

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 miles west of the village of Box Elder. The office facilities are located on the Central States Fairgrounds at 801 San Francisco Street, Rapid City. Telephone 605/394-2236.

The Research 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 extension agents.

The research conducted is not restricted to a specific area, crop, or soil, but by necessity of workload investigates only those problems which are pertinent to general areas. This report contains results of selected research. It does not include results of incomplete work nor work conducted by projects headquartered from the campus at Brookings.

FIELD PLOT COOPERATORS

<u>Name</u>	<u>Address</u>	<u>County</u>
County Crop Impr. Ass'n	Martin 57551	Bennett
Roger Rosenow	Ralph 57650	Harding
Paul Patterson	Draper 57531	Jones
Clifford Halverson	Kennebec 57544	Lyman
Steve Lien	Presho 57568	Lyman
Gary Hawks	Plainview 57771	Meade
Tim Komes	Sturgis 57785	Meade
Lavon Shearer	Wall 57790	Pennington
Gary Wunder	Bison 57620	Perkins
County Crop Impr. Ass'n	Winner 57580	Tripp

This is an annual report and results published herein are therefore neither complete nor conclusive. 500 copies printed at an estimated cost of 88¢ each.

TABLE OF CONTENTS

	<u>Page</u>
Introduction.	Cover
Weather Summary	3
Bennett County	4
Harding County	4
Jones County	4
Lyman County	4
Meade County	5
Pennington County.	5-6
Perkins County	6
Tripp County	6
Small Grain Variety Trials.	7
Winter Wheat	
Bennett County.	8
Lyman County.	9-10
Meade County.	11-12
Pennington County	13&15
Perkins County.	14-15
Spring Wheat	
Bennett County.	15-16
Harding County.	17-18
Meade County.	18-19
Pennington County	19-20
Perkins County.	21-22
Durum Wheat	
Bennett County.	22
Harding County.	22
Meade County.	23
Pennington County	23
Perkins County.	24
Spring Triticales	
Harding County.	24
Pennington County	25
Perkins County.	25
Oats	
Bennett County.	25-26
Harding County.	27
Meade County.	28-29
Pennington County	29-30
Perkins County.	29-31
Spring Barley	
Bennett County.	32-33
Harding County.	33
Meade County.	34-35
Pennington County	35
Perkins County.	35-36
Sorghum Variety Testing	
Grain Sorghum	
Pennington County	36-37
Forage Sorghum	
Pennington County	3
Sorghum-Sudangrass Crosses	
Pennington County	39
Sudangrass	
Pennington County	39
Millet Variety Testing.	40-41

	<u>Page</u>
Management, Tillage, and Cultural Practices	
Seeding Dates of Winter Barley	41
Rate of Seeding Studies of Hard Red Winter Wheat	
Bennett County.	43
Pennington County	43-44
Perkins County.	44
Alternate Cropping Sequences	45-46
Fallow, Seeding, and Fertilizer Alternatives	47-50
Reduced Tillage Studies	
Recropped Winter Wheat-Variety x Tillage.	50-51
Winter Wheat-Grain Sorghum-Fallow Rotations	51-52
Winter Wheat-Fallow-Winter Wheat Rotations.	53
Continuous Winter Wheat Rotation.	55
No-Tillage Grain Sorghum	
Jones County.	56
Tripp County.	57
Preplant Herbicides for Grain Sorghum Production	58
Effects of Non-residual Herbicides, Additives, and Water Source on Control of Downy Brome grass	59

Acknowledgements

The following County Extension Agents assisted in locating cooperators and conducting the research: Gary C. Nies-Martin, Roger Moul-Buffalo, Jerry L. Johnston-Sturgis, Lyndell Petersen-Rapid City, Jeanie K. Severson-Kennebec, Gary Erickson-Murdo, Robert Peterson-Winner, and Vincent J. Gunn-Bison.

The results reported in this pamphlet were funded under Plant Science Projects 1-87540 and 1-87466. Research was conducted by H. A. Geise-Research Agronomist, C. E. Stymiest-Extension Agronomist, and B. E. Jacobson-Assistant in Plant Science, and in conjunction with P. E. Fixen, D. L. Reeves, F. A. Cholick, J. Gellner, R. J. Pollman, J. D. Weber, J. J. Bonnemann, J. D. Smolik, and W. E. Arnold, of Brookings.

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.

Air temperatures during late summer in 1982 were below normal in the Southwest and West Central but above normal in the Northwest and South Central parts of the state. By December the temperatures were normal in Southwest and West Central but were above normal in the Northwest and South Central. From January 1983 through March the mean temperatures were 8 to 11 degrees above normal. Beginning in April the mean temperatures were as much as 6 degrees below normal and continued that way until July, except in the Northwest and South Central where the mean temperature was 2 degrees above normal.

The precipitation patterns in western South Dakota during the last crop year have been similar except for the South Central area. During the period August through September 1982 all areas received near normal precipitation. In October all areas received above normal rainfall which ranged from over 2.8 inches in the Martin area to over 4.6 inches in the Bison area. From November through April all areas received normal precipitation except the South Central where heavy wet snow was received in March, and below normal precipitation in April.

During May the Southwest and West Central areas were wet but Northwest and South Central were normal. In June the Northwest was dry, the Southwest near normal, and the South Central wet. During July as harvest approached the Northwest and Southwest had above normal rainfall while the West Central and South Central areas had spotty rainfall.

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

Month & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
<u>Martin</u> (Bennett County Reporting Station)				
Aug. 1982	72.7	--	2.14	--
Sept. 1982	61.2	--	1.78	--
Oct. 1982	47.8	--	3.82	--
Nov. 1982	32.7	--	0.73	--
Dec. 1982	28.8	--	0.62	--
Jan. 1983	31.9	--	0.24	--
Feb. 1983	36.4	--	0.04	--
Mar. 1983	36.3	--	1.54	--
Apr. 1983	41.1	--	2.06	--
May 1983	51.9	--	4.33	--
June 1983	64.2	--	3.30	--
July 1983	75.0	--	5.00	--
<u>Ralph</u> (Harding County Reporting Station)				
Mar. 1983	32.0	3.6	0.91	0.45
Apr. 1983	38.6	-3.6	0.73	-0.81
May. 1983	50.2	-3.6	3.31	0.70
June 1983	62.0	-0.3	2.09	-1.39
July 1983	72.9	3.3	3.59	1.67
<u>Murdo</u> (Jones County Reporting Station)				
Aug. 1982	74.6	0.3	2.39	0.38
Sept. 1982	62.5	-0.7	1.65	0.30
Oct. 1982	49.0	-3.2	4.14	3.06
Nov. 1982	32.6	-3.3	0.20	-0.30
Dec. 1982	28.1	3.5	0.40	0.04
Jan. 1983	30.9	13.3	0.05	-0.26
Feb. 1983	35.0	11.2	0.04	-0.42
Mar. 1983	35.4	3.4	2.52	1.44
Apr. 1983	41.8	-4.8	1.73	-0.47
May 1983	54.3	-3.8	4.51	1.84
June 1983	66.6	-1.4	2.63	-0.65
July 1983	77.7	2.5	1.80	-0.29
<u>Kennebec</u> (Lyman County Reporting Station)				
Aug. 1982	75.1	1.2	2.40	0.06
Sept. 1982	62.9	0.1	1.65	0.13
Oct. 1982	49.4	-1.8	4.53	3.50
Nov. 1982	32.1	-2.6	0.24	-0.39
Dec. 1982	26.8	4.5	0.46	0.09
Jan. 1983	28.8	13.2	0.02	-0.23
Feb. 1983	33.4	10.9	T	-0.48
Mar. 1983	35.0	3.0	1.83	0.94
Apr. 1983	42.1	-5.2	0.87	-1.26
May 1983	55.4	-3.5	2.81	0.29
June 1983	66.7	-2.4	4.13	1.12
July 1983	78.6	2.8	1.04	-1.25

(continued on following page)

Table 1. Continued

Month & Year	Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
<u>Bear Butte Valley</u> (Ft. Meade-Meade County Reporting Point)				
Aug. 1982	72.5	--	1.68	--
Sept. 1982	60.4	--	2.41	--
Oct. 1982	48.8	--	5.23	--
Nov. 1982	32.7	--	0.25	--
Dec. 1982	29.4	--	0.79	--
Jan. 1983	32.1	9.3	0.48	0.01
Feb. 1983	36.7	8.8	0.10	0.62
Mar. 1983	35.7	2.1	1.84	0.82
Apr. 1983	40.3	-5.2	2.08	-0.33
May 1983	53.1	-3.3	2.19	-1.12
June 1983	64.9	-0.9	1.58	-2.23
July 1983	76.4	3.4	1.60	-0.63
<u>Plainview</u> (Meade County Reporting Point)				
Aug. 1982	M	--	M	--
Sept. 1982	60.9	--	1.39	--
Oct. 1982	46.4	--	3.91	--
Nov. 1982	30.9	--	0.02	--
Dec. 1982	24.8	--	0.34	--
Jan. 1983	28.8	--	0.03	--
Feb. 1983	33.3	--	0.09	--
Mar. 1983	33.1	--	1.19	--
Apr. 1983	40.6	--	0.68	--
May 1983	51.7	--	2.95	--
June 1983	65.0	--	1.56	--
July 1983	77.5	--	1.82	--
<u>Rapid City</u> (Rapid City Airport Reporting Station)				
Aug. 1982	70.2	-1.4	4.83	3.36
Sept. 1982	58.7	-1.8	2.69	1.47
Oct. 1982	47.2	-2.8	3.82	2.96
Nov. 1982	32.7	-2.7	0.27	-0.21
Dec. 1982	28.6	2.1	0.36	-0.03
Jan. 1983	32.1	11.3	0.34	-0.08
Feb. 1983	37.3	11.3	0.18	-0.44
Mar. 1983	36.4	3.8	0.84	-0.18
Apr. 1983	40.7	-3.9	1.00	-0.96
May 1983	52.0	-3.6	2.18	-0.45
June 1983	63.1	-2.1	3.01	-0.25
July 1983	73.6	1.0	1.94	-0.18

* 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>Wall</u> (Wasta-Pennington County Reporting Station)				
Aug. 1982	72.7	--	4.20	--
Sept. 1982	61.5	--	1.87	--
Oct. 1982	48.0	--	4.41	--
Nov. 1982	32.9	--	T	--
Dec. 1982	27.4	--	0.33	--
Jan. 1983	30.6	10.8	0.17	-0.18
Feb. 1983	36.9	10.9	T	-0.44
Mar. 1983	37.9	3.8	0.87	0.02
Apr. 1983	41.6	-5.4	1.27	-0.64
May 1983	53.6	-4.5	2.64	0.13
June 1983	66.4	-1.3	3.54	0.41
July 1983	76.7	1.8	0.77	-1.28
<u>Meadow</u> (Bison-Perkins County Reporting Station)				
Aug. 1982	70.2	--	1.15	-0.66
Sept. 1982	58.4	--	1.46	0.16
Oct. 1982	45.7	--	5.48	4.65
Nov. 1982	26.7	--	0.28	-0.26
Dec. 1982	24.7	--	0.63	--
Jan. 1983	25.7	--	0.23	-0.13
Feb. 1983	30.8	--	0.07	-0.45
Mar. 1983	30.7	--	1.30	0.47
Apr. 1983	38.5	--	1.02	-0.83
May 1983	51.6	--	2.87	0.31
June 1983	63.2	--	3.64	0.36
July 1983	73.1	--	2.48	0.28
<u>Winner</u> (Tripp County Reporting Station)				
Aug. 1982	75.9	1.3	2.66	-0.07
Sept. 1982	64.1	0.3	2.80	0.98
Oct. 1982	51.1	-1.6	5.10	3.88
Nov. 1982	33.7	-3.5	1.00	0.27
Dec. 1982	29.8	3.7	0.67	0.19
Jan. 1983	31.5	11.4	0.09	-0.37
Feb. 1983	36.7	10.6	0.24	-0.46
Mar. 1983	36.6	2.6	2.76	1.40
Apr. 1983	43.3	-5.2	1.79	-0.95
May 1983	56.9	-3.1	5.23	1.98
June 1983	67.6	-2.3	4.83	1.03
July 1983	78.3	1.8	3.75	0.90

* 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 2. Weather Data - Date of Critical Temperatures and Total Useable-Precipitation in Counties with Experimental Plots (1982-1983).

Location	Date of Temperature*		Total Usable Moisture**	
	Fall-First	Spring-Last	Aug. 82-July 83	April 83-July 83
Bennett County (Martin)	Sept. 20 (27)	May 31 (27)	25.60	14.69
Harding County (Ralph)	Sept. 9 (24)	May 14 (22)	19.72	9.72
Jones County (Murdo)	Oct. 7 (28)	May 14 (28)	22.06	10.67
Lyman County (Kennebec)	Oct. 7 (25)	May 14 (28)	20.00	8.85
Meade County (Ft. Meade)***	Oct. 20 (21)	May 14 (28)	20.23	7.45
(Plainview)	Oct. 7 (26)	May 16 (28)	13.98***	7.01
Pennington County (Wasta)	Oct. 7 (26)	May 13 (28)	20.07	8.22
(Rapid City)	Oct. 19 (23)	May 12 (28)	21.46	8.13
Perkins County (Bison)	Oct. 7 (26)	May 14 (26)	20.61	10.01
Tripp County (Winner)	Oct. 21 (25)	Apr. 15 (22)	30.92	15.60

* 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 in two contiguous days.

*** Aug. 1982 missing.

****Ft. Meade was used as the reporting point for Bear Butte Valley.

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, Lyman-(2 locations), Meade-(2 locations), Pennington, and Perkins counties. All plots, except Perkins county, were seeded in non-fertilized fallow with a deep furrow type seeder. The seeding rate was 60 pounds per acre.

The plots were harvested with a Hege Model 125B self-propelled plot combine. Machine harvested plots contained a minimum of 125 square feet per sample. All plots contained six rows with 12 inch spacing.

Table 3. Hard Red Winter Wheat Variety Trial - Bennett County (Martin), 1982-83.

Variety	Percent Stand*	Height (Inches)	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					1983	(2 yr av)
Hawk***	91	34	13.7	54.3	59.2	--
Nell	90	37	13.7	54.6	56.9	52.0
Dawn	90	32	13.3	55.6	55.2	55.2
Brule***	88	34	12.7	53.7	54.2	56.4
Rocky	92	42	13.4	52.7	53.8	55.0
Wings	90	33	13.8	56.3	53.3	--
NE 78668	82	37	13.9	54.7	52.6	53.2
NE 77465	81	36	14.0	55.7	52.2	52.5
Centurk 78	89	38	14.8	54.0	51.8	52.6
Scout 66	84	38	13.4	55.7	51.1	49.6
Lancer	85	41	13.7	56.0	50.0	49.0
Larned	81	36	13.5	55.6	49.7	51.4
TX 79A2729	81	29	14.5	54.2	48.9	--
Rita	92	33	14.6	52.7	48.8	53.2
Baca	88	38	13.9	56.3	48.7	--
SD 76694	86	34	14.9	54.6	48.1	53.6
SD 79613	85	36	13.8	54.0	47.8	--
SD 76705	90	33	13.5	54.6	47.8	50.6
SD 74221	89	34	15.1	55.1	47.5	52.3
Archer	92	30	13.7	53.5	47.0	50.0
Gent	75	39	14.3	55.2	46.3	47.3
Agate	81	38	14.2	55.3	46.3	46.7
Dekalb 554	90	36	12.4	53.0	46.2	--
SD 76598	74	36	13.9	53.8	46.0	51.5
Roughrider	92	42	15.1	55.4	45.9	45.9
Rose	92	35	14.3	55.7	45.8	50.1
NE 78415	82	32	13.6	54.1	45.7	52.3
TAM 105	75	30	13.8	53.5	45.4	48.5
CO 786741	84	31	14.5	55.6	45.4	50.6
Wthrmstr 106	85	37	13.9	55.0	44.4	--
Winoka	89	42	13.6	55.6	43.4	39.8
Nebred	88	38	14.2	54.9	42.4	44.2
SD 76709	61	36	14.8	53.4	40.2	45.5
Bennett	80	34	14.7	55.9	40.0	43.0
Sage	81	32	13.9	55.0	39.0	46.6
SD 75284	55	33	13.4	54.1	36.9	45.1
Norstar	92	47	12.6	51.4	33.4	--
Buckskin	35	37	14.0	50.6	30.0	39.0

LSD(05) = 7.4 Bu/A C.V. = 11.2% Mean - 47.0 49.4

* Percent stand obtained by visual estimate of ground cover on 9 May 1983.

** Percent protein determined with a Technicon 300 InfraAnalyzer.

***Newly released varieties.

Note: Data presented within the table are an average of four replications. Seeded September 20, 1982 and harvested August 2, 1983.

The winter wheat variety trial in Bennett County did not receive beneficial rain until 10 days after seeding. However, there was soil moisture available for germination and emergence. Winter survival was excellent. The wheat responded to above normal rainfall and below normal spring and early summer temperatures with high yields and excellent protein content. Test weights were reduced by 2-3 pounds per bushel by rain which fell after the standing grain was mature.

Table 4. Hard Red Winter Wheat Variety Trial - Lyman County (Presho), 1983.

Variety	Rust Reaction		Wheat Streak	Winter	Percent	Test Wt	Grain Yield
	Leaf	Stem	Mosaic	Hardiness	Protein*	(Lbs/Bu)	Bu/Acre
Wings	S	MR	S	Fair	13.2	65	67.5
Dawn	MR	R	Tol	Fair	12.5	64	63.1
Hawk	R	R	Tol	Fair	12.6	65	62.1
Brule	MR	MR	MR	Good	12.1	62	61.3
Rocky	MS	R	MS	Good	12.9	65	60.0
DeKalb 554	--	--	--	--	13.6	63	59.9
Agate	S	R	MS	Good	14.0	64	59.3
Rose	MR	R	S	Excellent	13.9	65	59.3
Buckskin	S	R	MS	Good	12.3	64	58.5
Sage	MS	R	MR	Good	14.4	63	57.7
Rall	--	--	--	--	14.7	64	57.0
Lancer	S	R	MS	Good	11.7	65	56.9
Nell	S	R	S	Good	12.9	64	56.9
Centurk 78	S	R	MS	Good	12.4	64	55.7
Baca	S	R	MR	Fair	--	65	55.4
Bennett	S	R	S	Fair	13.0	65	54.2
Winoka	S	R	S	Excellent	14.2	66	54.2
Gent	MR	R	MR	Good	13.6	62	52.8
Scout 66	S	MR	MR	Fair	14.4	65	52.2
DeKalb 554**	--	--	--	--	13.8	63	51.2
Houghrider	S	R	S	Excellent	13.0	64	50.9
TAM 105	MS	S	S	Good	12.1	61	50.9
Rita	R	R	S	Good	14.5	61	47.3
Bronze	MR	R	S	Excellent	14.4	63	47.0
Norstar	S	S	S	Excellent	12.7	63	45.7

LSD(05) - 3.8 Bu/A

C.V. - 4.1%

Mean - 55.9

* Percent protein determined with a Technicon 300 InfraAnalyzer.

**1981 Test plot seed.

Note: Seeded September 8, 1982. Good soil moisture, planted on land summer fallowed in 1982.

Table 5. Hard Red Winter Wheat Test Plot - Lyman County (Kennebec), 1981-83.

Variety	Wheat Streak Mosaic	Winter Hardiness	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre 1983	(3 yr av)
Brule	MR	Good	11.8	62	75.8	--
Hawk	Tol	Fair	12.0	65	74.6	--
Dawn	Tol	Fair	12.8	65	73.3	57.3
Rocky	MS	Good	12.3	65	71.5	--
DeKalb 554	--	--	12.1	63	71.3	58.1
Wings	S	Fair	12.1	66	71.2	47.3**
Centurk 78	MS	Good	12.4	66	70.5	53.4
Rose	S	Excellent	13.2	66	69.9	67.6**
Lancota	MR	Good	13.7	65	69.1	--
Bennett	S	Fair	13.2	64	68.5	54.2
Buckskin	MS	Good	12.2	64	66.4	50.3
Agate	MS	Good	13.9	64	66.0	50.2
Sage	MR	Good	13.3	66	65.4	52.4
TAM 105	S	Good	12.0	63	65.3	55.8
Nell	MR	Good	12.8	66	65.1	64.3**
Lancer	MS	Good	13.0	64	64.6	51.1
Rall	MR	Fair	13.3	65	64.1	64.3**
Gent	MR	Good	13.4	64	63.7	51.9
Sage	MR	Good	--	65	62.7	--
DeKalb 554***	--	--	12.3	60	62.1	--
KeKalb 554 (Cork Reuman)	--	--	12.9	63.	62.1	--
Baca	MR	Fair	13.3	65	61.9	--
Rita	S	Good	13.5	61	61.2	52.1
Scout 66	MR	Fair	13.0	64	60.4	46.5
Winoka	S	Excellent	12.7	64	54.5	41.0
Norstar	S	Excellent	11.6	63	53.4	38.4**
Bronze	S	Excellent	13.4	65	53.2	53.3**
Roughrider	S	Excellent	13.8	66	51.5	39.7
Mixture	--	--	13.7	65	52.9	59.9**

LSD(05) - 3.7 Bu/A

C.V. - 3.5%

Mean - 64.6

* Percent protein determined with a Technicon 300 InfraAnalyzer.

** Two year's data

***1981 test plot seed

Note: Seeded September 7, 1982 on fallow at 60 pounds/A. Milboro series soil. Thimet applied for grasshopper control.

Lyman County had more than adequate moisture during the 1982 and 1983 growing season. So much moisture was in the soil that it affected available soil nitrogen. Temperatures were above normal except during October and November 1982. During the winter the average air temperature was 11 degrees above the longtime average. Winter wheat thrived and record yields of high quality grain were produced. Protein quantity and grain yield were lower in those fields which were not fertilized.

Table 6. Hard Red Winter Wheat Trials - Meade County (Bear Butte Valley), 1982-83.

Variety	Height (inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					1983	(2 yr av)
Hawk	34	June 12	18.2	54.0	43.6	--
TAM 105	33	12	16.9	54.1	43.3	53.9
SD 75284	38	13	16.2	55.5	41.8	--
Dawn	37	12	16.4	53.3	41.7	48.0
Archer	31	14	17.9	50.7	40.6	50.2
Baca	43	June 12	16.4	56.8	40.4	49.0
Bennett	38	12	16.3	54.6	40.4	49.4
Scout 66	41	11	16.1	56.5	40.0	49.3
Dekalb 554	41	12	18.0	53.4	37.5	--
Wings	32	12	17.3	52.9	37.3	46.9
Nell	38	June 13	17.7	55.8	37.2	50.2
Brule	33	13	16.7	52.0	36.9	49.2
Gent	39	12	16.8	54.6	36.7	47.6
Rita	35	13	17.8	49.6	36.1	44.5
Lancer	42	12	17.7	56.4	35.9	44.4
Centurk 78	38	June 13	17.5	53.7	35.9	45.8
SD 76705	38	14	18.3	52.0	35.7	--
Wthrmstr 106	38	12	15.7	56.2	35.6	--
Wall	45	11	16.7	55.0	35.6	43.8
Sage	40	11	16.6	55.5	35.4	48.3
SD 76694	38	June 15	18.4	52.3	35.1	--
SD 74221	39	14	18.0	54.5	34.8	--
Rocky	41	14	18.0	53.6	34.7	42.8
Buckskin	38	12	17.7	55.8	34.1	46.7
SD 76598	40	14	17.9	52.9	34.0	--
Agate	39	June 14	17.0	55.6	33.2	43.8
Rose	37	15	17.9	53.2	33.0	43.8
Roughrider	38	19	19.1	55.1	31.9	40.2
Winoka	40	18	17.5	54.3	29.5	39.1
Bronze	40	14	18.4	53.4	24.9	35.8
Norstar	36	20	17.4	53.6	24.7	43.0
SD (05) - 5.4 Bu/A		C.V. - 10.8%		Ave - 36.0		45.9

*Percent protein determined with a Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications. Seeded September 25, 1982. Harvested July 18, 1983.

The winter wheat variety trial in Bear Butte Valley was seeded into moist fallowed soil and received additional moisture within a week. Adequate moisture was available until April 1983. Precipitation was below normal the remainder of the season. Temperatures were normal except during January through March when they were above the longtime average by 8 degrees. Grain yield and weights per bushel were much lower than surrounding areas. The grain quality was low with badly shriveled kernels and high protein quantity. Both of those factors were due to droughty conditions.

Table 7. Hard Red Winter Wheat Trials - Meade County (Plainview), 1982-83.

Variety	Percent Stand*	Winter Hardiness	Percent Protein**	Test Wt (Lbs/BU)	Grain Yield-Bu/Acre 1983	(2 yr av)
Hawk	90	Fair	14.0	62.0	54.8	--
Brule	92	Good	13.3	60.3	53.0	54.2
Wall	86	Good	14.4	62.3	50.9	53.5
Wings	95	Fair	13.8	62.0	50.8	53.8
Rose	92	Excellent	16.0	62.3	50.5	53.4
Archer	93	--	14.3	60.6	49.8	53.2
SD 75705	93	--	15.7	61.2	49.6	--
SD 75284	90	Excellent	15.1	63.2	49.5	--
TAM 105	86	Fair	13.5	62.3	49.0	52.8
Rocky	92	Good	15.2	58.9	49.0	52.3
Dawn	93	Fair	14.2	63.2	48.4	51.4
Baca	92	Fair	14.8	60.9	48.4	51.8
Scout 66	80	Fair	14.9	63.2	48.1	53.8
SD 74221	88	Good	16.2	61.2	48.1	--
Centurk 78	90	Good	15.4	61.2	47.2	51.5
Wthrmstr 106	92	--	14.5	62.0	47.0	--
Gent	80	Good	14.6	62.3	46.6	50.2
Dekalb 554	93	--	14.3	62.0	46.2	--
Rita	93	Good	16.0	59.2	45.7	49.4
Lancer	88	Good	14.7	63.2	45.3	48.4
SD 76598	92	Good	14.8	61.2	45.2	--
Nell	90	Good	14.8	61.7	44.2	50.1
Bennett	88	Fair	14.6	62.9	44.2	51.6
SD 76694	92	Fair-Good	16.0	62.6	44.0	--
Winoka	90	Excellent	15.3	61.2	41.8	46.8
Agate	77	Good	14.8	60.0	41.4	48.1
Sage	70	Good	15.1	62.0	41.2	51.2
Roughrider	92	Excellent	16.6	61.7	41.1	45.9
Buckskin	77	Good	14.5	62.0	36.3	44.8
Norstar	92	Excellent	14.8	62.0	33.6	44.2
Bronze	58	Excellent	15.6	59.5	27.7	38.0

LSD(05) - 7.9 Bu/A

C.V. - 10.6%

Mean - 45.8

* Percent stand determined by visual observation on May 10, 1983.

**Percent protein determined with a Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of three replications. Plots were seeded September 27, 1982 and harvested July 25, 1983.

The winter wheat at Plainview had good soil moisture at seeding time and received additional rain immediately after seeding. Good showers were received in October, however, moisture was short from November through March but normal thereafter. The mean temperatures were near normal during the fall but were 8 degrees above normal from January through March. The remainder of the year was slightly cooler than normal. Grain yields were good, as was grain quality. The kernals were plump with high protein content. Weights per bushel were several pounds above standard weight.

Table 8. Hard Red Winter Wheat Variety Trials - Pennington County (Wall), 1982-83.

Variety	Height (Inches)	Percent Stand*	Date of Heading	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1983	(2 yr av)
Wings	32	90	June 12	13.2	64.8	75.7	--
Rocky	34	90	13	13.0	64.1	75.1	55.0
NE 77465	32	89	11	13.8	63.7	74.3	56.4
Centurk 78	34	90	13	13.7	--	74.1	53.7
Dekalb 554	35	91	13	13.6	63.6	72.5	--
Hawk***	28	85	June 12	13.2	63.9	72.5	--
Rita	30	92	13	14.9	60.6	72.1	54.6
Brule***	32	89	12	12.2	63.1	72.1	56.9
NE 78415	31	86	13	14.7	63.4	71.6	56.0
Archer	28	91	13	13.4	62.5	71.6	52.8
SD 79613	34	86	June 14	13.8	63.8	71.4	--
Lancer	35	88	12	13.9	65.1	70.6	54.8
Rose***	32	90	14	13.8	63.9	70.5	57.0
Dawn	28	90	12	13.0	63.4	70.0	54.2
Nell***	31	88	11	13.4	63.6	69.5	53.5
NE 78668	34	86	June 13	13.7	63.0	69.1	55.8
Baca	35	85	11	13.3	65.4	68.7	--
SD 76705	29	89	13	14.6	63.6	68.5	51.2
TX 79A2729	25	81	12	13.9	63.6	68.3	--
Wthrmstr 106	36	89	12	13.9	64.6	68.1	--
SD 74221	30	90	June 13	14.9	65.1	67.0	52.7
Agate	35	85	12	14.3	64.3	67.0	55.0
Sage	33	81	11	13.9	64.3	66.9	51.2
Roughrider	36	92	17	14.8	64.3	66.8	52.2
SD 76694	30	89	13	14.8	63.2	66.6	52.0
SD 76598	33	82	June 13	13.6	64.7	65.2	50.2
Bennett	30	86	11	15.1	64.0	64.9	51.6
Norstar	37	86	18	13.0	64.1	64.6	--
Nebred	33	84	13	14.2	64.6	64.6	50.6
Buckskin	32	76	12	14.0	63.8	64.6	51.0
CO 78741	30	88	June 11	13.9	64.4	64.5	48.5
Scout 66	34	86	11	14.3	65.1	64.4	50.8
TAM 105	26	85	11	13.5	63.5	64.3	55.6
Larned	34	85	11	14.3	65.0	63.9	52.2
SD 75284	28	80	11	15.4	64.1	62.6	53.6
Winoka	38	92	June 17	13.9	65.1	61.9	50.3
SD 76709	33	75	11	15.5	64.5	57.8	44.6
Gent	32	76	11	14.2	64.3	57.1	44.4

LSD(05) - 0.7 Bu/A

C.V. - 7.1%

Mean - 67.9

* Percent stand, based on ground cover, was observed on May 17, 1983.

** Percent protein determined with Technicon 300 InfraAnalyzer.

***Varieties released since 1981.

Note: Data presented within the table are an average of four replications.

Plots were seeded on September 20, 1982 and harvested August 3, 1983.

Table 9. Hard Red Winter Wheat Variety Trial - Perkins County (Bison), 1982-83.

Variety	Height [Inches]	Percent Stand	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1983	(2 yr av)
Baca	34	91	June 12	12.1	60.6	57.2	--
Rose	29	85	18	13.6	62.5	57.0	47.0
Norstar	42	90	22	10.8	60.1	55.0	--
Rocky	32	89	17	11.9	61.2	54.2	--
Centurk 78	33	88	15	13.2	60.8	54.0	34.0
Nell	30	89	June 13	12.5	60.0	51.8	37.4
Hawk	27	81	14	13.9	61.3	51.7	--
Dekalb 554	33	88	14	11.9	61.0	51.2	--
Wthrmstr 106	33	88	14	12.8	60.6	49.9	--
Brule	29	88	14	11.6	58.8	49.3	37.1
NE 77465	31	84	June 16	13.0	61.0	48.6	35.6
Wings	28	86	13	14.0	61.8	48.1	--
Roughrider	35	90	19	12.9	60.9	47.9	41.8
Lancer	34	89	16	13.1	60.3	47.8	33.0
Archer	27	85	15	13.0	59.8	47.7	30.8
Rita	28	91	June 16	12.8	59.4	46.9	34.8
Agate	32	79	14	12.5	59.7	46.9	35.6
SD 74221	30	92	16	13.6	60.6	46.6	35.9
Winoka	35	90	19	12.0	61.1	46.2	41.4
NE 78415	28	82	16	12.1	59.7	45.7	36.3
NE 78668	32	84	June 14	11.6	59.3	45.7	36.2
Dawn	27	88	14	12.6	60.8	45.2	32.2
TAM 105	25	84	13	13.5	60.6	44.8	32.0
SD 78705	27	85	16	13.5	60.1	44.3	37.5
SD 76598	28	75	17	12.5	59.8	44.2	33.4
Gent	32	68	June 12	13.3	59.9	43.8	28.8
CO 786741	28	78	13	14.4	60.7	43.2	31.2
TX 79A2729	24	82	14	13.9	61.0	43.0	--
Sage	32	80	13	12.7	59.7	42.9	30.9
Nebred	32	86	15	13.6	60.2	40.8	34.4
SD 79613	29	74	June 17	13.4	60.4	40.4	--
SD 76694	27	88	17	13.6	59.6	39.9	28.3
SD 76284	28	68	14	14.4	59.6	39.0	29.5
SD 76709	30	72	13	14.1	59.6	38.9	32.7
Scout 66	32	84	13	12.8	60.4	38.6	25.9
Bennett	27	82	June 13	12.7	59.7	38.5	29.0
Larned	29	82	13	12.3	60.1	35.7	22.5
Buckskin	29	34	18	13.1	60.0	30.8	23.1
LSD(05) - 10.3 Bu/A			C.V. - 16.1%		Mean - 45.9	33.4	

*Percent protein determined with Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications.
Plots were seeded September 16, 1982 and harvested August 5, 1983.

Pennington County

The winter wheat variety trial in Pennington County was seeded into fallow soil with good moisture. Heavy showers were received in August, light showers in September just prior to and after seeding, and heavy showers in October. Precipitation during the winter and spring was below normal.

The excess moisture in late summer resulted in saturated soil profiles which limited available soil nitrogen. Winter wheat yields of over 70 bushels per acre were harvested where commercial fertilizer was applied. The quality of the grain was excellent with weights per bushel ranging from 60 to 65 pounds. Protein content ranges from 13% to 15%. Yield and other data are shown in table 8.

Perkins County

The trial in Perkins County was seeded in mid-September. Stored soil moisture was minimal because subnormal rainfall was received during the summer of 1982. Heavy showers received in early October provided moisture necessary to grow healthy vigorous wheat seedlings. Precipitation was normal throughout the following months and adequate moisture was available to produce excellent grain yield. Temperatures were above normal during January and February. Winterkill was negligible. Grain quality was good with average protein content and normal weights per bushel. Grain yield and other agronomic data are listed in table 9.

Hard Red Spring Wheat

Plots were seeded at six locations in 1983. All trials were seeded on fallow with a six 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 10 thru 15.

Bennett County

Hard Red Spring Wheat plots at Martin were seeded on April 21 in soil fallowed in 1982. Soil moisture was excellent at seeding time. Above normal precipitation was received in May, while mean air temperatures were 6 degrees below normal. Plants were vigorous and tillered profusely. Rainfall during early July was limited and plants were showing stress during the kernel filling period. In late July when the grain was nearly mature it received a heavy shower which reduced weights per bushel. The droughty conditions are indicated by the high protein content shown in table 10. Grain yields were more than double the average of 1981-82.

Table 10. Hard Red Spring Wheat Variety Trial - Bennett County (Martin), 1981-83.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					1983	(3 yr av)
Solar	23	July 4	13.9	57.2	39.7	30.7
Marshall	21	3	15.4	55.8	39.3	30.6
Olaf	25	3	15.3	57.8	39.2	31.3
Walera	24	4	13.5	57.0	39.0	27.3
Era	22	3	14.3	56.5	39.0	29.9
Probrand 711	24	July 2	15.3	59.2	39.0	31.1
Pioneer PR2360	23	2	16.0	57.8	38.6	--
Erik	24	3	14.9	55.5	38.5	--
Guard	24	June 29	15.1	59.4	38.4	--
SD 8026	29	28	15.3	58.4	38.0	--
Oslo	23	June 28	14.7	57.1	37.4	33.3
Wheaton	22	July 2	15.4	56.9	37.4	--
Stoa (ND 582)	30	2	15.5	55.9	37.4	--
Pioneer PR2369	24	1	14.8	60.5	37.0	--
Arrowhead EX200	24	3	16.5	55.3	37.0	--
SD 2861	24	June 29	15.6	57.7	36.7	33.2
Len	25	July 3	15.9	56.8	36.4	31.4
Alex	29	3	15.3	58.0	36.4	30.5
Angus	24	3	15.2	58.7	35.7	29.7
SD 2854	28	2	16.0	55.8	35.4	30.3
West Bred 906R	22	June 29	15.3	58.4	35.2	30.8
SD 2912	23	July 1	16.2	58.1	34.6	--
James	27	June 29	15.9	56.3	34.6	30.4
Centa	29	27	16.0	58.4	34.4	--
Causmex A-99AR	29	July 4	17.1	54.1	34.0	--
Butte	28	June 30	15.5	58.7	33.8	32.9
West Bred Aim	24	July 1	13.2	56.5	33.5	30.3
Eureka	29	2	16.2	55.8	33.4	28.8
West Bred EX8-1	23	June 30	14.1	59.5	33.4	--
Protor	23	30	16.0	59.0	33.2	--
Victory Brand 283	29	July 1	16.6	58.0	32.5	--
SD 2925	25	1	16.7	56.4	32.5	--
Coteau	29	3	16.1	55.3	31.2	27.4
Lew	27	4	16.6	58.0	30.9	25.7
MPV-3	30	3	15.6	56.8	30.4	--
Pondera	24	July 2	15.8	58.8	30.0	26.3
Chris	30	1	16.3	56.9	29.5	26.3

LSD(05) - 5.2 Bu/A

C.V. - 10.6%

Mean - 35.5

30.0

*Percent protein determined with Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications. Plots were seeded April 21 and harvested August 8, 1983.

Table 11. Hard Red Spring Wheat Variety Trial - Harding County (Ralph), 1982-83.

Variety	Height (Inches)	Percent Protein*	Test Wt (lbs/Bu)	Grain Yield-Bu/Acre	
				1983	(2 yr av)
SD 2854	28	16.1	58.8	38.8	51.8
Stoa (ND582)	29	15.9	60.4	38.6	--
MPV-3	31	16.5	60.8	37.4	--
Erick	23	14.8	59.8	37.2	--
Eureka	28	16.6	58.7	36.7	46.6
Alex	28	16.0	60.2	36.2	52.8
Causmex A-99AR	29	15.9	58.9	36.2	--
Butte	29	15.5	61.6	36.0	49.8
Marshall	22	14.6	59.9	35.6	50.1
Oslo	23	13.5	58.0	35.0	46.7
James	28	15.7	60.0	34.8	47.7
Pondera	25	15.6	61.6	34.8	41.0
SD 8026	31	14.9	60.9	34.7	--
Guard	23	15.2	61.0	34.7	52.2
Coteau	27	17.4	58.9	34.5	47.6
Solar	22	14.0	59.8	34.2	41.3
SD 2912	24	14.4	60.1	33.8	--
Pioneer PR2360	25	14.4	59.9	33.6	44.9
Arrowhead EX200	24	15.6	59.6	33.3	--
Probrand 711	24	14.2	60.4	33.2	41.8
Wheaton	23	14.3	58.3	32.8	--
Victory Brand 283	27	15.9	60.4	32.3	--
Era	22	15.1	60.0	32.3	42.9
West Bred Aim	24	14.2	60.4	32.2	46.2
Pioneer PR2369	25	14.5	61.0	32.1	44.2
Olaf	24	16.0	60.4	32.0	49.0
Lew	28	16.1	60.6	32.0	39.8
SD 2861	24	15.8	58.4	32.0	47.1
Chris	30	16.4	59.7	31.8	40.2
Walera	23	14.7	60.0	31.7	42.2
Centa	28	15.4	62.0	31.6	47.8
SD 2925	26	15.6	59.4	31.2	--
West Bred 906R	23	15.2	58.6	31.2	44.6
Len	24	15.3	60.4	30.1	46.2
Angus	24	14.6	61.2	29.8	45.1
Protor	24	14.8	60.8	29.8	--
West Bred EX8-1	24	15.3	60.4	29.2	--
LSD(05) - 5.3 Bu/A		C.V. - 11.4%		Mean - 33.6	46.0

*Percent protein determined with Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications.
Plots were seeded April 27 and harvested August 12, 1983.

Harding County

A spring wheat trial was seeded in Harding County on April 27. Soil moisture was adequate although April received subnormal precipitation. Good rains were received in early May. Air temperatures in April and May were below normal, but normal in June. The combination of rain and temperature resulted in good yields of high quality grain (table 11). The weights per bushel were near the standard and protein content averaged 15%.

Table 12. Hard Red Spring Wheat Variety Trial - Meade County (Bear Butte Valley), 1982-83.

Variety	Height (inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre 1983	(2 yr av)
Oslo**	26	June 25	17.1	52.5	36.4	35.9
WPB 906R**	26	25	17.7	53.3	33.6	35.4
James	29	24	18.9	49.4	33.4	31.9
Guard**	28	24	18.5	51.3	32.8	--
Olaf**	28	25	18.2	52.5	32.2	31.3
Centa	32	June 24	18.0	53.3	30.9	31.5
Butte	30	24	18.3	51.8	29.6	30.9
Pondera**	26	25	19.5	53.9	29.3	29.7
Probrand 711**	25	25	16.8	50.6	29.2	29.7
Eureka	31	24	19.4	49.4	29.1	31.3
Len**	27	June 25	18.3	50.3	28.2	27.5
Wheaton**	24	26	18.3	48.2	28.0	--
Alex	31	24	20.0	52.8	27.6	28.1
Marshall**	24	26	18.2	47.2	27.3	28.1
Solar**	27	27	18.1	49.6	26.2	--
Coteau	27	June 26	19.8	49.3	22.3	24.7
Lew	30	27	19.4	52.6	22.2	24.3
LSD(05) - 2.7 Bu/A		C.V. - 6.5%		Mean - 29.3		30.0

* Percent protein determined with a Technicon 300 InfraAnalyzer.

**Semi-dwarf variety.

Note: Data presented within the table are an average of four replications. Plots were seeded April 19 and harvested August 2, 1983.

Meade County (Bear Butte Valley)

The spring wheat variety trial was seeded in Bear Butte Valley on April 19. Soil moisture was adequate for germination. Precipitation was below normal from April on, so all growth was dependent on moisture received the previous fall and during February and March. Below normal air temperatures in April and May helped to reduce evaporation and compensate for the lack of rain. Grain yield and test weights were reduced and protein contents were extremely high because of the drought conditions. The trial data are reported in table 12.

Table 13. Hard Red Spring Wheat Variety Trial - Meade County (Plainview), 1982-83.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre 1983	(2 yr av)
Oslo**	26	June 26	15.0	58.2	49.8	34.1
Wheaton**	26	28	16.1	55.8	47.0	--
Guard**	26	25	16.1	59.9	46.8	--
Pondera**	28	27	16.2	59.9	46.7	32.7
James	30	25	16.4	58.9	45.7	31.2
Marshall**	27	June 30	16.5	56.1	45.5	29.7
Probrand 711**	27	26	15.6	60.4	45.2	--
WPB 906R	24	26	16.6	58.3	45.0	30.1
Solar**	27	July 1	16.0	56.8	44.6	--
Olaf**	28	June 28	16.5	58.7	43.7	30.8
Alex	32	June 28	17.7	59.2	43.3	34.0
Len**	28	27	16.7	58.3	42.5	28.9
Butte	32	26	16.4	59.7	41.8	35.5
Centa	32	25	16.6	59.4	41.7	33.3
Coteau	33	30	16.8	56.4	39.7	28.2
Eureka	32	June 26	17.5	57.1	39.6	28.1
Lew	30	30	16.4	58.9	39.3	28.6
LSD(05) - 3.0 Bu/A		C.V. - 4.1%		Mean - 44.0		31.2

* Percent protein determined with a Technicon 300 InfraAnalyzer.

**Semi-dwarf variety.

Note: Data presented within the table are an average of three replications. Plots were seeded April 22 and harvested August 2, 1983.

Meade County (Plainview)

A spring wheat variety trial was seeded at Plainview on April 22. The soil had been fallowed in 1982 and received heavy rain in October 1982. Above normal precipitation fell in March, normal through June, and above normal during July. Temperatures were below normal during April and May, normal through June, and above normal during July. Grain yields were much above the previous years, test weights were slightly reduced, and protein content several percent above the expected. The trial data are reported in table 13.

Pennington County

The variety trial at Wall was seeded in fallow on April 20. Soil moisture was adequate for germination and emergence. Snowfall in March and above normal rain showers in June provided moisture necessary to produce above average grain yields. Weights per bushel were reduced and protein content high because of the drought conditions during July. The trial data are reported in table 14.

Table 14. Hard Red Spring Wheat Variety Trial - Pennington County (Wall), 1981-83.

Variety	Height (Inches)	Maturity	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					1983	(3 yr av)
SD 8026	30	Med-Early	15.0	58.8	42.7	--
Era**	26	Late	14.4	56.9	40.0	29.3
Protor**	24	Med-Early	15.8	58.5	39.6	--
Pioneer PR2369**	25	Med-Late	15.3	59.2	39.3	--
SD 2912**	26	Med-Late	16.1	57.4	39.1	--
West Bred 906R**	25	Med-Early	15.4	56.5	38.9	29.7
Oslo**	24	Med-Early	15.0	57.9	38.4	30.9
Marshall**	25	Late	16.2	55.9	38.3	29.9
Pioneer PR2360**	26	Med-Late	15.5	57.0	38.1	--
Centa	31	Early	15.1	58.2	38.1	--
Olaf**	26	Med-Late	16.0	57.0	37.6	29.8
Victory Brand 283	30	--	15.7	60.0	37.5	--
Len**	27	Med-Late	15.6	57.1	37.4	28.0
Arrowhead EX200**	28	Med-Late	16.5	54.4	36.8	--
James	28	Medium	17.1	55.9	36.6	29.9
Wheaton**	25	Med-Late	14.4	54.5	36.4	--
Erik**	26	Late	16.0	53.2	36.3	--
Guard**	24	Med-Early	15.2	59.8	36.2	--
Butte	27	Early	15.5	56.9	36.0	29.8
Coteau	31	Late	16.8	56.3	35.7	27.6
Alex	30	Med-Late	17.4	56.6	35.6	28.7
SD 2861**	26	Medium	15.5	57.3	35.4	29.3
SD 2854	29	Med-Late	15.7	55.7	34.8	28.7
Pondera**	29	Med-Early	15.7	57.8	34.7	27.5
Stoa (ND582)	29	Medium	15.6	56.4	34.2	--
SD 2925	27	Med-Late	16.0	54.5	34.2	--
Solar**	25	Late	14.3	54.6	34.2	26.4
MPV-3	32	Late	17.7	57.0	34.0	--
West Bred EX8-1**	24	Medium	15.1	57.7	33.8	--
Probrand 711**	25	Med-Early	15.2	57.0	33.6	27.8
Eureka	32	Medium	17.4	55.0	33.2	26.7
West Bred Aim**	25	Medium	14.9	55.9	32.4	27.7
Angus**	26	Late	15.4	57.8	32.1	25.7
Chris	32	Med-Late	17.1	56.8	31.7	27.3
Walera**	26	Late	15.3	52.3	31.0	26.7
Causmex A-99AR	32	Late	18.1	53.4	29.9	--
Lew	30	Med-Late	16.2	54.6	27.9	24.0

LSD(05) - 5.3 Bu/A C.V. - 10.6% Mean - 35.7 28.2

* Percent protein determined with a Technicon 300 InfraAnalyzer.

**Semi-dwarf variety.

Note: Data presented within the table are an average of four replications.
Plots were seeded April 20 and harvested August 3, 1983.

Table 15. Hard Red Spring Wheat Variety Trial - Perkins County (Bison), 1982-83.

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
				1983	(2 yr av)
Pioneer PR2369	24	13.9	59.8	45.5	37.2
Guard	23	14.8	59.9	43.9	37.6
Len	24	14.9	59.3	42.5	36.8
Era	24	14.8	59.4	42.3	37.1
Arrowhead EX 200	24	16.5	58.0	40.2	--
Walera	23	14.9	58.0	40.1	35.8
Pioneer PR2360	24	14.6	58.9	40.0	36.2
Probrand 711	25	14.0	60.1	39.3	34.8
SD 8026	27	15.6	58.0	39.0	--
Erik	23	16.1	57.5	39.0	--
Marshall	22	15.5	58.2	38.9	35.8
West Bred Aim	23	14.2	57.7	38.8	35.8
Butte	28	16.1	59.9	38.5	33.2
Stoa (ND582)	29	14.8	58.4	38.4	--
Protor	22	16.2	59.1	38.2	--
Alex	29	16.4	59.2	38.1	34.6
Victory Brand 283	29	16.1	60.0	38.0	--
SD 2854	28	15.1	57.0	38.0	34.0
SD 2912	24	14.2	58.4	38.0	--
West Bred EX8-1	22	16.4	59.4	37.4	--
Solar	23	14.8	58.0	37.3	34.2
Olaf	23	15.8	58.4	36.8	32.6
Pondera	24	16.3	60.1	36.5	32.8
Causmex A-99AR	31	16.2	55.7	36.4	--
MPV-3	32	16.4	58.2	36.4	--
Lew	29	15.2	59.8	35.7	33.4
Centa	26	15.7	59.4	35.2	31.8
Angus	24	16.7	59.6	34.9	32.8
SD 2925	25	16.8	57.9	34.3	--
Wheaton	22	16.1	56.0	34.0	--
Oslo	20	15.5	57.7	33.9	32.0
James	26	16.4	58.2	33.8	29.4
Eureka	30	17.2	57.0	33.8	30.6
Coteau	30	16.9	57.2	33.6	33.4
West Bred 906R	21	16.3	59.8	33.0	33.3
Chris	30	16.9	57.5	32.1	30.0
SD 2861	21	16.8	57.5	32.0	32.5

LS(05) - 6.4 Bu/A C.V. = 12.1% Mean = 37.4 33.9

* Percent protein determined with Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications. Plots were seeded April 22 and harvested August 10, 1983.

Perkins County

The spring wheat variety trial in Perkins County was seeded on April 22 in fallow soil. Soil moisture was adequate for germination and emergence. Snow received in March, and above normal rain during May, June, and July, along with cool temperatures during April and May, resulted in above average grain yields. The quality of the grain was fair with weights per bushel ranging from 55 to 60 pounds. Protein content ranged from 13.9% to 16.9% and could be considered in the normal range. The trial data are reported in table 15.

Durum Wheat

Durum wheat variety trials were seeded at six locations in 1983. The remarks and discussions pertinent to these trials were included in the Hard Red Spring Wheat section and appear just ahead of the table for each location. The yields and other data are listed in tables 16 thru 21.

Table 16. Durum Wheat Variety Trial - Bennett County (Martin), 1981-83.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					1983	(3 yr av)
Lloyd	23	July 2	14.4	56.3	37.9	--
Cando	22	3	14.7	58.8	35.8	22.4
Rugby	27	2	15.3	57.8	33.8	19.5
Vic	27	3	15.5	56.8	33.7	22.6
Crosby	28	2	15.7	57.8	32.5	20.9
Calvin	21	2	15.4	60.2	32.4	--
Edmore	28	3	16.1	56.5	30.4	21.2
Ward	28	2	15.5	56.8	29.8	20.7
LSD(05) - 10.4 Bu/A		C.V. - 18.5%		Mean - 33.2		21.5

*Percent protein determined with a Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications. Plots were seeded April 12 and harvested August 8, 1983.

Table 17. Durum Wheat Variety Trial - Harding County (Ralph), 1982-83.

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
				1983	(2 yr av)
Lloyd	24	12.5	60.2	31.5	47.4
Cando	21	13.4	61.9	29.2	45.8
Ward	28	13.4	61.9	28.5	45.4
Crosby	28	13.7	62.0	27.9	45.2
Calvin	20	13.8	62.2	27.3	46.8
Rugby	27	14.4	60.8	27.0	46.9
Vic	28	14.7	60.6	26.3	43.0
Edmore	28	14.7	59.9	24.6	38.8
LSD(05) - 2.9 Bu/A		C.V. - 7.2%		Mean - 27.8	
				44.9	

*Percent protein determined with a Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications. Plots were seeded April 27 and harvested August 12, 1983.

Table 18. Durum Wheat Variety Trial - Meade County (Bear Butte Valley), 1982-83.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					1983	(2 yr av)
Rugby	30	June 24	17.8	57.0	31.5	33.3
Edmore	32	June 25	17.8	57.5	29.7	30.5
Crosby	31	June 24	17.9	56.4	29.4	31.1
Vic	33	June 25	17.7	57.7	28.2	30.5
Cando	24	June 26	17.6	54.0	26.6	28.3
Lloyd	25	June 26	17.9	53.0	24.8	27.9
LSD(05) - 2.2 Bu/A					C.V. - 5.3%	Mean - 28.4
						30.3

*Percent protein determined with a Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications.
Plots were seeded April 19 and harvested August 2, 1983.

Table 19. Durum Wheat Variety Trial - Meade County (Plainview), 1983.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					1983	(3 yr av)**
Cando	26	July 1	16.0	55.5	44.4	16.4
Lloyd	26	July 2	16.0	54.1	43.9	--
Edmore	34	June 29	16.2	58.8	42.4	17.2
Vic	34	June 29	15.3	58.6	42.3	--
Rugby	33	June 28	16.0	58.7	41.0	18.8
Crosby	33	June 27	16.0	58.5	37.8	18.0
LSD(05) - 4.6 Bu/A					C.V. - 6.4%	Mean - 42.0

* Percent protein determined with a Technicon 300 InfraAnalyzer.

**Average yield is for the years 1979-80-81.

Note: Data presented within the table are an average of three replications.
Plots were seeded April 22 and harvested August 2, 1983.

Table 20. Durum Wheat Variety Trial - Pennington County (Wall), 1980-83.

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
				1983	(4 yr av)
Calvin	24	14.8	60.0	23.6	29.5
Rugby	31	14.8	58.7	22.9	28.9
Cando	24	14.4	57.5	22.4	28.0
Crosby	30	14.1	58.4	21.4	28.2
Lloyd	24	14.6	56.3	21.0	--
Ward	29	15.1	59.4	20.0	28.5
Vic	30	14.7	58.9	19.4	27.3
Edmore	32	15.2	59.2	17.0	26.0
LSD(05) - 6.0 Bu/A					C.V. - 20.5%
					Mean - 20.6

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications.
Plots were seeded April 21 and harvested on August 9, 1983.

Table 21. Durum Wheat Variety Trial - Perkins County (Bison), 1982-83.

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
				1983	(2 yr av)
Rugby	30	14.9	59.0	36.9	33.8
Cando	22	14.0	60.2	34.8	36.6
Ward	28	15.4	59.2	33.5	32.6
Crosby	29	15.0	60.8	33.1	31.2
Edmore	30	15.2	56.2	32.8	31.6
Vic	30	14.3	58.0	32.3	32.3
Calvin	22	15.2	61.7	31.5	--
Lloyd	24	13.7	54.7	30.5	36.6
LSD(05) - 6.9 Bu/A C.V. - 13.8%				Mean - 35.0	33.5

* Percent protein determined with a Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications. Plots were seeded April 22 and harvested August 11, 1983.

Triticales

Plots were seeded at three locations in 1983. All trials were seeded in fallow with a six row plot seeder having an eight inch row spacing. Seeding rate was controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. Harvesting was accomplished with a self-propelled plot combine. Grain yields and other data are reported in tables 22 thru 24.

Triticale varieties seeded at the three locations had yields similar to the adjacent durum wheat varieties. The climatic conditions under which the tests were conducted are discussed under the hard red spring wheat trials. The present varieties have an inherent shrivelled kernel which has a standard weight of 50 pounds per bushel. It is best utilized as a grain feed for swine or poultry.

Table 22. Triticales Variety Trial - Harding County (Ralph), 1983.

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield (Bu/Acre)
SD 9009	34	10.6	51.0	27.9
Kramer	30	11.2	49.8	27.8

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications. Plots were seeded April 27 and harvested August 12, 1983.

Table 23. Triticales Variety Trial - Pennington County (Wall), 1983.

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield (Bu/Acre)
Kramer	27	11.7	43.4	21.6
SD 9009	31	12.1	44.6	17.2
Mean - 19.4				

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications. Plots were seeded April 21 and harvested August 9, 1983.

Table 24. Triticales Variety Trial - Perkins County (Bison), 1983.

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield (Bu/Acre)
SD 9009	35	--	46.1	42.4
Kramer	28	--	46.5	42.1

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications. Plots were seeded April 22 and harvested August 11, 1983.

Oat Variety Trials

Oat variety trials were conducted on a cooperative basis at six locations in 1983. Seeding dates ranged from April 12 to April 27. All trials were seeded on fallow with a six row plot seeder having an 8 inch row spacing. Seeding rates were controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. Harvesting was accomplished with a self-propelled plot combine. Grain yields and other data are reported in tables 25 thru 30.

Bennett County

Oat variety plots at Martin were seeded on April 21 into fallowed soil. Soil moisture was excellent at seeding time. Above normal precipitation and cool temperatures in May were favorable for tillering. During the early part of July rainfall was limited and plants were under moisture stress during kernel development. Grain yield and other data are listed in table 25.

Table 25. Oat Variety Performance Trial - Bennett County (Martin), 1981-1983.

Variety	Height (Inches)	Date of Heading	Percent Protein*	% Oil*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre 1983	(3 yr av)
Larry	21	June 30	16.9	7.9	35.9	90.2	67.4
Ogle	20	July 1	16.4	6.0	33.1	87.4	73.2
Lang	21	June 29	16.7	6.8	34.4	86.8	70.3
SD 790400	23	July 2	18.9	7.1	35.4	84.3	--
Burnett	25	June 30	16.6	6.5	36.9	83.6	62.2
Benson	24	July 2	19.8	6.0	32.8	82.0	61.1
EXP 300**	21	2	19.5	8.5	34.1	81.8	--
Lancer	23	1	20.2	6.8	32.2	81.8	67.7
SD 790458	22	2	18.9	7.7	32.2	81.7	--
Bates	19	June 29	17.9	8.2	38.0	80.4	64.4
Moore	26	July 2	19.3	8.8	33.9	80.0	67.2
SD 743358-06	22	June 28	18.8	6.8	36.2	77.4	53.8
EXP 400**	25	July 2	19.4	8.1	31.9	76.1	--
135E**	24	June 29	18.0	6.5	37.0	75.2	--
SD 790369	25	July 2	19.5	8.1	36.1	74.8	--
MN 79229	23	July 2	20.5	7.9	33.1	74.8	--
Otee	24	June 30	20.3	7.7	35.7	74.6	62.9
335M**	23	July 1	18.5	6.2	34.6	74.4	--
Noble	22	1	18.2	6.3	33.0	74.0	60.9
Lyon	25	2	19.7	7.9	33.4	73.9	61.0
Wright	23	July 2	20.7	9.0	34.1	73.6	58.6
Porter	22	3	18.2	7.9	33.4	73.0	--
Nodaway 70	23	June 28	16.6	5.7	38.9	73.0	56.9
Chief	24	30	17.7	6.3	36.9	72.8	59.3
SD 743358-12	24	July 3	20.4	6.9	34.0	70.3	55.7
Centennial	24	July 1	17.4	5.8	33.3	69.9	--
Marathon	26	4	21.7	8.4	30.7	69.8	55.1
Preston	23	June 29	21.3	9.4	35.3	69.2	57.8
Pierce	23	July 3	18.7	7.7	31.0	68.0	--
Dal	22	3	20.5	8.4	34.3	67.7	56.1

LSD(05) - 7.9 Bu/A

C.V. - 7.4%

Mean - 76.8

61.7

* Percent protein and oil content are based on groats only and were determined with a Technican 300 InfraAnalyzer.

**EXP 300, EXP 400, 135E, and 335M are variety releases from Arrowhead Seed Company.

Note: Data presented within the table are an average of four replications. Seeded April 21 and harvested August 8, 1983.

Table 26. Oat Variety Trial - Harding County (Ralph), 1982-83.

Variety	Height (Inches)	Date of Heading	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1983	(2 yr av)
Otana	27	July 1	37.4	71.6	98.2
Arrowhead X300	25	June 29	34.3	69.4	--
Arrowhead 335M*	25	June 29	37.7	69.4	89.2
Lyon	31	June 29	32.7	68.6	84.4
Pierce	24	July 1	35.0	67.3	--
Moore	28	June 30	35.0	66.3	96.4
Porter	25	July 1	34.3	66.2	108.8
SD 790369	29	June 30	36.4	65.7	--
Ogle	24	June 28	33.5	65.4	105.8
Burnett	25	June 29	38.2	64.7	93.9
MN 79229	29	June 30	35.2	62.9	--
Wright	27	June 30	37.5	62.2	91.4
Benson	26	June 29	34.4	62.2	95.6
Bates	20	June 28	34.6	62.2	93.8
Lancer	25	June 28	36.7	61.8	78.0
SD 790400	26	June 30	33.9	61.6	--
Lang	25	June 28	33.5	61.6	97.0
Arrowhead X400	29	June 30	35.6	60.7	--
SD 743358-12	29	June 30	36.8	60.4	89.0
Noble	24	June 28	35.8	59.4	89.7
SD 790458	25	June 30	39.1	59.3	--
Marathon	28	June 30	32.7	58.9	80.1
Chief	25	June 27	35.5	58.6	71.6
Otee	27	June 28	35.2	57.1	80.6
Dal	26	June 30	35.7	56.6	85.6
Arrowhead 135E*	24	June 28	37.6	55.6	85.8
Centennial	25	June 28	34.4	55.6	--
Preston	25	June 27	34.9	55.1	73.4
Nodaway 70	27	June 27	37.3	54.0	82.2
SD 743358-06	27	June 28	37.4	53.6	88.2
Larry	23	June 27	33.3	53.3	88.2
LSD(05) - 5.8 Bu/A		C.V. - 11.4%		Mean - 61.5	89.0

*Blend of Varieties.

Note: Data presented within the table are an average of four replications.
Plots were seeded April 27 and harvested August 12, 1983.

Harding County

Soil moisture was adequate for germination on April 27 when the Harding County Oat Trial was seeded. Good rains were received in May, and air temperatures were below normal. A combination of rainfall and favorable temperatures helped to produce fair yields of good quality grain (table 26). The weights per bushel were above the standard weight and ranged from 39.1 pounds per bushel down to 32.7 pounds per bushel.

Table 27. Oat Variety Trial - Meade County (Bear Butte Valley), 1982-83.

Variety	Height (Inches)	Date of Heading	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
				1983	(2 yr av)
Bates	29	June 20	35.3	75.6	--
Lancer	31	24	33.1	73.1	75.1
Arrowhead 335M*	33	24	33.6	71.6	76.9
Lang	29	18	31.0	71.2	80.1
Ogle	29	20	32.6	69.7	78.4
Burnett	36	June 22	34.6	68.8	76.3
Preston	32	19	33.9	68.0	71.0
Noble	31	23	32.6	67.3	77.5
Otee	31	19	34.5	66.3	69.7
Benson	36	24	31.7	65.3	78.9
Arrowhead Haylander*	38	June 25	29.5	65.2	67.1
Chief	33	20	32.8	65.1	71.8
Larry	28	21	31.4	63.9	71.5
Lyon	27	25	30.8	62.3	70.1
Nodaway 70	33	18	36.1	62.1	72.1
Moore	35	25	31.3	61.3	68.7
Porter	29	June 26	30.9	60.1	72.9
Wright	35	25	32.7	59.9	67.6
Marathon	37	26	28.5	56.5	67.3
Dal	35	26	32.1	54.2	64.5
Pierce	33	27	30.8	50.8	--
Centennial	33	25	34.2	47.6	--

LSD(05) - 9.2 Bu/A C.V. - 10.2% Mean - 63.9 72.5

*Blend of varieties.

Note: Data presented within the table are an average of four replciations.
Plots were seeded April 19 and harvested August 1, 1983.

Meade County (Bear Butte Valley)

The Oat variety trial was seeded at Plainview on April 22. The soil had been fallowed and had received heavy showers in October 1982. Above normal precipitation was received in March and late July. Temperatures were below normal in July. Grain yield and weights per bushel were lower than in the previous year because of moisture stress during most of the month of July. The trial results are listed in table 27.

Meade County (Plainview)

The Oat varieties were seeded at Plainview in fallow soil on April 22. The area had received heavy rain in October 1982 and in addition above normal precipitation in March and late July. Cool temperatures were experienced during April and May and above normal during July. Average grain yield was slightly above those of 1982 and varied with variety. Protein content determined on hulled grain was above the expected due to drought conditions. The data are shown in table 28.

Table 28. Oat Variety Trial - Meade County (Plainview), 1982-83.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Percent Oil*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre 1983	Yield-Bu/Acre (2 yr av)
335M ⁺	24	June 25	18.8	6.6	36.3	70.0	67.7
Larry	18	26	18.9	9.0	34.1	67.6	70.5
Dal	23	July 3	21.6	9.2	33.0	65.6	65.7
Porter	21	1	19.5	8.0	35.9	65.5	74.3
Haylander ⁺	26	2	23.3	8.9	33.0	65.1	69.3
Lancer	23	June 27	20.0	7.9	36.1	62.5	65.7
Benson	24	29	18.8	7.1	33.5	62.3	64.7
Ogle	20	27	17.6	7.3	33.6	61.8	69.0
Moore	26	July 2	20.2	9.2	33.3	61.7	71.3
Burnett	24	June 26	18.6	6.3	35.1	61.2	65.7
Otee	20	June 26	19.8	8.6	36.0	61.0	64.1
Pierce	22	July 2	20.8	8.2	32.8	59.4	--
Noble	21	June 27	18.1	7.0	34.0	59.4	57.4
Bates	18	29	17.8	9.2	35.4	59.3	--
Wright	22	July 1	20.5	9.1	34.6	59.1	62.9
Marathon	28	July 4	22.2	8.9	28.6	58.3	60.0
Lyon	26	2	19.1	8.3	32.6	58.2	62.9
Preston	22	June 26	22.4	10.0	34.0	56.7	57.6
Lang	18	26	17.1	7.6	32.6	56.1	63.9
Nodaway 70	20	June 26	18.2	6.3	38.8	55.1	64.3
Chief	23	27	18.4	7.5	35.0	54.7	57.3
Centennial	22	29	--	--	31.5	52.7	--

LSD(05) - 11.6 Bu/A

C.V. - 11.8%

Mean - 60.6

65.0

*Percent protein and percent oil determined with a Technicon 300 InfraAnalyzer.

⁺335M and Haylander are variety releases from Arrowhead Seed Company

Note: Data presented within the table are an average of three replications.

Plots were seeded April 22 and harvested August 1, 1983. Protein and oil content were determined on hulled grain or groats.

Pennington County

The variety trial in eastern Pennington County at Wall was seeded on April 20. Soil moisture was adequate for germination and emergence. The area received heavy showers in October, snow in March, and above normal rains in June. High yields of excellent quality grain were produced. The weights per bushel and protein quantity are higher than surrounding areas and those of previous years. The trial data are reported in table 29.

Perkins County

The Perkins County Oat variety trial was seeded on April 22. The fallowed soil had good internal moisture having received heavy rain in October. Snow in March, and above normal precipitation throughout the growing season, coupled with cool temperatures resulted in good grain yields. The quality of the grain was good but because of moisture stress in early July test weights were reduced and ranged from 38.9 down to 30.7 pounds per bushel. The data are reported in table 30.

Table 29. Oats Variety Trial - Pennington County (Wall), 1981-83

Variety	Height	Maturity	Percent Protein*	Percent oil*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
	(Inches)					1983	(3 yr av)
Porter	23	Med-Late	19.1	7.9	39.3	109.0	--
Ogle	23	Medium	17.8	6.5	36.6	106.7	81.5
SD 790400	27	Medium	18.7	7.4	37.1	104.4	--
Arrowhead Exp 300	25	Medium	16.9	6.6	37.1	99.1	--
Burnett	26	Medium	16.3	5.7	38.1	99.0	72.0
Centennial	27	Med-Late	17.2	6.0	38.9	98.8	--
Pierce	25	Late	21.3	8.8	39.6	96.1	--
Moore	26	Late	18.7	9.2	37.4	95.6	75.0
SD 790458	27	Medium	18.2	7.8	38.0	93.7	--
SD 790369	26	Medium	19.3	8.9	36.3	93.2	--
Otee	24	Med-Early	20.2	7.9	39.8	93.1	70.0
Marathon	31	Late	23.1	9.2	33.2	90.1	68.4
Nodaway 70	25	Early	17.9	6.3	38.9	89.9	68.6
Bates	21	Med-Early	18.5	9.0	38.0	89.5	80.9
Arrowhead Exp 400	26	Late	20.2	8.8	37.9	87.3	--
Arrowhead 135E-BL	23	Early	18.9	7.2	40.0	86.7	--
Arrowhead 335M-BL	25	Medium	18.1	6.4	36.9	86.5	--
Larry	20	Early	19.7	8.7	36.7	85.6	70.3
Dal	25	Late	20.7	8.7	39.1	84.9	63.8
Noble	22	Medium	19.6	7.1	36.9	84.4	68.6
SD 743358-06	25	Early	18.5	7.1	40.0	84.4	69.8
Lang	21	Early	17.3	7.5	38.5	83.1	73.9
Chief	25	Medium	17.5	6.3	36.5	82.9	66.8
Lyon	28	Late	21.0	8.4	34.7	81.5	70.1
Preston	23	Medium	24.0	9.9	38.0	81.1	66.7
Wright	25	Med-Late	23.1	9.6	38.4	81.1	72.6
Lancer	22	Medium	20.1	7.2	37.1	78.7	70.6
Benson	21	Med-Late	18.3	6.8	36.3	77.8	70.8
MN 79229	23	Medium	21.9	8.2	37.7	72.8	--
SD 743358-12	27	Late	20.7	7.3	39.1	72.4	61.7

LSD (05) - 18.7 Bu/A

C.V. - 15.0%

Mean - 89.0 70.6

*Percent protein and percent oil were determined in groats only with a Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications. Plots were seeded April 20 and harvested August 3, 1983.

Table 30. Oat Variety Performance Trial - Perkins County (Bison), 1982-83.

Variety	Height (inches)	Maturity Rating	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre 1983	Grain Yield-Bu/Acre (2 yr av)
Larry	13	Early	35.9	90.2	70.4
Ogle	16	Medium	33.1	87.4	78.8
Lang	16	Early	34.4	86.8	72.5
SD 790400	20	Medium	35.4	84.3	--
Burnett	20	Medium	36.9	83.6	75.3
Benson	20	Late	32.8	82.0	73.0
Arrowhead Exp 300	19	Medium	34.1	81.8	--
Lancer	20	Medium	32.2	81.8	71.2
SD 790458	22	Medium	32.2	81.7	--
Bates	16	Early	38.0	80.4	71.0
Moore	22	Late	33.9	80.0	74.2
SD 743358-06	20	Early	36.2	77.4	66.4
Arrowhead Exp 400	22	Late	31.9	76.1	--
Arrowhead 135E	19	Early	37.0	75.2	65.4
SD 790369	22	Medium	36.1	74.8	--
MN 79229	21	Medium	33.1	74.8	--
Otee	17	Early	35.7	74.6	62.2
Arrowhead 335M	20	Medium	34.6	74.4	70.0
Noble	16	Medium	33.0	74.0	63.4
Lyon	23	Late	33.4	73.9	70.3
Wright	22	Late	34.1	73.6	72.2
Porter	20	Med-Late	33.4	73.0	69.0
Nodaway 70	18	Early	38.9	73.0	61.8
Chief	19	Medium	36.7	72.8	60.4
SD 743358-12	22	Late	34.0	70.3	69.5
Centennial	18	Med-Late	33.3	69.9	--
Marathon	24	Late	30.7	69.8	71.2
Preston	18	Medium	35.3	69.2	62.4
Pierce	20	Late	31.0	68.0	--
Dal	21	Late	34.3	67.7	67.0
LSD(05) - 7.9 Bu/A		C.V. - 7.4%		Mean - 76.8	69.0

Note: Data presented within the table are an average of four replications. Plots were seeded April 22 and harvested August 11, 1983

Spring Barley Trials

Barley variety trials were conducted on a cooperative basis at six locations in 1983. Soil moisture was adequate for germination and emergence at all sites. Seeding was accomplished with a six row plot seeder having an eight inch row spacing. Rate of seeding was controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. The dates of seeding ranged from April 12 to April 27. Harvesting was completed with a self-propelled plot combine between July 18 and August 12. Trial data are reported in tables 31 thru 36.

Table 31. Spring Barley Variety Trial - Bennett County (Martin), 1981-1983.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Percent Plump**	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
						1983	(3 yr av)
Glenn	29	June 29	15.6	98	42.2	50.5	40.9
Larker	29	July 1	14.4	100	43.2	50.1	39.8
Robust	28	1	16.4	98	41.6	49.7	--
Morex	29	June 30	15.2	100	41.4	49.1	55.7
Azure	29	July 1	15.5	100	43.6	49.0	--
Primus II	28	June 29	15.5	100	43.5	45.5	35.2
Bumper	30	July 1	16.4	98	42.4	43.4	39.3
Clark	26	3	16.5	98	42.0	42.9	44.9
Firlbeck's III	26	2	16.1	98	43.3	33.6	33.6

LSD(05) - 15.5 Bu/A

C.V. - 20.1%

Mean - 46.0

41.4

* Percent protein determined with a Technicon 300 InfraAnalyzer.

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

Note: Data presented within the table are an average of four replications. Plots were seeded April 21 and harvested August 2, 1983.

Bennett County

The barley variety trial at Martin was seeded on April 21 into fallowed soil that contained a high level of stored moisture. The conditions in May, cool temperatures and good moisture, were favorable for tillering. High temperatures and limited rain in early July produced stress and reduce the quality of the grain. Weights per bushel were 4 to 6 pounds below standard. Yields were above the three year average and are listed in table 31.

Table 32. Spring Barley Variety Trial - Harding County (Ralph), 1982-83.

Variety	Height (inches)	Date of Heading	Test Wt (lbs/Bu)	Grain Yield-Bu/Acre 1983	(2 yr av)
Bumper*	24	June 29	46.9	49.7	44.6
SD 71-672*	24	29	48.1	46.0	--
Azure	24	30	47.8	45.7	60.4
Primus II*	24	27	48.0	45.6	58.0
Unitan*	22	28	45.3	45.4	61.7
Clark	22	June 30	49.6	45.0	60.2
Piroline	19	29	50.3	44.6	59.8
Firlbecks III	20	July 1	49.3	44.1	55.8
Larker*	22	June 30	48.2	43.9	61.8
Glenn*	20	28	46.3	43.8	53.3
Morex*	24	June 30	47.1	43.5	59.0
SD 79-282	24	29	48.0	43.3	--
Robust*	22	30	49.1	40.4	61.0
Klages	19	July 2	49.4	39.6	55.8
Onda	22	June 27	42.7	35.2	47.6
Ershabet	20	28	49.8	34.2	50.0
<hr/>					
LSD(05) - 6.0 Bu/A		C.V. - 9.8%	Mean - 43.1	56.4	

*Plots of variety were severely lodged at harvest time.

Note: Data presented within the table are an average of four replications. Plots were seeded April 27 and harvested August 12, 1983.

Harding County

Experimental plots containing 16 barley varieties were seeded in Harding County on April 27. Cool spring air temperatures were experienced as well as above normal rains in May. Grain yields were much lower than the previous year as were weights per bushel. The lower yields can be attributed to subnormal rain during June and most of July. Rainfall in June was over an inch below normal and was received at mid-month. July showers came after the grain was damaged or drought matured.

Table 33. Spring Barley Variety Trial - Meade County (Bear Butte Valley), 1982-83.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre 1983	(2 yr av)
Azure**	32	June 24	14.4	49.1	61.7	65.0
Morex**	33	June 24	14.5	46.6	60.7	64.6
Primus II	35	June 15	13.8	48.2	59.9	65.3
Larker**	33	June 24	14.5	44.6	58.0	62.3
Glenn**	33	June 22	15.3	43.5	57.9	65.8
Clark	29	June 27	15.7	43.9	57.3	58.7
Robust	34	June 24	14.4	48.2	57.3	--
Bumper**	32	June 25	16.2	40.0	45.7	52.3

LSD(05) - 6.9 Bu/A C.V. - 8.4% Mean - 57.3 62.0

* Percent protein determined with a Technicon 300 InfraAnalyzer.

**Approved malting variety.

Note: Data presented within the table are an average of four replications. Plots were seeded April 19 and harvested August 1, 1983.

Meade County
(Bear Butte Valley)

Spring barley varieties were seeded in western Meade County on April 19. Soil moisture was adequate for germination and emergence. Rainfall was sub-normal for the entire growing season. Air temperatures were also below normal during late spring and early summer. Average grain yields were 5 bushels below the previous year. Weights per bushel were normal for early maturing varieties but below normal for the late maturing varieties. Yield data are reported in table 33.

Table 34. Spring Barley Variety Trial - Meade County (Plainview), 1981-83.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-By/Acre 1983	(3 yr av)
Azure**	29	June 29	13.4	49.1	60.9	--
Glenn**	27	June 29	14.0	48.7	59.9	35.5
Clark	27	July 2	14.8	50.5	58.2	--
Primus II	27	June 27	13.3	50.5	56.0	35.6
Morex**	30	June 30	13.6	48.6	54.9	34.2
Bumper**	30	July 1	14.6	46.1	53.3	29.6
Larker**	29	June 30	14.1	49.9	53.3	33.5
Robust	28	June 30	14.3	50.7	52.2	--

LSD(05) - 4.8 Bu/A C.V. - 5.1% Mean - 56.1 33.7

* Percent protein determined with a Technicon 300 InfraAnalyzer.

**Approved malting variety.

Note: Data presented within the table are an average of three replications. Plots were seeded April 22 and harvested August 1, 1983.

Meade County
(Plainview)

Spring barley varieties were seeded in eastern Meade County on April 22. The soil had been fallowed the previous season and had a high amount of stored moisture. The area had also received five inches of snow in March. Rainfall was normal for the remainder of the season. Air temperatures were subnormal except during July when the mean averaged 3 degrees above the longtime average. Grain yields, test weights, and protein contents are listed in table 34.

Table 35. Spring Barley Variety Trial - Pennington County (Wall), 1981-83.

Variety	Height (Inches)	Maturity	Percent Protein*	Test Wt (lbs/bu)	Grain Yield-Bu/Acre	
					1983	(3 yr av)
Azure**	31	Medium	14.0	47.2	85.6	--
Robust	30	Medium	14.3	48.0	81.1	--
Morex**	33	Medium	13.6	47.5	77.4	51.3
Primus II	29	Very Early	13.5	50.0	76.8	50.9
Bumper**	30	Medium	13.5	43.1	73.9	54.4
Larker**	31	Medium	14.3	49.1	73.1	47.7
SD 79-435	32	--	13.8	44.3	70.9	--
Glenn**	29	Medium	14.3	47.7	70.3	51.4
Firlbecks III	28	Med-Late	14.6	46.0	68.8	47.3
SD 79-282	30	--	13.6	47.2	68.4	--
Clark	28	Med-Late	14.0	45.3	67.9	44.4
Onda**	26	Medium	15.1	45.7	67.9	--
Klages**	30	Med-Late	15.0	42.1	50.6	--
Ershabet	23	Medium	14.3	47.9	49.2	--
LSD(05) - 7.1 Bu/A		C.V. - 7.1%		Mean - 70.1		49.6

* Percent protein determined with a Technicon 300 InfraAnalyzer.

**Approved malting variety.

Pennington County

Soil moisture was adequate for germination and emergence when the spring barley variety trial was seeded at Wall on April 20. Rainfall was above normal in June while air temperatures were normal from April on. The combination of rainfall and temperatures resulted in good yields of grain. However, limited rainfall during July reduced weight per bushel and increased protein content of the kernels. Trial data are reported in table 35.

Perkins County

The Perkins County barley variety trial seeded on April 22. The fallowed soil had good internal moisture having received heavy rain in October. Snow in March, and above normal precipitation throughout most of the 1983 growing season resulted high grain yields. The quality of the grain was excellent with test weights ranging from 52.5 down to 47.5 pounds per bushel. The data are shown in table 36.

Table 36. Spring Barley Variety Trial - Perkins County (Bison), 1982-83.

Variety	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
				1983	(2 yr av)
Glenn	26	13.3	47.5	58.8	47.8
Azure	26	12.9	49.8	58.7	44.4
Clark	24	14.4	51.3	56.0	48.9
Firlbecks III	25	13.8	50.8	55.4	39.0
Primus II	25	13.5	51.5	55.4	43.8
Bumper	26	14.3	48.7	55.4	45.8
Morex	27	13.1	48.6	54.9	45.4
Larker	26	13.8	50.6	51.3	45.0
Robust	25	13.7	52.5	50.6	46.6
Klages	25	12.9	49.6	38.5	43.0
LSD(05) - 7.6 Bu/A		C.V. - 9.9%	Mean - 53.5	44.9	

*Percent protein determined with Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications.
Plots were seeded April 22 and harvested August 11, 1983.

SORGHUM VARIETY TESTING

Grain Sorghum

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

A grain sorghum variety trial was seeded in Pennington County in 1983. Included were public and commercial varieties which varied in maturity from short-season to medium-season.

The stands were spotty as a result of severe soil crusting. The soil was extremely dry and cloddy at seeding time and did not receive moisture for ten days. Five days after the initial rain, a rainy period started in which there were two heavy showers. The rainy period was immediately followed by several days in which temperatures reached the mid-nineties. The combination of heavy rain and high temperatures resulted in a thick crust that sorghum seedlings could not penetrate.

Rainfall during July was much below normal. The area received a total of three quarters of an inch in four showers during the last half of July. The first half of August was also short, but two heavy showers were received in late August.

Normally, grain sorghum will head from late July thru early August. It was during this period that moisture was very limited and initial heading was delayed. The rain after mid-August brought the plants out of dormancy and all varieties headed. The grain yields are quite varied and show no relation to normal varietal maturity. Quality of the grain, as measured by test weight, show no relationship to either maturity or yield. Trial data are reported in table 37.

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. Yield and agronomic data are presented in tables 38 thru 40.

Table 37. Grain Sorghum Variety Trial - Pennington County (Wall), 1982-83

Variety	Percent Lodging*	Height (Inches)	Test Wt (lbs/Bu)	Grain Yield-Bu/Acre 1983	(2 yr av)
CENEX 3101	4	40	55.9	53.3	35.4
Pride P 508GB	2	40	47.3	52.1	45.3
Sokota 488y	tr	37	57.1	51.8	43.9
King's Western Early Hybrid	1	40	56.5	50.6	--
Sokota 480	tr	41	55.4	50.4	34.1
Keltgen 57T	tr	35	46.1	50.3	--
Keltgen 63T	tr	43	45.4	49.5	--
Funk's G 1460	tr	37	56.7	48.6	--
SIGCO 52YG	2	37	52.9	47.8	35.2
Funk's G-499GBR	tr	34	43.4	46.8	--
Paymaster R 1014	1	39	52.1	46.7	36.3
Pioneer 8790	tr	36	47.8	46.0	--
Disco 385B	tr	34	54.4	45.1	42.2
King's Western WS 203	2	38	56.7	44.2	36.3
DEKALB DK-20	1	35	56.2	43.8	--
CENEX 2241	tr	36	57.6	43.7	44.5
Growers GSA SG10	tr	40	47.4	43.2	46.4
Northrup King NK 1210	4	37	44.9	42.2	46.0
Pride P 151GB	2	37	44.6	41.1	40.0
King's Western WS-205	tr	38	55.5	39.2	--
Funk's HW5905	1	38	57.3	39.1	--
DEKALB DK-18	tr	36	45.1	39.1	--
ROB-SEE-CO H-300	tr	39	56.1	38.3	--
Northrup King Mini Milo 54BR	1	37	45.6	36.3	46.7
King's Western WS-201	8	43	54.3	35.8	35.6
Keltgen 60T	tr	39	47.1	35.2	--
SIGCO 54YG	1	38	36.5	35.0	30.0
Northrup King NK 121A	2	36	46.0	34.2	42.3
Mallard GS 1044	tr	37	46.4	33.0	27.4
SD 104	3	39	45.2	31.9	32.6
Cargill 20	tr	33	53.1	31.7	37.5
Pioneer 894	tr	35	37.6	31.2	39.0
Pioneer 8855	7	35	44.2	29.8	--
Paymaster R 920	tr	38	46.6	29.2	38.3
SD 106	tr	37	41.4	29.0	31.8
Funk's G 251	tr	33	42.8	28.8	--
Mallard GS 1010A	3	44	51.8	28.3	29.3
Asgrow Dorado E	1	38	45.4	28.3	34.4
Pioneer 956	42	60	43.4	28.1	--
ROB-SEE-CO EX 5150B	tr	38	35.2	25.9	--
King's Western Early Hegari	4	43	44.2	21.4	--
SD 102	3	36	53.8	14.9	24.8
Reliance	3	38	45.4	14.1	25.2
Pioneer 877F	22	73	45.5	12.5	--
Rose Hegari	5	49	48.1	11.4	12.8
LSD (05) - 14.9 Bu/A	C.V. - 25.1%		Mean - 36.9		36.0

*Percent lodging determined by visual estimate September 19, 1983.

Note: Single row replicated plots were seeded June 2 and harvested October 17, 1983.

Table 38. Forage Sorghum Variety Trial - Pennington County (Wall), 1983.

Brand & Variety	Height (inches)	Leaf No.	Maturity (1-5)*	% Sugar in Sap**	Percent Protein***	Plant Type****	Percent Dry Matter	Forage Yield-T/A @ 12% moisture
Dekalb FS-5	73	17	2	11.2	6.7	3	36.1	7.0
Pioneer 931	91	18	5	9.5	7.5	1	27.3	6.8
Rose Hegari	57	14	2	13.1	6.8	8	38.8	6.8
King's Western Exp 50	74	18	4	10.9	7.2	2	33.7	6.4
Northrup King 367	80	19	5	8.3	8.1	1	23.0	6.4
King's Western WS-60	76	17	4	12.5	7.5	3	29.3	6.1
Rose Rox Orange	65	14	2	9.4	6.4	3	38.5	6.0
King's Western WS-58	65	17	4	9.2	8.3	2	33.0	6.0
Rose Kansas Orange	75	15	4	14.4	4.5	4	34.0	5.8
Paymaster FS461	68	18	4	10.6	6.9	2	32.6	5.6
ROB-SEE-CO H-1	66	16	3	7.6	6.2	3	33.0	5.6
Rose Atlas	74	18	3	11.7	5.4	3	37.7	5.3
ROB-SEE-CO ReGro H22B	76	12	3	12.1	5.0	3	38.4	5.2
Northrup King 326	71	12	3	8.7	8.0	2	29.0	5.2
Rose Sweet-N-Red	79	14	3	11.1	6.3	3	33.4	5.1
Pioneer 956	70	15	1	12.4	6.8	3	44.2	5.1
Keltgen KFS-2	69	16	1	14.7	6.9	3	35.7	4.9
Kelgten KFS-1	69	14	1	12.0	6.4	3	37.4	4.8
Cenex Sweet Suso	71	15	3	12.9	6.8	3	39.4	4.7
Rose Sugar Drip	72	18	5	14.5	5.2	2	29.3	4.7
Rose Leoti	70	13	1	13.8	5.7	3	38.9	4.4
Rose Sumac 6550	71	14	2	12.7	5.7	3	31.2	4.4
Rose Early Sumac	65	14	2	13.1	6.4	4	34.7	4.3
Rose Ellis	71	14	3	8.4	5.7	4	37.6	3.7
Rancher	66	8	1	3.2	6.8	4	39.2	3.5
King's Western Early Hegari	41	14	1	12.2	7.8	4	45.4	2.5

LSD(05) - 2.1 T/A

C.V. - 24.3%

Mean - 5.3

Footnotes are described on page 40.

Note: Data presented within the table are an average of four replications. Single row plots with 36 inch spacing were seeded June 2 and harvested October 7, 1983.

Table 39. Sorghum-Sudangrass Variety Trial - Pennington County (Wall), 1983.

Brand & Variety	Height (Inches)	Percent Lodging	Leaf No.	Stem Diameter	% Sugar in Sap**	Percent Protein***	Percent Dry Matter	Forage Yield-T/A @ 12% moisture
Pioneer 877F	83	--	14	--	10.7	5.4	36.8	5.5
Keltgen KSS-2	77	10	13	12	14.4	6.6	42.1	4.9
King's Western WS-15	81	8	13	12	12.4	6.6	41.1	4.8
Dekalb ST-6+	84	22	13	12	11.4	4.5	42.4	4.6
Pioneer 988	75	9	13	12	13.0	5.7	39.1	4.6
Cargill SS-100	78	7	14	12	12.4	8.5	43.6	4.6
Mallard Sor-Sudangrass	78	9	13	12	11.5	6.5	37.7	4.4
Pride Su-60	77	5	12	12	11.1	6.0	39.4	4.4
Cenex Highland Green	76	3	13	14	13.4	6.6	40.5	4.3
Keltgen KSS-1	83	23	14	13	14.9	4.4	45.6	3.9
GSA 1757	77	4	14	10	13.1	6.6	36.4	3.9
King's Western MorFor 3X	77	12	13	11	13.6	5.8	43.0	3.8
Northrup King Sordan 79	79	12	14	12	7.8	6.0	30.4	3.7
Rose Sweet Sunny Sue	75	4	13	14	10.2	5.8	40.1	3.5
King's Western WS-20	77	5	11	9	17.1	6.7	37.9	3.2
Cenex Highland Sweet	85	18	12	11	12.2	5.8	40.3	3.2
<hr/>								
SD(05) - 1.4 tons/acre								Mean - 4.2
C.V. - 19.7%								

Footnotes are described on page 40.

Note: Data presented within the table are an average of three replications. Single row plots with 36 inch spacing were seeded June 2 and harvested September 28, 1983.

Table 40. Sudangrass Variety Trial - Pennington County (Wall), 1983.

Brand & Variety	Height (Inches)	Percent Lodging	Leaf No.	Stem Diameter	% Sugar in Sap**	Percent Protein***	Percent Dry Matter	Forage Yield-T/A @ 12% moisture
Northrup King Trudan 8	74	5	11	9	8.7	5.7	37.6	3.2
Cal/West Monarch	72	2	11	8	12.1	5.4	40.1	2.2
Piper	70	0	9	7	8.9	5.7	49.0	1.9
<hr/>								
SD(05) - 1.6 tons/acre								Mean - 2.4
C.V. - 29.0%								

Footnotes are described on page 40.

Note: Data presented within the table are an average of three replications. Single row plots with 36 inch spacing were seeded June 2 and harvested September 28, 1983.

Footnotes for tables 38 through 40.

* Legend for Maturity:

1-Mature Grain; 2-Hard Dough Stage; 3-Milk Stage; 4-Pollination Stage; 5-Not Headed.

** Percent sugar was determined with a high contrast refractometer.

*** Protein content was calculated from Kjeldahl nitrogen analysis and is reported on an oven-dry basis.

****Legend for Plant Type:

Score	Description
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

Replicated single row plots of Forage Sorghum, Sorghum-Sudangrass Crosses, and Sudan grasses were seeded in eastern Pennington County. The soil had been in fallow during 1982. The trial was seeded on June 2 into a cloddy dry soil. Germination did not occur until ten days later after the first rain shower occurred. High temperatures and intense rain showers during the next week resulted in a thick soil crust. The high Coefficients of Variability reflect the uneven stands caused by the soil crust.

Sorghum forage yields were only 54% of those harvested in 1982. The slow start in the spring, uneven growth, and drought during the last half of July and first half of August reduced the inherent ability of the plants to produce high yield. Most of the varieties were able to break summer dormancy and produce heads but still lacked the vigor to produce very much forage. The quality of the forage was also reduced as indicated by the low protein content. Yield and other agronomic data are shown in tables 39 through 40.

MILLET VARIETY TESTING

A variety trial containing eighteen varieties and selections from 4 species of millet was conducted in 1983. Various species are utilized in different ways, with Pearl, Barnyard, and Foxtail of importance as forages, while Proso is produced for its grain. In this particular trial all were harvested for grain production.

Pearl millet is unadapted to the area for grain production because the growing season is short. Barnyard, or Japanese millet are not adapted to low moisture. Foxtail and Proso produced fair grain yield and can be utilized as a short season emergency crop. Proso is not a desirable forage crop because it is not palatable. The yield data are shown in table 41.

Table 41. Millet Variety Trial - Pennington County (Wall), 1983.

Species	Variety	Test Wt (Lbs/Bu)	Seed Yield (Lbs/Acre)
PEARL	Early African	--	46
	Mil-Hy 100	--	27
BARNYARD	Japanese	--	30
FOXTAIL	Golden German	48	933
	German - Strain R	51	68
	Sno-Fox	53	512
	Manta	53	846
	Siberian	53	1285
PROSO	Abarr	57	599
	Cope	58	963
	Cerise	54	663
	Dawn	55	1287
	Minco	57	1052
	Minsum	56	910
	Panhandle	58	709
	NE 76003-9-6	55	1288
	Rose (NE 76004-3-8)	56	1549
	NE 76010-10-8	57	1045

Note: Data presented within the table are an average of four replications. Plots were seeded June 24 and harvested September 27, 1983.

MANAGEMENT, TILLAGE, AND CULTURAL PRACTICES

Winter Barley Date of Seeding

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

Six entries of winter barley were seeded at four separate calendar dates. The entries consisted of three varieties from Nebraska, and three composites from South Dakota. Each composite was composed of plants which were selected for deep setting crowns. Crown depth is associated with winter survival because those genotypes with naturally buried crowns most frequently survive winter conditions.

Seeding dates originally selected were all fall dates. Heavy rains in mid-October prevented the last two dates from being seeded until early spring. The early March seeding was done in favorable, but not normal conditions. The April date was delayed because of unfavorable conditions.

Table 42. Winter Barley Date of Planting - Pennington County (Wall), 1983.

Date	Variety	Percent Stand*	Percent Lodging	Height (Inches)	Date of Heading	Percent Protein**	Test Wt (Lbs/Bu)	Yield - Bu/A
Sept. 20	Dundy	99	5	24	6-10	14.4	50.7	80.5
	Comp 142	99	60	33	6-10	16.4	47.5	71.8
	Kearney	99	99	32	6-6	16.1	51.5	68.7
	Nebar	99	99	34	6-11	14.4	51.9	66.1
	Comp 10	99	99	32	6-8	14.9	47.9	65.8
	Comp 129	99	80	31	6-10	15.3	48.8	65.5
Sept. 30	Dundy	5	--	--	--	15.0	43.0	14.9
	Comp 142	2	--	--	--	14.4	42.8	9.9
	Comp 10	60	--	--	--	15.4	42.6	8.3
	Nebar	2	--	--	--	14.1	44.0	7.4
	Kearney	20	--	--	--	14.3	44.3	7.0
	Comp 129	5	--	--	--	14.9	44.5	6.4
March 3	Dundy	84	--	31	--	14.1	49.3	42.2
	Kearney	89	--	29	--	15.1	46.2	37.1
	Comp 129	85	--	30	--	15.2	47.4	34.0
	Comp 142	86	--	28	--	14.6	46.5	33.8
	Comp 10	86	--	27	--	14.7	46.0	29.0
	Nebar	87	--	30	--	14.6	47.4	25.2
April 20	Dundy	--	--	20	--	16.4	39.9	30.8
	Kearney	--	--	26	--	15.4	41.0	28.8
	Comp 129	--	--	25	--	16.3	40.6	22.3
	Comp 142	--	--	26	--	--	40.0	20.2
	Comp 10	--	--	25	--	16.4	39.8	19.4
	Nebar	--	--	23	--	15.7	43.4	13.2

LSD(05) - 9.9 Bu/A

C.V. - 23.0%

Mean - 30.9

* One rep only - data collected April 15, 1983.

**Percent protein determined with a Technicon 300 InfraAnalyzer.

Winter survival of the plants in the earliest seeding date is unusual for winter barley. There appeared to be uniform stands regardless of variety. The second date of seeding was more typical for winter barley survival. The third, or early March seeding date was uniform in stand but did not grow as vigorously as the fall seeded plots. The fourth date of seeding is ordinarily too late for vernalization but because of cool temperatures in April and May, the barley plants were able to produce heads. The yield data are shown in table 42.

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 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 43, 44, and 45.

Table 43. Rate of Seeding of Hard Red Winter Wheat - Bennett County (Martin), 1982-83.

Variety	Rate of Seeding (Bushel/Acre)	Percent Stand*	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					1983	(2 yr av)
Buckskin	1.00	50	12.7	56.9	29.3	40.0
	0.75	62	12.6	57.9	37.1	43.4
	0.50	56	12.0	57.6	35.4	41.2
	0.25	26	13.3	56.1	25.0	32.6
TAM 105	1.00	80	11.5	60.7	38.6	42.1
	0.75	78	12.1	59.0	36.0	36.6
	0.50	50	12.0	59.2	31.8	37.9
	0.25	26	12.2	56.5	23.6	28.6
LSD(05) - 4.6 Bu/A		C.V. - 9.8%		Mean - 32.1		37.8

* Percent stand was visually estimated on May 9, 1983.

**Percent protein determined with Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications.

Plots were seeded September 24, 1982 and harvested July 29, 1983.

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 state's southern border; in eastern Pennington County, a central location; and in Perkins County, near the northern border of the state. Seeding for all sites was completed within eight days.

Winter survival was good at all three sites. However, there was severe stand reduction in the 1 bushel rate at Martin. The stand was similar in all replications which indicates a seed source problem. The lack of a difference in stand between the 3/4 and 1/2 bushel rate was interesting because seed quantity differences of 25% in reality showed only an average difference of 5% in ground cover.

Table 44. Rate of Seeding Hard Red Winter Wheat - Pennington County (Wall), 1982-83.

Variety	Rate of Seeding (Bushel/Acre)	Percent Stand*	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					1983	(2 yr av)
Buckskin	1.00	84	13.1	64.1	64.2	52.8
	0.75	74	14.1	64.2	59.1	49.4
	0.50	75	13.7	64.7	66.2	50.6
	0.25	42	14.1	63.2	51.7	39.1
TAM 105	1.00	89	12.9	64.5	66.5	53.0
	0.75	81	12.6	64.0	62.8	48.6
	0.50	76	13.8	64.6	60.8	46.0
	0.25	48	13.0	62.4	49.3	37.4
LSD(05) - 7.6 Bu/A		C.V. - 8.6%		Mean - 60.3		47.1

* Percent stand was determined visually on May 17, 1983 and reflects ground cover.

**Percent protein determined with Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications. Plots were seeded on September 20, 1982 and harvested August 3, 1983.

Table 45. Rate of Seeding of Hard Red Winter Wheat - Perkins County (Bison), 1982-83.

Variety	Rate of Seeding (Bushel/Acre)	Percent Stand*	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					1983	(2 yr av)
Buckskin	1.00	74	11.9	60.6	58.0	38.7
	0.75	71	12.0	61.2	52.8	35.5
	0.50	69	12.3	60.1	56.0	35.8
	0.25	47	12.8	60.0	44.9	22.5
TAM 105	1.00	81	12.5	60.7	56.5	37.4
	0.75	71	13.0	60.7	48.9	32.9
	0.50	71	13.0	60.0	52.0	35.4
	0.25	40	13.5	59.8	38.1	23.6
LSD(05) - 4.4 Bu/A		C.V. - 5.9%		Mean - 50.9		

* Percent stand was visually estimated on April 22, 1983.

**Percent protein determined with Technicon 300 InfraAnalyzer.

Note: Data presented within the table are an average of four replications. Plots were seeded September 16, 1982 and harvested August 5, 1983.

Protein quantities did not reflect any consistent changes due to population differences. There was a slight advantage for Buckskin, except in Perkins County. Weight per bushel did not show any consistent pattern except the lower seeding rate also had a lower test weight. An explanation for that could be the plots were not as mature at harvest as were the heavier rates of seeding.

Grain yield, as with other factors, did not form a pattern except the large yields came from the heaviest seeding rate, whereas the smallest yield came from the smallest seeding rate. There was one yield characteristic that stands out in all locations. Grain yield was not significantly reduced until seeding rates dropped below 1/2 bushel per acre.

Alternate Cropping Sequence

Objective: To compare a series of six crop rotations and determine the relative operational costs and economic returns, as well as monitor changes in weed populations, pathogens, and soil moisture.

The series of rotations used in this study are shown in table 46, and includes a continuous cropping, and alternating crop-fallow systems, as well as monoculture, biculture, and triculture systems. The economic returns based on six years results are listed in table 47.

Table 46. Rotation Study - Pennington County (Wall).

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Rot 1	HRW*	HRW	HRW	HRW	HRW	HRW
Rot 2	Barley	HRW	Safflower	Barley	HRW	Safflower
Rot 3	HRS**	HRW	Fallow	HRS	HRW	Fallow
Rot 4	Fallow	HRW	Fallow	HRW	Fallow	HRW
Rot 5	HRS	HRW	Proso	HRS	HRW	Proso
Rot 6	HRW	HRW	Fallow	HRW	HRW	Fallow

* Hard Red Winter Wheat

**Hard Red Spring Wheat

The six rotations under study showed considerable differences for crop responses, weed problems, and ease of handling. The base rotation (1) is continuous winter wheat. The difficulties arising in this operation are tillage and seedbed preparation. A careful selection of, and operation of, the tillage implement is necessary. If the soil is dry it will form large clods which are undesirable for a seedbed. Associated with continuous cropping is the annual brome-grass infestation. The weed stand can become so thick that the wheat cannot compete. Consequently, there are only a few stunted wheat plants that produce little grain.

Rotation two is a three crop sequence with one year of winter wheat followed by a safflower crop in the second year, and a barley crop in the third year. During the year when safflowers are grown grassy weeds are controlled. Broadleaf weeds are controlled during the rotations of winter wheat and barley. The most difficult part of this rotation is establishing the safflower plants. This rotation provided the highest return of the six being studied.

Rotation three is a three year sequence consisting of spring wheat followed by winter wheat, with fallow in the third year. The combination is ideal to control winter annual weeds. However, the spring wheat yields are so low in relation to the winter wheat yields that the return per acre is similar to that of continuous winter wheat.

Rotation four is an alternating crop-fallow sequence in which annual weeds and soil moisture problems are not critical. The wheat is vigorous, tall, tillers profusely, has large heads, and produces good yields. Only a few annual brome-grass plants grow on the plot edges.

Rotation five is similar to rotation three except the fallow is replaced by Proso millet. This sequence yielded about the same winter and spring wheat as did rotation three. However, the dollar return was considerably higher because of the return from the millet. This sequence also provides excellent control both for annual and perennial weeds.

Rotation six had two winter wheat crops and a third year of fallow. This rotation provided for some control of the annual brome grass. With the annual brome's cycle partially broken there was an increase in soil moisture during the fallow year. There was also an increase in available nitrogen for the following year's winter wheat crop. In this sequence the annual brome grass is found mostly in the edges of the winter wheat plots. Both crops of winter wheat had better stands and much more vigor than continuous wheat.

Table 47. Economic Returns from Six Cropping Sequences - Pennington County (Wall), 1978-83.

Rotation	Sequence Year			Ave. Annual \$ Return	Cycle \$ Return	Six Year \$ Return
	1	2	3			
1						
Crop*	HRW					
Test Wt	58.2					
Yield-Bu/A	9.4					
Return/Acre	\$30.05			\$ 30.05	\$ 30.05	\$180.30
2						
Crop*	HRW	SAF	BAR			
Test Wt	57.7	36.1	46.8			
Yield-Bu/A	21.0	657#	14.0			
Return/Acre	\$68.96	\$62.10	\$33.88	\$ 54.98	\$164.94	\$329.88
3						
Crop*	HRW	FAL	HRS			
Test Wt	57.5	---	55.4			
Yield-Bu/A	21.3	---	7.4			
Return/Acre	\$71.57	---	\$27.16	\$ 32.91	\$ 98.73	\$197.46
4						
Crop*	HRW	FAL				
Test Wt	57.7	---				
Yield-Bu/A	25.4	---				
Return/Acre	\$82.19	---		\$ 41.10	\$ 82.19	\$246.57
5						
Crop*	HRW	PROSO	HRS			
Test Wt	57.9	54.5	55.9			
Yield-Bu/A	20.8	591#	6.2			
Return/Acre	\$66.63	\$69.05	\$22.67	\$ 52.78	\$158.35	\$316.70
6						
Crop*	HRW	HRW	FAL			
Test Wt	59.0	57.8	---			
Yield-Bu/A	23.8	19.1	---			
Return/Acre	\$76.59	\$61.32	---	\$ 45.97	\$137.91	\$275.82

*HRW-Hard Red Winter Wheat, HRS-Hard Red Spring Wheat, BAR-Spring Barley, SAF-Safflower, PROSO-Prosop Millet.

Note: Dollar return per acre is calculated on market price on January 1.

Fallow Alternatives and Seeding Methods

Objectives:

- (1) To compare the three fallow alternatives of zero-till, subsurface or mulch tillage, and black fallow, by measuring grain yield and quality. Soil changes are to be monitored by soil sampling.
- (2) To compare the long term effects of nitrogen and phosphorus fertilizer when applied in combinations with fallow alternatives.
- (3) To compare drill openers and press wheel combinations when used under different fallow procedures.
- (4) To compare the effects of fallow techniques on soil tilth, organic accumulation, plant pathogens, nematodes, and weed populations.

Procedures:

An experiment was established in which a winter wheat-fallow system was utilized to study the residue management of three fallow procedures. The systems consisted of (1) a black fallow, (2) a stubble mulch fallow, and (3) a zero-till or chemical fallow.

The fallowed areas were subdivided into five subtreatments in order to study the effect of different drill openers-press wheel combinations when used in three different fallow procedures.

The fallowed areas were further subdivided and a fertility factor in which nitrogen, phosphorus, and the combination of nitrogen plus phosphorus were incorporated. The plots were seeded to Hard Red Winter Wheat (Rose) in September 1982.

Results:

Table 48. Influence of Fallow Methods and Fertilizer Variables on Grain Yield of Hard Red Winter Wheat (Rose), Pennington County (Wall), 1981-83.

Fallow Method	Fertilizer Treatment	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					1983	3 yr av
Mulch	Check	37	12.2	63.3	59.1	53.0
	30# Nitrogen	39	13.9	62.9	77.2	59.1
	40# Phosphorus	42	12.4	63.4	56.2	55.4
	30# N + 40# P	40	13.6	62.5	71.2	59.1
Black	Check	40	12.5	63.5	73.5	58.7
	30# Nitrogen	41	12.9	63.2	77.3	57.1
	40# Phosphorus	41	12.5	63.8	72.6	61.3
	30# N + 40# P	42	13.2	62.9	77.3	60.4
Chemical	Check	39	12.2	63.3	66.0	52.2
	30# Nitrogen	39	13.9	63.4	70.2	53.4
	40# Phosphorus	39	12.4	62.9	63.2	54.3
	30# N + 40# P	42	13.6	62.8	68.9	54.6

LSD(05) - 13.5 Bu/A

C.V. - 12.4

Mean - 69.4

*Percent protein determined with a Technicon 300 InfraAnalyzer.

Table 49. Yield of Hard Red Winter Wheat Seeded with a Combination of Drill Openers and Press Wheels in Soil Fallowed by Three Different Techniques - Pennington County (Wall), 1981-83.

Drill Openers	Press Wheel	Fert.	Method of Fallow			Mean
			Black	Mulch	Chemical	
Spear Point	Steel "V"	O	67.2	52.4	59.6	59.7
		N	73.5	71.4	62.4	69.1
		P	72.1	51.7	59.0	60.9
		NP	74.6	65.4	67.9	69.3
Double Disc	2" Rubber	O	77.4	61.1	68.9	69.1
		N	78.9	79.4	72.2	76.8
		P	73.2	51.8	59.2	61.4
		NP	79.4	69.2	63.9	70.8
HZ (Slot)	Steel "V"	O	79.0	60.6	67.0	68.9
		N	86.0	79.7	71.7	79.1
		P	72.0	53.2	61.0	62.1
		NP	80.5	69.1	69.5	73.0
4" Shoe	2" Rubber	O	72.3	60.7	63.2	65.4
		N	73.6	77.1	72.4	74.4
		P	75.2	63.8	69.9	69.9
		NP	78.5	78.6	70.8	76.0
Double Disc	Steel "V"	O	71.4	60.7	71.3	67.8
		N	74.7	78.6	72.1	75.1
		P	70.5	60.5	67.0	66.0
		NP	73.4	74.0	72.4	73.3

Table 50. Influence of Drill Opener & Fallow Method on Grain Yield and Other Agronomic Characteristics of Hard Red Winter Wheat - Pennington County (Wall), 1981-83.

Drill Opener	Press Wheel	Method of Fallow	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre	
					1983	(3 yr av)
Spear Point	Steel "V"	Mulch	12.8	62.6	60.2	52.4
		Black	13.1	63.3	71.8	56.9
		Chemical	13.6	62.7	62.2	48.2
Double Disc	2" Rubber	Mulch	12.9	62.8	65.4	57.2
		Black	13.0	63.3	77.2	61.1
		Chemical	12.9	63.3	66.0	54.3
HZ (Slot)	Steel "V"	Mulch	12.7	63.0	65.6	57.2
		Black	13.1	63.2	79.4	59.8
		Chemical	13.3	63.1	67.3	70.4
Shoe 4"	2" Rubber	Mulch	12.8	63.3	70.0	60.0
		Black	12.8	63.6	74.9	62.7
		Chemical	12.5	63.0	69.0	54.4
Double Disc	Steel "V"	Mulch	12.6	63.3	68.5	56.5
		Black	12.2	63.3	72.5	56.7
		Chemical	12.8	63.4	70.7	57.7

LSD(05) - 13.5 Bu/A C.V. - 12.1 Mean - 69.4

*Percent protein determined with a Technicon InfraAnalyzer.

Table 51. Effects of Drill Opener and Fertilizer Variables on Grain Yield of Hard Red Winter Wheat (variety-Rose) - Pennington County (Fall), 1981-83.

Drill Opener	Press Wheel	Fertilizer Applied	Height (Inches)	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield 1983 [3 yr av]	Grain Yield/Bu-Acre
Spear Point	Steel "V"	Check	38	12.6	63.2	59.8	49.6
		30# Nitrogen	40	13.7	63.0	69.1	52.2
		40# Phosphorus	38	12.7	62.9	60.9	53.4
		30# N + 40# P	41	13.6	62.3	69.3	54.9
Double Disc	2" rubber	Check	39	12.1	63.8	69.1	56.3
		30# Nitrogen	38	13.3	62.8	76.8	58.0
		40# Phosphorus	37	12.6	63.3	61.4	59.4
		30# N + 40# P	40	13.6	62.7	70.8	60.5
HZ (Slot)	Steel "V"	Check	39	13.0	63.0	68.9	55.9
		30# Nitrogen	40	13.5	63.2	79.1	57.2
		40# Phosphorus	43	12.4	63.2	62.0	57.6
		30# N + 40# P	40	13.2	63.1	73.0	55.3
Shoe 4"	2" rubber	Check	39	12.3	63.4	65.4	57.2
		30# Nitrogen	40	13.3	62.8	74.4	59.1
		40# Phosphorus	44	12.3	63.9	69.6	58.6
		30# N + 40# P	43	13.0	63.0	75.9	60.5
Double Disc	Steel "V"	Check	40	11.5	63.4	67.8	54.1
		30# Nitrogen	40	13.3	63.9	75.2	52.6
		40# Phosphorus	40	11.8	63.5	66.0	58.7
		30# N + 40# P	42	13.6	62.6	73.3	59.0

LSU (05) - 13.5 Bu/A

C.V. - 13%

Mean - 60.4

*Percent protein determined with a Technicon 300 InfraAnalyzer.

A review of wheat yields (table 48) indicates the highest grain yield in 1983 was produced under the black fallow system. In 1981, when early spring moisture was readily available, the highest yields were also from black fallow. However, in 1982, when moisture was limited, except during the month of May, the highest yield was harvested from the mulched plots. When adequate moisture was available to produce high yields the quality of the grain was also improved by higher test weights regardless of the fallow method.

The effects of drill furrow opener, although not statistically significant, indicated higher yields were produced when a shoe type opener was used for seeding. The shape of the press wheel did show a small difference in favor of the steel "V" in 1983, but when compared for 3 years the 2 inch rubber press-wheel was favored. The slot type openers were the least desirable for 2 reasons, (1) they require more power to pull through the soil and (2) plots seeded with the openers produced the smallest yields during the three year study.

The fertilizer variable consisted of one rate each of nitrogen and phosphorus plus the combination. The phosphorus was applied down the drill spout with the seed, while the nitrogen was applied broadcast in the fall after seeding. In nearly all treatments there was a small increase in protein content, but the increases did not form a pattern. Weights per bushel were exceptionally high in 1983 and did not show any advantage for fertilization. The yield and grain quality data for the various treatments are listed in tables 48 through 51.

REDUCED TILLAGE STUDIES

Recropped Winter Wheat (Variety x Tillage)

Tillage Methods: Minimum tillage plots were undercut with a noble blade early post-harvest. The volunteer wheat and weeds were sprayed at planting on September 21, 1982. Conventional tillage plots were bladed early post-harvest and disked two times prior to seeding on September 21, 1982.

Cropping History: Minimum tillage plots were established on 50 bushel winter wheat stubble, while Conventional tillage plots were established on 30 bushel spring wheat stubble.

Fertilization & Weed Control: All plots had 68 pounds of nitrogen applied in early spring and were sprayed with 1/2 ounce of Glean per acre.

Table 52. Effects of Tillage Practices on Grain Yield of Winter Wheat - Pennington County (Wall), 1983.

Conventional Tillage		Minimum Tillage	
Variety	Bushels/A	Variety	Bushels/A
Rose	66.4	Buckskin	57.7
Archer	63.3	Rose	55.8
Sage	62.5	TAM 105	55.6
Buckskin	61.7	Dawn	54.8
Agate	60.1	Roughrider	53.4
Dawn	60.0	Sage	52.7
Rita	57.3	Archer	52.6
TAM 105	57.0	Agate	52.5
Roughrider	54.8	Rita	51.6
LSD 5%	6.1 Bu/A		5.4 Bu/A
C.V.	6.9%		6.8%
Ave. Yield	60.3 Bu/A		54.1 Bu/A

Discussion of Results: There did not appear to be any significantly different yields among varieties grown under reduced tillage. There were significant differences among varieties grown on clean tillage with Rose winter wheat being significantly higher in yield at the 5% protection level.

The conventional tillage plots had a higher average yield than the minimum tillage plots. The increased yield could have been due to past cropping or tillage methods.

Winter Wheat-Grain Sorghum-Fallow Rotations

Ecofallow is a term used to describe a cropping rotation of small grain-row crops-summer fallow. This rotation has some or all of the mechanical tillage replaced by herbicides. This concept was tested in research plots at Winner, South Dakota.

Conventional-tillage plots had sweep type tillage in the fall and were disked in the spring to control weeds and to establish a uniform seedbed. After planting the row crop with a buffalo till planter, the plots were sprayed with preemergence herbicide to control annual weeds. The plots were cultivated twice during the early part of the season.

Minimum-tillage plots in winter wheat stubble were sprayed with Atrazine after harvest of the crop. The plots were undercut by a blade in the spring prior to planting the row crop with a buffalo till planter. After planting, the plots were sprayed with a preemergence herbicide to control annual weeds. The plots were cultivated once during the early part of the growing season.

No-tillage stubble plots were sprayed with Atrazine after harvest of the winter wheat crop. There was no tillage prior to the planting of the row crop with a buffalo till planter. After planting, the plots were sprayed with a preemergence herbicide to control annual weeds. The plots were not cultivated during the growing season and much of the wheat stubble remained standing between the rows.

Table 53. Grain Yields from the Winter Wheat-Sorghum-Fall Rotation - Tripp County (Winner).

	Grain Sorghum Bu/A				Winter Wheat Bu/A		
	1980	1981	1982		1981	1982	1983
No-Tillage	71	44	82	rost Damage		48	61
Minimum-Tillage	84	39	75			54	59
Conventional-Tillage	63	19	54			50	54
C.V. (%) =	5.3	25.1	9.9			10.6	10.2
LSD 5% (Bu/A) =	6.7	14.8	12.0			9.3	10.2

SORGHUM ECOFALLOW ECONOMICS
Cost of Herbicides and Tillage

1979-1980

<u>No-Tillage</u>		<u>Minimum-Tillage</u>		<u>Conventional-Tillage</u>	
Atrazine	9.00	Atrazine	9.00	Sweeps	2.80
Paraquat	8.00	Paraquat	8.00	(2) Disk	6.00
Application	2.50	Application	2.50	(2) Cultivation	5.00
Ramrod	5.20	Tillage	4.00	Ramrod	5.20
		Ramrod	5.20		
		(1) Cultivation	2.50		
TOTAL	\$24.70		\$31.20		\$19.00

1980-1981

<u>No-Tillage</u>		<u>Minimum-Tillage</u>		<u>Conventional-Tillage</u>	
Atrazine	9.00	Atrazine	9.00	Fall-Tillage	4.00
Paraquat	7.50	Paraquat	7.50	Spring-Tillage	4.00
Ramrod	5.20	Ramrod	5.20	Spring Disk	4.00
Application	2.50	Application	2.50	Ramrod	5.20
		Tillage	4.00	(1) Cultivation	2.50
		(1) Cultivation	2.50		
TOTAL	\$24.20		\$30.70		\$19.70

1981-1982

<u>No-Tillage</u>		<u>Minimum-Tillage</u>		<u>Conventional-Tillage</u>	
Atrazine	7.50	Atrazine	7.50	Fall-Tillage	4.00
Roundup	3.36	Ramrod	5.20	Spring-Tillage	4.00
Ramrod	5.20	Application	2.50	Spring Disk	4.00
Application	5.00	Tillage	4.00	Ramrod	5.20
		(1) Cultivation	2.50	(2) Cultivation	5.00
TOTAL	\$21.06		\$21.70		\$22.20

Winter Wheat-Fallow-Winter Wheat

The winter wheat in the rotation was always planted on fallowed land. There were three levels of tillage used during the fallow period.

The No-Tillage treatment had three pounds Bladex 80W plus one pound Atrazine 80W applied in late July after wheat harvest. The no-tillage treatment also used two sprayings of non-residual herbicides during the late fallow period to control weeds.

The Minimum-Tillage treatment had three pounds Bladex 80W plus one pound Atrazine 80W applied in late July after wheat harvest. Tillage was begun in late June in the minium tillage treatment to control weeds. The minimum tillage plots require two to three tillage operations to control weeds during the fallow period.

The Conventional-Tillage treatment used sweep type tillage to control weeds during the fallow period. The soil surface had very little crop residue left on it by planting time.

Table 54. Grain Yield of Winter Wheat Grown after Three Tillage Methods of Fallow - Tripp County (Winner).

	Winter Wheat-Sorghum-Fallow		Winter Wheat-Fallow	
	Bushels Per Acre 1982	1982	Bushels Per Acre 1981	1982
No-Tillage	48	61	46	61
Minimum-Tillage	54	59	51	56
Conventional-Tillage	50	54	50	50
C.V. (%)	10.6	10.2	10.5	5.5
LSD 5% (Bu/A)	9.3	10.2	8.9	5.7

**CHEMICAL AID FALLOW
Cost Per Acre Comparisons**

1979-1980 Fallow Period

<u>No-Tillage</u>		<u>Minimum-Tillage</u>		<u>Conventional-Tillage</u>	
3# Bladex 80W	9.60	3# Bladex 80W	9.60	Fall-Tillage	4.00
1# Atrazine 80W	2.30	1# Atrazine 80W	2.36	4 Tillages	16.00
1 pt. Paraquat CL	5.62	1 pt. Paraquat	5.62		
6 oz. Roundup	3.36	2 Tillages	8.00		
6 oz. Roundup	3.36	Application	2.50		
Applications	6.50				
TOTAL	\$30.74		\$28.08		\$20.00

1980-1981 Fallow Period

<u>No-Tillage</u>		<u>Minimum-Tillage</u>		<u>Conventional-Tillage</u>	
3# Bladex 80W	9.60	3# Bladex 80W	9.60	Fall-Tillage	4.00
1# Atrazine 80W	2.30	1# Atrazine 80W	2.30	4 Tillages	16.00
6 oz. Roundup	3.36	2 Tillages	8.00		
6 oz. Roundup	3.36	Application	2.50		
Applications	6.50				
TOTAL	\$25.12		\$22.40		\$20.00

1981-1982 Fallow Period

<u>No-Tillage</u>		<u>Minimum-Tillage</u>		<u>Conventional-Tillage</u>	
1½# Atrazine 80W	2.88	1½# Atrazine 80W	2.88	Fall-Tillage	4.00
6 oz. Roundup	3.36	6 oz. Roundup	3.36	3 Tillages	12.00
6 oz. Roundup	3.36	2 Tillages	8.00		
6 oz. Roundup	3.36	Application	4.50		
Applications	8.50				
TOTAL	\$21.46		\$18.74		\$16.00

Continuous Winter Wheat

The No-Tillage treatment was sprayed twice with non-residual herbicides to control volunteer wheat and weeds prior to planting in mid-September. The Minimum-Tillage treatment was bladed post-harvest and sprayed once prior to seeding in mid-September. The Conventional-Tillage treatment used a disk and sweep type tillage to control weeds prior to seeding in mid-September.

Table 55. Continuous Winter Wheat Yields - Tripp County (Winner).

	Bushels Per Acre			
	1980	1981	1982	1983
No-Tillage	22	frost damage	27	--
Minimum-Tillage	27		31	--
Conventional-Tillage	21		23	--
C.V. (%)	14.4		14.0	--
LSD 5% (Bu/A) =	5.7		6.6	--

Discussion: The Minimum-Tillage plots had a significantly higher grain yield in both 1980 and 1982. However, the reduced-tillage and the conventionally-tilled plots developed a severe infestation of downy brome grass after three years and no yields were taken the fourth year.

CONTINUOUS WINTER WHEAT PRODUCTION Cost Per Acre Comparisons

1979-1980-1981

<u>No-Tillage</u>		<u>Minimum-Tillage</u>		<u>Conventional-Tillage</u>	
1½ pts. Paraquat	8.43	Blade-Tillage	4.00	Blade-Tillage	4.00
1½ pts. Paraquat	8.43	1½ pts. Paraquat	8.43	2 Disk-Tillage	8.00
Application	5.00	Application	2.50		
TOTAL	\$21.86		\$14.93		\$12.00

1982

<u>No-Tillage</u>		<u>Minimum-Tillage</u>		<u>Conventional-Tillage</u>	
6 oz. Roundup	3.36	Blade-Tillage	4.00	Blade-Tillage	4.00
6 oz. Banvel	2.06				
6 oz. Roundup	3.36	6 oz. Roundup	3.36	2 Disk-Tillage	8.00
1 pt. 2,4-D	1.88	1 pt. 2,4-D	1.88		
Applications	5.00	Application	2.50		
TOTAL	\$15.66		\$11.74		\$12.00

NO-TILLAGE GRAIN SORGHUM
Jones County - 1983

Objective: To evaluate the use of herbicides to replace tillage for grain sorghum production.

Cropping History: Winter wheat 1982.

Weeds & Size: Many small kochia, some small foxtail were just starting when the field was sprayed in May, 1983.

Treatment #1: Early weeds were sprayed with 8 oz/A Roundup plus 8 oz/A of Banvel. This treatment was sprayed again with 8 oz/A Roundup at planting time, June 2, 1983. Early weed control was good but later in the season weed control was poor. The yield on this 6 2/3 acre plot was 17.7 Bu/A.

Treatment #2: The 6 2/3 acres were sprayed about 30 days prior to planting with 3 lbs. Bladex 80N, .6 lbs. atrazine 80N plus 1 pint/A of paraquat. Early weed control did not look as good as Roundup plus Banvel but late season weed control was better. The plot yield was 48.7 Bu/A on this 6 2/3 acre plot.

The plots were seeded with a Buffalo slot planter at about 4.7 lbs of seed per acre. There was no cultivation during the growing season.

NO-TILLAGE GRAIN SORGHUM
Tripp County - 1983

Objective: To evaluate the use of non-residual herbicides in a No-Till Sorghum production.

Plot Information: Herbicides were applied with 10 GPA, 8001 nozzles, 30 PSI and 2.5 mph. The plots were 25' wide and 75' long. The grain sorghum seed was screen treated Pioneer 894. They were sprayed 3 days after the plots were seeded and 3" of rainfall occurred within 1 week after application.

Table 56. Effects of Non-Residual Herbicides on Annual Weed Control and Yield of Grain Sorghum - Tripp County (Witten), 1983.

Herbicides	Rates Pounds Active	Ounces Product	% Foxtail Control	Test Wt.	Yield Bu/A	Duncan's Test
Ramrod	4		33	52	38	ab
Roundup		8				
Lasso	2.5		65	61	49	B
Roundup		8				
097	2.5		80	60	52	B
Roundup		8				
Control	--	--	00	53	3	cd
Ramrod	4		20	59	23	bc
Roundup + Banvel		8+4				
Lasso	2.5		55	56	38	a)
Roundup + Banvel		8+4				
097	2.5		85	61	45	a
Roundup + Banvel		8+4				
Roundup + Banvel		8+4	00	60	12	c

Summary: Early evaluation of foxtail control taken on June 30, 1983 indicated better foxtail control with Lasso & 097 combinations than with non-residual treatments of Roundup + Banvel. The weeds present in the Roundup + Banvel plots were smaller than those in the Control, indicating the early flush of foxtail weeds were controlled and the later germinating weeds were the ones in the plots on June 30, 1983. The plots were cultivated on June 30. The yield and test weight data was collected in October 1983. The plots which had better weed control had a consistently higher bushel per acre yields than the control and the Roundup + Banvel treatments.

EARLY PREPLANT HERBICIDES FOR GRAIN SORGHUM PRODUCTION
Lyman County - 1983

Objective: To evaluate early preplant herbicides for weed control and yield of grain sorghum.

Soil Data: Clay texture, 3.3% organic matter, 7.7 pH, very high phosphorus, and very high potassium.

Application Data: 45 days preplant treatments were applied in 20 GPA solution on April 24, 1983. The 30 days preplant treatments were applied in 20 GPA solution on May 5, 1983. The May 5 treatments had 1 pint per acre of paraquat per acre applied in the spray solutions.

Pounds/A Active *Bladex 90 DF	Days Epp	% Foxtail Control	Test Wt.	Yield Bu/A	Duncan's Test
1.6	45	88	59	31	ab
2.4	45	89	59	33	ab
4.0	45	93	59	28	ab
*Bladex 90 DF					
1.6	30	81	58	35	a
2.4	30	73	57	21	b
4.0	30	90	60	30	ab
Control		00	59	21	b
Atrazine 80W					
1.0	30	15	58	25	ab
1.0	45	00	58	21	b

LSD(05) - 10.8 Bu/A C.V. 27.2% Mean - 27.1

*All Bladex 90 DF treatments had one pound per acre active ingredient atrazine tank mixed with treatments.

The experiment site was very dry during August and had some bindweed spots. The plots were planted with a Buffalo Slot planter and cultivated on July 8, 1983.

ROUNDUP + ADDITIVES
Rapid City Airport Farm - 1983

Introduction: The control of annual weeds with lower rates of Roundup has in general been poor when temperatures have been less than 65°F. This study was established to evaluate the control of downy brome grass that was in the boot stage of growth. The ammonium sulfate was a fertilizer grade material available from a local dealer. The concentrated sulfuric acid was a laboratory grade material and would be difficult for the producer to handle.

Roundup Rate	SO ₄ ++*a, *b Source	Water*** Source	Control Downy Brome Replications					Duncan's Test
			I	II	III	IV	Ave.	
4	H ₂ SO ₄	1	40	40	70	70	55	c
6	H ₂ SO ₄	1	80	85	85	75	81	b
8	H ₂ SO ₄	1	90	99	99	90	95	ab
4	(NH ₄) ₂ SO ₄	1	70	50**	40**	80	60	c
6	(NH ₄) ₂ SO ₄	1	80	75	95	90	85	ab
8	(NH ₄) ₂ SO ₄	1	90	90	99	99	95	ab
6	----	1	35	40	40	35	38	d
4	----	1	30	20	00	00	13	e
Control		1	00	00	00	00	00	e
4	H ₂ SO ₄	2	75	85	80	80	80	b
6	H ₂ SO ₄	2	80	85	99	99	91	ab
8	H ₂ SO ₄	2	90	90	99	90	92	ab
4	(NH ₄) ₂ SO ₄	2	40	50	75	70	59	c
6	(NH ₄) ₂ SO ₄	2	80	99	95	99	93	ab
8	(NH ₄) ₂ SO ₄	2	99	99	99	99	99	a
6	----	2	00	00	00	00	00	e
4	----	2	00	00	00	00	00	e

*a) 2.5 pounds/A of (NH₄)₂SO₄ was added to the spray solution.

*b) 480 ml of Conc. Sulfuric Acid was added to the spray solution.

** Sprayed with 20 PSI.

*** No. 1 Water - Box Elder source; No. 2 Water - Murdo source.

Note: The plots were sprayed on May 26, 1983. The sprayer applied 5 gallons of water per acre with 30 pounds of pressure. All treatments included Banvel in the mixture at 6 ounces per acre.

Summary: The air temperatures on May 26, 27, 28 were above 70°F. May 29 through June 8 the daily maximum was less than 70°F. This cool condition resulted in poor control with Roundup used alone at 4 and 6 ounces per acre. The addition of ammonium sulfate or sulfuric acid significantly increased weed control. The weed control at the 6 ounce rate plus additives was very satisfactory. This data would indicate that the addition of ammonium sulfate could make the % control more consistent under cool weather conditions. The exact amount of ammonium sulfate to add to the spray solution has not yet been determined. The amount used in this experiment may be excessive.

