

WEST RIVER AGRICULTURAL RESEARCH AND EXTENSION CENTER  
CROPS AND SOILS RESEARCH

Rapid City, South Dakota

Introduction

This is an annual progress report of the West River Crops and Soils Research Projects, South Dakota Agricultural Experiment Station. The equipment storage and processing facilities are located approximately 1 mile southwest of the village of Box Elder. The office facilities are located on the Central States Fairgrounds at 801 San Francisco Street, Rapid City. Telephone 605/394-2236.

The Research Projects serve the western part of the state. They are unique in that all experimental plots are cooperatively located with Farmers, Ranchers, or Crop Improvement Associations, through Extension Agents.

The research conducted is not restricted to a specific area, crop, or soil, but by necessity of workload, investigates only those problems which are pertinent to general areas. This report contains results of selected research. It does not include results of work conducted by projects headquartered from the campus at Brookings.

FIELD PLOT COOPERATORS

<u>Name</u>	<u>Address</u>	<u>County</u>
County Crop Impr. Ass'n	Martin 57551	Bennett
Roger Rosenow	Ralph 57650	Harding
Clifford Halverson	Kennebec 57544	Lyman
Steve Lien	Presho 57568	Lyman
Gary Hawks	Plainview 57771	Meade
Tim Komes	Sturgis 57785	Meade
Brian Barber	Hermosa 57744	Pennington
Martin Printz	New Underwood 57790	Pennington
Dan Bowar	Rapid City 57701	Pennington
Rodney Renner	Wall 57790	Pennington
Gary Wunder	Bison 57620	Perkins
Sivage Farms	Hayes 57537	Stanley

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This is an annual report and results published herein are therefore neither complete nor conclusive. 300 copies printed at an estimated cost of \$2.40 each.



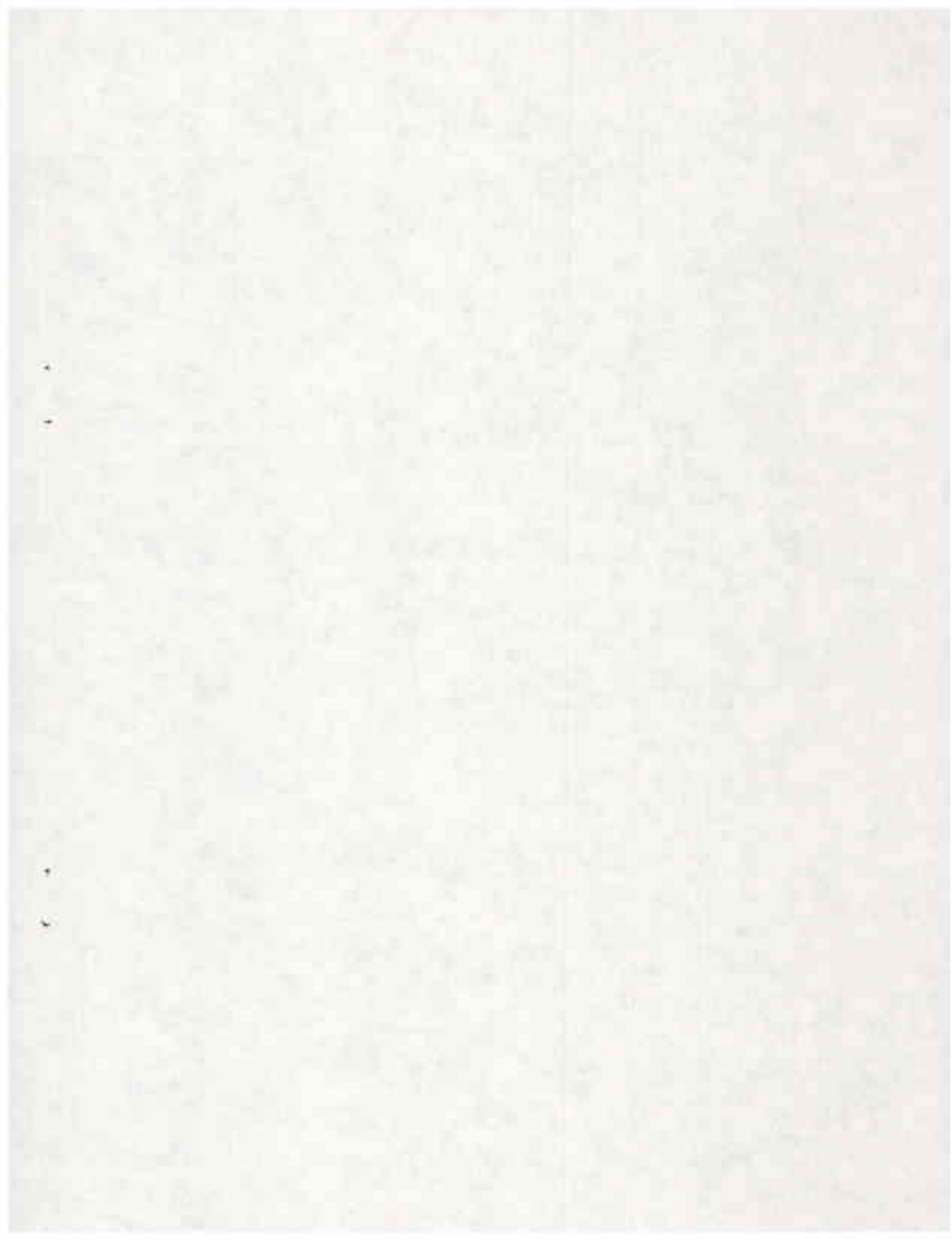


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### Weather Summary

The weather summaries presented in Tables 1 through 3 were obtained from the National Oceanic and Atmospheric Administration publication, Climatological Data - South Dakota, and from South Dakota Crop-Weather Summary published by the South Dakota Statistical Reporting Service-USDA.

Air temperatures in Western South Dakota averaged two to five degrees below normal during August and September, were normal in October, and two degrees below normal in November. During the winter months air temperatures were eight degrees above normal in December, nine degrees above normal in January, and eight degrees above normal in February. Springtime temperatures were normal in March, seven degrees above normal in April, and four degrees above normal in May. June was two degrees below normal, while July was one degree above normal.

Precipitation patterns varied but rainfall was generally above normal for the year. The entire area was dry during August but rains in September brought the average to normal. The total moisture received during October, November, and December averaged near normal for the period, except near the northern Black Hills. Precipitation received in January was slightly below normal but was offset by above normal moisture received during February. Above normal precipitation in March together with that received in February compensated for the shortages of April. Above normal rainfall in May provided the moisture needed but not received in June and July. (Continued on Page 8)

TABLE 1. Weather Data - Average Temperatures and Total Precipitation by Months, with Departures from Normal.

Month & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
<u>Martin</u> (Bennett County Reporting Station)***				
Aug. 1986	68.6	-3.7	1.40	-0.68
Sept. 1986	58.1	-3.4	3.38	1.96
Oct. 1986	48.7	-2.0	1.48	0.44
Nov. 1986	32.0	-3.6	0.63	0.28
Dec. 1986	29.4	2.7	Tr	-0.29
Jan. 1987	30.1	7.6	0.04	-0.25
Feb. 1987	33.7	9.4	2.00	1.59
Mar. 1987	32.9	0.8	2.23	1.56
Apr. 1987	51.8	6.0	0.44	-1.21
May 1987	61.6	5.5	2.36	-0.59
June 1987	68.1	2.9	1.78	-2.10
July 1987	74.7	1.4	1.59	-0.87

\*Average temperatures and precipitation obtained from NOAA Climatological Data from reporting station nearest the experimental sites. Temperatures are reported in degrees Fahrenheit and precipitation in inches.

\*\*Departures from normal are based on records for the period 1951-1980.

\*\*\*Departures based on records for 1979-1984 at specific locations.



TABLE 1. Continued

Month & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
<u>Ralph</u> (Harding County Reporting Station)				
Aug. 1986	67.9	0	1.91	0.28
Sept. 1986	53.0	-3.5	3.55	2.34
Oct. 1986	47.1	1.7	0.36	-0.47
Nov. 1986	27.2	-2.6	1.02	0.68
Dec. 1986	25.3	5.6	0.07	-0.21
Jan. 1987	26.2	12.9	0.10	-0.17
Feb. 1987	30.1	10.1	0.65	0.33
Mar. 1987	30.6	2.2	2.38	1.92
Apr. 1987	50.6	8.4	0.40	-1.14
May 1987	59.5	5.7	5.20	2.59
June 1987	66.7	4.0	0.91	-2.57
July 1987	71.3	1.7	3.30	1.38
<u>Murdo</u> (Jones County Reporting Station)				
Aug. 1986	72.0	-2.1	2.66	0.81
Sept. 1986	59.6	-2.2	2.10	0.99
Oct. 1986	51.8	0.5	0.93	-0.22
Nov. 1986	31.2	-16.0	2.32	1.83
Dec. 1986	31.1	7.4	0.04	-0.39
Jan. 1987	30.6	9.8	0.52	0.21
Feb. 1987	33.4	-3.0	0.50	0.04
Mar. 1987	31.7	10.4	3.11	2.03
Apr. 1987	53.4	-0.4	5.63	3.43
May 1987	64.0	1.0	3.78	1.11
June 1987	72.6	3.5	5.85	2.57
July 1987	78.1	0.5	2.95	0.86
<u>Kennebec</u> (Lyman County Reporting Station)				
Aug. 1986	71.4	-3.0	1.65	-0.58
Sept. 1986	60.5	-3.2	2.75	1.54
Oct. 1986	51.0	-0.1	0.78	-0.28
Nov. 1986	30.7	-3.5	0.69	0.18
Dec. 1986	28.9	6.8	0	-0.38
Jan. 1987	28.9	13.3	0.03	-0.22
Feb. 1987	32.6	10.1	1.59	1.11
Mar. 1987	33.8	1.8	3.77	2.88
Apr. 1987	53.2	5.9	0.65	-1.48
May 1987	65.9	7.0	2.21	-0.31
June 1987	72.6	3.5	1.84	-1.17
July 1987	79.2	3.4	1.54	-0.75

\*Average temperatures and precipitation obtained from NOAA Climatological Data from reporting station nearest the experimental sites. Temperatures are reported in degrees Fahrenheit and precipitation in inches.

\*\*Departures from normal are based on records for the period 1951-1980.

\*\*\*Departures based on records for 1979-1984 at specific locations.

TABLE 1. Continued

Month & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
<u>Presho</u> (Lyman County Reporting Station)+				
Aug. 1986	71.3	0.7	1.25	-0.98
Sept. 1986	59.0	-2.3	3.10	1.89
Oct. 1986	51.3	0.4	0.80	-0.26
Nov. 1986	30.9	11.5	0.55	0.04
Dec. 1986	29.4	14.6	0	-0.38
Jan. 1987	28.4	3.2	0	-0.25
Feb. 1987	32.8	13.7	M	M
Mar. 1987	32.3	-10.0	1.70	0.81
Apr. 1987	52.9	6.0	0.30	-1.83
May 1987	63.9	4.1	3.79	1.27
June 1987	71.7	-0.6	1.19	1.09
July 1987	M	M	1.00	-1.29

+(Longtime averages were recorded at Kennebec, SD.)

<u>Bear Butte Valley</u> (Ft. Meade-Meade County Reporting Station)***				
Aug. 1986	71.1	-0.6	0.27	-1.45
Sept. 1986	55.5	-6.1	5.98	4.79
Oct. 1986	49.4	-1.5	2.40	1.36
Nov. 1986	32.3	-3.6	1.74	1.04
Dec. 1986	32.0	3.9	0.08	-0.48
Jan. 1987	32.0	9.2	0.11	-0.36
Feb. 1987	34.5	6.6	1.25	0.53
Mar. 1987	34.0	0.4	2.13	1.11
Apr. 1987	53.6	8.1	0.42	-1.99
May 1987	60.6	4.2	4.44	1.13
June 1987	69.2	3.4	0.58	-3.23
July 1987	74.5	1.5	1.76	-0.47

<u>Plainview</u> (Meade County Reporting Point)***				
Aug. 1986	(69.0)+	(-4.3)+	(2.29)+	0.46
Sept. 1986	56.0	-6.3	1.53	-0.47
Oct. 1986	(49.3)+	(-0.6)+	(1.15)+	( 0.04)+
Nov. 1986	(29.4)+	(-4.0)+	(0.62)+	( 0.12)+
Dec. 1986	29.7	11.0	0	-0.32
Jan. 1987	29.0	5.9	0.03	-0.11
Feb. 1987	32.0	5.5	1.56	1.45
Mar. 1987	28.3	-1.6	2.43	1.44
Apr. 1987	(51.4)+	( 5.4)+	(0.19)+	(-1.63)+
May 1987	59.3	3.2	4.87	2.27
June 1987	70.1	—	1.39	—
July 1987	(76.0)+	( 1.6)+	(7.66)+	( 5.74)+

+(Data from Plainview missing, reported data from Milesville)

\*Average temperatures and precipitation obtained from NOAA Climatological Data from reporting station nearest the experimental sites. Temperatures are reported in degrees Fahrenheit and precipitation in inches.

\*\*Departures from normal are based on records for the period 1951-1980.

\*\*\*Departures based on records for 1979-1984 at specific locations.



TABLE 1. Continued

Month & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
<u>Rapid City Airport</u> (Pennington County Reporting Station)				
Aug. 1986	69.6	-1.8	1.32	-0.12
Sept. 1986	55.0	-5.9	3.14	2.11
Oct. 1986	48.7	-1.0	1.64	0.83
Nov. 1986	30.6	-4.3	1.40	0.89
Dec. 1986	30.5	4.4	0.01	-0.44
Jan. 1987	31.1	10.3	0.04	-0.38
Feb. 1987	32.4	6.4	1.71	1.09
Mar. 1987	32.6	0	1.14	0.12
Apr. 1987	51.6	7.0	0.02	-1.94
May 1987	59.5	3.9	3.39	0.76
June 1987	67.1	1.9	1.37	-1.89
July 1987	75.4	2.8	0.83	-1.29
<u>Wasta</u> (Pennington County Reporting Station)				
Aug. 1986	70.9	-2.4	0.96	-0.55
Sept. 1986	57.6	-4.6	4.41	3.35
Oct. 1986	48.9	-1.5	1.22	0.30
Nov. 1986	30.8	-4.3	0.77	0.28
Dec. 1986	29.0	4.3	Tr	-0.38
Jan. 1987	29.9	10.1	0.06	-0.29
Feb. 1987	32.4	6.4	1.82	1.38
Mar. 1987	31.6	-2.5	1.78	0.93
Apr. 1987	52.8	5.8	0	-1.91
May 1987	61.8	3.7	4.96	2.45
June 1987	69.6	1.9	0.45	-2.68
July 1987	76.7	1.8	1.03	-1.02
<u>Bison</u> (Perkins County Reporting Station)				
Aug. 1986	68.4	-2.4	0.67	-1.08
Sept. 1986	54.2	-4.6	2.57	1.36
Oct. 1986	48.3	-2.4	1.03	0.21
Nov. 1986	27.8	-4.2	0.75	0.24
Dec. 1986	27.5	9.5	Tr	-0.39
Jan. 1987	27.6	11.8	Tr	-0.36
Feb. 1987	29.8	5.6	0.81	0.29
Mar. 1987	30.1	0.1	2.32	1.49
Apr. 1987	51.9	8.5	0.25	-1.60
May 1987	60.2	3.2	4.95	2.39
June 1987	68.3	---	1.70	-1.58
July 1987	73.2	-0.9	1.39	-0.81

\*Average temperatures and precipitation obtained from NOAA Climatological Data from reporting station nearest the experimental sites. Temperatures are reported in degrees Fahrenheit and precipitation in inches.

\*\*Departures from normal are based on records for the period 1951-1980.

\*\*\*Departures based on records for 1979-1984 at specific locations.

TABLE 1. Continued

Month & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
<u>Kirley (Stanley County Reporting Station)****</u>				
Aug. 1986	69.5	--	0.48	-1.37
Sept. 1986	56.2	-6.1	3.33	1.97
Oct. 1986	49.5	1.6	0.75	-0.24
Nov. 1986	28.9	-4.3	1.01	0.58
Dec. 1986	28.3	8.9	Tr	-0.50
Jan. 1987	28.0	12.2	0.05	-0.30
Feb. 1987	31.3	8.5	2.56	1.98
Mar. 1987	27.1	---	3.24	1.18
Apr. 1987	M	M	M	M
May 1987	61.4	3.8	4.05	1.43
June 1987	69.8	---	1.96	-1.04
July 1987	(76.6)+	(0.7)+	(1.90)+	(0.07)+
+(Data missing from Kirley, reported data from Midland)				

\*Average temperatures and precipitation obtained from NOAA Climatological Data from reporting station nearest the experimental sites. Temperatures are reported in degrees Fahrenheit and precipitation in inches.

\*\*Departures from normal are based on records for the period 1951-1980.

\*\*\*Departures based on records for 1970-1984 at specific location.

\*\*\*\*Departures based on records of 14 years (1971-1984).

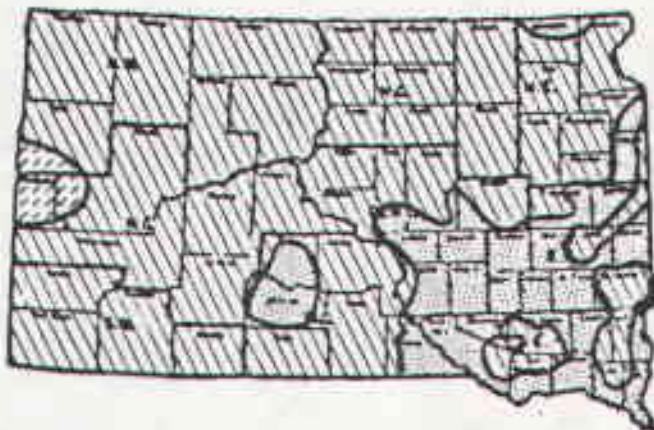
Topsoil moisture (Table 2) was adequate at nearly all locations in the western half of the state in mid-April. However, by mid-May the greater portion of western South Dakota was experiencing a topsoil moisture shortage. By mid-June, the droughty conditions were becoming critical in the northern border counties. These conditions continued through July and into August. By the end of the first week of August rain showers were received in nearly all areas except the extreme southwestern counties.

The total useable moisture (Table 3) for the entire crop year varied from 8.3 inches in western Lyman County at Presho to over 20 inches at Kirley in Haakon County. The Spring season useable moisture ranged from 3.7 inches at Kennebec in eastern Lyman County to over 11 inches at Kirley in Haakon County.

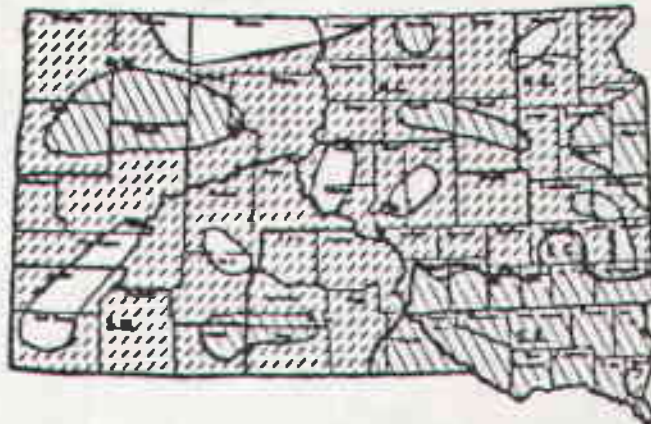


TABLE 2. Topsoil Moisture Conditions During Growing Season, May-September 1987. (Crop and Livestock Reporting Service-USDA)

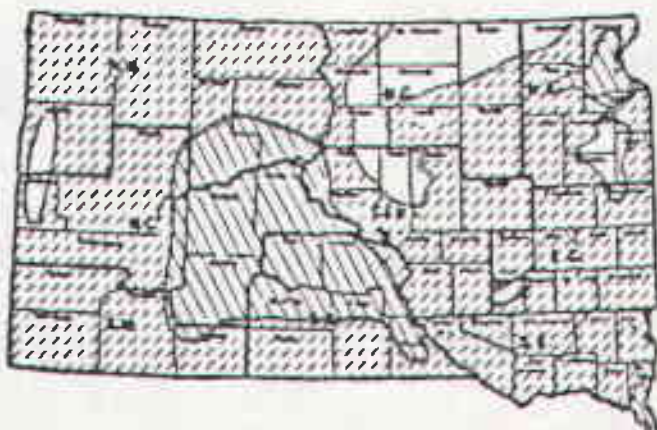
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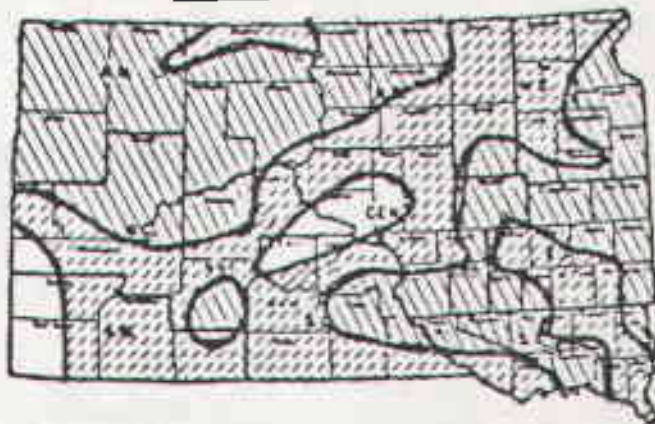
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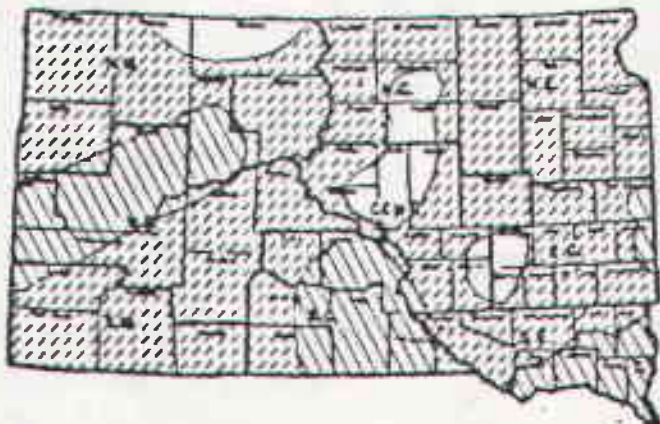
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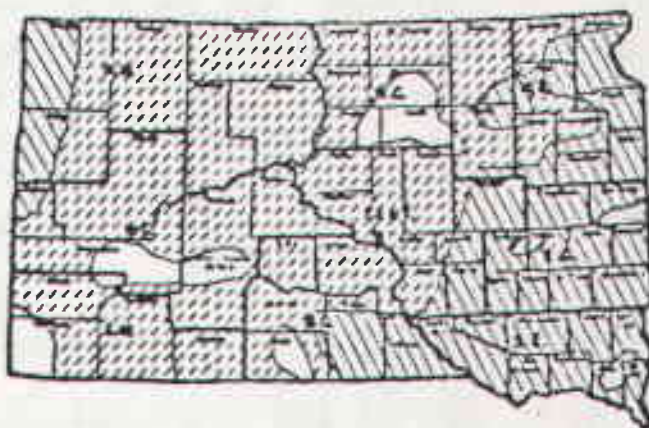
As of Friday, August 14, 1987



As of Friday, June 19, 1987



As of Friday, September 18, 1987



			
CRITICALLY SHORT	SHORT	ADEQUATE	SURPLUS

**TABLE 3. Weather Data - Date of Critical Temperatures and Total Useable Precipitation in Counties with Experimental Plots, (1986-1987).**

Location	Date of Temperature*		Total Useable Moisture**	
	Fall-First	Spring-Last	Aug. 86-July 87	April 87-July 87
Bennett County (Martin)	Oct. 12 (21°)	Apr 24 (28°)	9.53	4.03
Harding County (Ralph)	Sept. 7 (27°)	Apr 21 (26°)	12.22	6.55
Jones County (Murdo)	Oct. 12 (22°)	Apr 11 (28°)	11.91	4.41
Lyman County (Kennebec) (Presho)	Oct. 13 (17°)	Apr 22 (25°)	11.29	3.67
	Oct. 12 (18°)	Apr 3 (26°)	8.26	4.06
Meade County (Ft. Meade)	Oct. 11 (27°)	Apr 21 (27°)	14.19	4.87
Meade County (Plainview)	Oct. 12 (20°)	Apr 21 (26°)+	19.21+	9.85+
Pennington County (Rapid City AP)	Oct. 11 (25°)	Apr 14 (28°)	9.89	3.77
Pennington County (Wasta)	Oct. 12 (21°)	Apr 21 (24°)	11.29	4.77
Perkins County (Bison)	Oct. 12 (20°)	Apr 11 (24°)	9.53	5.58
Stanley County (Kirley)	Oct. 12 (23°)	—No Data—	20.63	11.69

\*First 28 degree temperature in Fall or last 28 degree temperature in Spring reported in degrees Fahrenheit.

\*\*Sum of all precipitation where amounts were greater than 0.25 inch or totaled 0.25 inches in two contiguous days.

+Missing Data - Closest reporting station was Milesville.



## SMALL GRAIN VARIETY TRIALS

Objective: To observe and compare standard small grain varieties and experimental lines for winter hardiness, grain yield, grain quality, disease resistance, insect resistance, and other characteristics for area adaptability.

### Hard Red Winter Wheat

Trials and demonstrations were located in Bennett, Harding, Lyman, Meade, Pennington, Perkins and Stanley Counties. The trial plots were seeded with a deep furrow seeder with fertilizer attachment. The demonstration plots were seeded by the Cooperators. The seeding rate for the trials was 60 pounds per acre.

The plots were harvested with a Hege Model 125B self-propelled plot combine. Machine harvested plots contained a minimum of 125 square feet per sample. All samples were weighed for plot yield and bushel weight at the harvest site.

### Bennett County

The winter wheat variety trial in Bennett county was seeded into fallow soil with a deep furrow seeder on September 25. Soil moisture was adequate for germination. Above normal precipitation was received during the following February and March, but precipitation was below normal from April through July. Grain yield was dependent upon moisture stored in the subsoil the previous summer and early spring. Table 2 illustrates the unfavorable topsoil moisture situation.

Subnormal temperatures (Table 1) were experienced during most of the fall. December, January and February air temperatures were above normal by 2.7, 7.6, and 9.4 degrees. March air temperatures were near normal, but from April through July the average air temperatures ranged from 1.4 to 6.0 degrees above normal.

The plots were fertilized for an anticipated yield of 40 bushel per acre. Weeds were controlled by an application of Glean at one-half ounce per acre. The results are listed in Table 4.

### Harding County

The Harding County trial was seeded on September 23. Soil moisture was more than adequate for germination and emergence. Rainfall was slightly above normal in August, and was over 2.3 inches above normal during September. Moisture was available in the subsoil at seeding time to a depth of thirty six inches. Precipitation during the winter and spring was near normal, with some months being above average and other months being below average.

Air temperatures were below normal during September and November, and above normal from December through July. The average temperature was above normal in January by almost thirteen degrees and in February by over ten degrees. The remaining months varied from two to eight degrees above normal.

Winterkill was extremely variable with an average survival of 48%. Fertilizer was applied for an anticipated yield of forty bushels per acre. The herbicide Glean was used to control the weeds. The trial data are published in Table 5.

TABLE 4. Hard Red Winter Wheat Variety Trial - Bennett County (Martin), 1985-87.

Variety	% Stand Apr 87	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1987 (3 yr av)	
Abilene(W362-5)	88	28	May 26	13.6	61.9	53.2	--
Quantum 554	83	38	May 27	12.6	60.8	53.1	--
Bounty 205	90	33	May 27	14.2	59.6	53.1	45.5
Colt	83	30	May 27	14.0	59.4	52.2	40.9
HW 1035	86	33	May 25	13.6	60.4	51.0	--
Quantum 568	86	32	May 27	12.3	59.8	51.0	--
Dawn	69	31	May 28	14.0	62.0	51.0	39.5
Rodeo	93	32	May 27	13.3	61.4	50.2	--
Quantum XH140A	89	32	May 27	13.3	59.7	49.7	--
Big Horn	83	28	May 31	14.4	60.6	49.5	34.4
SD 82102	90	36	May 29	14.0	60.5	48.8	--
Sage	91	35	May 27	13.7	61.4	48.6	41.4
Scout 66	86	36	May 27	13.2	60.9	48.6	38.8
Bounty 301	88	34	May 29	13.1	56.7	48.6	41.0
Redland	93	31	May 29	12.4	58.7	48.1	--
Rita	71	31	May 29	13.0	58.4	48.0	36.2
Centura	88	34	May 27	12.6	60.8	46.9	36.9
Rose	91	34	May 30	13.4	61.3	46.8	34.0
Dodge	93	31	May 26	13.5	59.8	45.7	--
Thunderbird	89	34	May 26	15.1	60.8	45.6	42.6
Centurk 78	92	35	May 28	13.5	60.8	45.2	35.7
Norkan	93	31	May 25	13.3	60.4	44.9	--
Bennett	63	31	May 27	14.2	59.8	44.8	37.3
SD 80259-18	88	34	May 28	14.9	60.7	44.4	34.4
Cody	85	33	May 28	14.0	60.3	43.6	--
TAM 107	81	27	May 24	13.5	60.7	43.2	35.5
Norwin	89	23	May 30	12.5	60.0	41.9	30.2
Lancota	69	35	May 31	15.3	60.2	41.6	--
SD 82195	86	35	May 30	13.9	60.7	41.2	34.3
Siouxland	86	35	May 27	14.5	59.7	41.1	43.2
Agassiz	89	40	June 1	14.2	61.9	39.8	32.8
Brule	78	30	May 29	13.2	58.9	39.7	35.7
Nell	40	34	May 28	14.0	60.3	38.0	33.9
RL845504	83	38	May 31	14.6	59.4	36.9	--
Arkan	93	28	May 24	12.8	56.8	36.4	--
Roughrider	93	38	June 1	15.4	61.0	35.2	32.3
RL845457	81	36	May 29	15.8	60.3	33.2	--
LSD (.05) - 8.4 Bu/A		C.V. - 13.1%			Mean - 45.4		

\*Protein content determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 25, 1986 and harvested July 22, 1987.



TABLE 5. Hard Red Winter Wheat Variety Trial - Harding County(Ralph), 1985-87.

Variety	% Stand May 1987	Height (Inches)	Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1987	Grain Yield-Bu/A (3 yr av)
Rose	84	29	M-L	12.1	61.3	51.7	40.3
Norwin	64	22	M-L	12.4	59.5	50.4	40.1
SD 82195	80	32	M-L	11.5	60.1	50.0	39.6
Roughrider	88	34	M-E	11.3	60.3	46.8	38.1
Quantum 568	48	25	M-E	10.3	58.9	46.7	--
Agassiz	80	36	M-L	11.4	60.8	45.7	39.1
Rodeo	66	29	M-E	11.0	60.0	45.7	--
SD 82102	78	31	M	11.7	59.4	45.5	--
Cody	69	28	M	13.3	58.9	45.4	--
Quantum XH140A	60	24	E	11.1	58.9	45.1	--
HW 1035	74	26	E	12.4	59.3	45.0	--
Abilene(W362-5)	49	23	E	11.5	60.4	43.2	--
Big Horn	55	27	M-E	12.3	59.0	41.9	34.8
SD 80259-18	63	30	M	12.5	58.6	40.6	33.4
Redland	40	29	M	10.8	58.2	40.1	--
Scout 66	65	28	E	12.8	59.0	39.1	35.8
Centura	60	29	M-E	12.5	58.7	39.1	34.8
Sage	56	28	E	11.7	59.3	37.8	35.5
Brule	35	28	M	10.8	57.4	37.0	36.5
Norkan	48	25	M-L	12.6	59.2	36.8	--
Quantum 554	35	29	M-E	12.5	58.2	36.6	--
Colt	28	25	M	12.9	58.3	36.3	33.5
Bennett	40	28	E	13.4	58.4	36.1	30.1
Dodge	44	26	M-E	13.4	58.9	35.6	--
Arkan	58	27	E	13.1	57.5	33.6	--
Nell	10	27	E	13.6	58.6	33.0	32.3
Centurk 78	51	26	M	12.1	58.5	32.8	32.3
TAM 107	54	22	E	11.7	57.4	31.4	--
RL845504(RHSX)	43	31	M-L	12.8	57.3	30.5	--
Siouxland	39	26	E	13.7	58.5	29.3	35.3
Thunderbird	44	26	M-E	13.4	58.9	28.4	31.7
Rita	5	25	M	12.6	55.8	28.3	33.0
Lancota	7	30	M	14.6	58.2	26.5	--
RL845457(RHSX)	34	28	M	13.9	58.4	25.2	--
Bounty 301	4	26	M	12.6	56.1	18.2	27.5
Dawn	2	28	M-E	13.0	57.6	17.9	27.2
Bounty 205	7	25	M	13.9	57.2	17.0	23.4

LSD(.05) - 7.6 Bu/A

C.V. - 15.0%

Mean - 37.0

\*Maturity Index: E=early, M-E=medium early, M=medium, M-L=medium late, L=late.

\*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

Note: Seeded September 23, 1986 and harvested July 27, 1987.

Lyman County  
(Kennebec)

The winter wheat variety demonstration near Kennebec was seeded on September 10 with a farm sized deep furrow drill. Varieties were seeded in single strips that were several hundred feet long. The strips were subdivided into shorter sections to provide uniform and multiple harvest samples. Management practices such as seeding rate, seeding date, soil fertility, and weed control are at the discretion of the cooperator. The trial data are reported in Table 6.

Lyman County  
(Presho)

The winter wheat variety demonstration near Presho was seeded on September 13, with a farm sized deep furrow drill. Varieties were seeded in single five row strips that were several hundred feet long. The strips were later subdivided into shorter sections to provide uniform and multiple harvest samples. Management practices such as seeding date, seeding rate, soil fertility, and weed control are at the discretion of the cooperator. Data are reported in Table 7.

Meade County  
(Bear Butte Valley)

Winter wheat varieties in Bear Butte Valley were seeded on September 23, 1986. The soil was wet on the surface and moist at seeding depth. Germination and emergence were good. Air temperatures from September through November were cool, but fall growth was normal. Air temperatures from December through the Spring growing season were above normal. Precipitation was limited during April and June. The result was a topsoil moisture deficiency except during late May. Overall, the above normal temperatures and limited moisture did not appear to influence yields to any extent.

Stored soil moisture was measured to a depth of thirty inches in the Spring of 1987. This would convert to six inches of water. With normal seasonal precipitation, sufficient soil moisture would have been available to produce grain yields of 45 bushels per acre. The trial received liquid fertilizer (12-41-0) at the rate of 100 pounds per acre at seeding. Weeds were controlled by an application of 1/2 ounce of Glean per acre. The trial results are reported in Table 8.

Meade County  
(Plainview)

The Winter wheat trial at Plainview was seeded on September 9, 1986. The soil was firm with good moisture. Germination and emergence was excellent resulting in vigorous plants and good ground cover. Air temperatures were below normal from August through November, and above normal from December through July, except during March. Precipitation averaged near normal from August through January, above normal during February, March, May, and July, but below normal during April and possibly June. Topsoil moisture was adequate during the entire spring and summer growing season. The trial was heavily infected with a foliage disease causing stunting and yellowing. Trial data are listed in Table 9.

TABLE 6. Hard Red Winter Wheat Variety Demonstration - Lyman County (Kennebec), 1986-87.

Variety	Height (Inches)	Days to Heading*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(2 yr av)
Quantum 568	38	151	12.9	58.1	88.9	67.0
Colt	34	152	13.3	56.8	83.9	68.2
Redland	41	153	12.1	53.2	82.8	—
Brule	40	152	11.7	55.4	81.9	66.1
TAM 107	34	149	13.0	58.0	79.1	—
Dawn	37	152	12.6	57.7	76.1	63.8
Centura	40	151	13.4	58.0	75.8	65.5
Siouxland	41	150	13.1	57.4	75.5	69.3
Centurk 78	41	152	12.9	59.3	74.4	57.3
Sage (Ck-4)	41	150	—	59.9	73.5	59.3
Rodeo	37	152	13.6	58.4	73.1	—
Lancota	43	153	14.7	58.1	72.5	65.9
Rose	40	153	14.0	59.3	71.9	54.3
Sage (Ck-3)	40	150	—	59.0	70.9	58.0
Arkan	34	150	12.9	57.9	70.2	—
Sage (Ck-6)	42	150	—	59.5	70.0	57.5
Sage (SDSU)	41	150	13.6	59.5	69.1	58.5
Sage (Ck-5)	43	150	—	60.1	68.9	57.0
Sage (Ck-7)	42	150	—	59.0	68.4	56.7
Sage (Ck-2)	40	150	—	59.7	66.6	55.9
Cody	39	152	12.7	57.1	65.2	—
Roughrider	40	154	14.2	59.5	62.2	49.3
Sage (Ck-1)	39	150	—	58.0	62.1	53.6
Bennett	37	151	15.4	58.8	62.0	46.7
Quantum 554	40	151	13.2	59.3	61.4	49.3
Rita	34	153	14.1	55.0	60.3	48.7
Scout 66	40	151	14.0	60.4	58.4	54.8
Thunderbird	34	150	13.4	61.3	58.3	57.7
Agassiz	47	154	14.6	59.6	58.3	48.8
Big Horn	34	153	15.1	59.6	58.2	37.7
Wthermster 104	44	—	14.2	59.5	58.2	—
Agate	43	—	14.0	59.8	56.8	—
Ram	36	—	12.9	55.8	55.5	51.9
Wthermster 106	42	—	14.0	58.7	55.3	—
Nell	39	151	13.9	59.0	54.2	48.4

LSD(.05) - 7.7 Bu/A

C.V. - 7.8%

Mean - 68.0

\*Indicates days from January 1 to day of heading.

\*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded September 10, 1986 and harvested July 13, 1987.

TABLE 7. Hard Red Winter Wheat Variety Demonstration - Lyman County (Presho), 1985-87.

Variety	Height (Inches)	Days to Heading*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
Redland	35	153	10.3	55.5	50.1	—
Quantum 554	38	151	12.5	56.9	48.3	40.6
Colt	29	152	11.3	56.5	47.4	40.1
Centura	35	151	11.5	57.5	46.2	—
Sage	36	150	13.0	58.1	45.8	37.0
Bennett (Ck-1)	34	151	—	56.0	45.5	37.4
Brule	34	152	10.5	55.3	45.4	36.6
Rose	38	153	12.1	59.4	41.8	39.5
Rodeo	33	152	11.9	59.0	41.7	—
Scout 66	42	151	12.1	58.5	41.2	37.9
Centurk 78	33	152	10.3	57.7	41.2	37.1
KS82H4	39	—	12.4	60.8	40.4	—
Roughrider	38	154	11.7	56.8	39.9	33.4
Bennett (Ck-5)	35	151	—	57.5	39.8	37.4
TAM 107	30	149	11.5	57.7	38.8	—
Big Horn	31	153	11.2	56.7	38.7	29.5
Bennett (Ck-2)	31	151	—	56.1	37.6	37.4
Agassiz	40	154	11.4	58.0	37.2	29.3
Arkan	30	150	11.5	55.6	37.2	—
Rita	32	153	11.6	55.8	37.0	34.3
Ram	32	—	11.3	55.8	36.4	35.6
Cody	33	152	10.4	56.1	36.1	—
Dawn	30	152	10.5	57.3	33.2	37.4
Lancota	35	153	11.8	56.5	32.9	32.9
Thunderbird	30	150	12.6	57.7	32.9	—
Bennett (Ck-4)	30	151	—	56.1	32.8	37.4
Abilene	28	152	12.1	57.9	32.2	—
Siouxland	33	150	12.1	55.3	31.7	35.0
Bennett (Ck-3)	31	151	—	56.6	29.5	37.4
Nell	37	151	12.7	57.4	29.5	32.3
LSD(.05) - 6.0 Bu/A		C.V. - 10.7%		Mean - 37.6		

\* Indicates days from January 1 to day of Heading.

\*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded September 13, 1986 and harvested July 13, 1987.

TABLE 8. Hard Red Winter Wheat Trial - Meade County(Bear Butte Valley), 1985-87.

Variety	% Stand May 1987	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A	
						1987	(3 yr av)
Rose	92	35	May 30	13.1	60.5	61.4	51.3
SD 82195	92	39	June 1	14.4	59.7	60.8	--
Big Horn	91	32	June 2	12.1	57.4	60.4	--
Siouxland	88	36	May 28	13.4	57.4	59.4	54.4
Rodeo	88	36	May 28	13.2	57.4	59.2	--
HW 1035	81	32	May 28	11.9	60.0	59.1	--
Quantum XH140A	89	32	May 29	12.9	57.7	59.0	--
Quantum 568	91	35	May 29	12.5	56.2	58.1	--
Sage	88	38	May 29	13.4	59.4	57.5	51.0
Roughrider	91	44	June 3	13.7	60.7	57.4	47.8
Centura	86	34	May 30	13.8	59.6	56.9	49.2
Dodge	78	30	May 29	13.4	59.6	56.6	--
Scout 66	88	40	May 28	13.7	59.6	56.6	49.3
Cody	86	35	May 30	12.8	58.6	56.3	--
Thunderbird	84	33	May 28	13.3	59.5	56.1	--
Abilene(W362-5)	89	28	May 30	13.2	59.5	56.1	--
Colt	84	28	May 31	14.1	57.0	55.8	51.0
Norkan	86	31	May 28	13.5	59.1	55.6	--
Centurk 78	89	36	May 30	13.3	58.8	55.4	49.3
Redland	86	33	June 2	11.7	56.8	54.6	--
SD 80259-18	89	40	May 30	14.9	59.4	54.6	--
SD 82102	89	39	May 29	14.6	58.0	54.5	--
TAM 107	88	32	May 27	13.2	58.2	52.2	--
Agassiz	95	46	June 4	14.4	58.6	50.5	43.2
RL845504(RHSX)	84	39	June 3	14.3	57.4	50.0	--
Dawn	84	34	June 1	13.3	57.1	49.8	45.8
Quantum 554	84	36	May 30	13.6	56.3	49.7	--
Norwin	92	28	June 4	13.2	56.0	49.6	--
Brule	81	36	June 3	12.5	55.2	48.6	48.2
Bennett	75	33	June 1	14.0	58.5	47.2	45.7
Rita	71	32	June 2	13.1	55.3	46.5	43.1
Nell	72	38	June 1	13.7	58.9	44.8	45.5
Bounty 301	74	36	June 2	13.8	57.1	43.6	--
RL845457(RHSX)	79	38	June 2	14.4	58.9	42.8	--
Bounty 205	70	34	May 31	14.2	56.8	42.8	--
Lancota	70	40	June 3	14.7	57.7	35.2	--
Arkan	51	30	May 29	12.8	59.2	34.5	--
LSD(.05) - 9.2 BU/A				C.V. - 12.7%		Mean - 48.6	

\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 23, 1986 and harvested July 27, 1987.



TABLE 9. Hard Red Winter Wheat Trial - Meade County (Plainview), 1985-87.

Variety	% Stand May 1987	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1987 (3 yr av)	
Quantum KH140A	88	29	May 29	13.1	50.2	44.5	--
Quantum 568	85	30	May 29	13.1	50.6	40.9	40.2
SD 82195	93	36	June 3	14.1	52.3	40.8	--
Rose	88	37	June 1	14.5	51.1	40.0	40.4
Big Horn	83	27	June 1	14.3	51.0	38.3	29.2
HW 1035	88	32	May 28	13.2	52.4	38.2	--
Abilene(W362-5)	83	27	May 29	13.4	52.6	37.5	--
Scout 66	87	36	May 28	13.7	54.9	36.7	38.2
Cody	85	31	May 31	13.9	48.6	36.2	--
Nell	83	33	May 29	13.7	52.1	35.7	35.1
TAM 107	85	27	May 27	13.7	51.3	35.6	--
Quantum 554	87	31	May 30	14.3	46.3	35.6	--
Bennett	87	31	May 30	13.9	48.7	35.6	42.0
SD 80259-18	87	33	May 30	14.6	52.2	34.8	--
SD 82102	85	36	May 30	14.4	51.1	33.7	--
Rita	82	31	May 31	14.8	48.0	33.7	37.8
Siouxland	83	31	May 30	14.2	46.2	32.5	43.5
Sage	85	31	May 28	13.4	52.4	31.7	38.6
Brule	82	30	May 31	12.6	47.8	31.2	39.2
Centura	82	31	May 29	13.6	51.6	30.9	37.4
Redland	78	31	June 3	12.6	49.9	30.3	--
Colt	83	26	June 1	13.9	46.2	29.6	39.7
Thunderbird	83	27	May 28	13.6	52.0	29.6	41.0
Rodeo	82	30	May 31	12.9	52.3	27.9	--
Roughrider	92	42	June 4	14.8	50.1	27.4	30.4
Dawn	72	29	May 29	13.0	48.4	26.8	38.2
Agassiz	90	36	June 4	15.0	50.8	26.4	28.0
Lancota	75	32	May 31	14.9	49.7	25.5	--
Norwin	83	24	June 3	14.1	46.7	25.0	--
Arkan	75	27	May 29	13.6	53.1	24.9	--
RL845457(RHSX)	83	34	June 1	15.5	49.1	24.7	--
Norkan	70	27	May 29	14.7	50.4	23.5	--
Dodge	75	26	May 30	14.4	50.3	23.3	--
Bounty 205	37	28	June 1	14.6	49.1	20.3	--
Bounty 301	63	29	June 4	13.8	48.3	19.9	--
RL845504(RHSX)	70	35	June 4	15.7	47.0	19.8	--
Centurk 78	78	28	May 29	14.1	46.2	18.6	33.4
LSD(.05) - 7.6 Bu/Acre		C.V. - 17.9%		Mean - 31.0			

\*Percent protein determined with a Technicon 300 InfraAnalyzer.

Note: Seeded September 9, 1986 and harvested July 23, 1987. Trial was adversely affected by disease as evidenced by low weight per bushel and grain yields.



### Pennington County

The winter wheat trial in Pennington County was seeded in fallow soil on September 8, 1986. The soil surface was loose, dry, and cloddy, but the subsoil contained moisture sufficient for germination. Rainfall had been below normal in August but was much above normal during September. Adequate moisture was therefore available to permit good fall growth and winter cover. Precipitation was normal from October through January, above normal during February, March, and May, but was below normal during April, June, and July. Air temperatures which were below normal from August through November, were four to ten degrees above normal from December through February. In March the temperatures were two degrees below normal. During the remainder of the growing season temperatures averaged several degrees above normal each month. The trial results are listed in Table 10.

### Perkins County

The winter wheat trial in Perkins County was seeded on September 24, 1986. Stored soil moisture was limited but rainshowers prior to and after seeding provided sufficient moisture for germination and emergence. Precipitation during the autumn months was above normal, but during the early winter months was below normal. March and May had above normal precipitation while April, June, and July received no rain or very little useable moisture. Spring soil moisture was measured to a depth of only 24 inches.

Air temperatures from August through November were two to four degrees below normal. During the winter, the air temperature averages were above normal by 9.5 degrees in December, 11.8 degrees in January, and 5.6 degrees in February. March temperatures were normal but April averaged 8.5 degrees above normal. The results of the study are published in Table 11.

### Stanley County

The winter wheat varieties in Stanley County were seeded in fallow soil on September 30, 1986. There was adequate moisture for germination and emergence in the fall. Above normal precipitation was received during the early Spring. However, topsoil moisture was short during late spring.

Air temperatures were below normal during September and November, but were above normal during the rest of the months. The winter was mild and average air temperatures were reported as 8.9 degrees above normal in December, 12.2 degrees above normal in January, and 8.5 degrees above normal in February. The trial data are listed in Table 12.

TABLE 10. Hard Red Winter Wheat Variety Trial - Pennington County(Wall),1985-87.

Variety	% Stand May 1987	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1987	(3 yr av)
HW 1035	89	35	May 23	10.3	60.6	70.9	--
Quantum 568	89	35	May 26	10.1	60.5	70.3	--
Abilene(W362-5)	85	28	May 26	11.4	62.8	70.3	--
Quantum XH140A	89	34	May 28	10.1	61.1	70.0	--
Cody	85	35	May 29	11.8	61.5	69.4	--
Siouxland	89	38	May 26	12.5	60.4	69.1	58.9
Colt	88	30	May 27	11.7	61.2	68.4	58.1
Sage	90	36	May 25	12.0	61.6	66.5	54.0
SD 82195	88	38	May 30	12.5	61.8	66.1	54.2
Big Horn	88	29	May 29	10.7	61.5	65.7	50.6
Brule	79	34	May 28	10.9	60.2	65.6	56.2
Rose	89	36	May 30	11.7	62.3	65.1	55.3
Norwin	84	33	May 30	11.0	62.2	64.8	48.6
SD 82102	88	39	May 29	10.6	61.5	64.6	--
Rodeo	90	34	May 25	10.9	62.7	64.2	--
TAM 107	84	31	May 21	11.0	60.9	63.7	52.5
Centurk 78	85	34	May 27	10.8	61.5	63.2	55.8
Quantum 554	85	38	May 27	10.5	59.9	62.4	--
SD 80259-18	86	35	May 28	11.6	59.5	61.8	--
Scout 66	85	36	May 26	11.0	61.7	61.6	53.1
Centura	84	36	May 27	11.2	60.0	61.6	53.4
Dawn	79	32	May 29	11.0	62.3	59.7	51.3
BH 205	73	32	May 29	12.8	61.1	59.4	50.6
Thunderbird	86	32	May 26	12.9	61.5	59.4	51.8
Bennett	83	32	May 27	12.8	59.9	59.2	52.6
RL845457(RHSX)	80	38	May 29	13.0	61.4	59.0	--
Nell	75	36	May 28	11.8	60.9	58.9	50.1
Redland	81	34	May 29	10.8	59.6	58.9	--
Agassiz	93	46	May 31	11.5	62.1	57.4	50.8
Dodge	83	31	May 26	12.2	61.3	57.2	--
Rita	81	34	May 30	12.0	60.1	57.0	49.2
Norkan	85	30	May 26	11.7	62.5	56.9	--
Arkan	86	28	May 24	12.1	61.0	55.9	--
BH 301	76	33	May 30	11.3	60.3	54.8	52.0
Lancota	78	39	May 30	12.9	61.1	54.7	--
Roughrider	93	41	May 30	11.8	60.6	53.6	50.5
RL845504(RHSX)	79	38	May 30	13.0	58.9	50.7	--

LSD(.05) - 6.0 Bu/A

C.V. - 7.1%

Mean - 62.1

\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 8, 1986 and harvested July 16 & 21, 1987.

TABLE 11. Hard Red Winter Wheat Variety Trial - Perkins County(Bison), 1985-87.

Variety	% Stand May 1987	Height (Inches)	Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1987	(3 yr av)
Cody	65	28	M	14.7	59.8	54.0	—
Centurk 78	65	26	M	13.8	61.1	53.6	40.3
Quantum XH140A	54	24	E	13.3	59.1	51.5	—
Norwin	72	22	M-L	14.7	60.4	51.3	38.6
SD 82102	75	31	M	14.1	60.3	51.2	—
Rodeo	72	29	M-E	14.5	61.0	50.8	—
Quantum 568	60	25	M-E	15.5	59.0	50.1	—
Rose	85	29	M-L	15.6	61.3	49.8	40.0
SD 80259-18	68	30	M	15.5	60.7	49.7	—
Brule	40	28	M	12.8	58.9	49.7	39.8
Dodge	45	29	M-E	14.3	62.2	49.0	—
Norkan	42	25	M-L	14.0	61.5	48.5	—
Scout 66	62	28	E	14.5	61.4	48.0	37.9
Siouxland	20	26	E	14.9	59.8	47.6	41.6
Sage	52	28	E	14.3	61.7	46.9	36.8
Abilene(W362-5	50	22	E	14.6	61.6	46.2	—
Big Horn	55	24	M-E	15.6	59.1	45.9	38.8
SD 82195	85	32	M-L	14.6	60.4	45.8	36.7
HW 1035	68	26	E	13.2	61.0	45.7	—
Quantum 554	20	29	M-E	14.7	58.8	45.4	—
Centura	55	30	M-E	13.5	61.0	45.1	37.1
Colt	22	25	M	14.2	59.6	44.5	38.9
RL845457(RHSX)	30	28	M	13.9	60.7	44.4	—
Roughrider	90	34	M-E	15.6	61.0	43.7	35.1
Agassiz	82	36	M-L	15.6	60.1	43.5	35.0
Lancota	10	30	M	16.0	58.9	43.4	—
TAM 107	60	22	E	14.8	60.8	42.7	—
Dawn	2	30	M-E	14.1	61.0	42.1	35.7
Nell	10	27	E	13.4	59.2	40.3	35.0
RL845504(RHSX)	32	31	M-L	14.3	59.4	40.2	—
Thunderbird	30	26	M-E	14.2	61.3	40.1	37.1
Redland	20	29	M	14.7	59.1	39.9	—
Bennett	40	28	E	15.0	59.0	39.0	34.3
Rita	5	25	M	15.1	57.4	36.4	34.9
Bounty 205	10	25	M	14.2	58.7	34.6	29.4
Bounty 301	3	26	M	14.2	60.0	34.2	28.9
Arkan	60	27	E	14.8	60.2	34.0	—
LSD(.05) - 8.2 Bu/A				C.V. - 15.7%		Mean - 45.1	

\*Maturity Index: E=early, M-E=medium early, M=medium, M-L=medium late, L=late.  
 \*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 24, 1986 and harvested July 29, 1987.

TABLE 12. Hard Red Winter Wheat Variety Trial - Stanley County (Hayes), 1987.

Variety	Height (Inches)	Days to Heading*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield Bushel/Acre
Redland	32	153	14.7	58.1	59.0
Brule	35	152	14.4	57.4	56.3
Centurk 78	35	152	14.6	61.1	56.1
Arkan	30	150	14.6	59.5	55.8
Cody	34	152	15.2	59.8	55.3
Rodeo	31	152	15.7	62.2	55.2
Thunderbird	33	150	14.3	61.5	54.5
Ram	33	—	15.3	55.0	54.3
Centura	34	151	14.9	60.9	53.7
Dawn	32	152	15.0	60.0	53.0
Roughrider	38	154	16.0	60.3	49.1
Big Horn	29	153	14.8	59.7	49.0
TAM 107	29	149	13.9	59.0	48.4
Abilene	27	152	15.6	61.8	46.9
Siouxland	35	150	15.6	60.1	46.8
Bennett	32	151	15.4	59.9	46.4
Rose	34	152	16.0	60.3	45.8
Quantum 568	32	151	15.3	57.3	44.1
Agassiz	34	154	15.9	59.2	43.0
Sage	34	150	14.9	62.3	43.0
Quantum 554	37	151	15.5	56.3	42.7
Rita	31	153	15.5	55.9	41.5
Lancota	34	153	16.4	56.5	37.1
Nell	33	151	14.3	58.7	31.7
LSD(.05) - 3.9 Bu/Acre			C.V. - 5.6%		Mean - 48.7

\*Indicates days from January 1 to day of Heading.

\*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

Note: Plots were seeded September 30, 1986 and harvested on July 14, 1987.

#### Hard Red Spring Wheat

Plots were seeded at five locations in 1987. All trials were seeded on fallow with a six row plot seeder having eight inch row spacing. Seeded areas contain a minimum of 120 square feet per variety and a minimum of three replications.

Seeding rate was controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. Harvesting was accomplished with a self-propelled plot combine. Machine harvested plots contained a minimum of 100 square feet per sample. Grain yields and other data are reported in Tables 13 through 22.



### Bennett County

Spring wheat plots at Martin were seeded on April 21 in soil fallowed in 1986. Soil moisture was adequate at seeding time because of heavy wet snow received in late February and mid-March. Rainfall during the period April through July was over 4.75 inches below normal and topsoil moisture was classed as short through the entire growing season. Air temperatures were above normal all of the months from December 1986 through July 1987. The trial results are shown in Table 13.

### Harding County

Spring wheat variety trials at Ralph were seeded in fallow soil on April 28. Precipitation was very irregular throughout the year with the total 4.96 inches above the longtime average. The rain came as heavy showers with long periods between when topsoil moisture would become short.

Air temperatures were above normal from December through July. Winter temperatures averaged eight degrees above normal, while Spring temperatures averaged six degrees above normal. The overall effect of moisture and temperature during the growing season was limited tillering, and reduced yields. Protein content was high and weight per bushel only slightly below standard. The trial data are reported for Hard Spring Wheat in Tables 14-15 and the data for Durum Wheat in Table 19.

### Meade County (Bear Butte Valley)

The variety trials in Bear Butte Valley were seeded on April 16. The surface soil was dry and cloddy, but there was subsurface moisture to a depth of 36 inches. Precipitation had been above normal during the fall and heavy snow had been received in late March. Rainfall was two inches below normal in April, over an inch above normal in May, and over three inches below normal in June. Topsoil moisture was classed as adequate except in May and July.

Air temperatures were above normal for the months December through July. The warmer conditions resulted in few tillers being formed. The drought conditions during early July produced grain with low weight per bushel and high protein content. The data for the Hard Red Spring Wheat are listed in Table 16, and for the Durum trial in Table 20.

### Pennington County

Variety plots of spring wheat were seeded in fallow near Wall on April 27, 1987. Soil moisture was adequate for germination and emergence. However, topsoil moisture was in short supply during May through July. Useable rainfall moisture during the same period was only 4.77 inches.

Air temperatures were above normal from December through July. The warm conditions also were favorable for heavy infection with Barley Yellow Dwarf Virus, which is transmitted by Aphids. The results of the Hard Red Spring Wheat trial are presented in Table 17 and the Durum Trial results in Table 21.

TABLE 13. Hard Red Spring Wheat Variety Trial-Bennett County(Martin), 1985-87.

Variety	Height (Inches)	Days to Heading*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
Stoa	29	56	15.4	55.0	38.4	36.9
SD 8052-1	28	--	15.4	54.2	36.9	--
Butte 86	29	53	16.3	55.4	36.7	35.8
Challenger	24	53	15.5	56.2	36.6	32.4
SD 3000	30	--	14.5	54.3	36.6	--
Prospect (SD2956)	27	--	15.4	53.1	36.6	36.3
SD 2999	25	53	15.9	55.1	35.5	--
Butte	28	54	15.3	55.6	35.4	30.7
SD 2980	28	54	14.9	56.8	35.2	35.8
ND 606	31	--	16.0	52.9	35.1	--
Norak	25	55	15.7	54.6	34.9	33.2
SD 3005	27	52	17.2	56.1	34.5	--
Guard	23	54	15.1	56.1	34.4	33.7
Apex 83	23	54	16.5	55.3	33.4	30.7
Nordic	26	57	14.5	56.5	33.4	--
Wheaton	24	57	16.1	52.5	33.1	32.8
Telemark	25	56	15.9	51.9	33.0	--
Celtic	27	56	15.5	55.2	31.9	32.0
Leo 747	23	53	15.4	55.2	31.7	--
Len	25	56	16.9	53.7	30.8	30.7
2369	25	55	16.6	54.7	30.0	29.6
Marshall	22	57	15.4	52.2	29.9	32.4
Norseman	22	57	16.1	51.4	28.9	31.1
2385	26	54	16.0	55.3	28.8	--
Alex	31	57	16.1	54.9	28.1	28.8
MN 81110	25	--	17.6	51.0	27.2	--
Angus	27	56	16.2	54.3	26.6	28.7
Chris	32	57	17.3	53.4	26.3	26.2
Success	26	58	15.5	51.1	23.5	27.0
Coteau	29	--	17.0	50.7	22.7	--
Shield	30	53	15.8	54.7	19.9	30.3
LSD(.05) - 4.0 Bu/A		C.V. - 8.8%		Mean - 31.8		

\*Indicates days from date of seeding to date of heading.

\*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 21 and harvested August 5, 1987.



TABLE 14. Hard Red Spring Wheat Variety Trial - Harding County(Ralph), 1985-87.

Variety	Height (Inches)	Days to Heading*	Percent Protein**	Test Wt. (lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
SD 8052-1	25	--	13.8	58.7	32.2	--
ND 606	28	--	15.0	59.1	30.0	--
SD 3000	28	--	14.1	59.5	29.9	--
Butte 86	28	53	14.7	59.7	29.8	32.5
Prospect(SD 2956)	24	--	15.0	59.6	29.5	33.3
Nordic	23	57	15.0	61.1	29.4	--
Alex	27	57	15.7	60.7	29.2	35.9
Stoa	27	56	14.4	59.7	29.2	35.1
Guard	23	54	15.2	60.3	28.6	31.1
Shield	27	53	14.7	57.4	28.3	27.3
Marshall	20	57	14.9	58.2	28.2	35.8
Norseman	21	57	15.5	57.4	27.9	34.2
SD 2999	27	53	15.4	57.9	26.8	--
MN 81110	25	--	16.1	57.2	26.7	--
Butte	27	54	14.6	59.5	26.5	29.7
Telemark	24	56	14.6	57.2	26.4	--
SD 3005	25	52	14.4	60.4	26.3	--
Wheaton	20	57	14.6	57.3	26.2	30.8
Len	24	56	15.5	59.1	26.2	32.2
SD 2980	26	54	15.5	60.0	26.2	30.9
Success	22	58	16.1	57.9	25.9	32.2
Celtic	26	56	14.5	59.9	25.8	34.0
2369	23	55	14.9	60.1	25.8	31.5
Chris	28	57	15.1	59.4	25.7	26.6
Norak	22	55	15.7	58.6	25.2	31.1
Leo 747	23	53	15.3	60.2	24.2	--
Angus	24	56	14.7	60.4	24.0	31.4
Coteau	23	--	17.3	56.8	24.0	--
Challenger	22	53	15.5	59.4	23.6	29.1
Apex 83	23	54	16.2	60.8	22.3	29.6
2385	23	54	17.1	58.3	18.7	--
LSD(05) - 3.0 Bu/A						
C.V. - 8.3%						
Mean - 26.7						

\*Indicates days from date of seeding to date of heading.

\*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 28 and harvested August 11, 1987.

TABLE 15. Hard Red Spring Wheat Advanced Line Yield Trial - Harding County  
(Ralph), 1985-87.

Variety	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
				1987	(3 yr av)
Stoa	29	15.3	58.7	34.3	31.8
SD 8056	26	13.4	58.2	32.9	--
Butte 86	26	15.4	59.3	32.2	32.0
Prospect(SD 2956)	22	16.6	58.8	32.2	33.1
Marshall	22	15.6	56.7	32.0	29.7
SD 3000	26	14.9	58.7	31.3	33.5
SD 3044	28	14.9	55.5	31.1	--
MN 82354	24	15.3	56.0	31.0	--
Guard	21	15.6	59.1	30.3	31.1
SD 8052-1	25	14.2	53.9	29.5	--
SD 8058	26	14.7	57.3	29.5	--
SD 3038	24	16.4	54.8	29.4	--
SD 2991	23	14.9	53.4	29.3	31.0
Shield	25	15.9	58.5	29.1	25.9
SD 8057	24	15.3	57.8	28.9	--
SD 2998	23	15.3	57.3	28.8	29.0
SD 3027	23	15.9	58.2	28.7	--
SD 3014	25	15.0	58.4	28.6	--
SD 3029	25	15.1	57.1	28.6	--
SD 3005	25	15.9	59.6	28.2	30.0
SD 3010	25	14.6	59.0	28.2	--
SD 3033	27	16.6	57.2	27.7	--
SD 3028	22	15.7	58.1	27.5	--
SD 2999	24	14.9	57.4	27.4	30.3
SD 3022	27	15.9	59.0	27.3	--
SD 2990-1	22	14.0	58.1	27.2	--
SD 3034	26	15.4	58.1	27.2	--
SD 3026	24	16.4	58.2	27.0	--
SD 2980	28	16.1	60.1	26.7	29.1
SD 3016	23	15.9	58.7	26.5	--
Butte	26	15.2	59.3	26.4	27.6
SD 3032	28	16.8	58.7	25.9	--
SD 3042	28	14.7	57.3	25.9	--
SD 8055	27	17.5	58.7	25.3	26.6
SD 3037	24	16.7	58.8	25.6	--
Chris	30	16.4	56.5	25.5	25.6
2369	26	15.9	58.3	25.2	28.7
SD 3046	24	17.1	59.3	24.9	--
SD 3039	23	16.3	60.4	24.8	--
SD 3025	25	16.2	57.5	24.5	--
SD 3030	27	16.0	58.2	24.3	--
SD 3043	23	15.9	58.6	24.3	--
Len	24	15.8	57.2	24.1	28.6
SD 3041	22	14.9	58.3	24.1	--
SD 3035	26	17.2	59.4	23.7	--
SD 3036	24	17.2	56.1	22.8	--
SD 3040	28	17.4	58.2	21.6	--
SD 3045	24	18.4	58.1	20.5	--
SD 3031	24	17.8	57.2	19.4	--
LSD(.05) - 3.9 Bu/A		C.V. 8.3%	Mean - 27.3		

\*Percent protein determined with a Technicon 300 InfraAnalyzer.

TABLE 16. Hard Red Spring Wheat Variety Trial - Meade County(Bear Butte Valley), 1985-87.

Variety	Height (Inches)	Days to Heading*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
Nordic	32	57	13.9	55.7	44.2	--
Shield	34	53	15.9	55.3	44.0	35.3
SD 8052-1	38	--	15.9	48.3	41.9	--
Apex 83	33	54	15.7	53.3	41.8	34.3
SD 3005	35	52	14.8	53.3	41.8	--
Butte	37	54	16.0	53.3	41.2	30.3
Butte 86	36	53	16.7	54.7	39.9	30.6
Celtic	31	56	15.3	54.0	39.8	34.7
MN 81110	34	--	15.9	55.0	39.1	--
Leo 747	31	53	15.7	52.7	38.9	--
2369	31	55	16.0	55.7	38.3	30.1
SD 2980	33	54	15.8	53.0	36.9	37.4
Challenger	33	53	15.8	53.7	36.9	33.8
Norak	30	55	16.0	54.0	36.2	35.3
Stoa	34	56	16.8	53.0	35.8	31.2
ND 606	41	--	15.5	51.3	35.0	--
SD 3000	39	--	15.3	53.0	34.8	--
2385	34	54	15.6	57.3	34.8	--
Success	30	58	15.1	52.7	34.6	29.0
Guard	35	54	15.6	52.7	34.1	30.7
Wheaton	30	57	15.7	51.7	33.5	32.3
Norseman	33	57	15.5	52.7	33.0	30.7
Marshall	34	57	15.3	51.3	32.8	27.8
Prospect	33	--	16.1	52.3	32.3	31.6
Angus	36	56	15.6	54.7	31.7	28.9
Alex	32	57	16.4	55.0	31.7	26.1
SD 2999	32	53	17.8	52.0	31.3	--
Chris	37	55	16.7	55.7	31.2	26.3
Len	33	56	16.7	53.7	30.0	27.9
Coteau	33	--	17.7	53.3	29.8	--
Telemark	32	56	16.4	52.7	28.3	--

LSD(.05) - 9.0 Bu/A

C.V. - 16.1%

Mean - 36.0

\*Indicates days from date of seeding to date of heading.

\*\*Percent protein determined with Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 16 and harvested July 27, 1987.

TABLE 17. Hard Red Spring Wheat Variety Trial - Pennington County(Wall), 1985-87.

Variety	Height	Date of	Disease	Percent	Test Wt.	Grain Yield-Bu/Acre	
	(Inches)	Heading	Score*	Protein**	(Lbs/Bu)	1987	(3 yr av)
SD 2980	27	June 17	0.7	15.0	53.5	24.2	--
Guard	26	June 18	2.0	15.8	52.4	21.6	31.6
Butte 86	27	June 17	1.0	15.0	50.7	21.5	34.0
Challenger	23	June 17	0.9	15.4	51.8	20.7	29.9
Apex 83	26	June 18	0.4	15.7	51.7	20.6	28.6
Leo 747	23	June 17	1.5	15.6	51.8	20.2	--
SD 3000	30	June 19	0.8	15.8	48.8	19.4	--
Shield	28	June 17	1.6	15.3	50.2	19.2	33.5
SD 8052-1	28	June 18	1.8	15.4	48.6	18.9	--
2385	26	June 18	1.0	15.6	52.0	18.7	--
SD 3005	27	June 17	0.3	15.0	51.4	17.9	--
Butte	26	June 18	0.9	16.2	51.9	17.7	27.8
ND 606	28	June 21	0.3	16.7	49.4	16.4	--
Norak	22	June 19	1.0	16.7	49.6	16.0	30.1
Success	27	June 21	1.5	16.7	48.6	15.5	26.4
SD 2999	27	June 17	1.3	16.0	50.9	15.3	--
Chris	31	June 20	0.7	17.1	47.2	14.8	25.2
Stoa	27	June 20	2.0	16.2	48.0	14.5	31.4
Prospect	24	June 19	1.3	15.9	49.9	14.1	34.1
2369	24	June 20	1.0	16.3	50.2	13.6	28.4
Wheaton	23	June 21	1.3	16.0	47.8	13.4	27.7
MN 81110	23	June 20	1.6	17.2	44.0	13.0	--
Norseman	23	June 21	1.1	16.8	48.7	12.5	26.1
Celtic	26	June 19	1.6	17.6	49.7	12.5	29.5
Marshall	23	June 21	1.3	15.3	49.6	12.2	28.5
Telemark	21	June 20	1.3	16.7	47.4	11.6	--
Alex	29	June 21	1.9	16.5	50.1	10.7	26.4
Len	24	June 20	1.3	17.4	46.4	9.9	26.5
Coteau	26	June 21	2.0	16.4	46.5	9.4	29.9
Nordic	25	June 20	1.0	16.7	48.3	8.6	28.5
Angus	25	June 21	1.8	16.8	48.3	8.6	28.5

LSD(.05) - 5.1 Bu/A

C.V. - 23.9%

Mean - 15.0

\*Plants infected with Barley Yellow Dwarf virus, Scale 0-5 where 0 indicates no infection and 5 indicates 100% infection.

\*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 27 and harvested August 10, 1987.

#### Perkins County

Spring wheat variety trials were seeded near Bison on April 16. The soil was loose and had moisture near the surface. Heavy snow was received in mid-March but only .25 inch of moisture was received during April. Above normal precipitation was reported during May while both June and July were dry.

Air temperatures were above normal from December through June. The warm dry conditions resulted in grain with high protein content and reduced weights per bushel. The data for the Hard Red Spring Wheat are reported in Table 18 and for the Durum wheat in Table 22.

TABLE 18. Hard Red Spring Wheat Variety Trial - Perkins County(Bison), 1985-87.

Variety	Height (Inches)	Days to Heading*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
SD 8052-1	30	--	15.8	57.7	47.6	--
SD 3005	33	52	16.7	58.7	46.7	--
SD 2980	32	54	16.0	60.7	46.4	38.4
Apex 83	28	54	14.6	58.0	44.8	36.4
Guard	29	54	16.0	58.0	43.1	37.2
Leo 747	26	53	16.4	55.8	42.8	--
Butte 86	32	53	16.4	59.1	42.6	38.7
Challenger	27	53	14.9	58.3	42.4	35.7
Prospect	27	--	16.4	57.5	42.1	34.9
SD 2999	32	53	16.0	56.8	42.1	--
SD 3000	31	--	15.7	58.3	42.1	--
Shield	33	53	15.4	58.4	40.9	35.0
Butte	32	54	15.8	58.9	40.6	35.9
Norak	25	55	16.0	57.7	40.6	35.7
2385	30	54	16.4	58.6	40.1	--
ND 606	33	--	16.2	56.7	38.2	--
2369	25	55	15.9	56.7	35.3	33.3
Wheaton	23	57	15.1	54.3	35.1	31.8
Norseman	23	57	16.6	53.9	34.9	33.3
Marshall	25	57	15.1	54.0	34.8	30.4
Stoa	30	56	16.0	55.6	34.8	31.1
Telemark	24	56	15.7	54.1	34.5	--
Alex	31	57	16.3	55.8	33.2	29.8
MN 81110	26	--	17.7	53.5	31.4	--
Chris	32	57	17.1	54.7	29.9	26.5
Celtic	28	56	15.7	54.8	29.7	28.8
Angus	29	56	16.2	56.5	29.5	26.7
Len	28	56	16.2	53.8	28.1	28.4
Coteau	31	--	17.0	52.7	27.9	--
Nordic	27	57	15.1	54.9	27.8	--
Success	29	58	15.7	51.9	27.7	27.4
<hr/>						
LSD(.05) - 4.9 Bu/A		C.V. - 9.6%		Mean - 37.3		

\*Indicates days from date of seeding to date of heading.

\*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 16 and harvested July 30, 1987.



# Durum Wheat

Durum wheat variety trials were seeded at four locations in 1987. The remarks and discussion pertinent to these trials were included in the Hard Red Spring Wheat section and can be found on pages 22, 23 and 28. The yields and other data are listed in Tables 19 through 22.

TABLE 19. Durum Wheat Variety Trial - Harding County (Ralph), 1985-87.

Variety	Height (Inches)	Relative Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
Stockholm	23	-2	13.7	59.4	30.5	--
Rugby	28	1	15.2	59.6	30.4	31.4
Crosby	30	-1	15.0	58.9	29.4	30.9
Laker	27	0	14.6	58.9	28.4	31.2
Ward	31	0	14.4	59.3	28.2	30.5
Monroe	28	-3	14.7	56.9	28.2	32.6
Fjord	31	-1	14.7	59.7	28.1	--
Edmore	30	1	16.0	57.9	26.4	28.6
Vic	29	1	15.3	57.7	23.8	30.4
LSD(.05) - 3.3 Bu/A					C.V. - 9.3%	
					Mean - 28.2	

\*Indicates maturity based on 58 day interval between seeding and heading.  
 \*\*Percent protein determined with a Technicon 300 InfraAnalyzer.  
 NOTE: Plots were seeded April 28 and harvested August 11, 1987.

TABLE 20. Durum Wheat Variety Trial - Meade County (Bear Butte Valley), 1985-87.

Variety	Height (Inches)	Relative Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
Stockholm	30	-2	18.1	55.9	41.0	--
Edmore	41	1	17.8	55.9	33.8	31.1
Laker	37	0	16.8	55.0	30.9	27.8
Fjord	42	-1	17.1	55.7	30.3	--
Ward	41	0	17.8	55.7	30.0	30.1
Monroe	41	-3	17.7	51.4	29.8	32.6
Vic	41	1	17.8	55.1	28.8	31.1
Crosby	41	-1	19.9	54.6	26.9	28.5
Rugby	40	1	18.7	53.4	24.8	29.1
LSD(.05) - 9.5 Bu/A					C.V. - 28.6%	
					Mean - 30.7	

\*Indicates maturity based on 58 day interval between seeding and heading.  
 \*\*Percent protein determined with a Technicon 300 InfraAnalyzer.  
 NOTE: Plots were seeded April 16 and harvested July 27, 1987.



TABLE 21. Durum Wheat Variety Trial - Pennington County (Wall), 1985-87.

Variety	Height (Inches)	Relative Maturity*	Percent Infection**	Percent Protein+	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
						1987	(3 yr av)
Fjord	28	-1	17	18.0	50.2	10.3	—
Stockholm	23	-2	42	18.3	51.0	10.1	—
Crosby	27	-1	25	18.8	50.4	9.1	25.7
Rugby	25	1	20	18.0	49.7	8.7	26.9
Ward	28	0	25	18.3	48.0	8.3	27.4
Monroe	28	-3	42	18.2	48.8	8.0	28.9
Edmore	31	1	45	18.7	48.7	6.4	26.3
Laker	27	0	42	17.7	48.4	6.3	26.6
Vic	26	1	42	19.5	46.8	3.4	26.6
<hr/>							
LSD(.05)	- 2.3 Bu/A		C.V. - 19.7%		Mean - 7.8		

\*Indicates maturity based on 58 day interval between seeding and heading.

\*\*Percent of plants severely infected with Barley Yellow Dwarf Virus.

+Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 27 and harvested August 10, 1987.

TABLE 22. Durum Wheat Variety Trial - Perkins County (Bison), 1985-87.

Variety	Height (Inches)	Relative Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
Monroe	30	-3	16.4	57.1	34.0	32.1
Rugby	34	1	16.4	57.6	30.0	30.5
Fjord	30	-1	16.9	57.3	29.0	—
Crosby	32	-1	17.3	57.7	28.8	31.0
Stockholm	28	-2	17.2	56.7	27.2	—
Ward	32	0	16.5	55.9	27.1	29.5
Edmore	31	1	17.7	54.1	22.7	25.7
Vic	31	1	18.1	54.4	22.3	27.6
Laker	28	0	16.7	55.2	22.0	26.7
<hr/>						
LSD(.05)	- 9.1 Bu/A		C.V. - 26.6%		Mean - 27.0	

\*Indicates maturity based on 58 day interval between seeding and heading.

\*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 16 and harvested July 30, 1987.

### Triticales

Plots were seeded at three locations in 1987. All trials were seeded in fallow with a six row plot seeder having an eight inch row spacing. Seeding rate was controlled by prepackaging all seed. Fertilizer requirements were pre-determined by soil test. Harvesting was accomplished with a self-propelled plot combine. Grain yields and other data are reported in Tables 23 through 25.

Triticale varieties seeded at the three locations had yields somewhat higher than adjacent spring wheat varieties. The climatic conditions under which the tests were conducted are discussed under the hard red spring wheat trials. The present varieties have an inherent shrivelled kernel which has a standard weight of 48 pounds per bushel. It is best utilized as a grain feed for swine or poultry.

TABLE 23. Spring Triticales Variety Trial - Harding County (Ralph), 1985-87.

Variety	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Lbs/Acre	
				1987	(3 yr av)
Karl	32	13.0	51.2	1912	--
Marval	32	13.4	48.4	1865	2218
Kramer	29	13.1	49.8	1842	2180
Not Statistically Analyzed			Mean - 1873		

\*Percent protein was determined with a Technicon 300 InfraAnalyzer.  
NOTE: Plots were seeded April 28 and harvested August 11, 1987.

TABLE 24. Spring Triticales Variety Trial - Pennington County (Wall), 1985-87.

Variety	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Lbs/Acre	
				1986	(3 yr av)
Karl	27	14.6	42.9	1029	--
Kramer	28	15.6	40.9	779	1845
Marval	29	14.0	40.1	663	1657
Not statistically analyzed			Mean - 824		

\*Percent protein was determined with a Technicon 300 InfraAnalyzer.  
NOTE: Plots were seeded April 27 and harvested August 10, 1987.

TABLE 25. Spring Triticales Variety Trial - Perkins County (Bison), 1985-87.

Variety	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Lbs/Acre	
				1987	(3 yr av)
Karl	25	14.7	48.8	1500	--
Marval	33	13.7	45.2	1494	1916
Kramer	29	15.0	46.7	1362	1884
Not statistically analyzed			Mean - 1452		

\*Percent protein was determined with a Technicon 300 InfraAnalyzer.  
NOTE: Plots were seeded April 16 and harvested July 30, 1987.

### Oat Variety Trials

Oat variety trials were conducted on a cooperative basis at five locations in 1987. Seeding dates ranged from April 16 to April 28. All trials were seeded on fallow with a six row plot seeder having an eight inch row spacing. Seeding rates were controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. Harvesting was accomplished with a self-propelled plot combine. Grain yields and other data are reported in Tables 26 through 30.

#### Bennett County

Oat variety plots at Martin were seeded on April 21 into fallowed soil. Soil moisture at seeding time was adequate for germination and emergence because of snow received in February and March. Precipitation during the spring and summer was below normal. Topsoil moisture was classed as short from early-May through the entire growing season. Air temperatures were above normal from December through July. Although moisture was short and temperatures were above normal, grain yields were high. Weights per bushel were higher for the earlier maturing varieties and lower for the later maturing varieties. The data are listed in Table 26.

#### Harding County

Variety plots of oats were seeded near Ralph on April 21. Precipitation during the spring was very irregular. The moisture was received as heavy showers with long dry periods between them. Although the total rainfall was over 4 inches above normal, the area suffered from a shortage of topsoil moisture during the entire growing season. Air temperature was above normal from December through July. Grain quality as measured by oil content, protein content, and weight per bushel was good. The trial results are listed in Table 27.

TABLE 26. Oat Variety Trial - Bennett County (Martin), 1985-87.

Variety	Height (Inches)	Days to Heading*	Percent Oil**	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1987	(3 yr av)
Monida	29	60	7.3	15.8	31.8	139.8	--
Porter	31	62	7.7	23.3	34.0	121.0	89.8
SD 790400	31	--	6.9	17.4	33.1	115.6	83.0
SD 790369	30	--	7.3	17.8	33.7	112.8	--
ND 820603	28	--	6.7	16.9	33.4	110.7	--
Steele	32	60	7.5	18.2	30.8	107.3	75.8
ND 810104	31	--	6.7	17.0	32.3	104.7	--
Moore	32	60	8.7	17.2	32.9	103.4	76.2
Sandy	32	60	6.9	16.7	33.0	101.1	74.6
Proat	32	61	7.4	19.7	32.9	99.7	73.4
SD 790195	32	--	6.9	17.4	33.8	97.7	--
Benson	30	59	6.3	17.8	33.6	97.4	73.4
Hazel	29	57	8.0	17.6	33.0	96.6	81.0
Trucker	31	--	7.3	18.0	36.8	95.6	72.4
Wright	33	59	8.6	19.6	33.7	95.0	71.2
Ogle	27	57	6.1	17.7	31.6	92.6	77.2
Lancer	29	57	6.3	20.3	32.2	91.1	72.5
IAD 62315	26	--	6.2	16.5	30.7	90.9	--
Lyon	33	59	7.9	19.0	33.3	90.4	65.4
Don	24	56	7.3	17.2	33.7	89.8	82.1
Burnett	30	56	5.5	17.6	35.0	89.4	72.1
Hytest	29	58	7.9	18.5	36.8	86.2	69.7
SD 830095	31	--	9.3	21.4	34.0	85.9	--
SD 820045	28	--	6.0	19.5	35.9	85.7	--
Starter	28	55	7.2	17.7	33.6	84.7	71.4
Webster	29	55	7.3	17.3	31.3	82.2	71.0
Kelly	27	55	6.6	19.9	35.1	79.0	66.0
Otee	27	56	7.5	20.0	33.7	73.5	66.7
Nodaway 70	27	55	6.6	18.4	35.4	71.2	63.6
Preston	29	56	7.6	19.5	33.5	68.9	62.3
<hr/>							
LSD(.05) - 9.4 Bu/A		C.V. - 7.3%		Mean - 95.3			

\*Indicates maturity based on days from date of seeding to date of heading.

\*\*Percent oil and protein determined on oat groats only with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 21 and harvested July 23, 1987.

TABLE 27. Oat Variety Trial - Harding County (Ralph), 1985-87.

Variety	Height (Inches)	Days to Heading*	Percent Oil**	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
						1987	(3 yr av)
Monida	26	60	8.2	15.5	35.2	92.3	--
ND810104	27	--	7.8	15.8	33.7	84.5	--
Porter	27	62	7.8	18.2	35.8	83.4	63.7
SD790400	27	--	7.2	17.4	34.9	80.9	43.6
ND820603	25	--	7.4	16.0	34.9	78.3	--
Steele	27	60	7.9	18.3	33.6	77.5	55.8
SD790369	30	--	10.0	15.8	36.6	75.8	--
SD820045	28	--	6.7	17.1	37.5	75.7	--
Wright	31	59	9.9	16.9	36.5	73.9	41.5
Sandy	29	60	7.4	16.7	37.3	72.9	59.2
SD790195	31	--	7.8	16.6	36.8	71.7	--
Hazel	25	57	8.6	17.4	34.9	71.6	55.8
Trucker	29	--	8.5	16.8	38.5	71.6	57.4
Benson	30	59	6.8	16.6	34.3	70.6	55.8
Burnett	27	56	6.2	16.4	37.3	70.1	55.8
Ogle	25	57	6.8	16.6	32.7	69.8	58.5
Lyon	28	59	8.8	17.4	35.6	69.7	55.2
IAD62315	24	--	7.1	16.1	32.4	67.9	--
Moore	29	60	9.3	14.8	35.1	67.8	58.1
Proat	28	61	8.6	19.0	35.5	67.3	51.0
SD830095	27	--	10.2	20.5	35.1	63.0	--
Lancer	28	57	6.7	19.0	35.0	62.6	49.9
Hytest	31	58	7.2	17.2	38.5	61.8	51.9
Don	27	56	8.1	16.9	34.4	61.2	48.7
Webster	26	55	7.7	17.5	32.0	57.8	37.7
Starter	28	55	7.5	19.5	36.5	56.5	47.7
Otee	26	56	7.5	20.7	34.9	54.9	43.6
Preston	27	56	9.4	21.2	35.2	54.7	44.7
Kelly	28	55	7.7	18.9	36.8	52.1	42.1
Nodaway 70	27	55	7.3	18.7	36.4	45.9	39.4

LSD(.05) - 8.6 Bu/A

C.V. - 9.1%

Mean - 68.8

\*Indicates maturity based on days from date of seeding to date of heading.

\*\*Percent oil and protein determined on oat groats with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 28 and harvested July 31, 1987.



### Meade County

The Meade County trial in Bear Butte Valley was seeded into fallow soil on April 16. Soil moisture, measured to a depth of 36 inches, was sufficient for germination and emergence. However, topsoil moisture was short during May and July.

Air temperatures were above normal from December through July. The above normal temperatures resulted in a limited number of tillers being produced. However, the grain yields were high and the quality of the grain was excellent. Trial data are reported in Table 28.

### Pennington County

On April 23, the oat variety trial near Wall was seeded into fallow soil. Subsoil moisture was adequate, but topsoil moisture was limited until June. The above normal moisture received in April was sufficient for the needs of the plants to produce a high yield of good quality grain. The results of the trial are given in Table 29.

### Perkins County

Oat varieties in Perkins County were seeded near Bison on April 16. The soil had been fallowed in 1986. There was adequate topsoil moisture for germination and emergence, but anticipated precipitation in April was not received. Above normal precipitation received in May was sufficient to carry the plants through harvest. Topsoil moisture was determined inadequate from early May through July. Extremely high yields of grain with high test weight and protein content were harvested. The yield data are listed in Table 30.

TABLE 28. Oat Variety Trial - Meade County(Bear Butte Valley), 1985-87.

Variety	Height (Inches)	Days to Heading*	Percent Oil**	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
						1987	(3 yr av)
IAD 62315	34	---	6.5	17.3	34.9	102.6	---
Ogle	37	57	6.3	17.7	33.8	97.7	102.5
ND 810104	37	---	6.7	18.0	34.1	95.6	---
Webster	37	55	7.6	17.2	34.8	90.0	94.7
ND 820603	36	---	6.4	18.8	35.4	89.5	---
Nodaway 70	38	55	6.4	15.8	38.6	89.3	93.5
Don	34	56	7.4	16.2	36.8	88.9	96.7
Monida	39	---	6.9	19.3	30.8	88.4	88.9
Lancer	36	57	6.2	19.2	36.6	86.6	90.1
SD 820045	39	---	5.9	17.8	37.7	86.3	91.5
Hazel	34	57	7.7	18.7	36.0	84.8	95.5
Starter	37	55	7.2	19.5	38.3	84.5	95.2
Otee	37	56	7.1	21.6	37.4	84.4	94.1
Porter	37	62	6.8	19.4	35.7	84.0	83.1
SD 790369	42	---	9.0	18.2	36.5	82.6	---
Moore	40	---	8.7	18.0	35.5	82.0	85.7
Trucker	40	---	7.7	18.4	39.9	81.1	82.3
SD 790400	40	---	6.5	19.1	35.7	80.5	86.9
Kelly	38	55	6.9	18.8	38.5	79.9	85.3
Wright	41	59	8.6	20.4	38.1	77.3	84.3
Lyon	45	---	7.5	18.8	35.1	76.3	80.3
SD 830095	38	---	9.5	20.3	35.4	75.0	---
Sandy	43	60	6.5	17.6	36.5	73.0	75.0
Preston	37	56	8.4	22.6	36.6	71.4	76.5
Proat	36	61	7.3	20.6	36.4	70.6	74.5
Steele	40	60	6.8	18.4	35.7	70.4	79.0
Benson	40	59	6.1	19.5	37.2	70.1	83.1
Hystest	44	58	7.0	19.2	40.1	68.6	80.1
SD 790195	42	---	6.9	17.9	37.4	67.1	---
Burnett	39	56	5.7	18.1	38.7	65.8	79.7
LSD(.05) - 12.5 Bu/Acre			C.V. - 9.8%		Mean - 81.5		

\*Indicates maturity based on days from date of seeding to date of heading.

\*\*Percent oil & protein determined on oat groats with a Technicon 300 Infra-Analyzer.

NOTE: Plots were seeded April 16 and harvested July 27, 1987.

TABLE 29. Oat Variety Trial - Pennington County (Wall), 1985-87.

Variety	Height (Inches)	Date of Heading	Percent Oil**	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre 1987	(3 yr av)
Monida	32	June 21	8.4	16.1	32.4	102.6	—
Porter	30	June 21	8.0	18.9	34.9	97.0	73.1
Proat	31	June 21	7.7	20.1	35.0	89.6	68.3
Burnett	33	June 18	6.3	16.1	35.8	89.5	75.1
Benson	34	June 20	6.8	19.2	34.6	87.1	69.8
ND 820603	29	June 22	7.1	17.5	34.9	81.6	--
ND 810104	29	June 19	6.8	18.5	33.3	81.3	--
Lancer	30	June 19	6.6	17.7	35.1	81.0	73.9
SD 820045	33	June 19	6.1	17.6	36.0	80.9	--
Hazel	30	June 19	8.3	19.0	34.5	79.4	74.8
Starter	29	June 17	7.8	19.8	36.4	79.2	71.0
Steele	33	June 21	7.2	19.4	33.8	79.0	71.2
Ogle	28	June 18	5.9	19.1	32.8	78.9	74.8
SD 790400	32	June 20	6.9	19.5	39.6	78.2	67.7
Moore	33	June 20	8.7	17.9	34.6	77.5	71.1
Hystest	34	June 19	7.1	18.0	38.8	76.3	76.2
Don	28	June 18	8.2	16.9	34.2	76.0	75.1
Webster	31	June 17	7.2	18.3	33.5	75.2	70.0
IAD 62315	28	June 18	6.8	16.3	33.1	74.2	--
Trucker	32	June 19	7.6	18.6	38.1	72.5	71.8
Wright	33	June 20	9.1	19.3	35.8	71.7	73.1
Lyon	36	June 20	8.4	19.7	34.4	69.9	70.1
SD 790195	35	June 20	7.5	18.0	35.5	69.7	—
Sandy	37	June 21	6.9	16.6	34.8	68.3	72.8
SD 790369	34	June 20	9.6	18.3	34.8	67.4	--
Preston	31	June 17	8.9	20.4	35.9	67.0	73.4
Kelly	30	June 17	7.3	19.0	35.9	65.0	72.6
Nodaway 70	31	June 17	7.0	17.1	36.6	63.7	72.5
Otee	30	June 18	7.2	21.6	35.5	62.5	68.3
SD 830095	31	June 18	9.8	21.9	34.0	62.3	—
LSD(.05) - 19.3 Bu/A			C.V. - 18.6%		Mean - 76.8		

\*Percent oil and protein determined on oat groats only with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 27 and harvested July 21, 1987.

TABLE 30. Oat Variety Trial - Perkins County (Bison), 1985-87.

Variety	Height (Inches)	Relative Maturity*	Percent Oil**	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1987	(3 yr av)
Monida	35	8	7.2	16.1	37.6	121.7	--
Trucker	39	--	8.0	18.0	41.1	111.6	74.1
Porter	39	11	7.6	16.7	39.0	110.0	74.7
Webster	36	-1	7.6	16.5	34.7	109.5	82.5
Starter	34	-1	7.5	19.6	38.4	107.6	80.4
Proat	35	7	7.4	18.6	37.5	106.4	72.0
Hazel	33	4	8.6	18.5	38.0	105.8	74.7
Don	28	0	7.9	16.7	36.5	105.4	60.2
SD790400	37	--	7.0	17.3	37.6	105.4	73.6
Ogle	35	4	6.5	15.9	35.1	104.5	81.6
SD790369	38	--	9.1	18.1	37.5	103.4	--
ND820603	35	--	7.4	16.5	37.6	103.1	--
Sandy	40	8	7.0	17.1	38.1	102.9	71.4
Burnett	36	4	6.0	16.5	38.7	102.3	75.6
Moore	41	2	9.0	16.9	38.9	101.0	74.6
Steele	37	8	7.7	17.2	35.6	100.1	70.7
SD820045	36	--	6.5	17.9	39.2	98.9	--
IAD62315	34	0	7.1	16.7	34.6	98.2	--
Lyon	42	7	7.9	19.2	36.6	97.6	70.1
Lancer	33	4	6.6	18.8	38.4	97.2	72.2
Wright	38	7	8.7	17.3	38.2	95.1	71.6
SD790195	39	--	6.8	17.5	38.5	94.3	--
Nodaway 70	37	-1	6.9	18.9	39.4	93.7	68.3
SD830095	35	0	9.7	19.3	37.7	93.6	--
ND810104	36	--	7.1	16.5	34.1	93.6	--
Hyttest	38	4	7.0	19.0	41.2	92.6	71.1
Preston	36	1	8.6	20.7	37.6	91.3	69.3
Kelly	34	-1	7.0	18.9	39.2	89.8	66.3
Benson	38	6	6.8	19.2	38.3	89.7	71.0
Otee	34	4	7.5	20.0	36.8	79.2	64.4
<hr/>							
LSD(.05) - 21.0 Bu/A			C.V. - 15.5%		Mean - 100.2		

\*Indicates maturity based on 58 day interval between seeding and heading.  
 \*\*Percent oil & protein determined on oat groats with a Technicon 300 Infra-Analyzer.

NOTE: Plots were seeded April 16 and harvested July 29, 1987.

### Spring Barley Trials

Spring barley variety trials were conducted on a cooperative basis at five locations in 1987. Soil moisture was adequate for germination and emergence at all sites. Seeding was accomplished with a six row plot seeder having an eight inch row spacing. Rate of seeding was controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. The dates of seeding ranged from April 16 to April 28. Harvesting was completed with a self-propelled plot combine between July 21 and July 31. Trial data are reported in Tables 31 through 35.

#### Bennett County

The spring barley variety trial at Martin was seeded on April 21 into fallowed soil. Soil moisture was good at seeding time because of snow received in February and March. Precipitation during the growing season was below normal with topsoil moisture classed as short from early-May through September.

Air temperatures were above normal from December 1986 through July 1987. The adverse weather conditions had considerable effect on grain yield and quality. The average yield for the 1987 trial was 26 bushel per acre less than the trial conducted in 1986. However, weights per bushel were near the standard test weight for barley. Trial data are presented in Table 31.

TABLE 31. Spring Barley Variety Trial - Bennett County (Martin), 1985-87.

Variety	Height (Inches)	Relative Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
Gallatin	26	2	12.5	49.5	78.5	—
Lewis	24	3	12.8	50.1	71.0	—
Bowman	28	1	13.5	49.9	68.7	66.9
Hazen	26	2	12.0	47.4	65.6	60.0
B1601	28	2	12.8	45.8	61.2	—
Morex	28	1	13.2	48.1	60.6	51.5
Robust	27	3	12.7	48.8	57.5	54.4
Ilenn	27	0	12.0	44.8	56.7	55.6
Azure	26	3	12.7	47.6	53.1	56.6
Primus II	26	0	13.1	46.6	50.5	51.7
LSD(.05) - 11.5 Bu/A		C.V. - 12.6%		Mean - 62.3		

\*Indicates maturity based on 58 day interval between seeding and heading.

\*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 21 and harvested July 22, 1987.



### Harding County

Experimental plots containing 10 varieties of spring barley were seeded near Ralph on April 28. Soil moisture was adequate for germination and emergence. Precipitation, which was very irregular during the summer months, was over four inches above normal. Rainfall during the growing season was received as heavy showers between long droughty periods. Topsoil moisture was classed as short from early May through July.

Air temperatures were above normal from December through July. They ranged from thirteen degrees above normal in January to two degrees above normal in May and July. Weight per bushel and grain yield was higher for two row varieties than for six row varieties. There were no effects on grain yield as influenced by maturity. Grain yields in 1987 were almost double those harvested in 1986. The trial results are reported in Table 32.

TABLE 32. Spring Barley Variety Trial - Harding County (Ralph), 1985-87.

Variety	Height (Inches)	Relative Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
Gallatin	23	5	12.1	48.2	76.4	--
Bowman	22	1	12.3	49.1	67.7	53.2
Lewis	22	3	12.4	48.1	65.2	--
Morex	24	1	12.2	46.2	62.1	46.6
Hazen	22	2	11.6	45.8	60.6	47.5
B1601	24	1	12.9	44.4	59.4	--
Robust	24	3	12.0	45.7	57.6	44.3
Azure	23	3	12.4	42.4	56.4	44.0
Glenn	23	0	12.3	42.0	52.4	41.3
Primus II	20	0	12.3	41.8	51.8	43.0
LSD(.05) - 9.1 Bu/A		C.V. - 10.3%		Mean - 61.0		

\*Indicates maturity based on 58 day interval between seeding and heading.

\*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 28 and harvested July 31, 1987.

### Meade County (Bear Butte Valley)

Spring barley varieties were seeded in Bear Butte Valley on April 16. The soil had been fallowed during the summer of 1986. Precipitation received as snow in February and March provided moisture necessary for germination and emergence. Rainfall during April and June was below normal, however, stored soil moisture was available at time of seeding to a depth of thirty six inches. Topsoil moisture, was classed as short in May, adequate in June, and short in July. Grain yields were higher in 1987 than in 1986. Weights per bushel were lower because the plots were harvested before the barley was completely mature. The trial data are reported in Table 33.

TABLE 33. Spring Barley Variety Trial - Meade County(Bear Butte Valley), 1985-87.

Variety	Height (Inches)	Relative Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
Bowman	31	1	13.0	49.6	78.6	61.3
Lewis	33	3	13.4	46.2	68.6	—
Primus II	34	0	11.8	44.3	65.6	58.5
Gallatin	31	2	15.3	43.9	65.0	—
Morex	35	1	12.8	41.0	62.3	49.2
Hazen	34	2	12.1	39.4	62.2	54.2
Robust	36	3	11.9	42.4	61.6	51.6
Azure	33	3	11.6	42.3	60.6	48.3
Glenn	34	0	12.6	38.0	58.7	—
Bl601	33	2	12.4	40.4	55.6	—
LSD(.05) - 18.0 Bu/A		C.V. - 16.4%		Mean - 63.9		

\*Indicates maturity based on 58 day interval between seeding and heading.

\*\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 16 and harvested July 27, 1987.

#### Pennington County

Spring barley was seeded near Wall on April 27 into fallowed soil. Subsurface soil moisture was available to a depth of thirty six inches. Surface soil moisture was available for germination and emergence. Limited precipitation during the months of April, June, and July resulted in a topsoil moisture shortage from May through July. The surplus moisture received in May was sufficient to carry the plants through the rest of the growing season. The trial data are reported in Table 34.

TABLE 34. Spring Barley Variety Trial - Pennington County (Wall), 1985-87.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
Bowman	30	June 18	14.1	50.8	60.4	77.2
Gallatin	25	June 20	14.9	46.5	57.2	—
Lewis	25	June 20	14.6	48.0	54.8	—
Hazen	31	June 18	13.0	42.6	51.2	68.3
Bl601	31	June 17	14.2	41.2	49.2	—
Azure	30	June 18	13.1	42.7	49.2	70.1
Morex	30	June 18	13.9	43.6	47.9	60.8
Primus II	31	June 17	13.3	44.8	47.7	61.4
Robust	29	June 19	14.3	44.8	44.6	66.3
Glenn	27	June 18	13.7	41.5	42.6	60.1
LSD(.05) - 7.2 Bu/A		C.V. - 9.9%		Mean - 50.5		

\*Percent protein determined with a Technicon 300 InfraAnalyzer

NOTE: Plots were seeded April 27 and harvested July 21, 1987.

# Perkins County

Spring barley plots in Perkins county were seeded on April 16. The soil had been fallowed in 1986. It contained adequate topsoil moisture, and subsoil moisture was measured to a depth of thirty six inches. Snowfall in March and rain in May provided moisture to compensate for below normal precipitation during April, June, and July. Topsoil moisture was short from May through July. Yield and other data are reported in Table 35.

TABLE 35. Spring Barley Variety Trial - Perkins County (Bison), 1985-87.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1987	(3 yr av)
Bowman	30	June 11	13.5	50.8	86.4	60.1
Gallatin	29	June 13	12.5	51.5	85.9	--
Lewis	29	June 13	12.8	51.4	83.9	--
Hazen	30	June 13	13.0	47.9	82.9	51.8
Azure	30	June 13	13.2	47.9	81.1	53.8
Primus II	30	June 9	12.4	48.5	75.7	48.9
Morex	30	June 13	12.8	48.8	75.5	48.9
Robust	30	June 13	12.9	50.8	73.4	48.9
Glenn	30	June 13	13.2	47.1	67.2	50.7
Bl601	29	June 13	13.0	46.2	58.6	--
LSD(.05) - 8.7 Bu/A		C.V.- 7.8%		Mean - 77.1		

\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 16 and harvested July 29, 1987.

## Winter Barley

Objective: To observe and compare growth characteristics, grain quality, and grain yield of varieties and composites of winter barley.

Twelve entries of winter barley were seeded in fallow on September 8, 1986. The entries consisted of four varieties from Nebraska and eight composites from South Dakota. Each composite was composed of plants which were selected for deep setting crowns. Crown depth is associated with winter survival because those genotypes with naturally buried crowns most frequently survive winter conditions.

At seeding time the surface soil was loose but contained sufficient subsurface moisture for germination and emergence. Rainfall was below normal in August but was above normal during September, October, and November. Precipitation during the year averaged near normal although it was limited during the months of April, June, and July. Air temperatures were above normal for all months except March. The barley entries varied in their ability to survive the winter. Grain yields were greatly reduced because of severe winterkill. The yield data are presented in Table 36.

Table 36. Winter Barley Variety Trial - Pennington County (Wall), 1984-87.

Variety	% Stand May 1987	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A	
					1987	(4 yr av)
Composite 10	58	27	11.9	44.6	27.3	54.1
Herb	63	32	12.2	46.9	27.0	61.8
Nebar	46	28	11.6	47.0	23.4	--
Composite 129	60	30	11.7	47.8	23.4	59.7
Dundy	43	23	12.8	45.5	20.3	59.4
Composite 250	34	26	14.4	45.4	19.5	36.5
Kearney	45	29	11.9	46.8	19.4	--
Composite 142	45	30	13.0	43.8	18.2	56.2
Composite 295	31	27	13.0	47.8	17.5	--
Composite 307	41	24	14.2	46.6	15.1	44.5
Composite 223	40	24	13.3	46.5	12.7	--
Composite 308	6	25	12.9	40.3	12.6	--
LSD(.05) - 13.5 Bu/A		C.V. - 47.4%		Mean - 19.7		

\*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded September 8, 1986 and harvested July 16, 1987.

### Flax Trials

Flax variety trials were conducted at three locations in 1987. Soil moisture was adequate for germination and emergence at all sites. Seeding was accomplished with a six row plot seeder having an eight inch row spacing. Rate of seeding was controlled by prepackaging all seed. Fertilizer was predetermined by soil test. Harvesting was completed with a self-propelled plot combine. Trial data are reported in Tables 37 through 39.



### Bennett County

The flax variety trial at Martin was seeded April 21. The fallowed soil had good moisture content as a result of wet snow received in February and March. Precipitation during the spring and summer was below normal. Topsoil moisture was classed as short from early-May through the entire growing season. Air temperatures were above normal from September through July. Yield data are presented in Table 37.

TABLE 37. Flax Variety Trial - Bennett County (Martin), 1985-87.

Variety	Height (Inches)	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
			1987	(3 yr av)
Clark	25	47.5	23.8	20.6
Flor	23	48.5	23.5	20.1
Culbert 79	24	50.0	22.8	20.5
Wishek	23	48.8	21.8	19.9
Rahab	22	46.8	20.8	19.0
LSD(.05) - 3.2 Bu/Acre		C.V. - 9.3 %	Mean - 22.5	

NOTE: Plots were seeded April 21 and harvested July 22, 1987.

### Harding County

Flax varieties at Ralph were seeded on April 21. Soil moisture was excellent for germination and emergence. Rainfall during the spring was intermittent, with heavy showers followed by long dry periods. Air temperatures were above normal in all months from April through July. Weights per bushel and grain yield were greater than those reported in 1986. The experimental results are listed in Table 38.

TABLE 38. Flax Variety Trial - Harding County (Ralph), 1985-87.

Variety	Height (Inches)	Date of Heading	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
				1987	(3 yr av)
Rahab	25	June 13	54.8	12.1	12.3
Flor	25	June 13	54.8	12.1	12.0
Clark	24	June 13	54.8	10.7	10.8
Culbert 79	23	June 11	55.3	10.3	11.4
Wishek	23	June 13	55.3	9.9	10.8
LSD(.05) - 1.8 Bu/Acre		C.V. - 10.5 %	Mean - 11.0		

NOTE: Plots were seeded April 28 and harvested August 11, 1987.



### Perkins County

The plots were seeded in fallow soil on April 16. Soil moisture was adequate for germination and emergence. Precipitation was below normal for April, June, and July. Above normal rainfall during May, along with stored soil moisture, provided the plants with water necessary for growth during the periods when rainfall was short. Air temperatures were above normal during most of the growing season. Agronomic data for the trial are listed in Table 39.

TABLE 39. Flax Variety Trial - Perkins County (Bison), 1985-87.

Variety	Height (Inches)	Date of Heading	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
				1987	(3 yr av)
Flor	24	June 11	51.3	37.5	19.8
Clark	24	June 13	52.0	28.5	17.2
Culbert 79	23	June 11	51.0	28.5	15.4
Rahab	25	June 13	51.5	27.0	17.0
Wishek	23	June 13	51.3	26.3	15.8
LSD(.05) - 13.4 Bu/Acre		C.V. - 29.4 %		Mean - 29.6	

NOTE: Plots were seeded April 18 and harvested July 30, 1987.

### SORGHUM VARIETY TESTING

#### Grain Sorghum

Objective: To compare the performance of grain sorghum hybrids and varieties for yield and other agronomic characteristics.

A grain sorghum variety trial was seeded in Pennington County on June 9, 1987. Included were commercial varieties which varied in maturity from short-season to medium season.

Forty grain sorghum hybrids were seeded near Wall in eastern Pennington county on May 29. Plant populations were established at 3.6 plants per square foot. Stands were good and plants were healthy but under moisture stress during the months of July, August, and September. All of the groups produced good quality mature grain. However, there were varieties within the groups that had low test weights and poor quality seed. The varieties were all dry at harvest on October 14. The results of the trial are listed in Table 40.

Table 40. Grain Sorghum Hybrid Variety Trial - Pennington County(Wall), 1987.

Brand and Variety	Height (Inches)	Maturity (1-5)	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
Garst 5715	43	1.4	53.1	100.5
Seedtec ST3101	46	1.1	51.7	89.9
NCT 55X	43	1.6	49.7	89.4
Interstate 665	45	1.4	48.0	88.8
Seedtec WS203	43	1.5	55.1	87.4
Northrup King 1210	40	1.1	53.6	82.8
SIGCO 1070	44	1.1	51.1	82.2
McCurdy M-410	46	1.5	50.8	80.0
Triumph TR46	40	1.6	53.4	79.8
Jacques 101	43	2.1	54.2	76.6
Warner W523T	42	2.1	52.5	75.9
Interstate 663	40	1.8	54.2	75.0
SIGCO 1060	43	1.1	52.8	74.8
Asgrow Dorado E	41	1.8	52.8	73.5
Dekalb P-708	37	1.4	52.8	72.0
Pioneer 8896	37	1.1	52.5	72.0
Cargill 2285	39	2.0	53.9	71.6
Warner W501T	38	1.8	54.2	71.2
Warner W545T	37	2.0	52.5	70.8
Pioneer 8791	39	1.1	54.8	70.3
Dekalb Dk-28	36	1.5	54.5	69.4
Interstate 668	43	2.4	53.9	69.1
Triumph TWO 48YG	37	1.6	50.8	67.2
Interstate 764	40	1.4	52.5	65.9
Pioneer 8855	41	1.0	54.7	64.0
McCurdy M-450	45	1.6	52.8	63.9
Dekalb DK-18	38	1.3	55.6	62.4
Dekalb P-728	36	1.4	54.2	62.2
Pioneer 894	37	1.0	55.6	60.9
Cargill 22	39	1.5	53.6	59.2
SIGCO 1080	46	2.3	54.2	58.9
Jacques 308	48	2.0	49.7	58.8
NCT 159	42	1.9	52.2	57.5
Jacques 311	44	2.3	48.3	56.3
Jacques 208	46	2.0	51.4	55.4
Cargill 1022	44	2.4	51.9	48.4
Cargill 40	42	2.3	49.4	46.7
Jacques 377W	45	2.6	45.4	41.0
Agripro AP910G	41	1.4	52.0	37.5
Cargill 3385	44	2.4	50.5	29.3

LSD(.05) - 28.0 Bu/A

Mean - 68.0

Note: Plots were seeded June 9, 1987 and harvested October 13, 1987.

## Small Grain Forage Trials

**Objective:** To compare the various cereal crops for forage production, forage quality, and the relationship of forage and grain production.

Twenty four varieties of small grains composed of spring wheat, durum wheat, triticales, oats, and spring barley were seeded at Martin on April 29. Soil moisture was adequate for germination and emergence. Precipitation was below normal and resulted in a topsoil moisture shortage during the remainder of the growing season.

TABLE 41. Small Grain Forage Trial - Bennett County (Martin), 1987.

Crop & Variety	% Dry Matter	Percent Protein*	Tons/Acre @ 12% H2O	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield (Bu/Acre)
<b>OATS</b>						
Kelly	25.3	12.2	1.78	19.9	35.1	79.0
Moore	23.4	11.6	1.63	17.2	32.9	103.4
Bates	26.0	11.3	1.63	--	--	--
Steele	23.4	12.1	1.62	18.2	30.8	107.3
Haylander II	20.6	13.3	1.58	--	--	--
Burnett	21.6	11.6	1.46	17.6	35.0	89.4
Lang	27.0	11.6	1.44	--	--	--
Lancer	26.1	11.1	1.22	20.3	32.2	91.1
			Mean-1.54			
<b>SPRING BARLEY</b>						
Morex	24.3	12.7	1.61	13.2	48.1	60.6
SD 71-672	25.9	13.1	1.60	--	--	--
Bowman	23.4	13.6	1.57	13.5	49.9	68.7
Larker	26.2	14.1	1.51	--	--	--
			Mean-1.57			
<b>DURUM WHEAT</b>						
Crosby	25.6	13.6	1.48	--	--	--
Vic	23.9	13.8	0.86	--	--	--
			Mean-1.17			
<b>SPRING WHEAT</b>						
Eureka	26.2	13.6	1.57	--	--	--
Butte	27.8	13.4	1.56	15.3	55.6	35.4
2369	28.5	14.0	1.34	16.6	54.7	30.0
Guard	26.1	12.8	1.26	15.1	56.1	34.4
Alex	24.6	12.8	1.24	16.1	54.9	28.1
Olaf	24.6	14.2	1.10	--	--	--
Marshall	24.7	14.3	1.06	15.4	52.2	29.9
James	27.7	13.2	1.09	--	--	--
			Mean-1.28			
<b>TRITICALES</b>						
Marval	25.8	11.6	1.80	--	--	--
Kramer	28.2	12.4	1.679	--	--	--
			Mean-1.74			

\*Percent protein was calculated from Kjeldahl nitrogen analysis and is reported on an oven-dry basis.

\*\*Percent protein in grain determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded in fallow soil on April 29 and harvested July 1, 1987. Harvested area was 4 feet x 25 feet. Grain yields were obtained from adjacent variety trials seeded on same date.

## MANAGEMENT, TILLAGE, AND CULTURAL PRACTICES

Date of Seeding-Hard Red Winter Wheat  
Pennington County (Box Elder), 1986-1987

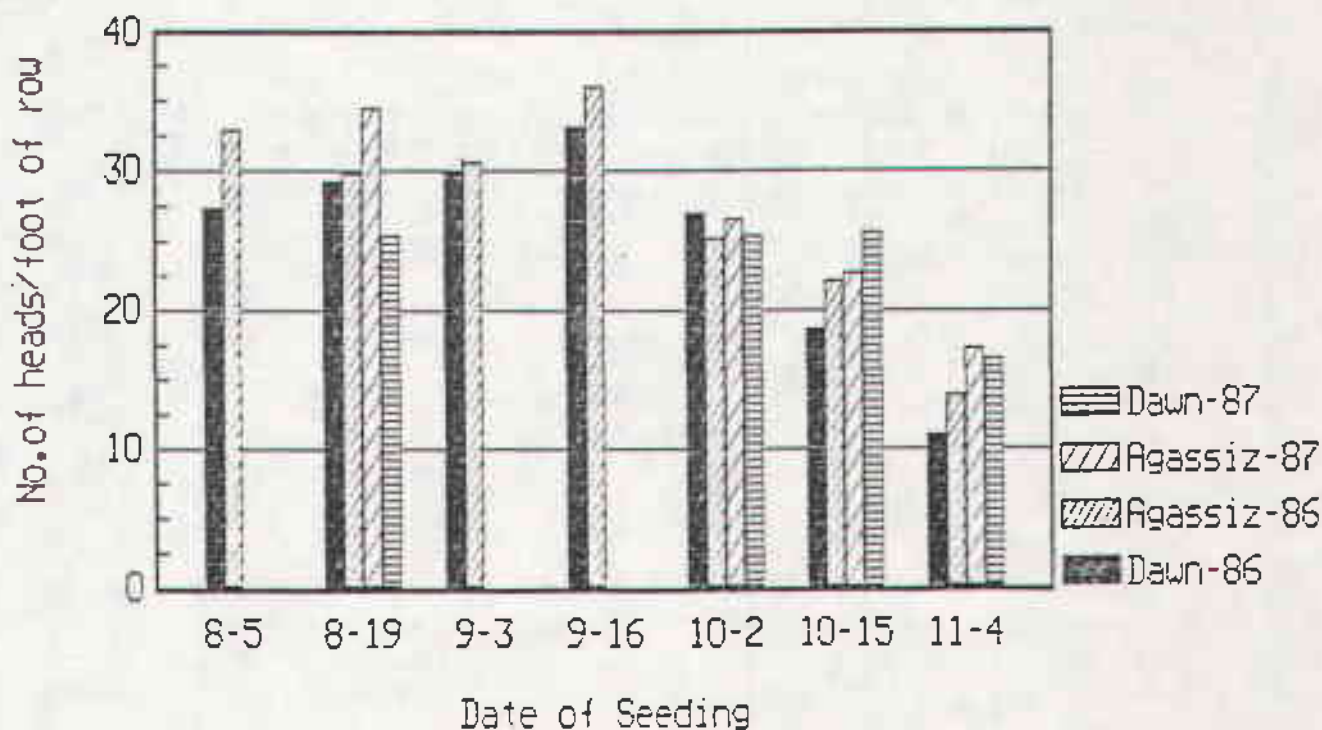
**Objective:** Evaluate winter wheat survival and yields as affected by fall planting dates.

**Crop:** Hard Red Winter Wheat: varieties - Dawn and Agassiz.

**Soil Test Data:** pH - 7.5, O.M. - 2.9%, Nitrogen - 127#/A., Phosphorus - 17#/A., Potassium - >1000#/A., Zinc - 0.45 ppm, Iron - 15.3 ppm, Sulfur - >426 #/A., Chlorine - 123.0 #/A..

**Field Data:** Plot Size - 5.5 ft x 20 ft, 4 Replications, Fertilizer - Applied 12.2# of Nitrogen per acre and 41.4# of Phosphorus with the seed. Herbicide - Glean applied on April 21 at the rate of 1/3 oz per acre. Weeds - Downy Brome grass was hand pulled, Pennycress was controlled by the Glean. Stand notes were taken on July 15, 1987. Early seeded plots were damaged by horses grazing and walking through the plots when the soil was wet.

GRAPH 1. Effects of Date of Seeding on Number of Heads Produced per Foot of Row - Hard Red Winter Wheat varieties: Dawn and Agassiz, Pennington County(Box Elder), 1986-87.



GRAPH 2. Effects of Date of Seeding on Percent Stand, Number of Heads, and Grain Yield of Hard Red Winter Wheat varieties: Dawn and Agassiz, Pennington County(Box Elder), 1987.

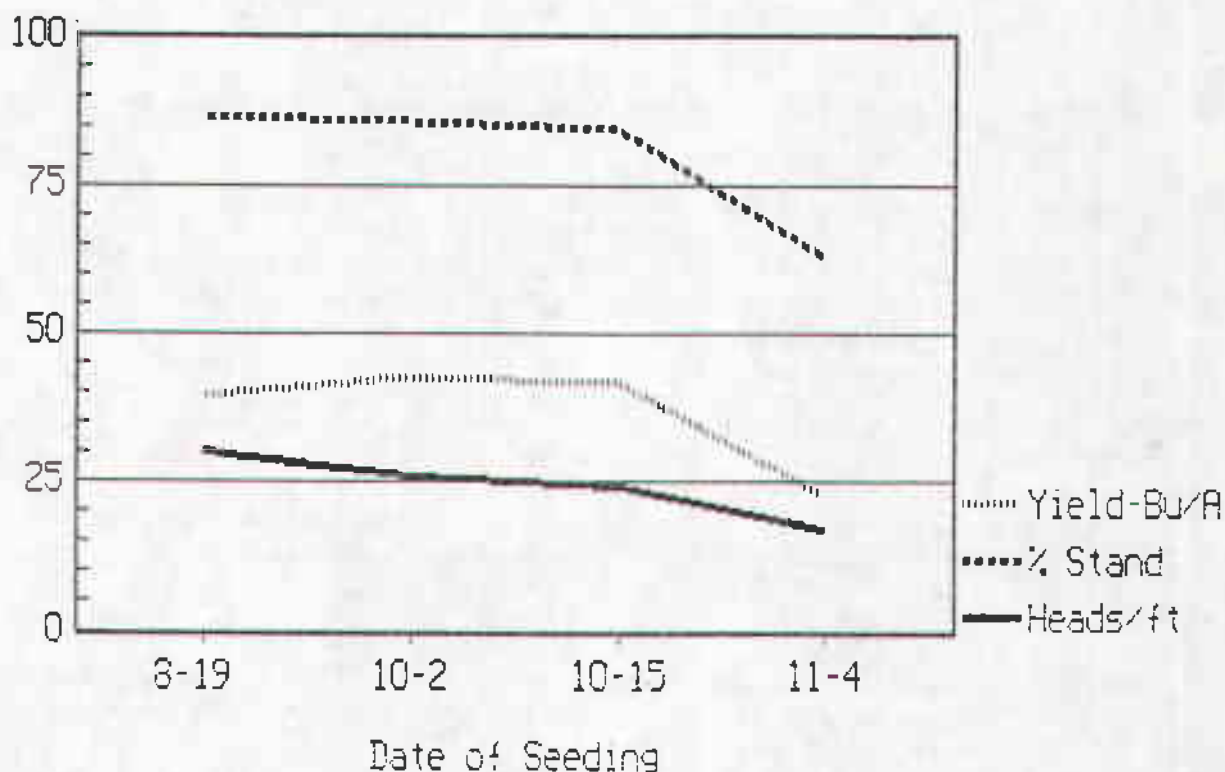


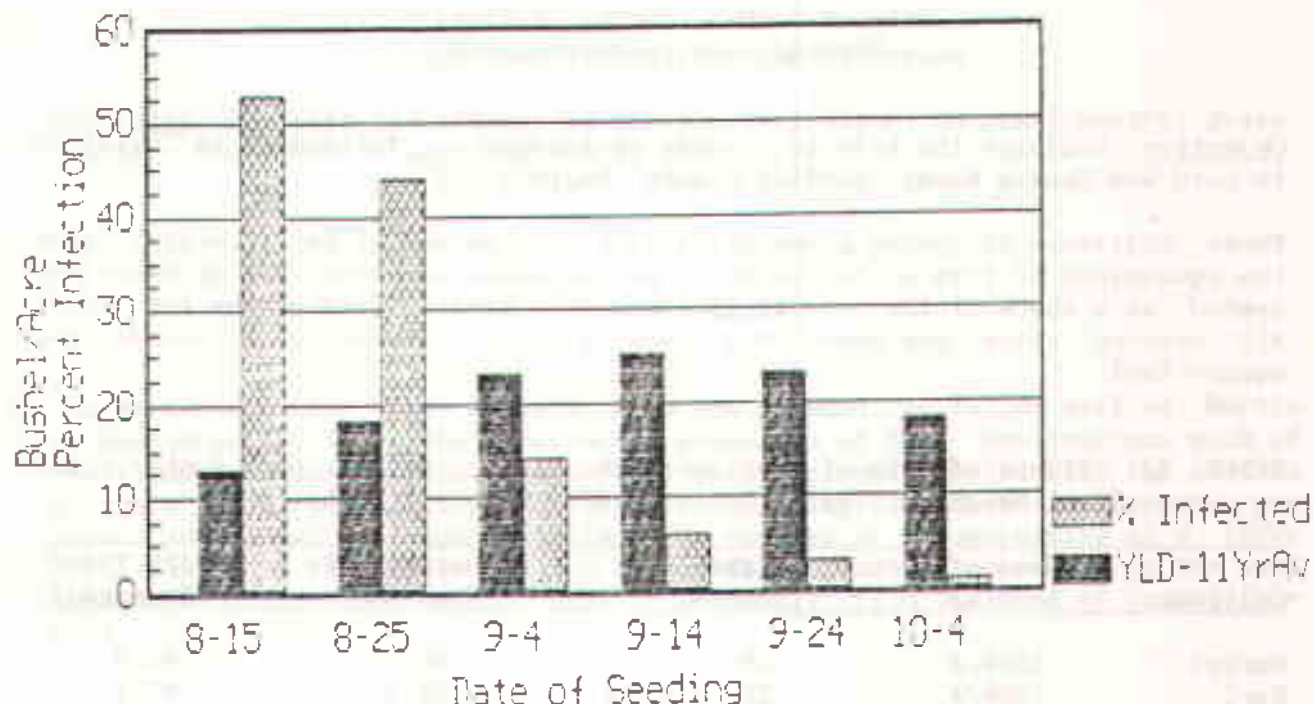
TABLE 42. Effects of Date of Seeding on Agronomic Characteristics of Hard Red Winter Wheat - Pennington County (Box Elder), 1987.

Date of Seeding	Variety	Percent Stand	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield (Bu/Acre)
August 19	Dawn	83.5	May 26	10.9	63.9	31.7
	Agassiz	89.0	May 28	12.8	62.8	46.2
October 2	Dawn	82.7	May 31	13.3	62.3	42.4
	Agassiz	87.7	June 4	11.8	61.6	42.6
October 15	Dawn	80.0	June 4	11.1	60.9	39.2
	Agassiz	88.0	June 5	13.1	57.4	44.6
November 4	Dawn	66.0	June 9	13.0	57.4	23.4
	Agassiz	59.0	June 15	—	48.6	21.6

\*Percent protein determined with a Technicon 300 InfraAnalyzer.



GRAPH 3. Effects of Date of Seeding on Control of Wheat Streak Mosaic and the Yield of Hard Red Winter Wheat - Lyman County(Presho), 1959-1970.



#### Discussion:

The experiment was designed in 1985 with seven dates of seeding scheduled at fourteen day intervals. However, due to wet soil conditions in 1986 it was not possible to seed on all dates. The result was four dates of seeding rather than the seven initially planned.

The soil was fertilized to provide nutrients required for a yield of 40 Bushels of grain per acre. Moisture was adequate to utilize the nutrients. The early seeded plots produced grain with higher weight per bushel.

The data listed in Graph 1, Number of Heads per unit area, depicts a condition similar to that depicted in Graph 3, Grain Yield per Acre. The data indicate seeding in mid-September produced the highest number of heads and the highest yield.

This combination of data was taken from Date of Seeding studies at The Box Elder Research Unit in 1986-87, and an eleven year Date of Seeding study in South Central South Dakota, during the period 1959-70. The primary purpose of the earlier study was to find a control for Wheat Streak Mosaic and indicates the reduction in infection and increase in yield due only to seeding date.

The information given in Graph 2 is biased by the irregularity of Date of Seeding. The period between August 19 and October 2, during which a seeding was not completed, should have had the highest yield because of more favorable growing conditions for the seedlings. This is confirmed by the data in Graph 1 which indicates the greatest number of heads are produced on plants seeded during mid-September. The number of heads per unit area is one of the basic factors of yield. The second item of influence from a normal field situation was the wheat seeded in August 1985 was irrigated.

limited germination and there were not enough plants to evaluate the stand by mid-May. All plots were mowed in late May to control larger weeds. The experiment in planting cool and warm season grasses used western wheatgrass and sideoats grama planted in alternately spaced six inch rows. No early summer germination was detected for either grass. By mid-summer, limited numbers of sideoats grama plants appeared to be established. The 1987 evaluation was too early and the plots will be evaluated in 1988 to determine if there were significant stand differences due to methods of establishment.

TABLE 50. No-Till Alfalfa Establishment in Stubble - Meade County(Elm Springs) 1984.

Seeder	Double Disc		Plants/square foot	
	Hoses	Incorporation	Roundup	Paraquat
John Deere-Double Disc	In		27	34
John Deere-Double Disc	Out	Rotary Hoe	35	31
John Deere-Double Disc	Out		35	37
Whirly Bird		Rotary Hoe	35	29
Whirly Bird			22	27

NOTE: Date of Seeding - May 30, 1984, Stand counts were made on July 2-3, 1984

TABLE 51. Summary of Weed Control and Stand Establishment for No-Till Alfalfa and Grass Study - Pennington County (Spring Creek Area), 1986.

Herbicide Treatment	Rate of Product (Oz/A)	Percent Weed Control*		Percent Stand**	
		Tansy-Mustard	Volunteer HRW Wheat	Alfalfa	Grass
<u>Preplant</u>					
Roundup	8	99	99	99	100
Roundup	12	99	97	86	65
Landmaster	40	99	99	54	79
Paraquat	16	83	45	81	71
Paraquat	24	86	53	100	72
Cultivated	Check	99	86	53	62
Uncultivated	check	0	0	45	26
<u>Post Plant</u>					
Roundup	8	92	97	87	69
Roundup	12	99	97	84	58
Landmaster	40	99	99	70	33
Paraquat	16	75	25	75	68
Paraquat	24	79	50	76	63
Least Significant Difference @ 5%		4	11		
Coefficient of Variability (%)		4	11		

\*Weed Control estimates were made on May 21, 1986.

\*\*Notes are based on top yielding plot=100%. Notes taken on May21, June 16-17, and July 1, 1986.

TABLE 52. Summary of Production: No-Till Alfalfa and Grass Seeding Study - Pennington County(Spring Creek), 1986.

Herbicide Treatment	Rate of Product (Oz/A)	Pounds per Acre				Alfalfa and Grass
		Alfalfa*	Grass	Volunteer HRW Wheat	Weeds	
<u>PrePlant</u>						
Roundup	8	1078	197	0	1121	1275
Roundup	12	1145	209	0	1123	1354
Landmaster	40	1041	168	0	1551	1209
Paraquat	16	413	68	1809	668	481
Paraquat	24	496	79	2147	724	575
Cultivated	Check	1034	354	702	581	1388
Uncultivated	Check	214	123	547	607	337
<u>Post Plant</u>						
Roundup	8	700	72	36	1415	772
Roundup	12	995	215	15	840	1210
Landmaster	40	719	58	490	1208	777
Paraquat	16	143	13	4626	320	156
Paraquat	24	351	154	2241	430	505
<hr/>						
LSD(.05)		464	168	1073	719	535
C.V. (%)		4.6	8.2	7.1	5.6	4.4

\*Plots were harvested on August 4-5, 1986.

TABLE 53. Summary of Production: No-Till Alfalfa and Grass Seeding Study - Pennington County(Spring Creek), 1987.

Herbicide Treatment	Rate of Product (Oz/A)	Pounds per Acre				
		Alfalfa*	Grass	Volunteer HRW Wheat	Weeds	Alfalfa and Grass
<u>Preplant</u>						
Roundup	8	1360	3464	284	262	4824
Roundup	16	1301	4707	577	257	6008
Landmaster	40	815	3019	1472	193	3834
Paraquat	16	502	2133	1133	324	2635
Paraquat	24	903	2920	1060	550	3823
Cultivated	Check	680	3188	1178	283	3868
Uncultivated	Check	530	2837	1571	791	3367
<u>Post Plant</u>						
Roundup	8	1226	4261	337	272	5487
Roundup	16	1042	4411	761	477	5453
Landmaster	40	905	3975	472	334	4880
Paraquat	16	959	4251	671	80	5210
Paraquat	24	1063	3633	1425	457	4696
LSD(.05) - Lbs/Acre		529	1859	1148	---	---
C.V. - (%)		39	36	87	---	---

\*Plots were harvested on June 24-29, 1987.

Summary: It would appear that spring no-till establishment of alfalfa and cool season grasses is somewhat variable. Herbicides improve the chance of success but there are no guarantees. In 1985, because of extreme drought, the alfalfa stand was not satisfactory. During 1984, 1986, and 1987, when volunteer winter wheat, downy brome grass, and other winter annual weeds were controlled, the no-till stand establishment of alfalfa was excellent. The no-till establishment of cool season grasses is very moisture dependent. More research into no-till establishment of cool and warm season grasses is needed to determine best planting times and methods of seeding. South Dakota producers have tried the no-till springtime method method of alfalfa and grass establishment. In general, it has worked well when 12 fluid ounces of Roundup, a wetting agent, and Ammonium Sulphate (2% by weight) have been applied in a 5 gallon per acre spray solution prior to planting. The volunteer wheat or downy brome grass must be actively growing and completely out of winter dormancy. Herbicides are generally most effective when applied after April 15. A word of caution to producers considering the no-till option. Insects, particularly grasshoppers, are also favored by no-till. A producer in the Rapid City area lost a no-till planting to grasshoppers when the alfalfa plants were less than 3 inches tall.

#### Effects of Growth Regulators and Fertilizer on Protein Content

Objectives: To evaluate changes in protein level and grain yield of winter wheat varieties resulting from application of growth regulators and fertilizer.

Application Data: The herbicide and fertilizer were applied as a spray at the rate of 20 gallons of solution per acre. The treatments were applied June 23, 1987, when the heads contained 60% dry matter. The study involved twenty eight varieties of Hard Red Winter Wheat.

TABLE 54. Effects of Herbicide and Fertilizer on the Protein Content and Grain Yield of Hard Red Winter Wheat - Stanley County(Hayes), 1987.

Treatment	Pounds (a.i./A)	Percent Protein*	Grain Yield** (Bu/Acre)
Untreated	—	15.1	38.4
Atrazine	1.0	15.5	28.9
Urea	5.0 N	15.0	39.5
Atrazine + Urea	1.0 5.0 N	15.7	27.2
Least Significant Difference at 5% level		0.3	1.9
Coefficient of Variability (%)		1.5	4.6

\*Percent protein determined with a Technicon 300 InfrAnalyzer.

\*\*Grain yield is an average yield for the 28 varieties treated.

NOTE: Plots were seeded September 30, 1986 and harvested July 13, 1987.



Discussion: In the normal development of a wheat kernel the embryo is developed first, followed by the development of the endosperm or starch. During normal maturation of a wheat plant, photosynthetic activity is reduced as the grain becomes fully developed and the plant completes its life cycle. If the life cycle is altered and the plant experiences an abnormal maturation then the components of the seed will also be altered. The external factor can be anything such as drought, disease, or a chemical. Usually, when a plant experiences such an event the result is a higher than normal percentage of amino nitrogen or protein content in the kernels of grain.

The application of a photosynthesis inhibitor, such as Atrazine, should force maturity by halting the production of starch thus resulting in an increase in the protein component. With that thought in mind wheat was sprayed with Atrazine and Urea when the heads were at 60% dry matter. The results of this experiment indicated there were only small increases in protein content of the grain, but drastic decreases in the yield of grain. In summary, the use of growth regulators to increase protein content of grain is not feasible at this time. The results are listed in Table 54.

Ecofallow Corn/Sorghum Experiment  
Pennington County(New Underwood), 1986-87  
Martin Printz Cooperator

Objective: Evaluate the effect of tillage and herbicides used to replace tillage on the grain yields of corn and grain sorghum.

Weed & Stage of Growth: Heavy stand of Russian Thistle from 12 to 15 inches tall in undisturbed wheat stubble.

Spraying Information: Atrazine was applied October 23, 1986 with 8002 nozzles. The herbicide was applied at a pressure of 26 PSI and a solution rate of 10 gallons per acre. The Landmaster was applied May 6, 1987 with a solution rate of 5 gallons per acre. The spring Atrazine + oil treatments were applied June 4, 1987.

Tillage Information: Spring tillage was completed on April 30, 1987. The soil was worked with a field cultivator followed by a disk operation. The cultivation treatment was completed on June 22.

Seeding Information: Pioneer Hybrid 3965 seed corn was planted at the rate of 14,100 plants per acre on May 11, 1987. A Buffalo No-till planter was used to plant four 30 inch rows in each plot. Pioneer 894 grain sorghum was planted with the Buffalo planter on May 23 at the rate of 2.5 pounds of seed per acre. The grain sorghum plots contained four 30 inch rows. The sorghum was reseeded on June 4.



Soil Test & Fertilization: The soil test taken at this site indicated the soil contained: N - 33 #/A, Phosphorus - 14 #/A, Potassium - 860 #/A, pH - 7.1, Zinc - 9.8 PPM, Copper - 1.8 PPM, Chloride - 7 #/A, S - 0#/A, Salts - 0.7 MMHO/cm. Both corn and sorghum received starter fertilizer (18-18-0) at 14 gallon per acre. The fertilizer attachment injected the liquid 2 inches to the side and below the seed. All plots received a knifed in application of 13 gallons/acre of 28-0-0 fertilizer between the rows.

Experimental Design: The experiment was designed as a Split plot randomized complete block with 4 replications. One-half of each plot was planted to corn and the other half to grain sorghum.

TABLE 55. Effect of Multiple Herbicide Application, With or Without Tillage or Cultivation, on the Grain and Grain Yield of Corn and Grain Sorghum. Pennington County (New Underwood), Marty Printz Cooperator, 1986-87.

Herbicide & Tillage	Rate/Acre of Product	Grain Sorghum	Corn	
		Bu/Acre	% Moisture	Bu/Acre
Atrazine (Fall) + Landmaster (Spring) + Cultivation (Summer)	1 lb 40 oz	23	12	37
Atrazine (Fall) + Landmaster (Spring)	1 lb 40 oz	18	12	36
Atrazine (Fall) + Cultivation (Summer)	2.5 lb	22	11	57
Atrazine (Fall) No-Till	2.5 lb	32	12	60
Landmaster (Spring) + Cultivation (Summer)	40 oz	19	12	30
Landmaster (Spring) + Atrazine + Oil(Summer)	40 oz 1#+1qt	30	12	48
Tillage (Spring) + Cultivation (Summer)		19	12	35
Tillage (Spring) + Atrazine + Oil(Summer)	1#+1qt	24	12	53
LSD(.05)		4.2	1.2	12
Standard Deviation		2.8	8.0	8
Coefficient of Variability (%)		12.2	6.9	18

Discussion: The results published in Table 55 are from the second year of the experiment and are similar to those of 1986. The plots which received fall applied Atrazine at the rate of 2.5 pounds of active ingredient per acre, produced the highest yield of both corn and grain sorghum in both 1986 and 1987. The latest results would indicate that Landmaster or tillage in combination with a post emergence application of Atrazine + oil was also effective. The higher rates of fall or summer applied Atrazine would require a fallow season after the corn or sorghum before planting a small grain crop. The results are listed in Table 55.

Downy Bromegrass Control in Winter Wheat  
Pennington County(Airport Farm), 1986-87.

Objective: To evaluate the control of downy bromegrass and the effect of Preplant and Post Emergence applied herbicides on yield of hard red winter wheat.

Application Data: Sprayer was equipped with 8001 nozzles spaced 30 inches apart. Herbicide solution were applied at the rate of 5 gallons per acre. Pre-plant incorporated treatments were applied October 7, 1986. Incorporation was done by disking twice at a depth of 2-3 inches. Post Emergence treatments were applied November 12, 1986.

Soil Test Data: Organic Matter - 2.6%, pH - 6.7, Texture - Clay Loam.

Experimental Design: Randomized complete block with 4 replications. Individual plot size was 10 feet by 50 feet.

Seeding Information: The hard red winter wheat variety Rose was seeded with a hoe type drill on October 9, 1986. The openers were spaced at 12 inches. Seeding rate was 1 bushel per acre.

Discussion: There was no crop injury as indicated by the crop yields and 8.2% Coefficient of Variability. The downy bromegrass infestation was light with approximately one plant per square foot in the check plot. There was a moderate infestation of wild buckwheat that was effectively controlled by the PrePlant Incorporated Glean treatments. The data are reported in Table 56.

**TABLE 56. Effects of Preplant and Post Emergence Herbicides on Yield of Hard Red Winter Wheat - Pennington County(Airport Farm), 1986-1987.**

<u>Herbicide Treatment</u>	<u>Formulation*</u>	<u>Rate (Lbs/A)</u>	<u>Type of Application</u>	<u>Grain Yield (Bu/Acre)</u>
Control				24.1
Hoelon	EC 3.0	0.750	PPI	27.9
Hoelon	EW 3.0	0.750	PPI	26.9
Hoelon	MC 3.0	0.750	PPI	27.5
Hoelon	EC 3.0	1.000	PPI	25.6
Hoelon	EW 3.0	1.000	PPI	29.1
Hoelon	MC 3.0	1.000	PPI	27.3
Hoelon	EC 3.0	0.750	PPI	30.6
Glean	DF 0.75**	0.016	PPI	
Hoelon	EW 3.0	0.750	PPI	29.7
Glean	DF 0.75**	0.160	PPI	
Hoelon	MC 3.0	0.750	PPI	31.8
Glean	DF 0.75**	0.016	PPI	
Hoelon	CL 0.05**	1.000	PPI	24.6
Hoelon	SD 0.05**	1.000	PPI	24.3
Metribuzin	DF 0.75**	0.250	POST	26.3
Metribuzin	DF 0.75**	0.125	POST	29.4
Siege	DF 0.50**	1.000	POST	
Fargo	GR 0.10**	1.500	PRE	27.6
LSD(.05) - 3.25 Bu/A		C.V. - 8.2%	Mean - 27.5	

\*Pounds per gallon active ingredient.

\*\*Percent active ingredient.

EC-Emulsifiable Concentrate, EW-Emulsifiable Water, MC-Micro-encapsulated, DF-Dry Flowable, CL-Clay Granule, SD-Sand Granule, GR-Granule.

#### Weed Control in Fallow

Residual Herbicides on Summer Fallow  
Pennington County(New Underwood), 1987  
Martin Printz, Cooperator

**Objective:** To evaluate the control of emerged and non-emerged weeds with non-residual and residual herbicides in fallow.

**Stage of Weeds and Crop Growth:** On May 6, 1987 the plants were vigorously growing. The volunteer wheat was 5 to 7 inches tall, Tansy Mustard was 3 to 5 inches tall, Kochia was 1½ to 2 inches tall, Prickly Lettuce was 3 to 7 inches tall, and Russian Thistle was 1 to 2 inches tall.

TABLE 57. Effect of Non-Residual and Residual Herbicides on Control of Weeds in Fallow Pennington County (New Underwood), 1987.

Herbicide Treatment	Formulation	Rate-ai Oz/Acre	Percent Control					
			Kochia*	Lettuce*	Wild Wheat*	Winter Thistle*	Kochia+	Russian Thistle+
Roundup	LQ 4.0	0.380	90.0	91.2	94.8	91.2	45.5	36.8
Prowl	LQ 4.0	1.000						
Roundup	LQ 4.0	0.380	77.5	70.0	98.0	78.8	1.0	34.2
Prowl	LQ 4.0	1.500						
Roundup	LQ 4.0	0.380	82.5	77.5	95.5	86.2	72.5	42.8
Prowl	LQ 4.0	2.000						
Roundup	LQ 4.0	0.380	68.8	91.0	96.8	77.5	25.5	55.2
Sceptor	LQ 4.0	0.062						
Roundup	LQ 4.0	0.380	85.0	73.8	96.8	84.8	92.5	93.2
Sceptor	LQ 4.0	0.125						
Roundup	LQ 4.0	0.380	82.5	73.8	93.2	88.5	94.5	95.5
Sceptor	LQ 4.0	0.187						
Roundup	LQ 4.0	0.380	70.0	67.5	90.8	76.2	43.0	59.0
Pursuit	LQ 4.0	0.031						
Roundup	LQ 4.0	0.380	71.2	70.0	96.8	81.2	1.0	62.8
Pursuit	LQ 4.0	0.062						
Roundup	LQ 4.0	0.380	77.5	78.8	95.8	86.2	99.0	97.0
Pursuit	LQ 4.0	0.125						
Roundup	LQ 4.0	0.380	82.5	90.0	97.0	81.2	55.0	77.5
Glean	DF 0.75	0.247						
Untreated	—	—	1.0	1.0	1.0	1.0	1.0	1.0
Least Sig. Diff. at 5% level			14.9	18.9	7.0	14.1	NA**	38.4
Standard Deviation			10.3	13.1	4.8	9.8	NA**	26.6
Coefficient of Variability(%)			14.4	18.4	5.6	12.9	NA**	44.6

+Control evaluations were made on May 25, 1987.

\*Control evaluations were made on June 10, 1987.

\*\*Values not available because of incomplete data.

Application Data: The herbicides were applied on May 7, 1987. The sprayer was equipped with #8001 nozzles spaced at 30 inches. The solutions were applied at a pressure of 25 PSI, a speed of 3.2 MPH, and solution rate of 5 gallons per acre. The sky was clear with an air temperature of 75 degrees. The wind was calm. The weed control observations were made on May 25 and June 10, 1987.

Soil Test Data: Organic Matter - 2.0%, pH - 6.3, Texture - Clay. Mechanical separation resulted in 29% sand, 31% silt, 40% clay. The area had received 1.5 inches of rain three days before the spray treatments were applied.

Experimental Design: Randomized complete block with 4 replications. Individual plot size was 10 feet by 50 feet.

Discussion: The control of the winter wheat was good and quite consistent. The control of broadleaved weeds was variable. The Sceptor treated plots had improved control of both Kochia and Russian Thistle at the time of the second observation. The results are listed in Table 57.

Non-Residual Herbicides on Summer Fallow  
Pennington County(New Underwood), 1987  
Martin Printz,Cooperator

Objective: To evaluate the control of broadleaved and grassy weeds in fallow.

Stage of Weeds and Crop Growth:On May 6 1987 the volunteer Winter Wheat was 3 to 5 inches tall and fully tillered. Kochia seedlings were 1\4 inch in diameter, Russian Thistle was 1 to 2 inches tall, Prickly Lettuce was 3 to 5 inches tall, and Wild Buckwheat had 2 to 4 leaves.

Application Data: The herbicides were applied on May 6, 1987. The sprayer was equipped with #8001 nozzles spaced at 30 inches. The solutions were applied at a pressure of 30 PSI, a speed of 3.2 MPH, and solution rate of 5 gallons per acre. The sky was clear with an air temperature of 75 degrees. The wind was calm. Observations of control of the weeds were made on May 28, 1987.

Discussion: Visual estimates of weed control were made on May 28 or 22 days after treatment. The weed control was good with all treatments. The control of volunteer Winter Wheat was the most consistent as indicated by the low value of the Coefficient of Variability. The control of Wild Lettuce was least consistent and less than satisfactory. The data are reported in Table 58.



TABLE 58. Control of Volunteer Winter Wheat and Broadleaved Weeds in Fallow Soil by Application of Non-Residual Herbicides - Pennington County (New Underwood), Martin Printz, Cooperator.

Herbicide Treatment	Formulation	Rate-ai Oz/Acre	Percent Control				
			Kochia	Wild Lettuce	Winter Wheat	Tansy Mustard	Russian Thistle
Landmaster II	LQ 1.01	40	86.2	86.0	99.0	95.8	83.8
Landmaster II	LQ 1.36	54	87.5	88.8	99.0	94.8	87.5
MOIN8783	LQ 0.53	32	80.0	71.2	94.2	90.0	82.5
MOIN8783	LQ 0.73	40	88.5	78.5	99.0	89.8	83.8
Landmaster II AMS	LQ 1.01	40 2.0%	84.8	67.5	99.0	90.0	81.2
MOIN8783 AMS	LQ 0.53	32 2.0%	90.0	80.0	99.0	94.8	88.8
Control	—	—	1.0	1.0	1.0	1.0	1.0
Least Sig. Diff. at 5% level			11.9	15.0	5.3	6.6	10.2
Standard Deviation			8.0	10.1	3.6	4.4	6.9
Coefficient of Variability(%)			10.8	14.9	4.3	5.6	9.5

**Herbicide Injury to Winter Wheat  
Pennington County(Airport Farm), 1986-87.**

**Objective:** To evaluate injury to winter wheat from Preemergence and Post Emergence application of Glean and Landmaster herbicides.

**Application Information:** Glean and Landmaster were applied as preemergence treatments on October 6, 1986. Post emergence treatments were applied December 19, 1986. At the time of post emergence application there was no snow on the ground and the wheat was in the 3 leaf stage. All applications were made with a plot sprayer using 8001 nozzles, and a pressure of 25 PSI. The spray mixture was applied at 5 gallons per acre.

**Soil Information:** Soil test (0-6"), Nitrogen - 19 #/A, Phosphorus - 23 #/A, Potash - 880 #/A, ph - 6.7, Organic Matter - 2.6%, Soil Texture - fine.

**Discussion:** There was no visual injury noted in the growing winter wheat. The yields (Table 59) also indicate there was no injury caused by Glean, Landmaster, or combinations of Glean and Landmaster applied in this study.

**TABLE 59. Effects of Preemergence and Post Emergence Applications of Glean and Landmaster on Grain Yield of Hard Red Winter Wheat - Pennington County (Airport Farm), 1986-87.**

<u>Herbicide Treatment</u>	<u>Rate Oz/A*</u>	<u>Time of Application</u>	<u>Grain Yield (Bu/Acre)</u>
Glean	0.33	PRE	30.6
Glean	0.33	PRE	28.2
Landmaster	40.00	PRE	
Glean	0.33	PRE	31.6
Landmaster	80.00	PRE	
Glean	0.66	PRE	29.3
Glean	0.66	PRE	28.6
Landmaster	40.00	PRE	
Glean	0.66	PRE	30.2
Landmaster	80.00	PRE	
Control	---	---	26.7
Landmaster	40.00	PRE	26.1
Landmaster	80.00	PRE	27.1
Glean	0.33	POST	29.8
Glean	0.33	POST	29.8
Landmaster	40.00	POST	
Glean	0.33	POST	32.1
Landmaster	80.00	POST	
Glean	0.66	POST	30.2
Glean	0.66	POST	29.6
Landmaster	40.00	POST	
Glean	0.66	POST	28.5
Landmaster	80.00	POST	
Least Significant Difference (.05) - Bu/Acre			3.53
Standard Deviation - Bu/Acre			2.44
Coefficient of Variability - (%)			7.24

\*Ounces of Product per acre.

**Broad Leaf Weed Control in Winter Wheat  
Pennington County(New Underwood), 1987  
Martin Printz, Cooperator**

# Combinations of Express and Other Herbicides

**Objective:** To evaluate the herbicide "Express" in combination with other herbicides for control of Kochia, W. Buckwheat, Sunflower, and Russian Thistle.

**Application Information:** Herbicides and combination of herbicides were applied on May 7, 1987. The treatments were applied with a plot sprayer equipped with 8001 nozzles and delivering spray solution at the rate of five gallons per acre.

**Soil Information:** Soil Test (0-6"), Nitrogen - 18 #/A, Phosphorus - 40 #/A, Potassium - 1100 #/A, ph - 6.3, Organic Matter - 1.8%, Texture - Clay loam.

TABLE 60. Effects of Express and Express Combinations on Broadleaf Weeds. Pennington County (New Underwood), 1987.

Herbicide Treatment	Rate-ai Oz/A	Percent Control of Weeds			
		Kochia	W. Buckwheat	W. Sunflower	Russian Thistle
Express	0.06	86	88	72	80
Bromoxy	1.00				
Express	0.06	84	87	72	65
Bromoxy	1.50				
Express	0.06	97	92	98	89
Bromoxy	3.00				
Express	0.125	96	97	65	96
Bromoxy	1.00				
Express	0.125	92	96	67	70
Bromoxy	1.50				
Express	0.125	96	98	94	98
Bomoxy	3.00				
Express	0.1875	97	97	59	86
Bromoxy	1.00				
Express	0.1875	98	98	80	98
Bromoxy	1.50				
Express	0.1875	96	99	99	99
Bromoxy	3.00				
2,4-D	6.00	71	85	93	65
Banvel	2.00				
Untreated	--	0	0	0	0
Matrix	0.30	98	99	99	99
	0.375				
LSD(.05) - % Control		25	16	43	38
C.V. - (%)		20	13	40	34

NOTE: Herbicides were applied post emergence. Weed control notes were visual observations on May 22, 1987.

# Combinations of Ally and Other Herbicides

**Objective:** To evaluate the herbicide "Ally" in combination with other herbicides for control of Kochia, W. Buckwheat, Sunflower, and Russian Thistle.

**Application Information:** Herbicides and combination of herbicides were applied on May 7, 1987. The treatments were applied with a plot sprayer equipped with 8001 nozzles and delivering spray solution at the rate of five gallons per acre.

**Soil Information:** Soil Test (0-6"), Nitrogen - 18 #/A, Phosphorus - 40 #/A, Potassium - 1100 #/A, ph - 6.3, Organic Matter - 1.8%, Texture - Clay loam.

TABLE 61. Effects of Ally and Ally Combinations on Broadleaf Weeds -Pennington County (New Underwood), 1987.

Herbicide Treatment	Rate-ai Oz/A*	Percent Control of Weeds			
		Kochia	W. Buckwheat	W. Sunflower	Russian Thistle
Ally	0.06	97	87	83	97
Surf*	0.50%				
Ally	0.125	98	98	98	98
Surf*	0.50%				
Ally	0.06	97	89	98	98
2,4-D. E	2.00				
Surf*	0.25%				
Ally	0.125	98	88	99	99
2,4-D. E	2.00				
Surf*	0.25%				
Ally	0.06	98	98	74	87
Tordon	0.25				
Surf*	0.25%				
Ally	0.125	88	88	97	97
Tordon	0.25				
Surf*	0.25%				
Ally	0.06	98	96	87	96
MCPA. E	2.00				
Surf*	0.25%				
Express	0.125	96	87	93	97
2,4-D. E	2.00				
Surf*	0.25%				
2,4-D. E	8.0	58	53	64	79
2,4-D. E	4.0	58	93	96	91
Tordon	0.25				
Check	---	0	0	0	0
LSD(.05) - % Control		14	20	32	13

\*Surfactant X-77 was mixed in spray mixtures at rates of .25% and .50% by vol.