestic	15	5	20	1		
Sharpshooter	20	5	15	0	Smut	
AC Cadillac	40	5	10	0	Smut	Scab
Hager	25	5	5	2		
HJ98	45	20	10	2	Smut	Scab
Ingot	20	25	10	3	Smut	
Argent	40	5	10	0	Smut	BYD*

Continued on next page.

Variety	Leaf Rust	Tan Spot	Septoria	Stem Magot	Other Diseases	
	---- % Flag Leaf Infection ----				%	
Norpro	0	5	10	1	Smut	
AC Abbey	25	5	5	0	Smut	
AC Intrepid	15	5	5	1	Smut	
Ivan	3	15	2	3	Smut	
McVey	25	0	5	2		
Ember	10	5	15	2		
Parshall	40	20	30	0	Smut	Ergot
Reeder	30	30	5	0	Smut	
Conan	35	30	30	0	Smut	
377S	5	10	15	1	Smut	
Dandy	50	15	15	1	Smut	
McKenzie	3	15	10	0	Smut	
Aurora	3	5	5	2	Smut	
Ernest	5	20	5	3	Smut	Scab
Scholar	5	20	0	0	Smut	Scab

Planting Date: April 14, 1999
 Previous crop: Field peas

Date of Observation: July 22, 1999
 *BYD = barley yellow dwarf.

Durum wheat varieties currently grown in North Dakota are described in the following tables. Successful durum production depends on numerous factors including selecting the right variety for a particular area. The information included in this publication is meant to aid in selecting that variety or group of varieties. Characteristics to evaluate in selecting a variety are: yield potential in your area; test weight; straw strength and plant height; reaction to important diseases; and maturity. Selecting varieties with good milling and pasta quality is also important to maintain market recognition.

When selecting a top yielding variety it is best to use data that summarizes several years and locations. The notion that the single data set nearest your farm will indicate which variety will perform the best for you is incorrect. Choose the variety that on average performs the best at multiple locations near you over several years.

2000 North Dakota durum variety description.

Variety	Agent or Origin ¹	Year Released	Chaff				Straw				Reaction to Disease ²				Quality Factors		
			Color	Height	Strength	Maturity	Stem Rust	Leaf Rust	Foliar Disease	Scab	Test Wt.	% Vit. Kernel	Kernel Size ³	Overall Quality			
Ward	ND	1972	tan	tall	v.strg.	m.early	R	R	MR	S	59.0	93	med.	Poor			
Rugby	ND	1973	tan	tall	v.strg.	m.early	R	R	MR	S*	59.3	92	med.	Poor			
Cando	ND	1975	tan	s.dwf.	v.strg.	med.	R	R	M	VS	N/A	N/A	small	Poor			
Vic	ND	1979	white	tall	med.	m.early	R	R	MR	S*	59.3	93	large	Good			
Lloyd	ND	1983	white	s.dwf.	v.strg.	med.	R	MR	S	VS	57.5	88	med.	Average			
Medora	Can.	1983	white	tall	strg.	m.early	R	R	MS	VS	59.1	93	large	Good			
Kyle	Can.	1984	white	tall	weak	med.	R	MR	M	N/A	N/A	96	large	Good			
Laker	WPB	1985	white	s.dwf.	strg.	med.	R	MR	S	S	58.5	91	med.	Average			
Monroe	ND	1985	white	tall	med.	early	R	R	M	VS	58.7	93	large	Good			
Fjord	AgriPro	1986	white	tall	strg.	m.early	R	R	M	S	N/A	N/A	large	Good			
Renville	ND	1988	white	tall	med.	med.	R	R	M	S*	59.2	93	med.	Good			
Plenty	Can.	1990	white	tall	weak	late	R	R	MR	MS	58.3	94	N/A	Good			
Voss	AgriPro	1994	white	s.dwf.	v.strg.	med.	R	MR	MS	S	58.7	91	med.	Average			
Munich	ND	1995	white	med.	v.strg.	med.	R	R	MR	S*	58.9	92	med.	Good			
AC Melita	Can.	1995	white	tall	med.	med.	R	N/A	N/A	S	N/A	N/A	large	Good			
Ben	ND	1996	white	med.	strong	med.	R	R	MR	S*	60.0	93	large	Excellent			
Dressler	AgriPro	1996	white	tall	med.	med.	R	MR	N/A	VS	N/A	N/A	large	Good			
AC Morse	Can.	1996	white	s.dwf.	strong	med.	R	R	M	N/A	N/A	N/A	m-large	Good			
AC Avonlea	Can.	1997	white	med	med.	med.	R	R	M	N/A	N/A	N/A	m-large	Good			
Belzer	ND	1997	white	tall	med.	late	R	R	M	MR	58.0	93	large	Good			
Maier	ND	1998	white	med	strong	m-late	R	R	M	S*	59.5	93	m-large	Excellent			
Mountrail	ND	1998	white	med	strong	late	R	R	M	S*	59.3	92	m-large	Good			
Kari	Agripro	1998	white	med	strong	med	R	R	M	S	N/A	N/A	m-large	Good			
Lebsock	ND	1999	white	med	strong	med	R	R	M	S	60.7	92	m-large	Good			
Plaza	ND	1999	white	s.dwf.	strong	late	R	R	M	MS	58.7	90	m-large	Average			
AC Pathfinder	Can.	1999	white	med.	weak	med.	R	R	M	N/A	N/A	N/A	m-large	Good			
AC Navigator	Can.	1999	white	s.dwf.	weak	med.	R	R	M	N/A	N/A	N/A	m-large	Good			

1 Refers to agent or developer: WPB = Western Plant Breeder.

2 R = resistant; MR = moderately resistant (slow rusters); M = intermediate; MS = moderately susceptible; S = susceptible; VS = very susceptible; Foliar Disease = reaction to tan spot and septoria leaf spot complex. Letter ratings for head blight (scab) based on visual head symptoms. * Indicates yields and/or quality have often been higher than would be expected based on visual symptoms.

3 No. seeds/lb.: Large = less than 11,000; medium = 11,000-12,000; small = more than 12,000.

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield			Average Yield	
					1997	1998	1999	2 year	3 year
		inches	lbs/bu	%	-----bu/ac-----				
Lebsock	70	36	60.2	13.9	84.3	75.8	81.8	78.8	80.6
Maier	72	37	59.7	14.2	78.0	76.3	84.0	80.2	79.4
Mountrail	72	37	59.1	13.9	71.3	65.1	91.4	78.2	75.9
Munich	70	33	57.8	14.1	68.4	69.5	86.8	78.2	74.9
Belzer	72	36	56.9	12.6	73.8	69.5	78.4	74.0	73.9
Lloyd	73	31	56.2	13.3	72.8	70.7	78.2	74.4	73.9
Ben	71	36	60.1	14.0	68.1	69.6	83.7	76.6	73.8
Monroe	67	37	58.5	14.3	78.5	66.9	76.0	71.4	73.8
Plaza	73	30	56.5	14.8	70.5	69.8	79.9	74.8	73.4
Rugby	70	39	59.0	14.0	73.9	68.4	76.5	72.4	72.9
Dressler	71	38	58.3	14.3	68.9	71.3	78.0	74.6	72.7
Renville	71	41	58.9	13.6	70.1	69.1	78.3	73.7	72.5
Vic	71	40	59.0	14.4	72.3	66.7	75.7	71.2	71.6
AC Melita	71	40	58.4	13.8	68.2	67.6	72.1	69.8	69.3
Plenty	71	40	57.7	14.1	71.2	69.7	66.5	68.1	69.1
Kari	71	36	58.9	14.3		68.2	84.3	76.2	
Navigator	72	33	59.2	13.6			80.5		
AC Pathfinder	70	37	58.8	14.2			78.8		
Trial Mean	71	36	58.7	13.7	72.6	69.4	80.4	--	--
C.V. %	1.0	4.4	0.9	--	8.4	9.1	4.3	--	--
LSD .05	1	2	0.7	--	8.5	ns	4.9	--	--
LSD .01	1	3	1.0	--	11.1	ns	6.4	--	--

Planting Date: April 14, 1999

Harvest Date: August 16, 1999

Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).

Yields are adjusted to 12% moisture.

Previous crop: 1997 & 98 = fallow, 1999 = field pea.

ns = no statistical difference between varieties.

Variety	Days to Head	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield			Average Yield		
						1997	1998	1999	Returns	2 Year	3 Year
			in	lbs/bu	%	-----bu/ac-----			\$/ac	----bu/ac----	
AC Avonlea	64	12,259	37	56.0	15.7	--	53	52.5	120.43	52.8	--
AC Melita	64	11,324	40	58.1	14.7	32.6	49	51.0	121.25	50.0	44.2
AC Morse	63	11,741	35	57.3	15.0	--	53.5	56.4	134.17	55.0	--
AC Navigator	64	12,543	30	57.8	15.1	--	--	56.0	131.01	--	--
Belzer	64	11,845	38	55.9	15.2	33.9	55.9	52.9	118.26	54.4	47.6
Ben	64	12,261	37	58.4	15.5	30	54.5	51.7	124.35	53.1	45.4
Dressler	64	12,103	37	56.8	15.3	37.8	47.8	47.7	110.62	47.8	44.4
Kari	64	11,858	35	58.4	15.3	--	52.6	53.1	128.05	52.9	--
Lebsock	64	12,774	33	58.8	14.4	29.9	51.6	50.6	122.90	51.1	44.0
Lloyd	65	13,377	26	49.3	15.1	33.6	51.9	54.3	97.67	53.1	46.6
Maier	65	12,945	34	57.1	15.5	29.6	52.4	55.2	129.06	53.8	45.7
Monroe	60	11,797	37	55.9	15.3	26.3	50.5	49.0	110.97	49.8	41.9
Mountrail	66	12,216	35	55.7	14.5	38.9	53.8	55.4	124.73	54.6	49.4
Munich	63	14,825	34	53.0	15.2	34.7	54	54.6	114.74	54.3	47.8
Pathfinder	63	12,580	37	58.9	14.8	--	--	56.6	136.89	--	--
Plaza	65	13,760	29	53.2	14.8	43.6	54.7	55.4	114.78	55.0	51.2
Plenty	65	12,576	41	57.8	15.5	30.7	49.6	53.7	128.73	51.6	44.7
Renville	64	13,583	37	55.4	15.4	31.1	51	52.4	117.18	51.7	44.8
Rugby	64	12,739	38	57.6	15.4	34.8	47.6	47.2	112.20	47.4	43.2
Vic	63	12,354	38	56.3	15.4	27.7	60.1	54.0	123.19	57.1	47.3
Trial Mean	64	12,465	36	57.0	15.1	32.7	52.8	54.6	126.65	--	--
C.V. %	1.0	5.1	3.5	3.1	2.9	18.7	11.2	6.3	9.5	--	--
LSD .05	1.0	886	2	2.5	0.9	NS	8.3	4.8	16.75	--	--

Planting Date: April 26

Harvest Date: August 11

Returns were calculated by multiplying the 1999 yield by the test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was \$2.50/bu, assuming a minimum test weight of 60 lb/bu. Grain was discounted \$.01/bu for each 0.5 lb reduction in test weight between 60 and 59 lb/bu, \$.03/bu per 0.5 lb reduction between 59 and 58 lb/bu, \$.04/bu between 58 and 55 lb/bu, and \$.05/bu per 0.5 lb/bu reduction between 55 and 50 lb/bu.

Durum - No-till Recrop

Scranton

Variety	Plant Height	Test Weight	Protein	----- Grain Yield -----			Average Yield	
				1997	1998	1999	2 year	3 year
	in	lbs/bu	%	-----bu/ac-----				
Ben	30	59.4	13.3	46.4	23.7	42.0	32.8	37.4
Belzer	30	56.1	14.3	44.2	19.6	36.2	27.9	33.3
Renville	31	57.2	14.0	41.0	22.1	36.6	29.4	33.2
Mountrail	28	57.8	14.1		23.1	40.3	31.7	
Maier	28	59.1	14.4		19.2	35.7	27.4	
Plaza	26	58.5	13.7			37.0		
Lebsock	28	59.3	13.7			36.0		
Trial Mean	29	58.2	13.9	43.2	22.0	37.7	--	--
C.V. %	7.6	0.7	--	7.6	8.0	11.0	--	--
LSD .05	NS	0.7	--	NS	2.6	NS	--	--
LSD .01	NS	1.0	--	NS	3.6	NS	--	--

Planting Date: April 28, 1999

Harvest Date: August 17, 1999

Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A). Previous Crop: 1997 = Fallow

Yields are adjusted to 12% moisture.

1998 = HRSW

NS = no statistical difference between varieties.

1999 = HRSW

Durum - No-till Recrop

Regent

Variety	Plant Height	Test Weight	Protein	----- Grain Yield -----			----- Average Yield -----	
				1996	1998	1999	2 year	3 year
	in	lbs/bu	%	-----bu/ac-----				
Ben	33	58.3	16.4	35.9	38.6	43.7	41.2	39.4
Renville	35	56.6	16.6	35.5	32.2	41.5	36.8	36.4
Mountrail	31	56.8	16.7		33.5	44.5	39.0	
Maier	31	57.6	17.2		30.8	46.9	38.8	
Belzer	34	55.5	16.9		27.7	39.1	33.4	
Lebsock	33	58.5	15.7			45.6		
Plaza	26	55.0	16.3			41.3		
Trial Mean	32	56.9	16.5	33.7	33.0	43.2	--	--
C.V. %	5.2	0.8	--	8.7	7.7	7.6	--	--
LSD .05	3	0.8	--	4.4	3.8	NS	--	--
LSD .01	4	1.1	--	NS	5.2	NS	--	--

Planting Date: April 28, 1999

Harvest Date: August 17, 1999

Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A). Previous Crop: 1996 = Fallow

Yields are adjusted to 12% moisture.

1998 = HRSW

NS = no statistical difference between varieties.

1999 = HRSW

Durum - No-till Recrop				New Leipzig
Variety	Plant Height	Test Weight	Protein	Grain Yield 1999
	in	lbs/bu	%	bu/ac
Mountrail	36	59.0	15.3	44.2
Maier	35	59.6	14.8	43.0
Lebsock	33	59.6	15.1	42.2
Plaza	29	56.5	15.3	41.8
Ben	36	59.2	15.5	41.7
Renville	39	58.2	15.0	41.6
Belzer	39	57.6	13.9	41.2
Trial Mean	35	58.5	15.0	42.2
C.V. %	5.9	1.2	--	9.9
LSD .05	3	1.1	--	NS
LSD .01	4	1.4	--	NS

Planting Date: April 30, 1999

Harvest Date: August 17, 1999

Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).

Previous Crop: HRSW

Yields are adjusted to 12% moisture.

NS = no statistical difference between varieties.

Durum - No-till Recrop

Salfridge

Variety	Plant Height	Test Weight	Protein	----- Grain Yield -----			Average Yield	
				1997	1998	1999	2 year	3 year
	in	lbs/bu	%	-----bu/ac-----				
Ben	36	60.9	12.2	35.5	64.6	51.5	58.0	50.5
Renville	38	59.5	12.5	34.0	63.5	41.3	52.4	46.3
Belzer	35	58.0	12.3	33.2	59.2	42.9	51.0	45.1
Mountrail	35	59.5	12.6		60.9	48.3	54.6	
Maier	34	59.8	13.1		59.7	44.5	52.1	
Lebsock	34	61.1	12.4			43.5		
Plaza	30	58.9	11.9			43.4		
Trial Mean	35	59.7	12.4	33.1	60.5	45.0	--	--
C.V. %	2.4	0.8	--	12.9	17.9	8.3	--	--
LSD .05	1	0.8	--	NS	NS	NS	--	--
LSD .01	2	1.1	--	NS	NS	NS	--	--

Planting Date: April 29, 1999

Harvest Date: August 18, 1999

Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).

Yields are adjusted to 12% moisture.

NS = no statistical difference between varieties.

Previous Crop: 1997 = HRSW

1998 = HRSW

1999 = Sunflower

Durum - No-till Recrop	Mandan
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Variety	Plant Height	Test Weight	Protein	----- Grain Yield -----			----- Average Yield -----	
				1997	1998	1999	2 year	3 year
	in	lbs/bu	%	-----bu/ac-----				
Ben	38	60.2	13.2	42.5	53.6	59.0	56.3	51.7
Renville	43	58.8	13.5	40.9	52.1	58.0	55.0	50.3
Belzer	39	57.3	12.8	31.8	45.0	50.9	48.0	42.6
Mountrail	38	58.8	13.0		57.0	60.5	58.8	
Maier	37	58.4	13.7		54.6	51.9	53.2	
Lebsock	37	60.0	12.9			55.0		
Plaza	31	56.9	12.8			45.3		
Trial Mean	38	58.6	13.1	37.5	52.3	54.4	--	--
C.V. %	4.8	0.7	--	15.7	5.2	8.9	--	--
LSD .05	3	0.8	--	NS	4.0	8.6	--	--
LSD .01	4	1.1	--	NS	5.5	NS	--	--

Planting Date: April 29, 1999 Harvest Date: August 18, 1999
 Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A). Previous Crop: 1997 = Corn
 Yields are adjusted to 12% moisture. 1998 = HRSW
 NS = no statistical difference between varieties. 1999 = Rye

Durum - Fallow**Wibaux, MT**

Variety	Height, Inches	Grain Protein	Test Weight	Yield bu/acre
Utopia	26	13.9	59.0	43.6
Lebsock	32	14.6	61.7	43.5
Plaza	28	14.4	60.5	40.0
Kyle	35	14.4	61.5	38.7
Maier	31	14.9	60.2	38.4
Plenty	37	14.8	61.0	37.3
Mountrail	30	14.2	60.7	37.1
Munich	31	14.5	59.0	36.5
Kari	31	14.7	60.0	34.9
Sceptre	31	14.4	59.2	34.0
Voss	26	13.5	60.7	33.7
PH894401	27	13.6	61.5	33.6
Ben	35	14.8	60.0	32.3
Renville	35	14.5	60.3	32.1
Monroe	36	14.1	59.3	20.4
Average	31.3	14.4	60.3	35.8
P Value	0.000	0.137	0.000	0.000
CV (S/Mean)	5.0	4.1	0.6	9.8
CV (SE/Mean)	2.9	2.4	0.3	5.7
LSD 0.05	2.6	NS	0.6	5.9

Planted: May 25, 1999
Harvested: September 9, 1999
Cooperator: David Maus

Beulah Durum - Recrop

Dickinson, ND

Variety	Seeds per Pound	Test Weight	Protein	Grain Yield		% of Renville	Returns	2 Year Average
				1998	1999			
		lbs/bu	%	-----bu/ac-----			\$/ac	bu/ac
Lebsock	13,134	59.0	16.3	24.1	19.7	93	48.83	21.9
Maier	13,068	57.5	17.0	--	17.1	81	39.88	--
Mountrail	12,834	57.2	17.0	--	20.5	97	47.92	--
Plaza	12,295	57.0	15.1	23.5	23.1	109	53.65	23.3
Renville	13,871	57.7	14.4	25.0	21.2	100	50.50	23.1
Trial Mean	13,040	57.7	--	25.2	20.3	--	48.16	--
C.V. %	8.1	1.8	--	7.9	14.8	--	13.7	--
LSD .05	NS	NS	--	NS	NS	--	NS	--

Planting Date: May 26

Harvest Date: August 31

Glen Ullin Durum - Fallow

Dickinson, ND

Variety	Seeds per Pound	Test Weight	Protein	Grain Yield		% of Renville	Returns	2 Year Average
				1998	1999			
		lbs/bu	%	-----bu/ac-----			\$/ac	bu/ac
Lebsock	11,033	61.0	14.1	53.2	35.9	90	89.52	44.5
Maier	12,175	62.6	14.6	--	33.6	84	83.99	--
Mountrail	11,161	58.9	14.2	--	42.5	106	105.29	--
Plaza	11,781	60.5	13.6	47.9	38.0	95	94.42	43.0
Renville	12,266	62.1	14.5	45.7	39.9	100	99.71	42.8
Trial Mean	11,683	61.0	--	49.9	38.0	--	94.59	--
C.V. %	6.3	2.8	--	5.0	8.7	--	9.2	--
LSD .05	NS	NS	--	3.7	NS	--	NS	--

Planting Date: May 26

Harvest Date: September 7

Returns were calculated by multiplying the 1999 yield by the test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was \$2.50/bu, assuming a minimum test weight of 60 lb/bu. Grain was discounted \$.01/bu for each 0.5 lb reduction in test weight between 60 and 59 lb/bu, \$.03/bu per 0.5 lb reduction between 59 and 58 lb/bu, \$.04/bu between 58 and 55 lb/bu, and \$.05/bu per 0.5 lb/bu reduction between 55 and 50 lb/bu.

Variety	Seeds per Pound	Test Weight	Protein	Grain Yield		% of Renville	Returns	2 Year Average
				1998	1999			
		lbs/bu	%	-----bu/ac-----			\$/ac	bu/ac
Lebsock	14,576	55.7	15.3	43.3	15.2	105.5	33.97	29.3
Maier	14,648	55.7	16.8	--	12.7	87.9	28.42	--
Mountrail	13,797	55.8	15.5	--	15.1	104.4	33.84	--
Plaza	14,177	54.8	14.8	42.8	10.4	72.2	22.45	26.6
Renville	14,747	55.3	15.2	37.5	14.4	100.0	31.77	26.0
Trial Mean	14,389	55.5	--	41.5	20.3	--	30.09	--
C.V. %	6.9	1.8	--	3.5	14.8	--	17.1	--
LSD .05	NS	NS	--	2.2	NS	--	NS	--

Planting Date: May 27

Harvest Date: September 7

Returns were calculated by multiplying the 1999 yield by the test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was \$2.50/bu, assuming a minimum test weight of 60 lb/bu. Grain was discounted \$.01/bu for each 0.5 lb reduction in test weight between 60 and 59 lb/bu, \$.03/bu per 0.5 lb reduction between 59 and 58 lb/bu, \$0.04/bu between 58 and 55 lb/bu, and \$0.05/bu per 0.5 lb/bu reduction between 55 and 50 lb/bu.

*Trial received hail damage.

Foliar Diseases - Durum

Hettinger

Observations by **Amy Dukart**, NDSU Extension Summer Intern

Variety	Leaf Rust	Tan Spot	Septoria	Stem Magot	Other Diseases	
	---- % Flag Leaf Infection ----			%		
Rugby	0	15	0	1		
Vic	2	10	0	2		
Lloyd	3	15	0	0		
Monroe	0	20	0	2		
Renville	1	15	0	2	BYD*	Smut
Munich	0	15	0	6	BYD	
Ben	0	5	0	3	BYD	
Belzer	0	20	0	3	Smut	
Maier	3	10	0	0	BYD	
Mountrail	0	15	0	2	Smut	
Lebsock	0	15	0	2		
Plaza	0	5	0	0		
AC Melita	0	10	3	0		
Plenty	2	15	0	3		
Kari	0	10	5	0	Smut	
Dressler	0	20	3	2		
Pathfinder	1	5	5	3	Smut	
Navigator	0	15	0	0		

Planting Date: April 14, 1999
 Previous crop: Field peas

Date of Observation: July 22, 1999
 *BYD = barley yellow dwarf.

Table 1. 2000 North Dakota barley variety description.

Variety	Use ³	Origin	Year Released	Awn Type ¹	Aleurone Color	Height	Straw Strength	Relative Maturity	Reaction to Disease ²			
									Stem Rust	Loose Smut	Spot Blotch	Net Blotch
Six-row												
Azure	M/F	ND	1982	S	blue	med.	m. strg.	m.early	S	S	MR-R	MS-S
Excel	M/F	MN	1990	S	white	m.short	strg.	med.	S	S	MR-R	MS-S
Foster	M/F	ND	1995	S	white	m.short	strg.	med.	S	S	MR-R	MS-S
Hazen	F	ND	1984	S	white	med.	m.strg.	med.	S	S	MR-R	MS-S
Morex	M/F	MN	1978	S	white	tall	med.	early	S	S	MR	S
Robust	M/F	MN	1983	S	white	med	m.strg.	med.	S	S	MR-R	MS-S
Stander	M/F	MN	1993	S	white	m.short	v.strg.	m.late	S	S	MR-R	MS-S
MNBrite†	F	MN	1997	S	white	tall	med	early	S	S	MR-R	MS-S
Two-row												
Bowman	F	ND	1984	S	white	m.short	med.	early	S	S	MS-S	S-MS
Conlon ⁵	F	ND	1996	S	white	m.short	med.	early	S	S	MS-MR	MR-R
Gallatin	F	MT	1986	R	white	med.	med.	late	S	S	MS	MS
Harrington ⁴	F	Can.	1981	R	white	med.	m.weak	v.late	S	S	S	MR-MS
Logan	F	ND	1995	S	white	med.	strg.	med.	S	S	MS-MR	MR
Stark	F	ND	1991	S	white	m.tall	med.	late	S	S	S-MS	MS-S
Merit ⁴	F	AB	1998	R	white	med	m.weak	v.late	S	S	MS	MR
Specialty												
Wanubet	SP	MT	1990	R	white	med.	weak	late	S	S	S	S

† Malting designation pending, Moderately resistant to *Fusarium* head blight.

¹ Rough or smooth awned.

² R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; N/A = not available.

³ M = malting; F = feed; SP = special uses (hulles).

⁴ Recommended as a malting barley in western US.

⁵ Lower DON accumulation than other varieties tested.

Barley varieties protected under Title V of the Plant Variety Protection Act.

B1202	Foster	Royal
B1602	Logan	Stander
Conlon	MNBrite	
Excel	Robust	

Barley - No-till recrop

Hettinger

Variety	Days to Head	Plant Height	Test Weight	Protein	----- Grain Yield -----			----- Average Yield -----	
					1997	1998	1999	2 year	3 year
		in	lbs/bu	%	-----bu/ac-----				
Logan	66	34	51.4	16.7	110.5	128.9	110.4	119.6	116.6
Conlon	63	33	51.1	16.2	117.3	132.8	96.3	114.6	115.5
Excel	66	34	48.0	15.7	109.8	128.2	103.0	115.6	113.7
Stark	66	35	50.4	16.1	109.3	101.8	92.4	97.1	101.2
Harrington	74	31	47.4	16.9	97.3	100.0	91.4	95.7	96.2
Bowman	63	34	49.6	16.9	93.1	103.3	87.9	95.6	94.8
Merit	77	32	47.1	16.4			115.5		
Morex	66	37	48.8	16.2			105.2		
Foster	66	36	47.7	15.8			99.1		
Stander	67	34	49.0	15.9			97.9		
M98	66	35	49.6	14.9			93.4		
Robust	66	36	49.4	16.5			87.0		
Trial Mean	67	34	49.3	15.8	111.7	113.4	98.6	--	--
C.V. %	1.1	3.5	1.0	--	8.5	6.4	7.5	--	--
LSD .05	1	2	0.7	--	13.6	10.3	10.5	--	--
LSD .01	1	2	1.0	--	18.1	13.8	14.0	--	--

Planting Date: April 14, 1999
 Harvest Date: August 4, 1999
 Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
 Previous Crop: 1997 & 98 = fallow, 1999 = field pea.
 Yields are adjusted to 12% moisture.

Variety	Days to Head	Seeds per Pound	Plant Height	Test Weight	Protein	% Plump	Grain Yield			Returns	Average Yield	
							1997	1998	1999		2 Year	3 Year
			in	lbs/bu	%	>6/64	-----bu/ac-----			\$/ac	----bu/ac----	
Six Row												
B 2978	63	15,418	30	44.8	15.2	76.5	--	101.4	84.5	99.05	92.9	--
Excel	59	13,632	27	44.1	14.0	64.0	79.8	103.2	94.6	109.92	98.9	92.5
Foster	58	13,159	30	45.1	14.1	84.4	81.3	98.5	94.2	110.41	96.3	91.3
M 98	59	14,376	27	45.9	15.1	77.8	--	--	87.6	103.60	--	--
MN Brite	59	13,761	30	46.8	16.4	77.6	74.0	99.0	80.6	95.23	89.8	84.5
Morex	58	15,255	31	45.5	16.2	75.6	63.3	86.8	82.8	96.64	84.8	77.6
Robust	59	13,948	30	48.8	15.3	79.3	78.6	89.2	82.8	98.53	86.0	83.5
Stander	59	14,233	28	47.2	15.0	81.1	94.1	104.0	94.3	111.65	99.1	97.5
Two Row												
Bowman	59	12,350	27	47.3	14.0	85.0	54.1	72.5	79.0	93.54	75.8	68.5
Conlon	55	11,294	26	46.7	13.5	89.9	73.9	94.4	83.9	99.14	89.1	84.1
Harrington	65	14,751	28	44.1	14.0	70.6	71.1	75.9	73.3	85.01	74.6	73.4
Logan	59	12,356	26	48.1	14.1	85.3	90.2	103.6	90.6	108.08	97.1	94.8
Merit	65	14,916	29	43.8	13.2	65.8	--	117.0	84.1	94.09	100.5	--
Stark	58	10,352	29	50.2	14.2	90.7	74.4	85.6	89.3	106.67	87.5	83.1
Trial Mean	59	13,173	28	46.8	14.5	81	76.9	95.0	86.8	102.60	--	--
C.V. %	0.6	7.9	4.2	1.9	2.7	6.6	6.6	5.7	4.6	5.2	--	--
LSD .05	1	1,475	2	1.3	0.8	7.6	7.2	7.7	5.7	7.60	--	--

Planting Date: April 28

Harvest Date: August 4

Returns were calculated by multiplying the 1999 yields by the price paid for feed barley minus the test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was \$1.20/bu, assuming that the test weight was heavier than 45 lb/bu. Grain with a test weight of 45 lb/bu was discounted \$.03/bu, with an additional discount of \$.04/bu per pound down to 42 lb/bu. Below 42 lb/bu, an additional discount of \$.05/bu occurred per pound.

Barley - No-till Recrop	New Leipzig
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Variety	Plant Height	Test Weight	Protein	----- Grain Yield -----			Average Yield	
				1997	1998	1999	2 year	3 year
	inches	lbs/bu	%	-----bu/ac-----				
Logan	25	49.3	16.0	109.2	60.5	77.6	69.0	82.4
Stark	26	49.0	15.5	93.2	62.6	76.1	69.4	77.3
Conlon	25	48.8	16.3	92.5	54.2	76.5	65.4	74.4
Bowman	25	49.2	17.5	70.5	60.3	81.7	71.0	70.8
Trial Mean	25	49.1	16.3	96.4	59.6	78.0	--	--
C.V. %	6.3	0.7	--	8.5	5.6	7.7	--	--
LSD .05	NS	NS	--	12.4	NS	NS	--	--

Planting Date: April 30, 1999
 Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
 Yields are adjusted to 12% moisture.
 NS = no statistical difference between varieties.

Harvest Date: August 17, 1999
 Previous Crop: 1997 = Fallow
 1998 = HRSW
 1999 = HRSW

Barley - No-till Recrop	Selfridge
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Variety	Plant Height	Test Weight	Protein	----- Grain Yield -----			Average Yield	
				1997	1998	1999	2 year	3 year
	inches	lbs/bu	%	-----bu/ac-----				
Stark	24	49.2	13.5	64.9	94.6	73.7	84.2	77.7
Logan	23	48.8	13.4	64.2	91.0	71.0	81.0	75.4
Bowman	18	48.4	13.9	64.5	83.0	71.8	77.4	73.1
Conlon	20	48.6	13.2	58.2	88.0	67.6	77.8	71.3
Trial Mean	21	48.7	13.5	63.7	88.5	71.0	--	--
C.V. %	11.4	0.7	--	13.1	5.6	8.4	--	--
LSD .05	4	NS	--	NS	7.5	NS	--	--

Planting Date: April 29, 1999
 Harvest Date: August 18, 1999
 Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
 Yields are adjusted to 12% moisture.
 NS = no statistical difference between varieties.

Previous Crop: 1997 = HRSW
 1998 = HRSW
 1999 = Sunflower

Barley - Fallow

Wibaux, MT

Variety	Test Weight	Yield
	lb/bu	bu/ac
Foster	48.0	74.0
Logan	51.5	53.7
Merit	47.2	52.7
Morex	40.8	51.9
Mean	46.9	58.1
CV %	9.0	19.2
LSD 0.05	NS	NS

Planted: May 25, 1999
Harvested: August 17, 1999
Cooperator: David Maus

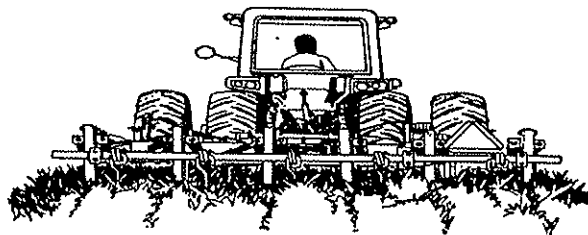


Table 4. 2000 North Dakota Oat Variety Descriptions.

Variety*	Origin	Year Release d	Grain Color	Straw Height	Straw Strength	Matprity	Reaction to Diseases			Quality Factors		
							Stem rust ¹	Crown rust	Barley Y. Dwf. ⁴	Rel. Yield	bu/Wt	Protein ³
Hyttest	SD	1986	white	tall	m.strg.	E	S	MS	S	fair	v.good	H
Prairie	WI	1991	white	short	strg.	E	S	S	T	good	good	M
Premier	MN	1990	yellow	short	med.	M	R	MS	MT	v.good	v.good	H
Milton	MN	1994	yellow	med.	strg.	L	S	MS	MT	v.good	v.good	M
Jerry	ND	1994	white	tall	strg.	M	R	MS	MT	v.good	v.good	M
Newdak	ND/NY	1990	white	med.	strg.	M	R	S	T	v.good	good	M
Jim	MN	1995	yellow	med.	strg.	M	S	MS	MT	good	good	M
Brawn	IL	1993	yellow	short	v.strg.	M	S	S	T	v.good	good	M
Valley	ND	1988	ivory	short	strg.	L	R	MS	MT	v.good	v.good	M
Whitestone	ND	1994	white	short	strg.	L	R	MS	MT	v.good	good	L
Otana	MT	1977	white	m.tall	m.weak	L	S	S	S	v.good	v.good	ML
CDC Boyer	Sask. Value Added S.	1994	white	tall	m.strg	L	S	MR	S	good	v.good	ML
Jud	ND	1997	ivory	tall	med.	L	R	MR	T	v. good	good	MH
Troy	SD	1991	ivory	tall	m.strg.	L	S	MS	T	good	good	M
AC Belmont	Can.	1993	naked	med.	strg.	L	R	S	MT	good	v.good	M
CDC Pacer	Sask. Value Added S.	1996	white	tall	m.strg	L	S	S	S	good	good	L
Paul	ND	1994	naked	v.tall	strg.	L	R	R-MR	T	v.good	good	H
AC Medallion	Can. Cargill	1997	white	tall	med.	L	R	R	MT	good	good	ML
Dumont	Can.	1982	white	m.tall	m.weak	L	R	S	MS	good	good	ML
AC Preakness	Can. Proven Seed	1996	white	tall	strong	L	R	S	M	good	good	L
Bay	WI	1993	yellow	med.	v.strg.	L	S	MR-S	T	good	fair	H
Youngs	ND	1999	white	med.	strong	L	R	MR	MT	v.good	good	M
AC Assiniboia	Can. Proven Seed	1997	red	med	strong	L	R	R	T	v. good	good	ML
Ebeltoft	ND	1999	white	tall	strong	VL	R	MR	S	good	v.good	M
AC Marie	Can.	1992	white	tall	weak	VL	R	S	MT	fair	fair	ML
Triple Crown	Canterra	1998	white	tall	strong	L	S	R	S	good	good	L

* Varieties listed in order of maturity.

1 Stem rust races most prevalent now. S = susceptible; M = moderately; R = resistant; VS = very susceptible.

2 E = early; M = medium; L = late.

3 H = high; M = medium; L = low; V = very; VL = very low.

4 S = susceptible; MS = moderately susceptible; MT = moderately tolerant; T = tolerant. Varieties rated MT or T have a relatively good degree of protection against barley yellow dwarf virus.

Oat varieties protected under Title V of the Plant Variety Protection Act.

Bay	Premier	Prairie
Centennial	Belle	Riser
Dane	Jim	

Variety	Days to head	Plant Height	Test Weight	----- Grain Yield -----			----- Average Yield -----	
				1997	1998	1999	2 year	3 year
		in	lbs/bu	----- bu/ac -----				
Whitestone	76	35	38.3	151.8	131.2	157.1	144.2	146.7
Ebeltoft	75	36	37.2	150.2	126.7	151.7	139.2	142.9
Monida	76	37	35.0	148.9	135.2	142.8	139.0	142.3
Brawn	72	33	36.2	152.1	135.3	132.1	133.7	139.8
Youngs	76	42	36.6	144.2	126.1	139.6	132.8	136.6
Otana	76	41	37.8	148.6	126.5	131.0	128.8	135.4
Jerry	72	40	39.7	138.8	127.6	137.2	132.4	134.5
AC Assinaboia	76	38	37.1	148.3	127.2	127.7	127.4	134.4
Troy	73	40	38.8	150.2	122.9	128.9	125.9	134.0
AC Medallion	75	37	37.4	146.4	123.2	116.4	119.8	128.7
CDC Boyer	75	40	36.6	142.0	126.1	108.4	117.2	125.5
Jud	76	42	35.8	138.8	121.2	115.8	118.5	125.3
Hyttest	72	40	40.6	131.2	121.2	94.4	107.8	115.6
Paul*	76	38	41.5	80.3	88.5	70.7	79.6	79.8
AC Preakness	76	38	37.7			134.2		
Rodeo	72	37	36.7			133.6		
Gem	72	38	37.4			129.8		
Chaps	70	37	36.1			126.2		
Triple Crown	80	38	35.8			124.4		
Belle	76	38	37.6			121.5		
CDC Pacer	76	38	37.6			114.0		
Trial Mean	75	39	37.8	138.6	124.9	128.4	--	--
C.V. %	1.4	4.8	1.7	10.9	5.9	11.8	--	--
LSD .05	1	3	0.9	21.1	10.3	21.3	--	--
LSD .01	2	3	1.2	27.9	13.7	28.2	--	--

Planting Date: April 14, 1999

Harvest Date: August 10, 1999

Seeding Rate: 750,000 live seeds/A (approx. 1.7 bu/A).

* = Naked (hulless) type.

Yields are adjusted to 12% moisture.

Previous Crop: 1997 & 98 = fallow, 1999 = soybean.

Variety	Days to Head	Seeds per Pound	Plant Height	Test Weight	Grain Yield			Returns	Average Yield	
					1997	1998	1999		2 Year	3 Year
			in	lbs/bu	bu/ac	bu/ac	bu/ac	\$/ac	bu/ac	bu/ac
AC Assinaboia	69	12,629	38	33.3	97.4	87.6	112.5	71.02	100.1	99.2
AC Medallion	67	14,178	41	34.0	82.2	93.2	116.1	75.44	104.7	97.2
AC Preakness	68	14,002	40	33.6	--	--	119.0	76.28	--	--
Belle	68	15,779	36	34.2	--	--	118.1	79.30	--	--
Brawn	64	11,428	34	32.0	124.8	106.3	131.5	77.36	118.9	120.9
CDC Boyer	69	13,176	41	32.2	74.2	96.5	111.1	65.49	103.8	93.9
CDC Pacer	67	13,652	39	33.9	--	--	125.0	81.51	--	--
Calibre	68	15,329	41	33.3	--	--	115.2	72.73	--	--
Chaps	62	14,862	35	32.3	--	--	112.0	66.42	--	--
Ebeltoft	70	14,141	35	32.8	126.3	101.0	133.5	78.50	117.2	120.3
Gem	64	13,417	37	34.2	--	--	115.4	76.88	--	--
Hyttest	63	12,596	42	39.0	94.9	85.7	115.5	91.84	100.6	98.7
Jerry	63	13,384	38	36.0	95.3	89.0	122.0	88.25	105.5	102.1
Jud	67	15,007	42	32.5	99.5	96.2	107.3	64.44	101.8	101.0
Milton	64	15,380	34	33.6	91.4	92.1	109.7	71.65	100.9	97.7
Monida	69	16,229	38	29.7	109.3	100.4	134.2	67.44	117.3	114.6
Otana	68	16,600	42	35.8	114.5	108.7	134.9	99.32	121.8	119.4
Paul	73	20,028	39	37.8	82.3	61.6	64.5	49.21	63.0	69.5
Rodeo	63	14,204	35	33.0	--	--	137.2	86.43	--	--
Triple Crown	72	16,026	37	28.5	--	103.6	121.2	50.30	112.4	--
Troy	64	15,909	40	35.0	108.0	99.9	127.7	89.50	113.8	111.9
Whitestone	70	15,989	33	32.8	98.4	101.3	131.1	79.78	116.2	110.3
Youngs	68	13,001	41	32.1	128.7	98.7	135.1	79.04	116.9	120.8
Trial Mean	67	15,133	38	33.6	99.8	95.2	119.7	76.40	--	--
C.V. %	1.0	8.4	3.3	4.2	13.8	6.5	6.2	11.6	--	--
LSD .05	1	1,785	2	2.0	22.4	8.8	10.4	12.43	--	--

Planting Date: April 23

Harvest Date: August 6

Returns were calculated by multiplying the 1999 yield by test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was \$.80/bu, assuming that the test weight was heavier than 37 lb/bu. Grain with a test weight of 37 lb/bu was discounted \$.04/bu, with an additional discount of \$.04/bu per pound down to 30 lb/bu. Below 30 lb/bu, an additional discount of \$.07/bu occurred per pound.

Oats - No-till Recrop			Scranton				
Variety	Plant Height	Test Weight	----- Grain Yield -----			Average Yield	
			1996	1997	1999	2 year	3 year
	inches	lbs/bu	-----bu/ac-----				
Jerry	35	36.5	111.7	92.3	53.2	72.8	85.7
Paul*	34	40.8	87.7	73.3	35.7	54.5	65.6
Jud	37	34.3		90.2	52.3	71.2	
Youngs	35	35.2			71.0		
Ebeltoft	28	35.7			67.3		
Trial Mean	34	36.5	113.1	94.1	55.9	--	--
C.V. %	3.0	2.1	5.9	9.7	14.9	--	--
LSD .05	2	1.4	9.9	13.4	15.4	--	--
LSD .01	3	2.0	12.8	18.3	22.2	--	--

Planting Date: April 28, 1999 Harvest Date: August 17, 1999
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 1996 = Fallow Yields are adjusted to 12% moisture.
 1997 = Fallow *Naked (hulless) type.
 1999 = HRSW

Oats - No-till Recrop			New Leipzig				
Variety	Plant Height	Test Weight	----- Grain Yield -----			Average Yield	
			1997	1998	1999	2 year	3 year
	inches	lbs/bu	-----bu/ac-----				
Jud	42	37.2	126.8	94.4	76.2	85.3	99.1
Jerry	39	40.0	123.8	74.7	75.7	75.2	91.4
Paul*	38	42.1	75.3	68.3	41.6	55.0	61.7
Ebeltoft	34	37.6			101.5		
Youngs	42	36.3			83.2		
Trial Mean	39	38.6	119.1	87.5	75.6	--	--
C.V. %	3.6	1.4	10.5	7.6	12.3	--	--
LSD .05	2	0.8	22.1	9.9	14.1	--	--
LSD .01	3	1.1	30.9	13.6	19.6	--	--

Planting Date: April 30, 1999 Harvest Date: August 17, 1999
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 1997 = Fallow Yields are adjusted to 12% moisture.
 1998 = HRSW *Naked (hulless) type.
 1999 = HRSW

Oats - No-till Recrop			Selfridge				
Variety	Plant Height	Test Weight	----- Grain Yield -----			Average Yield	
			1996	1997	1999	2 year	3 year
	inches	lbs/bu	-----bu/ac-----				
Jerry	39	37.6	116.5	48.1	32.0	40.0	65.5
Paul*	42	40.6	76.9	26.9	22.0	24.4	41.9
Jud	44	35.0		48.7	35.6	42.2	
Ebeltoft	37	35.0			38.4		
Youngs	44	34.7			26.1		
Trial Mean	41	36.6	115.6	53.0	30.8	--	--
C.V. %	4.2	2.8	11.4	23.1	43.4	--	--
LSD .05	3	1.6	23.3	18.3	NS	--	--
LSD .01	4	2.2	32.5	NS	NS	--	--

Planting Date: April 29, 1999

Harvest Date: August 18, 1999

Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).

Previous Crop: 1996 = Fallow

Yields are adjusted to 12% moisture.

1997 = HRSW

*Naked (hulless) type.

1999 = Sunflower

NS = no statistical difference between varieties.

Oats - No-till Recrop			Mandan				
Variety	Plant Height	Test Weight	----- Grain Yield -----			Average Yield	
			1997	1998	1999	2 year	3 year
	inches	lbs/bu	-----bu/ac-----				
Jud	46	35.5	53.4	112.9	91.0	102.0	85.8
Jerry	44	36.5	40.2	125.2	58.7	92.0	74.7
Paul*	49	43.6	33.8	93.3	48.3	70.8	58.5
Ebeltoft	39	36.0			99.2		
Youngs	46	34.8			84.1		
Trial Mean	45	37.3	50.4	116.9	76.3	--	--
C.V. %	5.2	1.0	15.6	7.8	5.9	--	--
LSD .05	4	0.7	11.6	13.6	8.3	--	--
LSD .01	6	1.0	15.8	18.7	11.9	--	--

Planting Date: April 29, 1999

Harvest Date: August 18, 1999

Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).

Previous Crop: 1997 = Corn

Yields are adjusted to 12% moisture.

1998 = HRSW

*Naked (hulless) type.

1999 = Rye

Beulah Oat - Recrop

Dickinson, ND

Variety	Seeds per Pound	Test Weight	Grain Yield			Returns	2 Year Average
			1998	1999	% of Whitestone		
	lbs/bu		bu/ac		\$/ac		
AC Medallion	14,673	34.5	--	26.1	98	17.35	--
Ebeltoft	13,204	31.3	--	27.7	105	14.64	--
Paul	17,234	38.2	26.8	13.7	52	10.65	20.27
Whitestone	15,297	32.3	46.6	26.5	100	15.69	36.54
Youngs	13,181	32.3	--	31.2	118	18.27	--
Trial Mean	14,718	33.7	39.1	25.0	--	15.32	--
C.V. %	8.3	3.9	17.9	28.1	--	25.8	--
LSD .05	2,294	2.5	NS	NS	--	NS	--

Planting Date: May 26

Harvest Date: August 31

Glen Ullin Oat - Fallow

Dickinson, ND

Variety	Seeds per Pound	Test Weight	Grain Yield			Returns	2 Year Average
			1998	1999	% of Whitestone		
	lbs/bu		bu/ac		\$/ac	bu/ac	
AC Medallion	14,966	34.4	--	74.4	110	47.49	--
Ebeltoft	15,099	32.5	--	86.8	128	49.59	--
Paul	19,835	40.3	64.1	55.2	82	46.27	59.7
Whitestone	16,743	33.4	97.2	67.7	100	41.62	82.5
Youngs	13,122	32.5	--	88.7	131	51.56	--
Trial Mean	15,953	34.6	90.0	74.6	--	47.30	--
C.V. %	12.8	1.9	6.1	12.5	--	11.6	--
LSD .05	3,835	1.3	8.2	17.6	--	NS	--

Planting Date: May 26

Harvest Date: August 31

Returns were calculated by multiplying the 1999 yield by test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was \$.80/bu, assuming that the test weight was heavier than 37 lb/bu. Grain with a test weight of 37 lb/bu was discounted \$.04/bu, with an additional discount of \$.04/bu per pound down to 30 lb/bu. Below 30 lb/bu, an additional discount of \$.07/bu occurred per pound.

Hannover Oat - Recrop

Dickinson, ND

Variety	Seeds per Pound	Test Weight	Grain Yield		% of Whitestone	Returns	2 Year Average
			1998	1999			
		lbs/bu	-----bu/ac-----			\$/ac	bu/ac
AC Medallion	18,093	35.0	--	23.8	86	16.46	--
Ebeltoft	14,625	35.3	--	25.7	93	17.81	--
Paul	19,615	41.7	55.7	22.5	81	18.03	39.1
Whitestone	20,369	34.5	71.5	27.7	100	18.74	49.6
Youngs	16,176	35.2	--	19.8	71	13.70	--
Trial Mean	17,775	36.3	70.3	23.9	--	16.95	--
C.V. %	11.2	2.1	9.4	18.0	--	23.0	--
LSD .05	3,743	1.5	9.9	NS	--	NS	--

Planting Date: May 27

Harvest Date: September 7

Returns were calculated by multiplying the 1999 yield by test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was \$.80/bu, assuming that the test weight was heavier than 37 lb/bu. Grain with a test weight of 37 lb/bu was discounted \$.04/bu, with an additional discount of \$.04/bu per pound down to 30 lb/bu. Below 30 lb/bu, an additional discount of \$.07/bu occurred per pound.

*Trial received hail damage.

Oat - Fallow

Wibaux, MT

Variety	Test Weight	Yield
	lb/bu	bu/ac
Youngs	37.8	66.5
Jerry	43.2	66.2
Milton	40.7	66.0
Paul	46.3	46.0
Ebeltoft	41.8	36.7
Mean	42.0	56.3
CV %	1.1	16.6
LSD 0.05	0.8	17.6

Planted: May 25, 1999 Harvested: August Cooperator: David Maus

Table 7. 2000 North Dakota Winter Rye Variety Description.

Variety	Origin	Year Released	Height	Straw Strength	Maturity	Seed Color	Seed Size	Test Weight	Winter hardiness
Dacold	ND	1989	med.	good ¹	v.late	bl-grn.	med.	low	good
Prima	Can	1984	tall	good	med.	blue	large	med.	v.good
Frederick	SD	1984	tall	fair	late	tan	med.	high	good
Musketeer	Can	1980	tall	good	m.early	blue	large	med.	v.good
Rymin	MN	1973	tall	v.good	late	grn-gray	large	high	fair ²

1 Under certain environments lodging has been observed.

2 Varieties with fair winter hardiness should not be seeded on bare soil.

Table 8. Yield and test weight of winter rye at seven locations in North Dakota, 1997-1999.

Variety	Test WT.	Yield 1999	Yield 2 Year	Test WT.	Yield 1999	Yield 2 Year	Test WT.	Yield 1999	Yield 2 Year	Test WT.	Yield 1999	Yield 2 Year
	lb/bu	bu/A	bu/A	lb/bu	bu/A	bu/A	lb/bu	bu/A	bu/A	lb/bu	bu/A	bu/A
	Minot			Williston			Dickinson			Hettinger		
AC Rifle	53.4	55.7	55.8	55.4	79.5	78.2	48.9	69.6	70.2	50.5	44.9	64.1
Dacold	52.3	70.7	--	54.7	96.0	90.4	48.0	88.8	92.4	50.2	61.0	83.8
Prima	55.2	66.5	68.8	56.9	80.8	79.7	52.5	72.5	74.6	51.1	42.2	69.1
	Casselton			Carrington			Langdon			State Average		
AC Rifle	52.6	49.8	54.2	49.7	29.0	37.2	52.8	57.2	51.9	51.9	55.1	58.8
Dacold	51.1	67.7	67.9	51.0	51.6	56.8	49.5	84.4	81.5	51.0	74.3	78.8
Musketeer	--	--	--	54.6	55.3	57.6	--	--	--	--	--	--
Prima	52.4	61.4	63.1	53.0	50.8	55.7	53.8	77.2	83.3	53.6	64.5	70.6

Winter Rye - No-till Recrop				Hettinger				
Variety	Days to Head	Plant Height	Test Weight	----- Grain Yield -----			Average Yield	
				1997	1998	1999	2 year	3 year
	1/1	inches	lbs/bu	-----bu/ac-----				
Dacold	159	45	50.2	96.6	106.7	61.0	83.8	88.1
Prima	155	47	51.1	75.9	96.0	42.2	69.1	71.4
AC Rifle	156	33	50.5	69.0	83.3	44.9	64.1	65.7
Trial mean	157	41	50.4	79.4	96.8	51.6	--	--
C.V. %	0.8	4.5	1.5	6.8	10.8	15.1	--	--
LSD .05	2	3	NS	8.2	16.2	12.3	--	--
LSD .01	3	4	NS	11.4	NS	NS	--	--

Planting Date: September 30, 1998 Harvest Date: August 16, 1999
Seeding rate: 1.1 million live seeds/A No winter kill observed.
Previous crop: 1997 & 98 = fallow, 1999 = field pea.
NS = no statistical difference between varieties.

Winter Rye - Recrop				Dickinson,ND			
Variety	Seeds per Pound	Days to Head	Plant Height	Test Weight	----- Grain Yield -----		2 Year Avg
					1998	1999	
		fr 1/1	in	lbs/bu	-----bu/ac-----		
AC Rifle	20,374	156	38	48.9	70.8	69.6	70.2
Dacold	17,872	157	44	48.0	96.0	88.8	92.4
Prima	15,167	150	49	52.5	76.8	72.5	74.6
Trial Mean	17,846	155	44	49.5	81.1	78.1	--
C.V. %	6.4	0.5	3.0	2.9	4.9	5.1	--
LSD .05	1,816	1	2	2.3	6.3	6.3	--

Planting Date: September 15, 1998

Harvest Date: August 9, 1999

1999 Hard Red Winter Wheat Variety Descriptions

Variety	Agent or Origin	Year	Quality	Leaf rust ¹	Stem rust ¹	Maturity	Straw strength	Height	Winter ^a hardiness
Roughrider	ND	1975	Good	S	R ³	med.	m. strong	med.	good
Norstar	Can.	1977	Average	S	S	late	med.	tall	good
Winridge	MT	1980	V. Poor	S	S	med.	strong	med.	poor
Rita	SD	1980	Average	MS	MR ²	early	strong	med.	fair
Rose	SD	1981	Poor	S	MS ²	early	v. strong	short	fair
Norwin*	MT	1983	Poor	S	MS	med.	strong	v. short	fair
Agassiz	ND	1983	Average	S	R	med.	med.	med.	good
Siouxland	NE	1984	Poor	MR	R	early	strong	med.	poor
Seward	ND	1987	Poor	S	R	med.	m. strong	med.	good
Abilene*	AgriPro	1987	2.5	S	MR	early	strong	v. short	poor
Judith	MT	1988	Average	S	S	med.	strong	med.	fair
Arapahoe	NE	1989	Poor	MR	MR	med.	med.	med.	fair
CDC Kestrel	Can.	1994	NA	S	S	med.	m. strong	med.	good
Elkhorn	ND	1995	Average	MR	R ⁴	med.	med.	med.	good
Erhardt	MT	1996	NA	S	R	med.	strong	med	good
McGuire	MT	1996	NA	S	R	m. early	strong	m. tall	fair
Rampart**	MT	1996	NA	S	R	med.	strong	med.	poor
AC Readymade	Can.	1996	NA	S	S	med.	strong	med.	good
Nekota	SD/NE	1997	NA	MS	NA	early	v. strong	v. short	good
Alliance	NE	1997	NA	S	NA	early	strong	short	good
Crimson	SD	1997	NA	MS	NA	med.	m. strong	med.	NA
Tandem	SD	1997	NA	MS	NA	early	med.	med.	NA
Windstar	NE	1997	NA	MS	NA	early	med.	med.	NA
Ransom	ND	1998	Good	R	NA	m. early	med.	med.	good
Harding	SD	1999	NA	MS	NA	med.	med.	med.	good

^a Varieties with less than good winterhardiness should be seeded only in tall stubble.

* Semidwarf, ** Saw fly resistant.

¹ R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible.

² Susceptible in artificially induced epidemics.

³ Slow rusting type of resistance to race 15.

⁴ Occasionally mixed with some susceptible plants.

Hard Red Winter Wheat - No-till recrop

Hettinger

Variety	Days to Head	Plant Height	Lodging	Test Weight	Grain Protein	Grain Yield			Average Yield	
						1997	1998	1999	2 year	3 year
	1/1	in	0-9*	lbs/bu	%	-----bu/ac-----				
CDC Kestrel	166	40	1	60.8	13.7	61.5	66.5	73.0	69.8	67.0
Seward	165	40	3	62.6	14.1	57.1	68.0	67.3	67.6	64.1
Ransom	164	37	3	61.5	14.7	56.4	62.3	71.8	67.0	63.5
Windstar	160	38	2	62.7	15.3	52.4	63.1	72.2	67.6	62.6
Elkhorn	165	42	2	61.8	14.8	54.4	65.4	60.6	63.0	60.1
Arapahoe	161	36	2	61.7	15.0	44.8	61.1	74.5	67.8	60.1
Crimson	164	37	2	63.0	14.9	50.5	61.4	66.9	64.2	59.6
Longhorn	161	35	0	62.6	15.7	44.9	58.0	75.6	66.8	59.5
Tandem	160	34	1	61.8	16.1	48.2	62.7	66.5	64.6	59.1
Roughrider	162	39	0	62.4	16.5	48.5	58.2	69.1	63.6	58.6
Agassiz	166	42	3	62.1	14.6	50.7	56.6	61.5	59.0	56.3
Nekota	159	31	0	62.3	15.0	46.6	50.6	71.6	61.1	56.3
Tomahawk	159	29	1	61.1	15.3	45.7	47.0	61.0	54.0	51.2
Alliance	159	31	1	61.8	13.6	42.3	47.3	68.6	58.0	52.7
Morgan	167	40	0	61.5	14.6		77.1	81.7	79.4	
Norstar	168	44	1	61.9	15.3		70.4	68.2	69.3	
Erhardt	166	37	0	62.5	15.4		65.2	71.3	68.2	
Harding	162	39	1	62.1	14.7			64.7		
Trial Mean	163	38	1	61.8	14.9	52.1	58.8	70.0	--	--
C.V. %	0.6	4.4	59.5	0.7	--	16.5	14.7	14.3	--	--
LSD .05	2	3	1	0.7	--	NS	14.1	NS	--	--
LSD .01	2	4	2	0.9	--	NS	18.8	NS	--	--

Planting Date: September 30, 1998

Harvest Date: July 27, 1999

Seeding Rate: 1.1 million live seeds/A (approx. 1.6 bu/A).

No winter kill observed.

Previous crop: 1997 & 98 = fallow, 1999 = lentils.

NS = no statistical difference between varieties.

*Lodging: 0 = none, 9 = lying flat on ground.

Variety	Days to Head	Winter Survival	Seeds per Pound	Height	Lodging Score	Test Weight	Protein	Grain Yield			Average Yield		
								1997	1998	1999	Returns	2 Year	3 Year
	fr 1/1	%		in	0-9	lbs/bu	%	-----bu/ac-----			\$/ac	----bu/ac----	
Agassiz	165	90	14,952	44	1.8	63.7	13.4	61.9	77.9	71.2	159.27	74.5	70.3
Alliance	157	86	13,342	37	0.0	62.3	11.4	59.9	69.9	61.6	105.76	65.8	63.8
Arapahoe	161	90	14,134	39	0.0	61.3	12.9	71.7	73.5	73.3	155.89	73.4	72.8
CDC Kestrel	165	91	15,534	42	0.0	59.6	11.6	74.1	83.6	81.5	143.00	82.5	79.7
Crimson	161	89	14,940	39	0.0	64.4	13.1	--	71.1	71.8	157.53	71.4	--
Elkhorn	167	86	14,909	42	0.3	62.0	12.9	66.3	81.6	68.9	140.74	75.3	72.3
Erhardt	162	89	15,742	37	0.0	61.8	13.3	72.9	67.2	66.0	153.71	66.6	68.7
Nekota	157	90	12,492	32	0.0	62.7	12.8	64.3	69.2	61.6	135.30	65.4	65.0
Norstar	168	86	14,333	46	1.3	63.6	12.5	--	74.4	70.1	138.05	72.2	--
Ransom	163	78	14,940	39	0.0	60.9	12.3	66.1	78.7	67.3	134.18	73.0	70.7
Roughrider	164	88	14,920	42	0.3	63.7	13.2	68.1	70.9	59.1	132.83	65.0	66.0
Seward	166	89	13,898	42	0.0	60.6	11.8	68.2	83.8	76.0	146.80	79.9	76.0
Tandem	160	89	11,649	38	0.0	63.2	14.0	--	59.2	63.1	135.35	61.2	--
Windstar	159	81	14,082	38	0.3	64.5	13.3	68.3	77.6	63.5	131.36	70.6	69.8
Trial Mean	162	88	14,105	40	0.2	62.3	12.9	67.0	75.4	69.2	143.01	--	--
C.V. %	0.9	7.8	5.8	4.1	138.6	1.6	1.6	10.3	6.8	7.5	7.0	--	--
LSD .05	2	10	1,153	2	0.3	1.4	0.4	9.7	7.2	7.3	20.71	--	--

Planting Date: September 15, 1998

Harvest Date: August 9, 1999

Lodging 0 = No lodging, 9 = Completely flat

Returns were calculated by multiplying the 1999 yield by protein premium or discount paid at the Southwest Grain Terminal located at Gladstone on August 26, for all plots in two of the four blocks included in the experiment. The price paid on this date was \$1.98/bu, assuming that grain protein concentration was 12%. An additional \$.03/bu was paid for each additional 0.2% increase in grain protein up to 13% protein, above which no additional premium was paid. Grain was discounted \$0.08/bu for each 0.2% reduction in grain protein from 12% to 10%, below which no additional discount was assigned. Returns factored in discounts for grain with a test weight < 60 lb/bu [-\$0.01/bu per 1 lb/bu between 60 and 58 lb/bu; -\$0.01/bu per 0.5 lb/bu between 58 and 57 lb/bu; -\$0.02/bu per 0.5 lb/bu between 57 and 55 lb/bu; and -\$0.04/bu per 0.5 lb/bu between 55 and 50 lb/bu; and -\$0.06/bu per 0.5 lb/bu between 50 and 46 lb/bu].

Spring Triticale - No-till recrop

Hettinger

Variety	Days to Head	Plant Height	Lodg.	Test Weight	----- Grain Yield -----			Average Yield	
					1997	1998	1999	2 year	3 year
		inches	0-9*	lbs/bu	-----bu/ac-----				
Wapiti	68	45	1	54.2	47.6	23.1	40.8	32.0	37.2
Trical 2000	72	46	0	49.4	42.4	19.8	40.0	29.9	34.1
Norico	70	42	0	51.8	38.9	--	36.1	37.5	
Marvel	68	41	1	46.0		22.3	32.1	27.2	
310	68	35	0	53.0			54.6		
Champion	67	45	2	54.2			39.3		
Trial Mean	69	43	1	51.4	43.7	21.7	40.5	--	--
C.V. %	1.2	3.6	71.3	0.6	18.5	19.5	5.8	--	--
LSD .05	1	2	1	0.5	NS	NS	3.5	--	--
LSD .01	2	3	NS	0.6	NS	NS	4.8	--	--

Planting Date: April 19, 1999
 Harvest Date: August 16, 1999
 Seeding rate: 1 million live seeds/A.
 Previous Crop: 1997 & 98 = fallow, 1999 = field pea.

Canary Seed

Hettinger

Variety	Days to Head	Plant Height	Lodg.	Test Weight	----- Grain Yield -----			Average Yield	
					1997	1998	1999	2 year	3 year
		inches	0-9*	lbs/bu	-----lbs/ac-----				
Keet	62	30	2	49.7	1112	1900	1289	1594	1434
Elias	63	31	2	49.4	964	2013	1156	1584	1378
CDC Maria	63	29	2	54.4		1793	907	1350	
Trial Mean	62	30	2	50.8	1038	1922	1143	--	--
C.V. %	0.8	6.4	--	1.1	18.3	8.5	9.3	--	--
LSD .05	NS	NS	--	1.2	NS	NS	242	--	--

Planting Date: April 19, 1999
 Harvest Date: August 16, 1999
 Seeding rate: 30 lbs live seeds/A.
 Previous crop: Fallow.
 *Lodging: 0 = none, 9 = laying flat on ground.
 NS = no statistical difference between varieties.

Proso Millet	No-till Recrop	Hettinger
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Variety	Days to Head	Plant Height	Lodg.	Test Weight	----- Grain Yield -----			Average Yield	
					1996	1997	1999	2 year	3 year
		inches	0-9*	lbs/bu	-----lbs/ac-----				
Siberian**	67	24.0	0	53.9	1019	3040	2660	2850	2240
Manta**	67	26.0	0	54.1	789	2840	2720	2780	2116
Earlybird	66	35.0	4	55.7	919	1493	2260	1876	1557
Minsum	64	33.0	6	55.0	1200	1273	1873	1573	1449
Rise	64	33.0	2	54.8	707	1353	2067	1710	1376
Huntsman	68	36.0	4	56.8	487	1467	2107	1787	1354
Sunup	66	38.0	2	55.6	613	1360	2040	1700	1338
Dawn	64	31.0	4	54.7	1035	1147	1713	1430	1298
Snowbird	62	32.0	4	56.2	734	1400	1753	1576	1296
Sunrise	67	36.0	4	56.2	528	1380	1953	1666	1287
Cerise	61	37.0	2	57.4	693	953	1560	1256	1069
Turghai	60	32.0	1	57.3			1147		
Trial mean	65	33.0	3	55.7	783	1610	2006	--	--
C.V. %	1.5	--	51.1	0.9	20.0	19.1	15.8	--	--
LSD .05	1	--	2	0.7	267	444	455	--	--
LSD .01	2	--	3	0.9	365	598	611	--	--

*Lodging: 0 = no lodging, 9 = lying flat on ground.

**Foxtail millets

Planting Date: May 20, 1999

Harvest Date: September 21, 1999

Seeding rate: 25 lbs/Ac.

Previous crop: 1996 & 97 = Fallow, 1999 = HRSW

Notes: moderate European corn borer damage to proso types during 1997 and 1999.

Mustard - No-till Recrop	Hettinger
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Variety	Days to First Flower	Days to Last Flower	Days to Maturity	Plant Height inches	Lodg. 0 - 9*	Yield			Average Yield	
						1996	1997	1999	2 Year	3 Year
Yellow						----- lbs/ac -----				
AC Pennant	51	75	98	31	1	1767	2258	2240	2249	2088
Tilney	51	76	98	31	2	1880	1885	2178	2032	1981
Viscount	53	77	99	37	1	1773	1911	1974	1942	1886
AC Base	51	76	98	32	1			2251		
Oriental										
AC Vulcan	57	80	100	48	2	1920	1956	2365	2160	2080
Forge	56	81	101	44	2	1800	1538	2276	1907	1871
Trial Mean	53	77	99	37	1	1833	1953	2214	--	--
C.V. %	1.0	0.4	0.9	4.0	40.1	8.0	10.5	10.2	--	--
LSD .05	1	1	1	2	1	NS	353	NS	--	--
LSD .01	1	1	2	3	1	NS	484	NS	--	--

Planting Date: April 13, 1999
 Harvest Date: August 5, 1999
 Seeding Rate: Yellow = 12 lbs/ac, Oriental = 6 lbs/ac.
 Previous crop: 1996 & 1997 = Fallow, 1999 = HRSW
 NS = no statistical difference between varieties.
 *Lodging: 0 = none, 9 = laying flat on ground.

Brand	Variety	Days to First Flower	Days to Last Flower	Days to Mature	Plant Height	Lodg.	Test Wt.	Oil	Yield		
									1998	1999	2 year
					inches	0 - 9*	lbs/bu	%	---- pounds per acre ----		
check	Hyola 401	55	76	105	31	2	53.0	37.7	2063	3285	2674
Croplan	CL2078	59	81	107	39	1	51.2	37.2	1756	3390	2573
Interstate	Hyola 420	57	78	104	36	1	52.0	37.8	1981	2968	2474
Limagrain	LG3333	56	80	106	33	2	52.0	38.7	1538	2995	2266
check	Crusher	62	82	106	41	0	53.0	38.3	1711	2802	2256
Cargill	Roseau	60	80	108	40	1	50.8	39.7	1731	2643	2187
Croplan	Hudson	56	78	104	31	2	52.1	39.1	1545	2810	2178
IntegraSeed	Eagle	57	80	104	35	0	52.8	37.9	1622	2466	2044
Cargill	Cavalier	58	79	104	35	2	53.6	36.9	1490	2582	2036
IntegraSeed	Battleford	58	80	105	36	1	53.6	38.0	1415	2547	1981
Limagrain	LG3369	58	81	106	35	2	52.8	38.8	1822	2134	1978
AgriTel	OAC Summit	60	80	104	36	1	54.0	37.3	1481	2459	1970
AgrEvo	InVigor 2373	60	80	106	40	1	53.6	38.8		3372	
Interstate	Hyola 330	55	76	104	30	2	52.3	38.0		3302	
AgrEvo	PHS 98-639	59	79	104	40	1	53.8	37.3		3091	
AgrEvo	HCN 41	60	80	105	40	0	53.3	38.8		3083	
Croplan	Oscar	59	80	106	32	1	54.4	35.3		3080	
Interstate	Z009	58	79	105	34	3	53.4	38.1		3039	
Interstate	Q2	62	82	107	37	1	54.7	36.3		3012	
Kaystar	K701	60	80	106	40	0	51.3	38.8		2933	
AgrEvo	PHS 98-730	57	78	104	31	4	53.4	36.4		2916	
AgrEvo	PHS 98-601	60	81	107	38	1	52.8	40.4		2845	
AgrEvo	PHS 98-596	59	80	106	39	2	51.8	41.2		2837	
Kaystar	K007	60	80	104	36	1	52.4	40.1		2837	
AgrEvo	PHS 98-685	58	80	104	38	2	53.3	38.0		2837	

Continued

Canola Variety Trial - No-till Recrop continued.

Hettinger

Brand	Variety	Days to First Flower	Days to Last Flower	Days to Mature	Plant Height	Lodg.	Test Wt.	Oil	Yield		
									1998	1999	2 year
					inches	0 - 9*	lbs/bu	%	---- pounds per acre ----		
AgrEvo	InVigor 2363	59	80	106	39	1	53.8	38.2		2819	
check	Ebony	62	82	108	41	0	52.3	38.7		2819	
AgrEvo	Phoenix	58	80	107	33	3	52.6	39.7		2810	
IntegraSeed	Crackerjack	60	81	106	37	1	52.5	37.9		2782	
Parsons	98-112	57	78	104	37	2	52.4	38.9		2573	
check	Reward**	53	75	92	28	6	51.4	40.0		2187	
check	AC Parkland**	52	73	90	29	3	52.2	39.9		2169	
check	AC Boreal**	51	73	90	25	5	51.8	40.4		2073	
Trial Mean		58	79	104	36	2	52.7	38.5	1410	2801	--
C.V. %		1.0	0.6	1.0	5.8	51.2	0.7	2.2	22.2	11.7	--
LSD .05		1	1	2	3	1	0.5	1.2	440	461	--
LSD .01		1	1	2	4	2	0.7	1.6	584	611	--

* Lodging: 0 = none, 9 = laying flat on ground.
 ** Polish type.
 Planting Date: April 13, 1999
 Harvest Date: August 9, 1999
 Seeding Rate: 7.5 lbs/acre, Polish type = 4.5 lbs/acre
 Previous crop: HRSW

1999 Roundup Ready Canola - No-till Recrop

Hettinger

Brand	Variety	Days to First Flower	Days to Last Flower	Days to Maturity	Plant Height inches	Lodg. 0 - 9	Test Wt. lbs/bu	Oil %	Yield lbs/ac
Interstate	Hyola 357	55	77	104	32	1	51.4	37.3	3741
Limagrain	5296	59	80	106	33	3	51.8	37.1	3487
Interstate	SW RiderR	57	80	104	33	2	52.2	37.3	3434
check	45A51	61	81	105	35	1	51.6	37.8	3355
check	3295	60	80	105	35	2	51.9	36.9	3179
Interstate	SW Arrow	58	80	104	35	2	53.0	37.1	3170
Limagrain	3235	55	78	104	29	2	51.5	38.5	3091
Limagrain	3345	57	79	104	32	2	51.6	38.7	2942
check	Quest	57	80	104	32	2	52.4	38.2	2942
Croplan	Minot RR	59	80	104	32	2	52.4	38.4	2854
IntegraSeed	RaideRR	62	81	106	36	2	52.0	37.3	2784
Limagrain	3275	56	79	104	32	1	52.1	38.5	2758
Limagrain	5292	57	79	105	32	3	50.7	37.9	2705
Svalof	B2675	57	80	105	35	2	50.7	37.0	2600
Trial Mean		58	79	105	33.0	2.0	51.8	37.7	3074
C.V. %		0.8	0.7	1.0	7.4	40.7	0.4	1.3	7.4
LSD .05		1	1	2	4	1	0.3	0.7	324
LSD .01		1	1	ns	ns	1	0.4	0.9	433

Planting Date: April 13, 1999

Harvest Date: August 9, 1999

Seeding Rate: 7.5 lbs/acre

Previous crop: HRSW

ns = no statistical difference between varieties.

No-till Dormant Seeded Canola on HRSW Stubble

Hettinger

Treatment	Date of Emerg.	Date of First Flower	Date of Last Flower	Date of Maturity	Plant Stand		Plant Height	Lodg.	Test Weight	1000 Kernel Weight	Oil	Yield
					Initial	Final						
	April	June		July	1000's/Ac		inches	0 - 9**	lbs/bu	grams	%	lbs/ac
Spg.Seeded	30	14	7/3	29	610	585	38	1	51.7	3.60	38.8	3039
Fall Treated*	14	6	7/1	28	243	218	33	2	50.6	3.80	40.0	2643
Fall Untrt.	14	6	6/29	26	300	249	34	1	51.1	3.52	40.3	2630
Trial Mean	19	9	7/1	27	384	351	35	1	51.1	3.64	39.7	2771
C.V. %	0.0	0.1	0.2	0.1	36.2	37.0	9.4	37.2	1.2	6.0	1.0	17.6
LSD .05	1	1	2	1	72	67	NS	NS	NS	NS	0.6	NS
LSD .01	1	2	3	2	104	97	NS	NS	NS	NS	0.9	NS

Dormant Seeded Canola on Black Fallow

Hettinger

Treatment	Date of Emerg.	Date of First Flower	Date of Last Flower	Date of Maturity	Plant Stand		Plant Height	Lodg.	Test Weight	1000 Kernel Weight	Oil	Yield
					Initial	Final						
	April	June			1000's/Ac		inches	0 - 9**	lbs/bu	grams	%	lbs/ac
Spg.Seeded	30	14	7/3	8/2	691	641	39	2	51.3	3.28	38.8	3487
Fall Treated*	18	6	6/30	7/27	305	292	32	2	44.6	3.68	39.5	2134
Fall Untrt.	18	6	6/29	7/27	299	286	33	2	50.8	3.68	39.3	2354
Trial Mean	22	8	6/30	7/29	431	406	34	2	48.9	3.56	39.2	2658
C.V. %	0.0	0.1	0.1	0.2	16.1	19.7	10.8	55.1	14.8	5.9	1.5	13.2
LSD .05	1	1	1	2	113	130	NS	NS	NS	0.34	NS	570
LSD .01	1	2	2	3	165	190	NS	NS	NS	NS	NS	830

Variety = Ebony

Planting Date: December 1, 1998 & April 13, 1999

Harvest Date: August 9, 1999

NS = no statistical difference between treatments.

*Fall Treated Seed with Extender.

**Lodging: 0 = none, 9 = laying flat on ground.

Notes: Severe soil crusting caused poor emergence of Fall treatments. Severe broadleaf weed problems in Fall treatments.

Safflower - No-till recrop

Hettinger

Variety	Days to Flower	Plant Height	Test Weight	Oil	----- Grain Yield -----			Average Yield	
					1997	1998	1999	2 Year	3 Year
		inches	lbs/bu	%	----- pounds per acre -----				
S-518	94	29	33.4	35.2	1674	1860	1271	1566	1602
Montola 2000	94	27	34.8	38.6	1467	1700	1067	1384	1411
Morlin	98	29	33.7	37.4	1600	1433	913	1173	1315
Centennial	98	27	34.8	35.8	1333	1580	787	1184	1233
S-541	96	31	35.8	36.6	947	1667	913	1290	1176
Finch	96	26	28.6	38.0	1233	1367	887	1127	1162
Montola 2001	94	28	33.7	37.6	1207	1387	753	1070	1116
Montola 2003	95	30	34.5	39.0			1260		
Trial Mean	95	28	33.9	38.4	1383	1567	1034	--	--
C.V. %	1.7	8.7	2.0	2.1	16.9	17.8	19.4	--	--
LSD .05	2	NS	1.0	1.1	333	400	287	--	--
LSD .01	3	NS	1.3	1.5	446	NS	385	--	--

Planting Date: April 19, 1999

Harvest Date: September 1, 1999

Seeding rate: 400,000 live seeds/acre.

Previous crop: 1997 = fallow, 1998 = Durum, 1999 = HRSW.

NS = no statistical difference between varieties.

Variety	Days to Flower	Seeds per Pound	Plant Height	Oil	Test Weight	Grain Yield		Returns	2 Year Average
						1998	1999		
			in	%	lbs/bu	----lbs/ac----	\$/ac	lbs/ac	
Centennial	83	15,600	29	35.8	36.4	1,692	955	100.24	1,323
Finch	83	16,147	31	31.4	41.3	1,492	1,251	131.32	1,371
Montola 2000	81	17,501	25	35.1	36.3	1,477	1,066	111.90	1,271
Montola 2001	83	13,092	30	33.3	35.5	1,435	919	96.46	1,177
Montola 2003	82	15,829	28	34.0	38.1	--	1,012	106.25	--
Morlin	84	19,233	26	34.1	36.3	1,479	1,082	113.57	1,280
S-518	84	15,947	30	32.9	34.5	1,990	1,208	126.84	1,599
S-541	83	16,709	30	35.6	36.5	1,793	1,059	111.17	1,426
Trial Mean	82	15,772	28	34.0	37.8	1,610	1,061	111.42	--
C.V. %	1.1	7.7	5.5	1.4	2.2	7.1	14.0	14.0	--
LSD .05	1	1,735	2	0.7	1.2	165	NS	NS	--

Planting Date: May 7

Harvest Date: September 9

Returns were calculated using a market value of \$10.50/cwt

Oil content is @ 8% moisture

* Trial received hail damage.

Table 9. 2000 North Dakota Flax Variety Description.

Variety ¹	Origin	Year Released	Relative Maturity	Seed ² Color	Plant Height	Wilt	Relative Yield
Webster	SD	1998	late	br	tall	MR	v. good
Cathay	ND	1998	mid	br.	med	MR	v. good
Pembina	ND	1998	mid	br.	med	MR	v. good
CDC-Valour	Can.	1996	early	br.	short	MR	v. good
AC-Watson	Can.	1996	early	br.	short	MR	v. good
CDC-Normandy	Can.	1995	mid.	br.	short	MR	v. good
AC-Emerson	Can.	1994	mid.	br.	med.	VR	v. good
McDuff	Can.	1993	late	br.	med. tall	MR	v. good
Linora	Can.	1993	late	br.	tall	R	v. good
Flanders	Can.	1989	late	br.	med.	MS	good
Omega	ND	1989	mid	yel.	med.	MS	v. good
Neche	ND	1988	mid	br.	med.	R	good
Prompt	SD	1988	early	br.	med.	MR	good
Linton	ND	1985	early	br.	med.	R	v. good
Rahab 94	SD	1994	mid	br.	med.	MR	good
NorMan	Can.	1984	mid	br.	med.	MR	good
NorLin	Can.	1982	early	br.	med.	MS	good
McGregor	Can.	1980	late	br.	tall	R	v. good
AC Carnduff	Can.	1998	mid/late	br.	med. tall	MR	v. good
CDC Arras	Can.	1999	mid.	br.	med.	MR	v. good
CDC Bethume	Can.	1999	mid./late	br.	med. tall	MR	v. good

1 All varieties have resistance to prevalent races of rust; all have good oil yield and oil quality.

2 br = brown, yel = yellow.

Variety	Days to Flower	Plant Height	Test Weight	----- Grain Yield -----			Average Yield	
				1997	1998	1999	2 Year	3 Year
		in	lbs/bu	----- bu/ac -----				
Pembina	57	23	54.9	28.8	19.7	35.7	27.70	28.1
Flanders	58	23	55.4	29.5	17.9	35	26.4	27.5
CDC Normandy	56	23	55.4	27.9	19.8	34	26.9	27.2
Rahab 94	56	22	55.3	26.7	20.5	33.5	27	26.9
McGregor	60	23	55.5	27.5	16.8	35.4	26.1	26.6
NorMan	56	23	55.6	27.7	19.0	32.6	25.8	26.4
CDC Valour	54	24	54.7	25.4	19.8	34.0	26.9	26.4
AC Emerson	57	24	55.4	27.6	20.0	31.4	25.7	26.3
Prompt	56	25	55.2	26.5	21.1	30.8	26.0	26.1
Cathay	56	24	54.8	26.8	19.5	30.4	25.0	25.6
AC Watson	54	23	54.2	24.4	17.8	33.3	25.6	25.2
Linton	56	23	55.4	24.8	18.3	32.1	25.2	25.1
McDuff	57	23	55.2	28.1	15.9	31.1	23.5	25.0
Linora	59	25	55.4	26.8	17.6	30.1	23.8	24.8
NorLin	57	24	55.4	25.7	17.0	30.4	23.7	24.4
Omega	61	25	54.7	22.0	19.0	30.4	24.7	23.8
Neche	56	23	55.8	25.7	17.3	27.3	22.3	23.4
CDC Arras	56	23	54.7		22.3	35.8	29.0	
CDC Bethume	58	22	55.0		20.2	36.9	28.6	
CDC Carnduff	55	22	55.6		20.2	34.4	27.3	
Webster	56	25	55.3		18.4	34.7	26.6	
Trial Mean	57	23	55.2	26	18.9	32.9	--	--
C.V. %	0.9	5.8	0.6	16.3	8.4	12.8	--	--
LSD .05	1	NS	0.5	NS	2.6	NS	--	--
LSD .01	1	NS	0.7	NS	3.5	NS	--	--

Planting Date: April 23, 1999

Harvest Date: August 9, 1999

Seeding rate: 32 lbs/Acre

Previous crop: 1997 = fallow, 1998 & 99 = HRSW.

NS = no statistical difference between varieties.

Brand	Hybrid	Type	Test weight	Oil Content	Yield			Avg. Yield	
					1997	1998	1999	2 Year	3 Year
			lbs/bu	%	----- lbs/ac -----				
Agsco	AGS9L01		24.2	40.4			1038		
Agsco	AGS9E01		28.6	38.1			958		
Cargill	SF120		33.6	37.6			1078		
Croplan Gen.	CL803		31.7	41.8	2471	2396	906	1651	1924
Croplan Gen.	CL385	Nusun	29.2	39.6			1967		
Croplan Gen.	CL815		30.5	42.5			1761		
Croplan Gen.	CL380	Nusun	30.0	38.2			1560		
Dekalb	DK3875		30.4	40.6	3337	3704	2088	2896	3043
Dekalb	DK3868		31.9	40.8	2836	3339	1784	2562	2653
Dekalb	DK3790		32.0	39.8	2701	2615	1319	1967	2212
Dekalb	DK3806		32.4	43.9		2718	1365	2042	
Dekalb	DK3872	Nusun	29.8	40.0			1474		
Dekalb	SF9813		31.0	41.0			1353		
Dekalb	SF837		31.6	41.2			1256		
Dekalb	SF9859		29.5	40.0			1141		
Dekalb	SF9825		25.3	34.7			1067		
IntegraSeed	INT550		29.2	41.4			1703		
IntegraSeed	INT547	Nusun	28.2	36.6			1548		
IntegraSeed	INT544	Nusun	28.9	37.3			1273		
IntegraSeed	INT442		30.0	40.1			1147		
IntegraSeed	INT445		29.1	38.4			1078		
IntegraSeed	INT435		30.8	42.0			969		
IntegraSeed	INT437		30.4	40.5			889		
IntegraSeed	INT425A		29.9	38.4			665		
Interstate	IS6039		30.5	39.1		2506	1050	1778	
Interstate	IS6767		30.0	39.4		2299	992	1646	
Interstate	IS6111		31.4	40.8		2025	648	1336	
Kaystar	8300		28.4	42.2		2615	837	1726	
continued									

Brand	Hybrid	Type	Test weight	Oil Content	Yield			Avg. Yield	
					1997	1998	1999	2 Year	3 Year
			lbs/bu	%	lbs/ac				
Kaystar	8550		29.1	40.2			1113		
Pioneer	6300		31.1	42.2	3067	2810	1302	2056	2393
Pioneer	63A81		29.6	42.5	3241	2457	1170	1814	2289
Pioneer	63A70		31.3	42.5			1606		
Pioneer	63M91	Nusun	31.2	41.7			1514		
Pioneer	XF379		28.0	38.3			1508		
Pioneer	63M80	Nusun	31.2	40.6			1399		
Pioneer	64M01	Nusun	30.6	37.6			1101		
Proseed	9103	Nusun	28.5	37.6	2717	2250	1032	1641	2000
Proseed	140		29.2	40.0	2685	2250	986	1618	1974
Proseed	141		28.2	40.2	2773	1691	856	1274	1773
Proseed	9215		33.7	43.4		2737	1462	2100	
Proseed	9612		30.6	35.3			1319		
Proseed	9123	Nusun	25.6	40.0			1084		
Seeds 2000	Wrangler		30.0	39.9	2749	2524	1193	1858	2155
Seeds 2000	Bronco	Nusun	29.9	40.2			1749		
Seeds 2000	Mustang	Nusun	31.5	39.6			975		
Seeds 2000	Maverick	Nusun	29.6	38.4			941		
check	NDSU894		29.4	36.8	2812	2992	1262	2127	2355
check	C270		30.8	38.1	2288	2469	1176	1822	1978
check	P6451		27.6	40.1		2895	1101	1998	
check	Hysun311		30.3	40.3			665		
Trial Mean			29.9	38.3	2646	2399	1233	--	--
C.V. %			7.2	--	11.8	15.0	20.3	--	--
LSD .05			3.0	--	503	500	349	--	--
LSD .01			3.9	--	675	660	461	--	--

Planting date: May 19, 1999

Harvest date: October 25, 1999

Seeding rate: 21,000 seeds/acre, thinned to 18,000 plants/acre.

Row spacing: 28"

Previous crop: 1997 & 98 = Summer fallow, 1999 = HRSW.

Yields are adjusted to 9% moisture. Oil content has been adjusted for Nusun types.

Moderate hail damage on June 26.

Sunflower Date of Seeding

Amidon, ND

Date of Seeding	Final Plant Stand	Test Weight	Yield
		lbs/bu	lbs/acre
April 28 ¹	18937	31.6	1206.6
May 23	29161	28.1	1765.0
June 4	26318	25.7	1507.7
June 14	26741	22.6	989.8
Mean	25289	27.0	1367.3
CV%	8.5	5.6	13.6
LSD 0.05	3455.1	2.4	297.8
LSD 0.10	2799.8	1.9	241.4

¹ April 28 seeding was severely damaged by sunflower moths at flowering

Variety: Mycogen 8242NS
 Harvest: October 10, 1999 for April 28, May 23 and June 4 planting
 October 28, 1999 for June 14 planting
 Cooperator: Miles Hansen
 Participating Agent: Bridget Whitney

Chickpea - Recrop

Dickinson, ND

Variety	Type	Days to Flower	Flower Duration	Seeds per Pound	Plant Height	Test Weight	Grain Yield			2 Year Average
							1998	1999	Returns	
					in	lbs/bu	----lbs/ac----		\$/ac	lbs/ac
Chico	K	39	26	1,977	14	60.5	--	756	83.16	--
Dwellely	K	48	17	942	16	55.9	1,953	683	75.18	1,318
Evans	K	43	22	1,099	17	57.3	--	839	92.25	--
Myles	D	45	19	2,720	14	55.4	2,317	716	78.71	1,517
Sanford	K	49	17	1,161	17	57.9	1,914	937	103.04	1,425
Trial Mean	--	44	21	1,501	15	57.5	2,096	882	96.97	--
C.V. %	--	6.0	13.6	3.9	5.0	1.4	3.7	19.0	19.0	--
LSD .05	--	4	4	89	1	1.2	123	NS	NS	--

Planting Date: May 17

Harvest Date: August 23

Type: K =Kabuli, D =Desi

*Trial received hail damage.

Returns calculated using a market value of \$11.00/cwt

Chickpea - No-till Recrop

Hettinger

Variety	Days to First Flower	Days to Last Flower	250 Kernel wt.	Test Weight	Yield			Average Yield	
					1997	1998	1999	2 year	3 year
			grams	lbs/bu	lbs/ac				
Myles*	60	90	45	57.6	2533	2047	2667	2357	2416
Sanford	65	90	92	62.1	1700	1607	1860	1734	1722
Dwelley	66	90	98	61.0	1387	1427	1533	1480	1449
B90	62	90	54	62.2			2380		
Chico	58	91	59	62.1			2307		
88587	56	90	110	60.4			2067		
CDC Yuma	61	90	80	62.4			1773		
Evans	62	90	89	61.3			1620		
Trial Mean	61	90	78	61.1	1754	1693	2026	--	--
C.V. %	0.9	0.8	3.2	1.3	11.3	9.3	17.9	--	--
LSD .05	1	NS	4	1.1	304	246	531	--	--
LSD .01	1	NS	5	1.5	423	347	720	--	--

*Myles = Desi type, other varieties are kabuli type.

Planting Date: April 19, 1999

Harvest Date: August 26, 1999

Seeding Rate: Desi = 120 lbs live seed/acre, Kabuli = 180 lbs live seed/acre

Previous Crop: HRSW

Chickpea Seeding Date and Rate at Hettinger

Sanford, a *kaboli* type chickpea was seeded at three different rates; 230, 172 and 115 pounds of pure live seed per acre on three different dates; April 19, May 3 and on May 18. The seed was inoculated with *rhizobia* and the trial was planted no-till into spring wheat stubble. Data was collected on days to emergence, plant stand shortly after emergence, plant stand at harvest, date of 10% bloom, date of 90% bloom, date of physiological maturity, 1000 seed weight, test weight and yield. The trial was treated with 2 pints per acre Tough herbicide on June 3 to control broadleaf weeds and with 9 ounces per acre Assure II herbicide on June 10 to control grassy weeds. The trial was harvested on August 26.

Chickpea Seeding Date and Rate										Means
Seeding Date	Seeding Rate	Days to Emerg.	Plant Stand		10% Bloom	90% Bloom	Maturity	1000 Seed Weight	Test Weight	Yield
			Initial	Final						
	lbs/ac		1000's/acre		Days from planting			grams	lbs/bu	lbs/ac
April 19	230	23	224	187	65	90	110	379	62.0	2173
April 19	172	23	249	218	65	90	110	385	61.8	2220
April 19	115	23	212	187	65	90	110	376	62.0	2180
May 3	230	18	143	143	57	80	99	381	61.8	2027
May 3	172	18	149	137	57	80	99	406	61.6	2000
May 3	115	18	162	156	57	80	100	391	61.4	1860
May 18	230	10	199	168	48	69	90	372	60.8	1533
May 18	172	10	224	205	48	69	90	359	60.9	1387
May 18	115	10	168	168	48	69	90	380	60.8	1473
C.V. %		0	31.8	32.4	0	0	0.7	7.1	0.7	11.7
LSD .05		1	NS	NS	1	1	1	NS	0.6	318

Continued on next page.

Seeding Date	Combined Means
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Seeding Date	Days to Emerg.	Plant Stand		10% Bloom	90% Bloom	Maturity	1000 Seed Weight	Test Weight	Yield
		Initial	Final						
		1000's/acre		Days from planting			grams	lbs/bu	lbs/ac
April 19	23	228	197	65	90	110	380	61.9	2191
May 3	18	151	145	57	80	99	393	61.6	1962
May 18	10	197	180	48	69	90	370	60.8	1465
LSD .05	1	50	NS	1	1	1	NS	0.5	227

Seeding Rate	Combined Means
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Seeding Rate	Days to Emerg.	Plant Stand		10% Bloom	90% Bloom	Maturity	1000 Seed Weight	Test Weight	Yield
		Initial	Final						
lbs/ac		1000's/acre		Days from planting			grams	lbs/bu	lbs/ac
230	17	189	166	57	80	100	377	61.5	1911
172	17	207	187	57	80	100	384	61.4	1869
115	17	180	170	57	80	100	382	61.4	1838
LSD .05	NS	NS	NS	NS	NS	NS	NS	NS	NS

Summary

There was no significant difference between seeding rates for any agronomic, quality or yield factors. Weed infestations tended to increase with lower seeding rates and with later seeding dates. The broadleaf herbicide treatment was applied to relatively large weeds and tended to cause only temporarily stunting rather than control. Minor *ascochyta* blight infections were observed throughout the trial and appeared to be more pronounced on the higher seeding rates and first seeding date. Heavy foliage restricted air movement and provided for a humid environment for disease development. Plant stature (height and girth) decreased with later seeding dates and probably contributed to declining yields. As would be expected due to warmer soils, days from planting to seedling emergence was reduced significantly with later seeding dates. The extended germination period of the first seeding date did not however cause a reduction in plant stand. The duration of flowering was 25 days for the April 19 seeding date, 23 days for the May 3 seeding date and 21 days for the May 18 seeding date. These differences were certainly a contributing factor to the significant differences in yield. There were no significant differences between seeding dates for 1000 seed weight. There was little difference between test weights of the first two seeding dates but decreased significantly with the last seeding date.

Field Pea - No-till Recrop

Hettinger

Brand	Variety	Type	Days to First Flower	Days to Last Flower	Days to Matur.	Plant Ht. at Harvest	Test Weight	1000 Kernel Weight	Seeds per Pound	Yield			Average Yield		
										1997	1998	1999	1997	1998	1999
										bu/ac					
							lbs/bu	grams							
check	Profi	yellow	61	72	95	9	61.4	267	1701	39.4	64.4	65.7	65.0	56.5	
check	Highlight	yellow	61	75	95	6	61.9	208	2200	42.2	55.1	70.4	62.8	55.9	
check	Atomic	green	63	72	95	20	62.1	324	1398	32.8	58.9	65.7	62.3	52.5	
check	Grande	yellow	65	75	97	14	61.8	222	2048	46.5	49.0	60.3	54.6	51.9	
check	Majoret	green	64	72	96	15	62.4	236	1944	36.0	60.6	55.1	57.8	50.6	
check	Carneval	yellow	63	74	95	16	61.1	211	2150	39.3	55.4	56.2	55.8	50.3	
Svalof	SW 93605	green	64	73	97	10	62.6	191	2374			66.0			
Cebeco	Toledo	green	61	70	95	18	61.1	282	1609			59.9			
Svalof	SW955180	yellow	64	73	97	17	61.4	206	2205			56.3			
check	Trapper	yellow	64	94	102	10	63.4	116	3934			32.2			
Trial Mean			63	75	96	14	61.9	226		38.0	58.1	58.8	--	--	
C.V. %			0.6	0.9	0.6	30.2	0.6	5.7		12.9	9.0	10.1	--	--	
LSD .05			1	1	1	6	0.5	19		8.4	7.6	8.6	--	--	
LSD .01			1	1	1	8	0.7	25		11.5	10.2	11.6	--	--	

Planting Date: April 19, 1999

Harvest Date: August 10, 1999

Seeding Rate: 250,000 live seeds/acre

Previous Crop: 1997 = fallow, 1998 & 99 = HRSW

Treatment	Seeds per Pound	Test Weight	Grain Yield
		lbs/bu	bu/ac
10# 11-52-0	2,347	62.3	21.7
Liquid	2,245	61.7	24.6
Granular	2,263	61.5	22.2
Peat	2,351	61.8	24.5
No Inoculant	2,279	62.3	22.3
Trial Mean	2,297	61.9	23.1
C.V. %	4.1	0.9	11.0
LSD .05	NS	NS	NS

Planting Date: May 26
Harvest Date: August 31



Lentil - No-till Recrop					Hettinger				
Variety	Days to First Flower	Days to Last Flower	1000 Kernel wt.	Test Weight	Yield			Average Yield	
					1997	1998	1999	2 year	3 year
			grams	lbs/bu	lbs/ac				
CDC Richlea	62	94	44.5	59.0	1341	2353	1160	1756	1618
Crimson	62	92	32	62.6	955	2560	1113	1836	1543
Brewer	56	94	49.7	56.7	1058	2393	1133	1763	1528
Laird	64	93	52.7	52.8	693	1880	673	1276	1082
Mason	56	92	55	57.2		2667	1000	1834	
CDC Vantage	61	93	32.7	59.0			1248		
CDC Milestone	62	92	31.5	60.7			1220		
CDC Glamis	65	92	48.3	53.6			587		
Trial Mean	61	93	43.3	57.8	1048	2375	1017	--	--
C.V. %	1.2	1.0	6.5	1.4	21.6	7.7	20.9	--	--
LSD .05	1	1	4.1	1.2	332	269	311	--	--
LSD .01	1	NS	5.6	1.7	450	366	422	--	--

Planting Date: April 19, 1999

Harvest Date: August 26, 1999

Seeding Rate: 550,000 live seed/acre.

Previous Crop: 1997 = fallow, 1998 & 99 = HRSW.

Lentil - Recrop							Dickinson, ND					
Variety	Type	Days to Flower	Flower Duration	Seeds per Pound	Plant Height	Test Weight	Grain Yield			Average Yield		
							1997	1998	1999	Returns	2 Year	3 Year
					in	lbs/bu	lbs/ac			\$/ac	lbs/ac	
Brewer	C	38	23	10,053	9.6	59.1	1232	1726	935	107.55	1331	1298
CDC Milestone	C	45	18	15,752	9.7	62.5	--	--	1015	116.68	--	--
CDC Richlea	C	49	17	9,898	9.7	61.6	1197	1809	851	97.86	1330	1286
CDC Vantage	C	48	16	10,597	9.7	62.3	--	--	958	110.14	--	--
Crimson	R	49	15	15,956	9.7	63.3	1187	1629	877	100.81	1253	1231
Mason	C	43	18	9,262	9.7	59.8	--	1729	913	104.98	1321	--
Trial Mean	--	45	18	11,920	9.7	61.4	1246	1688	925	106.38	--	--
C.V. %	--	1.2	6.7	6.8	1.4	1.7	14.0	7.4	12.4	12.4	--	--
LSD .05	--	1	2	1,212	NS	1.6	250	NS	NS	NS	--	--

Planting Date: May 17

Harvest Date: August 10

Type: C=Chilean, R=Red

Returns calculated using a market value of 11.50/cwt

Pinto Beans - No-till Recrop				Hettinger	
Variety	Yield			Average Yield	
	1996	1997	1999	2 Year	3 Year
	----- lbs/ac -----				
Hatton	947	1389	800	1094	1045
Chase	676	1471	875	1173	1007
Othello	809	1266	910	1088	995
Frontier			829		
Burke			735		
UI 320			724		
Maverick			712		
Kodiak			502		
Trial Mean	905	1335	761	--	--
C.V. %	12.0	10.1	16.5	--	--
LSD .05	184	200	184	--	--
LSD .01	255	275	250	--	--

Misc. Dry Edible Beans - No-till Recrop				Hettinger		
Variety	Type*	Yield			Average Yield	
		1996	1997	1999	2 Year	3 Year
		----- lbs/ac -----				
Norstar	N	671	1278	945	1112	965
Mayflower	N	322	817	916	866	685
Matterhorn	GN			957		
UI 911	Bk			899		
T 39	Bk			765		
Trial Mean		584	976	896	--	--
C.V. %		17.0	17.8	21.6	--	--
LSD .05		203	291	NS	--	--
LSD .01		319	413	NS	--	--

*Type: N = navy, GN = great northern, Bk = black

Planting Date: May 20, 1999

Harvest Date: September 22, 1999

Previous crop: 1996 & 1997 = Fallow, 1999 = HRSW

NS = no statistical difference between varieties.

Hybrid Corn	Hettinger
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Brand	Hybrid	Relative matur.	Harvest moist.	Silage		Test weight	Grain Yield	
				1998	1999		1998	1999
		days	%	-----Tons/ac*-----		lbs/bu	-----bu/ac**-----	
Dekalb	DK440	94	57	2.83	6.59	47.5	57.8	69.4
Dekalb	DK405	90	64		5.72	49.7		76.9
Dekalb	DK427	92	67		5.98	49.4		75.9
Dekalb	DK389BtY	88	68		4.98	52.0		62.4
G.Harvest	H6726	92	59		5.93	50.1		58.9
G.Harvest	H2263	90	64		4.64	50.3		54.6
IS/Payco	4X85	85	61	3.12	4.89	52.8	40.5	57.8
IS/Payco	X417	91	69		4.64	50.8		62.2
IS/Payco	4X309	85	60		5.60	53.4		55.5
Kaystar	KX405	90	66		5.28	49.0		65.1
Kaystar	KX288	82	62		5.16	49.2		60.0
Proseed	185	85	71	5.69	4.11	47.9	38.3	49.6
Proseed	4828	82	63		4.64	55.9		46.5
Trial Mean				2.69	5.24	50.6	37.9	61.1
C.V. %				13.0	13.8	1.7	28.4	12.7
LSD .05				0.58	1.22	1.4	17.8	13.0
LSD .01				0.77	1.65	1.9	NS	17.6

Planting date: May 18, 1999

Seeding rate: 21,000 seeds/acre, thinned to 18,000 plants/acre.

Row spacing: 28"

Previous crop: 1998 = fallow, 1999 = Canola.

*Silage yields are adjusted to 0% moisture.

**Grain yields are adjusted to 13.5% moisture.

NS = no statistical difference between hybrids.

Harvest date: Silage - September 15, 1999

Grain - October 14, 1999

Notes: Corn sustained a killing frost prior to full grain maturity (black layer).

1999 Hybrid Corn - Recrop

Dickinson, ND

Brand	Hybrid	RM	Harvest Moisture	Silage Yield			
				70% Moisture	DM Basis		
					1998	1999	2 yr avg
			days	%	Tons/ac		
Dekalb	DK-387 RR	88	78	8.4	--	2.5	--
Dekalb	DK-389 BTY	88	79	8.3	--	2.5	--
Dekalb	DK-405	90	78	8.4	4.3	2.5	3.4
Dekalb	DK-427	92	80	8.7	--	2.6	--
IS/PayCo	3x417	91	79	8.0	--	2.4	--
IS/PayCo	4x85	85	80	7.4	4.0	2.2	3.1
IS/PayCo	4x309	85	78	8.8	--	2.6	--
Kaystar	KX-288	82	79	7.2	--	2.2	--
Kaystar	KX-405	90	79	7.4	--	2.2	--
Trial Mean			79	8.1	4.1	2.4	--
C.V. %			2.8	16.3	12.7	16.3	--
LSD .05			NS	NS	0.7	NS	--

RM = relative maturity

Planting date = May 20

Harvest date = September 13

NS = no statistical difference

Experiment was damaged by hail. As a result, plants were harvested for silage earlier than recommended. Grain was harvested but was < 100lb/ac so is not reported.

Hettinger Corn Production Trial

Row Spacing	Combined Means
--------------------	-----------------------

Row Spacing	Ear Height	Test Weight	---- Grain Yield ----		
			1998	1999	Avg.
Inches	cm	lbs/bu	bushels per acre		
14	76	56.9	31.8	63.7	47.8
28	76	56.8	44.7	64.7	54.7
42	81	56.0	53.5	64.5	59.0
LSD .05	NS	NS	15.2	NS	--

Plant Populations	Combined Means
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Plant Pop.	Ear Height	Test Weight	---- Grain Yield ----		
			1998	1999	Avg.
plants/A	cm	lbs/bu	bushels per acre		
12,000	75	56.3	42.9	58.0	50.4
18,000	77	57.0	34.5	58.7	46.6
24,000	79	56.3	49.5	67.8	58.6
30,000	79	56.6	46.5	72.8	59.6
LSD .05	3	NS	8.9	7.5	--

Hybrids	Combined Means
----------------	-----------------------

Hybrid	Ear Height	Test Weight	---- Grain Yield ----		
			1998	1999	Avg.
*	cm	lbs/bu	bushels per acre		
P3963	72	59.0	42.9	62.8	52.8
P3921	80	57.8	43.2	67.6	55.4
P3861	81	52.9	44.0	62.6	53.3
LSD .05	2	0.4	NS	NS	--

Row Spacing X Plant Population	Combined Means
---------------------------------------	-----------------------

Row Spacing	Plant Pop.	Ear Height	Test Weight	---- Grain Yield ----		
				1998	1999	Avg.
Inches	plants/A	cm	lbs/bu	bushels per acre		
14	12,000	70	56.4	25.6	62.5	44.0
	18,000	78	57.4	16.8	53.8	35.3
	24,000	78	56.8	41.4	61.1	51.2
	30,000	80	56.9	43.5	77.5	60.5
28	12,000	76	56.9	45.7	55.8	50.8
	18,000	76	57.0	38.9	64.5	51.7
	24,000	77	56.3	46.8	69.6	58.2
	30,000	76	56.9	47.4	69.0	58.2
42	12,000	81	55.4	57.2	55.7	56.4
	18,000	78	56.6	47.9	57.7	52.8
	24,000	82	56.0	60.2	72.7	66.4
	30,000	82	55.9	48.6	71.9	60.2
LSD .05		5	NS	19.8	NS	--

Planting Date: May 3 Harvest Date: October 14
 Yields are adjusted to 13.5% moisture.
 NS = no statistical difference.

*Hybrid RM
 P3963 = 79
 P3921 = 86
 P3861 = 93

Seed provided by Pioneer Hi-Bred International, Inc.

1999 Cool Season Forage Trial - Recrop

Dickinson, ND

Variety	Cereal	Legume	Harvest	----- DM Basis -----				
	----- Height -----		Moisture	Yield	CP	ADF	NDF	RFV
	----- inches -----		%	Tons/ac	----- % -----			
Conlon barley	27	--	64	1.7	9.1	35	57	101
Foster barley	27	--	67	1.6	9.5	34	55	106
Haybet barley	29	--	63	1.9	8.2	35	58	99
Haybet/Arvika	30	35	70	2.2	13.5	36	53	108
Horsford barley	30	--	66	1.5	8.4	35	56	102
Logan barley	25	--	62	1.6	8.6	33	55	106
Robust barley	30	--	66	1.7	8.9	36	58	98
Robust/Arvika	30	37	71	2.1	13.1	32	47	128
Robust/Trapper	29	34	76	1.9	16.5	34	47	125
Stark barley	28	--	62	1.6	12.6	34	55	105
Stander barley	26	--	69	1.5	10.1	31	55	109
Westford barley	32	--	77	2.0	10.6	41	62	85
Celsia oat	33	--	63	2.3	7.1	41	62	86
Paul oat	35	--	64	2.0	7.5	39	59	92
Paul/Arvika	34	31	68	2.4	12.6	39	50	110
Paul/Trapper	35	32	72	2.3	14.3	35	50	115
Mammoth oat	41	--	62	2.4	6.8	38	61	91
Whitestone oat	29	--	63	2.4	6.4	40	63	86
Whitestone/Arvika	29	32	66	2.2	11.6	37	53	106
Whitestone/Trapper	28	30	68	2.6	12.1	37	53	106
Triple Crown oat	32	--	63	2.5	6.4	39	62	88
2700 triticale	42	--	56	2.4	4.9	43	65	80
2700/Arvika	43	34	64	2.4	10.0	36	55	103
Sandro triticale	34	--	59	2.0	6.9	39	59	92
Gazelle Spring rye	41	--	71	1.5	9.6	43	67	76
Trial Mean	32	31	68	2.0	10.5	36	55	104
C.V. %	5.8	18.2	3.3	13.5	17.6	8.7	5.2	11.1
LSD .05	3	8	3	0.4	3.0	5	5	19

1999 Cool Season Forage Trial - Recrop-continued

Variety	Height inches	Harvest Moisture %	Yield 1999 Tons/ac	----- DM Basis -----			
				CP	ADF	NDF	RFV
Arvika pea	28	79	2.0	15.7	37	46	123
Assas pea	35	80	1.8	--	--	--	--
Grande pea	36	79	2.3	--	--	--	--
Trapper pea	41	74	2.5	16.5	37	45	125
Victoria pea	28	79	1.9	--	--	--	--
Voyageur pea	26	81	1.7	--	--	--	--
SW 93605 pea	28	61	2.4	--	--	--	--
SW 955180 pea	31	57	2.4	--	--	--	--
AC Greenfix	18	71	1.6	14.7	33	43	139
Indianhead lentil	15	69	1.5	13.2	30	41	152
Trial Mean	31	68	2.0	10.5	36	55	104
C.V. %	18.2	3.3	13.5	17.6	8.7	5.2	11.1
LSD .05	8	3	0.4	3.0	5	5	19

Planting date: April 30

Harvest date: Gazelle Spring rye July 1,

Stander, Foster, Haybet, Conlon, Stark, Robust, Horsford, and Logan barley July 13
barley/pea mixes July 13

Voyageur, Assas, Arvika, Victoria, Grande peas and Westford barley July 15

oats, triticale, oat/pea, triticale/pea, and Trapper July 21

SW 93605 and SW 955180 July 23

Indianhead lentil and AC Greenfix July 26

CP = crude protein, ADF = acid detergent fiber, NDF = neutral detergent fiber

RFV = relative feed value

RFV calculated using formula : $RFV = ((88.9 - (0.77 * ADF)) * (120 / NDF)) / 1.29$

NS = no statistical difference

1999 Warm Season Annual Forages - Recrop

Dickinson, ND

Crop	Variety	Ht	Harvest Moisture	Hay Yield			
				12% Moisture	DM Basis		
					1997	1999	2 yr avg
in	%	Tons/ac	Tons/ac				
oat	Paul	32	63	1.7	1.6	1.5	1.6
millet	German	22	77	1.3	1.2	1.2	1.2
millet	Red Proso- Cerise	28	72	1.3	1.6	1.1	1.4
millet	Siberian	24	72	1.6	1.3	1.4	1.4
corn	Cargill 1877	--	81	2.8	--	2.5	--
open pollinated	Krugs	--	83	2.8	--	2.5	--
sorghum/sudan	Highland Sweet	28	68	1.0	--	0.9	--
forage sorghum	Mor-Cane II	27	76	2.2	--	1.9	--
sudangrass	Piper sudangrass	35	64	1.1	--	1.0	--
soybean	--	15	76	0.6	--	0.5	--
sudan/soy	Piper/soybean	34/	71	0.8	--	0.7	--
grasspea	AC Greenfix	15	68	1.5	--	1.3	--
Trial Mean		26	72	1.6	--	1.4	--
C.V. %		12.	4.9	26.9	--	26.9	--
LSD .05		5	5	NS	--	NS	--

Planting date = May 24

Harvest date = Grasspea and Paul oat Aug 4, German, Red proso, and Siberian millet Aug 9
 Mor-Cane II, Piper/soybean, Highland Sweet, Piper sudan, soybean, Krugs O.P. and
 Cargill 1877 Aug 20

NS = no statistical difference

Experiment was damaged by hail.

1999 Alfalfa Plant Density Trial

Dickinson, ND

Seeding rate/ac	Harvest		Hay Yield						
	Moisture		12% Moisture		DM Basis				
	-----%-----		-----Tons/ac-----		-----1999-----		1998	2 yr avg	
	1st	2nd	1st	2nd	1st	2nd	Total	Total	
Hand 1 plant/sqft	79	71	1.4	1.0	1.2	0.8	2.0	1.7	1.9
Hand 2 plant/sqft	81	70	1.7	1.0	1.5	0.9	2.4	2.3	2.4
Hand 3 plant/sqft	80	70	2.0	1.2	1.7	1.0	2.7	2.3	2.5
Hand 4 plant/sqft	80	71	1.6	1.1	1.4	1.0	2.4	2.3	2.4
1 lbs PLS/ac	78	72	1.6	0.7	1.4	0.6	2.0	2.1	2.1
2 lbs PLS/ac	80	70	1.8	1.1	1.6	0.9	2.5	2.1	2.3
4 lbs PLS/ac	80	69	2.0	0.8	1.8	0.7	2.5	1.4	2.0
8 lbs PLS/ac	80	69	2.0	1.1	1.8	1.0	2.8	2.6	2.7
16 lbs PLS/ac	80	70	2.1	0.8	1.8	0.7	2.5	2.6	2.6
32 lbs PLS/ac	78	68	1.9	0.9	1.7	0.8	2.5	2.7	2.6
Trial Mean	80	70	1.8	1.0	1.6	0.8	2.4	2.2	2.3
C.V. %	1.7	1.7	14.5	33.1	14.5	33.1	--	--	--
LSD .05	NS	2	0.4	NS	0.3	NS	--	--	--

1st cut = June 4, corresponds to late bud
 2nd cut = July 8, corresponds to 5-15% bloom
 PLS = Pure Live Seed
 NS = no statistical difference

VARITAL TOLERANCE TO FAR-GO HERBICIDE AT HETTINGER

Stand reduction: + = susceptible, ? = questionable, 0 = tolerant

Variety	6/9/99	5/26/98	6/18/97	6/20/96	6/9/95
AC Barrie	0	?	0	+	+
Butte 86	0	0	0	0	0
Kulm	0	0	0	+	+
2371	0	0	0	0	0
2375	0	0	0	0	0
2398	0	0	0	0	0
Grandin	0	0	0	0	0
Argent HWSW	0	0	0	0	0
Amidon	0	+	+	+	+
Keene	0	+	0	+	0
Trenton	0	0	0	0	0
Ernest	0	?	0	+	0
Hammer	0	+	0	+	+
Lars	0	0	0	0	0
Sharp	0	0	0	0	0
Russ	0	?	0	0	0
Oxen	0	0	0	0	0
Verde	0	0	0	0	0
Nora	0	0	0	0	0
Forge	0	0	0	+	
Gunner	0	0	0	+	
Reeder	0	0	0	0	
Parshall	0	0	0	0	
AC Cadillac	0	0	0		
Sharpshooter	0	0	0		
HJ98	0	0	0		
Hager	0	+	0		
Ingot	0	0			
Ivan	0	+			
Ember	0	0			
Norpro	0				
McVey	0				
Scholar	0				
Majestic	0				
Dandy	0				
McKenzie	0				
Mercury	0				
Aurora	0				
AC Eatonia		0	0	0	+
McNeal		0	0	0	0
AC Elsa		0	0		
Splendor		0	0		
BacUp		0	0		
AC Crystal		+			
Gus				+	0
Glupro				0	+
Norlander				0	0
AC Cora				0	+

Planting date: 4/13/99, 4/8/98, 4/29/97, 4/18/96, 4/7/95

Date of Application: 4/12/99, 4/3/98, 4/3/97, 4/19/96, 4/24/95

Rate of Application: 1997-99 = 3 pts/A, 1995/6 = 2 pts/A

HRSW VARIETY TOLERANCE TO AVENGE HERBICIDE AT HETTINGER

Injury: + = susceptible, 1 = moderate tolerance, 0 = tolerant

HRSW	1993	1994	1995	1996	1997	1998	1999
Keene	0	1	0	1	1	1	0
Sharp	0	1	1	1	0	1	0
Butte 86	0	1	+	1	1	1	1
Grandin	+	+	+	+	+	1	1
2371	0	1	1	+	0	1	0
2375	0	1	1	1	0	1	0
2398	0	1	1	+	0	0	0
Kulm	0	1	1	1	0	+	+
Amidon	0	+	0	1	1	0	1
Ernest	0	1	0	1	0	0	0
Trenton	+	+	+	+	+	+	1
Hamer		1	0	1	0	1	0
Lars		1	1	1	0	1	0
Verde		+	+	+	+	+	+
Russ		+	1	1	1	1	0
AC Barrie			0	1	0	1	0
Oxen			0	1	0	1	0
Argent HWSW			+	+	+	1	0
Gunner				+	+	+	+
Forge				1	1	1	0
Nora				+	+	+	+
Reeder				+	+	+	1
Parshall				+	+	+	0
AC Cadillac					0	1	0
Sharpshooter					0	1	0
HJ98					0	0	0
Hager					0	1	0
Ingot						1	0
Ivan						0	0
Ember						1	0
McVey							0
Scholar							0
Norpro							0
Majestic							0
Dandy							0
McKenzie							0
Mercury							0
Aurora							0
McNeal	0	+	1	1	1	0	
AC Eatonia		+	0	1	0	1	
AC Elsa					0	1	
Splendor					0	1	
BacUP					0	1	
AC Crystal						1	
Norlander		1	1	1	0		
Gus	0	1	+	+			
Glupro			1	1			
AC Cora			1	1			
Len	+	+	+				

Date of Application: 5/13/93, 5/20/94, 5/29/95, 6/11/96,
6/2/97, 5/25/98, 5/20/99

Rate of Application: 4 pts/A, (1999=3.5 pts/A)

Control of Leafy Spurge with Plateau Herbicide at Hettinger, N. Dakota

This experiment was conducted on leafy spurge infested rangeland. Grass species present was a combination of Kentucky bluegrass, smooth brome and western wheatgrass. Soil at the test location was a fine sandy loam with a pH of 7.3 and an organic matter content of 3.8%. Fall applied Plateau herbicide treatments were applied on September 29, 1997 to leafy spurge that had sustained a 24 degree frost 9 days prior to application. Leafy spurge stems were green but leafless. Conditions at application were 64 degree air temperature, wind at 2 MPH from the NW, sky was clear, soil surface was dry and subsoil was moderately moist. A late spring application was applied to leafy spurge which was in bloom on May 19, 1998 with 73 degree air temperature, wind at 3 MPH from the NW, sky was sunny and clear, soil surface was dry and subsoil had good moisture. Treatments were applied with a pickup mounted sprayer delivering 10 GPA at 40 psi through 8004 flat fan nozzles to a plot size of 30 feet wide by 30 feet long. The experiment was a randomized complete block design with three replications. Evaluations were on May 26, 1998 for leafy spurge control and grass height, on October 1, 1998 for leafy spurge control and stems per meter square and on May 28, 1999 for stems per meter square.

Treatment	Application	Rate	May 26, 1998		Oct. 1, 1998		May 28, 1999	
			control	grass	control	stems	control*	stems
		oz/A Product	%	inches	%		%	
1. Untreated			0	9.3	0	50+	0	78
2. Plateau + Sun-it II + 28-0-0	Fall 97	16 + 32 + 32	99	3.7	93	1	77	18
3. Plateau + Sun-it II + 28-0-0	Fall 97	24 + 32 + 32	99	1.3	93	1	83	13
4. Plateau + Sun-it II + 28-0-0	Fall 97	16 + 32 + 32	98	3.0	99	0	83	13
Plateau + Destiny + 28-0-0	Spg 98	8 + 32 + 32						
5. Plateau + Destiny + 28-0-0	Spg 98	24 + 32 + 32	—	—	88	14	87	10
C.V. %			1.5	40	8.7	78		98
LSD 5%			2	3.4	13	17		50

*Percent control based on stem counts.

Summary: Percent leafy spurge control was based off of visual estimations on the first two evaluations and based off of actual stem counts on the final evaluation. Leafy spurge control was almost 100 percent 8 months after application and was greater than 90 percent 12 months after application for all Fall applied treatments (trts 2,3 & 4). Leafy spurge control declined to below 85 percent on these treatments 20 months after application although the stem counts were still significantly lower than the untreated check. There was no difference between the Fall/Spring split application (trt 4) and the Fall applied higher rate of Plateau (trt 3) for leafy spurge control at 20 months after application, and only slightly (but not significantly) higher control than the Fall applied lower rate of Plateau (trt 1). The Spring applied Plateau treatment (trt 5) had lower leafy spurge control at 12 months after application (87%) than all of the Fall applied Plateau treatments at 12 months after application (>90%). Grass species were severely, but temporarily, stunted at 8 months after application with the smooth brome exhibiting the greatest amount of injury. All grass species recovered completely by the end of this study.

1999 Broadleaf Weed Control in Wheat at Hettinger. Butte 86 hard red spring wheat was seeded on May 12. Treatments were applied to 4 leaf wheat and to 1/2 to 3" kochia, 1 to 2" Russian thistle, 1 to 1 1/2" wild buckwheat and to 2 to 10" field bindweed on June 4 with 80F, 27% RH, clear sky and 4 mph wind. Treatments were applied with a tractor mounted CO₂ propelled plot sprayer delivering 17 gpa at 40 psi through 8001 flat fan nozzles to a 5 foot wide area the length of 10 by 28 ft plots. The experiment was a randomized complete block design with four replications. Kochia, Russian thistle, wild buckwheat and field bindweed populations were 18, 0.75, 0.5 and 3.25 plants/ft², respectively. Evaluations were on June 22 for crop injury and weed control and on July 6 and August 10 for weed control. A hail storm on June 26 caused moderate to severe crop injury. The trial was not harvested due to a poor crop stand at maturity.

Summary

Minor crop injury was observed on the higher rates of Starane (trts 6 & 7) and on the Starane + Quad 7 treatment. Broadleaf weed control tended to increase with increasing rates of Starane. The addition of Activator 90 to Starane did not enhance weed control. The addition of either Quad 7 or 2,4-D ester to Starane tended to enhance weed control. The 8 oz rate of Starane provided very good season long kochia control. Aim treatments (trts 9, 10 & 11) provided very good season long control of Russian thistle and kochia, and did a good job at holding back field bindweed until late in the growing season. The addition of 28%N (trt 9) to Aim + Activator 90 did not significantly enhance weed control. The adjuvants Activator 90 and Quad 7 performed equally well when used with Aim treatments (trts 10 & 11). The Clarity + MCPA treatment (trt 12) had excellent season long control of field bindweed and excellent kochia and Russian thistle control through the first two evaluations. The Harmony Extra + 2,4-D + Clarity treatment (trt 13) had the highest season long control ratings for field bindweed, kochia and Russian thistle. The Bronate treatment (trt 14) had excellent season long kochia and Russian thistle control and excellent field bindweed control through the first two evaluations. Higher weed control ratings would have been expected with a normal crop stand.

1999 Broadleaf Weed Control in Wheat at Hettfingher.

Treatment	Product rate oz/A	June 22			July 6			August 10						
		Wht	Fibw	Ruth	KOCZ	Wibw	Fibw	Ruth	KOCZ	Wibw	Fibw	Ruth	KOCZ	Wibw
1. Starane	1.3	0	50	1	10	5	50	36	81	2	45	28	33	25
2. Starane	2.7	0	17	4	63	8	12	12	83	37	0	25	58	37
3. Starane+Act90	2.7+0.25%	0	25	20	48	1	33	0	88	37	25	22	71	44
4. Starane+Quad7	2.7+1%	5	26	34	87	36	12	45	91	50	0	34	58	75
5. Starane	5.3	0	11	0	92	28	20	35	93	38	39	35	77	36
6. Starane	8	1	21	50	91	36	45	48	90	38	12	6	88	90
7. Starane	10.7	2	48	48	91	40	65	50	98	72	65	30	77	55
8. Starane+2,4-D ester	8+12	0	90	94	94	62	92	92	94	91	55	90	89	35
9. Aim+2,4-D amine+Act90+28N	0.33+8+0.25%+4%	0	98	99	92	80	69	98	90	78	72	98	80	44
10. Aim+2,4-D amine+Act90	0.33+8+0.25%	0	94	96	88	62	94	91	90	69	55	88	88	42
11. Aim+2,4-D amine+Quad7	0.33+8+1%	0	92	97	92	81	94	98	88	32	77	77	90	20
12. Clarity+MCPA	3+8	0	94	92	92	66	94	92	89	86	88	58	71	60
13. Harm.Ext.+2,4-D ester+Clarity	0.3+8+2	0	99	99	97	80	99	99	94	82	95	99	90	80
14. Bronate	32	0	99	99	83	80	92	99	90	55	66	95	93	64
15. Untreated	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C.V. %		500	43	30	18	47	56	46	9	56	83	61	38	75
LSD 5%		ns	31	23	19	31	39	39	11	41	46	46	39	ns
# of reps		4	4	4	4	4	4	4	4	4	4	4	4	4

1999 Wild Oat and Downey Brome Control in Wheat at Hettinger. Butte 86 hard red spring wheat was seeded on May 12. Treatments were applied to 4 leaf wheat and to 3 to 5 leaf wild oats on June 4 with 79F, 27% RH, clear sky and 4 mph wind. A second split application was applied to 5 leaf wheat and to 4 to 6 leaf wild oats on June 10 with 51F, 80% RH, partly sunny sky and 3 mph wind. Treatments were applied with a tractor mounted CO₂ propelled plot sprayer delivering 17 gpa at 40 psi through 8001 flat fan nozzles to a 5 foot wide area the length of 10 by 28 ft plots. The experiment was a randomized complete block design with four replications. Wild oat populations were 6 plants/ft². Evaluations were on June 22 for crop injury and weed control and on July 6 and August 8 for weed control. A hail storm on June 26 caused moderate to severe crop injury. The trial was not harvested due to a poor crop stand at maturity.

Treatment	Rate	June 22		July 6		August 8	
		Wioa	Dobr	Wioa	Dobr	Wioa	Dobr
		----- % -----					
1. Hoelon+Buctril+PO	42+16+15	87	0	93	18	88	5
2. Avenge+PO/ Avenge+Buctril+PO	32+15 32+16+15	91	0	87	1	68	0
3. Assert+Harm.Ext.+Act90	16+0.3+0.25%	99	0	99	23	94	0
4. Assert+Act90/ Assert+Harm.Ext.+Act90	8+0.25% 8+0.3+0.25%	99	6	99	8	91	0
5. Avenge+Harm.Ext.(day 6)	48+0.3	92	8	99	10	66	32
6. Avenge/ Avenge+Harmony Extra	24 24+0.3	94	22	85	38	55	15
7. Achieve+SC+Bronate	7+0.5%+32	98	20	97	5	86	0
8. Achieve+SC/ Achieve+SC+Bronate	3+0.5% 3+0.5%+32	81	6	90	2	80	0
9. Discover+Bronate+Score	3.2+32+0.8%	99	0	99	5	92	0
10. Discover+Score/ Discover+Bronate+Score	1.2+0.8% 1.2+32+0.8%	99	0	99	0	95	8
11. Puma+Harmony Extra	15+0.3	99	1	99	5	96	5
12. Puma/ Puma+Harmony Extra	5 5+0.3	99	0	99	6	92	2
13. Bayer1+2,4-D ester+Act90	0.25+8+0.25%	98	63	99	52	94	50
14. Bayer1+2,4-D ester+Act90	0.42+8+0.25%	99	68	99	77	97	99
15. Bayer1+Act90/ Bayer1+2,4-D ester+Act90	0.12+0.25% 0.12+8+0.25%	99	64	99	91	98	97
16. Bayer1+2,4-D ester+ND72	0.25+8+1%	99	87	99	70	96	72
17. Tiller	27	98	12	96	29	94	25
18. Cheyenne+Harmony Extra	22+0.3	97	6	92	2	92	0
19. Untreated	0	0	0	0	0	0	0
C.V. %		8.3	131	8.5	105	19	115
LSD 5%		11	33	12	35	22	35
# of reps		4	4	4	4	4	4

Summary

Crop injury was not observed (data not shown). Season long wild oat control was good on all treatments except for the Avenge split applications (trts 2 and 6), the late application of Avenge (trt 5) and the split application of Achieve (trt 8) which tended to diminish through the growing season. Split applications did not enhance wild oat control over the single application of the same product. The Bayer1 treatments (trts 13-16) were the only treatments that provided significantly higher season long control of downy brome from the untreated check. The higher rate of Bayer1 (trt 14) and the Bayer1 split application (trt 15) provided greater than 90% season long downy brome control.

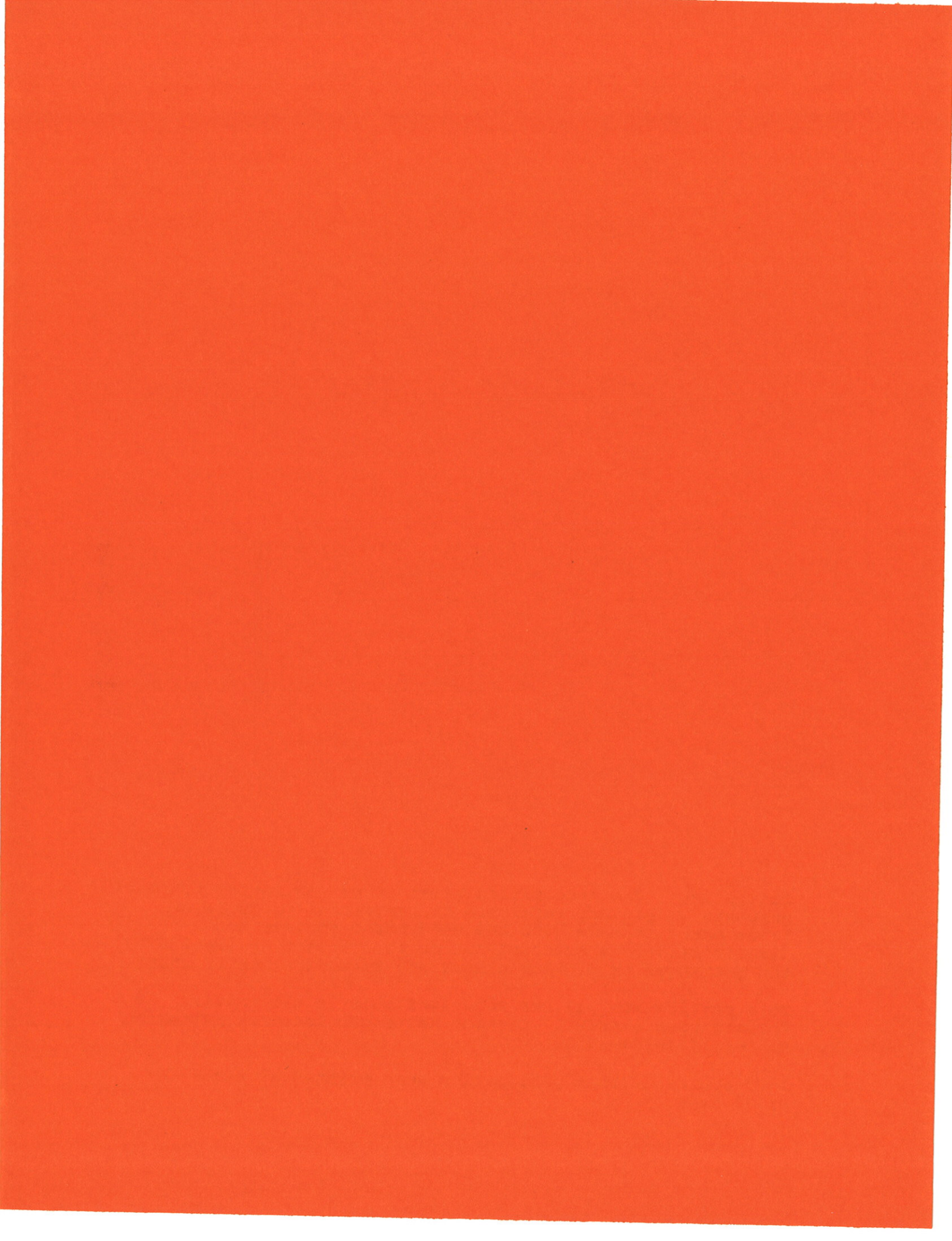
1999 Wild Oat Control with Discover Herbicide in Wheat at Hettinger, North Dakota.

Butte 86 hard red spring wheat was seeded on May 12. Treatments were applied to 4 leaf wheat and to 3 to 5 leaf wild oats on June 4 with 79F, 28% RH, clear sky and 6 mph wind. Treatments were applied with a tractor mounted CO₂ propelled plot sprayer delivering 10 gpa at 40 psi through 8001 flat fan nozzles to a 5 foot wide area the length of 10 by 28 ft plots. The experiment was a randomized complete block design with four replications. Wild oat population was 6 plants/ft². Evaluations were on June 22, July 6 and on August 7 for crop injury and wild oat control. A hail storm on June 26 caused moderate to severe crop injury. The trial was not harvested.

Treatment	Product rate oz/A	Wild oat Control		
		6/22	7/6	8/7
		----- % -----		
1. Untreated		0	0	0
2. Discover+Score	3.2+.8%	99	99	94
3. Discover+Bronate+Score	3.2+16+.8%	99	98	98
4. Discover+Peak+MCPE+Score	3.2+0.25+12+.8%	99	99	97
5. Discover+Starane+MCPE+Score	3.2+16+16+.8%	99	99	94
6. Puma+Bronate	10.5+16	97	92	85
7. Achieve+Bronate+Sup.chg+AMS	7.2+16+.5%+24	99	96	89
C.V. %		2.0	3.6	4.9
LSD 5%		3	5	7
# of reps		4	4	4

Summary

Crop injury caused by treatments were not observed (data not shown). All herbicide treatments had acceptable wild oat control throughout the growing season. Wild oat control declined with the Puma and Achieve treatments through the growing season and had significantly lower control than Discover treatments 3 and 4 during the final evaluation. Discover herbicide treatments had greater than 90 percent control throughout the growing season. Tank mixing Bronate, Peak and Starane with Discover did not decrease wild oat control.



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