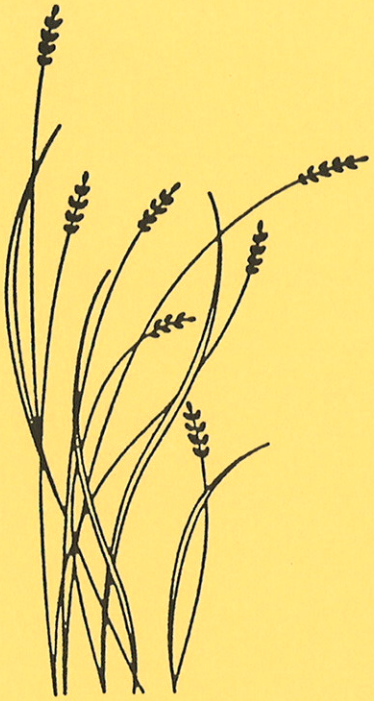

TWELFTH
ANNUAL

WESTERN DAKOTA

CROPS DAY RESEARCH REPORT

HETTINGER ARMORY
DECEMBER 14, 1995

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12th ANNUAL WESTERN DAKOTA CROPS DAY
DECEMBER 14, 1995
HETTINGER ARMORY

MST

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

10:30 Welcome

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

Pat Carr, Agronomist, Dickinson Research Extension Center

Glenn Martin, Research Specialist II, 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 Weather, Tillage & Crop Diseases
Dr. Marcia McMullen, Extension Plant Pathologist, NDSU, Fargo, ND.

2:15 Adjuvants - The Rest of the Story
Dr. Richard Zollinger, Extension Weed Specialist, NDSU, Fargo, 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.

1995 WESTERN DAKOTA CROPS DAY SPONSORS

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INTERSTATE PAYCO SEEDS CO.

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
Golden Valley SCD, Beach

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Miscellaneous Crops

Forage Crops

Weed Control Research

GROWING CONDITIONS
HETTINGER RESEARCH EXTENSION CENTER
-1995-

Hard red winter wheat was planted into dry soil during the last few days of September 1994. This was followed by mild temperatures and more than 5 inches of precipitation during October, providing excellent conditions for HRWW establishment prior to freeze up. The winter months of 1994/95 were generally mild with above normal temperatures and no large accumulations of snow.

Early springtime conditions were ideal for perennial and winter annual grass production. Hay production was at an all time high and HRWW yields were spectacular.

Fertility levels were determined to a 4 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. Soil crusting prior to crop emergence was typical in some areas and resulted in many fields being worked up and replanted.

A week of hot and dry weather conditions during mid-June may have adversely affected seed-head formation in young small grain seedlings. Mid-July, when most small grain crops were heading and forming kernels, saw hot temperatures again. August was generally hot and dry. These conditions provided an excellent environment for most late season row crops. Corn, sunflower and other row crop yields were generally above normal.

A hail storm destroyed the Regent plot site in August.

Environmental conditions were generally favorable for foliar disease development throughout most of the growing season. Tan spot, septoria leaf blotch and other diseases were prevalent with infections generally being limited to the lower leaves of the crop canopy. Higher temperatures and dryer conditions later in the growing season generally prevented the spread of these diseases onto the flag leaf. The hot and dry conditions in July and August exasperated small grain crops infected with common root rot, causing almost mature plants to dry up and die, a condition often blamed on herbicide misapplication. Aphids blown in from southern states brought with them viral diseases, notably, barley yellow dwarf (found on all small grain crops) and wheat streak mosaic virus.

Grasshoppers remain a concern. An explosion of hoppers during the Fall of 1994 was tempered by cool and wet environmental conditions during the Spring of 1995. Grasshopper levels once again exploded during the Fall of 1995.

WEATHER DATA SUMMARY
HETTINGER

Precipitation (inches)	1992-93	1993-94	1994-95	40 year average
Sept. - Dec.	2.26	2.23	7.80	3.18
Jan. - March	1.50	2.03	1.37	1.27
April	1.12	1.33	1.18	1.68
May	1.33	0.72	6.07	2.57
June	4.58	2.11	2.88	3.46
July	4.75	3.49	2.21	2.06
August	0.85	0.51	3.71	1.68
Total	16.39	12.42	25.22	15.90

Average Temperature F	1992	1993	1994	1995	40 year average
April	42.7	42.1	42.7	37.8	42.8
May	57.4	54.5	56.5	49.8	54.5
June	62.5	59.2	63.8	63.0	63.8
July	61.4	62.3	67.1	68.1	69.9
August	62.7	64.2	68.1	71.6	68.5
September	56.6	52.0	60.4	57.4	57.1

Growing Degree Units (50-86)	1992	1993	1994	1995	32 year average
May	323	255	321	186	335
June	391	309	414	412	425
July	375	375	484	559	498
August	429	452	519	644	535
September	338	245	377	348	389
Total	1856	1636	2115	2149	2182

	28 F	32 F	Normal 32 F
Date of last frost	May 4	May 25	May 18
Date of first frost	Sep 21	Sep 20	Sep 20
Frost free days	140	118	125

Dickinson Research Extension Center
Growing Conditions 1994-95

Precipitation during 1994-95 was 174% of the 100-year average. The relative abundance of moisture during the 1995 growing season generally protected most crops from long periods of water stress. However, several foliar and head diseases were more prevalent among small grain crops than they had been over the past several years, in part because of the greater amount of precipitation that was received. Soil-N levels were also very low since most of the N was leached from the top 4 feet of the soil, and some crops showed N-deficiency symptoms.

Precipitation between September through December of 1994 was more than 3 inches above the 100-year average, allowing the soil profile in fields cropped in 1993-94 to be completely recharged prior to planting crops in 1995. Precipitation received between January and March was close to the 100-year average, but was much more than the long-term average from May through August. A single-rainfall event dropping more than 4 inches of precipitation within a 90 minute period on August 24, along with rain and snow received after this date, have recharged soil profiles in fields at Dickinson.

ANNUAL PRECIPITATION	DICKINSON

	Precipitation					
	1991-92	1992-93	1993-94	1994-95	Average 100-year	1994-95 Change from Mean
	inches					%
Sept.-Dec.	3.65	2.34	1.80	6.44	3.16	204
Jan.-March	1.52	1.13	1.26	1.85	1.55	119
Apr.-June	7.29	7.88	8.06	7.34	5.23	140
July-Aug.	3.88	5.46	1.74	10.54	5.12	206
Total	16.34	16.81	12.86	26.17	15.06	174

Average daily temperature across the 1994-95 growing season were comparable to those of the 100-year average. Daily temperatures were cooler during April, May, and July than the long-term average, but were warmer in June and August. Average daily temperature across the growing season was similar to that in 1993-94, and notably warmer than that measured in 1992-93 and 1993-94.

ANNUAL TEMPERATURE	DICKINSON

	Temperature					
Month	1991-92	1992-93	1993-94	1994-95	Average 100-year	1994-95 Change from Mean
	°F					%
April	40	41	42	37	41	90
May	55	54	56	51	54	94
June	61	57	62	64	61	105
July	61	62	64	67	69	97
August	62	64	66	70	67	104
Average	56	56	58	58	58	

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 8.3%. 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.

Hard Red Spring Wheat Variety Description

Variety	Agent or Origin[1]	Year Rel.	Beard	Height	Strength of Straw	Maturity	Reaction to Disease[2] Stem rust	Leaf rust	Foliar Disease	Root Rot	Hd. Blight (Scab)	Quality factors Test wt.	Wheat protein	Quality rating[3]
Verde	MN	1995	yes	s.dwf.	strg.	med	R	R	MR	M	MS	high	low	NA
Sonja	AgriPro	1992	yes	s.dwf.	v.strg.	m.early	R	MR	MR	M	VS	high	avg.	NA
Krona	AgriPro	1991	yes	s.dwf.	v.strg.	m.late	R	R	MR	MR	S	high	low	2.0
Dalen	AgriPro	1991	yes	s.dwf.	v.strg.	early	R[5]	R	M	S	S	high	avg.	2.0
Bergen	AgriPro	1990	yes	s.dwf.	v.strg.	m.early	R[6]	R	MR	MS	S	high	avt.	2.0
Nordic	AgriPro	1986	yes	s.dwf.	strg.	m.late	R	MR	MR	MR	MS	high	low	2.0
Express	WPB	1990	yes	s.dwf.	v.strg.	m.early	R	MR	M	S	VS	low	avg.	NA

[1]Refers to agent or developer: NDSURF = North Dakota State University Research Foundation; WPB = Western Plant Breeders; 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;[5] =MR, [6] = M in artificially induced epidemics; NA = data not available; Head blight = scab; Foliar disease = reaction to tan spot and septoria leaf spot complex. *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. Bread making quality assessed by the Department of Cereal Science, NDSU.

Hard Red Spring Wheat Variety Description

Variety	Agent or Origin[1]	Year Rel.	Beard	Height	Strength of Straw	Maturity	Reaction to Disease[2]					Quality factors		
							Stem rust	Leaf rust	Foliar Disease	Root Rot	Hd. Blight (Scab)	Test wt.	Wheat protein	Quality rating[3]
Grandin	ND	1989	yes	s.dwf.	strg.	early	R	R	MS	M	S	high	avg.	4.0
Gus	ND	1989	yes	s.dwf.	strg.	m.early	R	R	M	M	VS	high	high	4.0
Amidon	ND	1988	yes	med.	med.	med.	R	R	M	MR	S	high	avg.	4.0
Len	ND	1979	yes	s.dwf.	v.strg.	m.early	R	R	S	S	MS	high	avg.	4.0
Coteau	ND	1978	yes	med.	m.strg.	med.	R	R	M	MS	S	avg.	high	4.0
Glupro	ND	1995	yes	tall	med.	m.late	R	MS	NA	NA	VS	avg.	high	4.0
Kulm	ND	1994	yes	med.	strg.	early	R	R	MS	MS	S	high	high	3.0
Butte 86	ND	1986	yes	med.	m.strg.	early	R[5]	R	MS	MS	MS	high	avg.	3.0
Stoa	ND	1984	yes	med.	m.strg.	m.early	R	R	MS	M	MS	high	avg.	3.0
2371	NDSURF	1991	yes	s.dwf.	v.strg.	m.early	R[5]	R	M	S	MS	high	avg.	3.0
Lew	MT	1976	no	med.	med.	med.	R[6]	MS	MS	S	NA	high	low	2.5
2375	NDSURF	1990	yes	s.dwf.	med.	m.early	R	R	MS	M	MS*	high	avg.	2.5
2370	NDSURF	1990	yes	s.dwf.	v.strg.	m.early	R[6]	R	MS	S	MS*	high	avg.	2.5
Trenton	ND	1995	yes	med.	med.	med.	R	R	MS	S	S	high	high	2.5
Ernest	ND	1995	yes	med.	med.	med.	R	R	MS	MS	S	high	high	2.5
Norm	MN	1992	yes	s.dwf.	v.strg.	med.	R	R	MR	MR	VS	high	low	2.0
Prospect	SD	1988	yes	s.dwf.	v.strg.	m.early	R[6]	MR	MS	MR	MS	high	avg.	2.0
Sharp	SD	1990	yes	med.	med.	early	R	R	MS	S	MS	v.high	avg.	2.0
CDC Teal	CDC	1991	no	med.	med.	m.early	R	MR	MR	MS	VS	high	avg.	NA
AC Minto	Can	1991	no	med.	med.	med.	R[6]	R	M	M	NA	low	avg.	NA
Hamer	AgriPro	1995	yes	s.dwf.	v.strg.	med.	R	R	M	NA	S	avg.	avg.	2.0
Lars	AgriPro	1995	yes	s.dwf.	v.strg.	med.	R	R	MR	NA	S*	avg.	avg.	2.0
Norlander	AgriPro	1995	yes	s.dwf.	med.	m.early	MS	MR	M	NA	S	avg.	avg.	2.0
Russ	SD	1995	yes	med.	med.	m.early	R	R	S	S	S*	avg.	avg.	NA
AC Domain	Can	1993	no	med.	med.	early	R	R	S	M	M	high	high	NA
McNeal	MT	1995	yes	med.	strg.	m.early	MS	S	M	M	VS	avg.	avg.	NA
2398	NDSURF	1995	yes	s.dwf.	strg.	m.late	R	R	MR	MS	VS	avg.	low	2.0

Durum Variety Description

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

[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; Head Blight = Scab; Foliar Disease = reaction to tan spot and septoria leaf s complex; Stem Rust - all listed varieties are resistant (R) to the current races of stem rust.
*Yields and/or quality have often been higher than would be expected based on visual head blight symptoms above.

[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 Departmen Cereal Science, NDSU.

DRYLAND HARD RED SPRING WHEAT - GREEN FALLOW DICKINSON

Variety	Type	Days to Head	F. leaf Disease	Height	Lodging Score[1]	Seeds	Test Weight
			%	inches	%	lb	lbs/bu
2370	Semidwarf	58	59	30	0	15,538	60.1
2371	Semidwarf	66	26	34	0	15,328	60.4
2375	Semidwarf	59	32	30	1	14,003	60.4
2398	Semidwarf	62	14	28	0	13,308	61.1
AC Barrie	Medium	62	24	33	0	15,457	59.9
AC Cora	Medium	66	9	34	1	15,440	59.9
AC Domain	Medium	57	81	31	0	14,879	60.0
AC Eatonia	Medium	59	60	33	5	15,864	59.8
Alpowa	Semidwarf	60	76	28	0	16,360	57.5
Amidon	Medium	63	14	34	0	15,494	59.8
Bergen	Semidwarf	59	20	27	0	13,846	58.9
Butte 86	Medium	57	46	31	0	13,582	60.4
CDC Teal	Medium	59	20	32	0	15,092	59.4
Dalen	Semidwarf	59	19	27	0	13,632	61.0
Edwall	Semidwarf	59	61	28	0	15,697	59.8
Ernest	Medium	62	19	34	1	14,425	59.8
Glupro	Medium	65	43	35	2	15,697	56.5
Grandin	Semidwarf	59	40	30	0	14,317	59.6
Gus	Semidwarf	64	15	29	0	16,731	57.4
Hamer	Semidwarf	59	11	28	0	13,299	59.0
HiLine	Semidwarf	60	57	28	0	16,123	57.6
Krona	Semidwarf	62	17	27	0	15,492	57.7
Kulm	Medium	58	35	33	0	14,353	61.0
Lars	Semidwarf	61	6	25	0	14,904	59.2
Len	Semidwarf	67	27	28	0	15,943	57.5
McNeal	Semidwarf	62	27	30	0	14,544	59.1
Norlander	Semidwarf	58	39	27	0	17,872	58.7
Norm	Semidwarf	60	12	29	0	13,285	58.6
Penewawa	Semidwarf	60	68	27	0	16,064	57.6
Russ	Medium	60	36	32	0	15,170	60.8
Sharp	Medium	59	36	32	0	14,312	60.8
Sonja	Semidwarf	62	18	27	0	13,909	58.2
Stoa	Medium	64	32	33	0	15,925	58.0
Trenton	Medium	61	17	34	0	13,735	59.9
Verde	Semidwarf	62	21	30	0	14,072	59.6
Mean		60.9	32	30.2	0.3	14,963	59.2
CV(%)		2.5	38	3.4	167	5.5	1.1
LSD.05		2.1	20	1.4	5	1155	0.9

[1]0 = no lodging; 9 = completely flat

Previous crop: Black lentil (plow down); Soil test results: 50 lbs N, 10 ppm P - applied 50 lbs DAP and 224 lbs urea per acre; Planted on May 4 at 1,200,000 Pure Live Seed per acre at a 1.25 inch depth; Applied 2.5 pt Hoelon + 1.33 pt Buctril per acre on June 1; Harvested on August 22.

DRYLAND HARD RED SPRING WHEAT - GREEN FALLOW — DICKINSON

Variety	Protein	Returns[2]	Grain Yield 1995	Grain Yield 1994	Grain Yield 1993	Averages 3-Year	Averages 2-Year	% of Grandin
	%	$/acre	bu/ac					
2370	14.5	225.2	46.8	44.2	42.1	44.4	45.7	95
2371	14.9	238.4	49.1	42.3	42.6	44.7	45.7	95
2375	14.0	232.9	49.1	44.1	45.1	46.1	46.6	97
2398	13.9	287.8	60.7	50.7	54.3	55.2	55.7	116
AC Barrie	14.8	247.4	50.7	40.4	--	--	45.6	95
AC Cora	14.9	222.9	45.3	38.4	--	--	41.9	87
AC Domain	15.5	198.3	39.4	39.4	35.7	38.2	39.4	82
AC Eatonia	15.5	181.0	36.0	39.1	--	--	--	--
Alpowa	12.3	214.9	46.9	--	--	--	--	--
Amidon	14.0	283.8	59.6	40.0	47.4	49.0	49.8	103
Bergen	13.8	271.5	57.6	49.2	54.6	53.8	53.4	111
Butte 86	14.5	254.0	52.7	43.5	41.1	45.8	48.1	100
CDC Teal	15.3	228.0	45.4	38.2	42.1	41.9	41.8	87
Dalen	14.7	285.8	59.1	43.8	51.2	51.4	51.5	107
Edwall	12.3	219.4	47.9	--	--	--	--	--
Ernest	14.6	267.3	55.2	45.3	50.8	50.4	50.3	104
Glupro	16.8	183.0	35.4	--	--	--	--	--
Grandin	14.8	261.6	54.0	42.3	46.8	47.7	48.2	100
Gus	15.3	264.6	52.8	44.7	49.5	49.0	48.8	101
Hamer	14.6	261.6	53.8	52.3	--	--	53.1	110
HiLine	14.5	199.5	41.3	--	--	--	--	--
Krona	13.2	269.6	57.9	45.2	--	--	51.6	107
Kulm	14.9	254.4	51.8	47.3	--	--	49.6	103
Lars	13.6	291.3	62.1	49.3	--	--	55.7	116
Len	15.0	207.5	41.9	42.1	37.8	40.6	42.0	87
McNeal	14.0	292.3	61.5	47.4	55.1	54.7	54.5	113
Norlander	14.1	256.2	53.7	40.9	--	--	47.3	98
Norm	14.0	258.7	54.6	49.3	--	--	52.0	108
Penewawa	11.9	214.3	47.0	43.2	46.7	45.6	45.1	94
Russ	14.2	237.8	49.7	41.8	--	--	45.8	95
Sharp	14.6	232.5	48.2	44.3	--	--	46.3	96
Sonja	14.5	259.0	53.8	44.6	56.8	51.7	49.2	102
Stoa	14.5	225.4	46.7	45.3	46.6	46.2	46.0	95
Trenton	15.0	263.4	53.6	44.4	47.8	48.6	49.0	102
Verde	14.1	268.7	56.4	49.6	--	--	53.0	110
Mean	14.4	245.1	50.8					
CV(%)	1.6	7.8	8.0					
LSD.05	0.3	26.77	5.7					

[2]Returns were calculated by multiplying the 1995 yield by the protein premium/discount paid at the Southwest Grain Terminal located at Gladstone on November 28; no discounts were considered for low test weight in calculating these returns.

DRYLAND DURUM - GREEN FALLOW — DICKINSON

Variety	Type	Days to Head	Height	Lodging Score[1]	Seeds	Test weight
			inches		lb	lbs/bu
Laker	Semidwarf	64	27.8	0	12,214	56.7
Lloyd	Semidwarf	63	25.9	0	12,691	56.5
Medora	Tall	62	28.8	2	13,787	58.5
Monroe	Tall	58	32.0	1	10,855	60.0
Munich	Medium	62	28.1	0	13,030	57.0
Plenty	Tall	64	35.6	2	11,622	58.6
Regold	Tall	64	35.0	0	10,548	57.4
Renville	Tall	63	31.8	1	12,217	58.4
Rugby	Tall	63	37.0	0	12,644	60.6
Sceptre	Medium	64	29.8	0	12,757	57.2
Vic	Tall	62	33.2	0	11,211	59.7
Voss	Semidwarf	63	26.5	0	11,389	59.9
Ward	Tall	62	33.4	1	12,097	59.9
Mean		62.8	31.1	0.6	12,082	58.5
C.V.(%)		2.1	7.6	169	7.3	2.3
LSD0.05		1.9	3.4	1.3	1275	1.9

		Grain Yield					
					Averages		% of
Variety	Protein	1995	1994	1993	3-Year	2-Year	Renville
	%		bu/ac				
Laker	13.2	50.0	40.7	48.8	46.5	45.4	98
Lloyd	13.6	46.9	38.1	45.7	43.6	42.5	92
Medora	13.6	45.0	38.7	40.5	41.4	41.9	91
Monroe	14.3	48.7	33.3	41.9	41.3	41.0	89
Munich	14.2	56.9	35.1	--	--	46.0	100
Plenty	15.1	50.3	35.7	51.8	45.9	43.0	93
Regold	13.8	53.0	33.4	48.9	45.1	43.2	94
Renville	13.8	54.3	38.0	44.9	45.7	46.2	100
Rugby	14.4	56.0	41.1	54.6	50.6	48.6	105
Sceptre	14.3	52.9	39.3	52.1	48.1	46.1	100
Vic	14.4	56.2	37.8	48.1	47.4	47.0	102
Voss	13.5	59.6	39.8	--	--	49.7	108
Ward	14.4	53.9	42.6	52.0	49.5	48.3	104
Mean	14.0	52.6					
C.V.(%)	1.6	6.1					
LSD0.05	0.3	4.6					

[1]0 = no lodging; 9 = completely flat

Previous crop: Black lentil (plow down); Soil test results: 50 lbs N, 10 ppm P - applied 50 lbs DAP and 224 lbs urea per acre; Planted on May 4 at 1,200,000 Pure Live Seed per acre at a 1.25 inch depth; Applied 2.5 pt Hoelon + 1.33 pt Buctril per acre on June 1; Harvested on August 21.

HARD RED SPRING WHEAT - FALLOW — BEACH

Variety	Sawfly[1] Lodging	Seeds	Test weight	Protein	Grain Yield 1995	1994	1993	3-Year	2-Year	% of Grandin
	%	lbs	lbs/bu	%	bu/ac					
2371	11	17,761	55.3	15.8	28.7	--	--	--	--	--
2375	16	14,857	57.9	14.8	33.8	43.3	53.8	43.6	38.6	111
Amidon	7	17,374	57.5	14.2	31.4	38.3	51.7	40.5	34.9	100
Butte 86	8	14,804	58.3	15.0	39.5	40.6	48.1	42.7	40.1	115
Ernest	2	16,951	57.4	14.3	37.9	--	--	--	--	--
Glupro	24	16,889	53.9	17.2	25.2	--	--	--	--	--
Grandin	19	15,248	56.9	14.7	33.1	36.5	43.3	37.6	34.8	100
Gus	13	19,603	56.4	15.6	32.5	37.6	52.9	41.0	35.1	101
Kulm	21	16,857	59.6	14.7	34.8	45.4	--	--	40.1	115
McNeal	9	16,569	57.0	14.3	36.8	37.4	58.8	44.3	37.1	107
Sonja	9	16,187	56.6	14.6	35.2	--	--	--	--	--
Trenton	24	17,466	56.4	14.7	32.8	--	--	--	--	--
Mean	13	16,714	56.9	14.9	33.5					
CV(%)	31.5	4.6	1.1	1.5	7.0					
LSD.05	6.0	1096.6	0.9	0.3	3.3					

DURUM - FALLOW — BEACH

Variety	Sawfly Lodging	Seeds	Test weight	Protein	Grain Yield 1995	1994	1993	3-Year	2-Year	% of Renville
	%	lbs	lbs/bu	%	bu/ac					
Medora	0	13,393	57.8	14.7	42.2	33.3	30.3	35.3	37.8	97
Munich	2	13,097	57.4	14.7	43.9	--	--	--	--	--
Plenty	0	13,588	56.5	15.7	41.9	--	--	--	--	--
Renville	5	13,504	57.4	14.7	42.1	35.4	36.6	38.0	38.8	100
Vic	4	11,858	57.4	15.2	43.3	33.2	35.4	37.3	38.3	99
Mean	2	13,088	57.3	14.9	42.7					
CV(%)	60.6	3	0.6	2.1	4.2					
LSD.05	2.0	595.0	0.6	0.5	NS					

[1]Sawfly lodging = lodging resulting from stem cutting

Prevous crop: Black lentil (burndown): Soil test results: 210 lbs N, 11 ppm P, 435 ppm K, 211 lbs S, 0.7 ppm Zn, 40 lbs Cl per acre - no fertilizer applied; Planted on May 18 at 1,200,000 Pure Live Seed per acre at a 1.25 inch depth; No herbicides were applied; Harvested on September 8.

HARD RED SPRING WHEAT - FALLOW — BEULAH

Variety	Seeds	Test weight	Protein	Grain Yield 1995	Grain Yield 1994	Grain Yield 1992	Grain Yield 3-Year	Grain Yield 2-Year	% of Grandin
	lbs	lbs/bu	%			bu/ac			
2371	18,022	53.8	15.7	34.1	--	--	--	--	--
2375	15,259	56.3	14.3	44.6	59.9	87.0	63.8	52.3	111
Amidon	16,721	55.4	14.7	40.3	60.2	100.0	66.8	50.3	107
Butte 86	14,705	55.1	14.5	46.8	54.5	81.0	60.8	50.7	108
Ernest	15,769	56.1	15.2	41.2	--	--	--	--	--
Glupro	16,523	52.5	17.5	22.4	--	--	--	--	--
Grandin	16,056	54	15.5	37.3	56.5	84.0	59.3	46.9	100
Gus	17,555	54.8	15.8	39.3	58.6	82.0	60.0	49.0	104
Kulm	16,350	57.9	15.2	40.0	58.3	--	--	49.2	105
McNeal	16,277	55.5	14.8	39.4	56.0	--	--	47.7	102
Sonja	15,847	54.5	14.9	45.2	--	--	--	--	--
Trenton	15,354	56.1	15.5	38.6	--	--	--	--	--
Mean	16,203	55.2	15.3	39.1					
CV(%)	4.1	1.2	1.6	6.3					
LSD.05	946.5	0.9	0.4	3.6					

DURUM - FALLOW — BEULAH

Variety	Seeds	Test weight	Protein	Grain Yield 1995	Grain Yield 1994	Grain Yield 1992	Grain Yield 3-Year	Grain Yield 2-Year	% of Renville
	lbs	lbs/bu	%			bu/ac			
Medora	17,555	56.1	14.1	38.3	59.9	73.0	60.0	49.0	84.4
Munich	16,350	56.5	14.3	43.6	--	--	--	--	--
Plenty	16,277	55.5	14.9	38.8	--	--	--	--	--
Renville	15,847	56.3	14.3	44.0	72.4	75.0	63.8	58.2	100.0
Vic	15,354	57.0	14.7	41.9	66.6	--	--	--	--
Mean	16,203	56.3	14.4	41.3					
CV(%)	3.2	0.6	2.2	12.9					
LSD.05	677.2	0.5	0.5	8.2					

Previous crop: Fallow: Soil test results: 41 lbs N, 7 ppm P - applied 50 lbs DAP and 244 lbs urea per acre; Planted on May 19 at 1,200,000 Pure Live Seed per acre at a 1.25 inch depth; Applied 2.7 pt Hoelon + 0.33 oz Harmony Extra + 0.75 pt MCPA ester on June 13; Harvested on September 11.

HARD RED SPRING WHEAT - FALLOW — GLEN ULLIN

Variety	Seeds	Test weight	Protein	Grain Yield 1995	1994	1993	3-Year	2-Year	% of Grandin
	lbs	lbs/bu	%			bu/ac			
2371	15,569	58.0	15.1	51.8	--	--	--	--	--
2375	14,239	59.3	13.8	63.8	51.3	50.0	55.0	57.6	114
Amidon	15,151	57.9	14.1	60.4	49.4	48.5	52.8	54.9	108
Butte 86	13,995	57.8	13.4	69.3	48.5	45.0	54.3	58.9	116
Ernest	15,214	58.0	14.8	62.9	--	--	--	--	--
Glupro	15,196	55.9	16.7	45.8	--	--	--	--	--
Grandin	15,475	56.9	14.2	54.8	46.5	47.9	49.7	50.7	100
Gus	16,208	57.8	15.1	59.6	46.0	45.0	50.2	52.8	104
Kulm	16,039	58.8	14.2	59.8	48.9	--	--	54.4	107
McNeal	16,176	57.8	14.2	60.1	48.2	53.6	54.0	54.2	107
Sonja	16,013	57.0	14.2	67.7	--	--	--	--	--
Trenton	14,628	59.0	14.8	59.6	--	--	--	--	--
Mean	15,325	57.8	14.6	59.6					
CV(%)	5.4	1.5	2.1	7.4					
LSD.05	1199	1.2	0.4	6.3					

DURUM - FALLOW — GLEN ULLIN

Variety	Seeds	Test weight	Protein	Grain Yield 1995	1994	1993	3-Year	2-Year	% of Renville
	lbs	lbs/bu	%			bu/ac			
Medora	12,994	58.3	12.6	54.6	38.1	30.3	41.0	46.4	80
Munich	11,845	59.6	12.6	63.4	--	--	--	--	--
Plenty	11,267	58.6	12.7	57.1	--	--	--	--	--
Renville	12,446	58.9	13.0	66.5	48.6	36.6	50.6	57.6	100.0
Vic	11,146	59.6	13.1	65.3	43.7	35.4	48.1	54.5	95
Mean	11,939	59.0	12.8	61.4					
CV(%)	2.7	0.5	2.8	6.3					
LSD.05	496	0.4	NS	6.0					

Previous crop: Fallow; Soil test results: 51 lbs N, 10 ppm P - applied 50 lbs DAP and 220 lbs urea per acre: Planted on May 19 at 1,200,000 Pure Live Seed per acre at a 1.25 inch depth; Applied 2.7 pt Hoelon + 0.33 oz Harmony Extra + 0.75 pt MCPA per acre on June 13: Harvested on September 12.

1995 HARD RED SPRING WHEAT - RECROP — HANNOVER

Variety	Seeds	Test weight	Protein	Grain Yield 1995	1994	1993	3-Year	2-Year	% of Grandin
	lbs	lbs/bu	%	bu/ac					
2371	19,588	52.3	15.8	26.3	--	--	--	--	--
2375	16,810	54.4	14.4	36.0	39.6	37.8	37.8	37.8	128
Amidon	19,201	53.6	14.7	27.9	36.6	29.5	31.3	32.3	109
Butte 86	15,857	52.4	14.4	38.7	40.4	33.2	37.4	39.6	134
Ernest	18,202	52.9	15.1	31.3	--	--	--	--	--
Glupro	17,959	51.4	16.9	23.9	--	--	--	--	--
Grandin	19,951	50.0	15.2	23.4	35.5	27.3	28.7	29.5	100
Gus	19,632	52.3	15.5	24.3	36.5	35.3	32.0	30.4	103
Kulm	18,684	55.1	14.6	31.5	43.0	--	--	37.3	126
McNeal	17,595	53.8	14.9	32.2	40.9	34.4	35.8	36.6	124
Sonja	19,486	50.9	15.3	34.5	--	--	--	--	--
Trenton	17,155	53.5	15.1	29.3	--	--	--	--	--
Mean	18,343	52.7	14.4	29.9					
CV(%)	5.9	1.8	1.6	10.7					
LSD .05	1549.8	1.4	0.3	4.6					

1995 DURUM - RECROP — HANNOVER

Variety	Seeds	Test weight	Protein	Grain Yield 1995	1994	1993	3-Year	2-Year	% of Renville
	lbs	lbs/bu	%	bu/ac					
Medora	17,183	52.1	13.4	23.5	31.1	17.1	23.9	27.3	74
Munich	14,846	54.1	13.5	37.4	--	--	--	--	--
Plenty	15,379	54.6	14.3	35.3	--	--	--	--	--
Renville	15,099	54.6	13.8	34.5	39.1	19.0	30.9	36.8	100
Vic	13,212	55.1	13.7	39.2	35.5	23.8	32.8	37.4	101
Mean	15,144	54.1	13.7	33.9					
CV(%)	7.7	1.3	1.1	8.7					
LSD .05	1790	1.1	0.2	4.5					

Previous crop: Corn; Soil test results: 50 lbs N, 5 ppm P - applied 50 lbs DAP and 225 lbs urea per acre. Planted on May 19 at 1,200,000 Pure Live Seed per acre at a 1.5 inch depth; Applied 2.7 pt Hoelon + 0.33 oz Harmony Extra + 0.75 pt MCPA per acre on June 13; harvested on September 13.

1995 Hettinger Hard Red Spring Wheat Variety Trial on Fallow

Variety	Test weight	Grain protein	Days to head	Ht	Foliar disease	Yield 1995	1993	1992	2yr	3yr
	lbs/bu	%		cm	%	bu/A				
McNeal	59.4	14.6	68	85	38	61.7	71.1	106.1	66.4	79.6
2398	61.2	14.5	66	79	28	64.7	78.0	92.8	71.4	78.5
Sonja	61.2	14.5	64	74	24	74.2	67.3	93.3	70.8	78.3
Krona	57.5	13.1	68	71	20	59.9	65.5	89.0	62.7	74.5
Trenton	61.8	14.6	64	102	36	64.2	70.8	87.1	67.5	74.0
2371	60.2	13.7	64	78	31	64.9	68.1	84.2	66.5	72.4
Gus	60.8	15.6	65	86	22	62.7	63.1	90.7	62.9	72.2
Norm	60.2	14.3	66	78	17	57.2	69.3	85.5	63.2	70.7
Kulm	62.7	15.6	63	92	46	62.1	70.8	78.1	66.4	70.3
Dalen	61.5	14.6	63	78	22	67.8	54.9	83.9	61.4	68.9
Prospect	60.8	13.8	65	86	24	66.3	58.7	81.2	62.5	68.7
Sharp	63.3	14.9	63	90	32	65.8	62.6	77.6	64.2	68.7
Butte 86	62.0	14.9	63	88	28	64.3	66.2	74.7	65.2	68.4
2375	61.7	14.8	62	84	30	64.7	61.1	78.4	62.9	68.1
Bergen	60.5	14.2	65	76	21	59.9	63.3	80.8	61.6	68.0
2370	61.9	14.7	63	88	28	68.6	57.5	76.9	63.0	67.7
Stoa	60.8	15.0	65	100	27	64.4	61.5	76.3	63.0	67.4
Amidon	61.1	14.8	66	102	17	54.0	62.0	86.0	58.0	67.3
Grandin	61.2	14.7	65	86	29	62.4	58.8	78.8	60.6	66.7
Ernest	60.8	15.5	64	86	44	53.8	65.0	75.2	59.4	64.7
Len	59.9	14.6	66	82	19	53.8	48.5	73.7	51.2	58.7
CDC Teal	59.6	15.6	64	95	26	46.6	51.8	79.7	49.2	59.4
AC Domain	61.2	16.6	63	90	33	53.2	55.3		54.2	
AC Eatonia	60.9	15.9	67	98	46	48.8	47.7		48.2	
Verde	60.9	13.3	67	73	59	72.4				
Russ	62.1	15.0	63	90	63	68.4				
Norlander	61.5	15.1	62	74	28	67.8				
Hamer	62.0	14.7	65	78	39	63.3				
Lars	59.5	14.6	67	74	33	60.5				
Edwall	55.3	12.2	64	81	80	54.6				
Alpowa	59.2	12.0	66	79	78	53.4				
Penawawa	58.2	13.6	64	74	78	52.0				
AC Barrie	59.9	15.9	66	91	29	42.8				
AC Cora	59.2	15.8	68	96	42	38.8				
Glupro	56.8	18.3	68	98	27	28.6				
SBF0402	60.9	14.8	64	85	31	63.9				
SD0010	61.7	14.4	63	79	25	62.9				
ND678	62.6	15.5	63	100	41	62.1				
ND689	60.2	15.2	64	88	44	59.3				
ND690	61.6	15.6	64	86	19	58.3				
ND688	59.8	14.9	65	84	19	53.3				
BW674	59.2	14.6	64	76	49	52.9				
Trial mean	60.5	14.8	65	85	35	59.1	60.0	81.4		
C.V. %	0.8	2.9	1	4		8.3	10.2	14.0		
LSD 5%	0.8	0.7	1	6		8.0	8.6	16.3		
LSD 1%	1.1	0.9	1	8		10.6	11.3	21.8		

Planting date: April 25 Harvest date: August 10
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A)
Yield goal: 60 bu/A
Herbicide application: 1 pt/A Buctril + 1/3 oz/A Harmony Ext. + 8 oz/A MCPE + 0.6 pt/A Assert
Yields are adjusted to 12.5% moisture.

1995 Hettinger Hard Red Spring Wheat Variety Trial on Recrop

Variety	Test weight	Grain protein	Days to head	Ht	Foliar disease	Yield				
						1995	1993	1992	2yr	3yr
	lbs/bu	%		cm	%	bu/A				
Sharp	63.4	14.0	63	90	15	56.8	61.7	34.8	59.2	51.1
Grandin	61.4	14.3	65	86	16	52.9	58.9	40.8	55.9	50.9
Gus	61.2	15.1	65	89	17	61.5	52.5	36.8	57.0	50.3
Krona	58.8	12.8	68	73	12	50.0	56.0	43.3	53.0	49.8
Stoa	60.4	14.8	66	91	17	53.1	54.0	35.0	53.6	47.4
Amidon	60.9	14.1	66	93	12	47.4	53.8	40.8	50.6	47.3
2375	62.0	14.9	63	77	17	56.0	55.7	28.3	55.8	46.7
Bergen	60.9	14.4	66	86	13	55.4	53.5	28.8	54.4	45.9
Butte 86	62.3	14.3	63	83	19	57.7	55.2	23.6	56.4	45.5
2371	60.4	14.2	66	70	14	50.2	54.4	29.8	52.3	44.8
Dalen	62.0	13.6	65	75	29	52.6	49.6	23.7	51.1	42.0
Len	59.6	14.0	67	82	15	42.6	40.0	36.0	41.3	39.5
2398	62.2	14.2	66	83	45	58.7	63.7		61.2	
Sonja	60.9	14.2	66	70	16	59.2	56.3		57.8	
McNeal	60.6	13.3	68	82	15	54.8	54.0		54.4	
Kulm	63.2	14.5	63	85	18	59.9	48.5		54.2	
CDC Teal	60.0	15.1	65	90	28	41.2	47.8		44.5	
Verde	61.8	12.9	68	80	35	59.9				
Norlander	62.3	14.2	63	78	28	58.6				
Trenton	62.6	15.2	64	94	28	57.0				
Lars	61.0	13.4	66	73	21	55.9				
Hamer	62.2	13.6	66	76	13	55.2				
Ernest	61.7	15.3	64	91	21	52.7				
AC Domain	61.9	15.9	63	91	42	48.2				
AC Eatonia	61.5	15.6	66	96	29	45.8				
AC Barrie	60.6	14.8	66	92	30	41.1				
Glupro	56.4	18.5	69	98	13	26.7				
Trial mean	61.2	14.4	65	84	21	52.2	53.7	34.0		
C.V. %	1.6	6.6	2			10.3	13.6	28.5		
LSD 5%	1.3	1.3	2			7.6	12.0	14.3		
LSD 1%	1.8	1.8	2			10.0	16.0	ns		

Planting date: April 25 Harvest date: August 10
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A)
Yield goal: 60 bu/A
Previous crop: HRSW
Herbicide application: 1 pt/A Buctril + 1/3 oz/A Harmony Ext.
Yields are adjusted to 12.5% moisture.

1995 Hettinger Durum Variety Trial

Variety	Test weight	Days to head	Ht	Foliar disease	Yield 1995	1993	1992	2yr	3yr
	lbs/bu		cm	%	bu/A				
Plenty	61.1	68	100	33	62.6	65.2	86.5	63.9	71.4
Regold	63.0	67	99	21	66.9	54.4	91.4	60.6	70.9
Rugby	62.6	67	100	10	67.2	61.8	78.9	64.5	69.3
Renville	61.5	68	100	18	61.9	59.8	85.4	60.8	69.0
Sceptre	59.8	68	90	17	56.9	60.1	86.2	58.5	67.7
Munich	59.6	66	79	23	53.6	64.0	81.4	58.8	66.3
Medora	60.0	68	94	16	58.2	53.7	85.5	56.0	65.8
Ward	61.9	65	94	8	58.8	60.5	75.5	59.6	64.9
Vic	61.4	67	94	10	55.7	56.2	82.6	56.0	64.8
Monroe	62.3	62	94	27	66.5	55.5	71.0	61.0	64.3
Lloyd	61.3	68	75	13	58.4	51.3	81.1	54.8	63.6
Laker	61.4	68	80	28	58.1	45.1	82.5	51.6	61.9
Voss	60.0	68	71	27	55.2	51.9		53.6	
D901518	61.7	68	84	37	72.0				
D901313	61.1	68	87	27	69.7				
D901786	62.2	64	78	58	67.9				
D89135	62.2	67	86	14	66.9				
D901442	62.9	67	88	32	64.6				
D87130	62.5	68	91	19	63.6				
DT475	60.4	66	90	19	62.2				
D87240	59.7	69	93	18	61.9				
D88303	61.7	68	74	15	61.8				
D901486	61.2	66	83	45	61.5				
D901536	61.8	66	86	29	57.2				
D901419	61.2	66	80	29	54.2				
Trial mean	61.4	67	88	24	61.7	55.8	79.6		
C.V. %	1.1	2	5		11.0	10.9	11.3		
LSD 5%	0.9	1	6		9.5	8.5	13.3		
LSD 1%	1.2	2	8		12.7	11.3	18.1		

Planting date: April 26 Harvest date: August 14
Seeding rate: 1.1 million live seeds/A (approx. 1.9 bu/A)
Yield goal: 60 bu/A
Herbicide application: 1 pt/A Buctril
Yields are adjusted to 12.5% moisture.

1995 Scranton Hard Red Spring Wheat Variety Trial

Variety	Test weight	Grain protein	Foliar disease	Yield 1995	1994	1993	2yr	3yr
	lbs/bu	%	%	bu/A				
2398	60.4	12.9	53	46.6	57.4	86.2	52.0	63.4
Krona	57.2	11.5	32	44.9	55.9	82.4	50.4	61.1
2375	60.3	12.7	51	47.2	50.6	78.2	48.9	58.7
2371	62.7	13.6	53	47.1	49.4	72.6	48.2	56.4
McNeal	57.2	12.1	35	42.1	46.6	80.2	44.4	56.3
Sonja	57.7	13.4	35	41.5	44.4	77.6	43.0	54.5
Dalen	60.8	13.5	30	42.5	47.7	71.6	45.1	53.9
Grandin	60.9	13.3	31	41.7	43.0	74.7	42.4	53.1
Amidon	58.9	13.0	35	41.1	44.4	73.3	42.8	52.9
Kulm	62.8	14.0	38	40.4	37.3	77.8	38.8	51.8
Ernest	61.7	13.3	35	42.6	45.5		44.0	
Trenton	61.0	13.4	37	43.5				
Russ	61.2	12.9	31	41.8				
Glupro	57.7	16.8	29	28.0				
Trial mean	60.0	13.3	38	41.9	47.6	77.1		
C.V. %	2.9	2.6		8.3	10.6	5.1		
LSD 5%	2.9	0.6		5.8	7.4	5.6		
LSD 1%	3.9	0.8		7.8	10.0	7.6		

Planting date: May 19 Harvest date: August 18
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A)
Yield goal: 60 bu/A
Herbicide application: 2 pt/A Hoelon + 1 pt/A Buctril + 1/3 oz/A Harmony Extra
Yields are adjusted to 12.5% moisture.

1995 Scranton Durum Variety Trial

Variety	Test weight	Foliar disease	Yield 1995	1994	1993	2yr	3yr
	lbs/bu	%	bu/A				
Plenty	58.0	23	45.7	57.0	73.2	51.4	58.6
Renville	59.4	55	41.9	53.7	59.8	47.8	51.8
Medora	59.9	55	40.9	56.8	55.2	48.8	51.0
Sceptre	59.3	57	38.1	50.5	60.7	44.3	49.8
Vic	59.3	56	36.1	48.5	55.9	42.3	46.8
Voss	57.6	44	34.9	49.9		42.4	
Munich	59.1	33	40.8				
Trial mean	58.9	46	39.8	52.2	61.7		
C.V. %	1.0		7.4	6.5	4.3		
LSD 5%	1.1		5.2	5.0	4.0		
LSD 1%	1.5		7.2	6.7	4.9		

Planting date: May 19 Harvest date: August 18
Seeding rate: 1.1 million live seeds/A (approx. 1.9 bu/A)
Yield goal: 60 bu/A
Herbicide application: 2 pt/A Hoelon + 1 pt/A Buctril + 1/3 oz/A Harmony Extra
Yields are adjusted to 12.5% moisture.

1995 Selfridge Hard Red Spring Wheat Variety Trial

Variety	Test weight	Grain protein	Yield				
			1995	1994	1993	2yr	3yr
	lbs/bu	%	bu/A				
Sonja	52.8	14.6	33.0	64.7	62.6	48.8	53.4
2398	52.2	14.6	28.4	64.4	63.2	46.4	52.0
Krona	51.2	13.3	32.2	64.1	54.2	48.2	50.2
Kulm	56.9	13.8	31.4	56.3	55.6	43.8	47.8
2375	55.1	14.1	30.3	59.2	52.6	44.8	47.4
2371	52.4	15.0	26.9	57.0	54.5	42.0	46.1
McNeal	53.8	13.9	28.6	56.9	49.4	42.8	45.0
Dalen	54.6	14.2	29.4	46.5	51.4	38.0	42.4
Grandin	52.7	14.6	24.2	44.6	46.6	34.4	38.5
Amidon	51.8	15.0	20.3	48.1	41.0	34.2	36.5
Ernest	52.9	14.4	24.5	52.6		38.6	
Trenton	53.9	14.9	29.9				
Russ	52.6	14.1	29.6				
Glupro	50.3	18.0	14.8				
Trial mean	53.1	14.6	27.4	56.3	56.5		
C.V. %	1.8	3.2	8.1	7.1	8.5		
LSD 5%	1.4	0.7	3.2	5.7	6.5		
LSD 1%	1.8	0.9	4.3	7.6	8.7		

Planting date: May 25 Harvest date: September 15
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A)
Yield goal: 60 bu/A
Herbicide application: 2 pt/A Hoelon + 1 pt/A Buctril + 1/3 oz/A Harmony Extra
Insecticide application: 1 pt/A Malathion + 1 pt/A Seven XLR for grasshopper control.
Note: Trial was planted late and harvested late due to wet soil conditions.

1995 Selfridge Durum Variety Trial

Variety	Test weight	Yield				
		1995	1993	1992	2yr	3yr
	lbs/bu	bu/A				
Sceptre	53.9	35.3	48.1	58.8	41.7	47.4
Renville	53.6	30.0	40.4	60.5	35.2	43.6
Vic	54.1	26.5	40.3	51.4	33.4	39.4
Medora	53.1	22.3	44.5	51.0	33.4	39.3
Plenty	55.3	31.5	54.3		42.9	
Munich	53.2	31.2				
Voss	52.1	26.2				
Trial mean	53.6	29.0	46.7	54.0		
C.V. %	1.3	9.8	7.5	4.8		
LSD 5%	1.0	4.2	5.2	4.7		
LSD 1%	1.4	5.7	6.5	7.4		

Planting date: May 25 Harvest date: August 15
Seeding rate: 1.1 million live seeds/A (approx. 1.9 bu/A)
Yield goal: 60 bu/A
Herbicide application: 2 pt/A Hoelon + 1 pt/A Buctril + 1/3 oz/A Harmony Extra
Yields are adjusted to 12.5% moisture.

1995 New Leipzig Hard Red Spring Wheat Variety Trial

Variety	Test weight	Grain protein	Plant height	Foliar disease	Yield 1995	1994	1993	2yr	3yr
	lbs/bu	%	cm	%	bu/A				
Sonja	55.8	15.2	72	28	55.8	39.6	67.5	47.7	54.3
2398	57.2	14.9	79	37	51.9	43.5	65.4	47.7	53.6
2375	59.6	14.6	76	34	58.9	36.8	63.1	47.8	52.9
Kulm	60.0	15.1	89	38	55.4	36.9	66.0	46.2	52.8
Dalen	57.8	15.6	72	29	49.5	39.4	68.8	44.4	52.6
Krona	52.6	14.0	73	33	44.5	47.3	64.8	45.9	52.2
McNeal	55.2	15.4	79	32	42.2	40.5	70.1	41.4	50.9
2371	56.0	15.5	70	36	47.2	35.3	61.3	41.2	47.9
Amidon	57.4	15.0	92	35	43.8	36.7	56.8	40.2	45.8
Grandin	50.3	15.8	76	38	37.2	33.1	63.9	35.2	44.7
Ernest	58.2	15.3	85	37	43.9	33.1		38.5	
Russ	56.7	14.8	83	26	53.5				
Trenton	57.4	15.6	93	35	46.7				
Glupro	54.3	18.2	93	39	27.5				
Trial mean	56.3	15.3	81	34	47.0	38.1	64.2		
C.V. %	5.8	3.0			11.2	6.7	6.2		
LSD 5%	4.7	0.7			7.5	4.3	5.8		
LSD 1%	6.2	0.9			10.1	5.8	7.7		

Planting date: May 20 Harvest date: August 18
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A)
Yield goal: 60 bu/A
Herbicide application: 2 pt/A Hoelon + 1 pt/A Buctril + 1/3 oz/A Harmony Extra
Yields are adjusted to 12.5% moisture.

1995 Hettinger Off-Station HRSW Variety Trials

Combined Means - 5 Sites***

Variety	Test weight	Grain protein	Plant height	Foliar disease	Yield 1995	1994*	1993**	2yr	3yr
	lbs/bu	%	cm	%	bu/A				
2398	58.6	14.2	80	41	48.9	55.2	72.0	52.0	58.7
Sonja	57.7	14.4	72	26	51.9	51.9	66.1	51.9	56.6
Krona	55.4	13.0	72	24	46.0	53.5	65.8	49.8	55.1
McNeal	57.4	13.9	83	30	44.9	49.8	66.2	47.4	53.6
2375	59.7	14.2	80	33	49.1	49.4	61.5	49.2	53.3
Kulm	61.1	14.5	90	35	49.8	45.6	63.3	47.7	52.9
2371	58.2	14.4	74	34	45.6	47.8	61.6	46.7	51.7
Dalen	59.3	14.3	76	28	47.9	45.3	59.8	46.6	51.0
Grandin	57.3	14.6	84	28	43.3	40.8	60.8	42.0	48.3
Amidon	58.0	14.4	97	25	40.5	42.9	58.2	41.7	47.2
Ernest	59.0	14.8	87	34	42.3	44.8		43.6	
Russ	58.1	14.2	88	40	47.8				
Trenton	59.3	14.8	98	34	47.6				
Glupro	55.1	17.6	97	27	25.0				

* 4 sites - Regent, Scranton, New Leipzig and Selfridge.
** 6 sites - Hettinger fallow & recrop, Regent, Scranton, New Leipzig and Selfridge.
*** 5 sites - Hettinger fallow & recrop, Scranton, New Leipzig and Selfridge.
Yields are adjusted to 12.5% moisture.

1995 Hettinger Off-Station Durum Variety Trials

Combined Means - 3 Sites***

Variety	Test weight	Days to head	Plant height	Foliar disease	Yield 1995	1994*	1993**	2yr	3yr
	lbs/bu		cm	%	bu/A				
Plenty	58.2	68	100	28	46.1	57.8	62.1	52.0	55.3
Renville	58.2	68	100	36	43.5	55.6	54.7	49.6	51.3
Sceptre	57.8	68	90	37	42.4	52.8	55.8	47.6	50.3
Medora	57.6	68	94	36	39.8	58.2	52.1	49.0	50.0
Vic	58.4	67	94	33	38.7	53.2	50.6	46.0	47.5
Voss	56.7	68	71	36	38.3	52.0		45.2	
Munich	57.4	66	79	28	40.8				

* 2 sites - Regent and Scranton.
** 5 sites - Hettinger, Regent, Scranton, New Leipzig and Selfridge.
*** 3 sites - Hettinger, Scranton and Selfridge.
Yields are adjusted to 12.5% moisture.

Barley Variety Description

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

[1] Rough or smooth awned.

[2] R = resistant; S = susceptible; MS = moderately susceptible; MR = moderately resistant; NA = not available.

[3] M = malting; F = feed; C = malting under contract only; SP = special uses.

[4] Recommended as a malting barley in western US.

Oat Variety Description

Variety*	Origin	Year Released	Color Grain	Height	Straw Strength	Maturity[2]	Reaction to Diseases: Stem rust[1]	Reaction to Diseases: Crown rust	Reaction to Diseases: Barley Yellow Dwf.[4]	Quality Factors: Rel. Yield	Quality Factors: bu/Wt	Quality Factors: Protein[3]
Don	IL	1985	white	m.short	strg.	E	VS	S	T	good	v.good	M
Hytest	SD	1986	white	tall	m.strg.	E	S	MR-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	MR	MT	v.good	v.good	H
Jerry	ND	1994	white	tall	strg.	M	R	MR	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	MR	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	fair	v.good	M
Paul	ND	1994	naked	v.tall	strg.	L	R	R	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	good	H
AC Marie	Can.	1992	white	tall	weak	VL	R	S	MT	fair	fair	ML
Milton	MN	1994	yellow	med.	strg.	L	R	R	MT	v.good	v.good	M

* Varieties listed in order of maturity.

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

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

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

[4] S = susceptible; MS = moderately susceptible; MT = moderately tolerant; T = tolerant.

Varieties rated MT or T have a relatively good degree of protection against barley yellow dwarf virus.

DRYLAND BARLEY - GREEN FALLOW — DICKINSON

Variety	Type	Days to Head	Height	Lodging Score[1]	Seed	Test Weight
			inches		lb	lbs/bu
Azure	6R	60	26	3	12,857	48.1
Bowman	2R	59	25	7	11,469	48.9
Chinook	2R	64	27	5	12,411	49.0
Crystal	2R	68	26	0	11,875	48.0
Excel	6R	62	24	1	12,865	47.2
Foster	6R	63	25	0	11,757	47.9
Gallatin	2R	65	27	2	12,995	47.9
Harrington	2R	67	27	2	12,818	47.0
Hazen	6R	62	26	2	12,745	48.7
Logan	2R	61	26	3	10,649	49.1
Manley	2R	70	27	0	11,784	48.9
Morex	6R	61	30	4	13,150	47.4
Robust	6R	63	27	0	12,111	49.1
Royal	6R	64	22	2	13,306	47.6
Stander	6R	64	24	0	12,035	48.6
Stark	2R	61	29	3	10,749	50.1
Mean		63.6	26.2	2.1	12,223	48.3
CV%		2.2	5.7	76.8	5.5	1.3
LSD.05		2.0	2.1	2.3	957	0.9

		Grain Yield					
					Averages		% of
Variety	Protein	1995	1994	1993	3-Year	2-Year	Stark
	%		bu/ac				
Azure	14.4	57.8	94.6	79.2	77.2	76.2	98
Bowman	13.4	56.7	81.0	67.2	68.3	68.9	88
Chinook	13.6	62.9	--	--	--	--	--
Crystal	14.2	50.9	--	--	--	--	--
Excel	14.0	65.2	95.7	85.3	82.1	80.5	103
Foster	13.8	56.3	97.8	87.5	80.5	77.1	99
Gallatin	13.1	54.8	96.9	67.3	73.0	75.9	97
Harrington	13.4	50.4	89.8	70.2	70.1	70.1	90
Hazen	14.7	51.5	91.2	92.9	78.5	71.4	92
Logan	13.5	73.0	98.1	81.1	84.1	85.6	110
Manley	14.5	53.1	88.0	97.2	79.4	70.6	90
Morex	15.5	45.8	84.1	66.0	65.3	65.0	83
Robust	15.5	56.7	90.4	72.9	73.3	73.6	94
Royal	15.1	48.7	84.5	--	--	66.6	85
Stander	13.8	67.1	102.8	87.9	85.9	85.0	109
Stark	13.5	58.9	97.0	81.8	79.2	78.0	100
Mean	14.2	56.9					
CV%	3.6	5.8					
LSD.05	0.7	4.7					

[1]0 =no lodging; 9= completely flat

Previous crop: Black lentil (plow down); Soil test results: 65 lbs N, 8 ppm P - applied 50 lbs DAP and 193 lbs urea per acre; Planted on May 3 at 800,000 Pure Live Seed per acre; Applied 2.5 pt Hoelon + 1.33 pt Buctril per acre on June 1; Harvested on August 21.

DRYLAND OAT - GREEN FALLOW					DICKINSON
Variety	Stampede Rating[1]	Days to Head	Height	Seeds	Test Weight
			inches	lb	lbs/bu
AC Belmont	1	53	35	15,414	31.9
Bay	0	53	30	14,614	29.6
Brawn	0	54	32	11,235	31.5
Calibre	1	54	37	12,928	31.6
Derby	1	53	38	12,865	32.0
Dumont	2	54	34	13,414	29.9
Hytest	0	50	36	13,522	34.1
Jerry	1	50	32	13,164	33.2
Kelsey	2	52	37	14,850	32.5
Milton	1	50	28	15,305	32.1
Monida	1	54	33	13,867	31.9
Newdak	0	50	31	13,971	30.7
Otana	1	53	36	15,136	33.2
Paul	1	54	37	16,330	36.6
Porter	0	54	33	13,368	34.1
Prairie	0	49	31	13,152	31.1
Riel	1	53	36	14,005	31.7
Robert	1	54	33	11,116	31.2
Troy	2	53	35	15,197	32.9
Valley	1	53	30	13,773	33.9
Whitestone	1	54	28	14,868	32.5
Mean	0.8	52.6	33.4	13,909	32.3
CV(%)	60.4	1	4.4	7.2	3.7
LSD.05	0.7	0.7	2.1	1409	1.7

[1]Stampede rating taken in 1994: 0 = no leaf chlorosis; 2 = at least 30% of leaf area chlorotic

Previous crop: Black lentil (plow down); Soil test results: 66 lbs N, 17 ppm P - applied 190 lbs urea per acre; Planted on May 17 at 800,000 Pure Live Seed per acre; Applied 0.33 oz Harmony Extra + 0.75 pt MCPA ester on June 5; Harvested on August 17.

DRYLAND OAT - GREEN FALLOW — DICKINSON

Variety	Grain Yield 1995	1994	1993	Averages 3-Year	Averages 2-Year	% of Otana
			bu/ac			
AC Belmont	91.3	134.6	143.0	123.0	113.0	85
Bay	110.3	159.1	192.0	153.8	134.7	101
Brawn	100.6	143.5	--	--	122.1	92
Calibre	98.1	180.6	136.0	138.2	139.4	105
Derby	99.4	172.0	130.0	133.8	135.7	102
Dumont	80.0	163.7	144.0	129.2	121.9	92
Hytest	73.0	117.0	116.0	102.0	95.0	72
Jerry	95.4	139.4	149.0	127.9	117.4	88
Kelsey	91.4	159.6	--	--	125.5	95
Milton	82.3	138.9	163.0	128.1	110.6	83
Monida	105.9	174.5	141.0	140.5	140.2	106
Newdak	93.0	155.4	132.0	126.8	124.2	94
Otana	95.0	170.6	129.0	131.5	132.8	100
Paul	92.0	107.7	127.0	108.9	99.9	75
Porter	103.8	157.8	184.0	148.5	130.8	98
Prairie	100.1	157.0	143.0	133.4	128.6	97
Riel	79.9	154.1	159.0	131.0	117.0	88
Robert	95.3	148.0	156.0	133.1	121.7	92
Troy	100.2	139.8	133.0	124.3	120.0	90
Valley	91.3	143.5	159.0	131.3	117.4	88
Whitestone	107.1	154.0	130.0	130.4	130.6	98
Mean	94.5					
CV(%)	7.8					
LSD.05	10.5					

BARLEY - FALLOW — BEACH

Variety	Seeds	Test weight	Protein	Grain Yield 1995	Grain Yield 1994	Grain Yield 1993	Grain Yield 3-Year	Grain Yield 2-Year	% of Stark
	lbs	lbs/bu	%			bu/ac			
Bowman	10,979	47.5	12.9	51.6	77.8	71.5	67.0	64.7	104
Crystal	13,085	43.8	13.5	56.3	--	--	--	--	--
Foster	13,052	37.8	12.1	53.8	--	--	--	--	--
Logan	10,037	46.8	12.6	69.4	--	--	--	--	--
Manley	14,417	40.1	12.9	57.9	63.0	--	--	60.5	97
Stark	10,762	47.1	12.8	50.9	73.9	72.9	65.9	62.4	100
Mean	11,959	43.7	12.7	53.9					
CV(%)	6.6	2.9	3.8	9.9					
LSD.05	1154.9	1.9	0.7	7.8					

Prevous crop: Black lentil (burndown): Soil test results: 210 lbs N, 11 ppm P, 435 ppm K, 211 lbs S, 0.7 ppm Zn, 40 lbs Cl per acre - no fertilizer applied; Planted on May 18 at 800,000 Pure Live Seed per acre at a 1.25 inch depth; No herbicides were applied; Harvested on September 8.

OAT - FALLOW — BEACH

Variety	Test weight	Seeds	Grain Yield 1995	Grain Yield 1994	Grain Yield 1993	Grain Yield 3-Year	Grain Yield 2-Year	% of Otana
	lbs/bu	lbs			bu/ac			
Jerry	36.9	13,008	68.9	84.5	129.9	94.4	76.7	102
Otana	35.8	17,959	54.9	94.9	112.4	87.4	74.9	100
Paul	39.6	19,562	20.1	57.6	--	--	38.9	52
Porter	36.4	18,804	76.0	--	--	--	--	--
Settler	36.9	14,345	60.9	--	--	--	--	--
Whitestone	33.6	18,701	79.8	107.3	--	--	93.6	125
Mean	36.5	17,603	60.1					
CV(%)	1.1	25.4	11.2					
LSD.05	0.6	NS	10.1					

Prevous crop: Black lentil (burndown): Soil test results: 210 lbs N, 11 ppm P, 435 ppm K, 211 lbs S, 0.7 ppm Zn, 40 lbs Cl per acre - no fertilizer applied; Planted on May 18 at 800,000 Pure Live Seed per acre at a 1.25 inch depth; No herbicides were applied; Harvested on September 8.

BARLEY - FALLOW — BEULAH

Variety	Seeds	Test weight	Protein	Grain Yield 1995	Grain Yield 1994	Grain Yield 1992	Grain Yield 3-Year	Grain Yield 2-Year	% of Stark
	lbs	lbs/bu	%			bu/ac			
Bowman	12,792	44.5	13.3	46.0	75.5	102.0	74.5	88.8	85
Crystal	14,986	40.6	14.0	37.0	--	--	--	--	--
Foster	12,608	42.5	12.5	40.9	--	--	--	--	--
Logan	11,251	44.2	13.2	50.8	--	--	--	--	--
Manley	14,502	40.7	14.5	32.9	95.9	--	--	95.9	92
Stark	11,859	45.6	13.5	37.0	86.6	122.0	81.9	104.3	100
Mean	12,820	43.1	13.3	41.8					
CV(%)	5.6	2.1	1.4	8.6					
LSD.05	1058	1.3	0.3	5.2					

Previous crop: Fallow: Soil test results: 41 lbs N, 7 ppm P - applied 50 lbs DAP and 244 lbs urea per acre; Planted on May 19 at 800,000 Pure Live Seed per acre at a 1.25 inch depth; Applied 2.7 pt Hoelon + 0.33 oz Harmony Extra + 0.75 pt MCPA ester to barley, and 0.33 oz Harmony Extra + 0.75 pt MCPA ester to oat, on June 13; Harvested on September 11.

OAT - FALLOW — BEULAH

Variety	Lodge Score[1]	Test weight	Seeds	Grain Yield 1995	Grain Yield 1994	Grain Yield 1992	Grain Yield 3-Year	Grain Yield 2-Year	% of Otana
		lbs/bu	lbs			bu/ac			
Jerry	4	34.2	12,102	58.3	108.3	--	--	83.3	81
Otana	6	30.0	14,274	56.1	150.0	78.4	118.7	103.1	100
Porter	4	34.1	13,180	70.9	--	--	--	--	--
Paul	2	42.6	16,037	56.1	86.6	--	--	71.4	69
Settler	6	34.7	13,150	78.1	--	--	--	--	--
Whitestone	8	30.0	14,768	80.4	121.4	--	--	100.9	98
Mean	5	34.3	13,918	66.5					
CV(%)	18.6	4.0	7.0	9.9					
LSD.05	1.5	2.1	1463	9.9					

[1]0 = no lodging; 9 = completely flat

Previous crop: Fallow: Soil test results: 41 lbs N, 7 ppm P - applied 50 lbs DAP and 244 lbs urea per acre; Planted on May 19 at 800,000 Pure Live Seed per acre at a 1.25 inch depth; Applied 2.7 pt Hoelon + 0.33 oz Harmony Extra + 0.75 pt MCPA ester to barley, and 0.33 oz Harmony Extra + 0.75 pt MCPA ester to oat, on June 13; Harvested on September 11.

BARLEY - FALLOW — GLEN ULLIN

Variety	Seeds	Test weight	Protein	Grain Yield 1995	Grain Yield 1994	Grain Yield 1993	Grain Yield 3-Year	Grain Yield 2-Year	% of Stark
	lbs	lbs/bu	%			bu/ac			
Bowman	14,016	42.0	12.3	51.3	68.8	59.0	59.7	60.1	82
Crystal	12,562	45.0	12.6	49.3	--	--	--	--	--
Foster	15,362	38.3	12.1	65.3	--	--	--	--	--
Logan	11,722	44.9	11.9	71.4	--	--	--	--	--
Manley	12,768	45.0	13.1	57.7	92.5	--	--	75.1	102
Stark	12,093	44.8	12.4	61.9	84.6	51.4	66.0	73.3	100
Mean	12,937	42.7	12.4	61.9					
CV(%)	6.8	3.9	2.9	7.4					
LSD.05	1302	2.4	0.5	6.7					

Previous crop: Fallow; Soil test results: 51 lbs N, 10 ppm P - applied 50 lbs DAP and 220 lbs urea per acre: Planted on May 19 at 800,000 Pure Live Seed per acre at a 1.25 inch depth; Applied 2.7 pt Hoelon + 0.33 oz Harmony Extra + 0.75 pt MCPA per acre to barley, and 0.33 oz Harmony Extra + 0.75 pt MCPA per acre to oat, on June 13: Harvested on September 12.

OAT - FALLOW — GLEN ULLIN

Variety	Test weight	Seeds	Grain Yield 1995	Grain Yield 1994	Grain Yield 1993	Grain Yield 3-Year	Grain Yield 2-Year	% of Otana
	lbs/bu	lbs			bu/ac			
Jerry	34.5	13,645	103.7	107.6	107.6	106.3	105.7	100
Otana	30.5	14,832	89.2	122.3	123.2	111.6	105.8	100
Paul	41.9	16,290	83.2	77.4	--	--	80.3	76
Porter	34.4	14,553	111.7	--	--	--	--	--
Settler	35.0	14,102	98.7	--	--	--	--	--
Whitestone	31.1	14,667	132.2	99.2	--	--	115.7	109
Mean	34.6	14,682	103.1					
CV(%)	2.1	5.9	9.3					
LSD.05	1.1	1321.6	14.5					

Previous crop: Fallow; Soil test results: 51 lbs N, 10 ppm P - applied 50 lbs DAP and 220 lbs urea per acre: Planted on May 19 at 800,000 Pure Live Seed per acre at a 1.25 inch depth; Applied 2.7 pt Hoelon + 0.33 oz Harmony Extra + 0.75 pt MCPA per acre to barley, and 0.33 oz Harmony Extra + 0.75 pt MCPA per acre to oat, on June 13: Harvested on September 12.

BARLEY - RECROP — HANNOVER

Variety	Seeds	Test weight	Protein	Grain Yield 1995	Grain Yield 1994	Grain Yield 1993	Grain Yield 3-Year	Grain Yield 2-Year	% of Stark
	lbs	lbs/bu	%			bu/ac			
Bowman	14,226	41.9	13.2	30.2	55.3	34.8	40.1	42.8	92
Crystal	13,515	41.4	14.3	34.2	--	--	--	--	--
Foster	14,313	38.9	12.9	38.4	--	--	--	--	--
Logan	11,902	42.7	13.1	46.1	--	--	--	--	--
Manley	12,811	39.9	14.4	34.9	50.2	--	--	42.6	92
Stark	12,483	43.6	13.4	35.8	57.0	48.6	47.1	46.4	100
Mean	13,208	41.4	13.5	36.6					
CV(%)	4.3	1.7	2.5	8.9					
LSD.05	836	1.0	0.4	4.9					

Previous crop: Corn; Soil test results: 50 lbs N, 5 ppm P - applied 50 lbs DAP and 225 lbs urea per acre. Planted on May 19 at 800,000 Pure Live Seed per acre at 1.5 inch depth; Applied 2.7 pt Hoelon + 0.33 oz Harmony Extra + 0.75 pt MCPA per acre to barley, and 0.33 oz/acre Harmony Extra + 0.75 pt MCPA per acre to oat on June 13; Harvested on September 13.

OAT - RECROP — HANNOVER

Variety	Test weight	Seeds	Grain Yield 1995	Grain Yield 1994	Grain Yield 1993	Grain Yield 3-Year	Grain Yield 2-Year	% of Otana
	lbs/bu	lbs			bu/ac			
Jerry	32.2	14,320	65.9	60.3	98.0	74.7	63.1	107
Otana	25.9	17,668	46.2	71.3	105.2	74.2	58.8	100
Paul	40.0	19,865	62.8	54.1	--	--	58.5	99
Porter	29.9	15,507	66.2	--	--	--	--	--
Settler	32.6	16,930	71.2	--	--	--	--	--
Whitestone	26.9	17,387	68.2	61.8	--	--	65.0	111
Mean	31.2	16,946	63.4					
CV(%)	3.5	11.6	13.6					
LSD.05	1.7	2962	13.0					

Previous crop: Corn; Soil test results: 50 lbs N, 5 ppm P - applied 50 lbs DAP and 225 lbs urea per acre. Planted on May 19 at 800,000 Pure Live Seed per acre at 1.5 inch depth; Applied 2.7 pt Hoelon + 0.33 oz Harmony Extra + 0.75 pt MCPA per acre to barley, and 0.33 oz/acre Harmony Extra + 0.75 pt MCPA per acre to oat on June 13; Harvested on September 13.

1995 Hettinger Barley Variety Trial on Fallow

Variety	Test weight	Grain protein	Days to head	Ht	Foliar disease	Yield 1995	1993	1992	2yr	3yr
	lbs/bu	%		cm	%	bu/A				
Excel	47.0	14.6	64	78	16	106.8	117.0	170.4	111.9	131.4
Foster	47.4	13.3	63	82	13	101.0	113.6	158.9	107.3	124.5
Hazen	47.1	13.9	65	82	15	94.2	113.6	153.2	103.9	120.3
Azure	47.3	13.7	64	86	12	98.3	107.4	147.6	102.8	117.8
Robust	48.7	14.4	64	82	13	98.1	102.3	151.0	100.2	117.1
Morex	47.6	14.1	64	86	13	105.2	100.9	136.7	103.0	114.3
Stander	47.4	13.7	66	72	14	80.6	113.3	147.4	97.0	113.8
Logan	50.4	13.5	62	74	17	94.3	111.1	124.1	102.7	109.8
Stark	50.4	13.9	63	83	15	90.2	99.1	137.7	94.6	109.0
Gallatin	49.5	13.5	67	78	12	92.2	95.4	134.3	93.8	107.3
Bowman	50.6	14.2	62	80	15	87.6	93.2	126.0	90.4	102.3
Harrington	47.6	14.1	70	74	13	56.3	96.5	137.1	76.4	96.6
Manley	48.4	14.0	70	76	11	80.5	104.7		92.6	
Royal	47.4	13.7	66	69	11	81.1				
Crystal	48.5	14.6	70	74	15	43.0				
B2912	45.7	14.5	69	72	15	54.7				
M66	48.2	14.0	63	83	11	107.5				
ND13299	50.0	13.8	60	80	18	88.4				
ND13300	50.1	14.4	62	78	14	82.9				
ND13629	47.2	13.9	66	82	13	77.2				
ND10981	46.7	13.5	66	84	12	75.2				
Trial mean	48.3	13.9	65	79	14	85.5	102.6	134.1		
C.V. %	1.0	2.6	1	5		11.5	10.2	8.3		
LSD 5%	0.7	0.5	1	5		14.0	14.8	15.8		
LSD 1%	0.9	0.7	1	7		18.6	19.7	21.0		

Planting date: April 25 Harvest date: August 7
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A)
Yield goal: 80 bu/A
Herbicide application: 1 pt/A Buctril + 1/3 oz/A Harmony Extra + 8 oz/A MCPE + 0.6 pt/A Assert
Yields are adjusted to 12% moisture.

1995 Hettinger Oat Variety Trial on Fallow

Variety	Test weight	Days to head	Ht	Foliar disease	Yield 1995	1993	1992	2yr	3yr
	lbs/bu		cm	%	bu/A				
Prairie	32.6	64	76	44	132.4	193.1	205.5	162.8	177.0
Porter	35.7	68	81	37	135.3	175.3	208.7	155.3	173.1
Robert	34.4	70	80	29	118.6	195.5	198.8	157.0	171.0
Troy	36.8	66	91	55	139.4	160.6	208.1	150.0	169.4
Jerry	36.2	64	81	37	124.9	173.8	201.4	149.4	166.7
Whitestone	34.4	70	72	53	121.6	167.2	204.6	144.4	164.5
Valley	35.7	67	71	46	127.5	176.5	186.6	152.0	163.5
Newdak	33.6	64	76	26	122.2	165.6	196.8	143.9	161.5
Monida	31.8	70	85	34	108.6	162.5	210.1	135.6	160.4
Otana	34.9	69	88	21	112.0	154.0	206.9	133.0	157.6
Riel	36.3	67	85	23	109.2	149.3	186.3	129.2	148.3
Dumont	34.4	70	84	36	75.9	145.1	190.7	110.5	137.2
Hytest	38.2	64	91	65	102.7	143.5	161.1	123.1	135.8
Derby	34.1	69	91	36	67.7	132.6	195.0	100.2	131.8
Calibre	33.2	70	93	38	57.1	121.8	187.8	89.4	122.2
Paul	41.0	70	91	24	58.3	118.7	138.7	88.5	105.2
Milton	34.8	66	79	51	129.4	194.7		162.0	
Bay	31.5	70	74	66	122.8	186.9		154.8	
AC Belmont	34.7	72	82	29	51.8	104.5		78.2	
Settler	36.4	64	80	68	130.0				
Brawn	32.5	66	73	72	127.3				
ND900117	35.9	63	79	65	133.4				
ND910697	34.6	70	89	15	132.8				
ND910779	33.8	70	86	19	128.1				
MN89127	35.2	62	74	49	122.6				
ND881508	35.5	72	87	22	109.7				
ND880224	36.5	71	79	31	107.8				
ND900779	33.6	68	80	27	107.1				
ND881374	36.2	68	86	30	105.4				
ND880107	34.3	68	97	53	87.2				
Trial mean	35.0	68	83	40	110.3	157.6	188.5		
C.V. %	1.9	1.4	5.9		9.6	10.5	13.4		
LSD 5%	0.9	1	7		14.9	23.4	35.2		
LSD 1%	1.2	2	9		19.8	30.8	46.5		

Planting date: April 25 Harvest date: August 8
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A)
Yield goal: 100 bu/A
Herbicide application: 1 pt/A Buctril + 1/3 oz/A Harmony Extra
Yields are adjusted to 12% moisture.

1995 Hettinger Barley Variety Trial on Recrop

Variety	Test weight	Grain protein	Days to head	Ht	Foliar disease	Yield 1995	Yield 1993	Yield 2yr
	lbs/bu	%		cm	%	bu/A	bu/A	bu/A
Gallatin	49.1	13.3	65	74	39	78.4	99.9	89.2
Stark	50.5	13.7	64	79	30	73.6	102.3	88.0
Bowman	50.5	13.8	62	71	37	72.1	93.6	82.8
Manley	48.2	14.3	70	70	17	59.9	64.8	62.4
Logan	50.3	13.4	63	74	35	80.7		
Crystal	48.3	14.4	70	69	15	36.6		
ND13299	50.0	13.6	61	75	19	78.8		
Trial mean	49.6	13.8	65	73	27	68.6	94.6	
C.V. %	0.8	3.2	0.4	6		5.7	13.2	
LSD 5%	0.6	0.6	1	ns		5.8	17.9	
LSD 1%	0.8	0.9	1	ns		7.9	24.0	

Planting date: April 25 Harvest date: August 7
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A)
Yield goal: 80 bu/A
Previous crop: Barley
Herbicide application: 1 pt/A Buctril + 1/3 oz/A Harmony Ext.
Yields are adjusted to 12% moisture.

1995 Hettinger Oat Variety Trial on Recrop

Variety	Test weight	Days to head	Ht	Foliar disease	Yield 1995	Yield 1993	Yield 2yr
	lbs/bu		cm	%	bu/A	bu/A	bu/A
Prairie	35.3	64	73	74	154.7	122.2	138.4
Newdak	36.0	64	77	57	150.8	107.1	129.0
Monida	34.3	70	88	58	140.9	112.2	126.6
Troy	38.2	67	84	58	134.4	111.7	123.0
Otana	37.2	69	88	42	134.4	105.7	120.0
Valley	39.4	68	65	65	137.7	97.0	117.4
Hytest	40.5	64	88	49	114.3	90.3	102.3
Dumont	35.3	71	85	25	96.7	86.2	91.4
Whitestone	37.7	70	70	69	147.9		
Settler	39.1	65	84	84	143.7		
Jerry	39.5	65	83	65	135.2		
Paul	43.5	70	88	36	95.6		
Derby	35.9	69	82	37	93.9		
Calibre	34.8	71	84	43	83.7		
Trial mean	37.6	68	81	54	126.0	99.4	
C.V. %	1.8	1	5		5.2	14.1	
LSD 5%	1.1	1	6		11.0	20.0	
LSD 1%	1.5	1	8		14.8	26.8	

Planting date: April 25 Harvest date: August 7
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A)
Yield goal: 100 bu/A
Previous crop: Oats
Herbicide application: 1 pt/A Buctril + 1/3 oz/A Harmony Extra
Yields are adjusted to 12% moisture.

1995 Scranton Barley Variety Trial

Variety	Test weight	Grain protein	Plant height	Foliar disease	Yield 1995	1994	1993	2yr	3yr
	lbs/bu	%	cm	%	bu/A				
Stark	51.5	12.6	53	64	83.2	71.0	70.9	77.1	75.0
Gallatin	46.7	13.1	51	62	77.1	71.1	70.6	74.1	72.9
Bowman	49.9	13.2	43	67	69.7	70.3	66.5	70.0	68.8
Logan	50.5	12.7	43	64	84.6	71.9		78.2	
Manley	48.2	12.6	48	15	86.8	63.5		75.2	
Crystal	47.0	12.8	51	25	71.3				
ND13299	50.4	13.0	43	62	80.4				
Trial mean	49.2	12.9	48	51	79.0	68.2	71.7		
C.V. %	1.1	3.1			11.2	7.3	17.5		
LSD 5%	0.8	ns			13.1	7.3	ns		
LSD 1%	1.1	ns			ns	ns	ns		

Planting date: May 19 Harvest date: August 18
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A)
Yield goal: 80 bu/A
Herbicide application: 2 pt/A Hoelon + 1 pt/A Buctril + 1/3 oz/A Harmony Extra
Yields are adjusted to 12% moisture.

1995 Scranton Oat Variety Trial

Variety	Test weight	Ht	Foliar disease	Yield 1995	1993	1992	2yr	3yr
	lbs/bu	cm	%	bu/A				
Otana	38.2	76	2	86.5	165.8	151.2	126.2	134.5
Prairie	35.8	84	2	73.4	127.0		100.2	
Troy	33.9	74	4	46.8	123.6		85.2	
Whitestone	35.6	66	3	71.9				
Settler	39.1	69	8	69.4				
Jerry	34.8	76	3	55.8				
Paul	39.9	104	2	25.5				
Trial mean	36.8	78	3	61.3	146.0	137.0		
C.V. %	3.7			17.3	8.1	5.7		
LSD 5%	2.0			15.6	21.7	-		
LSD 1%	2.7			21.3	31.2	-		

Planting date: May 19 Harvest date: August 18
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A)
Yield goal: 100 bu/A
Herbicide application: 1 pt/A Buctril + 1/3 oz/A Harmony Extra
Yields are adjusted to 12% moisture.

1995 New Leipzig Barley Variety Trial

Variety	Test weight	Grain protein	Plant height	Foliar disease	Yield 1995	1994	1993	2yr	3yr
	lbs/bu	%	cm	%	bu/A				
Bowman	47.5	14.7	60	72	82.5	42.2	74.8	62.4	66.5
Gallatin	43.3	15.4	62	63	62.6	56.9	69.0	59.8	62.8
Stark	46.6	14.8	69	66	70.5	41.9	68.5	56.2	60.3
Logan	48.7	14.3	67	59	80.8	40.2		60.5	
Manley	46.4	15.8	63	56	56.4	37.0		46.7	
Crystal	43.1	16.0	63	51	35.7				
ND13299	46.9	14.6	61	56	81.7				
Trial mean	46.1	15.1	64	60	67.2	44.9	73.1		
C.V. %	1.4	1.9			9.1	9.9	14.0		
LSD 5%	1.0	0.4			9.0	8.0	ns		
LSD 1%	1.3	9.6			12.3	11.3	ns		

Planting date: May 20 Harvest date: August 18
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A)
Yield goal: 80 bu/A
Herbicide application: 2 pt/A Hoelon + 1 pt/A Buctril + 1/3 oz/A Harmony Extra
Yields are adjusted to 12% moisture.

1995 New Leipzig Oat Variety Trial

Variety	Test weight	Ht	Foliar disease	Yield 1995	1994	1993	2yr	3yr
	lbs/bu	cm	%	bu/A				
Troy	37.0	107	2	129.3	63.4	131.1	96.4	107.9
Prairie	34.6	100	4	123.4	60.8	123.1	92.1	102.4
Otana	33.0	114	3	92.2	60.3	96.5	76.2	83.0
Jerry	38.4	110	2	133.8	61.4		97.6	
Whitestone	33.3	105	-	117.2	63.6		90.4	
Settler	37.0	110	4	124.9				
Paul	39.7	119	2	46.7				
Trial mean	36.2	109	3	109.6	61.9	120.4		
C.V. %	3.5			8.0	12.6	12.3		
LSD 5%	1.8			13.0	ns	22.4		
LSD 1%	2.6			17.7	ns	31.0		

Planting date: May 20 Harvest date: August 18
Seeding rate: 750,000 live seeds/A (approx. 1.7 bu/A)
Yield goal: 100 bu/A
Herbicide application: 1 pt/A Buctril
Yields are adjusted to 12% moisture.
Whitestone was severely lodged at harvest.

1995 Selfridge Barley Variety Trial

Variety	Test weight	Grain protein	Yield 1995	1994	1993	2yr	3yr
	lbs/bu	%	bu/A				
Bowman	48.3	14.7	45.9	70.3	66.5	58.1	60.9
Stark	46.0	14.7	37.1	71.0	70.9	54.0	59.7
Gallatin	43.7	13.9	34.4	71.1	70.6	52.8	58.7
Logan	47.3	14.0	30.5	71.9		51.2	
Manley	44.3	15.6	27.1	63.5		45.3	
Crystal	43.6	15.2	18.3				
ND13299	45.7	13.7	38.5				
Trial mean	45.6	14.5	33.1	68.2	71.7		
C.V. %	1.4	2.2	20.9	7.3	17.5		
LSD 5%	1.0	0.5	10.2	7.3	ns		
LS 1%	1.3	0.6	13.9	ns	ns		

Planting date: May 25 Harvest date: September 15
Seeding rate: 750,000 live seeds/A (approx. 1.4 bu/A)
Yield goal: 80 bu/A
Herbicide application: 2 pt/A Hoelon + 1 pt/A Buctril + 1/3 oz/A Harmony Extra
Yields are adjusted to 12% moisture.
Yields and quality were adversely affected by wet weather conditions at harvest time.

1995 Hettinger Off-Station Barley Variety Trials

Combined Means - 5 Sites***

Variety	Test weight	Grain protein	Plant height	Foliar disease	Yield 1995	1994*	1993**	2yr	3yr
	lbs/bu	%	cm	%	bu/A				
Gallatin	46.5	13.8	69	44	69.0	85.1	83.4	77.0	79.2
Stark	49.0	13.9	74	44	70.9	80.1	86.2	75.5	79.1
Bowman	49.4	14.1	68	48	71.6	74.8	78.4	73.2	74.9
Logan	49.4	13.6	68	44	74.2	82.2		78.2	
Manley	47.1	14.5	66	25	62.1	77.3		69.7	
Crystal	46.1	14.6	66	26	41.0				
ND13299	48.6	13.7	70	39	73.6				

* 4 sites - Regent, Scranton, New Leipzig and Selfridge.
** 6 sites - Hettinger fallow & recrop, Regent, Scranton, New Leipzig and Selfridge.
*** 5 sites - Hettinger fallow & recrop, Scranton, New Leipzig and Selfridge.
Yields are adjusted to 12% moisture.

1995 Hettinger Off-Station Oat Variety Trials

Combined Means - 4 Sites***

Variety	Test weight	Days to head	Plant height	Foliar disease	Yield 1995	1994*	1993**	2yr	3yr
	lbs/bu		cm	%	bu/A				
Prairie	34.5	64	73	31	117.8	89.8	142.6	103.8	116.7
Troy	36.4	66	84	30	110.2	91.8	135.3	101.0	112.4
Otana	35.7	68	84	17	102.9	85.3	131.0	94.1	106.4
Whitestone	35.2	70	70	32	111.5	102.7		107.1	
Jerry	37.1	64	78	27	109.0	90.6		99.8	
Settler	37.9	64	78	41	112.5				
Paul	41.0	70	87	16	53.6				

* 2 sites - Selfridge and Scranton.
** 6 sites - Hettinger fallow & recrop, Regent, Scranton, New Leipzig and Selfridge.
*** 4 sites - Hettinger fallow & recrop, Scranton and New Leipzig.
Yields are adjusted to 12% moisture.

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.

1995 Hettinger Winter Rye Variety Trial

Variety	Test weight	Heading date	Plant height	Foliar disease	Winter survival	Yield 1995	Yield 1993	Yield 1992	Yield 2yr	Yield 3yr
	lbs/bu	June	cm	%	%	bu/A				
Dacold	54.3	16	102	17	95	116.2	45.0	50.2	80.6	70.5
Prima	56.4	10	114	25	86	80.7	61.1	47.0	70.9	62.9
Frederick	55.7	12	110	23	40	62.2	70.3	18.2	66.2	50.2
NDE93	53.0	16	103	49	91	103.5				
Trial mean	54.9	13	107	28	78	90.7	54.2	39.7		
C.V. %	1.0	0.1	3.6		10	9.1	16.6	36.0		
LSD 5%	0.8	1	6		12	12.8	17.4	22.5		
LSD 1%	1.2	1	9		17	18.0	ns	ns		

Planting date: September 28, 1994 Harvest date: August 8, 1995
Seeding rate: 1.1 million live seeds/A
Herbicide application: 1 pt/A Buctril + 1/3 oz/A Harmony Extra + 8 oz/A MCPE + 0.6 pt/A Assert
Yields are adjusted to 12% moisture.

Hard Red Winter Wheat Variety Description

Variety	Agent or Origin	Year	Quality	Leaf Rust[1]	Stem Rust[1]	Maturity	Straw Strength	Height	Winter Hardiness
Roughrider	ND	1975	4.0[a]	S	R[3]	med.	m.strg.	med.	good
Agassiz	ND	1983	3.0	S	R	med.	med.	med.	good
Seward	ND	1987	2.0	S	R	med.	strg.	med.	good
Norstar	Can.	1977	3.0	S	S	late	med.	tall	good
Rita	SD	1980	3.0	MS	MR[2]	early	strg.	med.	fair
Rose	SD	1981	2.0	S	MS[2]	early	v.strg.	shrt.	fair
Winridge	MT	1980	1.0	S	S	med.	strg.	med.	poor
Norwin*	MT	1983	2.0	S	MS	med.	strg.	v.shrt.	fair
Siouxland	NE	1984	2.0	MR	R	early	strg.	med.	poor
Arapahoe	NE	1989	2.5	MR	R	early	m.strg.	shrt.	good
Judith	MT	1988	3.0	S	S	med.	strg.	med.	fair
Abilene*	AgriPro	1987	2.5	S	MR	early	strg.	v.shrt.	poor
Elkhorn	ND	1995	3.0	MR	R[4]	med.	m.strg.	med.	good

[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 winter hardiness should be seeded only in tall stubble or in standing solid seeded or narrow strip flax.

* Semidwarf

[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.

1995 Hettinger Hard Red Winter Wheat Variety Trial

Variety	Test weight	Grain protein	Heading date	Plant height	Foliar disease	Winter survival	Yield 1995	Yield 1993	Yield 1992	Yield 2yr	Yield 3yr
	lbs/bu	%	June	cm	%	%	bu/A	bu/A	bu/A	bu/A	bu/A
Seward	61.3	12.4	20	105	25	89	77.4	42.8	57.7	60.1	59.3
Elkhorn	60.7	13.8	23	107	15	71	64.9	45.2	67.4	55.0	59.2
Arapahoe	61.2	13.4	18	89	29	91	93.6	34.2	48.3	63.9	58.7
Roughrider	62.1	13.6	21	103	33	89	71.1	49.8	50.6	60.4	57.2
Siouxland	61.4	13.2	18	90	27	74	73.3	35.0	57.0	54.2	55.1
Agassiz	61.4	13.6	22	109	43	71	55.8	40.3	59.2	48.0	51.8
TAM 107	59.5	12.9	16	81	42	89	83.2	16.6	24.6	49.9	41.5
Longhorn	62.3	13.4	17	87	19	84	85.3	21.2		53.2	
Tomahawk	61.4	13.2	16	79	49	95	93.3	12.2		52.8	
CDC Kestrel	59.7	12.2	20	102	55	80	80.1				
ND9274	60.3	13.7	20	90	26	86	90.2				
ND9272	60.0	13.8	19	89	36	88	89.3				
ND8955	60.2	13.0	20	96	39	90	84.5				
ND9257	60.3	13.2	20	96	28	90	83.0				
ND9258	60.3	13.1	20	96	21	84	80.2				
ND8889	61.4	13.6	20	102	18	86	76.1				
ND9064	61.9	13.6	20	108	15	86	69.5				
ND8974	60.3	12.9	22	96	31	74	66.3				
Trial mean	60.9	13.2	20	96	31	84	78.7	35.4	57.2		
C.V. %	0.8	2.3	0.1	4		11	8.9	22.2	29.5		
LSD 5%	0.7	0.4	1	6		13	10.0	11.0	23.9		
LSD 1%	0.9	0.6	1	8		17	13.3	14.8	31.7		

Planting date: September 28, 1994 Harvest date: August 8, 1995
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A)
Yield goal: 60 bu/A
Herbicide application: 1 pt/A Buctril + 1/3 oz/A Harmony Extra + 8 oz/A MCPE + 0.6 pt/A Assert
Yields are adjusted to 12% moisture.

1995 Hettinger Dormant Seeded HRWW Trial

Hard red winter wheat (HRWW) is typically planted in the Fall of the year allowing the seed to germinate and produce foliage prior to freeze up. HRWW must be exposed to near freezing temperatures following germination to vernalize, a requirement for head development. Although cold tolerance (winterhardiness) varies between varieties, even the most winter hardy varieties will die at soil temperatures of 0 F. If HRWW could be planted in late Fall after soil temperatures have fallen below 40 F to prevent seed germination, the crop may be able to avoid these killing temperatures and still germinate and vernalize the following Spring.

This study was initiated to investigate agronomic and quality characteristics among and between HRWW varieties which were planted on 3 different dates.

HRWW was planted in small replicated plots on September 28, 1994, October 12, 1994 and on October 28, 1994. Plots were planted using hoe openers with a 14 inch row spacing and were harvested on August 8, 1995. The first planting (Sept. 28) was into relatively dry soil and did not emerge until mid October. The second planting (Oct. 12) also germinated and emerged prior to freeze up. The last planting (Oct. 28) did not emerge prior to freezeup. The winter of 1994/95 was generally mild with continuous snow cover. Soil temperatures remained above 10 F throughout the winter.

Agronomic and quality characteristics are shown in the following table, however, specific conclusions or recommendations should not be drawn based on this information alone.

Variety	Planting date*	Test weight	Grain protein	Heading date	Plant height	Foliar disease	Winter survival	Grain yield
		lbs/bu	%	June	cm	%	%	bu/A
Norstar	1	61.0	13.8	22	102	54	88	63.7
Norstar	2	60.4	12.9	22	111	12	86	68.3
Norstar	3	59.3	12.6	28	112	72	80	50.8
Roughrider	1	61.4	14.1	20	96	75	89	69.8
Roughrider	2	60.7	13.5	21	91	28	90	72.2
Roughrider	3	60.4	13.3	26	99	33	78	59.4
Elkhorn	1	60.6	14.2	22	101	19	89	65.3
Elkhorn	2	59.8	13.3	22	100	17	88	70.6
Elkhorn	3	59.4	13.4	27	100	11	80	57.8
Rose	1	61.8	13.6	19	86	83	89	78.5
Rose	2	61.5	13.0	19	83	33	85	69.8
Rose	3	61.4	12.8	22	89	57	76	69.0
Arapahoe	1	60.6	13.6	19	84	72	85	86.1
Arapahoe	2	60.6	13.1	18	80	49	86	82.3
Arapahoe	3	60.3	12.9	21	82	47	85	83.9

countinued on following page.

1995 Hettinger Dormant Seeded HRWW Trial continued.

Variety	Planting date*	Test weight	Grain protein	Heading date	Plant height	Foliar disease	Winter survival	Grain yield
		lbs/bu	%	June	cm	%	%	bu/A
Karl 92	1	60.6	13.0	16	69	90	89	69.9
Karl 92	2	60.0	13.1	16	66	71	89	69.5
Karl 92	3	59.1	13.0	19	65	39	78	61.2
Thunderbird	1	62.6	13.8	16	82	78	86	84.1
Thunderbird	2	62.0	13.4	17	71	65	85	77.0
Thunderbird	3	61.8	13.0	19	76	24	85	79.1
Grandin	1	58.5	13.7	19	76	45	4	17.0
Grandin	2	--	13.5	20	76	19	1	8.8
Grandin	3	58.8	15.1	21	82	16	48	34.8
Trial mean		60.6	13.4	21	87	46	76	64.5
Mean	1	60.9	13.7	19	87	64	77	66.8
Mean	2	60.7	13.2	19	85	37	76	64.8
Mean	3	60.1	13.3	23	88	37	76	62.0
C.V. %		0.9	2.1	0.1	6		10	10.7
LSD 5%		0.8	0.4	1	7		10	9.8
LSD 1%		1.0	0.5	1	10		14	13.0

* Planting date: 1 = 9/28/94, 2 = 10/12/94, 3 = 10/28/94
Seeding rate: 1.1 million live seeds/A (approx. 1.6 bu/A)
Herbicide application: 1 pt/A Buctril + 1/3 oz/A Harmony Extra + 8 oz/A MCPE + 0.6 pt/A Assert
Harvest date: August 8, 1995
Yields are adjusted to 12% moisture.

1995 Hettinger Small Grain Foliar Disease Survey

Foliar diseases are a constant and continuing threat to small grain production in North Dakota. Foliar diseases are caused by fungi, bacteria and viruses, and are present every year and are found in every field. The magnitude of severity is different for every field and changes according to varietal tolerance, disease pathogen population and environmental conditions.

Varietal tolerance is our best source of disease control and is achieved by genetically altering the small grain plant so as to limit the disease infection.

Disease pathogens are blown in from southern states or may be present in soils or on stubble. Populations of disease pathogens in the soil and on stubble are altered by tillage and by crop rotations.

Environmental conditions play the greatest role in a disease cycle. Foliar diseases typically present more of a problem during warm and humid conditions, however, some disease problems are amplified during dry conditions (common root rot). The timing of a disease infestation according to the crop growth stage is critical.

The flag leaf is the primary "factory" for head development and kernel production. If this leaf becomes infected during early seed development, losses in yield, test weight and quality are almost always assured. Infections which occur after the kernel is in the soft dough stage generally do not incur significant yield losses.

The following survey was conducted by **Rosamary Schoeder** on small grain varieties grown at Hettinger. Disease severity is the percentage of the flag leaf surface area affected by disease. This is followed by check marks which correspond to specific disease pathogens found on that variety.

HRSW on fallow

Variety	Disease severity	TS	LB	SB	GB	LR	SR	BA	BY	WS	LS	RS
LEN	19	x	x	x	x	x		x	x			
STOA	27	x	x	x	x	x		x	x	x		
BUTTE 86	28	x	x	x	x	x	x	x	x		x	x
2375	30	x	x	x	x	x		x	x	x		x
AMIDON	17	x	x	x	x	x		x	x		x	x
PROSPECT	24	x	x	x	x	x	x	x	x		x	
GUS	22	x	x	x	x	x	x	x	x	x	x	
GRANDIN	29	x	x	x	x	x	x	x	x	x		
BERGEN	21	x	x	x	x	x		x	x		x	
2370	28	x	x	x	x	x		x	x			x
SHARP	32	x	x	x	x	x	x	x	x			x
2371	31	x	x	x	x	x	x	x	x	x		
DALEN	22	x	x	x	x	x		x	x	x		
NORM	17	x	x	x	x			x	x			
KRONA	20	x	x	x	x	x			x			
CDC TEAL	26	x	x	x	x	x	x	x	x			x
SONJA	24	x	x	x	x	x		x	x	x		
AC DOMAIN	33	x	x	x	x	x		x	x			
KULM	46	x	x	x	x	x		x	x	x		
HAMER	39	x	x	x	x	x		x	x			x
LARS	33	x	x	x	x	x		x	x			
NORLANDER	28	x	x	x	x	x			x	x		
AC BARRIE	29	x	x	x	x	x	x	x	x	x		
2398	28	x	x	x	x	x	x	x	x			
RUSS	63	x	x	x	x			x	x			x
VERDE	59	x	x	x	x			x	x	x		
AC CORA	42	x	x	x	x			x	x	x		x
TRENTON	36	x	x	x	x	x	x	x	x	x		
ND678	41	x	x	x	x	x		x	x	x		x
GLUPRO	21	x	x	x	x	x	x	x	x	x		
MCNEAL	38	x	x	x	x	x	x	x	x	x		
AC EATONIA	46	x	x	x	x		x	x	x	x		
ERNEST	44	x	x	x	x	x	x	x	x		x	
PENAWAWA	78	x	x	x	x	x	x	x	x			
ALPOWA	78	x	x	x	x	x	x	x	x			
EDWALL	80	x	x	x	x	x	x	x	x	x		
SD0010	25	x	x	x	x	x	x	x	x			
ND688	19	x	x	x	x	x		x	x			
ND689	27	x	x	x	x	x		x	x	x		x
ND690	19	x	x	x	x	x		x	x			
SBF0402	31	x	x	x	x	x		x		x		
BW674	49	x	x	x	x	x	x	x	x			

TS = Tan Spot
LB = Leaf Blotch
SB = Spot Blotch
GB = Glum Blotch
LR = Leaf Rust
SR = Stem Rust
BA = Bacterial Blight
BY = Barley Yellow Dwarf (Yellow Leaf)
WS = Wheat Streak Mosaic Virus
LS = Loose Smut
RS = Ring Spot

HRSW Recrop on HRSW stubble

Variety	Disease severity	TS	LB	SB	GB	LR	SR	BA	BY	WS	LS	RS
LEN	15	x	x	x		x		x	x	x		
STOA	17	x	x	x		x		x	x			x
BUTTE 86	19	x	x	x	x	x	x	x	x	x		
2375	17	x	x	x		x	x	x	x	x		x
AMIDON	12	x	x	x	x			x	x			
ERNEST	21	x	x	x	x	x	x	x	x	x	x	x
GUS	17	x	x	x	x	x		x	x		x	x
GRANDIN	16	x	x	x	x	x		x	x			x
BERGEN	13	x	x	x	x	x		x	x	x		x
AC EATONIA	29	x	x	x	x	x	x	x	x	x		
SHARP	15	x	x	x	x			x	x	x		x
2371	14	x	x	x	x	x	x	x	x	x		x
DALEN	29	x	x	x	x	x	x	x	x	x		x
MCNEAL	15	x	x	x	x	x	x	x	x	x		
KRONA	12	x	x	x	x			x	x		x	x
CDC TEAL	28	x	x	x	x	x	x	x	x			x
SONJA	16	x	x	x	x		x	x	x	x		x
GLUPRO	13	x	x	x	x	x	x	x	x	x		x
KULM	18	x	x	x	x	x		x	x	x		x
HAMER	13	x	x	x	x			x	x	x		x
LARS	21	x	x	x	x	x		x	x	x		x
NORLANDER	28	x	x	x	x	x		x	x	x		
AC BARRIE	30	x	x	x	x	x		x	x	x		x
VERDE	35	x	x	x	x	x		x	x	x		x
TRENTON	28	x	x	x	x	x		x	x	x	x	
2398	45	x	x	x	x	x	x	x	x			x
AC DOMAIN	42	x	x	x	x	x	x	x	x	x		x

TS = Tan Spot
LB = Leaf Blotch
SB = Spot Blotch
GB = Glum Blotch
LR = Leaf Rust
SR = Stem Rust
BA = Bacterial Blight
BY = Barley Yellow Dwarf (Yellow Leaf)
WS = Wheat Streak Mosaic Virus
LS = Loose Smut
RS = Ring Spot

Durum on Fallow

Variety	Disease severity	TS	LB	SB	GB	LR	SR	BA	BY	WS	LS	RS
WARD	8	x	x	x	x				x	x		
RUGBY	10	x	x	x	x	x	x	x	x			x
VIC	10	x	x	x	x	x	x	x	x			
LLOYD	13	x	x	x	x	x		x	x		x	x
MONROE	27	x	x	x	x	x		x	x			
RENVILLE	18	x	x	x	x	x		x	x			x
MEDORA	16	x	x	x	x			x	x			x
SCEPTRE	17	x	x	x	x	x		x	x			
LAKER	28	x	x	x	x	x		x	x			
REGOLD	21	x	x	x	x	x		x	x			
PLENTY	33	x	x	x	x	x	x	x	x	x		
VOSS	27	x	x	x	x			x	x		x	x
MUNICH	23	x	x	x	x	x		x	x			x
DT475	19	x	x	x		x		x	x			x
D87130	19	x	x	x	x	x		x	x	x		
D87240	18	x	x	x	x	x		x	x	x		x
D88303	15	x	x	x	x			x	x			x
D89135	14	x	x	x	x	x		x	x			x
D901313	27	x	x	x	x			x	x			x
D901419	29	x	x	x	x	x		x	x	x		
D901442	32	x	x	x	x	x	x	x	x			
D901486	45	x	x	x	x	x		x	x			
D901518	37	x	x	x	x	x		x	x			x
D901536	29	x	x	x	x	x		x	x			
D901786	58	x	x	x	x			x	x			x

TS = Tan Spot
LB = Leaf Blotch
SB = Spot Blotch
GB = Glum Blotch
LR = Leaf Rust
SR = Stem Rust

BA = Bacterial Blight
BY = Barley Yellow Dwarf (Yellow Leaf)
WS = Wheat Streak Mosaic Virus
LS = Loose Smut
RS = Ring Spot

Barley on Fallow

Variety	Disease severity	NB	GB	SB	BS	BY	BA	LR	SR	SE	LS	RS	TS	SC
MOREX	13	x		x	x	x	x	x	x	x			x	
AZURE	12	x		x	x	x	x	x		x			x	x
ROBUST	12	x		x	x	x	x	x		x			x	
HAZEN	15	x		x	x	x	x			x			x	
EXCEL	16	x		x	x	x	x	x		x			x	
STANDER	14	x	x	x	x	x	x	x	x	x			x	
ROYAL	11	x		x	x	x	x	x		x			x	x
FOSTER	13	x			x	x	x	x	x	x			x	
B2912	15	x			x	x	x	x	x	x			x	
M66	11	x		x	x	x	x	x	x	x			x	x
ND10981	12	x		x	x	x	x			x	x	x	x	
ND13629	13	x		x	x	x	x			x			x	x
BOWMAN	15	x		x	x	x	x		x	x		x	x	
CRYSTAL	15	x		x	x	x	x			x		x	x	
GALLATIN	12	x		x	x	x	x			x		x	x	
HARRINGTON	13	x		x	x	x	x			x		x	x	x
MANLEY	11	x		x	x	x	x			x		x	x	
STARK	15	x	x	x	x	x	x			x	x	x		
LOGAN	17	x	x	x		x	x	x		x		x	x	x
ND13299	18	x		x	x	x	x			x		x	x	
ND13300	14	x		x	x	x	x		x	x		x	x	

Barley recrop on barley stubble

Variety	Disease severity	NB	GB	SB	BS	BY	BA	LR	SR	SE	LS	RS	TS	SC
BOWMAN	37	x		x		x	x			x			x	
STARK	30	x	x	x		x	x			x		x	x	
LOGAN	35	x		x	x	x	x	x		x		x	x	x
GALLATIN	39	x		x	x	x	x			x		x	x	x
MANLEY	17	x		x	x	x	x			x				
CRYSTAL	15	x		x		x	x			x				x
ND13299	19	x	x	x		x	x			x		x		

NB = Net Blotch
GB = Glume Blotch
SB = Spot Blotch
BS = Barley Stripe
BY = Barley Yellow Dwarf
BA = Bacterial Blight
LR = Leaf Rust
SR = Stem Rust
SE = Septoria
LS = Loose Smut
RS = Ring Spot
TS = Tan Spot
SC = Scald

Oat on Fallow

Variety	Disease severity	BY	BA	SB	RS
BAY	66	x	x	x	
AC BELMONT	29	x	x	x	
BRAWN	72	x		x	
CALIBRE	38	x	x	x	
DERBY	36	x	x	x	
DUMONT	36	x	x	x	
HYTEST	65	x	x	x	
JERRY	37	x	x	x	
MILTON	51	x	x	x	
MONIDA	34	x	x	x	x
NEWDAK	26	x	x	x	x
OTANA	21	x	x	x	
PAUL	24	x	x	x	
PORTER	37	x	x	x	
PRAIRIE	44	x	x	x	
RIEL	23	x	x	x	
ROBERT	29	x	x	x	
SETTLER	68	x	x	x	
TROY	55	x	x	x	
VALLEY	46	x	x	x	
WHITESTONE	53	x	x	x	
ND880107	42	x	x	x	
ND880224	31	x	x	x	
ND881374	30	x	x	x	
ND881508	22	x	x	x	
ND900117	65	x	x	x	
MN89127	49	x	x	x	
ND900779	27	x	x	x	x
ND910697	15	x	x	x	
ND910779	19	x	x	x	

BY = Barley Yellow Dwarf (Red Leaf)
BA = Bacterial Blight
SB = Septoria Blotch
RS = Ring Spot

Hard Red Winter Wheat on Fallow

Variety	Disease severity	TS	LB	SB	GB	LR	BA	BY	WS	RS
AGASSIZ	43	x	x	x	x	x	x	x	x	x
ARAPAHOE	29	x	x		x	x	x	x	x	
CDC KESTREL	55	x	x		x	x	x	x		x
ROUGHRIDER	33	x	x		x	x	x	x		x
SEWARD	25	x	x	x	x	x	x	x		x
TAM 107	42	x	x	x	x	x	x	x		x
SIOUXLAND	27	x	x		x	x	x	x		x
LONGHORN	19	x	x		x	x	x	x	x	x
TOMAHAWK	49	x	x		x		x	x		x
ELKHORN	15	x	x			x	x	x		x
ND8889	18	x	x	x	x	x	x	x		x
ND8955	39	x	x		x		x	x		x
ND8974	31	x	x		x	x	x	x	x	x
ND9064	15	x	x			x	x	x	x	x
ND9257	28	x	x	x	x	x	x	x		x
ND9258	21	x	x	x		x	x	x		x
ND9272	36	x	x	x	x	x	x	x		x
ND9274	26	x	x	x		x	x	x	x	x

TS = Tan Spot
LB = Leaf Blotch
SB = Spot Blotch
GB = Glume Blotch
LR = Leaf Rust
BA = Bacterial Blight
BY = Barley Yellow Dwarf
WS = Wheat Streak Mosaic Virus
RS = Ring Spot

Dickinson Oilseed Research

Mustard is one of several oilseed crops adapted to growing conditions in southwestern North Dakota. Preliminary data indicate that certain canola varieties are also adapted. Agronomists at the Langdon Research Center have begun coordinating statewide and regional mustard and canola variety comparisons. Dickinson was included as a location in these efforts for the first time in 1995, although both mustard and canola have been evaluated at Dickinson in the recent past.

Yield of both the mustard and canola variety trials averaged around 2000 lbs seed per acre in 1995. Yield ranged from 1700 to 2500 lbs seed per acre for mustard, depending on the variety and type grown. Seed yield across the canola varieties was comparable to yield across the mustard varieties evaluated at Dickinson; canola yield ranged from 1400 lbs seed per acre for Tobin to 2500 lbs seed per acre for Hyola 401. These trials will be continued, and possibly expanded, at Dickinson in 1996.

DRYLAND MUSTARD - GREEN FALLOW — DICKINSON

Type	Variety	Days to Flower	Length of Flower Period	Days to Harvest	Height	Lodging Score[1]
					inches	
Brown	Common	41	28	98	38	2
Oriental	Cutlass	40	28	100	37	3
Yellow	Gisilba	39	28	98	34	2
Oriental	Lethbridge 22A	40	30	99	39	4
Yellow	Ochre	40	29	98	40	3
Yellow	Tilney	40	28	98	40	2
Mean		40.0	28.5	98.5	38.0	
CV(%)		1.2	2.8	1.5	4.8	
LSD.05		0.7	1.2	2.3	2.6	

Type	Variety	Seeds	Test Weight	Oil	1995	1992	Average 2-Year
		lb	lbs/bu	%	---------- lbs/ac ----------		
Brown	Common	176,2066	50.1	38.3	2095.1	1568.0	1831.6
Oriental	Cutlass	143,844	51.0	40.8	2491.3	1814.0	2152.7
Yellow	Gisilba	85,189	53.4	30.0	2222.2	--	--
Oriental	Lethbridge 22A	149,601	50.6	39.5	1800.3		
Yellow	Ochre	84,971	53.4	30.1	1695.3	--	--
Yellow	Tilney	83,881	53.8	28.7	2035.2	1496.0	1765.6
Mean		98,175	52.1		2056.6		
CV(%)		7	2.5		9.7		
LSD.05		12,813	2		300.0		

[1] 0 = no lodging; 5 = completely flat

Previous crop: Black lentil (burn down); Soil test results: 154 lbs N, 25 ppm P - applied 20 lbs urea per acre; Applied 1 pt Treflan per acre on May 12 and incorporated; planted at 8 lbs (Brown and Oriental) and 15 lbs (Yellow) Pure Live Seed per acre on May 12; Applied 6 oz Asana XL on June 5; Harvested at 98 to 100 days following planting, depending on the variety.

DRYLAND CANOLA - GREEN FALLOW — DICKINSON

Variety	Stand	Days to Flower	Length of Flower	Days to Maturity	Height	Lodging Score[1]
	%		days		inches	
Crusher	95	47	31	105	39	1
Cyclone	92	35	43	109	37	2
Hyola 401 401	97	42	23	101	30	2
Hysun 110 110	97	37	24	87	29	3
Legend	100	45	22	101	37	3
OAC Springfield	96	43	22	102	34	3
Reward	87	36	25	87	27	4
Tobin	85	36	26	87	29	3
Trojan	85	46	32	106	39	2
Mean	92.9	40.9	27.5	98.4	33.6	
CV(%)	4.9	13.6	20.1	2.1	5.8	
LSD.05	6.6	8.1	8.1	3.1	2.9	

Variety	Seeds	Test Weight	Oil	Grain Yield 1995	Grain Yield 1992	Grain Yield Average 2-Year
	lb	lbs/bu	%	lbs/ac	lbs/ac	lbs/ac
Crusher	156,703	51.5	41.6	1834.1	--	--
Cyclone	154,265	49.2	40.0	1782.7	--	--
Hyola 401	118,904	52.5	41.8	2506.4	--	--
Hysun 110	169,578	51.8	39.5	1772.2	--	--
Legend	147,848	51.0	41.2	1907.5	1218.0	1562.8
OAC Springfield	117,879	51.2	42.3	2081.1	--	--
Reward	190,322	50.8	41.8	1500.1	--	--
Tobin	194,795	50.8	39.6	1392.0	1290.0	1341.0
Trojan	144,620	49.8	41.5	1597.6	--	--
Mean	154,990	50.9		1819.3		
CV(%)	7.2	1.8		11.6		
LSD.05	16,309	1.3		309.1		

[1]0 = no lodging; 5 = completely flat

Previous crop: Black lentil (burn down); Soil test results: 154 lbs N, 25 ppm P - applied 20 lbs urea per acre; Applied 1 pt Treflan per acre on May 12 and incorporated; planted at 21 Pure Live Seed per square foot on May 12; Applied 6 oz Asana XL on June 5; Harvested at 87 to 106 days following planting, depending on the variety.

1995 Hettinger Tame Mustard Variety Trial

Variety	Type*	Test weight	Days to mature	Ht	Yield 1995	1993	1992	2yr	3yr
		lbs/bu		cm	lbs/A				
Cutless	O	54.2	98	83	1852	2437	3668	2144	2652
Tilney	Y	56.3	95	76	2248	2485	2763	2366	2499
Brown	B	53.6	98	79	1711	1944	3346	1828	2334
Gisilba	Y	56.6	95	80	2006				
Ochre	Y	56.0	96	78	1718				
Leth. 22A	O	55.0	99	77	1282				
Trial mean		55.3	97	79	1807	2335	2529		
C.V. %		1.7	0.7	10	9.5	15	13		
LSD 5%		1.4	1	ns	257	ns	493		
LSD 1%		1.9	1	ns	352	ns	682		

* Type: O = Oriental, Y = Yellow, and B = Brown
Planting date: April 26
Seeding rate: Yellow = 15 lbs/A, B & O = 8 lbs/A
Yield goal: 2000 lbs/A
Herbicide applied: 2 pts/A Sonalan, Pre-plant incorporated
Harvest date: Yellow = August 2, B & O = August 8
Yields are adjusted to 8% moisture.

1995 Hettinger Canola Variety Trial

Variety	Test weight	Days to mature	Ht	Yield 1995	1993	1992	2yr	3yr
	lbs/bu		cm	lbs/A				
Hyola 401	53.6	100	82	2543	3615	2714	3079	2957
Legend	51.9	100	86	1604	3167	2380	2386	2384
Tobin*	53.8	95	79	1590	2201	1933	1896	1908
OAC Springfield	51.6	100	75	1839				
Hysyn 110*	54.0	94	80	1812				
Proseed Unica	52.9	102	109	1792				
Proseed Spok	54.2	102	118	1772				
Proseed 7/92	53.8	102	100	1751				
Crusher	52.8	101	97	1564				
Reward*	52.2	95	76	1530				
Trojan	53.2	102	88	1470				
Cyclone	52.7	103	101	1145				
Trial mean	53.1	100	91	1713	3029	2458		
C.V. %	0.8	0.8	8	16	14	21		
LSD 5%	0.6	1	11	394	615	729		
LSD 1%	0.8	2	15	529	837	ns		

* = Polish type (B. rapa)
Planting date: April 26 Harvest date: August 8, * = August 2
Seeding rate: 7.5 lbs/A, * = 4.5 lbs/A
Yield goal: 2000 lbs/A
Herbicide applied: 2 pt/A Sonalan, Pre-plant incorporated
Insecticide applied: 5 lbs/A Furadan CR-10 with seed
Yields are adjusted to 8% moisture.

1995 Hettinger Sunflower Trial

Brand	Hybrid	Test weight	Oil content	Yield 1995	1994	1993	2yr	3yr
		lbs/bu	%	lbs/A				
Pioneer	6339	32.3	55.0	3180	1927	1372	2554	2160
Pioneer	6230	34.3	47.9	2802	1973	1584	2388	2120
Dekalb	3790	34.7	49.8	2770	1608	1516	2189	1965
Proseed	140	31.8	48.2	2857	2614		2736	
Dekalb	3881	33.8	50.2	3393	2008		2700	
Proseed	143	31.5	43.6	3145	2019		2582	
Pioneer	DO-707	32.5	47.6	3119	1787		2453	
Proseed	107	30.8	45.2	2774	2111		2442	
Dekalb	3904	32.6	50.0	3453		1209	2331	
Pioneer	DO-827	34.1	45.2	2539	1663		2101	
Proseed	141	33.8	47.4	2224	1806		2015	
Cenex/LOL	745	31.5	48.4	2271	1437		1854	
Pioneer	6300	34.9	47.0	3563				
Dekalb	3868	33.8	50.4	3234				
Asgrow	4379	31.2	44.0	3212				
Proseed	9310	32.7	49.4	3185				
Asgrow	5305	31.6	49.3	3139				
Asgrow	5306	31.1	47.6	3009				
Asgrow	5110	31.8	44.5	2951				
Asgrow	4285	31.5	43.8	2864				
Asgrow	3211	34.0	46.3	2836				
Asgrow	931411	31.0	46.2	2785				
Asgrow	4170	32.8	46.3	2784				
Proseed	235	32.5	48.6	2771				
Proseed	260	31.5	47.6	2684				
Asgrow	931410	32.8	47.2	2629				
Cenex/LOL	803	33.9	51.5	2545				
Dekalb	5801	34.1	46.9	2290				
Proseed	261	31.6	53.1	2262				
Asgrow	477	32.0	45.3	2247				
Trial mean		32.6	47.8	2851	1893	1468		
C.V. %		3.3		13	19	16		
LSD 5%		1.8		594	498	328		
LSD 1%		2.3		790	658	439		

Planting date: May 23 Harvest date: October 16
Seeding rate: 21,000 seeds/A, thinned to 18,000 plants/A
Row spacing: 30"
Yield goal: 2500 lbs/A
Herbicides applied: 2.0 pt/A Sonalan + 2.5 pt/A Eptam, pre-plant incorporated
Insecticides: 12 oz/1000' row Furidan CR-10 with seed
3/4 lb/A Parathion on 8/3/95
Grain yields and oil content are on an 8% moisture bases.

1995 Hettinger Safflower Variety Trial

Variety	Test weight	10% bloom	Oil content	Yield				
				1995	1993	1992	2yr	3yr
	lbs/bu	days	%	lbs/A				
Centennial	39.6	76	47.2	3527	1250	1215	2388	1997
S-541	40.6	78	47.6	3276	1271	1298	2274	1948
Stirling	39.8	72	38.3	2863	1831	1017	2347	1904
Finch	42.2	74	38.2	2938	1333	1386	2136	1886
Montola 2000	39.4	75	45.4	2870	1277	1361	2074	1836
S-208	40.2	78	43.0	3222	569	1250	1896	1680
Morlin	40.2	77	43.1	2552	1192	1264	1872	1669
Girard	39.9	76	42.8	3107	768	1058	1938	1644
Montola 2001	39.5	76	45.5	2735				
91B1126	41.6	78	44.1	3147				
90B6011	38.6	78	44.4	3012				
91B6668	39.2	75	44.1	2816				
91B1130	37.7	76	45.0	2762				
88B3006	39.9	78	46.0	2565				
91B2676	38.6	76	44.9	2491				
90B2763	38.9	72	44.2	2369				
Trial mean	39.7	76	44.0	2891	1253	1155		
C.V. %	1.3	1.6		11	20	26		
LSD 5%	0.7	2		451	357	ns		
LSD 1%	1.0	2		601	478	ns		

Planting date: May 16 Harvest date: September 26
Seeding rate: 400,000 live seeds/A
Yield goal: 2000 lbs/A
Herbicides applied: 2 pts/A Sonalan, Pre-plant incorp.
Yields and oil content are adjusted to 8% moisture.

1995 Hettinger Crambe Variety Trial

Variety	Test weight	Oil content	Days to mature	Yield				
				1995	1993	1992	2yr	3yr
	lbs/bu	%	days	lbs/A				
BelAnn	31.1	32.6	106	1660	2575	2787	2118	2341
BelEnzian	30.6	32.7	106	1553	2421	2587	1987	2187
Prophet	30.8	31.6	106	1587	2390	2514	1988	2164
Indy	32.4	32.3	106	1220	2585	2267	1902	2024
Meyer	33.0	33.1	106	973	1877	1840	1425	1563
NM 02	32.5	32.4	105	1633				
NM 95	33.6	33.2	105	1633				
C-22	30.6	32.4	105	1587				
NM 97	33.6	32.3	105	1580				
NM 28	33.8	33.6	106	1547				
NM 89	33.6	32.4	105	1473				
NM 01	32.2	34.1	105	1467				
C-29	32.2	32.5	106	1440				
NM 04	32.8	33.5	105	1380				
C-37	32.6	32.4	106	1340				
Trial mean	32.4	32.7	106	1472				
C.V. %	2.7	2.7	1.1	21				
LSD 5%	1.2	1.3	ns	ns				
LSD 1%	1.7	1.7	ns	ns				

Planting date: April 26 Harvest date: August 11
Seeding rate: 25 lbs/A
Yield goal: 2000 lbs/A
Herbicide applied: 2 pts/A Sonalan pre-plant incorp.
Yields are adjusted to 8% moisture.

Crambe Planting Date at Hettinger

Planting date	Yield	Test weight	Oil content	Plant stand/A
	lbs/A	lbs/bu	%	1000's
1995				
April 26	1353	32.8	33.7	212
May 16	2300	30.3	31.8	644
May 30	684	26.9	30.4	652
C.V. %	19	3.2	2.7	42
LSD 5%	385	1.4	1.3	301
1993				
April 8	3149	29.3	30.4	907
April 22	3492	30.4	31.4	876
May 4	2852	32.7	33.3	529
May 19	1643	27.9	30.4	626
C.V. %	13	5.5	2.4	46
LSD 5%	251	ns	2.0	76
1992				
April 1	883	24.6	27.2	48
April 15	2295	24.4	30.0	498
April 29	2465	25.0	28.9	664
May 13	2722	24.8	29.7	529
C.V. %	18	3.0	9.9	57
LSD 5%	263	ns	2.0	174

Variety: Meyer

1995 Crambe Seeding Rate Trial at Hettinger

Seeding rate	Test weight	Oil content	Plant stand/A	Yield				
				1995	1993	1992	2yr	3yr
lbs/A	lbs/bu	%	1000's	lbs/A				
10	29.9	31.7	307	1477	2858	1917	2168	2084
20	29.8	31.7	417	1467	2806	2189	2136	2154
30	29.9	32.3	595	1433	2806	2207	2120	2149
40	30.3	32.3	691	1407	2893	1997	2150	2099
Mean	30.0	32.0	502	1446	2840	2078		
C.V. %	9.1	5.8	52	52	27	40		
LSD 5%	ns	ns	371	ns	ns	ns		

Variety: Meyer

Flax Variety Description

Variety*	Origin	Year Released	Relative Maturity	Seed[1] Color	Plant Height	Wilt	Relative Yield Ability
Linora	Can.	1993	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	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] bl. = Blue; br. = Brown; yel. = Yellow.

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

1995 Hettinger Flax Variety Trial

Variety	Test weight	10% bloom	90% bloom	Yield				
				1995	1993	1992	2yr	3yr
	lbs/bu	days	days	bu/A				
Norlin	54.4	48	63	32.1	43.2	32.4	37.6	35.9
Flor	54.2	48	61	34.1	39.8	32.1	37.0	35.3
Somme	54.1	48	61	34.1	38.2	31.8	36.2	34.7
Flanders	54.1	50	62	30.8	34.2	37.2	32.5	34.1
Linton	53.5	48	60	26.0	38.7	37.7	32.4	34.1
Norman	53.8	50	63	27.0	41.3	33.1	34.2	33.8
McGregor	54.7	50	63	34.9	31.0	33.9	33.0	33.3
Neche	54.6	47	63	27.7	36.2	33.3	32.0	32.4
Omega	54.7	51	63	30.5	35.3	31.0	32.9	32.3
Linora	54.0	50	63	31.3	37.4	27.8	34.4	32.2
Prompt	54.3	46	60	31.3	36.4	27.0	33.8	31.6
Verne	54.5	47	62	29.2	35.4	27.5	32.3	30.7
Rahab 93	53.6	48	59	31.5	40.2		35.8	
McDuff	54.5	49	61	32.9	36.7		34.8	
Culbert	54.4	46	63	30.0		31.6	30.8	
Linott	54.6	47	63	27.8		27.5	27.6	
AC Emerson	54.3	48	60	32.8				
Verne 93	54.5	46	63	30.1				
Bison	54.4	48	61	26.8				
CI3358	54.3	48	62	34.4				
Trial mean	54.3	48	62	30.8	36.6	31.2		
C.V. %	0.5	1.2	1.0	14.1	9.5	13.2		
LSD 5%	0.5	1	1	ns	5.8	5.9		
LSD 1%	0.6	1	1	ns	7.8	7.8		

Planting date: May 16 Harvest date: August 14
Seeding rate: 32 lbs/A
Yield goal: 30 bu/A
Herbicide application: 1 pt/A Buctril
Yields are adjusted to 7% moisture.

Dickinson Grain Legume Research

Adaptation trials conducted since 1992 indicate that lentil and field pea are adapted to growing conditions in southwestern North Dakota. These crops are not only attractive because they can offer new marketing opportunities to growers, but also because lentil and field pea are legumes and can fix atmospheric nitrogen if properly inoculated and grown in low- and medium- N environments. Lentil and pea can also be used to reduce certain pest problems if incorporated into a well-planned cropping sequence primarily involving small grain crops. Lupin is another annual legume which may have potential in the southwest, although disease and insect problems suggest it may have less potential than lentil and field pea.

Agronomists at the Carrington Research Extension Center are coordinating statewide trials for field pea, while agronomists at the North Central Research Extension Center located at Minot are coordinating statewide trials for lentil. Dickinson has been included as a site in these cooperative trials since they were begun in 1994.

Field Pea

The field pea trial was expanded from six varieties in 1994 to nine varieties in 1995 at Dickinson. Average grain yield for the nine pea varieties evaluated in 1995 was over 2200 lbs per acre in a field where barley was sown in 1994. No problems were encountered in establishing pea. Carneval and Majoret were rated as the easiest varieties to harvest (refer to lodging score). Seed yield across pea varieties evaluated at Dickinson has averaged well over 1500 lbs per acre in the last three years the trial has been conducted.

DRYLAND FIELD PEA - RECROP — DICKINSON

Variety	Maturity	Cotyledon Color	Vine Length	Days to Flower	Flower Duration	Days to Maturity	Lodging Score[1]
					days		
Carneval	Medium	Yellow	Short-M	48	19	83	3
Century	Late	Yellow	Long	50	25	88	5
Columbian	Early	Green	Long	35	24	82	8
Express	Medium	Yellow	Short	47	24	83	6
Majoret	Early	Yellow	Short-M	46	16	83	3
MIKO	Medium	Yellow	Short	49	13	84	5
Profi	Early	Yellow	Short	46	18	83	5
Radley	Early	Green	Medium	45	17	83	8
Trapper	Late	Yellow	Long	50	25	87	5
Mean				46	20	84	5.2
CV(%)				2.8	7.1	1.6	11.4
LSD.05				1.8	2.1	1.9	0.9

[1]0 = no lodging; 9 = completely flat

Previous crop: Barley; Soil test results: 64 lbs N, 17 ppm P - no fertilizer applied (but pea seed inoculated with N-fixing bacteria); Applied 2.75 pt Sonalan per acre on April 24 (seed was used for experimental purposes only; none was sold or fed to livestock); Planted at 300,000 Pure Live Seed on May 15.

DRYLAND FIELD PEA - RECROP — DICKINSON

Variety	1995 Seeds	1995 Test weight	1995 Height	Grain Yield 1995	Grain Yield 1994	Grain Yield 1992	Averages 3-Year	Averages 2-Year
	lb	lbs/bu	inches	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac
Carneval	1879	63.2	23	2816.8	--	--	--	--
Century	1994	63.0	25	2719.4	1678.1	2152.2	2183.2	2198.8
Columbian	1904	61.7	9	1273.5	--	--	--	--
Express	1959	62.1	19	2586.4	1611.1	--	--	2098.8
Majoret	1763	63.5	21	2619.7	--	--	--	--
Miko	1596	61.9	20	2489.1	--	--	--	--
Profi	1660	62.2	17	2646.8	1699.0	--	--	2172.9
Radley	2225	63.2	12	1607.6	--	--	--	--
Trapper	3471	62.8	23	2214.8	1429.8	3208.0	2284.2	1822.3
Mean	2015	62.6	18.5	2237.7				
CV(%)	4.3	0.7	11.3	97				
LSD.05	124.6	0.6	3.0	282				

Previous crop: Barley; Soil test results: 64 lbs N, 17 ppm P - no fertilizer applied (but pea seed inoculated with N-fixing bacteria); Applied 2.75 pt Sonalan per acre on April 24 (seed was used for experimental purposes only; none was sold or fed to livestock); Planted at 300,000 Pure Live Seed on May 15; Harvested on August 14 (except for Century and Trapper pea, which were harvested on August 18).

Lentil

Lentil yield ranged from 1395 lbs per acre for Spanish Brown to 2108 lbs per acre for CDC Richlea in 1995. Crimson, a variety of lentil developed by USDA-ARS scientists located at Pullman, Washington, for semiarid regions, continued to yield well at Dickinson. Of the varieties evaluated over the past three years, Crimson has consistently been among the highest yielding. It tends to mature earlier and be shorter than the dominant varieties grown.

Lentil is short compared to wheat and other crops that most growers are familiar with. Distance from the top of plants to the soil surface averaged only 12 inches for the lentil varieties evaluated at Dickinson in 1995, and 11 inches in 1994. However, we observed on farms in Golden Valley county that rolling lentils after they were established increased lentil height in 1995. Care should be taken to roll plants when they are somewhat wilted and mechanical injury to the plants can be minimized. Even with rolling, lentil production seems best suited to level fields that are free of rocks. Reduced- and no-till seedbeds are probably better suited than conventionally-tilled seedbeds for lentil, since the plants will be supported by standing stubble and may stand more upright.

DRYLAND LENTIL - RECROP — DICKINSON

Variety	Type	Days to Flower	Length of Flower Period	Days to Harvest	Height
			days		inches
Brewer	Grain	42	33	101	10
CDC Richlea	Grain	49	27	100	12
Crimson	Grain	51	22	94	10
Eston	Grain	46	27	100	11
Indian Head	Forage	56	28	100	15
Laird	Grain	53	25	104	13
Spanish Brown	Grain	44	29	100	8
Mean		48.8	27.2	100	11.6
CV(%)		1.4	6.1	1.6	10
LSD.05		1.0	2.5	2.3	1.7

			Grain Yield				
						Averages	
Variety	Seeds	Test weight	1995	1994	1993	3-Year	2-Year
	lb	lbs/bu	lbs/ac				
Brewer	7,369	59.5	1448.0	652.0	2503.0	1534.3	1050.0
CDC Richlea	9,261	61.4	2108.2	846.0	--	--	1477.1
Crimson	12,426	63.1	2009.2	1106.0	3255.0	2123.4	1557.6
Eston	13,512	63.1	1826.6	701.0	2647.0	1724.9	1263.8
Indian Head	20,630	64.8	1657.5	--	--	--	--
Laird	6,782	58.9	1693.2	545.0	--	--	1119.1
Spanish Brown	11,786	63.2	1395.0	784.0	--	--	1089.5
Mean	11,681	62.0	1734.0				
CV(%)	5.1	1.1	11.1				
LSD.05	886	1.0	285.8				

Previous crop: Barley; Soil test results: 64 lbs N, 17 ppm P - no fertilizer applied (but pea seed inoculated with N-fixing bacteria); Applied 2.75 pt Sonalan per acre on April 24 (seed was used for experimental purposes only; none was sold or fed to livestock); Planted on May 15; Harvested: August 17 (Crimson); August 23 (CDC Richlea, Eston, Indian Head, and Spanish Brown); August 24 (Brewer); August 27 (Laird).

Lupin

Grain yield averaged only 645 lbs per acre among the lupin varieties evaluated at Dickinson in 1995. This low yield does not reflect problems in establishing lupin plants, but rather a problem resulting from disease pathogens that dessimated lupin stands. Similar problems were encountered in 1994. The high variability in yield (indicated by the high CV[%]) across plots for a single variety has made yield comparisons between varieties difficult in the past three years, as well as drawing conclusions about the adaptability of lupin in low- and medium- pH soils in the southwest.

DRYLAND LUPIN - RECROP — DICKINSON

Variety	Type	Days to Flower	Length of Flower Period	Days to Harvest	Height
			days		inches
Gungurru	Blue	45	36	94	13
Juno	Yellow	44	34	94	17
Lupro 101	White	45	36	104	18
Lupro 208	White	48	33	110	18
Merrit	Blue	44	35	89	11
Primorski	White	43	38	105	22
Progress	White	45	36	107	21
Mean		46.6	35.6	100.3	17.2
CV(%)		2.1	3.8	4.9	7.5
LSD.05		1.4	2.0	7.3	1.9

			Grain Yield				
						Averages	
Variety	Seeds	Test weight	1995	1994	1993	3-Year	2-Year
	lb	lbs/bu	lbs/ac				
Gungurru	--	55.7	841.1	1012.6	1756.8	1203.5	926.9
Juno	--	55.6	271.0	596.7	1438.1	768.6	433.9
Lupro 101	--	52.2	741.1	--	--	--	--
Lupro 208	--	51.6	379.4	--	--	--	--
Merrit	--	55.4	675.7	1150.2	1449.3	1091.7	913.0
Primorski	--	56.5	897.3	1415.5	1455.8	1256.2	1156.4
Progress	--	55.4	711.8	831.8	2007.0	1183.5	771.8
Mean		54.6	645.4				
CV(%)		10.3	38.6				
LSD.05		NS	NS				

Previous crop: Barley; Soil test results: 64 lbs N, 17 ppm P - no fertilizer applied (but pea seed inoculated with N-fixing bacteria); Applied 2.75 pt Sonalan per acre on April 24 (seed was used for experimental purposes only; none was sold or fed to livestock); Planted at 250,000 Pure Live Seed on May 15; Applied 6 oz Asana XL per acre on June 5; Harvested from 89 to 110 days after planting, depending on the variety sown.

1995 Hettinger Field Pea Variety Trial

Variety	Type **	Grain yield lbs/A	Test Weight lbs/bu	10% bloom days	90% bloom days	250 Kwt g	Harvest height cm
Express	Y	4400	63.0	52	75	60.2	38
Profi	Y	4027	62.6	56	72	61.4	48
Century	Y	3637	64.3	52	75	52.1	25
Radley	G	3591	64.7	57	72	46.0	20
Trapper	Y	3355	64.4	51	76	33.4	32
Columbia	G	3100	63.0	50	74	56.1	18
Carneval	Y	2764*	63.1	51	73	56.5	70
Trial mean		3553	63.6	53	74	52.2	36
C.V. %		9.70	0.6	0.5	0.4	7.7	11
LSD 5%		608	0.6	1	1	7.1	7
LSD 1%		848	0.9	1	1	9.8	9

Planting date: April 26 Harvest date: August 8
Seeding rate: 300,000 live seeds/A (approx. 150 lbs/A)
Yield goal: 3000 lbs/A
Herbicide applied: 2 pts/A Sonalan pre-plant incorp.
Yields are adjusted to 12% moisture.
* Greater than 10% shatter.
** Type: Y = Yellow cotyledon, G = Green cotyledon

1995 Hettinger Lentil Variety Trial

Variety	Type*	Test weight lbs/bu	10% bloom days	90% bloom days	100 KWT g	Grain yield lbs/A
Eston	P	62.2	46	54	3.0	2235
CDC Richlea	C	61.0	49	58	4.8	2087
Pardina	S	63.5	45	52	3.7	1750
Crimson	R	63.2	51	61	3.2	1490
Brewer	C	59.1	43	50	6.0	1103
Indianhead	B	65.1	58	63	2.6	752
Laird	C	57.7	56	63	6.5	583
Trial mean		61.7	50	57	4.3	1426
C.V. %		0.7	2.1	4.1	3.1	20
LSD 5%		0.6	2	3	0.2	420
LSD 1%		0.8	2	5	0.3	573

* Type: P = Persian, C = Chilean, S = Spanish Brown,
R = Red, B = Black
Planting date: May 16 Harvest date: August 30
Seeding rate: 550,000 live seeds/A
Yield goal: 2000 lbs/A
Herbicide applied: 2 pts/A Sonalan, Pre-plant incorp.
Yields are adjusted to 12% moisture.

1995 Hettinger Lupin Variety Trial

Variety	Type*	Test weight lbs/bu	10% bloom days	90% bloom days	Days to mature days	100 KWT g	Grain yield lbs/A
Gungurru	B	58.4	43	53	78	15.6	1931
Primorski	W	58.0	40	55	82	35.3	1808
Merrit	B	58.1	42	53	78	15.9	1713
Progress	W	55.6	45	62	83	32.1	1363
Lupro 1013	W	57.7	42	61	82	29.7	1325
Lupro 2085	W	57.7	46	62	86	29.9	1145
Juno**	Y	57.1	53	72	82	14.7	416
Trial mean		57.5	44	60	81	24.7	1386
C.V. %		0.7	0.5	0.4	2.1	5.7	17
LSD 5%		0.7	1	1	3	2.5	425
LSD 1%		0.9	1	1	4	3.5	592

* Type: B = Blue, W = White, Y = Yellow
Planting date: May 17 Harvest date: August 30
Seeding rate: 250,000 live seeds/A
Yield goal: 2000 lbs/A
Herbicide applied: 2 pts/A Sonalan, Pre-plant incorp.
Yields are adjusted to 12% moisture.
** Juno had a thin plant stand.

1995 Hettinger Fababean Variety Trial

Variety	Test weight lbs/bu	10% bloom days	90% bloom days	150 KWT g	Grain yield lbs/A
Pegasus	66.3	48	75	41.9	1952
CDC Fatima	64.4	40	75	58.0	1952
Outlook	66.6	48	77	40.0	1849
Aladin	67.0	48	77	45.1	1589
Trial mean	66.1	46	76	46.2	1835
C.V. %	0.4	1.2	1.5	6.6	7.9
LSD 5%	0.5	1	ns	5.9	280
LSD 1%	0.8	2	ns	8.7	ns

Planting date: May 16 Harvest date: August 30
Seeding rate: 150 lbs live seed/A
Yield goal: 2000 lbs/A
Herbicide applied: 2 pts/A Sonalan, Pre-plant incorp.
Yields are adjusted to 12% moisture.

1995 Hettinger Chickpea Variety Trial

Variety	Type*	Test weight lbs/bu	10% bloom days	90% bloom days	100 KWT g	Grain yield lbs/A
Myles	D	59.8	45	65	17.2	4069
UC-27	K	62.9	42	63	46.7	3766
Sanford	K	62.8	56	75	40.0	2762
Dwelley	K	61.0	57	75	48.1	1911
Trial mean		61.6	50	69	38.0	3208
C.V. %		0.6	0.5	0.5	5.5	6.9
LSD 5%		0.6	1	1	3.2	349
LSD 1%		0.9	1	1	5.1	497

* Type: D = Desi, K = Kabuli
Planting date: May 17 Harvest date: August 30
Seeding rate: D = 120 lbs pls/A, K = 180 lbs pls/A
Yield goal: 2000 lbs/A
Herbicide applied: 2 pts/A Sonalan, Pre-plant incorp.
Yields are adjusted to 12% moisture.

1995 Hettinger Soybean Variety Trial

Variety	Test weight lbs/bu	Grain yield lbs/A
McCall	50.2	16.4
Maple Amber	57.3	15.8
Maple Ridge	58.7	15.4
KG 20	57.9	14.6
Agassiz	56.6	14.6
Maple Isle	58.6	13.8
Trial mean	56.5	15.1
C.V. %	10.1	19.4
LSD 5%	ns	ns

Planting date: May 30 Harvest date: September 26
Seeding rate: 60 lbs live seeds/A
Yield goal: 20 bu/A
Herbicide application: 2 pts/A Sonalan, Pre-plant incorp.
Yields are adjusted to 11% moisture.

1995 Hettinger Pinto Bean Variety Trial

Variety	Test weight	Yield				
		1995	1994	1992	2yr	3yr
	lbs/bu	lbs/A				
Othello	57.6	1190	827	1492	1008	1170
Bill Z	56.0	954	793	1538	874	1095
Fiesta	57.3	830	993	1431	912	1085
Topaz	55.2	941	953	1285	947	1060
Chase	58.2	889	560		724	
Hatton	57.8	994				
Trial mean	57.0	966	832	1386		
C.V. %	1.4	9	23	17		
LSD 5%	1.2	130	281	ns		
LSD 1%	1.6	178	386	ns		

Planting date: May 30 Harvest date: September 12
Seeding rate: 70 lbs live seeds/A
Yield goal: 2000 lbs/A
Herbicide application: none
Yields are adjusted to 12% moisture.

1995 Hettinger Navy Bean Variety Trial

Variety	Test weight	Yield				
		1995	1994	1992	2yr	3yr
	lbs/bu	lbs/A				
Norstar	62.2	671	1053	910	862	878
Mayflower	60.6	322	380	1038	351	580
Agri-1	62.0	758	273		516	
Trial mean	62.1	584	575	846		
C.V. %	0.8	17	29	22		
LSD 5%	ns	203	258	ns		
LSD 1%	ns	319	364	ns		

Planting date: May 30 Harvest date: September 13
Seeding rate: 60 lbs live seeds/A
Yield goal: 2000 lbs/A
Herbicide application: none
Yields are adjusted to 12% moisture.

Dickinson Buckwheat Trial

North Dakota continues to be the leading buckwheat producing state, and the southwest continues to be an important buckwheat producing region. When grown under contract, buckwheat production can be quite profitable. In addition, buckwheat can be used to break pest cycles when incorporated into cropping sequences dominated by small grains. Buckwheat can also provide growers in the southwest with new market opportunities. Work underway at Carrington, Dickinson, and Fargo is also underway to quantify how buckwheat influences soil fertility levels.

Agronomists at Dickinson have coordinated buckwheat variety testing across the state since 1994. The buckwheat variety trial included six named varieties in 1995. Seed yield averaged over 1000 lbs per acre in a low-N, recropped environment. Common buckwheat and 85624 were the highest yielding entries, while germplasm from Japan was the lowest yielding entry in the trial.

1995 BUCKWHEAT - RECROP **DICKINSON**

					Grain Yield				
	Plant	Days to		Test				--- Averages ---	
Variety	Height	flower	Seeds	weight	1995	1994	1992	3-year	2-year
	inches	June	lbs	lbs/bu			lbs/ac		
85624	28	35	14,454	36.6	1158.8	1541.7	1260.0	1320.2	1350.3
Common	26	34	24,699	41.8	1176.2	1617.4	1650.0	1481.2	1396.8
G. American	30	37	18,628	37.3	944.3	1555.3	1178.0	1225.9	1249.8
Japanese 1	32	35	18,372	39.1	775.1	--	--	--	--
Mancan	29	35	18,604	40.4	1070.2	1618.6	1094.0	1260.9	1344.4
Manor	31	35	18,802	39.0	1064.2	1395.8	1137.0	1199.0	1230.0
Mean	29.4	35.1	18,927	39.0	1031.5				
CV(%)	3.0	1.3	8.5	1.9	11.7				
LSD.05	1.3	0.67	2430	1.1	182.3				

Previous crop: barley; Soil test results: 13 lbs N, 4 ppm P - no fertilizer applied; Sown at 670,000 Pure Live Seed per acre on April 15; Applied 1 pt Poast + 1 pt Scoil per acre on June 9; Harvested on August 29.

1995 Hettinger Tame Buckwheat Variety Trial

Variety	Test weight	10% bloom	90% bloom	Yield 1995	1993	1992	2yr	3yr
	lbs/bu	days	days	lbs/A				
Mancan	35.7	36	63	781	2187	2647	1484	1872
Manor	34.6	36	63	677	2080	2474	1378	1744
Giant Am.	33.0	38	64	732	1769	2200	1250	1567
Common	41.6	35	60	710				
85624	33.5	38	64	657				
Ibaragi	34.3	38	64	577				
Trial mean	35.4	37	63	689	1998	2585		
C.V. %	3.7	1.3	0.7	21	11	14		
LSD 5%	2.0	1	1	ns	ns	ns		
LSD 1%	2.7	1	1	ns	ns	ns		

Planting date: May 16
Seeding rate: 50 lbs/A
Yield goal: 2000 lbs/A
Harvest date: September 13

1995 Hettinger Spring Triticale Variety Trial

Variety	Test weight	1000 KWT	Days to head	Ht	lodg*	Foliar disease	Grain yield
	lbs/bu	g		cm		%	bu/A
Trical 310	54.0	34.8	62	108	1	6	82.5
Companion	55.1	41.2	62	122	5	14	75.8
Wapiti	55.4	44.2	62	123	4	11	73.7
Frank	51.8	33.8	68	107	1	8	62.4
Trical 2700	47.3	36.5	72	126	0	17	56.9
Norico	49.8	35.0	66	113	2	12	54.7
Trial mean	52.2	37.6	65	116	2	13	67.7
C.V. %	2.4	5.4	1	6	39		15.9
LSD 5%	1.8	3.0	1	ns	1		16.1
LSD 1%	2.5	4.2	2	ns	2		22.1

Planting date: April 26 Harvest date: August 10
Seeding rate: 1.1 million live seeds/A
Yield goal: 60 bu/A
Herbicide application: 1 pt/A Buctril + 1/3 oz/A Harmony Extra + 8 oz/A MCPE + 0.6 pts/A Assert
Yields are adjusted to 12% moisture.
* Lodging 0 - 10: 0 = no lodging, 10 = 100% lodged.

1995 Hettinger Grain Millet Variety Trial

Variety	Type	Test weight lbs/bu	Days to head	Plant height cm	Lodging 0-10*	Grain yield lbs/A
Dawn	Proso	55.2	57	86	3	3434
Sunrise	Proso	55.0	63	92	2	3362
Rise	Proso	54.9	58	89	2	3246
Huntsman	Proso	54.6	64	90	1	3138
Earlybird	Proso	54.9	59	91	1	2994
Sunup	Proso	54.2	64	89	1	2778
Minsum	Proso	55.1	57	82	3	2445
Manta	Foxtail	53.5	61	73	7	2427
Siberian	Foxtail	53.7	60	75	7	2275
Snowbird	Proso	56.3	57	97	4	2185
Turghai	Proso	58.1	56	94	1	2185
Cerise	Proso	57.4	57	95	3	1996
Butte	Foxtail	37.4	76	91	0	1205
Golden German	Foxtail	38.6	78	93	1	944
Japanese	Barnyard	27.4	78	90	0	539
Trial mean		51.1	63	89	2	2344
C.V. %		2.3	1.2	6.5	34	13
LSD 5%		2.0	1	8	1	498
LSD 1%		2.6	2	11	2	672

Planting date: May 30 Harvest date: September 13
Seeding rate: 25 lbs live seeds/A
Yield goal: 2000 lbs/A
Herbicide application: 1 pt/A Buctril
* 0 = no lodging, 10 = 100% lodged.
Yields are adjusted to 12% moisture.

1995 Hettinger Canary Seed Variety Trial

Variety	Test weight lbs/bu	Days to head days	Lodging	Grain yield lbs/A
Keet	50.2	62	0	808
Elias	48.5	62	0	611
Trial mean	49.4	62	0	709
C.V. %	9.4	0.6		12
LSD 5%	ns	ns		ns

Planting date: April 26 Harvest date: August 10
Seeding rate: 30 lbs live seeds/A
Yield goal: 2000 lbs/A
Herbicide application: 1 pt/A Buctril + 1/3 oz/A Harmony Extra + 8 oz/A MCPE + 0.6 pts/A Assert
Yields are adjusted to 12% moisture.

1995 Hettinger Hybrid Corn Trial - Grain

Brand	Hybrid	Relative maturity	Test weight	Yield		
				1995	1994	2yr
		days	lbs/bu	------bu/A------		
Pioneer	3905	87	55.2	84.1	66.6	75.4
Pioneer	3963	79	57.9	86.0	59.0	72.5
Dekalb	343	84	55.8	81.0	61.7	71.4
NK	SB85*	85	55.8	68.9	64.4	66.6
Public	MN 13**		52.1	71.1	52.9	62.0
Pioneer	3984	75	59.1	59.6	55.4	57.5
Cargill	1077	75	61.0	49.4	46.1	47.8
Cenex/LOL	176	80	57.8	78.9		
Cargill	809	80	54.5	78.3		
Pioneer	3921	86	58.2	75.5		
Cenex/LOL	289	90	51.8	74.0		
Pioneer	3951	80	59.4	73.9		
Dekalb	385	88	51.8	72.1		
Cargill	1037	75	58.0	54.9		
Cenex/LOL	DC555	110	38.6	22.5		
Cargill	HS60*		38.2	19.9		
Trial mean			54.8	67.6	56.1	
C.V. %			2.6	11.3	15.7	
LSD 5%			2.4	12.7	12.6	
LSD 1%			3.2	17.2	16.8	

Planting date: May 23 Harvest date: October 25
Seeding rate: 21,000 seeds/A, thinned to 18,000 plants/A
Row spacing: 28"
Herbicides applied: 4 pt/A Eradicane, Pre-plant incorp.
Insecticide applied: 12 oz/1000'row Furidan CR-10 with seed
Previous crop: Hard Red Spring Wheat
Grain yields are adjusted to 13.5% moisture.
* Silage type or silage blend.
** Public open pollinated variety.

1995 Hettinger Hybrid Corn Trial - Silage

Brand	Hybrid	Relative maturity	Harvest moisture	Yield* 1995	1994	2yr
		days	%	-----tons/A-----		
Pioneer	3963	79	71	7.01	7.25	7.13
NK	SB85	85	71	7.41	5.89	6.65
Public	MN 13		73	6.09	7.17	6.63
Dekalb	343	84	70	6.67	6.20	6.44
Pioneer	3905	87	72	6.25	6.20	6.22
Pioneer	3984	75	71	5.40	5.90	5.65
Cargill	1077	75	69	3.82	5.38	4.60
Cenex/LOL	289	90	67	8.41		
Cenex/LOL	DC555	110	73	8.40		
Dekalb	385	88	72	7.79		
Cargill	HS60		77	7.41		
Cenex/LOL	176	80	73	7.12		
Pioneer	3921	86	67	7.00		
Cargill	809	80	72	6.19		
Cargill	1037	75	69	5.47		
Pioneer	3951	80	72	5.42		
Trial mean				6.62	6.28	
C.V. %				19.67	16.44	
LSD 5%				2.17	1.49	
LSD 1%				2.93	ns	

Planting date: May 23 Harvest date: September 5
Seeding rate: 21,000 seeds/A, thinned to 18,000 plants/A
Row spacing: 28"
Herbicides applied: 4 pt/A Eradicane, Pre-plant incorp.
Insecticide applied: 12 oz/1000'row Furidan CR-10 with seed
Previous crop: Hard Red Spring Wheat
* Silage yields are adjusted to 70% moisture.

1995 New Leipzig Hybrid Corn Trial - Grain

Brand	Hybrid	Relative maturity	Test weight	Yield 1995	Yield 1994	Yield 2yr
		days	lbs/bu	------bu/A------		
Pioneer	3963	79	58.4	124.6	57.8	91.2
Pioneer	3905	87	57.5	86.4	56.6	71.5
Public	MN 13*		57.2	86.8	52.1	69.4
Dekalb	343	84	58.3	76.6	55.3	66.0
Pioneer	3984	75	59.6	66.6	54.1	60.4
Cargill	1077	75	62.4	55.5	42.3	48.9
Pioneer	3951	80	61.2	92.5		
Pioneer	3921	86	56.8	83.6		
Cenex/LOL	176	80	58.8	64.2		
Dekalb	412	91	55.5	63.4		
Trial mean			58.6	80.0	51.4	
C.V. %			1.7	25.3	17.9	
LSD 5%			1.6	32.3	13.2	
LSD 1%			2.3	46.5	ns	

1995 New Leipzig Hybrid Corn Trial - Silage

Brand	Hybrid	Relative maturity	Harvest moisture	Yield 1995	Yield 1994	Yield 2yr
		days	%	-----tons/A-----		
Pioneer	3905	87	62	9.23	4.03	6.63
Pioneer	3984	75	64	6.55	6.09	6.32
Dekalb	343	84	67	6.54	5.24	5.89
Pioneer	3963	79	74	6.09	5.05	5.57
Cargill	1077	75	51	5.81	3.88	4.84
Public	MN 13		75	5.41	3.84	4.62
Cargill	HS60		70	10.84		
Pioneer	3921	86	62	8.92		
Cenex/LOL	176	80	70	7.46		
Dekalb	412	91	72	6.94		
Pioneer	3951	80	64	6.93		
Trial mean				7.34	4.93	
C.V. %				20.89	16.02	
LSD 5%				2.21	1.12	
LSD 1%				2.98	1.51	

Planting date: May 20 Harvest date: September 5
Seeding rate: 21,000 seeds/A, thinned to 18,000 plants/A
Row spacing: 28"
Herbicides applied: 1 pt/A Buctril + 2/3 oz/A Accent
Insecticide applied: 12 oz/1000'row Furidan CR-10 with seed
Previous crop: Fallow
Grain yields are adjusted to 13.5% moisture.
Silage yields are adjusted to 70% moisture.
* Public open pollinated variety.

Dickinson Annual Forages Trials

Following a directive of the Director of the Dickinson Research Extension Center, the agronomy program at Dickinson has begun a significant expansion in evaluating annual and selected perennial forages. This effort includes continued evaluation of selected cereal crops for hay, haylage, and silage production, as well as new trials evaluating cereal cultivars and forage management strategies that have not been explored at Dickinson. These trials will be expanded, and additional ones begun, in 1996.

Corn continues to be one of the most important annual forages grown in southwestern North Dakota. The corn adaptation trial at Dickinson in 1995 included 10 commercial hybrids and 1 open-pollinated variety. Silage yield averaged 5.5 tons of dry matter per acre across the 11 entries; highest yields were produced by Dekalb DK 385, Cenex 555, Cenex 289, Pioneer 3921, and Pioneer 3905. Birds destroyed grain on cobs before it could be harvested and yield determined

1995 HYBRID CORN TRIAL - RECROP — DICKINSON

					Silage Yield DM basis				
Brand	Hybrid	RM	Harvest Moisture	70% Moisture	1995	1994	1993	3-Year	2-Year
		days	%			tons/ac			bu/ac
Cenex	176	80	57	17.7	5.3	--	--	--	--
Cenex	289	90	63	19.7	5.9	--	--	--	--
Cenex	555	115	71	20.0	6.0	--	--	--	--
Dekalb	DK 343	84	56	18.2	5.5	3.6	3.1	4.1	4.6
Dekalb	DK 385	88	59	21.5	6.5	--	--	--	--
Public	MN-13	Open[1]	55	16.3	4.9	--	--	--	--
Pioneer	3905	87	54	19.2	5.8	4.1	--	--	5.0
Pioneer	3921	86	57	19.7	5.9	3.1	--	--	4.5
Pioneer	3951	80	56	15.3	4.6	--	--	--	--
Pioneer	3963	79	55	19.0	5.7	3.7	3.3	4.2	4.7
Pioneer	3984	75	54	13.7	4.1	--	--	--	--
Mean			58	18.2	5.5				
CV(%)			6.6	10.9	10.9				
LSD .05			5.5	2.9	0.9				

[1]Open = open pollinated

Previous crop: Black lentil (plow down); Soil test results: 107 lbs N, 18 ppm P; applied 225 lbs urea per acre; planted at 22,000 seed per acre on May 22; Applied 0.67 oz Accent + 0.60 lbs Atrazine + 1.5 pt Scoil per acre on June 16; Harvested on September 20.

CEREAL/PEA CUTTING DATE TRIAL - RECROP — DICKINSON

Crop	Variety	Seeding Rate		Height		Harvest Moisture	
		Cereal	Pea	Cereal	Pea	1 cut	2 cut
		seeds/acre		inches		%	
oat/pea	'Tripper'			31	36	75	73
oat	Dumont	750,000	0	37	--	73	72
barley	Horsford	750,000	0	30	--	77	68
triticale/pea	'Sprint'	[1]	[1]	44	32	70	70
barley/pea	Horsford/Trapper	1,125,000	487,000	28	20	76	71
barley/pea	Horsford/Trapper	375,000	162,500	28	23	76	71
barley/pea	Horsford/Trapper	750,000	325,000	29	24	76	73
oat/pea	Dumont/Trapper	1,125,000	487,000	35	33	74	73
oat/pea	Dumont/Trapper	375,000	162,500	36	34	75	75
oat/pea	Dumont/Trapper	750,000	325,000	36	30	73	76
Mean				33.7	29.3	74.5	72.3
CV(%)				4.6	13.4	2.0	2.7

Variety	Seeding Rate		Harvested Yield		Dry Weight		
	Cereal	Pea	1 cut	2 cut	1 cut	2 cut	1-2
	seeds/acre						
Tripper			11.0	12.5	2.8 b	3.3 b	0.5
Dumont	750,000	0	11.3	12.5	3.0 ab	3.5 a	0.5
Horsford	750,000	0	9.8	9.2	2.2 c	2.9 c	0.7
'Sprint'	[1]	[1]	10.4	10.5	3.1 ab	3.1 b	0.0
Horsford/Trapper	1,125,000	487,00	9.7	11.0	2.3 c	3.2 b	0.9
Horsford/Trapper	375,000	162,50	8.6	10.8	2.1 c	3.1 b	1.0
Horsford/Trapper	750,000	325,00	9.5	11.0	2.2 c	3.0 b	0.8
Dumont/Trapper	1,125,000	487,00	12.2	12.7	3.2 a	3.4 ab	0.2
Dumont/Trapper	375,000	162,50	11.5	12.5	2.8 b	3.2 b	0.4
Dumont/Trapper	750,000	325,00	11.6	12.9	3.1 ab	3.1 b	0.0
Mean			10.6	11.6	2.7	3.2	
CV(%)			8.4	6.5	10.5	9.4	

Previous crop: Black lentil (plow down); Soil test results: 66 lbs N, 17 ppm P; no fertilizer applied; planted at 800,000 Pure Live Seed per acre, or 80 lbs oat and 40 lbs pea for 'Sprint' [1] on May 17; No herbicide applied; Harvested first cutting on July 14 (Horsford) and July 18 (other entries); second cutting made on July 21.

COOL SEASON ANNUAL FORAGES - RECROP — DICKINSON

Crop	Variety	Cereal Height	Harvest Moisture	12% Moisture	Hay Yield DM basis 1995	1994	1993	3-Year
		inches	%		tons/ac			
barley	Azure	86	66	4.9	4.4	--	--	--
triticale	Frank	98	67	3.7	3.2	--	--	--
triticale/pea	Frank/Trapper	91	73	3.0	2.7	--	--	--
triticale/pea	'Sprint'	92	74	3.3	2.9	--	--	--
oat/pea	'Tripper'	113	71	3.7	3.2	--	--	--
oat	Whitestone	84	73	3.8	3.3	--	--	--
oat/pea	Whitestone/Trapper	79	77	3.0	2.6	--	--	--
Mean		91.8	72	3.6	3.2			
CV(%)		4.6	2.9	11.0	11.0			
LSD.05		6.3	3.1	0.6	0.5			

Previous crop: Black lentil (plow down); Soil test results: 66 lbs N, 17 ppm P; no fertilizer applied; planted at 100 lbs (Azure), 75 lbs (Frank), 95 lbs (Frank [35] + Trapper [60]), 65 lbs (Whitestone), 95 lbs (Whitestone [35] + Trapper [60]), and 120 lbs (Tripper and Sprint) seed per acre on May 17; No herbicide applied; Harvested on July 19.

FORAGE BARLEY AND OAT - RECROP — DICKINSON

Crop	Variety	Height	Harvest Moisture	12% Moisture	Hay Yield DM basis 1995	1994	1993	3-Year	2-Year
		inches	%		tons/ac				
barley	B 7518	68	69	4.3	3.8	--	--	--	--
oat	Bay	81	72	3.8	3.3	--	--	--	--
barley	Chopper	86	64	3.8	3.4	--	--	--	--
oat	Dumont	92	73	3.6	3.2	2.4	2.9	2.8	2.8
oat/pea	Dumont/Trapper	85	75	3.8	3.4	2.5	3.3	3.1	3.0
oat/pea	Dumont/Trapper	97	74	3.3	2.9	2.2	2.9	2.7	2.6
barley	Haybet	74	64	4.5	4.0	--	--	--	--
barley	Horsford	83	67	3.6	3.2	4.6	2.7	3.5	3.9
barley	I 92-615-2	76	62	3.1	2.7	--	--	--	--
oat	Mammoth	102	73	3.9	3.4	--	--	--	--
barley	Stark	87	65	4.3	3.7	--	--	--	--
barley	Weal	75	65	3.7	3.3	--	--	--	--
Mean		84	69	3.8	3.4				
CV(%)		5.0	2.6	9.7	9.7				
LSD.05		6.0	2.6	0.5	0.5				

Previous crop: Black lentil (plow down); Soil test results: 66 lbs N, 17 ppm P; no fertilizer applied; planted at 800,000 Pure Live Seed per acre on May 17; No herbicide applied; Harvested on July 19.

WARM SEASON ANNUAL FORAGES - RECROP — DICKINSON

Crop	Variety	Days to Heading	Harvest Moisture	12% Moisture	Hay Yield DM basis 1995	1994	1992	3-Year	2-Year
		days	%		tons/ac				
Millet	German	86	60	4.9	4.3	--	4.7	--	4.5
Sudangrass	Piper	79	57	3.3	2.9	--	--	--	--
Millet	Siberian	79	54	3.2	2.9	--	4.3	--	3.6
Sorghum x Sudan	Sudax	86	64	4.7	4.2	--	--	--	--
Mean			0.6	4.0	3.6				
CV(%)			3.2	10.9	10.9				
LSD.05			0.03	0.71	0.62				

Previous crop: Black lentil (plow down); Soil test results: 43 lbs N, 17 ppm P; no fertilizer applied; planted at 20 lbs (millets) and 25 lbs (Sudangrass and Sorghum x Sudan cross) on May 22; Applied 0.75 pt Buctril per acre on June 17; Harvested Sudangrass and Siberian millet on August 9 and other entries on August 16.

HETTINGER ALFALFA VARIETY DEMONSTRATION

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

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

1995 Hettinger Oat Hay Variety Trial

Variety	Days to head	Plant height	Moisture at harvest	Yield* 1995	1993	1992	2yr	3yr
		cm	%	-------Tons per acre--------				
Robert	69	89	66	3.92	8.52	5.75	6.22	6.06
Otana	67	89	62	4.78	7.39	5.24	6.08	5.80
Monida	71	91	68	4.33	6.76	6.09	5.54	5.73
Mammoth	74	117	67	4.65	5.45	6.00	5.05	5.37
Dumont	70	97	72	3.53	6.35	6.05	4.94	5.31
Tibor	66	112	61	4.02	5.95	5.49	5.00	5.15
Porter	66	91	62	4.74	7.64		6.19	
Newdak	64	81	67	4.31	6.77		5.54	
Magnum II	75	109	69	3.93	5.63		4.78	
Whitestone	68	78	62	4.89				
Paul	69	96	67	3.74				
Trial mean	69	96	66	4.26	6.63	5.61		
C.V. %	2			11.49	15.18	13.20		
LSD 5%	2			0.71	1.44	ns		
LSD 1%	3			0.95	1.94	ns		

Planting date: April 26
Harvest date: July 26 (soft dough growth stage)
Seeding rate: 750,000 live seeds/A
Yield goal: 5 Tons/A
Herbicide used: 1 pt/A Buctril
* Yields are adjusted to 12% moisture content.

1995 Hettinger Millet Hay Variety Trial

Variety	Type	Plant height	Yield*
		cm	tons/A
Manta	Foxtail	81	5.47
Siberian	Foxtail	80	4.81
Earlybird	Proso	90	4.72
Golden German	Foxtail	86	4.66
Rise	Proso	91	4.55
Cerise	Proso	94	4.34
Huntsman	Proso	88	4.22
Sunup	Proso	93	4.21
Snowbird	Proso	88	4.19
Sunrise	Proso	86	4.16
Minsum	Proso	85	4.09
Dawn	Proso	82	3.90
Turghai	Proso	92	3.89
Butte	Foxtail	88	3.88
Hybrid Pearl	Pearl	102	3.60
Japanese	Barnyard	78	3.42
Trial mean		88	4.26
C.V. %		6.3	7.31
LSD 5%		8	0.44
LSD 1%		10	0.59

Planting date: May 30
Seeding rate: 25 lbs live seeds/A
Yield goal: 4 tons/A
Herbicide application: 1 pt/A Buctril
Harvest date: August 15
*Yields are on a dry weight bases.

1995 Hettinger Alternative Forage/Hay Trial

Crop	Variety/Type	Yield				
		1995	1993	1992	2yr	3yr
		tons/A				
Triticale/Pea	Frank/Trapper	5.34				
Triticale/Pea	Sprint	4.90				
Oat/Pea	Whitestone/Trapper	5.66				
Oat/Pea	Tripper	5.57				
Forage Pea	Magnus	4.38		4.50	4.44	
HRSW	Amidon	4.32	2.22		3.27	
Barley	Azure	5.86				
Forage Barley	Horsford	3.92	3.96	5.21	2.94	4.36
Oat	Whitestone	4.29				
Triticale	Frank	4.80	4.16	5.71	4.48	4.89
Millet	Golden German	5.33		2.97	4.15	
Millet	Siberian	5.42		2.80	4.11	
Millet	Hybrid Pearl	4.48	3.59	1.45	4.04	3.17
Sorghum/Sudan	Sudax	5.69	4.84	3.80	5.26	4.78
Forage Sorghum	Sorgo 10	5.93	4.89	3.22	5.41	4.68
Corn	Pioneer 3963	4.66	3.57	5.54	4.12	4.59
Sudangrass	Piper	3.87	3.65	3.80	3.76	3.77
Trial Mean		4.97	3.84	3.98		
C.V. %		11.00	15.86	28.99		
LSD 5%		0.78	0.93	1.38		
LSD 1%		1.03	1.25	1.84		

Yields are adjusted to 12% moisture.

Soil 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, Soil Conservation Service (SCS); 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 SCS 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.

Summary:
The plots were off to a good start following the April 6, 1992, seeding. Moisture conditions in 1992 and 1993 were excellent, resulting in dense stands. Forage production was also abundant in 1993. Droughty conditions in the summer of 1994 reduced forage yields considerably. Weeds were abundant in 1992 and 1993 but were chemically controlled. Weeds were not severe in 1994. Overall, production was slightly greater in 1995 compared to 1994. No forage was clipped in several plots of replication 3 due to severe contamination from other grass species in 1995. Residue is managed using a spring burn.

The evaluation period is scheduled for 6 years. Forage production will be determined annually for the last 5 years of the project. Yields are expected to vary considerably on an annual basis. It is suggested that long-term production averages are generally more meaningful than annual comparisons. Stand densities, disease resistance, and seed production are other critical factors in determining overall plant performance.

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 1992-1994. Seeding Date: April 6, 1992.

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED (2) COMPETITION 92	93	STAND (3) DENSITY 92	93	STAND (4) RATING 94	95	PLANT (5) HEIGHT 93	95	(6) DISEASE 93	SEED (7) PRODUCTION 93	94	(8) VIGOR 95	FORAGE YIELD (lb/ac) (9) 1993	1994	1995
FAIRWAY WHEATGRASS																
1. Parkway	2.0	1.7	1.7	53	75	3.3	3.3	28	21	2.0	2.3	5.7	3.7	2260A	838B	985B
2. Kirk	3.3	2.7	2.0	52	68	3.3	2.7	31	29	2.0	1.3	4.3	3.0	2961A	1235B	1395B
3. SD-77	3.7	3.0	1.7	39	64	2.0	2.3	30	27	2.0	1.0	4.0	2.0	3187A	1632AB	1843AB
4. Ephraim	3.3	3.7	1.7	40	59	3.0	4.0	26	25	2.0	2.7	5.0	3.7	1957A	1346AB	1435B
5. Ruff	3.7	3.3	1.7	48	69	3.0	2.7	29	25	2.0	1.7	4.7	2.0	2864A	1198B	1322B
6. NEAC1	3.7	2.3	2.7	46	56	3.3	2.3	24	21	2.0	2.0	4.3	2.0	1962A	1079B	1478B
7. NEAC2	3.7	2.3	2.3	48	66	2.7	2.3	29	25	2.0	1.7	4.7	2.0	3454A	1377AB	1950AB
CRESTED WHEATGRASS																
8. Summit	3.3	3.0	1.7	45	62	3.0	3.7	30	31	2.0	1.7	3.3	2.3	2777A	2207A	2478A
9. Nordan	4.0	4.3	2.7	41	66	3.0	3.0	31	33	2.0	2.0	2.7	2.7	3382A	1609AB	1466B
10. NEAD1	3.0	3.7	1.7	45	72	2.7	3.3	31	29	2.0	1.7	4.3	3.7	2458A	1017B	1106B
FAIRWAY x CRESTED CROSS																
11. Hycrest	3.3	2.7	1.7	42	68	3.0	2.7	32	28	2.0	1.3	4.3	2.3	2688A	1330AB	1363B
12. Hycrest #2	3.0	2.7	1.3	40	61	3.0	4.3	28	27	1.7	1.7	3.3	3.3	2475A	1586AB	1602AB
SIBERIAN WHEATGRASS																
13. P-27	5.3	4.7	3.0	38	51	3.3	4.0	33	32	2.0	1.3	4.7	3.7	2860A	1340AB	1893AB

(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. Rating: 1=excellent, 5=fair, 9=poor.

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

(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. Rating: 1=excellent, 5=fair, 9=poor.

(8) Vigor (overall plant health), 8/30/95. 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. Comparison of means is by Student-Newman-Keul's Multiple Range Test (1993) and Duncan's New Multiple Range Test (1994, 1995), means with same letter for each species grouping (separated by line) are not significantly different (P=.05).

* 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.

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED (2) COMPETITION 92	93	STAND (3) DENSITY 92	93	STAND (4) RATING 94	95	PLANT (5) HEIGHT 93	95	(6) DISEASE 93	SEED (7) PRODUCTION 93	94	(8) VIGOR 95	FORAGE YIELD (lb/ac) (9) 1993	1994	1995
INTERMEDIATE WHEATGRASS																
14. Chief	3.0	4.7	1.7	52	60	1.3	1.7	42	38	2.0	1.3	4.7	1.3	4040A	2050A	3008A
15. Clarke	2.7	3.3	2.0	60	75	1.7	2.3	42	33	2.0	1.7	4.7	2.0	4806A	1811A	2748A
16. Reliant	2.0	1.3	1.0	58	77	1.0	2.0	44	35	2.0	1.3	5.0	2.7	4330A	2135A	2805A
17. Oahe	1.7	2.3	1.3	56	61	2.3	1.7	42	35	2.0	1.7	6.3	3.0	3919A	1593A	2829A
18. SD-54	2.0	1.3	1.0	47	66	1.7	2.0	44	38	2.0	1.7	4.3	2.3	5526A	2184A	2665A
19. *Tegmar	1.0	1.0	1.0	88	48	---	---	31	--	2.0	2.0	---	---	----	----	----
20. *Greenar	---	---	1.0	--	58	---	---	37	--	2.0	2.0	---	---	----	----	----
21. Slate	1.3	1.7	1.3	64	70	2.0	1.3	43	38	2.0	2.0	3.7	2.7	3510A	1829A	2469A
22. NETI1	2.7	3.7	2.0	64	64	1.7	1.3	45	40	2.0	1.3	4.7	1.7	3897A	2390A	3163A
23. NETI2	1.7	2.0	1.3	60	70	1.7	1.7	43	39	2.0	1.7	4.0	1.3	4081A	2197A	3228A
24. NETI3	2.0	2.0	1.7	58	60	1.0	1.3	44	41	2.0	1.3	3.3	1.3	4619A	2615A	3213A
25. NE50C3	3.0	2.7	2.0	48	70	1.3	1.7	42	42	2.0	2.0	3.3	1.7	4213A	3014A	3392A
26. NECASPIAN3	2.0	2.7	1.3	62	60	1.0	1.7	47	39	2.0	1.0	3.0	2.0	4592A	2506A	3585A
27. *Amur	---	1.0	1.0	41	40	---	---	43	--	2.0	2.0	---	---	----	----	----
PUBESCENT WHEATGRASS																
28. Greenleaf	3.0	3.3	2.0	56	67	1.7	1.3	44	37	2.0	2.0	6.7	1.7	3978A	2220A	2665A
29. MDN-759	2.7	2.0	1.0	55	64	2.0	2.7	42	35	2.0	2.0	5.3	3.0	3583A	2001A	2630A
30. Manska	2.0	2.3	1.3	44	63	1.3	1.7	41	33	2.0	1.7	3.7	2.0	4300A	2693A	3704A
31. *Topar	---	1.0	1.0	58	52	---	---	31	--	2.0	2.0	---	---	----	----	----
32. *Luna	---	1.0	1.0	60	50	---	---	39	--	2.0	2.0	---	---	----	----	----
TALL WHEATGRASS																
33. Orbit	3.3	5.3	1.7	49	61	2.0	2.3	48	52	2.0	2.0	4.0	2.0	4397A	2151A	2371A
34. Alkar	3.3	4.7	1.7	40	66	2.7	4.0	46	47	2.0	2.0	3.7	3.3	4664A	2162A	2530A
35. Platte	3.0	4.3	1.3	54	63	2.0	2.3	51	45	2.0	2.0	3.0	2.3	3536A	1894A	2652A
36. *Jose	---	1.0	1.0	82	70	---	---	53	--	2.0	2.0	---	---	----	----	----
37. *Largo	---	2.0	1.0	46	51	---	---	53	--	2.0	2.0	---	---	----	----	----
QUACKGRASS																
38. RS Hoffman	3.3	3.3	1.0	48	63	1.3	1.3	38	26	2.0	3.3	7.7	2.7	3454A	1327A	984

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED (2) COMPETITION 92	93	STAND (3) DENSITY 92	93	STAND (4) RATING 94	95	PLANT (5) HEIGHT 93	95	(6) DISEASE 93	SEED (7) PRODUCTION 93	94	(8) VIGOR 95	FORAGE YIELD (lb/ac) (9) 1993	1994	1995
BLUEBUNCH x QUACK CROSS																
77. RS-1 Hybrid N	3.3	4.0	1.7	40	67	1.7	2.3	44	27	2.0	2.3	7.0	2.7	3768A	1588A	1762A
78. RS-1 Hybrid R	3.0	3.0	1.7	53	64	2.0	2.0	38	26	2.0	3.0	7.0	3.7	3434A	1864A	1782A
SMOOTH BROMEGRASS																
39. Magna	3.3	2.7	1.0	40	77	1.3	1.3	35	37	2.0	2.3	5.3	2.3	3999A	1883AB	1751ABC
40. S-7133	3.0	3.7	2.0	37	66	3.3	2.7	34	33	2.0	3.7	6.7	3.0	2826A	1234ABC	709C
41. Manchar	3.3	3.0	2.0	42	76	1.3	3.7	32	33	2.0	2.0	3.7	3.7	2888A	1389ABC	1040BC
42. Rebound	3.7	2.7	1.3	44	80	1.0	2.7	31	35	2.0	3.3	8.0	3.3	2684A	1388ABC	1248ABC
43. Cottonwood	4.7	3.0	1.0	38	80	1.0	1.7	33	37	2.0	3.3	5.7	2.3	3190A	2016A	1888AB
44. Lincoln	3.0	2.0	1.7	44	76	1.7	2.0	30	31	2.0	3.3	6.7	2.7	3033A	1782AB	2206A
SMOOTH x MEADOW CROSS																
45. S-9183	3.7	2.7	1.7	38	64	3.7	3.3	34	32	2.0	2.7	6.3	2.7	2843A	849C	827BC
MEADOW BROMEGRASS																
46. Fleet	1.7	2.0	1.0	53	76	1.0	1.0	34	18	2.0	4.0	8.0	1.7	3668A	785C	957BC
47. Paddock	2.7	2.0	1.0	54	73	2.0	2.0	32	15	2.0	5.7	8.3	2.7	3139A	841C	1215ABC
48. Regar	2.7	4.3	1.0	33	74	2.3	2.3	29	19	2.0	6.7	8.7	2.0	2855A	1045BC	1203ABC
ORCHARDGRASS																
49. *Paiute	---	3.0	2.0	76	41	---	---	26	--	2.0	8.0	---	---	----	----	----
RUSSIAN WILDRYE																
50. Mayak	4.7	4.0	3.0	40	57	3.3	3.0	40	19	2.0	4.3	9.0	4.0	2105A	282A	520A
51. Swift	4.7	5.0	2.3	26	53	2.7	3.0	40	23	2.0	5.0	9.0	2.7	2439A	738A	599A
52. Cabree	4.3	3.3	1.7	36	63	3.7	4.7	37	13	2.0	3.0	8.7	4.3	2255A	449A	455A
53. Vinall	3.0	4.3	3.0	27	62	3.7	3.0	41	13	2.0	3.3	8.7	3.7	2101A	429A	566A
54. Mankota	5.7	5.3	3.0	41	56	4.0	3.7	42	25	2.0	3.0	8.0	3.7	2327A	504A	714A
55. MDN-1831	5.7	5.7	1.7	31	49	4.0	3.7	40	13	1.7	2.7	8.3	4.3	2356A	548A	516A
56. Bozoisky Select	5.3	4.0	1.7	40	56	0	3.3	46	25	2.0	2.0	8.3	3.0	2513A	620A	809A
57. PI-272136	4.3	2.3	1.7	29	56	3.3	4.3	43	13	2.0	4.0	8.3	3.7	2112A	339A	331A
58. Syn A NL	5.3	5.7	2.0	29	52	5.0	3.7	42	21	2.0	3.3	8.3	2.7	2571A	680A	922A

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SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED (2) COMPETITION 92	WEED (2) COMPETITION 93	STAND (3) DENSITY 92	STAND (3) DENSITY 93	STAND (4) RATING 94	STAND (4) RATING 95	PLANT (5) HEIGHT 93	PLANT (5) HEIGHT 95	(6) DISEASE 93	SEED (7) PRODUCTION 93	SEED (7) PRODUCTION 94	(8) VIGOR 95	FORAGE YIELD (lb/ac) (9) 1993	FORAGE YIELD (lb/ac) (9) 1994	FORAGE YIELD (lb/ac) (9) 1995
MAMMOTH WILDRYE																
59. ND-691	3.0	3.7	2.0	18	45	3.7	4.3	35	22	2.0	7.7	7.3	3.0	3301A	1433AB	2145A**
60. PI-478832	3.3	4.0	2.0	30	50	2.0	4.0	38	27	2.0	6.7	7.0	2.7	4234A	2088A	3055A**
61. Volga	4.3	4.0	3.0	20	42	4.3	5.3	38	26	2.0	7.3	7.3	4.0	2779A	1609AB	2256A**
EUROPEAN DUNEGRASS																
62. ND-2100	7.0	7.3	7.7	6	19	7.3	8.3	20	14	1.3	9.0	8.7	6.7	1048B	540B	501B**
ALTAI WILDRYE																
63. Prairieland	2.7	3.3	1.7	40	66	1.3	3.0	38	23	2.0	7.7	8.0	3.0	3137A	1555A	1535A**
64. Pearl	3.0	4.0	2.0	33	66	3.3	3.7	38	20	2.0	6.7	7.0	4.0	3104A	1171A	1253A**
65. Eejay	3.3	5.3	3.0	31	62	2.3	2.0	38	27	2.3	8.0	8.0	2.0	3507A	1643A	1648A**
BEARDLESS WILDRYE																
71. Shoshone	5.0	6.0	2.7	9	60	1.3	1.0	27	17	2.0	8.0	9.0	1.3	2223B	1098A	1762A**
DAHURIAN WILDRYE																
66. Arthur	2.3	1.7	1.7	58	71	2.3	3.0	46	31	2.0	1.0	1.7	3.3	4049	955	1143
BASIN WILDRYE																
67. M-718	6.0	5.3	4.0	9	33	5.0	4.7	43	43	7.0	7.7	7.0	3.3	2196A	1758A	2724A
68. PI-478831	2.7	2.0	2.3	32	72	4.0	3.3	40	33	7.0	7.3	7.3	3.3	1498A	1624A	1706A
69. Magnar	4.3	5.7	2.3	26	57	3.0	5.0	44	36	4.0	5.7	6.3	3.3	2431A	2112A	1674A
CANADA WILDRYE																
70. *Mandan	---	2.0	1.0	59	51	---	---	41	--	2.0	1.0	---	---	----	----	----
BEARDLESS BLUEBUNCH																
72. *Whitmar	---	3.0	3.0	69	59	---	---	26	--	2.0	5.0	---	---	----	----	----

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED (2) COMPETITION 92	93	STAND (3) DENSITY 92	93	STAND (4) RATING 94	95	PLANT (5) HEIGHT 93	95	(6) DISEASE 93	SEED (7) PRODUCTION 93	94	(8) VIGOR 95	FORAGE YIELD (lb/ac) (9) 1993	1994	1995
BLUEBUNCH WHEATGRASS																
73. PI-232127	1.3	3.0	2.0	45	58	2.3	3.3	27	27	3.0	6.7	7.3	3.0	1933A	995A	1530A
74. PI-232128	2.0	3.7	2.0	32	50	2.3	3.3	28	17	2.0	7.3	8.3	2.7	2262A	1212A	1216A
75. Goldar	1.0	3.7	2.0	57	79	2.0	2.3	27	14	2.0	6.7	8.3	2.7	2332A	941A	1487A
76. Secar	1.3	3.0	2.0	61	80	2.7	2.7	28	28	3.3	6.3	8.0	3.7	1975A	1294A	1318A
SHEEP FESCUE																
79. *Covar	---	4.0	7.0	9	22	---	---	20	--	1.0	3.0	---	---	----	----	----
HARD FESCUE																
80. *Durar	---	3.0	5.0	16	38	---	---	28	--	1.0	2.0	---	---	----	----	----
INDIAN RICEGRASS																
81. Mandan 57-2	5.0	6.3	5.3	26	37	6.7	8.3	24	18	2.0	3.0	2.3	7.0	2160A	323A	0
82. Nezpar	5.0	4.0	3.7	19	49	5.7	6.3	28	27	2.0	2.3	4.0	4.7	1960A	403A	0
83. *Paloma	---	6.0	8.0	24	24	---	---	20	--	2.0	3.0	---	---	----	----	----
CANBY BLUEGRASS																
84. *Canbar	5.0	6.0	8.0	2	25	---	---	16	16	5.0	3.0	---	---	----	----	----
GREEN NEEDLEGRASS																
85. Lodorm	3.7	5.7	2.3	45	67	2.3	4.0	36	35	2.0	2.3	2.3	2.3	3322A	1331A	1308A
86. SD-93	3.0	4.0	2.3	23	56	4.3	4.0	35	33	2.0	3.0	3.3	2.3	2196A	1035A	1113A
GREEN NEEDLEGRASS x RICEGRASS CROSS																
87. *Mandan	---	6.0	6.0	24	54	---	---	31	--	2.0	3.0	---	---	----	----	----
STREAMBANK WHEATGRASS																
88. *Sodar	---	6.0	5.0	54	73	---	---	26	--	5.0	5.0	---	---	----	----	----

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED (2) COMPETITION 92	93	STAND (3) DENSITY 92	93	STAND (4) RATING 94	95	PLANT (5) HEIGHT 93	95	(6) DISEASE 93	SEED (7) PRODUCTION 93	94	(8) VIGOR 95	FORAGE YIELD (lb/ac) (9) 1993	1994	1995
THICKSPIKE WHEATGRASS																
89. Elbee	2.0	3.0	1.7	48	71	1.7	1.7	28	9	2.0	3.0	8.3	4.0	2046B	412B	547A
90. Critana	3.7	4.0	2.0	43	68	2.0	1.7	26	13	3.7	4.3	8.0	3.0	2480A	711A	1223B
WESTERN WHEATGRASS																
91. Walsh	3.7	4.3	2.3	50	74	1.3	1.0	24	25	2.0	7.0	8.0	3.0	2253A	983B	1871B
92. Rodan	3.3	4.0	1.3	53	79	1.0	1.3	26	22	2.0	6.0	8.3	2.3	3780A	2205AB	2440B
93. *Rosana	---	6.0	3.0	54	57	---	---	22	--	2.0	6.0	---	---	----	----	----
94. Flintlock	3.0	4.0	2.0	36	54	1.3	1.3	31	29	2.0	5.7	8.0	1.3	3575A	2730A	4263A
95. *Barton	---	6.0	3.0	24	50	---	---	26	--	2.0	5.0	---	---	----	----	----
96. *Arriba	---	6.0	3.0	53	49	---	---	30	--	2.0	4.0	---	---	----	----	----
SLENDER WHEATGRASS																
97. Revenue	2.7	1.7	2.0	71	64	2.0	2.7	39	35	2.0	1.0	1.3	2.3	4146A	2011A	2063A
98. Adanac	1.7	2.0	2.3	69	62	1.7	2.3	37	33	2.7	1.3	1.3	1.7	2559B	1143A	1057B
99. Pryor	4.0	2.7	2.3	35	50	4.3	3.7	33	33	2.7	1.7	2.3	3.3	2082B	1367A	1046B
100. *San Luis	---	6.0	3.0	36	59	---	---	35	--	3.0	1.0	---	---	----	----	----
101. Primar	2.0	2.0	2.3	40	62	3.3	2.3	36	33	2.3	1.7	2.3	2.0	2831B	1185A	1469AB

VARIETY TOLERANCE TO AVENGE HERBICIDE AT HETTINGER

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

HRSW	1993	1994	1995
Len	+	+	+
Stoa	0	1	+
Butte 86	0	1	+
Gus	0	1	+
2370	0	1	0
2371	0	1	1
2375	0	1	1
2398	0	1	1
Kulm	0	1	1
Amidon	0	+	0
Ernest	0	1	0
McNeal	0	+	1
Trenton	+	+	+
Glupro			1
Grandin	+	+	+
Bergen	0	1	1
Dalen	0	1	0
Krona	0	+	1
Sonja	0	1	0
Hamer		1	0
Lars		1	1
Norlander		1	1
CDC Teal	1	1	+
AC Barrie			0
AC Domain	1	1	1
AC Eatonia		+	0
AC Cora			1
Verde		+	+
Norm	0	1	0
Sharp	0	1	1
Prospect	1	1	0
Penawawa HWSW			0
Alpowa HWSW			1
Edwall HWSW			1
ND678	0	1	0
ND688			1
ND689			1
ND690			+
BW674			0
SBF0402			0
RUSS		+	1
SD0010			0
HiLine	0	+	
Cutless	0		
AC Minto	0		
Alex	+		
Vance	0	1	
Express	0	1	
CDC Merlin		+	

Durum	1993	1994	1995
Ward	0	1	1
Rugby	0	1	0
Vic	+	+	+
Lloyd	0		0
Monroe	0	1	0
Renville	1	+	1
Medora	0	1	1
Sceptre	0	1	1
Laker	1	+	+
Regold	1	+	+
Plenty	0	1	1
Voss	0	1	+
Munich	0	1	1
DT475			0
D87130	0	1	0
D87240	+	+	+
D88303	0	+	1
D89135	0	1	0
D901313		+	+
D901419		1	0
D901442		+	+
D901486		1	0
D901518		1	0
D901536		1	0
D901786		+	1
D901155			0
D91058			+
D91066			+
D91103			0
D91180			+
D91309			+
D91321			0
D91306			1
D91076			1
D91080			1
D91410			+

Date of Application: 5/13/93, 5/20/94, 5/29/95
Rate of Application: 4 pts/A

1995 VARIETY TOLERANCE TO FARGO HERBICIDE AT HETTINGER

Injury: + = susceptible, 0 = tolerant

HRSW	6/9	DURUM	6/9	BARLEY	6/9
Len	0	Ward	0	Morex	0
Stoa	0	Rugby	0	Azure	0
Butte 86	0	Vic	0	Robust	0
Gus	0	Lloyd	0	Hazen	0
2370	0	Monroe	0	Excel	+
2371	0	Renville	0	Stander	+
2375	0	Medora	0	Royal	+
2398	0	Sceptre	0	Foster	0
Kulm	+	Laker	0	B2912	0
Amidon	+	Regold	0	Logan	0
Ernest	0	Plenty	0	Bowman	0
McNeal	0	Voss	0	Stark	0
Trenton	0	Munich	0	Crystal	0
Glupro	+	DT475	0	Gallatin	0
Grandin	0	D87130	0	Harrington	0
Bergen	0	D87240	0	Manley	0
Dalen	0	D88303	0	ND13299	0
Krona	+	D89135	0	ND13300	0
Sonja	0	D901313	0	M66	0
Hamer	+	D901419	+	ND10981	0
Lars	0	D901442	+	ND13629	0
Norlander	0	D901486	0		
CDC Teal	0	D901518	0		
AC Barrie	+	D901536	0		
AC Domain	+	D901786	0		
AC Eatonia	+	D901155	0		
AC Cora	+	D91058	0		
Verde	0	D91066	+		
Norm	0	D91103	0		
Sharp	0	D91180	0		
Prospect	0	D91309	0		
Penawawa HWSW	0	D91321	0		
Alpowa HWSW	0	D91306	0		
Edwall HWSW	0	D91076	+		
ND678	0	D91080	0		
ND688	+	D91410	0		
ND689	0				
ND690	0				
BW674	+				
SBF0402	0				
RUSS	0				
SD0010	0				

Rate of Application: 2 pts/A

Date of Application: 4/7/95

Nicosulfuron + adjuvant use on Corn, Hettinger 1994. Golden Harvest Early Blend 1104 seed corn was seeded on May 10. Early treatments were applied to 3 leaf corn and to 2 to 4 leaf wild oat on May 26 with 49 F, 94% RH, clear and sunny sky and 7 mph wind. Late treatments were applied to 5 leaf corn and to 5 leaf wild oat on June 10 with 51 F, 96% RH, partly sunny sky and 7 mph wind. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 10 gpa at 40 psi through 8001 flat fan nozzles to a 5 foot wide area the length of 10 by 28 ft plots. The experiment was a randomized complete block design with four replications. Evaluations for early applied treatments were taken on June 16 for crop injury, and on July 8 and July 27 for weed control. Evaluations for late applied treatments were taken on July 8 and on July 27 for weed control.

		6/16	Wild oat control			
		Corn	Early		Late	
Treatment	Rate	Inj.	7/8	7/27	7/8	7/27
	oz/A	%	%		%	
Nicosulfuron	0.67	2	8	21	68	82
Nicosulf. + Preference	0.67 + .25%	0	82	66	84	84
Nicosulf. + Scoil	0.67 + 1%	1	94	89	80	82
Nicosulf. + Class AMP28	0.67 + 5%	1	92	61	90	89
Nicosulf. + Class 17%COC	0.67 + .25%	1	56	12	84	85
Nicosulf. + EV Concentrate	0.67 + .25%	2	51	51	79	81
Nicosulf. + Dica-dma + Pref.	0.67+8+.25%	2	89	70	81	82
Nicosulf. + Dica-dma + AMP28	0.67+8+5%	1	90	58	90	89
Nicosulf. + Atrizine + Scoil	0.67+16+1%	4	90	88	82	84
Nicosulf. + R-11	0.67 + .25%	0	91	78	89	81
Nicosulfuron	0.33	1	29	26	79	74
Nicosulf. + Preference	0.33 + .25%	0	90	59	75	54
Nicosulf. + Scoil	0.33 + 1%	0	82	36	64	55
Nicosulf. + Class AMP28	0.33 + 5%	0	89	56	80	48
Nicosulf. + Class 17%COC	0.33 + .25%	0	0	0	40	34
Nicosulf. + EV Concentrate	0.33 + .25%	0	58	42	68	48
Nicosulf. + Dica-dma + Pref.	0.33+8+.25%	2	44	22	39	18
Nicosulf. + Dica-dma + AMP28	0.33+8+5%	4	86	30	80	61
Nicosulf. + Atrizine + Scoil	0.33+16+1%	2	91	46	56	55
Nicosulf. + R-11	0.33 + .25%	1	86	66	56	40
Untreated	0	0	0	0	0	0
C.V. %		218	29	69	28	36
LSD 5%		ns	27	46	28	32
# of Reps		4	4	4	4	4

Summary

Nicosulfuron alone had relatively poor wild oat control when applied early regardless of the rate applied. Late applications of nicosulfuron plus an adjuvant did not significantly increase wild oat control over nicosulfuron alone. Nicosulfuron plus Class 17% Concentrate or EV Concentrate provided less wild oat control than nicosulfuron plus Class AMP 28 or Scoil. The addition of dicamba-dma did not enhance wild oat contol at the higher nicosulfuron rate and appeared to be antagonistic with Preference at the lower nicosulfuron rate. The addition of atrizine did not significantly enhance wild oat control over nicosulfuron plus Scoil treatments. Higher rates of nicosulfuron generally provided better wild oat control over a longer period of time than lower rates. Crop injury was minor and inconsistent over treatments.

Weed control in seedling alfalfa, Hettinger 1994. An experiment was conducted to evaluate chemical control of a grassy nurse crop and chemical control of broadleaf weeds in seedling alfalfa. An alfalfa/oat mixture was seeded on April 13. Treatments were applied to 4 trifoliate leaf alfalfa, 4 1/2 leaf oat and 1-4 inch kochia on May 31 with 76 F, 75% RH, sunny sky and 10 mph wind. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 10 gpa at 40 psi through 8001 flat fan nozzles to a 5 foot wide area the length of 10 by 28 ft plots. The experiment was a randomized complete block design with four replications. Evaluations were on June 16.

Treatment	Rate	6/16 Taoa	6/16 KOCZ
	oz/A	---- % ----	
Poast Plus (1 lb/gal Sethoxydim)	32	94	2
Poast Plus + Dash	32 + 32	95	6
Poast Plus + Dash	24 + 32	97	12
Poast Plus + Dash	16 + 32	81	6
Poast Plus + Dash	8 + 32	58	0
Poast Plus + Class 17% COC	16 + .25%	90	12
Poast Plus + Scoil	16 + 1%	89	37
Poast Plus + EV Concentrate	16 + .25%	87	12
Poast Plus + 2,4-DB	16 + 32	94	41
Poast Plus + 2,4-DB + Dash	16 + 32 + 32	97	62
Poast Plus + bromoxynil	16 + 16	81	75
Poast Plus + bromoxynil + Dash	16 + 16 + 32	70	55
Untreated	0	0	0
C.V. %		23	86
LSD 5%		26	32

Summary

Tame oat phytotoxicity was significantly reduced at the lowest Poast Plus rate. The addition of Dash did not enhance tame oat control at the high Poast Plus rate. There was no significant difference between adjuvants for weed control. Poast Plus + bromoxynil had significantly higher kochia control than Poast Plus + 2,4-DB but were not significantly different when Dash was added to these treatments.

Wild oat control in wheat, Hettinger 1994. Grandin hard red spring wheat was seeded on April 14. Early treatments were applied to 3 leaf wheat and to 3 leaf wild oats on May 20 with 65 F, 84% RH, partly sunny sky and 7 mph wind. Late treatments were applied to 5 leaf wheat and to 4 leaf wild oats on May 31 with 41 F, 76% RH, sunny sky and 2 mph wind. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 10 gpa at 40 psi through 8001 flat fan nozzles to a 5 foot wide area the length of 10 by 28 ft plots. The experiment was a randomized complete block design with four replications. Evaluations were on June 15 for early treatments and on June 29 for late treatments. Experiment was destroyed by hail on July 4.

		6/15		6/29	
		Wht		Wht	
Treatment	Rate	inj	Wiot	inj	Wiot
	oz/A	---	--- % ---		
Diclofop + 17% POC	32 + .25%	7	70	0	60
Diclofop + 17% POC	24 + .25%	8	51	0	55
Diclofop + 17% POC	16 + .25%	2	28	0	46
Diclofop + 17% POC	8 + .25%	4	25	0	31
Tiller	24	14	49	0	50
Tiller	18	2	50	1	49
Tiller	12	6	28	0	12
Tiller	6	9	30	0	40
Imazamethabenz + Scoil	16 + 1%	6	91	0	81
Imazamethabenz + Scoil	12 + 1%	5	52	2	78
Imazamethabenz + Scoil	8 + 1%	2	70	0	70
Imazamethabenz + Scoil	4 + 1%	1	64	0	61
Difenzoquat + NIS	40 + .25%	11	81	0	74
Difenzoquat + NIS	30 + .25%	9	80	0	29
Difenzoquat + NIS	20 + .25%	5	61	0	40
Difenzoquat + NIS	10 + .25%	2	38	0	19
Untreated	0	0	0	0	0
C.V. %		112	51	398	39
LSD 5%		ns	37	ns	26
# of reps		4	4	4	4

Summary

Wild oat density was very heavy at 14 plants/ft^2. This caused considerable competition with the crop, resulting in a thin wheat stand and difficulty in rating the crop for herbicide injury. Percent wild oat control was generally higher for early applied treatments than for late applied treatments. Crop injury was also noticeably higher for early applied treatments than for late applied treatments. Percent wild oat control tended to decrease with decreasing rates of herbicide. This was especially noticeable at the 2 lower treatment rates of each product.

Imazamethabenz with commercial adjuvants, Hettinger 1994.
Grandin hard red spring wheat was seeded on April 14. Treatments were applied to 3 leaf wheat and 3 leaf wild oat on May 20 with 66 F, 100% RH, sunny sky and 7 mph wind. Wild oat density was 14 plants per square foot. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 10 gpa at 40 psi through 8001 flat fan nozzles to a 5 foot wide area the length of 10 by 28 ft plots. The experiment was a randomized complete block design with four replications. Evaluations were on June 16. Experiment was destroyed by hail on July 4.

Treatment	Rate	6/16 WIOT
	oz/A	%
Imazamethabenz	16	69
Immb & DM710	16	90
Immb + Preference	16 + .25%	86
Immbamethabenz	8	70
Immb & DM710	8	77
Immb + Preference	8 + .25%	65
Immb + Spray Booster S	8 + .25%	65
Immb + EV Concentrate	8 + .25%	66
Immb + R-11	8 + .25%	80
Immb + Activator 90	8 + .25%	79
Immb + Class 17% COC	8 + .25%	79
Immb + Scoil	8 + 1%	72
Immb + Sun-it II	8 + 1%	49
Immb + Class AMP28	8 + 5%	81
Immb + Class Act	8 + 5%	71
Untreated	0	0
C.V.%		25
LSD 5%		24

Summary

Precipitates formed with the addition of Class Act. Percent wild oat control varied considerably with the addition of various adjuvants to imazamethabenz, however, the addition of adjuvants did not significantly enhance wild oat control over imazamethabenz alone. Higher rates of imazamethabenz plus an adjuvant had better wild oat control than the lower rates.

Glyphosate with commercial adjuvants, Hettinger 1995.
Treatments were applied to wild oats in the jointing growth stage on June 14 with 79 F, 75% RH, sunny sky and 5-10 mph wind. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 17 gpa at 40 psi through 8001 flat fan nozzles to a 5 foot wide area the length of 10 by 28 ft plots. Water pH was 9.3. The experiment was a randomized complete block design with four replications. Treatments were evaluated on June 27 and on July 15.

Treatment	Rate	Wild oat 6/27	Wild oat 7/15
	oz/A	%	%
Roundup	3	66	58
Surfactants			
Roundup + X-77	3 + .5%	66	66
Roundup + R-11	3 + .5%	62	59
Roundup + Preference	3 + .5%	65	62
Roundup + Li-700	3 + .5%	52	39
Roundup + Activator 90	3 + .5%	68	58
Roundup + Amway 80	3 + .5%	71	74
Roundup + Spray Booster S	3 + .5%	58	58
Roundup + Activator Plus	3 + .5%	62	51
Surfactants with Silicone			
Roundup + Silwet L-77	3 + .125%	52	40
Roundup + Kenetic	3 + .1%	59	54
Vegetable Oil Concentrate			
Roundup + Class EV Conc.	3 + .5%	75	76
Petroleum Oil Concentrate			
Roundup + Class 17% Conc.	3 + .5%	60	50
Methylated Seed Oils			
Roundup + Destiny	3 + .5%	44	39
Roundup + Scoil	3 + .5%	55	48
Surfactants + Water Conditioning Agents			
Roundup + Choice + Act. 90	3 + .75% + .5%	81	82
Roundup + Cayuse + R-11	3 + .5% + .5%	81	84
Roundup + Optima	3 + .75%	70	85
Surfactants + Fertilizer			
Roundup + Ammonium Sulfate	3 + 2%	74	72
Roundup + Class Act	3 + 2%	88	87
Roundup + Surfate II	3 + 1.5%	82	80
Roundup + Impressive	3 + 1.5%	79	82
Roundup + Dispatch AMS	3 + 1%	72	74
Roundup + Class APM 28	3 + .75%	72	70
Miscellaneous			
Roundup + (pH = 5)	3	50	48
Roundup + Amm. Sul.+(pH=5)	3 + 1%	69	65
Roundup + TF8035	3 + .5%	29	0
C.V.%		22	25
LSD 5%		20	22

Summary

Surfactants (except Amway 80), surfactants with silicon, petroleum oil concentrates and methylated seed oils did not enhance the phytotoxicity of Roundup. Surfactants with water conditioning agents and surfactants with fertilizer enhanced weed control. Lowering the pH of the carrier did not influence Roundup activity.

Spray Adjuvants and Spray Carrier Water Quality

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Postemergence herbicide effectiveness is dependent upon spray droplet retention and herbicide absorption by weed foliage. Adjuvants and spray water quality influence postemergence herbicide efficacy. Adjuvants are not important to preemergence herbicides because retention and absorption by foliage does not occur. The advent of postemergence herbicides for weed control in corn and soybean has increased the interest in adjuvants.

Spray adjuvants consist of oils, surfactants, and fertilizers. The most effective adjuvant will vary with each herbicide and the need for an adjuvant will vary with environment, weeds present, and herbicide used. Adjuvants should be used only when indicated on the herbicide label or with caution as they may increase injury to crops or reduce weed control.

Oils generally are used at 1% v/v (1 gal/100 gal of spray solution) or at 1 to 2 pt/A depending upon herbicide and oil. Oil additives function to increase herbicide absorption and spray retention. Oil adjuvants are petroleum, vegetable, or methylated vegetable oils plus an emulsifier for dispersion in water spray carriers. The emulsifier, the oil class (petroleum, vegetable, etc.), and the specific type of oil in a class all influence effectiveness of a given oil adjuvant. Methylated seed oils (MSO type oils) have been especially effective with Poast and Accent, but generally are equal or better than the other oil classes with all herbicides. However, Cobra is more effective when applied with petroleum than MSO type oil. Vegetable oils (non MSO type) usually are equal to petroleum oils, except less effective with Assure II. The above comparison may differ depending on the specific adjuvant product.

Surfactants are used at 0.12 to 0.5% v/v (1 to 4 pt/100 gal of spray solution). Surfactant rate depends on the amount of active ingredient in the surfactant and other factors such as species and herbicides. The main function of a surfactant is to increase the plant spray retention, but surfactants also function in herbicide absorption. When a range of surfactant rates is given, the high rate is for use with low rates of the herbicide, drought stress, tolerant weeds, or when the surfactant contains a low (less than 50%) percentage active ingredient. Surfactants vary widely in chemical composition and in their effect on spray retention and herbicide absorption. Effectiveness of a given surfactant will also depend upon the herbicide and its formulation. Information on surfactant effectiveness with a herbicide requires field testing and can not be predicted from surface tension or droplet spread on leaf wax surface.

Fertilizers containing ammonium nitrogen have increased the effectiveness of Accent, Banvel, Blazer, Carbyne, Roundup/Glyphos, Basagran, Poast, Pursuit, and 2,4-D amine. Fertilizer applied with herbicides may reduce weed control or cause crop injury. Fertilizers should be used with herbicides only as indicated on the label or where experience has proven acceptability.

Ammonium sulfate (AMS) at 17 lb per 100 gal spray volume (2%) has enhanced weed control with glyphosate. Enhancement of glyphosate is most pronounced when spray water contains relatively large quantities of certain ions, such as calcium, sodium, and magnesium. AMS may contain contaminants which may not dissolve and then plug nozzles. AMS should be dissolved in a small amount of water and filtered to prevent nozzle plugging. Commercial solutions of AMS are available. AMS at 2% is adequate to overcome severe salt antagonism. AMS at 0.5% has adequately overcome antagonism of glyphosate from 300 ppm calcium. Ammonium ions also are involved in herbicide absorption and have enhanced phytotoxicity of many herbicides in the absence of salts in the spray carrier. The enhancement of herbicides by nitrogen compounds appears most pronounced to certain species (velvetleaf, sunflower).

AMS enhances phytotoxicity and overcomes antagonism from salts of Poast, Roundup, and 2,4-D amine. Liquid 28% UAN fertilizer is effective in enhancing weed control from many POST herbicides and overcoming sodium **but not calcium antagonism of Roundup**. Sodium bicarbonate antagonism of Poast is overcome by 28% UAN, ammonium nitrate, and AMS. AMS or 28% UAN does not preclude the need for a surfactant. Many adjuvants are available to enhance herbicide action, but information on their effectiveness is limited. The precise salt concentration in water which causes a visible loss in weed control is difficult to establish because weed control also is influenced by many other factors. Thus, comparisons of adjuvants should be made at marginal control levels to determine the effectiveness of adjuvants for specific herbicides, sprays, water and weeds. Effective adjuvants may allow use of herbicides at reduced rates or provide consistent results with adverse conditions. However, use of rates less than the label recommendation exempts herbicide manufacturers from liability for nonperformance.

Water pH modifiers are used to lower (acidify) spray solution pH because many insecticides and some fungicides breakdown under basic conditions (high water pH). pH of most solutions is not high nor low enough for important herbicide breakdown in the spray tank. pH reducing adjuvants (example: LI-700) are sometimes recommended for use with herbicides because of greater absorption of weak acid type herbicides when the spray solution is acidic. However, low pH is not essential to optimize herbicide absorption. Many herbicides are formulated as various salts which are absorbed as readily as the acid. Salts in the spray water may antagonize these formulated salt herbicides. In theory, acid conditions would convert the herbicide to an acid and overcome salt antagonism. However, water solubility of the herbicide acids is less than solubility of salt forms. Formation of herbicide acid with pH modifiers may precipitate and plug nozzles when solubility is exceeded, such as with high rates in low water volumes. The antagonism of herbicide efficacy by spray solution salts can be overcome without lowering pH by adding ammonium sulfate or, for some herbicides, 28% liquid nitrogen fertilizer (See section A6 and A7 of the 1996 North Dakota Weed Control Guide).

Antagonism of Roundup/RT/Glyphos (glyphosate) by calcium in a spray solution was overcome by sulfuric but not nitric acid indicating that the sulfate ion was important, not the acid hydrogen ion. The importance of the sulfate explains the effectiveness of the ammonium sulfate, and not 28% UAN, in overcoming calcium antagonism of Roundup. Other herbicides which become acid at a higher pH than Roundup may more realistically benefit from a reduced pH as has been shown for Poast. However, Poast does not require a low pH for efficacy. pH of about 4 has overcome sodium antagonism of Poast, but 28% nitrogen fertilizer or ammonium sulfate also will overcome sodium antagonism of Poast without lowering the pH. The ammonium ion provided by these fertilizers is apparently the important ion.

Assert 2.5S is formulated as a sulfate ester which is water soluble only at a low pH. The formulation contains chemicals to keep the pH low. However, the amount of acidifier in the formulation may be inadequate when herbicide rates are low in certain highly alkaline waters or in a mixture with other herbicides or fertilizers that raise pH. Thus, precipitate problems have occurred occasionally with Assert in North Dakota. The "solution" to the problem is a lowering of the spray solution pH by a strong acid like sulfuric or hydrochloric acid. Sulfuric acid is available at most dealers and is sold as a potato vine desiccant. Hydrochloric acid as muriatic acid is available in most hardware stores.

In summary, adjuvants that are designed specifically to reduce pH, generally, are not required for herbicide efficacy. The type of acid or components of buffering agents and the specific herbicide all need to be considered before using pH modifying agents.

Commercial adjuvants differ in effectiveness with herbicides. Experiments were conducted from 1992 through 1995 comparing several commercial adjuvants applied with Roundup (glyphosate with surfactant) or Honcho (glyphosate without surfactant) at the various Experiment Stations in North Dakota. The Table in this section presents the results from these experiments. Data was only included when a differential in control occurred among adjuvant treatments. In some experiments, all treatments gave similar control probably because of a more humid and favorable environment for glyphosate uptake and translocation. Roundup/Honcho was applied at lower than labeled rates (2.7 to 4 fl oz/A) so that control would not be complete and differences were much greater at some locations than others. All adjuvants enhanced glyphosate, but some were more effective than others. The last four commercial adjuvants listed in the Table are believed to contain ammonium sulfate (ingredients are often a trade secret) and were more effective than the surfactants as a group. The adjuvants differed in effectiveness across locations, possibly from variable spray water quality and environmental conditions at treatment. The results are averaged over various locations and may not represent adjuvant effectiveness for all situations. However, adjuvants differ in effectiveness and users should compare several products for their specific conditions or select one of the more effective adjuvants from the list.

Commercial adjuvant effect on Roundup/Honcho (glyphosate) phytotoxicity to selected grass and broadleaf plants.

	1992-1995[a]		1993-1995[a]	
Adjuvants	Grass	Brdlf	Grass	Range, Brdlfgrass
	% control			
Surfactants				
None	--	--	49	3111-68
X-77	62	38	66	4029-82
R-11	72	55	74	5134-89
Preference	70	40	67	3831-84
LI-700	55	36	58	4216-85
Silwet L-77	66	44	56	4016-73
Spray Booster S	65	41	64	4126-76
Activator 90	67	41	64	4125-85
Amway 80	--	--	74	5026-90
Surfactant + Fertilizer				
Cayuse + R-11	--	--	82	6666-94
Class Act	--	--	90	7580-98
Dispatch	--	--	85	6973-91
Surfate	--	--	89	7571-97

[a]Data for 1992-1995 represent 13 values selected for grass and 12 for broadleaf weeds, except Silwet L-77 had one less site than other adjuvants listed.

[b]In 1992, the Honcho formulation (without surfactant) was used and all surfactants were applied at 1% v/v. In 1993-1995, Roundup (with surfactant) was applied and all surfactants were applied at 0.5% v/v except Silwet L-77 was applied at 0.25% v/v in 1995 only. Cayuse + R-11 each were applied at 0.5% v/v. Class Act and Dispatch were applied at 2% v/v, and Surfate was applied at 1.5% v/v in 1992 and 1% v/v in 1993-1995.

[c]% control values were used only when control of a species was in a range where response differences were detectable. Thus, control levels are low and assumed to

SPRAY CARRIER WATER QUALITY:

Minerals, clay, and organic matter in spray carrier water can reduce the effectiveness of herbicides. Clay inactivates Gramoxone Extra/Cyclone (paraquat), and Roundup/Glyphos (glyphosate). Organic matter inactivates many herbicides, and minerals of various types can inactivate 2,4-D amine, MCPA amine, Poast, Roundup/Glyphos, and Banvel/Banvel SGF/Clarity (dicamba).

Water in many parts of the United States is high in sodium bicarbonate which reduces the effectiveness of 2,4-D and MCPA amines (not esters), Poast, Roundup/Glyphos, and Banvel products. Water samples with 1600 ppm sodium bicarbonate have been observed, but antagonism of the above herbicides was noticeable at or above 300 ppm. The antagonism is related to the salt concentration. At low salt levels, loss in weed control may not be noticeable under normal environmental conditions. However, the antagonism from low salt levels will cause inadequate weed control when weed control is marginal because of drought or partially susceptible weeds.

High salt levels in spray water can reduce weed control in nearly all situations. Calcium and, to a lesser degree, magnesium are antagonistic to 2,4-D and MCPA amine, Banvel, and Roundup. Calcium antagonism may become noticeable at 150 ppm. Sulfate ions in the solution have reduced the antagonism from calcium and magnesium, but the sulfate concentration must be three times the calcium concentration to overcome antagonism. The sulfate that occurs naturally in water can be disregarded. The amount of AMS needed to overcome antagonistic ions can be determined as follows: AMS (lb/100 gal water) = 0.005 sodium [ppm] + 0.002 potassium [ppm] + 0.009 calcium [ppm] + 0.014 magnesium [ppm].

An analysis of spray water sources will provide a guide for determining possible effects on herbicide efficacy. The analysis may report salt levels in ppm or grains. To convert from grains to ppm, multiply by 17 (Example: 10 grains calcium X 17 = 170 ppm calcium). AMS at 2% as indicated on many labels (17 lb/100 gallons spray) will overcome the antagonism from the highest calcium and/or sodium concentrations in North Dakota waters for Roundup, Poast, 2,4-D amine, MCPA amine, and Banvel. However, AMS at 1% is adequate for most North Dakota waters. Iron also is antagonistic to many herbicides, but usually is not abundant in North Dakota water.

Water often contains a combination of sodium, calcium, and magnesium, and these cations generally are additive in the antagonism of herbicides. Many adjuvants are marketed to modify spray water pH, but low pH does not appear essential to the action of most herbicides. AMS, granular or liquid, and 28% UAN fertilizer help overcome antagonistic salts in spray carrier water. The 28% UAN fertilizer overcomes mineral antagonism of most herbicides, but not Roundup. Research with amounts of 28% UAN fertilizer is limited, but 4 gal/100 gal of spray has generally been adequate.

The AMS and 28% UAN adjuvants have enhanced herbicide control of certain weeds even in water without salts. This is especially true for Roundup, sulfonylureas (SU) herbicides (Ally, Amber, Express, Harmony Extra, and Pinnacle), Blazer, and Basagran. However, AMS, 28% UAN, or other adjuvants should be used with caution as their benefit often is limited to specific herbicides or weeds and may be antagonistic to other herbicides or weeds.

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