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Pamphlet 38 December 1956

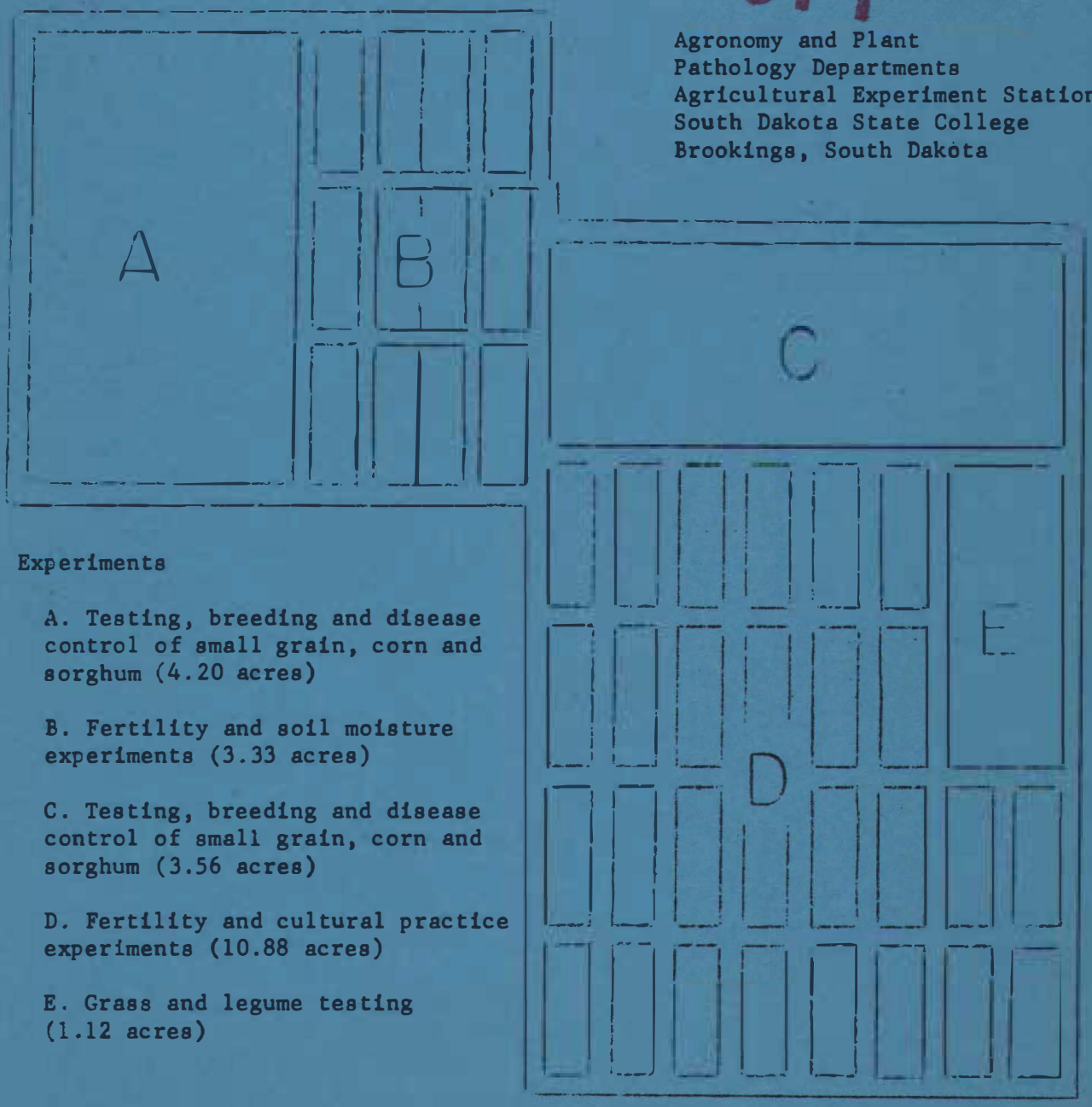
ANNUAL PROGRESS REPORT

EXTENSION
Plant Science
FILE
COPY

SOUTHEAST RESEARCH FARM

MENNO, SOUTH DAKOTA

Plot Diagram



Agronomy and Plant
Pathology Departments
Agricultural Experiment Station
South Dakota State College
Brookings, South Dakota

Experiments

A. Testing, breeding and disease control of small grain, corn and sorghum (4.20 acres)

B. Fertility and soil moisture experiments (3.33 acres)

C. Testing, breeding and disease control of small grain, corn and sorghum (3.56 acres)

D. Fertility and cultural practice experiments (10.88 acres)

E. Grass and legume testing (1.12 acres)

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 area 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.

Table of Contents

ANNUAL PROGRESS

REPORT FOR SOUTHEASTERN

RESEARCH FARM

1956

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 1955, 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 and crop variety testing have already been started.

An additional 3.33 acres were acquired for new experiments to be initiated in the summer of 1957. The farmers and county agents comprising the Southeastern South Dakota Farm Board, met on January 2, 1957 at Centerville and selected the experiments to be started on this newly acquired land.

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

1956 CROP SEASON

Table 1. Total Rainfall and Average Temperatures by Months, With Their Departures From Long Term Averages at S.E. Experimental Farm*

	April	May	June	July	Aug.	Total
Total Rainfall in Inches	2.98	2.42	1.00	2.22	3.19	11.81
Departure From Long-Time Average	-.90	-.82	-3.28	-.16	.13	-5.03
Average Monthly Temperature in Degrees F.	43.5	61.4	76.9	73.0	72.4	65.4
Departure From Long-Time Average	-5.7	1.4	6.8	-3.7	-1.6	-0.6

The month of June was characterized by high temperatures and drought with disastrous results for small grain. The above average rainfall in August saved part of the corn crop, but the small carry-over of subsoil moisture with the deficiency of rainfall in April, May, June and July seriously restricted the corn yields.

A more specific account of the weather and its influence on experimental results will be discussed in the respective sections submitted in this report.

*Data Courtesy U. S. Weather Bureau, Huron, South Dakota.

SMALL GRAIN VARIETY TESTING

by V. A. Dirks and D. D. Harpstead

Only spring sown small grains were tested at the Southeast Station in 1956. The tests were set up to furnish information on the performance of widely available varieties of crops not widely grown in the general area -- hard red spring wheat, durum wheat and flax. More extensive variety tests, and tests of breeding material that might hold promise for this area were made in oats and barley, two crops of considerable economic importance in the southeastern counties.

The tests included:

18 named spring wheats and 2 promising strains
10 named durum wheat varieties
11 named varieties of flax
40 named oat varieties, 50 unnamed selections from other states, and 57 new selections made in South Dakota
28 named barley varieties and 5 promising strains

This represents a total of 231 strains, each of which was grown two to six times to get accurate averages.

Extreme drought limited the value of this station for selection of new oats and barleys in 1956. The yields obtained in small grains in 1956 were too low and too uneven to rank and rate varieties. However, the work at the station was not a total loss. Valuable information was obtained on heat resistance in barleys, total tonnage forage yields in oats, and the unusual ability of Spring wheat to produce grain of good test weight under droughty conditions on these soils. The results of the varietal trials in wheat, oats, barley and flax are given in Tables 2 through 6. Note especially Table 6 giving the forage value in dollars of salvage oat hay of varieties commonly grown in this area.

Table 2. Spring Wheat Variety Test at the Southeast Experimental Farm, Menno, 1956.

Variety	Yield bu/acre	Heat injury	Scab injury	Test weight
Hard Red Spring				
Rushmore	13.2	5	4	58
Lee	13.6	6	4+	58
Selkirk	13.6	7	6	55
Conley	10.4	6-	4+	58
Mida	15.3	4-	6	61
Rival	11.0	5	5	59
Pilot	15.6	5-	3+	59
Thatcher	15.7	4+	4+	57
Cadet	9.3	7+	5+	57
Ceres	11.2	5-	3+	59
Spinkota	11.6	5	5	60
Marquis	14.9	7-	6+	60
N.D. 3	13.4	5+	5+	57
Ellar	13.1	4-	6	60
R.H. 1935	17.2	3	1	57
Durum				
Stewart	13.8	3+	3	63
Vernum	10.0	4	3+	62
Nugget	11.6	5	3+	59
Sentry	10.5	6+	5	61
Yuma	7.6	6+	2-	60
Ramsey	12.0	4-	5-	62
Langdon	8.8	4+	3	61
Towner	8.6	6-	6-	62
L.S.D.	6.0			

Scab and heat injury on 1-10 scale, 1 best.

Table 3. Oat Variety Test at the Southeast Station, Menno, 1956.

Variety	Yield bu/acre	Forage yield tons/acre	Height inches	Test wt. 1956
Vikota	8.7	.62	16	19
Andrew	10.3	.75	19	18
Dupree	6.0	.68	18	13
Cherokee	6.5	.65	19	14
Nemaha	6.2	.59	18	14
Clinton	5.3	.58	18	14
James	1.9	.54	19	12
Marion	7.3	.67	19	18
Branch	13.8	.74	19	28
Ajax	8.8	.68	20	21
Waubay	9.3	.76	20	22
Ransom	5.4	.54	16	14
Mo. 0-205	12.5	.63	18	14
Sauk	16.2	.78	19	30
Rodney	6.9	.65	18	16
Simcoe	8.3	.73	19	18
Minland	8.3	.63	19	16
Newton	4.0	.53	16	12
Garry	7.5	.77	20	15
Jackson	9.2	.70	20	27
Clarion	11.4	.71	20	26
Richland	4.5	.54	14	13
Brunker	6.0	.65	18	14
Osage	6.5	.51	14	18
Trojan	6.4	.62	16	19
Burnett	7.9	.78	18	14
C.I. 6913	5.2	.57	18	15
L.S.D.	3.5			

Forage yield includes weight of grain. This also estimates salvage value of crop.

Table 4. Barley Variety Test at the Southeast Station, Menno, 1956.

Variety	Yield in bushels 1956	Height inches	Heat damaged	Test weight 1956
Plains	14.9	17	2	44
Feebar	4.3	14	7	37
Velvon 11	7.6	17	4	42
Kindred	7.6	15	8	43
Spartan	6.9	18	2	43
Odessa	10.7	17	6	45
Tregal	7.3	15	7	46
Compana	12.5	16	2	45
Mars	10.5	16	4	49
Montcalm	1.5	14	9	--
Custer	16.9	19	2	44
Traill	10.5	16	6	50
S.D. 1776	11.6	16	5	49
L.S.D.	3.9			

Heat Damage 0-9 scale; 1 superior, 9 heavily damaged.

Table 5. Flax Variety Test at the Southeast Station, Menno, 1956.

Variety	Average yield, bu/acre
	Menno
Marine	2.9
Sheyenne	2.6
Redwood	3.0
B-5128	3.2
Redwing	2.6
Dakota	3.1
Koto	2.5
Norland	3.0
C.I. 1478	3.5
L.S.D.	0.7

Table 6. Yield of grain and forage, and forage value of ten oat varieties grown in southeast South Dakota. 1956.

Variety	Yield bu./acre	Test wt. lbs.	Forage yield tons/a.	Forage value/a.*	Price of replacement feed/a.**
Cherokee	6.5	14	.65	$ 9.75	$11.70
Nemaha	6.2	14	.59	8.85	10.62
Branch	13.8	28	.74	11.10	13.32
Ajax	8.8	21	.68	10.20	12.24
Waubay	9.3	22	.76	11.40	13.68
Ransom	5.4	14	.54	8.10	9.72
Mo. 0-205	12.5	14	.63	9.45	11.34
Sauk	16.2	30	.78	11.70	14.04
Newton	4.0	12	.53	7.95	9.54
Andrew	10.3	18	.75	11.25	13.50
Average	9.3	19	.66	9.98	11.97

* Forage value on the farm basis, as equivalent to $15.00 ton prairie hay.

**Replacement feed calculated as equivalent of $18.00 ton, average quality hay delivered at farm.

SORGHUM AND SOYBEAN VARIETY TESTING

by C. J. Franzke

Sorghum Variety Test

There were 74 sorghum varieties, strains and hybrid grain and forage types tested at the S. E. Experimental Farm in 1956. The test consisted of 8 named varieties of grain sorghum, 7 forage types, 8 hybrids and 51 South Dakota Experimental grain types. Table 7 lists the 8 named varieties of grain sorghums and the 8 hybrids.

Table 7. Sorghum Variety Test at the Southeast Experimental Farm, Menno, 1956

Variety	Bu/A	Height inches	Maturity
Reliance	67.3	43	Ripe
Norghum	56.2	39	"
Eureka	46.4	49	"
Prairie Rose	39.7	45	"
Imp. Coes	52.0	48	"
Early Kalo	45.0	36	"
Martin	56.2	33	"
Redbine #60	38.4	34	"
R.S. 501	76.6	46	"
Tex 590	40.7	31	"
" 601	58.2	42	"
" 610	95.3	46	"
" 611	66.9	40	"
" 620	56.0	42	"
" 650	85.5	40	"
" 660	65.8	40	"

The growing season was below normal in rainfall and the temperatures were above normal. Due to the abnormal dry warm season all sorghums advanced very rapidly and were early, showing very little difference in their maturity range. Therefore, one could not evaluate maturity on the varieties, strains and hybrids. The yields of all sorghums were high. It was a season much more favorable for sorghum production than for corn. Sorghums are a drought-enduring crop. They will produce a crop of grain under drought conditions where corn will fail to produce a grain crop.

The 51 South Dakota Experimental grain types are being evaluated for good agronomic characteristics such as maturity, yield, standability, disease and plant characters. These strains will be tested further to determine the best selections for future use.

Soybean Variety Test

There were 34 varieties and strains of soybeans tested in Group II maturity range. The soybean variety test is in cooperation with the U.S. Soybean Regional Laboratory of the U.S.D.A.

Table 8. Soybean Test at the Southeast Experimental Farm, Menno, 1956.

Variety	Maturity index*	Height inches	Bu/a
Adams	+1	25	12.9
Blackhawk	-2	23	15.2
Harosoy	-3	28	15.0
Hawkeye	0	27	11.6
Lincoln	+3	28	12.3
Richland	+1	24	14.6

*Maturity index using Hawkeye as 0 and rating the other varieties and strains plus or minus in days. Hawkeye matured September 22.

Table 8 lists only the 6 named varieties which are produced commercially in this area. The growing season was too warm and dry, as can be readily seen by the plant height recorded in the table. For good bean production, soybeans require a cool, moist, humid growing season, especially at blossom time. Therefore, the varieties show very little difference in maturity, height and yield.

CORN BREEDING AND YIELD TESTING

Southeast Research Farm - Menno, 1956

by D. B. Shank, D. E. Kratochvil, and R. A. Moore

Description of Work Performed and Objectives

(1) A yield trial on commercial hybrids with 32 entries.
(2) A yield trial on experimental three-way crosses with 18 entries.
(3) A test studying some of the various aspects of hybrid vigor.
(4) A hand pollinated nursery with about 300 individual progenies.

Because of the dry season, coupled with soil variability within the plots, results were uniformly poor. For example, the 32 commercial hybrids averaged only 19 bushels per acre.

Discussion and Interpretation of Results

(1) The results obtained from the commercial yield test are given in Table 9. Included are 2- and 3-year averages, even though this was the first year on the S.E. Experimental Farm. Yield trials had been conducted on the Roy Konrad farm just north of Kaylor in 1954 and 1955 and those results are included in the averages. Yields in 1956 ranged from 29 down to 7 bushels per acre. Sokota S.D. 400 was the best yielding hybrid, followed by Sokota S.D. 604 and Pioneer 352. The trial was harvested October 19 at which time moisture in the ears was down to an average of 13 percent.

In the table each hybrid has been given a performance rating which ranks them on the basis of their relative yields and maturity. This rating was obtained by converting yields for each hybrid to percentages by comparing them to the average yield of all entries. Similar calculations were made for moisture at harvest time after first subtracting each moisture content from 100 so that the varieties would be ranked according to their ability to produce sound, rather than soft corn. The performance rating which appears in the table for each entry was then found as follows:

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

(2) The test of three-way crosses involved lines developed by the Plant Pathology Department which had been top-crossed to a single cross tester. The 1956 test of this material was carried on cooperatively by the Agronomy and Pathology Department and the discussion will be included in the Pathology section of this report.

(3) The study on hybrid vigor is only in initial stages and therefore will be reported at a later date.

(4) Material included in the nursery was:

A. Inbred lines being maintained by self and sib pollination.

B. Single crosses for making experimental double crosses.

C. Single crosses for making three way top-crosses to evaluate lines in future yield test.

D. Segregating material from which new inbreds are being developed.

E. Material planted for observation purposes only.

In all, some two to three thousand hand pollinations were made. The results were very disappointing because of the drought. Many of the inbred lines set no seed at all and only in certain areas of the field was seed harvested from the single crosses. In most cases, the work planned for 1957 will not be possible.

Table 9. Corn Performance Test on S. E. Experimental Farm, 1956

Hybrid or Variety	Acre yield bu.	Moisture %	1956 Yield bu.*	1956 Moisture %	1956 Performance rating
3-Year Average**					
DeKalb 410	55	15	24	11	5
Pioneer 352	51	16	26	14	3
Pfister P.A.G. 57	51	14	22	11	7
Sokota S.D. 400	50	13	29	9	1
Jacques 1153J	50	17	23	13	6
Certified Seed Co. Ia. 306	49	17	13	13	30
Pioneer 352	49	15	19	11	17
Tomahawk 60	47	16	15	15	27
Turners T-48	47	17	7	15	32
3 yr. ave. of 9 entries	50	16	--	--	--
2-Year Average**					
Sokota S.D. 604	39	14	27	11	2
S.D. Exptl. #19 622	39	15	19	13	16
Tekseed 115	39	15	22	13	8
Cornhusker 84	38	15	21	14	12
S.D. Exptl. #20	38	14	21	13	13
Funk G-75A	38	17	18	17	20
Trojan G-94	36	15	21	14	11
Disco 108-AA	36	12	21	10	10
Farmers 427A	35	15	18	14	18
Garney 118A	34	14	18	11	19
2 yr. ave. of 19 entries	37	14	--	--	--
Haapala H130	--	--	25	11	4
Vinton V-14	--	--	21	9	9
Pfister P.A.G. 244	--	--	20	14	14
Kingscrost K04	--	--	19	13	15
Cargill 175	--	--	18	12	21
United Hagie UH41A	--	--	17	13	23
Curry C-49	--	--	17	12	22
Funk G-76	--	--	17	15	24
Renk & Sons R405A	--	--	16	13	25
Jacobsen J39	--	--	15	15	26
Moews 14	--	--	14	13	28
DeKalb 459	--	--	14	12	29
Green Acres 395	--	--	13	14	31
Average	--	--	19	13	--

* Differences in yield of less than 10 bushels are not statistically significant.

**Averages include data from yield trials conducted on the Roy Konrad farm north of Kaylor.

GRASS AND LEGUME TESTING 1956 SEEDINGS

by M. W. Adams and J. G. Rose

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) Consistency of performance

In addition, if there are specific disease factors, such as bacterial wilt of alfalfa, or insect factors, such as the spotted alfalfa aphid, it would be desirable to have information with respect to varietal reaction to these hazards.

Thus, the following nurseries were seeded on April 13, 1956.

Birdsfoot Trefoil	11 strains
Alfalfa	12 strains
Red Clover	8 strains
Sweet Clover	9 strains
Crested Wheatgrass	13 strains
Intermediate Wheatgrass	9 strains
Tall Wheatgrass	4 strains
Side Oats Grama	6 strains
Switch Grass	1 strain
Smooth Bromegrass	13 strains
Russian Wildrye	2 strains

Discussion and interpretation of results

The summer of 1956 was generally unfavorable at Menno for the establishment of small-seeded grasses and legumes. Consequently, the seedings may be considered failures insofar as achieving satisfactory stands is concerned. We may learn something with respect to objective (a) above, but new seedings will have to be made in order to pursue the other objectives.

The spotted alfalfa aphid was found in some 23 counties in southeastern South Dakota in late summer of 1956. We anticipate their presence again in 1957, thus special care will need to be exercised both to observe differential effects and to save the new seedings.

PLANT DISEASE CONTROL

Corn Root Rot

C. M. Nagel
Department of Plant Pathology

Objective

To control root rot of corn.

Discussion and interpretation of results

Corn root rot is a common disease that occurs virtually every season. It is caused by soil-borne micro-organisms which rot and destroy the roots, thereby causing pre-mature dying of stalks and lowered yields.

Fifteen top-crosses and three check varieties were planted at the farm but poor conditions and late season drought made yield results unreliable. These top-crosses contained one inbred parent which contained resistance to corn root rot.

Smut Resistance In Oats

L. S. Wood
Department of Plant Pathology
and United States Department of Agriculture

Objective

To control oat diseases.

Discussion and interpretation of results

Twenty-seven oat varieties and selections from several state experiment stations, along with certain smut differentials and resistant varieties, were tested for their reaction to the prevalent smut races in South Dakota. All 27 selections tested were resistant to the smut races prevalent in South Dakota. The results obtained are given in Table 10.

Disease reaction to a non-parasitic leaf blight was also obtained in this nursery. The cause of this physiologic leaf blight is not known and, although oat varieties differ in their disease reaction, the effect of this disease on yield has not been determined.

Table 12. Influence of Legumes in Rotation on Yields of Corn and Oats.

Crop	Pounds per acre of N P_2O_5 K_2O	Yield in bushels per acre
Oats	40 - 20 - 0	8.0
Corn	40 - 20 - 0	25.6

Objectives of experiment

1. Compare efficiency of biennial sweet clover, annual sweet clover, red clover and alfalfa for increasing grain yields when used as catch crops.

2. Compare commercial nitrogen fertilizer to legume nitrogen as a means of increasing crop yields.

3. From a standpoint of total maximum yield, is it best to use a catch crop legume or to let the legume stand over for one year?

Cropping history and past management

This experiment was started on land with a cropping history similar to most of the land in the area. Corn and small grain were the major crops with no legumes, manure or commercial fertilizer used for the past several years.

Discussion and interpretation of results

Since this is the first crop year for the experiment, no grain crops followed legumes. Therefore, no comparisons could be made on the effects of legume nitrogen to commercial nitrogen.

There was a question whether or not to include this experiment in the pamphlet, but it was felt that most of the readers would like to become more familiar with the experiments already in progress, despite the fact that practically no results can be given for this experiment.

Table 13. Comparative Influence of Manure, Legumes and Commercial Fertilizer on Yield of Corn

Treatment	Yield in bushels per acre
10 tons of manure per acre	38.1
60-40-0 from commercial fertilizer	38.9
Skip row planting with legumes between rows plus 0-40-0	34.1
Check (no legumes, manure or fertilizer)	29.7

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 manure, legume catch crop and commercial fertilizer for growing continuous corn.
3. Investigate the possibility of improving corn yields on these variable, salty or solonetzic slick spots that frequently occur in fields of the area.

Cropping history and past management

The cropping history and past management on this plot was similar to that for the other experiments already listed. It will vary considerably from now on, however, as the different experiments progress.

Discussion and interpretation of results

The two blocks comprising the area occupied by this experiment were known before planting time to have considerable soil variation. The other larger experiments were deliberately kept away from this area. If the soil variability proves to be so great that reproducible results cannot be obtained, the work and effort involved will not be wasted, however, because the experiment can be used for demonstration purposes.

In the "skip row" planting method, every third row was omitted. This left a space of 7 feet which was wide enough to run a brillion seeder through to plant a mixture of alfalfa, red clover, sweet clover and vetch. The corn was drilled in, allowing 10 inches between stalks. Therefore, by omitting 1 out of every 3 rows and increasing the number of stalks on the 2 remaining rows, the total plant population was only reduced approximately 6% from the standard rate used in the other planting methods, of 3 stalks per hill in 3'6" x 3'6" rows. Next year the two normally spaced rows of corn will be planted in the legume sod, leaving the 7 foot spacing to the left of the first row and to the right of the second row. These wide spaces will be planted to legumes in turn so that continuous corn will be raised in fresh legume sod every year.

Plots receiving either manure or commercial fertilizer appeared to yield a little more than the check plots and the "skip row" corn. This was not significant at the 5% confidence level however. It would be expected that the skip row corn would yield less because no legumes preceded the corn this first crop year of the experiment.

Table 14. Effect of Tillage and Planting Methods on Yield of Corn.

Pounds per acre of N	P_2O_5	K_2O	Method of tillage and planting	Yield in bushels per acre
0	40	0	Plow disc drag plant(drilled)	42.5
60	40	0	Plow disc drag plant(drilled)	51.5
0	40	0	Wheel-track planting(drilled)	46.1
60	40	0	Wheel-track planting(drilled)	32.1
0	40	0	Listing	43.4
60	40	0	Listing	43.1

Objectives of experiment

1. Determine how much tillage is really necessary for satisfactory corn production.
2. 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?
3. Evaluate the method of planting corn in tractor wheel tracks in plowing with no additional seedbed preparation.
4. Investigate the possibility of hard ground listing with speedy inexpensive cultivations - twice with the drag, once with the rotary hoe, and once with the lister cultivator.

Cropping history and past management

The land for this experiment was managed the same as the land used for the two preceding experiments discussed on pages 20 and 21. From 1956 on, the cropping history and treatment of the land will be entirely different for each of the experiments presented in this section of the report.

Discussion and interpretation of results

The land was fall plowed and the fertilizer was broadcasted in the spring on the plowed ground. Fertilizers used were treble super phosphate and ammonium nitrate.

With the conventional plow, disc, drag, and plant method, the corn was drilled in and later thinned to a population of 10,668 plants per acre. Rows were 42 inches apart, and plants were 14 inches apart in the row.

The wheel-track planting was done with a Ford tractor in rows spaced 48 inches with plants 12 inches apart in the row. This resulted in a few plants more than 10,668 per acre. If 11 inches were allowed between plants, the population would have been less than the goal of 10,668. This year's results with the wheel-track method cannot qualify as a minimum tillage experiment because the ground was already partially prepared before the idea for the experiment was conceived. However, the corn planter was adjusted to follow in the wheel tracks

of the tractor. To do this, the planter drive shaft had to be lengthened slightly on each end. The planter shoes were about two inches short of riding in the center of the tractor tire tracks in each row.

The listed corn was in rows 42 inches apart with 14 inches between plants in the row, giving a population of 10,668 plants per acre.

There was no response to fertilizer in the listed corn. It should be noted that the fertilizer was broadcasted on top of the ground before the listing operation. The lister would have a tendency to push the fertilizer out into the center of the rows, leaving the corn plants a considerable distance away from the fertilizer and down deep in the furrow. In a dry year, it is possible that this situation could have influenced the fertilizer response of listed corn. Successive applications will minimize this effect but it is planned to broadcast the fertilizer after listing in 1957. This will not be exactly comparable to the procedure of broadcasting and discing in the fertilizer, which was used for the other two planting methods, but it will approach it more closely.

With the wheel-track planting method, nitrogen appeared to have an undesirable effect on yields. This year's results should not be accepted as final because it was not possible to incorporate the minimum tillage feature of the experiment this year as explained above.

When nitrogen was applied, the conventional plow, disc, drag, and plant method gave the highest yield of the three different planting methods. This was not significant at the 5% confidence level, however, so it is possible that we may see some different results next year.

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