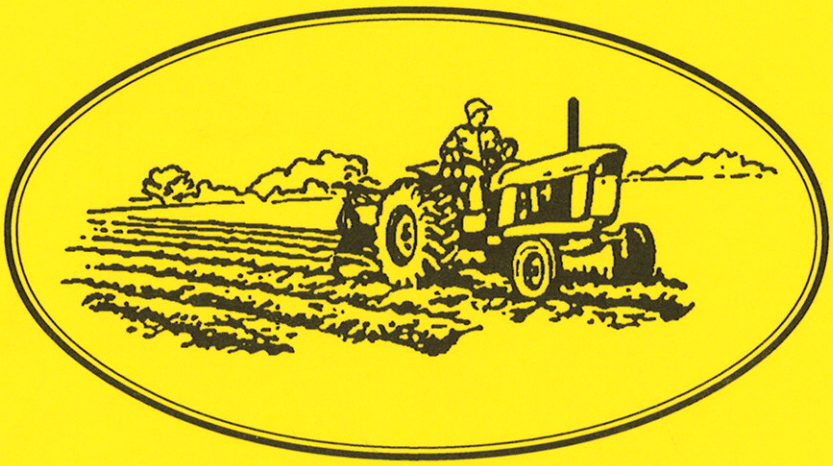
EIGHTEENTH
ANNUAL

AG. REPORT NO. 18

WESTERN DAKOTA

CROPS DAY
RESEARCH REPORT



HETTINGER ARMORY
DECEMBER 20, 2001

Pat Carr, Agronomist
Glenn Martin, Research Specialist II
Burt Melchoir, Ag. Technician II
Lee Tisor, Research Specialist I
DICKINSON RESEARCH EXTENSION CENTER
North Dakota State University
Dickinson, ND 58601
e-mail: pcarr@ndsuext.nodak.edu
www.ag.ndsu.nodak.edu/dickinso/

Eric Eriksmoen, Agronomist
Rick Olson, Ag. Technician III
HETTINGER RESEARCH EXTENSION CENTER
North Dakota State University
Hettinger, ND 58639
e-mail: eeriksmo@ndsuext.nodak.edu
www.ag.ndsu.nodak.edu/hettinge/

18th Annual Western Dakota Crops Day

December 20, 2001

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

1:30 Salts and Sodium - Problem and Solutions

Dr. Jim Richardson, NDSU Dept. Soil Science, Fargo, ND.

2:00 Weather Trends and Surprises

Dr. Leon Osborne, UND Reg. Weather Info. Center, Grand Forks, ND.

2:45 Conclusion

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

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.

2001 Western Dakota Crops Day Sponsors

Hettinger Chamber of Commerce
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Hettinger Farmers Union Oil
Croplan Genetics
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Monsanto
Minn-Dak Growers
Howe Seeds
Legume Logic
ND Dry Pea & Lentil Assn.
Dow AgroSciences

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.

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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 2375 grown in the Dickinson 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 2001 Dickinson HRSW trial was 11.1% meaning that there was an 11.1 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.

Growing Conditions
Hettinger Research Extension Center
2001

The fall of 2000 was very dry, eliminating most fall field work including the seeding of winter wheat. Research plots of HRWW were seeded into dry soil during the second week of October. Heavy show during the last days of October kept growers out of the field for the remainder of the year. December was bitterly cold, followed by a mild January and a bitterly cold February. Rain and snow during the first two weeks of April delayed field work. Record high nitrogen fertilizer prices caused considerable concern throughout the ag. community. Soybean, legumes and crops with lower nitrogen demands saw renewed interest. Field work began during the last week of April and continued without weather interruptions. Hot and windy conditions during the first half of May dried out top soil moisture and left seed in dry soil. Cool and dry conditions persisted throughout the remainder of May. A 28 degree frost on May 25 caused scattered problems in alfalfa. Timely rain during the first week of June sprouted canola and other seed left in dry soils. A hail storm on June 18 destroyed all of the small grain research plots which were in the boot growth stage, and most of the early seeded broadleaf research plots. Recovery of these crops after this devastating storm was absolutely remarkable, although data was not collected on any of the small grain or early seeded broadleaf crops. Hot and dry weather during the first part of July shut off the canola bloom and caused some wheat varieties to show drought stress with curled flag leaves and burning of lower leaves. Heavy rains during mid-July was welcome, providing almost ideal growing conditions for late season crops and finishing the small grain crop. These rains along with warm temperatures also created a serious ascochyta infection in chickpeas, destroying the crop. Small grain harvest began during the first week of August and continued without weather interruptions through completion. Many area growers reported bumper crops with good to excellent quality and topping last year's bumper crops.

Black stem weevils infested the sunflower crop in the seedling stage causing concern but minimal damage. High levels of thistle caterpillars were observed on canola, sunflowers and soybeans and caused some sunflowers to be replanted. Heavy infestations of alfalfa web caterpillars and army worms were also observed.

All trials at the Hettinger Research Center were planted with a no-till drill. Broadleaf crops were planted into barley stubble and small grain crops were planted into 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. Monoammonium phosphate (11-52-0) 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). Most 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)	1998-99	1999-00	2000-01	46 year average
Sept. - Dec.	6.32	2.29	4.12	3.30
Jan. - March	1.25	3.45	1.82	1.34
April	2.30	1.40	2.13	1.68
May	2.32	3.87	1.80	2.67
June	3.84	2.80	3.65	3.44
July	3.30	2.97	4.46	2.05
August	3.36	0.78	0.13	1.70
Total	22.69	17.56	18.11	16.18

Air Temperature

Average Temperature F	1998	1999	2000	2001	46 year average
April	45.6	41.8	42.6	43.0	42.5
May	56.0	53.5	55.0	55.2	54.2
June	57.8	61.2	60.5	62.7	63.5
July	69.7	69.9	71.2	71.6	69.8
August	71.7	68.5	71.8	73.0	68.8
September	65.3	53.3	58.6	59.1	57.3

Growing Degree Units - Corn

Growing Degree Units (50-86)	1998	1999	2000	2001	29 year average
May	309	230	284	285	269
June	312	381	377	401	424
July	644	574	638	652	578
August	663	565	633	631	536
September	469	259	412	357	307
Total	2397	2009	2344	2326	2114

Frost Free Days

	28 F	32 F	Normal 32 F
Date of last frost	May 25	May 25	May 18
Date of first frost	Sep 29	Sep 29	Sep 20
Frost free days	127	127	125

Table. 2001 Weather Summary for the Dickinson Research Extension Center, Dickinson, ND

Month	Maximum temp. Long Term 1897 - 2000	Maximum temp. Current Year	Minimum temp. Long Term 1897 - 2000	Minimum temp. Current Year	Precipitation Long Term 1897 - 2000	Precipitation Current year	Small grains GDD[1] Long Term 1897 - 2000	Small grains GDD[1] Current year	Corn GDD[2] Long Term 1897 - 2000	Corn GDD[2] Current year
	°F		°F		inches					
November - 00	39.6	30.3	16.7	10.0	0.52	2.70				
December - 00	27.6	19.0	5.6	-3.9	0.39	0.36				
January	22.6	33.0	-0.2	8.2	0.51	0.45				
February	26.8	21.5	3.7	-4.8	0.40	0.24				
March	37.8	41.5	14.9	19.2	0.71	0.21				
April	54.5	55.9	28.4	28.1	1.44	2.08	340	386		
May	66.3	69.2	39.2	39.1	2.28	1.75	648	691	255	295
June	75.0	73.4	49.0	47.9	3.61	7.15	901	860	382	380
July	83.3	82.9	54.1	57.1	2.22	3.99	1139	1179	581	611
August	82.4	88.2	51.5	54.7	1.75	0.00	1083	1216	529	621
September	71.2	72.4	41.0	44.7	1.38	2.53	723	793	318	330
October	57.8	43.1	30.1	27.5	0.95	0.24				
Mean	53.7	52.5	27.8	27.3						
Total					16.17	21.70	4834	5124	2065	2236

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

[2] Corn GDD, is growing degree days calculated with 86°F as the maxium temperature and 50°F as the base temperature.

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

Trial	Location	Previous Crop	Seeding Rate
			pls/ac
SMALL GRAINS			
Barley	Dickinson	Millet hay	1,200,000
Durum	Dickinson	Alfalfa	1,200,000
Spring wheat	Dickinson	Alfalfa	1,200,000
Winter wheat	Dickinson	Millet hay	75 lbs*
Winter rye	Dickinson	Millet hay	75 lbs*
Oat	Dickinson	Fallow	1,000,000
OTHER CROPS			
Field Pea	Dickinson	Wheat	325,000
Chickpea	Dickinson	Millet hay	120-180 lbs*
Lentil	Dickinson	Millet hay	550,000
Cool Season Forage	Dickinson	Millet hay	Various
Warm Season Forage	Dickinson	Barley	Various
Winter/Spring Cereal Forage	Dickinson	Barley	Various

* Rate is seed planted

		Soil test results			Fertilizer applied		
Trial	Location	N	P	K	N	P_2O_5	Form(s)
		lb/ac	ppm	ppm	lb/acre		
SMALL GRAINS							
Barley	Dickinson	37	6	--	111	44	34-0-0, 0-44-0
Durum	Dickinson	21	9	--	111	22	46-0-0, 0-44-0
Spring wheat	Dickinson	23	9	--	111	22	46-0-0, 0-44-0
Winter wheat	Dickinson	37	6	--	85	44	34-0-0, 0-44-0
Winter rye	Dickinson	37	6	--	85	44	34-0-0, 0-44-0
Oat	Dickinson	47	20	--	50	--	46-0-0
OTHER CROPS							
Field Pea	Dickinson	34	21	--	--	--	
Chickpea	Dickinson	34	21	--	--	--	
Lentil	Dickinson	34	21	--	--	--	
Cool Season Forage	Dickinson	34	21	--	102	--	34-0-0
Warm Season Forage	Dickinson	24	13	--	--	--	
Winter/Spring Cereal Forage	Dickinson	24	13	--	--	--	

2002 North Dakota hard red spring wheat variety description table, 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		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	S	S	M	S
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	S		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		S
Lars	AgriPro	1995	yes	s.dwf.	v.strg.	med.	R	R	MR		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	MR	MR	M	MS*
Keene	ND	1996	yes	med.	med.	med.	R	R	MR	M	S
Oxen	SD	1996	yes	s.dwf.	strg.	m.early	R	R	S	S	S
Forge	SD	1997	yes	s.dwf.	m.strg.	early	R	S	MR	MS	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	M	NA	S
HJ98	MN	1998	yes	s.dwf.	strg.	m.early	R	MS	MS	MS	MS
Ingot	SD	1998	yes	s.dwf.	med.	early	R	S	S	M	MS*
Dandy	N. Star G.	1998	yes	sdwf	v.strg.	early	R	S	MS	S	S
Mckenzie	Cenex	1998	yes	med.	med.	m.early	R	R	S	MS	S
Parshall	ND	1999	yes	med.	srtg.	m.early	R[4]	MS	M	M	M
Reeder	ND	1999	yes	s.dwf	strg.	m.early	R	MR	M	M	S
McVey	MN	1999	yes	med.	med.	med.	R	S	S		M
Ivan	AgriPro	1999	yes	s.dwf	v.strg.	med.	R	MR	S	MS	MS
Ember	SDSU	1999	yes	s.dwf	med.	m.early	R	S	S		MS
Aurora	N. Star G.	1999	yes	s.dwf	strg	m.early	R	R	S		S
Mercury	N. Star G.	1999	yes	s.dwf	strg	m.early	R	MR	S	MS	S
Norpro	AgriPro	1999	yes	s.dwf	strg	med	R	R	S	MS	MS
AC Intrepid	Canterra	1999	no	med	med	med	R	R			S
Prodigy	Sask. Wht	1999	yes	med	med	med	MR	MR			MS
Scholar	MT	1999	yes	med	med	med	R	S			S
Conan	WPB	1999	yes	s.dwf	v.strg	med	R	MR			S
AC Abbey	Canterra	1999	yes	med	med	m.early	R				S
Alsen	ND	2000	yes	s.dwf	strg	m.early	R	R	S	MS	MR

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.

2002 hard red spring wheat quality traits.

Variety	Quality factors		
	Test Weight	Wheat Protein	Quality Rating
Coteau	avg.	high	Good
Stoa	high	avg.	Average
Butte 86	high	avg.	Average
Amidon	high	avg.	Average
Grandin	high	avg.	Good
2370	high	avg.	Poor-Average
2375	high	avg.	Poor-Average
Sharp	high	avg.	Poor
AC Barrie	high	avg.	Good
Kulm	high	high	Average-Good
2398	avg.	low	Poor
Ernest	high	high	Poor-Average
Glupro	avg.	v.high	Good
Gunner	high	high	Average-Good
Hamer	avg.	avg.	Poor
Lars	avg.	low	Poor
McNeal	avg.	avg.	Poor-Average
Russ	avg.	avg.	Average
Trenton	high	avg.	Average
Verde	avg.	low	Poor
Keene	high	avg.	Average
Oxen	avg.	avg.	Average-Good
Forge†	high	low	Poor-Average
Nora†	avg.	high	Average
Argent	high	avg.	Good
Hagar†	avg.	low	Poor-Average
HJ98†	avg.	low	Poor
Ingot†	high	avg.	Poor-Average
Parshall	high	avg.	Good
Reeder	high	avg.	Average
McVey†	low	low	Poor
Ivan†	high	low	Poor
Alsen†	high	avg.	Average-Good

† Based on limited testing, rating may change.

The overall HRSW quality rating is based on a large number of quality parameters . These parameters are related to the physical kernel traits including protein content; milling performance; flour attributes; dough characteristics; and baking performance. Some of these quality parameters considered in the assessment of overall quality are listed in the above table.

Both protein quantity and quality are of extreme importance in establishing the rating score for hard red spring wheat varieties. Baking quality data given in this report is based on white sliced bread evaluation. Flour used for white sliced bread normally contains between 11.5-12.5% protein. However, the majority of hard red spring wheat used either domestically or in the export market is blended with lower protein wheat or lower quality wheat to improve baking performance. Another major use for hard red spring wheat is for specialty products such as bagels and frozen doughs that require a high protein content with strong gluten properties. In addition, the majority of hard red spring wheat is exported at the 14.0% protein level.

Hard red spring wheat produced in the Upper Midwest is purchased largely for its quality. Continued production of high quality wheat is paramount to maintaining future markets. Figure 1 illustrates the difference between bread made with poor quality wheat and that made with good quality.

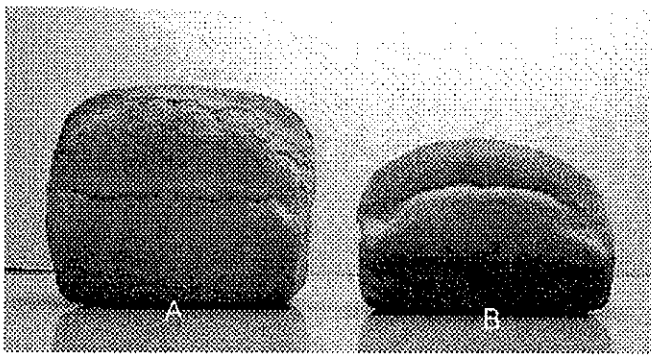


Fig. 1. Loaf A represents bread made from wheat with a quality rating of good. Loaf B represents bread made from wheat with a quality rating of poor.

Variety	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Returns	Average Yield 2 Year	Average Yield 3 Year
		in	lbs/bu	%	bu/ac	bu/ac	bu/ac	$/ac	bu/ac	bu/ac
2375	13,687	28	62.7	15.2	47.1	63.4	42.6	132.22	53.0	51.0
AC Intrepid	14,489	28	60.8	16.7	--	--	32.4	105.18	--	--
AC Superb	14,731	27	61.8	16.1	--	--	37.6	111.05	--	--
Alsen	15,642	27	63.3	16.1	49.5	60.9	37.7	116.22	49.3	49.4
Amidon	15,991	30	61.9	15.8	--	--	43.6	121.46	--	--
Argent*	13,759	26	62.9	16.4	45.6	63.6	35.3	--	49.4	48.2
Aurora	15,492	20	61.6	14.7	51.8	66.3	37.8	117.68	52.1	52.0
Butte 86	14,405	26	61.9	16.5	44.8	71.8	38.6	120.96	55.2	51.7
Conan	12,850	25	62.4	15.5	44.6	56.8	36.5	111.57	46.7	46.0
Dandy	13,507	26	62.4	15.8	51.8	64.3	31.4	85.02	47.9	49.2
Ember	15,838	25	63.3	15.2	51.5	75.2	37.8	109.90	56.5	54.8
Ernest	14,061	30	62.8	16.4	45.3	57.7	38.6	108.09	48.2	47.2
Forge	15,953	28	63.8	15.0	53.9	65.0	37.9	108.18	51.4	52.3
Grandin	14,310	25	62.6	15.9	48.9	61.1	36.6	106.33	48.8	48.9
Gunner	15,486	27	63.2	16.7	47.4	61.8	40.9	136.59	51.4	50.0
Hagar	13,252	23	61.7	15.8	45.9	63.4	38.2	112.35	50.8	49.2
HJ 98	15,452	26	62.4	15.3	51.2	64.4	41.1	105.11	52.7	52.2
Ingot	14,927	27	63.6	16.2	54.6	67.3	30.6	80.96	49.0	50.8
Ivan	15,029	22	63.0	14.5	52.9	59.9	44.9	121.82	52.4	52.6
Keene	16,089	29	62.8	16.1	49.1	70.6	38.9	113.61	54.8	52.9
Keystone	15,319	27	63.8	15.2	--	--	37.2	106.03	--	--
Knudson	14,847	23	63.1	15.5	--	--	39.5	110.41	--	--
McKenzie	16,496	28	62.6	16.1	48.3	73.4	39.7	127.27	56.6	53.8
McVey	14,864	25	61.3	13.7	51.6	66.2	42.7	120.04	54.4	53.5
Mercury	14,337	22	62.6	15.5	47.2	70.2	36.0	100.37	53.1	51.1
Norpro	14,739	24	62.8	15.5	54.9	69.5	42.4	121.17	56.0	55.6
Oxen	15,630	24	61.9	15.8	53.6	64.0	41.7	126.23	52.9	53.1
Parshall	15,331	28	63.2	16.5	45.1	59.4	37.0	112.19	48.2	47.2
Pristine*	13,079	22	63.0	14.9	--	--	33.2	--	--	--
Prodigy	16,273	31	62.2	16.8	43.9	71.5	40.6	123.57	56.0	52.0
Reeder	15,038	26	62.2	15.8	48.7	72.0	42.0	110.61	57.0	54.2
Russ	14,688	25	62.4	15.6	53.1	54.6	36.3	107.64	45.4	48.0
Scholar	14,189	27	62.2	15.9	44.4	76.2	36.0	108.88	56.1	52.2
Trenton	13,634	29	62.4	16.0	46.7	68.6	36.6	110.66	52.6	50.6
Walworth	16,730	26	61.5	15.8	--	54.1	43.0	104.11	48.6	--
Zeke	13,674	22	60.6	15.1	--	64.0	37.1	98.29	50.6	--
Trial Mean	14,829	26	62.6	15.8	47.9	65.6	38.5	111.23	--	--
C.V. %	6.5	9.5	0.7	--	8.0	10.6	11.1	--	--	--
LSD .05	1,348	3	0.6	--	5.4	9.7	6.0	--	--	--

Planting Date: April 30
Harvest Date: August 17
*Hard White Spring Wheat
Returns were calculated by multiplying the 2001 yield by protein premium or discount paid at the Southwest Grain Terminal located at Gladstone on September 17. The price paid on this date was $2.74/bu, assuming that grain protein concentration was 14%. An additional $.02/bu was paid for each additional 0.25% increase in grain protein up to 15% protein, where an additional $0.5/bu was paid. An additional $0.01/bu was paid for each additional 0.25% increase in grain protein up to 17%, above which an additional premium was not paid. Grain was discounted $0.05/bu for each 0.25% reduction in grain protein from 14% to 11%, below which no 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].

2000 Hard Red Spring Wheat - Continuously Cropped No-till **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield			Average Yield	
					1998	1999	2000	2 year	3 year
		inches	lbs/bu	%	bu/ac				
Ivan	75	32	62.4	12.8	82.8	87.3	66.3	76.8	78.8
HJ98	74	36	62.2	13.8	83.4	75.1	68.6	71.8	75.7
Reeder	72	39	61.6	16.8	81.5	82.5	55.8	69.2	73.3
2398	73	35	62.2	13.9	84.7	73.7	58.2	66.0	72.2
Hagar	74	33	61.4	14.7	79.9	75.3	60.2	67.8	71.8
Oxen	71	37	61.3	14.9	68.5	81.5	61.9	71.7	70.6
Forge	68	40	62.3	15.2	81.0	76.5	50.9	63.7	69.5
McVey	75	40	60.8	13.5	73.4	74.5	58.3	66.4	68.7
Ember	71	38	62.3	16.1	78.0	72.3	53.2	62.8	67.8
Russ	72	40	61.9	15.7	76.9	67.8	54.4	61.1	66.4
2375	73	39	63.0	16.0	77.5	64.8	56.9	60.8	66.4
Keene	73	46	62.6	16.5	78.1	68.7	46.3	57.5	64.4
Parshall	73	43	62.6	17.0	73.6	68.5	45.1	56.8	62.4
Gunner	75	39	62.6	16.9	71.7	66.5	46.7	56.6	61.6
Ernest	74	42	62.0	16.3	69.6	65.8	48.8	57.3	61.4
Grandin	74	38	60.7	15.7	71.7	59.2	50.9	55.0	60.6
Butte 86	71	41	61.2	16.0	72.6	63.9	43.9	53.9	60.1
Scholar	75	39	62.2	15.5	75.2	53.2	50.0	51.6	59.5
Ingot	69	42	62.6	16.4	64.1	67.0	45.0	56.0	58.7
Norpro	73	33	61.9	14.9		86.3	66.9	76.6	
Mercury	72	33	61.7	15.5		81.9	67.6	74.8	
Aurora	76	32	60.7	14.2		77.7	63.7	70.7	
McKenzie	73	43	61.9	16.7		74.7	52.2	63.4	
Conan	73	36	61.9	14.9		67.1	56.9	62.0	
Alsen	72	38	62.4	16.4		69.3	52.1	60.7	
Dandy	72	39	61.5	16.0		69.0	51.2	60.1	
377S *	74	37	59.4	13.9		55.9	54.7	55.3	
Zeke	71	35	58.9	14.4			62.6		
AC Vista *	72	38	59.3	13.9			59.3		
Walworth	70	39	60.8	15.2			58.6		
Trial Mean	73	39	61.8	15.7	73.9	70.0	53.0	--	--
C.V. %	1.2	4.4	0.9	3.3	8.7	6.2	6.7	--	--
LSD .05	1	2	0.8	0.7	8.9	6.0	4.9	--	--
LSD .01	2	3	1.1	1.0	11.8	7.9	6.5	--	--

* Hard White Spring Wheat Planting Date: April 10, 2000 Harvest Date: August 7, 2000
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous crop: 1998 = fallow, 1999 = field pea, 2000 = soybean

Performance of five hard red spring (HRS) wheat cultivars following fallow, oat, and canola at Beulah, Hannover, and Glen Ullin, North Dakota.

	Beulah					Hannover					Glen Ulin				
	height	yield	TW	protein	kernel weight	height	yield	TW	protein	kernel weight	height	yield	TW	protein	kernel weight
Crop rotation (R)	-in-	-bu/ac-	-lb/bu-	-%-	kernel/lb	-in-	-bu/ac-	-lb/bu-	-%-	kernel/lb	-in-	-bu/ac-	-lb/bu-	-%-	kernel/lb
HRS wht-fallow	30	43.6	60.6	14.5	15,561	31	47.8	59.6	16.0	15,662	33	65.7	60.7	15.8	14,986
HRS wht-durum-oat	31	45.0	60.0	13.4	16,257	32	47.8	59.6	15.3	15,831	34	65.6	60.6	14.4	14,800
HRS wht-pea-can	32	45.4	60.9	12.8	15,330	32	51.0	60.3	14.7	15,323	33	65.4	61.5	14.5	14,342
HRS wheat cultivar (C)															
Alsen	29	42.8	61.4	14.3	15,314	31	47.2	60.4	15.5	15,347	32	62.7	61.5	15.3	14,446
McKenzie	34	42.0	60.2	13.2	16,974	35	49.0	60.1	15.4	16,106	37	64.8	61.5	14.8	15,399
Oxen	29	46.7	58.9	13.3	15,777	30	44.8	58.4	15.3	15,763	30	65.4	58.6	14.9	15,041
Parshall	34	45.1	61.1	13.7	15,745	33	48.6	61.2	15.3	15,666	37	64.5	62.2	14.8	14,597
Reeder	29	46.8	60.8	13.2	14,770	30	54.6	58.9	15.2	15,144	31	70.3	60.8	14.7	14,063
Mean	31	44.7	60.5	13.6	15,716	32	45.8	59.8	15.3	15,605	33	65.5	60.9	14.9	14,709
R	NS	NS	*	*	*	NS	NS	NS	*	NS	NS	NS	*	*	*
C	*	NS	*	NS	*	*	*	*	NS	NS	*	*	*	NS	*
R x C	NS	NS	NS	NS	NS	NS	NS	NS	*	NS	NS	NS	NS	NS	NS

Additional information about this or other crop rotation studies coordinated by the NDSU Dickinson Research Extension Center can be obtained by contacting Dr. Patrick Carr at 701-483-2581 or by email pcarr@ndsu.nodak.edu.

NS = not significant; * = significant at P<0.05.

Planting Date: May 1, 2001 (Hannover, Beulah) May 2, 2001 (Glen Ullin)
Harvest Date: August 21, 2001 (Hannover) August 22, 2001 (Glen Ullin) August 15, 2001 (Beulah)

2001 Hard Red Spring Wheat - Continuously Cropped No-till **Scranton**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Reeder	32	59.1	14.9	40.1	67.0	60.7	63.8	55.9
Oxen	30	59.6	14.3	41.1	65.5	52.8	59.2	53.1
Parshall	37	62.2	15.5	34.6	64.3	52.9	58.6	50.6
Keene	37	61.0	15.2	33.4	61.8	52.6	57.2	49.3
Norpro	30	61.2	14.5		67.4	57.5	62.4	
Ivan	28	62.1	13.7		63.3	56.8	60.0	
Ember	32	62.8	13.7		61.5	58.6	60.0	
Alsen	31	62.1	15.3		63.7	53.4	58.6	
Ingot	34	63.7	14.7		52.9	51.0	52.0	
Walworth	31	61.0	14.8			51.3		
Mercury	27	62.1	14.4			50.7		
Trial Mean	32	61.6	14.8	33.8	61.5	54.1	--	--
C.V. %	4.5	0.7	--	10.1	8.1	10.9	--	--
LSD .05	2	0.6	--	5.8	8.4	8.5	--	--
LSD .01	3	0.9	--	7.9	11.4	NS	--	--

Planting Date: April 23, 2001
Harvest Date: August 7, 2001
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous Crop: 1999 = HRSW, 2000 = HRWW, 2001 = safflower.
NS = no statistical difference between varieties.

2001 Hard Red Spring Wheat - Continuously Cropped No-till **Regent**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Reeder	35	60.8	15.2	51.0	39.1	74.0	56.6	54.7
Oxen	32	59.0	14.8	56.0	32.3	69.0	50.6	52.4
Keene	38	61.2	15.1	50.5	29.8	66.3	48.0	48.9
Parshall	38	61.3	15.1	47.2	29.9	66.3	48.1	47.8
Ivan	30	60.1	13.6		37.9	70.0	54.0	
Norpro	31	59.8	13.8		36.2	69.2	52.7	
Alsen	34	61.4	15.1		31.7	67.5	49.6	
Ingot	40	63.3	14.6		29.7	67.0	48.4	
Ember	35	61.5	13.6		30.4	62.8	46.6	
Mercury	30	60.8	13.5			73.5		
Walworth	35	59.5	14.1			68.3		
Trial Mean	35	60.9	14.6	50.5	32.2	68.2	--	--
C.V. %	3.3	0.8	--	8.7	11.2	4.2	--	--
LSD .05	2	0.7	--	7.4	6.1	4.2	--	--
LSD .01	2	0.9	--	10.0	8.2	5.6	--	--

Planting Date: April 23, 2001
Harvest Date: August 7, 2001
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous Crop: 1999 = HRSW, 2000 = HRWW, 2001 = safflower.

2001 Hard Red Spring Wheat - Continuously Cropped No-till **New Leipzig**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Reeder	31	61.8	15.8	53.1	45.9	60.2	53.0	53.1
Oxen	29	60.3	15.1	54.5	44.7	52.4	48.6	50.5
Keene	36	61.6	15.2	44.9	41.3	49.3	45.3	45.2
Parshall	36	61.7	16.0	42.3	43.0	49.0	46.0	44.8
Norpro	28	61.0	15.1		42.4	55.1	48.8	
Alsen	31	61.6	16.0		43.9	53.3	48.6	
Ivan	26	61.4	14.3		42.5	53.0	47.8	
Ingot	34	63.7	16.3		41.6	46.9	44.2	
Ember	30	61.2	15.1		39.9	44.4	42.2	
Walworth	31	59.7	15.4			52.2		
Mercury	26	61.1	15.2			51.0		
Trial Mean	31	61.3	15.5	43.7	42.1	51.1	--	--
C.V. %	3.8	0.7	--	8.1	8.1	7.3	--	--
LSD .05	2	0.6	--	5.1	NS	5.4	--	--
LSD .01	3	0.8	--	6.8	NS	7.2	--	--

Planting Date: April 24, 2001
Harvest Date: August 8, 2001
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous Crop: 1999 = HRSW, 2000 = HRWW, 2001 = safflower.
NS = no statistical difference between varieties.

2001 Hard Red Spring Wheat - Continuously Cropped No-till **Selfridge**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Oxen	34	59.0	13.2	49.0	51.1	79.9	65.5	60.0
Reeder	34	61.1	13.8	44.9	52.3	82.2	67.2	59.8
Parshall	37	62.3	14.0	44.4	46.4	75.8	61.1	55.5
Keene	38	61.3	14.2	46.4	47.3	69.5	58.4	54.4
Norpro	30	60.0	13.1		53.6	83.4	68.5	
Ivan	30	60.6	13.1		53.6	76.5	65.0	
Alsen	33	61.7	14.3		48.9	73.0	61.0	
Ember	33	61.6	13.2		47.7	72.1	60.0	
Ingot	38	63.4	14.8		48.9	70.6	59.8	
Mercury	29	60.8	12.8			82.4		
Walworth	35	59.3	14.1			72.6		
Russ	35	59.2	14.1			69.6		
Trial Mean	34	60.9	13.8	40.5	49.3	74.8	--	--
C.V. %	3.7	0.7	--	8.1	4.3	4.7	--	--
LSD .05	2	0.6	--	4.7	3.6	5.0	--	--
LSD .01	3	0.8	--	6.3	4.9	6.7	--	--

Planting Date: April 24, 2001
Harvest Date: August 9, 2001
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous Crop: 1999 = HRSW, 2000 & 2001 = HRWW.

2001 Hard Red Spring Wheat - Continuously Cropped No-till **Mandan**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Reeder	33	59.4	14.6	46.9	60.3	48.6	54.4	51.9
Parshall	38	61.3	14.2	42.9	54.1	45.6	49.8	47.5
Oxen	31	57.8	14.1	36.0	59.1	45.0	52.0	46.7
Keene	39	59.5	14.8	39.8	48.6	40.6	44.6	43.0
Norpro	31	58.2	14.0		57.4	49.6	53.5	
Ivan	30	59.5	13.8		59.7	46.7	53.2	
Ingot	36	63.0	14.7		48.9	45.6	47.2	
Ember	31	60.6	13.5		50.9	43.2	47.0	
Alsen	32	60.2	15.1		50.2	42.9	46.6	
Mercury	29	59.3	13.3			52.3		
Walworth	34	58.4	15.0			47.2		
Trial Mean	34	59.8	14.4	39.3	52.7	45.9	--	--
C.V. %	3.3	1.0	--	12.5	9.5	8.3	--	--
LSD .05	2	1.0	--	8.3	7.2	6.4	--	--
LSD .01	3	1.4	--	11.3	9.6	8.7	--	--

Planting Date: April 24, 2001
Harvest Date: August 9, 2001
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous Crop: 1999 = HRSW, 2000 = rye, 2001 = barley.

Hard Red Spring Wheat Variety Trial – Perkins County (Bison), 1999-2001.

Variety	Height	Lodging	Test Wt.	Protein	Yield	Bu/A
	Inches	1-9*	Lb/Bu	Percent	2001	3 Year
ALSEN	28	1	64.4	12.7	**41**	40
BUTTE 86	33	1	62.1	11.6	**42**	39
CATEAU	33	1	61.6	13.5	34	
CHRIS	36	1.5	61.7	12.3	34	30
EMBER	29	1	62.0	11.2	**45**	**45**
FORGE	31	1	62.9	11.3	**47**	**46**
HANNA	34	1	62.4	13.1	38	
HJ98	29	1	61.2	11.6	**47**	**45**
INGOT	33	1	63.5	11.6	**44**	**44**
IVAN	27	1	61.8	11.1	**43**	**47**
KEYSTONE	30	1	63.6	11.3	40	
KNUDSON	27	1	62.8	12.6	**45**	
NORPRO	28	1	62.9	12.0	**46**	**46**
OXEN	27	1	60.9	11.2	**41**	**45**
PARSHALL	33	1	62.1	11.7	39	**41**
REEDER	30	1	63.2	12.3	**46**	**45**
RUSS	31	1	60.6	12.3	**45**	**47**
SAXON	30	1	61.2	11.6	**47**	**46**
WALWORTH	29	1	61.5	11.3	**41**	**45**
SD 3367	31	1	62.3	11.5	40	**45**
SD 3496	30	1	62.3	11.7	40	
SD 3506	32	1	64.0	12.1	**41**	
SD 3540	31	1	62.9	11.5	**43**	
SD 3546	30	1	62.3	11.3	**43**	
ND 722	31	1	61.8	12.1	40	
GM 40002	28	1	60.4	11.4	39	
GM 40016	28	1	61.8	11.7	40	
GM 40019	25	1	61.6	11.0	**42**	
Average	30	1.0	62.2	11.8	42	44
LSD (P=.05)	2.0	0.2	1.4	.	5.6	6
CV	4.6	10.7	1.6	.	9.5	9

* 1=No lodging, 9 = 100% lodged.

Planted: April 18, 2001
Herbicide: Puma (5.3 oz/A) + Bronate (16 oz/A)
Harvested: Aug 8, 2001
Additional Nitrogen: 80 Lb/A
Previous crop: Soybeans, No-till planted

Hard Red Spring Wheat Variety Trial - Harding County (Ralph), 1999-2001.

Variety	Height	Lodging	Test Wt.	Protein	Yield	Bu/A
	Inches	1-9*	Lb/Bu	Percent	2001	3 Year
ALSEN	25	1	61.2	14.2	27	31
BUTTE 86	25	1	59.4	13.9	21	30
CATEAU	32	1.3	58.4	14.1	25	
CHRIS	31	1.5	59.6	14.5	26	26
EMBER	25	1	63.6	13.8	28	**37**
FORGE	26	1	60.4	13.2	25	**34**
HANNA	30	1	60.4	14.2	26	
HJ98	24	1	60.4	14.1	29	**36**
INGOT	28	1	64.0	14.4	26	32
IVAN	24	1	63.2	12.6	30	**37**
KEYSTONE	26	1	62.9	13.5	28	
KNUDSON	25	1	62.4	13.5	**35**	
NORPRO	25	1	61.1	14.3	31	**37**
OXEN	24	1	60.7	13.8	29	**37**
PARSHALL	27	1	61.0	14.5	25	32
REEDER	27	1	61.0	13.3	**33**	**35**
RUSS	28	1	59.5	13.7	26	**34**
SAXON	26	1	59.8	13.2	**32**	**35**
WALWORTH	27	1	60.6	13.0	28	**35**
SD 3367	26	1	60.8	14.7	25	32
SD 3496	26	1	62.3	13.5	24	
SD 3506	28	1	62.2	13.8	29	
SD 3540	26	1	61.5	14.4	28	
SD 3546	28	1	62.6	13.9	29	
ND 722	29	1	60.3	14.0	25	
GM 40002	25	1	59.9	13.3	24	
GM 40016	23	1	61.1	14.4	25	
GM 40019	22	1	60.7	12.9	29	
Average	26	1.0	61.1	13.8	27	34
LSD (P=.05)	2.2	0.2	1.5	.	3.2	5
CV	5.8	13.9	1.8	.	8.2	12

* 1=No lodging, 9 = 100% lodged.

Planted: April 18, 2001
Harvested: August 7, 2001
Previous crop: Conventional fallow

Herbicide: Puma (10.6 oz/A) + Bronate (16 oz/A)
Additional Nitrogen: None

Spring wheat, dryland fallow, Wibaux, Montana.

	Yield		TW	Protein	
Cultivar	2001	3 yr	2001	2001	3 yr
	- bus/a -		lb/b	-- % --	
Reeder	49.4	44.0	60.7	16.3	15.8
Amidon	45.2	43.5	61.2	13.9	14.8
Parshall	43.0	41.9	61.2	15.5	15.6
Scholar	42.0	41.2	61.7	15.0	14.9
McNeal	48.4	41.0	60.0	14.4	14.0
Ernest	43.6	39.6	60.8	16.1	15.7
Argent*	42.4	39.1	61.0	16.1	16.4
MTHW9420*	42.4	39.0	57.8	14.4	14.2
Conan	36.7	33.7	61.3	16.0	15.2
Verde	21.5	29.8	61.5	17.1	15.4
McVey	45.3	--	59.0	14.4	--
Alsen	43.7	--	62.0	16.9	--
Pristine*	41.5	--	61.8	15.7	--
Westbred Express	41.2	--	59.0	15.3	--
CDC Bounty	40.3	--	61.5	15.7	--
Gunner	40.1	--	63.0	16.5	--
NK Bounty	38.6	--	58.5	14.5	--
Explorer*	35.7	--	58.2	15.4	--
LSD 5%	5.6		1.0	1.0	

Planted: May 3 **Harvested:** Aug 15

*hard white wheat

Hard Red Spring Wheat in the West River Region
Combined Means

Variety	Plant Height	Test Weight	Protein	Grain Yield			Average Yield	
				1999	2000	2001	2 year	3 year
	inches	lbs/bu	%	bu/ac				
Reeder	31	60.8	14.6	50.6	54.0	55.6	54.8	53.4
Oxen	29	59.6	14.2	48.2	48.5	51.6	50.0	49.4
Keene	36	61.2	15.1	43.8	49.4	52.9	51.2	48.7
Parshall	34	61.7	14.7	45.7	49.1	49.3	49.2	48.0
Norpro	28	60.9	14.0		56.2	54.3	55.2	
Ivan	27	61.5	13.3		54.7	52.6	53.6	
Ember	30	62.1	13.7		53.0	49.0	51.0	
Alsen	30	61.8	15.1		49.2	49.4	49.3	
Ingot	34	63.5	14.7		48.8	47.7	48.2	
Mercury	27	61.1	14.1			57.6		
Walworth	31	60.2	14.2			50.4		
# of locations	12	12	12	10	11	12	23	33

Locations: Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Hannover, Beulah, Glen Ullin, Wibaux MT, Ralph SD and Bison SD.

2001 North Dakota durum wheat variety descriptions, agronomic traits.

Variety	Agent or Origin[1]	Year Released	Chaff Color	Height	Straw Strength	Maturity	Reaction to Disease[2]			
							Stem Rust	Leaf Rust	Foliar Disease	Scab
Ward	ND	1972	tan	tall	v.strg.	m.early	R	R	MR	S
Rugby	ND	1973	tan	tall	v.strg.	m.early	R	R	MR	S*
Cando	ND	1975	tan	s.dwf.	v.strg.	med.	R	R	M	VS
Vic	ND	1979	white	tall	med.	m.early	R	R	MR	S*
Lloyd	ND	1983	white	s.dwf.	v.strg.	med.	R	MR	S	VS
Medora	Can.	1983	white	tall	strg.	m.early	R	R	MS	VS
Kyle	Can.	1984	white	tall	weak	med.	R	MR	M	N/A
Laker	WPB	1985	white	s.dwf.	strg.	med.	R	MR	S	S
Monroe	ND	1985	white	tall	med.	early	R	R	M	VS
Fjord	AgriPro	1986	white	tall	strg.	m.early	R	R	M	S
Renville	ND	1988	white	tall	med.	med.	R	R	M	S*
Plenty	Can.	1990	white	tall	weak	late	R	R	MR	MS
Voss	AgriPro	1994	white	s.dwf.	v.strg.	med.	R	MR	MS	S
Munich	ND	1995	white	med.	v.strg.	med.	R	R	MR	S*
AC Melita	Can.	1995	white	tall	med.	med.	R	N/A	N/A	S
Ben	ND	1996	white	med.	strong	med.	R	R	MR	S*
Dressler	AgriPro	1996	white	tall	med.	med.	R	MR	N/A	VS
AC Morse	Can.	1996	white	s.dwf.	strong	med.	R	R	M	N/A
AC Avonlea	Can.	1997	white	med	med.	med.	R	R	M	N/A
Belzer	ND	1997	white	tall	med.	late	R	R	M	MR
Maier	ND	1998	white	med	strong	m-late	R	R	M	S*
Mountrail	ND	1998	white	med	strong	late	R	R	M	S*
Kari	Agripro	1998	white	med	strong	med	R	R	M	S
Lebsock	ND	1999	white	med	strong	med	R	R	M	S
Plaza	ND	1999	white	s.dwf.	strong	late	R	R	M	MS
AC Pathfinder	Can.	1999	white	med.	weak	med.	R	R	M	N/A
AC Navigator	Can.	1999	white	s.dwf.	weak	med.	R	R	M	N/A

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.

Durum - Recrop — **Dickinson, ND**

Variety	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Returns	Average Yield 2 Year	Average Yield 3 Year
		in	lbs/bu	%	bu/ac	bu/ac	bu/ac	$/ac	bu/ac	bu/ac
AC Avonlea	13,057	34	61.9	15.4	52.5	45.8	54.1	175.98	50.0	50.8
AC Melita	12,236	30	62.3	14.9	51.0	40.4	43.7	141.95	42.0	45.0
AC Morse	12,563	30	61.9	15.0	56.4	42.3	55.2	179.38	48.7	51.3
AC Navigator	11,714	32	62.3	14.8	56.0	46.3	48.6	157.99	47.5	50.3
AC Pathfinder	12,041	30	63.3	14.4	56.6	40.1	42.0	136.60	41.1	46.2
Belzer	11,671	29	62.0	14.3	52.9	39.3	41.9	136.12	40.6	44.7
Ben	12,013	31	63.9	14.6	51.7	40.7	42.2	137.09	41.4	44.9
Dressler	11,620	32	63.0	14.8	47.7	44.5	46.1	149.73	45.3	46.1
Kari	12,628	30	62.9	14.6	53.1	40.0	53.1	172.57	46.6	48.7
Lebsock	12,049	29	64.1	14.7	50.6	38.9	45.5	147.78	42.2	45.0
Maier	12,378	30	63.1	15.4	54.3	47.1	47.6	154.59	47.3	49.7
Medora	12,454	28	63.8	14.5	55.2	46.3	42.5	138.06	44.4	48.0
Monroe	13,016	34	62.8	14.7	49.0	39.5	44.0	142.92	41.7	44.2
Mountrail	13,070	31	62.5	14.4	55.4	50.4	51.2	166.26	50.8	52.3
Munich	13,863	28	62.6	14.6	54.6	42.2	44.6	144.87	43.4	47.1
Pierce	12,230	32	64.1	13.9	59.8	49.4	45.3	147.30	47.4	51.5
Plaza	12,040	26	63.8	14.3	55.4	44.6	48.3	157.02	46.5	49.4
Renville	12,307	26	62.4	14.6	52.4	44.8	36.6	119.10	40.7	44.6
Rugby	12,252	32	63.1	14.9	47.2	39.9	43.1	140.00	41.5	43.4
Vic	11,627	32	63.4	14.8	54.0	48.6	45.8	148.75	47.2	49.5
Trial Mean	12,209	29	63.1	14.7	54.6	43.4	46.6	151.30	--	--
C.V. %	5.0	13.6	0.7	--	6.3	11.8	13.0	13.0	--	--
LSD .05	857	6	0.6	--	4.8	7.1	8.5	27.50	--	--

Planting Date: April 25
Harvest Date: August 20
Returns were calculated by multiplying the 2001 yield by the test weight discount paid at the Southwest Grain Terminal located at Gladstone on September 17 The price paid on this date was $3.25/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.

2000 Durum - Continuously Cropped No-till **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield 1998	Grain Yield 1999	Grain Yield 2000	Average Yield 2 year	Average Yield 3 year
		inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Maier	76	40	63.8	14.7	76.3	84.0	63.9	74.0	74.7
Munich	74	37	62.8	14.2	69.5	86.8	59.6	73.2	72.0
Lebsock	74	39	63.8	14.8	75.8	81.8	57.1	69.4	71.6
Plaza	77	33	62.6	14.0	69.8	79.9	65.4	72.6	71.7
Mountrail	77	.39	62.6	14.4	65.1	91.4	55.9	73.6	70.8
Kari	74	39	62.9	14.4	68.2	84.3	60.0	72.2	70.8
Belzer	76	42	62.0	14.3	69.5	78.4	60.2	69.3	69.4
Ben	76	42	63.4	14.8	69.6	83.7	54.0	68.8	69.1
Renville	75	44	63.0	14.5	69.1	78.3	58.4	68.4	68.6
Dressler	74	43	63.2	15.1	71.3	78.0	55.8	66.9	68.4
Monroe	72	43	62.7	14.5	66.9	76.0	53.8	64.9	65.6
Rugby	74	43	62.9	14.9	68.4	76.5	50.7	63.6	65.2
AC Melita	75	43	62.2	15.4	67.6	72.1	55.0	63.6	64.9
Plenty	76	44	62.7	14.9	69.7	66.5	52.7	59.6	63.0
1AS/1D2	76	46	61.5	15.4		61.7	39.8	50.8	
AC Avonlea	74	40	62.1	15.5			55.6		
Trial Mean	75	40	63.0	14.6	69.4	80.4	58.4	--	--
C.V. %	1.4	3.8	0.7	4.1	9.1	4.3	7.6	--	--
LSD .05	1	1	0.6	0.8	NS	4.9	6.2	--	--
LSD .01	2	2	0.8	1.1	NS	6.4	8.2	--	--

Planting Date: April 10, 2000 Harvest Date: August 7, 2000
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous crop: 1998 = fallow, 1999 = field pea, 2000 = soybean
NS = no statistical differences between varieties.

Hannover Durum - Recrop — **Dickinson, ND**

Variety	Seeds/ Pound	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	* Returns	Average Yield 2 Year	Average Yield 3 Year
		in	lbs/bu	%	-------bu/ac-------			$/ac	----bu/ac----	
Lebsock	12,024	29	61.2	14.0	15.2	39.4	35.9	115.37	37.6	30.1
Maier	12,005	30	60.5	14.2	12.7	52.8	38.0	120.40	45.4	34.5
Mountrail	11,769	30	60.3	14.1	15.1	49.0	40.2	127.40	44.6	34.8
Pierce	12,174	31	61.3	13.9	--	--	41.8	134.99	--	--
Plaza	11,815	28	59.8	13.9	10.4	40.5	40.2	127.87	40.4	30.4
Trial Mean	11,957	30	60.6	14.0	20.3	45.9	39.2	125.20	--	--
C.V. %	3.5	4.1	2.0	2.9	14.8	8.2	7.7	8.4	--	--
LSD .05	NS	NS	NS	NS	NS	7.1	NS	NS	--	--

Planting Date: May 1

Harvest Date: August 21

Beulah Durum - Recrop — **Dickinson, ND**

Variety	Seeds/ Pound	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	* Returns	Average Yield 2 Year	Average Yield 3 Year
		in	lbs/bu	%	-------bu/ac-------			$/ac	----bu/ac----	
Lebsock	13,404	31	62.3	10.7	19.7	42.4	42.5	138.17	42.4	34.9
Maier	13,176	33	59.5	11.6	17.1	37.7	52.7	168.57	45.2	35.8
Mountrail	14,571	33	59.0	11.7	20.5	43.3	50.3	159.26	46.8	38.0
Pierce	14,701	34	61.6	10.5	--	--	41.1	133.44	--	--
Plaza	13,813	27	58.1	11.2	23.1	45.3	47.0	144.53	46.1	38.5
Trial Mean	13,933	32	60.1	11.1	20.3	41.2	46.7	148.79	--	--
C.V. %	5.3	6.6	1.5	8.0	14.8	11.6	7.4	6.7	--	--
LSD .05	NS	4	1.7	NS	NS	NS	6.5	18.78	--	--

Planting Date: May 1

Harvest Date: August 15

*Returns were calculated by multiplying the 2001 yield by the test weight discount paid at the Southwest Grain Terminal located at Gladstone on September 17. The price paid on this date was $3.25/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.

Glen Ullin Durum - Recrop — **Dickinson, ND**

Variety	Seeds/ Pound	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	* Returns	Average Yield 2 Year	Average Yield 3 Year
		in	lbs/bu	%		bu/ac		$/ac	bu/ac	
Lebsock	12,065	35	60.6	13.6	35.9	65.9	64.5	207.98	65.2	55.4
Maier	12,725	33	59.2	12.9	33.6	61.6	61.3	196.02	61.5	52.2
Mountrail	11,715	34	58.7	13.6	42.5	72.2	72.1	229.28	72.1	62.3
Pierce	12,221	36	60.8	13.1	--	--	62.1	201.68	--	--
Plaza	12,186	29	59.3	12.5	38.0	65.3	66.6	213.70	65.9	56.6
Trial Mean	12,183	34	59.7	13.1	38.0	65.9	65.3	209.73	--	--
C.V. %	6.7	5.8	1.2	5.5	8.7	9.5	10.4	10.8	--	--
LSD .05	NS	4	1.3	NS	NS	NS	NS	NS	--	--

Planting Date: May 2 — Harvest Date: August 22

*Returns were calculated by multiplying the 2001 yield by the test weight discount paid at the Southwest Grain Terminal located at Gladstone on September 17. The price paid on this date was $3.25/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.

2001 Durum Wheat - Continuously Cropped No-till — **Scranton**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%			bu/ac		
Mountrail	31	61.4	13.8	40.3	71.1	49.0	60.0	53.5
Ben	32	63.0	14.2	42.0	64.1	52.4	58.2	52.8
Maier	30	61.2	14.8	35.7	68.5	45.4	57.0	49.9
Plaza	29	61.6	13.7	37.0	62.8	50.0	56.4	49.9
Lebsock	31	63.6	13.7	36.0	60.0	49.8	54.9	48.6
Pierce	32	62.9	13.3			51.4		
Trial Mean	31	62.3	13.9	37.7	65.9	49.7	--	--
C.V. %	3.9	0.6	--	11.0	7.2	5.3	--	--
LSD .05	2	0.5	--	NS	NS	4.0	--	--
LSD .01	NS	0.7	--	NS	NS	5.5	--	--

Planting Date: April 23, 2001 — Harvest Date: August 7, 2001
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous Crop: 1999 = HRSW, 2000 = HRWW, 2001 = safflower.
NS = no statistical difference between varieties.

2001 Durum Wheat - Continuously Cropped No-till **Regent**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Lebsock	34	62.6	14.3	45.6	44.2	68.1	56.2	52.6
Mountrail	36	60.5	--	44.5	44.5	68.2	56.4	52.4
Maier	36	61.4	14.6	46.9	41.3	67.0	54.2	51.7
Ben	38	62.7	14.9	43.7	41.3	63.9	52.6	49.6
Plaza	29	59.2	14.5	41.3	41.3	63.3	52.3	48.6
Pierce	38	62.1	14.3			63.8		
Trial Mean	35	61.4	14.5	43.2	42.3	65.7	--	--
C.V. %	5.9	0.3	--	7.6	4.0	2.5	--	--
LSD .05	4	0.3	--	NS	NS	2.4	--	--
LSD .01	5	0.4	--	NS	NS	3.4	--	--

Planting Date: April 23, 2001 Harvest Date: August 7, 2001
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous Crop: 1999 = HRSW, 2000 = HRWW, 2001 = safflower.
NS = no statistical difference between varieties.

2001 Durum Wheat - Continuously Cropped No-till **New Leipzig**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Mountrail	31	60.5	15.6	44.2	38.5	50.6	44.6	44.4
Lebsock	33	63.0	15.3	42.2	35.1	52.7	43.9	43.3
Maier	32	62.0	16.0	43.0	34.9	52.1	43.5	43.3
Plaza	27	60.7	15.4	41.8	39.3	48.2	43.8	43.1
Ben	32	62.5	15.6	41.7	32.7	48.6	40.6	41.0
Pierce	33	62.9	15.2			48.7		
Trial Mean	31	61.9	15.5	42.2	35.9	50.1	--	--
C.V. %	6.0	0.6	--	9.9	6.1	4.4	--	--
LSD .05	3	0.6	--	NS	3.3	3.3	--	--
LSD .01	NS	0.8	--	NS	4.5	NS	--	--

Planting Date: April 24, 2001 Harvest Date: August 8, 2001
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous Crop: 1999 = HRSW, 2000 = HRWW, 2001 = safflower.
NS = no statistical difference between varieties.

2001 Durum Wheat - Continuously Cropped No-till — **Selfridge**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Ben	37	61.4	13.9	51.5	60.2	76.3	68.2	62.7
Mountrail	36	59.9	13.9	48.3	61.1	78.7	69.9	62.7
Lebsock	37	61.4	13.7	43.5	62.5	77.6	70.0	61.2
Maier	36	59.4	14.2	44.5	65.2	72.7	69.0	60.8
Plaza	29	58.0	13.5	43.4	59.9	74.1	67.0	59.1
Pierce	38	60.8	14.1			72.9		
Trial Mean	35	60.2	13.9	45.0	62.0	75.4	--	--
C.V. %	5.6	0.5	--	8.3	6.4	3.9	--	--
LSD .05	4	0.5	--	NS	NS	4.4	--	--
LSD .01	5	0.7	--	NS	NS	NS	--	--

Planting Date: April 24, 2001 Harvest Date: August 9, 2001
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous Crop: 1999 = HRSW, 2000 & 2001 = HRWW.
NS = no statistical difference between varieties.

2001 Durum Wheat - Continuously Cropped No-till — **Mandan**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Mountrail	36	58.1	13.8	60.5	66.1	50.3	58.2	59.0
Ben	38	59.0	14.5	59.0	62.0	43.8	52.9	54.9
Lebsock	36	59.7	14.0	55.0	66.4	43.1	54.8	54.8
Maier	33	55.7	15.4	51.9	63.5	37.3	50.4	50.9
Plaza	28	56.0	14.0	45.3	42.2	42.4	42.3	43.3
Pierce	37	59.1	13.7			43.4		
Trial Mean	35	57.9	14.2	54.4	61.3	43.4	--	--
C.V. %	3.5	1.4	--	8.9	14.4	6.9	--	--
LSD .05	2	1.5	--	8.6	13.2	5.4	--	--
LSD .01	3	2.1	--	NS	18.1	7.7	--	--

Planting Date: April 24, 2001 Harvest Date: August 9, 2001
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous Crop: 1999 = HRSW, 2000 = rye, 2001 = barley.
NS = no statistical difference between varieties.

Perkins County – Bison

Durum Wheat Variety Trial - Perkins County (Bison), 1999-2001.

Variety	Height	Lodging	Protein	Test Wt	Yield	Bu/A
	Inches	1-9*	Percent	Lb/Bu	2001	3 Year
BELZER	36	1	14.4	60.0	**49**	**51**
BEN	34	1	14.7	62.9	**50**	47
LEBSOCK	34	1	13.4	63.5	**52**	49
MAIER	34	1	14.7	61.7	**53**	49
MONROE	33	1	15.1	61.8	42	
MOUNTRAIL	33	1	14.7	60.3	**53**	**53**
MUNICH	31	1	14.3	61.4	48	48
PLAZA	30	1	13.8	60.5	**50**	48
RENVILLE	36	1	14.9	59.5	48	
VIC	37	1	15.4	63.0	**50**	
Average	33.9	1.0	14.5	61.5	49.3	49.1
LSD (P=.05)	1.7	0.0	.	1.1	4.8	2.3
CV	3.0	0.0	.	1.2	6.7	8.7

Planted: April 18, 2001 Herbicide: Bronate (16 oz/A)
Harvested: Aug 8, 2001 Additional Nitrogen: 80 Lb/A
Previous crop: Soybeans, No-till planted

Harding County - Ralph

Durum Wheat Variety Trial – Harding County (Ralph), 2001.

Variety	Height	Lodging	Test Wt	Protein	Yield
	Inches	1-9*	Lb/Bu	Percent	Bu/A
BELZER	26	1	58.9	11.1	26
BEN	27	1	62.5	12.0	**29**
LEBSOCK	26	1	62.5	10.6	**31**
MAIER	29	1	62.0	12.9	25
MONROE	28	1	61.1	10.9	**28**
MOUNTRAIL	27	1	61.0	10.3	**33**
MUNICH	26	1	60.5	11.0	**33**
PLAZA	25	1	61.4	11.7	**29**
RENVILLE	29	1	61.2	11.1	**30**
VIC	31	1	62.4	11.6	**30**
Average	27.4	1.0	61.4	11.3	29.4
LSD (P=.05)	3.1	0.0	1.5	.	3.3
CV	6.5	0.0	1.7	.	7.8

* 1=No lodging, 9 = 100% lodged.

Planted: April 18, 2001 Herbicide: Puma (10.6 oz/A) + Bronate (16 oz/A)
Harvested: August 7, 2001 Additional Nitrogen: None

Durum, dryland fallow, Wibaux, Montana.

Cultivar	Yield 2001	Yield 3 yr	TW 2001	Protein 2001	Protein 2 yr
	- bus/a -		lb/b	-- % --	
Lebsock	39.4	41.8	62.7	14.8	15.4
Plaza	38.0	41.5	60.7	15.6	15.2
Mountrail	37.7	41.1	60.0	16.0	15.4
Kyle	39.2	40.9	61.2	15.5	15.5
Maier	41.3	39.7	61.8	15.7	16.0
Ben	38.6	38.1	61.8	16.0	15.9
Sceptre	36.7	37.7	60.3	15.4	15.3
Renville	37.0	36.9	61.0	15.8	15.6
AC Navigator	40.8	--	61.3	14.9	--
AC Avonlea	38.8	--	60.5	15.9	--
Belzer	38.6	--	60.8	15.2	--
AC Pathfinder	38.7	--	61.5	15.0	--
Pierce	36.9	--	61.3	15.9	--
AC Morse	39.5	--	60.8	16.1	--
AC Napoleon	36.1	--	59.5	16.2	--
AC Melita	36.2	--	61.2	15.6	--
LSD 5%	2.2		0.6	0.6	

Planted: May 3 **Harvested:** Aug 15

Durum in the West River Region
Combined Means

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac				
Mountrail	32	60.2	13.8	48.5	54.6	52.9	53.8	52.0
Ben	33	62.2	14.5	50.7	49.8	49.1	49.4	49.9
Maier	32	60.6	14.4	45.0	52.3	49.1	50.7	48.8
Lebsock	32	62.3	13.6	45.4	50.4	49.9	50.2	48.6
Plaza	28	59.9	13.7	44.5	50.3	49.6	50.0	48.1
Pierce	34	61.7	13.8			50.7		
# of locations	12	12	12	10	11	12	23	33

Locations: Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Hannover, Beulah, Glen Ullin, Wibaux MT, Ralph SD and Bison SD.

2002 North Dakota barley variety descriptions

Variety	Use[1]	Origin	Year Released	Awn Type[2]	Aleurone Color	Height	Straw Strength	Relative Maturity	Reaction to Disease[3]			
									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	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
Lacey	F†	MN	1999	S	white	m. short	strg.	med.	S	S	MR-R	MS-S
Drummond	F†	ND	2000	S	w	m. short	v strg	med	S	S	MR-R	MS-S
Legacy	F†	BARI	2000	S	w	med	strg	m. late	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[4]	M/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[5]	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[6]	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 M = malting; F = feed; SP = special uses (hulles).
2 Rough or smooth awned.
3 R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; N/A = not available.
4 Lower DON accumulation than other varieties tested.
5 Recommended as a malting barley in western US.

Barley - Recrop	Dickinson, ND

Variety	Days to Head	Seeds per Pound	Plant Height	Test Weight	Protein	Lodging	% Plump	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 Year	Average Yield 3 Year
			in	lbs/bu	%		>6/64	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Six Row												
Drummond	60	12,981	31	42.4	13.8	8	81.0	91.0	45.0	110.3	77.7	82.1
Excel	61	12,635	33	42.4	12.1	6	76.9	94.6	58.9	110.9	84.9	88.1
Foster	62	11,983	32	41.8	12.7	6	86.9	94.2	54.1	109.0	81.5	85.8
Lacey	60	12,326	32	42.9	12.4	7	81.1	87.6	51.2	105.6	78.4	81.5
Legacy	62	13,922	30	40.2	12.6	8	71.6	84.5	55.1	105.2	80.1	81.6
MN Brite	62	13,785	32	42.1	13.9	8	79.3	84.1	50.0	101.5	75.8	78.5
Morex	60	12,873	33	41.3	12.8	8	73.0	82.8	43.3	99.6	71.5	75.2
Robust	62	12,460	31	42.9	13.0	7	80.3	82.8	51.6	104.3	78.0	79.6
Stander	61	11,389	31	44.2	13.5	5	88.5	94.3	55.6	111.1	83.3	87.0
Two Row												
Bowman	60	11,183	31	45.4	13.1	8	87.9	79.0	43.2	86.6	64.9	69.6
Conlon	58	10,962	30	45.4	13.3	8	88.9	83.9	41.6	95.4	68.5	73.6
Harrington	64	12,579	33	38.6	12.9	5	74.8	73.3	46.4	91.5	68.9	70.4
Logan	60	10,214	32	44.0	13.2	4	84.8	90.6	46.1	91.1	68.6	75.9
Merit	68	11,363	30	45.2	12.8	1	83.3	80.6	45.6	118.8	82.2	81.7
Stark	61	10,911	30	46.3	13.0	5	84.5	89.3	51.3	98.4	74.9	79.7
Valier	65	11,509	34	48.5	14.7	2	81.8	--	--	109.4		
Trial Mean	61	12,101	32	43.3	13.1	6	82.8	86.8	49.5	104.9	--	--
C.V. %	1.0	5.3	9.1	2.3	--	24.2	3.8	4.6	11.2	5.5	--	--
LSD .05	1	900	4	1.4	--	2	4.4	5.7	7.8	8.1	--	--

Planting Date: April 24
Harvest Date: August 3
Lodging 0=No lodging, 9=Completely flat

2000 Barley - Continuously Cropped No-till — **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Grain Yield 1998	Grain Yield 1999	Grain Yield 2000	Average Yield 2 year	Average Yield 3 year
		inches	lbs/bu	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
2 Row								
Logan	70	32	49.4	128.9	110.4	77.2	93.8	105.5
Conlon	72	33	49.5	132.8	96.3	77.8	87.0	102.3
Stark	73	34	49.7	101.8	92.4	72.6	82.5	88.9
Bowman	72	33	48.8	103.3	87.9	71.7	79.8	87.6
Harrington	83	34	47.0	100.0	91.4	70.1	80.8	87.2
Merit	83	30	44.8		115.5	78.2	96.8	
6 Row								
Excel	73	36	46.2	128.2	103.0	83.9	93.4	105.0
B2978	75	35	45.9	121.8	93.3	80.2	86.8	98.4
Drummond	72	36	47.0	115.3	96.8	82.2	89.5	98.1
Robust	74	40	48.1	102.6	87.0	69.1	78.0	86.2
Morex	74	37	47.6		105.2	84.5	94.8	
Stander	74	36	47.8		97.9	85.9	91.9	
Lacey	72	35	48.0		93.4	84.1	88.8	
Foster	74	36	45.9		99.1	77.4	88.2	
Trial Mean	74	35	47.5	113.4	98.6	79.1	--	--
C.V. %	1.5	4.1	1.3	6.4	7.5	6.6	--	--
LSD .05	2	2	0.9	10.3	10.5	7.4	--	--
LSD .01	2	3	1.2	13.8	14.0	9.9	--	--

Planting Date: April 10, 2000
Harvest Date: July 31, 2000
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: 1998 = fallow, 1999 = field pea, 2000 = soybean.
Notes: Minor hail damage. Moderate Puma herbicide injury.

2001 Barley - Continuously Cropped No-till **Scranton**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Stark	28	50.8	13.0	36.3	69.3	69.2	69.2	58.3
Conlon	25	49.9	12.6	47.4	63.9	55.3	59.6	55.5
Robust	29	48.6	12.2		63.0	79.7	71.4	
Trial Mean	27	49.7	12.6	47.5	66.1	68.1	--	--
C.V. %	3.6	0.5	--	17.6	5.4	9.2	--	--
LSD .05	2	0.4	--	13.0	NS	10.8	--	--
LSD .01	NS	0.6	--	NS	NS	16.4	--	--

Planting Date: April 23, 2001 Harvest Date: August 7, 2001
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: 1999 = HRSW, 2000 = HRWW, 2001 = safflower.
NS = no statistical difference between varieties.

2001 Barley - Continuously Cropped No-till **Regent**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Conlon	28	50.0	12.3	92.6	64.9	97.8	81.4	85.1
Stark	33	51.3	12.1	87.8	66.5	93.9	80.2	82.7
Robust	33	48.6	12.1		63.1	90.6	76.8	
Trial Mean	31	50.0	12.2	92.6	65.7	94.1	--	--
C.V. %	6.3	1.1	--	5.7	10.2	6.2	--	--
LSD .05	4	1.0	--	NS	NS	NS	--	--
LSD .01	NS	1.5	--	NS	NS	NS	--	--

Planting Date: April 23, 2001 Harvest Date: August 7, 2001
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: 1999 = HRSW, 2000 = HRWW, 2001 = safflower.
NS = no statistical difference between varieties.

2001 Barley - Continuously Cropped No-till — **New Leipzig**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Stark	29	51.3	13.0	76.1	40.5	84.3	62.4	67.0
Conlon	27	50.9	12.8	76.5	36.1	67.4	51.8	60.0
Robust	29	48.3	12.9		38.6	75.6	57.1	
Trial Mean	29	50.2	12.9	78.0	38.8	75.7	--	--
C.V. %	9.8	0.5	--	7.7	9.7	1.9	--	--
LSD .05	NS	0.5	--	NS	NS	2.4	--	--
LSD .01	NS	0.7	--	NS	NS	3.7	--	--

Planting Date: April 24, 2001 Harvest Date: August 8, 2001
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: 1999 = HRSW, 2000 = HRWW, 2001 = safflower.
NS = no statistical difference between varieties.

2001 Barley - Continuously Cropped No-till — **Selfridge**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Conlon	35	51.3	11.7	67.6	56.0	120.0	88.0	81.2
Stark	36	50.9	12.1	73.7	51.9	98.4	75.2	74.7
Robust	38	48.2	12.3		57.0	95.6	76.3	
Trial Mean	36	50.5	12.0	71.0	54.3	104.7	--	--
C.V. %	4.1	0.8	--	8.4	11.1	5.1	--	--
LSD .05	NS	0.7	--	NS	NS	9.3	--	--
LSD .01	NS	1.0	--	NS	NS	14.1	--	--

Planting Date: April 24, 2001 Harvest Date: August 9, 2001
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: 1999 = HRSW, 2000 & 2001 = HRWW.
NS = no statistical difference between varieties.

Spring Barley Variety Trial - Perkins County (Bison), 1999-2001.

Variety	Height Inches	Lodging 1-9*	Test Wt Lb/Bu	Protein Percent	Yield 2001	Bu/A 3 Year
TWO ROW						
CONLON	26	1	49.9	10.6	**43**	**51**
LOGAN	27	1	51.3	10.9	**47**	**55**
SIX ROW						
DRUMMOND	28	1	48.1	11.3	38	48
EXCEL	26	1	46.8	10.6	38	47
FOSTER	30	1	47.7	10.9	**44**	**53**
LACEY	27	1	48.6	10.7	38	**52**
LEGACY	27	1	46.9	11.0	**43**	.
MNBRITE	28	1	48.2	11.8	32	48
ROBUST	29	1	48.6	11.6	37	50
STANDER	28	1	48.7	11.3	**43**	**55**
Average	27	1.0	48.5	11.1	40.4	51.0
LSD (P=.05)	3.7	0.0	1.1	.	6.9	5
CV	9.4	0.0	1.6	.	11.7	13

Planted: April 18, 2001 Herbicide: Bronate (16 oz/A)
Harvested: Aug 7, 2001 Additional Nitrogen: 80 Lb/A
Previous crop: Soybeans, No-till planted * 1 = no lodging, 9 = 100% lodged.

Spring Barley Variety Trial - Harding County (Ralph), 1999-2001.

Variety	Height Inches	Lodging 1-9*	Test Wt Lb/Bu	Protein Percent	Yield 2001	Bu/A 3 Year
TWO ROW						
CONLON	20.5	1	48.5	9.9	**42**	42
LOGAN	18.5	1	48.9	9.5	**45**	46
SIX ROW						
DRUMMOND	24.0	1	48.3	11.0	30	40
EXCEL	21.0	1	47.9	10.0	36	46
FOSTER	21.5	1	48.5	9.8	37	44
LACEY	23.0	1	49.0	10.4	36	49
LEGACY	20.5	1	49.1	9.9	**42**	.
MNBRITE	24.0	1	48.9	10.5	33	41
ROBUST	22.5	1	49.2	10.6	25	40
STANDER	23.0	1	49.1	9.8	33	45
Average	21.9	1.0	48.7	10.1	35.6	43.7
LSD (P=.05)	5.3	0.0	1.5	.	3.2	NS
CV	10.6	0.0	2.1	.	6.2	10

Planted: April 18, 2001 Herbicide: Puma (10.6 oz/A) + Bronate (16 oz/A)
Harvested: August 7, 2001 Additional Nitrogen: None
Previous crop: Conventional fallow *1 = no lodging, 9 = 100% lodged.

Barley Varieties	Wibaux, MT, 2001	
Variety	Grain yield	Test weight
	bushels/acre	lb/bu
Stander	40.6	43.7
Robust	35.7	43.5
Mean	38.2	43.6
CV%	20.9	1.2
LSD $_{.05}$	NS	NS

2001 Barley **Mandan**

Variety	Plant Height	Test Weight	Protein	Grain Yield
	inches	lbs/bu	%	bu/ac
Conlon	32	50.3	12.3	104.9
Robust	37	47.9	12.4	85.8
Stark	31	51.2	12.5	72.2
Trial Mean	33	49.8	12.4	87.6
C.V. %	4.6	0.7	--	5.9
LSD .05	3	0.8	--	11.8
LSD .01	NS	1.3	--	19.6

Planting Date: April 24, 2001
Harvest Date: August 9, 2001
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: Barley.
NS = no statistical difference between varieties.

Barley in the West River Region
Combined Means

				Grain Yield			Average Yield	
Variety	Plant Height	Test Weight	Protein	1999	2000	2001	2 year	3 year
	inches	lbs/bu	%	bu/ac				
Stark	31	50.3	12.6	75.9	58.7	86.1	72.4	73.6
Conlon	28	49.5	11.9	77.4	56.7	78.2	67.4	70.8
Robust	31	47.3	12.1		57.1	69.9	63.5	
# of locations	8	9	8	6	6	9	15	21

Locations: Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Wibaux MT, Ralph SD and Bison SD.

2002 North Dakota Oat Variety Descriptions

							Reaction to Diseases			Quality Factors		
Variety*	Origin	Year Released	Grain Color	Height	Straw Strength	Maturity[2]	Stem rust[1]	Crown rust	Barley Y. Dwf.[4]	Rel. Yield	bu/Wt	Protein[3]
Hytest	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
Killdeer	ND	2000	white	med	strong	M	R	MR	MT	v.good	good	M
Richard	MN	2000	yellow	tall	strong	M	S	MR	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	SVAS	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	SVAS	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	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	Proven	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	Proven	1997	red	med	strong	L	R	R	T	v. good	good	ML
Triple Crown	Canterra	1998	white	tall	strong	L	S	R	S	good	good	L
Loyal	SD	2000	ivory	tall	m.strong	L	MS	R-MR	T	v.good	good	MH
Vista	WI	2000	yellow	tall	strong	L	S	R	MT	v.good	good	M
Gem	WI	1996	yellow	tall	strong	L	S	R	MT	good	good	MH
Belle	WI	1995	yellow	tall	strong	L	S	R	MT	good	good	M
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

* 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 - Fallow **Dickinson, ND**

Variety	Days to Head	Seeds per Pound	Plant Height	Lodging	Test Weight	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Returns	Average Yield 2 Year	Average Yield 3 Year
			in	0 - 9	lbs/bu	-----bu/ac-----			$/ac	-----bu/ac-----	
AC Assiniboia	67	10,971	41	2.3	32.2	112.5	122.6	139.2	103.54	130.9	124.8
AC Medallion	66	12,262	41	6.3	32.0	116.1	123.6	138.1	104.79	130.9	125.9
Belle	65	13,147	38	0.8	33.4	118.1	106.4	128.9	101.67	117.6	117.8
Brawn	63	10,892	36	0.8	31.7	131.5	131.5	134.9	94.02	133.2	132.6
CDC Boyer	65	11,670	44	3.5	31.4	111.1	128.6	135.6	93.83	132.1	125.1
CDC Pacer	65	11,601	39	1.8	32.8	125.0	131.2	158.8	121.87	145.0	138.3
Ebeltoft	68	11,055	36	1.3	31.9	133.5	142.1	154.2	116.14	148.1	143.3
HiFi	64	14,752	41	4.8	33.3	119.6	129.1	132.0	101.52	130.6	126.9
Hytest	61	12,091	42	1.8	35.4	115.5	87.2	118.4	104.99	102.8	107.0
Jerry	60	12,762	40	2.0	34.6	122.0	85.3	133.6	112.30	109.5	113.6
Jud	64	13,813	44	3.8	33.1	107.3	127.2	136.6	104.03	131.9	123.7
Killdeer	62	14,034	36	3.8	31.7	128.9	125.4	139.3	99.82	132.3	131.2
Loyal	65	15,533	42	2.0	34.4	116.5	124.4	122.1	98.71	123.2	121.0
Monida	66	14,930	39	6.3	30.9	134.2	147.3	148.0	98.75	147.6	143.2
Morton	65	12,586	42	2.0	35.4	119.4	112.1	128.8	112.24	120.5	120.1
Otana	64	15,209	43	3.8	33.4	134.9	130.0	134.1	104.70	132.0	133.0
Paul*	68	14,057	40	3.0	38.1	64.5	88.6	105.1	--	96.8	86.1
Triple Crown	68	12,950	41	2.0	32.6	121.2	131.4	148.1	110.62	139.7	133.6
Vista	62	12,526	40	1.3	34.0	--	--	146.8	120.07	--	--
Whitestone	66	14,146	38	7.0	30.7	131.1	140.7	142.0	95.62	141.4	137.9
Youngs	65	10,473	41	4.0	30.7	135.1	137.3	139.7	94.53	138.5	137.4
Trial Mean	64	13,020	40	3.3	33.4	119.7	123.5	137.3	107.60	--	--
C.V. %	1.4	6.7	4.7	55.2	3.1	6.2	6.7	7.6	11.9	--	--
LSD .05	1	1,229	3	2.6	1.5	10.4	11.7	14.7	17.97	--	--

Planting Date: April 24
Harvest Date: August 6
Lodging 0 = No lodging, 9 = Completely flat
* Naked
Returns were calculated by multiplying the 2001 yield by the test weight discount paid at the Southwest Grain Terminal located in Gladstone on September 17. The price paid was $.95/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.

2000 Oats - Continuously Cropped No-till — Hettinger

Variety	Days to head	Plant Height	Test Weight	Grain Yield 1998	Grain Yield 1999	Grain Yield 2000	Average Yield 2 year	Average Yield 3 year
		inches	lbs/bu	bu/ac	bu/ac	bu/ac		
Killdeer	64	38	38.4	150.5	155.3	108.2	131.8	138.0
Whitestone	67	39	38.2	131.2	157.1	114.3	135.7	134.2
Ebeltoft	70	37	37.6	126.7	151.7	109.7	130.7	129.4
Monida	70	39	35.0	135.2	142.8	95.9	119.4	124.6
Brawn	63	38	37.5	135.3	132.1	96.0	114.0	121.1
Otana	67	44	38.2	126.5	131.0	100.6	115.8	119.4
Youngs	68	44	37.8	126.1	139.6	90.4	115.0	118.7
Jerry	63	42	39.6	127.6	137.2	90.8	114.0	118.5
AC Assiniboia	69	38	37.2	127.2	127.7	93.9	100.8	116.3
Troy	66	44	39.0	122.9	128.9	91.9	110.4	114.6
Morton	66	42	39.0	129.1	125.3	79.7	102.5	111.4
AC Medallion	68	42	36.0	123.2	116.4	91.5	104.0	110.4
Jud	67	44	38.6	121.2	115.8	91.2	103.5	109.4
CDC Boyer	69	42	36.2	126.1	108.4	78.3	93.4	104.3
Hytest	63	44	39.9	121.2	94.4	65.1	79.8	93.6
Paul*	71	41	43.0	88.5	70.7	55.8	63.2	71.7
HiFi	66	43	37.5		139.9	91.0	115.4	
Gem	64	39	37.7		129.8	92.5	111.2	
Triple Crown	73	40	36.2		124.4	92.8	108.6	
Belle	71	39	37.8		121.5	87.8	104.6	
CDC Pacer	66	42	36.0		114.0	84.2	99.1	
Loyal	68	44	38.6			97.9		
Riser	55	36	37.0			58.5		
Trial Mean	67	41	38.3	124.9	128.4	91.2	--	--
C.V. %	1.3	5.1	2.0	5.9	11.8	10.5	--	--
LSD .05	1	3	1.1	10.3	21.3	13.5	--	--
LSD .01	2	4	1.5	13.7	28.2	17.9	--	--

* = Naked (hulless) type.
Planting Date: April 11, 2000
Harvest Date: July 31, 2000
Seeding Rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 1998 = fallow, 1999 & 2000 = soybean.

Hannover Oat - Recrop — Dickinson, ND

Variety	Seeds/ Pound	Plant Height	Test Weight	Grain Yield 2000	Grain Yield 2001	* Returns	2 Year Average
		in	lbs/bu	----bu/ac----		$/ac	
HiFi	14,048	38	31.1	--	141.0	98.13	--
Killdeer	13,659	33	33.5	160.4	126.8	101.45	143.6
Morton	13,169	39	33.4	--	136.2	107.55	--
Paul**	17,006	41	38.5	--	83.1	--	--
Trial Mean	14,519	38	34.8	150.7	118.2	102.38	--
C.V. %	6.1	6.0	2.7	8.6	8.8	--	--
LSD .05	1,671	4	1.7	NS	19.7	--	--

Planting Date: May 1 Harvest Date: August 21 ** Naked

Beulah Oat - Recrop — Dickinson, ND

Variety	Seeds/ Pound	Plant Height	Test Weight	Grain Yield 2000	Grain Yield 2001	* Returns	2 Year Average
		in	lbs/bu	----bu/ac----		$/ac	
HiFi	13,187	31	30.3	--	56.6	37.62	--
Killdeer	12,095	28	35.2	78.5	42.1	35.66	60.3
Morton	12,762	31	34.3	--	57.7	47.23	--
Paul**	15,560	36	42.0	--	39.1	--	--
Trial Mean	13,526	32	36.8	84.3	47.2	40.17	--
C.V. %	5.2	8.5	3.6	15.6	11.4	--	--
LSD .05	1,323	NS	2.5	NS	10.1	--	--

Planting Date: May 1 Harvest Date: August 15 ** Naked

*Returns were calculated by multiplying the 2001yield by test weight discount paid at the Southwest Grain Terminal located at Gladstone on September 17. The price paid on this date was $.95/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.

Glen Ullin Oat - Recrop	Dickinson, ND

Variety	Seeds/ Pound	Plant Height	Test Weight	Grain Yield 2000	Grain Yield 2001	* Returns	2 Year Average
		in	lbs/bu	----bu/ac----		$/ac	
HiFi	12,958	38	34.6	--	164.7	138.54	--
Killdeer	13,990	33	34.3	159.0	149.3	126.06	154.2
Morton	13,186	40	36.0	--	179.0	158.67	--
Paul**	17,865	41	40.4	--	127.4	--	--
Trial Mean	14,654	38	36.9	152.2	153.8	141.09	--
C.V. %	4.7	4.8	2.2	5.5	8.5	--	--
LSD .05	1,301	4	1.5	NS	24.6	--	--

Planting Date: May 2 Harvest Date: August 22 ** Naked

*Returns were calculated by multiplying the 2001yield by test weight discount paid at the Southwest Grain Terminal located at Gladstone on September 17. The price paid on this date was $.95/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.

2001 Oats - Continuously Cropped No-till	Scranton

Variety	Plant Height	Test Weight	Grain Yield 1997	Grain Yield 1999	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	----------bu/ac----------				
Jud	37	36.4	90.2	52.3	121.4	86.8	88.0
Jerry	35	37.4	92.3	53.2	111.1	82.2	85.5
Ebeltoft	40	36.4		67.3	117.2	92.2	
Youngs	36	35.8		71.0	109.8	90.4	
Killdeer	35	36.6			130.4		
Morton	36	37.9			118.7		
HiFi	36	37.2			117.2		
Trial Mean	36	36.8	94.1	55.9	118.0	--	--
C.V. %	10.8	0.7	9.7	14.9	11.4	--	--
LSD .05	NS	0.4	NS	15.4	NS	--	--

Planting Date: April 23, 2001 Harvest Date: August 7, 2001
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 1997 = fallow, 1999 = HRSW, 2001 = safflower.
NS = no statistical difference between varieties.

2001 Oats - Continuously Cropped No-till **Regent**

Variety	Plant Height	Test Weight	-- Grain Yield -- 2000	2001	Average Yield 2 year
	inches	lbs/bu			
Killdeer	40	37.3	130.4	124.0	127.2
Youngs	44	38.2	127.1	111.5	119.3
Ebeltoft	37	38.6	118.3	108.9	113.6
Jud	37	36.4	101.7	117.2	109.4
Jerry	41	36.0	117.5	101.1	109.3
Morton	40	39.5		130.2	
HiFi	34	37.4		104.7	
Trial Mean	39	37.6	111.5	113.9	--
C.V. %	6.9	4.3	5.6	15.8	--
LSD .05	NS	NS	15.3	NS	--

Planting Date: April 23, 2001 Harvest Date: August 7, 2001
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 1999 = HRSW, 2000 = HRWW, 2001 = safflower.
NS = no statistical difference between varieties.

2001 Oats - Continuously Cropped No-till **New Leipzig**

Variety	Plant Height	Test Weight	-------- Grain Yield -------- 1999	2000	2001	Average Yield 2 year	3 year
	inches	lbs/bu	----------bu/ac----------				
Ebeltoft	35	36.1	101.5	78.8	87.9	83.4	89.4
Youngs	36	36.6	83.2	81.0	94.4	87.7	86.2
Jud	34	35.2	76.2	78.5	88.8	83.6	81.2
Jerry	37	36.3	75.7	57.9	96.5	77.2	76.7
Killdeer	37	35.7		87.9	91.3	89.6	
HiFi	31	35.2			102.9		
Morton	33	34.7			98.8		
Trial Mean	35	35.7	75.6	71.9	94.4	--	--
C.V. %	9.6	3.8	12.3	17.7	13.0	--	--
LSD .05	NS	NS	14.1	18.8	NS	--	--

Planting Date: April 24, 2001 Harvest Date: August 8, 2001
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 1999 = HRSW, 2000 = HRWW, 2001 = safflower.
NS = no statistical difference between varieties.

2001 Oats - Continuously Cropped No-till	Selfridge

Variety	Plant Height	Test Weight	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Ebeltoft	41	38.4	38.4	116.9	116.6	116.8	90.6
Jud	38	36.0	35.6	96.6	137.5	117.0	89.9
Youngs	40	36.8	26.1	107.9	118.2	113.0	84.1
Jerry	39	35.3	32.0	100.0	118.9	109.4	83.6
Killdeer	42	37.5		109.0	104.4	106.7	
HiFi	37	35.6			128.5		
Morton	41	36.6			111.7		
Trial Mean	40	36.6	30.8	99.5	119.4	--	--
C.V. %	6.3	4.5	43.4	7.8	17.0	--	--
LSD .05	NS	NS	NS	11.5	NS	--	--

Planting Date: April 24, 2001 Harvest Date: August 9, 2001
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 1999 = HRSW, 2000 & 2001 = HRWW.
NS = no statistical difference between varieties.

2001 Oats - Continuously Cropped No-till	Mandan

Variety	Plant Height	Test Weight	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Ebeltoft	40	36.1	99.2	110.2	84.1	97.2	97.8
Youngs	40	34.5	84.1	110.0	97.8	103.9	97.3
Jud	38	35.1	91.0	97.0	81.3	89.2	89.8
Jerry	39	33.6	58.7	89.4	90.9	90.2	79.7
Killdeer	42	35.5		121.1	89.2	105.2	
HiFi	35	33.3			98.9		
Morton	39	35.3			82.2		
Trial Mean	39	34.8	76.3	98.8	89.2	--	--
C.V. %	7.9	2.7	5.9	10.4	20.8	--	--
LSD .05	NS	1.6	8.3	15.2	NS	--	--

Planting Date: April 24, 2001 Harvest Date: August 9, 2001
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 1999 = HRSW, 2000 = rye, 2001 = barley.
NS = no statistical difference between varieties.

Oat Variety Trial - Perkins County (Bison), 1999-2001

Variety	Height	Lodging	Test Wt	Yield	Bu/A
	Inches	1-9*	Lb/Bu	2001	3 Year
DON	28	5.0	40.8	76	95
EBELTOFT	30	3.3	38.4	82	**113**
HYTEST	33	4.0	44.1	62	75
JERRY	34	3.0	41.2	71	98
KILLDEER	30	3.5	39.2	91	
LOYAL	34	5.0	39.5	78	**103**
RICHARD	34	3.8	40.1	73	**104**
RISER	30	6.3	40.6	67	79
SETTLER	34	8.3	39.3	66	90
TROY	35	5.8	39.5	69	95
YOUNGS	34	4.3	39.7	77	99
SD 96024	34	7.0	37.3	88	
SD 97525	34	6.5	42.1	75	
SD 97039	32	6.5	41.1	69	
SD 97250	32	2.0	41.7	85	
MN 97239	33	4.3	38.4	78	
PAUL HULLESS	34	4.3	47.9	60	76
SD 97839 HULLESS	29	2.8	43.1	65	
Average	32.4	4.7	40.8	74.0	93
LSD (P=.05)	2.8	1.3	1.0	10.5	12
CV	6.1	18.9	1.7	10.1	9

* 1 = No Lodging, 9 = 100% lodged.

Planted: April 18, 2001
Harvested: Aug 7, 2001
Previous crop: Soybeans, No-till planted

Herbicide: Bronate (16 oz/A)
Additional Nitrogen: 80 Lb/A

Oat Varieties at Wibaux, MT, 2001

Variety	Grain yield	Test weight
	bu/acre	lb/bushel
Ebeltoft	102.5	34.7
Otana	100.4	36.2
Brawn	98.5	35.2
AC Medallion	93.4	34.7
Jerry	85.2	39.5
Paul	80.0	40.5
Mean	93.3	36.8
CV%	12.1	8.2
$LSD_{.05}$	NS	NS

Oats in the West River Region
Combined Means

Variety	Plant Height	Test Weight	Grain Yield			Average Yield	
			1999	2000	2001	2 year	3 year
	inches	lbs/bu	bu/ac				
Ebeltoft	37	36.3	76.9	113.7	106.7	110.2	99.1
Jud	38	35.4	79.7	98.7	113.8	106.2	97.4
Youngs	39	36.0	74.5	110.1	106.9	108.5	97.2
Jerry	38	36.7	77.9	90.2	101.0	95.6	89.7
Killdeer	36	35.6		115.0	108.8	111.9	
HiFi	36	34.2			116.3		
Morton	38	36.4			115.9		
# of locations	10	11	10	10	11	21	31

Locations: Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Beulah, Hannover, Glen Ullin, Wibaux MT, and Bison SD.

2001 Hard Red Winter Wheat Variety Descriptions

Variety	Agent or Origin	Year	Quality	Leaf rust[2]	Stem rust[2]	Maturity	Straw strength	Height	Winter[1] hardiness
Roughrider	ND	1975	Good	S	R[3]	med.	m. strong	med.	good
Norstar	Can.	1977	Average	S	S	late	med.	tall	good
Rita	SD	1980	Average	MS	MR[4]	early	strong	med.	fair
Rose	SD	1981	Poor	S	MS[4]	early	v. strong	short	fair
Agassiz	ND	1983	Average	S	R	med.	med.	med.	good
Seward	ND	1987	Poor	S	R	med.	m. strong	med.	good
Arapahoe	NE	1989	Poor	MS	MR	med.	med.	med.	fair
CDC Kestrel	Can.	1994	Poor	S	S	med.	m. strong	med.	good
Elkhorn	ND	1995	Average	MR	R[5]	med.	med.	med.	good
AC Readymade	Can.	1996	NA	S	S	med.	strong	med.	good
Erhardt	MT	1996	NA[6]	S	R	med.	strong	med	good
McGuire	MT	1996	NA	S	R	m. early	strong	m. tall	fair
Morgan	WPB	1996	NA	NA	NA	med.	m. strong	med.	good.
Rampart[7]	MT	1996	NA	S	R	med.	strong	med.	poor
Alliance	NE	1997	NA	S	NA	early	strong	short	good
Crimson	SD	1997	NA	MS	NA	med.	m. strong	med.	NA
Nekota	SD/NE	1997	NA	MS	NA	early	v. strong	v. short	good
Tandem	SD	1997	Good	S	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
Culver	NE	1999	NA	NA	NA	m. early	m. strong	med.	good
Harding	SD	1999	NA	MS/MR	NA	med.	m. strong	med.	good
Millenium	NE/SD	1999	NA	NA	NA	med.	strong	m. short	fair
CDC Raptor	Can		NA	NA	NA	med.	m. strong	m. short	good
CDC Falcon	Can/WPB	2000	NA	NA	NA	med.	m. strong	short	good
Nuplains	NE	2000	NA	NA	NA	med.	m. strong	short	fair-poor
Wesley	NE/SD/WY	2000	NA	NA	NA	m. early	m. strong	short	fair
Jerry	ND	2001	Good	MR	R	med.	strong	med.	good

[1] Varieties with less than good winterhardiness should be seeded only in tall stubble. [2] R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible. [4] Susceptible in artificially induced epidemics. [3] Slow rusting type of resistance to race 15. [5] Occasionally mixed with some susceptible plants. [6] NA = data not available, or data insufficient to give rating. [7] Saw fly resistant.

Hard Red Winter Wheat - Recrop **Dickinson,ND**

Variety	Winter Surviv.	Seeds per Pound	Height	Lodging Score	Test Weight	Protein	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Returns	Average Yield 2 Year	Average Yield 3 Year
	%		in	0-9	lbs/bu	%	bu/ac	bu/ac	bu/ac	$/ac	bu/ac	bu/ac
Agassiz	76	15,773	41	4.3	58.3	14.2	71.2	73.5	51.7	107.61	62.6	65.5
Alliance	61	15,388	30	2.8	55.3	12.5	61.6	75.9	32.7	63.43	54.3	56.7
Arapahoe	76	15,684	34	3.0	58.3	12.9	73.3	84.0	48.7	102.04	66.3	68.7
CDC Kestrel	74	16,189	33	3.5	56.4	12.7	81.5	77.9	48.7	96.60	63.3	69.4
Crimson	57	14,855	29	2.0	58.1	14.1	71.8	79.6	34.3	71.43	56.9	61.9
Elkhorn	75	16,924	37	4.0	56.3	13.4	68.9	73.5	50.1	99.65	61.8	64.2
Erhardt	71	16,003	32	1.0	57.3	14.4	66.0	72.9	43.3	89.63	58.1	60.7
Harding	74	15,246	34	2.5	56.9	13.8	78.0	82.6	42.1	85.97	62.3	67.6
Jerry	68	14,163	32	3.0	56.5	13.5	74.8	81.0	43.4	88.12	62.2	66.4
Nekota	68	14,127	28	1.5	58.3	13.6	61.6	75.1	35.1	72.53	55.1	57.3
Norstar	84	16,176	42	3.8	58.5	13.1	70.1	72.2	51.6	107.85	61.9	64.6
Ransom	80	18,587	33	4.5	55.4	13.3	67.3	79.0	45.4	88.82	62.2	63.9
Roughrider	76	16,997	40	5.0	58.1	14.2	59.1	70.2	46.1	96.53	58.2	58.5
Seward	76	15,987	38	4.3	58.5	12.9	76.0	68.7	42.4	86.22	55.6	62.4
Tandem	56	13,738	31	2.3	56.5	14.2	63.1	81.6	32.3	64.73	56.9	59.0
Windstar	71	16,483	34	3.8	59.1	13.4	63.5	76.1	42.0	89.34	59.1	60.5
Trial Mean	71	15,770	34	3.2	57.3	13.5	69.2	74.8	43.1	88.16	--	--
C.V. %	13.2	5.9	10.3	27.8	2.2	--	7.5	6.2	13.9	--	--	--
LSD .05	13	1,332	5	1.3	1.8	--	7.3	6.5	8.6	--	--	--

Planting Date: September 18, 2000
Harvest Date: August 7, 2001
Lodging 0 = No lodging, 9 = Completely flat

Returns were calculated by multiplying the 2001 yield by protein premium or discount paid at the Southwest Grain Terminal located at Gladstone on September 17. The price paid on this date was $2.39/bu, assuming that grain protein concentration was 12%. An additional $.02/bu was paid for each additional 0.25% increase in grain protein up to 14% protein. Grain was discounted $0.04/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].

2000 Hard Red Winter Wheat - Continuously Cropped No-till	Hettinger

Variety	Days to Head	Plant Height	Test Weight	Grain Protein	Grain Yield 1998	Grain Yield 1999	Grain Yield 2000	Average Yield 2 year	Average Yield 3 year
	1/1	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Morgan	161	36	60.0	12.6	77.1	81.7	88.0	84.8	82.3
Ransom	158	35	59.4	13.4	62.3	71.8	93.3	82.6	75.8
Arapahoe	154	34	59.8	14.4	61.1	74.5	91.3	82.9	75.6
CDC Kestrel	160	37	59.0	13.0	66.5	73.0	86.9	80.0	75.5
Jerry	158	36	59.6	14.3	58.4	73.7	87.4	80.6	73.2
Erhardt	158	32	60.5	15.3	65.2	71.3	82.5	76.9	73.0
Norstar	161	43	60.9	13.9	70.4	68.2	75.0	71.6	71.2
Nekota	151	33	60.6	13.4	50.6	71.6	91.2	81.4	71.1
Windstar	155	35	61.4	14.6	63.1	72.2	74.4	73.3	69.9
Crimson	159	36	62.1	15.5	61.4	66.9	81.0	74.0	69.8
Tandem	153	36	61.7	13.9	62.7	66.5	78.1	72.3	69.1
Alliance	151	31	60.4	12.4	47.3	68.6	89.2	78.9	68.4
Seward	162	41	60.8	14.2	68.0	67.3	67.3	67.3	67.5
Roughrider	159	40	61.2	14.7	58.2	69.1	72.5	70.8	66.6
Elkhorn	161	40	60.6	14.5	65.4	60.6	70.4	65.5	65.5
Agassiz	160	40	60.0	15.8	56.6	61.5	66.8	64.2	61.6
Harding	157	34	59.4	15.3		64.7	84.2	74.4	
CDC Falcon	159	34	60.2	13.9			99.6		
Daws*	162	33	53.7	12.6			74.0		
Eltan*	164	34	53.7	12.5			66.5		
Trial Mean	156	36	60.0	14.0	58.8	70.0	80.3	--	--
C.V. %	0.5	6.1	0.9	--	14.7	14.3	7.5	--	--
LSD .05	1	4	0.9	--	14.1	NS	9.8	--	--
LSD .01	2	5	1.2	--	18.8	NS	13.1	--	--

Planting Date: September 13, 1999 Harvest Date: July 27, 2000
Seeding Rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous Crop: Field Pea
No winter kill observed.
NS = no statistical difference between varieties.
*Soft white winter wheat

2002 North Dakota Winter Rye Variety Descriptions

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.

Winter Rye - Recrop — **Dickinson,ND**

Variety	Days to Head	Winter Survival	Seeds per Pound	Plant Height	Lodging Score	Test Weight	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 Year	Average Yield 3 Year
	fr 1/1			in		lbs/bu	bu/ac				
AC Rifle	157	99	19,607	33	1.0	49.9	69.6	65.9	70.0	68.0	68.5
Dacold	160	94	18,787	40	2.3	48.3	88.8	102.1	77.4	89.8	89.5
Musketeer	155	95	17,024	45	2.0	52.5	--	76.5	83.8	80.1	--
Prima	157	91	16,817	40	1.3	51.1	72.5	74.9	79.6	77.3	75.7
Warko	157	94	17,185	43	1.0	52.3	--	--	80.3	--	--
Trial Mean	157	95	17,884	40	1.5	50.8	78.1	79.9	78.2	--	--
C.V. %	0.1	2.7	5.7	9.9	18.3	1.4	5.1	5.3	3.6	--	--
LSD .05	0	4	1,567	6	0.4	1.1	6.3	6.8	4.3	--	--

Planting Date: September 18, 2000
Harvest Date: August 7, 2001
Lodging 0 = No lodging, 9 = Completely flat

2001 Confection Sunflower - Continuously Cropped No-till — **Hettinger**

Brand	Hybrid	Yield	Test weight	Days to mature	Plant height	Seed over Screen 22/64	20/64	18/64
		lbs/ac	lbs/bu	days	inches	%		
Red River Com.	2213	1721	27.4	111	55	8.3	50.8	40.9
Red River Com.	2413	1266	26.9	114	54	8.7	54.6	36.7
Red River Com.	2582	1050	27.1	114	49	7.9	50.2	41.9
Interstate Seed	IS8048	1272	27.1	113	51	11.7	56.0	32.3
Interstate Seed	F89008	1173	27.0	112	56	5.5	49.6	44.9
Proseed	C9802	1581	28.1	110	54	3.4	42.1	54.5
USDA Check	924	1219	26.6	113	54	10.3	54.7	35.0
Trial Mean		1326	27.2	112	53	8.0	51.1	40.9
C.V. %		13.3	3.0	0.8	4.3	43.4	12.4	20.3
LSD .05		261	NS	1	3	5.1	NS	12.3
LSD .01		358	NS	2	5	NS	NS	NS

Planting date: June 8, 2001 Harvest date: October 19, 2001
Seeding rate: 20,000 seeds/acre, thinned to 18,000 plants/acre.
Row spacing: 28" Previous crop: HRSW
NS = no statistical difference between hybrids.

2001 Crambe - Continuously Cropped No-till — **Hettinger**

Variety	Oil	Test Weight	Yield 1998	Yield 2000	Yield 2001	Avg. Yield* 2 Year	Avg. Yield* 3 Year
	%	lbs/bu	lbs/ac				
Belann	32.1	27.8	1876	1953	1260	1914	2261
Meyer	31.4	26.7	1325	1987	1180	1656	1828
Carmen	33.4	27.4		1640	1165		
Trial Mean	34.4	27.5	1337	2038	1213	--	--
C.V. %	9.6	5.4	15.7	12.7	17.5	--	--
LSD .05	NS	NS	347	NS	NS	--	--

*2 and 3 year average yields do not include 2001data.
Planting Date: May 2, 2001 Harvest Date: August 13, 2001
Seeding Rate: 20 lbs/ac.
Previous Crop: 1998 = Durum, 2000 = Field pea, 2001 = soybean.
NS = no statistical difference between varieties.
Notes: The 2001 trial sustained moderate hail damage on June 18.

2002 North Dakota Flax Variety Descriptions

Variety[1]	Origin	Year Released	Relative Maturity[2]	Seed Color[3]	Plant Height	Wilt	Relative Yield
NorLin	Can.	1982	early	br.	med.	MS	good
AC-Watson	Can.	1996	early	br.	short	MR	v.good
CDC-Valour	Can.	1996	early	br.	short	MR	v.good
Linton	ND	1985	early	br.	med.	R	v.good
Prompt	SD	1988	early	br.	med.	MR	good
AC-Emerson	Can.	1994	mid.	br.	med.	VR	v.good
CDC-Normandy	Can.	1995	mid.	br.	short	MR	v.good
Cathay	ND	1998	mid	br.	med	MR	v. good
Pembina	ND	1998	mid	br.	med	MR	v. good
Neche	ND	1988	mid	br.	med.	R	good
Omega	ND	1989	mid	yel.	med.	MS	v.good
NorMan	Can.	1984	mid	br.	med.	MR	good
Rahab 94	SD	1994	mid	br.	med.	MR	good
CDC Arras	Can.	1999	mid.	br.	med.	MR	v.good
CDC Bethume	Can.	1999	mid./late	br.	med. tall	MR	v.good
AC Carnduff	Can.	1998	mid/late	br.	med. tall	MR	v.good
Flanders	Can.	1989	late	br.	med.	MS	good
Webster	SD	1998	late	br	tall	MR	v. good
McDuff	Can.	1993	late	br.	med.tall	MR	v.good
AC Linora	Can.	1993	late	br.	tall	R	v.good
McGregor	Can.	1980	late	br.	tall	R	v.good
Shelby	SD	2000	late	br	tall	MR	good

1 All varieties have resistance to prevalent races of rust; all have good oil yield and oil qulaity.
2 Varieties listed order of maturity.
3 br = brown, yel = yellow.

2001 Flax **Hettinger**

Variety	Test Weight	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Average Yield 2 Year	Average Yield 3 Year
	lbs/bu	bu/ac				
CDC Bethume	55.1	36.9	31.4	32.0	31.7	33.4
CDC Arras	55.0	35.8	28.4	31.4	29.9	31.9
Webster	55.9	34.7	29.5	29.0	29.2	31.1
CDC Carnduff	55.4	34.4	28.5	28.9	28.7	30.6
CDC Normandy	56.0	34.0	27.6	30.3	29.0	30.6
AC Watson	54.8	33.3	27.6	29.0	28.3	30.0
Pembina	55.5	35.7	26.6	26.6	26.6	29.6
Rahab 94	55.8	33.5	27.6	26.7	27.2	29.3
Norlin	56.0	30.4	27.5	30.1	28.8	29.3
AC Linora	55.6	30.1	27.5	27.6	27.6	28.4
Prompt	55.8	30.8	25.9	26.6	26.2	27.8
AC Emerson	55.5	31.4	24.3	27.4	25.8	27.7
Cathay	55.2	30.4	24.1	28.6	26.4	27.7
Neche	55.6	27.3	27.5	27.9	27.7	27.6
Omega	55.2	30.4	23.9	25.3	24.6	26.5
Shelby	55.9		27.4	29.8	28.6	
Flanders	55.6			32.3		
McDuff	55.6			27.7		
N9606	55.8			34.6		
N9719	55.8			25.0		
Trial Mean	55.6	32.9	27.2	28.8	--	--
C.V. %	0.5	12.8	5.3	8.5	--	--
LSD .05	0.4	NS	2.0	3.5	--	--
LSD .01	0.5	NS	2.7	4.6	--	--

Planting Date: April 18, 2001 Harvest Date: August 24, 2001
Seeding rate: 32 lbs/Acre
Previous crop: 1999 = HRSW, 2000 = soybean, 2001 = fallow.
NS = no statistical difference between varieties.
Note: The 2001 trial sustained minor hail damage on June 18.

2001 Oil Type Sunflower - Continuously Cropped No-till **Hettinger**

Brand	Hybrid	Days to Mature	Plant Height	Test Weight	Oil Content	Yield 1999	Yield 2000	Yield 2001	Avg. Yield 2 Year	Avg. Yield 3 Year
		days	inches	lbs/bu	%	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac
Croplan Gen.	322*	108	49	33.0	39.4			1857		
Croplan Gen.	345*	109	51	32.6	38.8		1654	1256	1455	
Dekalb	DKF29-90	107	55	34.8	42.6		2205	1929	2067	
Dekalb	DKF31-01*	110	55	35.5	35.9		2024	1628	1826	
Dekalb	DKF36-40*	110	55	35.2	35.8		1605	1628	1616	
Dekalb	EX3804*	106	50	33.6	34.9			1797		
Dekalb	DK3868	108	52	34.6	41.9	1784	2394	2139	2266	2106
Dekalb	DK3875	108	52	34.0	40.8	2088	3029	3293	3161	2803
Interstate	IS4049	111	58	33.4	40.1		1668	2686	2177	
Interstate	Hysun 450*	112	53	30.8	40.2			2434		
Interstate	IS5030	106	49	32.2	40.4			1586		
Interstate	Hysun 521*	107	46	33.6	39.3			2049		
Interstate	Hysun 530*	108	47	33.1	39.4			1821		
Interstate	IS5331	112	42	32.8	41.1			1538		
Interstate	IS6039	108	52	33.2	42.3	1050	2031	2097	2064	1726
Interstate	IS6521	108	46	33.7	40.7		2401	2043	2222	
Interstate	F84021	109	52	33.6	40.7			2548		
Kaystar	8300	104	49	31.6	42.3	837	1898	1568	1733	1434
Kaystar	9404	110	53	33.5	38.8		2317	2289	2303	
Mycogen	SF187	110	48	31.5	40.6			2548		
Mycogen	SF260	108	54	32.8	41.3			2476		
Mycogen	SF290	108	48	31.2	42.1			2404		
Mycogen	8377NS*	112	53	32.8	38.7		1738	1238	1488	
Mycogen	8488NS*	111	52	33.7	38.9		1891	1845	1868	
Mycogen	Cavalry	111	60	34.0	40.2		2345	1887	2116	
NK	278	109	49	31.9	42.5			2518		

continued

Brand	Hybrid	Days to Mature	Plant Height	Test Weight	Oil Content	Yield 1999	Yield 2000	Yield 2001	Avg. Yield 2 Year	Avg. Yield 3 Year
		days	inches	lbs/bu	%	lbs/ac				
NK	T46-R9	109	55	32.0	38.0			2133		
Proseed	9612	113	54	33.4	34.1		1856	1803	1830	
Seeds 2000	Bronco*	110	51	30.9	38.9	1749	2205	2025	2115	1993
Seeds 2000	Maverick*	110	46	32.2	37.4	941	1766	1677	1722	1461
Seeds 2000	Ranger*	110	47	32.7	39.1			1923		
E. Mat. check	Hysun 311	104								
M. Mat. check	C270	109								
L. Mat. check	P6451	112								
Oil check	USDA 894				38.3					
Trial Mean		109	51	33.0	39.7	1233	1950	2002	--	--
C.V. %		1.5	5.6	2.5	3.3	20.3	14.0	12.6	--	--
LSD .05		2	4	1.1	1.8	349	442	356	--	--
LSD .01		3	5	1.5	2.4	461	587	469	--	--

* Nusun
Planting date: June 8, 2001
Harvest date: October 19, 2001
Seeding rate: 21,000 seeds/acre, thinned to 18,000 plants/acre.
Row spacing: 28"
Previous crop: HRSW
Yields and oil content are adjusted to 10% moisture. Oil content has been adjusted for nusun types.
Notes: The 1999 crop sustained moderate hail damage.

Sunflower Date of Planting Study in Western North Dakota, 2001

R.O. Ashley, E.D. Eriksmoen, and M.B. Whitney

Summary: An early-season NuSun sunflower (*Helianthus annuus* L. c.v. Mycogen 8242 NS) cultivar was planted on five different dates in an on-farm research trial in southwest North Dakota. Cold soil temperatures reduced plant stands for the first two planting dates at the Bowman, ND site. Downey mildew reduced plant stands in the fourth planting date. Seed yield and seed oil content were significantly greater for the fifth planting date compared to the previous four planting dates. However, Oleic fatty acid content of oil produced by the fifth planting date was the lowest of the planting dates in this study. Oleic fatty acid content of this last planting date was less than the minimum required by processors.

Materials and Methods: A site was selected in southwest North Dakota for the third and final year of this study. This site was on the Miles Hansen Farm located near Bowman, ND. A randomized complete block design with four replications for each seeding date was used. Size of the plots was 40 feet by 1875 feet. The soil was sampled and analyzed in the fall, 2000, and fertilized according to soil test results for a 1500 to 2000 pound per acre yield. Anhydrous ammonia was used as the source of nitrogen and applied at the time of seeding using Anderson openers on a no-till drill. Additional nitrogen, phosphorous, potassium, and a micronutrient mix were applied through the drill at seeding time.

Stored soil moisture was estimated at the first planting date using the Brown soil moisture probe. Stored soil moisture at this site was estimated to be 4.4 inches. Precipitation was measured with an automated self-tipping bucket as well as at the farmstead. Heat units were calculated from the North Dakota Agricultural Weather Network site near Bowman, ND.

Roundup Ultra at the rate of 16 oz per acre + spray grade ammonium sulfate at the rate of 16 pounds per 100 gallons of solution was tank mixed with Spartan (sulfentrazone) herbicide at the rate of 3.5 oz per acre, and applied preplant. Rainfall and soil disturbance from the seeding operation were the only factors that incorporated Spartan. Poast (sethoxydim) was applied post-emergence at the rate of one pint per acre for grassy weed control. The first and second planting dates required a second application of Poast after above average rainfall occurred in June.

The NuSun sunflower cultivar 8242 NS was planted with a 40-foot Concord air drill with low disturbance Anderson points. The seeding rate was adjusted for a final harvest population of 23,000 plants per acre at Bowman. Seed rate was increase 15% for the first planting date and 10% increase for the second planting date over the planting rates used for the remaining three planting dates.

Fields were scouted on a regular basis for stage of crop development, pests, and beneficial insects. Birdshield, a chemical protect ant was used to prevent damage from black birds.

The center 30 feet of each plot was harvested using producer equipment and seed weight taken for each plot using a digital weigh scale at the farmstead. Dr. Jerry Miller, ARS, NDSU, Fargo, ND analyzed seed for oil content using Nuclear magnetic Resonance (NMR) and fatty acid profile using gas-liquid chromatography (GLC).

Results and Discussion: June was cooler and wetter than normal while August and September were warmer than normal. More favorable weather occurred during development of plants with a seeding date of June 20. Seed yield for the third planting date (Table 1) was significantly greater than seed yield for the first two planting dates. Seed yield for the fifth planting date, June 20, was

highest for this trial this year. Also seed oil content, test weight, and pounds of oil produced per acre was highest for the fifth planting date. Oleic fatty acid content was lowest for the fifth planting date – so low that it was less than the minimum acceptable content required by processors. Oleic fatty acid content was greater than 50 percent for all remaining planting dates in 2001. In 1999 the first and last planting dates at this site produced the lowest oleic content while in 2000 oleic content was lowest in the first date.

Implications: In a year where rainfall and temperature patterns favor late planted sunflower yields can be expected to be greatest for late seeded sunflower. However planting dates that occur from mid May to early June may be more consistent in producing yield and quality. A combined analysis of all three years will be completed and that information made available to producers.

Cooperating Organizations: The authors wish to thank Miles Hansen, Bowman, ND. Also we wish to thank Mycogen Seeds Inc for their contribution of seed to the project. The authors wish to thank the Slope County Agricultural Improvement Association for their generous support and the National Sunflower Association for support of bird control measures at these plots.

Table 1. Harvest plant population, grain yield, test weight, oil content, and pounds of oil produced per acre in the Sunflower Date of Seeding Study on the Miles Hansen Farm, Bowman, ND, 2001.

						---------Fatty acids ---------			
Date	Plant population	Seed[1] yield	Test[1] weight	Seed oil content	Oil produced	Palmitic	Stearic	Oleic	Linoleic
	no.	lb/ac	lb/bu	%	lb/ac	---------- % ----------			
25 Apr	16008	1116.2	28.7	40.8	455.0	5.00	3.94	60.63	28.96
9 May	16117	1137.1	28.7	39.1	445.3	4.44	4.27	74.25	15.03
23 May	20364	1398.3	28.1	41.7	583.1	4.44	4.29	70.95	18.32
7 Jun	19058	1324.4	29.7	42.5	562.5	4.57	4.20	63.28	26.00
20 Jun	20909	1581.3	30.1	44.5	703.0	4.91	4.82	41.96	46.75
Mean	18491	1311.5	29.1	41.7	549.8				
CV%	8.7	6.3	3.1	1.6	7.0	--	--	--	--
LSD $_{.05}$	2473	128.3	1.4	1.1	59.7	--	--	--	--

1 Adjusted to 10% moisture basis.

Chickpea - Recrop **Dickinson, ND**

Variety	Type	Days to Flower	Flower Duration	Seeds per Pound	Plant Height	Protein	Test Weight	Grain Yield 1999	Grain Yield 2001	2 Year Average
					in	%	lbs/bu	-----lbs/ac-----		lbs/ac
B-90	K	64	13	1,556	17	24.5	60.3	--	1,894	--
CA 97831	K	63	13	898	18	23.6	60.0	--	1,283	--
CDC Yuma	K	62	15	957	18	24.2	60.3	--	1,847	--
Dwelley	K	64	12	1,078	18	23.6	60.0	683	998	840
Myles	D	61	14	2,320	15	24.4	57.1	716	2,368	1,542
Sanford	K	63	13	1,342	20	24.2	60.6	937	843	890
Trial Mean	--	63	13	1,359	18	24.1	59.7	882	1,539	--
C.V. %	--	1.6	7.2	9.6	10.8	1.5	2.2	19.0	23.5	--
LSD .05	--	2	1	197	3	0.6	2.0	NS	NS	--

Planting Date: April 25
Harvest Date: September 24
Type: K = Kabuli, D = Desi

2001 Chickpea - Continuously Cropped No-till **Hettinger**

Variety	Dis*	Plant Height	1000 Kernel wt.	Test Weight	Yield 1998	Yield 1999	Yield 2000	Yield 2001
	0-9	inches	grams	lbs/bu	lbs/ac	lbs/ac	lbs/ac	lbs/ac
Kabuli:								
Sanford	8.8	--	90	--	1607	1860	267	113
Dwelley	8.8	--	82	--	1427	1533	0	80
CDC Yuma	3.8	20	239	61.8		1773	587	1387
Evans	9.0	--	104	--		1620	0	80
CDC Xena	8.5	--	120	--			0	200
CA9783152C	5.7	--	118	--			0	187
CA9783165C	7.0	--	84	--			187	60
Small Kabuli:								
B-90	2.0	15	230	64.8		2380	1627	2400
CDC Chico	3.8	17	153	60.4		2307	787	1313
Green Kabuli:								
CDC Verano	4.2	--	76	--			0	167
Desi:								
Myles	2.8	14	146	60.9	2047	2667	1860	1860
CDC Desiray	3.0	13	136	61.0			1553	1773
CDC Anna	2.2	16	152	63.6				2507
Large Desi:								
CDC Nika	2.5	18	228	62.8				2040
Trial Mean	5.1	16	140	62.2	1693	2026	1215	1011
C.V. %	13.0	4.7	12.4	1.7	9.3	17.9	28.6	17.7
LSD .05	1.0	1	25	1.6	246	531	531	255
LSD .01	1.3	2	33	2.2	347	720	740	342

Planting Date: April 25, 2001
Harvest Date: September 6, 2001
Previous Crop: 1998 - 2000 = Field pea, 2001 = Barley.
**Ascochyta* Disease Rating: 0 = disease free, 9 = dead plants.
Notes: 2000 & 2001 trials had severe ascochyta infestations.
The 2001 trial sustained moderate hail damage on June 18.

Lentil - Recrop — **Dickinson, ND**

Variety	Days to Flower	Flower Duration	Seeds per Pound	Plant Height	Protein	Test Weight	Grain Yield 1999	Grain Yield 2001	Returns	2 Year Average
				in	%	lbs/bu	-----lbs/ac-----		$/ac	lbs/ac
CDC Glamis	62	18	7,435	14.0	24.4	60.3	--	895	80.59	--
CDC Grandora	63	17	6,474	16.2	24.6	59.9	--	933	83.93	--
CDC Milestone	59	16	12,825	10.9	23.1	62.1	1,015	1,290	116.14	1,153
CDC Richlea	61	14	8,872	12.7	22.0	61.4	851	1,373	123.56	1,112
CDC Sovereign	61	15	6,973	15.1	25.1	60.6	--	1,151	103.63	--
CDC Vantage	60	15	9,243	12.1	24.1	61.4	958	1,058	95.21	1,008
Crimson	60	14	13,189	10.8	24.1	63.0	877	1,342	120.76	1,109
Laird	63	16	6,529	13.3	24.3	59.5	--	955	85.96	--
Trial Mean	61	16	8,943	13.0	24.0	61.0	925	1,125	101.22	--
C.V. %	0.7	7.7	3.0	13.5	3.5	0.9	12.4	19.1	--	--
LSD .05	1	2	400	2.6	1.2	0.8	NS	NS	--	--

Planting Date: April 25
Harvest Date: August 13 (Crimson, CDC Vantage, CDC Milestone, CDC Richlea) August 31 (CDC Glamis, CDC Grandora, CDC Sovereign, Laird)
Returns calculated using a market value of $9.00/cwt

2001 Lentils - Continuously Cropped No-till **Hettinger**

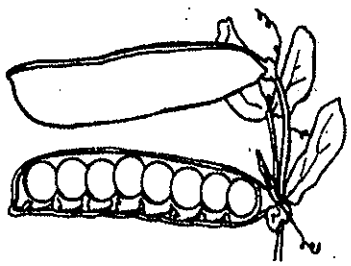
Variety	Harvest Height	250 Kernel wt.	Test Weight	Yield 1999	Yield 2000	Yield 2001	Average Yield * 2 year	Average Yield ** 3 year
	inches	grams	lbs/bu	lbs/ac				
CDC Richela	11	12.6	57.1	1160	680	1587	1374	1700
Crimson	9	9.6	58.0	1113	800	933	1023	1535
Laird	12	15.2	55.8	673	140	947	810	1167
CDC Milestone	11	9.4	58.0	1220	740	1547	1384	
CDC Vantage	10	12.5	56.4	1248	800	1120	1184	
CDC Glamis	10	14.8	56.8	587	173	733	660	
CDC Sovereign	11	14.0	55.8			1493		
CDC Grandora	13	15.0	55.2			733		
Trial Mean	11	12.9	56.8	1017	524	1137	--	--
C.V. %	15.1	8.0	3.4	20.9	29.2	9.1	--	--
LSD .05	NS	1.5	NS	311	225	245	--	--
LSD .01	NS	2.1	NS	422	307	363	--	--

*2 year average yield (1999 and 2001).
**3 year average yield (1998, 99 & 2001).
Planting Date: April 19, 2001
Harvest Date: September 6, 2001
Seeding Rate: 550,000 live seed/acre.
Previous Crop: 1999 = HRSW, 2000 = Field pea, 2001 = Barley.
NS = no statistical difference between varieties.
Notes: The 2000 trial had moderate disease (ascochyta) injury.
The 2001 trial sustained moderate hail damage on June 18.

Field Pea - Recrop **Dickinson, ND**

Variety	Type	Days to Flower	Flower Duration	Seeds per Pound	Plant Height	Lodging Score	Protein	Test Weight	Grain Yield 2000	Grain Yield 2001	Returns	2 Year Average
			days				%	lbs/bu	-----bu/ac-----		$/ac	bu/ac
Atomic	G	61	10	1,584	20	2	26.0	64.5	37.0	47.9	95.77	42.4
Carneval	Y	60	11	1,949	25	3	26.0	64.6	40.9	50.5	101.07	45.7
Integra	Y	59	12	1,733	22	3	28.7	64.0	--	42.4	84.75	--
Majoret	G	60	11	1,787	23	4	28.5	65.0	43.9	47.4	94.85	45.7
Marble	G	60	11	1,653	21	2	27.2	64.1	--	50.4	100.71	--
Scuba	G	59	12	1,896	21	4	25.5	64.4	--	44.9	89.85	--
Trapper	Y	63	--	3,781	30	7	30.9	63.6	44.0	34.1	68.15	39.0
Trial Mean	--	60	11	2,055	23	4	27.6	64.3	43.2	45.4	90.74	--
C.V. %	--	1.0	5.2	5.4	14.8	31.4	1.8	0.6	8.6	7.4	--	--
LSD .05	--	1	1	164	5	2	0.7	0.6	5.4	5.0	--	--

Planting Date: April 25
Harvest Date: July 31 (Atomic, Carneval, Integra, Majoret, Marble, Scuba) August 7 (Trapper)
Type: Y = Yellow, G = Green
Returns calculated using market value of $2.00/bu



2001 Field Pea Variety Trial - Continuously Cropped No-till **Hettinger**

Variety	Seed Type	Test Weight	1000 Kernel Weight	Yield 1999	Yield 2000	Yield 2001	Average Yield* 2 year	Average Yield* 3 year
	**	lbs/bu	grams	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Atomic	G	63.6	250	65.7	47.0	45.4	56.4	57.2
Majoret	G	64.0	209	55.1	35.1	42.3	45.1	50.3
Carneval	Y	63.6	191	56.2	30.2	48.4	43.2	47.3
Toledo	G	62.6	216	59.9	36.8	48.1	48.4	
Trapper	Y	64.6	114	32.2	12.0	50.9	22.1	
Integra	Y	63.1	224		38.8	43.4		
CEB 1171	G	63.0	266			50.3		
CEB 1475	Y	64.3	231			44.3		
Scuba	G	62.9	180			35.2		
Trial Mean		63.6	209	58.8	35.3	45.4	--	--
C.V. %		0.4	6.9	10.1	11.4	7.5	--	--
LSD .05		0.4	21	8.6	5.7	5.0	--	--
LSD .01		0.5	28	11.6	7.7	6.8	--	--

*Average Yield: 2 year = 1999 & 2000, 3 year = 1998, 1999 & 2000.
**Seed Type: Y = Yellow, G = Green. Seeding Rate: 250,000 live seeds/acre.
Planting Date: April 20, 2000 Harvest Date: August 1, 2000
Previous Crop: 1999 = HRSW, 2000 = Field Pea, 2001 = Barley.
Note: The 2001 trial sustained severe hail damage on June 18.

2001 Field Pea Seed Treatment Trial **Hettinger**

Treatment	Rate	Grain Yield	Test Weight	1000 KWT
Product	oz/cwt	bu/A	lbs/bu	grams
Captan 400 + Allegiance FL	2.5 + 0.2	32.7	63.1	214
Maxim 4FS + Apron XL	0.12 + 0.48	33.1	63.2	221
Thiram 42-S	3.0	34.4	63.1	223
TJ1300		31.7	63.2	224
TJ1300BM		34.7	63.2	216
Untreated		34.2	63.2	213
Trial mean		33.5	63.2	218
C.V. %		5.1	0.2	7.6
LSD .05		NS	NS	NS

Variety: Integra Planting Date: May 2 Harvest Date: August 24
Seeding rate: 300,000 pls/A Previous crop: Barley
NS = no statistical difference between treatments.
Note: The trial sustained severe hail damage on June 18.

2001 Dry Edible Beans - Continuously Cropped No-till	Hettinger

Variety	Days to Bloom	Plant Ht.	Yield			Average Yield	
			1999	2000	2001	2 Year	3 Year
		inches	lbs/ac				
Pinto:							
Othello	70	13	910	1575	1558	1566	1348
Maverick	68	12	712	1517	1138	1324	1122
Topaz	71	11		1435	922	1178	
Winchester	68	15		1353	805	1079	
Montrose	74	9			1569		
CO75511	72	13			1138		
Navy:							
Mayflower	74	19	916	996	887	942	933
Norstar	69	12	945	1338	508	923	930
Arthur	73	15		1167	391	779	
Dark Red Kidney:							
Redhawk	69	12			601		
Montcalm	70	13			449		
Black:							
T-39	74	13			852		
Jaguar	74	16			712		
Great Northern:							
Matterhorn	67	14			1313		
Trial Mean	71	14	--	--	917	--	--
C.V. %	2.8	14.9	--	--	9.9	--	--
LSD .05	3	3	--	--	130	--	--
LSD .01	4	4	--	--	174	--	--

Planting Date: May 10, 2001
Harvest Date: October 9, 2001
Previous crop: 1999 & 2000 = HRSW, 2001 = Barley.
Notes: The 2001 trial sustained moderate hail damage on June 18.

Soybean Production Trial at Hettinger
2000 & 2001

The trial was planted on May 10, 2000 into HRSW stubble and on May 8, 2001 into barley stubble that was either no-till or tilled once with at light field cultivator. Seed was inoculated prior to planting. Two varieties were used, Daksoy and Traill. These varieties were randomized within 7, 21 and 30 inch row spacings and at a seeding rate of 100, 150 and 200 thousand live seeds per acre. The trial was harvested on September 14, 2000 and on September 21, 2001. The 2001 trial sustained severe hail damage on June 18 however, the crop recovered nicely with axillary bud regrowth.

Summary of Results

Tillage system had the greatest impact on yield with the no-till system averaging 76 percent higher yields than the minimum tillage system. No-till crop maturity was 2 days later, plants were taller and oil content was similar to the minimum tillage system. Row spacing had the least impact on yield, quality and other agronomic characteristics, although there were more weeds with the wider row spacings (personal observation). Yields tended to increase with increasing seeding rates. Other agronomic and quality characteristics remained the same for seeding rates. Varietal differences were observed. Growers should select adapted varieties based on variety trial information.

2000/01 Soybean Production Trial - Combined Means - No-till

Row Spacing	Seeding Rate	Variety	Days to Bloom	Days to Canopy Closure	Days to Mature	Plant Height	Pod Height	Test Weight	Oil Content	Yield
inches	1000's					cm	cm	lbs/bu	%	bu/ac
7	100	Daksoy	66	88	116	48	0.5	57.2	21.0	12.3
		Traill	67	82	115	48	1.1	58.0	20.6	19.2
	150	Daksoy	66	84	114	45	0.4	57.2	21.0	17.3
		Traill	66	78	115	46	0.7	58.2	20.5	24.1
	200	Daksoy	66	83	115	42	0.3	57.6	20.9	18.8
		Traill	66	77	116	47	1.2	58.2	20.4	25.4
21	100	Daksoy	66	94	114	48	0.4	57.4	21.0	13.5
		Traill	66	90	115	53	1.0	58.0	20.6	21.6
	150	Daksoy	64	92	114	47	0.8	57.3	20.8	17.7
		Traill	66	89	114	54	1.3	58.0	20.6	25.5
	200	Daksoy	66	92	113	49	0.9	57.4	20.9	20.1
		Traill	66	86	115	54	1.0	58.2	20.4	25.6
30	100	Daksoy	66	--	114	51	0.5	57.0	21.0	12.9
		Traill	66	--	113	53	1.1	58.4	20.8	18.2
	150	Daksoy	66	--	113	50	1.8	57.2	21.1	14.9
		Traill	66	--	113	52	1.1	57.6	20.7	20.6
	200	Daksoy	66	--	114	52	1.4	57.2	21.0	17.2
		Traill	65	--	113	55	1.4	58.0	20.8	23.8

2000/01 Soybean Production Trial - Combined Means - Minimum Till

Row Spacing	Seeding Rate	Variety	Days to Bloom	Days to Canopy Closure	Days to Mature	Plant Height	Pod Height	Test Weight	Oil Content	Yield
inches	1000's					cm	cm	lbs/bu	%	bu/ac
7	100	Daksoy	66	--	113	42	0.6	--	21.0	7.0
		Traill	66	--	114	45	0.6	57.4	20.6	9.1
	150	Daksoy	67	--	116	42	0.4	--	20.8	7.9
		Traill	66	--	114	47	0.8	57.8	20.5	11.7
	200	Daksoy	66	--	113	43	0.7	55.7	20.8	8.4
		Traill	66	82	114	45	0.4	57.4	20.4	14.1
21	100	Daksoy	66	--	111	44	0.3	--	20.9	6.7
		Traill	66	--	112	43	0.6	--	20.6	12.4
	150	Daksoy	66	--	110	40	0.8	--	20.7	9.8
		Traill	66	--	111	40	0.4	--	20.5	10.2
	200	Daksoy	66	--	110	42	0.7	--	20.5	8.8
		Traill	66	--	112	42	0.2	--	20.4	11.8
30	100	Daksoy	66	--	110	42	0.8	56.6	21.0	10.6
		Traill	66	--	112	45	0.1	57.8	20.7	14.2
	150	Daksoy	66	--	111	43	0.4	56.7	21.0	10.8
		Traill	66	--	112	44	0.8	57.9	20.6	15.4
	200	Daksoy	66	--	110	45	0.1	57.3	20.9	12.8
		Traill	65	--	112	44	0.5	58.0	20.6	16.2

Combined Means - Tillage Systems

Tillage System	Days to Bloom	Days to Mature	Plant Height	Pod Height	Test Weight	Oil Content	Yield
			cm	cm	lbs/bu	%	bu/ac
No-till	66	114	50	1.0	57.7	20.8	19.4
Minimum	66	112	43	0.5	57.4	20.7	11.0

Combined Means - Row Spacing

Row Spacing	Days to Bloom	Days to Mature	Plant Height	Pod Height	Test Weight	Oil Content	Yield
inches			cm	cm	lbs/bu	%	bu/ac
7	66	114	45	0.6	57.6	20.6	14.8
21	66	112	46	0.6	57.7	20.7	15.4
30	66	112	48	0.8	57.6	20.9	15.7

Combined Means - Seeding Rate

Seeding Rate	Days to Bloom	Days to Mature	Plant Height	Pod Height	Test Weight	Oil Content	Yield
1000's			cm	cm	lbs/bu	%	bu/ac
100	66	113	46	0.6	57.6	20.8	13.2
150	66	113	46	0.8	57.6	20.8	15.6
200	66	113	46	0.7	57.6	20.7	17.1

Combined Means - Varieties

Variety	Days to Bloom	Days to Mature	Plant Height	Pod Height	Test Weight	Oil Content	Yield
			cm	cm	lbs/bu	%	bu/ac
Daksoy	66	112	45	0.7	57.2	20.9	12.8
Traill	66	114	48	0.8	58.0	20.6	17.8

2001 Soybeans - Continuously Cropped No-till **Hettinger**

Variety	Plant Height	Test Weight	Grain Yield 2000	Grain Yield 2001	2 year Avg. Yield
	inches	lbs/bu	bu/ac		
Barnes	21	58.3	30.4	26.3	28.4
Traill	22	58.5	26.4	19.9	23.2
Jim	20	57.1	23.9	21.3	22.6
Walsh	19	57.6		23.8	
Traill RR	20	58.2		23.2	
Trial Mean	20	57.9	26.1	22.9	--
C.V. %	4.8	1.2	6.7	11.4	--
LSD .05	1	1.1	2.7	4.0	--
LSD .01	2	NS	3.8	5.7	--

Planting Date: May 8 Harvest Date: September 21
Seeding rate: 150,000 live seeds/acre
Previous crop: 2000 =HRSW, 2001 = barley
NS = no statistical difference between varieties.
Notes: The 2001 trial sustained severe hail injury on June 18.

2001 Grain Sorghum - No-till **Hettinger**

Hybrid	Days to Head	Test Weight	--- Grain Yield --- 2000	2001	2 Year Avg.
		lbs/bu	bu/ac		
Pioneer 8925	62	56.6	67.8	52.5	60.2
Dekalb 28E	63	56.4	34.6	58.3	46.4
Agripro 2020	60	55.0	33.5	56.3	44.9
Agripro 2140	64	55.8	44.3	45.2	44.8
NK 251	60	57.1	45.6	38.5	42.0
Dekalb 18	60	56.4		58.1	
FX-R44X	64	54.8		52.3	
FX-RP	65	54.8		48.3	
FX-00106	71	52.7		40.0	
FX-00103	68	52.9		33.5	
Trial Mean	64	55.2	45.2	48.3	--
C.V. %	1.4	1.5	22.5	18.0	--
LSD .05	1	2.2	18.8	12.6	--
LSD .01	2	2.9	27.0	16.6	--

Planting Date: June 11, 2001 Harvest Date: October 9, 2001
Seeding rate: 120,000 live seeds/A.
Previous Crop: 2000 = HRSW, 2001 = Soybeans

2001 Proso Millet Continuously Cropped No-till — Hettinger

Variety	Days to Head	Plant Height	Lodg.	Test Weight	Grain Yield 1999	Grain Yield 2000	Grain Yield 2001	Avg. Yield 2 year	Avg. Yield 3 year
		inches	0-9*	lbs/bu	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac
Manta**	56	37	1.8	55.9	2720	1938	2513	2226	2390
Siberian**	54	35	1.5	56.0	2660	1689	2347	2018	2232
Earlybird	56	42	4.8	55.4	2260	1327	2033	1680	1873
Sunup	54	40	3.8	55.4	2040	1207	1880	1544	1709
Huntsman	58	42	4.2	55.8	2107	951	2067	1509	1708
Rise	52	38	4.2	55.2	2067	1280	1647	1464	1665
Sunrise	59	42	2.8	55.6	1953	1147	1860	1504	1653
Dawn	49	40	7.0	53.6	1713	1333	1207	1270	1418
Snowbird	52	46	4.5	55.9	1753	860	1620	1240	1411
Minsum	51	44	5.8	54.8	1873	773	1353	1063	1333
Cerise	47	38	4.8	57.7	1560	660	1120	890	1113
Turghai	48	42	3.0	58.4	1147	647	1407	1027	1067
Trial mean	53	40	4.0	55.8	2006	1131	1755	--	--
C.V. %	3.8	6.4	42.2	0.6	15.8	10.5	18.2	--	--
LSD .05	3	4	2.4	0.5	455	171	460	--	--
LSD .01	4	5	3.3	0.7	611	231	619	--	--

*Lodging: 0 = no lodging, 9 = lying flat on ground.
**Foxtail millets
Planting Date: June 11
Harvest Date: September 18
Seeding rate: 25 lbs/Ac.
Previous crop: 1999 = HRSW, 2000 & 01 = Soybean.
Notes: 2000 trial had moderate European corn borer damage to proso types.

Corn Production in Southwestern North Dakota

Eric Eriksmoen

Corn production using narrow row techniques and high plant populations is the current trend throughout much of the corn growing regions of the U.S. Interest has also been increasing throughout North Dakota. Limited studies on row spacing were conducted in the early 1970's and mid 80's in eastern and northwestern North Dakota. In western North Dakota where moisture tends to be a limiting factor, wider row spacings and/or lower plant populations may be more conducive to grain production than narrow row, high population practices.

The **objectives** of this project were to determine optimal management factors (row spacing, plant populations and hybrid maturities) and to better understand the relationships between these factors for grain corn production in southwestern North Dakota.

The trial was conducted at Hettinger in 1998, 1999 and 2001 using a randomized complete block design with a split-split plot arrangement and three replications. Row spacing was the main plot factor with plant population as the subplot factor and hybrid maturities as the sub-subplot factor. Row spacings were 14 inches, 28 inches and 42 inches. Four plant populations were utilized; 12,000, 18,000, 24,000 and 30,000 plants per acre. Plant populations were achieved by over planting and then by hand thinning to exact populations. Three hybrids were utilized; Pioneer 3963, Pioneer 3921 and Pioneer 3861 with 79, 86 and 93 day relative maturities, respectively. All combinations of row spacing by plant population by hybrid were evaluated for ear height (distance from soil surface to the shank of the ear), test weight and grain yield.

The trial was planted on May 5, 1998, on May 3, 1999 and on May 2, 2001 and harvested on September 29, 1998, on October 14, 1999, and on October 11, 2001. The 1998 trial was grown under conventional tillage practices on ground that was fallow the previous year. The 1999 trial was grown under conventional tillage practices on ground that was in canola the previous year, and the 2001 trial was grown under no-till on ground that was in buckwheat the previous year. Growing conditions at Hettinger during 1998 started out cool and dry, warming up in August and ending up with about 13 ½ inches of precipitation for the season. Corn growing degree units for the season was 2397. Growing conditions during 1999 was generally ideal with above normal precipitation in June, July and August and totaling over 22 ½ inches for the season. Air temperatures were generally mild with cooler than normal temps during May, June, August and September and an accumulation of 2009 corn growing degree units for the season. Growing conditions during 2001 was again ideal for corn production with generally warm and moist conditions. A severe hail storm on June 18 shredded the trial almost to the soil surface, however, the trial recovered very nicely with very little stand loss. Precipitation was above normal for the season with the month of July receiving almost 4 ½ inches, over 2 inches above normal. Monthly air temperatures were generally above normal except for June. August and September were hot and dry. Total corn growing degree units for the season was 2387.

On average, plant population had the most variability followed by relative maturity and finally, row spacing. Significant differences between plant populations were observed for ear height and grain yield. Both ear height and grain yields tended to increase with increasing population and

optimum yields were achieved at 24,000 plants per acre. Weeds became more prevalent as plant populations decreased (personal observation). Significant differences between relative maturities (hybrids) were observed for ear height, test weight and grain yield. The early maturing hybrid had a shorter ear height, a heavier test weight and was lower yielding than the later maturing hybrids. The 86 and 93 day maturing hybrids had similar ear height and grain yield. Test weight for the 93 day hybrid was 53.9 pounds per bushel vs. 57.0 pounds per bushel for the 86 day hybrid and 58.0 pounds per bushel for the 79 day hybrid. Grain yields were similar between hybrids in 1998 and 1999, but the 79 day hybrid had significantly lower yields in 2001. The optimum relative maturity for this area was for the 86 day hybrid. Significant differences between row spacing was observed for ear height and grain yield. Ear height tended to increase with increasing row spacing. Grain yield tended to increase slightly from the 14 inch to the 28 inch row spacing and then leveled off with the 42 inch row spacing. Row spacing had a greater effect on grain yield during the dry year (1998) then on relatively wet years (1999 and 2001) with increasing yields as row spacing increased. Weeds tended to be more prevalent with wider row spacings (personal observation). Wider row spacings tend to favor optimum grain yields. Row spacing and plant population interactions were observed with grain yields tending to increase with higher populations grown under wider row spacings.

In conclusion, corn production practices in southwestern North Dakota should focus on achieving a relatively heavy plant stand with an adapted hybrid, and wider row spacings favor higher grain yields, especially during dry years.

Plant Population						**Combined Means**
Plant Pop.	Ear Height	Test Weight	Grain Yield 1998	1999	2001	Avg.
plants/A	cm	lbs/bu	bushels per acre			
12,000	74	56.0	42.9	58.0	51.5	50.8
18,000	75	56.4	34.5	58.7	51.4	48.2
24,000	78	56.4	49.5	67.8	56.9	58.1
30,000	76	56.3	46.5	72.8	52.6	57.3
LSD .05	2	NS	8.9	7.5	1.5	1.8

Relative Maturity (hybrid)						**Combined Means**
Relative Maturity	Ear Height	Test Weight	Grain Yield 1998	1999	2001	Avg.
*	cm	lbs/bu	bushels per acre			
79	71	58.0	42.9	62.8	34.0	46.6
86	78	57.0	43.2	67.6	59.8	56.9
93	79	53.9	44.0	62.6	65.5	57.4
LSD .05	7	3.3	NS	NS	10.6	2.3

Row Spacing						**Combined Means**
Row Spacing	Ear Height	Test Weight	Grain Yield 1998	1999	2001	Avg.
Inches	cm	lbs/bu	bushels per acre			
14	73	56.1	31.8	63.7	53.7	49.7
28	76	56.7	44.7	64.7	56.3	55.2
42	79	56.2	53.5	64.5	49.2	55.7
LSD .05	5	NS	15.2	NS	5.9	3.9

Row Spacing X Plant Population							**Combined Means**
Row Spacing	Plant Pop.	Ear Height	Test Weight	Grain Yield 1998	1999	2001	Avg.
Inches	plants/A	cm	lbs/bu	bushels per acre			
14	12,000	70	55.7	25.6	62.5	40.7	42.9
	18,000	72	56.3	16.8	53.8	52.2	40.9
	24,000	75	56.2	41.4	61.1	61.8	54.8
	30,000	73	56.0	43.5	77.5	54.7	58.6
28	12,000	74	56.6	45.7	55.8	63.6	55.0
	18,000	75	56.7	38.9	64.5	48.9	50.8
	24,000	76	56.5	46.8	69.6	65.6	60.7
	30,000	77	56.8	47.4	69.0	54.7	57.0
42	12,000	78	55.7	57.2	55.7	49.3	54.1
	18,000	78	56.3	47.9	57.7	46.5	50.7
	24,000	82	56.4	60.2	72.7	52.8	61.9
	30,000	79	56.2	48.6	71.9	48.6	56.4
LSD .05		NS	NS	19.8	NS	12.2	13.0

Grain Corn Production at Hettinger, ND					1998 - 2001 Combined Means			
Row Spacing	Plant Pop.	Relative Maturity	Ear Height	Test Weight	---------- Grain Yield ---------- 1998	1999	2001	Avg.
Inches	plants/A	*	cm	lbs/bu	------ bushels per acre ------			
14	12,000	79	66	57.4	22.0	58.5	28.0	36.2
		86	70	56.0	28.2	65.0	44.7	46.0
		93	75	53.8	26.7	63.9	49.4	46.7
	18,000	79	68	58.1	22.9	58.8	23.4	35.0
		86	75	56.9	14.6	52.6	65.6	44.3
		93	74	53.8	12.8	50.0	67.6	43.5
	24,000	79	68	57.7	40.7	57.6	32.3	43.5
		86	80	57.3	37.9	72.6	75.2	61.9
		93	78	53.8	45.6	53.2	77.8	58.9
	30,000	79	70	57.6	38.9	77.4	30.4	48.9
		86	72	56.9	44.5	82.7	72.2	66.5
		93	79	53.5	47.0	72.4	61.6	60.3
28	12,000	79	70	58.2	41.4	53.2	36.6	43.7
		86	75	57.1	49.3	56.8	74.2	60.1
		93	78	54.5	46.5	57.5	79.9	61.3
	18,000	79	69	58.5	40.7	59.8	23.7	41.4
		86	76	57.4	40.7	64.5	61.9	55.7
		93	80	54.2	35.4	69.2	61.0	55.2
	24,000	79	69	57.8	52.5	63.8	37.1	51.1
		86	80	57.3	46.1	72.4	77.2	65.2
		93	80	54.3	41.9	72.5	82.4	65.6
	30,000	79	70	58.3	47.4	69.2	35.1	50.6
		86	80	57.7	46.4	72.0	64.4	60.9
		93	80	54.4	48.5	65.8	64.6	59.6

Continued

continued

Row Spacing	Plant Pop.	Relative Maturity	Ear Height	Test Weight	---- Grain Yield ---- 1998	1999	2001	Avg.
Inches	plants/A	*	cm	lbs/bu	------ bushels per acre ------			
42	12,000	79	74	57.2	53.6	54.7	40.0	49.4
		86	77	56.4	59.0	55.8	41.3	55.4
		93	83	53.6	59.0	56.4	56.7	57.4
	18,000	79	77	57.7	48.8	51.0	27.7	42.5
		86	78	57.3	46.2	65.8	54.5	55.5
		93	80	53.8	48.7	56.3	57.2	54.1
	24,000	79	77	58.2	56.7	74.3	37.0	56.0
		86	84	57.4	59.6	73.8	56.3	63.2
		93	84	53.7	64.4	70.0	65.2	66.5
	30,000	79	74	58.0	48.8	74.8	32.2	51.9
		86	80	57.0	45.4	76.6	56.1	59.4
		93	83	53.5	51.6	64.3	57.4	57.8
C.V. %			11.5	2.3	19.5	14.4	12.5	33
LSD .05			2	0.3	13.9	15.2	10.9	4.9

Yields are adjusted to 13.5% moisture.
NS = no statistical difference.

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

Seed provided by Pioneer Hi-Bred International, Inc.

2001 Corn - Continuously Cropped No-till **Hettinger**

Brand	Hybrid	Rel. matur.	Days to silk	Harvest moist.	Silage 2000	Silage 2001	Ear ht.	Test weight	Grain Yield 2000	Grain Yield 2001
		days	days	%	-----Tons/ac*-----		in	lbs/bu	-----bu/ac**-----	
Garst	155	80	88	61	4.23	5.70	26	54.0	57.4	53.6
Garst	8992	83	90	70		3.02	23	54.7		54.6
Garst	4X309	85	95	56	4.61	6.79	30	52.8	54.2	60.7
Garst	8972IT	87	96	67	6.45	5.21	33	55.5	68.1	63.5
Garst	8966	87	94	69	5.39	4.92	32	54.0	65.5	55.6
Garst	8909Bt	87	94	67		4.97	28	52.8		60.5
Garst	8991Bt	89	92	64		6.33	29	52.8		63.3
Garst	3X417A	91	95	68	4.39	5.61	31	53.2	63.6	69.7
Dekalb	37-81RR	87	92	66		6.12	29	54.2		61.7
Dekalb	39-47RR	89	91	70		5.21	34	53.0		85.9
Dekalb	440RR/BT	94	94	68		6.71	32	50.7		92.3
Proseed	XES755	75	87	68		3.79	25	56.0		49.2
Proseed	XET83	82	91	68		3.89	24	56.2		58.2
Proseed	XES86RR	86	94	69		5.60	32	53.4		72.8
Proseed	XES92RR	92	94	69		5.58	31	52.2		78.2
Cana Maise			82	62		1.26	6	60.9		25.3
Trial Mean			92		4.65	5.30	29	53.7	66.2	65.3
C.V. %			2.3		18.3	18.9	11	2.8	12.6	19.2
LSD .05			3		1.22	1.43	5	2.2	12.0	17.9
LSD .01			4		1.64	1.91	6	2.9	NS	24.0

Planting date: May 2, 2001
Seeding rate: 24,000 seeds/acre, thinned to 20,000 plants/acre.
Row spacing: 28"
Harvest date: Silage = September 4, Grain = October 9
Previous crop: 2000 = Soybean, 2001 = Buckwheat.
*Silage yields are adjusted to 0% moisture.
**Grain yields are adjusted to 13.5% moisture.

2001 Cool Season Forage Trial - Recrop **Dickinson, ND**

Variety	Cereal Height	Harvest Moisture	Growth Stage	DM Yield	DM CP	DM ADF	DM NDF	DM RFV
	inches	%-----		Tons/a	%	%	%	
Conlon barley	34	76	1	2.6	14.8	39	56	96
Foster barley	39	76	1	2.7	12.2	39	67	80
Haybet barley	34	73	2	3.1	13.9	40	70	76
Lewis barley	36	74	2	3.2	13.2	40	66	79
Logan barley	34	79	2	2.3	15.1	41	65	80
Robust barley	38	81	1	2.1	13.5	42	66	78
Stander barley	36	82	1	2.1	15.1	42	64	80
Stark barley	36	78	1	2.7	14.8	41	61	85
Washford barley	34	79	1	2.6	11.4	44	66	77
Westford barley	30	73	2	3.3	11.5	41	66	79
Celsia oat	36	76	2	3.0	12.7	42	69	76
Forage Plus oat	38	73	1	3.7	12.1	43	66	77
Paul oat	41	71	1	3.2	10.4	39	64	84
Mammoth oat	49	71	1	3.0	9.5	39	59	90
Otana oat	41	77	2	3.0	11.7	45	73	67
Triple Crown oat	43	74	2	3.3	10.6	43	69	73
Triple Crown/Arvika	40	73	2	3.0	12.9	42	71	73
Triple Crown/Carneval	40	75	2	2.9	11.9	43	68	74
Triple Crown/Trapper	40	74	2	2.9	12.7	43	65	78
Pronghorn triticale	39	64	2	3.5	10.8	40	66	81
Sandro triticale	48	62	3	4.1	9.0	44	70	71
Gazelle spring rye	52	58	3	3.7	8.1	45	69	72
Lucille emmer	41	63	3	3.5	9.9	47	69	70
SK3P spelt	42	65	1	3.3	11.8	42	65	80
93-ST-5-9 wheat/spelt	42	66	2	3.3	12.0	41	63	84
Trial Mean	39	73	1.0	3.0	12.1	42	67	79
C.V. %	6.7	1.9	10.7	11.3	9.0	4.2	6.9	8.5
LSD .05	4	2	NS	0.5	1.8	3	8	11

Lodging for all varieties was 0, with the exception of Lucille Emmer which was a 7.
Growth Stage: 1 = Milk, 2 = Early Soft Dough, 3 = Soft Dough, CP = Crude Protein, ADF = Acid Detergens Fiber, NDF = Neutral Detergens Fiber, RFV = Relative Feed Value

2001 Warm Season Annual Forages - Recrop **Dickinson, ND**

					Yield										
		Height	Harvest		12% Moisture			DM Basis							
Crop	Variety	1st Cut	1st	2nd	1st	2nd	Tota	1st	2nd	Tota	CP	AD	ND	TD	RF
		inches	---%---		---tons/ac---						---%				
forage sorghum	Mor-Cane 2	53	80	--	2.6	--	2.6	2.3	--	2.3	9.8	40	63	50	86
foxtail millet	German	36	72	--	2.2	--	2.2	1.9	--	1.9	7.5	40	68	49	79
foxtail millet	Manta	35	67	--	2.2	--	2.2	1.9	--	1.9	10.	42	69	48	76
pearl millet	Tifleaf 3	34	74	77	1.9	0.3	2.2	1.7	0.3	2.0	11.	40	64	50	85
red proso millet	Cerise	38	69	--	2.2	--	2.2	1.9	--	1.9	10.	39	65	51	85
foxtail millet	Siberian	34	64	--	2.1	--	2.1	1.9	--	1.9	11.	40	55	50	101
sorghum/ sudangrass	Highland Sweet	55	75	73	2.3	0.3	2.6	2.1	0.2	2.3	9.2	43	73	46	71
sudangrass	Piper	58	72	74	2.2	0.5	2.7	2.0	0.4	2.4	11.	39	62	52	89
Trial Mean		43	72	75	2.2	0.4	2.4	1.9	0.3	2.1	10.	40	65	50	84
C.V. %		7.7	2.8	1.7	12.6	33.9	--	12.6	33.9	--	7.6	7.9	9.1	8.3	13.4
LSD .05		5	3	2	NS	NS	--	NS	NS	--	1.8	NS	NS	NS	NS

Seeding date= May 10
Harvest date = 1st Cutting: August 6, 2nd Cutting: September 20
NS =No Statistical Difference
Quality on 1st Cutting only
CP=Crude Protein
ADF=Acid Detergent Fiber
NDF=Neutral Detergent Fiber
TDN = Total Digestible Nutrients
RFV=Relative Feed Value

2001 Cool Season Barley and Oats Forage Trial - Recrop **Dickinson, ND**

Variety	Harvest Moisture	12% Moisture	Yield DM basis 1999	2000	2001	3 yr avg
	%	Tons/ac	Tons/ac			
Conlon barley	76	3.0	1.7	0.7	2.6	1.6
Foster barley	76	3.1	1.6	0.9	2.7	1.7
Haybet barley	73	3.6	1.9	1.1	3.1	2.0
Lewis barley	74	3.7	--	--	3.2	
Logan barley	79	2.6	1.6	0.7	2.3	
Robust barley	81	2.4	1.7	0.7	2.1	1.5
Stander barley	82	2.4	1.5	1.0	2.1	1.5
Stark barley	78	3.0	1.6	0.7	2.7	1.5
Washford barley	79	3.0	--	--	2.6	1.6
Westford barley	73	3.7	2.0	0.9	3.3	2.0
Celsia oat	76	3.5	2.3	1.0	3.0	2.1
Forage Plus oat	73	4.2	--	--	3.7	
Mammoth oat	71	3.4	2.4	1.2	3.0	2.2
Otana oat	77	3.4	--	--	3.0	
Paul oat	71	3.6	2.0	1.0	3.2	2.0
Triple Crown oat	74	3.7	2.5	2.3	3.3	2.7
Triple Crown/Arvika	73	3.4	--	--	3.0	
Triple/Carneval	75	3.3	--	--	2.9	
Triple Crown/Trapper	74	3.3	--	--	2.9	
Pronghorn triticale	64	3.9	--	--	3.5	
Sandro triticale	62	4.6	2.0	0.8	4.1	2.3
Gazelle spring rye	58	4.2	1.5	1.6	3.7	2.2
Lucille emmer	63	4.0	--	--	3.5	
SK3P spelt	65	3.7	--	--	3.3	
93-ST-5-9 wheat/spelt	66	3.7	--	--	3.3	
Trial Mean	73	3.5	2.0	1.3	3.0	
C.V. %	1.9	11.3	13.5	24.2	11.3	
LSD .05	2	0.6	0.4	NS	0.5	

Forage yield of oat harvested on July 13, 2001 at the David Maus Farm, Wibaux, MT.

Variety	Stage at harvest	Hay yield	Dry matter basis: Crude protein	ADF	NDF	TDN
		tons/acre	%	%	%	%
Otana	Milk-soft dough	1.91	10.6	47.5	66.7	40.1
Derby	Milk-soft dough	1.88	12.1	40.6	63.5	48.9
Paul	Flowering	1.87	12.5	41.5	63.1	47.9
Mean		1.89	11.7	43.2	64.4	45.6
CV%		7.0				
LSD $_{.05}$		NS				

Planted May 3, 2001.

Barley and Oat Dissection Forage Trial 2001 **Dickinson, ND**

Variety	Growth Stage	Moisture: Head	Moisture: Leaf	Moisture: Stem	Contribution to Yield: Head	Contribution to Yield: Leaf	Contribution to Yield: Stem	3-Year Average: Head	3-Year Average: Leaf	3-Year Average: Stem
		%			%					
93-ST-5-9 wheat/spelt	2	65	56	64	27	17	56	--	--	--
Conlon barley	1	62	64	71	29	15	56	39	18	34
Forage Plus oat	2	60	69	69	30	16	54	--	--	--
Haybet barley	2	65	61	71	20	22	58	28	24	36
Lucille emmer	3	51	45	59	29	16	55	--	--	--
Robust barley	1	66	69	75	21	25	54	35	23	33
SK3P spelt	1	60	49	59	24	16	59	--	--	--
Sandro triticale	3	37	47	53	45	10	45	--	--	--
Trapper pea	--	61	75	77	35	20	45	--	--	--
Triple Crown oat	2	60	72	74	35	18	48	44	18	30
Trial Mean	2	59	61	67	30	17	53	--	--	--
C.V. %	9.9	3.3	7.0	3.9	10.9	12.2	5.2	--	--	--
LSD .05	0	3	6	4	5	3	4	--	--	--

Growth stage 1=Milk, 2= Early soft dough, 3= Soft dough

2001 Winter/Spring Intercrop Trial-Recrop — **Dickinson, ND**

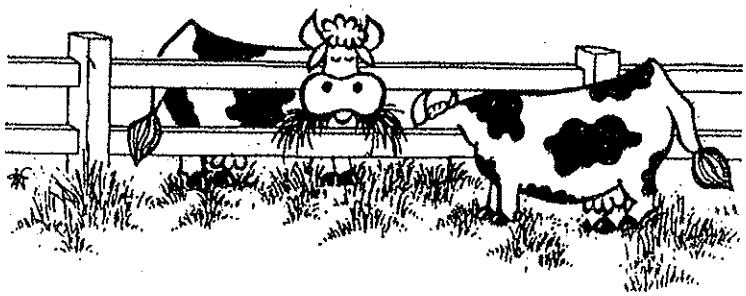
Variety	Yield: Dry Matter 1st Cutting	Yield: Dry Matter 2nd Cutting	Yield: Dry Matter Total	Yield: 12% Moisture 1st Cutting	Yield: 12% Moisture 2nd Cutting	Harvest Moisture 1st Cutting	Harvest Moisture 2nd Cutting	Spring Cereal Height 1st Cut	Growth Stage 1st Cut	DM Yield 2 Year Average
	tons/ac					%		inches		
2700 Spring Triticale	3.6	--	3.6	4.0	--	57	--	41	3	2.6
2700 Triticale / Dacold Winter Rye	2.5	0.1	2.6	2.8	0.1	59	68	41	3	2.1
2700 Triticale / Frostat Winter Triticale	2.8	0.2	3.0	3.2	0.2	61	73	42	3	--
2700 Triticale /Roughrider W. wheat	2.8	0.1	2.9	3.1	0.1	60	64	40	3	2.1
Dumont Oat	2.6	--	2.6	3.0	--	69	--	33	1	2.1
Dumont oat / Dacold Winter Rye	1.8	0.2	2.0	2.0	0.2	74	65	31	1	--
Dumont oat / Frostat Winter Triticale	2.1	0.3	2.4	2.4	0.4	76	70	29	1	--
Dumont oat /Roughrider W. wheat	1.9	0.1	2.0	2.1	0.2	72	60	32	1	1.5
Haybet Barley	2.5	--	2.5	2.8	--	70	--	29	2	2.0
Haybet barley / Dacold Winter Rye	2.2	0.1	2.3	2.5	0.1	73	67	28	2	--
Haybet barley / Frostat Winter Triticale	2.0	0.2	2.2	2.3	0.2	75	70	29	2	--
Haybet barley / Roughrider W. wheat	2.2	0.1	2.3	2.5	0.1	74	64	29	2	1.7
Trial Mean	2.4	0.2	2.5	2.7	0.2	68	67	34	2	2.0
C.V. %	13.6	44.6	--	13.6	44.6	2.7	3.6	4.5	--	--
LSD .05	0.5	NS	--	0.5	NS	3	3	2	--	--

Seeding date: May 5
Harvest date: 1st cut according to the growth stage 2nd cut 45 days later
NS=no statistical difference
Growth Stage: 1 = Milk, 2 = Early Soft Dough, 3 = Soft Dough

2001 Winter/Spring Intercrop Trial-Recrop **Dickinson,**

Variety	CP	ADF	NDF	TDN	RFV
	----------%----------				
2700 Spring Triticale	9.0	44	70	44	73
2700 Triticale / Dacold Winter Rye	9.1	40	66	50	83
2700 Triticale / Frostat Winter Triticale	9.7	43	67	46	76
2700 Triticale / Roughrider W. wheat	10.2	39	65	51	83
Dumont Oat	11.4	42	66	48	80
Dumont oat / Dacold Winter Rye	11.4	40	65	49	83
Dumont oat / Frostat Winter Triticale	11.9	42	64	47	83
Dumont oat / Roughrider W. wheat	11.7	41	66	49	80
Haybet Barley	11.7	43	69	46	75
Haybet barley / Dacold Winter Rye	11.8	40	66	49	81
Haybet barley / Frostat Winter Triticale	11.8	41	65	49	82
Haybet barley / Roughrider W. wheat	12.0	41	68	48	77
Trial Mean	11.0	41	66	48	80
C.V. %	8.2	4.9	5.1	5.4	7.3
LSD .05	1.5	NS	NS	NS	NS

CP =Crude Protein
ADF = Acid Detergent Fiber
NDF = Neutral Detergent Fiber
TDN = Total Digestible Nutrients
RFV = Relative Feed Value
NS = No Statistical Difference



Wheat-Pea Tillage Trial, Wheat 2001 **Dickinson, ND**

	Soil Moisture	Plant Stand	Tillers per Plant	Growth Stage	Days to Head	Spike Count	Residue
	feet	plants/acre		leaves		spikes/acre	%
Tillage							
Conventional	1.3	558,922	3.2	8.8	64	1,278,259	21
Reduced	1.4	690,493	3.9	9.3	63	1,619,837	33
None	2.1	962,237	2.7	8.9	63	1,804,542	94
F-test	*	*	NS	NS	NS	*	*
Rotation							
Wheat/Pea	1.5	739,157	3.4	9.0	63	1,600,776	41
Wheat/Wheat	1.7	735,277	3.0	9.0	63	1,534,316	58
F-test	NS	NS	NS	NS	NS	NS	*
Trial Mean	1.6	737,217	3.2	9.0	63	1,567,546	49
C.V.%	21.3	12.3	24.6	9.7	3.4	9.4	14

* = significant at the P<.05 level NS = not significant

Wheat-Pea Tillage Trial, Wheat 2001 **Dickinson, ND**

	Plant Height	Yield	Test Weight	Protein	Seeds per Pound	Returns
	inches	bu/ac	lbs/bu	%		$/ac
Tillage						
Conventional	34	46.5	56.8	15.5	16,020	131.71
Reduced	34	47.0	57.3	15.2	17,327	133.23
None	35	55.9	58.8	14.3	16,677	151.38
F-test	NS	*	*	*	NS	NS
Rotation						
Wheat/Pea	35	53.7	57.9	15.0	16,391	149.10
Wheat/Wheat	33	45.9	57.3	15.0	16,958	128.45
F-test	*	*	NS	NS	NS	*
Trial Mean	34	49.8	57.6	15.0	16,675	138.78
C.V.%	2.6	8.5	1.7	2.7	5.5	10.5

* = significant at the P<.05 level NS = not significant

Wheat-Pea Tillage Trial, Pea 2001 **Dickinson, ND**

	Height	Test Weight	Crude Protein	Grain Yield 2000	Grain Yield 2001	Returns	2 Year Average
	in	lbs/bu	%	lbs/ac		$/ac	lbs/ac
Tillage							
Conventional	26.8	62.9	25.8	2,035	2,761	92.05	2,398
Reduced	25.5	62.1	25.3	2,611	2,762	92.05	2,687
None	26.5	62.8	25.1	3,472	3,011	100.37	3,242
Trial Mean	26.2	62.6	25.4	2,706	2,845	94.82	2,775
C.V. %	13.6	1.2	1.4	11.5	9.8	9.8	--
LSD .05	NS	NS	NS	539	NS	NS	--

NS = not significant Returns calculated using market value of $2.00/bu

Wheat-Pea Tillage Trial, Pea 2001 **Dickinson, ND**

	Seeds per Pound	Soil Moisture	Residue Cover	Plant Count	Days to Flower	Flower Duration
		feet	%	plants/acre		days
Tillage						
Conventional	2,058	1.6	26	233,791	59	14
Reduced	2,046	1.6	58	264,153	58	15
None	2,050	2.4	93	260,105	60	14
Trial Mean	2,051	1.9	59	252,683	58.8	14.3
C.V. %	10.7	17.4	12.3	13.5	1.6	6.3
LSD .05	NS	0.6	12	NS	NS	NS

NS = not significant

Wheat-Canola Tillage Trial, Wheat 2001 **Dickinson, ND**

	Soil Moisture	Plant Stand	Tillers per plant	Growth Stage	Days to Head	Spike Count	Residue
	feet	plants/acre		leaves		spikes/acre	%
Tillage							
Conventional	1.1	556,139	3.0	9.3	65	1,493,832	11
Reduced	1.6	659,371	3.8	9.1	63	1,523,869	29
None	1.8	870,896	2.6	9.3	61	1,727,623	88
F-test	*	*	NS	NS	NS	NS	*
Rotation							
Wheat/Canola	1.5	702,891	3.0	9.3	63	1,586,269	34
Wheat/Wheat	1.6	688,047	3.3	9.2	63	1,577,161	52
F-test	NS	NS	NS	NS	NS	NS	*
Trial Mean	1.5	695,469	3.1	9.2	63	1,581,715	43
C.V.%	17.8	18.0	31.9	5.1	2.5	18.4	18.1

* = significant at the P<.05 level NS = not significant

Wheat-Canola Tillage Trial, Wheat 2001 **Dickinson, ND**

	Plant Height	Yield	Test Weight	Protein	Seeds per Pound	Returns
	inches	bu/ac	lbs/bu	%		$/ac
Tillage						
Conventional	32	37.6	56.8	16.3	17,066	108.31
Reduced	33	44.3	57.2	15.4	16,986	125.94
None	33	44.9	58.3	14.9	17,304	125.14
F-test	NS	NS	*	*	NS	NS
Rotation						
Wheat/Canola	33	42.2	57.5	15.6	16,970	119.74
Wheat/Wheat	33	42.3	57.3	15.4	17,267	119.85
F-test	NS	NS	NS	NS	NS	NS
Trial Mean	24	42.3	57.4	15.5	17,119	119.79
C.V.%	2.3	10.9	2.0	2.3	7.3	11.5

* = significant at the P<.05 level NS = not significant

Wheat-Canola Tillage Trial, Canola 2001 **Dickinson, ND**

	Residue Cover	Test Weight	Oil @ 8.5% Moisture	Grain Yield		2 Year Average
				2000	2001	
	%	lbs/bu	%	lbs/ac		lbs/ac
Tillage						
Conventional	16	46.3	43.3	391	926	659
Reduced	39	46.2	43.9	638	999	819
None	85	47.6	44.2	860	1117	989
Trial Mean	47	46.7	43.8	630	1014	822
C.V. %	35.2	4.3	2.9	23.8	20.2	--
LSD .05	28	NS	NS	NS	NS	--

NS = not significant

Wheat-Canola Tillage Trial, Canola 2001 **Dickinson, ND**

	Seeds per Pound	Soil Moisture	Days to Flower	Flower Duration	Plant Count
		feet		days	plants/acre
Tillage					
Conventional	142,028	1.4	55	21	400,278
Reduced	142,218	1.3	53	22	268,202
None	143,841	1.8	50	24	248,466
Trial Mean	142,696	2	53	22	305,649
C.V. %	6.8	21.3	2.1	9.0	29.5
LSD .05	NS	NS	2	NS	NS

NS = not significant

2001 Long Term Rotation Trial, Wheat	Dickinson, ND

Rotation[1]	Yield	Height	Seeds per Pound	Test Weight	Protein	Returns
	bu/ac	inches		lbs/bu	%	$/ac
Organic -(1)	45.2	39	15,112	57.8	13.8	226.00*
Organic -(4)	45.4	38	14,638	59.4	13.9	227.00*
Continuous	44.8	34	14,774	60.2	15.5	129.38
Cool (1)	46.5	39	14,880	60.1	14.9	130.61
Cool (3)	49.3	39	15,314	59.3	13.6	129.67
Cool/Warm	56.0	36	13,704	58.7	14.9	156.76
Trial Mean	47.9	37	14,737	59.3	14.4	131.02
C.V. %	10.9	7.3	4.6	2.1	5.4	12.9
LSD .05	6.9	NS	887	NS	1.0	22.34

NS = No Statistical Difference

[1] **Organic** = (1) hard red spring(HRS) wheat + alfalfa - (2) alfalfa - (3) alfalfa plowdown - (4) HRS wheat - (5) corn - (6)oat + pea(hayed)
Continuous = HRS wheat grown continuously
Cool = (1) HRS wheat - (2) field pea - (3) HRS wheat - (4) canola
Cool/Warm = (1) HRS wheat - (2) field pea - (3) corn - (4) buckwheat

*Organic returns were calculated based on a $5 per bushel rate.

Returns were calculated by multiplying the 2001 yield by protein premium or discount paid at the Southwest Grain Terminal located at Gladstone on September 17. The price paid on this date was $2.74/bu, assuming that grain protein concentration was 14%. An additional $.02/bu was paid for each additional 0.25% increase in grain protein up to 15% protein, where an additional $0.5/bu was paid. An additional $0.01/bu was paid for each additional 0.25% increase in grain protein up to 17%, above which an additional premium was not paid. Grain was discounted $0.05/bu for each 0.25% reduction in grain protein from 14% to 11%, below which no 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].

2001 Long Term Weed Management Trial, Wheat — Dickinson, ND

Treatment	Residue	Seeds per Pound	Plant Height	Yield	Test Weight
	%		inches	bu/ac	lbs/bu
Conventional Till	7	15,186	38	64.6	58.2
No-Till	97	14,543	39	64.9	58.6
Low - input	18	14,833	34	61.9	60.6
Trial Mean	41	14,854	37	63.8	59.2
C.V. %	11.6	7.6	7.3	9.6	3.3
LSD .05	11	NS	NS	NS	NS

NS = not significant

2001 Long Term Weed Management Trial, Corn — Dickinson, ND

Treatment	Harvest Moisture	Residue*	Silage Yield		Plant Height
			Dry Matter Basis	70% Moisture	
	%	%	tons/ac	tons/ac	inches
Conventional Till	55	95	3.7	12.3	68
No-Till	50	95	4.2	14.1	72
Low - input	44	90	2.8	9.4	67
Trial Mean	49	93	3.6	11.9	69
C.V. %	10.3	5.5	20.2	20.2	4.7
LSD .05	NS	NS	NS	NS	NS

NS = not significant

* Residue count for corn was done before tillage

Evaluation of Fungicides to Control Ascochyta in Chickpea
Hettinger, North Dakota

Eric Eriksmoen - Agronomist
Rick Olson - Technician
Lance Ketterling - Cooperator

Dwelley chickpea was seeded on May 4. Seed was inoculated with rhizobia and treated with LSP and Apron prior to seeding. 50 lbs/acre 11-52-0 plus 10 lbs/acre 'Roughrider' (3 lbs/ac copper) fertilizer were applied with the seed. The first treatment application was on July 2 to chickpeas in early bloom. The second treatment application was on July 16 to chickpeas in late bloom. A third treatment application was applied on July 30 to chickpeas that were completely podded and developing peas. Treatments were applied with a tractor mounted CO2 propelled plot sprayer delivering 17 gpa at 40psi through 8001 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. Visual evaluations for ascochyta infection on crop leaves and pods were on July 13, July 23, July 30, August 6 and on August 13. The trial was harvested on September 6. Harvested seed was cleaned with a clipper mill to remove chaff and weed seeds and then graded according to seed size.

Summary

Weather conditions were ideal for ascochyta development during the month of July with 15 days of measurable precipitation totaling almost 4 ½ inches of rain. Hot and dry August weather conditions ceased the progression of ascochyta with only 2 days of measurable precipitation totaling 0.13 inches. Evaluations on July 13 showed minor levels of visual ascochyta on all treatments (data not shown). Split applications of BAS 500, BAS 516 and Quadris (trts 4 - 9) provided good season long control of ascochyta, had the highest seed yields, the highest test weights and the highest % of large seed. Split applications of Bravo WeatherStik and Bravo Zn (trts 20 & 21) also provided relatively good seed yields. The single early application of BAS 500 (trts 2 & 3) provided good initial ascochyta control but deteriorated as the season progressed. Seed yield, test weight, seed weight and % large seed from these two treatments were still significantly higher than the untreated check. The second application of BAS 500 (trts 4 & 5) significantly enhanced ascochyta control and seed yields over the single BAS 500 application (trts 2 & 3). Split applications of Bravo Ultrex and Topsin M were not effective in controlling ascochyta. The addition of Scalia to the Bravo Ultrex/Topsin M mixture (trts 12 & 24) did not significantly enhance ascochyta control or seed yield over the single product mixture (trts 10 & 13). Higher fungicide application rates did not significantly enhance ascochyta control or seed yields (trt 3 vs.2, trt 5 vs.4, trt 7 vs.9).

Treatment		Product Rate	7/23	7/30	8/6	8/13	Seed		1000	Seed Size (mm)		
			Ascochyta Rating				Yield	TWT	KWT	>9	8-9	<8
#	Product	oz/A	0 - 9*				lbs/A	lbs/bu	g	-------- % --------		
1	Untreated	0	3.0	5.2	6.8	7.5	462	56.0	256	26	29	45
2	BAS 500	7.2	1.5	1.5	3.5	3.8	1306	59.9	408	70	20	10
3	BAS 500	10.4	1.3	1.7	4.0	4.7	1156	58.6	383	55	26	19
4	BAS 500 / BAS 500	7.2 / 7.2	1.0	1.2	1.8	1.2	1803	60.6	405	80	15	5
5	BAS 500 / BAS 500	10.4 / 10.4	1.2	1.2	1.5	1.8	1725	60.6	411	80	14	6
6	BAS 516 / BAS 516	10.53 / 10.53	1.0	1.0	1.5	1.2	1631	60.9	417	79	15	6
7	Quadris / Quadris	9.2 / 6.2	1.0	1.0	2.2	2.0	1794	60.7	400	78	15	7
8	Quadris / BAS 516	6.2 / 10.53	1.0	1.2	1.8	1.8	1761	60.7	386	77	16	7
9	Quadris / Quadris	6.2 / 6.2	1.0	1.2	2.0	2.2	1643	60.4	425	77	16	7
10	Bravo Ult / Bravo Ult	20 / 20	2.0	3.0	5.5	6.2	806	58.8	346	45	29	26
11	Bravo Ult / Quadris	20 / 6.2	1.2	1.5	2.8	2.5	1543	60.4	430	75	16	9
12	Scalia + Bravo Ult / Scalia + Bravo Ult	10.24 + 14.56 / 10.24 + 14.56	1.5	2.2	4.0	4.8	1134	59.3	378	54	28	18
13	Topsin M / Topsin M	8 / 8	2.0	3.5	5.2	6.2	767	58.8	347	45	29	26
14	Topsin M / Topsin M	16 / 16	2.7	4.3	6.0	7.0	590	58.4	279	31	26	43
15	Topsin M / Topsin M	24 / 24	2.0	4.0	6.0	6.2	562	58.0	271	34	26	40
16	Topsin M / Topsin M	32 / 32	1.6	2.0	4.0	4.3	961	58.1	353	55	25	20
17	Topsin M / Quadris / Topsin M	8 / 6.2 / 8	2.2	1.8	2.8	2.5	1326	60.0	396	65	23	12
18	Topsin M / Bravo Ult / Topsin M	8 / 20 / 8	3.0	3.5	5.0	6.2	694	57.2	318	46	27	27
19	Topsin M / Quadris / Bravo Ult	8 / 6.2 / 20	1.8	2.0	3.5	3.8	1351	60.1	375	67	20	12
20	Bravo WeatherStik / Bravo WeatherStik	32 / 32	1.0	1.8	2.8	3.0	1444	59.8	426	70	19	11
21	Bravo Zn / Bravo Zn	40 / 40	1.3	1.3	2.3	4.0	1495	59.6	341	65	21	14
22	BAS 500 + Topsin M	7.2 + 8	1.2	2.5	3.8	5.2	1119	58.9	374	57	26	17
23	Topsin M / BAS 500	8 / 7.2	2.5	1.8	2.5	3.0	1312	59.8	416	72	18	10
24	Topsin M / Scalia	8 / 10.24	1.3	2.7	4.0	4.7	907	58.5	354	44	31	25
C.V. %			55.2	44.3	30.4	29.2	24.6	1.6	13.4	14.8	16.5	46.8
LSD 5%			1.3	1.4	1.5	1.6	429	1.3	71	13	5	11

*Ascochyta Rating (0-9): 0 = no visual ascochyta on leaves or pods, 9 = dead plants

Seed Treatment Demonstration – Regent, ND 2001

R.O. Ashley, M.P. McMullen, P.M. Carr, D. Barondeau, E. Eriksmoen, and G. Martin

Summary: Nineteen registered and experimental seed treatments were evaluated for the control of fungal root and crown diseases on hard red spring wheat (*Triticum aestivum* L. c.v. Trenton) by comparing disease, growth, and yield parameters of treated plots to those in untreated check and fumigated plots in southwest North Dakota. Seed treatments with known activity against root rot tended to have greater seminal and crown root counts compared to the untreated check. Root mass and root color were significantly improved for selected seed treatments compared to the untreated check. Grain yield for the fumigated and three registered and experimental treatments was greater than the untreated check.

Methods: The demonstration was located on the August and Perry Kirschmann Farm near Regent, ND, at a site that had been in spring wheat continuously since 1993. Soil tests indicated that P, K, S, and Cl were adequate however nitrogen was required for an expected yield of 65 bushel per acre. Ammonium sulfate (21-0-0-24) was applied at the rate of 200 pounds per acre on May 5, 2001. Rainfall of over a quarter of an inch occurred shortly after application. Roundup (glyphosate) was applied May 3, 2001 preplant to control volunteer and emerged weeds. Trenton hard red spring wheat was treated with various seed treatment fungicides prior to planting (Table 1). Seed that was planted in the fumigated-check (FUMIGATED) and the check (CHECK) plot were untreated. A no-till drill with double disk openers was used to seed the plot.

A randomized complete block design with six replications was used in this demonstration. Plots were 10 feet wide by 45 feet long with a four foot buffer strip of winter wheat seeded between each plot. Plots to be fumigated were covered with a six mil clear plastic sheet, edges buried in trenches four to six inches deep to seal the covered area, and methyl bromide was metered through plastic hoses at the rate of one pound per 100 ft^2 (50 g m^{-2}), on April 30, 2001. The fumigated plots remained covered for 48 hours after which time the plastic was removed.

Trenton hard red spring wheat was seeded on May 8, 2001 at a rate of 1.5 million seeds per acre. Post emergence weed control consisted of an application of a tank mix of 2/3 pint per acre Puma with 1 pint per acre Buctril, applied on May 27, 2001. A second post emergence herbicide application was required on June 13, 2001. One pint of Bronate was applied. In addition to the herbicide, two fluid ounces of Tilt fungicide was tank mixed with the Bronate for control of tan spot.

Root and crown samples from four plots per treatment were evaluated twice during the growing season. The first evaluation occurred between the six- and seven-leaf stage on June 12, and the second evaluation occurred at soft dough stage on July 31. During the second evaluation, selected plants were placed in a cooler and shipped overnight to the Plant Pest Diagnostic Laboratory at NDSU, Fargo, ND. Agar plate cultures were conducted on these selected root samples to determine fungi present.

Soil samples were taken from a check plot and a fumigated plot at the one-leaf and soft dough stages and submitted to Riberio Plant Lab Inc., Bainbridge Island, Washington, to determine the level of propagules per gram of soil for three species of fungi.

Rainfall was recorded on site using a RainWise electronic self-tipping bucket and a Hobo event logger. Air and soil temperatures were record with a Hobo H8 Pro Series temperature data logger.

Prior to harvest, mature plant height and head densities were determined. The plots were harvested on August 16, 2001 with a Massy Ferguson 8XP combine, which measured grain weight harvested, percent moisture of harvested grain, and test weight. Harvested area was measured and yields calculated. Protein was determined at Southwest Grain, Inc., Dickinson, ND. Grain yield, test weight, and protein were adjusted to a 12% moisture basis.

All data were statistically analyzed using SAS Statistical software version 6.12.

Results and Discussion: Grain yields (Table 2) for Raxil MD, Raxil MD extra, and Charter Max were significantly greater than that of the untreated CHECK but were significantly less than the FUMIGATED treatment. Products labeled for the control of root pathogens tended to produce higher yields than the CHECK. Reducing the application rate of Raxil MD (Raxil MD-L) did not improve grain yield significantly over the untreated CHECK. Treatments that contained an insecticide such as lindane or thiamethoxam yielded no more than registered treatments without the insecticide. Wireworms were not found at this site and therefore a response to insecticide would not be expected. However, producers should consider the use of insecticides in fields where wireworm infestations are thought to exist.

Test weight (Table 2) for a few of the experimental and registered products was significantly greater than the FUMIGATED treatment. These differences may have been due to the maturity of the plants in relation to moisture stress during grain fill. No significant differences in grain protein content were observed between the untreated CHECK and seed treatments.

Root Evaluations: Seminal and crown root counts (Table 3) tended to be greater for seed treatments registered for the control of root diseases but not significantly. Fewer lesions were noted on subcrown internode, root mass was larger and roots were healthier than the CHECK for seed treatments registered for the control of root disease (Table 4).

Root tissue samples analyzed indicated that Pythium, Fusarium, and Rhizoctonia were present. Symptoms found on the subcrown internodes were consistent with the type of lesions produced by *Bipolaris sorokiniana* L. (Common root rot) but no cultures of this disease from tissue samples submitted were found. Fungi propagule counts (Table 5) indicated that Fusarium levels were very high in non-fumigated soils at the beginning of the growing season. Not all Fusarium propagules detected by this analysis are pathogenic. Pythium propagule levels at the beginning of the season were approaching levels that are thought to cause economic losses and benefit from seed treatments that control Pythium. Rhizoctonia propagule levels were considered low and less likely to cause economic loss than Fusarium.

Implications of Demonstration: Seed treatments do provide some protection against root pathogens that infect wheat as evidenced by root and yield data in this demonstration. Fungicidal seed treatments with activity against Fusarium, Pythium, and common root rot tended to promote healthier root systems. Soil fumigation reduces soil-born pathogens and may modify nutrient availability in soil, both of which affects yield.

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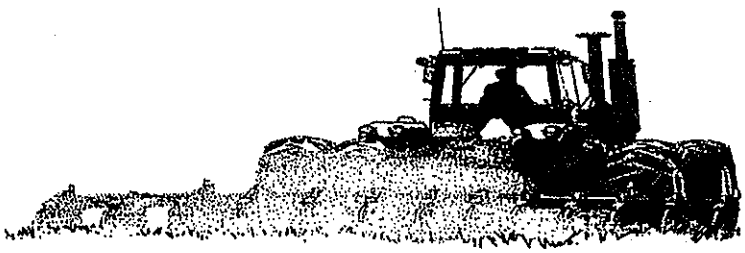

Table 1. Active ingredients of seed treatments used at Regent, ND, 2000.

Treatment	Status	Active ingredient and percent concentration in product	Product application rate	Active on disease[1]
Charter MAX	Not Registered in USA	Triticonazole 1.3 Metalaxyl 0.5	5.8 fl oz/cwt	NA[2]
Charter PB	Not Registered in USA	Triticonazole 1.3 Thiram 13.0	5.5 fl oz/cwt	NA[2]
DB Green L	Registered	Maneb 25.6 Lindane 8.6	5 fl oz/cwt	Seedling Blight
DB Green L + RR	Registered	Maneb 25.6 Imazalil 10.0 Lindane 8.6	5.6 fl oz/cwt	Seedling Blight, Common Root Rot
Dividend XL 1.6 FS	Registered	Difenoconazole 16.5 Mefenoxam 1.38	1 fl oz/cwt	Common Root Rot, Pythium, Seedling Blight, Loose Smut
RTU Vitavax - Thiram	Registered	Carboxin 10.0 Thiram 10.0	6.0 fl oz/cwt	Seedling Blight, Loose Smut
Raxil MD	Registered	Tebuconazole 0.48 Metalaxyl 0.64	5 fl oz/cwt	Seedling Blight, Pythium, Common Root Rot, Loose Smut
Raxil MD - L	Registered	Tebuconazole 0.48 Metalaxyl 0.64	3 fl oz wt/cwt	Seedling Blight, Pythium, Common Root Rot, Loose Smut
Gustafson Exp Trt #1	Not Registered	NA	NA	NA
Syngenta Exp Trt #4 - #10	Not Registered	NA	NA	NA

[1] Registered seed treatment for wheat has activity on seed-borne and/or soil-borne pathogen that causes these diseases.
[2] NA = Not Available.
[3] Lindane and Adage are insecticides.

Table 2. Grain yield, test weight, protein, height and head density at harvest of Trenton hard red spring wheat grown under various seed treatments, August and Perry Kirschmann Farm, Regent, ND, 2001.

			Grain[1]		
Treatment	Head density	Height	Yield	Test weight	Protein
	no/yd2	inches	bu/a	lb/bu	%
CHECK	329.4	36.1	56.5	60.6	15.4
FUMIGATED	390.2	36.8	63.1	60.1	15.8
Raxil MD	329.6	36.9	59.0	60.4	15.5
Raxil MD + Gaucho	336.5	36.8	58.3	60.5	15.2
Raxil MD extra	325.5	37.1	59.1	60.4	15.5
Gustafson Exp Trt #1	337.4	36.7	57.8	60.1	15.5
RTU Vitavax + Thiram	312.3	36.4	58.2	60.8	15.6
DB Green L	329.2	35.7	57.7	60.9	15.4
DB Green L + RR II	327.6	36.3	58.0	60.9	15.5
Charter PB	330.3	36.7	57.7	60.7	15.5
Charter Max	337.4	37.0	59.2	60.8	15.5
Vitavax 200 + Flo Pro IMZ	326.0	36.2	57.3	60.9	15.7
Dividend XL	318.4	37.0	58.2	60.7	15.3
Raxil MD – L[2]	322.1	36.3	57.2	60.4	15.6
Syngenta Exp Trt #4	325.3	36.8	57.3	60.3	15.6
Syngenta Exp Trt #5	348.2	36.6	57.0	60.7	15.5
Syngenta Exp Trt #6	332.2	35.9	58.2	60.4	15.6
Syngenta Exp Trt #7	333.8	36.1	58.0	60.9	15.5
Syngenta Exp Trt #8	338.1	35.5	58.2	60.9	15.4
Syngenta Exp Trt #9	326.4	36.1	58.3	61.1	15.6
Syngenta Exp Trt #10	342.9	36.0	57.9	61.0	15.6
Mean	333.3	36.4	58.2	60.6	15.5
CV %	7.3	2.6	3.3	0.8	1.8
$LSD_{.05}$	27.7	NS	2.2	0.6	0.3

1 All grain yields, test weights, and proteins are adjusted to 12% moisture basis.
2 Raxil MD – L is Raxil MD applied at a rate less than current labeled rate.

Table 3. Initial root and plant evaluations of Trenton hard red spring wheat with various seed treatments, August and Perry Kirschmann Farm, Regent, ND, 2001.

Treatment	Development stage	Length[1]	Tillers	Subcrown internode rating[2]	Seminal roots	Crown roots
	Haun	mm	no./plant		no./plant	no./plant
CHECK	6.4	385.1	2.9	1.45	4.9	9.9
FUMIGATED	6.6	431.2	3.6	1.33	5.6	14.1
Raxil MD	6.4	402.9	3.1	1.13	4.8	11.5
Raxil MD + Gaucho	6.3	400.3	2.6	1.00	5.0	9.4
Raxil MD extra	6.5	396.0	2.8	1.00	5.3	10.2
Gustafson Exp Trt #1	6.3	399.2	2.9	1.25	5.3	10.3
RTU Vitavax – Thiram	6.4	404.1	2.6	1.10	5.5	10.3
DB Green L	6.3	373.0	3.1	1.00	4.9	8.9
DB Green L + RR II	6.2	384.3	3.0	1.03	5.6	10.7
Charter PB	6.2	388.4	3.2	1.03	5.6	9.4
Charter Max	6.3	393.4	3.4	1.00	5.0	10.1
Vitavax 200 + Flo Pro IMZ	6.1	370.3	3.5	1.45	5.3	8.9
Dividend XL	6.3	388.2	3.2	1.38	5.1	10.4
Raxil MD – L[3]	6.3	385.7	3.2	1.38	5.3	9.6
Syngenta Exp Trt #4	6.2	380.8	3.1	1.18	5.3	9.6
Syngenta Exp Trt #5	6.3	372.1	3.4	1.13	5.0	10.3
Syngenta Exp Trt #6	6.1	365.8	3.3	1.10	5.3	9.0
Syngenta Exp Trt #7	6.2	355.8	3.1	1.10	4.9	9.0
Syngenta Exp Trt #8	6.1	376.2	3.1	1.20	4.5	10.0
Syngenta Exp Trt #9	6.3	378.8	3.2	1.08	4.9	10.3
Syngenta Exp Trt #10	6.3	395.2	3.2	1.10	5.2	11.2
Mean	6.3	387.0	3.1	1.16	5.1	10.1
CV%	2.3	4.4	16.7	20.4	8.4	11.7
$LSD_{.05}$	0.2	23.9	NS	NS	0.6	1.7

1 Length measured from the crown to the tip of the last fully extended leaf of the plant.
2 Subcrown internode rating, 1 to 4. 1 = less than 25% of the internode infected, 2 = 25 to 50% of the internode infected, 3 = 50 to 75% of the internode infected, multiple lesions, and 4 = 75 to 100% of the internode infected, lesions coalesced.
3 Raxil MD – L is Raxil MD applied at a rate less than the current labeled rate.

Table 4. Root evaluation at the soft dough stage, August and Perry Kirschmann Farm, Regent, ND, 2001.

Treatment	Subcrown internode rating[1]	Root color[2]	Root Mass[3]
CHECK	1.87	2.30	2.42
FUMIGATED	1.55	1.84	3.08
Raxil MD	1.41	2.09	2.63
Raxil MD + Gaucho	1.40	2.16	2.45
Raxil MD extra	1.37	2.12	2.52
Gustafson Exp Trt #1	1.25	2.07	2.73
RTU Vitavax + Thiram	1.80	2.36	2.27
DB Green L	1.98	2.30	2.40
DG Green L + RR II	1.37	2.39	2.56
Charter PB	1.51	2.21	2.62
Charter Max	1.60	2.09	2.70
Vitavax 200 + Flo Pro IMZ	1.42	2.22	2.57
Dividend XL	1.40	2.06	2.59
Raxil MD – L[4]	1.80	2.28	2.24
Syngenta Exp Trt #4	1.66	2.02	2.59
Syngenta Exp Trt #5	1.65	2.12	2.71
Syngenta Exp Trt #6	1.69	2.07	2.65
Syngenta Exp Trt #7	1.83	2.19	2.52
Syngenta Exp Trt #8	1.45	2.19	2.51
Syngenta Exp Trt #9	1.44	2.08	2.66
Syngenta Exp Trt #10	1.84	2.11	2.68
Mean	1.58	2.16	2.58
CV%	16.0	5.9	6.7
$LSD_{.05}$	0.36	0.18	0.25

1 Subcrown internode rating, 1-4. 1 = less than 25% internode infected, 2 = 25 – 50% of internode infected, 3 = 51-75% infected, multiple lesions, and 4 = 75-100% of internode infected, lesions coalesced.
2 Root color index, 1 to 4. 1 = white and 4 = dark brown.
3 Root mass 1 to 4. 1 = few roots and 4 = substantial root system.
4 Raxil MD – L is Raxil MD applied at a rate less than current labeled rate.

Table 5. Soil-borne pathogen survey of the August and Perry Kirschmann site, Regent, ND, 2001.

	May 16		August 5	
Pathogen	Fumigated	Natural	Fumigated	Natural
	---------- Propagules g^{-1} soil ----------			
Fusarium	90 (VL)	1760 (VH)	110 (L)	1840 (VH)
Pythium	280 (L)	360 (M)	320 (M)	300 (M)
Rhizoctonia	0	10 (L)	0	10 (L)

(VL) = very low number of propagules of pathogen isolated per gram of soil sample tested; (L) = low numbers; (M) = moderate numbers; (H) = high numbers; (VH) = very high numbers of propagules isolated.

2001 Reduced Rates and Application Timing of Wild Oat Herbicides at Hettinger. (Eriksmoen) The objective of this trial was to look at the relationship between various rates of wild oat herbicides applied at 3 different growth stages of HRSW. Reeder HRSW was planted on April 26. The first post-applied treatments were applied to 1 leaf wheat and to 1 leaf wild oats on May 8 with 65 deg. F, 26% RH, sunny sky and 10 mph wind. The second post-applied treatments were applied to 3 leaf wheat and to 1 to 3 leaf wild oats on May 17 with 44 deg. F, 53% RH, sunny sky and 12 mph wind. The third post-applied treatments were applied to 5 leaf wheat and to 2 to 5 leaf wild oats on June 11 with 63 deg. F, 44% RH, sunny sky and 5 mph wind. All 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 22 foot plots. The trial was sprayed with 10 ounces/Ac Starane + 1 pint/Ac Buctril + 1/3 ounce/Ac Express on June 7 to control broadleaf weeds. The experiment was a randomized complete block design with four replications. Wild oat populations were 8 plants per sq. foot on May 8, 38 plants per sq. foot on May 17 and 44 plants per sq. foot on June 11. Evaluations for wild oat control were on June 12 for the first two application dates and on July 3 for the third application date. The trial sustained severe hail damage on June 18 and was not harvested.

Summary

Crop injury was not observed on any treatment (data not shown). All treatments applied at the one leaf growth stage provided poor season long wild oat control, although there does appear to be some residual control with the Everest treatments. Wild oats at the first application were still emerging and the crop did not provide much competition. Wild oat control with Puma treatments tended to increase with the higher rates and later applications. Everest treatments were very effective at controlling wild oats at all treatment rates when applied at the 3 leaf stage. Everest treatments were less effective when applied at the 5 leaf stage than at the 3 leaf stage. Discover treatments provided excellent wild oat control at all three treatment rates when applied at the 3 and 5 leaf stages. The 5.25 ounce per acre rate of Achieve had better wild oat control (although not significantly) than the 7 ounce per acre rate when applied at the 3 and 5 leaf stages. The trial sustained severe hail damage on June 18 and was not harvested.

2001 Reduced Rates and Application Timing of Wild Oat Herbicides at Hettinger.

App. Timing	Treatment	Product Rate	Wild Oat RateBasis	Wild Oat Control
HRSW		oz/acre		%
1 leaf	Puma	10.6	Full	2
1 leaf	Puma	7.9	3/4	0
1 leaf	Puma	5.3	1/2	2
3 leaf	Puma	10.6	Full	72
3 leaf	Puma	7.9	3/4	59
3 leaf	Puma	5.3	1/2	25
5 leaf	Puma	10.6	Full	92
5 leaf	Puma	7.9	3/4	82
5 leaf	Puma	5.3	1/2	62
1 leaf	Everest + NIS*	0.60 + 0.25%	Full	40
1 leaf	Everest + NIS	0.45 + 0.25%	3/4	31
1 leaf	Everest + NIS	0.30 + 0.25%	1/2	25
3 leaf	Everest + NIS	0.60 + 0.25%	Full	90
3 leaf	Everest + NIS	0.45 + 0.25%	3/4	89
3 leaf	Everest + NIS	0.30 + 0.25%	1/2	88
5 leaf	Everest + NIS	0.60 + 0.25%	Full	62
5 leaf	Everest + NIS	0.45 + 0.25%	3/4	84
5 leaf	Everest + NIS	0.30 + 0.25%	1/2	72
1 leaf	Discover + DSV*	3.20 + 12.8	Full	10
1 leaf	Discover + DSV	2.40 + 12.8	3/4	18
1 leaf	Discover + DSV	1.60 + 12.8	1/2	1
3 leaf	Discover + DSV	3.20 + 12.8	Full	90
3 leaf	Discover + DSV	2.40 + 12.8	3/4	90
3 leaf	Discover + DSV	1.60 + 12.8	1/2	86
5 leaf	Discover + DSV	3.20 + 12.8	Full	95
5 leaf	Discover + DSV	2.40 + 12.8	3/4	95
5 leaf	Discover + DSV	1.60 + 12.8	1/2	92
1 leaf	Achieve + SC*+ AMS*	7.0 + 0.5% + 1%	Full	12
1 leaf	Achieve + SC+ AMS	5.25 + 0.5% + 1%	3/4	2
1 leaf	Achieve + SC+ AMS	3.50 + 0.5% + 1%	1/2	6
3 leaf	Achieve + SC+ AMS	7.0 + 0.5% + 1%	Full	71
3 leaf	Achieve + SC+ AMS	5.25 + 0.5% + 1%	3/4	84
3 leaf	Achieve + SC+ AMS	3.50 + 0.5% + 1%	1/2	75
5 leaf	Achieve + SC+ AMS	7.0 + 0.5% + 1%	Full	81
5 leaf	Achieve + SC+ AMS	5.25 + 0.5% + 1%	3/4	89
5 leaf	Achieve + SC+ AMS	3.50 + 0.5% + 1%	1/2	52
C.V. %				32.9
LSD 5%				25
# of Reps				4

*NIS=non ionic surfactant, DSV adjuvant, SC=super charge, AMS=ammonium sulfate.

2001 Corn Herbicide Trial at Hettinger. (Eriksmoen) Pre-plant incorporated treatments were applied on May 17 and then planted on the same day. Post applied treatments were applied to 4 leaf corn and to 1 to 5 leaf wild oats and to 1 inch to 6 inch field bindweed on June 12 with 57 deg. F, 74% RH, cloudy sky and 6 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 by 20 foot long area. The experiment was a randomized complete block design with four replications. The trial sustained severe hail damage on June 18. Evaluations were on July 3 and on July 18 for weed control. The trial was not harvested.

Application Timing	Treatment	Product Rate	July 3		July 18	
			Wioa	Fibw	Wioa	Fibw
		oz/acre	---------- % Control ----------			
PPI	DoublePlay	96	76	0	90	1
PPI	Define	18	80	0	75	0
PPI	Balance Pro	2.25	45	0	65	6
POST	Accent + Banvel + Quad 7	0.67 + 8 + 1%	99	85	99	81
POST	Basis + Callisto + Quad 7	0.33 + 3 + 1%	98	61	98	35
POST	Outlook + MVO	11 + 1%	0	2	12	0
POST	Steadfast + Quad 7	0.75 + 1%	99	18	99	4
POST	Accent Gold + MVO	2.9 + 1%	99	50	99	28
POST	Hornet + Accent + NIS	2 + 0.67 + 0.25%	96	61	90	28
POST	Callisto + Accent + MSO + AMS	3 + 0.67 + 1% + 1%	99	52	99	32
POST	Distinct + Accent + NIS + AMS	6 + 0.67 + 0.25% + 1%	94	89	88	86
POST	Permit + Accent + NIS + AMS	0.67 + 0.67 + 0.25% + 1%	99	1	99	2
POST	Starane + Accent + NIS + AMS	10.7 + 0.67 + 0.25% + 1%	99	58	99	70
	Untreated		0	0	0	0
C.V. %			10.2	35.7	11.9	56.3
LSD 5%			11	17	14	21
# of Reps			4	4	4	4

Summary

Crop injury was not observed on any treatment (data not shown). DoublePlay, Basis, Steadfast, Accent and Accent Gold treatments had very good season long wild oat control. Outlook and Balance Pro treatments provided poor wild oat control. Treatments containing Banvel, Distinct and Starane provided good season long control of field bindweed.

2001 Broadleaf Weed Control in Spring Wheat at Hettinger. (Eriksmoen) Reeder hard red spring wheat was seeded on April 26. Treatments were applied to 3 ½ leaf wheat and to ½ inch tall kochia on May 25 with 47 F, 78 % RH, clear sky and 5 mph wind. There was a light frost 2 ½ hours prior to application. Treatments were applied with a tractor mounted CO2 propelled plot sprayer delivering 17 gpa at 40psi through 8001 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. Kochia population was 24 plants per sq. foot. The trial was sprayed with 10 oz/A Puma on June 7 to control wild oats. Evaluations for crop injury were on May 29 and June 7, and for kochia control on June 12 and July 30. The trial was severely damaged by hail on June 18 and was not harvested.

Treatment		Product Rate	5/29	6/7	6/12	7/30
			HRSW	HRSW	Kocz	Kocz
			% Injury		% Control	
1	Fluroxypyr	0.25	0	0	86	70
2	Fluroxypyr	0.5	0	0	94	86
3	Fluroxypyr	1	0	0	94	89
4	Fluroxypyr	1.5	0	0	95	79
5	Fluroxypyr	2	0	5	95	82
6	Brox & MCPA (4 lb formulation)	8	0	1	95	94
7	Brox & MCPA (5 lb formulation)	8	2	1	95	92
8	Fluroxypyr & MCPA	8	0	2	95	95
9	Fluroxypyr & 2,4-D	7.5	1	0	95	94
10	Dicamba + MCPA	1.5 + 4	2	7	95	94
11	Thif & Trib + Flox & MCPA	0.22 + 5.4	6	3	95	94
12	Thif&Trib+Carf+MCPA+Act 90+UAN	0.22+0.128+4+.25%+4%	6	5	95	94
13	Carf + MCPA + Act 90 + UAN	0.128 + 6 + .25% + 4%	14	4	94	95
14	Carf + Flox & MCPA + Act 90 + UAN	0.128 + 5.6 + .25% + 4%	15	0	95	91
15	Untreated	0	0	0	0	0
C.V. %			47.9	230	2.6	14.7
LSD 5%			2	ns	3	17

Summary

Carfentrazone treatments (trts 13 & 14) caused significant but temporary crop injury (chlorosis). All herbicide treatments provided excellent season long kochia control except for the low rate of Fluroxypyr (trt 1) and the two high rates of Fluroxypyr (trts 4 & 5) which had good initial levels of control but declined after that point.

2001 Wild Oat Control in Spring Wheat at Hettinger. (Eriksmoen) Reeder hard red spring wheat was seeded on April 26. Treatments were applied to 3 ½ leaf wheat and to 2 to 3 ½ leaf wild oats on May 25 with 40 F, 96 % RH, clear sky and 2 mph wind. There was a light frost 2 hours prior to application. Treatments were applied with a tractor mounted CO2 propelled plot sprayer delivering 17 gpa at 40psi through 8001 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. Wild oat population was 47 plants per sq. foot. The trial was sprayed with 10 oz/A Starane + 1 pt/A Buctril + 1/3 oz/A Express on June 7 to control Broadleaf weeds. Evaluations for crop injury were on June 7, and for wild oat control on June 12, July 3 and on July 18. The trial was severely damaged by hail on June 18 and was not harvested.

Treatment		Product Rate	6/12	7/3	7/18
			Wioa	Wioa	Wioa
		oz/A	----- % Control -----		
1	Immb+Thif&Trib+Act 90	5+0.22+0.25%	76	85	96
2	Dife+Thif&Trib	12+0.22	68	60	50
3	Tral+Brox&MCPA+Supercharge+AMS	2.9+8+0.5%+20.4	85	85	81
4	Clodinafop+Brox&MCPA+DSV	0.8+8+0.8%	90	90	85
5	Fenoxaprop+Brox&MCPA	1.32+8	72	76	82
6	Flcz+Thif&Trib+2,4-Dioe+Act 90	0.42+0.22+4+0.25%	90	94	99
7	Immb+Dife+Thif&Trib+Act 90	3.7+8+0.22+0.25%	78	74	88
8	Flcz+Fenoxaprop+Brox&MCPA+Act 90	0.28+0.48+8+0.25%	86	91	92
9	Flcz+Fenoxaprop+Brox&MCPA+Act 90	0.28+0.66+8+0.25%	91	88	92
10	Flucarbazone+Fenoxaprop+Brox&MCPA	0.28+0.66+8	78	94	96
11	Flcz+Clodinafop+Brox&MCPA+DSV+Act 90	0.28+0.5+8+0.8%+0.25%	89	96	97
12	Untreated	0	0	0	0
C.V. %			16.3	18.3	13.1
LSD 5%			18	20	15

Summary

Crop injury was not observed on any treatment (data not shown). The difenzoquat treatment (trt 2) had poor season long wild oat control and had significantly lower wild oat control than the other treatments. Flucarbazone treatments (trts 6, 8, 9, 10 & 11) provided excellent season long wild oat control. Flucarbazone tank mix partners did not enhance or decrease wild oat control.

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