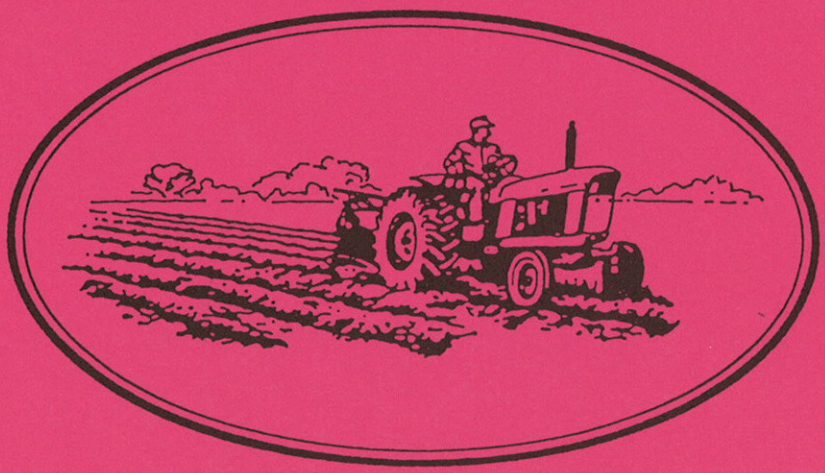
FOURTEENTH
ANNUAL

WESTERN DAKOTA

CROPS DAY RESEARCH REPORT



HETTINGER ARMORY
DECEMBER 18, 1997

Pat Carr, Agronomist
Glenn Martin, Research Specialist II
Burt Melchior, Ag. Technician II
Dickinson Research
and Extension Center
North Dakota State University
Dickinson, ND 58601

Eric Eriksmoen, Agronomist
Rick Olson, Ag. Technician III
Hettinger Research and
Extension Center
North Dakota State University
Hettinger, ND 58639

14th ANNUAL WESTERN DAKOTA CROPS DAY
DECEMBER 18, 1997
HETTINGER ARMORY

MST

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

10:00 **Earlybird Drawing**

10:30 **Opening Announcements**

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

Rodger Ashley, Extension Agronomist, Dickinson

Pat Carr, Agronomist, Dickinson Research Extension Center

Eric Eriksmoen, Agronomist, Hettinger Research Extension Center

12:00 **Lunch**
Provided by Program Sponsors. Free time to visit with sponsors.

1:00 **Ag Industry Update**

1:30 **Precision Ag: A Producer's Point of View**
Carl and Janice Mattson, Mattson Farms, Chester, Mont.

2:15 **Changes and Challenges from Field to Table**
Steven Edwardson, Crop Management Specialist, Minn-Dak Growers Ltd., Grand Forks, ND.

3:00 **Conclusion**
Drawing for door prizes, coffee and opportunity to visit with sponsors.

ACKNOWLEDGEMENTS

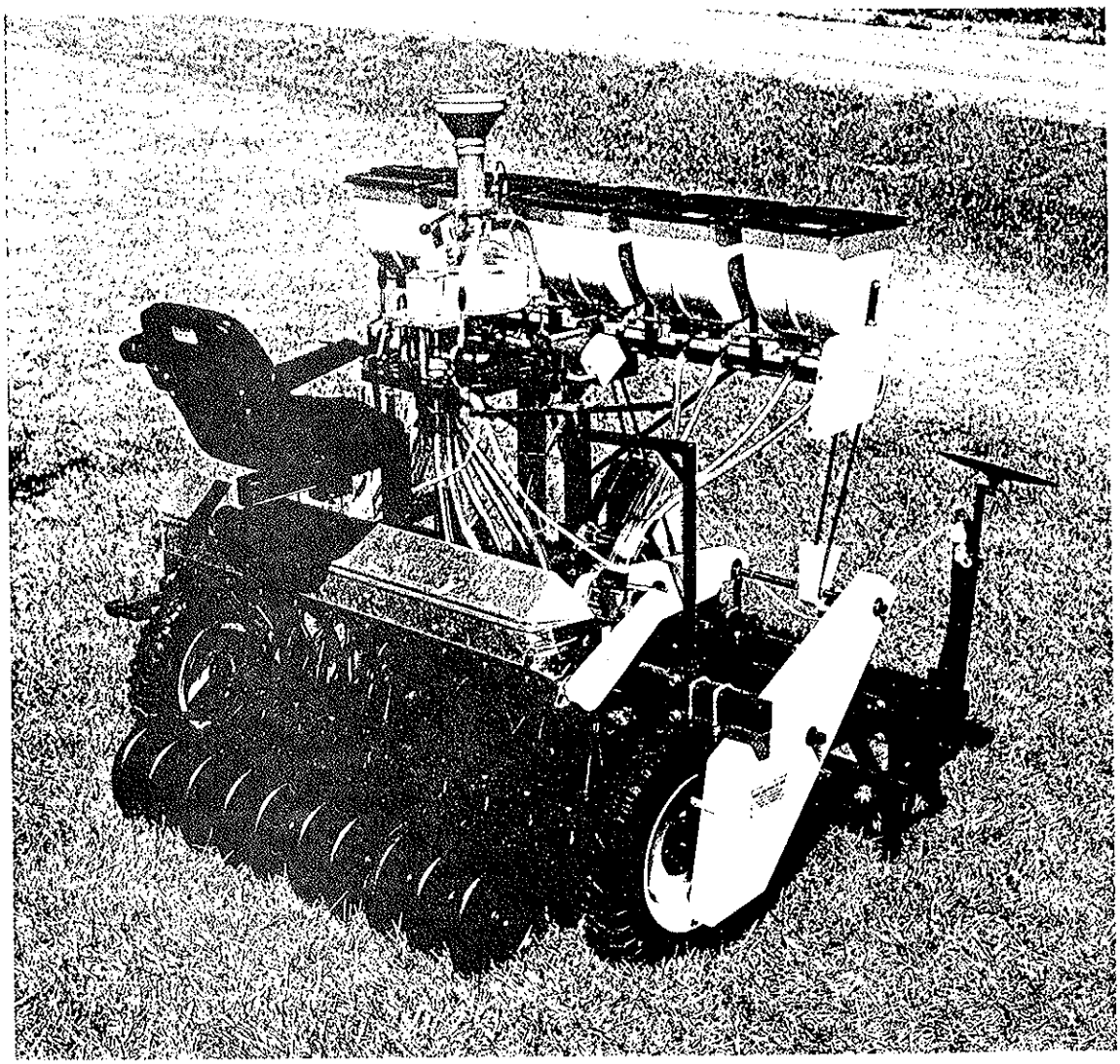
The Hettinger Research Extension Center and Dickinson Research Extension Center gratefully acknowledge and thank the following companies and organizations for their financial support and participation in this year's Western Dakota Crops Day. Those listed below have provided for the noon meal and have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

1997 WESTERN DAKOTA CROPS DAY SPONSORS

HETTINGER CHAMBER OF COMMERCE
MINN-DAK GROWERS, LTD.
DUPONT AG PRODUCTS
AGREVO, USA
PROSEED
MONSANTO
CARGILL HYBRID SEEDS
DEKALB GENETICS CORP.
WESTCHEM
FARM CREDIT SERVICES OF MANDAN
PIONEER HI-BRED SEEDS
ND STATE SEED DEPARTMENT
DOW ELANCO
KAYSTAR SEEDS
AGSCO
SCRANTON EQUITY EXCHANGE
SW GRAIN
ARROW K FARMS
ND GRAIN GROWERS ASSN.
NOVARTIS
ZENECA

We also acknowledge and thank the following individuals for their willingness to cooperate with us at our off-station plot sites. Their participation has enabled us to gather valuable information which would not otherwise be possible.

Daryl Birdsall, New Leipzig
Neal and Monte Freitag, Scranton
August and Perry Kirschmann, Regent
Dale and Calvin Hepper, Selfridge
Daryl Anderson, Reeder
Amos Gietzen, Glen Ullin
Ted Reich, Beulah
Pat Doll, Hannover



The Hettinger Research Extension Center extends their appreciation and thanks to the following organizations for their financial support in the purchase of a no-till research planter. This planter will provide the Research Center with new opportunities to incorporate badly needed no-till technology for the Western Dakota's.

Adams County Soil Conservation District
AgrEvo USA
American Cyanamid
BASF Corp.
Corson County Soil Conservation District
Dekalb Genetics Corp.
Dupont
Farm Credit Services of Mandan
Monsanto
North Dakota Barley Council
Perkins County Soil Conservation District
Zeneca

Table of Contents

Oats

Hard Red Winter Wheat and Winter Rye

Oilseed and Alternative Crops

Oilseeds

Grain Legumes

Corn and Millet

Special Report

Forage Crops

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. Trials conducted at Hettinger use four replications or repetitions of the variable in question. For example, the variety Amidon HRSW appeared four times (four replications) in the HRSW variety trial. In this case, the C.V. for yield of the Hettinger HRSW variety trial on fallow was 8.1%. This C.V. is a relative measure of how much the yield of all HRSW varieties varied between replications. In other words, C.V. is a measure of the precision or effectiveness of the trial and procedures used in conducting the trial. More can be said about a field trial with a relatively low C.V. (10 or less) than one with a C.V. greater than 10. Attempts are made to control human error and some environmental conditions such as conducting field studies on a uniform soil so that variability between replicates is minimized with a resulting low C.V. value (10 or less). In summation, a trial with a C.V. of 8 is more precise and more can be concluded from it than a trial with a C.V. of 18.

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 5% value you can conclude that under like environmental conditions, variety A will significantly out-yield variety B 95% of the time. 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 than the value for LSD 5% and is used in the same manner. If the yield of variety A exceeds variety B by more than the LSD 1% value you can conclude that under like environmental conditions, variety A will significantly out-yield variety B 99% of the time. 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
-1997-

Hard red winter wheat was planted into moist soil during the last few days of September 1996 providing excellent conditions for HRWW establishment prior to freeze up. The winter months of 1996/97 were generally cooler than normal and also wetter than normal with large accumulations of snow during the months of November and December. The blizzard of April 1997 will be remembered for it ferocity, causing heavy livestock loses, creating localized flooding and delaying the start of the planting season well into May. Winter injury to HRWW was not observed, even on the most sensitive varieties.

Fertility levels were determined to a 2 foot depth at all research sites prior to seeding. Adequate fertilizer was applied to each crop according to set yield goals.

The spring planting season was delayed by wet and cold soils until mid to late May. Localized rain showers along with mild temperatures throughout June provided for excellent small grain growing conditions at the Hettinger site. Most of southwestern North Dakota received little or no rain from mid-April through June causing uneven seedling emergence, poor stands and stressed growing conditions. The Regent site was abandoned for these reasons. A week of hot and dry weather during the last week of June may have adversely affected head formation in young small grain seedlings and caused blossom abortion in the canola trial.

Weed control was accomplished using herbicides with a pickup mounted sprayer applying 10 gallons of solution per acre. Herbicide varied according to crop and target weed.

Weather conditions during the summer months of July and August were warm and dry with below normal precipitation and near normal temperatures. Humidity brought up from the south tended to be high despite the lack of precipitation. There were no 100 degree temperatures recorded.

Warm season crop performance was outstanding with large sunflower heads, tall corn with long full ears and near bumper yields.

Insects were plentiful with grasshoppers continuing to cause problems. Their numbers appear to be fewer then from last year. We have seen a buildup of European corn borers during the past few years with a large infestation this year causing reduced corn yields at the New Leipzig site and almost a complete decimation of the proso millet trial at Hettinger.

Small grain foliar diseases were initially high but declined as the crops progressed under dry weather conditions.

WEATHER DATA SUMMARY
HETTINGER

Precipitation

Precipitation (inches)	1994-95	1995-96	1996-97	42 year average
Sept. - Dec.	7.80	2.35	6.95	3.26
Jan. - March	1.37	1.82	0.55	1.28
April	1.18	1.02	3.68	1.65
May	6.07	5.20	1.16	2.72
June	2.88	2.45	3.79	3.43
July	2.21	0.86	1.16	2.03
August	3.71	0.53	0.73	1.70
Total	25.22	14.23	18.02	16.07

Air Temperature

Average Temperature F	1994	1995	1996	1997	42 year average
April	42.7	37.8	38.7	34.8	42.6
May	56.5	49.8	48.8	52.0	54.3
June	63.8	63.0	65.5	65.9	63.8
July	67.1	68.1	67.2	68.0	69.8
August	68.1	71.6	70.4	68.0	68.6
September	60.4	57.4	56.8	60.1	57.1

Growing Degree Units - Corn

Growing Degree Units (50-86)	1994	1995	1996	1997	32 year average
May	321	186	148	226	335
June	414	412	457	480	425
July	484	559	550	574	498
August	519	644	591	543	535
September	377	348	276	412	389
Total	2115	2149	2022	2235	2182

Frost Free Days

	28 F	32 F	Normal 32 F
Date of last frost	May 14	May 20	May 18
Date of first frost	Sep 20	Sep 20	Sep 20
Frost free days	129	123	125

Growing Conditions
Dickinson Research Extension Center
1997

Precipitation and temperature data collected at the Dickinson Research Extension Center indicate that greater amounts of precipitation was received than the long-term average during the 1996-97 growing season, and near-normal temperatures were recorded between the months of April and August. Contrary to what these data imply, dry conditions persisted during critical periods of growth for many crops, and yields and/or seed quality were reduced. Precipitation was plentiful during other periods and led, along with other factors, to the development of disease. As a result, environmental factors during the 1996-97 growing season were hardly ideal.

Precipitation received as snow between September and March was greater than the long-term average and created wet field conditions in early April, 1997. Field work was delayed further by a blizzard occurring on 7 April, when over 17 inches of snow was received. As a result, planting was delayed by almost 3 weeks at the Dickinson Research Extension Center.

Dry conditions developed in May. With the exception of the 0.44 inches of precipitation received on 22 May, no significant precipitation was received at the Dickinson Research Extension Center between 27 April and 13 June. All field crops displayed severe water stress symptoms by June, and alfalfa and other forages harvested during this time produced yields generally no more than 1 ton/acre. The precipitation pattern changed in mid-June, and almost 6.4 inches of precipitation was received during July alone. Cool season crops seeded in late-May/early June, warm-season crops like millet and corn, and alfalfa seemed to benefit from the precipitation received during July; it appeared that precipitation received in July was too late to significantly improve the condition of early seeded crops.

Dry conditions again developed in August and persisted until fall freeze-up. As a result, winter wheat was planted in very dry soil and uneven emergence was observed. Soil moisture conditions improved somewhat in October, but soil moisture conditions continue to be a concern.

ANNUAL PRECIPITATION **DICKINSON R/E CENTER, ND**

	Precipitation						1996-97
						Long-term	Change
Month	1992-93	1993-94	1994-95	1995-96	1996-97	Average	from mean
	inches						%
Sep-Dec	2.34	1.80	6.44	1.38	4.17	3.16	132
Jan-March	1.13	1.26	1.85	2.38	6.01	1.55	388
Apr-June	7.88	8.06	7.34	4.72	6.40	5.23	122
July-Aug	5.46	1.74	10.54	4.41	7.36	5.12	144
Total	16.81	12.86	26.17	12.89	23.94	15.06	159

GROWING SEASON TEMPERATURE — **DICKINSON R/E CENTER, ND**

Month	Average temperature 1992-93	1993-94	1994-95	1995-96	1996-97	Long-term Average	1996-97 Change from mean
	°F						%
April	41	42	37	40	36	41	88
May	54	56	51	49	51	54	94
June	57	62	64	65	66	61	108
July	62	64	67	68	68	69	99
August	64	66	70	71	68	67	101
Average	56	58	58	59	58	58	99

GROWING DEGREE DAYS — **DICKINSON R/E CENTER, ND**

Month	Wheat (32° and 76°)	Corn (50° and 86°)
	Accumulated growing degree days (GDDs)	
May	375	145
June	1414	667
July	2473	1207
August	3489	1733
September	4308	2121

Trial Information	Dickinson Research and Extension Center

Trial	Location	Previous Crop	Seeding Rate	Seeding Date	Harvest Date
			pls/ac		
Barley	Dickinson	Green Fallow*	1,000,000	May 12	Aug 26
Barley	Hannover	Wheat	1,000,000	May 20	Aug 21
Durum	Dickinson	Green Fallow*	1,200,000	May 1	Aug 25
Durum	Hannover	Wheat	1,200,000	May 20	Sept 3
Wheat	Dickinson	Green Fallow*	1,200,000	April 30	Aug 18
Wheat	Beulah	Fallow	1,200,000	May 20	Sept 3
Wheat	Hannover	Wheat	1,200,000	May 20	Sept 3
Winter Wheat	Dickinson	Barley Hay	82 lbs**	Sept 24	July 31
Corn	Dickinson	Oat Hay	20,000	May 21	Sept 23
Corn Silage	Dickinson	Oat Hay	20,000	May 21	Sept 9
Lentil	Dickinson	Green Fallow*	550,000	May 6	Aug 7-21
Oat	Dickinson	Green Fallow*	1,000,000	May 5	Aug 14
Oat	Hannover	Wheat	1,000,000	May 20	Aug 21
Field Pea	Dickinson	Wheat	325,000	May 9	Aug 13
Field Pea Seeding Rate	Beulah	Fallow	Various	May 20	Aug 21
Field Pea Seeding Rate	Hannover	Wheat	Various	May 20	Aug 21
Field Pea Pop-up Fertilizer	Beulah	Fallow	325,000	May 20	Aug 21
Field Pea Pop-up Fertilizer	Hannover	Wheat	325,000	May 20	Aug 21
Mustard	Beulah	Fallow	8-12 lbs**	May 20	Aug 21
Mustard	Hannover	Wheat	8-12 lbs**	May 20	Aug 21
Lentil Forage	Dickinson	Green Fallow*	550,000	May 6	July 21
Field Pea Forage	Dickinson	Wheat	325,000	May 9	July 15
Warm Season Forage	Dickinson	Corn	Various	May 21	July 29
Cool Season Forage	Dickinson	Corn	Various	May 2	July 10

*Green Fallow was lentil, hairy vetch, or sweet clover as a cover crop

** Rate is seed planted

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

Trial	Location	Soil Test N	Soil Test P	Fertilizer Applied 18-46-0	Fertilizer Applied 24-0-0-24	Fertilizer Applied 46-0-0
		lbs/ac	ppm	lbs/ac	lbs/ac	lbs/ac
Barley	Dickinson	69	14	50	338	--
Barley	Hannover	42	--	50	--	120
Durum	Dickinson	57	20	50	338	--
Durum	Hannover	42	--	50	--	120
Wheat	Dickinson	57	20	50	338	--
Wheat	Beulah	79	--	50	--	120
Wheat	Hannover	42	--	50	--	120
Winter Wheat	Dickinson	87	28	--	200	--
Corn	Dickinson	98	8	50	--	120
Corn Silage	Dickinson	98	8	50	--	120
Lentil	Dickinson	37	10	--	--	--
Oat	Dickinson	82	14	--	280	--
Oat	Hannover	42	--	50	--	120
Field Pea	Dickinson	16	11	--	--	--
Field Pea Seeding Rate	Beulah	79	--	50	--	120
Field Pea Seeding Rate	Hannover	42	--	50	--	120
Field Pea Pop-up Fertilizer	Beulah	79	--	50	--	120
Field Pea Pop-up Fertilizer	Hannover	42	--	50	--	120
Mustard	Beulah	79	--	50	--	120
Mustard	Hannover	42	--	50	--	120
Lentil Forage	Dickinson	37	10	--	--	--
Field Pea Forage	Dickinson	16	11	--	--	--
Warm Season Forage	Dickinson	75	9	--	--	--
Cool Season Forage	Dickinson	75	9	--	--	--

Trial	Location	Application Date	Pesticide Applied
Barley	Dickinson	June 4	1 pt/a Bronate + 2 pt/a Hoelon
Barley	Hannover	June 12	2.5 pt/a Hoelon
		June 12	1.6 pt/a Buctril
Durum	Dickinson	May 27	2 pt/a Hoelon
		June 2	3 oz/a Banvel + 10 oz/a MCP ester
Durum	Hannover	June 12	2.5 pt/a Hoelon
		June 12	1.6 pt/a Buctril
Wheat	Dickinson	May 27	2 pt/a Hoelon
		June 2	3 oz/a Banvel + 10 oz/a MCP ester
Wheat	Beulah	June 12	2.5 pt/a Hoelon
		June 12	1.6 pt/a Buctril
Wheat	Hannover	June 12	2.5 pt/a Hoelon
		June 12	1.6 pt/a Buctril
Winter Wheat	Dickinson	May 23	1 pt/a 2-4 D ester
Corn	Dickinson	June 13	2/3 oz/a Accent + 1/2 pt/a Banvel + 5 pt/a Class Act
Corn Silage	Dickinson	June 13	2/3 oz/a Accent + 1/2 pt/a Banvel + 5 pt/a Class Act
Lentil	Dickinson	May 27	1.5 pt/a Poast + 1 qt/a Scoil
Oat	Dickinson	June 2	1 pt/a Bronate
Oat	Hannover	June 12	1.6 pt/a Buctril
Field Pea	Dickinson	May 6	1.5 pt/a Roundup 2pt/a Amonium Sulfate
		June 19	1.5 pt/a Poast + 1 qt/a Scoil
		Aug 7	1 pt/a Gramoxone Extra + .5 pt/a Class Preference
Field Pea Seeding Rate	Beulah	June 12	1.5 pt/a Poast + 1 qt/a Scoil
Field Pea Seeding Rate	Hannover	June 12	1.5 pt/a Poast + 1 qt/a Scoil
Field Pea Pop-up Fertilizer	Beulah	June 12	1.5 pt/a Poast + 1 qt/a Scoil
Field Pea Pop-up Fertilizer	Hannover	June 12	1.5 pt/a Poast + 1 qt/a Scoil
Mustard	Beulah	June 12	1.5 pt/a Poast + 1 qt/a Scoil
Mustard	Hannover	June 12	1.5 pt/a Poast + 1 qt/a Scoil
Lentil Forage	Dickinson	5/27/97	1.5 pt/a Poast + 1 qt/a Scoil
Field Pea Forage	Dickinson	May 6	1.5 pt/a Roundup + 2pt/a Amonium Sulfate
		June 19	1.5 pt/a Poast + 1 qt/a Scoil
Cool Season Forage	Dickinson	June 13	6 oz/a Asana
		June 30	6 oz/a Asana (Faba Bean)

NDSU Hard Red Spring Wheat Variety Description

Variety	Agent or Origin[1]	Released	Beard	Height	Strength of Straw	Maturity	Reaction to Disease[2] Stem rust	Leaf rust	Foliar Disease	Root Rot	Hd. (Scab)	Quality factors Test wt.	Wheat protein	Quality rating[3]
Coteau	ND	1978	yes	med.	m.strg.	med.	R	R	M	MS	S	avg.	high	4.0
Len	ND	1979	yes	s.dwf.	v.strg.	m.early	R	R	S	S	MS	high	avg.	4.0
Stoa	ND	1984	yes	med.	m.strg.	m.early	R	R	MS	M	MS	high	avg.	3.0
Butte 86	ND	1986	yes	med.	m.strg.	early	R[5]	R	MS	MS	MS	high	avg.	3.0
Nordic	AgriPro	1986	yes	s.dwf.	strg.	m.late	R	MR	MR	MR	MS	high	low	2.0
Amidon	ND	1988	yes	med.	med.	med.	R	R	M	MR	S	high	avg.	3.5
Prospect	SD	1988	yes	s.dwf.	v.strg.	m.early	R[6]	MR	MS	MR	MS	high	avg.	2.0
Grandin	ND	1989	yes	s.dwf.	strg.	early	R	R	S	M	S	high	avg.	4.0
Gus	ND	1989	yes	s.dwf.	strg.	m.early	R	R	M	M	VS	high	high	4.0
2370	NDSURF	1990	yes	s.dwf.	v.strg.	m.early	R[6]	R	S	S	MS*	high	avg.	2.5
2375	NDSURF	1990	yes	s.dwf.	med.	m.early	R	MR	S	M	MS*	high	avg.	2.5
Bergen	AgriPro	1990	yes	s.dwf.	v.strg.	m.early	R[6]	R	MR	MS	S	high	avg.	2.0
Sharp	SD	1990	yes	med.	med.	early	R	R	MS	S	MS*	v.high	avg.	2.0
2371	NDSURF	1991	yes	s.dwf.	v.strg.	m.early	R[5]	MR	M	S	MS	high	avg.	3.0
CDC Teal	CDC	1991	no	med.	med.	m.early	R	MR	M	MS	VS	high	high	4.0
Norm	MN	1992	yes	s.dwf.	v.strg.	med.	R	R	MR	MR	VS	high	low	2.0
Sonja	AgriPro	1992	yes	s.dwf.	v.strg.	m.early	R	MR	MR	M	VS	high	avg.	2.5
AC Domain	Can	1993	no	med.	med.	early	R	R	S	M	MS	high	high	2.5
AC Barrie	Can	1994	no	med.	med.	med.	R[7]	R	M	N/A	M	N/A	N/A	N/A
Kulm	ND	1994	yes	med.	strg.	early	R	R	MS	MS	S	high	high	3.5
2398	NDSURF	1995	yes	s.dwf.	strg.	m.late	R	R	MR	MS	VS	avg.	low	2.0
Ernest	ND	1995	yes	med.	med.	med.	R	R	MS	MR	S	high	high	2.5
Glupro	ND	1995	yes	tall	med.	m.late	R	MS	N/A	N/A	VS	avg.	v.high	4.0
Gunner	AgriPro	1995	yes	med.	m.strg.	med.	R[5]	R	MR	N/A	M	N/A	N/A	N/A
Hamer	AgriPro	1995	yes	s.dwf.	v.strg.	med.	R	R	M	N/A	S	avg.	avg.	2.0
Lars	AgriPro	1995	yes	s.dwf.	v.strg.	med.	R	R	MR	N/A	S*	avg.	low	2.0
McNeal	MT	1995	yes	med.	strg.	m.early	MS	S	M	M	VS	avg.	avg.	2.5
Norlander	AgriPro	1995	yes	s.dwf.	med.	m.early	MS	MR	MS	N/A	S	avg.	avg.	2.5
Russ	SD	1995	yes	med.	med.	m.early	R	R	S	S	S*	avg.	avg.	3.0
Trenton	ND	1995	yes	med.	med.	med.	R	R	MS	S	S*	high	avg.	3.0
Verde	MN	1995	yes	s.dwf.	strg.	med.	R	R	MR	M	MS*	avg.	low	2.0
AC Splendor	Cargil Can	1996	no	med.	med.	early	R	R	N/A	N/A	VS	N/A	N/A	N/A
AC Cora	Can	1996	no	med.	med.	med.	R[6]	R	M	N/A	S*	N/A	N/A	N/A
AC Majestic	Cargil Can	1996	no	med.	med.	med.	R	MR	N/A	N/A	S*	N/A	N/A	N/A
BacUp	MN	1996	yes	med.	med.	early	R	MR	S	N/A	MR	N/A	N/A	N/A
Keene	ND	1996	yes	med.	med.	med.	R	R	MR	M	S	high	avg.	3.0
Oxen	SD	1996	yes	s.dwf.	strg.	m.early	R[7]	R	MS	N/A	S	N/A	N/A	N/A
Sharpshooter	WPB	1996	yes	med.	med	early	R	R	MS	N/A	MS	N/A	N/A	N/A
AC Cadillac	Can	1997	no	med.	med.	med.	R	M	N/A	N/A	S	N/A	N/A	N/A
AC Elsa	Can	1997	no	med.	med.	med.	R[6]	M	N/A	N/A	VS	N/A	N/A	N/A
Forge	SD	1997	yes	s.dwf.	m.strg.	early	R[6]	R	N/A	N/A	MS	N/A	N/A	N/A
Nora	AgriPro	1997	yes	s.dwf.	strg.	med.	R[5]	R	MS	N/A	S	N/A	N/A	N/A

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

[2] R = resistant; MR = moderately resistant; M = intermediate; MS = moderately susceptible; S = susceptible; VS = very susceptible; [4] = occasionally mixed with some susceptible plant; [5] = MR, [6] = M, [7] = S or MS in artificially induced epidemics; N/A = data not available; Head blight = scab; Foliar disease = reaction to tan spot and septoria leaf spot complex. Letter ratings for head blight (scab) based on visual head symptoms. * Indicates yield and/or quality have often been higher than would be expected based on visual head blight symptoms alone.

[3] 1.0 = Very poor quality; 2.0 = Poor quality; 2.5 = Poor to average quality; 3.0 = Average quality; 3.5 = Average to good quality; 4.0 = Good quality; N/A = Quality data not available. Bread making quality assessed by the Department of Cereal Science, NDSU.

Hard Red Spring Wheat - Fallow **Hettinger**

Variety	Days to Head	Plant Height	Foliar Disease	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
		in	%	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
2398	57	31	4	59.4	13.8	64.7	63.3	85.8	74.6	71.3
Verde	58	30	15	58.4	13.5	72.4	56.6	79.4	68.0	69.5
Russ	55	30	5	59.0	14.2	68.4	57.9	76.7	67.3	67.7
Sharp	54	31	5	61.5	14.0	65.8	58.1	78.6	68.4	67.5
Trenton	57	36	7	60.4	14.2	64.2	55.0	81.4	68.2	66.9
Oxen	55	28	10	59.3	13.5	61.7	58.7	79.4	69.0	66.6
Lars	57	26	5	57.6	13.6	60.5	62.9	75.7	69.3	66.4
Norlander	55	29	15	58.8	14.1	67.8	59.2	70.6	64.9	65.9
2375	55	30	15	59.4	14.5	64.7	60.1	71.5	65.8	65.4
2370	55	28	10	58.1	14.7	68.6	56.9	70.5	63.7	65.3
McNeal	58	31	15	58.7	14.4	61.7	57.2	75.5	66.4	64.8
Hamer	57	29	4	59.0	13.7	63.3	60.5	70.3	65.4	64.7
2371	57	28	5	57.9	14.2	64.9	57.1	71.8	64.4	64.6
Butte 86	54	31	20	59.7	14.6	64.3	57.3	71.1	64.2	64.2
Amidon	57	33	15	60.0	13.8	54.0	55.5	79.3	67.4	62.9
Grandin	56	30	10	59.7	14.1	62.4	54.9	71.1	63.0	62.8
Keene	57	33	8	61.2	14.2	62.1	53.1	72.6	62.8	62.6
Kulm	53	31	10	60.7	14.6	62.1	56.1	68.5	62.3	62.2
Gus	58	30	10	58.2	14.8	62.7	55.4	66.4	60.9	61.5
Ernest	57	34	30	59.9	14.2	53.8	51.5	74.7	63.1	60.0
AC Barrie	57	34	20	60.0	14.3	42.8	55.6	78.3	67.0	58.9
AC Cora	57	36	5	59.2	14.9	38.8	48.7	71.4	60.0	53.0
AC Eatonia	57	33	20	59.6	14.9	48.8	45.8	58.6	52.2	51.1
Glupro	58	38	15	58.0	17.7	28.6	40.2	58.7	49.4	42.5
Nora	55	25	10	59.2	15.1		57.2	77.0	67.1	
Gunner	58	32	2	61.4	14.5		51.0	81.2	66.1	
Forge	53	31	30	60.7	13.9		60.8	70.6	65.7	
BacUP	53	30	8	62.3	16.3		41.6	56.8	49.2	

Continued

Hard Red Spring Wheat - Fallow - continued **Hettinger**

Variety	Days to Head	Plant Height	Foliar Disease	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
		in	%	lbs/bu	%	bu/ac				
AC Vista	56	30	20	57.4	12.8			78.9		
Cadillac	56	37	5	63.9	14.1			76.8		
AC Elsa	57	32	10	57.5	15.2			71.4		
Majestic	60	36	15	58.5	14.8			66.2		
Sharpshooter	54	31	15	61.7	14.0			65.5		
Splendor	53	30	15	57.9	15.5			61.0		
ND695	56	31	3	60.6	14.5			90.2		
ND691	59	34	5	58.7	13.5			84.4		
SBE0050	56	29	10	57.9	14.2			83.3		
ND704	56	32	25	60.3	13.6			83.1		
ND702	58	34	10	61.8	14.6			79.3		
ND700	58	35	10	61.6	13.8			79.2		
N92-0434	58	28	5	59.0	14.1			78.7		
SD3249	53	32	20	62.6	14.5			78.7		
ND694	56	31	10	61.4	14.8			77.8		
ND703	57	37	20	60.9	13.9			77.2		
ND690	56	32	15	60.0	14.3			76.4		
ND701	56	33	7	59.4	14.4			68.1		
Trial Mean	56.0	32.0	12.0	59.7	14.4	59.1	55.3	74.2	--	--
C.V. %	1.1	4.6	--	1.2	2.1	8.3	9.6	8.1	--	--
LSD .05	0.1	2.3	--	1.2	0.5	8.0	7.4	9.8	--	--
LSD .01	0.2	3.1	--	1.6	0.7	10.6	9.8	13.0	--	--

Planting Date: April 30, 1997
Harvest Date: August 18, 1997
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Yields are adjusted to 12% moisture.
Foliar disease = Percent of flag leaf infected with Tan Spot.

Hard Red Spring Wheat - Recrop **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield			Average Yield	
					1995	1996	1997	2 year	3 year
		in	lbs/bu	%	bu/ac				
2398	58	24	59.4	14.1	58.7	68.9	56.7	62.8	61.4
Hamer	57	26	58.7	15.2	55.2	68.9	55.4	62.2	59.8
2375	55	26	59.9	14.1	56.0	67.2	54.3	60.8	59.2
Verde	58	25	58.5	13.7	59.9	64.4	50.3	57.4	58.2
Norlander	55	24	59.5	14.6	58.6	65.7	48.1	56.9	57.5
McNeal	58	27	58.2	14.5	54.8	66.1	48.9	57.5	56.6
Sharp	55	28	61.5	13.5	56.8	64.1	49.0	56.6	56.6
Kulm	54	28	61.1	14.6	59.9	61.9	44.1	53.0	55.3
Trenton	58	30	59.3	15.3	57.0	61.1	46.2	53.6	54.8
Butte 86	55	28	60.6	13.6	57.7	57.8	42.9	50.4	52.8
Ernest	58	30	59.9	14.5	52.7	59.4	45.5	52.4	52.5
Grandin	57	28	58.6	14.9	52.9	55.1	47.5	51.3	51.8
2371	58	26	57.7	14.9	50.2	57.6	47.4	52.5	51.7
Amidon	57	30	59.3	15.0	47.4	58.2	44.6	51.4	50.1
Glupro	59	30	56.6	17.7	26.7	42.6	35.2	38.9	34.8
Oxen	54	26	59.5	13.4		66.6	53.0	59.8	
Russ	57	28	59.2	14.1		70.5	46.8	58.6	
Keene	58	30	60.8	14.6		63.5	49.7	56.6	
Forge	53	29	62.3	13.2			60.9		
2370	56	24	59.2	14.7			44.7		
ND695	57	25	59.8	14.2			57.7		
ND694	57	30	60.9	15.1			50.4		
ND690	57	28	60.3	14.6			50.3		
Trial Mean	57.0	27.0	59.6	14.5	52.2	62.3	49.1	--	--
C.V. %	1.4	4.8	0.9	4.7	10.3	9.2	9.0	--	--
LSD .05	1.0	2.0	0.9	1.1	7.6	8.1	7.3	--	--
LSD .01	2.0	3.0	1.2	1.5	10.0	10.7	9.7	--	--

Planting Date: April 30, 1997
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Previous crop: HRSW

Harvest Date: August 11, 1997
Yields are adjusted to 12% moisture.

Hard Red Spring Wheat — **Scranton**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
	in	lbs/bu	%			bu/ac		
2398	26	57.7	14.4	46.6	54.8	47.5	51.2	49.6
2375	28	57.9	15.0	47.2	57.2	41.3	49.2	48.6
Russ	29	58.2	14.1	41.8	55.1	46.9	51.0	47.9
Amidon	30	58.4	13.8	41.1	55.6	43.6	49.6	46.8
2371	29	55.6	14.6	47.1	47.3	43.6	45.4	46.0
Trenton	34	58.4	13.6	43.5	50.1	41.8	46.0	45.1
Ernest	33	57.3	14.1	42.6	47.1	41.8	44.4	43.8
Kulm	28	60.7	13.8	40.4	45.9	44.1	45.0	43.5
Grandin	30	57.3	15.1	41.7	47.7	36.4	42.0	41.9
Keene	33	59.1	13.9		55.4	38.6	47.0	
Oxen	27	56.9	14.0			47.7		
Verde	27	55.6	14.1			47.0		
Forge	27	59.8	13.5			42.6		
Butte 86	29	58.4	14.5			39.4		
Trial Mean	29.0	57.9	14.2	41.9	51.7	42.9	--	--
C.V. %	5.2	1.4	--	8.3	8.5	10.6	--	--
LSD .05	3.0	1.3	--	5.8	7.4	7.6	--	--
LSD .01	3.0	1.8	--	7.8	10.0	NS	--	--

Planting Date: May 6, 1997
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Yields are adjusted to 12% moisture.
NS = no statistical difference between varieties.

Harvest Date: August 21, 1997
Previous Crop: Fallow

Hard Red Spring Wheat — **New Leipzig**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
	in	lbs/bu	%	bu/ac				
2375	28	59.6	14.3	58.9	63.0	62.3	62.6	61.4
2398	28	59.0	14.2	51.9	67.5	60.5	64.0	60.0
Kulm	31	60.8	14.9	55.4	58.9	63.4	61.2	59.2
Russ	31	59.5	14.9	53.5	59.2	64.3	61.8	59.0
Amidon	32	59.8	14.3	43.8	58.5	68.0	63.2	56.8
Trenton	33	60.9	14.6	46.7	58.4	62.1	60.2	55.7
Ernest	32	59.7	14.8	43.9	56.1	59.5	57.8	53.2
Grandin	31	60.7	14.7	37.2	57.2	59.5	58.4	51.3
2371	27	58.3	14.4	47.2	53.3	53.1	53.2	51.2
Keene	33	61.1	14.5		63.4	64.6	64.0	
Verde	29	58.8	13.5			62.1		
Butte 86	30	60.4	14.9			61.4		
Oxen	25	58.5	14.0			60.2		
Forge	29	59.0	14.8			56.1		
Trial Mean	30.0	59.7	14.5	47.0	59.1	61.2	--	--
C.V. %	6.1	1.1	--	11.2	9.2	6.4	--	--
LSD .05	3.0	1.1	--	7.5	7.8	6.6	--	--
LSD .01	4.0	1.4	--	10.1	NS	8.9	--	--

Planting Date: May 12, 1997
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Yields are adjusted to 12% moisture.
NS = no statistical difference between varieties.

Harvest Date: August 21, 1997
Previous crop: Fallow

Hard Red Spring Wheat **Selfridge**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1995	1996	1997	Average Yield 2 year	3 year
	in	lbs/bu	%	bu/ac				
Trenton	28	58.3	14.0	29.9	71.6	39.4	55.5	47.0
2398	25	57.2	14.7	28.4	68.8	38.1	53.4	45.1
Amidon	30	57.6	14.1	20.3	70.3	39.3	54.8	43.3
Russ	26	56.5	14.5	29.6	69.6	30.1	49.8	43.1
2375	23	56.9	14.7	30.3	62.9	29.5	46.2	40.9
Ernest	28	58.1	14.2	24.5	62.0	33.4	47.7	40.0
2371	24	56.3	15.2	26.9	60.8	32.2	46.5	40.0
Kulm	24	58.7	--	31.4	59.1	26.3	42.7	38.9
Grandin	26	55.9	14.7	24.2	60.9	22.8	41.8	36.0
Keene	27	58.4	13.8		69.0	31.5		
Oxen	24	56.2	13.1			30.9		
Verde	24	56.9	14.2			30.9		
Butte 86	26	56.6	14.3			29.9		
Forge	25	57.8	13.5			27.2		
Trial Mean	26.0	57.3	14.2	27.4	64.4	31.6	--	--
C.V. %	6.7	0.9	--	8.1	8.7	18.5	--	--
LSD .05	2.0	0.7	--	3.2	9.5	8.4	--	--
LSD .01	3.0	1.0	--	4.3	12.9	NS	--	--

Planting Date: May 13, 1997
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Yields are adjusted to 12% moisture.
NS = no statistical difference between varieties.
Trial was planted into dry soil causing poor and uneven emergence.

Harvest Date: August 20, 1997
Previous crop: HRSW

Hard Red Spring Wheat	Mandan

Variety	Plant Height	Test Weight	Protein	Grain Yield
	in	lbs/bu	%	bu/ac
Russ	30	56.7	14.0	39.2
2371	25	56.8	14.6	38.8
2375	27	57.4	13.2	38.4
Forge	27	59.4	13.9	37.8
Oxen	25	56.8	14.5	37.3
Butte 86	28	57.8	13.8	35.0
Verde	27	56.9	12.9	33.7
Amidon	34	55.3	13.5	33.0
Keene	31	58.9	14.9	32.6
Grandin	27	57.2	14.4	32.5
Kulm	27	58.4	13.6	30.3
2398	27	55.6	13.3	29.3
Ernest	32	55.8	13.5	28.7
Trenton	31	55.9	12.3	27.8
Trial Mean	28.0	57.0	13.7	34.0
C.V. %	7.9	2.9	--	20.7
LSD .05	3.0	2.7	--	NS
LSD .01	4.0	NS	--	NS

Planting Date: May 13, 1997
Harvest Date: August 20, 1997
Previous crop: 100 bu/ac corn.
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Yields are adjusted to 12% moisture.
NS = no statistical difference between varieties.
Notes: Ground was intensively worked prior to planting to break down corn stubble. Seed was planted into dry soil resulting in a poor and uneven stand.

Hard Red Spring Wheat - Green Fallow — **Dickinson, ND**

Variety	Days to Head	Seeds	Plant Height	Lodging Score	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Returns	Average Yield 2 Year	Average Yield 3 Year
		lbs	in	0-9	lbs/bu	%	bu/ac	bu/ac	bu/ac	$/ac	bu/ac	bu/ac
Semidwarf												
2370	55	14,452	21	0.0	53.5	16.5	46.8	44.5	36.8	122.07	40.6	42.7
2371	58	16,613	27	0.0	52.8	15.9	49.1	40.4	45.2	147.98	42.8	44.9
2375	55	14,211	20	0.5	55.0	16.9	49.1	45.5	31.1	108.25	38.3	41.9
2398	55	13,866	22	0.0	54.4	15.4	60.7	53.5	48.0	158.82	50.7	54.1
Grandin	55	13,446	24	0.8	55.6	16.3	54	41.2	42.1	146.04	41.6	45.8
Gus	57	16,905	24	0.0	54.0	16.4	52.8	42.5	45.4	155.28	44.0	46.9
Hamer	55	15,196	21	0.0	52.3	16.4	53.8	42.8	41.1	135.32	41.9	45.9
Lars	56	15,553	20	0.0	51.8	15.5	62.1	41.1	42.9	137.67	42.0	48.7
Len	58	13,864	24	0.0	52.9	15.5	--	--	47.7	151.39	--	--
McNeal	56	12,857	25	0.0	53.9	15.4	61.5	48.6	51.3	170.02	50.0	53.8
Nora	53	13,739	19	1.0	54.9	16.7	--	45.9	38.0	129.14	42.0	--
Norlander	52	15,697	19	0.0	54.0	17.5	53.7	45.3	30.0	102.24	37.6	43.0
Oxen	51	14,320	23	0.0	55.4	15.6	54.5	44.7	48.2	164.71	46.4	49.1
Verde	57	13,706	22	0.0	55.1	15.7	56.4	47.4	45.2	151.42	46.3	49.7
Conventional												
AC Barrie	56	14,842	26	0.3	54.3	16.2	50.7	43.2	49.6	167.93	46.4	47.8
AC Cadillac	57	14,227	27	0.8	54.4	15.4	--	42.9	48.2	156.93	45.6	--
AC Cora	56	15,178	26	1.0	57.0	17.0	45.3	45	47.0	167.59	46.0	45.8
AC Eatonia	56	15,652	28	3.0	55.3	16.0	36	38.4	49.6	172.30	44.0	41.3
AC Elsa	55	18,272	23	0.8	51.1	16.5	--	43.6	40.5	127.49	42.0	--
AC Vista	54	12,420	22	0.8	54.1	15.4	--	--	39.7	131.65	--	--
Amidon	57	15,984	27	0.5	51.6	15.1	59.6	45.3	53.7	166.63	49.5	52.9
BacUP	52	15,434	20	0.3	55.8	19.4	--	33.2	26.9	95.95	30.0	
Butte 86	53	14,080	26	0.5	54.6	15.4	52.7	48.6	47.4	159.47	48.0	49.6
Ernest	56	16,202	24	0.5	52.3	15.8	55.2	48.5	44.1	142.53	46.3	49.3
Gunner	58	16,089	26	0.0	57.0	16.3	--	43.7	52.3	185.12	48.0	
Keene	57	16,477	28	0.0	55.6	14.4	58.8	45.8	54.6	178.11	50.2	53.1
Kulm	50	15,133	23	0.5	57.8	17.9	51.8	39.6	34.3	122.81	36.9	41.9
Majestic	58	17,490	25	0.0	53.0	16.7	--	36.7	37.7	126.37	37.2	--
Russ	54	14,556	22	0.0	54.8	15.8	49.7	38.4	42.9	145.77	40.6	43.7
Sharp	52	14,584	23	1.3	55.5	16.4	48.2	44.6	37.6	127.19	41.1	43.5
Sharpshooter	53	14,263	22	1.0	56.5	15.7	--	--	48.6	165.48	--	--
Splendor	54	14,191	25	0.3	55.4	15.9	--	41.4	46.7	155.33	44.0	--
Trenton	56	14,795	25	0.3	54.6	16.1	53.6	47.1	41.6	141.49	44.4	47.4
Mean	55	14,998	24	0.4	54.4	16.1	--	--	44.5	147.14	--	--
C.V. %	1.5	6.8	15.1	144.5	2.9	7.4	--	--	29.6	29.1	--	--
LSD .05	1	1,429	NS	NS	2.2	1.7	--	--	NS	NS	--	--

Lodging: 0 = No lodging, 9 = Completely flat

Returns were calculated by multiplying the 1997 yield by the protein premium/discount and test weight discount paid at the Southwest Grain Terminal located at Gladstone on November 3.

Hannover Hard Red Spring Wheat - Recrop — **Dickinson, ND**

Variety	Seeds	Height	Test Weight	Protein	Grain Yield 1995	Grain Yield 1997	% of Grandin	Returns	2 Year Average
	lbs	in	lbs/bu	%	-----bu/ac-----			$/ac	bu/ac
2370	17,702	27	56.5	14.6	--	34.0	98	119.04	--
2375	15,800	28	57.9	13.6	36.0	40.0	116	137.22	38.0
2398	14,950	27	57.9	13.0	--	40.2	116	136.67	--
AC Barrie	16,895	32	57.0	14.2	--	36.6	106	126.55	--
Amidon	16,297	35	58.1	13.3	27.9	43.0	125	147.10	35.5
Butte 86	15,502	28	57.6	14.0	38.7	33.2	96	114.23	36.0
Ernest	15,795	34	58.1	14.0	31.3	42.7	124	148.11	37.0
Grandin	15,775	29	57.5	14.0	23.4	34.5	100	118.97	29.0
Keene	17,104	33	59.5	13.3	--	41.2	119	140.10	--
Oxen	18,540	26	56.0	14.1	--	34.7	101	118.16	--
Russ	16,451	31	57.0	13.5	--	40.3	117	137.45	--
Verde	17,073	28	56.6	13.4	--	41.5	120	139.48	--
Mean	16,490	30	57.5	13.7	--	38.5	--	131.92	--
C.V. %	4.2	4.0	0.7	3.0	--	8.1	--	7.8	--
LSD .05	994	2	0.6	0.6	--	4.5	--	14.82	--

Lodging Score for 2375 = .3

Beulah Hard Red Spring Wheat - Fallow — **Dickinson, ND**

Variety	Seeds	Test Weight	Protein	Grain Yield 1995	Grain Yield 1997	% of Grandin	Returns	2 Year Average
	lbs	lbs/bu	%	bu/ac	bu/ac		$/ac	bu/ac
2370	18,935	56.8	16.4	--	12.5	108	68.61	--
2375	17,629	58.9	15.4	44.6	24.4	213	110.40	34.5
2398	18,057	57.5	16.2	--	25.8	224	109.76	--
AC Barrie	21,028	56.3	17.0	--	15.4	134	69.42	--
Amidon	19,749	57.9	15.0	40.3	19.4	169	96.19	29.9
Butte 86	17,384	57.5	16.1	46.8	9.4	82	61.12	28.1
Ernest	19,032	57.9	15.9	41.2	18.0	156	85.06	29.6
Grandin	20,079	54.5	16.2	37.3	11.5	100	74.94	24.4
Keene	18,743	58.9	15.2	--	18.3	159	93.90	--
Oxen	21,090	56.5	16.3	--	16.9	147	82.31	--
Russ	19,233	57.3	15.9	--	16.3	142	89.00	--
Verde	19,834	56.5	15.6	--	22.6	196	100.18	--
Mean	19,233	57.2	15.9	--	17.5	--	86.74	--
C.V. %	1.5	1.5	--	--	15.8	--	--	--
LSD .05	3,746	1.3	--	--	NS	--	--	--

*Trial received hail damage

Hard Red Spring Wheat in Southwestern North Dakota
Combined Means

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield 1995 *	Grain Yield 1996 **	Grain Yield 1997 ***	Average Yield 2 year	Average Yield 3 year
		in	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
2398	58	29	58.0	14.1	48.9	60.6	53.0	56.8	54.2
2375	55	27	58.5	14.3	49.1	57.2	49.6	53.4	52.0
Russ	56	29	58.2	14.3	47.8	57.4	50.7	54.0	52.0
Trenton	58	32	58.9	14.0	47.6	54.7	49.8	52.2	50.7
Kulm	54	28	60.1	14.3	49.8	52.7	46.1	49.4	49.5
2371	58	26	57.1	14.6	45.6	52.1	47.8	50.0	48.5
Amidon	57	32	58.4	14.1	40.5	53.7	51.3	52.5	48.5
Ernest	58	32	58.4	14.2	42.3	51.3	47.3	49.3	47.0
Grandin	56	29	58.2	14.6	43.3	51.8	45.0	48.4	46.7
Keene	58	31	59.9	14.3		55.2	48.3	51.8	
Oxen	54	26	57.9	13.8			51.4		
Verde	58	27	57.5	13.6			50.6		
Forge	53	28	59.8	13.8			49.2		
Butte 86	54	29	58.9	14.3			46.6		

Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Yields are adjusted to 12% moisture.
*5 locations: Hettinger fallow & recrop, Scranton, New Leipzig and Selfridge.
**6 locations: Hettinger fallow & recrop, Regent, Scranton, New Leipzig and Selfridge.
***6 locations: Hettinger fallow & recrop, Scranton, New Leipzig, Selfridge and Mandan.

NDSU Durum Variety Description

Variety	Agent or Origin[1]	Year Released	Chaff Color	Height	Straw Strength	Maturity	Reaction to Disease[2]				Quality Factors		
							Stem Rust	Leaf Rust	Foliar Disease	Hd Blight (Scab)	Test Wt.	Kernel Size[3]	Overall Quality[4]
Ward	ND	1972	tan	tall	v.strg.	m.early	R	R	MR	S	avg.	med.	2
Rugby	ND	1973	tan	tall	v.strg.	m.early	R	R	MR	S*	avg.	med.	2
Cando	ND	1975	tan	s.dwf.	v.strg.	med.	R	R	M	VS	avg.	small	2
Vic	ND	1979	white	tall	med.	m.early	R	R	MR	S*	high	large	4
Lloyd	ND	1983	white	s.dwf.	v.strg.	med.	R	MR	S	VS	avg.	med.	3
Medora	Can.	1983	white	tall	strg.	m.early	R	R	MS	VS	high	large	4
Kyle	Can.	1984	white	tall	weak	med.	R	MR	M	N/A	avg.	large	4
Laker	WPB	1985	white	s.dwf.	strg.	med.	R	MR	S	S	avg.	med.	3
Monroe	ND	1985	white	tall	med.	early	R	R	M	VS	avg.	large	4
Fjord	AgriPro	1986	white	tall	strg.	m.early	R	R	M	S	high	large	4
Renville	ND	1988	white	tall	med.	med.	R	R	M	S*	high	med.	4
Plenty	Can.	1990	white	tall	weak	late	R	R	MR	MS	avg.	N/A	4
Voss	AgriPro	1994	white	s.dwf.	v.strg.	med.	R	MR	MS	S	avg.	med.	3
Munich	ND	1995	white	med.	v.strg.	med.	R	R	MR	S*	avg.	med.	4
AC Melita	Can.	1995	white	tall	med.	med.	R	N/A	N/A	S	avg.	large	4
Ben	ND	1996	white	med.	strong	med.	R	R	MR	S*	high	large	4
Dressler	AgriPro	1996	white	tall	med.	med.	R	MR	N/A	VS	avg.	large	4
Belzer	ND	1997	white	tall	med.	late	R	R	M	MR	low	large	4

[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 head blight symptoms done.

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

[4] 1 = Very poor quality; 2 = Poor quality; 3 = Average quality; 4 = Good quality.
Quality assessment by the Department of Cereal Science, NDSU.

Durum - Green Fallow — **Dickinson, ND**

Variety	Days to Head	Seeds	Plant Height	Lodging Score	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Returns	Average Yield 2 Year	Average Yield 3 Year
		lbs	in	0-9	lbs/bu	%	bu/ac	bu/ac	bu/ac	$/ac	bu/ac	bu/ac
AC Melita	55	13,199	22	0.0	52.3	17.8	49.1	56.4	32.6	175.47	44.5	46.0
Belzer	55	12,710	21	1.3	51.1	16.9	49.3	61.6	33.9	177.68	47.7	48.3
Ben	55	12,432	24	0.3	54.0	17.3	60.1	59.3	30.0	166.75	44.6	49.8
Dressler	54	11,998	24	0.0	54.9	17.2	--	58.3	37.8	213.81	48.0	--
Laker	56	12,089	22	1.8	53.3	16.8	50.0	57.0	29.4	160.06	43.2	45.5
Lloyd	56	11,942	20	0.0	53.8	16.0	46.9	63.8	33.6	183.10	48.7	48.1
Medora	54	12,995	21	0.8	55.3	16.7	45.0	52.5	37.6	213.49	45.1	45.1
Monroe	51	12,456	23	0.8	53.1	17.7	48.7	52.3	26.3	143.73	39.3	42.4
Munich	54	13,527	20	0.0	51.5	18.2	56.9	56.1	34.7	184.51	45.4	49.2
Plenty	57	12,645	25	0.0	51.6	18.5	50.3	57.2	30.7	166.63	43.9	46.1
Regold	56	11,283	23	0.0	54.5	16.6	53.0	55.7	33.1	183.90	44.4	47.3
Renville	55	12,828	23	0.3	53.4	18.0	54.3	60.9	31.1	171.32	46.0	48.8
Rugby	55	12,536	24	0.0	54.0	18.3	56.0	51.6	34.8	194.62	43.2	47.5
Sceptre	55	13,194	21	0.0	53.5	18.1	52.9	58.1	33.7	186.45	45.9	48.2
Vic	55	13,249	22	0.5	51.8	18.6	56.2	55.7	27.7	151.68	41.7	46.5
Voss	55	11,575	20	0.0	54.4	16.1	59.6	54.2	37.7	207.06	46.0	50.5
Ward	55	12,383	24	0.3	53.6	17.8	53.9	57.1	35.1	193.15	46.1	48.7
Mean	55	12,674	22	0.2	53.5	17.5	--	--	32.7	180.79	--	--
C.V. %	4.6	6.3	7.9	166.4	2.8	3.5	--	--	18.7	17.0	--	--
LSD .05	3.6	1,122	2	NS	2.1	0.9	--	--	NS	NS	--	--

Lodging: 0 = No lodging, 9 = Completely flat

Returns were calculated by multiplying the 1997 yield by the protein premium/discount and test weight discount paid at the Southwest Grain Terminal located at Gladstone on November 3.

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

Variety	Seeds	Height	Test Weight	Protein	Grain Yield 1995	Grain Yield 1997	% of Renville	Returns	2 Year Average
	lbs	in	lbs/bu	%	bu/ac	bu/ac		$/ac	bu/ac
AC Melita	14,433	33	58.4	14.6	--	38.9	102	235.60	--
Belzer	13,522	34	57.1	13.3	--	37.7	99	219.27	--
Ben	11,987	35	60.4	14.2	--	42.7	112	257.17	--
D 88303	13,326	27	58.3	13.6	--	36.6	96	216.49	--
Munich	15,230	30	56.3	14.4	37.4	39.4	103	229.01	38.4
Renville	14,320	34	58.3	13.7	34.5	38.1	100	226.98	36.3
Mean	13,803	32	58.1	14.0	--	38.9	--	230.75	--
C.V. %	5.6	5.0	0.7	2.4	--	12.0	--	11.9	--
LSD .05	1,165	2	0.6	0.5	--	7.0	--	41.51	--

Durum Wheat - Fallow **Hettinger**

Variety	Days to Head	Plant Height	Foliar Disease	Test Weight	Protein	Grain Yield			Average Yield	
						1995	1996	1997	2 year	3 year
		in	%	lbs/bu	%	bu/ac				
Laker	58	29	5	59.4	14.4	58.1	73.1	86.2	79.6	72.5
Monroe	56	31	10	59.2	15.3	66.5	72.3	78.5	75.4	72.4
Regold	57	36	5	59.4	14.8	66.9	73.5	75.0	74.2	71.8
Lloyd	59	27	6	55.9	14.9	58.4	79.7	72.8	76.2	70.3
Ward	57	33	10	58.4	15.3	58.8	71.8	79.6	75.7	70.1
Rugby	58	34	10	58.5	15.3	67.2	68.2	73.9	71.0	69.8
Belzer	59	32	40	56.0	15.6	61.9	72.7	73.8	73.2	69.5
Renville	58	32	10	57.7	14.9	61.9	74.7	70.1	72.4	68.9
Voss	59	27	10	57.0	15.2	55.2	78.8	71.7	75.2	68.6
Plenty	60	37	7	56.4	15.9	62.6	71.8	71.2	71.5	68.5
Ben	58	30	15	57.7	15.9	63.6	71.0	68.1	69.6	67.6
AC Melita	58	34	8	57.6	15.4	62.2	71.4	68.2	69.8	67.3
Vic	57	34	10	58.1	15.1	55.7	70.8	72.3	71.6	66.3
Medora	57	33	10	57.8	16.0	58.2	67.5	72.2	69.8	66.0
Sceptre	58	32	8	56.4	15.3	56.9	70.9	69.6	70.2	65.8
Munich	57	28	10	54.7	15.8	53.6	70.2	68.4	69.3	64.1
Dressler	57	34	5	56.5	16.1		71.6	68.9	70.2	
D901442	57	30	5	59.3	14.8			84.3		
D91-1526	58	29	15	59.0	15.5			81.0		
D931114	57	27	8	58.2	14.2			80.8		
D920016	58	25	10	59.4	14.4			78.5		
D89135	58	33	10	57.2	16.2			78.0		
D901247	57	32	10	59.0	14.9			77.8		
D921585	59	33	10	57.8	14.5			76.6		
D931011	59	35	8	59.0	14.9			75.7		
D931054	56	30	15	57.7	15.3			75.1		
D901536	58	30	5	58.7	14.5			74.5		
D921019	58	33	8	58.5	14.9			74.0		

Continued

Variety	Days to Head	Plant Height	Foliar Disease	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
		in	%	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
D930503	58	34	15	58.6	15.0			73.4		
D901313	59	31	5	56.9	15.0			71.3		
D901518	59	30	7	56.5	14.6			71.2		
D91080	59	28	5	55.5	15.2			70.5		
D901155	56	33	8	59.5	15.6			70.2		
D91066	60	32	15	57.0	15.4			68.0		
D920078	60	26	9	55.6	15.2			68.0		
D901297	60	30	15	56.8	15.3			67.7		
D901419	58	27	5	57.7	14.6			64.1		
D88303	58	27	7	56.2	14.7			63.8		
D91058	61	30	5	55.3	15.7			55.3		
Trial Mean	58.0	31.0	10.0	57.6	15.2	61.7	72.6	72.8	--	--
C.V. %	1.5	4.1	--	0.9	2.4	11.0	8.4	7.7	--	--
LSD .05	1.0	2.0	--	0.9	0.6	9.5	8.5	9.1	--	--
LSD .01	2.0	3.0	--	1.2	0.8	12.7	11.1	12.1	--	--

Planting Date: April 30, 1997
Harvest Date: August 18, 1997
Seeding Rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Yields are adjusted to 12.5% moisture.
Foliar disease = Percent of flag leaf infected with Tan Spot.

Durum	Scranton

Variety	Plant Height	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
	in	lbs/bu	%	bu/ac				
Renville	29	56.2	15.9	41.9	57.1	41.0	49.0	46.7
Munich	26	55.2	16.3	40.8	55.9	42.1	49.0	46.3
Vic	29	58.8	16.0	36.1	52.6	42.5	47.6	43.7
Ben	28	58.8	15.9		58.4	46.4	52.4	
Belzer	30	54.8	16.3			44.2		
Trial Mean	28	56.7	16.1	39.8	56.1	43.2	--	--
C.V. %	3.6	0.8	--	7.4	6.6	7.6	--	--
LSD .05	2	0.7	--	5.2	5.0	NS	--	--
LSD .01	2	0.9	--	NS	NS	NS	--	--

Planting Date: May 6, 1997
Harvest Date: August 21, 1997
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous Crop: Fallow
Yields are adjusted to 12.5% moisture.
NS = no statistical difference between varieties.

Durum	Selfridge

Variety	Plant Height	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
	in	lbs/bu	%	bu/ac				
Renville	28	58.2	14.1	30.0	62.5	34.0	48.2	42.2
Vic	30	60.6	13.1	26.5	59.2	35.0	47.1	40.2
Munich	25	55.5	14.5	31.2	59.6	27.9	43.8	39.6
Ben	27	59.6	14.2		62.2	35.5	48.8	
Belzer	28	56.2	14.5			33.2		
Trial Mean	28	58.0	14.1	29.0	60.9	33.1	--	--
C.V. %	5.6	1.2	--	9.8	5.8	12.9	--	--
LSD .05	3	1.1	--	4.2	NS	NS	--	--
LSD .01	NS	1.6	--	NS	NS	NS	--	--

Planting Date: May 13, 1997
Harvest Date: August 20, 1997
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Previous crop: HRSW
Yields are adjusted to 12.5% moisture.
NS = no statistical difference between varieties.
Trial was planted into dry soil causing poor and uneven emergence.

Durum	Mandan

Variety	Plant Height	Test Weight	Protein	Grain Yield
	in	lbs/bu	%	bu/ac
Ben	33	50.0	14.0	42.5
Renville	33	57.0	13.7	40.9
Vic	34	57.2	14.2	36.9
Munich	31	55.9	12.9	34.2
Belzer	34	55.7	13.3	31.8
Trial Mean	33	57.2	13.6	37.5
C.V. %	5.3	2.0	--	15.7
LSD .05	NS	1.8	--	NS
LSD .01	NS	2.5	--	NS

Planting Date: May 13, 1997
Harvest Date: August 20, 1997
Previous crop: 100 bu/ac corn.
Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Yields are adjusted to 12.5% moisture.
NS = no statistical difference between varieties.
Notes: Ground was intensively worked prior to planting to break down corn stubble. Seed was planted into dry soil resulting in a poor and uneven stand.

Durum in Southwestern North Dakota
Combined Means

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield 1995 *	Grain Yield 1996 **	Grain Yield 1997 ***	Average Yield 2 year	Average Yield 3 year
		in	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Renville	58	30	57.3	14.6	43.5	58.4	46.5	52.4	49.5
Vic	57	32	58.7	14.6	38.7	54.5	46.7	50.6	46.6
Munich	57	28	55.3	14.9	40.8	54.2	43.2	48.7	46.1
Ben	58	30	58.7	15.0		57.8	48.1	53.0	
Belzer	59	31	55.7	14.9			45.8		

Seeding rate: 1.25 million live seeds/A (approx. 2.2 bu/A).
Yields are adjusted to 12.5% moisture.
*3 locations: Hettinger, Scranton, and Selfridge.
**4 locations: Hettinger, Regent, Scranton, and Selfridge.
***4 locations: Hettinger, Scranton, Selfridge and Mandan.

Barley Variety Descriptions

Variety	Use[3]	Origin	Year Released	Awn Type[1]	Aleurone Color	Height	Straw Strength	Relative Maturity	Reaction to Disease[2]			
									Stem Rust	Loose Smut	Spot Blotch	Net Blotch
Six-row												
Azure	M/F	ND	1982	S	blue	med.	strg.	m.early	S	S	MR-R	MS-S
Excel	M/F	MN	1990	S	white	m.shor	v.strg.	med.	S	S	MR-R	MS-S
Foster	M/F	ND	1995	S	white	m.shor	v.strg.	med.	S	S	MR-R	MS-S
Hazen	F	ND	1984	S	white	med.	m.strg.	med.	S	S	MR-R	MS-S
Morex	M/F	MN	1978	S	white	tall	med.	early	S	S	MR	S
Robust	M/F	MN	1983	S	white	tall	m.strg.	med.	S	S	MR-R	S
Stander	M/F	MN	1993	S	white	m.shor	v.strg.	med.	S	S	MR-R	MS-S
Two-row												
Bowman	F	ND	1984	S	white	m.shor	med.	early	S	S	MS-S	S-MS
Chinook[4]	F	MT	1994	R	white	med.	m.weak	late	S	S	MS	MS
Conlon[5]	F	ND	1996	S	white	m.shor	med.	early	S	S	MS-MR	MR-R
Gallatin	F	MT	1986	R	white	med.	med.	m.late	S	S	MS	MS
Harrington[4]	F	Can.	1981	R	white	med.	m.weak	late	S	S	S	MR-MS
Logan	F	ND	1995	S	white	med.	strg.	med.	S	S	MS-MR	MR
Stark	F	ND	1991	S	white	m.tall	med.	m.late	S	S	S-MS	MS-S
Specialty												
Wanubet	SP	MT	1990	R	white	med.	weak	late	S	S	S	S

[1] Rough or smooth awned.
[2] R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; N/A = not available.
[3] M = malting; F = feed; SP = special uses.
[4] Recommended as a malting barley in western US.
[5] Lower DON accumulation than other varieties tested.

Barley - Green Fallow — **Dickinson, ND**

Variety	Days to Head	Seeds	Plant Height	Lodging Score	Test Weight	Protein	% Plump	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Returns	Average Yield 2 Year	Average Yield 3 Year
		lbs	in	0-9	lbs/bu	%	>6/64	bu/ac	bu/ac	bu/ac	$/ac	bu/ac	bu/ac
Six Row													
Azure	50	13,241	25	4.0	43.8	13.4	79.1	57.8	60.7	72.5	125.36	66.6	63.7
Excel	53	11,992	26	1.8	45.3	13.6	84.7	65.2	67.2	79.8	142.49	73.5	70.7
Foster	54	12,208	26	2.3	44.1	13.3	88.2	56.3	64.1	81.3	141.69	72.7	67.2
Morex	50	13,602	28	4.3	44.3	13.9	82.9	45.8	54.2	63.3	110.75	58.8	54.4
Robust	55	11,156	28	1.5	47.5	14.1	90.6	56.7	56.8	78.6	141.52	67.7	64.0
Stander	55	12,050	27	0.5	46.9	13.6	91.0	67.1	62.2	94.1	169.42	78.2	74.5
Two Row													
Baronesse	58	12,081	22	1.8	44.9	13.3	79.5	--	--	88.0	155.51	--	--
Bowman	50	13,090	25	8.0	44.1	14.0	72.2	56.7	56.3	54.1	94.18	55.2	55.7
Chinook	58	11,466	28	3.0	47.5	13.6	76.2	62.9	57.7	82.4	148.39	70.1	67.7
Conlon	51	10,725	25	4.0	47.5	12.7	90.2	68.9	62.7	73.9	132.98	68.3	68.5
Harrington	58	14,150	27	5.5	42.9	13.9	58.2	50.4	56.9	71.1	120.32	64.0	59.5
Logan	54	10,497	27	2.5	47.3	13.2	85.5	73.0	74.9	90.2	162.33	82.5	79.4
Stark	56	11,406	28	3.3	47.0	13.7	79.6	58.9	56.2	74.4	134.00	65.3	63.2
Mean	53	12,263	26	3.1	45.6	13.6	82.4	--	--	76.9	136.46	--	--
C.V. %	1.6	5.2	3.6	30.8	1.4	2.7	5.4	--	--	6.6	6.9	--	--
LSD .05	1	909	1	NS	0.9	0.5	6.3	--	--	7.2	13.43	--	--

Lodging: 0=No lodging, 9=Completely flat

Returns were calculated by multiplying the 1997 yield by price for feed barley minus the test weight discount paid at the Southwest Grain Terminal located at Gladstone on November 3.

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

Variety	Seeds	Height	Lodging Score	Test Weight	Grain Yield 1995	Grain Yield 1997	% of Stark	Returns	2 Year Average
	lbs	in	0-9	lbs/bu	-----bu/ac-----			$/ac	bu/ac
Six Row									
Foster	12,236	27	0.5	42.2	38.4	63.7	121	106.23	51.0
Stander	12,459	29	0.0	44.1	--	65.3	124	113.88	--
Two Row									
Bowman	11,466	27	1.3	44.3	30.2	44.7	85	78.23	37.5
Conlon	10,265	25	0.3	45.6	--	55.0	104	98.26	--
Logan	10,238	28	0.0	46.5	46.1	72.2	137	129.35	59.1
Stark	10,104	30	0.0	47.0	35.8	52.8	100	95.00	44.3
Mean	11,128	28	0.3	45.0	--	59.0	--	103.49	--
C.V. %	4.6	4.6	137.8	1.8	--	6.5	--	6.8	--
LSD .05	767	2	NS	1.3	--	5.7	--	10.58	--

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

Variety	Seeds	Height	Lodging Score	Test Weight	Grain Yield 1995	Grain Yield 1997	% of Jerry	Returns	2 Year Average
	lbs	in	0-9	lbs/bu	------bu/ac------			$/ac	bu/ac
AC Belmont	18,217	33	1.5	37.3	--	55.6	79	67.96	--
CDC Boyer	11,805	34	2.0	32.9	--	75.0	107	79.55	--
Jerry	15,057	30	0.5	35.3	65.9	70.2	100	79.96	68.0
Jim	14,632	26	0.0	34.1	--	59.9	85	65.83	--
Paul	18,235	34	0.5	43.4	62.8	46.7	67	58.42	54.8
Whitestone	16,390	29	0.8	32.9	68.2	78.0	111	81.94	73.1
Mean	15,376	31	0.9	36.0	--	64.3	--	72.28	--
C.V. %	5.0	5.1	94.7	2.1	--	6.8	--	8.0	--
LSD .05	1248	2	NS	1.1	--	6.6	--	8.76	--

Barley - Fallow **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield 1995	1996	1997	Average Yield 2 year	3 year
		in	lbs/bu	%	bu/ac				
Morex	56	31	47.5	14.6	105.2	117.3	121.6	119.4	114.7
Foster	56	28	47.4	14.6	101.0	117.2	121.6	119.4	113.3
Excel	57	28	46.8	14.8	106.8	121.6	109.8	115.7	112.7
Robust	56	30	48.5	15.1	98.1	112.1	113.6	112.8	107.9
Azure	56	29	48.4	15.6	98.3	102.6	117.3	110.0	106.1
Stark	57	28	49.6	15.0	90.2	118.7	109.3	114.0	106.1
Conlon	56	29	49.1	14.4	88.4	110.6	117.3	114.0	105.4
Logan	57	29	48.9	15.0	94.3	108.8	110.5	109.6	104.5
Stander	58	28	47.6	14.4	80.6	108.6	113.6	111.1	100.9
Bowman	57	27	48.4	15.4	87.6	106.8	93.1	100.0	95.8
Harrington	60	30	46.2	15.7	56.3	99.6	97.3	98.4	84.4
Chinook	60	28	48.6	15.7		113.8	109.4	111.6	
MNS 85	58	29	47.6	16.4			116.7		
6B88-3213	56	27	49.4	15.0			114.5		
ND15477	58	28	46.8	15.3			113.7		
ND15403	57	30	47.2	15.3			111.2		
ND15483	57	27	47.1	15.0			109.0		
Trial Mean	57.0	29.0	47.9	15.1	85.5	109.0	111.7	--	--
C.V. %	1.8	6.6	1.1	2.3	11.5	5.6	8.5	--	--
LSD .05	1.0	NS	0.7	0.5	14.0	8.6	13.6	--	--
LSD .01	2.0	NS	0.9	0.6	18.6	11.5	18.1	--	--

Planting Date: April 30, 1997
Harvest Date: August 4, 1997
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Yields are adjusted to 12% moisture.
NS = No statistical difference between varieties.

Barley - Recrop **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
		in	lbs/bu	%	bu/ac				
Logan	58	28	50.1	14.4	80.7	89.1	97.1	93.1	89.0
Conlon	57	29	49.5	14.0	78.8	87.2	93.5	90.4	86.5
Stark	58	29	50.7	14.5	73.6	81.9	103.1	92.5	86.2
Bowman	58	26	50.1	14.9	72.1	81.7	98.2	90.0	84.0
Chinook	60	27	49.7	14.7		80.8	104.5	92.6	
Harrington	62	29	46.5	15.2		69.3	93.8	81.6	
Foster	56	27	46.4	13.8			104.9		
Trial Mean	59	28	49.0	14.5	68.6	81.6	99.3	--	--
C.V. %	0.8	7.8	1.1	3.7	5.7	9.2	7.1	--	--
LSD .05	1	NS	0.8	0.8	5.8	11.0	NS	--	--
LSD .01	1	NS	1.1	1.1	7.9	14.9	NS	--	--

Planting Date: April 30, 1997
Harvest Date: August 4, 1997
Previous Crop: HRSW
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Yields are adjusted to 12% moisture.
NS = No statistical difference between varieties.

Barley **Scranton**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
	in	lbs/bu	%	bu/ac				
Logan	25	48.6	15.1	84.6	104.3	85.6	95.0	91.5
Conlon	22	48.2	13.5	80.4	91.4	78.6	85.0	83.5
Stark	29	49.0	15.4	83.2	78.2	84.9	81.6	82.1
Bowman	24	47.3	14.4	69.7	79.6	73.1	76.4	74.1
Foster	28	46.4	13.3			94.9		
Trial Mean	26	47.9	14.3	79.0	90.8	83.4	--	--
C.V. %	5	1.5	--	11.2	11.4	7.4	--	--
LSD .05	2	1.1	--	13.1	15.8	9.3	--	--
LSD .01	3	1.5	--	NS	21.9	13.0	--	--

Planting Date: May 6, 1997
Harvest Date: August 21, 1997
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: Fallow
Yields are adjusted to 12% moisture.
NS = no statistical difference between varieties.

Barley — **New Leipzig**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
	in	lbs/bu	%	bu/ac				
Logan	27	49.2	14.2	80.8	75.1	109.2	92.2	88.4
Conlon	26	49.0	12.9	81.7	62.9	92.5	77.7	79.0
Stark	29	49.2	13.6	70.5	69.6	93.2	81.4	77.8
Bowman	25	47.4	14.5	82.5	63.7	70.5	67.1	72.2
Foster	29	47.1	12.9			116.7		
Trial Mean	27	48.4	13.6	67.2	71.2	96.4	--	--
C.V. %	7.2	1.3	--	9.1	12.4	8.5	--	--
LSD .05	3	1.0	--	9.0	13.4	12.4	--	--
LSD .01	NS	1.3	--	12.3	18.6	17.2	--	--

Planting Date: May 12, 1997
Harvest Date: August 21, 1997
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous Crop: Fallow
Yields are adjusted to 12% moisture.
NS = no statistical difference between varieties.

Barley — **Selfridge**

Variety	Plant Height	Test Weight	Protein	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
	in	lbs/bu	%	bu/ac				
Stark	25	50.0	14.3	37.1	95.1	64.9	80.0	65.7
Bowman	23	48.2	12.9	45.9	81.0	64.5	72.8	63.8
Conlon	22	48.3	12.3	38.5	93.0	58.2	75.6	63.2
Logan	25	48.3	12.5	30.5	94.3	64.2	79.2	63.0
Foster	24	45.8	12.3			66.6		
Trial Mean	23	48.1	12.9	33.1	91.3	63.7	--	--
C.V. %	7.7	2.1	--	20.9	9.1	13.1	--	--
LSD .05	NS	1.5	--	10.2	NS	NS	--	--
LSD .01	NS	2.1	--	13.9	NS	NS	--	--

Planting Date: May 13, 1997
Harvest Date: August 20, 1997
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Previous crop: HRSW
Yields are adjusted to 12% moisture.
NS = no statistical difference between varieties.
Trial was planted into dry soil causing poor and uneven emergence.

Barley	Mandan

Variety	Plant Height	Test Weight	Protein	Grain Yield
	in	lbs/bu	%	bu/ac
Bowman	28	45.5	12.8	51.2
Foster	28	45.2	13.1	51.0
Conlon	26	46.4	11.5	47.3
Logan	31	45.9	12.9	46.7
Stark	30	37.3	12.0	36.1
Trial Mean	29	44.0	12.5	46.1
C.V. %	5.8	13.0	--	29.3
LSD .05	3	NS	--	NS

Planting Date: May 13, 1997
Harvest Date: August 20, 1997
Previous crop: 100 bu/ac corn.
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Yields are adjusted to 12% moisture.
NS = no statistical difference between varieties.
Notes: Ground was intensively worked prior to planting to break down corn stubble. Seed was planted into dry soil resulting in a poor and uneven stand.

Barley in Southwestern North Dakota
Combined Means

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield 1995 *	Grain Yield 1996 **	Grain Yield 1997 ***	Average Yield 2 year	Average Yield 3 year
		in	lbs/bu	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Logan	58	28	48.5	14.0	74.2	88.3	85.6	87.0	82.7
Conlon	56	26	48.4	13.1	73.6	82.4	81.2	81.8	79.1
Stark	58	28	47.6	14.1	70.9	82.4	81.9	82.2	78.4
Bowman	58	26	47.8	14.2	71.6	76.8	75.1	76.0	74.5
Foster	56	27	46.4	13.3			92.6		

Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A).
Yields are adjusted to 12% moisture.
*5 locations: Hettinger fallow & recrop, Scranton, New Leipzig and Selfridge.
**6 locations: Hettinger fallow & recrop, Regent, Scranton, New Leipzig and Selfridge.
***6 locations: Hettinger fallow & recrop, Scranton, New Leipzig, Selfridge and Mandan.

Oat Variety Description

							Reaction to Diseases			Quality Factors		
Variety*	Origin	Year Released	Color Grain	Height	Straw Strength	Maturity[2]	Stem rust[1]	Crown rust	Barley Y. Dwarf.[4]	Rel. Yield	bu/Wt	Protein[3]
Hytest	SD	1986	white	tall	m.strg.	E	S	MS	S	fair	v.good	H
Prairie	WI	1991	white	short	strg.	E	S	S	T	good	good	M
Premier	MN	1990	yellow	short	med.	M	R	MS	MT	v.good	v.good	H
Jerry	ND	1994	white	tall	strg.	M	R	MS	MT	v.good	v.good	M
Newdak	ND/NY	1990	white	med.	strg.	M	R	S	T	v.good	good	M
Brawn	IL	1993	yellow	short	v.strg.	M	S	S	T	v.good	good	M
Valley	ND	1988	ivory	short	strg.	L	R	MS	MT	v.good	v.good	M
Whitestone	ND	1994	white	short	strg.	L	R	MS	MT	v.good	good	L
Otana	MT	1977	white	m.tall	m.weak	L	S	S	S	v.good	v.good	ML
Troy	SD	1991	ivory	tall	m.strg.	L	S	MS	T	good	good	M
AC Belmont	Can.	1993	naked	med.	strg.	L	R	S	MT	good	v.good	M
Paul	ND	1994	naked	v.tall	strg.	L	R	R-MR	T	v.good	good	H
Dumont	Can.	1982	white	m.tall	m.weak	L	R	S	MS	good	good	ML
Bay	WI	1993	yellow	med.	v.strg.	L	S	MR-S	T	good	fair	H
AC Marie	Can.	1992	white	tall	weak	VL	R	S	MT	fair	fair	ML
Milton	MN	1994	yellow	med.	strg.	L	S	MS	MT	v.good	v.good	M
Jim	MN	1995	yellow	med.	strg.	M	S	MS	MT	good	good	M
AC Assinaboia	Can.	1997	red	med.	strong	L	R	R	T	v.good	good	L
AC Medallion	Can.	1997	white	tall	m.strg.	L	R	R	T	v.good	good	L
CDC Boyer	Can.	1996	white	tall	m.strg.	L	S	MS	S	good	good	L
Gem	WI	1996	yellow	m.tall	strg.	M	S	R	T	good	good	M
Jud	ND	1997	ivory	tall	m.strg.	L	R	MR	T	v.good	good	MH
Monida	ID	1985	white	m.tall	m.weak	L	S	S	S	v. good	fair	L
Robert	Can.	1988	red	med.	strg	L	R	S	T	good	good	L

* Varieties listed in order of maturity.

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

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

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

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

Oat - Green Fallow — **Dickinson, ND**

Variety	Days to Head	Seeds	Plant Height	Test Weight	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Returns	Average Yield 2 Year	Average Yield 3 Year
		lbs	in	lbs/bu	bu/ac	bu/ac	bu/ac	$/ac	bu/ac	bu/ac
AC Assinaboia	55	11,989	30	34.8	--	--	97.4	110.48	--	--
AC Belmont	57	19,496	30	34.2	91.3	74.0	60.2	67.29	67.1	75.2
AC Medallion	57	13,732	32	34.8	--	--	82.2	93.07	--	--
Bay	56	15,221	24	32.0	110.3	75.9	108.5	110.85	92.2	98.2
Brawn	55	12,226	24	32.8	100.6	84.1	124.8	131.02	104.4	103.2
CDC Boyer	56	11,542	31	34.3	--	--	74.2	82.69	--	--
Calibre	57	14,116	32	34.0	98.1	96.7	98.5	107.29	97.6	97.8
Derby	57	12,161	29	38.7	99.4	101.2	119.9	149.93	110.6	106.8
Dumont	56	14,759	30	33.7	80.0	73.9	118.6	129.22	96.2	90.8
Hytest	51	12,473	30	38.7	73.0	79.8	94.9	118.57	87.3	82.6
Jerry	50	12,972	26	37.8	95.4	85.3	95.3	117.71	90.3	92.0
Jim	46	13,527	21	38.0	71.7	91.3	68.6	84.96	80.0	77.2
Milton	51	15,641	25	36.7	82.3	70.1	91.4	110.54	80.8	81.3
Monida	57	14,791	27	34.2	105.9	87.6	109.3	120.66	98.4	100.9
Jud	55	13,801	29	35.0	115.3	65.5	99.5	112.46	82.5	93.4
Newdak	50	13,732	25	33.5	93.0	81.8	91.9	98.65	86.9	88.9
Otana	56	14,905	30	35.7	95.0	84.7	114.5	133.96	99.6	98.1
Paul	57	18,144	33	41.0	92.0	64.7	82.3	102.85	73.5	79.7
Robert	56	11,711	28	34.7	95.3	86.0	94.9	107.23	90.4	92.1
Troy	55	15,916	29	36.2	100.2	90.0	108.0	129.37	99.0	99.4
Valley	54	14,680	24	35.8	91.3	70.2	101.2	118.72	85.7	87.6
Whitestone	55	15,623	25	34.8	107.1	96.2	98.4	113.49	97.3	100.6
Mean	55	13,747	28	35.4	--	--	99.8	114.51	--	--
C.V. %	1.0	6.3	5.6	2.6	--	--	13.8	15.0	--	--
LSD .05	1	1,563	3	1.5	--	--	22.4	27.93	--	--

Returns were calculated by multiplying the 1997 yield by the price for feed oats minus the test weight discount paid at the Southwest Grain Terminal located at Gladstone on November 3.

Oats - Fallow **Hettinger**

Variety	Plant Height	Lodging Score	Test Weight	Grain Yield			Average Yield	
				1995	1996	1997	2 year	3 year
	in	0-9	lbs/bu	bu/ac				
Brawn	31	0.0	32.8	127.3	117.4	152.1	134.8	132.3
Troy	34	2.0	35.9	139.4	106.4	150.2	128.3	132.0
Whitestone	29	0.0	34.2	121.6	120.4	151.8	136.1	131.3
Newdak	31	0.0	34.1	122.2	110.6	153.1	131.8	128.6
Bay	31	0.0	30.8	122.8	113.4	146.7	130.0	127.6
Monida	32	1.0	32.2	108.6	122.1	148.9	135.5	126.5
Milton	30	1.0	35.1	129.4	103.4	141.0	122.2	124.6
Jerry	33	1.0	37.3	124.9	108.9	138.8	123.8	124.2
Otana	36	2.0	35.4	112.0	107.9	148.6	128.2	122.8
Valley	29	0.0	36.1	127.5	114.6	125.8	120.2	122.6
Robert	32	2.0	34.8	118.6	105.9	142.6	124.2	122.4
Jim	29	0.0	36.0	122.6	105.5	131.8	118.6	120.0
Jud	36	2.0	34.0	87.2	108.9	138.8	123.8	111.6
Dumont	35	2.0	36.2	75.9	104.7	148.0	126.4	109.5
Hytest	35	1.0	39.6	102.7	92.8	131.2	112.0	108.9
Derby	36	2.0	34.9	67.7	103.0	144.5	123.8	105.1
Calibre	35	2.0	35.0	57.1	103.0	143.2	123.1	101.1
Paul*	33	2.0	41.4	58.3	72.5	80.3	76.4	70.4
AC Belmont*	34	1.0	36.1	51.8	70.1	89.2	79.6	70.4
AC Assinaboia	34	2.0	33.9			148.3		
AC Medallion	36	2.0	35.6			146.4		
CDC Boyer	33	2.0	32.9			142.0		
ND910916	31	1.0	35.1			150.2		
ND910779	36	1.0	34.0			146.4		
ND910117	34	4.0	34.9			144.2		
ND900697	34	3.0	34.2			144.2		
ND930122	29	0.0	35.0			143.5		
ND900779	35	2.0	33.8			141.6		
ND911048	30	0.0	34.9			141.0		
ND930376	31	3.0	37.3			140.1		
ND910569	30	0.0	36.4			136.9		
ND931475	34	0.0	34.5			132.1		
ND931318	32	1.0	34.9			124.5		
ND910592	32	0.0	36.1			123.5		
Trial Mean	33.0	1.0	35.2	110.3	109.0	138.6	--	--
C.V. %	6.0	67.4	1.7	9.6	7.1	10.9	--	--
LSD .05	3.0	1.0	0.9	14.9	10.9	21.1	--	--
LSD .01	4.0	2.0	1.1	19.8	14.5	27.9	--	--

Planting Date: April 30, 1997 Harvest Date: August 11, 1997
Seeding Rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Yields are adjusted to 12% moisture.
Lodging: 0 = No lodging, 9 = Completely flat.
* = Naked (hulless) type.

Oats - Recrop **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Grain Yield 1995	1996	1997	Average Yield 2 year	3 year
		in	lbs/bu	bu/ac				
Whitestone	62	27	33.8	147.9	103.0	122.9	113.0	124.6
Monida	63	32	30.7	140.9	95.8	135.0	115.4	123.9
Otana	61	31	34.2	134.4	92.1	128.6	110.4	118.4
Troy	61	32	35.4	124.4	91.7	118.7	105.2	114.9
Jerry	59	30	36.9	135.2	95.8	113.3	104.6	114.8
Dumont	62	32	35.2	96.7	100.5	120.3	110.4	105.8
Hytest	60	32	38.9	114.3	87.6	108.5	98.0	103.5
Derby	62	32	33.8	93.9	91.0	124.5	107.8	103.1
Calibre	62	33	34.3	82.7	94.9	125.4	110.2	101.0
Paul*	62	33	41.8	95.6	58.7	66.4	62.6	73.6
Jim	58	28	36.1		97.0	91.3	94.2	
AC Belmont*	63	31	36.3		55.2	74.7	65.0	
CDC Boyer	62	34	32.5			136.3		
Jud	61	33	32.8			104.7		
Trial Mean	61	31	35.2	126.0	91.7	112.2	--	--
C.V. %	0.9	5.8	2.4	5.2	12.1	10.6	--	--
LSD .05	1	3	1.2	11.0	15.9	16.9	--	--
LSD .01	1	4	1.6	14.8	21.3	23.0	--	--

Planting Date: April 30, 1997
Harvest Date: August 11, 1997
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Yields are adjusted to 12% moisture.
Previous crop: HRSW
*Naked (hulless) type.

Oats **Scranton**

Variety	Plant Height	Test Weight	Grain Yield 1995	1996	1997	Average Yield 2 year	3 year
	in	lbs/bu	bu/ac				
Whitestone	30	36.3	71.9	138.3	108.9	123.6	106.4
Troy	35	36.6	46.8	120.4	93.0	106.7	86.7
Jerry	32	39.2	55.8	111.7	92.3	102.0	86.6
Paul*	37	45.2	25.5	87.7	73.3	80.5	62.2
Otana	36	37.1			101.6		
CDC Boyer	35	36.6			99.2		
Jud	36	36.4			90.2		
Trial Mean	34	38.2	61.3	113.1	94.1	--	--
C.V. %	5.9	1.8	17.3	5.9	9.7	--	--
LSD .05	3	1.0	15.6	9.9	13.4	--	--
LSD .01	4	1.4	21.3	12.8	18.3	--	--

Planting Date: May 6, 1997
Harvest Date: August 21, 1997
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous Crop: Fallow
Yields are adjusted to 12% moisture.
*Naked (hulless) type.

Oats — **New Leipzig**

Variety	Plant Height	Test Weight	Grain Yield 1995	1996	1997	Average Yield 2 year	3 year
	in	lbs/bu	bu/ac				
Troy	46	36.3	129.3	71.6	130.6	101.1	110.5
Whitestone	43	34.3	117.2	77.1	130.2	103.6	108.2
Jerry	41	36.7	133.8	63.7	123.8	93.8	107.1
Paul*	47	41.7	46.7	37.0	75.3	56.2	53.0
Jud	43	34.5			126.8		
Otana	45	36.1			124.2		
CDC Boyer	42	34.1			123.0		
Trial Mean	44	36.2	109.6	61.8	119.1	--	--
C.V. %	5.7	2.5	8.0	24.6	10.5	--	--
LSD .05	NS	1.6	13.0	22.4	22.1	--	--
LSD .01	NS	2.2	17.7	29.0	30.9	--	--

Planting Date: May 12, 1997 Harvest Date: August 21, 1997
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous crop: Fallow
Yields are adjusted to 12% moisture.
*Naked (hulless) type.
NS = no statistical difference between varieties.

Oats — **Selfridge**

Variety	Plant Height	Test Weight	Grain Yield 1994	1996	1997	Average Yield 2 year	3 year
	in	lbs/bu	bu/ac				
Whitestone	28	37.6	141.8	133.4	60.1	96.8	111.8
Troy	32	38.4	102.1	119.8	60.9	90.4	100.3
Jerry	31	39.0	119.9	116.5	48.1	82.3	94.8
Paul*	35	43.5		76.9	26.9	51.9	
Otana	33	36.9			64.9		
CDC Boyer	32	36.3			58.4		
Jud	35	37.0			48.7		
Trial Mean	32	38.0	118.9	115.6	53.0	--	--
C.V. %	7.7	1.8	6.3	11.4	23.1	--	--
LSD .05	4	1.0	11.1	23.3	18.3	--	--
LSD .01	5	1.4	15.2	32.5	25.3	--	--

Planting Date: May 13, 1997 Harvest Date: August 20, 1997
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Previous crop: HRSW
Yields are adjusted to 12% moisture.
*Naked (hulless) type.
Trial was planted into dry soil causing poor and uneven emergence.

Oats	Mandan

Variety	Plant Height	Test Weight	Grain Yield
	in	lbs/bu	bu/ac
Whitestone	36	34.1	73.7
Otana	42	34.2	59.1
Jud	44	33.9	53.4
Troy	42	35.8	50.4
CDC Boyer	42	32.4	42.5
Jerry	37	34.6	40.2
Paul*	41	39.9	33.8
Trial Mean	41	35.0	50.4
C.V. %	4.1	2.4	15.6
LSD .05	2	1.3	11.6
LSD .01	3	1.7	15.8

Planting Date: May 13, 1997
Harvest Date: August 20, 1997
Previous crop: 100 bu/ac corn.
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Yields are adjusted to 12% moisture.
*Naked (hulless) type.
Notes: Ground was intensively worked prior to planting to break down corn stubble. Seed was planted into dry soil resulting in a poor and uneven stand.

Oats in Southwestern North Dakota
Combined Means

Variety	Days to Head	Plant Height	Test Weight	Grain Yield 1995 *	Grain Yield 1996 **	Grain Yield 1997 ***	Average Yield 2 year	Average Yield 3 year
		in	lbs/bu	bu/ac				
Whitestone	62	32	35.0	111.5	115.5	107.9	111.7	111.6
Troy	61	37	36.4	110.2	102.2	100.6	101.4	104.3
Jerry	59	34	37.3	109.0	99.8	92.8	96.3	100.5
Paul****	62	38	42.2	53.6	68.5	59.3	63.9	60.5
Otana	61	37	35.6			104.5		
CDC Boyer	62	36	34.1			100.2		
Jud	61	33	34.8			93.8		

Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A).
Yields are adjusted to 12% moisture.
*4 locations: Hettinger fallow & recrop, Scranton and New Leipzig.
**5 locations: Hettinger fallow & recrop, Scranton, New Leipzig and Selfridge.
***6 locations: Hettinger fallow & recrop, Scranton, New Leipzig, Selfridge and Mandan.
****Naked (hulless) type.

Hard Red Winter Wheat Variety Descriptions

Variety	Agent or origin	Year	Quality	Leaf rust[1]	Stem rust[1]	Maturity	Straw strength	Height	Winter-[b] hardiness
Roughrider	ND	1975	4.0 [a]	S	R[3]	med.	m. strong	med.	good
Norstar	Can.	1977	3.0	S	S	late	med.	tall	good
Rita	SD	1980	3.0	MS	MR[2]	early	strong	med.	fair
Winridge	MT	1980	1.0	S	S	med.	strong	med.	poor
Rose	SD	1981	2.0	S	MS[2]	early	v. strong	short	fair
Agassiz	ND	1983	3.0	S	R	med.	med.	med.	good
Norwin*	MT	1983	2.0	S	MS	med.	strong	v.short	fair
Siouxland	NE	1984	2.0	MR	R	early	strong	med.	poor
Abilene*	AgriPro	1987	2.5	S	MR	early	strong	v.short	poor
Seward	ND	1987	2.0	S	R	med.	strong	med.	good
Judith	MT	1988	3.0	S	S	med.	strong	med.	fair
Arapahoe	NE	1989	2.0	MR	MR	med.	med.	med.	fair
CDC Kestrel	Can.	1994		S	S	med.	strong	med.	good
Elkhorn	ND	1995	3.0	MR	R[4]	med.	m. strong	med.	good
AC Readymade	Can.	1996		S	S	med.	Strong	med.	good
Erhardt	MT	1996		S	R	med.	strong	med	good
McGuire	MT	1996		S	R	m. early	strong	m. tall	fair
Rampart**	MT	1996		S	R	med.	strong	med.	poor

[a] 1.0 = Very poor quality; 2.0 = Poor quality; 2.5 = Poor to average quality; 3.0 = Average quality; 3.5 = Average to good quality; 4.0 = Good quality; Quality assessed by the Department of Cereal Science, NDSU

[b] Varieties with less than good winterhardiness should be seeded only in tall stubble or in standing solid seeded or narrow strip flax.

* Semidwarf.

** Saw fly resistant.

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

[2] Susceptible in artificially induced epidemics.

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

[4] Occasionally mixed with some susceptible plants.

Hard Red Winter Wheat - Fallow — **Dickinson, ND**

Variety	Days to Head	Winter Survival	Height	Lodging Score	Test Weight	Protein	Grain Yield 1996	Grain Yield 1997	Returns	2 Year Average
		%	in	0-9	lbs/bu	%	--------bu/ac-------		$/ac	bu/ac
Agassiz	43	100	31	4.8	62.6	15.0	64.1	61.9	198.91	63.0
Alliance*	38	98	21	6.3	60.9	12.7	70.2	59.9	188.79	65.0
Arapahoe	39	100	24	2.3	61.1	15.3	74.5	71.7	230.17	73.1
CDC Kestrel	43	100	26	2.0	62.1	13.5	77.8	74.1	237.43	76.0
Elkhorn	43	100	26	2.3	61.8	15.3	64.4	66.3	212.40	65.4
Nekota	38	99	23	3.3	62.3	13.8	69.3	64.3	205.54	66.8
Pronghorn*	38	99	23	6.8	61.8	14.1	--	47.6	152.65	--
Roughrider	43	99	28	3.5	62.0	15.5	68.8	68.1	218.26	68.4
Seward	43	100	26	3.5	61.4	13.6	75.5	68.2	218.31	71.9
Mean	41	99.7	25	3.1	61.6	14.3	--	67	206.94	--
C.V. %	1.1	1.5	7.2	29.8	0.8	3.4	--	10.3	12.30	--
LSD .05	1	NS	3	1.3	0.7	0.7	--	9.7	37.15	--

* Received damage from gophers

Hard Red Winter Wheat									Hettinger
					Grain Yield			Average Yield	
Variety	Days to Head	Plant Height	Test Weight	Protein	1995	1996	1997	2 year	3 year
	June	in	lbs/bu	%	bu/ac				
Seward	17	31	61.0	12.2	77.4	76.0	57.1	66.6	70.2
Arapahoe	12	28	60.7	14.4	93.6	71.3	44.8	58.0	69.9
CDC Kestrel	16	32	61.2	12.1	80.1	65.3	61.5	63.4	69.0
Tomahawk	10	25	60.1	13.8	93.3	57.9	45.7	51.8	65.6
Longhorn	12	27	61.3	14.3	85.3	62.4	44.9	53.6	64.2
Roughrider	16	30	61.2	14.5	71.1	63.9	48.5	56.2	61.2
Elkhorn	17	33	61.3	14.2	64.9	62.0	54.4	58.2	60.4
Agassiz	18	33	61.6	14.6	55.8	63.9	50.7	57.3	56.8
Windstar	13	29	61.0	13.0		68.9	52.4	60.6	
Nekota	10	25	60.7	14.1		68.6	46.6	57.6	
Alliance	12	25	59.9	11.5		60.7	42.3	51.5	
Pronghorn	10	27	61.0	14.2			51.0		
Crimson	14	28	62.2	14.0			50.5		
Tandem	11	29	61.6	14.3			48.2		
ND9460	13	28	61.3	12.2			59.5		
ND9257	16	30	60.9	13.6			58.8		
ND9480	16	31	61.8	13.7			57.2		
SD92107	14	29	61.1	14.4			56.7		
SD92191	14	30	63.0	13.0			56.6		
ND9376	16	31	61.0	14.0			56.5		
ND8955	16	29	60.6	12.5			56.4		
ND8955-A	15	28	60.0	12.9			55.6		
ND9419	14	28	61.4	14.0			54.6		
ND9274	14	28	60.5	14.5			54.5		
ND9448	10	30	61.5	14.4			53.9		
ND9272	14	29	60.6	14.4			53.6		
ND9454	14	27	60.5	14.3			52.7		
ND9321	14	33	62.2	14.3			52.2		
ND9382	14	32	61.2	12.6			51.4		
ND8889	16	31	61.0	13.6			51.0		
ND9329	13	31	61.8	13.7			49.0		
ND9324	13	28	61.0	14.3			46.0		
ND9304	12	29	61.0	14.9			45.5		
Mean	14.0	29.1	61.1	13.7	78.7	66.1	52.1	--	--
C.V. %	0.2	5.0	0.9	--	8.9	8.9	16.5	--	--
LSD .05	2.0	2.4	0.8	--	10.0	9.8	NS	--	--
LSD .01	2.0	2.8	1.0	--	13.3	13.0	NS	--	--

Planting Date: September 25, 1996 Harvest Date: August 1, 1997
Seeding Rate: 1.1 million live seeds/A (approx. 1.6 bu/A).
Yields are adjusted to 12% moisture.
NS = no statistical difference between varieties.

Winter Rye Variety Description

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

[1] Under certain environments lodging has been observed.
[2] Varieties with fair winter hardiness should not be seeded on bare land.

Winter Rye **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
	June	in	lbs/bu	bu/ac				
Dacold	10	35	54.9	116.2	55.8	96.6	76.2	89.5
Prima	6	40	55.6	80.7	62.8	75.9	69.4	73.1
Pastar	6	43	54.8		60.3	65.5	62.9	
AC Rifle	7	31	54.4			69.0		
ND Exp.	10	35	53.4			90.6		
Mean	8.0	36.6	54.6	60.9	62.4	79.5	--	--
C.V. %	0.1	3.0	0.4	9.1	12.2	6.8	--	--
LSD .05	1.0	2.0	0.3	12.8	NS	8.2	--	--
LSD .01	1.0	2.8	0.4	18.0	NS	11.4	--	--

Planting Date: September 25, 1996 Harvest Date: August 4, 1997
Seeding rate: 1.1 million live seeds/A
No winter kill observed.
NS = no statistical difference between varieties.

Yield and Test Weight of Specialty Crops in Slope County Plot, Ernie Holzemer Farm, Amidon, ND 1997.

Crop	Yield	Test Weight
	(lbs/A)	(lbs/bu)
Carneval Pea	1983.8	64.2
Trapper Pea	1262.3	64.0
Flax	929.8	54.5
Canola H401	802.8	51.7
Crambe[1]	795.1	24.8
Othello Pinto Bean	781.2	61.3
Mavarik Pinto Bean	726.7	60.0
Oriental Mustard	687.9	54.6
Tilney Yellow Mustard	685.3	57.1
Lentil[1]	417.3	60.3
Pioneer 9007 Soybean	355.4	58.3
Lambert Soybean	290.5	59.3
Mean	809.8	55.8
CV%	21.5	1.2
LSD .05	295.1	1.1
Pioneer 3941 Corn[2]	1821.2	56.3
Paul Oat[2]	844.1	45.3
Proso Millet[2]	401.7	56.8
Manor Buckwheat[2]	242.7	43.7
Canary Seed[2]	92.2	46.8
Mean	680.4	49.8
CV%	30.1	1.4
LSD .05	386.1	1.3

[1]Stand establishment problems noted for lentil and crambe.
[2]Weed control was poor for corn, oat, millet, buckwheat and canary seed.
Planting Date: 5/15
Harvest Date: Pea, 8/15; Crambe, 8/21; Oat, 8/22; Flax, Canola, Mustard, Buckwheat, Millet, Canary Seed, 8/26; Lentil, Pinto bean, 9/1; Corn, 9/30; Soybean, 10/15.

Previous Crop: Hard red spring wheat.

Spring Triticale — **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
		in	lbs/bu	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Wapiti	56	46	54.2	73.7	83.1	47.6	65.4	68.1
Frank	58	40	51.4	62.4	88.9	44.3	66.6	65.2
Norico	58	43	50.7	54.7	89.8	38.9	64.4	61.1
Trical 2700	61	46	48.3	56.9	69.4	42.4	55.9	56.2
TCL 303	56	36	51.6			49.6		
Kramer	55	34	44.0			37.9		
Trial Mean	57	41	50.0	67.7	81.8	43.7	--	--
C.V. %	0.9	5.5	1.2	15.9	5.7	18.5	--	--
LSD .05	1	3	0.9	16.1	6.9	NS	--	--
LSD .01	1	5	1.2	NS	9.5	NS	--	--

Planting Date: April 30, 1997
Harvest Date: August 19, 1997
Seeding rate: 1 million live seeds/Ac.
Previous crop: Fallow
NS = no statistical difference between varieties.

Canary Seed — **Hettinger**

Variety	Days to Head	Plant Height	Test Weight	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 year	Average Yield 3 year
		in	lbs/bu	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac
Elias	56	28	50.4	808	1787	964	1376	1186
Keet	55	30	51.0	611	1700	1112	1406	1141
Trial Mean	56	29	50.7	709	1743	1038	--	--
C.V. %	0	0	0.9	12.0	6.0	18.3	--	--
LSD .05	--	--	NS	NS	NS	NS	--	--

Planting Date: April 30, 1997
Harvest Date: August 11, 1997
Seeding rate: 30 lbs live seeds/A.
Previous crop: Fallow
NS = no statistical difference between varieties.

Canola **Hettinger**

Variety	Type*	Days to First Flower	Days to Last Flower	Days to Maturity	Plant Ht	Oil	Test wt	Yield 1995	Yield 1996	Yield 1997
					in	%	lbs/bu	lbs/ac	lbs/ac	lbs/ac
Hyola 420	A	49	69	97	33	37.8	51.3			2080
Hyola 330	A	47	67	92	26	37.4	52.9			1902
Hyola 401	A	48	69	96	28	37.4	52.4	2543		1876
Hyola 308	A	47	68	90	26	37.5	52.2			1671
Impulse	A	55	71	96	34	37.1	51.8			1662
Optima 500	A	54	71	98	35	38.5	50.6			1591
Topscore	A	55	71	98	33	37.8	51.9		2020	1582
Crusher	A	56	72	97	32	38.8	51.6	1564		1549
OAC Dynamite	A	53	71	96	31	38.0	49.9			1374
UI 4721	R	50	70	96	32	38.8	51.9			1511
Garnet	R	52	70	96	29	39.0	52.0			1485
Sterling	R	54	72	98	31	39.9	49.8			1431
Tobin	P	44	68	86	27	33.3	52.9	1590	1520	1138
Trial Mean		51	70	95	31	37.8	51.6	1713	1798	1604
C.V. %		1.3	0.7	1.5	6.9	1.3	0.8	16.0	11.0	13.9
LSD .05		1	1	2	4	0.8	0.7	394	293	374
LSD .01		1	1	3	5	1.1	1.0	529	392	506

Planting Date: April 30, 1997 Harvest Date: August 19, 1997
Seeding Rate: A = 7.5 lbs/ac, R & P = 4.5 lbs/ac.
*Type: A=Argentine (B. napus), R=High Erucic Acid (Rapeseed), P=Polish (B. rapa).
Lodging was not observed.

Mustard **Hettinger**

Variety	Type*	Days to First Flower	Days to Last Flower	Days to Maturity	Test wt	Yield 1995	Yield 1996	Yield 1997	Yield 2 Year Avg.
					lbs/bu	lbs/ac	lbs/ac	lbs/ac	
AC Pennant	Y	40	69	87	56.4		1767	2258	2012
Gisilba	Y	40	70	88	56.6	2006	1860	1991	1926
Tilney	Y	40	69	88	56.3	2248	1880	1885	1882
Viscount	Y	41	71	91	56.6		1773	1911	1842
Ida Gold	Y	40	70	90	56.3			2222	
Ochre	Y	39	69	90	56.6			1965	
AC Vulcan	O	45	70	91	54.9		1920	1956	1938
Forge	O	49	72	92	55.8		1800	1538	1669
Cutless	O	45	71	92	54.6			1849	
Trial Mean		42	70	90	56.0	1807	1833	1953	--
C.V. %		0.8	1.6	2.2	0.5	10.0	8.0	10.5	--
LSD .05		1	2	3	0.5	NS	NS	353	--
LSD .01		1	NS	NS	0.6	NS	NS	484	--

Planting Date: April 30, 1997
Harvest Date: August 12, 1997
Seeding Rate: Y = 12 lbs/ac, O = 6 lbs/ac.
*Type: Y = Yellow, O = Oriental.
Lodging was not observed.
NS = no statistical difference between varieties.

Beulah Mustard - Fallow — **Dickinson, ND**

Variety	Type	Seeds	Test Weight	Grain Yield	Returns
		lbs	lbs/bu	lbs/ac	$/ac
AC Pennant	Y	126,733	55.3	290.5	37.77
AC Vulcan	O	157,810	50.3	518.0	56.98
Forge	O	173,610	51.5	247.8	27.26
Gisilba	Y	120,002	54.8	227.4	29.56
Tilney	Y	119,740	52.5	209.4	27.23
Viscount	Y	137,500	52.5	174.9	22.74
Mean	--	139,233	52.8	278.0	--
C.V. %	--	11.9	2.4	28.1	--
LSD .05	--	24,977	1.9	NS	--

* Trial received hail damage

Type: Y = yellow, O = oriental

Returns: Y = $13.00/cwt, O = $11.00/cwt

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

Variety	Type	Seeds	Height	Lodging Score	Test Weight	Grain Yield	Returns
		lbs	in	0-9	lbs/bu	lbs/ac	$/ac
AC Pennant	Y	106,859	28	0.8	54.6	712.3	92.59
AC Vulcan	O	187,274	32	1.3	51.9	794.1	87.35
Forge	O	199,859	39	2.0	51.0	573.9	63.13
Gisilba	Y	108,090	29	1.3	54.5	574.0	74.62
Tilney	Y	112,744	30	1.3	53.9	646.6	84.05
Viscount	Y	123,204	32	0.8	53.8	618.4	80.39
Mean	--	139,672	31	1.2	53.3	653.2	--
C.V. %	--	5.6	5.0	50.7	2.2	11.3	--
LSD .05	--	11,749	2	NS	1.7	111.1	--

Type: Y = yellow, O = oriental

Returns: Y = $13.00/cwt, O = $11.00/cwt

Crambe **Hettinger**

Variety	Days to First Flower	Days to Last Flower	Days to Matur.	Plant Ht	Oil	Test wt	Yield 1995	Yield 1996	Yield 1997	Average Yield 2 Year	Average Yield 3 Year
				in	%	lbs/bu	lbs/ac				
BelAnn	54	74	91	31	28.8	24.4	1660	2160	2954	2557	2258
Prophet	55	75	91	31	28.9	23.6	1587	2147	2660	2404	2131
BelEnzian	54	74	90	31	28.7	24.0	1553	1500	2720	2110	1924
Indy	51	72	88	28	30.2	23.8	1220	1813	2313	2063	1782
Meyer	50	70	88	28	28.8	24.4	973	1580	2173	1876	1575
C-29	53	74	90	31	29.9	24.2			2880		
ND9110-6	55	76	92	31	29.4	23.3			2860		
NMO-92	50	71	88	26	30.8	24.5			2787		
PI305283	56	76	92	30	29.3	23.2			2774		
C-37	53	73	90	30	29.3	24.9			2720		
NM99	49	72	89	28	29.8	23.6			2700		
PI319691	56	76	92	31	28.4	23.2			2667		
NMR-76	50	71	88	28	30.8	24.1			2647		
ND92112-44	54	74	90	30	29.4	23.3			2647		
NMR-142	50	70	87	27	29.1	23.2			2633		
C-22	54	74	90	30	28.0	23.4			2613		
NMO-46	49	72	88	28	28.4	23.7			2600		
NMO-85	52	73	88	29	29.5	24.3			2540		
NM0-52	50	72	88	28	28.4	24.1			2493		
NMO-54	50	73	89	27	30.6	24.5			2487		
NMO-43	48	72	88	25	29.0	24.1			2460		
NMR-45	49	72	88	28	29.6	23.4			2373		
NM28	50	74	89	28	29.6	24.2			2280		
NM95	50	72	88	27	28.4	24.3			2227		
NM97	51	70	88	29	28.4	23.9			2100		
Trial Mean	52	73	89	29	29.3	23.9	1472	1816	2572	--	--
C.V. %	1.7	1.3	1.0	6.8	3.8	2.2	21.0	16.0	10.6	--	--
LSD .05	1	1	1	3	1.5	0.8	NS	404	382	--	--
LSD .01	2	2	2	4	2.1	1.0	NS	540	507	--	--

Planting Date: May 1, 1997
Harvest Date: August 12, 1997

Seeding Rate: 21 lbs/ac.
NS = no statistical difference between varieties.

Safflower **Hettinger**

Variety	Days to Flower	Plant Ht	Oil	Test wt	Yield 1995	Yield 1996	Yield 1997	Average Yield 2 Year	Average Yield 3 Year
		in	%	lbs/bu	lbs/ac	lbs/ac	lbs/ac		
Centennial	85	22	42.1	39.6	3527	2114	1333	1724	2325
Montola 2000	83	18	40.1	39.8	2870	2222	1467	1844	2186
S-541	86	22	41.5	39.5	3276	2196	947	1572	2140
Finch	82	20	37.1	44.0	2938	2174	1233	1704	2115
Montola 2001	82	20	39.2	38.4	2735	1900	1207	1554	1947
Morlin	84	23	38.2	40.3	2552	1227	1600	1414	1793
S-317	83	21	39.4	39.4		3014	1407	2210	
S-518	84	22	40.2	38.0		2687	1674	2180	
95B7116	82	19	40.9	40.4			1553		
94B2869ER	82	21	42.6	38.0			1507		
95B7174	82	21	41.2	39.3			1500		
95B7348	84	21	38.2	40.2			1360		
94B3225ER	84	20	41.1	40.7			1300		
91B3842	82	22	45.9	38.8			1267		
Trial Mean	83	21	40.1	40.2	2891	2013	1383	--	--
C.V. %	1.4	7.2	3.4	2.2	11.0	11.0	16.9	--	--
LSD .05	2	1	2.0	1.3	451	317	333	--	--
LSD .01	2	1	2.6	1.7	601	423	446	--	--

Planting Date: April 30, 1997
Harvest Date: September 9, 1997
Seeding Rate: 400,000 live seeds/acre
Previous Crop: Fallow
NS = no statistical difference between varieties.

Flax Variety Description

Variety*	Origin	Year Released	Relative Maturity	Seed[1] Color	Plant Height	Wilt	Relative Yield Ability
AC-Watson	Can.	1996	mid.	br.	med.	MR	v.good
CDC-Valour	Can.	1996	mid.	br.	med.	MR	v.good
CDC-Normandy	Can.	1995	mid.	br.	med.	MR	v.good
AC-Emerson	Can.	1994	mid.	br.	med.	MR	v.good
McDuff	Can.	1993	late	br.	med.tall	MR	v.good
Linora	Can.	1991	late	br.	tall	R	v.good
Neche	ND	1988	mid	br.	med.	R	good
Flanders	Can.	1989	late	br.	med.	MS	good
Somme	Can.	1989	mid	br.	med.	MS	good
Omega	ND	1989	mid	yel.	med.	MS	v.good
Day	SD	1989	early	br.	med.	MR	good
Prompt	SD	1988	early	br.	med.	MR	good
Verne	MN	1987	early	br.	med.	R	v.good
Linton	ND	1985	early	br.	med.	R	v.good
NorMan	Can.	1984	mid	br.	med.	MR	good
Rahab 93	SD	1984	mid	br.	med.	MR	good
Clark	SD	1983	early	br.	med.	MR	good
NorLin	Can.	1982	early	br.	med.	MS	good
Flor	ND	1981	early	br.	med.	MS	v.good
McGregor	Can.	1980	late	br.	tall	R	v.good
Culbert 79	SD	1979	early	br.	med.	MR	good
Dufferin	Can.	1975	late	br.	tall	R	good

[1] br. = Brown; yel. = Yellow.

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

Flax	Hettinger

Variety	Days to Flower	Plant Height	Test Weight	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 Year	Average Yield 3 Year
		in	lbs/bu	bu/ac				
Flor	49	20	55.2	34.1	24.0	28.5	26.20	28.9
McGregor	50	21	55.6	34.9	21.1	27.5	24.3	27.8
AC Emerson	50	21	55.2	32.8	21.4	27.6	24.5	27.3
Flanders	50	20	55.2	30.8	20.3	29.5	24.9	26.9
McDuff	51	21	55.4	32.9	17.6	28.1	22.8	26.2
Linora	50	21	55.3	31.3	19.8	26.8	23.3	26.0
Verne 93	51	22	55.6	30.1	21.9	23.9	22.9	25.3
Prompt	49	20	55.2	31.3	17.8	26.5	22.2	25.2
Norlin	50	20	55.9	32.1	17.6	25.7	21.6	25.1
Rahab 94	49	20	55.3	31.5	16.7	26.7	21.7	25.0
Norman	49	20	55.2	27.0	19.0	27.7	23.4	24.6
Linott	47	20	55.8	27.8	19.7	24.8	22.2	24.1
Neche	49	20	55.6	27.7	17.9	25.7	21.8	23.8
Omega	50	22	55.4	30.5	18.6	22.0	20.3	23.7
Culbert	50	20	55.6	30.0	16.7	21.7	19.2	22.8
Linton	49	20	54.6	26.0	16.2	24.8	20.5	22.3
Bison	50	21	55.8	26.8	16.0	22.4	19.2	21.7
CDC Normandy	47	19	55.8		21.2	27.9	24.6	
Pembina	48	21	55.3			28.8		
Cathay	48	19	55.2			26.8		
CDC Valour	46	19	55.1			25.4		
AC Watson	47	20	54.8			24.4		
Trial Mean	49	20	55.4	30.8	19.2	26	--	--
C.V. %	2.1	7.2	0.6	14.1	13.4	16.3	--	--
LSD .05	1	NS	0.5	NS	4.3	NS	--	--
LSD .01	2	NS	0.7	NS	5.7	NS	--	--

Planting Date: May 14, 1997
Harvest Date: September 2, 1997
Seeding rate: 32 lbs/Acre
Previous crop: Fallow
NS = no statistical difference between varieties.

Sunflower	Hettinger

Brand	Hybrid	Test weight	Oil Content	Yield 1995	Yield 1997
		lbs/bu	%	-------lbs/ac------	
Asgrow	6305	35.1	42.9		2852
Asgrow	7305	34.7	49.9		2796
Asgrow	7304	36.7	43.6		2709
Asgrow	5202	33.4	47.9		2638
Asgrow	5303	33.9	45.5		2558
Asgrow	7311	33.3	42.9		2431
Asgrow	5101	34.4	48.5		2328
Asgrow	7306	33.5	42.5		2137
Asgrow	3211	34.0	41.2	2836	1923
Asgrow	471	35.9	43.3		1899
Cargill	SF187	32.0	43.4		3090
Cargill	SF128	36.8	41.0		2669
Cargill	SF270	35.0	43.9		2288
Croplan	757	33.9	46.6		2820
Croplan	803	36.0	47.7	2545	2471
Croplan	745	33.5	42.5	2271	2081
Dekalb	3875	33.5	44.9		3337
Dekalb	3868	34.7	46.9	3234	2836
Dekalb	3790	36.1	50.2	2770	2701
Dekalb	EX6861	34.9	53.4		2606
Dekalb	EX7806	36.2	46.9		2320
Dekalb	EX7793	35.2	48.4		2304
IS/Payco	6077	34.4	50.1		3027
IS/Payco	5077	32.3	45.7		2598
Monosun	9103	31.9	44.2		2717
Monosun	9301	30.6	45.5		2145

continued

Sunflower - continued **Hettinger**

Brand	Hybrid	Test weight	Oil Content	Yield 1995	Yield 1997
		lbs/bu	%	-------lbs/ac------	
NDSU	894	33.6	41.9		2812
Pioneer	63A81	31.7	47.8		3241
Pioneer	6300	35.1	49.8	3563	3067
Pioneer	XF266	31.8	48.1		3019
Pioneer	DO-827	34.0	42.9	2539	2439
Proseed	143	33.1	43.6	3145	3170
Proseed	EX9410	36.1	49.4		2955
Proseed	141	33.4	51.5	2224	2773
Proseed	EX9510	35.5	49.9		2749
Proseed	140	33.3	46.5	2857	2685
Proseed	9310	35.6	51.2		2685
Proseed	107	31.8	42.7	2774	2550
Seeds 2000	Wrangler	34.2	48.0		2749
Trial Mean		34.1	46.2	2851	2646
C.V. %		1.8	--	13.0	11.8
LSD .05		1.0	--	594	503
LSD .01		1.4	--	790	675

Planting date: May 15, 1997
Seeding rate: 21,000 seeds/acre, thinned to 18,000 plants/acre.
Row spacing: 28"
Previous crop: Summer fallow
Yields are adjusted to 9% moisture.
Harvest date: October 16, 1997

Field Pea-Recrop — **Dickinson, ND**

Variety	Type	Flower Duration	Days to Flower	Seeds	Plant Height	Lodging Score	Test Weight	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Returns	Average Yield 2 Year	Average Yield 3 Year
				lbs	in	0-9	lbs/bu	lbs/ac	lbs/ac	lbs/ac	$/ac	lbs/ac	lbs/ac
Aladin	Y	16	45	1,535	20	1.0	64.9	--	--	1424	66.45	--	--
Carneval	Y	22	48	2,071	23	0.5	64.5	2817	1723	2002	93.44	1863	2181
Grande	Y	16	53	1,672	18	5.5	65.3	--	2381	2309	107.77	2345	--
Highlight	Y	22	47	2,155	20	0.3	65.9	--	--	1759	82.11	--	--
Integra	Y	16	46	1,578	17	1.3	64.0	--	--	1322	61.72	--	--
Maja	Y	15	46	1,553	19	0.3	65.3	--	--	1469	68.57	--	--
Majoret	G	17	48	1,661	20	1.3	65.4	2620	1745	1957	91.34	1851	2107
Mustang	Y	17	44	2,162	17	1.5	65.4	--	--	1207	56.35	--	--
Profi	Y	20	46	1,731	23	1.0	64.8	2647	1727	1554	72.50	1640	1976
Radley	G	18	45	2,094	19	7.5	65.5	1608	1415	862	40.25	1139	1295
Totem	G	18	47	1,739	18	4.3	64.0	--	--	1914	89.31	--	--
Trapper	Y	33	51	3,207	24	8.0	64.5	2215	1867	1691	78.94	1779	1924
Mean		19	47	1,930	20	2.7	64.9	--	--	1623	--	--	--
C.V. %		13.0	1.6	6.8	21.9	51.2	0.5	--	--	13.8	--	--	--
LSD .05		4	1	188	NS	NS	0.5	--	--	321	--	--	--

Type: Y=Yellow, G=Green

Returns calculated using market value of $2.80/bu

Field Pea **Hettinger**

Variety	Days to First Flower	Days to Last Flower	Plant Ht.	100 Kernel wt.	Test Weight	Yield 1995	Yield 1996	Yield 1997	Average Yield 2 year	Average Yield 3 year
			in	grams	lbs/bu	lbs/ac	lbs/ac	lbs/ac		
Profi	50	62	19	24.7	62.9	4027	3414	2365	2890	3269
Radley	49	59	10	18.8	64.0	3591	3600	1698	2649	2963
Carneval	53	62	22	21.8	62.9	2764	3502	2356	2929	2874
Trapper	53	64	14	12.1	64.1	3355	2978	2169	2574	2834
Majoret	53	62	20	24.8	64.3		3414	2160	2787	
Grande	54	62	24	24.4	63.6			2791		
Mustang	49	63	15	19.4	63.3			2560		
Highlight	51	64	19	19.6	63.8			2533		
Totem	53	61	17	21.9	62.7			2205		
Atomic	52	62	18	28.6	63.8			1965		
Mean	52	62	18	21.6	63.5	3553	3384	2280	--	--
C.V. %	0.7	2.3	14.9	3.4	0.6	10	9	12.9	--	--
LSD .05	1	2	5	1.3	0.7	608	509	504	--	--
LSD .01	1	3	6	1.7	0.9	848	NS	689	--	--

Planting Date: May 5, 1997
Harvest Date: August 12, 1997
Seeding Rate: 300,000 live seeds/acre
Previous Crop: Fallow
NS = no statistical difference between varieties.

Hannover Field Pea Seeding Rate - Recrop — **Dickinson, ND**

Variety	Seeding Rate	Plant Stand	Seeds	Test Weight	Grain Yield
	pls/ac		lbs	lbs/bu	lbs/ac
Carneval	300,000	228,576	2,247	63.6	2,735
Carneval	350,000	232,657	2,213	63.1	2,600
Carneval	400,000	286,536	2,240	63.6	2,951
Mean		249,256	2,233	63.5	2,762
C.V. %		13.6	7.9	2.3	6.4
LSD .05		NS	NS	NS	303

Beulah Field Pea Seeding Rate - Fallow — **Dickinson, ND**

Variety	Seeding Rate	Plant Stand	Seeds	Test Weight	Grain Yield
	pls/ac		lbs	lbs/bu	lbs/ac
Carneval	300,000	187,759	2,205	64.3	1,787
Carneval	350,000	254,699	2,131	64.0	1,857
Carneval	400,000	260,413	2,144	63.8	1,923
Mean		234,290	2,160	64.0	1,856
C.V. %		7.7	1.8	0.5	5.4
LSD .05		31,358	66	NS	NS

* Trial received hail damage

Hannover Field Pea Pop-up Fertilizer Trial - Recrop — **Dickinson, ND**

Variety	Fertilizer Rate	Fertilizer Type	Height	Plant Stand	Seeds	Test Weight	GrainYield
	lbs/ac		in		lbs	lbs/bu	lbs/ac
Carneval	0	NONE	32	242,454	1,909	63.6	2,764
Carneval	6	46-0-0	28	216,331	2,167	63.3	2,172
Carneval	12	46-0-0	29	191,024	2,094	63.3	2,317
Carneval	18	46-0-0	31	198,371	2,027	63.0	2,313
Carneval	25	11-52-0	30	178,779	1,901	62.6	2,152
Carneval	50	11-52-0	30	156,738	2,072	64.0	2,250
Carneval	75	11-52-0	32	124,084	2,340	63.6	2,206
Carneval	30	0-44-0	29	186,942	1,969	63.8	2,228
Carneval	60	0-44-0	30	183,677	2,138	62.9	2,516
Carneval	90	0-44-0	28	146,125	2,116	63.8	2,361
Mean			30	182,452	2,073	63.4	2,328
C.V. %			7.5	14.1	9.3	2.5	11.6
LSD .05			3	37,306	279	NS	393

Beulah Field Pea Pop-up Fertilizer Trial -Fallow — **Dickinson, ND**

Variety	Fertilizer Rate	Fertilizer Type	Plant Stand	Seeds	Test Weight	GrainYield
	lbs/ac			lbs	lbs/bu	lbs/ac
Carneval	0	NONE	267,760	2,073	63.6	1,768
Carneval	6	46-0-0	238,372	2,138	64.4	1,618
Carneval	12	46-0-0	208,984	2,187	64.1	1,638
Carneval	18	46-0-0	180,412	2,106	63.9	1,578
Carneval	25	11-52-0	208,984	2,082	64.0	1,575
Carneval	50	11-52-0	131,431	2,085	62.9	1,464
Carneval	75	11-52-0	97,145	2,158	63.5	1,036
Carneval	30	0-44-0	191,840	2,102	63.9	1,801
Carneval	60	0-44-0	204,085	2,159	64.1	1,724
Carneval	90	0-44-0	165,717	2,106	63.6	1,843
Mean			189,473	2,120	63.8	1,605
C.V. %			16.6	4.9	1.4	11.8
LSD .05			NS	NS	1.3	276

* Trial received hail damage

1997 Field Pea Planting Date Trial — **Hettinger**

Planting Date	Days to First Flower	Days to Last Flower	Days to Mature	Plant Ht.	Lodg.	100 Kernel wt.	Test Weight	Yield
				in	0 - 9	grams	lbs/bu	lbs/ac
April 30	56	70	90	23	0.4	24.0	64.7	2007
May 14	56	61	82	24	0	23.3	65.4	2157
May 30	57	66	84	25	0.2	21.9	64.2	1800
June 10	48	55	76	23	0.1	21.5	64.6	1620
Trial Mean	54	63	83	24	0	33.6	64.8	1896
C.V. %	3.0	1.4	1.6	8.4	212	4.4	1.3	16.6
LSD .05	2	1	1	NS	NS	1.0	0.9	323
LSD .01	2	1	2	NS	NS	1.4	NS	436

These figures are the combined mean of 2 varieties (Profi and Grande).
Seeding Rate: 300,000 live seeds/acre
Previous Crop: Fallow
NS = no statistical difference between varieties.

Soybean — **Hettinger**

Variety	Days to First Flower	Plant Ht.	Test Weight	Yield		Average Yield
				1995	1997	2 year
		in	lbs/bu	bu/ac		
McCall	55	18	56.7	16.4	16.3	16.4
Agassiz	60	21	55.6	14.6	11.9	13.2
Maple Ridge	49	14	57.0	15.4	8.6	12.0
KG-20	56	16	57.4	14.6	6.0	10.3
ND91-2735	57	18	56.7		13.8	
Mean	55	18	56.5	15.1	11.7	--
C.V. %	5.3	3.9	0.5	19.4	11.5	--
LSD .05	6	2	0.6	NS	2.5	--
LSD .01	8	3	0.9	NS	3.7	--

Planting Date: May 15, 1997
Harvest Date: September 9, 1997
Seeding Rate: 70 lbs/acre
Previous Crop: Fallow
NS = no statistical difference between varieties.

Lentils-Green Fallow — **Dickinson, ND**

Variety	Type	Flower Duration	Days to Flower	Seeds	Plant Height	Lodging Score	Test Weight	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Returns	Average Yield 2 Year	Average Yield 3 Year
				lbs	in	0-9	lbs/bu	lbs/ac	lbs/ac	lbs/ac	$/ac	lbs/ac	lbs/ac
CDC Milestone	C	29	43	13,314	11	1.5	63.1	--	--	1511	203.93	--	--
Brewer	C	24	41	7,984	12	3.0	60.6	1448	815	1232	166.31	1023	1165
CDC Richlea	C	25	47	8,975	13	2.0	61.5	2108	1285	1197	161.62	1241	1530
Crimson	R	24	46	14,026	10	3.5	62.9	2010	810	1187	160.22	998	1336
Eston	P	25	44	14,457	12	2.0	62.6	1827	1025	1316	177.61	1170	1389
Laird	C	20	51	6,034	14	3.5	58.5	1693	945	947	127.80	946	1195
Pardina	SB	16	41	11,285	9	5.3	63.3	--	652	1212	163.57	932	--
Redwing	R	24	42	12,960	12	2.3	62.8	--	1129	1366	184.46	1248	--
Mean	--	23	44	11,129	12	2.9	61.9	--	--	1246	--	--	--
C.V. %	--	15	1	4.5	8.8	27.6	2.2	--	--	14	--	--	--
LSD .05	--	NS	1	739	2	1.2	2.0	--	--	250	--	--	--

Type: C=Chilean, R=Red, P=Persian, SB=Spanish Brown
Returns calculated using market value of $13.50/cwt

Lentils — **Hettinger**

Variety	Days to First Flower	Days to Last Flower	100 Kernel wt.	Test wt.	Yield 1995	Yield 1996	Yield 1997	Average Yield 2 Year	Average Yield 3 Year
			grams	lbs/bu	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac
CDC Richlea	53	67	4.60	60.4	2087	2093	1341	1717	1840
Eston	49	66	2.91	62.3	2235	1293	1064	1178	1531
Pardina	48	64	3.74	62.9	1750	1240	986	1113	1325
Crimson	52	67	3.28	62.3	1490	1156	955	1056	1200
Brewer	48	67	4.84	58.8	1103	907	1058	982	1023
Laird	55	63	5.53	59.0	583	942	693	818	739
CDC Redwing	50	63	3.33	61.9		1433	1152	1292	
Trial Mean	50	65	3.92	61.2	1426	1339	1048	--	--
C.V. %	0.7	1.1	14.3	0.6	20.0	25.0	21.6	--	--
LSD .05	1	1	0.82	0.5	420	490	332	--	--
LSD .01	1	1	1.12	0.7	573	664	450	--	--

Planting Date: May 5, 1997
Seeding Rate: 550,000 live seeds/acre
Harvest Date: August 13, 1997
Previous Crop: Fallow

Chickpea — Hettinger

Variety	Days to First Flower	Days to Last Flower	Plant Ht.	100 Kernel wt.	Test Weight	Yield 1995	Yield 1996	Yield 1997	Average Yield 2 year	Average Yield 3 year
			in	grams	lbs/bu	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac
Myles*	49	64	12	19.7	56.3	4069	2489	2533	2511	3030
UC-27	44	63	14	49.8	60.1	3766	2687	1933	2310	2795
Sanford	53	63	17	43.7	61.4	2762	2347	1700	2024	2270
Dwelley	55	62	15	53.8	60.2	1911	1751	1387	1569	1683
Evans	50	62	15	41.6	60.2			1127		
Mean	50	63	15	41.1	59.6	3208	2347	1754	--	--
C.V. %	0.6	1.0	9.4	6.5	2.8	7	11	11.3	--	--
LSD .05	1	1	2	4.1	2.5	349	420	304	--	--
LSD .01	1	1	3	5.7	3.5	497	593	423	--	--

*Myles = Desi type, other varieties are kabuli type.
Planting Date: May 5, 1997
Harvest Date: September 2, 1997
Seeding Rate: Desi = 120 lbs live seed/acre, Kabuli = 180 lbs live seed/acre
Previous Crop: Fallow

Lupin — Hettinger

Variety	Days to First Flower	Days to Last Flower	Days to Mature	Plant Ht.	100 Kernel wt.	Test Weight	Yield 1995	Yield 1996	Yield 1997	Average Yield 2 year	Average Yield 3 year
				in	grams	lbs/bu	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac
Primorski	47	65	92	19	31.8	57.1	1808	773	1725	1249	1435
Gungurru	45	56	82	12	28.5	57.4	1931	524	920	722	1125
Merrit	44	56	82	13	14.4	56.8	1713	427	840	634	993
Ultra	50	65	91	19	28.3	56.7		347	1333	840	
Danja	44	56	82	15	15.6	57.2		560	920	740	
U206	48	67	90	19	34.0	56.4			1587		
Lupro 2085	50	66	92	20	25.8	57.0			1547		
Trial Mean	47	62	87	17	25.5	56.9	1386	511	1250	--	--
C.V. %	1.1	0.5	1.2	10.8	--	0.7	17	29	19.9	--	--
LSD .05	1	1	2	3	--	0.6	425	263	368	--	--
LSD .01	1	1	2	4	--	0.8	NS	371	503	--	--

Planting Date: May 5, 1997
Harvest Date: September 2, 1997
Seeding Rate: 250,000 live seeds/acre
Previous Crop: Fallow
NS = no statistical difference between varieties.

Pinto Bean — **Hettinger**

Variety	Days to First Flower	Test Weight	Yield 1995	Yield 1996	Yield 1997	Average Yield 2 year	Average Yield 3 year
		lbs/bu	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac
Topaz	52	56.2	941	1193	1255	1224	1130
Hatton	52	59.1	994	947	1389	1168	1110
Othello	52	58.6	1190	809	1266	1038	1088
Bill-Z	53	57.8	954	631	1541	1086	1042
Chase	60	57.2	889	676	1471	1074	1012
Fiesta	49	58.9	830	1027	1091	1059	983
Mean	53	58.0	966	905	1335	--	--
C.V. %	4.1	0.9	9	12	10.1	--	--
LSD .05	3	0.8	130	184	200	--	--
LSD .01	4	1.1	178	255	275	--	--

Planting Date: May 15, 1997
Harvest Date: September 3, 1997
Seeding Rate: 110 lbs/acre
Previous Crop: Fallow

Navy Bean — **Hettinger**

Variety	Days to First Flower	Test Weight	Yield 1995	Yield 1996	Yield 1997	Average Yield 2 year	Average Yield 3 year
		lbs/bu	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac
Norstar	60	61.3	1053	671	1278	974	1001
Agri-1	61	61.1	273	758	794	776	608
Mayflower	63	58.9	380	322	817	570	506
Mean	61	60.6	575	584	976	--	--
C.V. %	0.5	1.0	29	17	17.8	--	--
LSD .05	1	1.0	258	203	291	--	--
LSD .01	1	1.4	264	319	413	--	--

Planting Date: May 15, 1997
Harvest Date: September 9, 1997
Seeding Rate: 73 lbs/acre
Previous Crop: Fallow

1997 Hybrid Corn - Recrop — **Dickinson, ND**

							Silage Yield		
			----- Grain -----		Harvest	70%	---------- DM Basis ----------		
Brand	Hybrid	RM	Yield	TW	Moisture	Moisture	1996	1997	2 yr avg
		days	bu/ac	lb/bu	%	----------Tons/ac ----------			
Dekalb	DK-345	84	67.8	55.4	52	13.4	--	4.0	--
Dekalb	DK-365	86	69.1	53.5	54	13.0	--	3.9	--
Dekalb	DK-385 B	88	76.6	55.8	53	17.1	--	5.1	--
Dekalb	DK-449	94	80.2	54.6	63	16.0	--	4.8	--
Kaystar	KX-285	81	68.0	54.2	52	12.7	--	3.8	--
Kaystar	KX-288	82	69.3	51.5	55	13.6	--	4.1	--
Pioneer	3878	89	74.2	55.8	56	14.1	5.9	4.2	5.0
Pioneer	3893	89	87.4	54.4	48	15.8	6.1	4.7	5.4
Pioneer	3941	82	75.3	56.0	49	12.8	--	3.8	--
Pioneer	3970	77	58.1	56.8	42	12.8	5.0	3.8	4.4
Proseed	180	80	71.4	55.6	50	12.1	--	3.6	--
Proseed	185	85	63.3	51.1	54	14.4	--	4.3	--
Proseed	S 107	--	--	--	68	15.6	--	4.7	--
Mean			71.7	54.6	53.5	14.1	--	4.2	--
C.V. %			10.4	1.9	11.6	17.0	--	17.0	--
LSD .05			9.7	1.3	12.0	NS	--	NS	--

RM = relative maturity

Hybrid Corn **Hettinger**

Brand	Hybrid	Relative matur.	Harvest moist.	Silage 1996	Silage 1997	Test weight	Grain Yield 1996	Grain Yield 1997
		days	%	------Tons/ac*------		lbs/bu	-------bu/ac**------	
Pioneer	3878	89	61	10.99	4.99	54.6	65.5	96.3
Pioneer	3893	89	46	13.53	5.96	56.3	63.8	92.4
Dekalb	442	94	52	11.58	6.23	52.2	59.8	89.6
Dekalb	385B	88	68	12.28	4.23	54.8	67.7	89.0
Proseed	180	80	58		5.30	56.7		87.4
Kaystar	KX288	82	58		5.30	50.5		84.6
Proseed	185	85	51		5.69	51.4		82.3
Pioneer	3970	77	27	9.23	6.13	58.0	61.6	80.4
Kaystar	KX285	81	59		3.68	53.6		80.3
Cargill	1877	80	62	10.56	3.99	59.3	63.1	79.7
Cargill	1907	85	47	10.02	5.70	60.2	58.9	79.1
Cargill	1527	80	21		7.43	58.5		78.7
Dekalb	417	91	58		4.62	51.9		77.3
Pioneer	36K27***	102	60		5.91	49.1		76.5
Pioneer	3941	82	56		4.37	55.9		70.5
Proseed	S107	--	72		3.79			
Trial Mean				10.87	5.17	54.3	55.1	81.6
C.V. %				13.17	24.17	1.8	15.6	11.8
LSD .05				1.97	1.77	1.4	NS	13.6
LSD .01				2.61	2.47	1.9	NS	19.0

Planting date: May 15, 1997
Seeding rate: 21,000 seeds/acre, thinned to 18,000 plants/acre.
Row spacing: 28"
Previous crop: Summer fallow
*Silage yields are adjusted to 0% moisture.
**Grain yields are adjusted to 13.5% moisture.
***Bt (European Corn Borer Resistant) hybrid.
NS = no statistical difference between hybrids.
Harvest date: Silage - September 25, 1997
Grain - October 6, 1997

Hybrid Corn — **New Leipzig**

Brand	Hybrid	Relative matur.	Silage: Harvest moist.	Silage: Yield*	Test weight	Grain Yield**
		days	%	Tons/ac	lbs/bu	bu/ac
Kaystar	288	82	54	4.37	53.6	89.8
Pioneer	3878	89	40	6.99	55.9	88.4
Proseed	185	85	41	5.78	52.6	87.1
Dekalb	385B	88	64	5.51	57.0	83.3
Pioneer	36K27***	102	52	7.81	53.4	78.8
Pioneer	3893	89	33	7.39	54.8	78.1
Proseed	180	80	64	2.93	56.9	77.9
Pioneer	3941	82	24	5.09	57.0	77.3
Kaystar	285	81	44	4.61	54.6	76.9
Pioneer	3970	77	24	4.92	56.8	65.9
Proseed	S107		70	4.41		
Trial Mean				5.44	54.7	78.3
C.V. %				17.04	2.3	10.7
LSD .05				1.34	1.8	12.1
LSD .01				1.80	2.4	16.3

Planting date: May 12, 1997
Seeding rate: 21,000 seeds/acre, thinned to 18,000 plants/acre.
Row spacing: 28"
Previous crop: Summer fallow
*Silage yields are adjusted to 0% moisture.
**Grain yields are adjusted to 13.5% moisture.
***Bt (European Corn Borer Resistant) hybrid.
Harvest date: Silage - September 25, 1997
Grain - September 26, 1997
This trial was heavily infested with late season European Corn Borers.

Grain Millet **Hettinger**

Variety	Type	Days to Head	Plant Height	Test Weight	Grain Yield 1995	Grain Yield 1996	Grain Yield 1997	Average Yield 2 Year	Average Yield 3 Year
			in	lbs/bu	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac
Siberian	Foxtail	70	33	54.1	2275	1019	3040	2030	2111
Manta	Foxtail	70	32	54.1	2427	789	2840	1814	2019
Dawn	Proso	64	36	56.2	3434	1035	1147	1091	1872
Cerise	Proso	63	35	56.9	1996	693	953	823	1821
Earlybird	Proso	66	36	55.7	2994	919	1493	1206	1802
Rise	Proso	66	34	54.8	3246	707	1353	1030	1769
Sunrise	Proso	68	29	56.6	3362	528	1380	954	1757
Huntsman	Proso	70	38	56.5	3138	487	1467	977	1697
Minsum	Proso	64	36	54.8	2445	1200	1273	1236	1639
Sunup	Proso	67	34	55.3	2778	613	1360	986	1584
Snowbird	Proso	63	37	56.0	2185	734	1400	1067	1440
Trial Mean		66	35	55.4	2344	783	1610	--	--
C.V. %		1.1	10.6	1.1	13	20	19.1	--	--
LSD .05		1	NS	0.8	498	267	444	--	--
LSD .01		1	NS	1.1	672	365	598	--	--

Planting Date: May 16, 1997
Harvest Date: September 9, 1997
Seeding rate: 25 lbs/Acre
Previous crop: Fallow
NS = no statistical difference between varieties.
All proso millets were severely infested with European corn borers.

How Good is Your Crop Rotation

R.O. Ashley

Dickinson Research Extension Center
North Dakota State University

Producers are encouraged to incorporate crop rotations into their farming practices yet are not sure what the impact would be on wheat yield and their farm's financial health. Producers have learned about how rotations reduce problems with insects, weeds and disease while improving yields and quality of crops grown after specific crops. Producers ask, "What level of wheat yields could we expect if we incorporated a good crop rotation on our farm?" This can be a difficult question to answer considering that a wide range of variables affect a major change in how a farm is managed and the results to be obtained.

A field demonstration was initiated at four sites in southwest North Dakota to show producers how their crop rotation is performing in controlling yield and quality limiting factors on wheat. Methyl bromide, a soil fumigant, was used in demonstration plots to control fungal root disease in wheat. Producers using their normal seeding and weed control practices farmed through the plots. This allowed producers to make side by side comparisons of fumigated and non-fumigated plots. **Methyl bromide is not an economical means of controlling root disease in wheat fields but was used to demonstrate the losses producers experience in the field and to demonstrate what producers can expect if adequate crop rotations to control root disease were practiced.**

Root disease ratings were consistently lower in the fumigated plots than the non-fumigated plots. A greater number of heads per square yard was produced and heading occurred three to five days earlier in the fumigated plots compared to the non-fumigated plots. Significant differences in grain yield were detected between fumigated and natural soil plots at Amidon and Beach (Table 1). Fumigation plots at the continuous wheat sites at Beach and Amidon had nearly a 40% increase in grain yield over natural soil plots whereas a one-year break with sweet clover at the Pick City site, in what was otherwise a continuous cereal grain rotation, saw a smaller yield increase of 26%. Test weight and protein as well were consistently greater in fumigated plots.

When durum was selling for $5.90 per bushel and hard red spring wheat selling for $3.46 per bushel, 14% protein, earlier this fall, that amounted to over a $90 per acre difference between the fumigated and the non-fumigated durum plots at Beach and over $55 per acre for hard red spring wheat at Amidon. When one year of a non-cereal crop was included in the rotation at Pick City the difference in returns between fumigated and non-fumigated hard red spring wheat was less than $35 per acre.

Soil nitrate concentrations (Table 2) were found to be greater in check plots than under the healthy root systems where root disease was controlled. High levels of nitrate, if exposed to leaching between crops, may be loss from the root zone for future crop production. This could be an added cost to farmers in producing future crops since the nitrate lost would need to be replaced.

The demonstration provided participating producers a graphic example of what an adequate crop rotation will do towards improving wheat yield and quality. Additional demonstrations are planned for the 1998 growing season.

Table 1. Yield, test weight, protein, height, and head density of hard red spring wheat and durum grown on fumigated and natural soil plots in southwestern North Dakota, 1997.

Treatment	Head density	Height	Yield	Test weight	Protein
	no/yd^2	inches	bu/a	lb/bu	%
Beach					
Fumigated	455.6	38.8	40.3	61.7	9.2
Natural	276.1	35.1	24.8	59.3	8.9
Mean	365.8	36.9	32.6	60.5	9.1
CV%	15.9	1.6	16.3	1.2	4.9
$LSD_{.10}$	138.4	1.4	12.6	1.7	NS
Amidon					
Fumigated	389.5	28.7	37.6	62.1	15.1
Natural	256.0	28.6	22.9	61.5	14.1
Mean	322.7	28.7	30.3	61.8	14.9
CV%	8.8	5.7	19.8	0.6	7.2
$LSD_{.10}$	47.3	NS	10.0	0.6	NS
Pick City					
Fumigated	453.9	31.6	36.6	62.0	15.6
Natural	261.4	30.4	27.1	61.8	15.3
Mean	357.6	30.9	31.9	61.9	15.4
CV%	10.7	7.7	23.0	0.6	2.2
$LSD_{.10}$	64.0	NS	NS	NS	NS

Table 2. Soil nitrate concentration under wheat at three locations in southwest North Dakota, 1997.

	------Beach------		------Amidon------		------Pick City------	
Depth	Fumigated	Natural	Fumigated	Natural	Fumigated	Natural
inches	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a
0 - 6	3	3	3	7	9	49
6 - 12	3	3	3	8	6	31
12 - 18	3	3	3	3	7	28
18 - 24	3	3	3	3	4	24
24 - 30	3	3	3	3	5	21
30 - 36	3	4	3	3	4	12
36 - 42	4	6	3	3	3	9
42 - 48	4	4	3	3	3	6
Total	26	29	24	33	41	180

Dry matter yields of alfalfa varieties at the Dickinson Research Extension Center-Manning Ranch, North Dakota, 1997.

	Cutting Date			Relative Yield		
Entry	**6/10**	**7/25**	**Total**	**6/10**	**7/25**	**Total**
1995 Planting	-----tons dry matter/acre-----			-------% of Vernal-------		
Sterling	0.52	1.74	2.26	124	123	123
Ranger	0.58	1.61	2.19	138	114	120
Blazer XL	0.71	1.41	2.12	169	100	116
Defiant	0.49	1.58	2.07	117	112	113
NK919 Rangeland	0.57	1.50	2.07	136	106	113
5364	0.50	1.50	2.00	119	106	109
Spreador III	0.32	1.63	1.95	76	116	107
5262	0.33	1.61	1.94	79	114	106
740	0.45	1.44	1.89	107	102	103
MG 2000	0.38	1.47	1.85	90	104	101
Vernal	0.42	1.41	1.83	-	-	-
NK919-10	0.37	1.45	1.82	88	103	99
Avalanche + z	0.40	1.37	1.77	95	97	97
Cut/Graze	0.29	1.40	1.69	69	99	92
LegenDairy	0.30	1.34	1.64	71	95	90
Crown II	0.35	1.28	1.63	83	91	89
Ladak	0.29	1.27	1.56	69	90	85
Mean	0.43	1.47	1.90			
$LSD_{.05}$	NS	NS	NS			
CV%	38.5	12.6	15.4			
1996 Planting						
120	0.94	1.49	2.43	108	108	108
Vernal	0.87	1.38	2.25	-	-	-
Proof	0.81	1.31	2.12	93	95	94
Rainier	0.84	1.28	2.12	97	93	94
5454	0.83	1.25	2.08	95	91	92
Allegiance	0.71	1.23	1.94	82	89	86
DK 127	0.65	1.16	1.81	75	84	80
Mean	0.81	1.30	2.11			
LSD .05	NS	NS	NS			
CV%	14.0	9.3	10.7			

Precipitation (inches)

April -	2.89	June -	5.02
May -	0.95	July -	5.41

Average Estimated Plant Available Water
May 8, 1997 - 1.80"

Stage of Development: 1st cutting ~ 20% bloom and wilting due to dry soil conditions; 2nd cutting ~ 40% bloom.

1997 Alfalfa Plant Density Trial — **Dickinson, ND**

Seeding rate/ac	Harvest Moisture		Hay Yield 12 % Moisture		DM Basis 1997			DM Basis 1996	DM Basis 2 yr avg
	%		Tons/ac						
	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut	Total	1st cut	
Hand 1plant/sqft	74	72	1.3	0.7	1.1	0.6	1.7	0.3	1.0
Hand 2plant/sqft	73	74	1.7	0.9	1.5	0.8	2.3	0.4	1.4
Hand 3plant/sqft	74	75	1.7	0.9	1.5	0.8	2.3	0.5	1.4
Hand 4 plant/sqft	73	74	1.6	1.0	1.4	0.9	2.3	0.5	1.4
1 lbs PLS/ac	72	74	1.3	1.0	1.2	0.9	2.1	0.7	1.4
2 lbs PLS/ac	72	73	1.4	1.0	1.2	0.9	2.1	0.8	1.4
4 lbs PLS/ac	71	75	1.7	1.1	1.5	0.9	1.4	0.8	1.6
8 lbs PLS/ac	72	74	1.7	1.2	1.5	1.1	2.6	0.8	1.7
16 lbs PLS/ac	72	74	1.8	1.2	1.6	1.0	2.6	0.8	1.7
32 lbs PLS/ac	72	75	1.8	1.2	1.6	1.1	2.7	0.7	1.7
Mean	72	74	1.6	1.0	1.4	0.9	2.2	0.6	1.5
C.V. %	1.8	1.6	10.1	12.6	10.1	12.6	--	13.9	--
LSD .05	2.0	2.0	0.2	0.2	0.2	0.2	--	0.1	--

1st cut=June 9, corresponds to 10-40% bloom
2nd cut=July 22, corresponds to 50-80% bloom
PLS=Pure Live Seed

HETTINGER ALFALFA VARIETY DEMONSTRATION

Source	Variety	Plants/ft^2 8/28/92	6/30/93	5/4/94	5/4/95	5/21/96	5/9/97
Planting date: 4/28/92							
AgriPro	9750	17	13	13	8	2	2
AgriPro	Dart	24	14	7	7	5	4
Northrup King	MultiKing 1	16	13	9	6	5	3
Northrup King	Spredor 2	10	16	13	9	6	3
Garst	636	8	12	14	11	5	4
Garst	645	11	13	11	8	4	2
Dekalb	120	28	16	12	7	4	3
Dekalb	122	9	17	9	8	4	2
Pioneer	5364	30	17	15	9	3	3
Pioneer	5262	25	12	11	6	5	3
public	Ladak	35	13	11	8	6	3
public	Travois	36	10	8	7	5	4
public	Vernal	22	18	9	7	5	5
Interstate	Clipper	33	22	10	7	3	5
Interstate	WL225	18	13	10	7	4	1
Cenex LOL	Blazer	27	19	11	7	4	1
Cenex LOL	Legend	29	12	12	8	4	1
Cargill	Trident II	11	14	9	10	5	4
Cargill	Crown II	30	14	12	7	2	2
Jacques	Multi-plier	12	11	11	6	4	3
Jacques	Chief	31	20	9	7	5	3
Planting date: 7/8/93			8/17/93				
ARS-Mandan	Rangelander		24	14	10	3	1
Ag. Canada	Anik		17	10	7	4	2
ARS-Mandan	Heinricks		19	9	7	3	1

Planting rate: 10 lbs/A

Nurse crop: Oats @ 25 lbs/A

Herbicides applied:
4/1/92 1.5 pt/A Treflan EC (PPI)
6/6/92 1.5 pt/A Poast + 2 pt/A Dash
5/3/93 1.5 pt/A Poast + 2 pt/A Dash
5/29/95 1.0 pt/A Buctril

Crop	Variety	Height	Harvest Moisture	12% Moisture	Hay Yield DM Basis 1995	1996	1997	2 yr avg
		in	%	Tons/ac				
barley	Haybet	23	63	2.1	-	--	1.8	--
triticale	2700	38	65	2.1	--	4.2	1.9	3.1
triticale/pea	2700/Trapper	38	63	2.5	--	3.4	2.2	2.8
oat	Paul	29	76	1.4	--	2.2	1.2	1.7
oat/pea	Paul/Trapper	31	75	1.7	--	2.1	1.5	1.8
oat	Whitestone	27	69	1.8	3.3	2.7	1.6	2.2
oat/pea	Whitestone/Trapper	28	73	2.0	2.6	2.6	1.8	2.2
oat/pea	Robert/Trapper	28	75	1.7	--	2.4	1.5	2.0
pea	Trapper	26	78	1.6	--	--	1.4	--
faba bean	Aladin	28	83	0.7	--	--	0.6	--
lentil	Indian Head	16	77	0.8	--	--	0.7	--
Mean		28	73	1.7	--	--	1.5	--
C.V.%		5.6	4.8	17.0	--	--	17.0	--
LSD .05		2.3	10.0	NS	--	--	NS	--

Haybet barley was seeded at 800,000 Pure Live Seed (PLS)/acre [86 lbs/acre); Paul and Whitestone oat were seeded at 800,000 PLS/acre [68 lbs/acre]; 2700 triticale was seeded at 800,000 PLS/acre [74 lbs/acre]; Trapper pea was seeded at 325,000 PLS/acre [106 lbs/acre]; fababean was seeded at 180,000 PLS/acre [151 lbs/acre]; and lentil was seeded at 511,000 PLS/acre [25 lbs/acre]. Seeding rates for mixtures were: Robert oat = 431,000 PLS/acre [43 lbs/acre]; Paul and Whitestone oat = 500,000 PLS/acre [43 lbs/acre]; 2700 triticale = 500,000 PLS/acre [46 lbs/acre]; and Trapper pea = 200,000 PLS/acre [65 lbs/acre].

Crop	Variety	CP	ADF	NDF
		DM Basis %		
barley	Haybet	11.3	33	52
triticale	2700	11.5	41	63
triticale/pea	2700/Trapper	10.5	43	59
oat	Paul	11.8	44	60
oat/pea	Paul/Trapper	12.6	45	53
oat	Whitestone	10.1	44	65
oat/pea	Whitestone/Trapper	11.8	44	58
oat/pea	Robert/Trapper	12.3	42	56
pea	Trapper	13.4	46	51
faba bean	Aladin	18.0	49	51
lentil	Indian Head	16.2	35	41
Mean		12.7	42	55
C.V.%		13.0	6.7	5.3
LSD .05		2.4	4.1	4.2

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

1997 Forage Pea Trial - Recrop — **Dickinson, ND**

Variety	Height	Harvest Moisture	Yield		DM Basis			
			12% moisture	DM basis	CP	ADF	NDF	RFV
	in	%	Tons/ac		%			
Algera	27	79	1.6	1.4	17.5	38	43	131
Carneval	24	80	1.4	1.2	17.0	33	44	134
Grande	28	82	1.6	1.4	18.8	33	41	147
Highlite	22	81	1.1	1.0	18.6	31	41	149
Motazz	26	81	1.1	0.9	19.8	34	43	137
Precourse	27	80	1.4	1.2	18.1	34	40	146
Pro 2100/8612-2g	26	79	1.3	1.2	16.9	33	42	141
Quayessa	22	82	1.3	1.2	17.2	36	42	137
Quintessa	24	79	1.1	1.0	17.3	35	41	141
Totem	18	82	0.8	0.7	20.0	29	37	169
Yorkton	24	80	1.3	1.2	17.7	35	43	133
4010	28	82	1.5	1.3	18.6	35	44	131
148-24f/200-17f	29	84	1.4	1.2	20.3	36	43	133
Mean	25	81	1.3	1.1	18.3	34	42	141
C.V. %	18.2	1.8	15.7	15.7	9.0	11.9	7.8	11.7
LSD .05	NS	2.0	NS	NS	2.4	5.8	4.6	23.6

1997 Forage Lentil Trial - Recrop — **Dickinson, ND**

Variety	Height	Harvest Moisture	Yield		DM Basis			
			12% moisture	DM basis	CP	ADF	NDF	RFV
	in	%	Tons/ac		%			
Brewer	12	63	1.2	1.0	15.7	36	40	143
CDC Richlea	15	66	2.0	1.8	16.3	34	40	144
Indian Head	16	70	2.2	2.0	18.2	36	42	136
Laird	16	69	2.3	2.0	16.1	34	40	146
Pardina	10	65	0.7	0.6	16.2	35	43	136
CDC Milestone	12	64	1.4	1.2	16.0	33	39	152
Mean	14	66	1.6	1.4	16.4	35	41	143
C.V. %	7.0	3.4	13.9	13.9	7.5	10.9	7.6	10.9
LSD .05	1.4	3.4	0.3	0.3	1.9	NS	NS	NS

CP = crude protein; ADF = acid detergent fiber; NDF = neutral detergent fiber; RFV = relative feed value

1997 Warm Season Annual Forages - Recrop **Dickinson, ND**

					Hay Yield			
			Harvest	12%	DM Basis			
Crop	Variety	Height	Moisture	Moisture	1995	1996	1997	3 yr avg
		in	%		Tons/ac			
millet	German	30	77	1.4	4.3	4.8	1.2	3.4
millet	Siberian	32	72	1.4	2.9	3.6	1.3	2.6
millet	Red Proso	42	75	1.9	--	--	1.6	--
sudangrass	Piper	54	78	1.8	2.9	2.8	1.5	2.4
forage sorghum	-----	42	81	1.4	--	--	1.3	--
oat	Paul	36	74	1.9	--	--	1.6	--
Mean		39	76	1.6	--	--	1.4	--
C.V. %		8.6	1.7	18.6	--	--	18.6	--
LSD .05		5.1	2.0	NS	--	--	NS	--

1997 Warm Season Annual Forages - Recrop **Dickinson, ND**

		DM Basis			
Crop	Variety	CP	ADF	NDF	RFV
		%			
millet	German	10.8	41	64	83
millet	Siberian	9.0	44	66	78
millet	Red Proso	8.9	43	67	78
sudangrass	Piper	8.4	46	68	73
forage sorghum	---	8.7	44	68	76
oat	Paul	9.6	42	65	--
Mean		9.2	43	66	78
C.V. %		12.8	4.2	5.7	6.7
LSD .05		1.8	2.8	5.6	7.9

CP=crude protein; ADF=acid detergent fiber; NDF=neutral detergent fiber; RFV=relative feed value

Natural Resources Conservation Service
Plant Materials Center
Bismarck, North Dakota

Project No.: 38A339X Hettinger, North Dakota

Project Title:

Field evaluation of cool-season grasses for pasture, range, wildlife habitat, and protection of surface and ground water.

Cooperators:

USDA, Natural Resources Conservation Service (NRCS) in cooperation with the North Dakota State University (NDSU), Hettinger Research and Extension Center (HREC); Adams County Soil Conservation District (ACSCD); and Mr. Joseph Clement, private landowner.

Location:

Legal Description; SE1/4 sec. 24, T. 129, R. 96, Adams County, North Dakota. Approximately 2 miles south of Hettinger.

Objective:

The objective of this study is to evaluate the performance and adaptation of native and introduced cool-season grass species and varieties for use in pastures, range, wildlife habitat, and water quality projects in southwestern North Dakota and surrounding regions of South Dakota, Montana, and Wyoming.

Site Information:

One hundred and one different varieties or experimental lines were seeded in 6 ft. x 25 ft. plots on April 6, 1992. Plots were replicated three times. Seeding rate varied with species but followed recommended seeding rates as specified in the North Dakota NRCS Technical Guide. Species with no specified seeding rates were generally planted at 20-25 seeds/ft^2. Soil at the site is a Vebar-Flasher fine sandy loam, which is typically low in organic matter and available water capacity.

Evaluation Methods:

Plant performance data has been collected by the Plant Materials Center (PMC) for six years. Evaluation parameters include: emergence, weed competition, stand density, stand rating, plant height, disease resistance, seed production, vigor, and forage production. Forage production has been determined since 1993 and will continue through 1997.

Forage quality (nutrient content) is another essential element in evaluating plant performance. A study was initiated in 1995 by the Adams County Soil Conservation District to address this parameter. North Dakota State University Extension Service has taken the lead in organizing sample collection and analyses. Samples of 25 selected entries to be analyzed were clipped at various intervals throughout the growing seasons of 1995, 1996, and 1997 by personnel from NDSU, NRCS, the District, and volunteers.

Summary:

Plots had a good start in 1992. Moisture conditions in 1992 and 1993 produced dense stands and abundant forage. Droughty conditions in 1994 reduced forage yields considerably. There was a slight increase in production in 1995 compared to 1994. Production overall in 1996 was the lowest of any evaluation year. Weeds have been chemically controlled at the site each year, and residue has been managed with a spring burn. Severe infestation of wheatgrasses from the surrounding CRP land forced the PMC to abandon replication three and gather data from the array in 1996 and 1997. Forage production in 1997 was similar or lower than for 1996. Dry growing conditions have contributed to declining yields.

PROJECT: 38A339X Hettinger, North Dakota

PROJECT TITLE: Field evaluation of cool season grasses for pasture, rangeland, wildlife habitat, and protection of surface and groundwater.

Table HE-2: Plant performance 1992-1997. Seeding Date: April 6, 1992.

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED(2) COMP. 92 93	STAND(3) DENSITY 92 93	STAND(4) RATING 94 95 96 97	PLANT(5) HEIGHT 93 95 96	(6) DISEASE 93	SEED(7) PRODUCTION 93 94 96	(8) VIGOR 95 96 97	FORAGE YIELD (lb/ac) (9) 1993	1994	1995	1996(10)	1997
FAIRWAY WHEATGRASS													
1. Parkway	2	2 2	53 75	3 3 2 3	28 21 22	2	2 6 8	4 3 4	2260A	838B	985B	664CD	539D
2. Kirk	3	3 2	52 68	3 3 3 2	31 29 25	2	1 4 5	3 2 4	2961A	1235B	1395B	690CD	767CD
3. SD-77	4	3 2	39 64	2 2 3 2	30 27 21	2	1 4 7	2 4 3	3187A	1632AB	1843AB	747CD	1064ABC
4. Ephraim	3	4 2	40 59	3 4 3 3	26 25 21	2	3 5 7	4 4 5	1957A	1346AB	1435B	955BCD***	662CD
5. Ruff	4	3 2	48 69	3 3 2 2	29 25 17	2	2 5 8	2 3 4	2864A	1198B	1322B	673CD	896BCD
6. NEAC1	4	2 3	46 56	3 2 3 2	24 21 19	2	2 4 7	2 3 4	1962A	1079B	1478B	557D	900BCD
7. NEAC2	4	2 2	48 66	3 2 3 2	29 25 19	2	2 5 7	2 4 4	3454A	1377AB	1950AB	838BCD	1397A
CRESTED WHEATGRASS													
8. Summit	3	3 2	45 62	3 4 3 2	30 31 29	2	2 3 4	2 2 3	2777A	2207A	2478A	1503AB	1095ABC
9. Nordan	4	4 3	41 66	3 3 3 2	31 33 21	2	2 3 6	3 3 3	3382A	1609AB	1466B	1757A***	1382AB
10. NEAD1	3	4 2	45 72	3 3 3 2	31 29 27	2	2 4 4	4 3 3	2458A	1017B	1106B	1310ABC	1281AB
FAIRWAY x CRESTED CROSS													
11. Hycrest	3	3 2	42 68	3 3 3 3	32 28 29	2	1 4 4	2 3 3	2688A	1330AB	1363B	1072ABCD***	1151ABC
12. Hycrest #2	3	3 1	40 61	3 4 3 2	28 27 29	2	2 3 5	3 2 4	2475A	1586AB	1602AB	1099ABCD	1141ABC

(1) Emergence and stand uniformity seven weeks after seeding, 5/21/92. Rating: 1=excellent, 5=fair, 9=no emergence.

(2) Weed competition, 7/21/92 and 8/17/93. Rating: 1=none, 5=moderate, 9=severe.

(3) Density estimate; percent of full rows in sample frames, 100% equals full frame, 7/21/92.

(4) Stand within plot, 8/16/94, 8/30/95, 7/31/96, 7/30/97. Rating: 1=excellent, 5=fair, 9=poor.

(5) Plant height average in inches, 8/17/93, 8/30/95, 7/31/96.

(6) Disease problems (primarily stem and leaf rust), 8/17/93. Rating: 1=none, 5=moderate, 9=severe.

(7) Seed production potential, using number of culms as an indicator, 8/17/93, 8/16/94, 7/31/96. Rating: 1=excellent, 5=fair, 9=poor.

(8) Vigor (overall plant health), 8/30/95, 7/31/96, 7/30/97. Rating: 1=excellent, 5=fair, 9=poor.

(9) Forage yield measured as lb/ac oven dry matter, 8/17/93, 8/16/94, 8/30/95, 7/31/96, 7/30/97. Comparison of means is by Student-Newman-Keul's Multiple Range Test (1993) and Duncan's New Multiple Range Test (1994, 1995, 1996, 1997), means with same letter for each species grouping (separated by line) are not significantly different (P=.05).

(10) In 1996 and 1997, the array and replications 1 and 2 were harvested for forage production (rep 3 not harvested due to severe contamination).

* Entries preceeded by an asterisk are not replicated, forage production data was not collected.

** Only replications 1 and 2 analyzed, no harvest in replication 3 due to severe contamination.

*** Replications 1 and 2 data taken from nutrient study.

**** Estimated. In 1997, 200 lb/a estimated for rep 1, entry #40.

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED(2) COMP. 92	93	STAND(3) DENSITY 92	93	STAND(4) RATING 94	95	96	97	PLANT(5) HEIGHT 93	95	96	(6) DISEASE 93	SEED(7) PRODUCTION 93	94	96	(8) VIGOR 95	96	97	FORAGE YIELD (lb/ac) (9) 1993	1994	1995	1996(10)	1997
SIBERIAN WHEATGRASS																								
13. P-27	5	5	3	38	51	3	4	4	3	33	32	26	2	1	5	5	4	3	3	2860A	1340AB	1893AB	1326ABC	1469A
INTERMEDIATE WHEATGRASS																								
14. Chief	3	5	2	52	60	1	2	2	2	42	38	32	2	1	5	5	1	3	2	4040A	2050A	3008A	1975A	1579A
15. Clarke	3	3	2	60	75	2	2	3	2	42	33	38	2	2	5	6	2	4	2	4806A	1811A	2748A	2160A	1619A
16. Reliant	2	1	1	58	77	1	2	2	2	44	35	33	2	1	5	6	3	3	3	4330A	2135A	2805A	2049A***	1314A
17. Oahe	2	2	1	56	61	2	2	3	2	42	35	28	2	2	6	7	3	3	3	3919A	1593A	2829A	1565A***	1476A
18. SD-54	2	1	1	47	66	2	2	2	2	44	38	32	2	2	4	6	2	3	3	5526A	2184A	2665A	2039A	1361A
19. *Tegmar	1	1	1	88	48	-	-	-	-	31	--	--	2	2	-	-	-	-	-	----	----	----	----	----
20. *Greenar	-	-	1	--	58	-	-	-	-	37	--	--	2	2	-	-	-	-	-	----	----	----	----	----
21. Slate	1	2	1	64	70	2	1	2	2	43	38	29	2	2	4	7	3	3	3	3510A	1829A	2469A	1424A	1285A
22. NETI1	3	4	2	64	64	2	1	3	2	45	40	29	2	1	5	7	2	3	3	3897A	2390A	3163A	1472A	1439A
23. NETI2	2	2	1	60	70	2	2	2	2	43	39	31	2	2	4	6	1	3	3	4081A	2197A	3228A	1486A	1235A
24. NETI3	2	2	2	58	60	1	1	2	2	44	41	28	2	1	3	6	1	3	3	4619A	2615A	3213A	1854A	1517A
25. NE50C3	3	3	2	48	70	1	2	2	1	42	42	31	2	2	3	7	2	3	3	4213A	3014A	3392A	1770A	1466A
26. NECASPIAN3	2	3	1	62	60	1	2	2	2	47	39	34	2	1	3	6	2	3	3	4592A	2506A	3585A	1573A	1196A
27. *Amur	-	1	1	41	40	-	-	-	-	43	--	--	2	2	-	-	-	-	-	----	----	----	----	----
PUBESCENT WHEATGRASS																								
28. Greenleaf	3	3	2	56	67	2	1	3	2	44	37	27	2	2	7	8	2	3	4	3978A	2220A	2665A	1563A	1258A
29. MDN-759	3	2	1	55	64	2	3	4	2	42	35	26	2	2	5	7	3	5	4	3583A	2001A	2630A	2034A***	1132A
30. Manska	2	2	1	44	63	1	2	3	2	41	33	30	2	2	4	8	2	4	4	4300A	2693A	3704A	1526A***	1354A
31. *Topar	-	1	1	58	52	-	-	-	-	31	--	--	2	2	-	-	-	-	-	----	----	----	----	----
32. *Luna	-	1	1	60	50	-	-	-	-	39	--	--	2	2	-	-	-	-	-	----	----	----	----	----
TALL WHEATGRASS																								
33. Orbit	3	5	2	49	61	2	2	3	3	48	52	32	2	2	4	5	2	3	4	4397A	2151A	2371A	1245A	673A
34. Alkar	3	5	2	40	66	3	4	4	2	46	47	33	2	2	4	5	3	2	4	4664A	2162A	2530A	1717A***	839A
35. Platte	3	4	1	54	63	2	2	3	2	51	45	34	2	2	3	6	2	4	3	3536A	1894A	2652A	953A	752A
36. *Jose	-	1	1	82	70	-	-	-	-	53	--	--	2	2	-	-	-	-	-	----	----	----	----	---
37. *Largo	-	2	1	46	51	-	-	-	-	53	--	--	2	2	-	-	-	-	-	----	----	----	----	---

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED(2) COMP. 92 93	STAND(3) DENSITY 92 93	STAND(4) RATING 94 95 96 97	PLANT(5) HEIGHT 93 95 96	(6) DISEASE 93	SEED(7) PRODUCTION 93 94 96	(8) VIGOR 95 96 97	FORAGE YIELD (lb/ac) (9) 1993	1994	1995	1996(10)	1997
QUACKGRASS													
38. RS Hoffman	3	3 1	48 63	1 1 4 4	38 26 22	2	3 8 6	3 4 4	3454A	1327A	984	969A	827A
BLUEBUNCH x QUACK CROSS													
77. RS-1 Hybrid N	3	4 2	40 67	2 2 2 3	44 27 28	2	2 7 6	3 2 3	3768A	1588A	1762A	1357A	1325A
78. RS-1 Hybrid R	3	3 2	53 64	2 2 4 2	38 26 26	2	3 7 5	4 3 3	3434A	1864A	1782A	1662A***	1364A
SMOOTH BROMEGRASS													
39. Magna	3	3 1	40 77	1 1 3 2	35 37 24	2	2 5 6	2 4 3	3999A	1883AB	1751ABC	824AB	817ABC
40. S-7133	3	4 2	37 66	3 3 3 4	34 33 24	2	4 7 6	3 4 5	2826A	1234ABC	709C	731AB	462CD****
41. Manchar	3	3 2	42 76	1 4 3 3	32 33 27	2	2 4 5	4 4 4	2888A	1389ABC	1040BC	776AB	707ABCD
42. Rebound	4	3 1	44 80	1 3 2 2	31 35 32	2	3 8 7	3 3 4	2684A	1388ABC	1248ABC	1241AB***	1010AB
43. Cottonwood	5	3 1	38 80	1 2 2 2	33 37 26	2	3 6 6	2 4 4	3190A	2016A	1888AB	1192AB***	831ABC
44. Lincoln	3	2 2	44 76	2 2 2 2	30 31 31	2	3 7 7	3 4 5	3033A	1782AB	2206A	1137AB	1156A
SMOOTH x MEADOW CROSS													
45. S-9183	4	3 2	38 64	4 3 3 3	34 32 29	2	3 6 6	3 3 5	2843A	849C	827BC	476B	495BCD
MEADOW BROMEGRASS													
46. Fleet	2	2 1	53 76	1 1 3 2	34 18 23	2	4 8 8	2 4 5	3668A	785C	957BC	523AB	222D
47. Paddock	3	2 1	54 73	2 2 2 2	32 15 17	2	6 8 8	3 3 5	3139A	841C	1215ABC	519AB	305CD
48. Regar	3	4 1	33 74	2 2 3 2	29 19 14	2	7 9 8	2 4 6	2855A	1045BC	1203ABC	1272A***	266D
ORCHARDGRASS													
49. *Paiute	-	3 2	76 41	- - - -	26 -- --	2	8 - -	- - -	----	----	----	----	---

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED(2) COMP. 92 93	STAND(3) DENSITY 92 93	STAND(4) RATING 94 95 96 97	PLANT(5) HEIGHT 93 95 96	(6) DISEASE 93	SEED(7) PRODUCTION 93 94 96	(8) VIGOR 95 96 97	FORAGE YIELD (lb/ac) (9) 1993	1994	1995	1996(10)	1997
RUSSIAN WILDRYE													
50. Mayak	5	4 3	40 57	3 3 3 4	40 19 17	2	4 9 8	4 5 5	2105A	282A	520A	193B	139A
51. Swift	5	5 2	26 53	3 3 3 3	40 23 14	2	5 9 7	3 4 5	2439A	738A	599A	432AB	351A
52. Cabree	4	3 2	36 63	4 5 4 4	37 13 13	2	3 9 8	4 4 5	2255A	449A	455A	258B	217A
53. Vinall	3	4 3	27 62	4 3 3 4	41 13 17	2	3 9 8	4 4 5	2101A	429A	566A	191B	169A
54. Mankota	6	5 3	41 56	4 4 3 3	42 25 24	2	3 8 7	4 4 5	2327A	504A	714A	516AB***	289A
55. MDN-1831	6	6 2	31 49	4 4 3 4	40 13 10	2	3 8 7	4 4 5	2356A	548A	516A	457AB	325A
56. Bozoisky Select	5	4 2	40 56	3 4 4	46 25 22	2	2 8 8	3 5 5	2513A	620A	809A	776A***	389A
57. PI-272136	4	2 2	29 56	3 4 4 4	43 13 14	2	4 8 7	4 4 5	2112A	339A	331A	273B	386A
58. Syn A NL	5	6 2	29 52	5 4 3 4	42 21 25	2	3 8 7	3 3 6	2571A	680A	922A	306B	450A
MAMMOTH WILDRYE													
59. ND-691	3	4 2	18 45	4 4 3 4	35 22 23	2	8 7 8	3 4 4	3301A	1433AB	2145A**	1216A	1139A
60. PI-478832	3	4 2	30 50	2 4 3 3	38 27 33	2	7 7 5	3 2 3	4234A	2088A	3055A**	1992A	1540A
61. Volga	4	4 3	20 42	4 5 4 5	38 26 33	2	7 7 6	4 4 5	2779A	1609AB	2256A**	1576A***	994A
EUROPEAN DUNEGRASS													
62. ND-2100	7	7 8	6 19	7 8 6 8	20 14 22	1	9 9 7	7 4 5	1048B	540B	501B**	0	<100****
ALTAI WILDRYE													
63. Prairieland	3	3 2	40 66	1 3 4 4	38 23 29	2	8 8 6	3 3 4	3137A	1555A	1535A**	2104A***	1308B
64. Pearl	3	4 2	33 66	3 4 3 6	38 20 29	2	7 7 7	4 2 5	3104A	1171A	1253A**	870B	945BC
65. Eejay	3	5 3	31 62	2 2 4 3	38 27 31	2	8 8 8	2 3 4	3507A	1643A	1648A**	1568AB	2072A
BEARDLESS WILDRYE													
71. Shoshone	5	6 3	9 60	1 1 4 5	27 17 21	2	8 9 8	1 4 5	2223B	1098A	1762A**	1247AB***	588C
DAHURIAN WILDRYE													
66. Arthur	2	2 2	58 71	2 3 5 8	46 31 31	2	1 2 4	3 4 6	4049	955	1143	607***	<100****

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED(2) COMP. 92 93	STAND(3) DENSITY 92 93	STAND(4) RATING 94 95 96 97	PLANT(5) HEIGHT 93 95 96	(6) DISEASE 93	SEED(7) PRODUCTION 93 94 96	(8) VIGOR 95 96 97	FORAGE YIELD (lb/ac) (9) 1993	1994	1995	1996(10)	1997
BASIN WILDRYE													
67. M-718	6	5 4	9 33	5 5 5 5	43 43 41	7	8 7 7	3 4 5	2196A	1758A	2724A	2008AB	1270A
68. PI-478831	3	2 2	32 72	4 3 3 4	40 33 41	7	7 7 6	3 3 5	1498A	1624A	1706A	1535B	1117A
69. Magnar	4	6 2	26 57	3 5 4 4	44 36 43	4	6 6 6	3 2 3	2431A	2112A	1674A	2766A***	1747A
CANADA WILDRYE													
70. *Mandan	-	2 1	59 51	- - - -	41 -- --	2	1 - -	- - -	----	----	----	----	----
BEARDLESS BLUEBUNCH													
72. *Whitmar	-	3 3	69 59	- - - -	26 -- --	2	5 - -	- - -	----	----	----	----	----
BLUEBUNCH WHEATGRASS													
73. PI-232127	1	3 2	45 58	2 3 2 2	27 27 24	3	7 7 6	3 2 5	1933A	995A	1530A	1300A	1311A
74. PI-232128	2	4 2	32 50	2 3 3 2	28 17 22	2	7 8 7	3 3 4	2262A	1212A	1216A	1108A	1356A
75. Goldar	1	4 2	57 79	2 2 2 2	27 14 18	2	7 8 7	3 3 5	2332A	941A	1487A	1412A***	1184A
76. Secar	1	3 2	61 80	3 3 2 2	28 28 23	3	6 8 7	4 3 4	1975A	1294A	1318A	1360A	1026A
SHEEP FESCUE													
79. *Covar	-	4 7	9 22	- - - -	20 -- --	1	3 - -	- - -	----	----	----	----	----
HARD FESCUE													
80. *Durar	-	3 5	16 38	- - - -	28 -- --	1	2 - -	- - -	----	----	----	----	----
INDIAN RICEGRASS													
81. Mandan 57-2	5	6 5	26 37	7 8 7 6	24 18 25	2	3 2 4	7 3 5	2160A	323A	0	137A	<100****
82. Nezpar	5	4 4	19 49	6 6 7 9	28 27 16	2	2 4 6	5 4 ?	1960A	403A	0	282A	<100****
83. *Paloma	-	6 8	24 24	- - - -	20 -- --	2	3 - -	- - -	----	----	----	----	----
CANBY BLUEGRASS													
84. *Canbar	5	6 8	2 25	- - - -	16 16 --	5	3 - -	- - -	----	----	----	----	----

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED(2) COMP. 92 93	STAND(3) DENSITY 92 93	STAND(4) RATING 94 95 96 97	PLANT(5) HEIGHT 93 95 96	(6) DISEASE 93	SEED(7) PRODUCTION 93 94 96	(8) VIGOR 95 96 97	FORAGE YIELD (lb/ac) (9) 1993	1994	1995	1996(10)	1997
GREEN NEEDLEGRASS													
85. Lodorm	4	6 2	45 67	2 4 3 3	36 35 28	2	2 2 3	2 3 4	3322A	1331A	1308A	973A***	643A
86. SD-93	3	4 2	23 56	4 4 3 3	35 33 28	2	3 3 3	2 2 3	2196A	1035A	1113A	908A	902A
GREEN NEEDLEGRASS x RICEGRASS CROSS													
87. *Mandan	-	6 6	24 54	- - - -	31 -- --	2	3 - -	- - -	----	----	----	----	----
STREAMBANK WHEATGRASS													
88. *Sodar	-	6 5	54 73	- - - -	26 -- --	5	5 - -	- - -	----	----	----	----	----
THICKSPIKE WHEATGRASS													
89. Elbee	2	3 2	48 71	2 2 3 3	28 9 21	2	3 8 6	4 5 5	2046B	412B	547A	238A	247A
90. Critana	4	4 2	43 68	2 2 2 3	26 13 21	4	4 8 7	3 4 5	2480A	711A	1223B	1135A***	319A
WESTERN WHEATGRASS													
91. Walsh	4	4 2	50 74	1 1 2 2	24 25 17	2	7 8 8	3 4 5	2253A	983B	1871B	840A	666A
92. Rodan	3	4 1	53 79	1 1 3 2	26 22 24	2	6 8 7	2 3 3	3780A	2205AB	2440B	1446A***	1466A
93. *Rosana	-	6 3	54 57	- - - -	22 -- --	2	6 - -	- - -	----	----	----	----	----
94. Flintlock	3	4 2	36 54	1 1 2 2	31 29 25	2	6 8 7	1 3 3	3575A	2730A	4263A	1905A	1014A
95. *Barton	-	6 3	24 50	- - - -	26 -- --	2	5 - -	- - -	----	----	----	----	----
96. *Arriba	-	6 3	53 49	- - - -	30 -- --	2	4 - -	- - -	----	----	----	----	----
SLENDER WHEATGRASS													
97. Revenue	3	2 2	71 64	2 3 4 5	39 35 31	2	1 1 3	2 3 3	4146A	2011A	2063A	1262A***	728A
98. Adanac	2	2 2	69 62	2 2 3 5	37 33 26	3	1 1 3	2 3 5	2559B	1143A	1057B	860AB	586A
99. Pryor	4	3 2	35 50	4 4 4 4	33 33 22	3	2 2 4	3 3 4	2082B	1367A	1046B	677B	599A
100. *San Luis	-	6 3	36 59	- - - -	35 -- --	3	1 - -	- - -	----	----	----	---	---
101. Primar	2	2 2	40 62	3 2 4 5	36 33 22	2	2 2 4	2 3 4	2831B	1185A	1469AB	711B	721A

This publication will be made available in alternative formats upon request. Contact Hettinger Research Extension Center, 701-567-4323.

1000 copies of this publication were printed at a cost of $1.38 each.