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SOUTHEAST RESEARCH FARM

MENNO, SOUTH DAKOTA

The picture illustrates the use of plastic between rows of corn to reduce evaporation. This corn was planted with a lister corn planter May 21, and cultivated once before the plastic was applied. Further information on this experiment may be found under the heading "Evaporation Control Study" in the Cultural Practice section.

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Origin and History of Mobile Unit Farms

During the past several years there has been an increasing need for research work on crops and soils in the northeast and southeast areas of the state. After several meetings of the people interested in research for areas not already represented by experiment stations, plans were made to ask the State Legislature for additional appropriations for this work. Adequate funds were granted and two new Research Farms or "Mobile Units" were started in 1956. The term "Mobile Unit" was used for two reasons: (a) some of the equipment could be moved from one unit to another to prevent purchasing a full line of machinery for each location, (b) after 5 to 8 years (depending on the nature of the experiments selected) the experimental units would be moved to a new location within the area with an entirely new set of problems such as slope, drainage, fertility, soil type etc.

In each of the two areas, meetings of interested farmers and county agents were held to set up areas committees to assist the Agricultural Experiment Station in selection of the research farms and to plan the experiments. The Area Committees are composed of the county agents and one farmer from each county in the area.

After looking at several possible locations, a joint committee of farmers and college representatives selected the present farms. The amounts of land devoted to each form of agronomic research, and also the specific experiments on fertility and soil management, were selected by the respective area committees.

Each farm or unit represents a particular soil and problem area that is characteristic to that geographical region. The experimental work is performed precisely where the problems occur. Therefore, the results of these investigations are directly applicable to the regions studied, and in addition it is considerably easier for the people in these areas to observe experiments when the research is conducted near their homes.

Annual field days will be held to observe first hand the results and progress of all experiments in the field. In addition, it is planned to have a winter meeting in each area to permit the presentation and discussion of results for all people who are interested.

ANNUAL PROGRESS REPORT FOR SOUTHEASTERN RESEARCH FARM 1958

NOTE: This is a progress report and therefore the results presented are not necessarily complete nor conclusive. Any interpretation given is strictly tentative because additional data resulting from continuation of these experiments may result in conclusions different than those of any one year.

INTRODUCTION

In the spring of 1956, money was appropriated by the State Legislature to begin new research on crops, soils and crop diseases in the southeastern part of the state. A site involving 20 acres was originally selected. It is located on the Theo. Handel farm, 4 miles east of Menno on Highway 18, and 1/4 mile north.

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

The third annual field day was held on June 28, 1958 with approximately 250 people attending. The program included tours and lectures on spring grains, winter grains, soil moisture studies, preemergent weed sprays, plant disease, legumes and grasses, and gibberellin study. Also included in the tours, were opportunities for inspection into other areas of research, such as corn, sorghums, and soybeans. The 1959 Field Day will be held in the fall, the interest will be centered on corn, sorghums, soybeans and legumes. It is planned to have a few experiments of short duration, to bring before the people new ideas that may be beneficial.

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.

1958 CROP SEASON

Table Total Rainfall and Average Temperature by Months, with their Departure from Long-time Averages at S. E. Research Station.*

	April	May	June	July	Aug.	Sept.	Oct.	Total
Total Rainfall in Inches	3.79	1.26	1.48	2.55	1.47	1.28	0.02	11.85
Departure from Long-time Average	-0.08	-1.98	-2.80	+0.17	-1.59	-0.70	-1.24	-8.39
Average Monthly Temperature in Degrees F.	50.4	65.8	67.9	75.3	80.5	71.3	57.7	
Departure from Long-time Average	+1.2	+5.8	-2.2	-1.4	+6.5	+6.5	5.1	
Frost free days	April 29 to Oct. 29				184 days			

The soil moisture reserves were high at the beginning of the 1958 cropping season. During the previous year, there was an increase of 2.77 inches of rainfall from the long time average. The months of April and August were quite dry, and this period came at a critical time for both small grain and corn.

The temperatures were above normal for the months of April, May, August and September, but the months of June and July were below normal. The growth of corn was slower, but the temperature was ideal for small grains.

The rainfall for the months of April through October was 8.39 inches less than normal, but the subsoil moisture was high enough to support plant growth, and the small grain and corn crops came through the season in fine shape. At the end of the 1958 growing season the subsoil moisture was quite low.

*The above rainfall and temperature data were taken and recorded at The S. E. 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 city of Menno Weather Station, Courtesy U. S. Weather Bureau, Huron, South Dak

FERTILITY AND CULTURAL PRACTICE EXPERIMENTS

By F. E. Shubeck and Q. S. Kingsley

Fertility Experiment #1

Objectives of Experiment

1. To measure the effect on yield of several different fertilizer nitrogen carriers.
2. To determine the effect of different nitrogen carriers on quality of grain (measured by per cent of protein).

Table 1. Effect of Several Different Nitrogen Fertilizer Carriers on Corn Yields and Per Cent Protein in Grain.

Source of Nitrogen	Pounds per acre of N	P_2O_5	K_2O	Per cent protein in grain*	Yields in bu/acre
None	0	0	0	8.07	49.3
Ammonium nitrate	40	20	0	10.60	57.4
Urea	40	20	0	9.88	61.6
Anhydrous Ammonia	40	20	0	11.54	69.6
Solution 15-15-0	40	40	0	10.53	55.7
Solution 15-10-0	40	26.6	0	10.56	59.2
Fertilaid	300 lb. fertilaid per acre			7.81	43.9
Super Gro	300 lb. Super Gro per acre			8.29	48.9
L.S.D. at 5% confidence level.				---	13.6

*Analyzed by Experiment Station Biochemistry Department.

Generally speaking, some favorable corn yield increases due to fertilizer were obtained with this experiment in 1958. Most of the increases were about 7 to 10 bushels per acre.

Anhydrous ammonia appeared to be unusually effective this year, for increasing corn yields. This is in direct contrast with the results of the preceding year on oats. Great care was taken in the application of ammonia this year to have all conditions just right to prevent the loss of the gas from the soil. The results on corn were very satisfactory.

For 1958 the corn yields from plots receiving organice (Super Gro and Fertilaid) were somewhat less than the yields from plots receiving the other nitrogen fertilizers.

The per cent protein in corn grain was increased about 2% to 2½% for most of the treatments with the exceptions of anhydrous ammonia

and the two "organics". The per cent protein was a little higher than the average with the former treatment and a little lower for the latter.

Experiment #2

Objectives of Experiment

1. Compare the efficiency of biennial sweet clover, annual sweet clover, red clover and alfalfa for increasing grain yields when used as a catch crop.
2. Compare commercial nitrogen fertilizer to legume nitrogen as a means of increasing grain yields and per cent protein in grain.
3. From a standpoint of maximum yield is it best to use a catch crop legume, or to let the legume stand over for one year?
4. Will legumes cause a decrease in yield of the following corn crop by reducing the reserves of subsoil moisture?

Table 2. Influence of Commercial Fertilizer and of Legumes in Rotation on Yield of Corn and per cent protein in Grain

Preceding Legume	Pounds per acre N	P_2O_5	K_2O	Corn Yields in bu/ac	%Protein in corn grain*
1 None	0	20	0	44.9	10.88
2 None	40	20	0	44.7	12.04
3 Biennial sweet clover catch crop	0	20	0	47.0	11.32
4 Annual sweet clover catch crop	0	20	0	46.3	11.06
5 Red clover catch crop	0	20	0	41.7	11.31
6 Alfalfa catch crop	0	20	0	46.3	11.76
7 Red clover for hay	0	20	0	37.0	13.00
8 Alfalfa for hay	0	20	0	38.0	12.72
L.S.D. at 5% confidence level				14.3	---

*Analysed by Experiment Station Biochemistry Department.

The per cent protein in corn grain was increased more in rotations using commercial nitrogen and legumes for hay than in catch crop legume rotations.

In this experiment, none of the treatments significantly increased the corn yields over treatment number one which serves as a check plot because no nitrogen or legumes were included in this rotation. The catch crop legumes were planted with the oats in 1957 and plowed under late that fall. The legumes for hay were planted with oats in 1956, allowed to stand over winter and cut for hay in 1957. These plots were plowed under in the fall in 1957 and planted to corn in 1958.

The efficiency of these short term legume rotations for increasing the yield of the following corn crop depends on moisture conditions. The rainfall in 1958 was several inches short of the

long term average.

On plots where alfalfa and red clover were held over for a year for hay, the yield of the next crop - corn - appeared to be lower than that of the check plot, but not significantly so. Note the high L.S.D. It would be logical to assume that the hay crop was responsible for this by virtue of its tendency to reduce subsoil moisture supplies. The soil moisture data (table 3) are somewhat in accordance with this possibility. Where alfalfa for hay preceded the corn, the subsoil moisture supplies under the corn were 3 to 4 per cent less than under corn that was preceded by alfalfa used as a catch crop.

The amount of subsoil moisture under corn in a straight corn oats rotation (without a legume) was more variable but in general was greater in amount than in the rotation where alfalfa for hay preceded the corn.

Table 3. Influence of Preceding Crop on Per Cent of Water in Soil Under Corn

1956 Crop*	1957 Crop*	1958 Crop*	Depth in feet	May 15	June 15	July 15	Aug. 15	Sept. 15
Corn	oats & alfalfa	corn	0-1	17.1	20.3	16.5	11.4	16.9
Corn	oats & alfalfa	corn	1-2	15.0	17.9	15.8	10.1	9.8
Corn	oats & alfalfa	corn	2-3	17.6	19.1	17.2	12.3	13.2
Corn	oats & alfalfa	corn	3-4	18.1	18.7	18.5	15.9	17.4
Corn	oats & alfalfa	corn	4-5	19.0	19.7	19.7	19.5	20.2
oats & alfalfa	alfalfa hay	corn	0-1	18.0	20.1	16.1	11.2	16.0
oats & alfalfa	alfalfa hay	corn	1-2	15.7	18.0	15.5	10.6	11.4
oats & alfalfa	alfalfa hay	corn	2-3	15.8	16.0	15.7	12.7	13.0
oats & alfalfa	alfalfa hay	corn	3-4	14.3	16.1	15.8	14.8	14.5
oats & alfalfa	alfalfa hay	corn	4-5	16.0	15.1	17.8	16.7	17.5
corn	oats	corn	0-1	17.0	19.3	18.6	12.1	18.6
corn	oats	corn	1-2	15.4	15.6	15.8	10.5	10.6
corn	oats	corn	2-3	16.0	19.1	15.4	14.0	13.3
corn	oats	corn	3-4	18.3	21.6	18.0	16.3	17.7
corn	oats	corn	4-5	18.6	19.1	18.8	19.7	22.8

*Fertilized with 0-20-0

Fertility Experiment #3

Objectives of Experiment

1. Investigate the possibility of wide row corn spacing with legumes planted between the rows. This is an attempt to build up organic matter and yet grow continuous corn.

2. Compare the effect of commercial fertilizer, legumes planted between corn rows, and manure for raising continuous corn.

Table 4. Comparative Influence of Manure, Legumes and Commercial Fertilizer on Yields of Corn.

Treatment	Yield in bushels per acre
10 tons of manure per acre	47.4
60-40-0 from commercial fertilizer	52.7
Skip row planting with legumes between rows plue 0-40-0	31.5
Check (no legumes, manure or commercial fertilizer)	43.0
L.S.D. at 5% confidence level.	11.8

In this experiment the treatment using commercial fertilizer gave the greatest yield increase. The skip row method, with legume interplantings, resulted in lower corn yields. The 1958 results are very similar to those of 1957.

Fertility Experiment #4

Objectives of Experiment

1. Evaluate the method of planting corn in tractor wheel tracks in fresh plowing with no additional seedbed preparation.
2. Investigate the possibility of hard ground listing with speedy inexpensive cultivations - twice with the drag, once with the rotary hoe and once with the cultivator.
3. With less tillage and with the expected slower rate of organic matter oxidation and nitrogen release, will the application of commercial nitrogen become more necessary?

Table 5. Effect of Tillage and Planting Method on Yield of Corn

Pounds per acre N	P_2O_5	K_2O	Method of tillage and planting	Yield in bu/acre
0	40	0	Plow disc drag plant (drilled)	52.3
60	40	0	Plow disc drag plant (drilled)	62.7
0	40	0	Wheel track planting (drilled)	53.9
60	40	0	Wheel track planting (drilled)	54.0
0	40	0	Hard ground listing (drilled)	63.3
60	40	0	Hard ground listing (drilled)	65.5

The yields from the hard ground listed plots were comparatively high again this year. The wheel track planting method resulted in yields somewhat lower than those obtained from the other two methods. The corn was planted in rows spaced 42 inches apart in all three planting methods.

We failed to get the expected yield increases from nitrogen fertilizer on the hard ground listed plots and wheel track planting plots. In the former, the fertilizer was broadcasted after listing and dragged in; in the latter method, fertilizer was plowed under.

The conventional plow disc drag plant method responded more definitely to the nitrogen fertilizer.

The amount of weed growth associated with each of these planting methods is rather interesting. The weeds were taken from only one of the four replicates. Samples were oven dried, the per cent moisture determined and pounds of weeds per acre at 15% water were calculated. No table with this information will be submitted because only one replicate was sampled. However, in the one replicate, there were less weeds in the hard ground listed and wheel track planted plows than with the standard surface planting.

Fertility Experiment #5

Objectives of Experiment

1. In a year of low subsoil moisture reserves, which of the following crops will give the greatest return: corn, oats, soybeans, forage sorghum, grain sorghum or sudan grass?
2. What is the comparative forage yields of these different crops?

Table 6. Comparason of Yield & Value of Various Grain & Forage Crops

Crop****	Yield of grain	Price per unit*** Dec.'58	Value of grain	Yield of stover tons/ acre	Value per ton of stover Dec '58	Value of stover	Total Value
Corn	63.8 bu.	.90/bu	$56.97	0.97#	5.00*	4.85	61.82
Oats	61.0 bu.	.53lbu	32.33	0.81##	1.73**	1.40	33.73
Soybeans	15.1 bu.	1.93/bu	29.14	----	—	--	29.14
Forage sorghum	945 lb.	1.40/100	13.23	2.40#	5.00*	12.00	25.23
Grain sorghum	1310 lbs.	1.40/100	18.34	1.86#	5.00	9.30	27.64
Sudan grass	1628 lbs.	1.40/100	15.28	0.75#	5.00*	3.75	19.03

*Based on the price of unbaled prairie hay which is similar in feeding value.

** Based on the price of $8.00 per ton for baled straw less estimated cost of baling.

*** At Farmers Coop. Elevator, Brookings, S Dak. Dec. 22, 1958.

**** All crops were fertlized with 40 lbs. of N and 20 lbs. P_2O_5, per acre.

Oven dried and calculated at 15% moisture.

Reported on air dried basis.

The prices listed are those for Dec. 22, 1958 at Farmers Coop. Elevator at Brookings. They will be different at other markets in the state and may vary considerably from time to time. Some of the prices were rather arbitrary - for example the forage sorghum seed and sudan grass seed. The figures in the table were intended only as a guide to

assist individual farmers in computing the costs and returns associated with their own specific farming enterprise.

The numbers given in the "total value" columns do not take into consideration the production costs of these various crops. The cost of the fertilizer (40-20-0) alone was approximately $7.60 per acre.

In calculating the yield of stovers, each crop was oven dried at 106°C and then brought to a standard figure of 15% moisture except oats straw. The oats straw was weighed in the field on an air dry basis. Actual field weights of some of the stovers was much greater than the pounds listed in the table, because some of the forage was over 50% water when the plots were harvested.

With the yields obtained and the prices used in this summary, corn was far ahead of the other crops in total value of grain plus forage.

CULTURAL PRACTICE DEMONSTRATIONS

At the March 7, 1958 planning meeting at Menno, the members of the Farm Board expressed interest in certain new materials and practices relating to improvement of crop yields and increased efficiency of operation.

Some of these materials were so new that practically no research work, on a field scale, had been reported which could serve as a guide or a basis for setting up a new experiment. Such was the case for the new series of plant hormones or growth regulating substances.

It was decided to try some of these new ideas on a very limited scale and use them for demonstrational purposes if they were instrumental in revealing any useful information. The demonstrations selected for this exploratory work were (1) effect of Gibberellic acid (a growth stimulant) on both field crops and vegetable crops. (2) pre-emergence weed sprays on corn and soybeans (3) drilling sorghums in closely spaced rows.

(1) Demonstration on Gibberellic acid

The gibberellic acid was given to us by a commercial company that specializes in the synthetic manufacture of these growth regulating substances. It should be kept in mind that gibberellic acid is strictly an experimental substance and research results are not yet adequate enough to provide a basis for recommended use on field crops. Our experience and observations will be given for each of the crops used in the test.

Lettuce - variety Hanson Head - plants bolted in rapid seed-stalk development.

Celery - variety Grant Pascal - difficulty in getting plants to grow and adverse weather prevented a reliable test.

Tomatoes - variety Bison - number of fruit was possibly increased but smaller in size.

Peas - Variety Dwarf Sugar - taller vines and earlier maturity.
Field corn - variety Pioneer 349 - rapid growth stimulation. Brace roots looked like damage from 2,4-D. Color of vegetation was lighter green in color than untreated plants.
Soybeans - variety Hawkeye - height of lower pods about three inches higher off the ground.
String beans - variety Pencil Pod Black Wax Dwarf - elongated internodes and earlier maturing.
Potatoes - variety Early Ohio - more rapid early growth and lighter green vegetation.
Cabbage - variety Early Wakefield - more rapid early growth.
Wheat - variety Selkirk - more rapid early growth and slightly earlier maturing.
Oats - Mo--0-205 - more rapid early growth and slightly earlier maturing.

In summarizing the work with gibberellic acid, it was obvious that an early stimulation in growth occurred with most plants. With corn and some of the other field crops, the growth of the untreated plants often caught up to the treated plants at about the tasseling stage. The growth stimulating properties of gibberellic acid are established as fact, but the effects on grain yields are yet to be determined.

(2) Preemergent Weed Sprays on Corn and Soybeans

The observation studyof various preemergent weed control chemicals at the S. E. Research Farm did not produce the desired effects. The surface moisture condition at planting time was ideal, and crop and weed growth was rapid. There was little if any control of the weeds. Further study may be needed to ascertain the proper amounts of chemical needed for weed control on this type of soil.

The chemicals used were Simazin, EPTC and CDAA. These were applied at varying rates per acre on corn and soybeans.

(3) Row Spaced Sorghum Versus Sorghum Planted with a Grain Drill

There were some striking results from this experiment, and it is planned to be continued next year on a larger scale.

The sorghum (Reliance) planted with a grain drill, outyielded the row spaced sorghum for both grain and forage yields. The plant population, using grain drill versus 42 inch row, was 3 to 1. The seeding rate using the grain drill was 10#, and for the corn planter, using sorghum plates, was 4#.

EVAPORATION CONTROL STUDIES

By Jack Runkles

An observational experiment was established in 1958 on the reduction of evaporation with plastic sheets. The corn was planted with a lister corn planter and cultivated once before applying the plastic. Plastic sheets were used to cover the ridge between the corn. This reduced the evaporation of water from between the corn rows.

At the early stages of growth, the corn on the covered soil appeared to grow more rapidly and resulted in a heavier stalk as well as taller corn. At maturity, the corn ears appeared to fill better on the plastic covered plots.

Evaporation reduction studies appear to offer possibilities for further experimentation.

INSECT CONTROL
Prepared by the Department
of Entomology & Zoology

Grasshoppers were a problem in many areas of the south-east and may continue to be a problem in 1959. The best time to apply chemical controls is while the grasshoppers are still young as they become harder to kill as they reach the adult stage. This season dieldrin was the insecticide of choice, and farmers received excellent control applying this material at the rate of one ounce of actual material per acre. Aldrin was second choice, applied at the rate of four ounces of actual material per acre. Chlordane, 1/2 to 1 pound per acre; heptachlor, 2 to 4 ounces per acre and toxaphene, one to one and one-half pounds per acre were also used with good results. The lower dosages are used for the young stages of 'hoppers and the higher dosages for the adults.

European corn borer numbers were lower in 1958 than in 1957. As a result very little spraying for this pest was noted. However, the corn borer is a potentially serious pest to all areas where corn is grown. DDT, either at the rate of one and one-half pounds per acre of 15 to 20 pounds per acre of the 5% granular form is the most often used insecticide. Any corn to be used for silage should be treated with 0.20 to 0.25 pounds of endrin, either as a spray or granular. The use of endrin will avoid any residues in the silage as when DDT is used which might contaminate milk or beef which is nearing slaughter.

Control of harmful insects in legumes is important and especially so in the production of alfalfa seed. To produce good yields of alfalfa seed, it is essential to control such pests as lygus bugs, plant bugs, blister beetles, grasshoppers, leafhoppers, field cricket, and flea beetles. A mixture of one pound of DDT combined with either four ounces of aldrin, or 1½ pounds of toxaphene or a pound of chlordane per acre will properly control these pests. The proper time to apply the spray is during the bud stage before bloom. If the spray is applied

during the blooming stage, many beneficial bees are likely to be poisoned. If spraying is necessary during the bloom stage, only toxaphene at the rate of 1½ pounds per acre should be used and this material applied in the evening or early morning (between 7 P.M. and 7 A.M.) when bees are not working.

Sweet clover weevils constitute a threat to newly-seeded stands of sweet clover. It is good insurance to apply an insecticide where sweet clover has been sown for a stand. Although sprays may be used, granular forms of insecticides are more convenient to use in most cases. The granular form of insecticide may be mixed right with the seed and sown together. The seed and insecticide need to be thoroughly mixed. Deep placements of the mixture should be avoided as the chemical works best near the soil surface. Spraying should be done early in the spring as soon as damage has been noted to new seedling. Material to be used, either as spray or granular, along with the rates to use, are as follows: DDT, 2 pounds per acre; aldrin, one half pound per acre; dieldrin, one half pound per acre; heptachlor, one half pound per acre or toxaphene, 2 pounds per acre.

Preliminary experimentation shows that the use of granular materials may be beneficial in controlling insects on alfalfa acreage reserves.

Wireworms and cutworms can be damaging to small grains in the Southeast area. For wireworms it is good insurance to treat the seed before planting. Aldrin, dieldrin, heptachlor or lindane at the rate of one ounce per bushel can be used for seed treatment. With use of lindane, treated seed should be planted following treatment, as storage of lindane treated seed for a period of time will lower germination. Cutworms occasionally have to be controlled where populations start getting heavy. Using the same materials as outlined for armyworms will give satisfactory control of these pests.

CORN BREEDING AND YIELD TESTING

By D. B. Shank and D. E. Kratochvil

The test in Hutchinson County was on the Southeast Research Farm. The plot area was on land which grew small grain in 1957. Prior to fall plowing of the area, 60 pounds of available nitrogen, and 40 pounds of available phosphorus per acre were applied broadcast. Alkali spots in the area produced moisture stress on the plants, causing severe yield reductions as compared to non-alkali areas. The month of June and July were considerably below normal for average temperature, however, the minus 6.9 inches of rainfall from May 1 through September 30 probably was the most important factor in yields being fairly low. The test was planted on May 13 and harvested on October 27.

In table 7 each hybrid has been ranked on the basis of a performance rating which evaluates the entries on their relative yields and maturity. This rating was obtained by first converting yields for each hybrid to a percentage of the average yield of all the entries. Similar calculations were made for moisture at harvest time after first subtracting each moisture percentage from 100, so as to rank the hybrids on their ability to produce sound, rather than soft, corn. The performance rating then equaled:

$$\frac{6(\text{yield percentage}) - 4(\text{moisture percentage})}{10}$$

Table 7 Areas 7 (Hutchinson County) 1958 Corn Performance test

Hybrid or Variety	Acre Yield bu.	Moisture per cent	1958 Yield Bu.*	1958 Moisture per cent	1958 Performance Rating
		5 year average			
Pioneer 352	50	19	58	12	1
DeKalb 410	50	19	47	12	9
S.D. 400	47	14	42	11	16
Average of 3 entries tested 5 years	49	17			
		4 year average			
Dakota S.D. 622	44	22	50	14	5
Tekseed 115	43	21	44	14	15
Disco 108AA	40	19	51	11	4
Gurney 118A	39	20	40	14	22
Funk G-75A	39	25	46	17	14
S.D. 604	38	20	37	14	24
Farmer 427A	37	20	40	12	21
Average of 10 entries tested 4 years	41	21			
		3 year average			
Curry C-49	37	17	49	14	6
Funk G-76	34	21	43	15	18
Average of 12 entries tested 3 years	36	21			
		2 year average			
Pioneer 329	44	23	35	16	27
Average of 13 entries tested 2 years	43	25			
McCurdy 100M			58	13	2
S.D. 420			55	13	3
DeKalb 409			49	12	7
Trojan 098A			48	14	8
Dowealth #15			47	14	10
Pfister P.A.G. 277			46	14	11
Hoapala H. 220			45	13	12
Mosws 65A			46	15	13
Pfister P.A.G. 303			44	16	17
Turner H14A			42	13	19
Beechly la 4375			41	15	20
United Hagie UH 52B			38	16	23
Cargill 255			36	15	25
Vinton V-35			36	16	26
Tomahawk 519			36	18	28
Kingscrest KT6			34	17	29
Average			44	14	

*Differences in yield of less than 16 bushels per acre are not statistically significant.

SORGHUM AND SOYBEAN TESTING
By C. J. Franzke

Table 8. Height, Maturity and Yield of Sorghum Varieties, 1958.

Variety	Height	Maturity	Bu./A.
Eureka	49	2	51.5
Prairie Rose	46	2	50.3
Brown Marval	44	2	69.4
Reliance	37	2	26.8
Norghum	38	1	40.8
Redbine 60	36	2	49.4
Martin Milo	39	2	51.7
RS 501	51	1	55.3
RS 610	44	2	110.3
Frontier 400	37	1	54.6
Combine grain sorghum	39	2	52.2
DeKalb C44A	34	2	74.1
Dual	48	2	25.6
Pfister 305-S	35	2	33.8
Pfister 406S	32	2	25.6
Stickleys R103	28	2	28.0

Maturity Range
1. Very Ripe
2. Ripe
3. Hard Dough Stage

The sorghums with a maturity number of "one" can be combined without excessive moisture in the grain, 2 requires extra drying, anything numbered 3 on down are immature and contain too high moisture content.

The 1958 season proved to be favorable for the early maturing of late sorghums. Under average conditions, many of these varieties would be in the late dough stage at frost time, and therefore would suffer severely from frost damage.

Table 9. Soybean Variety Test at S. E. Research Farm.

Variety	Height 1958	Bu./A.
Adams	29	10.9
Blackhawk	29	13.6
Harosoy	28	11.6
Hawkeye	27	11.7

Summary of the 1958 tests at Menno

This past season the following tests were conducted, notes and yields taken:

13 strains and varieties of sorghums replicated three times (39 rows) in a test plot.

31 commercial hybrid sorghums replicated twice (62 rows) in a test plot.

14 South Dakota hybrid sorghums (not replicated) in an observational test.

28 long rows of commercial hybrids and standard varieties in an observational plot for field day.

14 soybean varieties and strains, Group II replicated four times (56 rows) in a test plot.

76 South Dakota soybean strains (not replicated) in an observational test.

Grass and Legume Testing

by R. A. Moore

Objectives

To determine the adaptability of various legume and grass forages to growing conditions (soil and climate) in the area served by the experimental farm. Adaptability would be measured by:

a. Ease of getting a stand
b. Stand survival
   Winter resistance
   Drought resistance
c. Yield of forage, or green manure value
d. Varietal reaction to insects and diseases
e. Consistency of performance

Table 10 Comparison of 6 varieties of Red Clover in Regard to % Stand, plant height, and Tons of dry matter produced, S. E. Research Farm, 1958.

	Height (inches)	% Stand	Tons per* acre
Wisconsin Synthetic	16	90	.92
Dollard	16	92	1.02
La Salle	14	90	.92
Pennscott	18	95	.83
Kenland	16	95	.97
Stevens	16	95	.82

* Differences of less than .25 tons per acre are not significant differences.

Dollard continues to have a slight yield advantage, however its main advantage is that it is able to live over and produce well in the second harvest year.

Table 11. Comparison of 5 Varieties of Sweet Clover in Regard to % stand, plant height, and tons of dry matter produced, S. E. Research Farm, 1958.

	Height (inches)	% Stand	Tons per * acre
Intermediate Coumarin	44	92	2.57
Madrid	38	90	1.27
Goldtop	47	94	2.54
Evergreen	53	90	2.63
Spanish	46	94	2.39

* Difference in yield of less than .28 tons per acre are not significant differences.

Evergreen and Spanish are late maturing varieties, most valuable as green manure. Madrid is early maturing and a good seed producer. Intermediate Coumarin and Goldtop are intermediate in maturity. Goldtop is low in Coumarin (bitter tasting substance), and possesses resistance to certain foliage diseases.

Table 12. Comparison of 12 Varieties of Birdsfoot trefoil in Regard to Maturity, % stand and Tons of Dry Matter Produced per acre, S. E. Research Farm.

	Maturity	% Stand	Tons/Acre*
Granger	FB	91	.77
Iowa #2306	FB	91	.67
Italian imported	FB	95	.74
Cascade	FB	80	.66
S. D. #9	FB	92	.12
Tana	FB	91	.84
Leafoil	FB	92	.38
Iowa 2297	PB	85	.16
Empire	PB	94	.82
Viking	PB	85	1.01
French imported	PB	92	.79
Mansfield	PB	86	.62

PB - Past bloom at time of cutting
FB - Full bloom at time of cutting
* Differences in yield of less than .27 tons per acre are not significant differences.

This test, established in 1956, came through the winter in exceptionally good condition, with all strains showing good stands. Normally the Empire and Viking strains are the most winter hardy.

Table 13. Intermediate wheatgrass Performance Test at S. E. Research Farm, 1958.

	Height (inches)	% Stand	Tons per* Acre
Idaho #4	37	80	.91
Bee	34	88	.73
Amur	40	81	.77
Greenar	34	85	.87
A 12496	38	84	.96
Neb. 50	36	85	.96
Idaho #3	36	87	1.13

* There are no significant differences in this test.

Grass performance tests were established at the S. E. Research Farm in 1957. Tables 13 through 17 show the 1958 performance of several species of grass. Observation plots of orchard grass yielded very well in 1958. This was probably due to an ample supply of moisture in the fall of 1957. This grass is generally not productive under dryland farming in South Dakota.

The warm season grasses (switch grass and side-oats grass) did not make satisfactory stands. One exception was Nebraska 28 switch grass which looked very good late in the summer.

Table 14. Bromegrass Performance Test at the S. E. Research Farm, 1958.

	Height (inches)	% Stand	Tons per * Acre
Saratoga	27	91	.73
Southland	29	82	.68
Lancaster	28	86	.69
Wisconsin 55	29	86	.55
Candian Comm.	20	39	.29
Achenbach	33	92	.98
Lincoln	30	91	.77
Manchar	25	92	.88
Wisconsin 63	29	48	.29
Homesteader	26	86	.52

* Difference in yield of less than .33 tons per acre are not significant differences.

Table 15. Pubescent wheatgrass Performance Test at S. E. Research Farm, 1958.

	Height (inches)	% Stand	Tons per * Acre
A 1488	31	64	.32
Utah 109	34	64	..64
Mandan 759	35	81	1.15
Topar	28	58	.45

* There are no significant differences in this test.

Pubescent wheatgrass has no advantage over intermediate wheatgrass except in areas where the soil tends to "cake" or become very hard in dry weather.

Table 16. Crested Wheatgrass Performance Test at the S. E. Research Farm, 1958

	Height (inches)	% Stand	Tons Per * Acre
Commercial Crested	22	49	.18
Neb. 3576 Fairway	19	68	.42
A 1770 Fairway	18	48	.28
Nordan	24	74	.37
Summit	22	64	.35
Mandan 2359	23	66	.24
Commercial Fairway	20	79	.41
Utah 42-1	25	68	.36
Neb. 10	23	58	.79
S. Dak. II	20	52	.27
P-27	23	38	.17

* There are no significant differences in this test.

Table 17. Tall Wheatgrass Performance Test at the S. E. Research Farm, 1958.

	Height (inches)	% Stand	Tons Per * Acre
Neb. 98586	24	80	.94
S - 64	26	74	1.04
A 13044	30	70	.81
Utah	32	80	1.09
Mandan 1422	26	76	.90

* There are no significant differences in this test.

Table 18. Comparison of 12 Different Alfalfa Varieties in Regardto % Stand, % Flowering at 1st cutting, height in inches at each cutting and tons of Dry Matter produced per acre, S. E. Research Farm, 1958.

	% Stand	% Flowering 1st cut	Height (Inches) 1st cut	2nd cut	Tons/acre 1st cut *	2nd cut **	Total
Ranger	95	93	26	13	1.00	.59	1.59
Ladak	80	85	20	9	1.01	.42	1.43
Cossack	95	87	21	15	.94	.58	1.52
Grimm	82	77	22	14	1.06	.58	1.64
Vernal	87	82	22	15	1.32	.68	2.00
Narragansett	70	75	22	12	1.22	.54	1.76
Teton	77	50	24	10	.74	.26	1.00
Rhizoma	80	67	20	11	1.12	.56	1.68
Du Puits	80	60	24	16	.94	.68	1.62
Nomad	85	90	18	10	.81	.42	1.23
Lahonton	95	50	20	14	.88	.60	1.48
Terra Verde	65	72	27	20	1.06	.73	1.79

*Difference in yield of less than .34 tons per acre are not significant differences.

**Difference in yield of less than .19 tons per acre are not significant differences.

CROP DISEASES AND THEIR CONTROL

Corn Root Rot

C.M. Nagel
Plant Pathology Department

Objectives:

The control of root rot diseases in hybrid corn.

Results:

Root rot diseases which cause reductions in yield and lodging are present in most farmer's corn fields. This problem is worse in certain areas than others in the state. The experimental evidence indicates that the loss in yield may be about 15 per cent.

One method of controlling root rot diseases is to develop inbred strains of corn which are less susceptible to the root rot organisms which live in the soil and cause the rotting of the healthy roots. These are present to a more-or-less extent in all farm land.

As a result of a number of years' experimental work on this problem, a number of inbred lines of corn have been developed which when combined into certain hybrid combinations provide considerable protection in the form of root rot resistance.

In 1957 about 50 experimental hybrid combinations which had been produced were tested at the Menno station, and although the experiments were seriously affected by the alkali spots in the area where the plots were grown the yields indicated that these hybrids were too early for the Menno area to produce their maximum yields. Therefore, it became necessary to cross these disease resistant inbred lines into later maturing hybrid combinations. This was done at Brookings in 1958. Seed of the later hybrids will be available for testing in 1959 at the Menno station.

In the meantime a small number of the experimental hybrids were again planted at Menno in 1958. The results of these experimental hybrids and four commercial hybrids are presented in table 19. The results of yields are in line with those obtained in 1957 indicating that the experimental disease resistant hybrids included in the test in 1957 and 1958 are too early for the area. However, the results indicate that the performance of certain of them even though grown out of their adapted range still yield as well as the commercial hybrids.

IN THIS CONNECTION IT CAN BE POINTED OUT THAT WHEN THESE DISEASE-RESISTANT EXPERIMENTAL HYBRIDS WERE GROWN NORTH OF MENNO AT THE OTHER EXPERIMENTAL STATIONS IN THE STATE THEY OUTYIELDED THE BEST ADAPTED COMMERCIAL HYBRIDS BY APPROXIMATELY 15 PER CENT.

Table 19. Performance of 12 experimental corn hybrids having varying degrees of resistance to root rot, in comparison to 4 of the better performing commercial hybrids for the area.

Experimental hybrid or Commercial hybrid No.	Yield * Bu./A	Moisture Per cent	Performance Score
P349	96.28	13.5	1
Exptl. 1	86.48	11.3	2
SD622	84.22	15.1	3
Exptl. 2	83.39	15.4	6
" 3	81.06	10.5	4
" 4	80.75	10.9	5
" 5	80.24	10.9	7
" 6	80.00	12.3	9
Dak410	79.00	10.5	8
Exptl. 7	76.62	12.7	11
" 8	76.38	10.1	10
" 9	76.02	11.6	12
" 10	74.64	11.4	13
" 11	71.96	12.3	15
FG75A	71.26	15.0	16
Exptl. 12	70.79	10.3	14

Soybean Cyst Nematode Disease Survey in South Dakota

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Plant Pathology Department, State College
and
Plant Pest Control Branch
United States Department of Agriculture

The soybean cyst nematode* is a serious new disease to the soybean industry in the United States. Although the disease is not now known to be in South Dakota, there is a chance this new disease could become established in the soybean growing areas of this state.

This new disease was previously known only in Japan. It was found for the first time in the United States in North Carolina in 1954. Since 1954 this disease has been found causing serious damage to the crop in the following additional states: Arkansas, Kentucky, Mississippi, Missouri and Tennessee. Soon after its discovery in North Carolina, that state decided to control the disease by placing a quarantine on the movement of soil, plant parts, equipment and other materials which might spread the organism responsible for the disease. This step was taken because the disease can live in the soil, it may be spread by machinery, plant parts, soil, wind and water. A Federal quarantine was put into effect in July, 1957. Other states concerned issued

* Heterodera glycines, Ichinohe

similar restrictions designed to protect the uninfected soybean growing areas in this country. The nearest known infestation to South Dakota to date is in the extreme southeast part of Missouri where it has been found in parts of three counties.

The soybean cyst nematode is a microscopic soil-borne organism which penetrates and feeds inside the plant rootlets. When the roots of soybeans become infected, the organism causes the infected plants to become yellow, stunted and yields are seriously reduced, usually causing a crop failure.

The Plant Pathology Department in cooperation with the Plant Pest Control Branch of the United States Department of Agriculture conducted a survey during November and December of 1958. Soil samples were collected in each of 15 counties which includee the principle soybean producing counties. Processing of the soil samples in the Plant Pathology laboratories is in progress and until these examinations are completed the results of the survey will not be known.

At the present time control of this nematode disease in the field is very difficult and its eradication is even more so should it become established in South Dakota. In those states which have the disease, crop rotations are being stressed as a control measure since this parasite must have certain kinds of plants present in the field on which to live and reproduce. Other plants affected by this disease are lespedeza, common-vetch and snapbeans or garden beans.

SMALL GRAIN VARIETY TESTING

By

V. A. Dirks, D. D. Harpstead and P. B. Price

Good yields, although lower than those of 1957, were recorded for the adapted oat varieties. Yields were limited by lack of available moisture during much of the small grain season. Drouth and heat tolerant varieties produced the superior yields in 1958. Extensive testing of potential new varities of oats was conducted. These new lines have been derived from the breeding program at the South Dakota Experiment Station as well as lines produced by other states and Canada. Approximately 90 such lines were grown during the past season. Yield data is presented in table 20.

The need to find new barleys with outstanding heat tolerance and drought resistance is the dominant consideration in the testing of selections at the southeast station. Drought and the prevlance of yellow dwarf (a virus disease) provided a severe test for the 23 varieties and selections grown. As a consequence, the yields in 1958 were somewhat below those of the preceding year. Yield data is presented in table 21.

Wheat is actually one of the more reliable and consistent crops in Southeast South Dakota, especially in the absence of serious diseases, since its moisture requirement is much more limited than that of a full season crop.

Both spring and winter wheat were grown at the Southeast Research farm in 1958. The Winter wheat was sown on fallow, September 15, 1957. Germination was excellent, and winter survival was very good. Adequate soil moisture and fertility appear essential to winter wheat production in Southeast South Dakota; varieties with tolerable levels of hardiness are already available.

Spring wheats were seeded on April 7 with all the other spring sown small grains on corn ground. Growth was adequate and the crop fitted its major water needs into the brief period in which the major seasonal rainfall occurred. Of the common wheat diseases, only leaf rust appeared to cause any noticeable injury.

Winter wheat yields are given in Table 22, while Table 23 summarizes the results of the spring wheat tests.

Table 20. Oats Yields from the Southeast Research Farm, 1958.

Variety	Yield in bu./acre		Test weight
	1958	1957-58 Av.	1958
Andrew	64.1	73.7	41
Minhafer	59.2	79.0	40
Ransom	62.7	72.3	40
Cherokee	57.0	73.1	40
Marion	59.4	69.4	40
Mo-0-205	69.9	77.2	39
Newton	48.3	69.4	42
Clinton	61.6	66.8	41
Ajax	59.4	72.8	37
Jackson	67.4	78.9	41
Vaubay	55.9	72.3	41
Simcoe	63.8	76.8	36
Branch	62.4	66.3	40
Burnett	64.9	77.4	40
Garry	64.1	72.3	40

Table 21. Barley Yields from the Southeast Research Farm, 1958.

Variety	Test wt.	Bushels/A.	Rank
1. Custer	53	43.0	3
2. Feebar	46	34.4	9
3. Kindred	51	36.0	8
4. Liberty	52	40.6	4
5. Manchuria	50	37.8	7
6. Otis	53	39.7	5
7. Plaine	52	30.9	11
8. SD 1483	50	32.1	10
9. Spartan	52	30.4	12
10. Traill	53	39.0	6
11. Trebi	49	45.6	1
12. Velvon 11	48	43.4	2

Table 22. Winter Wheat Variety Test at the Southeast Station, 1958.

Variety	Av. Yield Bu./Acre 1958	Test wt. 1958	Survival 1958	Ht. In.
Northern Types:				
Minter	40.3	63	87	35
Minturki	36.5	62	72	35
Central Types:				
Nebred	34.8	63	70	28
Cheyenne	46.2	63	90	31
Turkey	35.5	62	77	34
Kharkof	38.9	62	72	33
Paw. x Neb. 13015	30.6	62	68	29
Paw. x Chey. 13190	38.3	62	60	29
C.I. 13279	34.3	63	60	30
Southern Types:				
Wichita	36.3	63	57	30
Pawnee	35.8	63	67	28
L.S.D.	7.3			

Table 23. Spring Wheat Variety Test at the Southeast Research Farm, 1956-1958.

Variety	Yield in bu/acre 1958	Yield in bu/acre 1956-58	Test wt. 1958	1958 Performance Notes Date Headed	Stem rust %	Leaf rust %	Scab*
Bread Wheat							
Rushmore	30.5	22.5	60	6-16	0	10	2
Lee	26.0	21.1	60	-15	1	2	4
Selkirk	28.8	23.8	58	-22	0	9	4
Conley	25.7	16.8	61	-22	T	5	4
Mida	25.4	21.8	59	-20	1	8	3
Durum Wheat							
Vernum	26.6	17.9	63	6-22	0	0	4
Langdon	28.2	21.8	63	-22	0	0	2
Yuma	25.0	18.0	63	-24	0	0	3
Ramsey	26.4	21.9	63	-23	0	0	3
L.S.D.	N.S.	3.4					

*where 1 is best

THE SOUTHEASTERN SOUTH DAKOTA EXPERIMENTAL FARM BOARD

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