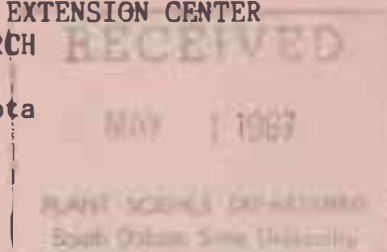


WEST RIVER AGRICULTURAL RESEARCH AND EXTENSION CENTER
CROPS AND SOILS RESEARCH

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
John Nicksic	Thunder Hawk 57655	Corson
Melvin Jorgensen	Wanblee 57577	Jackson
Paul Patterson	Draper 57531	Jones
Clifford Halverson	Kennebec 57544	Lyman
Steve Lien	Presho 57568	Lyman
Gary Hawks	Plainview 57771	Meade
Tim Komes	Sturgis 57785	Meade
William Bielmaier	Wall 57790	Pennington
Rodney Renner	Wall 57790	Pennington
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Ron Seidel	Bison 57620	Perkins
Terry Beastrom	Hayes 57537	Stanley

This is an annual report and results published herein are therefore neither complete nor conclusive. 300 copies printed at an estimated cost of \$2.60 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, one degree below normal in October, and sixteen degrees below normal in November. During the winter months air temperatures were four degrees below normal in December, nine degrees above normal in January, and five degrees below normal in February. Springtime temperatures were above normal by eleven degrees in March, one degree below normal in April, and near normal in May. June was five degrees below normal, while July was nine degrees above normal.

Precipitation patterns varied but rainfall was generally above normal for the year. The Northwest area was dry during August and September of 1985, while the Central area from the Missouri river to the Black Hills varied from an inch above normal to normal. The Southern area, along the Nebraska border, received an inch above normal.

During the winter season normal precipitation was received in almost the entire area. During the Spring season, all areas received above normal precipitation, but also reported periods of soil moisture shortage. (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**
Martin (Bennett County Reporting Station)***				
Aug. 1985	69.8	-2.5	3.04	0.96
Sept. 1985	59.2	-2.3	2.85	1.43
Oct. 1985	50.2	-0.5	1.39	0.35
Nov. 1985	18.0	-17.6	2.44	2.09
Dec. 1985	20.5	-6.2	0.41	0.12
Jan. 1986	31.6	9.1	0.05	-0.24
Feb. 1986	25.5	-1.2	0.48	0.07
Mar. 1986	44.1	12.0	2.09	1.42
Apr. 1986	46.1	0.3	3.93	2.28
May 1986	56.5	0.4	3.46	0.51
June 1986	69.3	4.1	5.18	1.30
July 1986	72.2	-1.1	2.79	0.33

*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 location.

TABLE 1. Continued

Month & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
Thunder Hawk (Lemmon-Corson County Reporting Station)				
Aug. 1985	(67.1)+	---	(1.81)+	---
Sept. 1985	(55.5)+	---	(0.81)+	---
Oct. 1985	(46.1)+	---	(1.03)+	---
Nov. 1985	(15.2)+	---	(0.58)+	---
Dec. 1985	13.7	-5.2	0.40	-0.16
Jan. 1986	24.0	12.3	0.65	0.13
Feb. 1986	14.6	-4.0	0.42	-0.16
Mar. 1986	40.2	12.9	0.37	-0.50
Apr. 1986	41.2	-0.8	4.80	2.95
May 1986	55.4	1.3	4.19	1.51
June 1986	67.2	3.7	1.54	-2.16
July 1986	70.0	-0.3	2.48	0.07

+(Data missing from Lemmon, reported data from McIntosh)

Ralph (Harding County Reporting Station)				
Aug. 1985	66.0	-1.9	1.48	-0.15
Sept. 1985	55.1	-1.4	1.02	-0.19
Oct. 1985	45.8	0.4	0.91	0.08
Nov. 1985	14.9	-14.9	1.24	0.90
Dec. 1985	15.6	-4.1	0.76	0.48
Jan. 1986	24.3	11.0	1.22	0.95
Feb. 1986	16.2	-3.8	0.46	0.14
Mar. 1986	40.6	12.2	0.53	0.07
Apr. 1986	42.2	0	3.62	2.08
May 1986	54.6	0.8	3.37	0.76
June 1986	67.6	4.9	1.21	-2.27
July 1986	69.6	0	0.84	-1.08

Wanblee (Long Valley-Jackson County Reporting Station)				
Aug. 1985	69.6	-4.0	2.24	0.19
Sept. 1985	58.4	-4.9	2.06	0.92
Oct. 1985	48.6	-3.1	1.43	0.50
Nov. 1985	17.8	-18.7	1.64	1.27
Dec. 1985	19.7	-7.4	0.33	0.01
Jan. 1986	30.5	8.8	0.48	0.24
Feb. 1986	23.7	-3.5	0.29	-0.13
Mar. 1986	41.5	7.8	1.85	0.76
Apr. 1986	44.2	-2.4	5.55	3.38
May 1986	56.0	-1.5	1.69	-1.08
June 1986	68.5	0.8	5.12	1.94
July 1986	71.2	-4.0	2.60	0.28

*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>Murdo (Jones County Reporting Station)</u>				
Aug. 1985	71.5	-2.1	2.66	0.81
Sept. 1985	60.9	-2.2	2.10	0.99
Oct. 1985	(50.9)+	—	(0.67)+	—
Nov. 1985	19.2	-16.0	2.32	1.83
Dec. 1985	(14.8)+	—	(0.24)+	—
Jan. 1986	27.4	9.8	0.52	0.21
Feb. 1986	20.8	-3.0	0.50	0.04
Mar. 1986	42.4	10.4	3.11	2.03
Apr. 1986	46.2	-0.4	5.63	3.43
May 1986	59.1	1.0	3.78	1.11
June 1986	71.5	3.5	5.85	2.57
July 1986	75.7	0.5	2.95	0.86
+(Data missing from Murdo, reported data from Kennebec)				

<u>Kennebec (Lyman County Reporting Station)</u>				
Aug. 1985	70.6	-3.8	2.30	0.07
Sept. 1985	61.3	-2.4	2.76	1.55
Oct. 1985	50.9	-0.2	0.67	-0.39
Nov. 1985	19.4	-14.8	1.20	0.69
Dec. 1985	14.8	-7.3	0.24	-0.14
Jan. 1986	25.2	9.6	0.24	-0.01
Feb. 1986	19.1	-3.4	0.22	-0.26
Mar. 1986	42.3	10.3	1.32	0.43
Apr. 1986	46.9	-0.4	4.58	2.45
May 1986	59.8	0.9	6.27	3.75
June 1986	72.3	3.2	2.26	-0.75
July 1986	77.1	1.3	1.99	-0.30

<u>Bear Butte Valley (Ft. Meade-Meade County Reporting Station)***</u>				
Aug. 1985	69.8	-1.9	3.00	1.28
Sept. 1985	57.4	-4.2	1.34	0.15
Oct. 1985	49.6	-1.3	0.45	-0.59
Nov. 1985	18.6	-17.3	2.38	1.68
Dec. 1985	26.8	-1.3	1.53	0.97
Jan. 1986	34.8	11.0	0.80	0.33
Feb. 1986	24.8	-3.1	1.24	0.52
Mar. 1986	44.9	11.3	0.72	-0.30
Apr. 1986	(43.7)+	—	(3.57)+	—
May 1986	57.1	0.7	2.27	-1.04
June 1986	69.9	4.1	5.59	1.78
July 1986	72.1	-0.9	3.08	0.85
+(Data missing from Ft. Meade, reported data from Newell)				

*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

Mouth & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
<u>Plainview (Meade County Reporting Point)***</u>				
Aug. 1985	68.9	-5.6	0.73	-0.82
Sept. 1985	57.8	-4.5	0.89	-0.17
Oct. 1985	(49.8)+	---	(1.40)+	---
Nov. 1985	(17.6)+	---	(1.66)+	---
Dec. 1985	16.1	-2.6	0.34	0.02
Jan. 1986	26.0	2.9	0.43	0.29
Feb. 1986	18.1	-8.4	0.81	0.70
Mar. 1986	41.8	11.9	0.73	-0.26
Apr. 1986	44.1	-4.0	4.51	3.55
May 1986	55.3	-0.8	2.30	-0.30
June 1986	(69.9)+	---	(4.34)+	---
July 1986	(72.6)+	---	(2.33)+	---
+(Data from Plainview missing, reported data from Milesville)				
<u>Rapid City Airport (Pennington County Reporting Station)</u>				
Aug. 1985	69.0	-2.4	1.86	0.42
Sept. 1985	55.6	-5.3	1.57	0.54
Oct. 1985	47.3	-2.4	0.98	0.17
Nov. 1985	16.0	-18.9	2.22	1.71
Dec. 1985	21.0	-5.1	0.77	0.32
Jan. 1986	29.8	9.0	0.49	0.07
Feb. 1986	21.5	-4.5	0.92	0.30
Mar. 1986	43.0	10.4	0.88	-0.14
Apr. 1986	44.2	-0.4	4.74	2.78
May 1986	54.9	-0.7	1.43	-1.20
June 1986	67.6	2.4	4.56	1.30
July 1986	70.9	-1.7	0.91	-1.21
<u>Wasta (Pennington County Reporting Station)</u>				
Aug. 1985	71.3	-2.0	0.76	-0.75
Sept. 1985	59.3	-2.9	1.84	0.78
Oct. 1985	48.8	-1.6	0.87	-0.05
Nov. 1985	18.4	-16.7	1.85	1.36
Dec. 1985	19.6	-5.1	0.67	0.29
Jan. 1986	29.1	9.3	0.41	0.06
Feb. 1986	22.7	-3.3	0.69	0.25
Mar. 1986	44.3	10.2	0.81	-0.04
Apr. 1986	46.4	-0.6	4.77	2.86
May 1986	58.5	0.4	1.64	-0.87
June 1986	71.3	3.6	3.57	0.44
July 1986	73.7	-1.2	1.40	-0.65

*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 location.

TABLE 1. Continued

Month & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
<u>Bison</u> (Perkins County Reporting Station)				
Aug. 1985	67.6	-3.2	1.72	-0.03
Sept. 1985	55.3	-3.5	0.94	-0.27
Oct. 1985	47.2	1.3	0.90	0.08
Nov. 1985	16.1	-15.9	1.10	0.59
Dec. 1985	15.6	-2.4	1.18	0.79
Jan. 1986	24.5	8.7	0.81	0.45
Feb. 1986	16.4	-7.8	0.70	0.18
Mar. 1986	40.5	10.5	0.78	-0.05
Apr. 1986	41.9	-1.5	5.30	3.45
May 1986	55.5	1.5	4.53	1.97
June 1986	(68.1)+	—	(4.56)+	—
July 1986	70.6	-1.7	3.72	—

+(Data missing from Bison, reported data from Usta)

Kirley (Stanley County Reporting Station)****

Aug. 1985	68.3	—	2.71	0.86
Sept. 1985	58.0	-4.3	1.22	-0.14
Oct. 1985	47.7	-0.2	0.93	-0.06
Nov. 1985	17.0	-16.2	2.27	1.84
Dec. 1985	14.2	-5.2	0.65	0.15
Jan. 1986	23.9	8.1	0.65	0.30
Feb. 1986	15.9	-6.9	1.36	0.78
Mar. 1986	(43.1)+	—	(2.10)+	—
Apr. 1986	—	—	—	—
May 1986	56.7	-0.9	3.89	1.27
June 1986	(70.1)+	—	(3.92)+	—
July 1986	72.2	—	3.70	1.73

+(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.

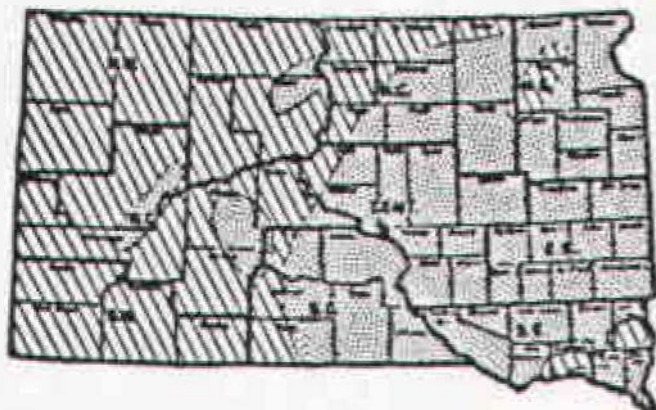
****Departures based on records of 14 years (1971-1984).

The total useable moisture (Table 3) for the entire year varied from 5.1 inches in eastern Pennington County to over 26 inches in Jones County. The Spring season useable moisture ranged from 1.5 inches in eastern Pennington County to over 17 inches in Jones County.

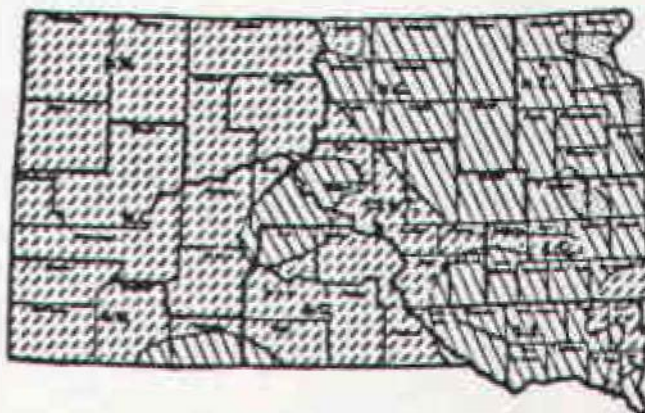
Soil moisture conditions during the growing season are illustrated in the maps shown in table 2.

TABLE 2. Topsoil Moisture Conditions During Growing Season, May-September 1986. (Crop and Livestock Reporting Service-USDA)

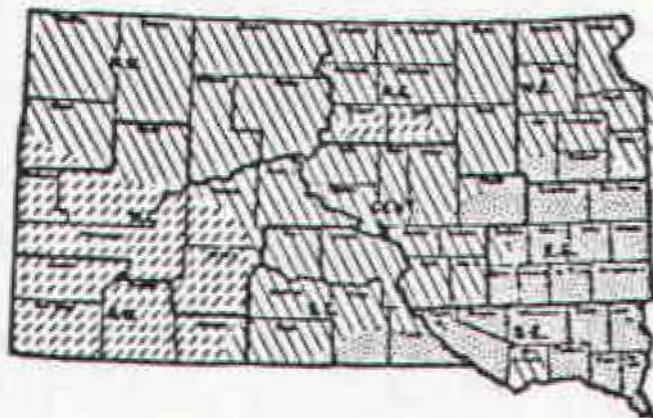
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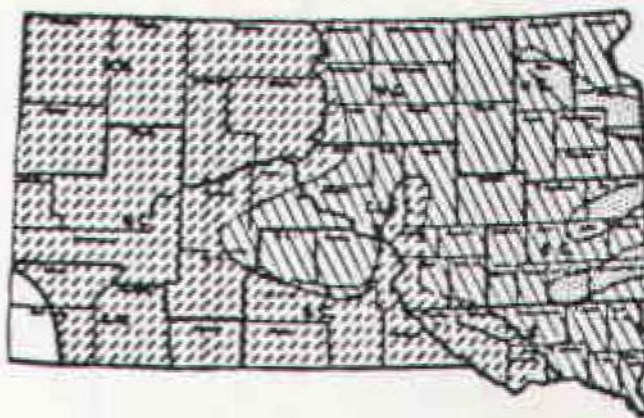
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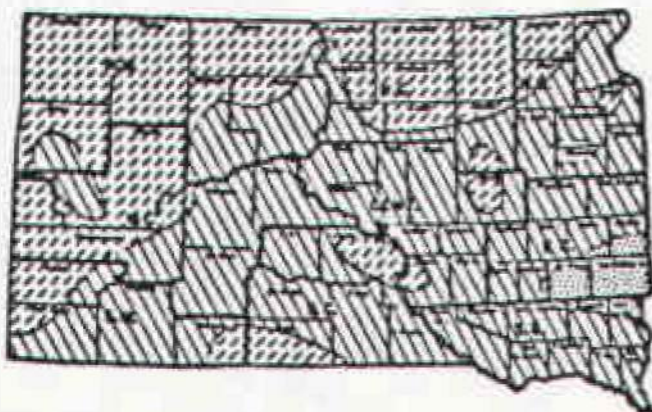
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As of Friday, August 22, 1986



As of Friday, June 27, 1986



As of Friday, September 19, 1986

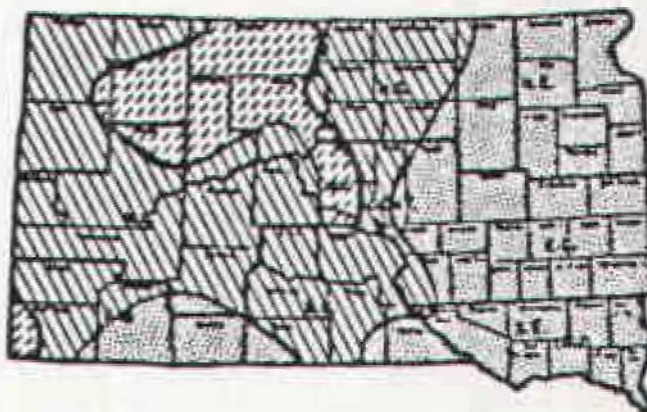


TABLE 3. Weather Data - Date of Critical Temperatures and Total Useable Precipitation in Counties with Experimental Plots, (1985-1986).

Location	Date of Temperature*		Total Useable Moisture**	
	Fall-First	Spring-Last	Aug. 85-July 86	April 86-July 86
Bennett County (Martin)	Sept. 24 (25°)	May 17 (24°)	24.06	13.70
Corson County (Lemmon)	Sept. 29 (28°)	Apr 29 (27°)	15.24	11.71
Harding County (Ralph)	Sept. 23 (27°)	May 17 (25°)	12.68	7.96
Jackson County (Long Valley)	Sept. 20 (28°)	May 1 (27°)	21.82	13.99
Jones County (Murdo)	Sept. 4 (25°)	Apr 21 (26°)	26.91	17.43
Lyman County (Kennebec)	Sept. 24 (26°)	Apr 21 (28°)	21.54	14.29
Meade County (Ft. Meade)	Sept. 24 (25°)	Apr 16 (13°)++	22.33	12.94
Meade County (Plainview)	Sept. 24 (24°)	Apr 21 (26°)	16.44	12.50
Pennington County (Rapid City AP)	Sept. 23 (24°)	Apr 16 (26°)	17.48	10.81
Pennington County (Wasta)	Sept. 24 (23°)	Apr 15 (15°)	15.66	10.29
Perkins County (Bison)	Sept. 24 (22°)	Apr 29 (28°)	22.46	17.38
Stanley County (Kirley)	Sept. 24 (25°)+++	Apr 21 (28°)+++	—	—

*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 inch in two contiguous days.

+Missing Data - Closest reporting station was McIntosh.

++Missing Data - Closest reporting station was Newell.

+++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 were located in Bennett, Harding, Jackson, Meade(2 locations), Pennington, Perkins and Stanley Counties. All plots were seeded with a deep furrow seeder with a fertilizer attachment. The seeding rate 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 plots contained six rows with a ten inch spacing.

Bennett County

The winter wheat variety trial in Bennett County was seeded into fallow soil with a deep furrow seeder on September 18. Soil moisture was adequate for germination. Above normal rainfall was received throughout the spring and summer providing adequate soil moisture throughout the growing season. However, there were several periods when topsoil moisture was short.

Subnormal temperatures (Table 1) were experienced during most of the fall. January and March air temperatures were 9.1 and 12.0 degrees above normal, respectively. All other months were near normal, except June when temperatures averaged 4 degrees above normal. The plots were fertilized for an anticipated yield of 40 bushels per acre. However, due to below normal spring temperatures many tillers developed, and with above normal spring rains, anticipated yields of 45 bushels per acre were produced. Weeds were controlled by an application of Glean at one-half ounce per acre. A light epiphytotic of leaf and stem rust was also experienced. The results of the trial are listed in Table 4.

Harding County

The Harding County trial was seeded on September 17. Soil moisture was adequate for germination and emergence. Precipitation was near normal during the fall, but during winter and spring was above normal. Early summer rainfall was below normal. Air temperatures were near normal except during November and December. In November they were more than fourteen degrees below normal, and in December they were more than four degrees below normal. January, March, and June air temperatures were much above normal, February was below, while April and May were normal.

Winterkill was extremely variable with an average survival of 74%. Fertilizer was applied for an anticipated yield of forty bushels per acre. Under normal rainfall the anticipated yield was forty one bushels per acre, but due to adverse weather and the effects of a stem rust epiphytotic during filling, the yield was reduced to thirty two bushels per acre. The trial data are published in Table 5.

TABLE 4. Hard Red Winter Wheat Variety Trial - Bennett County (Martin), 1984-86.

Variety	% Stand May 1986	Height (Inches)	Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1986	(3 yr av)
Siouxland	89	36	E	11.5	62.2	69.1	43.1
Thunderbird	89	35	M-E	12.8	61.1	61.7	—
Bounty 205	83	36	M	12.1	60.4	60.7	—
Ram	86	35	M	11.6	55.7	55.3	—
Sage	85	38	E	12.3	60.6	52.7	37.5
Colt	89	29	M	11.2	57.3	51.8	38.4
Bounty 301	85	34	M	12.4	60.3	50.9	—
Dawn	86	33	M-E	12.8	57.3	49.2	34.0
Scout 66	85	40	E	11.2	60.3	48.4	35.2
HW 1037	85	32	—	11.5	57.1	48.4	—
Hail	85	25	E	13.1	56.7	48.0	—
Centura	86	36	M-E	12.0	59.3	45.8	33.4
Brule	86	32	M	12.1	56.5	45.2	35.8
TAM 107	83	27	E	11.8	56.1	45.2	—
Nell	85	27	E	10.7	58.3	45.1	34.9
Bennett	75	32	E	12.5	57.7	44.1	37.1
Centurk 78	86	36	M	12.3	59.1	43.7	33.1
Rita	83	35	M	13.0	56.9	43.4	34.0
Roughrider	88	37	M-E	12.4	58.7	41.6	34.2
Lancer	80	22	E	12.2	59.8	40.9	33.9
HW 1035	85	32	—	11.1	57.0	39.7	—
Agassiz	88	46	M-L	12.1	60.9	39.0	33.5
Rose	89	35	M-L	10.6	59.2	37.0	32.5
Big Horn	83	29	M-E	10.6	55.3	34.3	—
Norwin	85	21	M-L	12.2	57.2	31.4	27.7
Quantum 524	88	40	(M)+	10.8	53.4	30.9	—
Norstar	88	37	L	9.9	57.2	28.9	31.5
WM 140A	86	23	(E)+	10.9	51.8	27.9	—
Quantum 515	89	41	(M)+	11.0	49.0	18.9	—
LSD(.05) - 7.7 Bu/A				C.V. - 12.5%		Mean = 44.1	

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

**Protein content determined with a Technicon 300 InfraAnalyzer.

+Maturity rating based on observation in 1986 only.

NOTE: Seeded September 18, 1985 and harvested July 21, 1986.

Jackson County

Winter wheat trials in Jackson County were seeded on October 3, 1985. The soil had been fallowed and seeding was done with a deep furrow drill. Soil moisture was adequate for germination and emergence. Rainfall was above normal during almost the entire year. However, soil surface moisture was classed as short during May and July. Total normal rainfall during the spring season is in

excess of ten inches, but in 1986, fourteen useable inches were received. Grain yields for the site averaged 26.6 bushels per acre. The results of the trial are printed in Table 6.

TABLE 5. Hard Red Winter Wheat Variety Trials - Harding County(Ralph), 1985-86.

Variety	% Stand May 1986	Height (Inches)	Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1986	(2 yr av)
Siouxland	88	31	E	13.7	61.6	43.1	34.6
Thunderbird	79	28	M-E	12.9	64.1	39.5	--
Agassiz	91	34	M-L	13.3	62.6	37.9	35.8
Sage	85	32	E	13.1	62.3	37.6	31.2
Hail	80	26	E	13.2	60.5	37.3	--
Ram	79	28	M	13.5	59.4	36.2	--
Norwin	85	22	M-L	12.8	61.0	35.9	--
Dawn	70	25	M-E	13.2	61.5	35.7	27.4
HW 1035	24	29	-	11.4	60.3	35.7	--
Bounty 301	71	29	M	13.9	60.3	35.6	--
Rita	65	28	M	13.7	58.5	35.4	30.6
Brule	79	28	M	11.9	60.9	35.4	--
Rose	91	29	M-L	12.8	60.3	34.7	34.9
Centura	78	29	M-E	12.4	61.9	34.6	30.1
Colt	68	22	M	12.5	61.2	34.2	31.1
Scout 66	85	31	E	13.3	62.0	34.1	29.6
Roughrider	81	24	M-E	13.6	61.4	33.6	30.0
Lancer	75	34	E	12.4	61.7	31.6	--
TAM 107	64	24	E	13.0	59.1	30.8	--
Centurk 78	76	28	M	13.0	62.0	30.6	27.8
HW 1037	60	26	-	13.0	59.5	30.2	--
Big Horn	86	26	M-E	12.9	56.8	30.1	--
Nell	75	30	E	13.2	60.3	29.9	--
Norstar	90	35	L	12.0	58.6	29.2	28.5
WM 140A	81	26	(E)+	11.7	55.6	27.6	--
Bounty 205	39	30	M	13.2	59.2	26.9	--
Quantun 524	85	33	(M)+	12.8	49.6	24.7	--
Bennett	34	25	E	13.0	61.0	24.4	26.4
Quantum 515	80	32	(M)+	11.8	44.8	16.3	--
LSD(.05) - 5.8 Bu/A C.V. - 12.8% Mean - 32.7							

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

**Percent protein determined with a Technicon 300 InfraAnalyzer.

+Maturity rating based on observations in 1986 only.

Note: Seeded September 17, 1985 and harvested July 25, 1986.

TABLE 6. Hard Red Winter Wheat Variety Trial - Jackson County (Wanblee), 1985-86.

Variety	Z Stand Aug 1986	Height (Inches)	Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Yield-Bu/Acre 1986 (2 yr av)	
Scout 66	90	36	E	13.3	54.8	40.7	36.1
Centura	90	32	M-E	14.0	54.7	38.5	36.6
Siouxland	85	32	E	14.2	56.4	37.3	—
Lancota	85	37	M-L	14.7	53.3	35.5	—
Quantum 568	75	28	M-E	14.3	50.6	35.1	—
Brule	85	36	M	12.2	50.2	35.1	33.3
Sage	85	35	E	14.8	55.0	34.3	33.2
Colt	80	25	M	14.0	51.6	34.3	—
TAM 105	85	27	E	13.1	50.3	33.5	32.2
Dawn	85	33	M-E	14.0	51.7	33.3	33.0
Ram	90	31	M	13.0	50.5	29.6	—
Wthrmstr 140A	80	31	(E)+	12.6	50.0	29.0	—
Lancer	85	37	E	12.9	56.4	28.6	28.2
Rocky	85	34	M-E	13.3	53.0	28.2	28.9
Quantum 555	90	27	M-E	14.3	47.0	27.0	—
Rita	85	27	M	15.3	50.5	26.0	30.0
Agassiz	95	42	M-L	13.4	51.3	24.8	28.5
Big Horn	90	26	M-L	14.0	50.9	24.6	—
Rose	90	32	M-L	12.2	52.0	22.0	23.4
Quantum 524	85	37	(M)+	13.1	47.0	17.9	—
Centurk 78	75	35	M	13.9	49.6	16.5	26.0
Quantum 515	85	38	(M)+	13.0	44.0	16.5	—
Hail	80	29	E	13.7	46.0	10.1	—
Nell	80	33	E	12.7	47.8	9.2	19.4
Roughrider	90	33	M-L	17.4	42.4	5.0	17.7
Buckskin	85	32	M-E	14.2	48.1	4.4	—

Non-replicated. Not statistically analyzed

Mean - 26.6

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

**Percent protein determined with a Technicon 300 InfrAnalyzer.

+Maturity rating based on observations in 1986 only.

Note: Plots were seeded October 3, 1985 and harvested July 29, 1986.

Meade County
(Bear Butte Valley)

Winter wheat varieties in Bear Butte Valley were seeded on September 11, 1985. The soil was dry at the surface but moist at seeding depth. Germination and emergence were good. Cool temperatures in September and October reduced fall growth but ground cover was near normal. Subnormal temperatures in November did not affect winter survival because of snow cover insulation. Air temperatures in March, April, and May were above longtime averages while rainfall was below normal. Showers during June brought the total rain fall to near normal.

Stored soil moisture was not measured in the Spring of 1986, but because of winter snows, should have been in excess of five inches. With normal seasonal precipitation sufficient soil moisture would be available to produce grain yields of 40 bushels per acre. The trials were fertilized to provide nutrients for that requirement. Near normal rainfall and temperatures were received. The combination of temperature, precipitation, and high humidity was favorable for development of a severe epiphytotic of stem and leaf rust. Although grain yields were high, the grain quality was poor. Reduced weights per bushel were a direct result from the necrosis caused by the rust fungus. The weeds were controlled by an application of 1/2 oz of Glean per acre. The trial data are reported in Table 7.

Meade County
(Plainview)

The variety trial at Plainview was seeded on September 11. The soil was firm with good moisture. Germination and emergence was excellent resulting in an exceptionally vigorous stand and good ground cover. Precipitation was limited during the fall and subnormal air temperatures were common from November through February. However, during March temperatures were much above normal and moisture was normal. While during April, temperatures were subnormal and moisture much above normal. Weeds were controlled by applying the herbicide Glean at 0.5 ounce per acre. The trial data are reported in Table 8.

TABLE 7. Hard Red Winter Wheat Trials—Meade County(Bear Butte Valley), 1984-86.

Variety	Stand May 1986	Height (Inches)	Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield—Bu/A 1986	(3 yr av)
Siouxland	91	43	E	12.1	60.1	69.5	51.1
Brule	89	30	M	10.5	57.7	65.0	48.4
Thunderbird	84	36	M-E	12.3	58.7	64.2	—
Sage	86	40	E	12.1	59.9	64.2	45.1
Colt	86	32	M	11.4	57.1	63.4	49.2
Centura	89	38	M-E	12.6	59.4	62.5	43.5
Ram	88	37	M	12.4	55.0	61.8	—
Lancota	81	40	M-L	13.3	62.7	59.7	—
Quantum 568	91	37	M-E	10.5	55.8	59.1	—
Scout 66	90	40	E	12.0	61.9	59.0	42.5
Nell	90	39	E	11.1	56.8	58.4	45.9
Bennett	85	38	E	13.1	59.3	58.4	43.3
Centurk 78	89	42	M	12.3	58.7	58.2	45.6
Rocky	81	40	M-E	11.7	58.1	56.2	44.4
Rose	86	42	M-L	12.0	54.7	55.4	48.6
Dawn	85	33	M-E	11.4	58.0	54.8	42.3
Hail	88	33	E	11.6	56.1	54.7	—
Lancer	90	41	E	11.5	59.5	54.0	45.9
Roughrider	91	42	M-L	12.4	60.2	52.5	45.2
Wthrmstr 110	80	31	—	11.1	54.6	52.2	—
Rita	86	35	M	13.8	54.1	51.6	40.5
Agassiz	88	46	M-L	12.2	61.2	49.3	43.2
Buckskin	88	42	M-E	10.4	55.5	48.5	—
Big Horn	88	35	M-L	11.3	54.0	47.6	—
TAM 105	91	32	E	11.1	51.4	47.3	38.8
Quantum 554	88	40	M-E	10.8	52.6	46.4	—
Wthrmstr 140A	89	31	(E)+	11.1	51.7	45.5	—
Quantum 555	82	31	M-E	11.0	51.3	44.5	—
Quantum 524	80	42	(M)+	10.7	50.7	41.7	—
Quantum 515	84	42	(M)+	10.4	45.8	29.2	—

LSD(.05) - 6.1 BU/A

C.V. - 8.0%

Mean - 54.5

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

**Percent protein determined with a Technicon 300 InfraAnalyzer.

+Maturity rating based on observation in 1986 only.

NOTE: Seeded September 11, 1985 and harvested July 29, 1986. Severe epiphytotic of leaf and stem rust in 1986.

TABLE 8. Hard Red Winter Wheat Trials - Meade County (Plainview), 1984-86.

Variety	% Stand May 1986	Height (Inches)	Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1986 (3 yr av)
Siouxland	95	42	E	12.4	57.7	68.5
Thunderbird	92	39	M-E	12.6	58.9	66.6
Sage	92	41	E	12.4	59.4	64.3
Colt	92	33	M	11.4	56.8	62.0
Ram	91	37	M	12.0	55.1	61.7
Lancota	91	44	M-L	13.7	58.9	61.4
Bennett	91	39	E	12.6	57.8	60.8
Brule	94	40	M	10.8	55.7	60.4
Dawn	89	37	M-E	11.6	57.6	59.0
Centura	95	42	M-E	12.2	57.9	58.4
Hail	94	34	E	11.4	55.8	58.1
Scout 66	92	45	E	12.5	58.4	57.3
Centurk 78	94	42	M	11.9	58.7	56.1
Rocky	92	43	M-E	11.7	58.2	56.0
Wthrmstr 110	91	34	-	11.2	56.9	55.5
Rose	91	42	M-L	10.9	59.4	54.4
Rita	89	38	M	12.6	55.6	52.8
Lancer	92	44	E	11.5	58.1	51.8
Quantum 568	91	37	M-E	10.3	55.0	50.0
Nell	94	42	E	11.0	56.4	46.7
Wthrmstr 140A	92	35	(E)+	11.1	53.4	45.9
TAM 105	92	35	E	10.6	53.4	44.8
Roughrider	95	43	M-L	12.5	59.0	37.9
Buckskin	95	45	M-E	10.7	55.2	34.4
Quantum 554	94	42	M-E	10.4	53.9	32.4
Quantum 555	91	35	M-E	10.8	51.2	31.5
Agassiz	95	46	M-L	13.1	57.8	30.2
YTO-117	95	45	-	11.6	54.8	30.1
Quantum 524	91	44	(M)+	10.3	51.7	29.3
Big Horn	91	36	M-L	10.7	51.3	25.3
Quantum 515	92	46	(M)+	10.0	48.0	17.2
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LSD(.05) - 7.6 Bu/Acre		C.V. - 11.3%		Mean - 48.0		

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

**Percent protein determined with a Technicon 300 InfraAnalyzer.

+Maturity rating based on observations in 1986 only.

Note: Seeded September 11, 1985 and harvested July 23, 1986. Severe epiphytotic of leaf and stem rust in 1986.

Pennington County

The winter wheat trial in Pennington County was seeded in fallow soil on September 19, 1985. The soil was loose but had sufficient subsurface moisture for germination and emergence. Rainfall was below normal in August but was above or near normal during the remainder of the crop year ending in July 1986. Air temperatures were below normal for all months except January, March, and June. During January and March the temperatures were over 9 degrees above normal. Plants were tall, protein content of the grain was low, and weights per bushel slightly below standard. Grain yield and quality were especially reduced in those varieties susceptible to leaf and stem rust. The trial results are listed in Table 9.

Perkins County

The winter wheat trial in Perkins County was seeded on September 17, 1985. Soil moisture was adequate for germination and emergence. Precipitation was above normal during almost the entire year but especially from March through June.

Air temperatures were below normal during most of the fall. In November they were more than 15 degrees below longtime averages. During March, temperatures were over 10 degrees above normal.

Spring soil moisture was not measured but it was assumed that the soil profile was saturated. Fertilizer was applied to meet a yield goal of 45 bushels per acre. Due to a combination of temperature, humidity, and precipitation, an epiphytotic of leaf and stem rust developed. For those reasons, the average yield of the trial was only 37.5 bushels per acre. The results are published in Table 10.

Stanley County

The winter wheat varieties in Stanley County were seeded in fallow soil on September 10, 1985. There was adequate moisture for germination and emergence in the fall. Above normal precipitation was received during the Spring and Summer growing season.

Air temperatures were below normal during the fall, especially during November and December. January was eight degrees above normal. A combination of favorable temperatures, good moisture, and high humidity resulted in a high incidence of leaf and stem rust among susceptible varieties. The trial data are listed in Table 11.

TABLE 9. Hard Red Winter Wheat Variety Trials - Pennington County(Wall), 1984-86.

Variety	X Stand May 1986	Height (Inches)	Maturity	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1986	(3 yr av)
Siouxland	91	38	E	9.5	58.3	71.1	54.9
Brule	91	34	M	8.5	57.2	68.7	53.9
Ram	89	34	M	9.5	56.6	67.1	—
Colt	89	28	M	10.0	57.8	65.7	53.0
HW 1036	90	31	-	10.1	57.9	64.6	—
Centura	90	34	M-E	10.2	59.3	64.3	49.9
KS82H4	95	31	-	10.9	60.3	64.2	—
Bennett	86	33	E	11.0	58.9	63.7	49.9
Centurk 78	94	36	M	10.4	58.4	63.6	51.9
HW 1037	86	30	-	11.0	57.4	62.6	—
Thunderbird	88	30	M-E	11.6	59.2	61.8	—
Roughrider	94	39	M-E	10.8	59.2	61.6	51.7
Dawn	89	30	E	11.0	58.9	61.2	49.1
Scout 66	88	38	E	10.6	60.0	61.2	51.1
Quantum	90	38	(M)+	9.2	56.5	60.1	—
Bounty 301	73	33	M	11.1	58.6	60.0	—
Bounty 206	81	32	M	11.2	58.9	58.9	—
Nell	90	34	E	10.0	58.4	58.6	39.4
Rose	86	37	M-L	10.5	59.8	57.9	52.6
TAM 107	86	38	E	10.6	56.1	57.9	—
Lancer	89	39	E	9.7	59.1	57.6	50.5
Sage	80	36	E	11.2	59.8	56.5	50.1
Rita	85	32	M	11.2	56.1	56.4	45.1
Agassiz	93	38	M-L	9.7	59.5	53.6	49.9
Wthrmstr 104A	86	28	E	9.3	54.8	53.4	—
Big Horn	89	31	M-E	9.3	56.6	53.0	—
Hail	83	29	E	11.1	56.7	50.4	—
Norstar	94	44	L	9.7	58.7	48.8	47.0
Quantum 515	89	38	(M)+	9.7	52.7	48.1	—
Norwin	86	25	M-L	10.5	56.7	42.7	42.2

LSD(05) - 7.7 Bu/A

C.V. - 9.2%

Mean - 59.2

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

**Percent protein determined with a Technicon 300 InfraAnalyzer.

+Maturity rating based on observations in 1986 only.

NOTE: Seeded September 19, 1985 and harvested July 22, 1986. Severe epiphytotic of leaf and stem rust in 1986.

TABLE 10. Hard Red Winter Wheat Variety Trials - Perkins County(Bison), 1984-86.

Variety	Σ Stand May 1986	Height (Inches)	Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1986	(3 yr av)
Siouxland	84	34	E	16.4	56.8	48.0	42.9
Thunderbird	71	31	M-E	15.6	57.7	44.8	—
Colt	88	28	M	17.1	55.1	43.1	39.6
Ram	79	32	M	15.6	43.4	42.0	—
Dawn	81	30	M-E	16.8	53.9	41.7	33.6
Hail	84	28	E	16.0	55.6	41.0	—
Rita	84	31	M	17.5	51.0	39.5	37.9
HW 1037	75	28	—	14.6	53.8	39.2	—
Rose	84	32	M-L	17.5	57.1	39.0	40.8
Scout 66	74	35	E	15.2	56.8	38.6	36.3
HW 1035	85	27	—	15.3	56.6	38.4	—
Brule	82	29	M	14.6	55.6	38.4	36.0
Big Horn	86	28	M-E	16.3	56.1	38.2	—
Centura	75	31	M-E	17.7	54.5	37.6	34.3
Centurk 78	75	30	M	17.0	56.1	36.6	33.8
Wthrmstr 140A	74	28	(E)+	14.6	54.3	36.5	—
Lancer	78	34	E	14.5	58.7	36.4	36.7
Nell	82	31	E	17.4	55.1	36.2	38.3
Bounty 301	71	29	M	17.9	56.3	36.1	—
Sage	70	30	E	15.3	57.2	35.3	36.3
Bennett	64	30	E	15.7	56.4	35.3	36.4
Norwin	85	24	M-L	16.0	55.3	35.2	—
Roughrider	88	30	M-E	17.1	56.8	35.2	39.1
Bounty 205	64	32	M	16.3	56.7	34.6	—
Quantum 524	86	35	(M)+	15.6	54.1	34.0	—
TAM 107	84	31	E	16.0	54.4	33.8	—
Agassiz	90	37	M-L	18.3	54.3	32.8	38.8
Norstar	92	38	L	17.5	56.2	32.0	38.1
Quantum 515	89	35	(M)+	16.8	48.2	28.2	—
<hr/>							
LSD (05) - 8.2 Bu/A		C.V. - 15.7%		Mean - 37.5			

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

**Percent protein determined with a Technicon 300 InfraAnalyzer.

+Maturity rating based on observations in 1986 only.

NOTE: Seeded September 17, 1985 and harvested July 24, 1986. Severe epiphytotic of leaf and stem rust in 1986.

TABLE 11. Hard Red Winter Wheat Variety Trial - Stanley County (Hayes), 1986.

Variety	Rust Reaction*		Wheat Streak Mosaic*	Winter Hardiness	Maturity**	Test Weight Lbs/Hu	Grain Yield Bu/A
	Leaf	Stem					
Dawn	MR	R	MR	Fair	M-E	59.8	55.4
Lancota	S	R	MS	Good	M-L	59.2	53.0
Thunderbird	MR	R	-	Good	M-E	59.2	50.8
Lancer	S	R	MS	Good	E	59.8	49.1
Siouxland	R	R	S	Good	E	56.4	49.1
Ram	MR	R	TOL	Good	M	55.0	46.2
Rocky	S	R	MS	Good	M-E	57.8	44.3
Colt	MR	R	S	Fair	M	54.7	44.0
Centura	MR	MR	MS	Good	M-E	58.4	43.8
Brule	R	R	MS	Good	M	55.8	43.3
Rita	R	MR	S	Good	M	55.3	42.6
Hail	R	R	S	Poor	E	55.0	42.6
Sage	MR	R	MR	Good	E	53.9	41.6
Scout 66	S	MR	MR	Fair	E	56.7	41.4
Rose	MR	MS	S	Excellent	M-L	59.2	38.2
Nell	S	MS	S	Good	E	57.5	37.1
Agassiz	R	S	S	Excellent	M-L	59.5	36.3
Quantum 568	MS	S	S	Fair-Good	M-E	50.2	36.1
Wthrmstr 110	-	-	-	---	-	54.1	35.6
Quantum 554	MR	S	S	Fair-Good	M-E	51.9	35.3
Centurk 78	S	R	MS	Good	M	58.4	34.7
Roughrider	S	R	S	Excellent	M-L	58.9	33.9
Buckskin	S	R	MS	Good	M-E	54.4	33.6
Quantum 525	-	-	-	---	-	47.9	31.9
Quantum 555	MR	S	S	Fair-Good	M-E	44.3	29.0
TAM 105	MS	S	S	Fair	E	46.2	28.7
Wthrmstr 140A	-	-	-	---	(E)+	42.9	26.1
Quantum 515	S	S	-	---	(M)+	38.1	25.4
Big Horn	MS	S	-	Good-Exc.	M-L	47.6	23.0

Non-replicated, Not statistically analyzed

Mean-39.0

*Letter indicates reaction to disease: S=susceptible, MS=moderately susceptible, MR=moderately resistant, R=resistant, TOL=tolerant.

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

+Maturity rating based on observations in 1986 only.

NOTE: Seeded September 10, 1985, harvested July 26, 1986.

Hard Red Spring Wheat

Plots were seeded at seven locations in 1986. All trials were seeded on fallow with a six row plot seeder having eight inch row spacing.

Seeding rate was 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 12 through 26.

Bennett County

Spring wheat plots at Martin were seeded on April 22 in soil fallowed in 1985. Soil moisture was adequate at seeding time because of heavy wet snow received in mid-March which filled the soil profile. Rainfall through the spring and early summer was above normal and topsoil moisture was classed as adequate except during late May. Air temperatures were above normal all of the Spring season. During March the temperatures were 12.0 degrees above the longtime average. June average 4 degrees above normal while the other months were near normal. The combination of temperatures and moisture provided ideal conditions for an epiphytotic of leaf and stem rust. Grain yields were double those of 1985, and 138% of the 3 year average. Weights per bushel were good for rust resistant varieties and protein content high. The trial results are shown in Table 12.

Corson County

The spring wheat variety trials were seeded near Thunder Hawk on May 2. Seeding had to be delayed because of wet soil conditions resulting from above normal precipitation during April. At the time of seeding the soil was sticky and cloddy. Rainfall was also above normal during May. Air temperatures were normal except during June when they were above normal.

The plots varied in stand because of poor seeding conditions. The plants lacked vigor because of the late seeding date. Weight per bushel was reduced in those varieties which were susceptible to leaf rust. Yield and other data are reported for Hard Spring Wheat in Table 13 and for Durum Wheat in Table 20.

Harding County

Spring wheat variety trials at Ralph were seeded in fallow soil on May 1. Precipitation from January through May was above longtime averages, this provided adequate topsoil moisture during the first part of the growing season. However, rainfall in June and July was below normal and that resulted in a topsoil shortage during that period. Air temperatures, which averaged 12 degrees above normal during March, were normal during April and May. They were 4.9 degrees above normal in June, and normal in July. 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 21.

TABLE 12. Hard Red Spring Wheat Variety Trial-Bennett County(Martin), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
SD 2962	34	June 20	13.8	61.6	55.1	—
Shield (SD 8026)	32	June 20	14.9	61.63	53.8	36.6
SD 2980	33	June 20	14.7	62.2	53.5	—
SD 2961	31	June 20	14.5	59.4	52.9	—
ND 606	33	June 21	15.1	58.1	52.2	—
Butte 86	34	June 20	15.9	59.0	51.0	—
SD 2990	34	June 20	14.8	60.1	50.8	—
Stoa	33	June 21	15.9	57.5	50.6	36.5
SD 2956	30	June 21	14.4	57.2	50.4	37.7
Nordic	28	June 23	12.8	57.8	49.9	—
Oslo	25	June 21	14.1	56.4	47.4	34.4
Guard	29	June 21	14.8	59.4	47.0	35.3
Marshall	26	June 24	14.8	57.4	45.8	34.7
Wheaton	26	June 23	14.4	53.4	44.7	34.9
Telemark	25	June 20	15.0	56.1	44.7	—
Celtic	30	June 22	15.3	59.8	44.4	—
Norseman	26	June 24	15.6	54.3	44.0	34.4
Norak	25	June 22	14.4	59.2	43.6	34.0
Len	28	June 23	15.6	54.9	42.0	26.8
Apex 83	27	June 21	14.5	57.0	41.5	31.0
Angus	27	June 23	15.7	60.9	41.5	32.0
Leo 747	27	June 21	14.9	57.1	41.5	—
Challenger	28	June 22	14.2	58.0	41.5	26.1
2369	26	June 23	14.9	58.5	40.4	31.7
Erik	28	June 24	15.7	50.2	39.2	32.3
Butte	33	June 20	15.6	57.2	39.0	30.2
Success	30	June 24	15.5	52.7	39.0	31.9
Alex	34	June 22	16.2	58.6	38.8	33.3
Buckshot	28	June 23	15.2	53.2	38.3	31.0
Centa	34	June 19	14.2	59.8	37.9	30.5
Chris	34	June 21	16.3	56.8	35.2	27.3
A99ar	34	June 24	16.6	51.5	33.8	30.3
Olaf	28	June 24	15.3	56.4	30.2	28.1
<hr/>						
LSD(05) - 4.4 Bu/A		C.V. - 71.1%		Mean - 44.3		

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 22 and harvested July 31, 1986.

TABLE 13. Hard Red Spring Wheat Variety Trials - Corson County (Thunder Hawk), 1985-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1986	(2 yr av)
ND 606	34	June 28	15.5	52.7	49.9	—
Shield (SD 8026)	30	June 26	14.2	58.6	47.6	41.6
Success	30	June 29	15.2	44.9	47.4	51.5
Buckshot	30	June 28	14.5	48.9	45.8	49.9
Stoa	31	June 28	15.35.7	53.1	44.0	48.6
Nordic	27	June 27	13.7	53.5	43.3	—
Wheaton	26	June 28	14.2	50.1	43.1	46.7
SD 2990	30	June 26	15.6	56.3	42.6	—
Celtic	30	June 27	15.9	54.7	41.5	46.3
Norak	27	June 29	14.7	55.3	40.4	48.1
2369	28	June 29	14.9	54.5	40.2	47.3
Erik	28	June 29	16.1	45.7	40.2	45.9
SD 2961	28	June 26	15.4	55.8	39.7	—
SD 2980	28	June 26	14.2	57.7	39.0	44.7
Butte 66	28	June 27	15.4	56.5	39.0	—
Angus	28	June 27	16.0	54.3	38.8	46.2
Marshall	25	June 28	14.7	49.0	38.6	46.6
Telemark	24	June 27	15.7	52.8	37.6	—
Norseman	26	June 29	15.8	48.6	37.0	44.7
SD 2962	30	June 26	15.8	55.3	36.7	43.3
Len	29	June 28	16.1	52.4	36.5	44.3
Butte	30	June 27	14.6	54.4	36.3	44.9
Centa	32	June 25	14.9	57.2	36.1	44.1
SD 2956	29	June 27	15.5	50.4	33.3	42.7
Apex 83	26	June 26	15.4	54.5	33.1	44.5
A99ar	32	June 28	15.6	46.4	32.7	39.9
Challenger	25	June 26	15.3	55.5	31.8	42.3
Leo 747	25	June 25	16.2	52.7	31.8	—
Guard	29	June 27	15.8	50.5	31.5	42.5
Chris	33	June 28	15.5	52.4	31.1	39.0
Oslo	25	June 25	15.9	51.0	30.8	53.5
Olaf	27	June 29	16.8	49.3	27.9	41.0
Alex	32	June 28	16.3	50.6	27.7	38.7

ISD(05) - 6.4 Bu/A

C.V. - 12.0%

Mean - 38.0

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 2 and harvest August 7, 1986.

TABLE 14. Hard Red Spring Wheat Variety Trial - Harding County (Ralph), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1985	(3 yr av)
Celtic	25	June 26	15.9	61.0	33.8	—
Stoa	25	June 26	14.9	59.6	33.6	33.8
ND 606	27	June 26	15.4	58.4	33.6	—
SD 2990	26	June 23	14.4	61.0	33.6	—
Alex	27	June 27	14.3	57.2	31.8	34.8
SD 2956	24	June 25	14.6	60.1	31.5	36.3
Len	23	June 26	15.7	59.5	30.8	34.5
Shield (SD 8026)	26	June 23	13.7	60.8	30.6	25.5
Angus	22	June 27	16.0	62.5	30.4	34.6
Apex 83	23	June 22	14.0	59.9	30.2	30.7
SD 2980	24	June 23	14.0	62.9	29.7	—
Telemark	21	June 26	14.2	57.5	29.3	—
SD 2961	23	June 23	14.9	60.7	29.0	—
Butte 86	24	June 24	15.7	62.0	29.0	—
2369	24	June 26	14.8	60.4	28.4	25.4
SD 2962	24	June 22	14.0	61.8	28.1	—
Challenger	23	June 23	14.7	60.4	28.1	30.3
Norak	21	June 25	14.3	60.4	27.0	33.4
Erik	21	June 27	16.1	56.3	26.5	33.0
Nordic	23	June 27	13.6	60.2	26.5	—
Olaf	25	June 26	14.4	59.2	26.5	32.3
Marshall	20	June 27	14.9	58.9	26.3	35.7
Butte	26	June 24	15.0	61.3	26.3	28.7
Success	23	June 27	15.2	57.1	25.9	32.2
Oslo	21	June 23	14.0	59.1	25.4	46.1
Guard	21	June 25	15.5	60.1	25.2	33.8
Leo 747	22	June 22	15.5	59.7	25.2	—
Norseman	19	June 26	15.4	57.4	25.0	35.4
Buckshot	23	June 27	14.7	58.0	25.0	34.2
Wheaton	20	June 27	14.3	57.7	25.0	32.5
Centa	26	June 23	15.7	61.1	24.3	27.7
A99ar	28	June 27	16.6	55.4	23.1	29.4
Chris	24	June 26	16.8	57.2	20.2	24.9
LSD(05) - 5.2 Bu/A					C.V. - 13.2%	
					Mean - 28.0	

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 1 and harvested August 5, 1986.

**TABLE 16. Hard Red Spring Wheat Advanced Line Yield Trial - Harding County
(Ralph), 1986.**

Variety	Height (Inches)	Heading Day*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield (Bu/Acre)
SD 3000	27	56	14.6	60.9	33.4
SD 8056	23	58	12.9	61.2	34.5
SD 3021	22	58	14.1	63.2	32.4
SD 3008	26	56	15.1	61.5	32.3
SD 2956	24	54	14.3	60.6	32.2
Butte 86	26	54	15.3	62.3	31.7
ND 606	29	57	16.7	56.4	31.4
SD 3013	20	56	14.4	61.5	31.2
SD 3020	22	57	15.3	59.8	30.9
SD 2999	24	51	14.8	58.1	30.8
Norseman	20	57	15.8	58.4	30.7
SD 2992	25	54	15.2	62.3	30.6
Nordak	21	65	13.4	61.8	30.1
SD 2980	26	53	14.4	64.0	30.0
SD 2991	25	57	14.2	58.1	29.5
Guard	24	57	14.8	60.3	29.4
SD 2962	27	56	14.4	60.9	29.0
Stoa	23	57	14.9	57.8	28.7
SD 3016	24	58	15.1	60.9	28.6
SD 3019	24	57	15.3	59.5	28.2
Wheaton	22	56	14.4	59.5	28.1
SD 3005	27	51	14.6	61.8	28.1
SD 3007	24	54	14.7	60.3	28.1
SD 3017	24	56	14.1	60.1	28.0
SD 3018	22	56	14.4	60.1	28.0
SD 8052	26	53	14.1	58.4	27.9
Len	24	57	14.8	60.3	27.8
SD 2994	25	55	15.1	60.6	27.5
SD 3022	23	56	14.4	61.5	27.5
Shield (SD 8026)	27	53	13.3	60.3	27.4
SD 3010	24	55	14.5	62.9	27.3
SD 3023	28	56	15.6	58.1	27.3
Challenger	23	54	13.5	59.8	27.2
SD 2998	27	54	14.8	59.2	27.1
SD 3012	25	56	13.8	58.9	27.0
Butte	25	55	13.6	60.9	26.9
SD 3009	27	58	14.6	58.9	26.9
SD 2990	26	51	13.8	62.0	26.5
SD 3015	22	57	14.5	59.8	26.4
2369	22	58	15.7	61.2	26.4
Marshall	20	57	15.0	55.3	26.3
SD 3011	22	58	14.5	60.6	26.3
SD 3004	26	51	16.7	60.9	26.1
SD 8055	28	50	17.3	61.5	25.6
SD 3014	27	56	14.1	58.7	25.4
SD 2961	25	56	15.6	58.4	25.0
SD 3024	27	57	13.9	57.8	24.5
Chris	28	58	15.3	56.7	23.1
Nordic	22	56	13.7	55.8	21.6

LSD(05) - 6.2 Bu/A

Mean - 28.4

*Heading day is number of days after seeding until 50% of heads are visible.

**Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 1 and harvested August 5, 1986.

Meade County
(Bear Butte Valley)

The variety trials in Bear Butte Valley were seeded on April 29. The soil was mellow with adequate surface moisture. Subsurface moistures was in good supply because of early showers. Precipitation was below normal in April and May but above normal in June. However, topsoil moisture was classed as short through early June. Air temperatures were above normal during March, May, and June.

Due to above normal temperatures and lack of moisture, there were few tillers but plants were vigorous. Protein content was exceptionally high. There was a high incidence of leaf rust on susceptible varieties. The data for Hard Spring Wheat are listed in Table 16 and the data for Durum Wheat in Table 22.

Meade County
(Plainview)

Spring wheat plots at Plainview were seeded on May 14. The soil was saturated due to heavy showers during April. Rainfall was below normal during May. Air temperatures were above normal during March and June. Due to lateness of seeding plants were short, there were few tillers, and heads were small. The protein content was very high and test weights low. The average yield for the trial as only 12.2 bushels per acre which was less than half of the 1985 average yield. Trial data are listed in Table 17.

Pennington County

Variety plots of spring wheat were seeded in fallow near Wall on April 23, 1986. Soil moisture was adequate for germination and emergence, but was in short supply during May and June. Useable moisture during April through July was 10.81 inches. Air temperatures were nearly normal during April and May. In June they were 3.6 degrees above normal. Subnormal temperatures in July permitted the grain to partially fill resulting in low weight per bushel. The results for Hard Spring Wheat are listed in Table 18 and the results for Durum Wheat are listed in Table 23.

Perkins County

Spring wheat variety plots were seeded near Bison on May 2. The soil was saturated with water as a result of rain showers received in April. Precipitation was above normal throughout the growing season. Air temperatures during April and May were normal. The protein contents were several percent above normal while weights per bushel ranged from 50.1 pounds up to 60.8 pounds. Grain yields were only 73% of those in 1985. The data are reported in Table 19 for the Hard Spring Wheat and in Table 24 for the Durum Wheat.

TABLE 16. Hard Red Spring Wheat Variety Trial - Meade County (Bear Butte Valley), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
SD 2980	32	June 19	15.8	61.0	48.8	—
Shield (SD 8026)	32	June 19	14.9	58.7	46.0	37.4
SD 2961	30	June 19	16.8	56.8	44.5	—
SD 2962	31	June 19	15.8	60.8	43.6	—
ND 606	33	June 23	16.1	57.1	42.0	—
Norsk	28	June 22	15.4	57.1	40.8	40.0
Nordic	29	June 24	15.2	57.7	40.6	—
SD 2990	33	June 20	17.0	56.2	39.5	—
Celtic	30	June 24	17.3	55.8	39.2	—
Stoa	34	June 24	15.7	54.9	37.9	33.6
Leo 747	28	June 19	16.3	55.5	37.2	—
Oslo	27	June 20	16.3	57.7	37.0	42.2
SD 2956	29	June 22	17.0	55.0	36.5	37.7
2369	28	June 23	16.5	58.9	36.5	33.8
Guard	28	June 20	16.8	56.5	36.3	34.9
Wheaton	27	June 25	17.4	53.2	36.3	38.8
Challenger	27	June 20	17.7	59.2	35.8	40.9
Norseman	26	June 27	17.0	52.0	35.6	36.4
Buckshot	29	June 25	16.2	53.8	35.4	36.2
Apex 83	28	June 20	17.0	58.4	34.5	39.9
Angus	29	June 23	16.4	57.9	34.2	34.9
Centa	33	June 19	16.4	56.7	33.8	35.3
Butte 86	32	June 20	17.3	55.4	32.9	—
Olaf	29	June 23	17.0	54.5	32.9	31.7
Len	28	June 23	16.9	55.0	32.9	30.0
Erik	29	June 28	16.4	51.6	32.7	30.5
Butte	33	June 20	16.8	55.0	32.4	30.4
Success	30	June 27	18.0	53.7	32.0	34.2
Marshall	26	June 27	17.3	53.8	32.0	27.4
Alex	34	June 24	16.3	57.0	31.1	27.8
Telemark	26	June 22	17.1	54.1	30.2	—
Chris	34	June 23	17.7	56.4	28.8	27.7
A99ar	35	June 25	17.0	52.7	28.6	31.2
LSD(.05) - 5.2 Bu/A		C.V. - 10.1%		Mean - 36.3		

*Percent protein determined with Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 16 and harvested August 12, 1986.

TABLE 17. Hard Red Spring Wheat Variety Trial - Meade County(Plainview), 1984-86.

Variety	Height (Inches)	Date of Harvesting	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
ND 606	29	July 8	17.0	46.0	19.9	—
Marshall	24	July 9	15.9	44.6	19.0	24.3
Stoa	28	July 7	15.3	49.4	15.4	22.5
SD 2961	26	July 3	16.2	52.0	15.4	—
SD 2980	26	June 30	15.3	53.5	15.4	—
SD 2990	27	July 1	15.1	54.4	15.4	—
Guard	25	July 8	15.5	50.3	15.1	22.6
Shield (SD8026)	27	July 6	14.4	54.8	15.1	22.3
Norak	23	July 8	16.1	50.8	14.5	—
SD 2956	25	July 8	17.3	45.4	13.9	—
Butte 86	27	July 5	15.9	53.7	13.3	—
SD 2962	26	July 5	15.5	52.9	13.0	—
Wheaton	24	July 8	15.5	44.9	12.7	20.1
Chris	28	July 8	16.8	42.0	11.8	18.2
Success	26	July 9	17.1	41.3	11.8	19.5
Erik	24	July 9	17.1	36.6	11.8	20.4
Norseman	23	July 9	17.2	43.2	11.5	23.2
Butte	26	July 4	14.4	51.2	11.5	22.4
Len	25	July 9	17.2	38.8	11.5	20.2
Nordic	25	July 7	16.2	47.1	11.2	—
Alex	26	July 9	15.5	45.4	10.6	19.5
Buckshot	24	July 8	16.5	47.0	10.6	21.2
Challenger	24	July 1	15.7	50.0	10.6	21.7
2369	25	July 5	16.8	46.6	10.3	20.4
A99ar	27	July 9	16.8	43.2	10.3	18.2
Telemark	23	July 8	17.2	41.2	10.3	—
Celtic	25	July 8	17.5	47.0	9.7	—
Olaf	23	July 9	17.6	39.9	9.1	21.0
Centa	25	July 4	15.0	51.3	9.1	21.3
Oslo	21	July 6	17.4	44.4	8.8	20.1
Leo 747	23	July 4	17.1	45.1	8.5	—
Apex 83	22	July 9	16.2	47.8	8.2	21.0
Angus	24	July 7	17.6	42.5	8.2	20.7

LSD(.05) - 5.5 Bu/A

C.V. - 27.8%

Mean - 12.2

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 14 and harvested August 8, 1986.

TABLE 18. Hard Red Spring Wheat Variety Trial - Pennington County(Wall), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
Shield (SD 8026)	30	June 19	13.0	59.9	44.0	39.1
SD 2961	29	June 19	14.5	59.3	43.6	--
SD 2962	30	June 19	14.6	60.0	43.1	--
Butte 86	28	June 20	13.5	58.9	42.0	--
SD 2980	28	June 18	12.6	61.8	40.4	--
Stoa	31	June 23	14.8	57.3	40.2	37.3
SD 2990	30	June 19	14.5	59.7	38.3	--
Nordic	28	June 24	14.6	58.7	37.6	--
SD 2956	26	June 21	14.6	59.0	37.4	38.7
Leo 747	26	June 19	14.4	58.3	37.2	--
ND 606	28	June 23	14.8	57.7	36.5	--
Marshall	24	June 27	13.5	57.9	36.3	37.7
Angus	28	June 23	14.6	57.3	36.1	37.4
Celtic	28	June 23	15.3	58.7	35.4	--
Guard	26	June 20	14.5	58.9	34.5	38.2
Oslo	22	June 19	15.0	55.0	34.2	38.3
Challenger	25	June 20	14.7	57.7	34.0	37.1
Centa	31	June 19	14.2	60.4	34.0	35.3
2369	28	June 23	15.3	58.5	33.6	36.7
Telemark	24	June 22	15.9	57.2	33.6	--
Butte	28	June 19	13.0	59.0	33.3	33.1
Apex 83	24	June 19	14.6	57.0	32.4	36.4
Norak	24	June 21	14.6	58.5	32.0	37.8
Alex	32	June 24	13.8	57.7	31.5	33.7
Len	26	June 23	15.3	57.0	31.1	33.8
Wheaton	23	June 25	14.7	54.5	30.4	38.4
Erik	26	June 28	14.6	54.4	28.8	33.7
Buckshot	25	June 25	14.7	55.2	27.2	34.9
Success	27	June 27	15.8	54.6	26.8	32.5
A99ar	30	June 25	15.5	53.4	26.5	32.9
Norseman	22	June 27	15.0	55.7	26.5	35.6
Chris	33	June 23	15.6	54.6	26.3	30.2
Olaf	25	June 23	15.5	54.9	25.4	33.5
LSD(.05) - 7.6 Bu/A					C.V. - 15.9%	
					Mean - 34.2	

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 23 and harvested August 1, 1986.

TABLE 19. Hard Red Spring Wheat Variety Trial - Perkins County(Bison), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
SD 2962	28	June 25	16.5	59.8	33.1	--
Butte 86	27	June 25	16.4	57.6	32.9	--
SD 2990	27	June 24	16.6	57.3	31.5	--
SD 2980	27	June 26	15.8	60.8	30.2	--
Shield (SD 8026)	26	June 25	16.8	57.6	29.7	32.8
Butte	27	June 26	16.6	58.2	29.5	33.6
SD 2961	24	June 25	17.4	57.7	28.6	--
Guard	23	June 27	16.3	57.0	28.6	35.5
Norak	24	June 28	16.5	56.0	28.4	35.1
Challenger	25	June 26	17.1	57.2	27.9	34.5
2369	26	June 27	16.5	58.0	27.4	33.6
Oslo	26	June 25	17.8	54.4	26.8	34.9
ND 606	24	June 28	16.7	58.4	26.8	--
Buckshot	23	June 28	16.2	54.1	26.5	31.7
SD 2956	25	June 26	16.5	57.0	26.5	33.9
Apex 83	24	June 26	16.6	56.7	26.5	36.3
Nordic	24	June 28	17.6	58.0	26.1	--
Stoa	23	June 28	16.0	57.7	25.9	30.2
Centa	27	June 25	18.1	58.3	25.6	32.9
Norseman	22	June 29	17.1	54.1	25.2	34.5
Wheaton	24	June 29	17.6	54.1	25.2	32.8
Len	22	June 28	17.5	56.6	25.0	30.2
Telemark	22	June 28	17.9	53.6	24.7	--
Alex	25	June 28	17.7	58.4	24.3	28.8
Marshall	23	June 29	17.6	55.8	23.8	29.6
Leo 747	22	June 25	17.4	55.1	22.9	--
Success	23	June 29	17.9	53.5	22.0	29.6
Celtic	23	June 27	17.8	55.9	21.8	--
Chris	27	June 28	18.8	56.0	21.3	24.8
A99ar	28	June 29	19.4	52.3	20.6	27.3
Angus	22	June 28	18.7	56.8	17.9	29.4
Olaf	23	June 29	17.8	55.3	17.2	28.3
Erik	24	June 29	18.9	50.1	16.1	25.8
LSD(.05) - 5.9 Bu/A		C.V. - 16.3%		Mean - 25.6		

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 2 and harvested August 6, 1986.

Durum Wheat

Durum wheat variety trials were seeded at five locations in 1986. The remarks and discussion pertinent to these trials were included in the Hard Red Spring Wheat section and can be found on pages 22 and 27. The yields and other data are listed in Tables 20 through 24.

TABLE 20. Durum Wheat Variety Trial - Corson County (Thunder Hawk), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
Rugby	30	June 28	13.7	51.0	41.3	35.9
Vic	31	June 29	14.1	51.0	40.2	36.8
Edmore	32	June 28	14.5	51.2	39.0	36.9
Crosby	30	June 28	13.9	55.9	38.8	37.4
Lloyd	26	June 29	13.4	48.6	37.4	37.8
Monroe	30	June 27	14.4	56.8	37.2	--
Ward	30	June 28	14.6	54.1	37.0	34.9
Laker	28	June 29	14.5	47.7	31.5	--
LSD(.05) - 5.5 Bu/A			C.V. - 10.5%	Mean - 37.0		

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 2 and harvested August 7, 1986.

TABLE 21. Durum Wheat Variety Trial - Harding County (Ralph), 1984-86

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
Monroe	29	June 25	13.7	60.8	39.2	--
Vic	29	June 25	14.2	60.1	36.7	35.2
Crosby	29	June 24	12.8	61.6	36.5	33.9
Ward	28	June 25	14.2	59.6	35.8	33.9
Rugby	28	June 25	14.1	59.4	35.2	33.4
Laker	28	June 26	13.3	58.4	32.4	--
Lloyd	24	June 26	13.4	59.8	31.5	35.2
Edmore	30	June 26	14.8	60.8	30.6	31.9
LSD(.05) - 5.3 Bu/A			C.V. - 11.2%	Mean - 33.1		

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 1 and harvested August 5, 1986.

TABLE 22. Durum Wheat Variety Trial - Meade County (Bear Butte Valley), 1984-86.

<u>Variety</u>	<u>Height (Inches)</u>	<u>Relative Maturity*</u>	<u>Percent Protein**</u>	<u>Test Wt. (Lbs/Bu)</u>	<u>Grain Yield-Bu/Acre</u>	
					<u>1986</u>	<u>(3 yr av)</u>
Monroe	32	-2	16.0	60.4	43.8	--
Rugby	34	1	15.7	60.1	39.0	34.2
Ward	32	0	16.6	60.8	37.6	34.9
Edmore	34	1	15.7	60.6	37.4	34.7
Vic	34	1	15.6	61.0	36.7	25.7
Crosby	33	-1	15.5	60.1	35.6	34.4
Laker	28	1	15.9	58.2	33.8	--
Lloyd	25	3	16.7	54.1	29.7	29.0
LSD(.05) - 5.4 Bu/A		C.V. - 10.6%		Mean - 36.1		

*Indicates relative heading time in days based on earliest heading date.

**Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 29 and harvested August 4, 1986.

TABLE 23. Durum Wheat Variety Trial - Pennington County (Wall), 1984-86.

<u>Variety</u>	<u>Height (Inches)</u>	<u>Relative Maturity*</u>	<u>Percent Protein**</u>	<u>Test Wt. (Lbs/Bu)</u>	<u>Grain Yield-Bu/Acre</u>	
					<u>1986</u>	<u>(3 yr av)</u>
Monroe	29	-2	15.3	58.3	37.6	--
Vic	28	1	15.7	59.1	36.2	35.8
Edmore	31	1	14.1	59.8	34.2	34.4
Rugby	28	1	14.8	59.8	33.8	33.6
Ward	29	0	15.5	59.2	33.8	35.3
Crosby	29	-1	15.9	58.9	32.2	34.2
Lloyd	25	3	15.0	56.2	31.3	32.2
Laker	26	1	17.2	56.3	28.4	--
Sheba	30	--	15.1	52.9	20.2	--
LSD(.05) - 5.9 Bu/A		C.V. - 13.0%		Mean - 32.0		

*Indicates relative heading time in days based on earliest heading date.

**Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 23 and harvested August 1, 1986.

TABLE 24. Durum Wheat Variety Trial - Perkins County (Bison), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Lbs/Acre	
					1986	(3 yr av)
Crosby	28	June 26	15.8	57.6	25.9	33.2
Monroe	27	June 26	17.2	56.9	25.4	—
Rugby	27	June 28	17.4	58.0	25.0	30.7
Ward	28	June 27	17.3	59.2	24.3	32.0
Lloyd	24	June 29	17.8	53.9	23.6	30.5
Vic	25	June 27	17.7	57.8	22.2	31.1
Edmore	27	June 28	18.7	55.8	18.8	28.4
Laker	25	June 28	17.5	54.4	18.6	—
LSN (.05) = 4.9 Bu/A C.V. = 14.7% Mean = 23.3						

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 2 and harvested August 6, 1986.

Triticales

Plots were seeded at five locations in 1986. 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 25 through 29.

Triticale varieties seeded at the five 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 50 pounds per bushel. It is best utilized as a grain feed for swine or poultry.

TABLE 25. Spring Triticales Variety Trial - Corson County(Thunder Hawk), 1985-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Lbs/Acre	
					1986	(2 yr av)
Karl	27	June 26	10.9	46.1	2190	—
Marval	35	June 24	10.9	40.1	2178	2794
Kramer	29	June 25	11.0	45.5	1878	2629
Not Statistically Analyzed Mean = 2082						

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 1 and harvested August 5, 1986.

TABLE 26. Spring Triticales Variety Trial-Harding County (Ralph), 1984-86.

<u>Variety</u>	<u>Height (Inches)</u>	<u>Date of Heading</u>	<u>Percent Protein*</u>	<u>Test Wt. (Lbs/Bu)</u>	<u>Grain Yield-Lbs/Acre</u>	
					<u>1986</u>	<u>(3 yr av)</u>
Marval	32	June 25	10.5	47.4	1812	2360
Karl	24	June 23	11.3	52.1	1716	--
Kramer	27	June 20	11.3	48.5	1662	2302
Not Statistically Analyzed				Mean - 1730		

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 1 and harvested August 5, 1986.

TABLE 27. Spring Triticales Variety Trial - Meade County (Bear Butte Valley), 1985-1986

<u>Variety</u>	<u>Height (Inches)</u>	<u>Date of Heading</u>	<u>Percent Protein*</u>	<u>Test Wt. (Lbs/Bu)</u>	<u>Grain Yield-Lbs/Acre</u>	
					<u>1986</u>	<u>(2 yr av)</u>
Kramer	36	June 18	11.9	45.1	2220	2436
Marval	38	June 21	12.0	45.3	2094	2250
Karl	28	June 19	11.7	46.6	1878	--
Not statistically analyzed				Mean - 2044		

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 29 and harvested August 4, 1986.

TABLE 28. Spring Triticales Variety Trial - Pennington County (Wall), 1985-86.

<u>Variety</u>	<u>Height (Inches)</u>	<u>Date of Heading</u>	<u>Percent Protein*</u>	<u>Test Wt. (Lbs/Bu)</u>	<u>Grain Yield-Lbs/Acre</u>	
					<u>1986</u>	<u>(2 yr av)</u>
Kramer	33	June 17	11.6	44.6	2205	2356
Marval	42	June 21	11.5	44.7	1794	2340
Karl	44	June 19	12.6	43.9	1688	--
Not statistically analyzed				Mean - 1896		

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 23 and harvested August 1, 1986.

TABLE 29. Spring Triticale Variety Trial - Perkins County (Bison), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (lbs/bu)	Grain Yield (lbs/Acre)	
					1986	(3 yr av)
Karl	24	June 26	12.8	49.6	1554	—
Kramer	30	June 24	12.8	48.3	1500	1980
Marval	28	June 28	13.7	44.4	1278	2058
Mean -					1444	

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 2 and harvested August 6, 1986.

Oat Variety Trials

Oat variety trials were conducted on a cooperative basis at seven locations in 1986. Seeding dates ranged from April 22 to May 14. All trials, except Corson County, were seeded on fallow with a six row plot seeder having an eight inch row spacing. Corson County plots were seeded into spring wheat stubble. 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 30 through 36.

Bennett County

Oat variety plots at Martin were seeded on April 22 into fallowed soil. Soil moisture at seeding time was plentiful because of wet snow received in mid-March and heavy rain showers in early April. Precipitation during the spring and summer was above normal with topsoil moisture being classed as adequate except during late May and early June. Air temperatures were near normal except during June when they were over 4 degrees above normal. The favorable weather conditions resulted in vigorous plants with many tillers and well filled heads. Grain yield, weights per bushel, and protein content were all high. The data are listed in Table 30.

TABLE 30. Oat Variety Trial - Bennett County (Martin), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Oil*	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield 1986	Grain Yield (3 yr av)
Don	30	June 21	7.5	19.9	35.7	135.3	--
SD 820045	35	June 22	6.2	21.5	34.5	128.0	--
Hazel	30	June 22	8.0	27.2	34.2	124.6	--
Porter	34	June 24	7.6	21.8	34.0	122.9	77.2
Dates	32	June 20	8.3	23.9	36.4	116.6	71.7
Pierce	35	June 24	7.5	22.9	35.2	115.3	52.3
Starter	32	June 21	7.1	22.0	36.3	112.7	--
SD 790400	37	June 23	6.9	22.6	33.7	112.3	66.5
Burnett	35	June 21	5.7	19.8	36.1	111.9	63.8
Ogle	33	June 22	6.1	19.5	32.6	110.6	73.8
Noble	32	June 21	6.5	20.0	33.5	109.8	64.2
SD 800287	36	June 23	6.5	19.6	35.0	108.9	--
Monida	33	June 23	6.9	17.0	30.8	108.5	--
Kelly	35	June 21	6.6	22.7	36.2	107.2	62.1
Webster	32	June 21	7.6	20.2	33.8	106.4	69.4
Waylander II	36	June 23	8.8	23.0	33.4	105.9	68.2
Sandy	38	June 23	6.6	21.6	35.0	105.5	59.3
Benson	36	June 22	6.4	22.3	34.1	105.1	66.3
Lancer	33	June 21	6.1	21.7	34.3	105.1	64.0
Nodaway 70	34	June 20	6.1	21.7	34.9	104.6	63.3
Otee	34	June 21	7.4	23.0	35.2	104.2	68.1
SD 810088	35	June 21	7.4	21.3	35.4	103.8	--
Hyttest	38	June 22	6.0	22.3	38.8	102.5	62.2
Wright	38	June 23	8.8	22.2	34.9	102.1	65.6
Moore	39	June 23	8.3	21.4	34.4	101.2	65.8
Steele	36	June 22	6.8	22.5	32.2	100.8	63.0
Proat	36	June 24	7.3	23.1	34.3	100.8	56.5
SD 810109	36	June 23	7.4	21.6	36.3	100.0	--
SD 820184	33	June 23	8.1	23.1	34.5	99.5	--
Preston	34	June 21	8.5	25.6	35.5	99.1	62.2
Centennial	36	June 22	6.1	21.0	35.7	91.5	54.9
Lyon	40	June 22	7.6	23.3	32.6	87.6	60.6

LSD(.05) - 10.8 Bu/A

C.V. - 7.2%

Mean - 107.8

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

NOTE: Plots were seeded April 22 and harvested July 31, 1986.

Corson County

Oat variety plots near Thunder Hawk in Corson County were seeded on May 2. The soil was wet and cloddy with excess moisture. Rainfall was above normal through the months of April and May. Air temperatures were slightly below normal during April and slightly above normal in May. The effects of temperature during tillering had little effect at this location and the normal quantity of tillers developed. Plants were not as vigorous as in the previous year. However, a high yield of grain of excellent quality was produced. The trial results are given in Table 31.

Harding County

Varietal plots of oats were seeded near Ralph on May 1. Precipitation during April, more than two inches above normal, prevented the soil from drying and thus delayed spring tillage and seeding. Rainfall during May was also above normal, but during June and July was much below longtime averages. Air temperatures were normal except during June when they were nearly five degrees above longtime averages. The result of the high temperature and low precipitation was limited tillering. Grain quality as measured by oil content, protein content, and weight per bushel was good. The trial results are listed in Table 32.

Meade County

The Meade County trial at Bear Butte Valley was seeded into fallow soil on April 29, while the Plainview trial was not seeded until May 11. Seeding was delayed because of wet soil conditions. Rainfall was below normal during May but above normal during June. However, topsoil moisture was short from mid-May on.

Spring air temperatures were near normal in May but several degrees above long time averages in June. Grain quality and yield were good at Bear Butte. The trial at Plainview had low yield and poor quality grain, primarily due to the late seeding date. Trial data are reported in Tables 33 and 34.

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 35.

Perkins County

Oat varieties in Perkins County were seeded near Bison on May 2. The soil had been fallowed in 1985. There was adequate topsoil moisture resulting from above normal precipitation in April. Seeding was delayed because of excess moisture. Spring and summer precipitation was above normal. However, there were periods of time in June and July when topsoil moisture was short. The plants were under moisture stress at maturity. Yield data are listed in Table 36.

TABLE 31. Oat Variety Trial - Cgrscn Coenty (Thundeb Hawk), 1984)86.

Variety	Height (Inches)	Date of Heading	Test Wt. (Lbs/Ru)	Grain Yield-Ru/Acre 1986	Yield-Ru/Acre (3 yr av)
Steele	33	June 29	34.5	112.7	92.5
Ogle	29	June 27	35.8	105.5	97.2
Monida	34	June 29	34.2	104.2	--
Lancer	29	June 27	36.6	102.5	91.9
Pierce	32	June 29	36.6	102.5	86.0
Benson	33	June 29	36.5	102.5	88.8
Porter	32	June 29	36.3	101.2	93.0
SD 790400	31	June 28	36.4	101.2	94.1
Bates	28	June 25	38.4	98.3	90.2
SD 820045	31	June 28	37.3	97.8	--
SD 800287	32	June 28	37.2	97.0	--
Don	26	June 25	37.1	96.6	--
Hazel	26	June 27	36.9	96.4	--
Burnett	32	June 26	36.3	96.1	88.8
Moore	34	June 29	36.4	94.0	88.5
Wright	35	June 29	36.4	93.6	88.6
Proat	32	June 29	37.2	92.7	86.2
Noble	29	June 26	36.4	92.7	80.0
SD 810088	33	June 27	36.0	92.3	--
Lyon	34	June 28	35.2	91.9	86.8
Webster	30	June 25	34.8	91.5	84.1
Kelly	32	June 25	38.1	90.6	81.1
SD 820184	32	June 28	37.8	89.8	--
Preston	30	June 26	37.9	88.9	79.1
Sandy	38	June 29	34.5	87.6	85.5
Centennial	33	June 29	34.8	86.4	83.5
SD 810109	32	June 28	38.9	85.9	--
Haylander II	33	June 29	36.2	85.9	87.1
Starter	29	June 25	36.9	85.9	--
Otee	29	June 26	37.1	79.1	77.5
Hyttest	36	June 27	38.6	77.0	81.2
Nodaway 70	30	June 26	37.2	75.7	76.6
<hr/>					
LSD(.05) = 14.7 Ru/Acre		C.V. = 11.2%		Mean = 93.6	

NOTE: Plots were seeded May 2 and harvested August 7, 1986.

TABLE 32. Oat Variety Trial - Harding County (Ralph), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Oil*	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
						1986	(3 yr av)
Monida	25	June 27	7.5	20.1	35.0	65.7	--
Benson	25	June 24	7.0	22.4	37.4	55.4	43.9
Ogle	23	June 24	6.5	21.9	36.7	50.2	55.3
Sandy	27	June 26	7.4	22.1	39.4	49.4	49.1
Lyon	27	June 24	8.7	24.9	36.7	48.6	46.9
Moore	27	June 25	9.3	22.0	37.2	48.6	51.0
SD 820045	24	June 24	7.1	22.0	39.1	48.5	--
SD 790400	25	June 25	8.2	24.1	38.1	48.4	46.9
Burnett	25	June 21	6.1	21.0	39.4	48.2	49.8
Porter	23	June 27	8.9	24.3	36.0	47.3	53.0
SD 810109	26	June 25	8.3	24.0	41.8	46.9	--
Wright	25	June 25	9.5	25.7	37.6	45.8	44.2
Pierce	23	June 27	8.6	22.4	36.8	44.4	44.6
Steele	25	June 25	7.6	24.0	35.4	43.0	46.1
Hytest	27	June 24	7.2	22.5	40.0	42.5	49.0
Noble	23	June 23	7.2	23.2	36.2	42.4	45.1
SD 820184	24	June 26	8.5	24.3	35.9	42.1	--
SD 800287	23	June 24	6.8	21.5	35.1	42.0	--
Don	21	June 21	8.0	21.7	38.6	41.8	--
Starter	22	June 20	8.0	26.0	39.4	41.7	--
Proat	24	June 26	8.8	26.2	36.7	40.8	40.8
Preston	23	June 21	9.7	27.6	37.2	40.2	43.0
SD 810088	26	June 23	8.0	21.9	37.4	39.8	--
Lancer	23	June 23	6.8	22.8	36.9	39.5	45.1
Bates	22	June 21	9.3	23.7	38.2	39.4	50.6
Centennial	26	June 25	6.1	21.7	29.1	38.3	39.0
Hazel	20	June 24	8.1	23.6	35.1	37.4	--
Nodaway 70	24	June 20	6.8	22.7	40.8	36.6	39.9
Haylander II	26	June 26	9.4	24.7	33.8	36.0	44.7
Kelly	24	June 21	7.1	24.5	37.5	35.6	39.0
Otee	22	June 22	7.7	26.2	36.8	30.4	39.9
Webster	23	June 20	7.9	21.5	29.0	28.2	46.8

LSR(.05) - 15.4 Bu/A

C.V. - 22.0%

Mean - 43.3

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

NOTE: Plots were seeded May 1 and harvested July 25, 1986.

TABLE 33. Oat Variety Trial - Meade County(Bear Butte Valley), 1984,86.

Variety	Height (Inches)	Date of Heading	Percent Oil*	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
						1986	(2 yr av)
Ogle	28	June 20	6.1	21.5	34.7	107.4	103.0
Hazel	27	June 23	7.9	22.5	38.4	106.1	—
Starter	29	June 17	7.3	22.4	41.0	105.9	—
Don	26	June 19	7.6	20.5	37.1	104.6	—
Otee	28	June 19	7.4	24.0	38.8	103.8	89.4
Bates	28	June 19	8.7	22.9	38.9	101.4	90.2
Webster	28	June 18	7.6	20.7	37.3	99.5	90.8
SD 810088	33	June 20	7.5	21.2	39.8	98.9	—
Nodaway 70	30	June 18	6.2	21.4	39.9	97.8	92.4
Noble	29	June 19	6.5	22.2	38.1	97.2	87.0
SD 820045	28	June 23	6.1	22.0	37.8	96.8	—
Benson	30	June 23	6.6	22.0	37.8	96.1	84.0
Burnett	32	June 19	5.5	20.9	40.2	93.8	74.2
Lancer	30	June 21	6.5	22.7	38.3	93.6	71.8
SD 790400	32	June 24	6.8	21.1	39.4	93.4	85.5
Haylander II	34	June 24	8.6	22.0	38.4	93.4	93.2
Ilytest	33	June 21	6.5	21.9	43.4	91.7	83.7
Wright	32	June 24	8.6	23.3	39.1	91.2	87.0
Kelly	29	June 18	7.0	23.2	39.7	90.6	72.4
Moore	32	June 25	8.7	20.6	38.4	89.5	89.5
Monida	31	June 22	7.1	20.6	35.7	89.5	—
Steele	32	June 25	7.1	22.8	38.3	87.6	77.3
SD 800287	32	June 24	6.7	21.5	39.2	85.5	75.0
Lyon	33	June 24	7.8	23.6	36.7	84.4	82.8
SD 810109	33	June 23	7.7	21.5	40.0	83.4	—
Porter	28	June 27	8.0	23.4	39.1	82.1	89.4
SD 820184	29	June 19	8.1	24.2	38.4	81.9	—
Preston	29	June 18	8.4	26.7	38.1	81.7	74.9
Proat	30	June 24	7.4	25.7	38.1	78.3	77.6
Sandy	33	June 25	6.5	21.0	40.0	77.0	69.4
Pierce	28	June 26	7.6	22.5	39.6	75.9	69.9
Centennial	31	June 24	5.9	20.8	39.1	75.5	67.1

LSH(.05) - 16.5 Bu/Acre

C.V. - 12.9%

Mean - 91.7

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

NOTE: Plots were seeded April 29 and harvested July 29, 1986.

TABLE 34. Oat Variety Trial - Meade County (Plainview) 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Oil*	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
						1986	(3 yr av)
Ogle	28	July 3	6.6	20.2	32.4	44.2	48.9
SD 790400	31	July 4	7.2	21.4	34.2	38.6	42.0
Porter	31	July 6	7.2	21.5	32.0	38.0	46.8
Webster	27	June 26	7.3	21.2	31.8	35.2	47.7
Bates	25	June 27	8.6	22.6	34.6	35.2	47.9
Monida	29	July 9	6.8	20.1	29.9	34.0	—
SD 820184	31	July 8	7.6	24.3	33.4	32.3	—
Steele	32	July 5	7.2	23.5	30.5	31.2	42.4
Moore	33	July 5	8.4	24.5	32.4	31.2	43.7
Kelly	28	June 27	6.8	22.8	36.5	30.1	40.5
Hyttest	33	July 4	6.6	22.3	37.4	29.5	36.9
Proat	29	July 5	7.5	24.6	33.4	29.5	36.5
Haylander II	32	July 5	8.4	24.0	33.0	27.8	—
Preston	27	June 27	9.3	26.0	35.7	27.8	41.1
Sandy	36	July 5	6.8	21.0	31.0	27.2	—
SD 810088	31	July 7	7.3	22.3	35.2	27.2	—
SD 810109	31	July 4	7.4	21.2	36.4	26.6	—
Lancer	27	July 3	6.4	21.7	34.7	26.6	38.5
Wright	33	July 5	8.5	23.5	33.5	26.1	36.7
Nodaway 70	29	June 27	6.4	20.3	36.2	26.1	38.8
Lyon	32	July 4	7.5	23.8	32.0	25.0	32.1
SD 820045	28	July 4	5.9	20.9	35.7	24.4	—
Hazel	26	July 5	7.7	24.0	33.1	23.2	—
Burnett	30	June 29	5.6	20.2	36.2	22.7	37.9
Centennial	32	July 6	5.7	22.0	30.9	22.1	30.8
SD 800287	30	July 1	7.1	20.9	32.7	21.0	—
Otee	26	June 30	7.7	23.6	35.9	21.0	38.2
Pierce	29	July 6	7.8	24.7	31.3	21.0	33.9
Starter	28	June 27	6.8	22.9	36.6	19.3	—
Noble	28	June 27	7.0	21.3	34.1	18.7	38.3
Don	26	June 30	7.4	20.7	35.8	18.7	—
Benson	31	July 5	6.3	27.4	32.0	18.2	33.6

LSD(.05) - 8.3 Bu/Acre

C.V. - 18.6%

Mean - 27.5

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

Note: Plots were seeded May 14 and harvested August 8, 1986.

TABLE 35. Oat Variety Trial - Pennington County (Wall), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Oil*	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
						1986	(3 yr av)
Ogle	30	June 19	6.5	18.0	34.0	98.7	79.3
Monida	30	June 22	7.1	18.5	35.4	95.7	—
Porter	28	June 27	7.7	20.7	38.0	94.9	77.5
Wright	33	June 23	9.0	24.0	37.8	94.4	71.4
Sandy	34	June 25	6.7	20.0	39.0	93.2	57.5
Hytess	32	June 21	6.6	21.6	40.8	92.3	59.2
SD 820095	28	June 21	6.4	21.7	37.8	91.0	—
Don	24	June 17	7.6	20.3	36.8	90.6	—
Pierce	29	June 26	7.7	22.2	38.1	90.2	42.4
Lyon	35	June 24	7.9	22.7	36.9	89.3	61.5
Burnett	29	June 18	5.9	20.2	39.4	88.9	47.0
Hazel	25	June 20	8.1	21.3	37.1	88.5	—
Moore	32	June 25	8.5	20.5	37.8	88.0	71.0
Steele	31	June 25	7.4	21.8	36.2	87.6	62.4
SD 810088	31	June 20	7.4	19.8	38.6	87.2	—
SD 810109	32	June 23	8.0	19.5	40.2	86.8	—
SD 790400	32	June 24	7.2	20.4	36.8	86.4	69.3
Bates	27	June 17	8.3	22.9	36.9	86.4	70.2
Proat	28	June 24	7.6	23.9	38.0	84.6	49.5
Nodaway 70	30	June 17	6.2	20.7	37.2	84.6	74.1
Noble	28	June 19	6.3	22.0	38.1	84.6	55.6
Preston	32	June 17	9.0	23.7	37.1	84.6	64.1
Lancer	27	June 20	6.3	22.6	37.3	83.4	58.1
SD 820184	32	June 19	8.1	24.7	37.6	83.4	—
Webster	27	June 17	7.3	20.4	34.8	83.0	69.5
Benson	31	June 23	6.7	27.3	36.8	81.2	59.6
Kelly	28	June 17	6.9	19.1	38.1	79.1	58.2
SD 800287	28	June 22	6.6	20.1	36.7	79.1	45.4
Starter	28	June 17	7.2	21.8	39.1	77.4	—
Otee	29	June 18	7.4	25.1	39.1	77.4	63.2
Haylander II	31	June 24	9.2	23.6	37.7	75.7	64.8
Centennial	30	June 24	6.1	21.3	35.2	63.4	39.4
LSD(.05) - 16.9 Bu/A			C.V. - 14.0%		Mean - 93.6		

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

NOTE: Plots were seeded April 23 and harvested August 1, 1986.

TABLE 36. Oat Variety Trial - Perkins County (Bison), 1984-86.

Variety	Height (Inches)	Date of Reading	Percent Oil*	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
						1986	(3 yr av)
Ogle	25	June 25	6.2	22.4	31.6	68.5	68.4
Webster	26	June 23	7.4	22.3	31.7	65.5	69.4
Starter	26	June 23	7.3	24.4	36.5	63.4	--
Monida	26	June 29	6.6	20.4	35.2	63.0	--
SD 810088	31	June 26	7.3	21.8	36.6	60.8	--
Moore	28	June 28	8.6	22.7	35.1	60.0	58.3
Benson	28	June 27	6.3	23.9	34.6	57.4	55.2
SD 820184	27	June 27	7.7	23.9	35.5	57.4	--
Bates	24	June 23	7.5	22.9	33.8	57.0	64.2
Lyon	30	June 27	7.8	24.2	33.1	55.7	54.6
Noble	26	June 24	6.3	23.5	34.8	55.3	52.8
Burnett	29	June 25	5.5	21.5	35.0	55.3	53.6
Otee	28	June 25	7.2	25.5	37.0	54.4	56.9
Porter	24	June 29	7.1	22.9	31.9	54.4	59.8
Lancer	26	June 25	6.2	23.7	32.8	53.2	55.6
Hyttest	30	June 26	6.9	22.9	38.1	52.7	54.3
SD 800287	26	June 26	6.3	21.1	32.1	51.9	--
Preston	25	June 24	8.4	28.9	35.4	51.5	55.4
SD 790400	26	June 26	6.7	23.1	33.7	51.0	56.4
Steele	26	June 27	6.9	23.0	31.9	51.0	52.5
Kelly	25	June 24	6.6	24.4	37.1	50.6	52.2
Wright	28	June 27	8.7	23.6	36.0	50.6	56.2
SD 820045	27	June 26	5.9	22.6	36.4	50.2	--
Nodaway 70	27	June 24	6.2	23.0	36.4	50.2	58.5
Sandy	29	June 27	7.1	21.6	37.0	50.2	50.6
Hazel	23	June 26	8.1	23.2	32.1	49.8	--
Proat	26	June 29	7.3	23.6	34.0	49.3	50.2
Haylander II	28	June 28	8.4	21.4	33.7	48.9	54.7
Don	24	June 24	7.3	22.4	34.0	48.9	--
Pierce	24	June 29	7.3	24.3	31.8	48.5	47.6
SD 810109	26	June 26	7.1	23.4	37.9	46.8	--
Centennial	28	June 28	5.8	22.5	31.0	45.1	43.2

LS(.05) - 9.6 Bu/A

C.V. - 12.7%

Mean - 54.0

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

NOTE: Plots were seeded May 2 and harvested August 6, 1986.

Spring Barley Trials

Spring barley variety trials were conducted on a cooperative basis at six locations in 1986. 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 22 to May 14. Harvesting was completed with a self-propelled plot combine between July 21 and August 8. Trial data are reported in Tables 37 through 43.

Bennett County

The spring barley variety trial at Martin was seeded on April 22 into fallowed soil. Soil moisture was good at seeding time because of wet snow received in mid-March and heavy rain showers in early April. Precipitation during the growing season was above normal with topsoil moisture being classed as adequate except during late May and early June. Air temperatures were normal except for the month of June when they were 4 degrees above normal. Grain yields were good. However, weights per bushel were reduced because it was necessary to harvest prior to normal maturity. Trial data are presented in Table 37.

TABLE 37. Spring Barley Variety Trial - Bennett County (Martin), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
Bowman	29	June 21	13.3	46.8	99.5	64.4
Lewis	30	June 23	13.8	49.1	97.8	--
Azure	31	June 21	12.9	45.7	95.5	62.0
Bumper	32	June 21	13.9	44.9	91.8	55.7
Hazen	30	June 22	12.6	46.0	90.9	60.8
Bl601	30	June 21	14.0	46.4	86.7	—
Glenn	30	June 21	13.5	44.7	86.3	57.1
Robust	32	June 22	14.2	47.9	86.3	56.3
Primus II	30	June 20	13.3	47.6	81.0	52.8
Morex	30	June 21	13.7	46.4	80.2	55.9
Larker	32	June 21	13.3	45.1	79.2	51.6

LSD(.05) - 10.3 Bu/A

C.V. - 8.2%

Mean - 88.6

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 22 and harvested July 31, 1986.

Corson County

The spring barley variety trial near Thunder Hawk was seeded on May 2. Seeding had to be delayed because of wet soil conditions resulting from above normal precipitation during April. At the time of seeding the soil was sticky and cloddy. Precipitation was above normal through May but was over 2 inches below normal during June. Air temperatures were normal except during June when they were 3.7 degrees above normal. Trial data are presented in Table 38.

TABLE 38. Spring Barley Variety Trial - Corson County (Thunder Hawk), 1984-86

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
Bowman	23	June 28	13.9	47.9	60.4	59.4
Hazen	24	June 28	13.8	46.2	59.6	58.0
Azure	26	June 28	13.6	45.3	54.2	56.6
Robust	26	June 28	14.4	47.3	54.2	57.5
Lewis	24	June 29	13.2	49.2	50.8	--
B1601	26	June 28	14.0	42.4	50.2	--
Bumper	26	June 29	14.8	44.7	49.4	49.5
Glenn	23	June 26	14.3	43.3	48.0	52.2
Larker	24	June 28	14.4	45.8	46.6	48.4
Primus II	25	June 24	14.5	45.0	44.0	50.3
Morex	26	June 28	15.3	43.1	40.9	51.6

LSD(.05) - 8.9 Bu/A

C.V. - 12.3%

Mean - 50.8

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 2 and harvested August 7, 1986.

Harding County

Experimental plots containing 11 varieties of spring barley were seeded near Ralph on May 1. Soil moisture was excellent because of early season precipitation. The above normal moisture prevented the soil from drying out and resulted in late seeding. Limited rainfall in June and July caused a topsoil moisture shortage in those months. Air temperatures were normal except during June when they were 4.9 degrees above the longtime average. Weight per bushel was higher for the early maturing varieties. Grain yields were considerably lower than the 3 year average. The yield and trial data are listed in Table 39.

TABLE 39. Spring Barley Variety Trial - Harding County (Ralph), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
Lewis	18	June 26	15.3	49.6	40.2	--
Robust	19	June 26	13.3	48.4	39.8	44.4
Bowman	18	June 22	14.0	51.2	39.3	50.9
Hazen	20	June 24	13.5	47.3	39.0	45.6
Azure	20	June 24	15.0	46.8	36.4	32.8
Morex	20	June 25	13.6	48.4	35.3	43.1
Bumper	20	June 25	13.9	44.3	34.3	42.7
B1601	22	June 23	13.6	45.6	33.7	--
Glenn	20	June 21	14.6	44.3	32.2	40.0
Primus II	20	June 18	14.5	45.5	30.6	41.2
Larker	19	June 22	15.9	48.4	28.5	40.1

LSD(.05) - 5.2 Bu/A

C.V. - 10.3%

Mean - 35.4

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 1 and harvested July 25, 1986.

Meade County
(Bear Butte Valley)

Spring barley varieties were seeded in Bear Butte Valley on April 29. The soil had been fallowed. Heavy wet snow in mid-March provided adequate subsoil moisture. Precipitation during April and May was below normal, but during June was above normal. Topsoil moisture, however, was classed as short through June. During March, May, and June air temperatures were above normal. The late planting and higher than normal temperatures resulted in few tillers, low test weights and poor quality grain. Trial data are reported in Table 40.

TABLE 40. Spring Barley Variety Trial - Meade County (Bear Butte Valley), 1984-86.

Variety	Height (inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
Primus II	26	June 15	13.1	44.5	63.8	58.6
Hazen	26	June 19	13.9	41.5	61.2	60.8
Robust	26	June 20	13.4	42.2	57.7	56.9
Bumper	26	June 22	14.6	43.1	56.3	53.8
Bowman	25	June 18	13.9	46.8	54.5	59.0
Glenn	24	June 18	14.3	39.2	53.9	—
Azure	27	June 19	13.3	40.5	53.4	47.6
Larker	28	June 19	14.4	42.2	52.8	51.0
Lewis	24	June 20	14.3	44.8	50.2	—
B1601	26	June 19	13.5	40.3	49.8	—
SD 71-672	—	June 18	—	46.5	49.7	—
Morex	26	June 17	12.2	40.5	44.9	53.9
LSM (.05) - 8.5 Bu/A		C.V. - 11.1%		Mean - 54.0		

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 29 and harvested July 29, 1986.

Meade County
(Plainview)

A Spring Barley variety trial was seeded at Plainview on May 14, 1986. The soil was saturated with moisture due to wet snow received in March and rain showers received in early-April. Rainfall was below normal in May. Air temperatures were above normal in June. Due to the lateness of planting and above normal temperatures there were few tillers, short straw, and small heads. The grain quality was very low as indicated by the test weights (Table 41). Grain yields were extremely low.

TABLE 41. Spring Barley Variety Trial - Meade County (Plainview), 1984,86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(2 yr av)
Robust	20	July 7	14.1	44.1	12.8	18.2
Primus II	22	June 27	14.3	43.0	12.4	19.0
Glenn	21	July 5	14.0	38.9	12.4	22.0
Hazen	20	July 8	14.1	40.4	12.2	20.2
Larker	21	July 6	15.0	41.6	11.1	16.6
Azure	21	July 6	13.9	42.5	10.5	15.4
Bumper	22	July 9	14.5	38.5	9.8	17.5
B1601	21	July 6	14.5	39.7	9.0	--
Bowman	22	July 5	14.7	46.4	8.6	15.8
Morex	21	July 8	13.9	41.9	8.3	14.2
Lewis	19	July 8	15.8	45.5	4.9	--
LSD(.05) - 4.0 Bu/A		C.V. - 23.6%		Mean - 10.2		

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded on May 14 and harvested August 8, 1986.

Pennington County

Spring barley was seeded near Wall on April 23 into fallowed soil. Subsoil moisture was adequate, but topsoil moisture was limited until June. Above normal moisture received in April was sufficient for the needs of the plants through the period of moisture stress. Protein content of the grain was equal to that of 1984. Weights per bushel were near standard. Grain yield was below the yield of 1985 and the 3 year average. The yield data are presented in Table 42.

TABLE 42. Spring Barley Variety Trial - Pennington County (Wall), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
Hazen	30	June 19	10.9	50.1	72.2	73.1
Azure	32	June 18	12.1	49.6	69.9	75.4
Bowman	26	June 18	12.7	50.8	67.3	81.4
Bumper	29	June 22	11.9	49.1	65.3	65.0
Robust	30	June 20	11.7	50.4	63.8	73.7
B1601	28	June 21	11.2	48.1	59.1	--
Larker	29	June 19	12.8	51.8	59.0	59.3
Primus II	28	June 16	16.3	51.0	59.0	68.3
Glenn	25	June 18	12.3	47.7	58.4	69.6
Lewis	25	June 20	12.7	50.9	53.4	--
Morex	32	June 19	11.1	48.4	49.8	65.0
LSD(.05) - 8.1 Bu/A		C.V. - 9.3%		Mean - 61.6		

*Percent protein determined with a Technicon 300 InfraAnalyzer

NOTE: Plots were seeded April 23 and harvested July 21, 1986.

Perkins County

Spring barley plots in Perkins county were seeded on May 2. The soil had been fallowed in 1985. It contained adequate topsoil and subsoil moisture from above normal precipitation received in early April. Wet soil conditions delayed seeding until early May. Above normal rainfall was received during the remaining Spring and Summer months. However, there were periods of time in June and July when topsoil moisture was in short supply. Yield and other data are reported in Table 43.

TABLE 43. Spring Barley Variety Trial - Perkins County (Bison), 1984-86.

Variety	Height (Inches)	Date of Heading	Percent Protein	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
					1986	(3 yr av)
Bowman	21	June 27	16.3	50.1	38.4	53.5
Bumper	22	June 26	15.2	42.3	35.7	40.2
Robust	21	June 27	15.0	47.4	35.5	41.5
Glenn	22	June 23	16.2	40.6	31.2	46.3
Lewis	20	June 27	15.6	49.4	31.0	--
Azure	22	June 26	14.7	41.3	29.5	42.3
Hazen	21	June 26	15.7	45.9	28.3	38.6
Morex	22	June 26	14.5	45.8	28.0	41.3
B1601	24	June 25	14.3	41.4	27.7	--
Primus II	23	June 21	--	40.3	26.5	43.2
Larker	20	June 25	16.8	45.0	22.5	36.2
LSD(.05) - 9.4 Bu/A		C.V. - 21.8%		Mean - 30.4		

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded May 2 and harvested July 24, 1986.

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 19, 1985. 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 or near normal during the remainder of the crop year ending in July 1986. Air temperatures were below normal for all months except January, March, and June. During January and March the temperatures were over 9 degrees above normal.

The barley entries varied in their ability to survive the winter. They also varied in date of maturity as shown by the moisture content in the seed at harvest. The yield data are presented in Table 44.

Table 44. Winter Barley Variety Trial - Pennington County (Wall), 1984-86.

Variety	Stand May 1986	Height (Inches)	Percent Moisture	Percent Protein*	Test Wt. (lbs/Bu)	Grain Yield-Bu/A 1986 (3 yr av)	
Herb	79	38	2.7	13.1	50.0	101.4	73.4
Dundy	58	32	7.8	13.6	50.3	95.4	72.4
Composite 129	76	37	4.8	13.6	51.3	92.0	71.8
Composite 142	71	38	2.8	14.0	48.5	84.7	68.8
Composite 307	52	38	6.2	13.7	49.6	77.8	54.3
Composite 10	81	38	5.6	11.3	49.2	77.4	63.0
Composite 250	44	38	14.4	13.1	47.3	76.8	42.2
Composite 295	38	35	8.7	13.7	49.9	75.2	—
Composite 223	56	35	4.8	12.4	49.1	74.6	—
Kearney	56	37	8.6	14.9	49.8	73.2	—
Nebar	36	39	20.0	13.9	44.7	58.7	—
Composite 308	24	33	21.8	13.2	43.7	55.5	—

Not statistically analyzed.

Mean - 78.6

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded September 19, 1985 and harvested July 7, 1986.

Flax Trials

Flax variety trials were conducted at three locations in 1986. 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 45 through 47.

Bennett County

The flax variety trial at Martin was seeded April 22. The fallowed soil had good moisture content as a result of wet snow received in mid-March. Precipitation was above normal during the remainder of the spring and early summer. However, topsoil moisture was classed as short during late May. Air temperatures were above normal during all of the spring season. Yield data are presented in Table 45.

TABLE 45. Flax Variety Trial - Bennett County (Martin), 1985-86.

Variety	Height (Inches)	Date of Heading	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
				1986	(2 yr av)
Rahab	22	June 25	50.1	29.7	19.4
Culbert 79	24	June 24	48.1	29.5	19.5
Flor	24	June 23	53.2	28.3	19.0
Clark	25	June 23	48.5	27.0	18.2
Wishek	25	June 22	52.9	25.8	17.6
Not Statistically Analyzed		C.V. - 6.7%	Mean - 28.1		

NOTE: Plots were seeded April 22 and harvested July 31, 1986.

Harding County

Flax varieties at Ralph were seeded on May 1. Soil moisture was excellent and germination immediate. Rainfall during the spring was above the long time average. Air temperatures were normal in all months except March and June. The weights per bushel and grain yield were less than those reported in 1985. The experimental results for 1986 are listed in Table 46.

TABLE 46. Flax Variety Trial - Harding County (Ralph), 1984-86.

Variety	Height (Inches)	Date of Heading	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
				1986	(3 yr av)
Culbert 79	18	June 25	50.5	11.0	12.4
Rahab	18	June 26	51.7	10.4	—
Wishek	19	June 26	53.4	9.1	12.0
Flor	17	June 25	53.5	8.8	12.7
Clark	17	June 26	51.8	7.8	12.1
Not Statistically Analyzed			Mean - 9.4		

NOTE: Plots were seeded May 1 and harvested August 5, 1986.

Perkins County

The plots were seeded in fallow soil on May 2. Soil moisture was adequate for germination and emergence. Precipitation was above normal for the growing season. Air temperatures during April and May were normal. Weight per bushel and grain yields were similar to those of 1985 and are reported in Table 47.

TABLE 47. Flax Variety Trial - Perkins County (Bison), 1985-86.

Variety	Height (Inches)	Relative Maturity*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre	
				1986	(2 yr av)
Rahab	20	4	53.8	12.0	12.0
Clark	21	1	53.7	10.9	11.6
Wishek	22	0	50.3	10.7	10.6
Culbert 79	21	0	52.3	10.0	8.8
Flor	20	3	52.3	9.7	11.0

Not Statistically Analyzed

Mean - 10.7

*Indicates relative heading time in days based on earliest heading date.

NOTE: Plots were seeded May 2 and harvested August 6, 1986.

Soybeans

Twenty six varieties of soybeans from 4 maturity groups 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, & September. All of the groups produced good quality mature beans. However, there were varieties within the groups that had low test weights and poor quality beans. The varieties were all mature at harvest on October 14. The results of the trial are listed in Table 48.

TABLE 48. Soybean Variety Trial - Pennington County (Wall), 1985-86.

Brand & Variety	Height (Inches)	Seed Shatter*	Test Weight (Lbs/Bu)	Seed 1986	Yield-Bu/A (2 yr av)
GROUP 00					
Clay	18	2.5	48.9	19.4	--
				Group Mean -	19.4
GROUP 0					
Arrowhead 8450	19	0	53.0	23.3	14.4
Ily-Vigor Hardy	20	0	47.0	22.2	--
Northrup King 09-90	27	2.5	51.1	21.0	--
Dassel	21	1.5	53.6	20.9	--
Sands SOI059	19	1.5	54.3	19.8	--
Dawson	19	1.5	54.1	19.6	--
Pride B095	23	0.5	53.4	18.9	--
Dekalb CX096	20	3.0	63.2	18.6	--
Simpson	21	0	51.9	17.7	--
King KG31	25	3.0	53.4	16.0	--
SIGCO 80	20	1.5	52.4	15.1	--
				Group Mean -	19.4
GROUP I					
Sands SOI136	24	0	53.0	26.4	--
Sibley	14	0	54.1	24.6	--
Asgrow A1937	22	0	52.4	23.2	16.1
Weber	20	0	51.5	22.4	15.2
Hodgson 78	23	0	53.0	21.4	14.7
Lakota	24	0	53.8	20.7	14.2
Cenex 8410	18	1.5	52.8	19.9	13.8
BSR 101	22	2.0	53.8	19.4	--
Seedtec 610	25	2.0	53.8	19.0	12.8
SIGCO 90	22	0	51.3	19.0	--
King KG71	19	0	53.6	16.5	--
				Group Mean -	21.1
GROUP II					
Hofler Opal	19	0	53.8	23.1	--
Harcor	23	0	54.3	20.1	--
Corsoy 79	24	0	53.6	19.4	14.2
				Group Mean -	20.9
(Not statistically Analyzed)			Trial Mean - 20.3		

*Seed Shatter: 0=No shattering, 1=20%, 2=40%, 3=60%, 4=70%, 5=100% shattered.

NOTE: Plots were seeded on May 29 and harvested October 14. Seeding was done with a 2 row Buffalo-Till planter having a 30 inch row spacing.

Chickpea (Garbanzo Bean)

Chickpea (*Cicer arietinum* L.) is an annual legume, widely grown for its edible seed. It is the third most important pulse (grain legume) crop in the world. Most of the production in the United States is used for the salad bar market. Chickpeas are a summer crop adapted to low rainfall areas, but can be grown

under irrigation on well drained soils. The plants are frost tolerant and can be planted when soil temperatures reach 43°F at seeding depth. Seeding depth can vary from 3 to 6 inches depending on available moisture. Seed treatment is required to prevent damping off of seedlings caused by soil-borne fungi.

The crop can be windrowed or direct-combined when the seeds contain less than 12% moisture. Cylinder speed and concave settings must be watched closely to prevent seed damage. Grain handling equipment also needs to be monitored because of the fragility of the beans.

Several agronomic and breeding studies have been conducted on the chickpea since 1983. On May 2, 1986 six studies were seeded near Wall. The South Dakota Chickpea Screening Nursery (SDCSN) consisting of 54 entries, and the Individual Plant Screening Nursery (IPSN) consisting of 96 entries were used to screen germ-plasm and breeding materials for adaptability and yield. The Chickpea International Ascochyta Blight Nursery (CIABN) consisting of 40 test entries and a susceptible check variety (SDGI-131) was designed to screen lines for resistance to the disease. Entries were evaluated using a 1 to 9 scale; where, 1 is highly resistant and 9 is highly susceptible. The South Dakota Chickpea Yield Trial (SDCYT), and Chickpea International F4 Yield Trial (CIF4T), each with 24 entries were used to evaluate lines for yield and seed quality. The Agronomic study was designed to study the effect of variety, within row and between row spacing on yield and seed size.

SDCSN and IPSN were sown in single rows 3 meters long, 60 cm spacing between rows and 10 cm spacing between plants within rows. CIABN had 2 replications of single rows 3 meters long, 60 cm between rows, and 10 cm between plants within rows. A disease spreader row was seeded after each two test entries to ensure uniform disease development. SDCYT and CIF4T contained 3 replications of four row plots 3 meters long with 30 cm between the rows and 10 cm between plants within the rows. The Agronomic trial had six replications of four row plots which were 3 meters long with 30 and 60 cm spacings between rows. Plant spacings of 3.8, 7.6, and 15.2 cm were used within rows. All nurseries and trials were harvested on August 18, 1986.

Results and Discussion:

South Dakota Chickpea Screening Nursery

All 54 entries grew successfully, however, a large number of entries produced very low yields. Seed yields ranged from 122 to 2506 kg/ha, with a mean of 1173. Data on yield and other desirable traits for the 5 top yielding entries are presented in Table 49.

TABLE 49. Yield and Agronomic Data from the Top 5 Yielding Entries in the South Dakota Chickpea Screening Nursery - Pennington County (Wall), 1986.

Entry	Plant Height (Centimeters)	Percent Stand	Seeds per Pod	100 seed Wt in gms	Seed Yield (Kg/ha)*
SDR- 252	42	80	1.2	27	2506
SDR- 211	29	80	1.4	30	2444
SDR- 255	31	80	1.2	32	2183
SDGI-131	42	85	1.0	26	2133
SDR- 256	38	80	1.0	29	1972

* To convert to pounds per acre divide value by 1.2

Trial Mean - 1173

Individual Plant Screening Nursery

Of the 96 entries seeded, only 74 produced seed. Seed yield ranged from 127 to 2517 Kg/ha, with a mean of 1016 Kg/ha. The top five had yields greater than 2000 Kg/ha. Plant height ranged from 20 to 50 cm. Plant stands ranged from 15% to 95%. Seed number per pod ranged from 1.0 to 1.8 seeds. 100 seed weight ranged from 24 to 32 grams, and Ascochyta Blight disease scores ranged from 3 to 9. The data for the top five entries are presented in Table 50.

TABLE 50. Yield and Agronomic Data for the Top 5 Yielding Entries - Individual Plant Screening Nursery - Pennington County (Wall), 1986.

Entry	Plant Height (Centimeters)	Percent Stand	Seeds per Pod	100 seed Wt in gms	Seed Yield (Kg/Ha)*
X81TH-104	35	75	1.1	32	2517
X81TH-120	33	80	1.0	32	2422
X81TH-125	36	80	1.1	24	2350
X81TH-105	47	80	1.1	27	2144
X81TH-77	34	85	1.8	26	2050

* To convert to pounds per acre divide value by 1.2

Trial Mean - 1016

Chickpea International Ascochyta Blight Nursery

Three germplasm and two breeding lines were the 5 best yielding entries (Table 51). The yield ranged from 361 to 2128 Kg/ha. However out of the 40 entries only 12 had yields greater than the mean of 1263 Kg/ha. High seed yields were associated with low disease scores. Plant height ranged from 24 to 42 cm. Plant stand ranged from 55% to 93%. Seed number per pod ranged from 1.0 to 1.8 seeds per pod. Seed weight ranged from 18 to 34 grams per 100 seeds, and Ascochyta disease scores ranged from 4 to 9.

TABLE 51. Yield and Agronomic Data for the Top 5 Yielding Entries - Chickpea International Ascochyta Blight Nursery - Pennington County (Wall), 1986.

Entry	Plant Height (Centimeters)	Percent Stand	Seeds per Pod	100 seed Wt in gms	Seed Yield (Kg/Ha)*
FLIP-82-243	37	75	1.1	27	2128
ILC-182	34	85	1.8	20	1975
ILC-3856	36	80	1.4	23	1806
ILC-4421	32	83	1.2	20	1747
FLIP-82-150c	26	83	1.0	26	1719

* To convert to pounds per acre divide value by 1.2

Trial Mean - 1263

South Dakota Chickpea Yield Trial

Seed yield for this trial of 24 entries ranged from 312 to 1931 Kg/ha. Plant height ranged from 22 to 44 cm, plant stand ranged from 50% to 82%, seed weight ranged from 22 to 39 grams per 100 seeds, and disease scores ranged from 3 to 9 for Ascochyta Blight. The data for the top 5 yielders are in Table 52.

TABLE 52. Yield and Agronomic Data for the Top 5 Yielding Entries - South Dakota Chickpea Yield Trial - Pennington County (Wall), 1986.

Entry	Plant Height (Centimeters.)	Percent Stand	Seeds per Pod	100 seed Wt in gms	Seed Yield (Kg/Ha)*
SDB - 5	30	63	---	26	1931
SDB - 3	36	72	---	25	1769
SDB - 16	32	73	---	22	1720
SDB - 6	32	72	---	27	1652
SDB - 2	44	70	---	27	1635

* To convert to pounds per acre divide value by 1.2. Trial Mean - 1291

Chickpea International F4 Yield Trial

Data from the top 5 entries on the CIP4T trial are listed in Table 53. Seed yields for the 24 entries ranged from 781 to 2637 Kg/ha. plant height ranged from 30 to 41 cm, plant stand ranged from 45% to 80%, Seeds per pod ranged from 1.0 to 1.4, seed weight ranged from 23 to 34 grams per 100 seeds, and Ascochyta blight ranged from 4 to 7.

TABLE 53. Yield and Agronomic Data for the Top 5 Yielding Entries - Chickpea International F4 Yield Trial - Pennington County (Wall), 1986.

Entry	Plant Height (Centimeters.)	Percent Stand	Seeds per Pod	100 seed Wt in gms	Seed Yield (Kg/Ha)*
X83TH - 337	40	63	1.1	28	2637
X83TH - 325	30	77	1.2	27	2013
X83TH - 331	31	72	1.2	29	1891
X83TH - 3279	39	80	1.2	27	1765
X83TH - 335	30	77	1.3	29	1752

* To convert to pounds per acre divide the value by 1.2 Trial Mean - 1394

Chickpea Agronomic Study

Three varieties of chickpea were used in row spacing and plant spacing within the row to study those effects on yield and seed size. Data from Sohio-131 was excluded from this report because of very low yield.

Four populations, (107500, 215000, 430000, and 860000 plants/ha) were created by combining various row and plant spacings. In general, yields were increased as row space and plant spacing within the row were decreased, or as population was increased yield was also increased.

Although the two remaining varieties were different in yield and seed size, both were affected similarly by the various spacing combinations. Row spacings or populations did not cause a significant difference in seed size. The data from the study are presented in Table 54.

TABLE 54. Effect of Variety, Row Spacing, and Plant Spacing Within the Row on Yield and Seed Weight of Chickpea - Pennington County (Wall), 1986.

Variety	Plant Spacing within Row in Centimeters	Row Spacing in Centimeters					
		Seed Yield-Kg/ha			Seed Weight/100 seeds		
		30 cm	60 cm	ave	30 cm	60 cm	ave
SDGI- 6	15.2	703	298	500	27	28	28
	7.6	1047	452	749	25	24	24
	3.8	1233	566	899	25	25	25
	Average	994	439	716	26	26	26
X81TH-111	15.2	859	549	704	23	23	23
	7.6	1456	933	1195	23	23	23
	3.8	1599	1223	1411	23	23	23
	Average	1305	902	1103	23	23	23

NOTE: To convert yield in Kg/ha to Lbs/A divide value by 1.2

Approximate Conversions: 30 cm = 12 inches, 15.2 cm = 6 in., 7.6 cm = 3 in., 3.8 cm = 1.5 in.

Conclusions:

Entries in all nurseries and trials produced high yields considering the time of seeding and the growing conditions for 1986. Seeding was delayed by ten days due to continuous rainfall in April. Heavy runoff and formation of a soil crust during the early part of the growing season resulted in reduction of plant stand in most of the plots. However, the screening of a large number of entries was beneficial for identifying high-yielding, adaptable, and disease resistant sources for direct exploitation and/or for a gene source. The exhibited large ranges of the traits indicated the presence of wide genetic variability within the materials studied and the potential of the environment for growing chickpeas. Even though seed yield and color were very encouraging, seed sizes were not large enough to compete with the existing large-seeded commercial varieties for premiums paid for larger seeds. Therefore, future studies must emphasize improving seed-size. Otherwise, the data have confirmed that chickpea has the potential of being a commercial crop at Wall, SD.

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 22. Spring moisture was adequate for germination and emergence and far above normal for the remainder of the growing season. Air temperatures during April and May were normal resulting in a large number of tillers being produced per plant.

TABLE 55. Small Grain Forage Trial - Bennett County (Martin), 1986.

Crop & Variety	Percent Dry Matter	Percent Protein*	Tons/Acre @ 12% H2O	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield (Bu/Acre)
OATS						
Steele	22.2	10.3	3.45	22.5	32.2	100.8
Bates	26.2	11.1	3.43	23.9	36.4	116.6
Kelly	26.6	10.2	3.40	22.7	36.2	107.2
Lang	28.2	10.1	3.30	—	—	—
Haylander II	24.4	11.1	3.24	23.0	33.4	105.9
Moore	23.3	11.1	3.23	21.4	34.4	101.2
Lancer	24.2	12.1	3.17	21.7	34.3	105.1
Burnett	24.0	11.4	3.02	19.8	36.1	111.9
			Mean-3.28			
SPRING BARLEY						
SD 71-672	33.4	11.1	3.87	15.6	—	—
Morex	33.2	10.9	3.69	13.7	46.4	80.2
Bowman	28.7	12.3	3.48	13.3	46.8	99.5
Larker	30.6	11.5	3.11	13.3	45.1	79.2
			Mean-3.54			
DURUM WHEAT						
Crosby	32.2	11.2	3.04	—	—	—
Vic	29.6	12.2	2.79	—	—	—
			Mean-2.92			
SPRING WHEAT						
Alex	26.8	12.9	3.08	16.2	58.6	38.8
Guard	28.2	11.8	2.72	14.8	59.4	47.0
Butte	29.3	11.6	2.62	15.6	57.2	39.0
Pio. 2369	28.6	13.2	2.57	14.9	58.5	40.4
Marshall	27.0	14.0	2.38	14.8	57.4	45.8
Eureka	28.5	12.6	2.28	—	—	—
Olaf	27.9	13.0	2.19	15.3	56.4	30.2
James	28.5	12.2	1.98	—	—	—
			Mean-2.48			
TRITICALES						
Kramer	27.2	12.1	2.42	—	—	—
Marval	26.2	12.2	2.29	—	—	—
			Mean-2.36			

*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 22 and harvested July 2, 1986. 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), 1985-1986

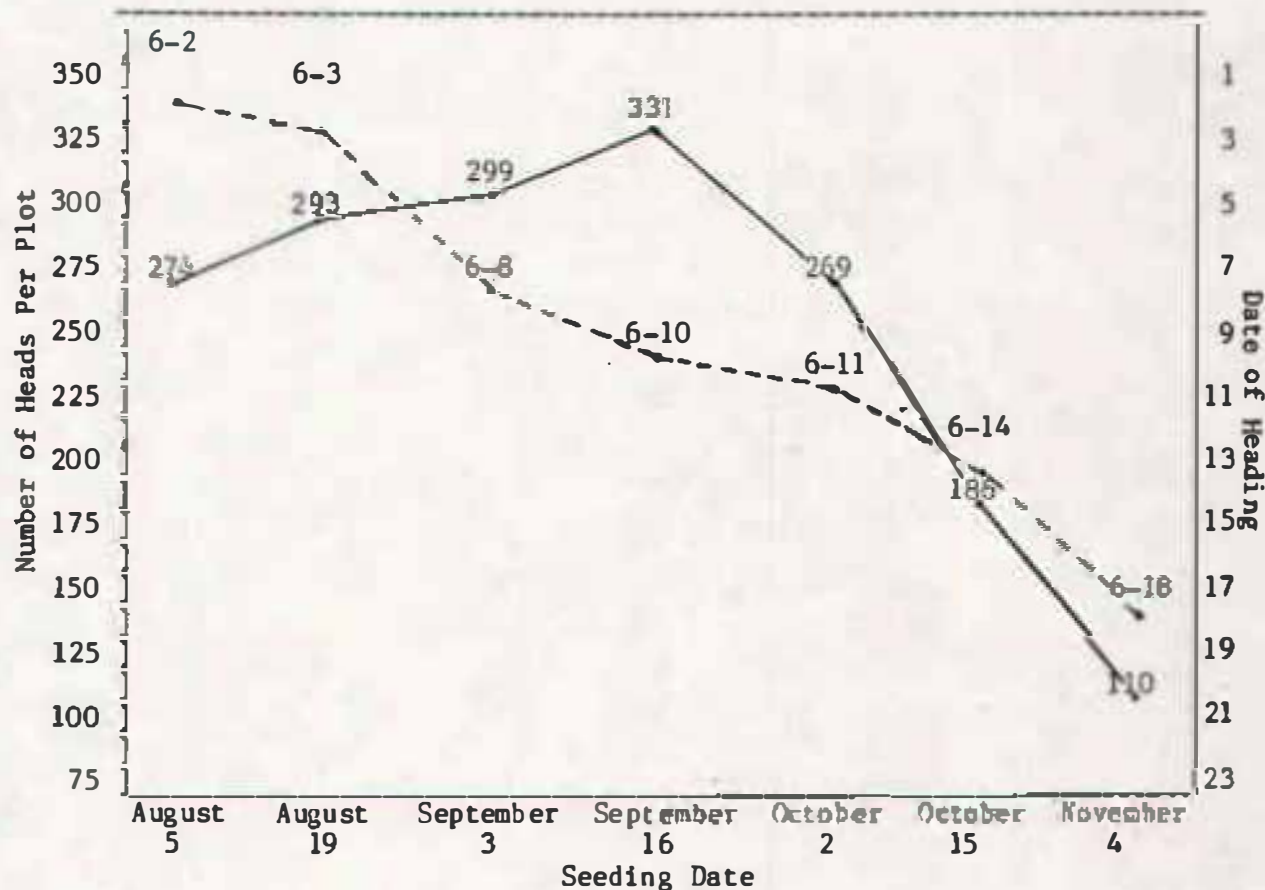
Objective: Evaluate winter wheat survival and yields as affected by fall planting dates.

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

Soil Test Data: pH - 7.6, O.M. - 2.1%. Nitrogen - 24 #/A., Phosphorus - 14 #/A., Potassium - >1000 #/A., Zinc - 0.45 ppm, Iron - 15.3 ppm, Sulfur - >100 #/A., Chlorine - 109.0 #/A..

Field Data: Plot Size - 5.5 ft x 30 ft, 4 Replications, Fertilizer - Applied 76# of Nitrogen per acre prior to seeding. 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 1/2 oz per acre. Weeds - Downy Brome grass was hand pulled, Pennycress was controlled by the Glean. Plots were haled out on June 30, 1986. Stand notes were taken on June 20, 1986.

GRAPH 1. Effects of Date of Planting on Number of Heads per Plot, and Date of Heading - Hard Red Winter Wheat var. Dawn, 1986.



GRAPH 2. Effects of Date of Seeding on Number of Heads per Plot, and Date of Heading of Hard Red Winter Wheat var. Agassiz, 1986.

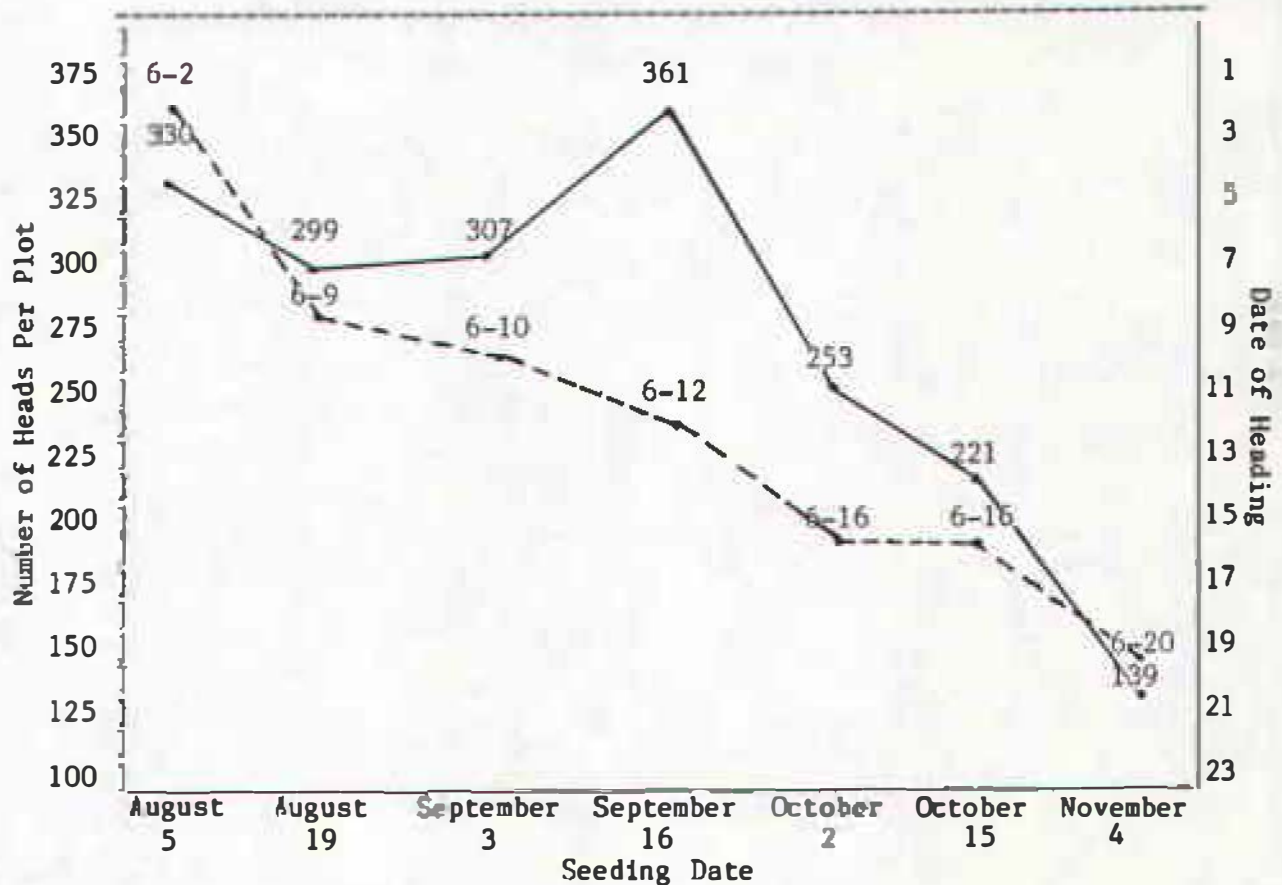


TABLE 56. Effects of Date of Planting on the Percent Stand of Hard Red Winter Wheat - Pennington County (Box Elder), 1986.

Variety	Rep	Percent Stand						
		Date of Planting						
		8-5	8-19	9-3	9-16	10-2	10-15	11-4
Dawn	I	90	80	75	85	85	70	45
	II	85	90	85	90	90	55	95
	III	85	80	80	85	90	80	55
	IV	85	75	85	90	80	80	70
	Mean-	86.3	81.3	81.3	87.5	86.3	71.3	66.3
Agassiz	I	85	90	75	90	73*	80	70*
	II	80	95	75	95	80	85	75
	III	85	90	85	90	90	85	65
	IV	85	85	80	90	90	75	80
	Mean -	83.7	90.0	78.7	91.3	83.3**	81.3	72.5**

*Estimated value -missing plot

**Approximate value based on estimated value

Discussion:

The plots at Box Elder were fertilized to produce a yield of 45 Bushels per acre of winter wheat. The plots were totally destroyed by a hail storm on June 30, 1986, but some data had previously been taken. The number of heads per plot corresponds with yields previously acquired on Best Date of Seeding studies. The data indicate that planting on the 16th of September produced the highest number of heads with Dawn winter wheat. Agassiz winter wheat produced the maximum number of heads when seeded September 16th and October 2nd. The increased number of heads per plot is one of the factors contributing to total yield.

Winter Wheat Fertilizer Demonstration

Objective: Evaluate the effect of starter fertilizer on growth response, plant height, maturity, grain quality, and yield of hard red winter wheat.

Meade County

The hard red winter wheat variety Buckskin was seeded in fallow soil in Bear Butte Valley on September 11, 1985. The experiment consisted of seven replications each of fertilized and unfertilized plots. The fertilizer was applied as a liquid at a rate necessary to bring the nitrogen in the soil to the level required by the wheat to produce a grain yield of 40 bushels per acre.

TABLE 57. Starter Fertilizer Demonstration with Hard Red Winter Wheat - Meade County (Bear Butte Valley), 1986.

Treatment	Height (Inches)	Percent Protein*	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
Check	42	12.0	48.6	38.8
Fertilized	41	12.3	49.4	38.3

*Percent protein determined with a Technicon 300 InfraAnalyzer.

Soil Analysis Data:

Nutrient	Pounds per Acre		
	Nitrogen	Phosphorus	Potash
In Soil	102	60	990
Pounds Added	12	41	0
Required for 40 Bu Yield	96	40	275

Soil nutrient levels at this site were sufficient to produce the anticipated yield goal without additional fertilizer. Rainfall was normal which was sufficient to produce wheat yields of 54 bushel per acre in adjacent plots. The lower yields received in this experiment were due to an infestation of Downy Brome grass, leaf and stem rust, and use of an unadapted variety. The plots were harvested on July 29, 1986. Data is reported in Table 57.

Pennington County

The hard red winter wheat variety Buckskin was seeded in fallow soil near Wall in eastern Pennington county on September 19, 1985. The experiment consisted of four replications each of fertilized and unfertilized plots. The fertilizer was applied as a liquid at a rate necessary to bring the nitrogen in the soil to a level required by the wheat to produce a grain yield of 55 bushels per acre.

TABLE 58. Starter Fertilizer Demonstration with Hard Red Winter Wheat - Pennington County(Wall), 1986.

Treatment	Height (Inches)	Percent Protein*	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
Check	34	11.7	53.4	33.3
Fertilized	36	11.3	50.2	47.7

*Percent protein determined with a Technicon 300 InfraAnalyzer.

Soil Analysis Data:

Nutrient	Pounds per Acre		
	Nitrogen	Phosphorus	Potash
In Soil	99	57	>1000
Pounds Added	16	41	0
Required for 55 Bu/A Yield	132	52	275

The results of this experiment indicated that additional fertilizer together with adequate soil moisture resulted in an increase in yield of 30%. There was also a small increase in plant height and plant vigor. Lower protein content and weight per bushel in the fertilized plots resulted because the higher soil nutrient level delayed maturity of the wheat plants. The data are reported in Table 58.

Winter Wheat Variety Demonstrations Lyman County

Procedure: Winter wheat variety Drill Strips were seeded in 2 locations in Lyman county in the fall of 1985. The strips were seeded by interested producers with large size conventional farm equipment. Drill seed boxes were divided so that several varieties could be seeded at the same time. Each resulting strip was of uniform width and 300 feet long. All normal management tasks were the sole responsibility of each producer. Harvesting was completed with a small plot combine. The results are reported in Table 59.

TABLE 59. Hard Red Winter Wheat Drill Strips - Lyman County, 1986.

Cliff Halverson Farm-Rennebec, SD			Steve Lein Farm-Presho, SD		
Varieties	T/Bu	Bu/Acre	Varieties	T/Bu	Bu/Acre
Sage (A)	59.1	51.7	Bennett (A)	58.7	43.6
Sage-SDSU	57.6	48.0	Dawn	58.2	48.8
TAM 105	49.4	35.0	Bighorn	51.3	27.4
Sage (B)	58.8	48.7	Wthrmstr 110	60.2	38.1
Bennett	56.0	31.4	Brule	56.4	39.1
Scout 66	58.3	51.2	TAM 105	51.1	38.0
Brule	54.2	50.4	Centura	58.3	45.1
Agassiz	57.4	39.3	Bennett (B)	58.3	42.4
Sage (C)	59.3	49.3	Lancer	58.3	42.0
Thunderbird	57.9	57.1	Quantum 554	53.5	48.2
Rocky	57.3	42.7	Quantum 515	46.8	37.0
Wthrmstr 110	55.6	53.2	Roughrider	59.7	37.3
Centura	57.4	55.1	Scout 66	59.4	44.7
Sage (D)	59.0	53.3	Wthrmstr 140A	54.9	38.3
Ram	52.6	48.2	Colt	58.8	43.9
Nell	56.0	42.6	Agassiz	59.1	35.1
Colt	55.8	52.5	Ram	52.5	45.9
Lancota	59.4	59.4	Sage	59.9	37.5
Sage (E)	59.3	51.0	Siouxland	57.1	45.7
Quantum 554	51.6	37.2	Buckskin	56.4	39.4
Siouxland	57.7	63.2	Bennett (C)	58.2	43.0
Dawn	56.3	51.5	Quantum 524	55.3	42.1
Sage (G)	60.1	56.2	Lancota	58.1	42.4
Rose	55.2	36.6	Thunderbird	61.1	43.5
Rita	52.4	37.0	Nell	61.1	40.3
Bighorn	42.5	17.3	Centurk 78	61.3	45.0
Roughrider	53.4	36.4	Rocky	60.8	47.0
Sage (I)	59.0	48.4	Bennett (D)	60.4	44.2
Hail	54.0	40.4	Quantum 568	58.0	48.9
Wthrmstr 140A	50.5	36.8	Quantum 555	55.2	43.2
Quantum 568	51.8	45.0	Rose	60.5	48.6
Quantum 555	47.8	35.9	Rita	55.4	39.1
Sage (J)	58.3	47.6	Hail	57.9	41.0
Quantum 524	48.6	32.2	Scout	61.4	50.2
Quantum 515	40.1	20.0	Bennett (E)	60.3	51.6
Sage/Dawn	57.2	52.3			
Buckskin	51.9	30.8			
Sage (K)	59.4	48.7			
Centurk 78	57.2	40.1			
Lancer	58.5	45.3			

Discussion of Results:

The above yields were taken from non-replicated drill strips. The cooperators in each case planted a check variety each 5th or 6th strip in order to measure response due to location in the trial. The soil on which the trials were located was very uniform. There was an excellent job of seeding, weed control, and plot maintenance throughout the growing season. Three sections (30'x5') were harvested from each strip. The Halverson trial was seeded September 27, 1985 and harvested July 16, 1986. The Lein trial was seeded September 7, 1985 and harvested on July 15, 1986. The trial data are reported in Table 59.

No-Till Grain Sorghum Hybrid Trial
Paul Patterson Farm-Jones County (Draper), 1986.

Objective: To observe and compare grain sorghum hybrids grown in a No-Till soil demonstration.

Field Data: Twenty three grain sorghum hybrids were seeded into No-Till soil on June 17. Liquid fertilizer was applied with the seed at the rate of 49 pounds of Nitrogen and 43 pounds of Phosphorus per acre. Immediately after seeding Ramrod was broadcast on the soil surface at the rate of 4 pounds per acre. The plots were harvested on October 29, 1986. Plot size was 30' x 10'.

TABLE 60. Grain Sorghum Hybrid Variety Demonstration Grown on No-Till Soil-Jones County (Draper), 1986.

Brand & Hybrid	Percent Stand (Oct 29)	Height (Inches)	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
Stockmans Hybrid	40.0	39	38.8	58.7
Paymaster 930	90.0	42	49.1	77.4
Paymaster 980	78.3	40	44.7	57.4
Keltgen 57T	83.3	38	45.9	58.1
Keltgen 63T	90.0	46	41.3	61.0
Keltgen 70B	90.0	44	24.6	35.2
Pioneer 894	88.3	37	49.2	62.7
Pioneer 8855	88.3	38	50.6	73.5
Dekalb DK-18	85.0	38	51.4	95.9
Dekalb DK-28	90.0	38	51.8	83.4
Northrup King 1210	90.0	38	43.8	76.6
Funks G251	90.0	34	53.3	73.1
Cenex 224T	85.0	38	32.4	67.2
SIGCO 48YG	90.0	33	48.2	81.4
SIGCO TR46	90.0	44	46.6	83.5
SIGCO X1045	86.7	45	45.8	73.2
SIGCO X1047	80.0	43	50.0	74.2
SIGCO X1048	60.0	36	47.0	56.5
Jacques 101	71.7	42	50.8	75.3
Jacques 108	66.7	37	46.4	70.7
Jacques 208	78.3	43	50.5	91.3
Jacques 308	86.7	46	44.1	63.6
Jacques 6335	90.0	44	45.5	61.6
LSD(05) - 47.4 Bu/A		C.V.- 34.3%		Mean - 70.1

Discussion:

The demonstration plot was seeded, fertilized, and treated with herbicide on June 17, 1986. The sorghum was fertilized with an attachment on the seeder that placed the fertilizer near the seed. The herbicide was broadcast on the surface after seeding was completed. Three varieties had poor stands. They were Stockmans hybrid at 40%, SIGCO X1048 at 60%, and Jacques 108 at 66.7%. All other varieties had stands of 70-95%.

No-Till Alfalfa - Grass Seeding
Pennington County (Spring Creek Area), 1986

Objective: To evaluate the use of herbicides to replace tillage in the establishment of Alfalfa and Intermediate Wheatgrass in winter wheat stubble.

Equipment: Seeding was completed with a conventional John Deere Press Drill (PDL4R6) with double disk openers spaced 6 inches apart and a grass seeder attachment. The conventionally tilled area was worked with a 7 foot chisel and a 7 foot tandem disc. It was then packed with the press drill. Pesticides were applied with a sprayer mounted on a 4-wheeled ATV.

Application Data: Herbicides were applied on 2 dates. The first application, or preplant, was applied on April 21, 1986. The second application, or post plant, was applied on April 29, 1986. The nozzles, flat fan #8001, were spaced at 30 inches. The mixture was applied at a pressure of 30 PSI, a speed of 3.6 MPH, and at a rate of 5 gallons per acre. The wind was from the Southeast at 3 MPH and the air temperature was 55 degrees Fahrenheit. The soil was dry at the first application and was wet at the second application.

Field Data: The plots were seeded on April 25, 1986. Alternating rows of Vernal Alfalfa and Oahe Intermediate Wheatgrass were seeded at 6 lbs/acre and 1 lb/acre, respectively. The Vernal was seeded alongside of the double disk opener and pushed into the soil by the packer wheels. The Oahe was placed down the seed spout in the usual manner.

Weeds: At the first application the Pennycress had 2 leaves and was 8 inches tall, the Tanzymustard was 3 inches to 8 inches tall, and the Volunteer Wheat was 6 inches tall. At the second application the Pennycress was 12 inches tall, and the Volunteer Wheat fully tillered.

Discussion: A no-till seeding of alfalfa and intermediate wheatgrass was established in April 1986. Replicated treatments compared Paraquat, Roundup, and a 2,4-D herbicide, to a cultivated check and plots with no weed control. The herbicide was applied four days prior to seeding and four days after seeding.

Seedling counts in May revealed that good germination for alfalfa and grass occurred in all 12 treatments. Weed control ratings in May indicated all herbicide treatments controlled the winter annual broadleaved weeds. The Roundup was effective in controlling the volunteer wheat while Paraquat did not control the volunteer wheat. Alfalfa and grass production ranged from 1387 lbs per acre in the cultivated check to 156 lbs per acre for the Paraquat treatment applied four days after seeding.

The spring no-till seeding of alfalfa and cool-season grass into dead stubble appears to be extremely promising as compared to current seeding practices. This method would be useful in the revegetation of erodible farmland.

TABLE 61. No-Till Alfalfa and Grass - Summary of Weed Control, Stand Establishment, and Production. Pennington County (Spring Creek Area), 1986.

Treatment	Rate of Product Oz/Acre	Percent Weed Control		Percent Stand***		Production+ # 12% D.M. (Lbs/Acre)
		T.M.*	V.W.**	Alfalfa	Grass	
<u>PrePlant</u>						
Roundup	8	99	99	99.2	100.0	1275
Roundup	12	99	97	85.7	64.7	1352
Landmaster	40	99	99	54.1	78.9	1211
Paraquat	16	83	45	81.5	71.4	481
Paraquat	24	86	53	100.0	72.2	576
Cultivated	Check	99	86	52.9	62.4	1387
Uncultivated	Check	0	0	45.5	26.3	337
<u>Post Plant</u>						
Roundup	8	92	97	87.3	69.2	772
Roundup	12	99	97	84.4	57.9	1209
Landmaster	40	99	99	70.1	33.1	777
Paraquat	16	75	25	75.4	68.4	156
Paraquat	24	79	50	76.2	63.1	504
LSD(05)		4.4%	11.7%			
C.V.		3.7%	11.1%			

*T.M. = Tanzymustard.

**V.W. = Volunteer Wheat.

***Percent of top plot.

+Production = Alfalfa + Grass.

NOTE: Stand counts taken on May 21, June 16-17, and July 1, 1986.

Weed control was measured on May 21, 1986.

Plots were harvested August 4-5, 1986.

Plot Size was 20 ft x 60 ft, 4 Replications.

Harvested area was 2 ft x 4.8 ft.

Ecofallow Corn/Sorghum Experiment
Penninton County (New Underwood), 1985-86
Marty Printz Farm

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 8 to 12 inches tall.

Spraying Information: Atrazine was applied October 10, 1985 with TK4 flood nozzles. Landmaster was applied May 13, 1986 with #8001 nozzles applying 5 gallons of spray solution per acre. The Ramrod was applied after planting and prior to emergence of corn and sorghum.

Tillage Information: Fall tilled plots were chisel plowed on October 10, 1985. Spring tillage was completed on May 6, 1986 just prior to seeding. Cultivation was done with a Buffalo No-till cultivator. The cultivator was fitted with a liquid fertilizer attachment which injected 10 gallons per acre of 28-0-0 solution behind the sweeps.

Seeding Information: Seed-Tec 2020 seed corn was planted at the rate of 15,500 plants per acre on May 22, 1986. 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 June 3, 1986 at the rate of 2.5 pounds of seed per acre. The grain sorghum plots contained four 30 inch rows with plants 5 to 6 inches apart in the row.

Soil Test & Fertilization: The soil test taken on October 10, 1985 indicated the soil contained $\text{NO}_3\text{-N}$ - 30 #/A, Organic Matter - 1.7%, Phosphorus - 26 #/A, Potassium - 860 #/A, pH - 7.2, Zinc - 0.47 PPM, Copper - 2.01 PPM, Chloride - 2 #/A, Sulfur - 5 PPM. Liquid fertilizer was applied at the rate of 24 #/A of Nitrogen and 21 #/A of Phosphorus at 2 inches to the side and 2 inches below the seed. An additional 31 pounds per acre of Nitrogen was applied as a cultivation treatment or knifed into the soil in plots that were not cultivated.

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.

Discussion of Results: The fall application of herbicides was later than would normally be recommended for the ecofallow system. An earlier application of Atrazine would conserve more moisture and nutrient for the next year's crop. The growing season was much above normal for precipitation and therefore, there was little stress for moisture. The yields (Table 62) of no-till and conventional tillage were similar. From past experiences, during a dry season, there is a greater yield advantage for the reduced tillage treatments.

The least cost methods for grain sorghum were: (A) Atrazine applied in the fall + Landmaster applied in the Spring followed by cultivation, for \$1.44 per bushel of grain; and (2) Atrazine applied in the fall without tillage which produced grain sorghum for \$1.33 per bushel. The spring tillage plus summer cultivation produced grain sorghum for a cost of \$1.64 per bushel.

TABLE 62. 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 Farm, 1985-86.

Herbicide & Tillage	Rate/Acre of Product	Grain Sorghum		Corn	
		Lb/Bu	Bu/Acre	% Moisture	Bu/Acre
Atrazine (Fall) + Landmaster (Spring) + Cultivation	1 qt 20 oz	54.4	63.2	21.3	76.1
Atrazine (Fall) + Landmaster (Spring) + Ramrod + Cultivation	1 qt 20 oz 4 qt	53.3	66.2	19.6	70.4 ^a
Atrazine (Fall) + Cultivation	2.5 qt	56.0	63.1	19.2	69.7
Atrazine (Fall)	2.5 qt	55.2	68.4	20.7	73.8
Landmaster (Spring) + Ramrod (Banded) + Cultivation	40 oz 4 qt	55.8	60.8	21.6	58.3
Landmaster (Spring) + Cultivation	40 oz	55.8	69.5	21.1	57.0
Tillage (Fall) + Tillage (Spring) + Cultivation		54.5	65.2	21.5	70.4
Tillage (Fall) + Tillage (Spring) + Ramrod (Banded) + Cultivation	4 qt	50.9	58.9	21.0	65.7
Tillage (Spring) + Ramrod (Banded) + Cultivation	4 qt	53.0	45.5	24.9	62.3
Tillage (Spring) + Cultivation		53.5	52.4	23.3	62.2
LSD(.05)		4.41	16.17		14.49
Standard Deviation		3.04	11.15		9.99
Coefficient of Variability (%)		5.06	17.88		14.82

Effects of Selective Herbicides on Winter Wheat Varieties
Lyman County (Presho) Steve Lein Farm, 1985-86.

Objective: To determine the effect of two herbicides, selective for Downy Brome grass, on the yield of winter wheat varieties.

Plot Data: Wheat was seeded on September 7, 1985. Herbicides were applied on October 22, 1985. Sprayer was equipped with #8002 nozzles, solution was applied at 10 gallon per acre, a pressure of 40# PSI, and ground speed of 4 MPH. Air Temperature was 50 degrees Fahrenheit. Wind velocity was 4-8 MPH. The wheat had 5-6 tillers per plant.

Soil Test Data: The soil had an organic content of 2.4%, Phosphorus - 16#/A, Potassium - 1500#/A, pH - 7.6, Zinc - 0.90 PPM, Copper - 1.62 PPM, Sulfur - 10 PPM. The soil was a clay loam.

TABLE 63. Yield Comparisons of Herbicides Selective for Downy Brome grass Control Applied Across Winter Wheat Varieties - Lyman County (Presho), 1985-86.

Herbicide	Rate-a.i. (Oz/Acre)	Grain Yield - Bushel/Acre	
		1985	1986
Tycor	12	28.2	--
Tycor + Sencor	12 + 2	33.2	--
Siege	16	39.1	43.7
Siege + Sencor	16 + 2	33.7	39.8
Tycor	20	--	39.3
Tycor	32	--	43.1
Tycor + Sencor	32 + 4	--	37.5
Tycor	40	--	40.5
Sencor	2	24.7	--
Control	No-Herbicide	29.6	42.5

Discussion of Results: The experiment was designed to evaluate injury caused by normal rates of use and higher than normal rates of use. Normal use rates would be 16 ounces per acre of Siege or Tycor mixed with 1 to 3 ounces active ingredient per acre of Lexone or Sencor. The injury to the wheat crop is very weather dependent. The roots of Downy Brome grow more shallow than roots of wheat and if the herbicides can be concentrated in that shallow zone where the Downy Brome is removing moisture from the soil, the control will be good and wheat injury will be slight. However, if the herbicide application is made when the wheat is small and has not developed crown roots feeding deeper in the soil, crop injury can be significant. In these experiments, herbicide injury even from higher rates of application was slight.

Siege and Tycor are separate trade names for the same herbicide. Neither Siege nor Tycor are currently labelled.

TABLE 64. Effect of Selective Herbicides on Yield and Test Weight of Winter Wheat - Lyman County, 1986.

Variety	Grain Yield - Bushels per Acre							Average of col 1-5	Average Test Wt (Lbs/Bu)
	Herbicide and Rate								
	Tycor 20 oz	Siege 16 oz	Control	Tycor 32 oz	Tycor 16 oz Sencor 2 oz	Tycor 32 oz Sencor 4 oz	Tycor 40 oz		
Bennett (A)	44.1	42.3	41.0	43.3	47.1	50.6	31.4	43.6	58.7
Dawn	38.7	—	41.7	37.1	42.6	35.1	40.8	48.8	58.2
Bighorn	25.5	29.3	28.1	28.7	25.2	21.9	27.6	27.4	51.3
Wthrmstr 110	37.5	39.5	36.3	37.1	39.9	38.4	43.0	38.1	60.2
Brule	38.0	40.7	43.8	40.4	32.6	27.8	32.8	39.1	56.4
TAM 105	32.3	41.6	39.1	43.4	33.5	33.4	37.8	38.0	51.1
Centura	40.2	52.4	46.0	48.2	38.5	43.8	45.3	45.1	58.3
Bennett (B)	45.1	45.9	45.0	40.4	35.7	42.3	40.5	42.4	58.3
Lancer	38.0	46.9	46.9	41.1	36.9	40.3	39.3	42.0	58.3
Quantum 554	33.2	48.4	41.2	44.1	33.6	40.6	33.5	48.2	53.5
Quantum 515	28.0	32.9	32.2	31.9	30.0	30.2	27.2	37.0	46.8
Roughrider	33.1	40.9	40.3	36.8	35.6	37.0	36.1	37.3	59.7
Scout 66	44.3	46.0	45.2	44.0	44.2	40.8	45.3	44.7	59.4
Wthrmstr 140A	34.8	38.2	40.9	41.6	36.1	31.1	36.7	38.3	54.9
Colt	38.7	42.6	48.1	46.1	44.0	41.2	41.7	43.9	58.8
Agassiz	33.1	35.9	35.3	36.9	34.2	31.9	35.5	35.1	59.1
Ram	43.0	46.0	45.4	49.0	46.1	39.3	45.9	45.9	52.5
Sage	35.7	39.0	40.8	35.7	36.1	33.0	37.5	37.5	59.9
Siouxland	44.4	46.6	46.3	48.7	42.7	44.4	45.4	45.7	57.1
Buckskin	35.1	41.7	39.6	43.9	36.5	36.0	36.9	39.4	56.4
Bennett (C)	41.7	40.9	41.1	50.5	40.6	43.1	39.6	43.0	58.2
Quantum 524	37.4	42.3	44.1	44.8	42.1	42.0	40.8	42.1	55.3
Lancota	36.3	43.6	41.7	47.6	42.7	28.0	40.0	42.4	58.1
Thunderbird	42.0	46.0	42.8	45.7	40.8	39.5	42.5	43.5	61.1
Nell	38.5	42.2	37.0	42.5	41.3	41.7	43.3	40.3	61.1
Centurk 78	42.0	50.2	45.5	46.9	40.2	36.6	41.6	45.0	61.3
Rocky	45.0	49.0	47.7	51.5	41.6	39.7	45.1	47.0	60.8
Bennett (D)	40.7	45.5	43.3	46.6	44.7	45.4	42.6	44.2	60.4
Quantum 568	42.0	53.5	46.6	54.8	47.8	49.2	48.4	48.9	58.0
Quantum 555	41.6	46.9	42.9	45.7	38.7	36.1	40.0	43.2	55.2
Rose	45.7	50.8	48.2	51.2	47.0	45.9	47.7	48.6	60.5
Rita	39.5	39.9	39.2	40.4	36.5	38.3	38.6	39.1	55.4
Hail	39.5	42.2	42.0	43.9	37.2	40.1	43.6	41.0	57.9
Scout	52.1	49.4	50.9	49.3	49.5	47.6	46.6	50.2	61.4
Bennett (E)	50.4	52.2	52.2	53.6	49.5	51.1	51.1	51.6	60.3
Treatment Mean -	39.3	43.7	42.5	43.1	39.8	37.5	40.5		

Downy Bromegrass Control in Winter Wheat
(Early Fall Application)
Lyman County (Presho), 1935-86

Objective: To evaluate the plant injury and potential yield reductions from high rates of Siege + Glean.

Growth Stages: Winter wheat plants had 5 tillers and Downy Bromegrass had 3 tillers at the time of herbicide application.

Application Data: Sprayer was equipped with TK2 nozzles spaced 40 inches apart. Herbicide solution was applied at the rate of 10 gallons per acre. Air temperature was 40 degrees Fahrenheit. Wind velocity was 5 mile per hour. Herbicide was applied on October 29, 1985.

Soil Test Data: Organic Matter - 2.7%, Phosphorus - 28#/A, Potassium - 1500+ #/A, pH - 7.3, Zinc - 0.86 PPM, Copper - 1.62 PPM, Sulfur - 10 PPM, Texture - Clay Loam.

TABLE 65. Effects of High Rates of Herbicides on the Control of Downy Bromegrass and The Yield of Winter Wheat. Lyman County (Vivian), 1985-86.

Herbicide	Rate-a.i. (Oz/Acre)	Percent Control Downy Bromegrass	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
Siege	14	30	64.5	27.3
Siege	16	33	64.5	29.5
Siege	24	60	63.3	39.0
Siege	32	58	64.8	33.5
Siege	48	75	64.3	44.0
Control	0	0	63.8	17.8
Siege + Glean	14 + .25	34	63.8	32.5
Siege + Glean	16 + .25	38	63.3	28.5
Siege + Glean	24 + .25	53	63.0	32.3
Siege + Glean	14 + .375	55	63.5	32.0
Glean	.25	20	63.0	27.5
Glean	.375	30	62.5	26.0
LSD(.05) - Bu/Acre			2.52	7.49
Standard Deviation			1.75	5.19
Coefficient of Variability (%)			2.75	16.54

Discussion of Results: The indications of stunting or plant injury were not consistent. The study site had a very heavy infestation of Downy Bromegrass. The plots where there was better control of Downy Bromegrass had significantly higher yields. The Glean herbicide did appear to give some stunting and control of the Downy Bromegrass. Glean alone will do very little on a field basis to control Downy Bromegrass.

Downy Bromegrass Control in Winter Wheat
(Late Fall Application)
Lyman County (Presho), 1985-86

Objectives: To evaluate the percent control of Downy Bromegrass herbicides in winter wheat and determine average yields from herbicide treated plots.

Stage of Weeds and Crop Growth: Downy Bromegrass had 4-6 tillers and 25% ground cover. The Lancota winter wheat had 6-8 tillers and a good stand.

Application Date: The herbicides were applied on November 4, 1985. The sprayer was equipped with TK2 flood jet nozzles spaced at 40 inches. The solution was applied with a pressure of 10 PSI and a speed of 3 MPH. The air temperature was 53 degrees Fahrenheit. The wind was from the Southeast at 5-12 MPH. A windshield was used to prevent herbicide drift.

Soil Information: Organic Matter - 2.4%, Phosphorus - 16 #/A, Potassium - 1400+ #/A, pH - 7.6, Zinc - 0.90 PPM, Sulfur - 11 PPM, Texture - fine clay loam.

Experimental Design: Randomized complete block with 4 replications. Individual plot size was 10 feet by 60 feet.

TABLE 66. Effect of Herbicides on Control of Downy Bromegrass and Yield of Winter Wheat - Lyman County (Presho), 1985-86.

Herbicide Treatments	Rate-a.i. (Oz/Acre)	Percent Control Downy Bromegrass	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
Siege	12	50	62.5	31.0
Siege	16	69	61.5	35.0
Siege + Lexone	12 1	59	60.8	32.5
Siege + Lexone	16 1	66	61.3	34.0
Siege + Lexone + S*	12 1	64	60.8	34.5
Siege + Lexone + S**	12 1	78	62.0	35.3
Siege + Lexone + S*	16 1	86	61.3	37.0
Siege + Lexone + S**	16 1	83	61.0	33.5
Siege + Ammonium Sulfate 2%	12	50	61.0	30.3
Siege + Ammonium Sulfate 2%	16	78	61.0	31.0
Siege + S*	12	81	60.8	37.5
Siege + S**	16	74	60.5	37.0
Control	0	0	62.0	30.0
LSD(0.05)		20.4	1.30	4.71
Standard Deviation		14.13	0.88	3.27
Coefficient of Variability (%)		21.94	1.44	9.69
*0.25% Surfactant (volume/volume)		**0.50% (volume/volume)		

Discussion of Results: Late fall application (Nov 4, 1986) of Siege and Siege + Lexone had significantly better control of downy brome grass than did the early (Oct 29, 1986) application of Siege and Siege + Glean. The grain yield and test weight of the wheat was also increased in the later application.

**Downy Brome grass Control in Winter Wheat
(Early Spring Application)
Lyman County (Presho), 1985-86**

Objectives: To evaluate the percent control of Downy Brome grass herbicides in winter wheat and determine average yields from herbicide treated plots.

Stage of Weeds and Crop Growth: Downy Brome grass had 6-9 tillers with 2 to 4 leaves. The Lancota wheat had 6-10 tillers with 3 to 4 leaves.

Application Data: The herbicides were applied on April 8, 1986. The sprayer was equipped with #8002 nozzles spaced at 30 inches. The solution was applied at the rate of 10 gallons per acre with a pressure of 30 PSI and a speed of 3.5 MPH. The air temperature was 56 degrees Fahrenheit, and soil temperature was 55 degrees Fahrenheit. The wind was from the Northeast at 9 MPH and was gusty.

Soil Information: Organic Matter - 2.4%, Phosphorus - 16 #/A, Potassium - 1400+ #/A, pH - 7.6, Zinc - 0.90 PPM, Sulfur - 11 PPM, Texture - fine clay loam.

Experimental Design: Randomized complete block with 4 replications. Individual plot size was 10 feet by 60 feet.

TABLE 67. Effect of Herbicides on Control of Downy Brome grass and Yield of Winter Wheat - Lyman County (Presho), 1985-86.

Herbicide Treatments	Rate-a.i. (Oz/Acre)	Percent Control Downy Brome grass	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
Pyridate	.9	40	63.8	18.5
Pyridate + Atrazine	.9 .5	65	64.0	20.3
Atrazine	.5	56	63.3	13.6
Pyridate + Sencor	.9 .125	45	63.8	20.4
Pyridate + Sencor	.9 .25	63	65.5	22.8
Sencor	.125	50	63.8	16.3
Control	0	0	64.5	19.0
Sencor + Atrazine	.125 .50	79	64.5	21.3
LSM (.05)			2.7	7.2
Standard Deviation			1.8	4.9
Coefficient of Variability (%)			2.9	25.7

Discussion of Results: Sencor + Atrazine produced the best downy brome grass control and the best winter wheat yield.

Downy Brome grass Control in Winter Wheat
(Early Fall and Spring Application)
Lyman County (Presho), 1985-86

Objectives: To evaluate the percent control of Downy Brome grass herbicides in winter wheat and determine average yields from herbicide treated plots.

Stage of Weeds and Crop Growth: At fall application the Downy Brome grass had 3 tillers and the winter wheat had 4-5 tillers. At spring application downy brome grass had 2-4 tillers and 6-9 leaves, while the Lancota winter wheat had 9 tillers and was 8-10 inches tall.

Application Data: The herbicides were applied on October 29, 1985 and April 8, 1986. The fall application used TK2 nozzles spaced at 40 inches, a pressure of 10 PSI, a speed of 3 MPH, and solution rate of 10 gallons per acre. The air temperature was 45 degrees Fahrenheit and the wind was 7-10 MPH. The spring treatments were applied with #8002 nozzles spaced at 30 inches, a pressure of 26 PSI, a speed of 3.3 MPH, and a solution rate of 10 gallons per acre. The air temperature was 56 degrees Fahrenheit, and soil temperature was 55 degrees Fahrenheit.

Soil Information: Organic Matter - 2.4%, Phosphorus - 16 #/A, Potassium - 1400+ #/A, pH - 7.6, Zinc - 0.90 PPM, Sulfur - 11 PPM, Texture - fine clay loam.

Experimental Design: Randomized complete block with 4 replications. Individual plot size was 10 feet by 60 feet.

Discussion of Results: Spring application of herbicides produced higher winter wheat yields. The increased yield was not significant in this experiment but the trends for higher yields from the fall applications are apparent. The plots which received the Sencor, Tycor, and Sencor + Tycor at the higher rates gave the best control and in most cases resulted in the highest yields.

TABLE 68. Effect of Fall and Spring Applied Herbicides for Control of Downy Brome grass and Yield of Winter Wheat-Lyaman County(Presho), 1985-86.

<u>Herbicide Treatments</u>	<u>Rate-a.i. (Oz/Acre)</u>	<u>Percent Control Downy Brome grass</u>	<u>Test Weight (Lbs/Bu)</u>	<u>Grain Yield (Bu/Acre)</u>
<u>Fall Treatments</u>				
Tycor	16	76.3	60.3	33.5
Tycor	20	88.7	60.3	37.3
Control	0	0	60.3	30.8
Tycor	12	82.5	59.0	35.5
Tycor +	12	70.0	59.3	33.0
Sencor	2			
Tycor +	16	38.7	60.5	33.0
Sencor	1			
Tycor +	16	90.0	59.8	37.0
Sencor	2			
Sencor	4	77.5	44.5	27.3
Sencor	6	90.0	59.5	32.6
<u>Spring Treatments</u>				
Tycor	16	82.5	60.0	38.5
Tycor	20	86.3	61.0	40.5
Control	0	0	60.0	24.0
Tycor +	12	71.3	61.3	35.8
Sencor	1			
Tycor +	12	85.0	60.3	39.0
Sencor	2			
Tycor +	16	82.5	60.0	35.3
Sencor	1			
Tycor +	16	70.0	61.5	37.5
Sencor	2			
Sencor	4	82.5	60.8	33.75
Sencor	6	85.0	61.0	40.3
LSD(.05)			10.07	7.83
Standard Deviation			6.97	5.43
Coefficient of Variability (%)			11.74	15.64

Broadleaf Weed Control in Winter Wheat
Pennington County (New Underwood), 1986
Marty Printz Farm

Objective: To evaluate the performance of Ally and Ally combinations in controlling wild buckwheat and/or kochia.

Stage of Weeds and Crop Growth: On May 12, 1986 the wild buckwheat was in the 1-3 leaf stage. Russian thistle and kochia were the size of a dime. The winter wheat was in the 1-3 leaf stage and appeared light green in color. On May 26 the wild buckwheat had 2-6 leaves, Russian thistle and kochia were 1-3 inches tall. The winter wheat had jointed.

Application Data: The herbicides were applied on May 12 and May 26, 1986. The sprayer was equipped with #8002 nozzles spaced at 30 inches. The solutions were applied at a pressure of 26 PSI, a speed of 3.4 MPH, and solution rate of 10 gallons per acre. The air temperature on May 12 was 75 degrees Fahrenheit at 5:00 P.M.. On May 26 the air temperature was 61 degrees Fahrenheit and the soil temperature was 70 degrees Fahrenheit.

Soil Information: Organic Matter - 1.7%, Phosphorus - 24 #/A, Potassium - 890 #/A, pH - 6.3, Zinc - 1.70 PPM, Chloride 6.6 PPM, Texture - clay.

Experimental Design: Randomized complete block with 4 replications. Individual plot size was 10 feet by 60 feet.

TABLE 69. Effects of Ally and Ally Combinations on Broadleaf Weeds in Winter Wheat - Pennington County (New Underwood), 1986.

Treatments	Rate-a.i. (oz/Acre)	Percent Control Wild Buckwheat	Test Wt (Lbs/Bu)	Yield (Bu/Acre)
<u>May 12th</u>				
Ally + Surfactant	0.06 + 0.25%	90	59	27.5
Ally + Surfactant	0.06 + 0.50%	78	58	27.8
Ally + Banvel	0.06 + 1.0	94	58	28.0
DPX-R9521 + Surfactant	0.25 + 0.25%	90	59	26.0
DPX-R9521 + Surfactant	0.30 + 0.25%	94	59	26.3
Harmony + Ally + S*	0.10 + 0.05 + 0.25%	90	59	27.5
Harmony + Ally + S*	0.125 + 0.06 + 0.25%	94	59	27.5
Ally + Tordon	0.06 + 0.18	94	59	28.3
2,4-D + Banvel	6.0 + 2.0	95	59	27.8
Untreated Check		0	58	27.3
<u>May 26</u>				
Ally + Surfactant	0.06 + 0.25%	61	56	25.0
Ally + Surfactant	0.06 + 0.50%	70	58	23.5
Ally + Banvel	0.06 + 1.0	80	57	22.5
DPX-R9521 + Surfactant	0.25 + 0.25%	71	58	21.8
DPX-R9521 + Surfactant	0.30 + 0.25%	80	58	23.5
Harmony + Ally + S*	0.10 + 0.05 + 0.25%	69	58	23.8
Harmony + Ally + S*	0.125 + 0.06 + 0.25%	74	58	24.0
Ally + Tordon	0.06 + 0.18	80	57	21.8
2,4-D + Banvel	6.0 + 2.0	60	58	25.0
Untreated Check		0	58	28.0
LSD(.05)			1.49	2.81
Standard Deviation			1.03	1.95
Coefficient of Variability (%)			1.77	7.61

Discussion of Results: The early treatments applied on May 12 gave the highest yields of winter wheat and had better control of wild buckwheat in all treatments. All early treatments, except Ally + heavy rate of surfactant, produced excellent weed control results. Yields of winter wheat were not significantly different in the early treatment period. Later applications of herbicides controlled less weeds and had significantly lower wheat yields.

Broadleaf Weed Control in Winter Wheat
(Late Spring Application)
Pennington County (New Underwood), 1986
Marty Printz Farm

Objective: To determine if the addition of low rates of 2,4-D can increase the efficiency of Glean and Ally applied under less than ideal situations, such as, weeds in advanced stage of growth (greater than 6 inches tall), or not actively growing (drought stressed).

State of Weeds and Crop Growth: On May 26, 1986 the wild buckwheat was in the 4-6 leaf stage, kochia was 4-5 inches tall, and the winter wheat had jointed. The wheat was not under drought stress.

Application Data: The herbicides were applied on May 26, 1986. The sprayer was equipped with #8002 nozzles spaced at 30 inches. The solutions were applied at a pressure of 26 PSI, a speed of 3.4 MPH, and solution rate of 10 gallons per acre. The air temperature was 66 degrees and the soil temperature was 61 degrees Fahrenheit. Wind velocity was 0-8 MPH. The treatments were applied from 3:00 to 5:00 PM. At 7:00 PM the area received a rain shower.

Soil Information: Organic Matter - 1.7%, Phosphorus - 24 #/A, Potassium - 990 #/A, pH - 6.3, Zinc - 1.70 PPM, Texture - clay loam.

Experimental Design: Randomized complete block with 4 replications. Individual plot size was 10 feet by 60 feet. Treatments were applied perpendicular to the drilled wheat rows.

TABLE 70. Effect of Low Rate of 2,4-D Ester Applied on Broadleaf Weeds in Winter Wheat - Pennington County (New Underwood), 1985-86.

Treatments	Rate-a.i. (Oz/Acre)	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
Glean + Surfactant	0.375 + 0.50% v/v	57.0	49.3
Glean + 2,4-D ester	0.187 + 2.0	57.5	42.3
Glean + 2,4-D ester	0.187 + 4.0	57.3	43.3
Glean + 2,4-D ester	0.375 + 2.0	58.0	42.3
Glean + 2,4-D ester	0.375 + 4.0	57.3	43.5
Ally + Surfactant	0.06 + 0.50% v/v	57.3	42.0
Ally + 2,4-D ester	0.06 + 2.0	58.0	43.0
Ally + 2,4-D ester	0.06 + 4.0	57.3	42.5
Ally + Harmony + Surfactant	0.05 + 0.10 + 0.25% v/v	56.5	40.0
2,4-D ester	8.0	58.3	42.0
2,4-D amine + Banvel	6.0 + 2.0	57.5	32.3
Control		57.5	49.3
LSN(.05)		1.22	3.44
Standard Deviation		0.85	2.39
Coefficient of Variability (%)		1.48	5.71

Discussion of Results: There were very few weeds in this trial, all treatments provided effective control. The check plot with no herbicide applied had the highest yield. The 2,4-D plus Banvel had a significantly lower yield because Banvel applied to winter wheat after jointing causes damage such as leaf curl and twisted heads.

Control of Blue Mustard in Winter Wheat
Pennington County (New Underwood), 1986
Marty Printz Farm

Objectives: To evaluate Ally and other herbicides for antagonistic effect in tank mixing when used to control winter annual type mustards.

Stage of Weeds and Crop Growth: Observations made on May 12 indicated the Blue Mustard was 8-12 inches tall. The Winter Wheat had 3-4 tillers and appeared light green due to competition of the mustard.

Application Data: The herbicides were applied on May 12, 1986. The sprayer was equipped with #8002 nozzles spaced at 30 inches. The solutions were applied at a pressure of 26 PSI, a speed of 3.4 MPH, and solution rate of 10 gallons per acre. The air temperature was 60 degrees Fahrenheit. The wind was calm. The treatments were applied at 7:00 PM and the area received a 0.20 inch rain shower at 8:00 PM.

Soil Information: Organic Matter - 1.9%, Phosphorus - 30 #/A, Potassium - 1200 #/A, pH - 6.1, Zinc - 0.59 PPM, Chloride - 7.2 PPM, Sulfur - 5.5 PPM. This field, if used for production of grain sorghum, is low in zinc and sulfur. If used for the production of wheat, it is low in chloride.

TABLE 71. Effect of Broadleaf Herbicide Combinations for Control of Winter Annual Mustard - Pennington County (New Underwood), 1986.

Herbicide Treatment	Rate-a.i. (Oz/Acre)	Percent Control of Blue Mustard				
		I	II	III	IV	Mean
Ally	.1	95	99*	99*	95	97
Ally + Banvel	.1 + 4.0	95	95	95	99*	96
Ally + 2,4-D Ester	.1 + 4.0	99	95	99*	95	97
Ally + Tordon	.1 + 1.0	99	95	90	99	96
Control		0	0	0	0	0
2,4-D Ester	12	20**	30**	30**	30*	28
Glean + 2,4-D	.16 + 4.0	99	90	90	90	92
Glean	.16	99	95	99#	95	97

*Plants dried up
**Green & Flowering

Discussion of Results: Blue mustard was 8-12 inches tall. Winter wheat was thin due to weed competition. All treatments except 2,4-D ester gave excellent control.

Control of Weeds in Fallow
(Rate of Herbicide Application)
Pennington County(New Underwood), 1986
Marty Printz Farm

Objective: To evaluate the control of weeds in fallow by use of non-residual herbicides.

Stage of Weeds and Crop Growth: On May 26, 1986 the wild buckwheat was in the 2-5 leaf stage, Kochia was 1 to 1-1/2 inches tall, prickly lettuce was in the 4-6 leaf stage, and the downy brome was headed out. The winter wheat had jointed.

Application Data: The herbicides were applied on May 26, 1986. The sprayer was equipped with #8002 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 10 gallons per acre. The air temperature was 70 degrees and the soil temperature was 65 degrees Fahrenheit. The wind was from the North at 0-8 MPH. The weed control notes were taken on June 25, 1986.

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

TABLE 72. Effect of Non-Residual Herbicides on Control of Weeds in Fallow - Pennington County (New Underwood), 1986.

Herbicide Treatment	Rate-a.i. (Oz/Acre)	Percent Control of Weeds				
		I	II	III	IV	Mean
Roundup + 2,4-D Ester	12 + 12	95	95	99	90	94.7
Roundup + 2,4-D Ester + AMS*	12 + 12 + 2%	95	99	99	95	97.0
Control		0	0	0	0	0
BAS 517 + AMS* + Crop Oil	0.10 + 2% + 32	30	50	50	50	45.0
BAS 517 + AMS* + Crop Oil	0.20 + 2% + 32	30	30	90	60	52.5
Paraquat	32	95	90	95	85	91.3
Paraquat + Ethylene glycol	32 + 16	95	90	95	90	92.5

*AMS = ammonium sulfate

Discussion of Results: Both Roundup and Paraquat treatments provided excellent control. The BAS 517 gave poor control at the applied rates. The addition of Ammonium Sulfate to the Roundup resulted in slightly better weed control.

Control of Weeds in Grain Sorghum
(Rate of Herbicide Application)
Pennington County (New Underwood), 1986
Marty Printz Farm

Objectives: To evaluate post emergence application of herbicides for broadleaf weed control in grain sorghum.

Stage of Weeds and Crop Growth: At the time of application of the herbicides, the Russian thistles were 3-5 inches tall and the purslane had a 6 inch rosette. The grain sorghum was 5-9 inches tall and had 4-6 leaves.

Application Data: The herbicides were applied on July 7, 1986. The sprayer was equipped with #8002 nozzles spaced at 30 inches. The solution was applied at the rate of 10 gallons per acre with a pressure of 30 PSI and a speed of 3.4 MPH. The air temperature was 65-70 degrees Fahrenheit and reached 85 degrees by 2:30 PM. The wind was calm. The soil was moist at a depth of 5-6 inches.

Experimental Design: Randomized complete block with 4 replications. Individual plot size was 12.5 feet by 75 feet.

TABLE 73. Effect of Post Emergence Application of Herbicides on Broadleaf Weeds in Grain Sorghum - Pennington County (New Underwood), 1986.

Herbicide Treatment	Rate-a.i. (Oz/Acre)	Percent Control of Weeds	
		R.thistle	Purslane
Harmony	0.125	53.7	0
Harmony	0.25	55.0	45.0
Harmony	0.50	77.5	27.5
Harmony + Surfactant	0.125 + 0.25% v/v	98.0	95.5
Harmony + Surfactant	0.25 + 0.25% v/v	97.0	94.7
Harmony + Surfactant	0.50 + 0.25% v/v	98.0	95.7
Harmony + 2,4-D amine	0.25 + 2.0	71.5	15.0
Harmony + 2,4-D amine	0.50 + 2.0	69.0	24.7
Harmony + 2,4-D amine	0.125 + 2.0	53.7	0
Control		0	0
Banvel	2	32.5	0
2,4-D	8	73.7	17.5
Atrazine + Crop Oil	16 + 32	99.0	99.0
Pyrodate + Atrazine	16 + 8	97.0	97.0
Banvel	4	55.0	0

Discussion of Results: Atrazine at 16 oz/A + Crop Oil was rated the best treatment in this experiment. The only weed in the Atrazine + Crop Oil plot was Fall Panicum. Atrazine + Pyrodate was next best followed by the Harmony + surfactant plots. Harmony + 2,4-D was not very consistent in its weed control. 2,4-D at 8 Oz/A. was consistently better than Banvel at either 2 or 4 oz/A. Harmony alone gave unsatisfactory results but can be made effective by the addition of a surfactant.