AG. REPORT NO. 20

TWENTIETH
ANNUAL

WESTERN DAKOTA

CROPS DAY
RESEARCH REPORT

REEDER COMMUNITY CENTER
DECEMBER 18, 2003

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20th Annual Western Dakota Crops Day
December 18, 2003
Reeder Community Center

MST

9:00 am Registration
Coffee and doughnuts. Free time to view exhibits and visit with Ag. Industry Program Sponsors.

10:00 Earlybird Drawing

10:20 Opening Announcements

10:30 Crop Variety Updates and Highlights of Ongoing Crop Production Research

Roger Ashley, Extension Agronomist, Dickinson

Dr. 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 PVP and Seed Laws - How They Impact You, Jim Swanson, Seed Regulatory Manager, ND State Seed Dept., Fargo

2:00 Changes in Fertilizer Outlook and Recommendations, Dr. Dave Franzen, Extension Soil Scientist, NDSU, Fargo

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.

2003 Western Dakota Crops Day Sponsors

Reeder Community Center
Hettinger Area Chamber of Commerce
Hettinger Farmers Union Coop
SW District Health Unit
Interstate Seed
Agricore United
Farm Credit Services of Mandan
ND Dry Pea & Lentil Assn.
ND Soybean Council
ND Barley Council
NuTech Seed
Arvesta Corp.
ND State Seed Dept.
Mycogen Seed
Monsanto
Croplan Genetics
Proseed
AgriPro Wheat
Legend Seeds
REA Hybrids
BASF
Bench Mark Seeds
ND Farmers Union

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

Daryl Birdsall, New Leipzig
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Roger Rosenow, Ralph, SD
Gary Wunder, Bison, SD

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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Oilseeds

Grain Legumes

Proso Millet, Corn and Buckwheat

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 Reeder grown in the Hettinger HRSW variety trial. The plots are mixed and dispersed throughout the trial to help eliminated differences that might be a result of soil or other variations. The numbers that you see in the tables are an average of all four replications. The C.V. for yield in the 2003 Hettinger HRSW trial was 9.8 meaning that there was a 9.8 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
2003

The severe drought of 2002 continued throughout the Fall and winter with warm temperatures and almost no snow. Winter wheat was seeded into dry soil and did not sprout until spring time. Over 3 inches of rainfall in March provided much needed soil moisture for small grain germination. Timely rainfall and cool temperatures through June provided ideal growing conditions for cool season crops. Growing conditions changed 180 degrees from July through the remainder of the growing season with very hot temperatures and very little precipitation. These conditions limited grain fill and yields of most crops although some early season crops (canola, barley and field pea) were able to largely avoid these adverse conditions and had very good yields. Most of the growing season was not conducive to corn production, causing very poor yields. Sunflower, on the other hand, did very well.

Insect infestations were minimal this year, although there were some localized areas with severe grasshopper damage. There were also a few reports of cutworm damage to sunflower and oat bird cherry aphids on wheat. Plant diseases were almost non-existent. Minor infestations of strip rust on wheat were observed at Hettinger and tended to be more severe as you went south.

All trials at the Hettinger Research Center were planted with a no-till drill. Broadleaf crop trials were planted into barley stubble and small grain trials were planted into soybean stubble. Residual soil fertility was determined and fertilizer was applied according to specific yield goals for each crop. Urea (46-0-0) was the primary nitrogen fertilizer source 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 grassy 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 grassy weeds and broadleaf weeds when possible. Canola, mustard, corn, millet and sunflowers were treated post-emergence with an insecticide. Chickpea, field pea, lentil and safflower were treated with a post-emergence fungicide application.

Weather Data Summary - Hettinger

Frost Free Days			
	28 F	32 F	Normal 32 F
Date of last frost	May 20	May 20	May 18
Date of first frost	Sept. 30	Sept. 25	Sept. 20
Frost free days	133	128	125

Weather Data Summary - Hettinger

Precipitation				
Precipitation (inches)	2000 - 01	2001 - 02	2002 - 03	48 Year Average
Sept. - Dec.	4.12	1.69	1.49	3.22
Jan. - March	1.82	1.11	3.83	1.35
April	2.13	1.14	1.38	1.68
May	1.80	0.80	3.18	2.61
June	3.65	1.34	1.99	3.40
July	4.46	1.36	0.37	2.08
August	0.13	1.11	0.44	1.66
Total	18.11	8.55	12.60	15.99

Air Temperature					
Average Temperature F	2000	2001	2002	2003	48 Year Average
April	42.6	43.0	40.2	46.7	42.5
May	55.0	55.2	49.6	52.9	54.1
June	60.5	62.7	65.4	60.2	63.5
July	71.2	71.6	76.2	72.4	69.9
August	71.8	73.0	67.5	73.7	68.9
September	58.6	59.1	61.1	57.6	57.4

Growing Degree Units - Corn					
Growing Degree Units (50 - 86)	2000	2001	2002	2003	31 Year Average
May	284	285	245	212	266
June	377	401	476	349	424
July	638	652	707	612	583
August	633	631	549	655	540
September	412	357	387	294	309
Total	2344	2326	2364	2186	2122

2003 Weather Summary for the Dickinson Research Extension Center, Dickinson, ND.

Month	—Maximum temp.— Long Term 1897 - 2002	Current Year	—Minimum temp.— Long Term 1897 - 2002	Current Year	—Precipitation — Long Term 1897 - 2002	Current year	—Small grains GDD[1]— Long Term 1897 - 2002	Current year	—Corn GDD[2] — Long Term 1897 - 2002	Current year
	—°F—		—°F—		— inches —					
November - 02	39.7	44.9	16.8	20.7	0.52	0.24				
December - 02	27.6	34.6	5.6	12.1	0.39	0.57				
January	22.7	27.0	-0.1	2.8	0.51	0.43				
February	27.0	26.9	3.8	2.1	0.41	0.32				
March	37.7	36.7	14.8	11.5	0.71	2.43				
April	54.5	59.1	28.3	31.1	1.44	0.72	343	450		
May	66.3	65.1	39.2	39.9	2.28	2.69	647	646	255	246
June	75.0	71.2	49.0	47.0	3.62	2.84	900	814	382	337
July	83.3	87.6	54.1	55.1	2.23	0.94	1141	1208	583	613
August	82.4	88.7	51.5	55.9	1.76	1.47	1085	1235	530	636
September	71.2	69.5	41.0	39.8	1.37	2.94	723	694	318	295
October	57.6	64.5	30.0	30.7	0.95	0.72				
Mean	53.7	56.3	27.8	29.1						
Total					16.18	16.31	4838	5045	2067	2126

[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.

Variety Trial Information 2003 — **Dickinson Research and Extension Center**

Trial	Location	Previous Crop	Seeding Rate
			pls/ac
SMALL GRAINS			
Barley	Dickinson	Alfalfa burn down	1,200,000
Durum	Dickinson	Alfalfa burn down	1,200,000
Spring wheat	Dickinson	Alfalfa burn down	1,200,000
Winter wheat	Dickinson	Oat hay	75 lbs*
Oat	Dickinson	Fallow	1,000,000
OTHER CROPS			
Cool Season Forage	Dickinson	Oat hay	Various

* Rate is seed planted

Variety Trial Fertility Information 2003 — **Dickinson Research and Extension Center**

		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	114	22	525	--	--	--
Durum	Dickinson	149	25	500	34	--	34-0-0
Spring wheat	Dickinson	149	25	500	34	--	34-0-0
Winter wheat	Dickinson	128	13	480	85	31	34-0-0, 0-44-0
Oat	Dickinson	114	22	525	--	--	--
OTHER CROPS							
Cool Season Forage	Dickinson	81	26	390	85	31	34-0-0, 0-44-0

2004 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)
2375	NDSURF	1990	yes	sdwf	med	m.early	R-MR	S	S	M	MS*
AC Intrepid	Canterra	1999	no	med	med	med	R	MR	MS	M	S
AC Amazon	Can	2001	no	med/tall	med	med	R	S	MS	NA	MS
AC Superb	Can	2001	yes	sdwf	strg	m.early	R	S	S	M	S
AC Abbey	Canterra	1999	yes	med	med	m.early	R	NA	NA	M	S
Alsen	ND	2000	yes	s.dwf	strg	m.early	R	MR	S	M	MR
Amidon	ND	1988	yes	med	med	med	R	MR	M	MR	S
Argent[3]	ND	1998	yes	sdwf	strg.	early	R	S	S	M	S
Aurora	N. Star G.	1999	yes	sdwf	strg	m.early	R	NA	S	NA	S
Briggs	SD	2002	yes	sdwf	strg	m.early	R-MR	R	MS	S	S
Butte 86	ND	1986	yes	med	m.strg.	early	R	MS	MS	MS	MS
Conan	WPB	1999	yes	s.dwf	v.strg	med	R	NA	NA	S	S
Dandy	N. Star G.	1998	yes	sdwf	v.strg.	early	R	S	MS	M	S
Dapps	**NDSU**	**2003**	**yes**	**sdwf**	**med**	**m.early**	**R**	**R**	**S**	**M**	**MS**
Ember	SDSU	1999	yes	sdwf	med	m.early	R	S	S	MS	MS
Ernest	ND	1995	yes	med	med	med	R	MR	MS	MR	S
Forge	SD	1997	yes	sdwf	m.strg.	early	R	S	MR	MS	MS
Glupro	ND	1995	yes	tall	med	m.late	R	MS	S	NA	VS
Grandin	ND	1989	yes	sdwf	strg.	early	R	S	S	M	S
Granite	WPB	2002	yes	sdwf	strg	m.late	R-MR	MR	S	NA	MS
Gunner	AgriPro	1995	yes	med	m.strg.	med	R-MR	S	M	S	M
Hagar	AgriPro	1998	yes	sdwf	strg.	med	R	MS/MR	M	M	S
Hamer	AgriPro	1995	yes	sdwf	v.strg.	med	R	MR	M	NA	S
Hanna	AgriPro	2002	yes	med	med	m.early	MRMS	MS/MR	NA	MS	MS
HJ98	MN	1998	yes	sdwf	strg.	m.early	R	S	MS	MR	S
Ingot	SD	1998	yes	sdwf	med	early	R	S	S	M	MS*
Ivan	AgriPro	1999	yes	sdwf	v.strg.	med	R	MR	S	M	S
Keene	ND	1996	yes	med	med	med	R-MR	R	MR	MS	S
Keystone	WPB	2001	yes	med	med	m.early	R	MR	S	S	MS
Knudson	AgriPro	2001	yes	sdwf	strg	med	MRMS	MR	S	MS	M
Kulm	ND	1994	yes	med	strg.	early	R	MR	MS	M	S
Lars	AgriPro	1995	yes	sdwf	v.strg.	med	R	NA	MR	NA	S
McKenzie	Cenex	1998	yes	med	med	m.early	R	MR	S	M	S
McNeal	MT	1995	yes	med	strg.	m.early	MS	S	M	M	VS
McVey	MN	1999	yes	med	med	med	R	MS	S	M	M
Mercury	N. Star G.	1999	yes	sdwf	strg	m.early	R	MS	S	S	S
Norpro	AgriPro	1999	yes	sdwf	strg	med	R	MS/MR	S	M	MS
Oklee	**MN**	**2003**	**yes**	**sdwf**	**med**	**m.early**	**R**	**MS**	**MR**	**NA**	**NA**
Oxen	SD	1996	yes	sdwf	strg.	m.early	MR	S	S	MS	S

Parshall	ND	1999	yes	med	strg.	m.early	MR	MS	M	MS	M
Polaris	N. Star G.	**2003**	**yes**	**med**	**strg.**	**late**	**NA**	**NA**	**NA**	**NA**	**NA**
Prodigy	Sask. Wht	1999	yes	med	med	med	MR	MS	NA	M	MS
Reeder	ND	1999	yes	s.dwf	strg.	m.early	R	MS	M	M	S
Russ	SD	1995	yes	med	med	m.early	R	S	S	MS	S*
Saturn	N.Star G.	**2003**	**yes**	**med**	**NA**	**m.late**	**NA**	**NA**	**NA**	**NA**	**NA**
Scholar	MT	1999	yes	med	med	med	R	S	NA	M	S
Trenton	ND	1995	yes	med	med	med	R	MS	MS	S	S*
Walworth	SD	2001	yes	sdwf	med	m.early	R	S	S	M	S

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. **Bold** varieties are those released in 2003.

2003 Hard Red Spring Wheat in the West River Region **Combined Means**

						Grain Yield			Average Yield	
Variety	Days to Head	Plant Height	Seeds / Pound	Test Weight	Protein	2001	2002	2003	2 year	3 year
		inches		lbs/bu	%	bu/ac				
Mercury	69	27	14,417	58.0	15.9	57.6	29.1	46.5	37.8	44.4
Reeder	66	29	15,339	58.3	15.5	55.6	28.6	43.5	36.0	42.6
Keene	70	36	16,923	58.9	16.1	52.9	30.4	43.1	36.8	42.1
Oxen	68	29	14,224	58.9	15.7	51.6	27.1	45.6	36.4	41.4
Parshall	66	33	15,566	59.6	15.8	49.3	25.9	40.7	33.3	38.6
Alsen	66	29	15,572	59.6	16.0	49.4	25.6	40.6	33.1	38.5
Walworth	59	27	15,898	60.7	14.4	50.4	25.6	39.2	32.4	38.4
Hanna	68	33	15,230	60.3	14.9		27.7	43.2	35.4	
Briggs	68	31	15,835	60.0	15.7		26.3	42.0	34.2	
Knudson	70	27	14,315	60.9	15.1			44.0		
Granite	73	28	16,775	62.1	16.4			41.8		
Dapps	65	33	16,241	58.1	16.5			38.2		
# of locations	3	13	5	13	13	12	9	13	22	34

Locations: 2003 = Hettinger, Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Beulah, Hannover, Glen Ullin, Richardton (organic), Ralph SD and Bison SD.
2002 = Hettinger, Dickinson, Scranton, Regent, Selfridge, New Leipzig, Beulah, Hannover & Glen Ullin.
2001 = Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Beulah, Hannover, Glen Ullin, Wibaux MT, Ralph SD and Bison SD.

2003 Hard Red Spring Wheat - Continuously Cropped No-till **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield 2000	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
		inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Mercury	70	28	58.8	16.2	67.6	22.1	52.5	37.3	47.4
Briggs	69	32	60.1	16.4	71.9	23.3	45.7	34.5	47.0
Oxen	70	29	59.1	16.4	61.9	24.3	54.7	39.5	47.0
Norpro	72	28	56.1	16.8	66.9	23.1	46.0	34.6	45.3
Hanna	70	33	60.2	16.0	68.0	23.8	41.7	32.8	44.5
Reeder	70	31	55.8	16.6	55.8	22.7	49.8	36.2	42.8
Zeke	69	28	56.6	16.8	62.6	20.7	43.3	32.0	42.2
Alsen	70	30	56.9	16.8	52.1	23.9	46.9	35.4	41.0
McKenzie	70	34	59.3	15.8	52.2	22.3	46.5	34.4	40.3
Russ	71	32	57.9	16.8	54.4	21.2	44.9	33.0	40.2
Keene	72	35	60.3	16.2	46.3	24.9	47.6	36.2	39.6
Ingot	69	36	61.1	16.8	45.0	21.6	51.9	36.8	39.5
Dandy	70	31	60.1	16.4	51.2	20.7	46.3	33.5	39.4
Parshall	70	35	57.8	16.9	45.1	23.3	46.2	34.8	38.2
Gunner	72	32	59.3	18.1	46.7	21.0	43.6	32.3	37.1
Dapps	70	35	58.4	17.1	46.7	18.2	42.9	30.6	35.9
Hank	70	28	54.7	17.0		23.9	50.0	37.0	
Keystone	70	32	60.8	15.7		22.6	49.3	36.0	
Outlook	72	29	58.3	15.6		23.4	48.4	35.9	
AC Superb	72	33	56.9	16.2		23.3	48.0	35.6	
Knudson	72	30	59.7	16.1		20.9	49.0	35.0	
Granite	74	29	61.0	17.8		22.0	45.1	33.6	
Amizon	74	34	58.7	16.3		19.3	46.7	33.0	
Oklee	69	30	60.6	16.5			45.4		
Trial Mean	71	32	58.7	16.5	53.0	21.8	47.8	--	--
C.V. %	0.8	7.1	1.9	3.2	6.7	13.7	9.8	--	--
LSD .05	1	3	1.6	0.7	4.9	NS	6.6	--	--
LSD .01	1	4	2.1	1.0	6.5	NS	8.7	--	--

Planting Date: April 10, 2002 Harvest Date: August 4, 2003
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous crop: 1999 = soybean, 2001 = barley, 2002 = soybean.
Note: The 2002 trial sustained severe heat and moisture stress. The 2003 trial sustained late season heat and moisture stress.
NS = no statistical differences between varieties.

2003 Hard Red Spring Wheat - Alfalfa burn down **Dickinson, ND**

Variety	Days to Head	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Returns	Avg. Yield 2 Year	Avg. Yield 3 Year
			in	lbs/bu	%	--------bu/ac--------			$/ac	-----bu/ac-----	
AC Corinne	71	14,773	36	54.1	15.7	--	36.5	51.0	166.33	43.8	--
AC Glenavon	67	16,033	38	55.9	16.6	--	38.6	63.7	214.64	51.1	--
AC Superb	69	14,776	36	52.9	16.4	37.6	47.7	60.8	195.04	54.2	48.7
Alsen	67	15,218	32	57.0	16.5	37.7	45.7	61.4	209.27	53.5	48.3
Amazon	71	15,544	40	54.3	15.7	--	40.9	54.5	178.63	47.7	--
Briggs	67	16,978	37	56.2	16.3	36.2	44.9	57.3	194.15	51.1	46.1
Dandy	69	14,624	34	57.7	15.9	31.4	44.0	54.8	187.00	49.4	43.4
Dapps	67	17,493	40	54.6	16.8	42.2	42.7	60.6	201.80	51.6	48.5
Granite	72	17,754	29	59.9	17.3	--	41.5	56.4	193.52	49.0	--
Gunner	71	15,533	36	58.2	16.3	40.9	43.8	58.8	201.82	51.3	47.8
Hank	66	14,652	30	53.6	15.7	--	45.3	60.9	196.71	53.1	--
Hanna	67	16,573	38	54.9	15.4	38.1	45.4	60.9	199.01	53.1	48.1
Ingot	64	14,998	39	60.2	16.1	30.6	45.9	64.1	219.79	55.0	46.9
Keene	68	16,923	39	56.7	15.6	38.9	47.2	61.3	206.68	54.3	49.1
Keystone	66	17,236	36	57.9	15.8	37.2	43.9	55.0	187.52	49.4	45.4
Knudson	69	14,100	31	57.3	15.5	39.5	44.6	62.8	211.11	53.7	49.0
Laser	64	15,442	39	53.4	15.8	--	41.8	57.2	184.25	49.5	--
McKenzie	68	18,555	38	53.7	16.0	39.7	43.4	63.6	208.04	53.5	48.9
Mercury	68	14,417	29	56.3	15.3	36.0	44.2	61.6	205.20	52.9	47.3
Norpro	69	15,729	33	54.6	16.1	42.4	45.9	63.0	209.86	54.5	50.4
Oklee	65	16,354	33	56.9	16.3	--	--	57.7	196.89	--	--
Outlook	70	17,569	32	54.8	14.9	--	45.0	62.1	200.52	53.5	--
Oxen	67	14,224	33	56.3	15.3	41.7	45.2	66.1	220.01	55.6	51.0
Parshall	68	14,813	39	55.0	16.5	37.0	44.9	62.5	207.96	53.7	48.1
Reeder	68	16,244	33	55.5	16.1	42.0	47.1	65.4	220.26	56.2	51.5
Russ	67	15,937	37	54.1	15.8	36.3	40.0	64.4	211.40	52.2	46.9
Trial Mean	67	15,963	36	55.9	16.0	38.5	44.1	60.8	203.18	--	--
C.V. %	1.5	6.6	5.1	2.6	1.8	11.1	7.1	6.0	--	--	--
LSD .05	1	1,464	3	2.0	0.6	6.0	4.4	5.1	--	--	--

Planting Date: April 22
Harvest Date: August 15
Returns were calculated by multiplying the 2003 yield by protein premium or discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was $3.27/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 16% protein, above which an additional premium was not paid. Grain was discounted $0.02/bu for each 0.25% reduction in grain protein from 14% to 12%, 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].

2003 Hard Red Spring Wheat Variety Trial - Continuously Cropped No-till Scranton

Variety	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Reeder	31	54.2	15.5	60.7	44.2	40.8	42.5	48.6
Oxen	30	57.3	13.8	52.8	41.0	42.9	42.0	45.6
Alsen	31	59.2	15.5	53.4	39.3	43.7	41.5	45.5
Mercury	29	58.6	15.4	50.7	40.6	43.2	41.9	44.8
Keene	37	58.1	14.5	52.6	41.1	35.9	38.5	43.2
Parshall	36	55.7	15.2	52.9	38.6	34.3	36.4	41.9
Briggs	32	59.3	14.4		39.3	36.3	37.8	
Dapps	37	55.9	16.0		39.6	32.8	36.2	
Trial Mean	33	57.3	15.1	54.1	40.0	39.1	--	--
C.V. %	5.3	1.9	--	10.9	5.3	11.3	--	--
LSD .05	3	1.6	--	8.5	3.1	6.4	--	--
LSD .01	3	2.1	--	NS	4.1	8.7	--	--

Planting Date: April 21, 2003
Harvest Date: August 7, 2003
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous Crop: 2000 = safflower, 2001 & 2002 = lentil.
NS = no statistical difference between varieties.

2003 Hard Red Spring Wheat Variety Trial - Continuously Cropped No-till **Regent**

Variety	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Mercury	28	58.7	15.3	73.5	32.7	63.6	48.2	56.6
Reeder	33	55.9	16.4	74.0	32.1	58.2	45.2	54.8
Oxen	30	58.9	15.7	69.0	30.0	63.2	46.6	54.1
Alsen	32	59.1	16.8	67.5	32.0	55.9	44.0	51.8
Keene	37	59.6	16.8	66.3	32.7	52.3	42.5	50.4
Parshall	37	58.5	16.8	66.3	28.4	53.6	41.0	49.4
Briggs	34	59.5	16.7		27.1	56.3	41.7	
Dapps	37	56.6	17.1		28.1	53.1	40.6	
Trial Mean	33	58.3	16.4	68.2	30.6	57.0	--	--
C.V. %	4.7	1.7	--	4.2	8.5	7.8	--	--
LSD .05	2	1.5	--	4.2	3.8	6.5	--	--
LSD .01	3	2.0	--	5.6	NS	8.8	--	--

Planting Date: April 22, 2003
Harvest Date: August 7, 2003
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous Crop: 2000 = safflower, 2001 & 2002 = lentil.
NS = no statistical difference between varieties.

2003 Hard Red Spring Wheat - Continuously Cropped No-till **New Leipzig**

Variety	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Reeder	27	57.1	17.2	60.2	16.7	35.2	30.0	37.4
Oxen	26	58.8	16.2	52.4	12.7	36.1	24.4	33.7
Parshall	29	59.2	16.6	49.0	12.0	37.3	24.6	32.8
Keene	31	58.9	16.7	49.3	13.6	35.3	24.4	32.7
Alsen	27	58.9	17.6	53.3	11.1	30.0	20.6	31.5
Mercury	23	59.1	16.8	51.0	11.0	30.1	20.6	30.7
Briggs	25	59.5	17.3		13.0	31.8	22.4	
Dapps	28	56.0	17.7		13.2	29.3	21.2	
Trial Mean	27	58.4	17.0	51.1	12.9	32.9	--	--
C.V. %	5.8	1.6	--	7.3	16.2	10.8	--	--
LSD .05	2	1.4	--	5.4	NS	5.2	--	--
LSD .01	3	1.8	--	7.2	NS	7.0	--	--

Planting Date: April 22, 2003
Harvest Date: July 30, 2003
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous Crop: 2000 = safflower, 2001 & 2002 = lentil.
NS = no statistical difference between varieties.

2003 Hard Red Spring Wheat - Continuously Cropped No-till **Selfridge**

Variety	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Oxen	30	57.0	16.8	79.9	29.3	30.8	30.0	46.7
Mercury	26	57.0	16.8	82.4	23.8	32.0	27.9	46.1
Reeder	30	53.9	17.9	82.2	25.4	26.8	61.1	44.8
Alsen	30	58.3	16.8	73.0	22.9	28.9	25.9	41.6
Keene	35	58.7	16.9	69.5	22.8	30.4	26.6	40.9
Parshall	34	56.8	17.2	75.8	18.6	28.1	23.4	40.8
Briggs	31	57.4	17.5		24.4	30.8	27.6	
Dapps	35	56.0	17.9		16.8	28.1	22.4	
Trial Mean	32	56.5	17.2	74.8	23.3	29.0	--	--
C.V. %	6.0	2.2	2.7	4.7	16.9	10.4	--	--
LSD .05	3	1.8	0.7	5.0	5.7	4.4	--	--
LSD .01	4	2.5	0.9	6.7	7.7	6.0	--	--

Planting Date: April 23, 2003
Harvest Date: August 11, 2003
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous Crop: 2000 = HRWW, 2001 & 2002 = lentil.

2003 Hard Red Spring Wheat - Continuously Cropped No-till **Mandan**

Variety	Plant Height	Lodging	Test Weight	Protein	Grain Yield 2000	Grain Yield 2001	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	0 - 9*	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Oxen	30	0.0	58.6	15.6	59.1	45.0	45.8	45.4	50.0
Reeder	31	0.0	55.8	15.7	60.3	48.6	40.7	44.6	49.9
Parshall	36	0.5	59.7	16.1	54.1	45.6	40.5	43.0	46.7
Alsen	30	0.0	59.3	15.9	50.2	42.9	38.0	40.4	43.7
Keene	36	0.0	59.7	15.8	48.6	40.6	39.2	39.9	42.8
Mercury	27	0.0	57.8	15.7		52.3	42.3	47.3	
Briggs	31	2.5	59.8	15.7			40.8		
Dapps	35	0.0	58.2	16.1			37.5		
Trial Mean	32	0.4	58.7	15.8	52.7	45.9	40.5	--	--
C.V. %	5.1	116	1.4	3.7	9.5	8.3	7.3	--	--
LSD .05	2	1.2	1.2	NS	7.2	6.4	4.3	--	--
LSD .01	3	1.7	1.7	NS	9.6	8.7	NS	--	--

*Lodging: 0 = none, 9 = lying flat on ground.
Planting Date: April 23, 2003
Harvest Date: August 11, 2003
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous Crop: 1999 = rye, 2000 & 2002 = barley.
NS = no statistical difference between varieties.

Performance of nine hard red spring (HRS) wheat cultivars following fallow and oat 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	25	39.9	61.1	13.7	14,699	30	41.7	61.2	15.5	14,646	28	42.3	62.7	15.2	14,746
HRS wht-pea-oat	26	40.5	60.6	14.0	15,079	30	42.1	59.3	15.5	16,093	27	39.6	58.8	15.0	17,417
HRS wheat cultivar (C)															
Alsen	25	38.4	60.5	14.2	15,284	30	41.6	59.2	15.7	15,292	29	39.9	59.2	16.2	16,620
Briggs	27	39.7	62.3	13.4	14,930	30	41.2	60.4	15.0	15,099	28	41.6	60.3	14.6	16,332
Dapps	25	41.1	58.7	14.8	14,726	34	41.1	59.2	16.3	16,100	26	37.5	59.1	16.1	16,789
Granite	24	39.4	60.6	14.6	16,134	29	40.9	62.1	16.4	16,581	24	41.6	63.3	16.1	16,631
Hanna	28	38.9	60.3	13.7	14,236	35	42.3	61.4	15.0	14,943	32	39.8	62.2	14.3	15,169
Knudson	21	41.6	60.3	13.2	13,720	27	42.2	61.3	15.5	14,612	24	38.7	62.1	15.3	14,827
Parshall	27	40.5	62.1	13.8	14,799	31	38.4	59.7	15.7	15,998	28	42.3	61.8	14.7	15,619
Reeder	25	41.0	61.9	13.3	14,649	29	47.2	60.3	14.8	14,065	26	44.9	59.8	13.8	16,222
Walworth	25	41.1	60.9	13.6	15,525	30	42.3	59.0	15.1	15,634	27	42.3	59.2	14.9	16,534
Mean	25	40.1	60.8	13.9	15,014	30	41.8	60.4	15.6	15,491	27	41.0	61.0	15.2	16,137
R	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	*	NS	*
C	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: April 30, 2003 (Hannover, Beulah) May 1, 2003 (Glen Ullin)
Harvest Date: August 12, 2003 (Hannover, Glen Ullin, Beulah)

Table 1. Plant stand, seedling vigor, height, and canopy of eighteen hard red spring wheat cultivars during 2003 in a certified organic field near Richardton, ND.

	Plant Stand		Seedling vigor[1]		Plant height			Plant canopy	
Variety	May 22	May 28	May 22	May 28	May 28	June 26	July 29	PAR[2]	Ground[2]
	--------no./ft^2---------				---------- inches----------			--------%-------	
AC Cadillac	31	33	7.3	7.9	5	19	31	74	34
Acadia	27	26	6.6	7.3	5	19	31	69	28
Alsen	34	31	7.4	7.5	4	18	27	72	34
Backup	31	29	7.1	7.6	5	20	29	79	28
Chris	37	39	6.5	7.4	4	16	31	73	31
Coteau	34	34	7.5	7.8	4	14	32	68	29
Dapps	32	27	7.0	6.9	4	19	30	79	33
Glupro	26	30	5.8	6.6	5	15	31	63	28
Gunner	34	36	8.0	8.5	4	14	30	76	34
Ingot	33	32	7.4	8.0	5	21	31	81	39
Marquis	34	31	6.9	7.8	4	18	35	68	31
Oklee	31	29	7.5	7.8	5	18	25	69	33
Parshall (CON)[3]	32	32	7.5	7.8	5	18	29	72	32
Parshall	33	33	7.8	8.1	4	19	30	78	36
Red Fife	33	32	7.1	7.8	5	18	36	85	36
Reeder	32	33	7.4	7.8	5	18	28	76	39
Stoa (CON)[3]	32	28	6.6	7.0	4	17	30	62	28
Stoa	32	29	7.5	7.6	5	18	31	72	33
Waldron	35	34	7.6	8.1	5	19	31	66	33
Walworth	33	32	7.6	7.8	5	20	27	68	39
Mean	32	32	7.2	7.6	5	18	30	72	33
CV %	8.2	15.7	4.9	4.6	4.4	4.3	4.3	15.1	19.2
LSD	4	NS	0.5	0.5	0.3	1	2	NS	NS

[1] 1 = good vigor; 9 = poor vigor

[2] PAR = light interception by the plant canopy; Ground = percentage ground coverage

[3](CON) = seed lots produced under conventional management; seed lots of other variety treatments generally were produced under organic management.

Table 2. Days to heading, spike density, insect rating, competitiveness, grain yield and quality of eighteen hard red spring wheat cultivars during 2003 in a certified organic field near Richardton, ND.

					Grain			
Variety	Days to heading	Spike density	Wheat stem maggot[1]	Competition[2]	Yield	Protein	Test Weight	Kernel weight
	------no.-------	----no./ft^2----	-------%-------	----%----	- bu/acre -	- % -	- lbs/bu -	- kernels/lb -
AC Cadillac	61	31	1	64	29.0	13.5	62.6	15,611
Acadia	62	30	1	66	29.2	12.9	61.3	16,068
Alsen	60	38	1	50	30.2	13.8	63.5	15,445
Backup	58	36	0	50	24.9	16.3	63.6	16,973
Chris	62	38	2	54	26.4	14.6	61.4	18,707
Coteau	65	34	4	61	28.6	15.4	59.4	17,322
Dapps	59	34	1	49	27.1	15.3	60.8	16,095
Glupro	63	30	8	46	18.5	17.2	58.0	16,324
Gunner	63	31	4	60	31.7	14.1	63.0	17,693
Ingot	57	35	1	50	32.3	14.3	64.0	16,411
Marquis	64	33	3	72	24.9	13.6	61.0	17,310
Oklee	58	32	0	49	30.5	14.7	62.4	16,607
Parshall (CON)[3]	60	32	1	53	30.2	13.6	62.5	15,715
Parshall	60	36	1	59	33.2	14.0	63.0	16,603
Red Fife	66	33	1	74	27.7	13.1	60.8	16,714
Reeder	60	34	5	48	36.6	13.7	62.4	15,513
Stoa (CON)[3]	63	30	2	49	29.5	13.5	61.4	17,166
Stoa	62	28	1	46	32.7	13.0	61.5	17,415
Waldron	61	35	0	66	29.2	13.7	60.5	16,149
Walworth	59	37	1	50	34.2	13.9	62.0	16,586
Mean	61	33	2	56	29.3	14.2	61.7	16,621
CV %	1.2	15.3	97.9	16.0	6.0	3.0	0.8	4.5
LSD	1	NS	3	13	2.5	0.6	0.7	1064

[1]Visual estimate of the percentage of plants infested with wheat stem maggot.

[2]Visual estimate of the weed density in plots compared with a prostrate winter wheat check plot expressed as a percentage.

[3](CON) = seed lots produced under conventional management; seed lots of other variety treatments generally were produced under organic management.

SDSU Hard Red Spring Wheat Variety Trial – Perkins County (Bison), 2003.

Variety	Height	Lodging	Test Wt.	Yield Bu/A
	Inches	1-9*	Lb/Bu	2003
ALSEN	32	1	61.1	43.9
BRIGGS	33	1	62.1	**49.9**
CHRIS CK	37	1	59.8	41.7
DAPPS	34	1	59.6	39.5
FORGE	33	1	62.9	**49.3**
GRANITE	31	1	62.8	41.6
HANNA	37	1	61.0	**45.7**
INGOT	35	1	64.2	**48.7**
KNUDSON	30	1	62.2	**45.9**
NORPRO	30	1	60.7	**46.5**
OKLEE	29	1	61.2	42.0
OXEN	30	1	60.4	44.5
PARSHALL	35	1	62.4	44.8
REEDER	32	1	61.2	**48.6**
RUSS	35	1	60.6	45.0
WALWORTH	30	1	60.3	43.0
MN 97803A	31	1	61.0	43.1
ND 741	33	1	61.9	45.0
SD 3540*	32	1	62.1	**45.4**
SD 3546*	32	1	61.8	44.2
SD 3618	33	1	60.2	44.3
SD 3623*	35	1	61.9	43.9
SD 3635	35	1	59.9	43.9
SD 3641*	29	1	59.7	39.1
SD 3720	33	1	63.3	43.2
BZ998-447	31	1	59.0	**49.8**
Average	32.3	1.0	61.3	44.7
LSD (P=.05)	1.8	0.0	1.9	4.8
CV	4.0	0.0	2.1	7.7

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

Planted: April 9, 2003 Herbicide: Bronate (1 pint/A)
Harvested: July 31, 2003 Additional Nitrogen: None
Previous crop: Hayed wheat, No-till planted

SDSU Hard Red Spring Wheat Variety Trial - Harding County (Ralph), 2003.

Variety	Height Inches	Lodging 1-9*	Test Wt. Lb/Bu	Yield Bu/A 2003
ALSEN	28	1	63.2	29.1
BRIGGS	30	1	62.7	33.0
CHRIS CK	31	1	62.2	24.2
DAPPS	30	1	61.8	26.6
FORGE	27	1	63.6	33.6
GRANITE	30	1	64.8	27.5
HANNA	30	1	62.1	32.9
INGOT	33	1	64.6	25.6
KNUDSON	26	1	63.1	27.7
NORPRO	24	1	62.6	29.1
OKLEE	25	1	62.6	24.9
OXEN	25	1	63.7	25.9
PARSHALL	26	1	63.5	27.6
REEDER	24	1	63.6	30.5
RUSS	31	1	62.1	31.8
WALWORTH	24	1	63.0	27.3
MN 97803A	28	1	63.0	25.3
ND 741	29	1	63.0	32.9
SD 3540*	31	1	63.6	29.7
SD 3546*	27	1	62.6	27.0
SD 3618	28	1	61.6	26.9
SD 3623*	31	1	63.1	32.6
SD 3635	30	1	62.3	30.6
SD 3641*	27	1	63.5	26.7
SD 3720	28	1	65.1	25.9
BZ998-447	28	1	61.8	32.1
Average	27.9	1.0	63.0	28.7
LSD (P=.05)	3.8	0.0	1.4	**NS**
CV	6.7	0.0	1.5	**20.2**

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

Planted: April 9, 2003 Harvested: July 31, 2003
Additional Nitrogen: None
Previous crop: Conventional fallow
Herbicide: Puma ($^2/_3$ pint/A) +Harmony ($^1/_2$ oz/A)

Table 1. Plant stand, plant height, seed yield and quality of hard red spring wheat and selected soil chemical properties following canola (CW) and in a continuous wheat monoculture (WW) in conventional tillage (CT), reduced tillage (RT), and no tillage (NT) environments during 2003 at Dickinson, ND.

	Plant stand			Plant	Soil					Grain			
					Organic	N							
	count 1	count 2	mean	Height	Matter	0-6	6-24	total	P	Yield	Protein	Test weight	kernel weight
Tillage	--plants/ft^2--			--in--	--%--	--lbs/acre--			ppm	--bu/acre--	--%--	-lbs/bu-	kernels/lb
CT	23	22	22	30	2.14	38	47	84	14	30.5	18.0	56.1	22,269
RT	22	23	22	31	2.34	30	24	54	20	28.0	17.6	55.9	21,741
NT	23	23	23	32	2.33	36	33	69	19	38.3	16.4	57.4	20,809
F-test[1]	NS	NS	NS	NS	NS	NS	*	NS	NS	NS	*	NS	NS
Rotation													
CW	23	22	22	31	2.27	40	42	81	19	31.9	17.6	56.3	21,334
WW	22	23	23	31	2.27	29	28	56	16	32.6	17.1	56.7	21,879
F-test[1]	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Tillage x Rotation													
CTCW	23	21	22	30	2.13	41	70	111	17	28.7	18.3	55.9	22,219
RTCW	22	23	22	31	2.38	43	29	72	22	29.7	17.7	56.5	20,442
NTCW	23	22	23	32	2.30	35	26	62	20	37.5	16.7	56.5	21,340
CTWW	23	23	23	31	2.15	35	24	57	11	32.4	17.7	56.4	22,319
RTWW	22	23	22	30	2.30	17	20	36	18	26.3	17.6	55.4	23,040
NTWW	22	24	23	31	2.35	37	39	76	18	39.1	16.1	58.3	20,227
F-test[1]	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

[1]A significant *F-test* indicates that treatment differences existed at the $P < 0.05$ level; NS = not significant.

Table 1. Crop residue, yield components, plant height, and days to heading for hard red spring wheat and selected soil physical properties in a wheat-pea rotation and a continuous wheat monoculture in conventional tillage, reduced tillage, and no tillage environments at Dickinson, ND.

					Soil N					
Factor	Surface residue	Plants	Tillers	Spikes	0-6	6-24	Total	P	Plant height	Days to heading
	-- % --	-no./ft^2-	-no./plant-	-no./ft^2-	---------- lbs/acre ----------			ppm	-- inches --	-- no. --
Tillage										
Conventional (CT)	18	17	2.2	28	16	13	30	17	31	62
Reduced (RT)	28	19	2.2	32	17	14	32	17	33	62
None (NT)	92	22	2.6	35	19	20	38	17	35	63
F-test[1]	*	*	NS	*	NS	NS	NS	NS	*	NS
Rotation										
Wheat-Pea (WP)	38	20	2.4	32	15	15	30	19	34	62
Wheat-Wheat (WW)	54	19	2.3	31	20	17	37	15	32	63
F-test[1]	*	*	NS	NS	*	NS	NS	*	*	NS
Tillage x Rotation										
CTWW	28	16	2.1	28	21	20	43	15	30	62
RTWW	36	18	2.5	31	21	13	34	16	32	61
NTWW	97	22	2.1	35	18	17	34	15	33	65
CTWP	8	18	2.3	27	14	20	34	18	32	62
RTWP	19	19	2.8	32	16	14	30	19	34	62
NTWP	88	22	2.3	36	15	11	26	19	36	62
F-test[1]	NS	NS	NS	NS	NS	NS	NS	NS	NS	*

[1]A significant *F-test* indicates that treatment differences existed at the $P < 0.05$ level; NS = not significant.

2003 Dormant Seeded HRSW - No-till **Hettinger**

Variety	Seeding Date	Winter Survival	Heading Date	Plant Height	Test Weight	Grain Protein	- Grain Yield - 2002*	2003
	2002	%	June	inches	lbs/bu	%	-- bu / acre --	
Reeder	Oct. 28	80	17	32	51.3	16.0	2.5	38.3
Reeder	Nov. 12	85	18	32	55.8	16.0		42.8
Russ	Oct. 28	65	19	29	52.1	15.8	6.8	35.6
Russ	Nov. 12	80	19	30	57.1	15.8		40.0
Oxen	Oct. 28	50	18	26	55.9	15.9	11.2	26.1
Oxen	Nov. 12	70	18	27	56.1	15.6		30.0
Keene	Oct. 28	40	21	29	53.8	17.0	10.0	26.1
Keene	Nov. 12	35	21	31	55.1	17.0		23.3
Alsen	Oct. 28	50	21	30	50.4	16.3	4.4	23.3
Alsen	Nov. 12	55	17	30	54.1	16.5		25.0
Parshall	Oct. 28	20	16	31	56.7	16.5	5.6	17.2
Parshall	Nov. 12	15	17	31	49.3	16.7		12.8

* 2002 trial was seeded on November 15, 2001 and sustained severe heat and moisture stress.
Seeding rate: 1.1 million live seeds per acre.
Harvest date: August 15, 2002 and August 6, 2003
Previous crop: 2001= barley, 2002 = soybean.
Note: This trial was not replicated.

2003 Hard Red Winter Wheat variety descriptions.									
Variety	**Origin**	Year	Quality	**Leaf Rust[2]**	**Stem Rust[2]**	Maturity	**Straw Strength**	Height	**Winter[1] Hardiness**
AC Readymade	Can.	1996	NA	S	S	med.	strong	med.	good
Agassiz	ND	1983	Average	S	R	med.	med.	med.	good
Alliance	NE	1997	NA	S	NA	early	strong	short	good
Arapahoe	NE	1989	Poor	MS	MR	med.	med.	med.	fair
CDC Kestrel	Can.	1994	Poor	S	S	med.	m. strong	med.	good
CDC Raptor	Can.	2002	NA	NA	NA	med.	m. strong	m. short	good
CDC Falcon	Can/WPB	2000	NA	NA	NA	med.	m. strong	short	good
Crimson	SD	1997	NA	MS	NA	med.	m. strong	med.	fair-good
Culver	ND	1999	NA	NA	NA	m. early	m. strong	med.	good
Elkhorn	ND	1995	Average	MR	R[5]	med.	med.	med.	good
Erhardt	MT	1996	NA[6]	S	R	med.	strong	med.	good
Expedition	SD	2002	Average	MS	R	med.	strong	med.	good
Harding	SD	1999	NA	MS/MR	NA	med.	m. strong	med.	good
Jagalene	Agripro	2001	NA	NA	NA	early	strong	short	fair-poor
Jerry	ND	2001	Good	MR	R	med.	strong	med.	good
McClintock	Can	2003	NS	NA	NA	med.	strong	med.	fair-good
McGuire	MT	1996	NA	S	R	m. early	strong	m. tall	fair
Millenium	NE/SD	1999	NA	NA	NA	med.	strong	m. short	fair
Morgan	WPB	1996	NA	NA	NA	med.	m. strong	med.	good
Nekota	SD/NE	1997	NA	MS	NA	early	v. strong	v. short	good
Norstar	Can.	1977	Average	S	S	late	med.	tall	good
Nuplains	NE	2000	NA	NA	NA	med.	m. strong	short	fair-poor
Paul	MT	2002	NA	NA	NA	med	med.	med.	fair
Rampart[7]	MT	1996	NA	S	R	med.	strong	med.	poor
Ransom	ND	1998	Good	R	NA	m. early	med.	med.	good
Rita	SD	1980	Average	MS	MR[4]	early	strong	med.	fair
Rose	SD	1981	Poor	S	MS[4]	early	v. strong	short	fair
Roughrider	ND	1975	Good	S	R[3]	med	m. strong	med.	good
Seward	ND	1987	Poor	S	R	med.	m. strong	med.	good
Tandem	SD	1997	Good	S	NA	early	med.	med.	fair
Wahoo	NE/WY	2001	NA	S	R	med.	m. strong	med.	fair
Wesley	NE/SD/WY	2000	NA	NA	NA	m. early	m. strong	short	fair
Windstar	ND	1997	NA	MS	NA	early	med.	med.	fair-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.

[3] Slow rusting type of resistance to race 15.

[4] Susceptible in artificially induced epidemics

[5] Occasionally mixed with some susceptible plants.

[6] NA = data not available, or data insufficient to give rating.

[7] Saw fly resistant.

2003 Hard Red Winter Wheat Variety Trial - Continuously Cropped No-till **Hettinger**

Variety	Winter Survival	Days to Head	Plant Height	Test Weight	Grain Protein	Grain Yield 2000	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	%	from 1/1	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
CDC Falcon	77	171	30	56.3	15.2	99.6	40.3	52.5	46.4	64.1
Jerry	78	173	34	56.9	14.8	87.4	35.7	51.7	43.7	58.3
Harding	88	171	31	57.4	14.9	84.2	34.5	54.2	44.4	57.6
Arapahoe	65	170	35	57.1	14.8	91.3	34.9	44.4	39.6	56.9
Nekota	80	169	25	58.8	14.0	91.2	37.6	41.7	39.6	56.8
Ransom	73	172	31	56.5	14.8	93.3	32.2	43.8	38.0	56.4
CDC Kestrel	73	172	36	54.8	14.7	86.9	30.1	45.2	37.6	54.1
Alliance	60	169	28	56.8	14.1	89.2	34.2	38.6	36.4	54.0
Morgan	67	175	31	55.4	15.0	88.0	32.4	40.3	36.4	53.6
Crimson	75	171	30	59.2	14.5	81.0	33.0	44.4	38.7	52.8
Tandem	85	169	28	59.7	14.6	78.1	32.8	47.3	40.0	52.7
Windstar	85	167	33	60.3	14.4	74.4	34.7	47.9	41.3	52.3
Norstar	78	175	39	58.0	15.3	75.0	28.6	48.6	38.6	50.7
Agassiz	88	173	36	57.8	15.3	66.8	27.6	49.4	38.5	47.9
Elkhorn	73	173	35	55.8	15.3	70.4	28.4	43.6	36.0	47.5
Roughrider	52	173	36	57.7	15.0	72.5	29.7	38.0	33.8	46.7
Seward	78	175	34	56.1	15.3	67.3	31.8	39.2	35.5	46.1
Wahoo	73	170	30	54.7	15.1		41.1	47.7	44.4	
Millennium	70	169	30	60.2	14.0		38.2	47.5	42.8	
Wesley	70	168	26	56.8	15.6		40.5	37.2	38.8	
CDC Raptor	47	173	30	54.2	15.1		34.0	42.3	38.2	
Expedition	87	167	29	58.1	14.2			54.2		
Good Streak	95	168	32	59.0	14.9			52.7		
Paul	83	172	31	55.7	15.2			51.1		
McClintock	50	174	35	57.1	14.5			46.9		
2137	73	170	31	59.2	14.6			45.4		
Jagalene	14	171	28	59.0	15.0			18.3		
Trial Mean	70	171	31	57.1	14.8	80.3	33.8	44.8	--	--
C.V. %	31.4	0.7	7.2	2.3	3.0	7.5	9.4	17.1	--	--
LSD .05	36	2	4	2.2	0.7	9.8	5.2	12.5	--	--
LSD .01	48	2	5	2.9	1.0	13.1	7.0	16.6	--	--

Planting Date: October 10, 2002
Harvest Date: August 4, 2003
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: 1999 = soybean, 2001 = barley, 2002 = soybean.
Notes: The 2002 and 2003 trials sustained severe heat and moisture stress.

2003 Hard Red Winter Wheat - Recrop **Dickinson,ND**

Variety	Heading Date[1]	Seeds per Pound	Height	Lodging Score[2]	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Returns	Average Yield 2 Year	Average Yield 3 Year
	June		in	0-9	lbs/bu	%	---bu/ac---			$/ac	---bu/ac---	
Agassiz	16	13,137	41	1.3	62.4	14.3	51.7	40.8	74.1	215.63	57.4	55.5
Alliance	13	13,009	32	1.0	61.5	12.6	32.7	46.9	65.7	187.25	56.3	48.4
Arapahoe	16	13,776	37	1.3	61.2	13.8	48.7	46.9	69.1	200.39	58.0	54.9
CDC Falcon	15	16,575	29	1.0	60.8	12.9	--	55.4	83.4	238.52	69.4	--
CDC Kestrel	17	15,105	38	1.0	57.7	12.5	48.7	39.4	80.2	226.97	59.8	56.1
CDC Raptor	18	14,924	35	1.0	59.6	13.2	--	41.3	76.5	219.56	58.9	--
Crimson	16	12,449	36	1.3	61.1	13.9	34.3	46.8	73.8	214.02	60.3	51.6
Elkhorn	17	15,027	39	1.3	59.5	13.5	50.1	37.3	73.9	213.57	55.6	53.8
Expedition	14	12,352	30	1.0	61.7	13.3	--	50.3	70.8	203.90	60.6	--
Good Streak	16	13,207	37	1.0	63.2	13.5	--	--	73.4	212.13	--	--
Harding	16	14,848	37	1.0	59.3	13.9	42.1	52.5	70.3	203.87	61.4	55.0
Jagalene	15	12,055	29	1.0	63.4	13.9	--	--	76.2	220.98	--	--
Jerry	16	11,468	37	1.0	60.2	13.5	43.4	43.3	76.7	221.66	60.0	54.5
Millenium	15	13,687	34	1.0	63.0	13.8	--	49.3	79.4	230.26	64.3	--
Morgan	18	15,144	36	1.0	60.0	13.3	--	40.4	80.0	230.40	60.2	--
Nekota	13	13,542	31	1.0	61.4	13.9	35.1	47.4	59.3	171.97	53.4	47.3
Northstar	19	14,201	41	1.0	60.5	13.5	51.6	32.9	81.4	235.25	57.1	55.3
Paul	17	17,032	33	1.0	56.6	13.4	--	--	84.6	238.57	--	--
Ransom	16	15,815	37	1.0	59.5	13.1	45.4	44.6	80.3	230.46	62.5	56.8
Roughrider	17	13,880	39	1.3	61.5	14.1	46.1	22.8	66.6	193.81	44.7	45.2
Seward	19	15,595	40	1.0	61.9	13.4	42.4	33.7	82.5	237.60	58.1	52.9
Tandem	15	11,635	36	1.0	62.8	14.9	32.3	39.2	63.3	184.20	51.3	44.9
McClintock	16	14,387	39	1.0	61.6	13.5	--	--	83.8	242.18	--	--
Wahoo	15	15,466	33	1.0	59.3	13.0	--	48.0	83.3	239.07	65.7	--
Wesley	13	11,424	28	1.0	61.8	13.9	--	45.2	65.9	191.11	55.6	--
Windstar	14	14,960	39	1.0	62.1	13.9	42.0	43.2	69.1	200.39	56.1	51.4
Trial Mean	16	14,157	35	1.0	60.8	13.5	43.1	42.8	75.0	216.26	--	--
C.V. %	5.4	15.6	4.9	19.9	2.6	1.5	13.9	12.4	9.5	--	--	--
LSD .05	1	3,104	2	NS	2.2	0.4	8.6	8.2	10.0	--	--	--

Planting Date: September 17 , 2002
Harvest Date: August 1, 2003
[1]Winterkill notes were not recorded since little winter injury was observed.
[2]Lodging 0=No lodging, 9=Completely flat

Returns were calculated by multiplying the 2003 yield by protein premium or discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was $2.83/bu, assuming that grain protein concentration was 12%. An additional $.01/bu was paid for each additional 0.25% increase in grain protein up to 14% protein. Grain was discounted $0.02/bu for each 0.25% 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].

SDSU Hard Winter Wheat Variety Trial – Perkins County (Bison), 2003.

Variety	Height	Lodging	Test Wt	Yield Bu/A
	Inches	1-9*	Lb/Bu	2003
Hard Red				
ALLIANCE	33.0	1	58.6	**52.6**
AP502 CL	30.0	1	57.2	50.7
ARAPAHOE	34.0	1	60.0	**52.8**
CDC FALCON	31.3	1	60.5	**56.4**
CRIMSON	34.8	1	61.9	**53.0**
EXPEDITION	32.5	1	60.6	**54.5**
HARDING	35.3	1	61.0	**52.8**
JAGALENE	30.5	1	61.6	**55.2**
JERRY	34.8	1	61.1	50.4
MILLENNIUM	33.5	1	61.6	**55.6**
NEKOTA	31.0	1	60.2	50.6
RANSOM	34.3	1	60.4	47.0
TANDEM	33.8	1	62.2	**52.3**
WAHOO	33.0	1	60.0	**53.5**
WESLEY	28.3	1	61.3	**51.9**
SD92107-3	34.3	1	58.9	48.0
SD92107-5	34.8	1	61.3	49.7
SD97049	30.8	1	61.4	51.3
SD97250	31.5	1	62.4	50.6
SD97088	34.3	1	60.7	48.1
SD98102	34.8	1	59.7	49.2
SD97538	30.3	1	61.3	49.4
SD97059-2	33.3	1	60.6	**52.7**
SD97380-2	33.8	1	59.7	49.9
Hard White				
NUPLAINS	29.5	1	63.3	48.6
TREGO	31.3	1	62.6	**56.9**
SD97W604	29.0	1	62.4	**57.2**
SD97W609	31.0	1	62.2	**51.8**
SD99W015	32.0	1	61.1	**51.8**
SD97W671-1	31.8	1	61.5	**52.7**
Average	32.4	1.0	60.9	51.9
LSD (P=.05)	1.8	0.0	2.3	5.8
CV	3.9	0.0	2.7	7.9

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

Planted: Sept. 17, 2002 Herbicide: Bronate (1 pint/A)
Harvested: July 24, 2003 Additional Nitrogen: None
Previous crop: Hayed wheat, No-till planted

2004 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	Root Rot	Scab
AC Avonlea	Can.	1997	white	med	med.	med.	R	R	M	S	S
AC Melita	Can.	1995	white	tall	med.	med.	R	NA	NA	M	S
AC Morse	Can.	1996	white	s.dwf.	strong	med.	R	R	M	MS	NA
AC Navigator	Can.	1999	white	s.dwf.	weak	med.	R	R	M	S	S
AC Pathfinder	Can.	1999	white	med.	weak	med.	R	R	M	MS	S
Belzer	ND	1997	white	tall	med.	late	R	R	M	M	M
Ben	ND	1996	white	med.	strong	med.	R	R	MR	M	MS
Cando	ND	1975	tan	s.dwf.	v.strong.	med.	R	R	M	M	VS
Dilse	ND	2002	white	med.	strong	late	R	R	M	M	MS
Dressler	AgriPro	1996	white	tall	med.	med.	R	MR	NA	MR	VS
Fjord	AgriPro	1986	white	tall	strong.	m.early	R	R	M	M	S
Kari	Agripro	1998	white	med	strong	med	R	R	M	M	S
Kyle	Can.	1984	white	tall	weak	med.	R	MR	M	S	NA
Laker	WPB	1985	white	s.dwf.	strong.	med.	R	MR	S	NA	S
Lebsock	ND	1999	white	med	strong	med	R	R	M	MS	MS
Lloyd	ND	1983	white	s.dwf.	v.strong.	med.	R	MR	S	MR	VS
Maier	ND	1998	white	med	strong	m-late	R	R	M	M	S*
Medora	Can.	1983	white	tall	strg.	m.early	R	R	MS	MS	VS
Monroe	ND	1985	white	tall	med.	early	R	R	M	M	VS
Mountrail	ND	1998	white	med	strong	late	R	R	M	M	MS
Munich	ND	1995	white	med.	v.strg.	med.	R	R	MR	M	S*
Pierce	ND	2001	white	med.	m.strong	med.	R	R	MS	MR	MS
Plaza	ND	1999	white	s.dwf.	strong	late	R	R	M	MS	MS
Plenty	Can.	1990	white	tall	weak	late	R	R	MR	M	MS
Renville	ND	1988	white	tall	med.	med.	R	R	M	M	S*
Rugby	ND	1973	tan	tall	v.strong.	m.early	R	R	MR	MS	S*
Vic	ND	1979	white	tall	med.	m.early	R	R	MR	M	S*
Voss	AgriPro	1994	white	s.dwf.	v.strong.	med.	R	MR	MS	MR	S
Ward	ND	1972	tan	tall	v.strong.	m.early	R	R	MR	MS	S

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.

2003 Durum Variety Trial - Continuously Cropped No-till **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield 2000	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
		inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Lebsock	73	37	59.2	16.8	57.1	26.0	44.2	35.1	42.4
Munich	72	32	57.6	17.5	59.6	22.0	43.8	32.9	41.8
Renville	73	37	57.8	18.1	58.4	26.2	40.4	33.3	41.7
Plaza	76	32	56.2	17.6	65.4	22.3	36.5	29.4	41.4
Mountrail	74	38	57.4	17.4	55.9	22.6	44.3	33.4	40.9
Belzer	74	38	56.4	17.6	60.2	21.7	39.5	30.6	40.5
Ben	74	38	58.4	17.5	54.0	22.8	43.8	33.3	40.2
Pierce	74	35	58.4	18.2	59.9	22.1	38.0	30.0	40.0
Maier	74	34	58.2	18.7	63.9	17.3	38.2	27.8	39.8
Dilse	75	35	57.7	20.0	57.7	22.0	36.6	29.3	38.8
Monroe	70	34	57.5	17.8	53.8	24.2	36.6	30.4	38.2
Rugby	72	36	58.5	17.9	50.7	21.6	38.9	30.2	37.1
AC Avonlea	73	39	57.1	18.8			39.9		
Trial Mean	73	38	57.6	18.0	58.4	23.4	39.8	--	--
C.V. %	1.0	--	1.3	4.4	7.6	15.3	10.4	--	--
LSD .05	1	--	1.1	1.1	6.2	NS	5.8	--	--
LSD .01	1	--	1.4	1.5	8.2	NS	7.7	--	--

Planting Date: April 10, 2003
Harvest Date: July 28, 2003
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous crop: 1999 = soybean, 2001 = barley, 2002 = soybean.
Note: The 2002 trial sustained severe heat and moisture stress. The 2003 trial sustained late season heat and moisture stress.
NS = no statistical differences between varieties.

2003 Durum - Alfalfa burn down **Dickinson, ND**

Variety	Days to Head	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	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	70	13,454	38	54.4	15.7	54.1	34.1	61.4	204.96	47.7	49.9
Belzer	72	12,540	38	57.7	14.4	41.9	34.3	55.9	201.92	45.1	44.0
Ben	72	11,704	38	59.1	15.7	42.2	31.3	55.6	203.58	43.4	43.0
Dilse	73	13,008	36	58.4	15.6	45.3	36.5	55.5	202.42	46.0	45.8
Lebsock	72	13,354	36	59.0	14.8	45.5	36.4	56.0	204.80	46.2	46.0
Maier	73	13,515	35	58.8	15.7	47.6	35.5	60.6	221.91	48.0	47.9
Monroe	72	14,091	39	57.3	15.5	44.0	34.7	54.2	193.56	44.4	44.3
Mountrail	73	14,120	36	56.2	14.9	51.2	35.1	56.2	196.00	45.7	47.5
Munich	71	14,268	35	57.5	15.2	44.6	31.1	56.6	202.02	43.8	44.1
Pierce	72	13,247	37	58.4	14.7	45.3	34.5	58.0	210.92	46.2	45.9
Plaza	72	13,919	32	57.2	15.2	48.3	33.4	56.4	200.37	44.9	46.0
Renville	68	12,585	37	56.8	15.3	36.6	31.0	48.9	173.18	40.0	38.8
Rugby	72	14,377	41	57.4	15.4	43.1	32.8	53.3	191.27	43.1	43.1
Trial Mean	72	13,336	37	57.6	15.1	46.6	34.2	56.7	203.29	--	--
C.V. %	0.8	6.0	4.2	2.4	2.1	13.0	10.0	8.0	9.3	--	--
LSD .05	1	1,127	2	2.0	0.7	8.5	4.8	6.4	26.42	--	--

Planting Date: April 21
Harvest Date: August 14
Returns were calculated by multiplying the 2003 yield by the test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was $3.70/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.

2003 Durum Variety Trial - Continuously Cropped No-till **Scranton**

Variety	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Lebsock	31	58.5	16.3	49.8	41.1	36.1	38.6	42.3
Ben	33	56.5	17.3	52.4	38.1	35.8	37.0	42.1
Mountrail	32	55.3	16.6	49.0	39.1	38.2	38.6	42.1
Pierce	32	56.0	16.9	51.4	39.2	33.8	36.5	41.5
Maier	32	55.7	17.5	45.4	41.9	34.7	38.3	40.7
Dilse	32	55.7	18.2		40.3	35.3	37.8	
Trial Mean	32	56.3	17.1	49.7	40.0	35.7	--	--
C.V. %	3.4	1.0	--	5.3	4.9	3.3	--	--
LSD .05	NS	0.8	--	4.0	NS	1.8	--	--
LSD .01	NS	1.1	--	5.5	NS	2.5	--	--

Planting Date: April 21, 2003 Harvest Date: August 7, 2003
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous Crop: 2000 = safflower, 2001 & 2002 = lentil.
NS = no statistical difference between varieties.

2003 Durum Variety Trial - Continuously Cropped No-till **Regent**

Variety	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Lebsock	33	59.8	17.6	68.1	28.0	45.0	36.5	47.0
Mountrail	31	57.9	17.7	68.2	27.6	44.6	36.1	46.8
Ben	35	59.1	17.9	63.9	26.4	45.6	36.0	45.3
Maier	33	57.9	18.3	67.0	26.2	42.6	34.4	45.3
Pierce	33	59.0	17.8	63.8	26.7	42.3	34.5	44.3
Dilse	31	58.2	19.3		22.5	41.2	31.8	
Trial Mean	33	58.7	18.1	65.7	26.2	43.5	--	--
C.V. %	3.6	0.7	--	2.5	6.8	5.4	--	--
LSD .05	2	0.6	--	2.4	3.3	NS	--	--
LSD .01	2	0.8	--	3.4	NS	NS	--	--

Planting Date: April 22, 2003 Harvest Date: August 7, 2003
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous Crop: 2000 = safflower, 2001 & 2002 = lentil.
NS = no statistical difference between varieties.

2003 Durum Variety Trial - Continuously Cropped No-till **New Leipzig**

Variety	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac				
Maier	25	55.9	19.9	52.1	14.2	21.8	18.0	29.4
Mountrail	25	57.2	19.0	50.6	14.0	23.7	18.8	29.4
Ben	27	58.0	19.2	48.6	15.4	23.1	19.2	29.0
Lebsock	25	58.9	18.4	52.7	11.1	22.6	16.8	28.8
Pierce	25	56.2	19.2	48.7	12.5	21.0	16.8	27.4
Dilse	23	53.9	20.9		11.3	20.0	15.6	
Trial Mean	25	56.7	19.4	50.1	13.1	22.0	--	--
C.V. %	4.7	2.1	--	4.4	11.3	14.3	--	--
LSD .05	2	1.8	--	3.3	2.2	NS	--	--
LSD .01	2	2.0.4	--	NS	3.1	NS	--	--

Planting Date: April 22, 2003 Harvest Date: July 30, 2003
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous Crop: 2000 = safflower, 2001 & 2002 = lentil.
NS = no statistical difference between varieties.

2003 Durum Variety Trial - Continuously Cropped No-till **Selfridge**

Variety	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac				
Lebsock	32	60.1	17.9	77.6	20.4	30.3	25.4	42.8
Mountrail	31	56.9	19.3	78.7	22.1	26.8	24.4	42.5
Ben	33	59.3	18.8	76.3	18.5	28.0	23.2	40.9
Pierce	32	59.5	18.0	72.9	18.7	29.0	23.8	40.2
Maier	33	58.7	18.9	72.7	19.9	26.8	23.4	39.8
Dilse	31	59.2	18.8		19.4	29.2	24.3	
Trial Mean	32	58.9	18.6	75.4	19.8	28.4	--	--
C.V. %	4.9	1.5	4.2	3.9	8.6	8.4	--	--
LSD .05	NS	1.3	NS	4.4	NS	NS	--	--
LSD .01	NS	1.8	NS	NS	NS	NS	--	--

Planting Date: April 23, 2003 Harvest Date: August 11, 2003
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous Crop: 2000 = HRWW, 2001 & 2002 = lentil.
NS = no statistical difference between varieties.

2003 Durum Variety Trial - Continuously Cropped No-till **Mandan**

Variety	Plant Height	Test Weight	Protein	Grain Yield 2000	Grain Yield 2001	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Mountrail	33	57.9	16.3	66.1	50.3	42.4	46.4	52.9
Ben	36	60.3	16.4	62.0	42.8	44.9	44.4	50.2
Lebsock	33	60.9	15.9	66.4	43.1	40.4	41.8	50.0
Maier	33	59.8	16.9	63.5	37.3	39.4	38.4	46.7
Pierce	35	60.0	16.1		43.4	42.2	42.8	
Dilse	33	59.3	17.1			40.4		
Trial Mean	34	59.7	16.4	61.3	43.4	41.7	--	--
C.V. %	3.9	0.8	2.7	14.4	6.9	2.8	--	--
LSD .05	2	0.7	0.7	NS	5.4	1.7	--	--
LSD .01	NS	0.9	0.9	NS	7.7	2.4	--	--

Planting Date: April 23, 2003 Harvest Date: August 11, 2003
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous Crop: 1999 = rye, 2000 & 2002 = barley.
NS = no statistical difference between varieties.

2003 Beulah Durum - Recrop **Dickinson, ND**

Variety	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield	Returns
		in	lbs/bu		bu/ac	$/ac
Dilse	14,196	29	58.7	13.8	39.5	144.61
Lebsock	13,485	28	58.8	12.7	37.2	136.88
Mountrail	14,156	29	58.5	13.0	41.9	150.10
Pierce	13,515	28	61.7	12.1	34.9	129.12
Trial Mean	13,734	28	59.4	12.7	38.2	139.74
C.V. %	4.8	10.0	2.5	8.7	11.5	--
LSD .05	NS	NS	NS	NS	NS	--

Planting Date: April 30 Harvest Date: August 12

Returns were calculated by multiplying the 2003 yield by the test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was $3.70/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.

2003 Glen Ullin Durum - Recrop **Dickinson, ND**

Variety	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield	Returns
		in	lbs/bu		bu/ac	$/ac
Dilse	16,715	27	55.4	16.5	37.2	127.34
Lebsock	16,147	27	59.8	13.8	38.0	140.40
Mountrail	16,556	27	54.3	14.0	39.3	130.43
Pierce	17,185	29	58.1	14.9	37.4	134.21
Trial Mean	16,435	27	56.9	14.6	38.5	135.47
C.V. %	7.6	4.1	3.0	9.0	3.2	--
LSD .05	NS	2	3.2	NS	2.3	--

Planting Date: May 1 Harvest Date: August 12

2003 Hannover Durum - Recrop **Dickinson, ND**

Variety	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield	Returns
		in	lbs/bu		bu/ac	$/ac
Dilse	14,708	30	57.7	15.3	37.1	133.34
Lebsock	13,933	29	59.3	14.4	35.7	131.14
Mountrail	14,123	32	58.9	14.7	40.7	148.61
Pierce	13,711	31	62.0	13.8	40.9	151.03
Trial Mean	14,085	30	59.1	14.6	39.1	142.12
C.V. %	3.4	6.0	3.3	4.0	10.0	--
LSD .05	NS	NS	NS	NS	NS	--

Planting Date: April 30 Harvest Date: August 12

Returns were calculated by multiplying the 2003 yield by the test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was $3.70/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.

SDSU Durum Wheat Variety Trial - Perkins County (Bison), 2003.

Variety	Height	Lodging	Test Wt	Yield	Bu/A
	Inches	1-9*	Lb/Bu	2003	
AC Avonlea	33.0	1	61.6	46.4	
Ben	34.8	1	62.2	46.5	
Dilse	29.5	1	61.6	44.5	
Lebsock	31.5	1	63.1	**51.0**	
Maier	31.3	1	63.1	**49.4**	
Mountrail	31.3	1	62.1	**50.6**	
Pierce	33.3	1	62.7	**50.2**	
Renville	34.8	1	61.7	45.7	
Vic	35.5	1	62.0	**47.4**	
Average	32.8	1.0	62.2	48.0	
LSD (P=.05)	2.0	0.0	1.0	4.1	
CV	4.2	0.0	1.0	5.9	

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

Planted: April 9, 2003 Herbicide: Bronate (1 pint/A)
Harvested: July 31, 2003 Additional Nitrogen: None
Previous crop: Hayed wheat, No-till planted

SDSU Durum Wheat Variety Trial – Harding County (Ralph), 2003.

Variety	Height	Lodging	Test Wt	Yield	Bu/A
	Inches	1-9*	Lb/Bu	2003	3 Year
AC Avonlea	31	1	62.9	**32.3**	.
Ben	31	1	62.8	**29.4**	26.2
Dilse	30	1	63.5	**29.5**	.
Lebsock	28	1	64.2	**29.7**	27.2
Maier	31	1	63.3	**30.7**	26.3
Mountrail	31	1	62.7	**29.2**	28.6
Pierce	32	1	62.7	**32.9**	.
Renville	34	1	63.1	28.5	25.3
Vic	32	1	62.9	**29.2**	26.7
Average	31.4	1.0	63.1	30.2	26.7
LSD (P=.05)	2.0	0.0	0.8	4.0	**NS**
CV	3.7	0.0	0.9	9.0	11.6

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

Planted: April 9, 2003 Herbicide: Puma ($^2/_3$ pint/A) +Harmony ($^1/_2$ oz/A)
Harvested: July 31, 2003 Additional Nitrogen: None
Previous crop: Conventional fallow

2003 Durum Wheat in the West River Region **Combined Means**

Variety	Days to Head	Plant Height	Seeds / Pound	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
		inches		lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Mountrail	74	31	14,739	57.9	16.3	52.9	28.1	39.8	34.0	40.3
Lebsock	72	31	14,230	60.1	15.9	49.9	27.7	38.8	33.2	38.8
Pierce	73	32	14,414	59.6	16.2	50.7	26.6	38.4	32.5	38.6
Ben	73	34	11,704	59.5	17.5	49.1	36.3	39.2	32.8	38.2
Maier	74	32	13,515	59.0	18.0	49.1	26.4	38.2	32.3	37.9
Dilse	74	31	14,657	58.3	17.6		25.6	37.2	31.4	
# of locations	2	12	4	12	10	12	7	12	19	31

Locations: 2003 = Hettinger, Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Beulah, Hannover, Glen Ullin, Ralph SD and Bison SD.
2002 = Hettinger, Dickinson, Scranton, Regent, Selfridge, New Leipzig and Wibaux MT.
2001 = Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Beulah, Hannover, Glen Ullin, Wibaux MT, Ralph SD and Bison SD.

2003 Durum Seeding Rate - No-till **Hettinger**

Variety	Seeding Rate		Days to Head	Plant Height	Test Weight	Protein	Grain Yield 2002	Grain Yield 2003	Grain Yield 2 yr avg
	million's	lbs/ac	days	inches	lbs/bu	%	bu/ac	bu/ac	bu/ac
Ben	1.00	107	74	34	57.4	19.4	21.4	36.5	29.0
Ben	1.25	134	73	34	57.3	19.8	23.3	33.4	28.4
Ben	1.50	160	74	34	57.7	19.8	23.7	34.7	29.2
Maier	1.00	102	74	34	56.4	20.2	22.9	34.3	28.6
Maier	1.25	128	75	32	57.4	20.3	24.2	34.6	29.4
Maier	1.50	155	74	33	57.1	20.3	24.0	33.6	28.8
Trial Mean			74	34	57.2	20.0	23.2	34.5	--
C.V. %			0.5	6.7	1.2	1.5	6.6	10.2	--
LSD .05			NS	NS	NS	NS	NS	NS	--

Planting Date: April 10, 2003 Harvest Date: July 28, 2003
Previous Crop: 2001 = barley, 2002 = soybean.
NS = no statistical difference between seeding rates.

2003 Durum Seeding Rate - No-till **Scranton**

Variety	Seeding Rate		Plant Height	Test Weight	1000 Seed Weight	Protein	Grain Yield 2002	Grain Yield 2003	Grain Yield 2 yr avg
	million's	lbs/ac	inches	lbs/bu	grams	%	bu/ac	bu/ac	bu/ac
Ben	1.00	107	35	56.9	31.2	17.6	41.7	40.8	41.2
Ben	1.25	134	34	56.7	31.1	17.4	40.4	40.3	40.4
Ben	1.50	160	33	56.3	29.4	17.2	39.3	40.3	39.8
Maier	1.00	102	31	56.8	30.9	17.6	42.7	40.3	41.5
Maier	1.25	128	32	57.0	29.6	18.0	40.9	41.0	41.0
Maier	1.50	155	33	57.2	28.5	17.5	40.2	43.6	41.9
Trial Mean			33	56.8	30.1	17.5	40.9	41.0	--
C.V. %			3.9	0.9	5.7	1.7	5.1	5.1	--
LSD .05			NS	NS	NS	NS	NS	NS	--

Planting Date: April 21, 2003 Harvest Date: August 7, 2003
Previous Crop: lentil
NS = no statistical difference between seeding rates.

2003 Durum Seeding Rate - No-till **Regent**

Variety	Seeding Rate		Plant Height	Test Weight	1000 Seed Weight	Protein	Grain Yield 2002	Grain Yield 2003	Grain Yield 2 yr avg
	million's	lbs/ac	inches	lbs/bu	grams	%	bu/ac	bu/ac	bu/ac
Ben	1.00	107	34	58.6	31.4	18.3	23.9	42.0	33.0
Ben	1.25	134	35	59.1	31.2	18.2	24.0	43.3	33.6
Ben	1.50	160	33	59.1	30.8	18.3	23.8	44.2	34.0
Maier	1.00	102	31	57.6	28.0	18.4	24.4	41.7	33.0
Maier	1.25	128	31	57.1	26.4	18.7	22.6	42.4	32.5
Maier	1.50	155	32	57.9	28.4	18.7	22.4	44.6	33.5
Trial Mean			33	58.2	29.4	18.4	23.5	43.0	--
C.V. %			2.8	1.1	4.7	1.4	5.5	3.6	--
LSD .05			1	NS	NS	NS	NS	NS	--

Planting Date: April 22, 2003 Harvest Date: August 7, 2003
Previous Crop: lentil
NS = no statistical difference between seeding rates.

2003 Durum Seeding Rate - No-till **Combined means**

Variety	Seeding Rate		Days to Head	Plant Height	Test Weight	100 Seed Weight	Protein	Grain Yield 2002	Grain Yield 2003	Grain Yield 2 yr avg
	million's	lbs/ac	days	inches	lbs/bu	grams	%	bu/ac	bu/ac	bu/ac
Ben	1.00	107	74	34	57.6	31.3	18.4	29.0	39.8	34.4
Ben	1.25	134	73	34	57.7	31.2	18.5	29.4	39.0	34.2
Ben	1.50	160	74	33	57.7	30.1	18.4	28.8	39.7	34.2
Maier	1.00	102	74	32	56.9	29.4	18.7	30.0	38.8	34.4
Maier	1.25	128	75	32	57.2	28.0	19.0	29.6	39.3	34.4
Maier	1.50	155	74	33	57.4	28.4	18.8	29.0	40.6	34.8
# of Locations*			1	3	3	2	3	3	3	6

* Locations: Hettinger, Scranton and Regent.

2004 North Dakota barley variety descriptions.

										Reaction to Disease[3]			
Variety	Use[1]	Origin	Year **Released**	Awn **Type**[2]	**Rachilla hair length**[6]	Aleurone **Color**	Height	Straw **Strength**	Relative **Maturity**	Stem **Rust**	Loose **Smut**	Spot **Blotch**	Net **Blotch**
Six-row													
Azure	M/F	ND	1982	S	L	blue	med.	m.strg.	m.early	S	S	MR-R	MS-S
Excel	M/F	MN	1990	S	L	white	m.short	strg.	med.	S	S	MR-R	MS-S
Foster	M/F	ND	1995	S	L	white	m.short	strg.	med.	S	S	MR-R	MS-S
Hazen	F	ND	1984	S	L	white	med.	m.strg.	med.	S	S	MR-R	MS-S
Morex	M/F	MN	1978	S	S	white	tall	med.	early	S	S	MR	S
Robust	M/F	MN	1983	S	S	white	med.	m.strg.	med.	S	S	MR-R	MS-S
Stander	F	MN	1993	S	S	white	m.short	v.strg.	m.late	S	S	MR-R	MS-S
MNBrite*	F	MN	1997	S	S	white	tall	med.	early	S	S	MR-R	MS-S
Lacey	M/F†	MN	1999	S	S	white	m.short	strg.	med.	S	S	MR-R	MS-S
Drummond	M/F	ND	2000	S	L	white	m.short	v.strg.	med.	S	S	MR-R	MS-S
Legacy	M/F†	BARI	2000	S	L	white	med.	strg.	m.late	S	S	MR-R	MS-S
Tradition	M/F†	BARI	2003	S	L	white	m.short	v.strg.	med.	S	S	MR-R	MS-S
Two-row													
Bowman	F	ND	1984	S	L	white	m.short	med.	early	S	S	MS-S	S-MS
Conlon[4]	M/F†	ND	1996	S	L	white	m.short	med.	early	S	S	MS	MR-R
Gallatin	F	MT	1986	R	L	white	med.	med.	late	S	S	MS-S	MS
Harrington[5]	F	Can.	1981	R	L	white	med.	m.weak	v.late	S	S	S	MR-MS
Logan	F	ND	1995	S	L	white	med.	strg.	med.	S	S	MS-MR	MR
Stark	F	ND	1991	S	L	white	m.tall	med.	late	S	S	S-MS	MS-S
Specialty													
Wanubet	SP	MT	1990	R	L	white	med.	weak	late	S	S	S	S

†Not being used by all major U.S. brewers.
*Moderately resistant to Fusarium head blight
1 M = malting; F = feed; SP = special uses (hulless).
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 U.S.
6 S = short, L = long

2003 Barley Variety Trial - Continuously Cropped No-till **Hettinger**

Variety	Days to Head	Plant Height	Lodging	Test Weight	Plump	Grain Protein	Grain Yield 2000	Grain Yield 2002	Grain Yield 2003	Avg. Yield 2 year	Avg. Yield 3 year
		inches	0 - 9*	lbs/bu	%	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
2 Row											
Logan	66	29	3.0	49.6	40	16.1	77.2	33.3	90.8	62.0	67.1
Conlon	65	31	3.0	50.1	76	15.4	77.8	23.9	96.4	60.2	66.0
Stark	70	31	1.8	49.8	42	15.8	72.6	30.6	84.9	57.8	62.7
Bowman	67	30	3.5	48.8	51	15.9	71.7	30.0	84.3	57.2	62.0
Merit	78	23	1.0	41.9	22	17.3	78.2	15.6	59.1	37.4	51.0
Harrington	77	24	1.0	43.9	19	16.5	70.1	16.5	63.4	40.0	50.0
Valier	75	24	1.0	48.3	12	17.5		25.1	77.8	51.4	
6 Row											
Lacey	69	30	3.2	46.1	30	16.9	84.1	24.3	82.6	53.4	63.7
Morex	70	32	2.5	45.9	18	15.9	84.5	23.1	83.3	53.2	63.6
Stander	70	31	1.8	46.6	35	16.0	85.9	22.8	77.5	50.2	62.1
Drummond	70	31	1.2	45.7	25	16.6	82.2	21.4	79.4	50.4	61.0
Excel	70	30	2.5	44.3	19	16.2	83.9	20.0	71.1	45.6	58.3
Foster	69	30	1.8	44.0	30	15.6	77.4	21.0	73.9	47.4	57.4
Robust	70	32	4.0	46.5	26	16.7	69.1	24.4	74.7	49.6	56.1
Legacy	72	28	2.2	43.7	18	16.3	80.2	18.5	68.7	43.6	55.8
Tradition	70	27	1.0	46.2	29	16.0		19.3	77.3	48.3	
Trial Mean	70	29	2.0	46.2	32	16.1	79.1	22.9	77.2	--	--
C.V. %	1.6	7.9	33.2	1.4	16.3	3.7	6.6	18.0	7.1	--	--
LSD .05	2	3	0.9	0.9	7	0.8	7.4	5.8	7.8	--	--
LSD .01	2	4	1.2	1.2	10	1.1	9.9	7.8	10.4	--	--

*Lodging: 0 = none, 9 = lying flat on ground.
Planting Date: April 10, 2003 Harvest Date: July 23, 2003
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: 1999 = soybean, 2001 = barley, 2002 = soybean.
Notes: The 2002 trial sustained severe heat and moisture stress.

2003 Barley - Alfalfa burn down **Dickinson, ND**

Variety	Days to Head	Seeds per Pound	Plant Height	Test Weight	Protein	Lodging	% Plump	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Returns	Average Yield 2 Year	Average Yield 3 Year
			in	lbs/bu	%		>6/64	bu/ac	bu/ac	bu/ac	$/ac	bu/ac	bu/ac
Six Row													
Drummond	60	14,625	37	45.1	16.5	3	56	110.3	74.4	110.4	197.87	92.4	98.4
Excel	61	14,294	36	43.6	16.3	3	46	110.9	74.1	110.6	192.40	92.4	98.5
Foster	61	13,679	38	45.6	16.2	2	73	109.0	80.8	116.3	205.85	98.6	102.0
Lacey	61	13,661	36	45.7	16.0	2	61	105.6	76.5	111.3	199.53	93.9	97.8
Legacy	63	15,330	36	42.1	16.2	3	49	105.2	72.9	107.8	180.08	90.3	95.3
Morex	61	14,972	38	45.6	16.3	4	55	99.6	72.7	104.1	185.67	88.4	92.1
Robust	62	13,076	39	48.8	16.1	2	69	104.3	75.0	106.2	191.20	90.6	95.2
Stander	61	12,882	35	48.2	16.6	1	73	111.1	72.8	113.0	203.35	92.9	99.0
Tradition	62	14,041	37	46.2	16.5	1	72	--	--	116.4	207.54	--	--
Two Row													
Bowman	58	10,699	34	51.6	17.6	1	91	86.6	83.6	98.0	176.47	90.8	89.4
Conlon	57	9,909	34	50.4	16.8	2	95	95.4	78.1	93.6	168.49	85.9	89.0
Harrington	66	12,177	36	46.8	18.5	1	57	91.5	77.8	95.0	170.95	86.4	88.1
Logan	61	9,906	34	52.3	16.0	1	81	91.1	86.9	112.6	202.71	99.8	96.9
Merit	67	12,255	34	44.8	14.8	1	65	118.8	73.8	101.9	178.07	87.8	98.2
Stark	61	10,037	35	53.0	15.9	1	87	98.4	82.3	116.3	209.39	99.3	99.0
Valier	66	13,030	33	48.1	17.6	1	53	109.4	80.4	100.9	181.62	90.7	96.9
Trial Mean	62	12,541	35	47.2	16.5	2	69	104.9	77.4	106.9	190.11	--	--
C.V. %	1.1	8.4	5.0	4.4	3.9	43.4	16.2	5.5	5.0	9.5	10.7	--	--
LSD .05	1	1,487	2	2.9	1.3	1	16	8.1	5.4	14.3	28.70	--	--

Planting Date: April 23
Harvest Date: July 28
Lodging 0=No lodging, 9=Completely flat
Returns were calculated by multiplying the 2003 yields by the price paid for feed barley minus the test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was $1.80/bu, assuming that the test weight was heavier than 45 lb/bu. Grain with a test weight of 45 lb/bu was discounted $.03/bu, with an additional discount of $.04/bu per pound down to 42 lb/bu. Below 42 lb/bu, an additional discount of $.05/bu occurred per pound.

2003 Barley Variety Trial - Continuously Cropped No-till **Scranton**

Variety	Plant Height	Test Weight	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	bu/ac				
Robust*	32	45.7	79.7	42.4	58.5	50.4	60.2
Stark	32	50.7	69.2	36.4	71.3	53.8	59.0
Legacy*	33	42.7		49.3	60.3	54.8	
Trial Mean	32	46.0	68.1	42.1	64.3	--	--
C.V. %	1.8	1.5	9.2	14.4	11.5	--	--
LSD .05	NS	1.1	NS	11.2	11.8	--	--

* 6 row type. Planting Date: April 21, 2003 Harvest Date: August 7, 2003
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: 2000 = safflower, 2001 & 2002 = lentil.
NS = no statistical difference between varieties.

2003 Barley Variety Trial - Continuously Cropped No-till **Regent**

Variety	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac				
Stark	31	51.0	13.8	93.9	44.0	75.4	59.7	71.1
Conlon	29	50.4	13.3	97.8	31.4	76.4	53.9	68.5
Robust*	31	47.1	14.7	90.6	32.2	58.3	45.2	60.4
Legacy*	31	44.5	14.2		31.1	62.2	46.2	
Trial Mean	30	47.8	13.8	94.1	34.1	66.8	--	--
C.V. %	6.7	2.5	--	6.2	6.0	5.5	--	--
LSD .05	NS	1.9	--	NS	3.2	5.7	--	--
LSD .01	NS	2.6	--	NS	4.4	8.0	--	--

*6 row type. Planting Date: April 22, 2003 Harvest Date: August 7, 2003
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: 2000 = safflower, 2001 & 2002 = lentil.
NS = no statistical difference between varieties.

2003 Barley Variety Trial - Continuously Cropped No-till **New Leipzig**

Variety	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac				
Stark	24	51.6	14.9	84.3	7.4	50.1	28.8	47.3
Robust*	25	48.6	16.6	75.6	12.0	43.1	27.6	43.6
Conlon	22	49.6	15.2	67.4	0.0	44.2	22.1	37.2
Legacy*	23	48.2	15.0		14.4	47.8	31.1	
Trial Mean	23	49.2	15.4	75.7	11.9	46.0	--	--
C.V. %	6.2	1.8	--	1.9	17.8	5.7	--	--
LSD .05	2	1.3	--	2.4	4.1	4.1	--	--
LSD .01	NS	1.9	--	3.7	6.1	NS	--	--

*6 row type. Planting Date: April 22, 2003 Harvest Date: July 30, 2003
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: 2000 = safflower, 2001 & 2002 = lentil.
NS = no statistical difference between varieties.

2003 Barley Variety Trial - Continuously Cropped No-till **Selfridge**

Variety	Plant Height	Test Weight	Protein	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	%	bu/ac				
Conlon	30	49.0	14.0	120.0	21.7	58.6	40.2	66.8
Stark	31	50.8	13.5	98.4	26.5	68.3	47.4	64.4
Robust*	31	48.3	14.6	95.6	17.5	50.6	34.0	54.6
Legacy*	31	46.2	13.6		16.4	52.2	34.3	
Trial Mean	31	48.4	13.8	104.7	19.9	57.3	--	--
C.V. %	4.1	1.5	4.2	5.1	10.7	7.0	--	--
LSD .05	NS	1.1	0.9	9.3	3.2	6.1	--	--
LSD .01	NS	1.6	NS	14.1	4.5	8.6	--	--

*6 row type. Planting Date: April 23, 2003 Harvest Date: August 11, 2003
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: 2000 = HRWW, 2001 & 2002 = lentil.

2003 Barley Variety Trial - Continuously Cropped No-till **Mandan**

Variety	Plant Height	Lodging	Test Weight	Protein	-- Grain Yield -- 2001	2003	2 yr Avg.
	inches	0 - 9**	lbs/bu	%	---------- bu/ac ----------		
Conlon	30	2.5	50.1	13.5	104.9	42.9	73.9
Robust*	31	6.0	48.1	14.2	85.8	43.5	64.6
Stark	30	1.5	50.8	13.9	72.2	45.4	58.8
Legacy*	29	5.5	45.8	13.4		46.8	
Trial Mean	30	3.9	48.2	13.6	87.6	45.2	--
C.V. %	5.6	43.9	1.3	2.3	5.9	11.7	--
LSD .05	NS	2.6	1.0	0.5	11.8	NS	--
LSD .01	NS	3.7	1.3	0.7	19.6	NS	--

* 6 row type. **Lodging: 0 = none, 9 = lying flat on ground.
Planting Date: April 23, 2003 Harvest Date: August 11, 2003
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: 1999 = rye, 2002 = barley.
NS = no statistical difference between varieties.

2003 Beulah Barley - Recrop **Dickinson, ND**

Variety	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield 2002	2003	Returns	2 Year Average
		in	lbs/bu	%	-----bu/ac-----		$/ac	--bu/ac--
Conlon	10,532	16	47.7	13.0	24.5	21.0	37.74	22.8
Drummond	12,632	17	47.3	12.7	21.7	25.8	46.51	23.7
Lacey	11,822	17	47.0	12.8	24.5	36.2	65.21	30.4
Legacy	12,112	17	45.7	12.8	30.9	39.6	70.80	35.3
Tradition	12,086	15	47.7	13.0	--	33.8	60.78	--
Trial Mean	11,837	17	47.1	12.8	23.9	31.3	56.21	--
C.V. %	5.3	16.1	0.9	2.8	23.2	13.4	--	--
LSD .05	1,190	NS	0.8	NS	NS	NS	--	--

Planting Date: April 30 Harvest Date: August 5

Returns were calculated by multiplying the 2003 yields by the price paid for feed barley minus the test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was $1.80/bu, assuming that the test weight was heavier than 45 lb/bu. Grain with a test weight of 45 lb/bu was discounted $.03/bu, with an additional discount of $.04/bu per pound down to 42 lb/bu. Below 42 lb/bu, an additional discount of $.05/bu occurred per pound.

2003 Glen Ullin Barley - Recrop **Dickinson, ND**

Variety	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield 2002	Grain Yield 2003	Returns	2 Year Average
		in	lbs/bu	%	bu/ac	bu/ac	$/ac	bu/ac
Conlon	11,299	24	45.6	14.6	16.8	59.7	112.65	38.3
Drummond	13,610	25	41.4	12.8	23.9	61.2	103.67	42.5
Lacey	13,823	26	38.6	15.2	31.3	65.7	102.32	48.5
Legacy	15,343	22	35.1	13.1	28.0	55.3	82.59	41.7
Tradition	14,088	26	41.1	15.3	--	63.4	107.86	--
Trial Mean	13,632	25	40.4	14.2	21.9	61.0	101.82	--
C.V. %	4.2	6.1	3.2	6.4	17.6	6.2	--	--
LSD .05	1,064	3	2.5	NS	NS	NS	--	--

Planting Date: May 1 Harvest Date: August 5

2003 Hannover Barley - Recrop **Dickinson, ND**

Variety	Seeds per Pound	Plant Height	Test Weight	Protein	Grain Yield	Returns
		in	lbs/bu	%	bu/ac	$/ac
Conlon	10,311	28	45.1	15.5	58.6	105.57
Drummond	13,014	27	41.4	15.3	63.2	105.04
Lacey	12,710	26	40.1	15.9	68.4	106.69
Legacy	14,393	28	38.5	15.3	65.5	95.83
Tradition	13,203	28	43.5	15.7	69.4	120.75
Trial Mean	12,726	27	41.7	15.5	65.0	106.78
C.V. %	5.5	6.2	2.4	1.9	8.0	--
LSD .05	1,314	NS	1.9	NS	NS	--

Planting Date: April 30 Harvest Date: August 12

Returns were calculated by multiplying the 2003 yields by the price paid for feed barley minus the test weight discount paid at the Southwest Grain Terminal located at Gladstone on August 26. The price paid on this date was $1.80/bu, assuming that the test weight was heavier than 45 lb/bu. Grain with a test weight of 45 lb/bu was discounted $.03/bu, with an additional discount of $.04/bu per pound down to 42 lb/bu. Below 42 lb/bu, an additional discount of $.05/bu occurred per pound.

SDSU Spring Barley Variety Trial - Perkins County (Bison), 2003.

Variety	Height	Lodging	Test Wt	Yield	Bu/A
	Inches	1-9*	Lb/Bu	2003	
TWO ROW					
CONLON	27	1	52.6	**62.4**	
HAXBY	25	1	53.5	**62.4**	
VALIER	25	1	51.1	57.8	
MT 960228	24	1	51.6	**62.7**	
SIX ROW					
DRUMMOND	30	1	50.2	53.9	
EXCEL	26	1	50.2	53.2	
LACEY	27	1	51.1	**60.7**	
LEGACY	25	1	51.2	**65.3**	
ROBUST	28	1	50.5	57.9	
ND 16301	27	1	49.7	52.1	
Average	26.2	1.0	51.2	58.8	
LSD (P=.05)	1.5	0.0	1.4	6.0	
CV	3.9	0.0	1.9	7.1	

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

Planted: April 9, 2003 Herbicide: Bronate (1 pint/A)
Harvested: July 24, 2003 Additional Nitrogen: None
Previous crop: Hayed wheat, No-till planted

SDSU Spring Barley Variety Trial - Harding County (Ralph), 2001-2003.

Variety	Height	Lodging	Test Wt	Yield	Bu/A
	Inches	1-9*	Lb/Bu	2003	3 Year
TWO ROW					
CONLON	24	1	54.2	40.6	32
HAXBY	24	1	54.5	34.3	.
VALIER	23	1	53.3	**45.0**	.
MT 960228	22	1	53.2	**50.6**	.
SIX ROW					
DRUMMOND	26	1	52.2	33.4	28
EXCEL	29	1	51.5	**45.8**	35
LACEY	28	1	52.8	40.0	32
LEGACY	24	1	53.7	**48.3**	.
ROBUST	26	1	52.1	31.9	25
ND 16301	28	1	51.3	39.1	.
Average	25.1	1.0	52.9	40.9	31
LSD (P=.05)	3.5	0.0	1.4	6.2	**NS**
CV	6.1	0.0	1.8	10.4	17

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

Planted: April 9, 2003 Herbicide: Puma ($^2/_3$ pint/A) +Harmony ($^1/_2$ oz/A)
Harvested: July 31, 2003 Additional Nitrogen: None
Previous crop: Conventional fallow

2003 Barley in the West River Region **Combined Means**

Variety	Days to Head	Plant Height	Seeds / Pound	Lodg.	Test Weight	Protein	Plump Seed	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
		inches		0-9*	lbs/bu	%	%	bu/ac				
Stark	66	31	10,037	1.4	51.1	14.6	64	86.1	37.9	73.1	55.5	65.7
Conlon	61	27	10,513	1.9	49.5	14.6	86	78.2	33.0	59.5	46.2	56.9
Robust	66	31	13,076	2.8	48.4	15.5	48	69.9	33.9	58.3	46.1	54.0
Legacy	68	27	14,294	2.5	44.8	14.4	34		32.6	60.0	46.3	
Tradition	66	27	13,354	1.0	44.9	15.3	50			72.1		
Lacey	65	27	13,004	1.8	45.9	15.4	46			66.4		
Drummond	65	28	13,470	1.6	46.2	14.8	40			61.0		
# of locations	2	12	4	5	12	9	2	9	8	12	20	29

* Lodging: 0 = none, 9 = lying flat on ground.
Locations: 2003 = Hettinger, Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Beulah, Hannover, Glen Ulin, Ralph SD and Bison SD.
2002 = Hettinger, Dickinson, Scranton, Regent, Selfridge, New Leipzig, Beulah & Glen Ullin.
2001 = Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Wibaux MT, Ralph SD and Bison SD.

Enhancing Malt Barley Plump with Potash Fertilizer in SW North Dakota

Throughout U.S. history, malt barley production has gradually moved west from New York to its current location in eastern North Dakota. This westward advancement has largely been a result of movement away from areas harboring diseases, including Fusarium head blight or scab. The U.S. malt industry is continuing it's move west and are currently setting up malting houses in Western North Dakota and Eastern Montana with an expectation of malt barley production to follow in these areas. North Dakota State University is also expending a considerable amount of resources to meet malt barley quality specifications for production in Western North Dakota, including varietal development and fertilizer management. This study was designed to look at the effects of chloride fertilization to enhance kernel plumpness, a key quality requirement for malt barley.

Chloride is an essential plant micro-nutrient utilized in various metabolic processes including photosynthesis. It is readily released from harvested straw and leaches back into the soil. Chloride deficiency is very rare, however, applying chloride in the form of potassium chloride (Potash) has been known to enhance root development, enhance disease tolerance and enhance seed plumpness. Potash contains about 47% chloride which is water soluble and readily leaches into the soil.

The trials were grown at Hettinger, New Leipzig and Selfridge during the 2002 and 2003 growing seasons. All trials were seeded into a no-till system with potash fertilizer being applied with the seed. Two six row malting type barley varieties, Drummond and Robust, were utilized. The trials were seeded at a rate of 750,000 live seeds per acre (approx. 1.4 bu/ac) on April 12, 2002 and April 21, 2003 at Hettinger, April 17, 2002 and April 22, 2003 at New Leipzig, and on April 25, 2002 and on April 24, 2003 at Selfridge. The trials were harvested on July 22, 2002 and on July 23, 2003 at Hettinger, July 31, 2002 and on July 30, 2003 at New Leipzig and on July 31, 2002 and on August 11, 2003 at Selfridge. All trial sites sustained severe heat and moisture stress during the 2002 growing season and had almost ideal growing conditions during the 2003 season. The table below shows combined agronomic and kernel quality characteristics from both years and all trial locations.

Variety	Potash 0-0-60	Plant Stand	Days to Head	Plant Height	Grain Yield	Test Weight	Grain Protein	Plump >6/64
	lbs/ac	1000's		inches	bu/ac	lbs/bu	%	%
Drummond	0	485	75	26	39.6	44.9	14.2	49
	25	436	74	26	39.0	44.9	14.3	48
	50	448	74	26	40.0	45.1	14.3	52
	100	485	76	25	39.0	45.0	14.2	52
Robust	0	454	76	27	36.8	46.1	14.4	54
	25	380	76	27	36.9	46.0	14.4	54
	50	373	76	27	37.5	45.7	14.5	53
	100	411	76	27	38.0	45.9	14.5	54
LSD 5%		NS	1	NS	NS	NS	NS	NS

Summary

Applying potash with the seed at rates as high as 100 pounds per acre did not significantly affect plant stands. Days to head for the variety Drummond tended to increase slightly with increasing rates of potash, although days to head was unaffected with the variety Robust. Plant height, test weight and grain protein were unaffected by applications of potash. Grain yield tended to increase slightly with increasing rates of potash for the variety Robust but were unaffected for the variety Drummond. Seed plumpness was essentially unaffected by increasing rates of potash. Economic benefits of potash fertilization to enhance malt barley characteristics were not observed in this study.

2003 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]
AC Assiniboia	Can. Proven Seed	1997	red	med.	strong	L	R	R	T	v.good	good	ML
AC Gwen	Can. SeCan	2000	hulless	tall	strong	L	R	R	R	v.good	good	L
AC Kaufman	Can.	2000	yellow	tall	strong	L	R	R	MT	v.good	v.good	ML
AC Medallion	Can. Cargill	1997	white	tall	med.	L	R	R	MT	good	good	ML
AC Morgan	Can. SeCan	1999	white	med.	strong	L	S	S	S	v.good	v.good	ML
AC Pinnacle	Can. QAS	1999	white	tall	med.	L	R	R	S	v.good	v.good	L
AC Ronald	Can. SeCan	2001	white	m.short	v.strong	L	R	R	T	v.good	v.good	M
Belle	WI	1995	yellow	tall	strong	L	S	R	MT	good	good	M
Brawn	IL	1993	yellow	short	v.strg.	M	S	S	T	v.good	good	M
Buff	SD	2002	hulless	med.	m.strg.	E	S	MR	MT	v.good	good	H
CDC Boyer	Sask. Value Added	1994	white	tall	m.strg.	L	S	MS	S	good	v.good	ML
CDC Dancer	Can. Cargill	2000	white	tall	strong	L	S	S	S	v.good	v.good	M
CDC Orrin	Can. QAS Cargill	2001	white	tall	strong	L	S	S	S	v.good	good	ML
CDC Pacer	Sask. Value Added	1996	white	tall	m.strg.	L	S	S	S	good	good	L
Dumont	Can.	1982	white	m.tall	m.weak	L	R	S	MS	good	good	ML
Ebeltoft	ND	1999	white	tall	strong	VL	R	MR-MS	S	good	v.good	M
Gem	WI	1996	yellow	tall	strong	L	S	R	MT	good	good	MH
HiFi	ND	2001	white	tall	strong	L	R	R	T	v.good	good	M
Hytest	SD	1986	white	tall	m.strg.	E	S	MS	S	fair	v.good	H
Jerry	ND	1994	white	tall	strg.	M	R	MS	MT	v.good	v.good	M
Jud	ND	1997	ivory	tall	med.	L	R[†]	MR	T	v.good	good	MH
Killdeer	ND	2000	white	med	strong	M	R	MS	MT	v.good	good	M
Leonard	MN	2001	yellow	tall	m.strong	L	S	R	T	v.good	fair	ML
Loyal	SD	2000	ivory	tall	m.strong	L	MS	R-MR	T	v.good	good	MH
Milton	MN	1994	yellow	med.	strg.	L	S	MS	MT	v.good	v.good	M
Morton	ND	2001	white	tall	v.strong	L	R	R	MT	v.good	v.good	M
Newdak	ND/NY	1990	white	med.	strg.	M	R	S	T	v.good	good	M

Otana	MT	1977	white	m.tall	m.weak	L	S	S	S	v.good	v.good	ML
Paul	ND	1994	naked	v.tall	strg.	L	R†	R-MR	T	v.good	good	H
Reeves	SD	2002	white	m.tall	med.	E	S	MR	MT	good	good	H
Richard	MN	2000	yellow	tall	strong	M	S	MS	T	v.good	good	M
Sesqui	MN	2001	yellow	m.tall	strong	L	S	R	T	v.good	good	M
Triple Crown	Canterra	1998	white	tall	strong	L	S	S	S	good	good	L
Valley	ND	1988	ivory	short	strg.	L	R	MS	MT	v.good	v.good	M
Vista	WI	2000	yellow	tall	strong	L	S	R	MT	v.good	good	M
Wabasha	MN	2001	white	tall	v.strong	M	S	R	T	v.good	good	M
Whitestone	ND	1994	white	short	strg.	L	R	MS	MT	v.good	good	L
Youngs	ND	1999	white	med.	strong	L	R	MS-S	MT	v.good	good	M

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.
† Resistant to the new race of stem rust that is gaining in importance in the state.

2003 Oats in the West River Region **Combined Means**

Variety	Days to Head	Plant Height	Seeds / Pound	Test Weight	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
		inches		lbs/bu	bu/ac				
Killdeer	68	31	14,474	32.4	108.8	53.4	91.7	72.6	84.6
Ebeltoft	70	30	14,025	31.9	106.7	56.6	90.4	73.5	84.6
HiFi	67	34	16,240	34.8	116.3	55.8	77.4	66.6	83.2
Morton	67	35	14,329	34.8	115.9	50.7	78.7	64.7	81.8
Youngs	69	36	13,239	32.6	106.9	52.0	81.9	67.0	80.3
# of locations	3	11	5	11	11	6	11	17	28

Locations: 2003 = Hettinger, Dickinson, Scranton, Regent, New Leipzig, Mandan, Beulah, Glen Ullin, Hannover, Richardton (organic), and Bison SD.
2002 = Hettinger, Dickinson, Scranton, Regent, Beulah & Glen Ullin.
2001 = Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Beulah, Glen Ullin, Hannover, Wibaux MT, and Bison SD.

2003 Oat Variety Trial - Continuously Cropped No-till — Hettinger

Variety	Days to head	Plant Height	Test Weight	Grain Yield 2000	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
		inches	lbs/bu	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Killdeer	71	31	32.5	108.2	38.8	72.4	55.6	73.1
Monida	76	29	28.7	95.9	42.5	73.4	58.0	70.6
Otana	74	34	31.6	100.6	39.2	68.7	54.0	69.5
Jerry	69	34	38.5	90.8	41.0	76.2	58.6	69.3
Ebeltoft	76	28	31.2	109.7	34.2	63.5	48.8	69.1
AC Assiniboia	74	31	34.4	93.9	34.2	67.4	50.8	65.2
Youngs	74	34	32.8	90.4	34.4	66.1	50.2	63.6
AC Medallion	75	34	33.6	91.5	30.4	68.9	49.6	63.6
HiFi	73	30	33.3	91.0	31.3	65.1	48.2	62.5
Morton	72	33	34.1	79.7	30.4	69.0	49.7	59.7
Hytest	70	36	38.8	65.1	33.3	71.1	52.2	56.5
Paul*	76	34	38.3	55.8	16.7	33.7	25.2	35.4
Sesqui	72	31	34.2		39.4	78.1	58.8	
Reeves	64	35	38.7		29.6	65.3	47.4	
Buff*	68	30	41.2		24.8	44.9	34.8	
AC Pinnacle	75	31	32.6			69.2		
AC Ronald	74	32	35.9			68.7		
Kaufman	74	33	33.9			66.9		
AC Morgan	76	30	29.9			66.8		
CDC Pace	73	33	30.8			66.8		
Trial Mean	73	33	34.6	91.2	35.6	67.2	--	--
C.V. %	1.1	5.8	2.1	10.5	17.4	8.3	--	--
LSD .05	1	3	1.0	13.5	8.7	7.8	--	--
LSD .01	1	3	1.3	17.9	11.6	10.3	--	--

* = Naked (hulless) type.
Planting Date: April 17, 2003
Harvest Date: August 5, 2003
Seeding Rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 1999 = soybean, 2001 = barley, 2002 = soybean.
Note: The 2002 trial sustained severe heat and moisture stress. The 2003 trial sustained late season heat and moisture stress.

2003 Oat - Fallow **Dickinson, ND**

Variety	Days to Head	Seeds per Pound	Plant Height	Test Weight	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Returns	Average Yield 2 Year	Average Yield 3 Year
			in	lbs/bu	--------bu/ac ---------			$/ac	-----bu/ac-----	
AC Assiniboia	69	14,106	34	31.4	139.2	68.6	103.8	85.70	86.2	103.9
AC Kaufman	68	12,869	37	30.8	--	--	112.3	90.66	--	--
AC Medallion	68	14,471	36	30.7	138.1	68.1	107.1	84.20	87.6	104.4
AC Morgan	69	14,630	33	28.0	--	--	115.9	72.91	--	--
AC Pinnacle	69	15,433	34	29.8	--	--	124.8	91.99	--	--
AC Ronald	68	15,703	33	33.0	--	76.2	120.1	104.71	98.1	--
Buff*	61	14,867	34	38.1	--	--	103.5	--	--	--
CDC Pacer	66	14,757	35	27.9	158.8	84.4	125.2	76.90	104.8	122.8
Ebeltoft	70	15,835	32	28.1	154.2	78.8	109.1	71.13	93.9	114.0
HiFi	66	16,125	37	30.9	132	63.4	121.6	96.73	92.5	105.7
Hytest	63	13,466	41	36.5	118.4	69.1	122.9	125.99	96.0	103.5
Jerry	62	14,518	36	33.4	133.6	68.8	124.2	111.46	96.5	108.9
Killdeer	66	15,041	33	30.2	139.3	78.4	127.7	98.25	103.1	115.1
Monida	69	15,731	35	27.2	148	75.7	127.5	77.08	101.6	117.1
Morton	67	14,323	36	31.4	128.8	67.8	114.7	93.40	91.2	103.8
Otana	68	16,475	37	29.6	134.1	78.5	130.3	96.07	104.4	114.3
Paul*	69	17,295	34	38.6	105.1	39.9	73.5	--	56.7	72.9
Reeves	60	15,137	40	35.9	--	--	109.8	111.36	--	--
Sesqui	66	15,680	33	32.6	--	77.3	131.6	115.32	104.4	--
Youngs	69	13,736	35	29.3	139.7	75.8	119.3	84.63	97.6	111.6
Wabasha	62	15,136	35	33.4	--	70.3	124.3	111.49	97.3	--
Trial Mean	66	14,813	36	31.9	137.3	70.5	118.0	97.28	--	--
C.V. %	1.0	7.8	5.1	3.0	7.6	10.4	4.4	8.0	--	--
LSD .05	1	1,616	3	1.3	14.7	10.3	7.4	10.88	--	--

Planting Date: April 24
Harvest Date: August 6
* Hulless
Returns were calculated by multiplying the 2003 yield by the test weight discount paid at the Southwest Grain Terminal located in Gladstone on August 26. The price paid was $1.10/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.

2003 Oat Variety Trial - Continuously Cropped No-till **Scranton**

Variety	Plant Height	Test Weight	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	bu/ac				
Killdeer	33	31.7	130.4	80.3	94.7	87.5	101.8
HiFi	37	33.4	117.2	77.1	83.8	80.4	92.7
Morton	38	32.8	118.7	73.9	76.6	75.2	89.7
Youngs	40	32.4	109.8	70.6	87.0	78.8	89.1
Trial Mean	38	33.1	118.0	75.3	86.9	--	--
C.V. %	3.1	2.1	11.4	9.9	9.9	--	--
LSD .05	2	1.3	NS	11.2	NS	--	--
LSD .01	3	1.9	NS	NS	NS	--	--

Planting Date: April 21, 2003 Harvest Date: August 7, 2003
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 2000 = safflower, 2001 & 2002 = lentil.
NS = no statistical difference between varieties.

2003 Oat Variety Trial - Continuously Cropped No-till **Regent**

Variety	Plant Height	Test Weight	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	bu/ac				
Killdeer	32	33.4	124.0	53.5	82.9	68.2	86.8
Morton	36	35.0	130.2	54.0	71.7	62.8	85.3
Youngs	35	34.3	111.5	50.2	73.1	61.6	78.3
HiFi	34	34.3	104.7	51.3	76.0	63.6	77.3
Trial Mean	35	34.9	113.9	48.1	76.7	--	--
C.V. %	5.1	1.6	15.8	15.1	7.7	--	--
LSD .05	3	0.9	NS	NS	NS	--	--
LSD .01	NS	1.2	NS	NS	NS	--	--

Planting Date: April 22, 2003 Harvest Date: August 7, 2003
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 2000 = safflower, 2001 & 2002 = lentil.
NS = no statistical difference between varieties.

2003 Oat Variety Trial - Continuously Cropped No-till **New Leipzig**

Variety	Plant Height	Test Weight	Grain Yield 2000	Grain Yield 2001	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	bu/ac				
Killdeer	30	32.3	87.9	91.3	72.7	82.0	84.0
Youngs	32	30.6	81.0	94.4	49.4	71.9	74.9
HiFi	32	33.8		102.9	52.3	77.6	
Morton	31	33.5		98.8	50.4	74.6	
Trial Mean	31	33.2	71.9	94.4	57.7	--	--
C.V. %	4.8	1.9	17.7	13.0	12.9	--	--
LSD .05	2	1.0	NS	NS	11.5	--	--
LSD .01	3	1.4	NS	NS	16.1	--	--

Planting Date: April 22, 2003 Harvest Date: July 30, 2003
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 1999 = HRSW, 2000 = HRWW, 2002 = lentil.
NS = no statistical difference between varieties.

2003 Oat Variety Trial - Continuously Cropped No-till **Mandan**

Variety	Plant Height	Test Weight	Grain Yield 2000	Grain Yield 2001	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
	inches	lbs/bu	bu/ac				
Killdeer	36	34.0	121.1	89.2	92.5	90.8	100.9
Youngs	41	33.8	110.0	97.8	67.7	82.8	91.8
HiFi	37	35.0		98.9	81.0	90.0	
Morton	42	36.2		82.2	77.5	79.8	
Trial Mean	39	35.4	98.8	89.2	80.8	--	--
C.V. %	2.7	1.2	10.4	20.8	6.3	--	--
LSD .05	2	0.7	NS	NS	7.9	--	--
LSD .01	2	0.9	NS	NS	11.0	--	--

Planting Date: April 23, 2003 Harvest Date: August 11, 2003
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: 1999 = rye, 2000 & 2002 = barley.
NS = no statistical difference between varieties.

2003 Beulah Oat - Recrop **Dickinson, ND**

Variety	Seeds per Pound	Plant Height	Test Weight	Grain Yield 2002	Grain Yield 2003	Returns	2 Year Average
		in	lbs/bu	----bu/ac----		$/ac	----bu/ac----
Ebeltoft	12,315	29	32.0	67.0	75.3	66.55	71.2
Killdeer	13,228	27	32.0	60.4	80.8	72.16	70.6
Morton	12,932	31	34.9	64.6	71.8	71.28	68.2
Youngs	12,747	35	32.9	62.4	80.1	74.34	71.2
Trial Mean	12,740	31	33.3	56.8	77.0	71.99	--
C.V. %	6.4	4.6	3.6	10.7	12.2	--	--
LSD .05	NS	3	2.2	11.5	NS	--	--

Planting Date: April 30 Harvest Date: August 12

2003 Glen Ullin Oat - Recrop **Dickinson, ND**

Variety	Seeds per Pound	Plant Height	Test Weight	Grain Yield 2002	Grain Yield 2003	Returns	2 Year Average
		in	lbs/bu	----bu/ac----		$/ac	----bu/ac----
Ebeltoft	13,974	31	31.4	23.0	110.8	95.25	66.9
Killdeer	14,849	28	34.2	9.2	97.3	94.46	53.2
Morton	14,835	35	35.1	13.6	102.8	103.43	58.2
Youngs	13,177	36	32.4	18.7	107.1	96.36	62.9
Trial Mean	14,312	33	33.9	16.0	103.8	99.30	--
C.V. %	3.7	6.5	1.7	9.2	8.2	--	--
LSD .05	1,007	4	1.1	2.8	NS	--	--

Planting Date: May 1 Harvest Date: August 12

Returns were calculated by multiplying the 2003 yield by the test weight discount paid at the Southwest Grain Terminal located in Gladstone on August 26. The price paid was $1.10/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.

2003 Hannover Oat - Recrop **Dickinson, ND**

Variety	Seeds per Pound	Plant Height	Test Weight	Grain Yield	Returns
		in	lbs/bu	----bu/ac----	$/ac
Ebeltoft	13,703	32	30.1	114.1	93.34
Killdeer	14,779	31	31.7	104.2	89.99
Morton	15,189	36	32.6	98.9	90.74
Youngs	12,800	37	30.7	111.0	91.00
Trial Mean	14,074	34	32.2	105.3	--
C.V. %	4.5	5.1	3.5	9.2	--
LSD .05	1,203	3	2.1	NS	--

Planting Date: April 30 Harvest Date: August 12

Returns were calculated by multiplying the 2003 yield by the test weight discount paid at the Southwest Grain Terminal located in Gladstone on August 26. The price paid was $1.10/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.

SDSU Oat Variety Trial - Perkins County (Bison), 2003.

Variety	Height	Lodging	Test Wt	Yield Bu/A
	Inches	1-9*	Lb/Bu	2003
BUFF HULLESS	31	1.0	45.3	56.2
PAUL HULLESS	33	1.3	43.5	50.4
SD 580 HULLESS	35	3.3	47.4	51.2
DON	31	1.8	39.5	**71.5**
HIFI	34	3.5	38.3	**71.9**
HYTEST	38	1.5	42.7	61.5
JERRY	36	1.3	40.7	**76.3**
LOYAL	34	2.0	38.2	**72.5**
MORTON	37	2.5	38.3	**75.7**
REEVES	36	2.5	41.2	64.4
Average	34.5	2.2	41.1	68.7
LSD (P=.05)	2.2	1.1	1.4	12.3
CV	4.4	34.1	2.3	12.5

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

Planted: April 9, 2003 Herbicide: Bronate (1 pint/A)
Harvested: July 31, 2003 Additional Nitrogen: None
Previous crop: Hayed wheat, No-till planted

Table 1. Plant stand, seedling vigor, days to heading, canopy cover, height, grain yield and quality of thirteen oat cultivars during 2003 in a certified organic field near Richardton, ND.

	Plant Stand		Seedling Vigor[1]		Day to		Plant height			Grain		
variety	22-May	28-May	22-May	28-May	heading	Plant Canopy[2]	22-May	26-Jun	29-Jul	Yield	Test weight	Kernels
	-------no/ft^2 ---------				- d -	-- % --	----------inches----------			-bu/acre-	-lb/bu-	-kernels/lb-
AC Assiniboia	28	24	7.1	8.0	65	24	4	17	29	61.7	37.1	13,507
Buff	33	30	7.4	7.9	59	25	4	19	28	49.6	45.8	16,867
Ebeltoft	32	31	7.5	8.0	64	26	4	18	27	69.8	38.8	14,296
HiFi	28	27	7.3	7.9	63	30	4	18	32	67.3	39.0	16,354
Hytest	31	30	8.0	8.3	60	30	4	20	35	54.7	41.5	13,047
Hytest (organic)[3]	31	28	7.8	8.3	59	30	4	20	34	53.0	41.4	14,000
Leonard	37	31	7.4	8.0	63	23	4	18	28	63.9	38.1	15,375
Morton	34	29	7.5	8.0	62	29	4	19	31	56.4	39.0	14,364
Otana	34	31	7.4	8.0	64	26	4	18	33	53.0	39.9	16,634
Otana (organic)[3]	29	27	6.8	8.0	61	30	4	20	33	56.4	39.8	16,103
Richard	31	29	7.9	8.0	61	24	4	19	31	60.0	38.4	14,567
Sesqui	30	30	7.3	8.0	61	28	4	19	29	61.4	38.8	16,506
Triple Crown	30	25	7.3	8.0	67	28	4	17	31	53.6	35.1	14,221
Wabasha	32	31	7.1	8.1	60	26	4	19	29	56.9	38.6	15,656
Youngs	33	31	7.1	8.0	63	29	4	18	32	58.3	37.3	13,735
Mean	32	29	7.4	8.0	62	27	4	19	31	58.4	39.2	15,015
CV %	6.2	11.7	4.3	1.9	1.1	17.1	7.9	8.2	5.2	8.3	1.9	7.8
LSD	3	NS	0.5	0.2	1	NS	NS	NS	2	6.9	1.1	1676

[1] 1=good vigor; 9=poor vigor

[2] Plant canopy is percentage ground cover.

[3](organic) = an organic seed lot; the remaining variety treatments were established using a seed lot produced under conventional management.

2003 Spring Triticale - Continuously Cropped No-till **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Grain Yield 2000	Grain Yield 2002	Grain Yield 2003	Average Yield 2 year	Average Yield 3 year
		inches	lbs/bu	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
RSI 310	68	37	48.5	56.6	6.2	43.4	24.8	35.4
Lazer	68	44	51.6	44.1	10.4	42.3	26.4	32.3
Companion	68	43	49.1	44.2	9.1	37.9	23.5	30.4
Trical 2700	73	39	44.7	43.8	8.2	30.2	19.2	27.4
Marvel	70	41	38.6	43.1	5.0	30.4	17.7	26.2
Wapiti	72	39	43.6	42.2	3.3	27.9	15.6	24.5
Trial Mean	70	40	46.0	45.7	7.1	35.4	--	--
C.V. %	0.5	7.3	1.7	11.3	36.3	9.6	--	--
LSD .05	1	4	1.2	7.7	3.8	5.1	--	--
LSD .01	1	6	1.6	10.6	5.3	7.1	--	--

Planting Date: April 17, 2003
Harvest Date: August 6, 2003
Seeding rate: 1 million live seeds/A.
Previous Crop: Soybean.
Note: The 2002 and 2003 trials sustained severe heat and moisture stress.

SDSU Winter Triticale Variety Trial - Perkins County (Bison), 2003.

Variety	Height	Lodging	Test Wt	Yield	Lb/A
	Inches	1-9*	Lb/Bu	2003	
Boreal	54	4.3	55.1	2701	
Frostat	55	1.5	55.8	**3430**	
Windrift	54	2.3	50.2	2692	
Average	54.3	2.7	53.7	2941	
LSD (P=.05)	2.1	0.8	1.8	139	
CV	2.2	16.5	1.8	2.6	

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

Planted: Sept. 17, 2002 Herbicide: Bronate (1 pint/A)
Harvested: July 24, 2003 Additional Nitrogen: None
Previous crop: Hayed wheat, No-till planted

2004 North Dakota flax variety descriptions.

Variety[1]	Origin	Year Released	Relative Maturity[2]	Seed Color	Plant Height	Wilt	Relative Yield
NorLin	Can.	1982	early	brown	med.	MS	good
AC-Watson	Can.	1996	early	brown	short	MR	v.good
CDC-Valour	Can.	1996	early	brown	short	MR	v.good
Linton	ND	1985	early	brown	med.	R	v.good
Prompt	SD	1988	early	brown	med.	MR	good
Hanley	Can.	2002	mid/early	brown	med.	R	v.good
AC-Emerson	Can.	1994	mid.	brown	med.	VR	v.good
CDC-Normandy	Can.	1995	mid.	brown	short	MR	v.good
Cathay	ND	1998	mid.	brown	med.	MR	v.good
Pembina	ND	1998	mid.	brown	med.	MR	v.good
Neche	ND	1988	mid.	brown	med.	R	good
Omega	ND	1989	mid.	yellow	med.	MS	v.good
Rahab 94	SD	1994	mid.	brown	med.	MR	good
CDC Arras	Can.	1999	mid.	brown	med.	MR	v.good
CDC Bethume	Can.	1999	mid/late	brown	med.tall	MR	v.good
AC Carnduff	Can.	1998	mid/late	brown	med.tall	MR	v.good
CDC Mons	Can.	2003	mid/late	brown	med.	MR	v.good
Taurus	Can.	2003	mid/late	brown	med.	MR	v.good
Flanders	Can.	1989	late	brown	med.	MS	good
Webster	SD	1998	late	brown	tall	MR	v.good
McDuff	Can.	1993	late	brown	med.tall	MR	v.good
AC Linora	Can.	1993	late	brown	tall	R	v.good
Selby	SD	2000	late	brown	tall	MR	good
York	ND	2002	late	brown	med.	R	v.good
Nekoma	ND	2002	late	brown	med.	MR	v.good
Lightning	Can.	2002	late	brown	med.tall	R	v.good

1 All varieties have resistance to prevalent races of rust; all have good oil yield and oil quality.
2 Varieties listed order of maturity.

2003 Flax - Continuously Cropped No-till **Hettinger**

Variety	Days to Bloom	Plant Height	Test Weight	Grain Yield 2001	Grain Yield 2002	Grain Yield 2003	Average Yield 2 Year	Average Yield 3 Year
		inches	lbs/bu	bu/ac	bu/ac	bu/ac		
York	65	21	49.0	34.6	5.2	24.8	15.0	21.5
Shelby	62	23	48.6	29.8	5.7	24.0	14.8	19.8
CDC Arras	64	20	51.0	31.4	6.5	21.6	14.0	19.8
AC Watson	60	20	47.9	29.0	4.8	25.7	15.2	19.8
CDC Bethume	64	23	47.4	32.0	5.6	20.5	13.0	19.4
AC Carnduff	62	20	49.7	28.9	6.6	19.0	12.8	18.2
Cathay	63	22	48.2	28.6	5.3	19.5	12.4	17.8
Webster	60	23	50.5	29.0	5.8	17.9	11.8	17.6
Pembina	62	22	46.6	26.6	5.8	19.2	12.5	17.2
Neche	62	22	49.8	27.9	4.5	17.6	11.0	16.7
Nekoma	62	20	50.8	25.0	4.6	19.7	12.2	16.4
Rahab 94	64	20	50.7	26.7	5.0	17.1	11.0	16.3
Omega	65	22	49.4	25.3	2.9	20.2	11.6	16.1
Prairie Blue	65	22	46.6			26.8		
CDC Mons	65	20	48.6			20.0		
Hanley	59	19	49.7			19.5		
Trial Mean	63	21	49.2	28.8	5.2	20.6	--	--
C.V. %	2.1	6.6	6.5	8.5	15.2	11.8	--	--
LSD .05	2	2	NS	3.5	1.1	4.0	--	--
LSD .01	3	3	NS	4.6	1.5	5.4	--	--

Planting Date: April 24, 2003
Harvest Date: August 18, 2003
Seeding rate: 32 lbs/Acre
Previous crop: 2000 = fallow, 2001& 2002 = barley.
Note: The 2001 trial sustained minor hail damage on June 18.
The 2002 trial sustained severe heat and moisture stress.
The 2003 trial sustained moderate heat and moisture stress.

2003 Oil Type Sunflower Variety Trial - Continuously Cropped No-till **Hettinger, North Dakota**

Brand	Hybrid	Trait*	Days to Bloom	Days to Mature	Plant Height	Test Weight	Oil Content	Yield 2002	Yield 2003	Yield 2 yr Avg.
			days	days	inches	lbs/bu	%	lbs/Ac	lbs/Ac	lbs/Ac
Dekalb	DKF 33-33NS	NS	78	122	52	32.7	37.0	1571	1995	1783
	DKF 30-33NS	NS	79	126	56	31.6	39.7		2492	
	Exp 38-80CL	CL	80	120	44	28.8	37.5		2418	
	Exp 38-30NS	NS	83	127	57	30.6	44.4		2707	
	Exp 31-22NS	NS	82	124	50	31.0	52.2		1932	
IntegraSeed	INT 432		79	123	50	29.8	50.4	2260	2878	2569
	INT 550	NS	84	129	50	28.6	42.5	2196	2844	2520
	INT 541	NS	82	126	54	30.5	42.9	2261	2316	2288
	INT 536	NS	77	124	50	31.9	42.5	1480	1796	1638
	INT 434		78	121	56	32.4	47.0		2497	
	INT 552	NS	84	126	51	30.0	47.0		2138	
Interstate	F10002NS	NS	78	126	50	30.0	40.0		1848	
	Hysun 525	NS	81	122	50	31.4	42.8	1583	2347	1965
	Hysun 450	NS	84	129	52	29.8	47.3	2307	2103	2205
	Hysun 424	NS	84	126	51	30.8	48.6	1594	1865	1730
	IS 6039		78	121	50	32.8	50.4	1749	1991	1870
	IS 6521		78	121	53	31.6	46.0	2147	1595	1871
	IS 4049		82	129	57	30.8	47.8	2103	2632	2368
	HyOleic 120	HO	78	125	60	30.9	46.5	2296	2664	2480
Kaystar Seed	8300		76	123	52	29.4	46.4		2168	
	8303		78	123	52	31.9	45.7		2143	
	2015NS	NS	76	125	48	32.5	43.6		1825	
Legend Seed	LSF 117N	NS	76	123	52	32.2	43.5		2128	
	LSF 119N	NS	82	124	56	29.1	34.9		1808	
	LSF 126N	NS	81	123	56	31.9	44.8		2470	
	LX 02N	NS	84	127	54	29.6	46.0		2231	

continued

2003 Oil Type Sunflower Variety Trial - continued **Hettinger, North Dakota**

Brand	Hybrid	Trait*	Days to Bloom	Days to Mature	Plant Height	Test Weight	Oil Content	Yield 2002	Yield 2003	Yield 2 yr Avg.
			days	days	inches	lbs/bu	%	lbs/Ac	lbs/Ac	lbs/Ac
Mycogen	SF260		79	119	51	31.7	48.6	1890	1993	1942
	SF187		80	122	48	30.5	42.1		2403	
	8N327	NS	76	124	50	30.8	55.6	2115	2357	2236
	8488NS	NS	80	126	60	31.2	47.4		2944	
	8N421	NS	82	128	53	30.1	47.4	2431	1936	2184
Proseed	9441	NS	83	124	52	31.0	47.6		1444	
	9405	NS	82	127	55	27.5	42.9	1757	2546	2152
	CL5515	NS,CL	83	124	54	30.8	43.9		2465	
	Ex12	NS	79	120	57	29.4	48.6		2472	
	Ex14	NS	79	123	56	30.5	48.9		2302	
	Ex15	NS	78	118	52	30.2	47.4		2556	
	Ex39	NS	78	119	46	28.8	41.6		2349	
Seeds 2000	Colonel	NS	81	120	54	27.7	38.1		2439	
	Blazer	NS	80	124	48	32.2	48.6	2264	2429	2346
	Charger	NS,CL	81	125	57	29.7	37.1		2256	
E. Mat. check	Hysun 311		76	121	54	28.8	44.8	1589	2105	1847
M. Mat. check	Myc SF270		78	123	48	32.7	45.7	1502	2308	1905
L. Mat. check	P6451		82	126	53	29.4	50.2	2009	2412	2210
Check	USDA 894		82	124	54	28.9	37.8	2112	2471	2292
Trial Mean			80	124	53	30.2	44.9	1991	2274	--
C.V. %			1.2	2.8	10.4	3.9	7.7	15.9	10.7	--
LSD .05			1	5	8	1.6	4.8	515	341	--
LSD .01			2	6	10	2.2	6.4	683	450	--

* Trait: NS = Nusun, CL = Clearfield, HO = High Oleic
Planting date: May 15, 2003
Harvest date: October 17, 2003
Seeding rate: 21,000 seeds/acre, thinned to 18,650 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.

2003 Confection Sunflower Variety Trial - Continuously Cropped No-till **Hettinger**

		Yield							Seed over Screen		
Brand	Hybrid	2002	2003	2 yr Avg	Test weight	Days to Bloom	Days to mature	Plant height	22/64	20/64	18/64
		lbs/acre			lbs/bu	days	days	inches	%		
Interstate	IS8048	2039	1886	1962	25.8	77	121	52	31.6	34.6	20.5
Interstate	IS8089	2214	2829	2522	23.5	81	133	61	31.0	42.6	14.2
Check	Hyb 924	2033	2404	2218	25.2	82	123	54	33.3	34.9	15.8
Trial Mean		2077	2420	--	24.6	80	126	57	32.0	37.4	16.8
C.V. %		5.9	4.0	--	12.0	0.0	--	9.7	--	--	--
LSD .05		NS	218	--	NS	1	--	NS	--	--	--
LSD .01		NS	400	--	NS	1	--	NS	--	--	--

Planting date: May 15, 2003 Harvest date: October 17, 2003
Seeding rate: 20,000 seeds/acre, thinned to 18,000 plants/acre.
Row spacing: 28" Previous crop: HRSW
NS = no statistical difference between hybrids.

2003 Conventional Canola Variety Trial - Continuously Cropped - No-till **Hettinger, North Dakota**

Brand	Variety	Type*	Days to Bloom	Duration of Flowering	Days to Mature	Plant Height	Lodging	Oil Content	Yield
				days		inches	0 - 9**	%	lbs/ac
Brett Young	6045CL	op, cl	64	18	99	41	1.8	41.9	940
Croplan Gen.	Hudson	op	65	18	98	38	1.2	39.4	1013
Croplan Gen.	KAB36	op, cl	66	15	99	41	1.8	41.7	1173
Interstate	D1034CL	H, cl	64	17	98	40	2.2	39.2	1260
Interstate	Hyola 401	H	62	18	99	36	1.0	40.0	1767
RR check	DKL 34-55	op, RR	68	18	102	42	1.0	41.4	1480
RR check	Hyola 357 mag	H, RR	63	18	100	39	1.2	39.6	1893
Trial Mean			65	17	99	39	1.5	40.5	1361
C.V. %			0.6	3.4	0.8	5.5	38.2	1.1	14.0
LSD .05			1	1	1	3	0.8	0.7	283
LSD .01			1	1	2	4	NS	0.9	388

*Type: H = Hybrid, op = Open Pollinated, cl = Clearfield, RR = Roundup Ready.
**Lodging: 0 = none, 9 = lying flat on ground.
Planting date: April 7, 2003 Harvest date: July 23, 2003 Previous crop: Barley
Notes: The trial sustained moderate heat and moisture stress. Oil content is adjusted to 8.5% moisture.

2003 Roundup Ready Canola - Continuously Cropped - No-till **Hettinger, North Dakota**

Brand	Variety	Type*	Days to Bloom	Duration of Flowering	Days to Mature	Plant Height	Lodging	Oil Content	Yield
				days		inches	0 - 9**	%	lbs/ac
Brett Young	LBD 588RR	OP	66	18	99	40	1	41.92	1413
Croplan Gen.	Crosby	OP	67	18	100	42	2	40.31	1556
	HyCLASS 2061	H	68	17	99	41	1	41.62	1627
	HyCLASS 767SW	Syn	67	17	99	42	2	40.29	1502
	HyCLASS 905	H	69	17	102	44	1	41.51	1538
	HyCLASS 910	H	69	16	100	46	1	40.78	1618
	Minot	OP	66	16	98	40	2	42.37	1467
Dekalb	DKL223	H	63	19	98	38	3	40.60	1556
	DKL34-55	OP	68	17	100	41	1	42.38	1396
Interstate	Hyola 357 mag	H	64	18	99	36	1	40.17	1600
	SWP9883944RR	H	68	17	100	40	1	40.62	1325
	ExCalibuRR	OP	64	19	100	38	2	41.50	1360
	SW GladiatoR	Syn	64	19	98	38	2	41.52	1458
	HyLite 225 RR	OP	65	19	98	38	1	41.83	1449
	Hyola 505 RR	H	69	17	100	43	1	41.00	1316
	Hyola 512 RR	H	68	17	99	43	1	41.10	1325
	Hyola 514 RR	H	70	16	102	43	2	40.12	1342
	PAC Seed RR	H	64	18	99	41	1	40.78	1493
	SW F5189 RR	H	66	17	97	41	2	41.20	1440
	SW F5191 RR	H	66	18	98	41	2	40.86	1440
	SW F5229 RR	H	66	18	99	41	2	41.99	1582
Proseed	RR 2013	H	68	17	101	43	1	41.64	1351
	RR 2066	H	67	17	98	44	2	41.73	1538
	Razor	Syn	66	18	99	38	2	40.38	1209
	Roughrider	OP	68	16	100	41	2	44.64	1085
Seeds 2000	SW BadgeRR	Syn	68	18	99	38	1	41.19	862
Trial Mean			67	18	99	41	1	41.27	1417
C.V. %			1.0	4.5	0.7	5.2	29.0	1.2	9.7
LSD .05			1	1	1	3	1	0.70	194
LSD .01			1	1	1	4	1	0.93	257

*Type: H = Hybrid, OP = Open Pollinated, Syn = Synthetic. **Lodging: 0 = none, 9 = lying flat on ground.
Planting date: April 7, 2003 Harvest date: July 23, 2003 Previous crop: Barley
Notes: The trial sustained moderate heat and moisture stress. Oil content is adjusted to 8.5% moisture.

2003 Applications of Nitrogen Fertilizer on Canola at Hettinger - No-till **Combined Means***

Pounds / acre N**		Plant		Plant	Days to 10%	Duration of	Days to	1000 Seed	Oil	
Pre Plant	4-5 leaf	Stand	Biomass	Height	Bloom	Bloom	Mature	Weight	Content	Yield
		#/sq ft	%***	inches	days	days	days	grams	%	lbs/acre
30	0	6.7	106	29	65	19	102	3.45	41.1	900
45	0	6.1	110	32	66	19	101	4.00	40.8	993
60	0	7.0	126	34	65	19	101	3.75	41.1	1080
75	0	5.3	155	33	65	19	100	3.60	41.1	1163
90	0	6.7	138	34	65	19	102	3.65	41.3	1183
120	0	6.5	138	33	65	19	100	4.15	40.6	1123
150	0	5.7	131	35	65	18	100	3.65	40.6	1100
0	60	6.5	102	31	66	19	101	3.90	41.4	1027
0	90	6.8	101	31	66	18	101	3.50	41.1	980
0	120	6.7	100	29	66	18	102	3.70	40.3	840
0	150	7.6	102	31	66	19	101	4.05	40.6	1037
Trial Mean		6.5	119	32	65	19	101	3.8	40.9	1039
C.V. %		30.4	11.9	5.8	2.3	5.4	1.7	23.2	2.4	15.6
LSD .05		NS	14	2	NS	NS	NS	NS	NS	161
LSD .01		NS	19	2	NS	NS	NS	NS	NS	213

* Combined means of 2 varieties: Hyola 357 and Minot RR and 4 replications.
** Pounds per acre actual N (residual soil N 0-24" + fertilizer N). Pre-plant fert. = Urea. Post applied fert. =Amm. Nitrate applied on May 29. Rainfall after post applied N: 0.72" on May 31 - June 3.
*** Biomass = Visual estimation of plant foliage compared to untreated at early bloom.
Planting Date: April 8, 2003
Harvest Date: August 1, 2003
Previous Crop: sunflower
There was no lodging or plant diseases.
NS = no statistical difference between seeding rates.

2003 Split Applications with Various Nitrogen Fertilizers on Canola - No-till **Hettinger**

Pounds / acre N*		POST N fert. Form**	POST N fert injury	Days to 10% Bloom	Duration of Bloom	Days to Mature	Plant Height	Oil Content	Yield
Pre Plant	4-5 leaf								
			%	days	days	days	inches	%	lbs/acre
130	0		0	63	20	100	32	41.5	1280
85	45	urea	0	63	20	100	31	41.4	1400
85	45	AN	0	63	20	100	31	40.9	1173
85	45	UAN	0	63	20	101	30	40.6	1240
40	90	urea	0	64	20	100	30	41.0	1120
40	90	AN	0	64	20	101	30	41.0	1100
40	90	UAN	0	64	20	102	29	40.1	1107
Trial Mean			0	64	20	101	30	40.9	1203
C.V. %			0	1.2	5.0	0.9	5.6	1.2	8.4
LSD .05			NS	NS	NS	NS	NS	0.8	150
LSD .01			NS	NS	NS	NS	NS	1.0	205

* Pounds per acre actual N (residual soil N 0-24" + fertilizer N). Residual soil N = 30 lbs/acre.
Pre-plant fert. = Urea.
** POST applied fert. = urea (46-0-0), AN = ammonium nitrate (34-0-0), UAN = 28% liquid N applied on May 29.
Rainfall after post applied N: 0.72" on May 31 - June 3.
Planting Date: April 8, 2003
Variety = Hyola 357 mag.
Harvest Date: August 1, 2003
Previous Crop: sunflower
There was no lodging or plant diseases.
NS = no statistical difference between seeding rates.

2003 Mustard - Continuously Cropped No-till — **Hettinger**

Variety	Days to First Flower	Duration of Bloom	Days to Maturity	Plant Height	Lodging	1000 Seed Weight	Yield 2000	Yield 2002	Yield 2003	Avg. Yield 2 yr	Avg. Yield 3 yr
Yellow				inches	0 - 9*	grams	lbs/ac				
AC Pennant	52	18	85	30	3.2	5.8	2040	504	1036	770	1193
AC Base	51	18	85	26	2.5	5.6	1827	513	849	681	1063
Tilney	52	18	86	32	3.8	5.4	1653	504	868	686	1008
Viscount	52	18	86	24	2.8	4.7	1667	448	840	644	985
Ace	52	17	85	35	3.5	5.3		504	868	686	
Andante	51	18	85	30	2.8	5.6			971		
Oriental											
Forge	55	18	87	28	2.0	3.8	2409	187	345	266	980
Brown											
Common	57	16	87	27	2.2	4.0			383		
Trial Mean	53	18	86	29	2.8	5.0	1922	404	770	--	--
C.V. %	0.9	3.5	1.4	30.3	43.7	12.2	6.2	15.8	9.6	--	--
LSD .05	1	1	NS	NS	NS	0.9	182	95	109	--	--
LSD .01	1	1	NS	NS	NS	1.2	252	130	148	--	--

* Lodging: 0 = none, 9 = lying flat on ground.
Planting Date: April 21, 2003 Harvest Date: July 23, 2003
Seeding Rate: Yellow = 12 lbs/ac, Oriental & Brown = 6 lbs/ac.
Previous crop: 1999 = HRSW, 2001 = Fallow, 2002 = Barley.
NS = no statistical difference between varieties.
Notes: The 2002 trial sustained severe heat and moisture stress.

2003 Safflower Variety Trial - Continuously Cropped No-till — **Hettinger**

Variety	Days to Flower	Plant Height	Test Weight	Oil*	Grain Yield 2000	Grain Yield 2002	Grain Yield 2003	Average Yield 2 Year	Average Yield 3 Year
		inches	lbs/bu	%	pounds per acre				
S-518	89	21	40.5	37.6	1847	1127	1227	1177	1400
S-541	92	25	41.7	38.0	1393	947	1207	1077	1182
Montola 2000	89	19	40.4	35.5	1640	880	987	934	1169
Montola 2003	90	22	42.4	33.3	1553	720	1000	860	1091
Finch	90	24	43.7	33.1	1100	853	1280	1066	1078
Montola 2004	88	23	42.2	34.0		900	1267	1084	
Trial Mean	90	23	42.1	34.4	1493	908	1221	--	--
C.V. %	1.0	8.3	2.6	1.1	13.4	9.4	14.2	--	--
LSD .05	1	3	1.6	0.5	286	123	250	--	--
LSD .01	2	4	2.1	0.7	382	166	337	--	--

Planting Date: April 21, 2003 Harvest Date: August 27, 2003
Seeding rate: 400,000 live seeds/acre.
Previous crop: 1999 = soybean, 2001 = fallow, 2002 = barley.
*Oil content is adjusted by type of oil to 8% moisture.

2003 Chickpea Variety Trial - No-till **Hettinger**

Variety	Days to First Flower	Duration of Bloom	Days to Matur.	Dis.	Plant Height	1000 Seed Weight	Test Weight	Yield 1999	Yield 2002	Yield 2003	Average 2 yr	Average 3 yr
				0 - 9*	inches	grams	lbs/bu	lbs/ac	lbs/ac	lbs/ac		
Large Kabuli:												
Sanford	64	17	96	1.2	19	398	61.9	1860	727	1887	1307	1491
CDC Yuma	58	20	96	0.5	18	334	62.3	1773	533	1853	1193	1386
Evans	58	22	96	1.8	18	384	61.7	1620	800	1567	1184	1329
Dwelley	66	14	98	1.0	16	453	60.6	1533	693	1227	960	1151
CDC Xena	57	23	94	1.0	16	433	62.1		1100	1920	1510	
CDC Diva	57	24	95	2.0	15	444	61.8		893	1927	1410	
CDC ChiChi	57	22	93	0	16	328	60.4		667	1920	1294	
Sierra	62	17	96	2.0	17	432	61.2		640	1373	1006	
Small Kabuli:												
CDC Chico	56	23	91	0	16	227	62.7	2307	1153	2060	1606	1840
B-90	60	20	92	0	17	237	63.5	2380	1007	2060	1534	1816
Green Kabuli:												
CDC Verano	56	24	96	0	12	182	61.9		773	1693	1233	
Large Desi:												
CDC Nika	55	22	90	0.2	14	269	62.0		960	2100	1530	
Small Desi:												
Myles	56	22	89	0	14	182	58.2	2667	1027	2220	1624	1971
CDC Anna	57	23	92	0	15	190	61.7		853	2253	1553	
CDC Desiray	56	22	89	0	13	186	58.4		1013	1933	1473	
Trial Mean	58	21	94	0.6	16	312	61.4	2026	816	1866	--	--
C.V. %	2.3	7.1	0.8	61.3	6.0	3.3	1.0	17.9	19.7	9.1	--	--
LSD .05	2	2	1	0.6	1	15	0.9	531	228	243	--	--
LSD .01	3	3	1	0.8	2	20	1.2	720	305	325	--	--

* Disease (ascochyta blight): 0 = none, 9 = dead.
Planting Date: April 24, 2003
Harvest Date: August 14, 2003
Previous Crop: 1998 = field pea, 2001 = fallow, 2002 = barley.

Seeding Date and Rate of Chickpea at Hettinger
1999, 2002 & 2003

Chickpeas are cool season legumes and should be seeded in the early spring. Seed cost of the large kaboli types have been as expensive as $0.50 per pound and current recommended seeding rates are 174,000 seeds per acre (120 - 140 lbs/Ac). Guidelines on planting dates and seeding rates for southwestern North Dakota have generally been adapted from Canadian sources and have not been studied in this area in the past. This study was initiated to determine more specific production practices for southwestern North Dakota and encompasses results from the 1999, 2002 and 2003 growing seasons. The study was also seeded in 2000 and 2001 but were infested with *ascochyta blight* and subsequently destroyed.

Sanford chickpeas were seeded in 1999 and Dwelley chickpeas were seeded in 2002 and 2003. Both varieties are a large *kaboli* types and were seeded at three different rates; 174, 131 and 87 thousand pure live seeds per acre on three different dates; mid-April (April 19, 1999, April 15, 2002 and April 17, 2003), late April/early May (May 3, 1999, April 29, 2002 and May 1, 2003) and in mid-May (May 18, 1999, May 13, 2002 and May 15, 2003). The seed was inoculated with *rhizobia* and treated for seed-borne *ascochyta* with thiabendazole (LSP). The trials were planted no-till into spring wheat stubble in 1999, into summer fallow in 2002 and into barley stubble in 2003. The trials were harvested on August 26, 1999, August 26, 2002 and on August 18, 2003.

Summary

The 1999 growing season was almost ideal for chickpea production with an abundance of moisture and mild temperatures, unlike the 2002 season with hot and dry conditions. The 2003 growing season was also ideal with the exception of a lack of stored soil moisture. Minor levels of ascochyta blight were noted in 1999 and 2003 and were absent in 2002. Average yields over 3 years were less than 20 pounds per acre between seeding rates. The number of pods per plant was the only significant difference between seeding rates for any agronomic characteristic. As plant populations decreased, plants branched more vigorously and put on more pods. This explains the ability of this crop to compensate plant populations with grain yields. Seed size and seed weight tended to decrease with increasing plant populations. Seeding date played a key role in agronomic characteristics, seed quality and yield. The duration of flowering was longer which provided for a higher pod set and consequently, higher yields, when the crop was seeded in mid-April and decreased with each succeeding seeding date. Test weights declined significantly, especially with the mid-May seeding date. Weed infestations tended to increase with lower seeding rates and with later seeding dates (personal observations). There is currently no Post-emergence broadleaf weed control options available. Sulfentrazone (Spartan) appears to have a good fit for broadleaf weed control in chickpea. A relatively minor infection of *Ascochyta blight* was observed throughout the 1999 trial and appeared to be more pronounced on the higher seeding rates and on the first seeding date. Heavy foliage tends to restrict air movement and provides for a more humid environment for disease development. Fungicide applications of azoxystrobin (Quadris) or pyraclostrobin (Headline) are very effective against this disease. As would be expected due to warmer soils, days from planting to seedling emergence was reduced significantly with later seeding dates. The extended germination period of the first seeding date however, did not cause a reduction in plant stand. In conclusion, planting of chickpeas should be curtailed by the end of April and seeding rates as low as 87,000 seeds per acre is sufficient to provide for an adequate stand to maintain yield and seed quality.

Seeding Rate — **Combined Means (1999, 2002 & 2003)**

Seeding Rate	Days to Emerg.	Days to Bloom	Duration of Bloom	Days to Mature	Pods per Plant	Plant Height	1000 Seed Weight	Test Weight	Seed Size		Yield			
									<9mm	>8mm	1999	2002	2003	Avg.
seeds/A	days	days	days	days	#	inches	grams	lbs/bu	%	%	lbs/ac			
174,000	18	59	17	98	14	12	394	60.8	60	7	1911	384	1186	1160
131,000	18	59	17	98	16	12	396	60.7	57	8	1869	437	1142	1149
87,000	18	59	17	98	24	12	400	60.8	65	6	1838	541	1126	1168
C.V. %	0.0	12.2	26.9	4.9	40.2	7.6	6.7	1.2	13.0	19.2	20.7	33.2	39.5	--
LSD .05	1	NS	NS	NS	5	NS	NS	NS	7	1	NS	126	NS	--

Seeding Date — **Combined Means (1999, 2002 & 2003)**

Seeding Date	Days to Emerg.	Days to Bloom	Duration of Bloom	Days to Mature	Pods per Plant	Plant Height	1000 Seed Weight	Test Weight	Seed Size		Yield			
									<9mm	>8mm	1999	2002	2003	Avg.
	days	days	days	days	#	inches	grams	lbs/bu	%	%	lbs/ac			
Mid-April	24	67	21	104	22	14	398	61.2	60	7	2191	499	1556	1415
Late April	19	59	17	98	18	12	398	60.9	60	8	1962	540	1198	1233
Mid-May	12	50	15	91	14	12	394	60.0	62	8	1465	324	700	830
C.V. %	0.0	1.0	5.0	0.8	44.9	6.9	6.4	0.8	14.0	20.7	10.8	29.0	21.2	--
LSD .05	1	1	1	1	6	NS	NS	0.2	NS	NS	227	110	183	--

2003 Lentil Variety Trial - Continuously Cropped No-till **Hettinger**

Variety	Days to First Flower	Duration of Bloom	Days to Mature	Harvest Height	1000 Kernel wt.	Test Weight	Yield			Avg. Yield	
							2000	2002	2003	2 yr	3 yr
	days	days	days	inches	grams	lbs/bu	lbs/ac				
Chilean											
CDC Richlea	61	21	90	15	44.3	60.3	680	360	952	656	664
Laird	62	21	90	15	45.0	58.1	140	53	719	386	304
Merrit	57	26	87	14	57.3	58.5		258	1279	768	
Pennell	62	22	90	13	60.8	57.4		347	905	626	
CDC Sovereign	62	23	94	18	55.4	59.2		307	803	555	
Red Chief	57	26	90	12	50.3	--			177		
Persian											
CDC Milestone	58	24	86	13	32.6	61.8	740	293	1148	720	727
Crimson	61	22	88	11	34.1	61.7	800	231	775	503	602
Red Robin	58	22	86	12	27.2	55.4			1195		
Pardina	58	22	87	11	34.8	62.9			859		
Trial Mean	60	23	89	13	44.2	59.5	524	296	881	--	--
C.V. %	1.0	5.8	1.9	7.2	5.1	8.9	29.2	33.1	14.4	--	--
LSD .05	1	2	2	1	3.3	NS	225	146	184	--	--
LSD .01	1	3	3	2	4.4	NS	307	199	248	--	--

Planting Date: April 21, 2003 Harvest Date: August 14, 2003
Seeding Rate: 550,000 live seed/acre. Previous Crop: 1999 = Field pea, 2001 = Fallow, 2002 = Barley.
Notes: The 2002 trial sustained severe heat and moisture stress. NS = no statistical difference between varieties.

2003 Lentil Seeding Rate Trial - No-till **Hettinger**

Seeding Rate		Days to Bloom	Duration of Bloom	Days to Mature	Plant Height	1000 Seed Weight	Test Weight	Yield
# / sq ft	lbs/ac	days	days	days	inches	grams	lbs/bu	lbs/Ac
12	66	61	22	91	14	45.0	60.6	1307
10	55	61	22	91	14	44.0	60.3	1232
8	44	61	22	91	15	45.2	60.3	999
6	33	61	22	91	14	45.5	60.4	1018
4	22	61	22	91	12	46.8	60.4	719
Trial Mean		61	22	91	14	45.3	60.3	1055
C.V. %		0	0	0	8.3	3.5	0.6	8.2
LSD 5%		NS	NS	NS	NS	NS	NS	134
		NS	NS	NS	NS	NS	NS	188

Planting date: April 21, 2003 Harvest date: August 14, 2003
Variety = CDC Richlea Previous crop: Barley
NS = no statistical difference between seeding rates.

2003 Field Pea Variety Trial - Continuously Cropped No-till **Hettinger**

Variety	Seed Type	Days to First Flower	Duration of Bloom	Days to Matur.	Plant Ht. at Harvest	Lodg.	1000 Seed Weight	Yield 2000	Yield 2002	Yield 2003	Avg. Yield 2 yr	Avg. Yield 3 yr
					inches	0 - 9*	grams	bu/ac				
CDC Mozart	Yellow	59	12	82	19	3.5	181	50.0	6.5	41.2	23.8	32.6
Carneval	Yellow	60	12	82	25	0.5	168	30.2	5.9	36.1	21.0	24.1
SW Salute	Yellow	59	13	83	21	4.0	180		7.5	41.8	24.6	
Cruiser	Green	59	11	84	24	0.8	181		8.1	38.4	23.2	
DS Admiral	Yellow	60	12	83	25	1.2	188			39.6		
Majoret	Green	60	10	85	25	0	198			35.4		
Trial Mean		60	12	83	23	1.7	183	35.3	6.5	38.8	--	--
C.V. %		0.3	4.1	0.7	10.5	46.9	5.1	11.4	27.3	6.3	--	--
LSD .05		1	1	1	4	1.2	14	5.7	NS	3.7	--	--
LSD .01		1	1	1	5	1.6	20	7.7	NS	5.1	--	--

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

Planting Date: April 21, 2003 Harvest Date: July 23, 2003
Seeding Rate: 250,000 live seeds/acre
Previous Crop: 1999 = Field Pea, 2001 = Fallow, 2002 = Barley.
Notes: The 2002 trial sustained severe heat and moisture stress.

2003 Glen Ullin Field Pea - Recrop **Dickinson, ND**

Variety	Type	Seeds per Pound	Plant Height	Protein	Test Weight	Grain Yield
			inches	%	lbs/bu	--bu/ac--
CDC Minuet	Y	2,435	10	23.3	65.0	11.0
CDC Mozart	Y	2,048	13	23.7	69.5	23.2
CDC Striker	G	2,120	16	23.2	66.5	13.7
Carneval	Y	2,276	15	23.6	67.3	11.7
Cruiser	G	2,052	14	24.7	67.2	17.7
DS Admiral	Y	2,100	16	23.2	64.3	23.2
Eclipse	Y	2,429	15	24.5	68.3	20.0
Majoret	G	1,703	15	23.4	67.7	17.2
Trial Mean	--	2,145	14	23.7	67.0	17.2
C.V. %	--	26.6	17.4	4.8	3.2	7.3
LSD .05	--	NS	NS	NS	NS	2.2

Planting Date: May Harvest Date: August 5 Type: Y=Yellow, G=Green

2003 Beulah Field Pea - Recrop **Dickinson, ND**

Variety	Type	Seeds per Pound	Plant Height	Protein	Test Weight	Grain Yield
			inches	%	lbs/bu	--bu/ac--
CDC Mozart	Y	1,898	17	21.8	66.5	16.3
Carneval	Y	1,825	20	21.2	65.3	13.8
Cruiser	G	1,743	17	21.1	65.5	20.0
DS Admiral	Y	1,733	20	21.6	64.3	16.9
Majoret	G	1,597	19	24.6	65.3	11.4
Trial Mean	--	1,759	19	22.1	65.4	15.7
C.V. %	--	8.5	4.9	4.4	3.4	31.4
LSD .05	--	NS	2	1.8	NS	NS

Planting Date: April 30 Harvest Date: August 5 Type: Y=Yellow, G=Green

2003 Hannover Field Pea - Recrop **Dickinson, ND**

Variety	Type	Seeds per Pound	Plant Height	Protein	Test Weight	Grain Yield
			inches	%	lbs/bu	--bu/ac--
CDC Mozart	Y	2,006	19	22.7	68.5	42.3
Carneval	Y	2,072	23	20.6	65.9	26.2
Cruiser	G	1,948	18	22.0	66.5	39.1
DS Admiral	Y	1,810	23	21.1	67.7	46.2
Majoret	G	1,807	21	22.6	67.2	38.8
Trial Mean	--	1,929	21	21.8	67.1	38.5
C.V. %	--	8.3	7.6	3.0	1.4	8.5
LSD .05	--	NS	3	1.2	NS	6.2

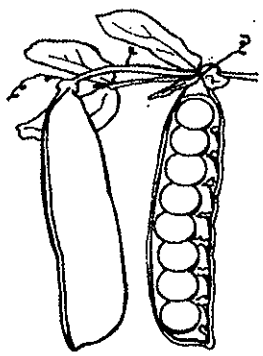
Planting Date: April 30 Harvest Date: August 5 Type: Y=Yellow, G=Green

SDSU Field Pea Variety Trial – Perkins County (Bison), 2003.

Variety	Height Inches	Lodging 1-9*	Test Wt Lb/Bu	Yield Bu/A
Forage				
4010 Magda	34	7.0	62.6	23.6
Arvika	35	7.5	62.0	21.6
Wyodun	35	7.8	61.9	25.2
Yellow Cotyledon				
Grande	24	1.0	63.0	**33.3**
Carneval	24	1.0	61.8	30.8
CDC Mozart	18	1.0	63.7	30.8
Eclipse	18	1.0	63.1	**32.7**
Integra	21	1.0	60.4	27.0
SW Circus	21	1.0	62.4	31.1
SW Midas	21	1.0	61.8	28.3
SW Salute	22	1.0	63.2	31.5
Topeka	18	1.0	62.8	30.7
Green Cotyledon				
Cruiser	20	1.0	62.0	26.6
Journey	29	8.3	61.0	22.5
Majoret	20	1.0	63.0	26.4
Stratus	16	1.0	62.5	**37.5**
SW Parade	20	1.0	59.9	25.1
Toledo	21	1.0	60.3	25.8
Average	23.0	2.5	28.4	28.4
LSD (P=.05)	3.0	0.5	1.3	5.0
CV	6.1	13.8	12.5	12.5

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

Planted: April 9, 2003
Harvested: July 24, 2003 Additional Nitrogen: Inoculated
Previous crop: Hayed wheat, No-till planted
Herbicide: Pursuit (3 oz/A) + Poast Plus ($1^1/_2$ pints/A)



2003 Field Peas in the West River Region	Combined Means

Variety	Type	Plant Height	Lodg.	Seeds / Pound	Test Weight	Grain Protein	Grain Yield
		inches	0-9*		lbs/bu	%	bu/ac
DS Admiral	Yellow	21	1.2	1881	65.4	22.0	31.5
CDC Mozart	Yellow	17	2.2	1984	67.0	22.7	30.8
Cruiser	Green	19	0.9	1914	65.3	22.6	28.4
Majoret	Green	20	0.5	1702	65.8	23.5	25.8
Carneval	Yellow	21	0.8	2058	65.1	21.8	23.7
# of locations		3	2	3	4	4	5

Locations: Hettinger, Beulah, Glen Ullin, Hannover, and Bison SD.

Table 1. Pea plant stand, root evaluation, early vegetative growth, and soil nutrient status in conventional tillage (CT), reduced tillage (RT), and no-tillage (NT) environments in a wheat-pea rotation during 2003 at Dickinson, ND.

		Roots			Pea Plant			Soil N			
Tillage	Plants	Nodules		Rating[1]	Weight	Length	Nodes	0-6	6-24	Total	Soil P
	no./ft^2	- no. -	-- g --	--%--	-- g --	- mm -	- no. -	--------- lbs/acre ----------			- ppm -
CT	6.6	43	0.09	0	1.2	229	109	35	33	68	18
RT	7.0	56	0.14	10	1.0	236	108	29	38	68	17
NT	7.8	57	0.16	30	0.8	206	108	23	18	41	20
Mean	7.1	52	0.13	13.3	1.0	223	108	29	30	59	18
CV %	19.5	23.2	26.4	96.8	21.4	9.3	0.5	59.4	70.1	59.7	23.0
LSD	NS	NS	NS	22	NS	NS	NS	NS	NS	NS	NS

[1]Indicates percentage of pea root that is discolored.

Table 2. Pea plant height, plant-N content, grain yield and quality in conventional tillage (CT), reduced tillage (RT), and no-tillage (NT) environments in a wheat-pea rotation during 2003 at Dickinson, ND.

	Height	Plant N	Yield	Crude protei	Test weight	Seed weight
	--in.--	--%--	--bu/a--lb/acre--	--%--	-- lbs/bu --	--seeds/lb--
CT	26.9	1.2	2788	26.0	63.4	2241
RT	27.3	1.2	2850	26.2	63.8	2341
NT	27.4	1.0	3138	24.6	65.5	2189
Mean	27.2	1.1	2925	25.6	64.2	2257
CV %	9.8	18.3	4.6	3.2	1.2	10.2
LSD	NS	NS	231	NS	1.36	NS

2003 Roundup Ready Soybean Variety Trial - No Till **Hettinger, ND**

Brand	Variety	Maturity Group	Days to Bloom	Test Weight	1000 Seed Weight	Grain Yield
				lbs/bu	grams	bu/Ac
AgriPro	0527 RR	0.5	61.5	56.9	83.8	10.4
Asgrow	AG 08-01	0.8	62.8	56.8	87.1	10.0
Asgrow	AG 05-01	0.5	61.0	56.6	81.7	6.9
Croplan Gen.	RT0269	0.2	61.0	56.4	89.2	7.8
Croplan Gen.	RT0574	0.5	62.0	56.8	91.4	8.9
Dekalb	DKB 07-52	0.7	63.8	56.0	88.3	10.4
Garst	XR05Y05	0.5	62.2	55.9	92.2	9.5
Kaystar	K-0505 RR	0.5	61.5	56.6	89.9	12.7
Kaystar	K-0450 RR	0.4	61.0	56.8	88.5	10.9
Pioneer	90B51	0.5	62.5	57.2	95.4	8.2
Pioneer	90B11	0.1	61.0	56.9	88.8	12.6
Proseed	RR 0069	0.6	61.2	56.4	89.2	8.3
Proseed	RR 0079	0.7	62.0	57.7	98.0	9.7
R'rider Gen.	Walsh RR	0.0	61.5	56.8	98.4	10.7
R'rider Gen.	Barnes RR	0.3	64.0	55.9	98.1	7.1
R'rider Gen.	RG200RR	0.0	61.5	56.7	88.2	10.9
Trial Mean			61.9	56.7	90.5	9.7
C.V. %			1.6	0.8	8.4	34.2
LSD .05			1.4	0.7	NS	NS
LSD .01			1.9	NS	NS	NS

Planting Date: May 15, 2003
Harvest Date: September 23, 2003
Seeding rate: 200,000 live seeds/acre
Previous crop: barley
NS = no statistical difference between varieties.
Notes: The trial sustained severe moisture stress.

2003 Dry Edible Beans - Continuously Cropped No-till **Hettinger**

Variety	Days to Bloom	Days to Mature	Yield 2000	Yield 2001	Yield 2003	Average Yield 2 yr	Average Yield 3 yr
			lbs/ac				
Pinto:							
Othello	55	84	1575	1558	1006	1282	1380
Maverick	55	88	1517	1138	758	948	1138
Remington	56	92			466		
Buster	56	92			408		
Navy:							
Norstar	56	87	1338	508	899	704	915
Mayflower	56	87	996	887	747	817	877
Arthur	57	87	1167	391	853	622	804
Navigator	57	90			761		
Vista	57	92			443		
Black:							
T-39	57	88		852	727	790	
Jaguar	56	88		712	733	722	
Trial Mean	56	89	--	917	709	--	--
C.V. %	1.2	2.6	--	9.9	10.8	--	--
LSD .05	1	3	--	130	111	--	--
LSD .01	1	5	--	174	149	--	--

Planting Date: May 20, 2003
Harvest Date: September 23, 2003
Previous crop: 1999 = HRSW, 2000 & 2002 = Barley.

2003 Proso Millet Variety Trial Continuously Cropped No-till **Hettinger**

Variety	Days to Head	Plant Height	Lodging	Test Weight	1000 Seed Weight	----- Grain Yield ----- 2001	2002	2003	Avg. Yield 2 yr	3 yr
		inches	0 - 9*	lbs/bu	grams	---------- lbs/ac ----------				
Huntsman	64	26	2.8	53.9	6.6	2067	1960	2560	2260	2196
Sunup	61	27	2.5	54.3	6.2	1880	1600	3067	2334	2182
Earlybird	60	27	4.2	53.4	6.8	2033	1073	2620	1846	1909
Sunrise	61	27	2.8	53.5	7.3	1860	960	2787	1874	1869
Minsum	59	28	5.8	54.6	6.8	1353	1289	2027	1658	1556
Rise	58	28	3.8	53.6	6.7	1647	640	2353	1496	1547
Snowbird	57	29	5.0	54.2	6.8	1620	980	1780	1380	1460
Turghai	52	30	8.0	57.3	5.5	1407	693	1447	1070	1182
Dawn	57	27	5.8	54.0	6.1	1207	507	1813	1160	1176
Cerise	53	28	7.0	56.9	6.1	1120	280	1289	784	896
Horizon	62	25	2.8	53.8	6.9		1867	2900	2384	
Trial mean	59	27	4.5	54.5	6.5	1755	1121	2262	--	--
C.V. %	1.5	13.3	25.1	0.9	7.6	18.2	20.6	9.4	--	--
LSD .05	1	NS	1.6	0.7	0.7	460	335	308	--	--
LSD .01	2	NS	2.2	1.0	1.0	619	453	415	--	--

* Lodging: 0 = none, 9 = lying flat on ground.
Planting Date: June 5, 2003
Harvest Date: October 1, 2003
Seeding rate: 25 lbs/Ac.
Previous crop: 2000 = soybean, 2001 = oats, 2002 = barley.
NS = no statistical difference between varieties.

2003 Roundup Ready Corn - Continuously Cropped No-till **Hettinger, North Dakota**

Brand	Hybrid	GDU's to BL*	RM	Trait	Days to silk	Silage moist.	Silage Yield	Ear height	Test Weight	Grain Yield
			days	**		%	Tons/ac	inches	lbs/bu	bu/ac
Dekalb	DKC 35-50	2250	85		87			26	55.1	21.0
Dekalb	DKC 35-51	2250	85	Bt	88			24	54.1	25.7
Dekalb	DKC 39-48	2300	89	Bt	92			27	53.6	17.4
Dekalb	DKC 40-63	2315	90		90			27	53.8	28.4
IS / Garst	8905RR	2110	87		89	62	3.85	25	54.3	27.9
IS / Garst	8961RR		87		89	57	3.29	23	55.5	25.8
Kaystar	KX-2795RR		79		89			23	58.4	29.1
Kaystar	KX-285RR		85		87			23	56.2	25.9
Legend	LR 9282RB		82	Bt	89			26	54.8	27.9
Legend	LR 9385RR		85		89			25	56.1	24.5
Proseed	RRBtS83	2000	83	Bt	88			26	55.8	21.2
Proseed	RRT82		82		89			22	58.0	32.0
Proseed	RRXES86		86		92			25	54.0	23.6
Trial Mean					89		3.57	25	55.1	25.2
C.V. %					2.3		16.3	8.0	2.7	14.9
LSD .05					NS		NS	3	2.5	6.3
LSD .01					NS		NS	4	3.4	8.5

* Growing Degree Units to Black Layer.
** Trait: Bt = Yield Guard Corn Borer.
NS = no statistical difference between hybrids.
Planting date: May 2, 2003
Seeding rate: 26,500 seeds/acre, thinned to 24,000 plants/acre.
Row spacing: 28"
Harvest date: Silage - September 9
Grain - October 13
Previous crop: soybean
Note: Silage yields are adjusted to 0% moisture.
Grain yields are adjusted to 13.5% moisture.

"Twin Row" Corn Production at Hettinger, North Dakota
2003

Corn production trials conducted at the Hettinger Research Extension Center during the 1998, 1999 and 2001 growing seasons showed increased yields with plant populations of at least 24,000 plants per acre (vs. 12,000 or 18,000) and row spacings no narrower than 28 inches. As plant population and row spacing increase, the distance between plants within a row decreases. The "twin row" or "paired row" concept spaces seed between two narrowly planted rows (twin rows) with a wider row spacing between twin rows. This concept provides more distance between plants within a row at higher plant populations. The concept has been used successfully in peanut production but has had inconsistent results with corn. Yield increases of 10% or more above conventionally planted corn have been reported however, there are just as many reports of no yield advantage. It is speculated that this inconsistency may be due to different genetic responses to row spacing, row orientation, row configuration and to plant population.

The Hettinger trial utilized two 85 day RM hybrids with genetically different backgrounds and were seeded at two different plant populations (20,000 and 30,000 plants / acre) on May 2, 2003, into three different row configurations; 7 inch twin row spacing with 28 inches between sets of twin rows (7"x28"), 14 inch twin row spacing with 28 inches between sets of twin rows (14"x28"), and conventional 28" single row spacing (28"). There was almost no sub-surface soil moisture and the trial sustained severe moisture stress late in the growing season. The trial was harvested on October 13, 2003.

Row Configuration	**Twin Row Corn**		
Row Spacing	Days to Silk	Test Weight	Grain Yield
	days	lbs/bu	bu/ac
7" x 28"	89	54.6	24.8
14" x 28"	89	54.2	21.0
28"	89	53.8	21.4
LSD 5%	NS	NS	2.2

NS = no statistical difference

Summary

Days to silk and test weight were essentially unaffected by row configuration. The 7" x 28" twin row configuration yielded more than the 14" x 28" twin row configuration and the 28" conventional single row spacing. There was no significant difference in yield between plant populations although there was a significant difference between hybrids (data not shown). This trial will be continued next year.

2003 Tame Buckwheat Variety Trial Continuously Cropped No-till Hettinger

Variety	Days to Bloom	Plant Height	Lodging	Test Weight	1000 Seed Weight	Grain Yield 2000	Grain Yield 2003	2 Year Avg.
		inches	0 - 9*	lbs/bu	grams	-------- lbs/ac --------		
AC Manisoba	40	19	6.7	34.2	27.9	371	381	376
AC Springfield	40	22	5.7	--	28.7	330	393	362
Koban	40	21	5.5	--	27.0	348	306	327
Mancan	40	20	5.8	35.8	25.5	262	373	318
Koto	40	21	2.2	36.0	30.8	210	361	286
Trial mean	40	20	4.7	35.7	28.3	323	367	--
C.V. %	2.0	11.5	24.2	--	6.4	35.0	31.6	--
LSD .05	NS	NS	1.7	--	2.7	NS	NS	--
LSD .01	NS	NS	2.3	--	3.7	NS	NS	--

* Lodging: 0 = none, 9 = lying flat on ground.
Planting Date: June 5, 2003 Harvest Date: October 1, 2003
Seeding rate: 700,000 seeds/acre.
Previous crop: 1999 = buckwheat, 2002 = soybean.
NS = no statistical difference between varieties.

2003 Hay Barley Variety Trial
Continuously Cropped No-till Hettinger

Variety	Days to Head	Plant Height	Harvest Moisture	Yield*
		inches	%	Tons/ac
Dillon	68	31	47	4.32
Bestford	68	32	47	3.61
Westford	68	32	46	3.41
Trial Mean	68	32	47	3.86
C.V. %	0.5	7.1	5.8	4.4
LSD .05	NS	NS	NS	0.26
LSD .01	NS	NS	NS	0.37

*Yield is adjusted to a 0% moisture basis.
Planting Date: April 17, 2003
Harvest Date: July 10, 2003 (early soft dough)
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: soybean
NS = no statistical difference between varieties.

2003 Cool Season Forage Trial - Chemical Fallow **Dickinson, ND**

Variety	Cereal Height	Harvest Moisture	Growth Stage[1]	DM Yield	CP[2]	ADF	NDF	RFV
	inches	-----%-----		Ton/ac	---------- % ----------			
Conlon barley	30	70	2	1.6	13.8	36	58	98
Haybet barley	31	63	2	2.1	12.2	38	57	98
Hays barley	28	66	2	2.2	12.2	39	58	95
Robust barley	33	66	2	1.6	12.2	39	58	95
AC Assiniboia oat	32	62	2	1.7	10.6	37	59	95
Ebeltoft oat	28	54	2	1.7	8.4	42	62	84
Ensiler oat	36	56	2	1.9	8.1	44	65	79
Forage Plus oat	31	48	1	2.2	10.1	40	59	91
HiFi oat	34	54	2	1.5	8.0	43	64	80
Jerry oat	33	56	2	2.0	9.7	41	60	89
Killdeer oat	30	60	2	2.3	10.0	40	62	87
Morton oat	36	63	1	1.9	8.8	43	64	81
Paul oat	35	53	1	1.8	9.1	39	62	87
Triple Crown oat	34	53	1	2.1	9.5	45	63	79
Triple Crown/Arvika pea	35	61	2	1.6	11.6	39	59	91
Triple Crown/Carneval pea	32	59	1	1.6	11.3	38	62	89
Sandro triticale	36	58	2	2.1	9.8	39	58	95
SK3P speltz	43	51	2	1.8	9.1	38	58	96
Trial Mean	33	58	2	1.9	10.2	40	60	89
C.V. %	7.3	6.3	--	18.2	10.5	6.0	3.4	5.7
LSD .05	3	5	--	NS	1.8	4	3	9

[1]Growth Stage at harvest: 1=Milk, 2=Early Soft Dough.
[2]CP=Crude Protein, ADF=Acid Detergent Fiber, NDF=Neutral Detergent Fiber, RFV=Relative Feed Value.

2003 Cool Season Forage Trial -Chemical Fallow					Dickinson, ND	
	Harvest	12%	DM yield			
Variety	Moisture	Moisture	2001	2002	2003	3 yr avg
	-%-	-Tons/ac-	---------- Tons/ac ----------			
Conlon barley	70	1.8	2.6	1.4	1.6	1.9
Haybet barley	63	2.4	3.1	2.0	2.1	2.4
Hays barley	66	2.5	--	--	2.2	--
Robust barley	66	1.8	2.1	2.2	1.6	2.0
AC Assiniboia oat	62	2.0	--	--	1.7	--
Ebeltoft oat	54	2.0	--	--	1.7	--
Ensiler oat	56	2.2	--	--	1.9	--
Forage Plus oat	48	2.5	3.7	1.8	2.2	2.6
HiFi oat	54	1.7	--	--	1.5	--
Jerry oat	56	2.3	--	--	2.0	--
Killdeer oat	60	2.6	--	--	2.3	--
Morton oat	63	2.2	--	--	1.9	--
Paul oat	53	2.1	3.2	2.0	1.8	2.3
Triple Crown oat	53	2.4	3.3	2.1	2.1	2.5
Triple Crown/Arvika	61	1.8	3.0	1.9	1.6	2.2
Triple	59	1.9	2.9	1.8	1.6	2.1
Sandro triticale	58	2.4	4.1	2.0	2.1	2.7
SK3P speltz	51	2.1	3.3	1.7	1.8	2.3
Trial Mean	58	2.0	3.0	2.0	1.9	--
C.V. %	6.3	18.2	11.3	15.3	18.2	--
LSD .05	5	NS	0.5	NS	NS	--

2003 Cool Season Forage Trial - Chemical Fallow **Dickinson, ND**

Variety	Growth Stage	Contribution to Yield					
					2-Year Average		
		Head	Leaf	Stem	Head	Leaf	Stem
		%			%		
Conlon barley	2	50	14	35	42	15	42
Haybet barley	2	53	14	33	41	16	42
Hays barley	2	47	17	36	--	--	--
Robust barley	2	58	14	28	54	15	32
Forage Plus oat	1	45	26	29	42	24	35
Paul oat	1	66	14	21	--	--	--
Triple Crown oat	1	64	16	19	48	20	32
SK3P spelt	2	54	12	34	39	16	45
Sandro triticale	2	54	13	33	46	15	40
Trial Mean	--	55	16	30	--	--	--
C.V. %	--	13.1	18.9	16.3	--	--	--
LSD .05	--	10	4	7	--	--	--

2003 Perennial Rye Forage Trial - Site 1 **Dickinson, ND**

Variety	Yield					Harvest Moisture		DM Yield
	Dry Matter			12% Moisture				
	1st Cutting	2nd Cutting	Total	1st Cutting	2nd Cutting	1st Cutting	2nd Cutting	2 yr avg
	Tons/ac					%		-Tons/ac-
Crested wheatgrass	1.0	0.1	1.1	1.1	1.3	69	46	1.1
Jerry oat	0.8	--	0.8	0.9	--	65	--	--
[1]Perennial rye	--	--	--	--	--	--	--	--
Regal meadow brome	1.0	--	1.0	1.1	--	73	--	1.4
Robust barley	0.5	--	0.5	0.6	--	66	--	0.9
Russian wildrye	1.1	--	1.1	1.2	--	71	--	1.8
Western wheatgrass	1.1	--	1.1	1.3	--	61	--	1.3
Trial Mean	0.9	--	--	1.0	--	68	--	--
C.V.%	24.8	--	--	24.8	--	1.6	--	--
LSD .05	NS	--	--	NS	--	2	--	--

[1]Plots in this study were established in 2000; perennial rye was damaged over the winter in 2001 and killed completely over the winter in 2002.
[3]NS=no significant difference.

2003 Perennial Rye Forage Trial - Site 1 **Dickinson, ND**

Variety	CP[1]		CP[2]	ADF		NDF		TDN		RFV		Nitrate	
	%		Yield	%								ppm	
	1st cut	2nd cut	lbs/ac	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut
Crested wheatgrass	18.3	13.8	399.3	35	36	59	58	62	61	97	98	117	68
Jerry oat	11.1	--	162.3	39	--	60	--	59	--	92	--	180	--
Regal meadow brome	16.5	--	328.9	42	--	59	--	56	--	88	--	142	--
Robust barley	11.5	--	118.7	36	--	58	--	61	--	99	--	113	--
Russian wildrye	12.3	--	258.5	38	--	66	--	59	--	83	--	25	--
Western wheatgrass	--	--	--	--	--	--	--	--	--	--	--	--	--
Trial Mean	13.9	--	253.5	38	--	60	--	59	--	92	--	115	--
C.V.%	7.8	--	19.3	2.8	--	3.3	--	1.4	--	4.6	--	56.3	--
LSD .05	2.0	--	NS	2	--	4	--	2	--	2	--	NS	--

[1]CP = Crude Protein, ADF = Acid Detergent Fiber, NDF = Neutral Detergent Fiber, and TDN = Total Digestible Nutrient concentrations; RFV = Relative Feed Value.
[2]CP Yield calculated on three reps

2003 Perennial Rye Forage Trial - Site 2 **Dickinson, ND**

Variety	Yield					Harvest Moisture		DM Yield
	Dry Matter			12% Moisture				
	1st Cutting	2nd Cutting	Total	1st Cutting	2nd Cutting	1st Cutting	2nd Cutting	2 yr avg
	----------Tons/ac----------			----------Tons/ac----------		----------%----------		-Tons/ac-
Crested wheatgrass	0.6	0.1	0.7	0.7	0.2	67	51	--
Jerry oat	0.3	--	0.3	0.4	--	71	--	--
[1]Perennial rye	1.0	--	1.0	1.2	--	74	--	--
Regal meadow brome	0.9	--	0.9	1.0	--	70	--	--
Robust barley	0.4	--	0.4	0.5	--	72	--	--
Russian wildrye	0.9	--	0.9	1.0	--	65	--	--
Western wheatgrass	0.4	--	0.4	0.4	--	60	--	--
Trial Mean	0.6	--	--	0.7	--	68	--	--
C.V.%	29.8	--	--	29.8	--	1.8	--	--
LSD .05	NS	--	--	NS	--	2	--	--

[1]Plots in this study were established in 2001. 2003 was first year a harvest was taken on grasses.
[3]NS=no significant difference.

2003 Perennial Rye Forage Trial - Site 2 **Dickinson, ND**

Variety	CP[1]		CP[2]	ADF		NDF		TDN		RFV		Nitrate	
	%		Yield	%								ppm	
	1st cut	2nd cut	lbs/ac	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut
Crested wheatgrass	12.6	8.0	159.8	40	36	62	58	58	61	86	98	87	68
Jerry oat	11.7	--	56.2	41	--	65	--	57	--	81	--	117	--
Regal meadow brome	11.9	--	222.0	44	--	63	--	54	--	81	--	107	--
Robust barley	14.1	--	107.0	32	--	59	--	64	--	101	--	193	--
Russian wildrye	10.1	--	162.0	41	--	62	--	57	--	87	--	90	--
Western wheatgrass	12.2	--	73.5	42	--	62	--	56	--	84	--	28	--
Trial Mean	11.3	--	130.9	41	--	62	--	57	--	86	--	110	--
C.V.%	17.2	--	52.2	8.2	--	3.2	--	4.5	--	6.1	--	48.6	--
LSD .05	3.5	--	NS	6	--	NS	--	5	--	9	--	NS	--

[1]CP = Crude Protein, ADF = Acid Detergent Fiber, NDF = Neutral Detergent Fiber, and TDN = Total Digestible Nutrient concentrations; RFV = Relative Feed Value.
[2]CP calculated on three reps

HRSW Varietal Tolerance to Far-Go Herbicide at Hettinger. (Eriksmoen)

Variety	6/10/03	5/24/02	5/22/01	5/22/00	6/9/99	5/26/98	6/18/97	6/20/96	6/9/95
Keene	0	+	+	0	0	+	0	+	0
Russ	0	0	0	0	0	?	0	0	0
Oxen	0	0	0	0	0	0	0	0	0
Gunner	0	0	+	0	0	0	0	+	
Reeder	0	0	0	0	0	0	0	0	
Parshall	0	0	0	0	0	0	0	0	
Ingot	0	0	0	0	0	0			
Norpro	0	0	0	0	0				
Dandy	0	0	0	0	0				
McKenzie	0	0	+	+	0				
Mercury	0	0	0	0	0				
Alsen	0	0	0	0	0				
Dapps	0	+	+	?	0				
Knudson	+	0	+						
Keystone	+	0	0						
AC Superb	?	0	+						
Zeke	0	0	0						
Briggs	0	0	0						
Hanna	0	0	0						
Granite	0	?							
Outlook	0	+							
Hank	0	0							
Amazon	0								
AC Corinne	0								
AC Glenavon	0								
Laser	0								
Walworth		0	0						
Grandin			0	0	0	0	0	0	0
Ivan			+	+	0	+			
Ember			0	0	0	0			
Scholar			+	0	0				
Aurora			0	+	0				
Conan			0	0					
McVey			0		0				
Butte 86				0	0	0	0	0	0
2375				0	0	0	0	0	0
2398				0	0	0	0	0	0
Ernest				+	0	?	0	+	0
HJ98				0	0	0	0		
AC Barrie					0	?	0	+	+
Kulm					0	0	0	+	+
2371					0	0	0	0	0
Argent					0	0	0	0	0
Amidon					0	+	+	+	+
Trenton					0	0	0	0	0
Hammer					0	+	0	+	+
Application Date	4/1	4/11	4/16	3/27	4/12	4/3	4/3	4/18	3/24
Seeding Date	4/8	4/11	4/17	4/4	4/13	4/8	4/29	4/19	4/7
Rate (product)	3 pt	3 pt	3 pt	3 pt	3 pt	3 pt	3 pt	2 pt	2 pt

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

Varietal Tolerance to Treflan Herbicide at Hettinger. (Eriksmoen)

HRSW	2003	2002	2000
Keene	0	0	0
Russ	0	0	+
Oxen	0	0	0
Gunner	0	0	0
Reeder	0	0	0
Parshall	0	0	0
Ingot	0	0	0
Norpro	0	0	+
Dandy	0	+	+
McKenzie	0	0	0
Mercury	0	?	0
Alsen	0	0	0
Knudson	0	+	
Keystone	0	0	
AC Superb	0	0	
Zeke	0	+	
Briggs	0	0	
Hanna	0	0	
Dapps	0	0	
Granite	0	0	
Outlook	0	0	
Hank	0	0	
Amazon	0		
AC Corinne	0		
AC Glenavon	0		
Laser	0		
Walworth		0	
Ernest			0
Butte 86			+
Ivan			+
Ember			0
2375			0
Grandin			+
2398			0
HJ98			0
Aurora			+
Conan			+
Scholar			+
AC Vista			0
AC Impervo			0
Prodigy			0

Durum	2003	2002	2000
Rugby	0	0	0
Monroe	0	0	0
Renville	0	0	0
Munich	0	0	0
Ben	0	0	+
Belzer	0	0	0
Maier	0	0	0
Mountrail	0	0	0
Lebsock	0	0	0
Plaza	0	0	0
Pierce	0	0	0
Dilse	0	0	0
AC Avonlea	0		
1AS/1D2			0
AC Melita			0
Plenty			0
Kari			0
Dressler			0

Application Date: 4/1/03, 4/11/02, 4/4/00
Seeding Date: 4/8/03, 4/11/02, 4/4/00
Application Rate (product): 1.5 pt/A
Stand reduction: + = susceptible, 0 = tolerant, ? = questionable

Varietal Tolerance to Everest Herbicide at Hettinger

Hard Red Spring Wheat

Variety	Crop Injury*		
	2002	** 2003	*** 2003
Oxen	0	0	0
Ingot	0	0	0
Russ	0	0	0
Briggs	0	0	0
Parshall	0	0	0
Reeder	0	0	0
Alsen	0	0	0
Keene	0	0	0
Mercury	0	0	0
Norpro	0	0	0
Gunner	0	0	0
Dandy	+	0	0
Knudson	0	0	0
Keystone	0	0	0
McKenzie	+	0	0
Hank	0	0	0
Granite	0	0	0
Hanna	0	0	0
Zeke	0	0	0
Dapps	0	0	0
Outlook	0	0	0
Walworth	0		
AC Superb	0		
Amazon		0	0
AC Corinne		0	0
AC Glenavon		0	0
Laser		0	0

* Crop Injury: 0 = none, + = stunting
** Applied at 3 leaf (5/14/03)
***Applied at 4½ leaf (5/27/03)
Application Rate: 0.6 oz/A

Varietal Tolerance to Everest Herbicide at Hettinger

Durum

Variety	Crop Injury*		
	2002	** 2003	*** 2003
Rugby	0	0	0
Monroe	0	0	0
Renville	0	0	0
Munich	0	0	0
Ben	+	0	0
Belzer	0	0	0
Maier	0	0	0
Mountrail	0	0	0
Lebsock	0	0	0
Plaza	0	0	0
Pierce	0	0	0
Dilse	0	0	0
AC Avonlea		0	0

* Crop Injury: 0 = none, + = stunting
** Applied at 3 leaf (5/14/03)
***Applied at 4½ leaf (5/27/03)
Application Rate: 0.6 oz/A

2003 Crop Tolerance to Fall applied Plateau Herbicide at Hettinger. (Eriksmoen) Plateau herbicide treatments were applied on October 2, 2002 into no-till spring wheat stubble. Hank hard red spring wheat, Ben durum, Drummond barley, Youngs oat , BadgeRR canola and B-90 chickpea were seeded on April 23, 2003. The trial was not replicated. Evaluations for plant height and heads / plants per 3 foot of row were on August 1, 2003. The trial was not harvested.

Treatment	Product Rate	Plant Height	Heads/ Plants
	oz/A	cm	#/3'row
Hank HRSW			
Untreated	0	69	63
Plateau + MSO	4 + 32	63	48
Plateau + MSO	8 + 32	58	49
Plateau + MSO	12 + 32	52	18
Ben Durum			
Untreated	0	72	56
Plateau + MSO	4 + 32	70	49
Plateau + MSO	8 + 32	69	27
Plateau + MSO	12 + 32	57	22
Drummond Barley			
Untreated	0	69	65
Plateau + MSO	4 + 32	61	47
Plateau + MSO	8 + 32	62	44
Plateau + MSO	12 + 32	54	37
Youngs Oat			
Untreated	0	74	48
Plateau + MSO	4 + 32	69	35
Plateau + MSO	8 + 32	54	31
Plateau + MSO	12 + 32	59	33
BadgeRR Canola			
Untreated	0	50	7
Plateau + MSO	4 + 32	--	0
Plateau + MSO	8 + 32	--	0
Plateau + MSO	12 + 32	--	0
B-90 Chickpea			
Untreated	0	32	4
Plateau + MSO	4 + 32	34	5
Plateau + MSO	8 + 32	34	3
Plateau + MSO	12 + 32	29	1

Summary

Spring seeded small grain crops were affected by Fall applied Plateau herbicide. Fall applied Plateau killed spring seeded canola. Spring seeded chickpea had very good tolerance to Fall applied Plateau.

2003 Broadleaf Weed Control in Spring Wheat at Hettinger. (Eriksmoen) Reeder hard red spring wheat was seeded on April 24. Treatments were applied to 3 ½ leaf wheat and to 1 inch kochia and to 1 ½ inch wild buckwheat on May 28 with 78 F, 30 % RH, partly cloudy sky and 7 mph NW wind. Treatments were applied with a tractor mounted CO^2 propelled plot sprayer delivering 10 gpa at 40psi through 8001.5 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. 8 oz/A Achieve was applied over the entire trial on June 12 to control wild oats. Kochia and wild buckwheat populations were 20 and 4 plants per sq. ft, respectively. Evaluations for crop injury were on June 12, and for weed control on June 12, June 27 and July 26. The trial was harvested on July 30.

Treatment		Product Rate	June 12			June 27		7/26	7/30
			HRSW	Kocz	Wibw	Kocz	Wibw	Kocz	Yield
		oz/A	% Control						bu/A
1	Salvo	16	1.5	90	75	94	82	98	26.4
2	Sward	12.3	0.3	73	40	92	52	96	24.5
3	Aim + Salvo	0.5 + 16	0.0	94	92	95	95	99	25.2
4	Aim + Sward	0.5 + 12.3	0.8	94	84	95	92	99	25.9
5	Aim + Clarity	0.5 + 2	0.0	92	82	95	94	99	27.1
6	Bronate	16	1.2	92	91	96	94	99	26.5
7	Bronate + Harmony Extra	16 + 0.3	1.2	94	93	95	95	97	26.4
8	Harmony Extra + Salvo	0.3 + 16	5.5	90	91	95	95	99	26.8
9	Harmony Extra + 2,4-D	0.3 + 12	2.8	65	84	79	94	78	22.3
10	Harmony Extra + Aim + 2,4-D	0.3 + 0.5 + 12	0	88	89	94	84	96	26.6
11	Untreated	0	0	0	0	0	0	0	22.1
C.V. %			201	8.6	11.4	5.9	18.5	6.1	8.5
LSD 5%			ns	10	12	7	21	7	3.0

Summary

Crop injury was relatively minor on all herbicide treatments. Season long kochia control was excellent for all herbicide treatments except for Harmony Extra + 2,4-D (trt 9) which provided only partial control and had yields similar to the untreated check. Season long wild buckwheat control was also excellent for all herbicide treatments except for 1 and 2. Grain yields were significantly higher than the untreated check for all herbicide treatments except for 2 and 9.

2003 Tank Mixes with Aim Herbicide in Spring Wheat at Hettinger. (Eriksmoen) Reeder hard red spring wheat was seeded on April 24. Treatments were applied to 3 ½ leaf wheat and to 1 inch tall kochia and to 2 ½ leaf wild oats on May 28 with 78 F, 32 % RH, partly cloudy sky and 5 mph NW wind. Treatments were applied with a tractor mounted CO2 propelled plot sprayer delivering 10 gpa at 40psi through 8001.5 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 and wild oat populations were 41 and 9 plants per sq. foot, respectively. Evaluations for crop injury were on June 4 and June 12, and on June 4, June 12, June 27 and July 26 for kochia control and on June 4, June 27 and July 26 for wild oat control. The trial was harvested on July 30.

Treatment		Rate	June 4			June 12	June 27		July 26		7/30
			HRSW	Kocz	Wiot	HRSW	Kocz	Kocz	Wiot	Kocz	Wiot	Yield
		oz product/A	% Chlor	% Control		% Stunt	% Control					bu/A
1	Aim + 2,4-D ester	1.0 + 12.0	12	68	0	0	89	92	0	98	0	20.7
2	Aim + 2,4-D ester	0.5 + 12.0	6	60	0	0	58	84	0	93	0	22.2
3	Aim + 2,4-D ester + NIS	0.5 + 12.0 + 0.25% v/v	9	62	0	0	89	94	0	98	0	21.2
4	Aim + 2,4-D + Harmony GT	1.0 + 12.0 + 0.3	6	68	0	0	91	95	0	99	0	24.5
5	Aim + 2,4-D + Harmony GT	0.5 + 12.0 + 0.3	2	50	0	3	89	90	0	94	0	22.0
6	Aim + MCPA ester + Puma	0.5 + 12.0 + 6.4	9	55	10	6	85	94	99	90	99	23.4
7	Harmony GT + MCPA + Puma	0.3 + 12.0 + 6.4	0	10	6	0	39	50	99	79	99	23.8
8	Aim + MCPA + Everest + NIS	0.5 + 12.0 + 0.6 + 0.25%	6	45	2	14	75	84	99	95	99	23.9
9	MCPA ester + Everest + NIS	12.0 + 0.6 + 0.25% v/v	0	19	4	6	25	24	99	49	99	18.8
10	Untreated	0	0	0	0	0	0	0	0	0	0	15.8
C.V. %			92	27	138	145	21	18	0	18	0	12.5
LSD 5%			6	17	5	6	20	19	0	21	0	3.9

Summary

Relatively minor wheat leaf chlorosis was observed 7 days after application on all Aim treatments, however, the crop grew out of this condition relatively quickly and did not affect yield. Minor crop stunting 2 weeks after application was observed, however, this was not associated with leaf chlorosis and did not affect yield. All Aim treatments provided excellent kochia control. Harmony GT + MCPA + Puma (trt 7) and MCPA + Everest + NIS (trt 9) did not provide adequate kochia control. The rate of Aim (1.0 vs 0.5 oz/A) and the Aim + broadleaf tank mix partner (2,4-D, Harmony GT and MCPA) did not significantly enhance or decrease the control of kochia. Both Puma and Everest herbicides provided excellent wild oat control and this control was not affected by the broadleaf tank mix partner.

Reduced Rates and Application Timing of Wild Oat Herbicides at Hettinger 2001-2003. (Eriksmoen) The objective of this trial was to look at the relationship between various rates of wild oat herbicides applied at 2 different growth stages of HRSW. The first post-applied treatments were to 3 leaf wheat and the second post-applied treatments were to 5 leaf wheat. All treatments were applied with a tractor mounted CO^2 propelled plot sprayer delivering 17 gpa (10 gpa in 2003) at 40 psi 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 (Wiot) populations were 44, 22 and 0.4 plants per sq. foot respectively in 2001, 2002 and 2003. Patches of downy brome (Dobr), Japanese brome (Jabr) and foxtail barley (Fxba) were non-uniformly scattered throughout the trial in 2002 and were evaluated for control when observed. The 2001 trial was not harvested due to severe hail damage. The 2002 trial was not harvested due to a thin and short wheat stand caused by severe drought, and the 2003 trial sustained moderate heat and moisture stress.

App. Timing	Treatment	Product Rate	Wild Oat Rate	2001 Wiot	2002				2003 Wiot	2003 Crop Inj.	2003 Yield
					Wiot	Dobr	Jabr	Fxba			
HRSW		oz/acre		% Control							bu/A
3 leaf	Puma	10.6	Full	72	99	0	0	--	99	0	25.0
3 leaf	Puma	7.9	3/4	59	88	0	0	10	99	0	22.5
3 leaf	Puma	5.3	1/2	25	75	0	15	--	99	0	22.6
5 leaf	Puma	10.6	Full	92	72	--	50	--	99	1	21.6
5 leaf	Puma	7.9	3/4	82	44	--	0	--	99	1	23.6
5 leaf	Puma	5.3	1/2	62	21	--	0	--	99	1	22.0
3 leaf	Everest + NIS	0.60 + 0.25%	Full	90	99	50	96	--	99	1	22.4
3 leaf	Everest + NIS	0.45 + 0.25%	3/4	89	99	50	94	--	99	0	24.8
3 leaf	Everest + NIS	0.30 + 0.25%	1/2	88	97	70	99	--	99	0	22.6
5 leaf	Everest + NIS	0.60 + 0.25%	Full	62	99	--	90	--	99	19	19.8
5 leaf	Everest + NIS	0.45 + 0.25%	3/4	84	99	--	--	--	99	9	17.8
5 leaf	Everest + NIS	0.30 + 0.25%	1/2	72	99	--	90	--	99	3	19.8
3 leaf	Discover + DSV	3.20 + 12.8	Full	90	99	0	0	0	99	0	25.6
3 leaf	Discover + DSV	2.40 + 12.8	3/4	90	98	--	17	--	99	0	21.8
3 leaf	Discover + DSV	1.60 + 12.8	1/2	86	97	50	0	--	99	0	22.8
5 leaf	Discover + DSV	3.20 + 12.8	Full	95	99	--	0	--	99	0	21.3
5 leaf	Discover + DSV	2.40 + 12.8	3/4	95	99	--	50	--	99	0	23.7
5 leaf	Discover + DSV	1.60 + 12.8	1/2	92	99	--	0	--	99	0	22.7
3 leaf	Achieve+SC+AMS	7.0+0.5%+1%	Full	71	79	0	45	--	99	0	22.2
3 leaf	Achieve+SC+AMS	5.25+0.5%+1%	3/4	84	70	--	45	0	99	0	23.0
3 leaf	Achieve+SC+AMS	3.50+0.5%+1%	1/2	75	55	0	48	50	99	0	22.6
5 leaf	Achieve+SC+AMS	7.0+0.5%+1%	Full	81	71	--	0	--	99	0	21.5
5 leaf	Achieve+SC+AMS	5.25+0.5%+1%	3/4	89	82	--	--	--	99	0	22.0
5 leaf	Achieve+SC+AMS	3.50+0.5%+1%	1/2	52	82	--	99	--	99	0	21.4
	Untreated	0		--	0	0	0	0	0	0	23.1
C.V. %				32.9	20.6	74	83	--	0	254	9.6
LSD 5%				25	23	ns	40	--	1	5	3.0

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

Summary

Everest herbicide applied at the 5 leaf growth stage caused significant crop injury and yield loss in 2003. Crop injury was minimal on all other treatments in 2003 and on all treatments in 2001 and 2002 (data not shown). In 2002, full and 3/4 rates of Puma provided good wild oat control when applied at the 3 leaf stage and significantly reduced control at the 5 leaf stage. This is the opposite of what took place in 2001 where Puma applied at the 5 leaf stage resulted in higher wild oat control than when applied at the 3 leaf stage. This was probably due to additional wild oat flushes emerging after the 3 leaf stage application in 2001, with Puma providing good control of small wild oats and less activity on larger wild oats. All application rates and timing of application of Everest provided excellent wild oat control in all three years except for the late application in 2001. This probably indicates that Everest is less effective on larger wild oat plants. Everest treatments also had fair control of downy brome and excellent control of Japanese brome in 2002. All application rates and timing of application of Discover provided excellent wild oat control in all three years, indicating that Discover is effective on both small and large wild oats. Achieve treatments did not provide adequate wild oat control in 2001 or 2002, but provided excellent control in 2003. Achieve treatments also provided fair control of Japanese brome but no activity on downy brome in 2002. Some herbicidal activity was also observed on foxtail barley with Puma and Achieve in 2002.

Adjuvant use with Discover Herbicide at Hettinger, 2002 - 2003. (Eriksmoen)
2002: Russ hard red spring wheat was seeded on April 27. Treatments were applied to 4 leaf wheat and to 3 ½ leaf green foxtail on June 7 with 58 F, 50 % RH, cloudy sky and 8 mph wind. 2003: Reeder hard red spring wheat was seeded on April 24. Treatments were applied to 3 ½ leaf wheat and to 2 leaf wild oats on May 28 with 78 F, 31% RH, partly cloudy sky and 5 mph NW wind. Treatments were applied with a tractor mounted CO^2 propelled plot sprayer delivering 17 gpa (10 gpa in 2003) at 40 psi 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 (3 in 2002). Green foxtail population was 20 plants per sq. foot and wild oat population was 0.5 plants per sq. foot. Evaluations for crop injury were on June 21, 2002 and June 12, 2003. Evaluations for foxtail control were on July 1, 2002 and for wild oat control on July 26, 2003. The trial was not harvested in 2002 due a short and thin crop caused by severe drought. The 2003 trial was harvested on July 30.

	Treatment	Product Rate	7/1/02 Fxtl	7/26/03 Wiot	7/30/03 Yield
		oz /A	----- % control -----		bu/A
1	Discover + DSV*	3.2 + 12.8	99	99	24.5
2	Discover + DSV	1.6 + 6.4	95	99	24.8
3	Discover + DSV + NIS*	1.6 + 6.4 + .25%	96	99	25.7
4	Discover + DSV + MSO*	1.6 + 6.4 + 16	95	99	25.8
5	Discover + DSV + VOC*	1.6 + 6.4 + 16	98	99	23.5
6	Discover + DSV + Basic Blend*	1.6 + 6.4 + .25%	96	99	24.5
7	Untreated	0	0	0	21.0
C.V. %			3.7	0	9.1
LSD 5%			5	0	3.2

*Adjuvant: DSV=Score, NIS=Non-Ionic Surfactant (Preference), MSO=Methylated Seed Oil (Destiny), VOC=Vegetable Oil Concentrate (Prime Oil EV), Basic Blend=Quad 7.

Summary

The objective of this study was to look for differences in weed control when Discover Herbicide is applied at low rates with various adjuvants. Crop injury was not observed on any treatment (data not shown). Wild oat and green foxtail control was excellent for all herbicide treatments and did not vary significantly between the recommended rate (trt 1), the lower Discover rate (trt 2) or the lower Discover rate plus various adjuvants (trts 3-6). Grain yields did not differ significantly between herbicide treatments.

2003 Foliar Diseases on HRSW and Durum at Hettinger

Variety	Foliar Disease	Incidence **	Spot*** Severity	Rust Severity
	*	%	%	%
AC Superb	Spot, Stripe	90	11	5
Keene	Spot, Stripe	100	7	5
Alsen	Spot	100	5	0
Dandy	Spot	100	7	0
Hanna	Spot, Stripe	100	10	5
Oklee	Spot	100	6	0
Zeke	Spot, Stripe	100	7	5
Briggs	Spot, Stripe	100	5	1
Gunner	Spot, Leaf	100	8	1
Hank	Spot	100	5	0
Norpro	Spot, Stripe	100	3	1
Oxen	Spot	100	9	0
Amazon	Spot, Stripe	100	3	5
Knudson	Spot, Stripe	100	3	5
Mercury	Spot	80	2	0
Dapps	Spot, Stripe	100	3	1
McKenzie	Stripe	100	0	10
Reeder	Spot, Stripe	100	10	5
Granite	Spot, Leaf	50	3	1
Russ	Spot	100	10	0
Outlook	Spot	70	2	0
Parshall	Spot	100	80	0
Keystone	Spot	100	10	0
Ingot	Spot, Stripe	100	5	1

	Tan spot and Septoria	
Variety	Incidence	Severity
	%	%
Plaza	10	1
Lebsock	20	1
Munich	30	1
Pierce	40	3
Belzer	90	2
Rugby	90	3
Mountrail	70	5
AC Avonlea	100	5
Renville	80	3
Ben	50	1
Dilse	40	2
Maier	100	1
Monroe	80	1

* Foliar Diseases: Spot = leaf spotting complex (tan spot and septoria),
Stripe = stripe rust, Leaf = leaf rust.
** Incidence = % of plants with infection.
*** Severity = % of flag leaf surface infected.
This data was collected by Roger Ashley, Cody VanDerbusch and Cindy Leisy, NDSU Extension Service, Dickinson, on July 10, 2003. Plants were in the milk to soft dough growth stage.

Cross-Slot Plot Drill

A new research/demonstration drill using Cross-Slot openers was fabricated for use in southwestern North Dakota. Cross-Slot openers are known to be low-disturbance openers with the ability to handle large volumes of residue, placing seed and fertilizer accurately in separate bands. This no-till drill has the capability to seed both small research plots as well as larger demonstration plots. This new technology will increase the capacity of the NDSU Experiment Station and Extension Service to answer questions pertaining to no-till environments.

The Dickinson Research Extension Center extends their appreciation and thanks to the following organizations for their financial support in building this Cross-Slot plot drill.

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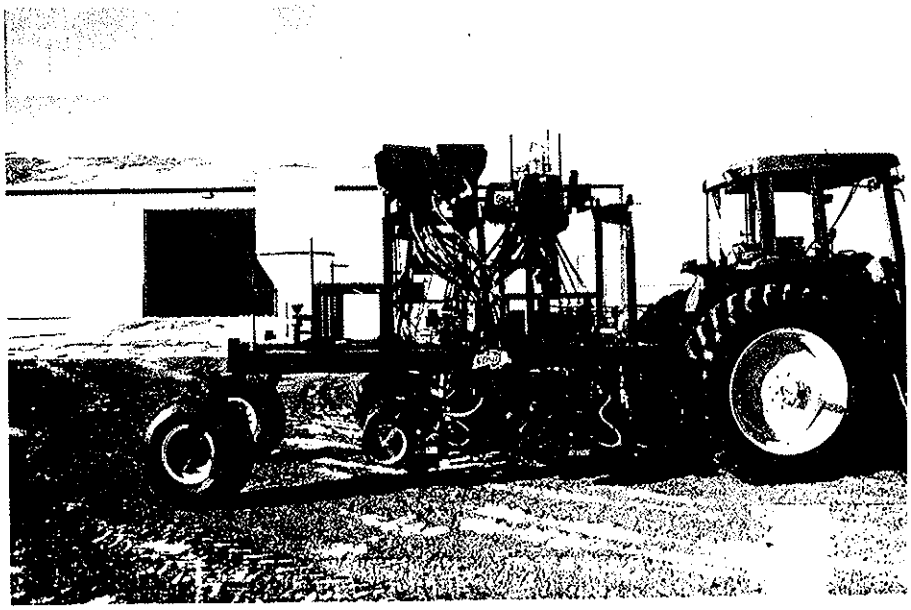

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