Agronomy Pamphlet #75

December, 1963

ANNUAL PROGRESS REPORT

NORTHEAST RESEARCH FARM

Watertown, South Dakota

INTRODUCTION

In the spring of 1955, money was appropriated by the State Legislature to begin new research on crops, soils and crop diseases in the northeastern area of the state. A site involving 20 acres was originally selected, which was later increased to 42 acres to facilitate more experiments. It is located on the Otto Korth farm, 15 miles north of Watertown at the junction of Highways 81 and 20.

The purpose of this farm is to provide research facilities to obtain solutions of local problems in crop production and soil management. Experiments involving fertilizers, plant disease control, crop management, weed control, soil fertility, and crop variety testing have been underway for 8 crop seasons.

New crop introductions from other areas of the world and the United States were grown on the farm this year, with favorable results. Grown for the first time with crambe, a relative of the mustard family, and sesame, oil producing crops. An extensive program of testing plant introductions is being planned for the coming years. Evaluations of other crops are necessary to keep up with the variable demands of industry, also to know the adaptability of these crops to this area.

NORTHEAST EXPERIMENTAL FARM COMMITTEE

Member	County	Address
W. H. Schwanke (Chairman)	Codington	Watertown - Route 4
F. Morris (Secretary)	Codington	Watertown
Harold Hurlbut	Clark	Raymond
W. Peterson	Day	Lily
Alfred Skovly	Deuel	Astoria
Lyle Kriesel	Grant	Summit
Oliver Heitsmeyer	Hamlin	Estelline
Donald Naddy	Marshall	Britton
Elmer Greseth	Roberts	Sisseton

This report was prepared by the staff members of South Dakota State College as indicated in each section, and assembled by Q. S. Kingsley, Agronomy Department.

BRIEF HISTORY

An annual winter meeting was held February 6, 1963, at Hayti, South Dakota, with the Northeast Research Farm Advisory Committee, County Extension Agents and the general public. The main discussion concerned the movement of the farm from its present site. Previous discussions of this move took place in 1962, once at the field day and the other during the winter meeting. The action taken by the Board of Directors of the Northeast Research Farm, at their meeting February 6, 1963, would indicate we should proceed with the selection of a site for at least a portion of the work being done at the Northeast Research Farm at a location on the Poinsett Soil Association.

Accordingly, a new farm site was located on the Everett Fletcher farm north of Garden City, which is to be cropped by the farmer with a small grain crop in 1964. Upon removal of the crop, a soil survey will be conducted to further evaluate the land. Preliminary soil and topographic surveys were completed last fall.

The cultural practice experiments are to be concluded at the end of the 1964 crop season, but the adaptation studies with corn, small grain, sorghum, soybean and grass will continue for an indefinite period at Watertown. A summarized report of all cultural practice experiments will be presented at the end of the 1964 season.

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1963 CROP SEASON

Table 1. Total Rainfall and Average Temperature by Months, with Their Departure from Long-Time Average at Northeast Research Farm*

	April	May	June	July	Aug.	Sept.	Oct.	Total
Total Rainfall in Inches	1.41	3.54	3.22	5.74	2.51	4.33	0.68	21.43
Departure from Long-Time Avg.	-0.65	0.67	-0.48	3.07	-0.27	2.48	-0.48	4.34
Avg. Monthly Temperature in Degrees F.	43.9	52.4	66.1	72.7	67.3	60.0	54.5	
Departure from Long-Time Avg.	0.7	-3.6	2.2	0.4	-1.7	0.1	6.8	
Frost Free Days	May 23 to October 28 = 158 days							

The rainfall for the 1963 season was fairly equally spaced except for the mid-weeks of May, June, July and September. Rainfall at these times came too rapidly for proper infiltration, thus creating erosion due to runoff. Small grain was also affected by these driving rains, which resulted in lodging and an increase in disease incidence, weeds and shattered grain. Subsoil moisture remained uniform throughout the season with little change in the 5-foot samples taken.

Temperatures remained close to the long time averages except for October. The first killing frost in the fall usually occurs during September, but this year, the season extended to October 28. Late frosts in the spring are not unusual, because in 1957, 58 and 59 freezes were recorded from May 20 to May 23. Table 2 illustrates by years the dates of last spring and first fall frost, plus frost free days.

* The above rainfall and temperature were taken and recorded at the Northeast Research Farm. The departure from long-time average was obtained by comparing the data taken at the farm to the long-time average at the Watertown Weather Station, Courtesy U. S. Weather Bureau, Huron, South Dakota.

Table 2. Periods of Frosts and Frost Free Days Recorded at the Northeast Research Farm

Year	Last Frost	First Froet	Frost Free Days
1956	May 4	Sept. 6	125
1957	May 20	Sept. 16	119
1958	May 23	Sept. 16	116
1959	May 22	Sept. 10	110
1960	May 11	Sept. 19	123
1961	May 10	Sept. 25	138
1962	April 30	Sept. 20	143
1963	May 23	Oct. 28	158
		Average days - - - -	129

FERTILITY AND CULTURAL PRACTICE EXPERIMENTS

Q. S. Kingsley and F. E. Shubeck

Fertility Experiment #1

Objectives of Experiment

1. Compare the efficiency of alfalfa, red clover, and biennial sweetclover in increasing grain yields.
2. Compare commercial nitrogen to legume nitrogen as a means of increasing crop yields.
3. Will a sweetclover fallow treatment increase grain yields sufficiently, or reduce risks enough to justify its adoption?

Table 3. Comparison of Legumes, Commercial Nitrogen and Fallow in Increasing Yields of Spring Wheat, Corn and Flax

	Preceding Crop or Treatment (1962)	Fertilizer applied per acre in 1963			Yields in 1963		
		N	P_2O_5	K_2O	Wheat Bu/A	Corn Bu/A	Flax Bu/A
1	Oats (check plot)	0	40	0	13.7	74.4	8.5
2	Oats + Commercial N	30	40	0	17.9	74.8	8.7
3	Alfalfa for Hay	0	40	0	16.8	73.0	8.5
4	Red Clover for Hay	0	40	0	16.5	73.5	8.1
5	Sweetclover for Seed	0	40	0	19.4	72.6	9.1
6	Sweetclover Fallow	0	40	0	15.4	76.6	7.9
	Significance				**	N.S.	N.S.

** Differences were significant at the 1% confidence level.
N.S. not significant at either the 1% or 5% level.

The data in table 3 are the results of 6 separate rotations, all of which have wheat in the cropping sequence followed by corn and then flax. Legumes precede the wheat except in rotations 1 and 2.

Treatment Number 1 is considered the check plot to measure nitrogen responses, therefore no commercial nitrogen or legumes were used in this rotation. In treatment 2 commercial nitrogen was used in place of legumes. Forty pounds of P_2O_5 per acre were applied to all plots so that possible soil deficiencies of phosphorus would not be a limiting factor.

In this year of above average rainfall, all the legumes were effective in increasing yields of the following wheat. This was especially so in the rotation where sweetclover was harvested for seed. Thirty pounds of nitrogen appears to increase the yield of wheat about the same as a year of legume hay.

Sweetclover fallow was nearly as effective as a year of legume hay in increasing wheat yields. This trend occurs in the high rainfall years when the deficiency of nitrogen rather than moisture limits yields. The sweetclover was plowed when 1 to 1 1/2 feet high and consequently did not return as much nitrogen as the legumes held over for hay.

Corn and flax measure the residual effect of legumes but the commercial nitrogen treatment was applied every year in rotation number 2.

Corn yields were high in 1963, but there were no significant yield increases from the residual effect of legumes with corn (the second crop after legume) or with flax (the third crop after legumes).

Fertility Experiment #2

Objectives of Experiment:

1. Determine how many years alfalfa will have an influence on yield of subsequent crops after the alfalfa is plowed under.

2. Should nitrogen fertilizer be applied to the 2nd, 3rd, or 4th grain crop after alfalfa to obtain maximum yields that the rainfall and climate will permit?

3. Evaluate the residual effect of legume nitrogen compared to fertilizer nitrogen applied every year.

Table 4. Residual Effect of Legumes on Grain Yield

Preceding Crops*	Fertilizer Applied in 1961, 62 & 63	1961 Crop	1962 Crop	1963 Oats Bu/A
1 Alfalfa 5 Years	0-40-0	flax	wheat	61.4
2 Alfalfa 4 Years	0-40-0	flax	wheat	61.8
3 Alfalfa 3 Years	0-40-0	flax	wheat	61.7
4 Alfalfa 2 Years	0-40-0	flax	wheat	65.3
5 Flax + Alfalfa 1 Year	0-40-0	flax	wheat	41.7
6 Corn (1960)	0-40-0	flax	wheat	58.6
7 Corn (1960)	40-40-0	flax	wheat	68.9

Differences due to treatments were highly significant.
* For alfalfa, the year planted was counted as 1 year.

By the third crop year after legumes, there was still a carryover of fertility from any alfalfa stand 2 years old or older sufficient to increase the yield of oats over the check plot (treatment 6). However, this increase was not as great as that obtained from an annual application of 40 pounds of nitrogen (treatment 7).

Notice the relatively low yield in treatment 5. The reason for this is rather unusual. Treatment 5 had flax plus alfalfa in 1960, flax in 1961, and wheat in 1962. This is the only treatment that had flax for 2 consecutive years. As a result wild oats became a severe problem and reduced yields in the 1962 wheat and the 1963 oats. These were the only plots that had wild oats in this experiment and it occurred in all 4 replications.

Fertility Experiment #3

Objectives of Experiment:

1. Determine whether it is best to follow alfalfa with a short season crop like small grain or a long season crop like corn when the reserve of subsoil moisture may be limited because of the large amounts of water used by the preceding alfalfa crop.

2. What is the optimum time to plow alfalfa - after the first hay crop, the second hay crop, or early the following spring?

3. Investigate the possibility of spray to kill alfalfa in late summer. This would keep the ground covered during the winter and help to control erosion. If successful it would stop transpiration losses immediately because the plant is dead. If the plants were clipped, they would remain alive and continue to allow loss of water through transpiration.

Table 5. Effect of Time of Plowing Legumes on Yield of Flax and Corn

	1960 Crop No Fertilizer	1961 Crop 40 lbs. P_2O_5/A	1962 Crop 60 lbs. P_2O_5/A	Time of Plowing	1963 Crop Bu/A
1	Flax + Alfalfa	alfalfa hay	alfalfa hay	June 1962-after first hay crop	9.2 flax
2	Flax + Alfalfa	alfalfa hay	alfalfa hay	July 1962-after second hay crop	9.0 flax
3	Flax + Alfalfa	alfalfa hay	alfalfa hay	Early in spring-1963	8.8 flax
4	Flax + Alfalfa	alfalfa hey	alfalfa hay	Spray kill after 1st hay crop spring plow	8.4 flax
5	Flax + Alfalfa	alfalfa hay	alfalfa hay	July 1962 after 2nd hay crop	69.4 corn

This experiment was designed to solve the problem of how to bring the land back into production after alfalfa without taking a serious yield reduction in the first cash crop. Another objective was to determine which crop is best to plant after alfalfa - a short season crop like flax, or a long season crop like corn.

In years with above average rainfall, the moisture conserving practices in this experiment had only minor effects on flax yields. The long season crop, corn, produced the best returns. Notice that 69.4 bushels per acre of number 2 corn were obtained the first year after alfalfa.

Fertility Experiment #4

Objectives of Experiment:

1. From the standpoint of weed control and maximum yields, what is the best way to fertilize flax? Should it be broadcast and disced in, drilled with the seed, or plowed under?
2. Can method of fertilizer application influence the severity of the weed problem?
3. Is drilling the fertilizer with the seed a more efficient method of application? Is it safe to drill 40 pounds of nitrogen per acre with the seed?
4. Will the residual effect on the following crop, corn, be different for the various fertilizer application methods?

Table 6. Effect of Methods of Fertilizer Application and Weed Control on Yield of Flax

Lbs. per acre on Flax N, P_2O_5, K_2O	Method of Fertilizer Application on Flax	Weed Controls*	Flax Bu/A	Residual Effect on Corn Bu/A
0-0-0	None applied	None	9.8	69.1
0-0-0	None applied	Weed Control	7.9	73.3
40-30-0	Drilled with the seed	None	7.0	75.3
40-30-0	Drilled with the seed	Weed Control	9.1	78.3
40-30-0	Disked in	None	6.7	74.8
40-30-0	Disked in	Weed Control	10.8	75.3
40-30-0	Plowed under	None	6.8	77.2
40-30-0	Plowed under	Weed Control	9.8	77.1
20-15-0	Drilled with seed	None	11.1	72.3
20-15-0	Drilled with seed	Weed Control	7.7	74.3

* Weed control consisted of 3/4 lb. of Dalapon/Acre to control grassy weeds and 1/4 lb. of MCP/Acre for broadleaved weeds.

No outstanding yield increases of flax were obtained with any of the fertilizer treatments or methods of application.

This experiment has a cropping sequence of flax and corn. Corn measures the residual effect of the fertilizer and weed control treatments on flax.

There were highly significant yield increases in corn for some treatments. It is interesting to note that in almost every case, weed control measures applied to flax resulted in a higher yield of the following corn for most methods of fertilizer application. The one exception was in plots where fertilizer for flax was plowed under.

CORN AND SORGHUM FORAGE STUDIES

Q. S. Kingsley

The corn and forage sorghum varieties tested are quite well adapted to this area of the state, and this same group of entries will be used for the duration of the experiment.

Yield potential at different row spacings and plant populations is the primary objective of this study. Row spacings are important when cultivation and harvesting methods are considered. For dryland farming, an abundance of subsoil moisture is necessary when using high seeding rates as in the 20-inch row spacing.

Table 7. Performance of Annual Forages at Northeast Research Farm, 1963

Environment:

Fertilizer - 60-40-0
Population and seeding rates:
Corn: 40" rows - 12,000 per acre
20" rows - 22,000 per acre
Sorghum and Sudan
40" rows - 6# per acre
20" rows -12# per acre
Planting date: June 28, 1963
Harvest date: Sept. 25, 1963
Approximate sorghum seeds per pound 22-25,000

Yields, Tons Per Acre

Crop	40 in. Rows		20 in. Rows	
	Silage wt.	Air Dry wt.	Silage wt.	Air Dry wt.
Rancher Sorghum	11.5	4.3	14.8	5.6
Hybrid Sudan	15.9	7.1	19.5	8.3
Piper Sudan	9.2	3.5	11.3	4.3
S. D. 252	13.6	5.8	19.5	8.3
Volkman S-100	13.1	5.5	17.1	6.4
De Kalb SX-11	17.4	6.8	20.4	8.9
Rox Orange	21.6	11.8	24.6	11.6
Frontier FS 210	17.8	8.1	21.3	9.5
Hydan 37	14.8	6.6	18.1	7.5
High Sugar Corn	21.2	10.8	25.1	10.4

ALFALFA VARIETY TRIALS

M. D. Rumbaugh

Table 8. Summary of the Average Yield Performance of Eighteen Varieties of Alfalfa at the Watertown Experiment Farm, 1961-1963

Variety	Percent Stand 5/15/63	Yield (Dry Tons/Acre) 1961 2 Cuts	1962 3 Cuts	1963 1st Cut	1963 2nd Cut	1963 Total	Average Total
Atlantic	86	2.18	4.72	.72	1.13	1.85	2.92
Buffalo	78	1.91	4.43	.67	1.30	1.97	2.77
Cody	77	1.68	4.33	.37	1.01	1.38	2.46
Cossack	93	2.18	4.92	.81	1.20	2.02	3.04
Culver	94	2.04	5.28	.86	1.32	2.18	3.16
DuPuits	31	2.15	4.49	.01	.38	.38	2.34
Grimm	90	2.01	4.82	.82	1.18	1.99	2.94
Ladak	93	2.20	5.44	.94	1.34	2.27	3.30
Lahontan	13	1.17	3.59	.03	.04	.08	1.61
Narragansett	96	2.28	5.10	.84	1.47	2.32	3.23
Nomad	30	1.72	4.62	.08	.23	.30	2.22
Rambler	93	2.40	4.95	.76	1.31	2.07	3.14
Ranger	96	2.02	4.90	.94	1.35	2.30	3.07
Rhizoma	96	2.14	5.48	.97	.91	1.88	3.17
Semipalatinsk	94	2.42	5.12	1.21	1.42	2.64	3.39
Teton	95	2.00	5.14	1.12	1.37	2.48	3.21
Travois	76 1/	1.64	4.42	1.00	.84	1.85	2.64
Vernal	98	2.24	5.30	.78	1.33	2.10	3.21
Average	79	2.02	4.84	.72	1.06	1.78	2.88
L S D (0.05)	20	NS	.57	.39	.47	.39	.36
(0.01)	26	NS	.76	.53	.62	.52	.49

1/ Average replications 1-3 = 95%. Replication 4 = 16%.

The results of the 1960 alfalfa forage yield test are shown in table 8. In general the hay production estimates obtained the past 3 seasons support the current variety recommendations of the Experiment Station. Ranger and Vernal are believed to be well adapted in the Watertown area. Narragansett has performed well in this test but is not resistant to bacterial wilt.

Teton and Rambler are suggested for use in pasture mixtures only. In most experiments these varieties have not yielded as well, as is indicated by the table.

Several other varieties included in this test have yielded comparatively well. Many of these are susceptible to one or more major leaf or stem diseases and are therefore not recommended.

STANDARD VARIETY TRIALS OF SMALL GRAIN, NE FARM, 1963

J. J. Bonnemann

Abnormally heavy rainfall occurred at the NE Farm during the summer, especially during July. This contributed to reduced yields of poorer quality.

Lodging was noted in the trials but not to a degree greatly detrimental for normal yields. Disease and moist weather greatly reduced the yields of most of the later maturing varieties, especially of oats.

A newly recommended oat variety for the higher northeastern area of the state, Lodi, produced quite well. The varieties Minhafer, Burnett, Andrew and Rodney have good yield records over the past 5-year period.

Improved varieties cannot overcome poor management practices. The oat yields were achieved under good management practices at adequate fertility levels.

Though not yielding as well as some varieties in 1963, the recently recommended malting barley varieties, Larker and Trophy, still maintained test weights as high as any of the trial entries. It is suggested that production of other malting types be discontinued in favor of Larker and Trophy.

Of the acceptable milling spring wheats, Selkirk and Pembina are most satisfactory. Other entries, though higher in yield, are not yet released or acceptable to the milling industry. A new variety, Crim, is being released. It possesses sources of rust resistance not presently found in other varieties.

Langdon and Ramsey durum wheats did not perform well in 1963. These durums are more susceptible to disease and have been dropped from the recommended list for 1964.

Summit, a new South Dakota flax release, and Windom have the highest 5-year averages of the flax varieties grown. Two new races of flax rust were noted in North Dakota and Canada in 1963. All varieties except B-5128, Bolley, Redwood, Summit and Windom are susceptible to at least one of these races.

Table 9. Oats Variety Testing, NE Farm 1963

Variety	Yield Bu/A 1963	Yield Bu/A 1959-63	Test Wt., 1963 lbs/bu
Minhefer	61.9	68.8	32.0
Garland	61.3		34.5
Lodi	59.2		32.0
Mo. 0-205	57.5	56.8	32.0
Burnett	56.9	61.6	34.5
CI 7399	55.9		32.0
Nodaway	55.5		35.5
Dupree	55.4		29.5
Coachman	55.0		33.0
Portage	54.2		33.0
Bonkee	53.9		32.0
Minton	53.8		28.5
Marion	52.9		32.0
Clintland 60	52.6	59.9	34.0
Neal	52.6		30.0
Dodge	52.3		35.5
Andrew	52.2	60.9	30.5
Waubay	51.6		33.0
Nehawka	49.0		33.5
Ranaom	48.6	56.3	33.0
AuSable	46.8		32.5
Ortley	46.2		34.5
Garry	44.2	56.9	33.0
Goodfield	42.9		34.5
Rodney	40.6	60.0	33.0
L S D .05	6.9		

Table 10. Barley Variety Testing, NE Farm 1963

Variety	Yield Bu/A 1963	Yield Bu/A 1959-63	Test Wt., 1963 lbs/bu
Liberty	37.9	36.4	42.5
Plains	34.0		42.5
Betzes	34.0	33.6	43.0
Larker	31.6		45.0
Custer	31.6		39.0
Parkland	30.4	32.6	43.5
Spartan	30.3		43.5
Feebar	29.7		38.5
Otis	28.3		40.0
Trophy	26.8		43.5
Traill	25.6	33.5	40.0
Kindred	22.5	27.4	40.5

L S D .05 7.5

Table 11. Flax Variety Testing, NE Farm 1963

Variety	Yield Bu/A 1963	Yield Bu/A 1959-63	Test Wt., 1963 lbs/bu
Marine	18.3	15.0	54.5
Marine 62	17.0		55.0
Arny	16.7	14.6	54.0
Summit	16.4	16.9	52.5
Windom	15.8	16.7	54.5
Bolley	15.5	14.3	53.5
Bison	14.4		53.5
Cree	13.9		52.0
Caldwell	13.0		53.0
Redwood	13.0	13.9	54.0
B-5128 (ss)	12.9		53.0
Linda	12.6	13.8	51.0
Norland	12.6	14.1	52.0
B-5128	11.6	13.9	52.0
De Oro a/	6.1		45.5

L S D .05 2.0

a/ Poor stand because of weevil damaged seed

GRAIN SORGHUM PERFORMANCE TRIALS
AREA D2, 1963

J. J. Bonnemann

This is the second year the Grain Sorghum Performance Trials have been conducted on a fee basis. Entries included are the choice of the entering commercial producer.

Twelve entries were included in the Area D2 trial in 1963. The material was planted May 20 and harvested September 27, a week following the normal expected date of frost. Many entries were near maturity as evidenced by the test weights. The high moisture content made machine combining somewhat hazardous.

The yields are recorded in hundred weight per acre and range from 50.9 down to 22.7 hundred pounds per acre.

Table 14. Grain Sorghum Performance Trial, Area D2, NE Farm, 1963

Variety	Percent Moisture	Height, Inches	Yield, cwt/A 1963	Yield, cwt/A 1962-63	Test Weight	Statistical Significance a/
SD 503	44.1	55	50.9	32.5	56.5	
Rocket A	47.7	52	49.1		56.5	
RS 501	45.6	64	49.0	31.2	57.0	
Frontier 400C	51.7	52	45.1		55.0	
NK 120	46.2	45	44.2	28.2	57.5	
NK 144	42.2	43	42.1		57.0	
SD 451	43.8	53	40.8	27.0	56.0	
Frontier 388	49.8	51	40.6	23.8	57.5	
NK 125	43.1	47	39.8	24.3	53.5	
SD 441	38.3	54	38.9	28.2	54.5	
SD 102	44.4	44	33.3	21.4	55.0	
Reliance	37.7	46	22.7	17.0	53.0	
Mean			41.4			
L S D .05			5.7			

a/ Using Duncan's Multiple Range Test at the 5 percent level (1963 yields).

Table 13. Corn Performance Trial, Area D2, NE Farm, 1963

Variety	Performance Rating	Percent Moisture	Yield Bu/A 1963	Yield Bu/A 1961-63
Pioneer 3658	2	35.9	94.9	
Funks G-174	8	36.3	91.8	
Pioneer 385	3	31.7	91.3	
Funks G-10A	5	33.4	91.2	
S. D. 250	1	30.1	90.7	66.8
S. D. Exptl. 39	4	30.9	90.5	
DeKalb 57	7	33.8	90.4	
Funks G-184	9	34.1	89.6	
Pioneer 3812	6	30.8	88.5	
Sokota 255	13	35.8	88.0	
Master F-70	16	37.4	86.7	
S. D. 240	12	33.4	86.6	63.7
DeKalb 59	11	32.8	86.3	
Master F-34	10	31.0	85.6	
Pioneer 384	14	30.8	83.7	65.7
Cargill 590	19	32.1	81.5	
DeKalb 56	15	28.8	80.9	
S. D. Exptl. 26	22	33.3	80.3	
Master F-30	17	28.6	79.3	
Master F-35	20	29.6	78.0	
Pioneer 3862	18	26.4	77.1	
DeKalb 45	23	29.8	76.3	
Sokota 215	25	31.6	76.1	
Pioneer 388	21	27.8	76.0	60.9
Disco 900	27	30.9	75.3	
Master F-31A	24	29.4	75.2	
Sokota 225	26	27.8	73.0	
S. D. 220	28	27.4	71.0	60.2
S. D. 210	29	27.0	70.0	59.5
Mean		31.3	82.9	
L S D .05		6.9		

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AREA D2, 1963

J. J. Bonnemann

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SD 503	44.1	55	50.9	32.5	56.5	
Rocket A	47.7	52	49.1		56.5	
RS 501	45.6	64	49.0	31.2	57.0	
Frontier 400C	51.7	52	45.1		55.0	
NK 120	46.2	45	44.2	28.2	57.5	
NK 144	42.2	43	42.1		57.0	
SD 451	43.8	53	40.8	27.0	56.0	
Frontier 388	49.8	51	40.6	23.8	57.5	
NK 125	43.1	47	39.8	24.3	53.5	
SD 441	38.3	54	38.9	28.2	54.5	
SD 102	44.4	44	33.3	21.4	55.0	
Reliance	37.7	46	22.7	17.0	53.0	
Mean			41.4			
L S D .05			5.7			

a/ Using Duncan's Multiple Range Test at the 5 percent level (1963 yields).

COMPARATIVE TESTS OF NEW WHEAT STRAINS AND COMMERCIAL VARIETIES

D. G. Wells

The wheat materials presented in table 15 are part of a regional cooperative study, also conducted in other states. By comparative studies of this nature, sound decisions may be made as to the true value of the new material being studied.

Table 15. Hard Red Spring Wheat and Durum Uniform Regional Nurseries, Watertown, 1963

	Scab*	Stem Rust**	Leaf Rust	Test Wt. Lbs.	Yield Bu.
SPRING WHEAT					
Thatcher	Susc.	Mod. res.	Susc.	47	9.8
Selkirk	"	Res.	"	47	11.7
Lee	"	Mod. res.	"	45	8.8
Pembina	"	Res.	"	49	15.6
Crim	"	"	"	47	9.6
Justin	"	"	"	48	9.3
Minn. Selection	"	"	Res.	56	19.8
"	"	"	"	55	20.1
"	"	"	"	53	17.8
N.D. Selection	"	"	Susc.	50	17.5
DURUM					
Mindum				43	3.1
Langdon				36	3.9
Ramsey				46	3.7
Wells				43	5.7
Lakota				47	8.7
N.D. Selection				47	10.7
N.D. Selection				46	8.8
Manitoba Selection				54	10.0

* - Susc. - susceptible to scab
** - Res. - resistant

GRASS TESTING

J. G. Ross

Table 16. Smooth Bromegrass Forage Yields 1963

Variety	1962 Planting Yield T/A	1957 Planting Yield T/A
Manchar	2.18	1.16
Homesteader	2.15	0.94
Wisconsin 55	2.32	1.04
Saratoga	2.46	1.13
Sac	2.63	----
Canadian Commercial	2.35	1.04
Southland	2.28	1.06
Lincoln	2.78	1.04
Achenbach	2.21	1.03
Lyons	2.87	----
Lancaster	2.41	0.98
L S D .05	0.41	0.15

Yields of the 1957 planting were about one-half of those of the 1962 planting which was made the previous fall. This lower yield was a result of lack of nitrogen primarily since the 1957 planting had not been fertilized. An optimum amount of nitrogen was available for the other planting.

Varietal differences in yield were small in the 1957 planting. Manchar, under conditions in that test, was the top yielder, but at the bottom in the other test where conditions were more favorable. It is considered that the yield differences observed where yield was allowed to be expressed to the greater degree are more important. The varieties Lyons, Lincoln and Sac are, therefore, considered the outstanding varieties as indicated by this test.

Table 17. Wheatgrass Forage Yields, 1963

	1962 Planting Yield T/A	1957 Planting Yield T/A
PUBESCENT WHEATGRASS		
Mandan 759	2.24	1.39
INTERMEDIATE WHEATGRASS		
Oahe	2.29	----
Amur	2.18	1.57
Greenar	-----	1.07
Nebraska 50	-----	1.12
Idaho #4	-----	1.15
L S D 5%	NS	0.25
CRESTED WHEATGRASS		
Nordan	2.28	----
Commercial Standard	2.50	----
Summit	2.90	----
Fairway	1.89	----
L S D 5%	0.48	----

Again yields were higher in the 1962 planting because of the greater availability of nitrogen. Amur and Mandan 759 were the best yielding varieties in the 1957 test. In the 1962 test, little difference was noted between Oahe, Mandan 759 and Amur though Oahe did rank first.

The standard crested wheatgrass yielded somewhat better than the Fairway in the crested wheatgrass test planted in 1962. Summit yielded considerably more than the other varieties.

WEED RESEARCH

The Competitive Effect of Wild Buckwheat on Small Grain

L. C. Warner

During the spring of 1963, field experiments were established to study the competitive effect of wild buckwheat in barley, wheat and flax. The competitive effect of 4 wild buckwheat stand densities were compared: 0-plants/ft.^{2}; 2-plants/ft.^{2}; 5-plants/ft.^{2}; and 10-plants/ft.^{2}. A comparison was also made between the competitive effect of wild buckwheat which emerged early (before May 10) and that which emerged late (after May 10).

RESULTS

In all three crops, wheat, barley and flax, the early heavy infestation of wild buckwheat reduced the crop yield more severely than any other stage or stand density. In wheat, the early heavy infestation (10 plant/ft.^{2}) reduced wheat yields 3.6 bu/A, barley 5.6 bu/A and flax 1.2 bu/A.

It was apparent that the less dense wild buckwheat stands and the later emerging wild buckwheat were less competitive than the early heavy stands. However, in statistically analyzing these less competitive stages and stand densities, the lack of precision in the experiment resulted in the apparent differences being "non-significant".

The lack of precision was thought to be a result of two major factors: first, the stand of flax and barley were both thin and in places uneven. The stand of wheat, however, was satisfactory. Second, the narrow plots made it possible for wild buckwheat from one plot to extend into and entwine with crops in adjoining plots. This offered at least aerial competition.

WORK PLANNED FOR 1964

The field experiments planned for 1964 will follow the same general pattern used in 1963. However, the plot size and number of replications will be increased. At least one additional experimental location is also planned.

SOYBEANS

C. J. Franzke

The Grant soybean, table 18, is used as the guide crop in Group 0, and all maturity ratings are expressed with reference to it. This soybean variety is fairly well adapted to this area, and anything with minus days matures that many days before Grant. Anything with plus days matures after Grant does. Chippewa is used in Group 1 as the guide crop.

The group designation is used because the Northeast Research Farm is in the transitional area between Group 0 and Group 1. These two groups have to be tested to find out which is more nearly adapted. This does not include individual selections which may change due to local conditions of other areas.

Table 18. 1963 Summary of Soybeans at Northeast Farm

Variety	Group	Height Inches	Maturity +, - Days	Bu/Acre
Grant	0	33	0	33.9
Merit	0	35	0	28.0
Norchief	0	31	0	32.2
Flambeau	0	26	0	25.2
Grant matured September 15				
Blackhawk	1	40	+1	42.8
Chippewa	1	34	0	47.3
Chippewa 63	1	35	+2	47.6
Ottawa	1	36	+1	50.1
Chippewa matured September 23				

CROP DISEASE CONTROL

DISEASES VS. WINTER SURVIVAL OF WHEAT

G. W. Buchenau

Previous experiments at other South Dakota locations have indicated that winter survival of wheat is sometimes affected by the presence of certain root-attacking plant pathogens. To determine if winter survival could be improved by controlling such diseases, experiments were conducted in 1963 in an attempt to control them by soil treatments applied in the fall before planting. Included among the chemicals were soil fumigants, fungicides, nematocides, an insecticide, and fertilizers. Fall stands were not affected by any of the chemicals, but there was no survival of wheat the following spring. Possibly the chemicals did not control the plant pathogens sufficiently to prevent their attack, or it is possible that such diseases were not closely associated with winter survival of wheat at the northeast farm in 1963.

SEEDLING BLIGHT AND ROOT ROT OF BARLEY AND FLAX

Vernyl S. Pederson

Seedling blight and root rot of barley and flax caused by fungi that inhabit the soil are responsible for certain losses in stand of these two crops and frequently cause reduction in yield. One of the factors which may influence the occurrence of such diseases is the previous cropping program, as it relates to disease buildup from previous susceptible crops. An experiment designed to evaluate the effect of crop sequence on root disease of flax and barley was begun in 1961. Flax and barley were planted in continuous cropping and in rotation with corn, sorghum and soybeans. Six replications were used. Disease notes were taken during the seedling stage.

Seedling blight of flax was most severe where flax was grown in continuous cropping (Table 19). Despite this reduction in stand the best yield was obtained when flax was followed by flax. No difference in severity of seedling blight or root rot could be observed in barley. However, best yields of barley were obtained when grown in continuous crop sequence; poorest yield was obtained where barley followed corn.

Table 19. Effect of Previous Crop on Stand of Flax Seedlings and Yield of Flax and Barley

Previous Crop	Per Cent Reduction in Stand of Flax	Yield - Bu./Acre Flax	Barley
Flax	28	8.2	27.1
Barley	15	6.8	29.2
Soybeans	19	6.4	28.2
Sorghum	14	6.3	28.0
Corn	17	6.7	25.8

The Development of Root and Stalk Rot Resistant Corn Hybrids

C. M. Nagel

Corn is one of the most important and widely grown crops in South Dakota. Stalk and root rot are the most damaging disease problems of this crop in the state, although there are additional new disease problems attacking the crop which may become equally as important in the immediate years ahead.

Surveys in other corn states have shown that up to 50% of the corn plants in commercial fields are partially or completely killed by the stalk rot disease before harvest. Pathologists at the University of Minnesota have shown, as a result of a three year study, that yields were reduced by as much as 17%.

In addition, substantial losses from stalk rot can come late in the season from weakened stalks that lodge and cannot be harvested by mechanical pickers.

In 1963, 172 three-way experimental hybrids were grown in four experiments at the Northeast Research Farm. In the case of each of these hybrids one of the parents consisted of an inbred line which was being evaluated for its disease control benefits, as may be reflected in better yields, reduced lodging, and stalk weakness at harvest time.

The inbred lines which were incorporated in the hybrids referred to above are the results of experiments conducted by the Plant Pathology Department over the past several years to develop disease resistant inbred lines for ultimate use in commercial hybrids.

As a guide for yield comparisons four commercial, high yielding, adapted hybrids were included in these experiments.

The results of the four experiments conducted in 1963 involving 172 three-way experimental hybrids show that one particular experimental hybrid ranked first in three out of the four experiments and third in the fourth experiment. The bushel yields of this particular experimental hybrid in each of the four experiments were as follows: 82.01, 87.11, 82.2, and 87.2, respectively.