ANNUAL PROGRESS REPORT
Plant Science Pamphlet #62-4 December 1991

WEST RIVER AGRICULTURAL RESEARCH AND EXTENSION CENTER
CROPS AND SOILS RESEARCH

Rapid City, South Dakota

BENNETT, FALL RIVER, JONES, LYMAN, & STANLEY COUNTIES

Introduction

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

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

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

FIELD PLOT COOPERATORS

Name	Address	County
County Crop Impr. Ass'n	Martin 57551	Bennett
Don Brown	Scenic 57780	Custer
William O. Miller	Oelrichs 57763	Fall River
Gilbert A. Bogner	Oral 57766	Fall River
Paul Patterson	Draper 57531	Jones
Clifford Halverson	Kennebec 57544	Lyman
Don Hackens	New Underwood 57761	Pennington
Martin Printz	New Underwood 57761	Pennington
Rodney Renner	Wall 57790	Pennington
Terry Beastrom	Ft Pierre 57532	Stanley
Phil Norman	Hayes 57537	Stanley
Sivage Farms	Hayes 57537	Stanley

This is an annual report and results published herein are therefore neither complete nor conclusive. 50 copies printed at an estimated cost of $1.17 each.

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Acknowledgements

The following County Extension Agents assisted in locating cooperators and conducting the research: Gary C Nies-Martin, Ed Bowker-Hot Springs, Robert Fanning-Kennebec, Gary Erickson-Murdo, and Paul Weeldreyer-Pierre.

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Research was conducted by H. A. Geise-Research Agronomist, C. E. Stymiest-Extension Agronomist, and in conjunction with F. A. Cholick, J. L. Gellner, D. L. Reeves, J. J. Bonnemann, R. J. Pollman, J. Ingemansen, and R. G. Hall.

This publication was written and edited by Harry A. Geise, Ass't Professor.

Weather Summary

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

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

Month & Year		Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
Martin (Bennett County Reporting Station)***					
Aug.	1990	71.1	-1.0	1.27	-0.82
Sept.	1990	65.7	3.5	0.55	-0.71
Oct.	1990	51.8	1.1	0.66	-0.23
Nov.	1990	41.0	4.7	0.28	-0.10
Dec.	1990	18.9	-7.4	0.12	-0.23
Jan.	1991	18.9	-2.5	0.21	-0.05
Feb.	1991	36.2	9.2	0.82	0.40
Mar.	1991	39.0	5.9	0.14	-0.79
Apr.	1991	48.3	2.6	2.83	1.87
May	1991	59.2	2.5	5.63	2.68
June	1991	69.3	2.7	3.74	0.37
July	1991	71.3	-2.5	2.63	0.27

*Average temperatures and precipitation obtained from NOAA Climatological Data from reporting station nearest the experimental sites. Temperatures are reported in degrees Fahrenheit and precipitation in inches.
**Departures from normal are based on records for the period 1951-1980.
***Departures based on records for 1977-1987 at specific locations.

TABLE 1. Continued

Month & Year		Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
Oelrichs (Fall River County Reporting Station)					
Aug.	1990	73.6	0.7	0.82	-0.72
Sept.	1990	66.7	4.4	1.16	0
Oct.	1990	49.2	-1.2	0.47	-0.38
Nov.	1990	41.0	5.9	0.49	-0.03
Dec.	1990	18.0	-8.4	0.36	-0.06
Jan.	1991	18.2	-3.7	0.06	-0.34
Feb.	1991	36.2	8.4	0.83	0.29
Mar.	1991	39.6	5.1	0.52	-0.51
Apr.	1991	46.9	0.7	2.34	0.39
May	1991	58.2	1.4	8.52	5.60
June	1991	68.2	1.4	4.25	1.42
July	1991	73.9	-0.6	0.80	-1.39
Oral (Fall River County Reporting Station)+++					
Aug.	1990	73.0	1.9	0.49	-1.55
Sept.	1990	65.3	4.5	1.04	-0.03
Oct.	1990	48.0	1.0	0.67	-0.25
Nov.	1990	40.5	6.4	0.62	0
Dec.	1990	19.7	1.2	0.65	0.26
Jan.	1991	19.0	-4.0	0.05	-0.26
Feb.	1991	35.5	8.3	0.94	0.55
Mar.	1991	39.2	2.7	0.63	-0.25
Apr.	1991	47.1	0.1	2.77	1.18
May	1991	57.0	0.2	4.86	2.28
June	1991	68.6	1.6	5.93	3.32
July	1991	72.4	-1.9	0.62	-1.99
Murdo (Jones County Reporting Station)					
Aug.	1990	74.0	0.4	0.47	-1.38
Sept.	1990	67.2	4.1	0.63	-0.48
Oct.	1990	47.6	-3.7	0.30	-0.85
Nov.	1990	39.1	3.9	0.10	-0.39
Dec.	1990	15.2	-8.5	0.59	0.16
Jan.	1991	16.8	-0.8	0.33	0.02
Feb.	1991	32.4	8.6	1.45	0.99
Mar.	1991	36.3	4.3	0.44	-0.64
Apr.	1991	48.6	2.0	3.25	1.05
May	1991	56.6	-1.5	4.45	1.78
June	1991	69.5	1.5	6.50	3.22
July	1991	73.9	-1.5	1.38	-0.71
Aug.	1991	74.5	.9	2.13	0.28

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

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

+++Departures based on records for 1972-1989 at specific location.

TABLE 1. Continued

Month & Year		Average Temperature*	Departure from Normal**	Total Precipitation*	Departure from Normal**
Kennebec (Lyman County Reporting Station)					
Aug.	1990	74.0	-0.4	2.41	0.18
Sept.	1990	68.7	5.0	1.12	-0.09
Oct.	1990	51.0	-0.1	0.96	0.08
Nov.	1990	39.6	5.4	Tr	-0.51
Dec.	1990	16.4	-5.7	0.50	0.12
Jan.	1991	16.5	0.9	0.15	-0.10
Feb.	1991	31.5	9.0	1.26	0.78
Mar.	1991	38.0	6.0	1.16	0.27
Apr.	1991	50.5	3.2	3.23	1.10
May	1991	61.2	2.3	5.19	2.67
June	1991	73.3	4.2	4.21	1.20
July	1991	76.0	0.2	0.41	-1.88
Wasta (East Pennington & Custer County Reporting Station)					
Aug.	1990	74.1	0.8	1.62	0.11
Sept.	1990	66.1	3.9	0.88	-0.18
Oct.	1990	48.3	-2.1	0.40	-0.52
Nov.	1990	40.3	5.2	0.43	-0.06
Dec.	1990	16.9	-7.8	0.20	-0.18
Jan.	1991	16.4	-3.4	0.13	-0.22
Feb.	1991	34.3	8.3	0.91	0.47
Mar.	1991	38.7	4.6	0.34	-0.51
Apr.	1991	48.4	1.4	2.04	0.13
May	1991	59.4	1.3	6.01	3.50
June	1991	69.8	2.1	3.89	0.76
July	1991	74.4	-0.5	1.39	-0.66
Aug.	1991	74.4	1.1	1.96	0.45
Kirley (Stanley County Reporting Station)***					
Aug.	1990	74.4	-2.7	1.72	-0.13
Sept.	1990	67.1	5.3	0.62	-0.74
Oct.	1990	49.2	-0.6	0.59	-0.40
Nov.	1990	38.5	6.2	0.12	-0.31
Dec.	1990	14.0	-6.5	0.58	0.08
Jan.	1991	14.6	-2.1	0.31	-0.04
Feb.	1991	32.4	9.4	1.13	0.55
Mar.	1991	35.7	2.3	1.21	0.20
Apr.	1991	M	M	(1.20)est.	(-0.52)
May	1991	58.1	-0.5	4.71	2.09
June	1991	69.0	1.9	2.92	-0.08
July	1991	73.9	-0.7	2.43	0.46
Aug.	1991	75.4	-1.7	1.00	-0.85

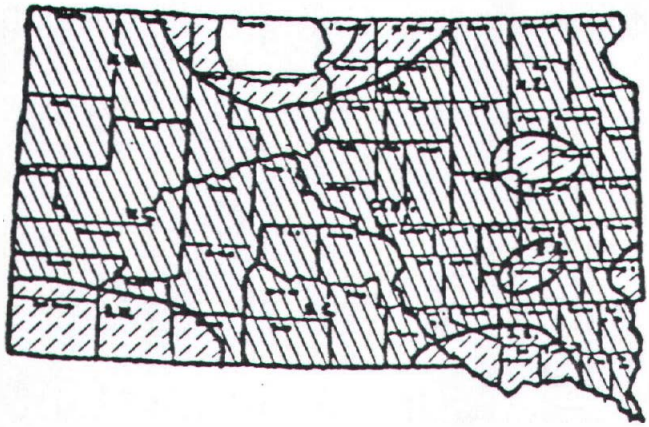
*Average temperatures and precipitation obtained from NOAA Climatological Data from reporting station nearest the experimental sites. Temperatures are reported in degrees Fahrenheit and precipitation in inches.

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

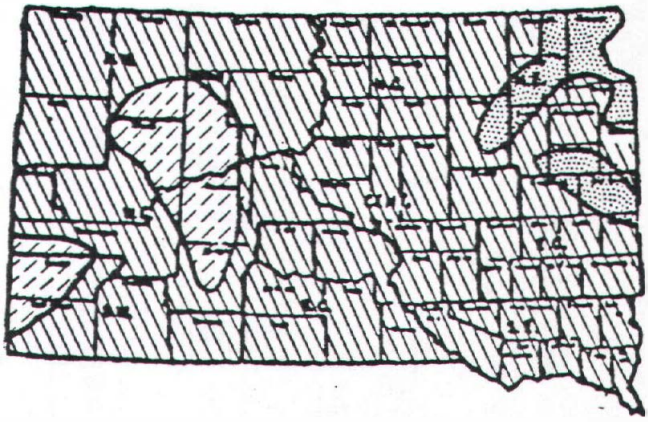
***Departures are based on records of 14 years (1971-1984).

Table 2. Topsoil Moisture Conditions During Growing Season, April-September 1991. (Crop and Livestock Reporting Service-USDA)

As of Friday April 12, 1991



As of Friday May 10, 1991



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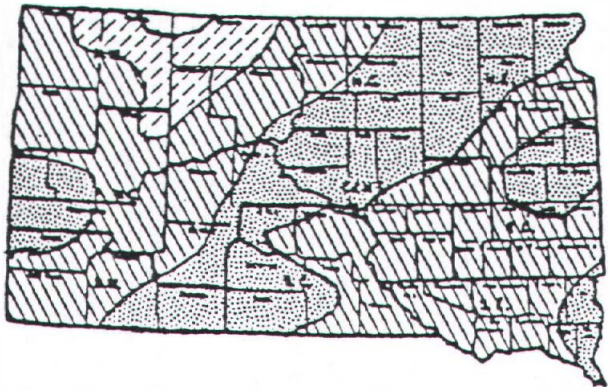

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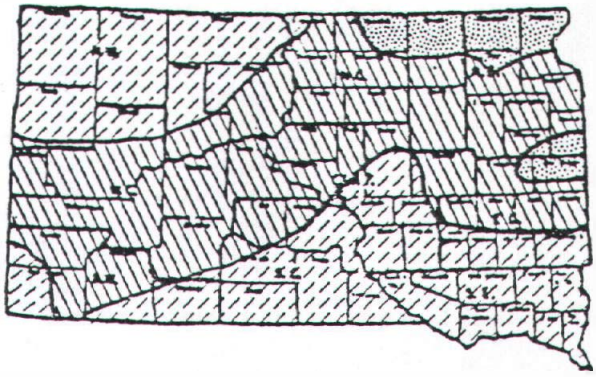

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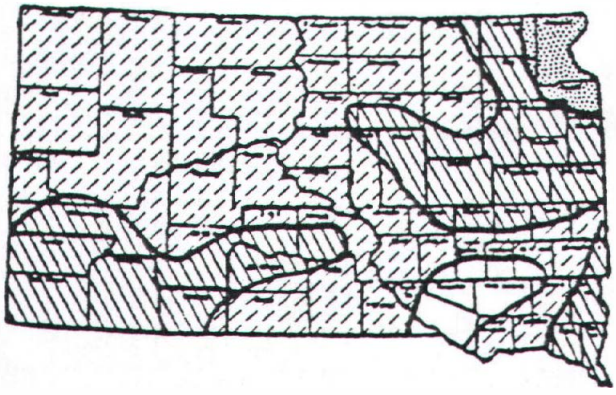

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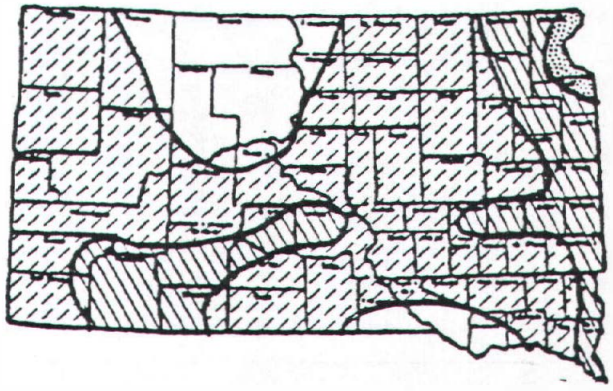

TABLE 3. Weather Data - Date of Critical Temperatures and Total Usable-Precipitation in Counties with Experimental Plots, (1990-1991).

Location	Date of Temperature*		Total Usable Moisture**	
	Fall-First	Spring-Last	Aug 90-July 91	April 91-July 91
Bennett County (Martin)	Sep. 23 (22°)	May 6 (21°)	12.19	10.86
Fall River County (Oelrichs)	Oct. 8 (27°)	May 6 (23°)	13.88	12.05
Fall River County (Oral)	Oct. 9 (28°)	May 6 (26°)	12.09	9.94
Jones County (Murdo)	Oct. 9 (26°)	May 5 (27°)	13.01	11.37
Lyman County (Kennebec)	Oct. 9 (23°)	May 6 (27°)	12.90	9.83
Pennington County (Wasta)	Sep. 23 (27°)	May 6 (26°)	11.41	9.08
Stanley County (Kirley)	Oct. 7 (28°)	May 6 (28°)	9.41	7.61

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

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

SMALL GRAIN VARIETY TRIALS

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

Hard Red Winter Wheat

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

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

Table 4. Hard Red Winter Wheat Variety Trial - Bennett County(Martin), 1989-91.

Variety	% Stand 11/90	Height Inches	Maturity (0-7)*	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1991	Grain Yield-Bu/A (3 yr av)
Arapahoe	89	37	Medium 2	13.7	56.6	56.4	50.3
Siouxland 89	90	40	Early 2	11.6	56.6	55.0	--
SD 87143	88	39	Medium 3	13.1	57.7	54.9	--
SD 88185	90	39	Medium 3	12.7	57.8	53.1	--
Siouxland	90	41	Early 1	12.0	55.5	51.5	49.0
Quantum 549	89	37	Medium 3	12.3	55.2	51.4	--
Brule	90	37	Medium 3	12.7	54.9	51.1	48.9
Redland	88	36	Medium 3	13.7	54.9	50.6	49.8
Centura	90	39	Early 3	13.7	55.5	50.4	48.5
Quantum 562	89	35	Medium 2	13.0	54.0	50.3	50.2
Karl	89	32	Early 0	12.7	58.6	50.1	--
Quantum 542	90	40	Early 3	13.2	54.6	49.5	51.2
SD 88191	90	34	Early 3	12.2	54.6	49.4	--
SD 88253	90	35	Medium 3	12.8	56.8	47.8	--
Abilene	90	32	Medium 2	13.5	53.7	47.2	48.6
SD 87127	83	43	Medium 2	13.2	60.0	45.8	--
Dawn	90	34	Medium 4	13.0	56.0	45.5	46.5
SD 88231	90	38	Early 2	13.3	57.7	44.8	--
Seward	90	45	Med-Late 5	12.5	55.2	44.5	44.0
SD 87128	90	43	Medium 2	13.3	59.1	44.4	--
Rawhide	90	37	Medium 2	12.2	53.8	43.5	--
Thunderbird	89	35	Medium 4	14.0	55.2	43.0	43.7
Rose	90	41	Med-Late 5	13.8	55.8	41.9	39.1
Bronco	90	34	Medium 3	13.0	54.9	41.6	--
Scout 66	89	42	Early 2	12.7	55.5	41.0	43.4
TAM 107	90	31	Early 0	13.5	53.6	40.2	47.0
Sage	90	38	Early 2	14.4	57.5	39.9	43.1
Bennett	90	35	Early 1	14.2	55.4	38.5	44.1
Roughrider	90	43	Med-Late 6	13.9	57.6	33.9	36.4
TAM 200	91	30	Early 2	13.1	53.2	32.6	40.6
Lamar	90	38	Medium 2	13.9	54.8	32.3	--
Agassiz	89	48	Med-Late 6	13.4	54.5	30.4	36.0
Rio-Blanco	89	30	Medium 3	15.1	45.4	26.5	--
Norstar***	88	51	Late 7	12.4	51.1	26.4	31.6
Carson	90	37	Early 2	12.8	49.0	26.3	--
Tiber***	90	43	Med-Late 5	13.5	48.5	24.6	38.0

LSD(5%) - 7.8 Bu/A C.V. - 12.5% Mean - 43.2

*Maturity rating and days headed after earliest varieties have headed.
**Percent protein determined with a Technicon 300 InfraAnalyzer.
***Variety susceptible to stem rust.

NOTE: Seeded September 12, 1990 and harvested July 22, 1991. Starter fertilizer was applied at 12-41-0 pounds per acre. Weeds were controlled by an application of Ally at 1/10 ounce per acre plus 2,4-D at 1/2 pound per acre.

TABLE 5. Hard Red Winter Wheat Variety Trial - Fall River County (Oelrichs), 1989-91.

Variety	Percent Stand 11/90	Percent Stand 4/91	Height Inches	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1991	Grain Yield-Bu/A (3 yr av)
Redland	90	94	38	June 2	11.2	55.0	80.3	59.2
Quantum 549	89	92	36	June 1	12.7	54.3	77.4	--
Abilene	90	94	32	May 30	13.2	57.5	76.8	59.0
Rose	89	94	41	June 4	12.8	52.5	76.6	55.2
Siouxland	90	93	41	June 2	12.6	54.3	74.8	55.3
Arapahoe	90	94	39	May 31	13.2	56.0	74.1	56.5
SD 87143	90	90	39	June 1	12.6	57.0	74.0	--
SD 88185	90	93	39	June 1	14.4	55.3	73.4	--
Rawhide	90	93	37	May 30	13.0	56.8	73.0	--
Siouxland 89	90	94	40	May 31	13.1	55.3	72.4	--
Karl	90	94	32	May 26	13.0	58.3	71.8	--
Quantum 562	90	94	33	May 30	11.5	55.0	71.7	56.5
Brule	90	91	38	June 1	11.6	54.3	71.6	55.4
Centura	90	92	39	June 2	13.5	54.8	71.5	54.6
SD 88253	90	94	36	June 1	13.5	55.5	70.6	--
SD 88191	89	94	33	June 2	10.8	54.3	70.5	--
SD 87128	90	92	43	May 30	14.2	56.8	68.2	--
TAM 107	88	93	32	May 25	12.0	56.8	68.1	59.1
Lamar	90	92	38	May 31	12.6	56.5	68.0	--
TAM 200	88	93	30	May 31	11.7	59.5	67.5	56.7
Quantum 542	90	92	39	June 2	12.4	53.8	67.4	56.3
Dawn	90	95	33	May 31	13.1	55.3	66.1	52.9
Thunderbird	90	94	35	May 26	13.0	58.0	65.6	53.1
Bronco	90	93	32	June 1	12.2	54.8	65.4	--
SD 87127	90	94	41	May 30	12.8	57.0	65.1	--
Sage	88	92	38	May 28	12.4	56.3	64.6	53.1
SD 88231	90	93	38	May 28	13.0	58.0	64.4	--
Agassiz	90	95	46	June 6	12.0	52.5	63.4	45.1
Seward	90	94	44	June 5	12.5	52.3	63.1	49.3
Rio-Blanco	90	93	31	June 1	12.0	57.5	61.9	--
Scout 66	90	94	39	May 27	12.2	57.8	60.5	50.3
Bennett	89	92	33	May 30	13.1	55.5	55.8	51.6
Roughrider	90	94	41	June 3	12.5	54.3	54.3	42.0
Carson	90	95	35	May 28	11.6	53.3	52.7	--
Norstar**	90	94	50	June 6	12.6	49.5	49.6	37.2
Tiber**	90	92	43	June 5	11.5	52.8	42.1	44.5

LSD(5%) - 8.1 Bu/A C.V. - 8.3% Mean - 67.1

*Percent protein determined with a Technicon 300 InfraAnalyzer.
**Variety susceptible to stem rust.

NOTE: Seeded September 17,1990 and harvested July 13, 1991. Weeds were controlled with Ally at 1/10 oz/A. and 2,4D at 12 oz/A.

Lyman County

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

Table 6. Hard Red Winter Wheat Variety Trial - Lyman County(Kennebec), 1989-91.

Variety	Height Inches	Lodging (1-5)*	Maturity (0-7)**	Percent Protein+	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1991	Grain Yield-Bu/A (3 yr av)
Abilene	34	1	Medium 2	14.5	63.3	63.7	57.0
TAM 200	31	1	Early 2	13.8	62.7	57.1	56.2
Thunderbird	39	1	Medium 4	14.7	63.0	55.4	50.3
TAM 107	33	1	Early 0	12.6	61.0	54.6	56.8
Arapahoe	38	2	Medium 2	14.9	59.3	54.6	50.8
Bronco	33	2	Medium 3	13.7	60.7	53.6	--
Siouxland 89	38	3	Early 2	14.0	61.3	53.4	--
Quantum 562	39	2	Medium 2	14.8	58.3	53.3	53.1
Karl	34	1	Early 0	15.8	61.7	53.1	--
Dawn CH	36	4	Medium 4	14.7	61.3	52.7	--
Centura	40	4	Early 3	15.3	61.3	51.6	--
Dawn SDS	36	4	Medium 4	14.7	60.3	50.6	53.8
WeathrMastr 140A	36	5	---	14.1	59.3	50.5	--
Brule	39	2	Medium 3	13.4	58.0	50.5	52.2
Redland	39	2	Medium 3	13.5	58.3	50.2	54.5
Siouxland	38	3	Early 1	14.2	60.7	49.8	53.6
Seward	42	3	Med-Late 5	14.3	57.7	46.6	42.3
Rawhide	33	3	Medium 2	14.4	59.7	46.3	--
Rose	41	2	Med-Late 5	14.1	60.0	46.2	45.1
Scout 66	42	5	Early 2	15.4	61.3	40.6	47.8
Sage	40	4	Early 2	15.8	60.0	39.1	48.6
Agate	38	3	Medium 3	15.4	60.0	38.7	47.4
Weathrmastr 106	40	5	---	15.1	60.0	33.1	--
Agassiz	42	5	Med-Late 6	15.3	51.3	24.9	30.7

LSD(5%) - 2.1 Bu/A C.V. - 2.1% Mean - 48.8 Bu/A

*Lodging score: 1-plants are upright, 5-plants are prostrate.
**Maturity rating and days headed after earliest variety has headed.
+Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 11, 1990 and harvested July 11, 1991.

Table 7. Hard Red Winter Wheat Variety Trial (Conventional Fallow) - Stanley County (Hayes), 1989-91.

Variety	Percent Stand 11/90	Percent Stand 5/91	Height Inches	Maturity (0-7)*	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1991	Grain Yield-Bu/A (3 yr av)
Quantum 549	84	92	37	Medium 3	12.9	63.1	66.2	--
Redland	85	93	35	Medium 3	13.3	61.2	65.9	44.4
Seward	86	93	41	Med-Late 5	13.9	63.8	64.7	30.8
Arapahoe	87	94	35	Medium 2	13.8	62.6	64.4	47.4
SD 87143	84	94	37	Medium 3	14.0	63.6	64.0	--
SD 88185	86	95	33	Medium 3	13.2	64.8	63.0	--
Rose	89	94	38	Med-Late 5	13.5	63.0	61.9	45.5
Quantum 562	86	93	32	Medium 2	13.4	62.6	60.2	44.3
Agassiz	88	94	46	Med-Late 6	13.7	62.4	59.7	46.0
Quantum 542	81	93	37	Early 3	13.3	63.1	57.8	57.8
SD 88231	84	94	40	Early 2	13.4	63.2	57.6	--
Scout 66	89	93	42	Early 2	14.2	63.5	57.3	27.3
SD 88191	86	91	29	Early 3	12.2	61.1	57.3	--
SD 87127	86	94	40	Medium 2	13.0	64.3	57.1	--
Dawn	83	90	32	Medium 4	13.3	63.8	56.5	39.0
Sage	87	94	40	Early 2	14.1	64.2	56.5	29.6
SD 88253	89	94	33	Medium 3	13.3	63.0	56.0	--
SD 87128	89	94	37	Medium 2	13.3	63.5	55.8	--
Siouxland 89	80	92	36	Early 2	12.7	63.6	55.7	--
Siouxland	87	93	37	Early 1	12.8	63.2	55.7	30.2
Roughrider	83	94	42	Med-Late 6	13.5	64.2	55.6	37.3
Brule	83	91	34	Medium 3	12.9	60.2	54.0	38.0
Centura	84	92	36	Early 3	13.0	63.8	53.8	37.2
Bronco	87	94	30	Medium 3	13.5	62.6	53.8	--
Lamar	86	94	37	Medium 2	15.1	63.7	53.7	--
Carson	86	94	35	Early 2	13.2	61.9	53.6	--
Thunderbird	84	94	33	Medium 4	14.0	63.6	53.1	30.8
Abilene	87	94	26	Medium 2	14.2	63.8	53.0	44.1
Rawhide	89	94	31	Medium 2	13.3	63.5	52.4	--
Bennett	80	93	34	Early 1	14.5	62.0	51.6	51.6
TAM 200	86	94	31	Early 2	13.1	64.9	50.6	25.8
Norstar***	84	94	47	Late 7	11.2	60.4	48.0	30.4
Karl	90	95	30	Early 0	16.0	63.7	44.1	--
Rio-Blanco	86	93	31	Medium 3	14.3	62.0	43.5	--
TAM 107	85	92	27	Early 0	13.6	62.3	40.5	24.5
Tiber***	77	92	40	Med-Late 5	11.9	58.0	35.9	29.4

LSD(5%) - 7.1 Bu/A C.V. - 8.9% Mean - 55.3

*Maturity rating and days headed after earliest variety has headed.
**Percent protein determined with a Technicon 300 InfraAnalyzer.
***Variety susceptible to stem rust.

NOTE: Seeded September 24, 1990 and harvested July 18, 1991.

Hard Red Spring Wheat

Plots were seeded at six locations in 1991. All trials were seeded on fallow with a six row plot seeder having eight inch row spacing. Individual plots contained a minimum of 120 square feet with four replications per variety. Seeding rate was controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. Harvesting was accomplished with a self-propelled plot combine. Machine harvested plots contained a minimum of 100 square feet per sample.

TABLE 8. Hard Red Spring Wheat Variety Trial-Bennett County(Martin), 1989-91.

Variety	Height (Inches)	Relative Maturity*	Percent Moisture	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1991	Grain Yield-Bu/Acre (3 yr av)
SD 3080	37	-1	12.9	16.9	55.0	36.9	--
SD 8070	37	-1	11.5	16.7	52.6	33.2	--
Sharp	36	-2	11.3	17.0	46.7	32.8	26.8
SD 3055	34	0	10.7	16.9	46.7	32.0	--
SD 3056	33	-1	11.2	16.9	47.4	31.8	--
SD 8073	35	-1	11.8	16.8	46.0	30.1	--
SD 8074	34	-1	10.8	17.5	47.1	28.8	--
SD 8072	34	-1	12.0	16.6	47.2	28.8	--
Butte 86	35	0	13.5	17.1	47.0	28.8	22.2
2375	35	0	--	18.4	50.6	28.3	23.1
ND 655	31	3	12.1	17.9	46.1	27.9	--
Prospect	29	2	11.3	15.4	46.6	25.7	22.6
Guard	30	1	12.1	16.3	48.8	25.0	21.0
Dalen	29	1	11.0	17.1	44.3	24.8	--
Grandin	29	1	10.7	17.1	44.8	24.6	19.6
NDWX371	31	3	10.5	17.0	43.3	23.0	--
MN 85324	31	1	12.8	18.0	43.2	21.7	--
Celtic	31	4	16.2	17.6	40.6	21.6	21.3
Bergen	32	2	11.7	17.2	45.2	21.3	--
Amidon	32	2	16.1	17.4	42.7	21.1	19.2
Fjeld	30	1	9.7	16.3	40.7	20.5	18.1
W2502	28	3	13.5	17.2	39.1	20.1	18.4
2369	28	3	13.0	17.1	45.3	19.6	19.1
Stoa	34	3	11.8	17.6	44.8	19.5	20.6
N86-0542	26	4	11.1	16.4	45.7	19.5	--
Chris	36	3	11.9	17.7	43.3	19.4	17.2
Gus	32	3	10.6	17.7	46.4	19.0	18.3
W2501	28	3	11.5	16.9	36.6	19.0	17.0
Nordic	28	4	13.0	15.5	47.2	18.1	19.0
Telemark	27	2	10.2	16.9	38.5	15.7	17.3
Vance	28	4	12.3	17.7	40.4	15.2	15.5
Marshall	26	6	14.6	17.3	40.9	12.3	15.6

LSD(5%) - 4.4 Bu/A C.V. - 11.3% Mean - 23.9

*Indicates relative maturity based on 60 days from seeding to heading.
**Percent protein was determined with a Technicon 300 InfraAnalyzer.
NOTE: Plots were seeded April 17 and harvested August 15, 1991.

Durum Wheat

TABLE 9. Durum Wheat Variety Trial - Bennett County (Martin), 1989-1991.

Variety	Height (Inches)	Relative Maturity*	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1991	Grain Yield-Bu/Acre (3 yr av)
Monroe	37	-3	17.1	48.3	27.6	20.7
Ward	38	0	18.2	47.5	23.7	16.9
Fjord	36	-1	17.6	48.5	22.4	16.7
Vic	38	0	17.9	48.6	22.2	16.6
Renville	37	0	17.5	46.2	21.4	15.5
Stockholm	28	1	17.7	43.2	19.0	14.3
Sceptre	31	-1	18.2	41.9	18.3	14.8

LSD(5%) - 5.2Bu/A C.V. - 13.2% Mean - 22.1

*Indicates maturity based on 68 day interval between seeding and heading.
**Protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 17 and harvested August 15, 1991.

Winter Triticale

Plots were seeded at seven locations in 1990. All trials were seeded in fallow soil with a six row plot seeder having a ten 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.

TABLE 10. Winter Triticale Variety Trial - Bennett County (Martin), 1989-1991.

Variety	% Stand 11/90	Height (Inches)	Percent Moisture	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1991	Grain Yield-Bu/A (3 yr av)
18249	83	48	10.0	12.6	49.5	65.3	48.6
Newcales	91	41	10.0	13.2	51.2	64.3	53.9
Jenkins	84	57	9.0	13.5	44.4	58.5	43.7
Winteri	85	56	8.0	12.4	43.6	42.2	36.5
Thunderbird**	89	37	11.0	14.0	55.4	37.9	42.1

LSD(5%) - 5.5 Bu/A. C.V. - 6.7% Mean - 57.6

*Percent protein was determined with a Technicon 300 InfraAnalyzer.
**HRW Wheat (var.) Thunderbird was used as a standard for comparison.

NOTE: Plots were seeded September 15, 1989 and harvested July 25, 1990.

TABLE 11. Winter Triticale Variety Trial - Fall River County(Oelrichs), 1989-91.

Variety	Percent Stand 11/90	4/91	Date of Heading	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1991	(3 yr av)
Jenkins	83	94	June 6	55	12.2	43.5	108.2	71.7
Winteri	90	94	June 6	58	12.8	44.7	98.3	66.7
Newcales	91	94	May 31	40	12.0	48.7	79.4	70.2
18249	81	92	May 31	48	11.2	46.6	75.7	60.9
Thunderbird**	90	95	May 29	35	12.9	59.4	60.6	53.2

LSD(5%) - 20.2 Bu/A. C.V. - 15.0% Mean - 90.4

*Percent protein was determined with a Technicon 300 InfraAnalyzer.
**HRW Wheat (variety) Thunderbird was used as a standard for comparison.
NOTE: Plots were seeded September 17, 1990 and harvested July 12, 1991.

TABLE 12. Winter Triticale Variety Trial - Stanley County (Hayes), 1991.

Variety	Percent Stand 11/90	6/91	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield (Bu/Acre)
Newcales	89	95	44	13.8	54.3	82.0
18249	88	95	58	14.2	55.0	72.0
Jenkins	87	95	57	13.6	51.4	68.8
Winteri	90	95	62	12.9	49.4	62.5
Thunderbird**	85	95	35	14.0	63.0	50.8

LSD(5%) - 15.2 Bu/A. C.V. - 15.4% Mean - 71.3

*Percent protein determined with Technicon 300 InfraAnalyzer.
**HRW Wheat (var.- Thunderbird) was used as a standard for comparison.
NOTE: Plots were seeded September 20, 1990 and harvested July 30, 1991.

Spring Triticale

Plots were seeded at five locations in 1991. All trials were seeded in fallow soil 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.

TABLE 13. Spring Triticale Variety Trial - Bennett County (Martin), 1989-91.

Variety	Height (Inches)	Percent Moisture*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1991	Grain Yield-Bu/Acre (3 yr av)
Kramer	36	8.3	14.5	39.4	35.5	24.6
Marval	35	8.6	15.0	36.7	23.6	17.9
Trical Victoria	35	11.3	14.1	41.6	19.8	23.2
Trical Grace	40	8.2	15.9	40.6	19.8	--

LSD(5%) - 3.2 Bu/A. C.V. - 6.4% Mean - 24.7

*Percent moisture in grain was determined in field at harvest.
**Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 17 and harvested August 15, 1991.

Spring triticale varieties grown under normal moisture conditions had grain yields equal to the higher yielding spring wheat and double the yield of durum wheat. However, when grown under moisture stress the yields were higher than the spring wheat and equal to the durum wheat. The weights per bushel were near normal where the plants were drought stressed but were above standard weight when moisture was available to permit normal maturity. The conditions under which the trials were conducted are discussed under the hard red spring wheat trials. The present varieties have an inherent shrivelled kernel which has a standard weight of 48 pounds per bushel. It is best utilized as a grain feed for swine or poultry.

Oat Variety Trials

Oat variety trials were conducted on a cooperative basis at six locations in 1990. Seeding dates ranged from April 18 to April 24. All trials were seeded on fallow with a six row plot seeder having an eight inch row spacing. Seeding rates were controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. Harvesting was accomplished with a self-propelled plot combine.

Bennett County

Oat variety plots at Martin were seeded on April 17 into fallowed soil. Soil moisture at seeding time was adequate for germination and emergence. Precipitation during the spring was above normal and was received as heavy showers. Usable moisture from April through July totaled 10.45 inches.

TABLE 14. Oat Variety Trial - Bennett County (Martin), 1989-91.

Variety	Height (Inches)	Date of Heading	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre 1991	Grain Yield-Bu/Acre (3 yr av)
WIX5229-1	34	June 26	37.6	111.4	--
Premier	39	June 24	33.3	107.2	--
SD 87572	38	June 27	38.2	106.0	--
Webster	34	June 23	35.1	106.0	54.3
Ogle	36	June 25	33.2	104.8	54.9
Y933-11-2	37	June 25	35.5	104.4	--
Newdak	37	June 25	30.6	104.2	55.8
Don	36	June 22	33.9	104.2	54.5
Hamilton	36	June 23	35.4	104.1	55.4
Porter	36	June 27	37.3	102.8	46.5
SD 87063	38	June 22	35.1	101.4	--
Moore	38	June 28	34.8	99.6	43.5
Troy	39	June 27	33.8	98.4	46.4
Monida	37	June 28	37.1	98.0	51.8
Settler	37	June 27	37.6	97.6	53.2
Hazel	33	June 25	35.4	96.7	53.9
Dane	34	June 22	36.1	95.6	--
Valley	35	June 22	35.4	95.2	52.4
Kelly	43	June 25	34.2	92.4	42.8
Starter	37	June 23	39.9	92.2	53.3
Steele	37	June 27	36.0	91.6	45.9
SD 87675	35	June 27	33.5	90.6	--
Riel	41	June 29	35.2	90.4	--
Burnett	38	June 25	35.6	89.1	47.4
Dumont	39	June 28	37.0	88.6	--
Hytest	40	June 25	36.3	86.6	49.1
Robert	33	June 29	37.7	81.5	--
Tibor	40	June 27	36.4	56.5	--

LSD(5%) - 7.5 Bu/A C.V. - 4.8% Mean - 96.3

NOTE: Plots were seeded April 17 and harvested August 15, 1991.

GRAIN CROPS

Grain Sorghum

Objective: To compare the performance of various grain crops for yield and other agronomic characteristics.

Jones County

Thirty two grain sorghum hybrids were seeded near Draper in Jones county on June 13. Plant populations were established at 1.3 plants per square foot, or 58,000 plants per acre. Stands were good and plants were healthy. Precipitation was above normal from May through June, but below normal during July. Temperatures were below normal during July, but normal during August. The conditions resulted in healthy robust plants with the potential for high yields. Good growing conditions prevailed through early October. The first killing frost occurred on October 9. The trial data are reported in Table 16.

Stanley County

Twenty five grain sorghum hybrids were seeded near Hayes in western Stanley county on June 11. Plant populations were established at 1.3 plants per square foot, or 58,000 plants per acre. Stands were good and plants were healthy. The area received below normal precipitation towards the end of the growing season. The plants headed at the normal time but soon were under moisture stress and could not fill out the kernels. The first killing frost did not occur until early October. Harvesting was completed in mid-October. The yield and other data are listed in Table 16.

Table 15. Grain Sorghum Hybrid Variety Trial - Jones County (Draper), 1990-91.

Brand and Variety	Date of Heading	Height (Inches)	Percent Lodging	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1991	Grain Yield-Bu/A (2yr av)
Wilson 512	Aug 13	40	1	52.4	89.5	--
Asgrow Madera	Aug 11	41	0	59.4	87.4	--
Pioneer 8790	Aug 11	42	1	56.4	86.2	--
Agripro ST3280	Aug 11	44	2	55.7	81.2	54.4
Pioneer 8570	Aug 9	42	2	54.8	81.2	--
Jacques 311	Aug 15	45	1	53.0	80.5	--
Agripro ST1002	Aug 11	38	0	56.0	80.2	55.4
Cargill 577	Aug 10	45	3	57.8	78.0	57.0
Dahlgren DG27B	Aug 10	41	1	57.8	77.9	47.8
Cargill 630	Aug 14	42	0	54.4	77.2	--
Dahlgren DG33B	Aug 12	43	1	57.9	76.3	51.8
Northrup King X8803	Aug 11	38	1	55.4	75.4	--
Taylor-Evans Chico	Aug 10	41	3	57.9	75.4	--
Pioneer 894	Aug 11	37	2	57.0	75.4	44.1
Jacques 308	Aug 15	48	1	55.0	74.7	--
Cargill 40CS	Aug 17	39	0	51.3	74.4	--
Dekalb DK28E	Aug 11	40	1	57.8	73.3	50.6
Pioneer 8855	Aug 10	42	0	58.2	72.7	55.5
Dekalb X109	Aug 10	40	4	58.0	72.5	--
Pioneer XS902	Aug 11	41	1	58.7	72.2	--
Jacques 101	Aug 11	46	4	56.0	72.2	--
Cargill X77010	Aug 11	39	2	56.8	71.8	--
Golden Harvest H301	Aug 13	40	0	55.8	71.6	--
Jacques 111E	Aug 11	40	2	57.0	70.8	--
Wilson 514	Aug 13	42	2	55.9	70.4	--
Northrup King 1210	Aug 11	39	1	56.1	67.2	49.5
Cargill X70001	Aug 10	44	2	57.0	65.6	56.0
Dekalb X110	Aug 10	42	3	56.5	63.2	--
Dekalb DK18	Aug 9	41	5	56.5	62.5	46.6
Pioneer 8877	Aug 10	43	2	59.7	60.6	49.5
Asgrow Seneca	Aug 9	40	0	57.5	57.6	--
Cargill X15645	Aug 15	82	3	39.8	41.2	22.2

LSD(5%) - 17.0 Bu/Acre C.V. - 16.1% Mean - 73.0

NOTE: Plots were seeded in 30 inches rows with a Buffalo no-till seeder June 13 and harvested October 1, 1991. Weeds were controlled with Atrazine-Lasso applied post-plant pre-emergence.

Table 16. Grain Sorghum Hybrid Variety Trial - Stanley County(Hayes), 1990-91.

Brand and Variety	Height (Inches)	Percent Lodged	Percent Moisture	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1991	Grain Yield-Bu/A (2 yr av)
Pioneer 894	36	5	9.2	41.4	12.1	27.7
Wilson 512	36	2	3.9	24.8	12.0	--
Asgrow Madera	36	1	4.9	25.1	9.8	27.2
Cargill X77010A	37	9	7.5	21.2	8.8	--
Taylor-Evans Chico	37	5	5.3	31.6	8.7	--
Cargill 577	39	10	7.3	23.8	8.7	23.8
Dekalb DK-28E	35	15	4.1	26.0	8.5	16.7
Agripro ST3280	38	15	3.2	22.4	8.4	29.6
Pioneer XS902	36	3	4.7	28.9	8.3	--
Northrup King 1210	37	7	4.6	29.4	8.2	--
Golden Harvest H301	34	4	3.2	22.4	7.8	--
Pioneer 8855	37	16	6.2	34.9	7.2	23.5
Dahlgren DG-33B	36	8	4.1	23.9	7.1	--
Jacques 101	39	8	2.3	23.0	7.1	--
Dahlgren DG-27B	35	3	3.7	24.2	7.0	--
Northrup King X8803	36	1	3.4	19.7	6.5	--
Jacques 111E	37	4	4.0	25.8	6.5	--
Pioneer 8877	39	10	4.1	24.6	6.5	23.6
Asgrow Seneca	35	1	2.9	20.0	6.4	21.0
Cargill X70001	37	3	5.4	29.1	6.41	--
Dekalb DK-18	37	24	5.6	30.0	6.0	14.1
Wilson 514	36	10	5.1	23.6	5.4	--
Pioneer 8790	35	2	4.2	23.9	5.1	24.2
Cargill 40	31	2	3.3	19.0	4.7	--
Jacques 308	37	6	2.7	18.5	4.2	--

LSD(5%) - 3.3 Bu/Acre C.V. - 30.2% Mean - 7.5

NOTE: Plots were seeded June 11, 1991 and harvested October 2, 1991. No herbicides were applied for weed control. The plots received one cultivation in early July and were sidedressed with 28-0-0 at 15 gallons per acre.

OILSEED CROPS

Pennington County

Safflower Varieties

Objective: To evaluate the adaptation of safflower varieties in western South Dakota.

Procedure: The field was fallowed in 1990. The field was disked in the early spring and had 1 pound per acre of Treflan applied and incorporated. The plots were seeded on April 30, 1991. Seeding was done with a plot seeder having disc openers and an 8 inch row spacing. Plot size was 4 feet by 25 feet. The stand was excellent with few weeds. Harvesting was completed on September 6, 1991.

Results:

Table 17. Safflower Variety Trial - Pennington County (Wall), 1990-91.

Variety	Date of Flower	Height (Inches)	% Oil Content	Test Wt. (Lbs/Bu)	Seed Yield-Lbs/A 1991	Seed Yield-Lbs/A (2 yr av)
S-317*	June 24	29	41.1	39.5	1476	1450
Girard	June 28	30	41.6	41.9	1424	1344
Finch	June 25	29	38.8	43.1	1404	1378
Montola 2000*	June 24	24	41.5	40.2	1387	--
S-208	June 28	30	41.6	40.9	1358	1359
S-541	June 27	31	46.1	40.8	1271	1298
Centennial*	June 28	28	39.2	41.8	1127	1204
Oker	June 25	29	42.8	40.2	1108	1114

LSD(5%) - 200 Lbs/A C.V. - 10.2% Mean - 1319

*High Oleic acid oil

Discussion: The three studies were grown under quite different conditions. The trials in Meade and Perkins counties were on recrop soil, while the Pennington county study was on fallow soil. The shortage of soil moisture under recrop conditions resulted in low yield of seed. Weed control of all trials was good, however, some hand weeding was required. The crop is adapted to the area and can be grown with normal small grain planting and harvesting equipment. Weed control is very important, therefore it is necessary to select a clean field and use a herbicide.

Soybean Varities

Objective: To evaluate the adaptation of soybean varieties to western South Dakota.

Location: Rod Renner farm north of Wall, South Dakota.

Procedure:The soybeans were planted in 8 inch rows, with 6 rows in each plot. The field had been fallowed in 1990 and was relatively weed free. One quart of Treflan herbicide was applied and incorporated with a disk prior to planting. The crop was not cultivated during the summer. The plots were harvested with a small plot combine. The experimental data are given in Table 18.

Results:

Table 18. Soybean Variety Trial - Pennington County (Wall), 1991.

Varieties	Maturity Group	Height (Inches)	Plants per Acre	Percent Stand	Test Wt (Lbs/A)	Yield (Bu/A)
Glenwood	0	21	191,000	75	56.0	15.6
Simpson	0	23	145,000	90	55.9	14.0
Hardin	I	24	65,000	88	56.6	13.7
Sibley	I	24	135,000	90	56.7	13.1

LSD(5%) - 3.5 Bu/A C.V. - 15.4% Mean - 14.1

Discussion: The soybean yields were consistent with yields obtained in past research trials. The seed pods were from 3 to 4 inches above the soil surface making harvest easy. The location of the seed pod on the plant was higher from the soil surface than when the beans were planted in 12 inch rows. The narrow rows did not allow cultivation but weed control by the herbicide was excellent.

Sunflower Varieties

Pennington County

Objective: To evaluate the adaptation of sunflower varieties to western South Dakota.

Procedure:The sunflowers were seeded in 30 inch rows, with 2 rows in each plot. The field was fallowed in 1990. Treflan herbicide was applied at the rate of one pound per acre and incorporated with a disk prior to seeding. The plots were harvested with a plot combine.

Results:

Table 19. Sunflower Variety Trial - Pennington County (Wall), 1991.

Varieties	Height (Inches)	Plants per Acre	Date of Flowering	Test Wt (Lb/Bu)	Yield (Lbs/A)
Dahlgen DO855	64	14,250	August 6	24.5	1383
Dahlgren DO704XL	63	13,300	August 9	25.0	1301

LSD(5%) - 320 lbs/A C.V. - 14.5% Mean - 1342

FORAGE PRODUCTION RESEARCH

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

Fall Seeded Small Grain Forage Trials

Pennington County

Eleven varieties of Fall seeded small grain including Winter wheat and Winter Triticales were seeded in replicated plots in the fall of 1990. The rate of seeding in pounds per acre was: Winter Wheat - 60 lbs, and Triticales - 75 lbs. Plots were located in proximity of variety trials so that grain yields would be comparable.

Fall seeded grain for forage production were seeded near Wall in November 1990. Soil moisture was adequate for germination and emergence. The forage was harvested on July 3 when the seeds were in the milk stage. The adjacent plots for grain production were harvested for grain on July 17.

Table 20. Fall Seeded Small Grain Forage Trial - Pennington County(Wall), 1991.

		Forage Production			Grain Production	
Crop & Variety	Height (Inches)	% Dry Matter	Percent Protein	Yield-T/A (@ 12% H2O)	Test Wt. (Lbs/Bu)	Yield (Bu/A)
Winter Triticales						
18249	55	43.1	7.4	4.4	51.6	41.6
Jenkins	59	37.8	6.9	3.3	46.0	32.8
Winteri	63	39.4	8.2	3.1	45.9	30.6
Newcales	43	42.5	9.9	2.9	50.2	35.6
				Mean - 3.4		35.2
Winter Wheat						
Sage	40	55.4	10.1	3.6	56.9	20.4
Thunderbird	36	55.8	10.2	3.3	57.7	23.3
TAM 107	31	68.9	9.8	3.2	51.3	16.0
Rose	40	52.2	9.0	3.0	56.2	22.0
Agassiz	49	48.8	9.9	1.7	53.6	12.9
				Mean - 3.0		18.9
Least Significant Difference(5%)				T/A - 0.3		Bu/A - 5.4
Average Yield				3.2		27.1

Millet Forage Trials

Procedure: Millets for grain and forage production were seeded near Wall in June 1991. Soil moisture was adequate for germination and emergence. The forage was harvested on August 29 when the seeds were in the dough stage. The adjacent plots for grain production were harvested for grain on September 6.

Table 21. Millet Grain and Forage Trial - Pennington County(Wall), 1991.

Crop & Variety	Height (Inches)	Forage Production: % Dry Matter	Forage Production: Percent Protein	Forage Production: Yield-T/A (@ 12% H2O)	Grain Production: Test Wt. (Lbs/Bu)	Grain Production: Yield (Bu/A)
Proso Millet						
Cerise	34	68.0	7.9	3.3	58.3	35.7
Rise	35	61.0	7.1	3.6	56.2	52.5
Minsum	38	67.0	8.4	3.3	56.0	44.3
Minco	38	72.0	6.2	3.8	56.9	43.2
Dawn	29	74.0	6.9	2.7	56.8	48.6
				Mean - 3.3		Mean - 44.9
Foxtail Millet						
Siberian	32	69.0	8.4	3.6	54.7	32.2
Manta	32	67.0	9.4	3.7	54.8	34.7
German	33	45.0	7.0	4.1	50.5	6.5
				Mean - 3.8		Mean - 24.5
Pearl Millet						
Hypro	47	32.0	6.6	4.0	51.3	4.2
Least Significant Difference(5%)				T/A - 0.6		Bu/A - 7.8
Average Yield				3.7		33.5

Winter Wheat Starter Fertilizer Studies

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

Introduction: The use of fertilizer to increase and stabilize production, by maintaining soil nutrient level, has been practiced since the beginning of plant cultivation. The method of application, time of application, and source of nutrients have all been studied. Each with a specific objective. These studies were initiated to determine (1) the effect of starter fertilizer on winter survival, (2) the effect on yield as a result of winter survival, and (3) the effect on grain quality.

Procedure: Seven sites were selected in conjunction with area winter wheat variety trials. The initial treatment consisted of the presence or absence of starter fertilizer. The liquid fertilizer (Analysis 10-34-0) was applied at the rate indicated in the tables. The second step was the application of the liquid plus a granular fertilizer. The granular fertilizer was applied at a level required to produce a response without damaging germination.

Seeding was completed during the period September 13-24, 1990. Seeding rate was established at 60 pounds per acre and was controlled by prepackaging the seed. The seeded areas were 5 feet wide by 30 feet long. They were trimmed to a 25 foot length prior to harvest. The experiment contained four replications. Harvesting was completed with a Hege 125B self-propelled plot combine.

Bennett County

The hard red winter wheat variety, Thunderbird, was seeded in fallow soil at Martin on September 13, 1990. All nitrogen and phosphorus was applied in liquid form. The nutrients potassium and sulfur were applied as granules, at the rate specified in Table 22. The total nutrients present in the soil was in excess of the amount needed for the wheat to produce a grain yield of 49 bushels per acre.

Results:

TABLE 22. Starter Fertilizer Demonstration with Hard Red Winter Wheat - Bennett County (Martin), 1990-91.

Treatment	Percent Stand* 11/90	5/91	Percent Moisture	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1991	(2 yr av)
0- 0- 0	87	90	12.0	12.9	59.4	47.0	58.3
12-41- 0	90	95	11.0	13.1	58.0	48.2	57.7
12-41-20	85	85	12.0	12.9	56.8	47.9	57.4
0-41- 0	88	88	12.0	12.9	56.2	45.1	--
12-41- 0 +S	88	88	19.0	12.8	57.1	43.6	55.7
12-41-20 +S	86	86	11.0	13.0	58.2	48.6	58.8

LSD(5%) - 7.1 Bu/A C.V. - 10.0% Mean - 46.7

*Percent stand determined by visual observation.
**Percent protein determined with a Technicon 300 InfraAnalyzer.
NOTE: Plots were seeded on September 13, 1990 and harvested July 22, 1991.

(Table 22 Continued)
Soil Analysis Data:

Nutrient	Pounds per Acre Nitrogen	Phosphorus	Potash	Sulfur
In Soil	147	64	2090	84
Pounds Added*	12	41	20	20
Required for 49 Bu Yield	118	40	275	12

*Added pounds of nutrient indicated only to those plots receiving a specific treatment.

Fall River County

The hard red winter wheat variety, Thunderbird was seeded in fallow soil at Oelrichs on September 17, 1990. All nitrogen and phosphorus was applied in liquid form. The potash and sulfur was applied as granules, at the rate specified in Table 24. The total fertilizer applied raised the nutrient content in the soil to the yield goal level of 40 bushel per acre. Plots were harvested on July 12.

Results:

TABLE 23. Starter Fertilizer Demonstration with Hard Red Winter Wheat - Fall River County (Oelrichs), 1990-91.

Treatment	% Stand* 11/90	% Stand* 5/91	Date of Heading	Height (Inches)	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1991	Grain Yield-Bu/A (2 yr av)
0- 0- 0	90	92	May 26	35	13.2	57.0	61.6	52.9
0-41- 0	90	94	May 25	34	13.2	56.9	62.4	--
0- 0-20	89	92	May 26	36	13.7	56.5	61.2	51.6
0- 0- 0 +S	90	92	May 26	36	14.0	56.4	60.5	51.1
0- 0-20 +S	90	93	May 26	35	13.2	56.2	62.8	52.2

LSD(5%) - 3.1 Bu/A C.V. - 3.3% Mean - 61.7

*Percent stand determined by visual observation.
**Percent protein determined with a Technicon 300 InfraAnalyzer.

(Table 23 Continued)
Soil Analysis Data:

Nutrient	Pounds per Acre Nitrogen	Phosphorus	Potash	Sulfur
In Soil	104	30	1540	88
Pounds Added*	12	41	20	20
Required for 40 Bu Yield	96	40	275	10

*Added pounds of nutrient indicated only to those plots receiving a specific treatment.

Stanley County

The hard red winter wheat variety, Thunderbird, was seeded in fallow soil at Hayes on September 24, 1990. All nitrogen and phosphorus was applied in liquid form. The potash and sulfur was applied as granules, at the rate specified in Table 24. The total fertilizer applied raised the nutrient content in the soil to the yield goal level of 37 bushel per acre.

Results:

TABLE 24. Starter Fertilizer Demonstration with Hard Red Winter Wheat - Stanley County (Hayes), 1991.

Treatment	Percent Stand* 11/90	Percent Stand* 5/91	Height (Inches)	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield (Bu/Acre)
0- 0- 0	83	89	29	12.7	64.7	38.6
12-41- 0	70	92	31	13.4	65.8	45.5
12-41-20	70	91	32	13.2	66.1	46.0
0-41- 0	75	94	30	13.3	65.2	48.6
12-41- 0 +S	80	91	29	13.9	66.1	45.6
12-41-20 +S	74	91	30	13.5	65.8	46.4

LSD(5%) - 6.0 Bu/A C.V. - 8.8% Mean - 45.1

*Percent stand determined visually.
**Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded September 24, 1990 and harvested July 18, 1991.

(Table 24 Continued)
Soil Analysis Data:

Nutrient	Pounds per Acre Nitrogen	Phosphorus	Potash	Sulfur
In Soil	68	52	1540	70
Pounds Added*	12	41	20	20
Required for 37 Bu/A Yield	89	40	275	10

*Added pounds of nutrient indicated only to those plots receiving a specific treatment.

The winter wheat starter fertilizer study at Hayes was seeded in late September 1990. The seedbed was good with some topsoil moisture available. Fall stands ranged from 70% to 83%. Spring stands were over 90% indicating a mild winter without winterkill. Data are reported in Table 24.

Summary:
The use of starter fertilizer generally resulted in better fall emergence and winter survival. The increase in survival was associated with the addition of phosphorus which favors root growth. Larger root masses would permit more water intake resulting in less plant dehydration and eventual death. Increase in yield was also associated with phosphorus application. The difference in yield of unfertilized and fertilized was greater than would be expected when the nutrient levels in the soil are high enough so as to be readily available.

Recrop Winter Wheat on Millet Stubble

Objective: To compare yield potential of winter wheat varieties on millet stubble.

Procedure: Nine drill strips of winter wheat were seeded on September 24, 1990. Starter fertilizer (10-34-0) was applied at six gallons per acre. The trial was sprayed on May 7 to control kochia, buckwheat, tansy mustard, russian thistle, and pennycress. Ally was used at 1/10 oz/acre and 2,4D ester at 1/6lb/a. The strips were harvested on July 17, 1991.

TABLE 25. Hard Red Winter Wheat Variety Trial (Recrop on Millet Stubble) Stanley County (Hayes), 1991.

Variety	Plant Height	Relative Maturity	% Moisture in Grain	Percent Protein*	Test Wt. Lbs/Bu	Grain Yield Bu/Acre
Arapahoe	Medium	Medium	16.0	12.9	61.0	55.3
Dawn	Med-Short	Medium	13.0	12.5	64.0	41.5
Karl	Short	Early	10.7	12.9	64.0	40.9
TAM 200	Short	Early	10.0	12.3	64.3	40.5
Siouxland	Medium	Early	12.0	12.9	62.3	37.9
Scout 66	Medium	Early	9.8	13.1	64.0	36.6
Quantum 562	Medium	Med-Early	9.8	13.1	61.0	34.5
Abilene	Short	Medium	10.2	13.2	61.3	24.4
TAM 107	Short	Early	7.1	12.2	57.7	24.3

LSD(5%) - 4.5 Bu/A C.V. = 7.0% Mean - 37.3

*Percent protein determined with a Technicon 300 InfraAnalyzer.

Note: Plots were seeded September 1990 and harvested on July 1991.

Summary: Arapahoe significantly out yielded all other varieties when continuous cropped back on millet stubble ground. All of the above varieties are adjusted to 13.5% moisture.

WEED CONTROL RESEARCH

Control of Weeds With Roundup, Herbicide Combinations, and Sulfate Additives

Objective: To evaluate the control of weeds with Roundup in combination with other herbicides and various sulfate additives on fallow.

Table 26. Percent Control of Weeds with Roundup, Herbicide Combinations, and Sulphate Additives. Pennington County(New Underwood), 1991.

Herbicide Treatment	Product (Oz/Acre)	Sulfate Source	Volunteer Wheat 5/21	Volunteer Wheat 6/14	Pennycress 5/21	Pennycress 6/14	Wild Buckwheat 5/21	Wild Buckwheat 6/14
Roundup	4	None	35	53	71	86	20	40
Roundup 2,4-D Amine	4 16	Am-Sul	86	86	90	95	43	66
Roundup 2,4-d Ester	4	Am-Sul	86	89	94	95	55	60
Roundup DF	4	Am-Sul	75	86	90	94	38	48
Roundup DF 2,4-D Amine	4 16	Am-Sul	85	89	85	95	43	68
Roundup DF 2,4-D Ester	4 8	Am-Sul	74	83	88	94	35	55
Control			1	1	1	1	1	1
Roundup	4	Acid	79	76	86	94	33	55
Roundup 2,4-D Amine	4 16	Acid (Gelled)	1	1	1	1	1	1
Roundup 2,4-D Ester	4 11	Acid	80	93	90	93	35	65
Roundup	4	Am-Sul	86	75	85	93	23	50
Roundup 2,4-D Ester	4 11	Alone	43	63	83	94	18	58
Roundup 2,4-D Amine	4 8	Alone	59	74	86	94	35	60
Roundup	4	Na-Sul	69	78	85	93	28	50
Roundup Banvel	4 8	Am-Sul	95	86	98	95	91	84
		LSD(5%) =	13	12	11	4	17	16
		SD =	9	9	7	3	12	11
		CV(%) =	14	13	10	3	36	22

Summary: Treatments of Roundup alone and Roundup plus other herbicides with sulfate additives had significantly better control of volunteer wheat. Control of Pennycress was excellent with all formulations that contained a sulfate additive. Wild Buckwheat was sparsely populated in this trial so the assessment probably isn't valid.

Control of Weeds with Roundup and Various Combinations of Herbicides

Ojective: To assess control of Volunteer Wheat, Pennycress, and Wild Buckwheat using Roundup alone and various combinations of herbicides with various sulfate additives.

Table 27. Control of Weeds with Roundup in Combination with Other Herbicides. Pennington County (New Underwood), 1991.

Herbicide Treatment	Product (Oz/Acre)	Sulfate Source	Volunteer Wheat 5/21	Volunteer Wheat 6/14	Pennycress 5/21	Pennycress 6/14	Wild Buckwheat 5/21	Wild Buckwheat 6/14
Roundup	6		76	79	78	94	25	43
Roundup	6	Am-Sul	90	90	91	95	40	35
Roundup DF	6	Am-Sul	79	86	75	94	28	48
Roundup	6	H2SO4	90	90	91	95	30	40
Control			1	1	1	1	1	1
Roundup 2,4-D ester	6 8	Am-Sul	83	88	92	94	38	55
Roundup DF 2,4-D ester	6	Am-Sul	85	83	93	94	45	76
Roundup Banvel SGF	6 4	Am-Sul	84	88	88	95	86	84
Roundup Banvel SGF	6 4	Am-Sul	89	91	96	95	93	88
Roundup Banvel SGF	6 4	H2SO4	73	84	89	95	91	78
Roundup 2,4-D ester	6	H2SO4	83	88	94	95	65	68
Roundup 2,4-D Amine	6	Am-Sul	89	93	93	95	51	69
Roundup Atrazine	6 16	Am-Sul	71	88	96	95	85	88
		LSD(5%) -	10	7	14	2	20	13
		SD -	7	5	10	1	14	9
		CV(%) -	9	6	12	2	27	15

Summary: Test results indicate Roundup is more effective when used with a sulfate additive when controlling volunteer wheat. Due to the caustic nature of H2SO4, Am-Sul (Ammonium Sulfate) is the beeter choice as a sulfate additive. Ammonium sulfate indicates a slight advantage over H2SO4 in the table as well.

Efficiency of Surfactants with Roundup and Monsanto 35085

Objective: To assess the efficiency of various surfactants when used with Roundup and Montsanto 35085 at various rates.

Table 28. Efficiency of Surfactants When Used With Roundup and Monsanto 35085. Pennington County (New Underwood), 1991.

Herbicide Treatment	Product (Oz/Acre)	Surfactant	Volunteer Wheat 5/21	Volunteer Wheat 6/14	Pennycress 5/21	Pennycress 6/14	Wild Buckwheat 5/21	Wild Buckwheat 6/14
Roundup	6		82	83	92	95	25	56
Roundup	12		88	69	97	84	40	55
Control			1	1	1	1	1	1
Mon 35085	6		59	71	91	94	25	43
Mon 35085	6	LI 700	44	64	88	91	25	58
Mon 35085	6	SP-BO	28	58	74	88	25	53
Mon 35085	6	R-11	33	59	75	89	25	48
Mon 35085	6	Act 90	41	74	84	94	23	60
Mon 35085	6	Adwet	28	55	84	70	25	39
Mon 35085	6	Kenet	15	54	80	88	18	63
Mon 35085	12	LI 700	78	88	93	94	23	61
Mon 35085	12	SP-BO	88	89	96	94	33	63
Mon 35085	12	R-11	91	90	96	95	33	75
Mon 35085	12	Act 90	93	90	98	95	36	58
Mon 35085	12	Adwet	88	88	95	95	35	59
Mon 35085	12	Kenet	69	80	90	95	25	58
Mon 35085	12	Alone	86	89	96	95	30	68
Mon 35085	6	Am-Sul	64	80	92	95	23	50
Roundup	6	Am-Sul	84	81	94	95	30	61
Mon 35085	12	Am-Sul	92	86	98	94	48	68
		LSD(5%) -	18	17	8	17	17	20
		SD -	12	12	6	12	12	14
		CV -	20	16	7	14	43	26

Summary: In most trials, heavier rates of herbicides exhibited better control of volunteer wheat and pennycress. Surfactant type had little effect on degree of control. Wild Buckwheat was too sparsely populated to get a good measure of control.

Resistance of Kochia to Sulfonylurea Herbicides

Objective: To determine if kochia in this trial has a genetic resistance to Sulfonylurea herbicides (Ally, Amber, Glean).

Table 29. Effect of Sulfonylurea Herbicides in Combinations on Growth of Kochia and on Winter Wheat. Custer County(Scenic), 1991.

Herbicide Treatment	Formulation	Product (Oz/A ai)	Injury (Hgt-In)	Kochia % Control	Kochia (1-5)*	Wheat** Maturity	Wheat** Yield
Control			34	1	5.0	5.0	59.5
Amber	WG71.4	0.15	32	89	1.0	4.8	57.1
2,4-D ester	Lq 4.0	4.0					
Ally	DF 60%	0.6	32	93	1.0	4.5	56.0
Starane	Lq	1.5					
Ally	DF 60%	0.4	33	89	1.0	5.0	55.9
Starane	Lq 34.9	1.5					
Amber	WG71.4	0.21	33	93	1.0	4.8	55.2
2,4-D ester	Lq 4.0	4.0					
Ally	DF 60%	0.06	32	95	1.0	4.8	55.2
2,4-D ester	Lq 4.0	6.0					
Ally	DF 60%	0.60+Sur	31	93	1.0	5.0	55.0
Banvel	Lq 2.0	0.75+Sur					
2,4-D ester	Lq 4.0	4.00+Sur					
Ally	DF 60%	0.04+Sur	29	93	1.0	4.8	54.7
Banvel-SGF	Lq 2.0	0.75+Sur					
2,4-D ester	Lq 4.0	4.00+Sur					
Amber	WG71.4	0.15	31	88	1.0	4.5	54.7
Banvel-SGF	LQ 2.0	1.5					
Amber	WG71.4	0.21	28	89	1.0	5.0	53.6
Banvel-SGF	Lq 2.0	1.5					
Ally	DF 60%	0.06+Sur	32	90	1.3	4.8	53.0
Ally	DF 60%	0.60	30	94	1.0	4.8	52.4
Banvel-SGF	Lq 2.0	1.5					
Ally	DF 60%	0.06+Sur	28	94	1.0	4.5	52.3
2,4-D ester	Lq 4.0	4.00+Sur					
Banvel-SGF	Lq 2.0	1.50+Sur					
Ally	DF 60%	0.04+Sur	28	94	1.0	4.3	51.6
Banvel-SGF	Lq 2.0	1.50+Sur					
2,4-D ester	Lq 4.0	4.00+Sur					
2,4-D ester	Lq 4.0	6.0	28	94	1.0	4.5	51.1
Banvel	Lq 2.0	1.0					
		LSD(5%) -	2	6	.2	.7	3.5
		SD -	1	4	.1	.5	2.4
		CV(%) -	5	5	10.1	10.6	4.4

Footnotes for table on following page.

NOTE: Injury as noted in Height in inches was as of June 14, 1991.
Percent Control of Kochia was as of May 25, 1991.
Kochia Population (1-5), Wheat Yield and Maturity,were as of July 15.
Surfactant was X-77.

*Kochia Population: 1-No kochia, 5-Heavy kochia population.
**Maturity of Wheat: 1-Very Green Heads, 5-Fully Matured. Yield in Bu/acre.

Summary:No resistant strains of Kochia were found in this trial. Applying herbicides indicated a minimum yield loss of 2.4 bushels per acre.

Control of Shattercane in Corn

Objectives: To obtain effective control of shatter cane in corn. To measure effect on yield when various herbicides and spreaders are used alone and in combination.

Procedure: The trial was sprayed on June 17, 1991. with an ATV mounted sprayer at 3.5 MPH using 8002 XR nozzles and a pressure of 20PSI. The solution was applied at the rate of 8 gallons per acre. Air tmeperature was 75 degrees with a wind from the south at 3-5 MPH. The sky was clear at 2 PM and cloudy at 5PM. The corn was 8-10 inches tall. There was a high population of shatter cane 2-8 inches tall in the field.

The trial was evaluated for percent control of the shattercane and height of the corn on July 1 and July 22, 1991. The corn was harvested on September 9, 1991.

Comments: Atrazine was applied at 2 pounds per acre prior to planting the corn to control all broadleaved weeds. The ears were harvested at a high moisture content, as indicated in the table, to avoid the loss of the data. The corn had frozen and there would have been very little increase in yield by allowing the corn to dry down.

Table 30. Control of Shattercane and the Effect on Yield of Corn when Treated with Various Herbicides and Spreaders. Fall River County (Oral), 1991.

Herbicide Treatment	Formulation	Ounces a.i./A	% Control 7/01	% Control 07/22	Corn Height 7/01	Corn Height 7/22	Percent Moisture	Yield Bu/A.
Accent	DF 75%	.50	97	95	20.8	42.0	60	129.4
Atrazine	Lq 4.0	16.00						
COC	Lq	1.00%						
28%N-Fer	Lq	4.00%						
Accent	DF 75%	.50	98	93	21.3	43.5	66	122.5
28%N-Fer	Lq	4.00%						
NIS	Lq	.25%						
Accent	DF 75%	.50	93	89	20.3	43.0	64	122.0
Buctril	Lq 2.0	6.00						
Accent	DF 75%	.50	98	95	19.5	42.0	63	120.4
Buctril	Lq 2.0	6.00						
28%N-Fer	Lq	4.00%						
COC	Lq	1.00%						
Accent	DF 75%	.50	93	90	19.3	43.0	64	119.1
Buctril	Lq 2.0	6.00						
NIS	Lq	.25%						
Accent	DF 75%	.50	95	93	19.5	42.5	65	114.4
Buctril/At	Lq 2.0	18.00						
NIS	Lq	.25%						
Beacon	DF 75%	.58	88	85	19.8	41.5	65	114.3
COC	Lq	1.0%						
28%N-Fer	Lq	4.0%						
Accent	DF 75%	.5	96	93	22.0	43.0	63	113.0
Bucrtil	Lq 2.0	18.0						
28%N-Fer		4.0%						
Accent	DF 75%	.50	95	93	20.3	42.8	70	110.8
28%-Fer	Lq	4.0%						
AT/COC	Lq	1.0%						
Buctril	Lq 2.0	18.0						
Accent	DF 75%	.5	95	91	20.3	42.5	68	102.9
COC	Lq	1.0%						
28%-Fer	Lq	4.0%						
Accent	DF 75%	.5	96	89	18.5	41.0	69	101.2
Buctril	Lq 2.0	18.0						
AT/COC	Lq	1.0%						
Accent	DF 75%	.5	95	94	18.0	40.0	64	98.3
28%N-Fer	Lq	.25%						
Buctril	Lq	6.0						
NIS	Lq	.25%						

Table 30. (Continued)

Herbicide Treatment	Formulation	Ounces a.i./A	% Control 7/01	% Control 07/22	Corn Height 7/01	Corn Height 7/22	Percent Moisture	Yield Bu/A.
Pursuit	Lq 2.0	1.0	93	88	14.5	34.5	65	96.5
NIS	Lq	.25%						
28%N-Fer	Lq	4.0%						
Buctril	Lq 2.0	6.0	1	1	20.8	52.0	65	70.7
NIS	Lq	.25%						
28%N-Fer	Lq	4.0%						
Control			1	1	20.8	46.0	65	66.5
Buctril	Lq 2.0	6.0	1	1	20.5	41.5	68	48.6
COC	Lq	1.0%						
28%N-Fer	Lq	4.0%						
Buctril	Lq 2.0	6.0	1	1	19.3	42.5	67	41.6
COC	Lq	1.0%						
Buctril	Lq 2.0	6.0	1	1	21.0	41.5	69	40.5
NIS	Lq	.25%						
	LSD(5%) =		5	5	2.6	3.7	NA	25.7
	SD =		3	3	1.8	2.6	NA	17.8
	CV(%) =		5	5	9.0	6.2	NA	18.5

COC = Crop oil concentrate
NIS = Non-ionic spreader
28%N-Fer = 28-0-0 liquid fertilizer

Summary: The use of Accent with a spreader indicated highest yields in this trial. Using Buctril in conjunction with Accent lowered the yield slightly. Buctril used by itself greatly reduced yield of the corn due to competition from the shatter cane.

DISEASE CONTROL

Control of Tan Spot on Winter Wheat

Objective: To control Tan Spot on winter wheat using fungicides at various rates. To assess yield potential of the crop when these fungicides are used.

Table 31. Control of Tan Spot on Winter Wheat With Fungicides. Pennington County (New Underwood), 1991.

Fungicide Treatment	Rate of Application (Oz of ai/acre)	Time of Application	Percent Moisture*	Test Wt (Lbs/Bu)	Grain Yield Bu/Acre
Tilt 41.8%	4.0	Flag Leaf	13.5	63.3	77.8
H6573 25%	2.0	Flag Leaf	13.8	63.3	75.8
H6573 25%	1.0	Flag Leaf	13.0	63.3	74.5
H6573 25%	1.0	Heading	13.3	63.5	73.8
H6573 25%	2.0	Heading	13.8	63.8	73.8
Control			13.0	63.3	66.0
		LSD(5%) -	1.5	1.2	4.0
		SD -	1.0	0.8	2.6
		CV(%) -	7.3	1.3	3.6

Summary: Use of fungicides indicated a very positive response in this trial. The effectiveness and need for fungicides, however, hinges on the amount of moisture received during the spring and the amount of tan-spot innoculum found on the wheat.

Control of Tan Spot on Wheat with Various Rates of Fungicides

Objective: To control Tan Spot on Spring Wheat by using fungicides at various rates. To assess yield potential of the crop when these fungicides are used.

Table 32. Control of Tan Spot on Spring Wheat with Various Rates of Fungicide. Pennington County (New Underwood), 1991.

Fungicide Treatment	Application Rate (Oz of ai/A)	Time of Application	Test Wt (Lb/Bu)	Grain Yield (Bu/Acre)
H6573 25%	2.0	Flag Leaf	60.0	23.8
H6573 25%	1.0	Heading	59.8	21.7
Control			60.5	21.2
H6573 25%	1.0	Flag Leaf	60.5	20.6
Tilt 41.8%	4.0	Flag Leaf	60.8	18.7
H6573 25%	2.0	Heading	60.8	18.3
		LSD(5%) -	0.7	6.8
		SD -	0.5	4.5
		CV(%) -	0.8	21.7

Summary: Fungicides were not effective on the Spring Wheat in this trial. The weather turned hot and the rains stopped after the heading time treatment was applied. These weather conditions blocked further development of the tan-spot disease and also reduced the yield of the wheat crop because proper filling of the heads could not take place.