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Agronomy Pamphlet #71

December, 1961

ANNUAL PROGRESS REPORT

NORTHEAST RESEARCH FARM

Watertown, South Dakota

INTRODUCTION

The Northeast Research Farm is utilized for testing varieties and selections of several crops grown in the northeast part of the state. Because soil and climatic conditions at the station approximate those of the Northeastern area of South Dakota, it is the only station at which crops adapted to that area can be extensively and adequately tested.

The period covered by this pamphlet is from April 1 through October 31.

Moisture conditions at the Research Farm have been adequate enough to produce above average crop yields. Rainfall during this recorded period was 20 inches which is 2.75 inches above normal. Any rainfall received after this period is not recorded, but the soil remained unfrozen until mid-November allowing this moisture to soak in freely. Subsoil moisture has increased considerably, and under certain rotations is as high as the surface one foot was last spring at soil moisture sampling time.

Temperatures were unseasonably cool during the growing period, except the months of August and October. Generally, conditions were favorable for small grain, but corn and sorghums had not dried down sufficiently at harvest time to store safely. The corn was well filled this year, and yields compare to corn raised in Southeastern areas of South Dakota.

NORTHEAST EXPERIMENTAL FARM COMMITTEE

Member	County	Address
W. H. Schwanke (Chairman)	Codington	Watertown-Route 4
F. Morris (Secretary)	Codington	Watertown
W. Peterson	Day	Lily
Donald Naddy	Marshall	Britton
Elmer Greseth	Roberts	Sisseton
Otto Beyer	Grant	Revillo
Oliver Heitsmeyer	Hamlin	Estelline
Alfred Skovly	Deuel	Astoria
Bob Myers	Clark	Clark

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.

Winter grains have been included in the experimental operation this year where two methods of planting are used. A regular press drill type planting is being compared to a deep furrow drill, which utilizes stubble mulch. In order to initiate this program, an additional 2 acres of land were leased from the Korth Farms.

Approximately 2½ - 3 acres are devoted each year to experimental work on corn. This involves the testing of single cross, three way cross and double cross hybrids. The work is directed toward the development of new adapted hybrids for the area. This work is being carried out by D. B. Shank and D. W. Beatty.

A field day is scheduled for July 12, 1962, and the attention will be on small grains, crop rotations, weed control plus any interesting phase of work which is now in progress.

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FERTILITY AND CULTURAL PRACTICE EXPERIMENTS

Q. S. Kingsley and F. E. Shubeck

Table 1. Comparison of Legumes, Commercial Nitrogen and Fallow for Increasing Yields of Spring Wheat.

Preceding Crop or Treatment	Pounds of Fertilizer Applied per acre to Wheat			Spring Wheat Bu/A	Spring Wheat % Protein
	N	P_2O_5	K_2O		
1 Oats (check plot)	0	40	0	24.4	12.03
2 Oats	30	40	0	29.5	14.96
3 Alfalfa for hay	0	40	0	25.9	15.85
4 Red Clover for hay	0	40	0	24.1	15.36
5 Sweet Clover for seed	0	40	0	27.5	15.98
6 Sweet Clover fallow	0	40	0	31.7	15.82
L.S.D. at 5%				5.6	

For experimental objectives, cropping sequence and other details, see Agronomy Pamphlet #53.

The data in Table 1 are the results of 6 separate rotations, all of which have wheat in the cropping sequence. The table was set up in such a way that attention would be focused on how the yield of the Cash Crop wheat was influenced by preceding treatments and legumes.

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

Where wheat followed alfalfa or red clover for hay, the wheat yields were about the same as that in the check rotation. A substantial yield increase was obtained with 30 lbs. of commercial nitrogen. The sweet clover fallow treatment again resulted in the highest wheat yield in the experiment. This is due to a large part to the additional water saved by this practice (see Table 2).

There were substantial increases in % protein in wheat grain in the legume rotations and in the plots receiving commercial nitrogen fertilizer when compared to that of the check rotation.

At the beginning of the growing season, there was more water for wheat at every depth sampled when the wheat came after the sweet clover fallow treatment. To a depth of 4 feet at the beginning of the season, there was less water for the wheat where alfalfa hay was the preceding crop than where oats was the preceding crop. It is interesting to note how closely the wheat yields are associated with the water reserves stored in the soil at the beginning of the season (see Tables 1 & 2).

By August 9, at the end of the wheat growing season, there was an increase in soil moisture in the lower horizons compared to the March 28 sampling date. The months of August, September and October in 1961 all had above average rainfall. Therefore, 1962 should be a crucial year for evaluating these rotations and treatments regarding moisture storage possibilities.

Table 2. Influence of Crop Sequence on Per Cent of Water in Soil Under Wheat.

1960 Crop	1961 Crop	Depth in ft.	% water 3/28/61	% water 8/9/61
Oats + 30-20-0	Wheat + 30-20-0	0-1	19.1	11.9
"	"	1-2	11.9	13.4
"	"	2-3	8.6	16.5
"	"	3-4	10.0	15.6
"	"	4-5	8.7	19.4
Alfalfa hay + 0-20-0	Wheat + 0-20-0	0-1	18.0	13.4
"	"	1-2	11.6	12.0
"	"	2-3	8.1	19.1
"	"	3-4	9.7	16.8
"	"	4-5	9.9	24.2
Sweet Clover fallow + 0-20-0	Wheat + 0-20-0	0-1	23.0	13.5
"	"	1-2	15.6	10.5
"	"	2-3	10.6	11.0
"	"	3-4	11.6	16.1
"	"	4-5	13.5	17.7

Table 3. Residual Effect of Legumes and Annual Application of Commercial Nitrogen on Yield of Corn

1959 Crop	1960 Crop	Lbs. of Fertilizer Applied per acre each year			Yield of Corn in 1961 Bu/acre
		N	P_2O_5	K_2O	
1 Oats (check plot)	Wheat	0	40	0	58.9
2 Oats	Wheat	30	40	0	57.3
3 Alfalfa for hay	Wheat	0	40	0	55.8
4 Red Clover for hay	Wheat	0	40	0	58.9
5 S. Clover for seed	Wheat	0	40	0	57.9
6 S. Clover fallow	Wheat	0	40	0	60.0
L.S.D. at 5%					1.4

Corn was the second crop after the legumes in these rotations. The yield of corn in the alfalfa rotation appeared to be a little less than in rotations without legumes. This trend was also evident in 1960 (see Agronomy Pamphlet #61) and in 1959 (see Agronomy Pamphlet #53). The sweet clover fallow treatment had a beneficial residual effect on the yield of corn. This was also true in 1960.

Table 4. Residual effect of Legumes and Annual Applications of Commercial Nitrogen on Yields of Flax

1958 Crop	1959 Crop	1960 Crop	Lbs. of Fertilizer Applied per acre each year			Yield of Flax in 1961 Bu/acre
			N	P_2O_5	K_2O	
1. Oats (check plot)	Wheat	Corn	0	40	0	11.6
2. Oats	Wheat	Corn	30	40	0	14.2
3. Alfalfa for hay	Wheat	Corn	0	40	0	12.7
4. Red Clover hay	Wheat	Corn	0	40	0	14.8
5. Sweet Clover for seed	Wheat	Corn	0	40	0	13.5
6. Sweet Clover fallow	Wheat	Corn	0	40	0	13.3
L.S.D. at 5% level						3.2

Flax was the third crop after legumes in these rotations. There was a consistent trend for an increase in flax yields due to the residual effect of the legumes and for the annual application of nitrogen.

Table 5. Effect of Fertilizer Methods of Application and Weed Control on Yield of Flax

Lbs. per acre N	P_2O_5	K_2O	Method of Fert. Application	Weed Control*	Yield of flax in Bu/acre
0	0	0	None Applied	None	15.8
0	0	0	None applied	Weed Control	12.7
40	30	0	Drilled with seed	None	14.8
40	30	0	Drilled with Seed	Weed Control	14.8
40	30	0	Disced in	None	12.9
40	30	0	Disced in	Weed Control	14.1
40	30	0	Plowed under	None	12.5
40	30	0	Plowed under	Weed Control	14.3
20	15	0	Drilled with seed	None	11.4
20	15	0	Drilled with seed	Weed Control	13.4

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

No definite yield advantage was obtained for any of the different methods of fertilizer application or for the weed control treatment under the conditions of this experiment.

Table 6. Residual Effect of Fertilizer, Methods of Application and Weed Control Applied to Flax on the Yield of the Following Crop-Corn

Lbs. per Acre Applied in 1960 N	P_2O_5	K_2O	Method of Fert. Application in 1960	Weed Control on flax in 1960*	1960 Crop	Yield of Corn in 1961
0	0	0	None applied	None	Flax	54.2
0	0	0	None applied	Weed Control	Flax	59.7
40	30	0	Drilled with seed	None	Flax	52.3
40	30	0	Drilled with seed	Weed Control	Flax	61.4
40	30	0	Disced in	None	Flax	54.0
40	30	0	Disced in	Weed Control	Flax	59.2
40	30	0	Plowed under	None	Flax	58.9
40	30	0	Plowed under	Weed Control	Flax	58.5
20	15	0	Drilled with seed	None	Flax	54.1
20	15	0	Drilled with seed	Weed Control	Flax	55.9

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

The residual effect on corn yield in 1961 was greatest in the plots receiving chemical weed control combined with heavier nitrogen application rates and shallow placement of fertilizer on the flax in 1960.

Table 7. Effect of Time of Plowing Legumes on Yields of Flax and Corn.

1958 Crop 40 lb. P_2O_5	1959 Crop 60 lb. P_2O_5/A.	1960 Crop	Time of Plowing	1961 Crop Yield in Bu./A.
1 Flax & Alfalfa	Alfalfa hay	Alfalfa hay	June 1960 - after first hay crop	13.9 flax
2 Flax & Alfalfa	Alfalfa hay	Alfalfa hay	July 1960 - after second hay crop	9.7 flax
3 Flax & Alfalfa	Alfalfa hay	Alfalfa hay	Early the following spring, 1961	14.0 flax
4 Flax & Alfalfa	Alfalfa hay	Alfalfa hay	Spray to kill after 1st hay crop, then plow in spring, 1961	10.4 flax
5 Flax & Alfalfa	Alfalfa hay	Alfalfa hay	July 1960, after 2nd hay crop	57.7 corn
L.S.D. at 5%				1.7 bu. flax

By plowing the alfalfa early (after the first hay crop was removed) the yield of the following flax crop was improved 3-4 bushels per acre compared to flax yields in plots where the alfalfa was plowed in July. This was very similar to results obtained in 1960 (see Agron. Pamphlet #61).

The yield of flax in 1961 was not depressed as much as in 1960 when it followed alfalfa plowed in early spring (pamphlet #61). This may be due to different rainfall distribution and snow cover.

Another objective of the experiment was to determine whether it was best to follow alfalfa with a short season crop like flax or a long season crop like corn. The above average late season rainfall helped to develop the good corn yield presented in Table 7. The month of August had 4.41 inches and September had 3.75 inches - a total of over 3.5 inches above normal for the two months. The growing season extended to September 25. Under these conditions, corn was a very successful crop when it followed alfalfa hay, and would compete favorably with flax.

Table 8. Residual Effect of Legume on Grain Yields

Preceding Crops *	Fertilizer Applied in 1961	Flax, Bu/acre
1. Alfalfa for 5 years	0-40-0	5.2
2. Alfalfa for 4 years	0-40-0	5.3
3. Alfalfa for 3 years	0-40-0	4.9
4. Alfalfa for 2 years	0-40-0	6.6
5. Alfalfa for 1 year	0-40-0	4.3
6. Corn	0-40-0	9.1
7. Corn	40-40-0	10.2
L.S.D. at 5%		1.3

* For alfalfa, the year planted was counted as one yaar. Example: plots with alfalfa for 5 years would have flax and alfalfa the first year and alfalfa hay for the next 4 years.

1961 is the first year of results for this experiment because it required 5 years of alfalfa for the oldest stand. Alfalfa was planted in additional plots each successive year until 1961. Now the residual fertility from 1, 2, 3, 4 and 5 year old stands of alfalfa can be measured by the yield of grain crops. The residual fertility from alfalfa can be compared to that furnished by 40 lb. of commercial nitrogen per year and to the check plots where no alfalfa was used or nitrogen applied.

Yields of flax that followed corn were considerably higher than those where flax came after alfalfa. The older stands of alfalfa did not depress the yield of flax any more than the younger stands in this one year.

Forty pounds of nitrogen appeared to cause an increase in yield over the check plot but it was not significant at the 5% confidence level.

Table 9. Effect of Fertilizer Row Spacing and Cultivation Between Rows on Yield of Bromegrass Hay in Tons/acre.

Pounds Applied/Acre N	P_2O_5	K_2O	7" Row Spacing Not cultivated	21" Row Spacing Cultivated	35" Row Spacing Cultivated
0	40	0	0.3	2.4	2.5
40	40	0	2.2	4.1	3.5
60	40	0	3.0	4.3	3.8
80	40	0	3.3	4.4	3.9

The rates of nitrogen application were increased this year to 40, 60 and 80 lb. of N. per acre.

The highest yields of hay were obtained with the 21-inch row spacing. At this row spacing, the heavier application rates were not as effective for increasing hay yields as they were with the 7-inch row spacing.

Table 10. Effect of Fertilizer, Row Spacing and Cultivation Between Rows on Yield of Bromegrass Seed in Pounds/acre.

Pounds Applied/Acre N	P_2O_5	K_2O	7" Row Spacing Not Cultivated	21" Row Spacing Cultivated	35" Row Spacing Cultivated
0	40	0	29.8 lb.	193.9 lb.	231.4 lb.
40	40	0	135.1 lb.	403.9 lb.	288.4 lb.
60	40	0	189.7 lb.	363.3 lb.	365.4 lb.
80	40	0	202.0 lb.	349.7 lb.	307.7 lb.

Nitrogen was more important for increasing yields of seed when the plants were spaced in 7-inch rows. Cultivation between rows and wider row spacing reduced the requirements of nitrogen fertilizer for maximum seed production.

No increase in hay yield was obtained for application rates over 40 lb. of P_2O_5 per acre with any of the row spacings, Table 11.

Cultivation between the rows was not as effective for increasing alfalfa hay yields as it was for bromegrass hay.

Table 11. Effect of Fertilizer, Row Spacing and Cultivation Between rows on Yield of Alfalfa Hay in Tons/acre.

Pounds Applied/Acre N	P_2O_5	K_2O	7" Row Spacing Not Cultivated	21" Row Spacing Cultivated	35" Row Spacing Cultivated
0	0	0	0.9	1.0	1.1
0	40	0	1.4	1.3	1.3
0	60	0	1.4	1.3	1.3
0	80	0	1.4	1.2	1.3

SMALL GRAIN VARIETY TESTING

Oats Trials

D. D. Harpstead

Oat production continues to make up an important part of the farming operation in northeastern South Dakota. With the large number of varieties that are available to the producer, extensive yield trials become an important part of the considerations which are necessary in the preparation of next year's plans.

The individual using the data in Table 12 must remember that yield is not the only consideration necessary when a variety is evaluated. Maturity, disease reaction, heat tolerance and kernel type are also important. The variety Minton serves as a good example of this. In many cases it is high yielding but very low in test weight, making it undesirable from the feeding standpoint. The excellent performance of Burnett, Mo-0-205 and Andrew in the eastern areas of the state is in line with the long term average of these types. The unseasonably cool temperatures at Northeast Research Farm favored the growth of varieties such as Garry and Rodney which are known to do well under these conditions.

The eastern and southeastern areas of the state where the bulk of the oat acreage exists, many fields lacked adequate fertility to take advantage of the favorable growing conditions. Improved varieties can in no way substitute for proper management of the soil. Indeed, it may be true that varieties most productive under conditions of good management are less well adapted to conditions of poor soil fertility.

Flax Trials

Diseases were not a major problem in flax production except in local areas where the seedlings were killed during the first 2 or 3 weeks of growth by a "root rotting" organism. Watertown was the only site where serious stand reductions that were probably due to this organism occurred.

Data from two new potential varieties are included with Table 12. These have given excellent yields at most locations in 1961 and merit consideration in future production. Standard recommended varieties have continued to yield well under the test conditions. As in previous seasons the varieties, B5128 and Redwood, have given the best yields on the northeastern high lands of South Dakota while Marine has been most satisfactory at lower elevations south and west of the main flax area. When late planting is necessary in any area, the variety Marine should be considered over later maturing varieties such as Redwood, B5128 or Arny. This experiment was planted during the first week of May.

Barley Trials

P. B. Price

Average growing conditions prevailed at the Northeast Research Farm in 1961. Barley diseases were not highly prevalent and consequently had little effect on production. The two new varieties, Trophy and Larker, Table 12, were the top yielders. Final approval on the acceptability of these two as malting types is expected in the spring of 1962. A sufficient quantity of seed should be available to interested growers in spring of 1963.

Wheat Trials

V. A. Dirks, J. J. Bonnemann

Climatic conditions prevailing during 1961 caused some losses as diseases reduced the test weight of most entries. Some of the entries, though high in yield, have been unacceptable to the milling industry. The newer variety, Pembina, is an acceptable wheat and considered well adapted to the northeast area. It can be used in areas where Selkirk is presently grown.

No significant differences in yield were attained in either spring wheat or durum production in 1961. Durum wheat yields were again slightly higher than spring wheat yields. This follows previous trends at this location.

Table 12. Small Grain Variety Testing.

Variety	Maturity	Average Yield Bu/A. 1961	Average Yield Bu/A. 1957-61	Test wt. 1961
OATS				
MO-0-205	M	99.3	65.5	35
Andrew	E	96.9	65.9	38
Minton	ML	96.3		32
Portage	L	95.5		35
Garry	L	94.9	74.7	36
Waubay	M	93.9		37
Burnett	ML	92.5	74.8	38
Nodaway	M	92.4		36
Ransom	E	91.5	69.2	35
C.I. 7473	L	91.0		39
Dodge	ML	91.0		39
Minhafer	E	89.8	75.2	35
Clintland 60	ME	89.4		37
Rodney	L	88.7	78.2	37
Marion	M	88.2		33
Cherokee	E	85.6		35
Tonka	E	85.5		37
Nehawka	E	85.4		36
Putnam 61	E	84.1		35
Goodfield	E	79.7		38
L.S.D.		8.6		
BARLEY				
Betzes	L	40.4	35.4	45.5
Kindred	M	40.3	35.5	45.0
Liberty	M	41.6	38.9	45.5
Parkland	L	38.0	38.0	46.5
Traill	M	41.8	40.6	45.5
Trophy	M	45.6*		44.5
Larker	M	42.8*		47.0
L.S.D.		N.S.	* 1 year	

Variety	Maturity	Average Yield Bu/A. 1961	Average Yield Bu/A. 1957-61	Test wt. 1961
FLAX				
C.I. 1914	ML	21.3		53.5
C.I. 1823	ML	19.2		55.0
Norland	L	18.7	15.7	54.5
B5128	L	18.5	15.4	55.0
Redwood	ML	18.3	15.5	54.5
Arny	L	16.5	15.1	54.5
Redwing	E	16.8	15.1	54.5
Linda	ME	15.8	15.1	52.0
Marine	E	15.7	14.7	54.5
Bolley	E	13.5	14.8	53.0
L.S.D.		2.7		
BREAD WHEAT				
Selkirk	M	25.5	25.2	54.0
Pembina	M	23.7	22.7	55.0
Thatcher	E	22.0	19.5	55.5
Canthatch	M	24.6	22.3	56.5
Rushmore	E	24.3	22.5	57.5
Lee	E	25.2	25.5	56.5
Mida	M	27.0	25.3	58.5
Spinkcota	M	28.1	27.8	60.0
R.H. 1935	E	25.3*		59.0
Minn 404	M	27.8*		58.0
L.S.D. = 4.34		N.S.	* 1 year	
DURUM WHEAT				
Langdon	M	28.9	29.1	59.5
Ramsey	M	25.7	25.1	59.0
Wells	E	32.8	32.6	56.5
Lakota	E	28.4	29.0	56.5
L.D. 408		29.3*		58.0
L.S.D. = 7.9		N.S.	* 1 year	

Maturity: E-early, M-medium, ME-medium early, ML-medium late, L-late

FORAGE LEGUME VARIETY TESTING

M. D. Rumbaugh & R. A. Moore

ALFALFA: Forage evaluation trials have been conducted at Watertown for a number of years. On the basis of these tests, as well as trials at several other locations, the varieties Vernal, Ranger, and Ladak are recommended for hay production. Varietal preference would be in the order of listing with Vernal being somewhat superior to Ranger and Ladak. Two varieties of alfalfa are now recommended for utilization as the legume component in pasture plantings. These are Rambler and Teton. Rambler will out-yield Teton but the latter variety is more winter hardy and more disease resistant. Both are spreading types, Rambler by means of root proliferation and Teton by means of Rhizomes. Each of these varieties has proved to be persistent under intensive grazing in South Dakota.

RED CLOVER: Variety trials of red clover at Watertown have been discontinued. On the basis of results obtained in previous years, Dollard is the red clover variety approved for use in South Dakota.

SWEETCLOVER: Sweetclover yield data obtained in 1961 substantiated previously obtained results. Goldtop and Madrid continued to exhibit superiority with respect to traits of agronomic importance. Both of these varieties are biennial, yellow-flowered, and are recommended for use in South Dakota. Goldtop has a lower coumarin content than Madrid and is also slightly more resistant to the blackstem disease.

THE USE OF TREFOIL IN PASTURE MIXTURES

M. D. Rumbaugh

Birdsfoot trefoil (Lotus Corniculatus) is a perennial legume which has merit for consideration as a constituent of pasture mixtures in those areas to which it is adapted. The taproot of this species has numerous branches that form a dense mat in the upper region of the soil. In vigorous stands the roots will extend to a depth of 5-6 feet.

The stems of trefoil may be either erect or prostrate depending upon the variety. Leaves also vary greatly in size and shape but are borne alternately along two sides of the stem in all varieties. Attractive yellow to orange flowers are located in clusters at the apex of the flower stems. The growth of trefoil is indeterminate and flowers and seedpods in all stages of maturity may occasionally be found on any one plant at the same time.

It is sometimes difficult to obtain stands of trefoil and maximum production is quite often not attained until the third year after seeding. For that reason, many users of trefoil include a short-lived clover in pasture mixtures along with the grass and trefoil seed. If a vigorous grass, such as brome, is used it may be necessary to clip the stand while the trefoil is in the seedling stage in order to reduce competition.

In brief, the principal advantages of trefoil are that it is:

(1) drought resistant,
(2) more tolerant than other legumes to saline soils,
(3) long-lived in competition with grasses, and
(4) the incidence of bloat is reduced.

The major shortcomings of birds foot trefoil are:

(1) slow stand establishment,
(2) lower forage yield than alfalfa, and
(3) greater probability of winter kill than with alfalfa.

The only variety of trefoil currently recommended for use in pasture plantings in South Dakota is Empire. Because the area of adaptation of trefoil has not been exactly determined, it is suggested that only small acreages of this species be planted until the grower familiarizes himself with the characteristics of the crop.

GRASS TESTING

J. G. Ross

Tests of varieties of smooth bromegrass, crested wheatgrass and intermediate wheatgrass sown in 1957 have been harvested for 4 years. The 4 year average yield of hay as well as the individual yields for each of the varieties for each of the years is shown in Table 13.

The yields of the 3 species did not differ greatly, but the crested wheatgrass hay was coarser and poorer quality than bromegrass and intermediate wheatgrass. For hay, either bromegrass or intermediate wheatgrass would be preferred. Crested wheatgrass grew earlier in the spring and would therefore be suited for early spring pasture.

Of the crested wheatgrass varieties, Nordan and Fairway appear to yield well and of the varieties available appear to be the best adapted.

There was very little difference in yield between the intermediate wheatgrass varieties, Ree, Idaho #4, Nebraska 50 and Mandan 759. Greenar has not yielded very well on the average in this or other tests in the state. The yields of the different bromegrass varieties do not vary greatly except for Canadian Commercial which has shown up poorly each year. Lincoln, Wisconsin 55 and Saratoga have yielded very well when the average for the 4 years are examined.

Table 13. Forage Yields, Bromegrass, Intermediate Wheatgrass and Crested Wheatgrass. 1961.

Variety	Average Yield Tons/acre 1961	1958-1961
BROMEGRASS		
Saratoga	1.98	1.50
Southland	2.11	1.48
Lancaster	1.85	1.47
Wisc. 55	1.90	1.52
Canada Common	1.66	1.09
Achenbach	1.80	1.38
Lincoln	2.01	1.41
Manchar	1.89	1.39
Wisc. 63	2.01	1.41
Homesteader	1.70	1.38
LSD	0.31 T/A	

Table 13 cont.

Variety	Average Yield Tons/acre 1961	1958-1961
INTERMEDIATE WHEATGRASS		
Idaho #4	1.88	1.47
Ree	1.80	1.42
Amur	1.94	1.35
Greenar	1.63	1.27
A 12496	1.77	1.32
Neb. 50	1.90	1.52
Idaho #3	1.37	1.28
Mandan 759	2.03	1.53
L.S.D.	NS	
CRESTED WHEATGRASS		
Commercial	2.09	1.21
Neb. 3576	2.41	1.55
Nordan	2.35	1.44
Summit	2.18	1.42
Mandan 2359	1.82	1.18
Comm. Fairway	2.55	1.45
Utah 42-1	2.33	1.28
Neb. 10	2.13	1.25
L.S.D.	NS	

SORGHUM AND SOYBEAN VARIETY TESTING

C. J. Franzke

Table 14. Height, Maturity and Yield of Commercial Sorghum Varieties.

Variety	Height	Maturity	Bu./A.
SD 102	37	1	99.6
Reliance	46	1	109.2
Norghum	43	1	114.5
SD 441	47	1	102.4
SD 451	41	1	111.3
RS 610	39	2	73.4
RS 608	36	3	39.0
RS 501	51	2	84.7
Lindsey 722	46	2	53.7
Stickley R 103	34	3	44.9
" " 99	50	2	90.0
" " 106	39	4	47.8
Pfister 305 S	42	2	62.6
" 430 S	35	4	61.7
De Kalb 50A	43	3	65.3
" C44A	32	4	37.1
" C45	32	5	39.8
" X49	39	5	31.1
" E56A	41	5	30.4
Pioneer 9409	37	5	45.4
Northrup K 125	43	3	98.4
" 3026	39	3	63.0
" 210	47	4	78.1
" 140	40	4	62.9
" 135	44	2	62.9
" 120	42	2	83.0
Frontier 400C	41	4	53.3
" 400B	38	3	53.0

1. Very ripe
2. Ripe
3. Hard Dough
4. Late Dough
5. Soft Dough
6. Early or Dough
7. Fertilized & seed
8. Heading
9. Not headed

The sorghum produced during the 1961 crop season was much better than in previous years. The crop had the leafiness and filled heads necessary for good silage. Many of the commercial varieties tested did not mature to the combine stage, thus indicating a need for earlier varieties in this area of the state. It may be well to note, considering the average of many years, few varieties reach the combine stage in northeastern South Dakota. The main benefit from sorghum lies in the production of a silage crop.

Table 15. Height, Maturity and Yield of Soybean Varieties.

Variety	Group	Heighth-Inches	Maturity-Days	Bu/acre
Grant	0	26	0	18.8
Merit	0	27	+1	17.2
Norchief	0	27	0	15.7
Flambeau	0	26	-2	15.1
Grant Matured September 20.				
Blackhawk	1	30	+2	17.9
Chippewa	1	27	0	15.9
Chippewa matured September 23.				

The Grant soybean, table 15, 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.

CORN PERFORMANCE TESTING

J. J. Bonnemann

Corn performance testing of commercial and selected Experiment Station lines was assumed by Statewide Services in 1961. Entries were chosen by producers who desired to enter hybrids for testing. As this was the first year this program was operated by Statewide Services on a fee basis, comparisons of past performances are not included.

The state is divided into thirteen crop adaptation areas on the basis of soil type, elevation, temperature, rainfall and other related conditions. The Northeast Farm is located in Area D_2, the site of the test for that area.

Fourteen entries were included in the test. Yields ranged from 69 down to 54 bushels per acre; the average of all entries was 60.7 bushels per acre. Lodging was very slight in most cases.

The trial was planted on May 23 and harvested October 5, 1961. Killing frost on September 25 occurred near the normal fall-frost date. Temperatures warmed in early October and in combination with normal to above normal precipitation of late September and early October caused poor drying conditions until late October.

Table 16. 1961 Corn Performance Test, Area D_2, Watertown.

Variety	Acre Yield Bu/A.	Performance Rating	Moisture at Harvest %	Lodging %
S.D. Expt. 26	69.0	1	42.0	1
Pioneer 384	65.9	4	41.5	0
Agsco 100	64.3	6	41.9	1
Pioneer 391	63.8	2	36.0	0
S.D. 210	63.4	3	36.8	1
S.D. 220	62.5	5	37.8	0
S.D. 250	61.4	8	42.3	2
Agsco 95	61.1	7	40.8	0
Pioneer 388	58.6	10	39.5	0
S.D. 240	58.1	11	41.3	1
Agsco 90	58.0	9	37.6	2
Pioneer 383	56.6	12	44.5	4
Pioneer 368	54.2	13	47.4	2
Pioneer 377A	54.0	14	45.6	1
Average	60.7		41.1	

Yield differences of less than 7.6 bushels per acre are not significant.

CROP DISEASE CONTROL

Potatoes

K. D. Fisher
Plant Pathology Department

Yield, quality and disease resistance of 19 advanced potato lines were evaluated at the Northeastern Research Farm in 1961. Scab resistance was high in several lines, but yield and quality of tubers were not superior to those of the check varieties, Norland and Red Lasoda. These results were similar to those obtained in 1960.

In a second experiment 14 varieties and two selections were evaluated for chipping purposes under the dryland conditions of this station. Potatoes used for production of potato chips should have high yields and must be high in dry matter (total solids). None of the varieties or selections outyielded the check varieties, Norland and Red Lasoda. Total solids of seven lines were 20.7% or greater and were rated superior, table 17. Pontiac and Red Lasoda, the two most widely grown varieties in South Dakota, had low total solids and were not acceptable for chipping purposes.

Table 17. Rating of 14 potato varieties and 2 selections for chipping characteristics (based on total solids).

Superior	Acceptable	Inferior
Red Warba	Norland	Pontiac
Early Ohio	Teton	Red Lasoda
Fundy	Russet Rural	
Bounty	Redskin	
Merrimack	Haig	
White Cloud	Saranac	
La 91-78	La 42-45	

WEED CONTROL

W. H. Wallace

These experiments were designed to determine the possibility of using barban in combination with 2,4-D or MCPA and dalapon, (both as one application and as two separate applications) and the use of 2,4-D or MCPA and dalapon with avadex. In addition, these plots were underseeded to alfalfa to determine the effect on the legume. The results of the experiments appear in the tables that follow.

Table 18. Combinations of Barban with 2,4-D, MCPA or Dalapon on Flax Underseeded with Alfalfa.

Treatments		Flax Yield	Alfalfa Stand	Per Cent Wild oats	Per Cent Foxtail
Chemicals	Lb/A.	Bu/A.	(% of ck)	Control	Control
Untreated	---	9.0	100	0	0
Barban*	1/3	7.6	97	77	8
Barban-2,4-D*	1/3-1/4	8.5	26	89	9
Barban-MCPA*	1/3-1/4	8.7	32	60	3
Barban-2,4-D-dalapon*	1/3-1/4-1	8.5	36	76	95
Barban-MCPA-dalapon*	1/3-1/4-1	6.8	26	46	91
Barban-dalapon*	1/3-1	8.2	95	24	94
Barban-2,4-D**	1/3-1/4	6.6	84	77	3
Barban-MCPA**	1/3-1/4	8.1	80	62	13
Barban-2,4-D-dalapon**	1/3-1/4-1	6.3	97	82	85
Barban-MCPA-dalapon**	1/3-1/4-1	6.9	80	71	95
Barban-dalapon**	1/3-1	7.8	94	81	94
2,4-D amine**	1/4	7.9	92	9	21
MCPA amine**	1/4	9.2	81	-29	19
Dalapon**	1	7.2	96	17	95
2,4-D-dalapon**	1/4-1	7.4	91	0	96
MCPA-dalapon**	1/4-1	7.1	74	6	97

* 2,4-D, MCPA and dalapon applied same day as barban-wild oats 1 1/4 - leaf stage

** 2,4-D, MCPA and dalapon applied later - flax 3 inches tall.

Table 19. Amiben and Combinations of Avadex with 2,4-D, MCPA and dalapon applied in flax underseeded with alfalfa.

Treatments		Flax Yield	Alfalfa Stand	Per Cent Wild Oats	Per Cent Foxtail
Chemicals	Lb/A	Bu/A.	(% of ck)	Control	Control
Untreated	---	7.1	100	0	0
Avadex	1 1/4	9.8	93	71	30
2,4-D amine	1/4	7.7	80	-29	0
MCPA amine	1/4	8.5	18	3	0
Dalapon	1	6.2	73	- 9	95
Avadex-2,4-D	1 1/4-1/4	9.0	87	83	63
Avadex-MCPA	1 1/4-1/4	10.3	60	75	60
Avadex-dalapon	1 1/4-1	7.3	97	84	98
Avadex-2,4-D-dalapon	1 1/4-1/4-1	5.5	93	76	98
Avadex-MCPA-dalapon	1 1/4-1/4-1	7.2	47	21	99
Amiben	3	10.9	17	8	0

* Full stand but 25 or 50 per cent taller than that in untreated plot.

Table 20. Amiben and combinations of Avadex with 2,4-D or MCPA applied to spring wheat, underseeded with alfalfa.

Treatments		Wheat Experiment		
Chemicals	Lb/A.	Crop Yield Bu/A.	Per Cent Wild Oats Control	Alfalfa stand (% of ck)
Untreated	---	26.9	0	100
Avadex	1 1/4	23.9	-100	+25*
2,4-D amine	1/4	25.8	0	85
MCPA amine	1/4	27.3	-187	15
Avadex-2,4-D	1 1/4-1/4	21.8	-100	+50*
Avadex-MCPA	1 1/4-1/4	22.6	0	+25*
Amiben	2	28.1	- 25	62
Amiben	3	25.2	- 63	48

* Full stand but 25 or 50 per cent taller than that in untreated plot.

Table 21.
Pre-emergence applications of chemicals to corn for purposes of checking residual effect on small grain the following year, estimate percentage of weed control and crop damage.

Treatment		Weed control	Crop
Chemical	Lb/A.	(% kill)	Damage
Untreated *	---	0.00	None
Atrazine	2	83	None
Avadex	2	75	Injury **
Propazine	2	64	None
G-34698	2	56	None
EPTC	4	6	None

* weed kill based on stand of weeds in row

** This injury appeared as a dwarfing effect and the leaves on some plants did not unfold normally.

GERMINATION STUDY

G. Semeniuk and Q. S. Kingsley

Many interesting aspects of plants and disease are brought to light in a germination study. It also helps in the selection of chemicals for seed treatment to aid in control of some diseases until the plant has passed the critical period.

This germination study was conducted using alfalfa, sweet clover, soybeans, wheat, grain sorghum and corn. There were 4 dates of planting and 4 different seed treatments, no treatment, Arasan, Dexon 70% W.P. and Dexon-PCNB 35-35 W.P. These methods were used in the trial plantings to help find areas of weakness in the procedure. The experiment is to be conducted again next year, but will be enlarged to encompass more observations and locations.