

December 1961

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 project, South Dakota Agricultural Experiment Station. The equipment storage and processing facilities are located approximately 1 mile west of the village of Tea Ridge. The office facilities are located on the Central States Fairgrounds at 501 San Francisco Street, Rapid City. Telephone 505/394-2236.

The Research Project serves the western part of the state. It is unique in that all experimental plots are cooperatively located with farmers, ranchers, crop improvement associations, and county 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 incomplete work nor work conducted by projects headquartered from the campus at Brookings.

FIELD PLOT COORDINATORS

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This is an annual report and results published herein are therefore neither complete nor conclusive. 300 copies printed at an estimated cost of 50¢ each.

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Weather Summary

The weather summaries presented in tables 1 and 2 were obtained from the National Oceanic and Atmospheric Administration publication, Climatological Data-South Dakota.

Some of the information which is identified by footnotes, was obtained from private cooperators, and The South Dakota Department of Natural Resources, because data from the primary source was missing.

The effects of weather had a major influence on yields of all crops in 1981. Data indicated the Northern and South Central areas experienced above normal temperatures in August and September, while the Southwestern area experienced below normal temperatures in August and above normal in September. The entire west half of the state was cool during October and had above normal temperatures from November through April.

Moisture was received in August but was not heavy enough to eliminate the drought conditions. Precipitation in September was low for the entire west half of the state. However, rainfall in October brought relief to the South Central part of the state. The period of November through April produced very little moisture for the entire area.

A severe frost was experienced on May 9-10 (12° F. at Presho) and affected much of the winter wheat crop. In the area where the lowest temperatures were received the wheat was killed back to ground level while at other sites only the primary stem was damaged.

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

Month & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
<u>Martin</u> (Bennett County Reporting Station)				
Aug. 1980	71.9	-0.4	2.35	0.27
Sept. 1980	64.1	--	0.16	--
Oct. 1980	49.5	--	2.05	--
Nov. 1980	39.6	--	0.79	--
Dec. 1980	30.7	--	0.88	--
Jan. 1981	31.4	--	0.08	--
Feb. 1981	29.5	--	0.12	--
Mar. 1981	40.3	--	0.95	--
Apr. 1981	54.0	--	0.90	--
May 1981	56.0	--	2.40	--
June 1981	67.2	--	1.87	--
July 1981	73.5	--	6.44	--
<u>Newell</u> (Butte County Reporting Station)				
Aug. 1980	68.0	-3.0	2.51	1.26
Sept. 1980	60.0	0.8	0.55	-0.71
Oct. 1980	48.3	0.2	1.79	1.01
Nov. 1980	38.7	6.1	0.21	-0.36
Dec. 1980	25.0	2.3	0.66	0.37
Jan. 1981	29.2	11.7	0.23	-0.17
Feb. 1981	25.5	3.6	0.10	-0.27
Mar. 1981	39.2	10.4	tr	-0.64
Apr. 1981	50.9	7.0	0.04	-1.59
May 1981	55.9	1.4	2.67	-0.02
June 1981	64.0	0.6	3.73	0.21
July 1981	--	--	--	--
<u>Murdo</u> (Jones County Reporting Station)				
Aug. 1980	73.6	-0.7	1.92	-0.09
Sept. 1980	--	--	0.33	-1.02
Oct. 1980	50.2	-2.0	2.96	1.88
Nov. 1980	39.7	3.8	0.76	0.26
Dec. 1980	26.8	2.2	1.12	0.76
Jan. 1981	30.4	10.9	0.13	-0.24
Feb. 1981	29.8	5.7	0.30	-0.17
Mar. 1981	42.1	10.2	0.90	0.01
Apr. 1981	55.5	8.0	0.51	-1.45
May 1981	57.0	-1.0	2.85	0.03
June 1981	69.1	1.8	2.51	-1.33
July 1981	75.6	0.4	6.47	4.68

* 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 1941-1970.

Table 1 Continued.

Month & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
<u>Kennebec</u> (Lyman County Reporting Station)				
Aug. 1980	76.2	2.3	4.15	1.81
Sept. 1980	66.1	3.3	0.17	-1.35
Oct. 1980	49.5	-1.7	3.26	2.23
Nov. 1980	38.9	4.2	0.30	-0.33
Dec. 1980	25.6	3.3	0.41	0.04
Jan. 1981	27.5	10.3	tr	-0.33
Feb. 1981	28.6	6.3	0.03	-0.50
Mar. 1981	39.3	8.3	1.31	0.48
Apr. 1981	54.6	7.3	0.17	-1.75
May 1981	57.6	-0.5	2.05	-0.64
June 1981	69.3	1.8	1.53	-2.00
July 1981	77.0	2.1	3.72	1.67
<u>Bear Butte Valley</u> (Ft Meade-Meade County Reporting Station)				
Aug. 1980	69.0	--	1.90	--
Sept. 1980	63.4	--	0.15	--
Oct. 1980	49.2	--	2.84	--
Nov. 1980	40.9	--	0.63	--
Dec. 1980	30.1	--	0.82	--
Jan. 1981	32.4	--	0.32	--
Feb. 1981	30.2	--	0.16	--
Mar. 1981	39.9	--	0.05	--
Apr. 1981	53.9	--	0.30	--
May 1981	56.0	--	7.14	--
June 1981	65.1	--	2.44	--
July 1981	73.8	--	6.17	--
<u>Plainview</u> (Meade County Reporting Station)***				
Aug. 1980	72.0	--	1.39	--
Sept. 1980	63.5	--	0.96	--
Oct. 1980	48.9	--	2.22	--
Nov. 1980	39.3	--	0.30	--
Dec. 1980	24.8	--	0.50	--
Jan. 1981	29.2	--	0.10	--
Feb. 1981	27.9	--	0.10	--
Mar. 1981	39.7	--	0.06	--
Apr. 1981	53.6	--	0.06	--
May 1981	56.8	--	2.66	--
June 1981	66.8	--	3.14	--
July 1981	75.2	--	3.22	--

* 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 1941-1970.

***Data obtained from alternate sources.

Table 1 Continued.

Month & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
<u>Wasta</u> (Pennington County Reporting Station)				
Aug. 1980	71.7	--	2.11	--
Sept. 1980	63.5	--	0.45	--
Oct. 1980	49.1	--	2.34	--
Nov. 1980	40.0	--	0.35	--
Dec. 1980	28.3	--	0.83	--
Jan. 1981	31.3	--	0.07	--
Feb. 1981	29.8	--	0.12	--
Mar. 1981	41.0	--	0	--
Apr. 1981	54.6	--	0.08	--
May 1981	58.3	--	2.04	--
June 1981	68.4	--	2.17	--
July 1981	75.8	--	3.03	--
<u>Bison</u> (Perkins County Reporting Station)				
Aug. 1980	67.6	--	3.20	1.39
Sept. 1980	59.5	--	0.17	-1.13
Oct. 1980	45.9	--	2.09	1.26
Nov. 1980	36.8	--	0.05	-0.49
Dec. 1980	22.3	--	0.07	-0.20
Jan. 1981	--	--	--	--
Feb. 1981	35.2	--	tr	-0.41
Mar. 1981	37.0	--	0	-0.73
Apr. 1981	50.1	--	0.30	-1.30
May 1981	54.9	--	2.10	-0.43
June 1981	64.0	--	2.84	-1.11
July 1981	72.6	--	2.40	0.35
<u>Winner</u> (Tripp County Reporting Station)				
Aug. 1980	75.2	0.6	4.77	2.04
Sept. 1980	67.5	3.7	0.87	0.95
Oct. 1980	51.1	-1.6	2.30	1.08
Nov. 1980	42.2	5.0	0.27	-0.46
Dec. 1980	29.2	3.1	0.71	0.23
Jan. 1981	31.0	9.5	0.07	-0.38
Feb. 1981	31.5	4.9	0.21	-0.37
Mar. 1981	42.5	9.5	2.95	1.83
Apr. 1981	57.1	8.6	0.96	-1.40
May 1981	58.3	-1.0	3.38	0.37
June 1981	71.0	2.5	3.01	-1.23
July 1981	76.2	0.3	5.12	2.56

* 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.

**Departure from normal are based on records for the period 1941-1970.

Table 2. Weather Data - Date of Critical Temperatures and Total Usable Precipitation in Counties with Experimental Plots, 1980-1981.

Location	Date of Temperature*		Total Usable Moisture**	
	Fall-First	Spring-Last	Aug 80-July 81	April 81-July 81
Bennett County (Martin)	Oct 3 (28)	May 19 (28)	10.29	6.16
Butte County (Newell)	Oct 17 (23)	Apr 14 (19)	6.15	3.65#
Jones County (Murdo)	Oct 24 (24)	May 10 (25)	13.12	8.16
Lyman County (Kennebec)	Oct 14 (25)	May 12 (27)	11.29	4.57
Meade County (Ft Meade)	Oct 11 (28)	Apr 14 (22)	14.42	10.48
(Plainview)##	Oct 11 (28)	May 10 (28)	10.39	6.59
Pennington County (Wasta)	Oct 11 (27)	Apr 14 (20)	7.31	3.83
Perkins County (Bison)	Oct 18 (20)	May 9 (26)	7.26	3.52
Tripp County (Winner)	Oct 24 (25)	May 10 (20)	15.75	8.09

* First 28° temperature in Fall or last 28° temperature in Spring.

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

Does not include data for July 1981 since none was collected

##Ft Meade was used as the reporting point for Bear Butte Valley, while an average of data from Milesville, Red Owl, & Elm Springs was used for the Plainview research site.

SMALL GRAIN VARIETY TRIALS

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

Hard Red Winter Wheat

Trials were located in Bennett, Jones, Lyman, Meade-(2 locations), Pennington, and Perkins counties. All plots were seeded in non-fertilized fallow with a deep furrow drill. The seeding rate averaged 60 pounds per acre.

The plots were harvested with a HEGE Model 125B self-propelled plot combine. Machine harvested plots contained a minimum of 100 square feet per sample.

Table 3. Hard Red Winter Wheat Variety Performance Trial - Bennett County (Martin), 1979-81.

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield - Bu/Acre	
				1981	(3 yr av)
Agate	33	13.3	62.8	59.3	39.2
Rose (SD 7279)	30	14.0	61.8	55.2	--
Rocky	33	13.0	64.6	54.3	44.8**
Buckskin	33	14.4	63.0	54.2	37.3
Vona	28	11.2	64.1	53.6	34.4
NE 75414	31	11.4	64.0	53.5	--
Sage	34	12.5	64.9	53.0	32.7
Wings	30	11.2	64.2	51.7	41.2**
CO 745597	34	11.8	63.0	51.6	--
Wall (MPV-1)	36	12.3	61.9	51.5	--
NE 77663	34	12.5	63.4	50.6	--
Rita	28	11.4	61.2	50.2	--
Rall	34	13.0	64.2	50.1	34.1
Scout 66	35	12.5	65.2	50.1	36.3
Dawn	32	11.2	63.6	49.9	--
SD 76598	34	12.2	64.8	49.7	--
Nebred	34	13.6	63.0	49.0	--
TAM 105	28	12.1	64.4	49.0	--
Larned	32	13.2	64.4	48.8	36.0
Norstar	32	13.3	64.9	48.6	--
SD 75284	32	12.4	62.7	48.3	--
Gent	34	12.8	63.9	48.1	35.0
SD 76709	28	11.6	65.5	47.5	--
Roughrider	34	13.2	62.4	47.4	35.7
MT 7431	34	12.0	63.0	47.2	--
Nell (SD 73177)	33	12.3	63.4	47.2	--
Newton	29	13.6	62.8	46.3	31.4
Archer	28	13.2	62.1	46.1	--
ND 7481	36	13.1	63.0	46.1	--
Lancota	33	13.1	62.1	46.1	31.1
Bennett	31	14.7	62.0	45.8	29.1
Centurk 78	31	15.2	62.8	45.1	30.4
Bronze	34	13.0	61.1	45.1	33.8
Winoka	36	11.8	64.2	45.0	34.0
SD 76705	27	13.6	62.1	44.0	--
SD 74221	29	13.0	63.2	43.8	--
Lancer	32	12.9	63.9	43.5	32.4
Eagle	30	14.2	63.1	40.6	29.2

LSD(05) - 7.5 Bu/A

C.V. - 11.0%

Mean - 48.9

* Percent protein determined with Technicon 300 Infranalyzer.

**2 year data only (1980-81).

Note: Yield data presented within the table are averages of four replications. Plot size was 6' x 25' with 12 inch spaced rows. Seeded on September 10, 1980 and harvested on July 8, 1981. Seeding rate was 60 pounds per acre.

The winter wheat variety trial in Bennett county had sufficient soil moisture to initiate immediate germination and emergence. Showers in October resulted in vigorous seedlings which survived the dry winter. Timely rain and a cool spring resulted in good tillering, well developed heads, and high yields of exceptional quality grain. Trial data are shown in table 3.

Table 4. Hard Red Winter Wheat Variety Performance Trial - Jones County(Murdo), 1981.

Variety	Rust Reaction*		Wheat Streak Mosaic*	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
	Leaf	Stem			
Agate	S	R	MS	66.0	64.5
Centurk 78	S	R	MS	65.8	61.7
Dawn	MR	R	Tol	64.9	55.7
Wall (MPV-1)	MS	R	MR	65.8	55.4
Rocky	MS	R	MS	64.8	54.4
Rita	R	R	S	64.9	54.3
Wings	R	R	Tol	64.5	51.9
Buckskin	S	R	MS	64.6	50.6
Roughrider	S	R	S	63.8	50.5
Gent	MR	R	MR	64.7	47.3
Bennett	S	R	S	64.0	46.4
Scout 66	S	MR	MR	64.1	46.0
Winoka	S	R	S	65.8	44.6
TAM 105	MS	S	S	63.8	42.3
Norstar	S	S	S	63.2	42.2
Sage	MR	R	MR	63.5	42.0
Western W4714	--	-	--	60.9	25.1
Western W5210	--	-	--	54.5	22.1
Western W4578	--	-	--	52.8	21.3
Western W5221	--	-	--	54.5	11.2

Mean - 44.5

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

Winter wheat seeded in Jones county in the fall of 1980, was limited in available soil moisture. However, showers in October permitted plants to become well established and provide good winter ground cover. The warm winter and early spring resulted in good winter survival. Cool temperatures in April resulted in excellent tillering. A late spring freeze on May 9-10, when area temperatures dropped to 25° Fahrenheit, resulted in some of the main growing points being destroyed. The varieties which were advanced in growth stage were more severely damaged. The yields reported in table 4 reflect stage of growth at frost rather than winter hardiness.

Table 5. Hard Red Winter Wheat Variety Performance Trial - Lyman County (Kennebec), 1981.

Variety	Winter Hardiness	Percent Protein*	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
Dawn	Fair	15.6	56.8	29.8
Rita	Good	15.3	55.2	29.1
Buckskin	Good	15.1	58.5	27.3
Lancer	Good	14.4	59.8	26.9
TAM 105	Fair	15.2	58.2	26.5
Agate	Good	14.4	59.8	26.2
Gent	Good	14.7	60.0	25.8
Bennett	Fair	15.4	58.9	25.4
Dekalb 554	--	17.1	56.0	25.4
Wall (MPV-1)	Good	14.4	60.0	24.9
Rocky	Good	16.1	55.8	24.3
Sage	Good	15.1	59.6	24.0
Dekalb H85B	--	16.4	54.9	24.0
Norstar	Excellent	14.9	58.8	23.8
Scout 66	Fair	14.9	59.5	23.8
Wings	Fair	14.9	59.8	23.7
Centurk 78	Good	16.4	56.0	23.4
Sage (old seed)	Good	15.0	60.0	23.0
Winoka	Excellent	15.0	58.2	21.2
Roughrider	Excellent	16.7	57.2	19.0
LSD(05) - 2.3 Bu/A		C.V. - 6.6%	Mean - 25.0	

* Percent protein determined with Technicon 300 Infranalyzer.

Winter wheat in the Lyman county area was under droughty growing conditions in early May 1981. On May 9 the air temperature had a high of 61^o Fahrenheit and started to fall, and reached a low early on May 10 of 15^o which lasted until daylight. Later in the afternoon of May 10 the temperatures again reached mid 60's. On that date the wheat was variable in growth stage with most of it in the jointing to early boot stage.

The frost was the most damaging to the more mature wheat, killing the small developing head in the stem or boot. The plants were killed back to the soil level. The yields harvested were from growth of tillers. There were five varieties that appeared to send up new tillers faster. They were: Agate, Buckskin, Dawn, Lancer, and Rita. The growing season was favorable after the frost allowing the tiller to produce grain yields that were about 1/2 of the expected yield. The data are shown in table 5.

Meade County

Winter wheat variety trials in Meade county in 1981, had adequate moisture for germination and emergence. During October they received supplemental rains which helped to maintain the plants in a vigorous condition. A warm winter resulted in plant survival of 80% or better. Cool temperatures in April were favorable for tillering. The grain yields were high as were weights per bushel. Seeding was completed on September 15. The plots in Bear Butte Valley were harvested on July 7, while Plainview was harvested on July 21. The data are reported in tables 6 and 7.

Pennington County

The winter wheat variety trials in Pennington county were slow to germinate in the fall of 1980 because of the general lack of soil moisture. However, showers in October coupled with warm temperatures during the winter resulted in excellent survival. Timely spring rain and cool temperatures in April resulted in an abundance of tillers. Grain yields were excellent as was the quality of the grain with weights per bushel and protein content near normal. The plots were seeded in fallow soil on September 9, 1980 and harvested on July 16, 1981. The data are shown in tables 8 and 9.

Perkins County

The Perkins county area suffered from drought during the last two years. This lead to slow germination and emergence. Little ground cover was available to prevent wind blown soil erosion during the spring of 1981. The lack of moisture reduced the vigor of the wheat plants and resulted in ~~some~~ problems with weeds. The drought stress is visible by the lower weights per bushel and the higher protein content. The plots were seeded on September 11, 1980 and harvested on July 29, 1981. Yield and agronomic data are shown in tables 10 and 11.

Table 6. Hard Red Winter Wheat Variety Performance Trial - Meade County(Bear Butte Valley), 1981.

Variety	Percent Stand (April 1981)	Height (Inches)	Winter Hardiness	Test Wt (Lbs/Bu)	Grain Yield Bu/Acre	DMR*
Rocky	86	30	Good	64.3	51.8	
Scout 66	90	30	Fair	64.3	51.6	
Rita	87	28	Good	63.3	51.6	
Norstar	90	23	Excellent	62.3	47.2	
Buckskin	92	28	Good	63.7	46.5	
Sage	90	28	Good	65.3	46.5	
Centurk 78	91	29	Good	65.7	46.2	
Roughrider	90	30	Excellent	64.2	46.0	
TAM 105	89	24	Fair	64.2	45.0	
Agate	91	23	Good	65.0	43.6	
Bronze	87	29	Excellent	64.0	42.6	
Gent	92	23	Good	63.7	42.4	
Bennett	92	25	Fair	63.6	41.1	
Winoka	90	21	Excellent	64.3	40.4	
Dawn	92	26	Fair	63.3	40.2	
Wings	87	22	Fair	63.0	37.3	
Wall (MPV-1)	90	22	Good	64.7	36.1	

LSD(05) - 10.7 Bu/A

C.V. - 14.5%

Mean - 44.5

*Duncan's Multiple Range Test showing statistical significant differences at 5%.

Table 7. Hard Red Winter Wheat Variety Performance Trial - Meade County(Plainview), 1980-81.

Variety	% Stand Apr 1981	Height (Inches)	Winter Hardiness	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1981	Grain Yield-Bu/A (2 yr av)
Dawn	79	27	Fair	13.6	56.5	41.6	--
Buckskin	83	29	Good	13.8	58.3	41.1	33.0
TAM 105	89	24	Fair	12.8	58.8	40.7	--
Centurk 78	88	26	Good	14.0	57.0	36.8	29.0
Winoka	84	26	Excellent	13.9	58.7	35.3	27.1
Rocky	82	27	Good	13.8	57.5	35.1	28.8
Gent	83	26	Good	13.9	58.5	34.4	25.4
Roughrider	87	28	Excellent	14.6	57.6	33.9	27.7
Agate	74	30	Good	13.5	58.7	33.9	27.2
Wall (MPV-1)	78	25	Good	13.7	58.3	33.6	--
Rita	82	24	Good	14.0	54.3	32.4	--
Bennett	86	26	Fair	13.5	57.7	31.5	26.4
Wings	72	26	Fair	12.5	59.2	31.0	25.2
Sage	85	25	Good	13.4	58.5	30.0	26.5
Scout 66	77	27	Fair	13.5	58.0	27.1	20.6
Bronze	77	29	Excellent	14.4	56.0	26.1	23.4
Norstar	71	25	Excellent	13.5	56.6	24.7	--

Mean - 33.5 25.0

*Percent protein determined with Technicon 300 Infranalyzer.

Table 8. Hard Red Winter Wheat Variety Performance Trial - Pennington County (Wall), 1978-79-81*

Variety	Height (Inches)	Percent Protein	Test Wt (Lbs/Bu)	Grain Yield - Bu/Acre	
				1981	(3 yr av)
Centurk 78	34	12.8	60.0	61.0	42.6
Archer	28	12.9	59.6	59.2	--
Rita	31	13.4	57.9	59.0	--
Rocky	34	13.3	59.5	58.8	--
Agate	35	13.1	60.8	58.6	41.9
Dawn	32	13.1	60.4	57.7	--
Larned	32	13.5	61.1	57.4	39.6***
Buckskin	36	13.4	60.2	57.2	44.0
Vona	29	12.5	60.8	57.2	41.6
TAM 105	30	12.9	60.6	57.0	--
Rall	32	13.3	60.8	55.7	42.1
Rose (SD 7279)	31	14.5	59.5	55.5	--
Gent	34	13.5	59.8	55.5	37.9
Eagle	30	14.6	60.8	55.4	41.9
Scout 66	35	13.9	60.5	54.9	38.6
Benneft	30	14.5	60.1	54.8	41.6
Lancer	35	14.3	60.0	54.4	39.9
Sage	32	14.0	60.0	54.1	36.7
Nebred	34	13.9	60.1	53.4	--
SD 76598	34	13.7	58.2	52.8	--
ND 7481	37	13.3	57.9	52.6	--
SD 75284	33	14.3	59.5	52.2	--
Winoka	36	13.9	61.1	51.9	42.2
Newton	27	13.6	60.2	51.8	37.2***
CO 745597	33	13.8	63.6	51.7	--
Roughrider	35	14.2	59.6	51.2	28.9
Norstar	31	13.5	59.8	51.0	--
Nell (SD 73177)	30	13.5	59.8	50.3	--
NE 75414	32	12.9	58.4	49.2	--
NE 77663	34	13.7	59.4	48.8	--
Lancota	33	14.4	58.8	48.7	38.6***
Wall (MPV-1)	34	13.6	59.6	47.4	--
Wings	30	13.6	59.8	46.8	--
MT 7431	34	13.6	58.8	46.3	--
Bronze	33	14.6	58.2	45.9	37.0***
SD 76705	26	14.4	58.6	45.9	--
SD 74221	30	14.6	59.0	45.0	--
SD 74709	30	14.4	56.6	42.4	--

LSD(05) - 7.0 Bu/A

C.V. - 9.5%

Mean - 52.9

* 1980 variety trials were destroyed by hail.

**Percent protein was determined by Technicon 300 Infr analyzer.

***Average for 1979 and 1981 only.

Note: Yield data presented within the table are averages of four replications. Plot size was 6' x 25' with 12 inch spaced rows. Seeded on September 9, 1980, and harvested on July 16, 1981. Normal seeding rate was 60 lbs(1 bushel)/acre.

Table 9. Hard Red Winter Wheat Performance Nursery I - Pennington County (Wall), 1981

Variety	Height (Inches)	Percent Protein*	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
Buckskin	37	12.5	60.0	47.0
Centurk 78	34	12.8	58.8	45.2
SD 76589	33	12.5	58.8	44.9
SD 76569	34	12.7	57.0	44.3
SD 76125	32	12.2	57.9	43.4
SD 75115-3	30	13.3	57.0	43.0
SD 76501	34	13.6	61.0	42.4
SD 74213-2	32	14.2	59.9	42.0
SD 74217-4	31	12.7	57.8	41.8
CO 745622	33	13.3	59.8	41.7
SD 74217-1	34	13.4	58.5	41.5
SD 76694	30	13.3	58.1	40.7
Scout 66	36	12.9	59.5	40.2
SD 74220	32	13.5	57.8	40.2
Winoka	38	13.7	59.6	39.9
SD 76463	33	13.2	59.1	39.1
SD 74219	29	14.1	57.2	38.5
SD 74216-6	33	13.8	58.2	38.0
SD 74213	32	13.6	57.5	38.0
SD 76106-W	36	13.0	59.2	37.9
SD 76706	31	13.4	57.8	37.2
SD 76596	32	13.1	57.9	37.0
SD 75238	32	13.8	57.6	37.0
SD 76708	31	13.1	57.2	36.9
SD 75108-2	31	13.1	55.1	36.7
SD 75244-2	33	12.7	58.0	36.4
SD 75123-1**	31	12.8	58.5	36.0
SD 75376	30	13.5	56.9	35.6
SD 76169	36	14.5	58.9	30.2
SD 76177	35	13.5	58.6	29.6

LSD(05) - 4.3 Bu/A

C.V. - 7.8%

Mean - 39.4

* Percent protein determined by Technicon 300 Infranalyzer.

**SD 75123-1 was seeded at Bison and Wall only.

Note: Yield data presented within the table are averages of four replications. Plot size was 6' x 25' with 12 inch spaced rows. Seeded on September 9, 1980, and harvested on July 16, 1981. Normal seeding rate was 60 lbs(1 bushel)/acre.

Table 10. Hard Red Winter Wheat Variety Performance Trial - Perkins County (Bison), 1976-81.

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
				1981	(5 yr av)
TAM 105	23	13.2	55.1	39.9	--
Vona	22	12.7	60.0	39.0	31.2
ND 7481	26	14.8	55.9	37.7	--
Wings	24	13.3	60.5	37.3	--
Wall (MPV-1)	26	14.0	58.0	36.4	--
Roughrider	28	15.5	56.0	35.1	25.8**
Nebred	28	15.2	55.6	35.0	24.9
Rocky	25	14.3	57.6	33.3	--
Rose (SD7279)	25	14.5	57.1	33.3	--
Winoka	27	15.4	58.6	33.0	26.8
Nell (SD 73177)	24	14.5	57.1	33.0	--
Rall	24	14.6	57.5	32.4	25.9
Dawn	26	14.6	55.9	32.2	--
Lancota	26	15.9	57.4	30.6	--
Agate	25	14.6	56.5	30.4	27.8
Norstar	22	14.7	56.6	30.2	--
MT 7431	27	15.2	56.2	29.8	--
Buckskin	26	14.9	56.8	29.5	27.1
Lancer	23	14.6	56.9	29.3	24.7
Scout 66	24	15.1	56.5	29.3	23.9
Bronze	26	15.0	57.6	29.1	--
SD 75284	25	14.8	57.1	28.9	--
Larned	24	15.2	58.1	28.6	--
NE 75414	24	13.7	55.8	28.0	--
SD 76709	24	15.2	55.0	28.0	--
Rita	22	15.1	53.1	27.5	--
SD 76598	24	15.3	56.8	27.5	--
SD 74221	23	14.6	57.5	26.9	--
SD 76705	21	15.2	55.1	26.6	--
Eagle	25	15.0	54.8	26.4	22.6
Centurk 78	25	14.4	55.4	25.8	18.8
Sage	24	14.9	56.5	24.9	23.9
Newton	20	14.8	56.9	23.3	--
CO 745597	22	14.9	55.2	22.9	--
Gent	23	15.2	55.9	20.0	25.3
Bennett	21	15.3	56.0	19.8	18.8**
NE 77663	26	15.1	54.2	19.8	--
Archer	20	14.9	53.8	18.6	--

LSD(05) - NS

Mean - 29.4

* Percent protein determined with Technicon 300 Infralyzer.

**Average yield for 1979, 1980, and 1981 only.

Note: Yield data presented within the table are averages of four replications.

Plot size was 6' x 25' with 12 inch spaced rows. Seeded on September 11, 1980, and harvested on July 18, 1981. Normal seeding rate was 60 lbs (1 bushel)/acre.

Table 11. Hard Red Winter Wheat Performance Nursery I - Perkins County(Bison), 1981.

Variety	Height (Inches)	Percent Protein*	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
SD 76708	26	14.1	56.1	26.7
SD 75123-1**	25	14.8	55.6	25.8
CO 745622	26	14.9	58.0	24.4
Winoka	30	15.5	56.1	21.2
Buckskin	28	15.0	53.9	20.2
SD 76125	25	15.1	56.2	19.6
Centurk 78	25	14.2	56.5	19.3
SD 76706	24	14.9	56.1	19.0
SD 76596	24	14.5	54.9	18.9
SD 76177	24	14.6	57.4	17.9
SD 74217-1	24	15.7	54.8	17.7
SD 76589	25	14.4	55.2	17.4
SD 74213-2	24	14.8	57.4	17.4
SD 76501	27	15.3	56.0	17.3
SD 76569	27	14.6	53.4	17.0
SD 74219	24	16.0	54.1	15.5
SD 76694	22	14.8	55.0	15.5
Scout 66	25	14.6	55.6	14.4
SD 75115-3	23	16.0	53.4	14.2
SD 76106W	25	15.5	56.6	13.8
SD 76463	23	15.5	55.9	13.8
SD 74220	24	15.2	54.2	13.6
SD 75244-2	24	15.8	53.9	13.4
SD 74217-4	22	15.8	54.8	12.6
SD 74213	23	15.6	53.8	12.2
SD 74216-6	23	15.6	54.4	11.8
SD 75238-2	24	16.2	53.5	11.0
SD 75376	23	15.9	53.6	10.6
SD 76169	24	16.0	55.9	10.0
SD 75108-2	24	16.6	50.6	8.9

LSD(05) - 11.0 Bu/A

Mean - 16.4

* Percent protein determination by Technicon 300 Infralyzer.

**SD 75123-1 was seeded at Bison and Wall only.

Hard Red and Durum Spring Wheat

Plots were seeded at 6 locations in 1980. All trials were seeded on fallow with the exception of Butte county. The Butte county site had been in small grain the previous year. All sites were seeded with a 6 row plot seeder having an 8 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 thru 23.

Table 12. Hard Red Spring Wheat Variety Performance Trial - Bennett County
(Martin), 1979-81.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre (3 yr av)	1981 DMR**
SD 2861***	27	June 21	15.7	54.3	--	23.5
Oslo***	27	21	14.3	53.5	--	23.5
Probrand 715***	24	23	15.1	52.0	--	23.5
Probrand 711***	25	23	14.4	54.0	--	22.5
Protor** *	24	21	15.3	53.3	21.7	22.0
Era***	23	June 24	15.5	52.8	20.5	22.0
Butte	25	22	15.1	54.0	20.5	21.5
Fortuna	28	23	15.9	55.5	20.0	21.5
Len***	26	24	15.7	54.2	21.6	21.3
Pondera	26	23	16.0	54.8	--	21.3
SD 2865***	24	June 24	15.1	53.5	--	20.8
Solar***	23	25	14.5	53.0	20.6	20.6
Angus***	25	25	15.8	55.3	19.4	20.3
WPB 906R***	24	23	14.8	54.7	--	19.8
Olaf***	24	24	16.4	54.5	20.1	19.8
SD 2868	25	June 22	15.8	53.7	--	19.8
James	26	23	15.3	53.7	21.4	19.8
Chris	28	24	16.7	55.0	--	19.8
Aim***	27	25	14.7	53.8	--	19.6
MPV-2	28	25	16.0	52.7	--	19.4
Walera***	25	June 25	14.4	52.3	--	19.4
SD 2854	26	22	15.5	53.3	--	19.1
Coteau	27	25	16.8	54.0	19.0	19.1
Eureka	28	21	16.4	54.8	19.3	18.9
Marshall(MN70170R***22		25	15.8	52.0	--	18.6
Prodax***	24	June 23	15.4	50.7	18.9	18.6
Lew	28	25	15.8	54.8	--	18.4
Waldron	26	23	17.0	55.0	20.7	18.2
Alex	28	24	16.4	54.7	--	17.7
MPV-3	26	23	14.0	55.7	--	16.2

LSD(05) - 4.2 Bu/A

C.V. - 12.9%

Mean - 20.2

* Percent protein determined with Technicon 300 Infranalyzer.

** Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

*** Semidwarf variety.

Bennett County

Hard Red Spring Wheat plots at Martin were seeded on April 16 on soil fallowed in 1980. Soil moisture, although adequate for germination, was not abundant. Plants grew and tillered well, but droughty conditions during filling and maturation resulted in grain of low weight per bushel. Protein content was slightly above normal. The plots were harvested on August 3 with data being reported in table 12.

Table 13. Hard Red Spring Wheat Variety Performance Trial - Butte County(Newell), 1980-81. (Irrigated)

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bushel/Acre		
				(2 yr av)	1981	DMR**
SD 2861***	33	14.8	54.5	--	59.8	
James	37	15.6	52.3	54.3	54.4	
SD 2854	41	15.6	54.3	--	53.0	
SD 2868	39	14.9	56.0	48.9	52.8	
Oslo***	33	14.0	52.2	--	52.0	
WPB 906R***	30	14.7	53.3	45.4	51.8	
Angus	36	15.4	57.5	45.8	51.6	
Marshall(MN70170R)***	34	14.5	54.0	--	51.1	
Solar***	35	13.5	55.5	55.0	50.6	
Len***	36	16.0	54.3	51.0	50.1	
Butte	40	15.5	58.2	50.0	50.1	
Albion***	34	14.0	56.0	49.8	49.8	
Olaf***	35	15.8	55.5	48.4	49.8	
Protar***	35	14.8	55.5	46.7	49.6	
Pondera	37	15.0	55.3	53.6	49.4	
Walera***	33	14.2	53.3	--	48.2	
Probrand 715***	34	14.8	53.3	--	48.2	
Era***	35	13.7	56.0	52.4	48.2	
MPV-3	41	15.5	59.0	--	47.9	
Alex	43	16.0	55.2	--	45.5	
SD 2865***	34	14.5	53.3	--	45.2	
MPV-2	34	16.5	56.8	--	45.2	
Pavon "Sib"***	31	14.8	55.2	--	44.0	
Fortuna	41	15.0	52.3	45.2	44.0	
Eureka	42	15.5	55.8	44.2	43.1	
Probrand 711***	35	14.3	53.8	50.4	42.8	
Lew	41	15.7	56.5	45.4	42.4	
Coteau	42	16.1	58.0	41.1	41.1	
Chris	39	15.9	51.3	47.4	40.4	
Bounty 309***	39	15.4	54.7	45.4	38.7	
Prodax***	32	14.5	49.7	45.5	38.0	
Waldron	42	16.2	52.5	41.8	36.5	

ISD(05) - 9.2 Bu/A

C.V. - 12.0%

Mean - 47.3

* Percent protein determined with Technicon 300 Infranalyzer.

** Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

*** Semidwarf variety.

Butte County

An irrigated spring wheat trial was seeded at Newell on April 9. Soil moisture was limited resulting in irregular germination and emergence. That condition carried on through the growing season. The plots were top dressed with nitro-

gen in mid-May. Two applications of water were applied during the growing season. Extremely high temperatures were experienced in early July which affected normal maturity. For that reason earlier maturing varieties had higher test weights and better quality grain. Harvesting was completed on August 6. Trial results are reported in table 13.

Table 14. Hard Red Spring Wheat Variety Performance Trial - Meade County (Bear Butte Valley), 1978-79-81.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bushel/Acre	
					(3 yr av)	1981
Probrand 711**	24	June 16	16.5	53.8	--	21.3
Prodax**	20	15	17.6	49.2	27.8	20.8
Protor**	21	14	17.0	53.2	27.2	20.3
WPB 906R**	22	13	17.0	49.0	--	19.8
WS 1809**	22	14	17.0	52.0	25.2	19.1
Len**	24	June 17	18.2	51.8	--	18.6
Solar**	25	21	17.2	47.3	24.1	18.2
Era **	24	20	17.2	47.0	23.9	17.7
James	27	13	18.0	50.8	24.3	17.4
Butte	25	13	17.4	54.0	26.5	17.4
Pondera	23	June 16	18.3	50.5	--	16.7
Angus**	21	17	18.2	52.0	--	16.7
Olaf**	26	17	18.4	48.8	23.6	14.8
Fortuna	25	17	17.1	50.8	21.5	14.5
Ellar	23	15	18.6	45.8	24.6	14.0
Aim**	20	June 16	17.6	51.2	--	13.6
Coteau	24	18	18.1	44.8	22.3	13.6
Eureka	26	16	18.8	45.3	23.6	12.8
Lew	24	18	18.7	47.3	--	12.1

LSD(05) - 5.3 Bu/A

C.V. - 19.1%

Mean - 16.8

* Percent protein determined with Technicon 300 Infr analyzer.

** Semidwarf variety.

***Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

Meade County
(Bear Butte Valley)

The spring wheat variety trial was seeded in Bear Butte Valley on April 7. Soil moisture conditions were poor because of the lack of fall rain and winter snow. However, conditions improved in May with heavy showers, and conditions looked favorable for a good harvest. Extremely high temperatures during the second week of July cooked the immature heads thus terminating further growth. Yields were low as were weights per bushel. The kernels were shrivelled and contained high levels of protein. The data are reported in table 14.

Table 15. Hard Red Spring Wheat Variety Performane Trial - Meade County(Plainview), 1979-81.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre (3 yr av)	1981 DT***
WPB 906R**	26	June 28	17.4	52.3	--	15.5
WS 1809**	25	26	16.3	51.2	13.5	14.0
Olaf**	26	27	18.6	53.0	14.7	12.6
James	31	26	19.4	48.0	13.3	12.3
Len**	27	28	18.8	50.8	--	11.9
Eureka	30	June 26	19.2	46.5	14.2	11.9
Probrand 711**	25	28	17.5	52.2	--	11.6
Pondera	26	27	19.3	54.3	--	11.4
Butte	30	26	18.0	52.0	11.5	11.1
Fortuna	27	27	17.6	51.2	12.5	10.9
Angus**	24	June 29	19.0	51.7	--	10.9
Prodax**	23	27	17.9	49.0	--	10.6
Lew	29	28	19.1	51.5	--	10.4
Ellar	29	26	18.9	47.7	19.7	10.4
Protor**	24	28	17.3	51.2	14.8	10.2
Era**	22	June 29	16.8	52.2	17.8	9.9
Aim**	24	29	18.3	52.5	--	9.9
Solar**	23	29	17.6	50.7	--	9.4
Coteau	25	29	19.4	50.0	15.7	8.2
LSD(05) - 3.1 Bu/A		C.V. - 16.8%		Mean - 11.2		

* Percent protein determined with Technicon 300 Infranalyzer.

**Semidwarf variety.

***Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

Meade County (Plainview)

A spring wheat variety trial was seeded at Plainview on April 7. The soil had been fallow in 1980 but was short of available soil moisture because of lack of fall rain, winter snow, and spring rain. Showers in May gave the plants a late start and growing conditions improved. Throughout June and early July conditions were favorable for a fair harvest. However, the extremely high temperatures experienced during the second week of July cooked the immature heads and terminated further growth. Yields and weights per bushel were low while protein content was exceptionally high. The plots were harvested on July 30 and results are shown in table 15.

Pennington County

The spring wheat variety trial at Wall was seeded in fallow soil on April 10. Soil conditions were good except moisture was limited. Germination and emergence was slow but cool temperatures during April and rain in May resulted in good stands. The lateness of growth was detrimental when air temperatures in excess of 105° Fahrenheit were experienced in early July. At that date the

Table 16. Hard Red Spring Wheat Variety Performance Trial - Pennington County (Wall), 1980-81.

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bushel/A (2 yr av) 1981	
Oslo**	31	17.1	52.7	--	27.4
MPV-2	33	15.7	51.8	--	27.2
Lew	32	17.0	51.6	25.5	27.0
Era**	29	16.5	51.3	27.0	26.7
Walera**	28	16.1	49.3	25.5	25.8
SD 2854	31	16.9	51.6	--	25.6
Pondera	29	16.6	51.1	25.3	25.2
Chris	31	16.7	52.6	23.0	25.0
Olaf**	33	17.2	52.1	24.6	24.9
MPV-3	30	16.2	52.5	--	24.9
Fortuna	31	16.8	51.6	23.9	24.7
James	34	16.2	52.0	24.0	24.3
Alm**	28	16.1	51.0	23.6	24.1
Probrand 711**	29	16.4	51.4	22.3	24.1
Solar**	29	16.0	51.4	24.5	24.1
Eureka	33	16.7	51.6	23.9	24.0
Probrand 715**	30	16.9	50.0	--	23.8
Coteau	29	16.6	51.9	25.9	23.8
Alex	32	18.3	52.3	--	23.8
Protor**	32	17.2	52.5	24.5	23.4
Marshall(MN70170R)**	31	17.1	51.9	24.2	23.2
Prodax**	30	16.7	51.6	23.6	23.0
SD 2861**	28	16.8	51.1	--	22.7
Waldron	34	17.0	51.4	23.6	22.7
SD 2868	32	17.2	50.8	22.9	21.8
Angus**	29	16.7	51.9	22.4	21.4
Len**	30	17.4	51.8	23.3	21.0
Butte	31	16.4	51.8	21.4	20.9
WPB 906R**	29	17.0	51.0	21.0	19.8
LSD(05) - 6.9 Bu/A		C.V. - 20.2%		Mean - 24.3	

* Protein content determined with Technicon 300 Infranalyzer.

**Semidwarf variety.

plants were all headed and were beginning to fill. The heat cooked the heads and stopped further growth. The yields were reduced, with low test weights and extremely shrivelled kernels. The plots were harvested on August 4 and are reported in table 16.

Perkins County

The spring wheat variety trial at Bison was seeded on April 14. The soil was extremely dry because of the drought experienced during the previous two growing seasons. Germination and emergence was very slow and spotty. Rain was

Table 17. Hard Red Spring Wheat Variety Performance Trial - Perkins County(Bison), 1978-79-81.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bushel/Acre	
					(3 yr av)	1981 DMR***
Oslo**	24	June 27	17.1	53.6	--	16.9
Pondera	24	27	18.9	58.8	--	16.5
SD 2861**	20	26	17.3	52.8	--	16.3
Probrand 711**	22	28	17.0	57.9	--	15.4
MPV-3	26	27	17.2	57.4	--	15.2
Lew	26	June 29	18.7	56.8	--	14.5
SD 2868	24	26	17.6	57.5	--	14.2
WPB 906R**	22	27	17.8	56.4	--	14.2
Prodax**	20	28	17.3	56.2	17.7	14.0
Marshall** (MN70170R)	21	30	17.8	57.8	--	13.8
SD 2854	25	June 27	18.7	52.8	--	13.6
Walera**	20	June 1	17.1	56.9	--	13.4
Era**	22	June 30	17.4	57.2	14.7	13.2
Protor**	20	28	17.5	57.8	16.6	13.2
James	22	27	18.6	54.6	16.5	13.2
Eureka	26	June 27	18.8	54.4	17.8	13.2
Len**	24	27	18.2	54.2	--	13.1
Butte	24	26	17.0	58.0	17.5	12.9
Angus**	20	30	17.8	58.8	17.3	12.7
Chris	24	26	18.2	53.8	--	12.5
Solar**	20	July 1	17.3	58.2	18.2	12.3
Alex	25	June 29	18.2	58.6	--	12.0
MPV-2	26	28	18.0	56.9	--	11.8
Coteau	22	July 1	18.1	56.4	17.0	11.6
Olaf**	23	June 28	17.7	56.1	16.5	11.4
Fortuna	23	June 28	17.8	55.0	15.0	11.2
Probrand 715**	22	June 30	18.0	57.5	--	10.9
Waldron	23	30	18.4	56.4	16.8	10.5
Aim**	21	30	17.1	56.6	--	9.4

LSD(05) - 3.2 Bu/A

C.V. - 17.2%

Mean - 13.2

* Percent protein determined with Technicon 300 Infranalyzer.

**Semidwarf variety.

***Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

received in May and good stands were in evidence. Growth was limited and late throughout the entire season because of limited rainfall. Heading occurred in late June and seed had only begun to fill when air temperature of 107° Fahrenheit was experienced on July 7. As a result the heads were blasted. The leaves were not damaged but further grain development was stopped resulting in reduced test weights and very low yields. The plots were harvested on July 29 and the results are shown in table 17.

Table 18. Durum Wheat Variety Performance Trial - Bennett County (Martin), 1979-1981.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre		
					(3 yr av)	1981	DMR**
Edmore	29	June 22	17.8	56.2	22.0	17.7	
Vic	28	23	17.0	55.3	--	16.5	
Cando***	21	24	16.7	53.7	16.8	14.5	
Crosby	29	23	18.1	54.8	18.9	12.8	
Botno	27	22	17.5	55.5	18.1	12.6	
Ward	28	June 23	17.3	55.7	20.1	11.6	
Calvin***	20	25	17.4	55.0	19.6	9.9	
Rolette	27	23	18.3	56.3	19.7	9.7	
Rugby	27	25	17.3	53.5	17.8	7.3	

LSD(05) - 2.6 Bu/A

C.V. - 12.2%

Mean - 12.5

* Percent protein determined with Technicon 300 Infr analyzer.

** Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

***Semidwarf variety.

Note: Plots were seeded on April 16 at 60 pounds per acre, and harvested on August 3. Drill row space was 8 inches.

The durum wheat plots in Bennett county were seeded in fallow soil and had sufficient soil moisture for germination and emergence. Rainfall after seeding was below normal and resulted in low yields and poor quality grain. Results are shown in table 18.

Table 19. Durum Wheat Variety Performance Trial - Butte County (Newell), 1979

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bushel/Acre		
				(3 yr av)	1981	DMR**
Edmore	44	15.6	56.2	49.6	59.1	
Cando***	33	15.3	53.7	42.4	64.0	
Vic	46	14.3	54.8	41.1	61.5	
Ward	43	15.7	55.7	39.2	60.3	
Crosby	42	15.1	55.8	38.7	60.2	
Calvin***	29	15.2	55.0	37.5	61.7	
Botno	42	15.2	56.2	37.3	51.1	
Rolette	42	15.4	55.3	33.4	53.2	
Rugby	42	16.0	54.3	30.0	59.0	

LSD(05) - 9.7 Bu/A

C.V. - 14.5%

Mean - 38.8

* Percent protein determined with Technicon 300 Infr analyzer.

** Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

***Semidwarf variety.

Note: Plots were seeded on April 9 at 120 pounds per acre, and harvested on August 6. Row spacing was 8 inches. The wheat was flood irrigated twice during the growing season. The plots received 155 pounds of broadcast nitrogen on May 14.

The irrigated durum wheat trial in Butte county was seeded in dry soil and required an application of water before the seed would germinate. The lack of

normal rainfall required an additional irrigation treatment during the growing season. Extremely high temperatures in early July resulted in blasted heads. Yields were lower than those of previous years because the heat damaged heads could not complete further growth. The kernels were badly shrivelled and test weights were low. Yield data are reported in table 19.

Table 20. Durum Wheat Variety Performance Trial - Meade County (Bear Butte Valley), 1978-79, 1981.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					(3 yr av)	1981 DGR**
Rolette	24	June 14	18.5	55.5	23.9	16.7
Crosby	24	14	19.5	52.6	23.3	16.0
Calvin***	19	16	18.4	51.2	21.2	16.0
Ward	25	16	19.0	53.8	24.2	15.0
Rugby	24	16	18.9	52.0	23.5	15.0
Cando***	19	June 17	18.6	49.5	21.2	15.0
Botno	24	14	18.4	53.5	23.2	14.8
Edmore	26	15	19.0	53.3	23.6	13.1
Vic	26	16	19.3	52.3	--	12.6
LSD(05) - 2.2 Bu/A		C.V. - 8.6%		Mean - 14.9		

* Protein content determined with Technicon 300 Infralyzer.

** Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

***Semidwarf variety.

Note: Plots were seeded on April 7 at 60 pounds per acre, and harvested on July 30. Drill row space was 8 inches.

The trial in Bear Butte Valley (table 20) was seeded in fallow soil. Soil moisture, although very limited, was adequate for germination and emergence. Rainfall in May provided moisture necessary to continue growth. Plants were short but heads were normal length. Heading occurred in mid-June and good yields were expected. However, temperatures in excess of 107° Fahrenheit in early July resulted in blasted heads. Yields were much reduced and test weights were low.

Plainview

The durum wheat trial at Plainview was seeded into dry soil which delayed germination. Cool temperatures slowed growth until showers were received in May. Growth then continued normally and heading occurred in late June. Extremely high temperatures blasted the heads and prevented further growth. Yields were far below normal and grain quality low. Protein content was very high because the kernels were destroyed before the starch was produced. Yield data are reported in table 21.

Wall

Seeded into dry soil, the durum test at Wall had slow germination and emergence. Rain showers in May provided much needed moisture and the plants responded with near normal growth. The plants were damaged by high temperatures shortly after heading and produced poor quality grain. The data are reported in table 22.

Table 21. Durum Wheat Variety Performance Trial - Meade County (Plainview), 1978-79, 1981.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre		
					(3 yr av)	1981	DMR**
Edmore	31	June 28	19.2	55.8	17.2	12.3	
Ward	25	27	19.8	55.4	18.7	11.6	
Vic	30	29	20.4	56.1	--	11.1	
Rugby	28	29	18.8	55.0	18.8	10.9	
Rolette	30	28	19.6	57.1	15.3	10.9	
Botno	29	June 28	19.8	55.9	16.8	10.9	
Calvin***	19	29	20.7	56.4	17.2	10.4	
Crosby	26	27	19.8	54.4	18.0	9.9	
Cando***	20	30	21.2	54.6	16.4	9.0	

LSD(05) - 2.7 Bu/A

C.V. - 14.6%

Mean - 10.8

* Protein content determined with Technicon 300 Infr analyzer.

** Duncan's Multiple Range Test showing statistical differences at 5% level of significance.

***Semidwarf variety.

Note: Plots were seeded on April 14 at 60 pounds per acre, and harvested on July 30. Row space was 8 inches.

Table 22. Durum Wheat Variety Performance Trial - Pennington County (Wall), 1979-81.

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bushel/Acre		
				(3 yr av)	1981	DMR**
Crosby	34	18.0	51.2	30.5	24.2	
Ward	34	18.5	53.0	31.3	21.0	
Calvin***	24	18.5	51.3	31.5	20.3	
Rugby	35	17.5	54.2	30.9	19.4	
Botno	34	17.7	52.3	27.4	18.9	
Edmore	36	18.0	52.7	29.2	17.2	
Cando***	27	18.2	51.2	29.8	16.9	
Vic	35	18.5	51.8	29.9	15.5	
Rolette	32	18.4	53.7	26.1	14.3	

LSD(05) - 5.4 Bu/A

C.V. - 16.6%

Mean - 18.6

* Percent protein determined with Technicon 300 Infr analyzer.

** Duncan's Multiple Range Test showing statistical differences at 5% level of significance.

***Semidwarf variety.

Note: Plots were seeded on April 10 at 60 pounds per acre, and harvested on August 4. Drill row space was 8 inches.

Bison

The durum wheat trial at Bison was seeded into soil which was dry because of a two year drought. Germination was slow and spotted. Rainfall was received in May and good stands resulted. Heading occurred in late June but growth was terminated by temperature in excess of 107° Fahrenheit on July 7. Grain yields and test weights were reduced. The data are shown in table 23.

Table 23. Durum Wheat Variety Performance Trial - Perkins County (Bison), 1978-1979, & 1981.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre		
					(3 yr av)	1981	DMR**
Edmore	26	June 26	19.0	57.5	18.5	18.5	
Ward	25	25	18.0	57.4	17.7	15.8	
Rolette	24	26	18.5	54.5	15.8	15.2	
Calvin***	21	27	18.1	57.2	17.7	14.0	
Cando***	20	27	18.2	55.8	17.6	13.6	
Vic	25	June 27	18.8	57.0	--	13.4	
Botno	25	26	18.1	56.9	16.1	13.2	
Crosby	27	26	18.6	57.8	16.3	12.5	
Rugby	24	27	18.0	55.5	17.4	10.7	

LSD(05) - 4.5 Bu/A

C.V. - 21.9%-

Mean - 14.1

* Percent protein determined with Technicon 300 Infralyzer.

** Duncan's Multiple Range Test showing statistical differences at 5% level of significance.

***Semidwarf variety.

Note: Plots were seeded on April 14 at 60 pounds per acre, and harvested on August 12. Drill row space was 8 inches.

Oat Variety Trials

Oat variety trials were conducted on a cooperative basis at six locations in 1981. Seeding dates ranged from April 7 to April 16. Soil moisture was adequate for germination and emergence at all sites but Newell. Further growth was limited by subnormal precipitation during the remainder of the growing season.

Bennett County

The plots in Bennett county were seeded in fallow soil and had sufficient soil moisture for germination and emergence. Rainfall was below normal and temperatures above normal except for May. The combination resulted in short plants and few tillers. Harvesting was completed on August 3 when all plots were mature.

Butte County

The trial in Butte county was an irrigated study. It was seeded in soil which had been in small grain the previous year. Due to drought conditions it was necessary to irrigate the soil before germination would begin. For that reason the plants were late in starting growth. Stands were irregular as was height and maturity. The area experienced extremely high temperatures in early July which damaged the plants. Test weights and grain yields were lower than anticipated and below the previous years results.

Table 24. Oat Variety Performance Trial - Bennett County (Martin), 1979-81.

Variety	Height (Inches)	Date of Heading	Percent Groat*	Percent Protein*	Percent Oil*	Test Wt (Lbs/Bu)	Grain Yield - Bu/Acre		
							(3 yr av)	1981	DMR**
Ogle	27	June 20	57.4	20.3	4.6	35.7	--	64.7	X
Lang	28	20	61.8	18.9	5.3	37.0	36.0	55.9	X X
Lyon	33	23	63.6	18.0	7.3	36.2	59.5	52.9	X XX
Otana	32	23	58.8	22.8	6.1	35.7	61.0	51.0	X XXX
Moore	31	23	54.2	21.0	8.0	36.3	67.2	50.1	XXX
									XXX
Bates	28	June 20	65.2	18.4	6.5	38.7	61.5	50.1	XXX
Lancer	28	22	74.0	22.5	4.2	38.0	59.5	49.7	XXX
SD 743358-12	32	25	70.2	19.0	5.7	38.3	--	45.7	XXXX
Otee	28	22	73.8	23.2	4.3	39.0	64.4	45.2	XXXXX
SD 743358-17	31	25	63.8	19.6	6.0	36.5	--	45.2	XXXXX
									XXXXX
SD 743358-10	30	June 22	80.0	18.1	6.4	37.0	--	43.4	XXXXX
Marathon	34	25	62.6	21.3	6.6	33.7	55.3	43.0	XXXXX
Froker	29	25	74.0	20.1	4.3	38.8	44.7	42.1	XXXXX
Larry	25	21	69.2	19.6	5.2	36.8	--	41.7	XXXXX
Chief	30	21	75.4	23.2	4.1	38.2	51.4	41.7	XXXXX
									XXXX
SD 743358-11	29	June 22	61.4	21.0	6.5	35.3	--	40.8	XXXX
Preston (MN76161)	30	21	66.0	21.6	7.4	36.7	--	40.8	XXXX
Wright	32	23	67.4	19.9	7.4	38.3	54.0	40.8	XXXX
Noble	28	22	57.6	20.4	4.4	36.3	57.6	40.3	XXXX
Dal	27	25	61.8	21.5	6.2	34.5	50.2	39.0	XXXX
									XXXX
Burnett	32	June 21	70.2	18.4	4.2	37.7	52.5	39.0	XXXX
Benson	30	23	72.0	22.2	4.2	35.3	54.5	38.6	XXXX
SD 743358-09	31	23	73.4	19.1	4.8	36.3	--	36.4	XXX
Nodaway 70	32	20	69.6	18.2	3.9	39.8	52.5	34.1	XX
SD 743358-06	30	23	77.4	21.5	4.3	39.7	--	30.6	X

LSD(05) - 12.2 Bu/A

C.V. - 17.0%

Mean - 44.1

* Percent groat, percent protein, and percent oil determined with Technicon 300 Infranalyzer.

**Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

Note: Plots were seeded on April 16 at 64 pounds per acre, and harvested on August 3. Drill row space was 8 inches.

Table 25 . Oat Variety Performance Trial - Butte County (Newell), 1979-81.
(Irrigated)

Variety	Height (Inches)	Percent Groats*	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield - Bu/Acre (3 yr av)	1981	DMR**
Moore	37	60.0	19.3	35.3	85.4	60.7	X
Lancer	37	61.8	20.5	33.0	87.2	59.0	XX
Bates	37	64.8	18.8	35.3	91.8	59.0	XX
Wright	39	69.4	21.0	33.5	87.4	57.6	XXX
Benson	38	70.6	20.2	30.5	78.1	56.3	XXX
							XXX
SD 743358-17	41	68.8	19.9	31.2	--	55.9	XXX
Chief	37	67.6	18.0	34.8	67.5	55.9	XXX
Marathon	43	59.4	14.8	33.2	84.9	54.5	XXX
Froker	37	66.2	17.7	32.8	79.1	53.6	XXXX
Otana	39	74.4	18.6	33.8	97.6	53.6	XXXX
							XXXX
Lang	34	55.2	18.6	29.0	92.5	53.2	XXXX
Nodaway 70	40	73.4	18.3	34.5	81.3	52.3	XXXX
Dal	38	69.6	21.0	35.0	77.4	51.9	XXXX
Larry	38	58.2	17.1	30.7	--	51.4	XXXX
SD 743358-06	37	73.2	21.0	35.6	--	51.0	XXXX
							XXXX
SD 743358-09	38	63.2	20.6	35.0	--	50.5	XXXX
Lyon	38	62.8	18.3	32.0	80.3	50.5	XXXX
Burnett	39	61.8	14.8	33.8	76.5	49.6	XXXX
SD 743358-11	38	70.2	21.3	34.3	--	48.8	XXXX
SD 743358-10	37	74.0	20.3	35.5	--	48.8	XXXX
							XXXX
SD 743358-12	37	73.6	17.3	34.0	--	46.6	XXXX
Noble	36	57.6	14.4	34.3	76.4	46.6	XXXX
Otee	32	60.0	21.7	34.5	79.4	46.1	XXX
Preston (MN76161)	37	70.0	19.6	35.7	--	43.9	XX
Ogle	37	44.8	14.8	27.5	--	39.5	X

LSD(05) - 12.0 Bu/A

C.V. - 14.2%

Mean - 51.9

* Percent groats and percent protein determined with Technicon 300 Infralyzer.

**Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

Note: Plots were seeded on April 9 at 80 pounds per acre, and harvested on August 6. Drill row space was 8 inches. The oats were flood irrigated 2 times during the growing season. The soil received 50 pounds of broadcast nitrogen fertilizer on May 14.

Meade County

The oat variety trial in Bear Butte Valley was seeded in mid-April on fallow soil. Germination and emergence were normal, but lack of rainfall and above normal temperatures restricted growth. The trial was severely damaged by high temperatures after heading. The test data are listed in table 26.

Table 26 . Oat Variety Performance Trial - Meade County(Bear Butte Valley), 1978-79-81.

Variety	Height (Inches)	Date of Harvesting	Percent Groats*	Percent Protein*	Test Wt (lbs/Bu)	Grain Yield-Bu/Acre		
						(3 yr av)	1981	DMR
Bates	27	June 11	56.6	22.1	34.5	65.6	51.7	X
Ogle	25	14	51.0	22.3	30.2	--	49.9	XX
Lang	27	13	54.2	19.1	32.3	63.7	49.4	XXX
Larry	25	12	50.6	21.7	32.6	--	44.9	XXXX
Chief	29	10	58.2	20.3	34.6	58.7	44.9	XXXX
								XXXX
Noble	28	June 15	48.6	23.7	30.3	60.8	44.4	XXXX
Burnett	31	11	51.0	20.8	33.0	63.4	44.4	XXXX
Lancer	27	13	54.8	23.7	29.0	60.0	43.5	XXXX
Otee	26	11	56.2	23.4	34.0	58.2	42.6	XXXX
Nodaway 70	27	12	60.8	18.6	36.2	57.7	42.6	XXXX
								XXXX
Benson	29	June 14	41.0	23.6	29.0	57.5	42.6	XXXX
Spear	27	12	48.2	23.6	32.0	58.5	41.7	XXXX
Wright	31	14	49.8	24.8	32.0	56.9	41.2	XXXX
Moore	30	16	45.2	22.9	28.7	63.2	39.4	XXX
Stout	24	12	47.7	22.8	34.3	49.1	38.5	XX
								XX
Otana	32	June 16	42.0	23.2	38.1	62.2	38.1	XX
Lyon	30	16	51.4	21.3	27.8	61.4	38.1	XX
Marathon	28	19	49.0	24.1	25.8	58.4	36.7	XX
Froker	26	18	53.6	21.7	31.5	57.3	34.9	XX
Diana	29	14	51.4	25.0	28.7	52.9	32.2	X

LSD(05) - 8.7 Bu/A

C.V. - 12.6%

Mean - 42.1

* Percent groat and percent protein determined with Technicon 300 Infranalyzer.

DMR: Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

Note: Plots were seeded on April 7 at 64 pounds per acre, and harvested on July 30. Drill row space was 8 inches.

Table 27. Oat Variety Forage and Grain Yield Trial - Meade County(Bear Butte Valley), 1981.

Variety	Maturity	Height (Inches)	Grain Yield (Bushel/Acre)	Forage Yield-Lbs/A at 40% moisture
Ogle	Medium	25	49.9	7391
Wright	Late	31	41.2	7216
Larry	Early	25	44.9	7187
Moore	Late	30	39.4	6941
Lancer	Medium	27	43.5	6607
Froker	Late	26	34.9	6563
Nodaway 70	Early	27	42.6	6483
Marathon	Late	28	36.7	5859
Diana	Medium	29	32.2	5605
Burnett	Medium	31	44.9	5496
Chief	Medium	29	44.9	5489
Average			41.3	6440

Note: Plots were seeded on April 7 at 64 pounds per acre, and harvested on July 14. Drill row space was 8 inches.

A trial was conducted to compare eleven oat varieties for forage production. Ten varieties were selected on the basis of leafiness, straw strength, and protein content. They were compared to Burnett which was used as a standard variety. The plots were seeded at the normal seeding rate.

Oats grown for grain has been a poor crop. Therefore, most producers who raise oats feed them to livestock. The question was raised should these producers harvest the oats for forage or for grain. The experiment was conducted along side of the oat variety grain yield test plots.

The average grain yield of the eleven varieties tested was 41 bushels per acre. Based on \$1.80 per bushel it was calculated that the 40% moisture hay produced would have cost about \$23.00 per ton. The grain produced would have returned about \$74.00 per acre whereas the forage or hay would have returned \$161.00 per acre. The producer would have been much better off to cut the oats for forage rather than to take it as a grain crop. The data are reported in table 27.

Table 28. Oat Variety Performance Trial - Meade County(Plainview), 1979-81.

Variety	Maturity	Height	Date of	Test Wt	Grain Yield-Bushel/Acre		
	Rating	(Inches)	Heading	(Lb./Bu)	[3 yr av]	1981	1982
Chief	Medium	29	June 28	31.0	40.4	29.9	X
Larry	Early	29	28	27.0	--	29.9	X
Bates	Early	26	27	27.7	39.3	27.7	X X
Noble	Medium	30	29	25.8	46.0	26.8	XX X
Otee	Early	26	28	29.7	--	25.9	XX XX
							XX XX
Spear	Medium	27	June 28	28.3	42.4	25.0	XXX XX
Burnett	Medium	30	28	28.2	44.0	25.0	XXX XX
Lyon	Late	32	30	24.2	47.6	24.5	XXXXXX
Lang	Early	27	28	25.0	40.2	24.0	XX XXX
Ogle	Medium	27	28	23.8	--	24.0	XX XXX
							XX XXX
Nodaway 70	Early	29	June 28	32.7	40.5	23.1	XXXXXX
Lancer	Medium	26	29	29.5	41.6	23.1	XXXXXX
Wright	Late	30	29	25.8	52.6	21.8	XXXXX
Otana	Late	26	July 2	25.3	45.2	20.4	X XXX
Benson	Late	30	June 30	22.5	40.1	20.4	X XXX
							X XX
Stout	Early	25	June 28	25.3	38.4	20.0	XXXX
Moore	Late	29	July 1	23.7	46.7	19.0	XXXX
Diana	Medium	27	June 28	26.7	--	17.7	XXX
Marathon	Late	29	July 2	20.8	47.8	15.0	XX
Froker	Late	28	2	26.0	--	12.7	X

LSD(05) - 4.7 Bu/A

C.V. - 12.4%

Mean - 22.8

*Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

Note: Plots were seeded on April 14 at 64 pounds per acre, and harvested on July 30. Drill row space was 8 inches.

The oat trial at Plainview was seeded into fallow soil. Abnormally high temperatures in early July and subnormal rainfall reduced yields and grain quality. The 1981 yields were reduced from 75% down to 31% of the 3 year average. Data are reported in table 28.

Table 29. Oat Variety Performance Trial - Pennington County(Wall), 1979-81.

Variety	Height (Inches)	Percent Groat*	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield - Bu/Acre		
					(3 yr. av)	1981	1982
Otana	33	47.2	16.2	27.6	78.6	91.8	X
Lancer	28	67.6	19.9	33.0	72.7	85.8	XX
Bates	30	69.6	19.8	34.9	74.8	85.5	XX
Lang	29	59.2	14.2	32.2	69.4	85.1	XX
Moore	34	48.8	20.8	30.6	76.7	84.1	XXX
							XXX
Ogle	29	49.0	19.1	29.5	--	81.8	XXXX
Benson	33	63.4	19.6	30.2	66.8	80.5	XXXX
SD 743358-10	30	65.0	21.8	30.5	--	79.8	XXXX
Wright	33	63.0	22.0	32.9	72.1	79.8	XXXX
Lyon	35	62.2	21.5	29.1	73.7	79.5	XXXX
							XXXX
Burnett	32	60.2	20.1	32.9	69.2	75.8	XXXXX
Preston(MN76161)	30	69.2	19.3	33.4	--	72.8	XXXXX
SD 743358-09	31	66.6	19.6	32.0	--	70.8	XXXX
Larry	24	69.0	18.0	33.0	--	70.5	XXXX
Otee	26	64.0	24.4	34.6	62.3	68.8	XXXX
							XXXX
Nodaway 70	31	77.2	19.3	34.9	60.0	68.5	XXXX
SD 743358-06	30	71.2	19.1	33.6	--	68.5	XXXX
SD 743358-11	32	63.6	18.8	29.4	--	68.2	XXXX
Chief	30	70.4	19.6	33.5	62.0	67.5	XXXX
Noble	29	45.2	16.8	30.9	65.5	67.5	XXXX
							XXX
Marathon	32	48.4	22.1	26.4	66.4	65.5	XXX
Dal	30	48.6	23.6	29.1	64.4	64.2	XX
Froker	32	52.6	20.4	28.4	65.0	63.5	XX
SD 743358-17	32	65.8	15.2	30.0	--	62.8	XX
SD 743358-12	34	47.0	24.8	29.1	--	59.8	X

LSD(05) - 15.8 Bu/A

C.V. - 15.3%

Mean = 73.9

* Percent groat and percent protein determined with Technicon 300 Infranalyzer.

**Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

Note: Plots were seeded on April 10 at 64 pounds per acre, and harvested on August 4. Drill row space was 8 inches.

Pennington County

The oat variety trial at Wall was seeded in early April in fallow. Soil moisture was adequate to start growth but was limited from then on. Yields were higher than in previous years even though tillers were in limited numbers and conditions were droughty. Agronomic and grain yield data are reported in table 29.

Table 30. Oat Variety Performance Trial - Perkins County(Bison), 1981.

Variety	Maturity	Height (Inches)	Date of Heading	Test Wt (lbs/Bu)	Grain Yield-Bu/A 1981	DMR*
SD 743358-06	Medium	30	June 22	34.8	36.4	X
Ogle	Medium	26	19	28.0	34.7	X X
SD 743358-09	Early	33	19	27.0	33.0	X XX
Lang	Early	26	18	26.8	32.0	X XXX
SD 743358-11	Medium	32	28	33.9	30.6	X XXXX
						X XXXX
Preston(MN76161)	Early	29	June 19	32.8	30.6	X XXXX
Chief	Medium	29	23	26.9	28.9	X XXXXX
Bates	Early	28	19	31.5	27.2	XXXXX
Nodaway 70	Early	30	17	35.2	26.9	XXXXX
Larry	Early	25	19	24.5	26.5	XXXXXX
						XXXXX
SD 743358-10	Medium	32	June 25	32.1	25.8	XXXXXX
SD 743358-12	Late	35	30	27.0	25.2	XXXXXX
Lyon	Late	30	29	26.6	24.5	XXXXXX
Dal	Late	27	July 1	33.2	23.5	XXXXX
Otana	Late	33	June 29	30.2	23.5	XXXXX
						XXXXX
Noble	Medium	24	June 25	24.9	22.8	XXXXX
Froker	Late	27	27	27.2	22.4	XXXXX
Marathon	Late	33	July 1	24.8	22.4	XXXXX
Moore	late	29	June 30	27.2	22.1	XXXXX
Wright	Late	32	28	23.2	22.1	XXXXX
						XXX
Lancer	Medium	30	June 28	26.6	21.8	XXX
Otee	Early	30	21	28.1	21.1	XXX
Burnett	Medium	28	24	26.6	18.0	XX
SD 743358-17	Late	29	30	27.8	17.7	X
Benson	Late	32	27	25.0	17.7	X

LSD(05) - 7.3 Bu/A

C.V. - 20.4%

Mean - 25.5

*Duncan's Multiple Range Test showing statistical significant differences at 5%.

Note: Plots were seeded on April 14 at 64 pounds per acre, and harvested on August 12. Drill row space was 8 inches.

Perkins County

A 25 variety oat trial was seeded in Perkins county on April 14. Soil moisture was adequate for emergence. Growth was slow, and grassy weeds were present. Sufficient heads were produced for a good yield. However, extremely high temperatures shortly after heading damaged the plants. Yields were low and weights per bushel below normal. Maturity of the varieties was not important because early varieties were damaged by the heat as much as late maturing varieties.

Spring Barley Trials

Barley variety trials were conducted on a cooperative basis at six locations in 1981. Seeding dates ranged from April 7 to April 16. Soil moisture was adequate for germination and emergence at all sites except Newell. Further growth was limited by subnormal precipitation during the remainder of the growing season. Grain quality was very poor as a result of extremely high temperatures in early July.

Bennett County

The plots in Bennett county were seeded in fallow soil and had sufficient soil moisture for germination and emergence. Rainfall was below normal and temperatures above normal except for May. The combination resulted in short plants and few tillers. Harvesting was completed on August 3 when all plots were mature.

Table 31. Spring Barley Variety Performance Trial - Bennett County (Martin), 1980-81.

Variety	Height (Inches)	Date of Heading	Percent Plumpness*	Test Wt (Lbs/Bu)	Grain Yield-Bushel/Acre (2 yr av)	1981	DMR**
Clark	25	June 24	56.4	47.5	--	56.0	X
Firlbeck III	21	23	65.8	48.0	37.4	40.8	X
WE HV #14	22	22	85.4	50.7	--	40.2	X
Onda	24	20	51.9	41.7	--	39.9	X
Morex	28	20	62.8	45.7	39.3	39.3	X
Klages	21	June 25	28.1	46.7	34.0	37.8	X
Glenn	26	20	44.6	43.0	40.0	37.2	X
WE HV #9	24	21	58.8	43.5	--	36.3	X
SD 79-282	25	22	54.4	45.3	--	36.3	X
SD 79-434	28	21	68.8	45.5	--	35.7	X
Larker	27	June 19	67.0	46.2	36.9	35.4	X
SD 79-435	27	22	44.4	43.5	--	35.1	X
Bumper	27	22	28.4	43.3	--	33.9	X
Primus II	25	19	61.0	46.0	33.1	26.6	

LSD(05) - 6.7 Bu/A

C.V. - 10.6%

Mean - 37.9

* Percentage of kernels not passing through 6/64 inch screen, must be greater than 65% to meet malting standards.

**Duncan's Multiple Range Test showing statistical significant differences at the 5% level of significance.

Note: Plots were seeded on April 16 at 72 pounds per acre, and harvested on August 3. Drill row space was 8 inches.

Butte County

The trial in Butte county was an irrigated study. It was seeded in soil which had been in small grain the previous year. Due to drought conditions it was necessary to irrigate the soil before germination would begin. For that reason the plants were late in starting growth. Stands were irregular as was height and maturity. The area experienced extremely high temperatures in early July which damaged the plants. Test weights and grain yields were lower than anticipated and below the previous years results.

Table 32. Spring Barley Variety Performance Trial - Butte County(Newell), 1979-81 (Irrigated).

Variety	Height (Inches)	Date of Heading	Percent Plumpness*	Test Wt (Lbs/Bu)	Grain Yield-Bushel/Acre (3 yr av)	1981	DMR**
Steptoe	36	June 17	62.9	44.8	82.2	69.0	X
Bumper	37		68.4	47.7	--	66.2	X X
Compana	34	16	80.6	49.5	--	62.9	X XX
Shabet	35		45.8	47.0	--	61.1	X XXX
Hector	34	19	59.9	49.2	69.6	59.0	XXXXX XXXXX
Pirolina	38	June 18	49.0	48.5	--	58.4	XXXXX
Unitan	41		54.0	45.3	--	58.4	XXXXX
Menuet	33	19	68.2	50.3	--	57.5	XXXX
Ershabet	36	16	79.8	51.0	--	57.2	XXXX
Glenn	40	16	72.0	47.7	72.4	56.9	XXXX XXXX
Clark	34	June 18	72.8	48.5	--	56.0	XXXX
WE HV 14	34	15	74.4	49.8	--	54.8	XXXX
SD 79-435	42	19	56.5	48.5	--	54.4	XXXX
Onda	35	14	59.5	43.3	--	52.9	XXXX
Klages	34		66.4	47.7	--	52.6	XXXX XXXX
Larker	35	June 16	69.6	49.5	60.7	51.7	XXXX
Ingrid	32		78.0	49.5	--	50.5	XXX
SD 79-434	42	16	65.1	48.2	--	49.3	XX
Primus II	37	15	69.3	49.2	55.5	49.0	XX
Firlbecks IIII35			77.1	48.7	--	49.0	XX XX
SD 79-282	38	June 17	62.3	46.8	--	48.7	XX
WE HV 9	32	14	58.4	45.0	--	48.4	XX
Morex	36	16	66.8	47.2	62.7	43.9	X

LSD(05) - 9.4 Bu/A

C.V.- 10.4%

Mean - 55.1

* Percentage of kernels not passing through 6/64 inch screen, must be 65% to meet malting standards.

**Duncan's Multiple Range Test showing statistical significant differences at 5%.

Note: Plots were seeded on April 9 at 96 pounds per acre, and harvested on August 6. Drill row space was 8 inches. The barley plots were flood irrigated 2 times during the growing season. The soil received 50 pounds of broadcast nitrogen fertilized on May 14.

Meade County
(Bear Butte Valley)

The barley trial in Bear Butte Valley (table 33) was seeded in fallow soil. Soil moisture, although very limited, was adequate for germination and emergence. Rain-fall in May provided moisture necessary to continue growth. Plants were short but heads were normal length. Heading occurred in mid-June and good yields were expected. However, temperatures in excess of 107° Fahrenheit in early July resulted in blasted heads. Yields were much reduced and test weights were low.

Table 33. Spring Barley Variety Performance Trial - Meade County(Bear Butte Valley), 1978-79-81.

Variety	Height (Inches)	Date of Heading	Test Wt (Lbs/Bu)	Grain Yield-Bushel/Acre		
				(3 yr av)	1981	DMR*
Steptoe	21	June 15	44.3	--	33.6	X
Morex	23	15	46.0	46.3	33.0	X
Primus II	25	13	48.8	42.7	31.2	XX
SD 71-672	22	15	50.7	--	28.4	XX
Park	26	16	43.8	43.2	27.5	XX
Prilar	26	June 15	47.8	41.3	26.9	XX
Larker	25	15	49.2	41.9	26.6	XX
Glenn	24	15	43.5	44.2	26.6	XX
Bumper	26	15	42.2	--	23.3	XX
Klages	22	16	46.8	--	16.9	X

LSD(05) - 8.3 Bu/A

C.V. - 17.7%

Mean - 27.4

*Duncan's Multiple Range Test showing statistical significant differences at 5%.

Note: Plots were seeded on April 7 at 72 pounds per acre, and harvested on July 30. Drill row space was 8 inches.

Meade County
(Plainview)

The spring barley variety trial at Plainview was seeded in fallow soil. Abnormally high temperatures in early July and subnormal rainfall reduced yields and grain quality. The 1981 yields averaged only 60% of the two previous years yields. Weights per bushel indicate the very low quality of the grain. Yield data are reported in table 34.

Table 34. Spring Barley Variety Performance Trial - Meade County(Plainview), 1979-81.

Variety	Height (Inches)	Date of Heading	Test Wt (Lbs/Bu)	Grain Yield-Bushel/Acre		
				(3 yr av)	1981	DMR*
Primus II	23	June 29	39.3	20.3	17.2	X
Larker	24	30	34.7	25.6	16.9	XX
SD 71-672	20	July 1	43.0	--	16.6	XX
Steptoe	22	2	31.5	27.0	15.4	X XX
Glenn	22	June 30	30.8	23.2	14.2	XXX
Prilar	23	June 30	36.3	23.3	12.7	XXX
Morex	23	30	31.7	25.7	12.7	XX
Park	23	30	31.7	23.4	12.4	X
Bumper	22	July 1	31.3	--	9.1	X
Klages	18	2	31.0	--	1.8	

LSD(05) - 2.61 Bu/A

C V - 11.8%

Mean - 12.9

* Duncan's Multiple Range Test showing statistical significant differences at 5% level of significance.

Note: Plots were seeded on April 14 at 72 pounds per acre, and harvested on July 30. Drill row space was 8 inches.

Pennington County

The spring barley variety trial at Wall was seeded in fallow soil on April 10. Soil conditions were good except soil moisture was limited. Germination and emergence was slow but cool temperatures during April and rain in May resulted in good stands. The lateness of growth was detrimental when air temperatures in excess of 105° Fahrenheit were experienced in early July. At that date the plants were all headed and were beginning to fill. The heat cooked the heads and stopped further growth. The yields were reduced as were grain quality. The plumpness percentages were very low with only two varieties satisfactory. The data are reported in table 35.

Table 35. Spring Barley Variety Performance Trial - Pennington County(Wall), 1979-81.

Variety	Height (Inches)	Percent Plumpness	Test Wt (Lbs/Bu)	Grain Yield-Bushel/Acre		
				(3 yr av)	1981	DMR**
SD 79-435	36	43.2	46.1	--	69.6	X
Clark	27	57.4	49.8	--	69.2	XX
Onda	29	49.9	45.1	--	67.6	XX
Bumper	33	26.2	44.8	--	64.0	XXX
SD 79-434	34	64.2	49.0	--	62.8	XXXX
						XXXX
WE HV #9	25	55.5	47.6	--	61.7	XXXX
SD 79-282	35	44.8	47.5	--	60.6	XXXX
Glenn	31	46.0	47.2	63.3	59.9	XXXX
Morex	34	61.2	48.6	60.7	59.4	XXXX
WE HV #14	26	39.2	51.2	--	57.8	XXXX
						XXXX
Firlbeck's III	30	46.6	44.9	--	56.0	XXXX
Primus II	29	73.2	49.2	54.6	54.0	XXX
Klages	26	17.3	43.0	--	51.5	XX
larker	33	71.2	49.4	56.7	48.1	X

LSD(05) - 12.6 Bu/A

C.V. - 14.6%

Mean - 60.2

* Percentage of kernels not passing through 6/64 inch screen, must be greater than 65% to meet malting standards.

**Duncan's Multiple Range Test showing statistical significant differences at 5%.

Note: Plots were seeded on April 10 at 72 pounds per acre, and harvested on August 4. Drill row space was 8 inches.

Perkins County

The spring barley variety trial at Bison was seeded on April 14. Soil moisture was adequate for emergence. Growth was slow with heavy grassy weed competition. Tillering was good and many large heads were produced. However, extremely high temperatures immediately after heading killed the heads. As a result, yields were low and grain quality poor. Weights per bushel were 7 to 15 pounds below standard, and percent plump kernels very low. The data are shown in table 36.

Table 36. Spring Barley Variety Performance Trial - Perkins County(Bison), 1978-79-81.

Variety	Height (Inches)	Date of Heading	Percent Plumpness*	Test Wt (Lbs/Bu)	Grain Yield-Bushel/Acre (3 yr av) 1981 DMR**		
Glenn	32	June 25	5.5	38.6	47.3	52.0	X
Primus II	31	16	41.8	45.2	47.9	52.0	X
Morex	31	26	8.8	41.4	55.7	51.3	X
SD 79-282	36	25	13.0	39.6	--	48.6	XX
SD 79-434	30	27	12.2	41.9	--	44.5	XXX
							XXX
WE HV 9	28	June 22	11.2	40.9	--	44.2	XXX
Onda	32	21	7.3	33.2	--	43.6	XXX
Larker	34	22	7.7	41.4	54.0	40.2	XXX
Clark	28	30	7.9	39.0	--	39.0	XXX
WE HV 14	29	29	23.4	44.9	--	36.8	XX
							X
SD 79-435	31	June 29	15.8	39.9	--	33.8	X
Bumper	31	26	3.0	35.2	--	32.4	X
Firlbeck III	31	30	8.8	38.9	--	32.4	X
Klages	31	30	---	39.2	--	32.2	X

LSD(05) - 11.4 Bu/A

C.V. - 19.3%

Mean - 41.6

* Percentage of kernels not passing through 6/64 inch screen, must be greater than 65% to meet malting standards.

**Duncan's Multiple Range Test showing statistical significant differences at 5%.

Note: Plots were seeded on April 14 at 72 pounds per acre, and harvested on August 12. Drill row space was 8 inches.

SORGHUM VARIETY TESTING

Grain Sorghum

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

Grain sorghum variety trials were seeded in Meade and Pennington counties in 1981. Included were commercial varieties which varied in maturity from short season, or very early, to medium, or mid-season.

The stands varied from excellent to good. Moisture shortage was evident in all trials by the number of plants that failed to produce seed. Heading and pollination for most varieties was not initiated until late-August. The trial in Meade county was badly lodged as a result of weather conditions. It was also badly damaged by sparrows when the seeds were in the milk stage. Yield data are reported in tables 37 and 38.

Table 37. Grain Sorghum Variety Performance Trial - Meade County(Alkali), 1981.

Brand & Variety	Height (Inches)	Percent Lodging	Test Wt (Lbs/Bu)	Grain Yield (Lbs/Acre)
Northrup King 121A	38	40	52.0	1869
Mallard GS1010A	34	35	44.5	1820
Paymaster R920	33	88	50.5	1220
Northrup King 1210	37	48	51.2	926
Western WS-201	46	65	50.0	886
Pioneer 8901	39	86	38.4	838
SD 104	32	65	51.0	715
SD 106	34	65	49.5	696
Northrup King MM54BR	38	46	52.5	672
Northrup King 1580	36	11	48.5	625
Pride P-151GB	39	62	47.5	572
Paymaster R980	34	64	52.0	526
Asgrow Dorado E	36	69	44.0	512
GSA 17GBR	34	40	45.0	473
Northrup King X7911	35	22	46.8	459
Dekalb A28+	37	54	46.5	448
SD 102	36	86	48.2	446
Disco 200R	41	21	50.7	433
Funk's G623GBR	32	20	45.5	417
Disco 385B	34	34	45.0	405
Sokota 488Y	37	42	44.0	403
Disco 204R	35	2	45.5	385
Paymaster R1014	32	68	43.7	384
Pride P508GB	35	34	50.7	376
Cenex 224T	24	45	48.5	365
Pioneer 894	37	66	47.7	360
Mallard GS1044	36	19	46.5	349
GSA SB10	38	52	48.0	341
Disco Duo	38	15	37.0	304
Western WS-203	36	45	40.5	285
Mallard GS1010	34	35	44.5	280
Cargill 20	32	23	46.2	261
Dekalb B38+	37	48	42.5	241
Cenex 228T	34	41	49.5	238
Pride P812GB	32	0	52.0	230
Disco 289R	33	24	43.5	230
SIGCO Two 52YG	30	40	45.0	174
Reliance	42	42	50.0	163
Cenex 700T	40	22	38.0	149
SIGCO Two 54YG	36	26	45.0	138
Sokota 480	36	25	46.5	130
Asgrow Corral	30	28	46.5	69
Cenex 310T	34	10	42.0	21

Mean - 484

Note: Plots were seeded in oat stubble on May 27. Planting rate was 121 Thousand plants per acre. Row space was 36 inches. Harvest date was October 27.

Table 38. Grain Sorghum Variety Performance Trial - Pennington County(Wall), 1981.

<u>Brand & Variety</u>	<u>Height (Inches)</u>	<u>Percent Lodging</u>	<u>Test Wt (Lbs/Bu.)</u>	<u>Grain Yield (Lbs/ Acre)</u>
Pioneer 894	36	21	54.5	1997
Northrup King X7911	36	15	53.5	1958
Mallard GS1010	39	32	52.9	1856
Northrup King MM54	36	14	51.0	1792
Northrup King 121A	36	15	52.1	1772
Pride P812-GB	39	10	51.0	1762
Sokota 480	38	tr	53.6	1716
Northrup King 1580	36	11	53.8	1700
Mallard GS1010A	40	31	51.8	1669
Paymaster R920	42	8	53.2	1657
Sokota 488Y	41	30	49.5	1653
Dekalb B38+	38	16	53.5	1633
Asgrow Corral	36	10	53.5	1631
Funks G623GBR	36	0	48.9	1571
Western WS-201	43	32	51.2	1549
Disco 204R	39	14	51.5	1517
Western WS-203	36	17	48.5	1509
Pride P812-GB	36	14	54.1	1482
Disco 385B	36	30	51.8	1442
Sokota 330F	50	12	45.2	1438
Pioneer 8901	38	9	46.0	1409
Cenex 310T	34	0	52.4	1401
SIGCO Two 54YG	32	13	51.7	1393
Paymaster R980	34	4	54.2	1386
SD 106	37	18	51.8	1343
Paymaster R1014	37	23	50.2	1342
Dekalb A28+	37	24	52.5	1328
Mallard GS1044	40	32	53.0	1322
Cenex 224T	33	4	54.0	1268
Disco 289R	40	0	50.2	1247
SD 102	39	16	53.2	1246
Pride P151-GB	36	40	50.0	1234
GSA SB10	38	15	53.2	1223
Cenex 228T	36	42	52.1	1198
Cargill 20	33	3	49.5	1154
Asgrow Dorado E	35	45	50.1	1091
SD 104	37	8	54.2	1025
GSA 17GBR	33	12	52.7	1021
Northrup King 1210	32	25	50.9	967
SIGCO Two 52YG	32	6	52.2	953
Reliance	38	1	55.7	886
Disco 200R	37	23	52.2	884
Hegari	42	4	54.1	875
Disco Duo	39	0	42.5	737
Cenex 700T	44	0	47.8	598

LSD(05) - 857 Lbs/A

Mean - 1374

See Page 40 for footnotes and notes.

Footnotes for table 38, page 39;

Note: Plots were seeded on May 26 on soil which had been seeded to sorghum in 1980. The seeding was destroyed in mid-season because of poor stand due to drought conditions. The 1981 plots were harvested on October 27.

Sorghum Forage Trials

Objective: To compare the various forage sorghums, sorghum-sudangrass crosses, and sudangrasses as to their adaptability, their forage production, and their forage quality.

Replicated single row plots of forage sorghum, sorghum-sudangrass, and sudangrasses were seeded in Meade and Pennington counties. The trial in Meade county was seeded into soil which had been in an oat crop in 1980, the trial in Pennington county had been seeded to sorghum in the previous cropping year, but it was destroyed because of poor stand due to droughty conditions. The seedbeds were excellent, but soil moisture was limited. Forage yields are reported in tables 39 through 44.

Legend for Plant type in table 40.

<u>Score</u>	<u>Description</u>
1	Tall-Extra Leafy-No Grain
2	Tall-Leafy-Some Grain
3	Tall-Leafy-Grain (50-50)
4	Tall-Few Leaves-Some Grain
5	Tall-Few Leaves-No Grain
6	Short-Extra Leafy-No Grain
7	Short-Leafy-Some Grain
8	Short-Leafy-Grain (50-50)
9	Short-Few Leaves-Some Grain
10	Short-Few Leaves-No Grain

Meade County

A trial containing 41 forage sorghum, 27 sorghum-sudan crosses, and 6 sudangrasses was seeded at Alkali in late May. The trial consisted of replicated single row plots seeded in 36 inch rows. Weed control was accomplished by two cultivations. Stands were fairly uniform and growth normal for plants in a moisture short environment. Growth was erratic with most varieties heading in mid- to late-August. Some dormancy was noted with pollination still visible in mid-October. Lodging was present in nearly all varieties and consisted of stalk breakage at the ground level. The plots were harvested on October 27. Sugar content was determined from the stem tissue at the time of harvest. The data are reported in tables 39, 42, and 43.

Pennington County

The trial was seeded on May 26 and consisted of 41 forage sorghum, 27 sorghum-sudan crosses, and 6 sudangrasses. All varieties were replicated four times in randomized rows spaced 36 inches apart. The plots were cultivated twice after emergence. Stands were uniform but suffered from moisture shortage. Lodging was of minor concern in the forage sorghums but was severe in some of the sorghum-sudan crosses and sudans. Yield data are reported in tables 40, 41, and 44.

Table 39. Forage Sorghum Variety Performance Trial - Meade County(Alkali), 1981.

Brand & Variety	Percent Lodged	Height (Inches)	% Sugar in Sap*	% Dry Matter	Forage Yield-T/A at 12% Moisture
Northrup King X8042F	4	76	12.2	39.0	6.8
Pioneer 956	18	70	5.4	79.4	6.6
Paymaster FS 461	2	55	12.0	49.7	6.0
Disco S210R	9	62	8.3	51.3	5.6
Newell Rose Sweet-N-Red	6	64	16.4	41.0	5.0
Newell Rose Sugar Drip	0	--	20.1	42.2	4.5
Pride PF70	4	62	12.4	37.0	4.5
Pfizer F40A	6	60	17.1	43.4	3.9
Dekalb FS-25a+	0	60	13.6	41.9	3.8
Paymaster FS 351	2	72	8.2	40.4	3.8
Mallard Rine AAA	2	54	17.2	56.8	3.6
Dekalb FS-4	11	66	10.0	48.2	3.6
Northrup King 326	12	66	14.5	42.3	3.3
Newell Rose Early Sumac	10	70	18.4	46.3	3.3
SIGCO Two 54YG	0	46	4.0	64.3	3.3
Pioneer 931	4	75	12.8	38.2	3.3
Northrup King X7984F	11	77	7.6	38.5	3.2
Pride PF38	5	64	12.0	39.8	3.0
Paymaster FS 451	2	55	15.0	49.8	2.8
Rancher	17	78	13.0	43.9	2.8
Western WS-58	0	64	13.0	44.0	2.7
Disco Wintergraze	6	65	12.0	37.6	2.7
Disco Duo	0	51	19.0	51.8	2.7
Waconia	20	74	12.2	38.4	2.7
Western WS-60	15	81	13.4	42.3	2.7
SIGCO Sooner-Sue	16	78	18.4	43.8	2.6
Sokota 330F	0	54	7.2	46.8	2.6
Robinson Regro H20B	1	75	15.3	42.7	2.4
Paymaster FS 351	0	45	14.0	52.3	2.3
Northrup King 367	1	--	11.6	37.9	2.2
Newell Rose Rox Orange	21	57	16.2	39.7	2.0
Newell Rose Sumac 6550	0	61	21.8	41.8	1.9
Newell Rose Leoti Red	18	64	15.9	39.5	1.9
GSA SSF 55	0	67	15.0	42.6	1.8
Newell Rose Hegari	10	51	12.3	48.0	1.8
CENEX 700T	0	54	13.0	45.3	1.4
Newell Rose Atlas Sorgo	1	66	10.2	44.0	1.4
SIGCO Sooner Sweet	16	72	12.3	47.6	1.4
Newell Rose Kansas Orange	8	67	9.0	44.8	1.0
Newell Rose Ellis Sorgo	4	55	7.2	44.2	0.9
FMC Dual	85	59	13.0	65.3	0.6

Mean - 3.0

*Percent sugar was determined with a high contrast refractometer.

Note: Plots were seeded in oat stubble on May 27. Planting rate was 121 Thousand plants per acre in a 36 inch spaced row. The trial was hand harvested on October 27.

Table 40. Forage Sorghum Variety Performance Trial - Pennington County(Wall), 1981.

Brand & Variety	Height (Inches)	Percent Lodged	Leaf Number	Stem Dia. (mm)	% Sugar in Sap*	HCN** (ppm)	Plant Type	Percent Dry Matter	Forage Yield-T/A at 12% moisture
Sokota 330F	70	2	14	20	2.3	349	3	42.0	4.8
GSA SSF 55	64	tr	16	19	1.0	158	2	29.1	4.7
Northrup King 326	68	11	13	20	4.9	263	3	39.5	4.4
CENEX 700T	57	0	13	16	-	482	8	41.0	4.4
Western WS-58	60	0	17	19	4.9	244	8	34.6	4.4
Paymaster FS 461	56	0	14	21	3.7	341	8	43.3	4.4
Mallard Rine AAA	60	1	16	21	3.9	0	8	47.4	4.4
Disco Wintergraze	75	4	14	21	2.6	519	3	33.7	4.2
Western WS-60	66	4	17	20	4.1	346	3	38.7	4.2
Newell Rose Rox Orange	72	tr	15	20	3.1	22	3	33.2	4.1
Paymaster FS 531	77	0	18	21	2.0	668	2	24.0	4.0
Pioneer 931	78	tr	17	25	5.0	722	3	28.3	3.8
Northrup King X8042F	73	1	18	20	1.8	576	3	25.8	3.7
Disco S210R	59	1	18	19	3.1	291	3	30.8	3.7
Newell Rose Atlas Sorgo	70	tr	18	21	2.9	194	3	32.6	3.7
Disco Duo	51	0	16	22	5.1	245	8	33.9	3.6
Newell Rose Sumac 6550	68	tr	15	22	3.7	1000	4	31.4	3.6
Newell Rose Kansas Orange	70	0	15	19	1.8	435	3	35.4	3.4
Newell Rose Hegari	56	5	10	16	2.5	114	8	56.6	3.4
Dekalb FS-4	63	0	15	22	3.6	13	3	33.6	3.4
Paymaster FS 451	56	0	17	20	1.7	508	8	32.2	3.4
Dekalb FS-25a+	62	tr	16	22	3.7	548	3	28.1	3.3
Pride PF 38	72	4	14	17	5.9	400	3	32.4	3.2
Newell Rose Early Sumac	72	13	14	18	2.6	301	3	36.1	3.2
Pfizer F40A	69	7	15	18	4.4	390	3	35.4	3.2
Newell Rose Sweet-N-Red	74	2	17	22	2.1	224	3	29.5	3.1
Pride PF 70	68	tr	18	25	6.7	331	2	24.4	3.0
Paymaster FS 351	52	0	13	21	5.9	149	8	39.8	3.0
Pioneer 956	75	6	16	19	2.7	428	3	35.8	2.9
Newell Rose Leoti Red	72	7	13	21	2.6	28	3	35.6	2.9

(Continued)

(Table 40. continued)

SIGCO Sooner-Sweet	79	tr	12	17	1.9	329	3	33.7	2.9
Waconia	62	tr	14	21	2.9	642	3	30.5	2.8
Newell Rose Sugar Drip	70	0	16	22	3.1	340	2	24.9	2.8
SIGCO Two 54YG	48	tr	14	14	3.8	2	8	54.9	2.8
Robinson Regro H20B	71	tr	13	16	2.7	219	4	31.9	2.7
Northrup King X7984F	69	1	12	15	3.2	-	3	32.4	2.6
Rancher	68	tr	9	17	3.1	-	4	40.1	2.6
Northrup King 367	72	0	19	20	3.1	528	2	18.2	2.3
SIGCO Sooner-Sue	75	1	11	13	3.9	58	3	31.1	2.0
FMC Dual	60	75	9	16	1.7	-	9	64.9	2.0
Newell Rose Ellis Sorgo	68	0	14	18	2.6	42	3	28.4	1.7

* Percent sugar was determined with a high contrast refractometer. Sugar content is lower than normal due to mechanical failure of cold storage unit.

**HCN levels should be considered as relative rather than absolute values. However, any value above 600 PPM should be considered as potentially toxic.

Note: Plots were seeded on May 26. The soil which had been seeded to sorghum in 1980 was fallowed from late summer on. The population was approximately 121 thousand plants per acre. Harvesting was completed on October 28.

Table 41. Sudangrass Variety Performance Trial - Pennington County(Wall), 1981.

Brand & Variety	Height (Inches)	Percent Lodged	Leaf Number	Stem Dia. (mm)	% Sugar in Sap*	HCN* (ppm)	Percent Dry Matter	Forage Yield-T/A at 12% moisture
Northrup King Trudan 8	79	47	11	8	8.5	33	57.5	2.1
GSA FFR 74A	67	55	8	8	9.6	67	65.8	2.0
Northrup King Trudan 6	78	45	9	7	14.5	133	52.6	1.5
Cal/West Monarch	70	23	9	7	7.2	46	57.3	1.4
Piper	71	30	9	7	--	0	66.1	1.2
Acco HS-33	71	30	10	6	9.6	--	50.9	1.0

Mean - 1.5

* Percent sugar was determined with a high contrast refractometer. Sugar content is lower than normal due to mechanical failure of cold storage unit.

**Values are relative and not absolute. Insufficient laboratory sample precludes reliability.

Note: Plots were seeded on May 26. The soil which had been seeded to sorghum was fallowed from late summer on. The population was approximately 232 thousand plants per acre. Harvesting was completed on October 28.

Table 42. Sorghum-Sudangrass Variety Performance Trial - Meade County(Alkali), 1981.

Brand & Variety	Percent Lodged	Height (Inches)	% Sugar in Sap*	% Dry Matter	Forage Yield-T/A at 12% Moisture
GSA SS75	25	66	7.1	44.5	4.8
Paymaster S99	42	72	11.8	42.1	4.3
Sokota 300F	27	69	12.0	42.9	4.2
Pfizer S33	32	67	6.2	40.0	3.9
Pioneer 988	14	64	7.2	46.2	3.8
Dekalb ST-6+	14	74	--	38.5	3.8
Paymaster Sweet Sioux IV	42	73	10.2	49.5	3.6
Mustang Sorghum-Sudan	20	68	7.3	43.0	3.6
Cargill SS100	28	72	4.0	41.8	3.6
CENEX Highland Sweet	25	61	3.3	45.2	3.5
Newell Rose Sunny Sue	30	72	3.0	46.1	3.3
Mallard SSG	22	70	10.2	36.2	3.2
Northrup King Sordan 79	26	71	6.3	35.8	3.2
Robinson SIGCO H1	8	68	1.6	34.8	3.2
Disco 3530	19	73	6.5	35.1	3.1
GSA 1757	72	69	3.0	34.3	3.1
Pride Su-ghum 60	26	68	9.3	37.8	2.8
Western WS-15	11	66	2.0	44.6	2.7
GSA SG62	70	71	3.2	40.4	2.7
CENEX Sweet Suso	9	62	6.4	29.8	2.7
Newell Rose Sunny Sue	32	70	12.2	40.4	2.5
Western WS-20	50	73	6.5	43.2	2.3
Disco 3030	20	63	8.0	37.2	2.3
Newell Rose Sweet SunnySue	28	72	10.8	40.4	2.0
Disco Hidan 35	42	54	2.8	43.5	1.8
CENEX Highland Sweet Two	16	64	8.5	50.6	1.7
Sokota 310F	47	80	2.0	52.0	1.6

Mean - 3.1

*Percent sugar was determined with a high contrast refractometer.

Note: Plots were seeded in oat stubble on May 27. Planting rate was 121 Thousand plants/Acre in a 36 inch spaced row. The trial was hand harvested on October 27.

Table 43. Sudangrass Variety Performance Trial - Meade County(Alkali), 1981.

Brand & Variety	Percent Lodged	Height (Inches)	% Sugar in Sap*	% Dry Matter	Forage Yield-T/A at 12% Moisture
Cal/West Monarch	45	78	11.0	57.3	3.4
Northrup King Trudan 6	69	80	6.0	52.5	3.0
Acco HS-33	20	82	7.2	50.9	2.0
GSA FFR 74A	48	78	5.2	65.8	1.9
Piper	20	78	14.3	66.7	1.4
Northrup King Trudan 8	59	78	6.5	57.4	1.1

Mean - 2.2

*Percent sugar was determined with a high contrast refractometer.

Note: Plots were seeded in oat stubble on May 27. Planting rate was 232 Thousand plants per acre in a 36 inch spaced row. The trial was harvested on October 27.

Table 44 . Sorghum-Sudangrass Variety Performance Trial - Pennington County (Wall), 1981.

Brand & Variety	Height (Inches)	Percent Lodged	Leaf Number	Stem Dia. (mm)	% Sugar in Sap*	HCN** (ppm)	Percent Dry Matter	Forage Yield-T/A at 12% moisture
Mallard SSG	84	21	13	14	6.3	--	38.4	3.7
Robinson S1GCO H1	75	12	13	10	8.8	11	29.9	3.4
Dekalb ST-6+	86	16	14	12	8.6	--	29.0	3.1
Disco 3030	85	10	12	13	4.6	--	34.0	3.0
CENEX Highland Sweet	86	16	13	12	2.4	142	37.8	2.9
CENEX Sweet Suso	88	38	15	13	9.2	11	30.2	2.9
Paymaster S99	76	9	12	14	4.5	--	34.3	2.8
Pioneer 988	78	12	12	11	5.3	6	41.6	2.6
Cargill SS100	84	18	14	12	3.0	--	37.2	2.6
Northrup King Sordan 79	85	15	15	11	7.2	18	28.2	2.6
Paymaster Sweet Sioux IV	86	14	14	12	7.0	--	30.3	2.6
GSA 1757	81	9	14	12	8.1	9	31.4	2.6
Pride Su-grum 60	78	10	13	13	4.8	12	33.5	2.4
Northrup King Munchmore	78	6	--	13	8.7	--	30.9	2.4
CENEX Highland Sweet Two	72	14	11	12	7.0	13	34.8	2.4
Western WS-20	84	16	11	11	9.1	--	34.4	2.3
Pfizer S33	76	11	13	13	4.5	--	37.6	2.2
Disco Hidan 35	80	6	11	12	8.5	--	42.0	2.2
Disco 3530	87	12	14	12	3.9	156	32.5	2.1
Western WS-15	83	16	13	12	6.1	--	33.9	2.1
Mustang Sorghum-Sudan	79	12	13	10	5.4	3	31.5	2.0
GSA SH62	73	24	13	9	12.7	--	52.2	2.0
Newell Rose Sunny Sue	80	12	13	11	5.5	--	31.7	2.0
Newell Rose Sunny Sweet	74	22	13	13	6.3	16	30.7	2.0
Sokota 300F	74	18	13	10	6.9	23	34.8	2.0
GSA SS75	74	10	13	11	8.9	48	28.8	2.0
Newell Rose Sweet Sunny Sue	82	14	13	11	5.0	395	35.9	1.9
Sokota 310F	81	19	11	12	5.8	91	38.4	1.7

LSD(05) - 1.0 T/A

C.V. - 28.6%

Mean - 2.5

* Percent sugar was determined with a high contrast refractometer. Sugar content is lower than normal due to mechanical failure of cold storage unit.

**Values are relative and not absolute. Insufficient laboratory sample preclude reliability.

Note: Plots were seeded on May 26. The soil which had been seeded to sorghum in 1980 was fallowed from late summer on. The population was approximately 174 Thousand plants per acre. Harvesting was completed on October 28.

MANAGEMENT, TILLAGE, AND CULTURAL PRACTICES

Seeding Rates of Hard Red Winter Wheat

Objective: To observe and compare growth characteristics, seed quality, and seed production of winter wheat when seeded at progressive rates from 1/4 bushel per acre up to 1 bushel per acre.

Two varieties of hard red winter wheat were seeded in replicated plots at progressive rates of 1/4 bushel per acre up to 1 bushel per acre. Grain quality was compared by measuring protein content and weight per bushel. Grain yield was the final measurement. The data are reported in tables 45, 46, and 47.

Table 45. Rate of Seeding of Hard Red Winter Wheat - Bennett County(Martin), 1981.

Variety	Rate of Seeding (Bushel/Acre)	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield Bu/Acre)
Scout 66	1.00	35	13.7	62.4	47.6
	0.75	36	13.4	61.4	47.1
	0.50	36	13.1	62.5	52.9
	0.25	37	12.4	61.4	53.3
Bronze	1.00	34	14.5	60.1	45.0
	0.75	34	15.5	59.8	50.7
	0.50	34	14.8	59.2	41.6
	0.25	34	14.3	58.9	40.4
LSD(05) - 10.1 Bu/A		C.V. - 14.6%		Mean - 47.3	

* Percent protein determined with Technicon 300 Infranalyzer.

Note: Yield data presented within the table are averages of four replications. Plot size was 6' x 25' with 12 inch spaced rows. Seeded on September 10, 1980 and harvested on July 8, 1981. Normal seeding rate was 60 lbs(1 bushel)/acre.

Table 46. Rate of Seeding of Hard Red Winter Wheat - Pennington County(Wall), 1981.

Variety	Rate of Seeding (Bushel/Acre)	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield (Bu/Acre)
Scout 66	1.00	32	14.0	61.1	35.6
	0.75	33	13.4	61.1	36.9
	0.50	36	13.3	61.4	40.2
	0.25	36	13.6	61.0	37.9
Bronze	1.00	34	14.2	59.6	34.3
	0.75	34	14.1	59.9	36.0
	0.50	37	13.9	59.9	36.0
	0.25	35	13.8	59.2	32.7
LSD(05) - 3.9 Bu/A		C.V. - 7.4%		Mean - 36.2	

* Percent protein determined with Technicon 300 Infranalyzer.

Note: Yield data presented within the table are averages of four replications. Plot size was 6' x 25' with 12 inch spaced rows. Seeded on September 9, 1980, and harvested on July 16, 1981. Normal seeding rate was 60 lbs or 1 bushel/acre.

Table 47. Rate of Seeding of Hard Red Winter Wheat - Perkins County (Bison) 1981.

Variety	Rate of Seeding (Bushel/Acre)	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield (Bu/Acre)
Scout 66	1.00	28	14.5	57.6	30.9
	0.75	28	14.8	57.1	26.9
	0.50	30	14.2	56.8	35.0
	0.25	31	14.3	56.8	31.2
Bronze	1.00	26	15.4	56.8	33.5
	0.75	30	15.4	56.0	28.3
	0.50	30	15.6	56.4	29.6
	0.25	29	14.8	56.4	31.6

LSD(05) - 10.6 Bu/A

Mean - 30.9

* Percent protein determined with Technicon 300 Infranalyzer.

Note: Yield data presented within the table are averages of four replications. Plot size was 6' x 25' with 12 inch spaced rows. Seeded on September 11, 1980 and harvested on July 28, 1981. Normal seeding rate was 60 lbs or 1 bushel/acre.

The winter wheat seeding rate experiment was placed at three locations in western South Dakota. The experimental sites were located in Bennett county, on the states southern border; in eastern Pennington county at Wall, a central location; and in Perkins county, near the northern border of the state. Seeding for all sites was completed within three days.

Plant heights varied with planting rate, but generally the taller plants were found in plots seeded at lower rates. Protein contents were higher for the variety Bronze than for Scout 66 and indicated a trend for lower protein when seeding rates, or stands were less. The trend is a reflection of available soil moisture during kernel filling and maturation.

Weights per bushel were lower when seeding rates were reduced. This would indicate a later maturity which resulted from less competition for soil moisture but ultimately was more damaging because of a period of extremely high temperatures during kernel development in mid-July.

Grain yield trends differed for the two varieties. Scout 66 tended to have higher yields when seeded at lower rates, whereas Bronze tended to have lower yields when seeded at lower rates. The yield trends may be the result of two separate yield component factors. Scout 66 may have the ability to produce more tillers when not subjected to plant competition, or it may be able to produce more seeds per head. Previous research utilizing different varieties resulted in yield patterns similar to those of Bronze, where a positive correlation existed for yield and seeding rate.

Soil Fertility Studies with Winter Wheat

Objective: To compare and study the effects and results of different rates and ratios of inorganic fertilizer on yield, grain quality, and other agronomic characteristics of winter wheat.

Four rates of nitrogen and phosphorus fertilizer and combinations of the rates were applied to plots of winter wheat. The phosphorus fertilizer was applied with the seed with a drill attachment while the nitrogen was broadcast on the surface after seeding. The data are reported in table 48.

Table 48. Effects of Commercial Fertilizer on Grain Yield and Other Agronomic Characteristics of Hard Red Winter Wheat - Pennington County (Wall), 1981.

Treatment	Height (Inches)	Percent Protein*	Percent Moisture	Test Weight (Lbs/Bu)	Grain Yield (Bu/Acre)
0- 0-0	34	13.1	14.7	60.2	46.7
60- 0-0	33	13.9	13.3	60.8	48.3
90- 0-0	32	13.9	13.3	60.8	49.0
120- 0-0	36	13.2	13.4	60.7	49.2
0-15-0	35	13.3	12.7	60.8	55.6
0-30-0	33	13.0	13.5	61.2	51.8
0-45-0	35	14.0	12.8	60.5	58.8
60-15-0	33	13.7	13.3	61.2	47.0
60-30-0	33	13.8	13.1	61.2	52.3
60-45-0	36	13.3	13.0	61.0	56.5
90-15-0	33	13.3	13.0	60.5	54.2
90-30-0	31	13.9	13.0	60.7	49.8
90-45-0	30	13.8	12.8	60.2	56.9
120-15-0	32	13.9	13.4	60.7	47.6
120-30-0	33	14.0	13.4	59.8	54.6
120-45-0	34	14.0	13.2	59.8	54.2

LSD(05) - 12.7 bu/A

C.V. - 14.8%

Mean - 52.0

* Percent protein determined with Technicon 300 Infranalyser.

Note: Yield data presented within the table are averages of four replications. Plot size was 6' x 50' with 12 inch spaced rows. Seeded on September 17, 1980, and harvested July 17, 1981. Normal seeding rate was 60 lbs or 1 bushel/acre.

The application of commercial fertilizer at any of the rates and ratios used did not statistically increase grain yield. However, there were changes in protein levels, maturity, weight per bushel, and grain yield.

Protein levels in the grain were increased when the balance of nitrogen and phosphorus was maintained. Excesses of either nitrogen or phosphorus prevented any sizeable increase.

Maturity was hastened at all levels of application as shown by the decrease in moisture content of the grain at harvest. Weights per bushel were increased over the check plots in all treatments except at the highest level of nitrogen and phosphorus combination.

Grain yields were also increased with all levels of fertilizer application. Although the increase was not statistically significant the dollar increase obtained by the higher level of yield was notable. The greatest increase was obtained when the fertilizer ratio was balanced.

HOW TO DEVELOP A SYSTEM OF CHEMICAL AID FALLOW

There are many reasons to consider the use of herbicides to replace some of the tillage required to produce winter wheat. Maintaining stubble on the soil surface reduces soil erosion, increases snow trap and soil moisture during winter months. It also reduces the fuel required to produce an acre of wheat. All these things, I am sure, are the goals of most wheat producers. There are some factors which may limit the widespread use of currently labeled herbicides to replace tillage. They are soil pH, the presence of free lime in the soil, soil texture, spraying equipment and crop rotation plans. I will list some of the limiting factors that should be checked prior to starting a chemical aid fallow program.

1) Soil factors

The presence of free lime, calcium or magnesium carbonates in the soil causes herbicides such as atrazine to be more active. The lower rates control weeds better but they also last longer in the soil which could cause carry over problems the following growing season. By reducing the rates applied it is possible in some soil to match the rate with the soil pH. Having your soil tested for pH is essential prior to trying to select a herbicide to be used. You should test all areas of the field in question separately because the pH may vary from an eroded hill to non-eroded land. The soil in western South Dakota has developed over a long period of time and this accounts for the changes in pH from the top soil to the subsoil. The subsoil is generally higher in pH and free lime. If the top soil has been eroded away exposing the high lime subsoil, the herbicide performance will change in these spots. There is a guide in the herbicide section of this handout relating to rates of atrazine based on soil pH.

2) Weeds present in stubble after harvest

If a good job of weed control has been accomplished during the growing season it makes the selection of a herbicide for chemical aid fallow easier. Kochia weeds that were cut off with the combine and are now standing above the stubble are difficult to kill with herbicides. These weeds also make it almost impossible to get a residual herbicide to the soil. The weed seed produced from larger weeds provide a vast source of weeds for next season. Weed control of 99 percent may not be good enough if there is too much seed present in the soil. The control of large Kochia, Russian thistle, Foxtail or sunflowers will require tillage or high rates of herbicide application. This would increase the cost of the chemical fallow treatments. Hail damaged wheat can also provide a lot of seed on the ground and the normal rates of residual herbicides will not control all the volunteer wheat. It may be necessary to apply early post emergence treatments of low rates of Roundup or Paraquat on hail damaged wheat stubble.

3) Crop rotations decision

Crop rotations decisions must be made at the time of application of a residual herbicide such as atrazine. A rate designed to control weeds until June of the following fallow season applied in August will generally kill spring planted small grains. An alternative to atrazine might be a short residual herbicide such as Bladex or a nonresidual herbicide treatment like Roundup plus Banvel. There is an experimental herbicide under test which controls most broadleaf and grassy annual weeds except wheat. Sounds good but this herbicide would not allow the grower to change his mind and plant sunflowers, sorghum or corn the following spring.

CHEMICAL AID FALLOW HERBICIDES

Atrazine (AAtrex-Nine-0, 4L, 4LC or 80W) may be applied alone in late summer after wheat harvest at rates of 0.5 to .99 pounds active ingredient per acre. Allow 12 or more months between application and planting of wheat. Do not use on very sandy soils, eroded hillsides, caliche and rocky outcroppings or exposed calcareous subsoil. The soil pH effects the performance of atrazine on soil with less than 2 percent organic matter. It is suggested that different rates be used as the soil goes from 6.8 to 7.9. The following would be a guide for changes in rates and the producer should read and follow label instructions.

6.8 to 7.2	1 pound active ingredient per acre
7.3 to 7.7	3/4 pound active ingredient per acre
7.8 to 7.9	1/2 pound active ingredient per acre
8.0	Don't treat soil with atrazine

One-half pound of atrazine per acre will not control all volunteer wheat or weeds. Therefore, it becomes necessary to combine the atrazine with other soil applied herbicides such as Bladex or Igran.

If weeds are present at the time of application but less than 6 inches tall, a tank mixture of atrazine with Paraquat CL, Roundup or terbutryn (Igran) should be used. If the weeds are more than 6 inches tall, it is difficult to control them with chemicals.

Cyanazine (Bladex) is applied preemergence at 2.4 to 3.2 pounds per acre to control annual weeds on fallow for future planting to wheat, barley, oats, sorghum or corn. Bladex is a short residual herbicide so carry-over to succeeding crops is unlikely. Because of its short residual, Bladex is recommended for use in combination with atrazine where carry-over could be a problem. This combination allows the producer to apply enough soil active herbicide to prevent fall germination and growth of volunteer winter wheat and winter annuals such as cheatgrass. For example, if the field soil pH was 7.8 and the organic matter was less than 2 percent, it would be recommended that no more than 1/2 pound active ingredient atrazine be fall applied. The combination of 2.0 pounds active ingredient Bladex with 1/2 pound active ingredient atrazine per acre has looked good in demonstration strips this past year.

The action of these soil applied herbicides is moisture dependent. Rainfall is required for activation of Bladex and Atrazine. Generally, 0.5 inch will be adequate if the soil is wet to a depth of 1.5 to 2 inches. Whenever possible, Bladex should be applied at a time when rainfall can be expected within about 10 days. Application for fall weed control may be made after harvest. A late fall application about two weeks ahead of expected soil freeze-up will result in adequate control of early germinating weeds the following spring. Spring applications of Bladex should be made as soon as practical after the soil thaws to take advantage of rains for activation and to move the herbicide into the soil before weeds germinate. If winter annual or annual weeds are present, a tank mix of Paraquat and Bladex should be applied because Bladex does not kill large emerged weeds.

Terbutryn (Igran). If weeds are present at time of atrazine application following wheat harvest, Igran may be tank mixed to control existing annual weeds less than 6 inches tall. Using a ground sprayer, broadcast 2.0-2.5 pounds of Igran 80W plus atrazine in 20 to 60 gallons of water per acre. Add 1-2 pints of a nonionic surfactant per 100 gallons of spray mixture. Add Igran 80W to water in spray tank first, thoroughly mix then add the atrazine, followed by the surfactant. Plant wheat no sooner than 12 months after application.

Paraquat CL. A nonselective contact herbicide that can be used as a substitute for a weed control tillage operation. It can be applied alone or in combination with Atrazine and Bladex at rates of 1-2 pints per acre of Paraquat CL. The herbicide should be applied in 20-60 gallons of water per acre by ground equipment. Add 0.5-1 pint of nonionic surfactant, such as X-77 per 100 gallons of spray mixture. Mix atrazine or Bladex with water first then add Paraquat followed by surfactant. If this sequence is not followed, the mixture may jell. Paraquat is corrosive to exposed aluminum spray equipment.

Glyphosate (Roundup) is a translocated nonselective herbicide with no soil activity at rates applied for chemical fallow. Roundup is labeled at 4 to 6 fluid ounces of Roundup plus 4 to 8 ounces of Banvel. This treatment must have 0.5 percent solution. These rates have given satisfactory control of annual grassy weeds. The addition of Banvel to the Roundup helps control hard to kill annual broadleaved weeds such as wild buckwheat, kochia, and Russian thistle. All these annual weeds should be sprayed early before they are 4 inches tall. Volunteer wheat is controlled by 4 to 6 ounces of Roundup when it is small, 2 to 4 inches tall, but if the wheat has developed a crown, a higher rate of 10 to 16 fluid ounces will generally be necessary to control the larger wheat. Field bindweed, Canada thistle and quackgrass will require higher rates to give lasting control. In the future, recommended rates and methods of application may change. Roundup appears to be weather dependent in its activity. The weed control is much better when plants are young and actively growing. Roundup or Roundup combinations may be used where recropped winter wheat is grown, or where a nonresidual herbicide is required.

Bladex + Atrazine. A tank mix combination of Bladex 80W at 2.5 to 3.0 pounds per acre plus atrazine at 0.5 pounds per acre is labeled in South Dakota for annual weed control on fallow. Soils with 3 to 4 percent organic matter require the high rate of Bladex. The Bladex plus atrazine combination gives increased residual weed control compared to Bladex alone. The tank mix combination must be applied before November 15 of the year preceding the planting of winter wheat. Allow 12 or more months between application and planting.

Glean. Glean herbicide is recommended for trial use for selective control of weeds in wheat, barley and reduced tillage fallow systems for wheat. It is a dry flowable granule to be mixed in water and applied as a spray.

Trials have shown that Glean is effective in controlling many annual broadleaved weeds and certain grasses. Glean is not effective at rates applied for the control of volunteer wheat, barley, oats or downy brome. In a fallow system it should be used in combination with tillage or other herbicide to control resistant weeds. Glean will provide extended weed control when applied at one-half ounce product or more per acre. The decomposition of Glean is very slow in a soil with a pH of more than 7.5. Therefore, do not replant to any crop other than wheat within 24 months of the last application on soil with a pH greater than 7.5.

Reduced-tillage fallow--Wheat--In a fallow-to-wheat rotation, apply 1/3 to 2/3 ounce per acre to control weeds during the fallow period. Use the lower rate for short-term weed control (up to 4 months) and the higher rate for longer-term weed control.

For maximum moisture conservation, apply Glean after harvest but before freeze-up. Best results are obtained from applications made to small, actively growing weeds. Use a surfactant to improve postemergence weed control. If weeds other than those listed are present or anticipated, use a suitable registered companion herbicide (follow manufacturer's label instructions).

Sprayer cleanup.—Thoroughly clean all traces of Glend from application equipment immediately after use. A solution of 1 gallon household ammonia in 100 gallons water is recommended for washing spray equipment. Flush tank, pump, hoses, and boom with several changes of water after removing nozzle tips and screens (clean these parts separately).

TANK MIXTURE OF HERBICIDES. All agricultural pesticides which are tank mixed should be registered for use as a mixture by the Environmental Protection Agency. Agricultural pesticides may be tank mixed if all pesticides in the mixture are registered by the Environmental Protection Agency on the crop being treated. However, users must assume liability for any possible crop injury, inadequate weed control and illegal residues.

HERBICIDE RESIDUES IN THE SOIL. Chemical and microbial activity are necessary to break down herbicides in the soil. If the soil is dry or at the improper pH, this action will be slowed down. This is the reason why atrazine applied at the 1 pound per acre active ingredient will give damaging carryover on some soils and not on others. To reduce risk of damaging carryover to winter wheat after fallow, the chemical should be applied as soon after wheat harvest as possible. This will extend the time soil micro-organisms have to decompose it and will also help hold down fall weed competition.