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CENTRAL CROPS AND SOILS RESEARCH STATION

Highmore, South Dakota

INTRODUCTION

This is an annual report of the Central Crops and Soils Research Station. The experimental area is located one mile west of Highmore, South Dakota. The soils on which the Experiment Farm is located have developed over glacial drift, a dark colored shale, and alluvial deposits consisting of sediments derived from the two other materials.

A field tour for 1973 was not scheduled but the station was and is open to visitors at all times.

The advisory board meeting in March of 1973 outlined the immediate research problems as follows: Minimum tillage, Cultural practices, Commercial fertilizer use in corn production, Variety trials of soybeans, mustard, and sunflowers, and stubble mulching for soil and moisture conservation.

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Table 1. Weather Data - Crops and Soils Research Station - Highmore, SD - 1972-73.

Month	1972 Sept	Oct	Nov	Dec	1973 Jan	Feb	Mar	Apr	May	June	July	Aug	Total
Rainfall in Inches*	Tr	1.83	1.04	1.41	0.64	0.34	1.90	1.54	2.22	0.92	2.06	1.44	
Longtime Average**	1.45	1.18	0.54	0.36	0.39	0.48	0.88	1.85	2.78	3.41	2.34	2.18	17.84
Departure from Longtime Average	-1.45	0.65	0.50	1.05	0.25	-0.14	1.02	-0.31	-0.56	-2.49	-0.28	-0.74	
Average Temperature*	62.0	46.8	30.6	13.4	18.8	24.4	40.0	45.5	57.4	68.8	75.5	72.4	
Longtime Average**	61.7	49.5	32.7	19.6	13.7	17.9	30.3	45.4	56.3	66.3	73.3	71.7	44.9
Departure from Longtime Average	0.3	-2.7	-2.1	-6.2	5.1	6.5	9.7	0.1	1.1	2.5	2.2	0.7	
Av. Monthly Maximum*	75.8	60.5	38.3	23.2	28.3	35.0	49.8	59.4	73.7	84.8	91.8	86.4	
Av. Monthly Minimum*	48.2	33.1	23.0	3.6	9.2	13.9	30.1	31.6	41.0	52.9	59.2	58.3	

Last killing frost, 1973 - May 14; Last frost in spring - May 22

First frost in fall - Sept. 26, 1972; First killing frost in fall - Oct. 6, 1972.

*Data taken and recorded at Central Research Station.
**Longtime averages were recorded at same location.

SMALL GRAIN VARIETY TESTING

H. A. Geise, D. G. Wells, P. B. Price,
D. L. Reeves and J. J. Bonnemann

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

RYE

The plots were seeded by using a deep furrow drill. The seeding rate was 5 pecks or 70 pounds per acre. The soil was fertilized by applying 15 pounds of elemental phosphorus with the seed. The results of the trial are presented in Table 2.

Table 2. Standard Variety Rye Yield Trial - Central Research Station - 1973.

Variety	Yield - Bu/Acre				Test Wt
	1971	1972	1973	3 Yr Av.	Lbs/Bu
Caribou	55.9	46.3	23.9	42.0	55
Coloma		53.7	43.1		55
Cougar	67.6	70.8	37.8	58.7	54
Frontier	70.2	74.9	43.4	62.8	57
Kodiak			40.0		52
Pearl	75.7	64.8	39.5	60.0	55
Von Lochow	75.6		47.0		56
Zelder	82.0		44.5		56
LSD (05) - 5.9 Bu/A			Mean - 39.9		
C.V. - 11.6%					

Note: Date of Planting: September 14, 1972
Date of Harvest: July 10, 1973

WINTER WHEAT

Winter wheat varieties were evaluated in 4 row rod length sized plots. They were fertilized by broadcasting 30 pounds of nitrogen per acre and applying 15 pounds of elemental phosphorus with the seed. The information is published in Table 3.

Table 3. Standard Variety Winter Wheat Trial - Central Research Station, 1973.

Variety or Selection	Test Wt-Lb/Bu	Yield-Bu/Acre
Sentinel	60	39.5
HiPlains	60	37.4
Eagle	62	37.1
Gage	60	37.1
Nebred	59	35.9
Bronze	60	35.7
Cloud	60	35.2
Scout 66	61	34.8
Sage	61	34.6
Trapper	59	34.5
Homestead	59	33.9
Centurk	60	32.9
Hume	60	32.9
Buckskin	60	32.5
SD 69103	58	32.5
Winoka	60	31.4
Minter	59	31.2
SD 7117	61	30.2
SD 69100	57	30.2
Scoutland	62	30.0
Lancer	59	28.3
Froid	57	26.7
LSD (05) - 6.8 Bu/A	C.V. - 14.5%	Mean - 33.4

Table 4. Winter Triticales Yield Trial - Central Research Station, 1973.

Variety or Selection	Test Wt-Lb/Bu	Yield-Lbs/Acre
Fas-Gro 131	48	1425

Note: All plots reported in Tables 3 and 4 were seeded on September 14, 1972 and harvested on July 19, 1973.

SPRING WHEAT AND FLAX

All varieties reported in Tables 5 and 6 were seeded in fallow. The soil was fertilized by broadcasting 30 pounds of nitrogen per acre, and applying 15 pounds of phosphorus per acre with the seed when planted. The plots were seeded on April 6, and harvested with a self-propelled combine in late July.

Table 5. Spring Wheat Variety Trial-Central Crops & Soils Research Station.

Variety	Date of Heading	Height Inches	Lodging Percent	Test Wt Lbs/Bu	Yield Bu/A
HARD RED SPRING					
Waldron	June 7	31	5	51.3	33.4
Chris	9	31	0	52.9	30.2
Polk	10	31	2	54.6	29.2
Fortuna	8	32	5	51.5	28.7
Nowesta	7	30	2	50.5	27.8
Nordak	9	34	0	52.2	26.3
Manitou	7	32	0	51.5	26.3
SEMI-DWARFS					
Olaf	June 10	26	0	52.4	34.6
Bonanza	9	26	0	50.8	34.3
World Seeds 1809	7	27	0	51.4	33.8
Bounty 208	5	25	2	50.5	31.8
Era	9	26	0	49.5	31.8
Lark	7	25	5	50.5	31.8
DURUM					
Ward	June 10	30	2	55.1	33.0
Hercules	9	30	8	56.8	32.5
Leeds	10	31	8	57.5	31.9
Rolette	7	29	10	57.5	30.5
Wells	10	28	8	55.4	22.3
Harvested - July 10, 1973					Mean - 30.6

Table 6. Flax Variety Trial - Central Crops & Soils Research Station, 1973.

Variety	Test Wt-Lbs/Bu	Yield-Bu/Acre
Linott	47.8	15.6
Nored	44.0	15.2
Summit	47.5	14.6
Windom	49.5	12.8
B5128	43.1	12.0
Norstar	47.8	10.7
Harvested - July 19, 1973		Mean - 13.5

All varieties listed in Tables 7 and 8 were seeded on fallow. The soil was fertilized by broadcasting nitrogen at the rate of 30 pounds per acre, while phosphorus was applied with the seed at the rate of 15 pounds of the element per acre. The plots were seeded on April 6, and harvested with a self-propelled combine on July 10.

Table 7. Oat Variety Trial - Crops & Soils Research Station-Highmore, SD-1973

Variety	Date of Heading	Height Inches	Lodging Percent	Test Wt Lbs/Bu	Yield Bu/A
Cayuse	June 16	30	2	31	80.0
Holden	12	32	0	35	74.5
Kelsey	15	32	2	34	74.2
Kota	12	34	8	35	73.8
Garland	9	30	2	35	72.8
Grundy	June 12	32	5	36	72.1
Diana	11	31	0	34	71.1
Dupree	10	32	5	35	69.4
Chief	10	33	0	34	68.0
Burnett	11	33	8	35	67.4
Nodaway 70	June 12	32	2	37	67.0
Otee	14	29	2	36	67.0
Trio	15	31	2	35	64.6
Lodi	17	34	2	32	61.9
Portal	17	32	2	36	60.9
Froker	June 10	33	8	35	60.6
M-72	10	31	8	34	58.9
Mammoth	18	36	10	34	57.5
Rodney	10	32	2	34	57.2
Pettis	15	31	10	37	56.5
Dal	10	30	5	32	55.4
					Mean - 66.2

Table 8. Oat Variety Trial (Forage Type) - Central Crops & Soils Research Station

Variety	Height Inches	Forage Yield*** % Dry Matter	Protein**	Tons/Acre	Grain Yield Bu/Acre
Cayuse	30	81	12.3	5.4	80.0
Dal	30	81	10.7	6.0	55.4
Froker	33	82	11.4	6.4	60.6
Kelsey	32	83	12.2	6.4	74.2
Lodi	34	81	10.3	5.6	61.9
Portal	32	78	10.9	5.6	60.9
Mammoth	36	80	12.0	5.9	57.5
Rodney	32	78	11.1	5.7	57.2

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

***Forage yields are reported on a 12% moisture content.

SPRING BARLEY

The plots were seeded in fallow and received 30 pounds of nitrogen fertilizer. Phosphorus fertilizer was applied at the rate of 15 pounds of elemental phosphorus per acre with the seed at planting time. The yields and other data are presented in Table 9. The plots were seeded April 6 and harvested July 10.

Table 9. Spring Barley Variety Trial - Central Crops & Soils Research Station.

Variety	Date of Heading	Height Inches	Lodging Percent	Test Wt Lbs/Bu	Yield-Bu/Acre 1973	Yield-Bu/Acre 3 Yr Av
Liberty	June 5	28	8	47	61.3	51.2
Burk	1	29	5	47	56.5	--
Firlbeck's III	1	26	10	46	51.6	48.6
Primus II	6	27	18	49	51.3	63.4
Prilar	5	30	12	44	51.3	52.3
Larker	4	30	18	45	48.8	51.7
Conquest	June 2	29	10	46	48.4	53.5
Beacon	5	28	25	42	42.9	--
Cree	6	28	22	43	42.9	48.5
Trophy	7	28	15	41	39.8	--
Nordic	7	29	30	42	39.5	48.3
Dickson	3	27	25	41	37.4	44.5
				Mean -	50.8	

SPECIALTY CROP TESTING

H. A. Geise

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

SUNFLOWER YIELD TRIAL

Sunflowers are grown as a crop for several purposes. The large-seed types are grown for whole-seed-uses in the confectionery trade. They are also preferred by some bird feeders because the large seed is less likely to attract sparrows and is less likely to be lost on the ground.

The small seeded varieties have a much thinner hull resulting in a proportionally larger meat. These thin hulled types are used primarily for their oil. Certain varieties contain over 50% high quality oil in the seed.

Seed yields reported in 1973 (Table 10) are extremely low because of bird damage. A large flock of sparrows moved into the field before the flowers were ready for harvest and within a short time had destroyed the plots.

Table 10. Sunflower Variety Trial - Central Crops & Soils Station - 1973

Variety	Date of Heading	Test Wt lb/Bu	Yield Lb/A
NONOILSEED VARIETIES			
SD68001	July 10	29	575
Mingren	16	23	558
Sundak	17	25	389
Commander	13	24	378
Arrowhead	11	27	357
		Nonoilseed Mean	- 451
OILSEED VARIETIES			
Luch	July 18	28	582
VNIIMK 8931-66	20	28	498
Record	23	29	477
Sputnik	19	21	392
Peredovik 66		21	392
OILSEED - GENETIC MALE STERILITY			
Ronsum HS-52	July 23	26	605
OILSEED - CYTOPLASMIC MALE STERILITY			
Cargill 111	July 25	29	1051
(cmsHA89xHA234) x RHA271	20	32	680
cmsP21VR1 x RHA269	27	28	577
cmsHA234 x RHA271	18	32	572
cmsHA234 x RHA266	21	30	486
cmsHA234 x RHA269	25	28	473
cmsHA232 x RHA271	16	30	443
cmsHA99 x RHA271	27	31	402
cmsP21VR1 x RHA266	17	28	398
cmsP21VR1 x RHA265	29	26	350
Cargill 101	24	30	332
cmsHA232 x RHA265	22	28	332
cmsHA89 x RHA266	22	21	286
cmsHA89 x RHA271	23	31	288
cmsHA89 x RHA269	28	30	198
Cargill 102	28	30	170
cmsHA232 x RHA266	21	32	148
cmsHA99 x RHA266	25	30	148
cmsHA234 x RHA265	22	28	132
cmsHA99 x RHA265	29	28	131
cmsHA89 x RHA265	31	29	96
		Oilseed Mean	- 380
		Average Yield	- 392

A number of specialty crops were grown in observation plots in 1973. The crops are grown for the oil which is extracted from their seed. Specialty crops require new management techniques which must be utilized if the crops are to be successfully grown. They require different seedbed preparation, planting procedures, pest control practices, and harvesting procedures.

Table 11. Specialty Crop Testing - Crops & Soils Research Stations - 1973

Specialty Crop	Seed Yield - Pounds per Acre		
	Highmore	Brookings	Presho
Brown Mustard	229	1036	232
Yellow Mustard	414	671	222
Crambe	761	1683	675
Lentils	0	254	0
Oilseed Sunflowers	380	1726	---
Nonoilseed Sunflowers	451	1734	---

SOYBEAN YIELD TESTING

A. O. Lunden

Soybeans were planted at Highmore to determine the most adapted variety and to study the effect of row spacing in anticipation of the western extension of the soybean belt in South Dakota. Narrow-rows are more desirable as they provide better ground cover against wind erosion and are easier to harvest. Five varieties were planted on May 21 in replicated split plots of 12 and 30 inch rows. Results of the test are presented in Table 12. Yields were not high but were acceptable in relation to the rainfall in 1973. Weed control was satisfactory although plant stands were lower than intended. Plant population was not as important as expected with some plots of 60-70,000 plants per acre yielding as well as plots with the desired 100,000 plants per acre. Plant height was, reduced with low stands and harvest was more difficult in these plots.

Table 12. Soybean Yields - Central Crops & Soils Research Station - 1973

Variety & Maturity	Row Spacing	Yield Bu/A	Height Inches	Seed Quality	Relative Pod Height	Post-Harvest Ground Cover
Corsoy-late	12"	17.9	20	good	good	good
	30"	15.0	23	good	good	poor
Hark-late	12"	15.2	18	good	fair	fair-good
	30"	14.1	21	good	poor	poor
Swift-early	12"	15.0	16	green	very poor	fair
	30"	12.1	20	green	poor	very poor
Steele-midseason	12"	16.1	20	sl. green	poor	fair to good
	30	12.4	19	sl. green	poor	poor
Wells-late	12"	15.5	18	good	poor	fair to good
	30"	14.0	22	good	poor	poor

Corsoy was the best entry and narrow-row planting resulted in a 20% yield advantage for this variety. Seed quality was generally good but the earliest variety, Swift, had many green seeds and Steele had some immaturity. Pod height was too low for easy harvest but was better with narrow rows. Profitable soybean yields can be obtained in the Highmore area but drill planting should be considered in view of the wind erosion potential after soybeans and the limited ground cover left in the field after harvest.

SORGHUM PERFORMANCE TESTING

Sorghum Breeding

A. O. Lunden

Grain sorghum plantings in 1973 included Regional Uniform Test entries, experimental hybrids and early lines. All entries were planted on May 24 in 30 inch rows. The early lines were also included in a late drill-plant test. The narrow-row yield test, planted on June 7, was designed to evaluate three early-maturing lines for late planting. Sorghum yields were near average in 1973 in spite of very dry midsummer conditions. Yields are presented in Table 13.

The main advantages of late planting are less weeds and improved stand because growing conditions are much better for this tropical crop when planted in warm soil. The poor stands of both SD102 and SD104 planted in May and good stands from June planting demonstrate this fact. Greenbug populations were low on the Furadan treated early planting but severe lodging on the late planting may have been influenced by severe greenbug damage in that field.

SD104 is an excellent grain sorghum line for late planting, RS506 is good for early planting, and SD106 produces a good yield whether planted early or late.

Table 13. Grain Sorghum Yields-Central Crops & Soils Research Station - 1973

Entry	Row Spacing	Planting Date	Percent Stand	Test Wt Lb/Bu	Yield Lb/A	Height Inches	Percent Lodging
RS610	30"	5-24	69	54	1610	34	4
RS506	30"	5-24	74	56	4010	42	11
SD451	30"	5-24	51	54	2350	43	5
SD106	30"	5-24	82	54	3690	34	9
SD104	30"	5-24	54	56	2270	33	8
SD102	30"	5-24	52	54	2520	37	5
SD106	12"	6- 7	89	52	2540	29	15
SD104	12"	6- 7	80	53	2540	29	78
SD102	12"	6- 7	82	52	2370	30	80

Grain Sorghum Performance Testing

J. J. Bonnemann

Objective: To compare the performance of grain sorghum hybrid varieties as to yield and other agronomic characteristics.

Performance trials with grain sorghum hybrids have been conducted on a fee basis at the Central Research Station since 1962. Table 14 presents the 1973 yields and agronomic data. Long term averages and other information can be found in circulars entitled Grain Sorghum Performance Trials, South Dakota Agricultural Experiment Station.

Sorghum Forage Testing

H. A. Geise

Objective: To compare the various forage sorghums and sudangrasses, or their hybrids as to their adaptability, their forage production, and their forage quality.

Sorghum forage testing at the Central Research Station is continued because of voluntary contribution of seed by commercial companies. With the exception of certain preselected "check" varieties, which will remain unidentified, all other seed is donated.

The research will not make interpretations or verbal comparisons of the trials, because of what may be misconstrued as "brand" favoritism.

When studying the tables, the reader should consider the extremely droughty conditions which occurred during the growing season. The lack of available moisture prevented heading and maturity, and thus altered such measurements as maturity, and plant type.

The data from these trials are presented in Tables 15, 16, 17, and 18. The plots were planted on May 30. Plant notes, sugar content of plant sap, moisture content, and forage yield measurements were taken and recorded on October 5.

Table 14. Grain Sorghum Performance Trial - Central Crops & Soils Station

Brand & Variety	Yield Lbs/A 1973	Test Weight Lbs/Bu	Date of 50% Heading	Percent Lodging @Harvest	Percent Moisture 9/20/73
Western WS 201	4246	55	7-28	2	17
Northrup King NK180	4234	56	8- 1	2	29
SDAES SD106	4197	54	7-24	5	20
DeKalb A-25	3875	53	7-26	0	19
Pioneer 8681	3780	57	8- 7	0	34
ACCO R1010	3733	56	7-30	3	23
SDAES RS610	3627	56	8- 4	2	32
SDAES RS506	3595	56	7-27	20	26
Northrup King NK121	3492	56	7-28	0	22
DeKalb A-26	3416	54	7-31	0	22
SDAES SD451	3395	55	7-29	10	19
Pioneer 878	3383	57	8- 2	0	22
Pioneer 883	3260	56	8- 6	0	32
Pioneer 894	3132	57	7-28	3	21
DeKalb X1330	3099	56	7-24	3	16
Frontier 385	3072	56	8- 4	0	25
Asgrow Dorado E	3050	58	8- 2	0	26
Excel 202C	3048	56	8- 1	0	19
ACCO R920	2998	55	7-27	2	17
Funk's G393	2891	58	8- 4	0	30
Western WS102	2877	55	7-28	20	22
Horizon 25	2870	56	8- 3	0	29
Funk's Exp HW3843	2704	55	8- 7	0	31
SDAES SD104	2687	55	7-24	30	18
Frontier Super 400A	2650	56	8- 5	0	28
Frontier 400C	2504	55	8- 6	0	31
Frontier 389	2414	56	8- 5	0	31
Pioneer 866	2411	57	8- 6	0	32
Funk's G251	2403	57	7-29	0	18
Frontier 350	2164	56	7-30	0	19
Northrup King NK233A	2071	58	8- 3	0	26
Funk's Exp HW3075	1922	55	8- 8	0	34
Horizon 45	1691	56	8- 8	0	35.+[a]
SDAES NB635	1781	56	8-12	0	35.+
Funk's G-399	1638	58	8- 7	0	30
Excel 9163	1159	59	8- 6	15	32
SDAES SD503	1034	56	7-30	2	25

LSD(05) - 1464 lbs/a Mean-2890 C.V. - 31%

[a] + sign indicates moisture exceeded 35% which was the top range of the moisture meter used.

Note: Plots were seeded May 22 and harvested September 27. Yield data are an average of three replications.

Table 15. Performance Trial of Forage Sorghum Varieties - Central Crops & Soils Research Station, Highmore, SD - 1973

Brand & Variety	Date of Heading	Percent Lodging	Maturity* (1-5)	Height Inches	% Sugar in Bag	Plant** Type	Percent*** Protein	Forage Yield**** Tons/Acre
Acco FS531	9- 1	0	4	70	14.4	1	8.2	12.7
Pioneer 931	8-31	tr	4	73	18.0	1	9.5	12.6
Northrup King 24	8-31	4	4	68	14.5	1	9.8	12.2
Northrup King 25	8-11	tr	1	73	7.8	3	8.9	11.2
DeKalb FS-4	8-20	0	1	64	14.1	3	8.5	10.0
Rudy-Patrick Sumax	8- 6	0	1	64	11.6	3	7.2	9.2
Rudy-Patrick 55F	8-23	tr	3	67	12.2	3	8.7	9.2
Advance 1071F	8-18	0	2	72	12.1	3	9.4	9.1
Weathermaster 500B	8-25	0	3	59	6.0	3	9.3	8.5
Asgrow Beefbuilder T	8-22	0	4	61	18.2	2	7.9	8.5
Acco FS403R	8-22	0	2	63	23.6	3	8.5	7.9
Frontier FX352	8-17	0	2	66	15.3	3	8.1	7.2
Excel Silo-Fill 33A	8-22	0	2	50	10.0	8	9.8	7.1
Northrup King 23	8-15	tr	2	64	14.0	3	7.1	7.1
Asgrow Dairy D	8-21	0	3	57	19.1	3	9.1	7.0
Sokota 300	8-11	tr	1	74	7.7	3	9.9	6.7
Frontier S-209	8-11	1	1	66	17.4	3	8.9	6.2
Waconia	8-14	2	1	69	22.8	4	7.2	5.9
Acco FS401R	8-16	0	1	50	10.9	8	10.2	5.9
Weathermaster 500R	8-16	tr	2	61	8.6	3	8.5	5.7
Frontier S-210	8-12	0	2	67	18.2	3	8.4	5.3
DeKalb FS-1b	8-22	0	2	38	14.1	8	10.4	5.2
Rudy-Patrick 22F	8- 4	1	1	55	17.1	4	8.8	5.2
DeKalb FS-1a	8-20	0	2	45	14.1	8	9.3	5.2
Northrup King 26	8- 1	6	1	68	11.1	4	7.7	4.8
SD XR873	8-12	1	1	51	6.0	8	8.5	4.6
Acco X7804	8-21	0	3	46	12.8	8	10.4	4.4
Northrup King 22	8-15	0	1	43	8.0	8	9.4	4.0
Frontier S-205	8- 4	6	1	66	16.2	4	8.5	3.6
Rancher	7-27	tr	1	62	15.8	4	6.0	2.9
SD 252F	7-23	27	1	62	6.6	4	8.2	2.4
Dual	7-30	12	1	55	20.0	4	8.8	1.6

LSD(05) - 2.0 Tons/Acre C.V. - 19.87 Mean - 6.8

Note: Footnote explanations can be found on following pages.

**Legend for Plant Type - Tables 15-18.

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

Table 16. Performance Trial of Sorghum-Sudangrass Crosses - Central Crops & Soils Research Station - Highmore, SD - 1973

Brand & Variety	Date of Heading	Percent Lodging	Maturity* (1-5)	Height Inches	% Sugar in Sap	Plant** Type	Percent*** Protein	Forage Yield**** Tons/Acre
Funk's 83F	8- 9	2	1	68	17.0	2	9.4	7.7
DeKalb ST-4	8-14	3	1	81	12.1	2	8.8	7.7
Acco Sweet Sioux III	8- 4	4	1	86	9.1	3	6.9	7.6
Weathermaster FS551	8- 5	2	1	77	13.2	3	9.4	7.3
Rudy-Patrick Mor-Su II	8-11	3	1	57	10.7	3	8.6	7.2
Frontier Hidan 35	8- 7	17	1	76	9.0	3	9.5	7.1
Frontier Hidan 39	8-12	3	1	74	11.8	3	10.8	7.0
DeKalb ST-6	8- 6	1	1	80	11.3	3	7.9	6.8
Excel Chowmaker 235	8-15	4	1	75	13.4	3	10.4	6.5
Funk's 78F	8- 9	6	1	78	18.7	3	9.4	6.3
Doreman Sure-Graze	8-14	4	1	73	6.1	3	9.9	6.3
Excel Graze-N-Bale	8- 2	13	1	78	11.1	3	8.8	6.1
Acco Sweet Sioux	8-16	3	1	74	16.2	3	6.8	6.0
Northrup King Sordan 70	8-11	3	1	72	10.9	3	8.4	5.8
Weathermaster FS550	8- 1	21	1	73	19.0	3	9.4	5.8
Frontier HX1144	8- 3	9	1	73	14.7	4	8.1	5.3
Acco Sweet Sioux II	8- 3	3	1	69	12.0	3	7.8	4.9
DeKalb SX-15	8-14	2	1	79	10.6	2	8.2	4.9
Frontier HX1146	8- 1	14	1	70	9.6	4	8.9	4.2
Pioneer 988	8- 4	14	1	69	13.6	4	8.9	3.9
Frontier HX1149	7-25	25	1	65	12.4	4	8.9	3.8
Note: Yield differences are not statistically significant				C.V. - 30.8%				Mean - 6.1

*See legend on page 16.
**See legend at top of page.
***Protein content was calculated from Kjeldahl nitrogen analysis and is reported on an oven-dry basis.
****Forage yields are reported on an oven-dry basis.

Table 17. Performance Trial of Sudangrasses - Central Crops & Soils Research Station, Highmore, SD - 1973

Brand & Variety	Date of Heading	Percent Lodging	Maturity* (1-5)	Height Inches	% Sugar in Sap	Plant** Type	Percent*** Protein	Forage Yield**** Tons/Acre
Rudy-Patrick Trudy G	7-21	4	1	75	13.0	4	8.5	4.9
Northrup King Trudan 5	7-25	11	1	78	11.8	3	7.6	4.7
Cal/West Monarch	7-22	5	1	70	7.0	3	9.9	4.2
Acco HS-33	7-20	8	1	73	14.6	3	7.4	3.6
Piper	7-20	9	1	68	6.8	4	6.1	2.9
LSD(05) - 1.1 Ton/Acre			C.V. - 17.8%					Mean - 4.0

Table 18. Performance Trial of Blends of Sorghum - Central Crops & Soils Research Station, Highmore, SD - 1973

Brand & Variety	Date of Heading	Percent Lodging	Maturity* (1-5)	Height Inches	% Sugar in Sap	Plant** Type	Percent*** Protein	Forage Yield**** Tons/Acre
Acco FB-44	8-10	0	1	68	5.6	3	8.1	5.4
Acco 3 Little Indians	8- 3	8	1	75	18.4	3	7.2	5.1
Note: Yield differences are not statistically significant				C.V. - 14.2%				Mean - 5.4

*Legend for Maturity: 1-Mature Grain; 2-Hard Dough Stage; 3-Milk Stage; 4-Pollination Stage; 5-Not Headed
**See legend at top of page 15.
***Protein content was calculated from Kjeldahl analysis and is reported on an oven-dry basis.
****Forage yields are reported on an oven-dry basis.

CROP PRODUCTION AND MANAGEMENT

Seed Treatment of Winter Wheat

H. A. Geise

Objectives: To determine the effects of a biological organism used as a seed treatment on the yield and agronomic characteristics of selected winter wheat varieties.

Seed of eighteen varieties of winter wheat was selected for this study. One-half of the seed of each variety was treated with a bacteria, Bacillus uniflagellatus, at the rate of 4 oz. per 100 lbs of seed. The treated and untreated samples were seeded in paired plots at the rate of 60 lbs per acre, using a deep furrow drill. The plots were observed periodically during the following growing season to determine what changes could be observed.

The varieties responded differently for those characters shown in Table 19. The most obvious was the response to winter survival. Height differences of up to 5 inches were seen but the response was not consistent. Some of the treated plots were taller than the untreated while other treated plots were shorter. The treatment appeared to hasten maturity with an average of 5% less moisture at the time of harvest. Yield was increased in most instances but the differences were not consistent and are probably not statistically significant.

Grain Sorghum Management

H. A. Geise

Objectives: To determine the optimum date of planting and row spacing for short-season or early-maturing varieties of grain sorghum.

Date of Planting

Three early-maturing or short-season grain sorghum varieties were seeded at fifteen day intervals to determine the optimum date of planting. The dates of seeding based on expected soil temperatures bracketed the time period when the optimum temperature for rapid emergence first occurs by an earlier and a later planting. The earlier planting permits a long growing season with possible heading and flowering prior to summer moisture stress, while a later planting delays heading until after the drought period but delays maturity until frost damage may occur.

The results of this study presented in Table 20 indicate there was difficulty in obtaining a uniform stand. There were two reasons for the poor stand, one was an excess of soil moisture resulting in a poor seed bed and cool soil which hindered germination and emergence.

The second date of planting resulted in a good stand, healthy plants and an excellent yield. Test weight was low due to drought during the period when the kernels were filling.

The third or late planting in early July resulted in fair stands but heading was delayed by dormancy induced by drought. Yields in this part of the study was further reduced by excessive sparrow damage.

Table 19. Influence of Seed Treatment (*Bacillus uniflagellatus*) on Grain Yield and Other Agronomic Characteristics of Selected Winter Wheat Varieties - Central Crops & Soils Research Station - Highmore, South Dakota - 1973.

Cultivar	Seed Treatment	% Winter Survival	Height Inches	Percent Moisture	Test Weight Lbs/Bu	Grain Yield Bushel/Acre	Percent of Check
Bronze	Check	70	33	8.8	58.0	12.1	
	Bacillus	80	34	9.0	57.0	14.4	119
Centurk	Check	82	31	8.8	57.5	20.7	
	Bacillus	80	31	8.7	57.5	20.9	101
Eagle	Check	65	30	11.0	60.0	13.4	
	Bacillus	75	31	9.9	59.0	16.5	123
Froid	Check	95	35	9.0	55.0	14.3	
	Bacillus	95	34	8.8	55.5	18.8	132
Gage	Check	90	30	8.8	58.0	21.0	
	Bacillus	85	28	9.1	59.0	20.2	96
Guide	Check	65	29	11.6	62.0	15.1	
	Bacillus	50	28	11.6	62.0	11.3	75
Hume	Check	40	32	9.9	58.0	7.1	
	Bacillus	50	30	11.0	59.0	10.4	146
Lancer	Check	25	31	12.2	59.0	9.1	
	Bacillus	25	28	11.9	61.0	9.6	106
Minter	Check	40	29	14.3	57.0	11.8	
	Bacillus	2	24	7.9	53.0	0.8	7

Table 19. Continued

Cultivar	Seed Treatment	% Winter Survival	Height Inches	Percent Moisture	Test Weight Lbs/Bu	Grain Yield Bushel/Acre	Percent of Check
Omaha	Check	25	25	11.6	59.5	8.8	
	Bacillus	30	26	11.9	57.5	12.0	136
Scoutland	Check	87	28	10.3	61.0	23.2	
	Bacillus	85	28	9.9	61.0	21.4	92
Scout 66	Check	70	27	9.6	57.5	17.2	
	Bacillus	87	28	9.4	61.5	22.3	130
Shamnea	Check	90	31	9.0	59.5	22.7	
	Bacillus	95	31	9.2	59.5	23.8	105
SD 7117	Check	92	31	9.3	59.0	24.7	
	Bacillus	95	29	9.1	60.0	24.8	100
SD 66169	Check	90	33	9.8	60.0	19.4	
	Bacillus	92	32	10.2	60.0	21.3	110
Trader	Check	85	31	9.6	58.0	18.7	
	Bacillus	90	30	9.8	59.0	21.5	115
Trapper	Check	65	29	14.5	57.0	11.7	
	Bacillus	87	30	11.2	60.0	18.8	161
Winoka	Check	95	32	10.0	59.0	22.3	
	Bacillus	90	30	11.2	60.0	17.9	80
Average	Check	70.6	30.4	15.3	58.6	16.3	
	Bacillus	71.8	29.6	10.0	59.0	17.0	107

Table 20. Effect of Date of Planting on Three Varieties of Grain Sorghum-Central Crops & Soils Research Station - Highmore, SD - 1973.

Date of Planting	Variety	Percent Stand	Height Inches	Grain Yield Lb/Bu	Grain Yield Lb/A
June 1	SD 106	58	36	52.7	1330
	NK 121	78	41	51.7	1463
	NK MM52	77	33	54.3	1065
				Average -	1286
June 15	SD 106	85	34	50.5	2121
	NK 121	92	39	53.7	2124
	NK MM52	93	32	53.0	2069
				Average -	2105
July 1	SD 106	90	36	24.8	183
	NK 121	87	32	30.7	269
	NK MM52	87	32	33.5	144
				Average -	205

Note: All plots were seeded in 24" rows.

Row Spacing Study

The purpose of this study was to determine the most advantageous row spacing for three short-season grain sorghum varieties. The populations were kept as constant as possible. The results in Table 21 do not show any large differences in yield between row spacings, although there is a slight advantage in wider rows. The bird damage indicates the seeds were succulent for a longer period of time, and although yields were severely reduced the seed quality was better as shown by test weight. The plots were seeded in mid-June.

Table 21. Effect of Row Spacing on Yield of Three Short-Season Varieties of Grain Sorghum-Central Research Station-Highmore, SD - 1973.

Variety	Row Space	Percent Stand	Percent Lodging	Percent Bird Damage	Height Inches	Grain Yield Lbs/Bu	Grain Yield Lbs/A
SD 106	6"	61	1.0	1.0	30	47	1200
	12"	86	0	1.0	32	48	1232
	24"	86	1.0	12.0	32	48	1203
NK 121	6"	79	0.5	9.0	32	50	1469
	12"	92	2.0	18.0	31	52	1430
	24"	88	2.5	15.0	32	52	1658
NK MM52	6"	74	2.0	16.0	33	55	1732
	12"	93	6.0	15.0	29	55	1779
	24"	89	3.5	14.0	29	56	1749

Mean Yields

Row Space	Lbs/A
6"	1467
12"	1480
24"	1537

Variety	Lbs/A
SD 106	1212
NK 121	1519
NK MM52	1753

CROP DISEASE CONTROL

Management of Stubble, Fallow, and Seed Bed Preparation for Mosaic Control in Winter Wheat

W. S. Gardner and H. A. Geise

The wheat streak mosaic virus, which infects winter wheat, can be controlled through the management of wheat stubble by proper fallow practices and seed bed preparation. The virus is spread by the wheat curl mite wich reproduces on annual and perennial grasses as well as in wheat. Thus volunteer wheat and annual or perennial grasses may harbor the mite and the mosaic virus so that they can spread into the wheat fields.

Tentative recommendatione are that wheat stubble should be tilled before August 15 to kill volunteer wheat and grassy weeds so the mites and virus will be destroyed. The wheat stubble should be left exposed on the soil surface so the soil will be protected from erosion. Summer fallowing should destroy all volunteer wheat and grassy weeds but leave the soil surface protected by a stubble mulch. All volunteer wheat and grassy weeds should be destroyed 7 to 10 days before the wheat is planted. Otherwise these plants can act as a reservoir for mites and virus to infect the wheat planted after midSeptember.

The incidence of wheat streak mosaic can also be controlled by regulating the date of planting of winter wheat. The results of the demonstration are shown in Table 22.

Table 22. Influence of Date of Planting on Yield of Winter Wheat and Incidence of Wheat Streak Mosaic - Central Crops & Soils Research Station - Highmore

Date of Planting	Percent Stand	% Mosaic Infection	1973 Test Wt Lbs/Bu	1973 Yield Bu/A	Average 1968-71 Percent Mosaic	Average 1968-71 Yield Bu/A
Aug. 15	65	18.3	56	11.4	46	18.0
Aug. 25	78	4.0	55	10.6	34	30.0
Sept. 4	53	1.2	50	4.5	17	35.0
Sept. 14	62	3.0	52	6.4	8	42.0
Sept. 24	88	1.0	55	11.1	1	39.0
Oct. 4	92	tr	57	15.0	tr	28.0

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