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Agronomy Pamphlet #80

December 1965

SOUTH CENTRAL RESEARCH FARM
Presho, South Dakota

INTRODUCTION

This is the eighth annual progress report of the South Central Research Farm. Because the spring of 1965 was cool and moist, small grains had favorable weather for growth and tillering. This cool, moist weather was also favorable for the growth of disease organisms. Winter wheat varieties not resistant to black stem rust were badly damaged or destroyed by this disease. On the other hand, spring wheat generally produced satisfactory yields because of stem rust resistance. Oat and barley yields were considerably higher than average because of the favorable weather and the lack of disease.

Abundant rains in May provided the soil moisture necessary for the cereals, but in the spring this moisture was depleted by the luxurious corn and sorghum growth. High temperatures and drought caused poor pollination in corn and sorghum. Only small ears of corn were produced and many sorghum fields in the neighborhood were not harvested.

Rain and cool weather in September delayed wheat seeding until late in the month. Then in October warm weather returned and a reasonable fall cover was established.

SOUTH CENTRAL RESEARCH FARM ADVISORY COMMITTEE

Officers	Address	County
Walter Stolte	Chamberlain	Brule
Fred Lucas	Platte	Charles Mix
Ed Bailey	Lucas	Gregory
Lyn Lyman	Murdo	Jones
John Quillan	Kennebec	Lyman
Dwight Schaffer	Wood	Mellette
Ray Norman	Hayes	Stanley
John Fernen	Mission	Todd
Don Jorgenson	Ideal	Tripp

This report was prepared by members of the South Dakota Agricultural Experiment Station. It is an annual progress report and results published herein are for one year only. They are therefore neither complete nor conclusive.

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Table 1. Weather Data - South Central Research Farm* 1965

Month	Jan.	Feb.	Mar.	April**	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Rainfall in inches	.20	.13	.25	1.96	5.11	3.28	1.75	1.14	3.04	1.05	.16	.64	18.71
Longtime Average***	.47	.57	1.02	1.79	2.38	3.11	1.66	2.08	1.45	0.98	.67	.39	16.57
Departure from Longtime Average	-.27	-.44	-.77	.17	2.73	.17	.09	-.94	1.59	.07	-.51	.25	2.14
Average Air Temperature	----	----	----	48.4	58.1	66.7	74.0	70.5	52.6	54.4	----	----	
Longtime Average***	18.6	21.9	31.8	47.6	58.9	68.7	76.8	75.0	64.5	51.4	34.8	23.9	
Departure from Longtime Average	----	----	----	.8	-.8	-2.0	-2.8	-4.5	-11.9	3.0	----	----	
Average Maximum -1965	----	----	----	61.8	70.5	77.4	88.4	87.8	64.2	68.7	66.6	----	
Average Minimum -1965	----	----	----	34.9	45.7	55.9	59.5	58.3	40.9	39.6	32.5	----	
Average Soil Temperature @ 4"	----	----	----	50.3	59.3	70.5	79.4	78.5	56.5	52.5	46.3	----	
Average Maximum Soil Temp.	----	----	----	54.4	62.9	74.1	82.1	84.8	59.3	55.8	49.8	----	
Average Minimum Soil Temp.	----	----	----	46.1	55.6	66.8	73.4	73.1	53.4	49.0	43.6	----	
Average Inches of H_2O Evaporated from free surface	----	----	----	----	----	6.56	8.82	12.11	9.72	3.76	----	----	

Maximum Recorded Air Temperature - 113° - 13 August 1965
Last Frost - 28 May; First Frost - 18 September; Growing Season - 113 days

* Data taken and recorded at South Central Research Farm
** Temperature data collected for the period 16-30 April only
*** Longtime averages were recorded at Kennebec, South Dakota, based on 30 year period 1931-1960 inclusive.

SMALL GRAIN VARIETY TESTING

D. G. Wells, P. B. Price, R. S. Albrechtsen, J. J. Bonnemann, and H. A. Geise

Objective: To observe and compare small grain varieties and experimental strains for winterhardiness, grain yield, disease resistance, and other characteristics of area adaptability.

Winter Wheat

The past year was unusual and not favorable for most winter wheat varieties because of the severe winter and the development of rust. Grain yields of winter wheat at Presho were good for varieties resistant to rust. K60252 was outstanding in yield and protein content. Hume and Lancer were good in yield and resistance to stem rust. Ottawa is susceptible to new leaf and stem rust. The older varieties such as Nebred and Warrior were hurt by rust. Omaha, because of its earliness did fairly well in spite of rust susceptibility. The performance and yield data are listed in Table 3.

Rye

Five varieties of rye were grown in the 1964-65 season. Data on grain yield and other agronomic characteristics are shown in Table 2. Von Lochow is a newly introduced variety from Germany. It is described as being a short, stiff strawed, high yielding variety with less winterhardiness than Elk, which in turn is less hardy than Pierre, Antelope, or Caribou. Von Lochow performed very well at the Presho and Highmore stations during a single year of testing, 1964-65, when there was very little observable winter-killing in any of the rye varieties. On the other hand, Von Lochow and Elk showed severe winter-killing at the Centerville station and relative yields closely paralleled winter survival at that location. Additional testing is necessary before a decision will be made concerning the recommendation of Von Lochow for growing in South Dakota.

Table 2. Rye Variety Trial - South Central Research Farm, 1964-65

Variety	Percent Survival	Heading Date	Height Inches	Percent Lodging	Test Wt Lbs/Bu	Grain Yield- Bu/A 1965 Ave.	1964-65
Von Lochow	90	June 2	48	12	54.7	67.4	
Elk	90	June 2	51	55	54.7	61.8	38.8
Antelope	90	May 26	51	22	54.5	49.1	33.2
Caribou	95	May 25	52	15	55.2	47.4	31.1
Pierre	95	May 24	44	22	54.4	46.3	27.9
Average						54.4	

LSD at 5% level - 11.1 bu/A

Table 3. Winter Wheat Variety Trial - South Central Research Farm - 1965

Variety	Percent Survival	Heading Date (June)	Maturity Date (July)	Percent Lodging	Height Inches	Rust* Leaf	Rust* Stem(56)	Percent Protein	Test Wt. Lbs/Bu.	Grain Yield, Bu/Acre 1965	Grain Yield, Bu/Acre Ave. 63-65
Northern											
Minter	95	22	20	5	39	S	R	12.6	57.3	26.1	27.2
Winalta	95	18	19	5	34	S	Mix	11.5	55.0	19.3	31.4
Yogo	95	22	20	7	38	S	S	12.7	48.2	8.1	18.6
Central											
K60252	90	18	20	5	33	R	R-tr	15.4	59.1	39.3	
N61359	88	17	20	5	35	S	S	12.6	59.0	32.9	
N61355	90	18	20	5	34	R	R-tr	14.5	57.7	32.5	
Hume	95	15	19	5	35	S	R	11.8	58.8	31.6	28.3
Lancer	85	16	18	5	36	S	R	12.9	58.8	30.7	34.0
N61930	90	18	19	5	37	Mix	Mix	12.4	57.8	27.6	
Gage	78	17	20	5	33	R	R	13.8	56.2	25.9	34.6
Scout	82	16	19	7	33	S	R	10.7	57.0	23.2	35.2
Omaha	95	12	13	6	34	S	S	11.7	55.5	20.3	29.8
Ottawa	63	17	21	6	33	S	S	11.8	53.5	12.8	30.4
Nebred	93	16	16	6	34	S	S	9.8	49.7	10.6	24.2
Warrior	95	17	16	6	33	S	S	11.0	48.0	10.5	30.2
Cheyenne	88	19	16	5	38	S	S		48.3	7.9	25.4
Southern											
Wichita	83	12	13	8	35	S	S	11.3	51.3	12.5	24.1
Rodco	68	18	19	6	36	Mix	Mix	13.3	49.6	11.5	24.6
Bison	53	19	19	17	32	S	S		45.3	7.7	21.5
Average									54.0	20.6	

Note: Date of Planting - 22 September 1964; Values in table are an average of three replications.
LSD at 5% level - 4.4 Bu/Acre.

* R - Resistant, S - Susceptible, tr - trace, Mix - Contains both resistant and susceptible types.

Winter Barley

The winter barley varieties presently under test vary in winter hardiness with Kearney and Dicktoo being most hardy, Chase intermediate, and MO. B969 and Mo. B1222 being least hardy. It is for this reason the last two are not recommended for planting. However, under conditions where winter survival is high, one can expect good yields. All of the varieties have weak straw and can be expected to lodge.

Oats

Tyler and Clintford are the most recent oat releases of the varieties tested in 1965. Both are early varieties and have short straw with exceptional strength. Clintford produces the best quality seed of the two but Tyler has consistently yielded higher in South Dakota tests. Thus, Tyler has been added to the 1966 list of recommended varieties for South Dakota. Yields and other variety characteristics are shown in Tables 4 and 5.

Table 4. Oat Variety Trial - South Central Research Farm

Variety	Heading Date	Height Inches	Test Wt. Lbs/Bu.	Grain Yield - Bushel/Acre 1965	Ave.1963-65
Brave	June 20	35	35.5	86.5	
Dupree	" 19	31	37.7	83.3	61.0
Garry	" 26	36	35.7	82.5	55.8
Mo. 0-205	" 20	33	39.2	79.6	59.3
Burnett	" 23	34	37.5	78.9	59.2
Garland	" 22	29	39.5	78.9	55.5
Dodge	" 25	34	37.5	74.6	54.6
Tyler	" 21	29	36.2	72.8	
Andrew	" 20	32	39.5	72.4	55.7
Coachman	" 25	31	38.5	71.3	
Clintford	" 20	30	40.7	70.6	
Rodney	July 1	35	37.5	70.2	
Tippecanoe	June 19	31	38.0	66.6	
Neal	" 20	31	34.7	63.4	53.5
Minhafer	" 19	33	37.7	56.8	46.4
Santee	" 19	30	37.7	54.3	
Clintland 64	" 23	31	36.5	53.9	
Bonkee	" 21	31	36.5	50.3	
Average				70.4	

LSD at 5% level - 10.4 Bu/A
Note: This variety trial was not fertilized, but was seeded on fallow.

Table 5. Oat Variety Trial - Gregory County - 1965

Variety	Height Inches	Date Mature	Percent Lodging	Test Wt. Lbs/Bu	Grain Yield Bushel/Acre
Mo. 0-205	32	27-7	17	37.2	73.8
Tyler	32	30-7	8	36.5	73.1
Coachman	31	31-7	8	39.3	70.2
Brave	32	29-7	12	36.5	69.5
Andrew	33	29-7	33	36.3	68.8
Burnett	34	30-7	7	38.5	68.1
Garland	30	31-7	13	38.2	67.3
Dupree	31	29-7	15	35.5	63.0
Minhafer	33	25-7	8	38.7	61.5
Dodge	33	29-7	15	38.3	61.5
Tippecanoe	31	27-7	7	39.2	58.6
Clintford	31	28-7	7	39.5	58.6
Clintland 64	32	26-7	7	37.2	57.9
Neal	32	26-7	10	35.7	52.1
Bonkee	32	28-7	12	36.5	51.4
Santee	28	26-7	7	36.0	44.9
Garry	33	31-7	5	36.5	39.8
Rodney	41	2-8	13	34.8	39.8
Average					60.0

Note: Variety trial was fertilized with 52# of Nitrogen, 17# of Phosphorus, per acre.

Spring Wheat

Spring wheat at Presho yielded quite well especially Chris which has resistance to stem and leaf rust. Protein contents of the spring wheats were higher than for most of the winter wheats.

Spring wheat at Gregory yielded less than at Presho, but there too, Chris was highest. The plots at Presho were seeded on April 22, while those at Gregory were seeded on May 6, 1965. The performance data and yields are listed in Tables 6, 7, 8, and 9.

Table 6. Durum Wheat Variety Trial - South Central Research Farm, 1964-65

Variety	Heading Date	Height Inches	Percent Protein	Test Wt. Lbs/Bu	Grain Yield-Bushel/Acre 1965	Ave.1963-65
Wells	27-6	35	17.4	58.5	26.4	17.1
Lakota	25-6	36	18.1	57.0	26.1	17.6
Stewart 63	1-7	43	15.4	57.0	24.7	
Average					25.7	

Note: This trial was placed on fallow, but was not fertilized.

Table 7. Durum Wheat Variety Trial - Gregory County - 1965

Variety	Height Inches	Date Mature	Percent Lodging	Test Wt. Lbs/Bu	Grain Yield Bushel/Acre
Stewart 63	44	3-8	5	49.5	6.2
Wells	37	3-8	5	50.3	5.0
Lakota	36	4-8	5	50.2	3.1
Average					4.8

Note: (1) Trial was fertilized with 52# of Nitrogen and 17# of Phosphorous per acre.

(2) Yields of this trial would have been much higher had it been seeded two weeks earlier.

Table 8. Spring Wheat Variety Trial - South Central Research Farm

Variety	Heading Date	Height Inches	Percent Protein	Test Wt. Lbs/Bu	Grain Yield-Bushel/Acre 1965	Ave.1963-65
Chris	26-6	34	15.5	58.5	28.6	
C.I. 13586	30-6	39	14.7	59.5	24.5	
BH 631	23-6	31	16.3	57.2	22.6	
Crim	27-6	34	14.5	58.0	22.4	15.3
BH 632	25-6	33	13.3	57.0	21.8	
Justin	27-6	33	15.1	56.0	20.4	10.1
Pembina	26-6	30	13.5	54.7	20.1	10.1
Selkirk	28-6	30	15.6	53.5	19.3	12.1
Manitou	29-6	34	16.3	57.2	18.5	
Rushmore	29-6	32	13.6	57.5	16.8	10.3
Spinkcota	2-7	39	13.9	54.2	9.6	5.7
Lee	27-6	32	13.1	49.5	9.6	6.1
Thatcher	29-6	29	10.6	52.0	9.4	
Marquis	30-6	35	13.2	53.2	8.5	
Average					18.0	

LSD at 5% level - 6.2 bu/A

Note: Trial was not fertilized, but was seeded on fallow.

Table 9. Spring Wheat Variety Trial - Gregory County - 1965

Variety	Height Inches	Date Mature	Percent Lodging	Test Wt. Lbs/Bu	Grain Yield Bushel/Acre
Chris	29	28-7	5	53.5	18.1
Pembina	30	29-7	5	49.7	15.1
BH 631	33	30-7	5	50.7	14.3
Thatcher	28	30-7	5	46.0	13.5
C.I. 13586	34	4-8	5	53.3	13.1
Crim	29	29-7	5	52.8	12.7
Selkirk	31	29-7	5	46.5	12.4
Manitou	30	31-7	5	48.7	12.0
Justin	30	29-7	5	48.0	10.4
BH 632	30	29-7	5	50.3	10.0
Rushmore	29	29-7	5	49.8	9.7
Spinkcota	35	4-8	5	49.7	7.7
Marquis	30	31-7	5	47.5	6.2
Lee	29	1-8	5	43.0	4.6
Average					11.4

Note: Trial was fertilized with 52# of Nitrogen, and 17# of Phosphorous per acre.

Spring Barley

The 1965 season was excellent for spring barley. Growing conditions were ideal so plants tillered profusely. With the incidence of disease the lowest it had been for the last decade, grain yields were far above average and grain quality was exceptional.

The plots at Presho were seeded about two weeks earlier than those in Gregory County. The earlier seeded plots were able to grow more during the period of ample rain and cool temperatures. Thus, yields at Presho were about twice those at Gregory. Yield data for the two trials are reported in Tables 10 and 11.

Table 10. Spring Barley Variety Trial - South Central Research Farm

Variety	Heading Date	Height Inches	Test Wt. Lbs/Bu	Grain Yield-Bushel/Acre 1965	Ave.1963-65
Liberty	23-6	28	46.0	82.1	38.4
Trophy	23-6	29	43.0	77.6	35.4
Larker	22-6	31	44.0	76.8	37.1
Traill	24-6	29	44.0	74.5	36.4
Plains	19-6	28	45.0	73.1	36.1
Otis	19-6	28	46.0	72.6	41.3
Custer	18-6	32	42.5	68.6	35.2
Spartan	18-6	30	46.5	63.3	32.8
Average				73.8	

LSD at 5% level - 9.2 Bu/A.
Note: Trial was not fertilized, but was seeded on fallow.

Table 11. Spring Barley Variety Trial - Gregory County - 1965

Variety	Maturity Date	Height Inches	Percent Lodging	Test Wt. Lbs/Bu.	Grain Yield Bushel/Acre
Plains	22-7	29	10	42.7	42.5
Otis	17-7	26	13	41.5	42.0
Trophy	23-7	26	5	43.7	41.1
Traill	23-7	25	5	39.8	40.1
Spartan	20-7	30	5	42.7	39.6
Larker	23-7	26	5	44.7	37.7
Custer	19-7	26	13	40.0	36.7
Liberty	24-7	25	5	44.0	30.4
Average					38.8

Note: Trial was fertilized with 52# of Nitrogen, and 17# of Phosphorous per acre.

SPECIALTY CROP TESTING

Objective: To observe and compare various specialty crop varieties and selections for grain yield, disease resistance, management practices, and other characteristics for area adaptability.

Safflower Testing

H. A. Geise

A thorough test program for safflower was initiated in 1963. Several tests are now being conducted and notes on variety characteristics are being collected. Part of the data are presented in Tables 12 through 14.

Table 12. Regional Safflower Variety Trial - South Central Research Farm

Variety	Date of 50% Bloom	Spinescense*	Percent Lodging	Height Inches	Test Wt. Lbs/Bu.	Yield-Lb/A 1965	Yield-Lb/A 1963-65
U5	27-7	4	20	19	36	352	646
US 10	27-7	4	36	20	36	349	579
Gila	27-7	4	30	17	38	343	733
A0104	27-7	4	26	18	35	306	663
A101	27-7	4	26	17	32	226	
12417	27-7	4	20	17	37	211	
Average						298	

LSD at 5% level - 67.0 Lbs/A

*Spinescense: Graded from 1-No Spines to 5-Heavily Spined

Table 13. Safflower Selection Trial for Varieties Adapted for South Dakota - South Central Research Farm

Variety	Date of 50% Bloom	Shattering* (1-5)	Percent Lodging	Height Inches	Test Wt. Lbs/Bu	Yield - Lb/A 1965	Yield - Lb/A 1963-65
Pacific 1	26-7	2.0	30	18	36	329	536
N2377	26-7	2.0	20	19	37	328	463
N4036	27-7	1.5	20	19	34	268	601
N4042	27-7	1.0	20	19	37	258	513
N10	26-7	2.5	20	18	36	256	548
N472349X	27-7	2.0	20	19	38	254	594
N6	26-7	2.5	30	20	37	238	518
N8	27-7	2.0	20	19	37	238	405
N472248C	27-7	1.0	20	19	38	236	412
N472148C	27-7	1.5	20	18	37	219	596
N472449X	27-7	2.0	20	19	38	217	513
N848C	27-7	2.0	20	18	37	206	509
N472848C	28-7	2.0	40	20	38	178	516
Average						248	

*Shattering: 1-None, 5-Complete;

Table 14. Introduced Safflower Variety Trial - South Central Research Farm

S.D. No.	Date of 50% Bloom	Spinescense*	Shattering+	Height Inches	Test Wt. Lbs/Bu	Yield-lbs/A 1965	Yield-lbs/A 1963-65
30	29-7	3	3.0	21	42	634	617
83	27-7	1	2.0	20	43	605	677
38	27-7	3	2.0	19	42	563	620
12	27-7	5	2.5	18	43	561	614
24	27-7	1	2.5	20	39	559	571
39	27-7	5	2.5	19	42	552	596
102	28-7	4	2.5	22	43	547	554
85	30-7	5	2.0	17	42	528	669
96	27-7	3	2.5	19	41	513	578
46	27-7	2	2.0	20	41	471	607
47	27-7	3	3.0	20	43	465	530
87	27-7	3	2.0	19	42	459	660
84	27-7	3	2.0	20	39	452	565
25	27-7	3	2.0	18	42	426	575
103	27-7	4	2.0	21	40	419	575
18	27-7	2	2.0	19	39	399	520
94	27-7	2	2.0	19	40	385	529
82	30-7	1	2.5	21	42	367	515
Average						495	

*Spinescense: Graded from 1-No Spines to 5-Heavily Spined.
+Shattering: Graded from 1-No Shattering to 5-Heavily Shattered.

The 1965 safflower variety trials were composed of three groups. The first group or Regional Test contained six varieties. Two, A0101 and 12417, are thin hulled varieties with seed which contains over 40 percent oil. The other four in group 1 have seed which contain about 36 percent oil. Their varietal characteristics are listed in Table 12.

The second group are either old varieties or selections from varieties that had been treated with mutagens to obtain these improved selections. This group has seeds which are from 40 to 45 percent hulls, and consequently, are lower in oil content. Their varietal characteristics are listed in Table 13.

The third group are lines introduced from foreign countries. They were selected for high oil content, low spinescense, and high yield. Their average yield for the last three years indicates they are quite well adapted. Oil content and oil quality are now being studied.

Sunflower Yield Trial

H. A. Geise

Sunflowers are grown as a crop for several purposes. The large seeded types are grown for whole seed uses in the confectionary trade, while the small seeded types are used for wild bird feed. A potentially large commercial market in the United States for sunflower seed is as a source of edible oil with a high linoleic acid content. This market would require seeds with a high oil content.

Twelve varieties of sunflower were tested in 1965. The variety T56002 is a rust resistant hybrid developed jointly by ARS and Texas A & M University. It was developed primarily for bird feed or oil processing.

Arrowhead, a dwarf type, has large seed which shatters easily. Mingren was selected from the variety Mennonite for yield, large seed size, and single-headedness, while Commander was selected from Mennonite B for large seeds. All of these varieties are used primarily for confectioneries.

The remaining seven varieties were introduced from the U.S.S.R. and are characterized by a high oil content. Ienissei exhibits some resistance to the Sunflower Moth, and also to Sclerotinia sclerotiorum or Stem Rot. It is also only slightly susceptible to seed shattering. Additional information can be found in Table 15.

Table 15. Regional Sunflower Yield Trial - South Central Research Farm

Strain	Plant Height Inches	Date of Flower	Percent Lodged	Percent Stand	Test Wt. Lbs/Bu	Yield Lbs/A
Armavirec	51	29-7	6	59	29	542
Smena	55	20-7	9	88	32	516
Tchernianka 66	48	1-8	15	78	33	502
Ienissei	54	29-7	15	54	29	496
Peredovik	53	30-7	12	79	31	471
VNIIMK 89.31	56	31-7	15	69	32	454
Arrowhead	51	27-7	6	59	30	437
T56002	50	30-7	12	46	33	304
Mingren	51	31-7	6	58	31	278
Commander	49	2-8	12	50	28	222
VNIIMK 16.46	56	31-7	5	42	32	198
Peredovik 15659	50	31-7	5	60	33	168
Average						382

SORGHUM PERFORMANCE TESTING

Grain Sorghum Performance Trial

J. J. Bonnemann

Objective: To compare the relative performance abilities of grain sorghum hybrids as to yield and other agronomic characteristics.

Performance trials with grain sorghum have been conducted on a fee basis at the South Central Research Farm for four years. Yields reported in the accompanying table include 1965 yields and three-year averages, if they were available.

Table 16. Grain Sorghum Performance Trial - South Central Research Farm

Variety	Height Inches	Percent Lodging	Date of Heading	Test Wt. Lbs/Bu	Yield, 100#/A 1965	Yield, 100#/A 1963-65
SD 503	41	60	8-8	52.0	34.0	36.3
NK 125	40	27	8-7	51.5	25.2	33.1
NK 115	38	41	8-1	53.0	23.3	
T-E 44	35	7	8-13	50.0	23.1	
SD 502	38	43	8-7	52.5	22.2	
RS 501	39	25	8-9	49.0	22.0	35.3
Pioneer 865	38	0	8-17	43.0	21.0	
Neb. 504	37	20	8-11	51.0	20.2	
SD 451	38	25	8-4	53.0	19.3	30.1
SD 441	45	85	7-30	53.0	18.9	28.6
PAG 304	31	1	8-9	52.0	18.8	
NK 133	40	6	8-8	46.0	18.8	
PAG 275	36	27	8-1	55.0	18.3	
Colo. 604	36	5	8-12	51.0	17.7	
RS 608	33	0	8-15	49.0	17.4	32.5
SD 102	37	85	7-29	54.5	16.3	
Frontier 388	35	0	8-12	50.0	16.3	22.4
Amak R10	33	0	8-16	48.0	15.8	
Rocket A	33	0	8-13	49.0	15.7	
Colo. 606	35	3	8-13	50.0	15.3	
NK 222	34	0	8-14	48.0	15.0	
Advance 22	33	16	8-12	49.5	14.8	
Advance 14	36	0	8-16	41.0	14.5	
Pronto	38	25	8-3	51.0	14.1	
DeKalb B-32	35	25	8-8	51.5	13.8	
Pawnee	36	37	8-7	55.0	13.3	
Colo. 585	40	2	8-4	48.0	12.5	
Frontier GX104	34	1	8-14	47.5	11.9	
Comanche	33	0	8-18	45.0	10.9	
RS 610	34	0	8-15	46.5	10.8	30.4
Frontier 401	34	0	8-17	39.5	10.0	
Pioneer 848	33	0	8-19	43.0	7.3	
Frontier GX375	31	0	8-19	39.5	4.8	
Average					16.8	

Sudangrass and Forage Sorghum Testing

H. A. Geise

Objective: To compare various Forage Sorghums, Forage Sorghum Hybrids, Sudangrass, and Sorghum-Sudangrass Hybrids, as to their ability to produce high quality forage, and for adaptability to the South Central area.

Thirty eight selections of either Sudangrass and Forage Sorghum or their hybrids and crosses were compared for forage yield and other agronomic characters. All plots were seeded in early June and were harvested at the same time as neighboring fields. The agronomic notes and yield data are reported in tables 18 and 19.

LEGUME AND GRASS TESTING

Alfalfa Forage Production

H. A. Geise and M. D. Rumbaugh

Objective: To compare the forage production of two varieties of alfalfa when grown under various row spacings with and without the addition of phosphorous fertilizer.

Table 17. Effects of Row Spacing and Fertility on Forage Production of Two Varieties of Alfalfa - South Central Research Farm

Row Space	Variety	Fertilizer* 26#/A	Percent Protein	Forage Yield-Tons/Acre 1965	Ave. 1962-65
6"	Teton	P	13.3	.95	1.5
		0	14.6	.62	1.3
	Vernal	P	13.6	1.14	1.6
		0	13.8	.83	1.4
42"	Teton	P	15.3	.93	1.4
		0	14.1	.68	1.2
	Vernal	P	14.0	1.08	1.4
		0	13.3	.83	1.2

*P - Plot fertilized with Phosphorous, 0 - No fertilizer applied.

Alfalfa Variety Trial

H. A. Geise and M. D. Rumbaugh

Objective: To compare the forage production of six varieties of alfalfa.

Six varieties of alfalfa were seeded in 1958. A five-year average (1961-65) indicates that yields in this experiment have been consistently lower than other experiments. The reason for the low yields has not been determined, but may be due to lack of subsoil moisture, or lack of available phosphorous, or both. The yield data is reported in Table 20.

Table 18. Sorghum Vulgare Forage Summary - South Central Research Farm - 1965

Identity	Date of* Heading	Height Inches	Leafiness (1-5)	Coarseness (1-5)	Lodging	Percent Protein	Percent Moisture	Tons/A. Dry Wt.
FORAGE SORGHUM								
Asgrow Beef Builder T		51	2	4	3	8.2	64	3.86
Advance 1071F	20-8	54	3	3	2	6.5	64	3.17
Ark AK Leafy Hyb 44		37	2	4	1	8.4	63	2.95
Excel-Silo-Fill 44		51	3	4	3	8.1	68	2.82
Frontier S 205	5-8	53	4	3	3	8.9	60	2.68
DeKalb FS22		47	3	5	2	8.7	73	2.58
Asgrow Duet	14-8	41	3	3	3	9.4	84	2.46
Advance 1085F		51	3	4	3	8.2	72	2.43
Pioneer 931		58	3	4	4	9.5	75	2.29
DeKalb FS1A	21-8	39	3	3	2	8.8	72	2.10
Frontier FX 200	24-8	45	3	4	3	8.3	68	2.82
Frontier S 210	28-8	54	3	3	2	8.8	73	2.04
Arkansas AK-43		38	2	4	2	9.1	70	1.92
Waconia	22-8	43	3	2	3	6.6	71	1.68
252 F	28-7	50	3	3	3	8.9	71	1.58
Rancher	2-8	57	4	2	4	5.3	73	1.34
NK 145	30-7	67	3	2	3	5.6	72	1.30
39-30-S	28-7	64	4	2	4	5.6	77	1.28
Dual	31-7	56	4	2	4	7.2	71	.96

Scoring Legend

Leafiness: 1-Very Leafy; 2-Leafy; 3-Average; 4-Mostly Stems; 5-All Stems
Lodging: 1-No Lodging; 5-Heavily Lodged
Coarseness: 1-Very Fine Stemmed; 5-Coarsed Stemmed

* Absence of date indicates heading did not occur.

Table 19. Sorghum Vulgare Forage Summary - South Central Research Farm - 1965

Identity	Date of+ Heading	Height Inches	Leafiness (1-5)	Coarseness (1-5)	Lodging	Percent Protein	Percent Moisture	Tons/A Dry Wt.
SUDAN GRASSES*								
NK Trudan IV	7-8	65	3	2	3	13.8	68	2.56
NK Trudan II	4-8	67	3	2	2	12.7	67	2.29
Frontier H-40	15-8	62	3	2	2	13.4	68	2.02
Piper	31-7	65	3	2	2	13.6	65	2.00
Georgia Suhi I	9-8	63	2	2	4	12.6	68	1.52
SORGHUM SUDAN								
Paymaster Sweet Sioux	11-8	69	3	3	3	7.9	70	2.23
Excel-Chow-Maker		58	3	2	3	8.1	70	2.11
Caladino-Greenlan	24-8	70	3	3	4	8.5	70	2.08
NK Sordan	15-8	63	3	2	4	9.1	69	1.90
DeKalb SX-11	9-8	58	3	3	4	7.7	68	1.90
Sexauer S-100	12-8	68	4	3	3	7.4	66	1.82
Dorman-Suregraze		57	3	3	4	8.6	72	1.71
Asgrow-Grazer	16-8	60	3	3	3	8.1	74	1.69
Pioneer 981	10-8	64	4	2	3	7.4	71	1.68
Frontier H-35-X	11-8	58	4	2	3	7.8	72	1.67
Frontier Hidan 37	13-8	59	3	3	3	8.2	71	1.63
Nebraska 280S	6-8	61	4	2	3	8.6	72	1.49
Advance 1038G	7-8	61	4	3	4	7.3	72	1.30
Asgrow-Orbit	11-8	56	4	3	4	7.9	75	1.28

Scoring Legend

Leafiness: 1-Very Leafy; 2-Leafy; 3-Average; 4-Mostly Stems; 5-All Stems

Lodging: 1-No Lodging to 5-Heavily Lodged

Coarseness: Graded from 1-Very Fine Stemmed to 5-Coarsed Stemmed

*All Sudans were harvested twice during the growing season.

+Absence of date indicates heading did not occur.

Table 20. Alfalfa Variety Forage Yield Trial - South Central Research Farm

Variety	Forage yield - Tons/Acre	
	1965	5 Yr Average
A 225	.54	.56
Grimm	.48	.54
Ladak	.58	.65
Nomad	.39	.58
Rambler	.68	.63
Vernal	.52	.56

Grass Variety Trials

J. G. Ross and H. A. Geise

Objective: To determine which species and varieties of introduced grasses are best adapted to the South Central area on the basis of their forage production.

Table 21. Smooth Bromegrass Forage Yield Trial-South Central Research Farm

Variety	Forage yield - Tons/Acre+			
	Seeded August 1958		Seeded August 1960	
	1965	Ave. 1960-65	1965	Ave. 1962-65
Achenbach	---	---	.30	0.8
Canadian Common	.25	1.0	.22	0.7
Fischer	---	---	.24	0.5
Homesteader	.28	1.2	.31	0.8
Lancaster	.35	1.5	.29	0.9
Lincoln	.32	1.5	.28	0.7
Lyon	---	---	.27	0.7
Manchar	---	---	.18	0.6
Saratoga	---	---	.27	0.7
South Dakota 5	.32	1.2	.27	0.8
Southland	.34	1.5	.34	1.0
Wisconsin 55	.41	1.0	.22	0.7
Wisconsin 81	---	---	.22	0.8

+Absence of yield indicates that variety was not included in trial.

Smooth Bromegrass produced slightly less forage in 1965 than in 1964. The yields of the 1958 and 1960 seedings are now comparable, but the longtime averages are in favor of the 1958 trial. All of the plots have been fertilized each year with one hundred pounds of 40-9-0 fertilizer. The forage produced was of excellent quality.

Table 22. Wheatgrass Forage Yield Trial - South Central Research Farm

Variety	Forage yield - Tons/Acre+			
	Seeded August 1958		Seeded August 1960	
	1965	Ave.1960-65	1965	Ave.1962-65
Crested Wheatgrass				
Common	.41	1.0	---	---
Common Fairway	.35	0.8	.57	1.1
Mandan 2359	.48	0.9	.57	1.2
Nebraska 10	.45	1.0	---	---
Nebraska 20	---	---	.44	1.0
Nebraska 3576 Fairway	.39	1.0	.50	1.1
Nordan	.49	1.0	.52	1.2
S.D. 15	---	---	.39	0.5
Summit	.48	1.1	---	---
Tall Wheatgrass				
Alkar	---	---	.32	1.6
A12465	---	---	.35	1.6
Mandan 1422	.47	1.2	.28	1.5
Nebraska Tall	.42	1.0	---	---
S-64	.43	0.8	.28	1.5
Intermediate Wheatgrass				
Amur	.61	1.3	.45	1.4
Greenar	.44	1.3	.49	1.6
Idaho #3	.39	1.0	.54	1.5
Idaho #4	.51	1.4	---	---
Mandan	---	---	.48	1.3
Nebraska 50	.53	1.4	.52	1.2
Oahe	.44	1.5	.58	1.6
Ree	.45	1.3	.45	1.5
Misc. Wheatgrasses				
P-27 (A. sibericum)	.45	0.9	.47	1.2
Slender (A. trachycaulum)	.39	1.3	---	---
S.D. Syn 2-2nd Cycle	.47	1.3	---	---
Topar Pubescent (A. trichophorum)	.45	0.8	.37	1.0
Whitmar (A. inerme)	.46	0.9	---	---

+ Absence of a yield indicates variety was not included in trial.

Intermediate and Tall Wheatgrasses have consistently produced the highest forage yields. Oahe, an intermediate wheatgrass recently released, although not the highest yielding in 1965, has the highest average of both tests. The recommended intermediate wheatgrass varieties are Oahe, Amur, and Greenar. Tall wheatgrass is a strong competitor of intermediate, but is not as desirable or palatable. Nordan crested wheatgrass was the highest forage producer of the crested wheatgrass varieties in either test and is also the most desirable from other agronomic standpoints.

Table 23. Misc. Grass Species Forage Yield Trial - South Central Research Farm

Variety	Forage Yield- Tons/Acre+			
	Seeded August 1958		Seeded August 1960	
	1965	Ave. 1962-65	1965	Ave. 1962-65
Common Russian Wildrye	.14	0.8	0.2	0.7
Vinall Wildrye	.14	0.9	0.2	0.7
Ricegrass (Stipa oryopsis)	.19	0.6	---	---
Blackwell Switchgrass	.47	1.7	---	---
Nebraska 28 Switchgrass	.40	1.5	---	---

+ Absence of yield indicates variety was not included in yield trial.

Vinall in comparison to Common Russian Wildrye is in general more easily established and is a better seed producer. The new switchgrass varieties may be useful for summer pastures.

Grass Forage Production with Various Fertilizers and Row Spacings

J. G. Ross and H. A. Geise

Objectives: To determine optimum rates and ratios of fertilizers to be used in the production of grass forage. The effects of row spacing and solid stand are also included.

Table 24. Influence of Row Space and Fertilizer on Forage Yield of Smooth Bromegrass and Ree Wheatgrass

Species	Row Space	Fertilizer	Protein	Forage 1965*	Yield-Tons/Acre (Ave. 1961-65)
Intermediate Wheatgrass	6"	0-0-0	9.4	.11	1.4
		20-0-0	10.3	.18	2.0
		40-0-0	11.6	.14	1.7
		40-9-0	10.4	.16	1.8
	42"	0-0-0	13.9	.06	1.5
		20-0-0	10.1	.08	1.7
		40-0-0	12.6	.07	1.8
		40-9-0	12.3	.10	1.7
Smooth Bromegrass	6"	0-0-0	8.8	.08	0.9
		20-0-0	8.2	.12	1.3
		40-0-0	11.1	.14	1.5
		40-9-0	8.7	.14	1.6
	42"	0-0-0	11.8	.12	1.4
		20-0-0	9.7	.12	1.5
		40-0-0	9.0	.13	1.6
		40-9-0	7.3	.17	1.6

*Fertilizer differences and Species x Spacing interaction are highly significant.

The forage yield of these two species in 1965 was below that of previous years. A critical analysis of yields and weather seems to indicate that a definite lack of soil moisture limited the production. The increase in yield due to fertilizer, although highly significant, was not large enough to pay the cost of the fertilizer.

The five-year average indicates that for forage yield, the only profitable application of fertilizer has been on solid stands, and only at lower rates.

MANAGEMENT, TILLAGE, AND CULTURAL PRACTICES

H. A. Geise

Comparison of Different Techniques in Growing Winter Wheat

Objective: To compare yields of winter wheat grown, (1) continuously with and without commercial nitrogen, (2) in rotation with conventional fallow or sweet-clover fallow, and (3) in rotation with corn or sorghum harvested as an ensilage crop.

Table 25. Yields of Winter Wheat from Plots Having Six Different Management Practices

Management Practice	1965 Test Wt. Lbs/Bu.	1965 Percent Protein	1965 Yield Bu/A.	Ave. Yield Bu/Acre (1959-65)
Continuous Wheat	58	17.5	7.7	8.1
Continuous Wheat + 30# N/Yr	58	16.6	7.7	8.0
Winter Wheat - Fallow	54	13.4	15.4	13.6
Winter Wheat - Sw. Cl. Fallow	56	16.2	9.3	10.7
Winter Wheat - Corn (Silage)	58	14.4	11.9	9.0
Winter Wheat - Sorghum (Silage)	59	12.7	12.0	9.7

LSD at 5% level - 0.7 Bu/A

Table 26. Yields of Forage obtained from Corn and Sorghum - 1965

Crop	Percent Dry Matter	Forage Yield - Tons/Acre Wet	Dry
Corn	57	4.0	2.3
Sorghum	40	4.5	1.8

The average winter wheat yields reported in Table 25 show the effects of limited soil moisture and weed competition. In a continuous one-crop system, hard-to-control competitive weeds tend to become established. A row crop is beneficial as a substitute crop because its cultivation controls the weeds although cash returns may not be increased by the row crop.

The substitution of a green manure crop improves the soil by providing organic matter, controls the competition, and increases soil moisture in the partial fallow year. At the present time, however, when the soil nutrients have not been depleted, higher cash returns can be obtained simply by conserving soil moisture. This is most easily accomplished by using a wheat-fallow rotation.

Methods of Summer Fallow

Objectives: To compare various fallow techniques in which the type of tillage and number of tillage operations vary.

Table 27. Yields of Winter Wheat Obtained from Plots where Six Different Fallow Practices were Compared. (1959-1965)

Fallow Practice		Grain Yield of Winter Wheat			
Fall	Summer	Test Wt. Lbs/Bu.	Percent Protein	Bu/A+ 1965	Average (1959-65)
1) One-Way	One-Way	58	15.1	11.1	13.1
2) Noble Blade	Noble Blade	58	13.7	11.2	15.9
3) Noble Blade	Noble Blade or 2,4-D	58	14.5	10.6	15.3
4) Noble-Chem*	Chemical** + 1 Tillage	59	16.2	5.7	14.1
5) No Tillage	Noble Blade	59	14.7	12.0	14.8
6) Noble Blade	Chemical***	59	15.2	5.2	13.4

\+ LSD at 5% level - 2.1 Bu/A

* Fall Treatment consists of 5# of Dalapon + 1/2# of 2,4-D per acre.

** Spring Treatment consists of 5# of Dalapon + 1/2# of 2,4-D per acre.

*** Two applications of Dalapon + 2,4-D; and 2 applications of 2,4-D per year.

Table 28. Soil Moisture Conditions as Influenced by Six Different Fallow Techniques. (1964-1965)

Fallow Treatment	Total Inches of Soil Moisture (0-48")						
	Stubble Oct 65	Stubble Oct 64 (A)	Fallow May 65 (B)	Fallow Oct 65 (C)	Winter Gain (B-A)	Summer Loss (B-C)	Gain for Year (C-A)
1	10.61	10.02	11.39	11.32	1.37	.07	1.30
2	10.29	10.29	12.39	11.66	2.10	.73	1.37
3	10.94	9.97	12.46	11.28	2.49	1.18	1.31
4	10.55	9.61	12.08	10.44	2.47	1.64	.83
5	10.55	10.28	12.69	12.04	2.41	.65	1.76
6	9.98	9.45	11.15	10.37	1.70	.78	.92

Grain yields reported in Table 27 are low because the plots had to be reseeded in April 1965. Reseeding was necessary because the fall drought in 1964 slowed the growth of the wheat seedlings sufficiently so they were not able to survive the winter. Crim, a Hard Red Spring Wheat, was used for reseeding.

Soil moisture conditions in 1965 were quite similar to those reported in previous years. However, because of the rainfall pattern during the summer it was possible to conserve considerably more moisture. Table 28 indicates much higher soil moisture losses for treatments 3 and 4 than for the others. This was due to grassy weeds which were not controlled by the preemergence chemicals.

Management, Methods of Seeding Sorghum, and Fertilizer Effects on a Sorghum-Spring Wheat Rotation

Objectives: To determine the optimum time, implement, and row spacing for planting grain sorghum, and the effects of these practices on the yield of the following spring wheat.

Table 29. Effects of Fertilizer and Date and Method of planting Sorghum on Grain Yield of Spring Wheat in a Sorghum-Spring Wheat Rotation

Date of Planting Sorghum	Method of Planting Sorghum	Fertilizer*	Percent Protein	Grain Yield-Bushel/A 1965**	Grain Yield-Bushel/A (Ave. 1959-65)
May 21	Deep Furrow Drill	0	15.1	6.7	9.5
		N	12.8	8.0	9.7
	Lister	0	15.1	7.6	10.3
		N	16.9	8.0	10.3
	Corn Planter	0	13.7	6.3	10.0
		N	14.4	6.8	10.4
June 2	Deep Furrow Drill	0	14.0	6.6	9.5
		N	14.3	8.8	9.2
	Lister	0	15.2	9.0	10.1
		N	14.4	8.2	10.1
	Corn Planter	0	13.3	6.2	10.0
		N	15.7	8.2	10.6
June 14	Deep Furrow Drill	0	13.5	6.2	9.5
		N	14.6	8.4	11.2
	Lister	0	15.4	8.3	11.4
		N	16.6	8.3	10.7
	Corn Planter	0	13.7	6.2	10.1
		N	15.5	8.6	10.8

* "N" indicates 30# of Nitrogen per acre, "0" indicates fertilizer was not applied.

** Sig. Dif. in wheat yield because of Fertilizer, and Method of Planting Sorghum.

The methods of seeding sorghum in this experiment were evaluated after six years or when three rotation cycles were completed. Results from the experiment indicate significant differences exist between the date of planting and the method used. The conclusions drawn are listed below:

(1) When planting about May 21, the sorghum should be seeded as shallow as possible. This places the seed in soil that is warm. Secondly, the sorghum should be seeded in rows which can be cultivated because early planting reduces the effectiveness of seedbed tillage for weed control.

(2) When planting in early June, it is permissible to plant in narrower rows or solid stands. The sorghum will control the weeds by shading if the stand is dense. Although the dense stands limit vegetative development and tillering, maturity will be uniform.

(3) When planting in mid-June, a lister planter can be used most successfully. By this date, the soil is warm enough to permit germination at the depth where the seed will be placed. The lister furrows, in addition to reducing water runoff so more soil moisture will be available for use later in the season, will also help to control the competitive weeds. These weeds will be destroyed when the furrows are closed.

Spring wheat grown in rotation with the sorghum has benefited by the addition of commercial fertilizer. The yield increases, although small, have been consistent. Even larger differences than these were caused by the method of planting sorghum. Plots where sorghum was seeded in wide rows, in contrast to narrow spacings, have produced higher spring wheat yields. Apparently the sorghum in wide rows used less of the soil moisture than it did in narrow rows with a large plant population, thus, more moisture was left for the spring wheat the following year. The spring wheat yields are reported in Table 29.

CROP DISEASES AND THEIR CONTROL

Plant Pathology Department

Root and Stalk Rot Disease Control in Hybrid Corn

Eighty-six, 3-way experimental corn hybrids, including 6 commonly grown commercial hybrids were grown at the Research Farm in 1965. The purpose of the experiment was to determine the influence of disease resistant inbred lines in hybrid combinations on yield performance, standability and drought.

The 86 experimental 3-way crosses each contained an inbred line possessing varying degrees of resistance to the destructive root and stalk rot diseases present in the area.

Although the 1965 results are not completely analyzed, the preliminary data indicated that the more disease resistant 3-way experimental hybrids outperformed the best commercial checks used in the test for comparison.

Transmission and Spread of Wheat Streak Mosaic

G. B. Orlob

Experiments were continued in 1965 to study the spread of wheat streak mosaic when successive plantings of virus-tolerant and virus-susceptible small grains are grown adjacent to winter wheat under field conditions. A continuous planting of spring wheat, which is susceptible to both virus and mite, produced 60% infection in the fall crop of winter wheat. Successive plantings of oats, which is a less suitable food plant of the mite, resulted in an 80% infection of the adjacent winter wheat plot. These findings indicate that under the present conditions wind-borne inoculum seemed more important in spreading the disease than inoculum from nearby sources.

These experiments will be continued from year to year in order to determine other seasonal influences on the spread of mosaic under field conditions.

Control of Wheat Streak Mosaic by Regulating Planting Date

G. W. Buchenau and G. B. Orlob

Wheat streak mosaic, a mite-transmitted virus disease of wheat, was successfully controlled by proper selection of planting date for the seventh consecutive year. As in the past, planting dates after the first week in September provided excellent control of the disease, as well as optimum yields (Tables 30 and 31). The data also shows that early October planting carries the risk of winter kill, although this may be no greater than winter killing that occurs when wheat is planted too early. Although 1965 was a moderately severe rust year, early maturity did not provide sufficient rust protection to offset mosaic damage in these tests.

Other tests at the Presho station indicated that rust-resistant varieties perform much better when planted in mid-September compared to those planted in mid-August.

Table 30. Effect of Planting Date on: Infection by Wheat Streak Mosaic, Yield, and Other Characteristics of Omaha Winter Wheat at Presho, 1965

Planting Date	% Mosaic Infected	% Winter Survival	Percent Protein	Test Wt. Lbs/Bu.	Grain Yield* Bu/Acre
15 August	90	20	12.7	50.0	7.7
25 August	55	80	12.7	55.5	15.3
4 September	8	88	11.6	55.2	19.3
14 September	t	95	10.7	54.7	18.4
24 September	t	95	10.1	57.0	19.7
4 October	t	50	10.0	51.7	9.4

*LSD at 5% level - 3.5 Bu/A.

Table 31. Effect of Planting Date on the Incidence of Wheat Streak Mosaic and Yield of Winter Wheat in 1959, 1960, 1962, 1963, and 1964 at Presho, S. D.

Planting	1959[a]		1960[b]		1962[c]		1963[d]		1964[e]		6-Year Ave.[f]
	Mosaic %	Yield Bu/Acre	Mosaic %	Yield Bu/Acre	Mosaic %	Yield Bu/Acre	Mosaic %	Yield Bu/Acre	Mosaic %	Yield Bu/Acre	Yield, Bu/Acre (Includes 1965)
August 15	97	1	TR	31	40	9	30	15	93	6	12
August 25	95	3	TR	38	10	8	15	20	87	10	16
September 4	65	8	TR	36	2	5	1	29	25	24	20
September 14	8	14	TR	32	TR	7	TR	33	13	28	22
September 24	6	14	0	24	TR	4	TR	36	8	31	22
October 4	1	10	0	18	TR	1	TR	34	5	27	17

[a] Dry year with severe mosaic and little rust.

[b] Good year with little mosaic and little rust.

[c] Good year with moderate mosaic and very heavy rust.

[d] Good year with moderate mosaic, little rust, and late spring frost.

[e] Very late fall after seeding in 1963; high temperatures and hot winds in June and July of 1964; severe mosaic and light rust.

[f] The 6-year averages and the data in individual years clearly indicates that early planted winter wheat is more likely to be severely damaged by mosaic than later planted wheat. Wheat planted after September 10 has consistently escaped severe damage.

Chemical Rust Control in Winter Wheat

G. W. Buchenau and L. W. Carlson

Rust control experiments on winter wheat were conducted in 1965 to determine the best time to apply fungicides. Three chemicals were compared for their relative effectiveness for rust control. They were Zineb, Dithane S-31, and Manzate D which was used as the control fungicide.

The chemicals were applied with a portable sprayer calibrated to deliver 100 gallons of solution per acre at a pressure of 150 Psi. Manzate D and Zineb were applied at the rate of 2 pounds per acre per treatment, while Dithane S-31 was applied at 3 pounds per acre per treatment. In addition to drop nozzles, Plyac spreader-sticker was added to all spray suspensions at the rate to 10 oz/100 gallons of solution to insure a complete coverage of the foliage.

Season-long coverage (6 applications) with Manzate D provided excellent rust protection with wheat yields double those of the unsprayed check (see Tables 32 & 33). Similar treatments with Zineb did not provide satisfactory control.

The best two-application rust control and corresponding yield increase was obtained by spraying during jointing and again at heading. With these two applications, Manzate D treated wheat yielded 11.3 bu. per acre more than the untreated wheat, while Zineb treated wheat yielded only 6.0 bu/acre more than untreated wheat. Economically, use of Manzate D was very profitable.

Two sprays, applied at heading and at ten days after heading, were slightly more effective in controlling stem rust than earlier applications (Table 34). However, much poorer leaf-rust control was obtained and yields decreased correspondingly.

The spray schedule that commenced 10 days after heading was of little value in rust control. Yields were not increased enough to pay for the chemical and its application. Successful rust control depends upon thorough coverage of the plants with the chemical and applying them at the proper time.

It should be noted that Zineb is the only rust-control chemical currently cleared for use against wheat rust. Clearance of Dithane S-31 is anticipated for the 1966 season.

Effect of Disease Control Chemicals on Winter Survival of Kearney Barley

V. D. Pederson

Preplant chemical treatments; DiSyston, DD, Vorlex, Chloropicrin; and 65 pounds of 0-46-0 fertilizer were incorporated in soils of the experimental plots to determine their effects on winter survival of Kearney barley. Good stands were obtained in all plots in the fall of 1964; but due to poor winter survival, the experiment was abandoned the spring of 1965.

South Central Research Farm Rust Spray Data Summary

Table 32. Effect of Fungicides Applied in Several Schedules on Leaf Rust, Stem Rust, Yield, and Test Weight of Nebred Winter Wheat at Presho, 1965

Treatment	No. Applications	Time of Application	Terminal Rust Severity (Flag) leaf	Terminal Rust Severity Stem	Test Wt. Lbs./Bu.	Grain Yield - Bu./A. Actual Yield	Grain Yield - Bu./A. Yield* Increase
Manzate D	6	Every 10 days starting 10 May	10.3	1.1	59.6	36.9	18.5
Manzate D	4	Joint, head, head + 10, & head + 20	15.3	2.7	59.3	31.5	13.1
Zineb	6	Every 10 days starting 10 May	28.2	23.0	58.7	30.0	11.6
Manzate D	2	Joint, head	19.9	17.7	59.0	29.7	11.3
Dithane S-31	2	Head, head + 10	38.4	13.2	58.7	27.1	8.7
Manzate D	2	Head, & head + 10	51.3	13.2	58.5	25.5	7.1
Zineb	2	Joint, head	37.0	23.0	57.6	24.4	6.0
Manzate D	2	Head + 10, head + 20	73.3	31.5	55.8	20.7	2.3
Check	0	----	70.3	51.8	55.2	18.4	0

LSD at 5% level - 2.9 Bu./Acre.
*This column indicates the yield increase over the check plot yield.

Table 33. Comparison of Fungicides for Three Different Spray Schedules on Rust Control of Nebred Winter Wheat - 1965

Treatment	Fungicide	Percent Rust Control (Flag)Leaf	Stem	Yield* Bu/Acre	Net Return** Dollars/Acre
6 spray appl. Full Schedule	Manzate D	85	98	18.5	$4.88
	Zineb	60	56	11.1	-$1.44
2 spray appl. Joint, Head	Manzate D	72	66	11.3	$8.58
	Zineb	47	56	6.0	$2.40
2 spray appl. Head, H+10	Manzate D	25	75	7.1	$2.89
	Dithane S-31	45	75	8.7	$2.23

* Yield increase in Bu/Acre over the unsprayed check.

** Net for treatment = income from yield increase — cost of chem. & application.

Application cost:	$1.50/acre/application
Zineb:	$0.65/lb.
Manzate D:	$0.90/lb.
Dithane S-31:	$1.07/lb.
Spreader-sticker:	$0.05/acre/application
wheat:	$1.35/bu.

Table 34. Effect of Time of Spraying and Number of Applications on Winter Wheat Yields, and Net Returns When Using Manzate D for Rust Control - 1965

Timing & Number of Treatments	Rust Control (Flag)Leaf	Stem	Yield increase Bu/Acre	Net Return Dollars/A.
6 Treatments Full Season	85	98	18.5	$4.88
4 Treatments Joint, Head, H+10, H+20	78	95	13.1	$4.29
2 Treatments Joint, Head	72	66	11.3	$8.58
Head, H+10	25	75	7.1	$2.89
Head+10, H+20	0	39	2.3	-$3.59