23rd Annual . . .

SDSU

SOUTHEAST SOUTH DAKOTA EXPERIMENT FARM

PROGRESS REPORT 1983

Agricultural Experiment Station
South Dakota State University
Brookings

"A MAN'S MIND, STRETCHED BY A NEW IDEA,
CAN NEVER GO BACK TO ITS ORIGINAL DIMENSION."

OLIVER WENDELL HOLMES

This twenty-third annual report of the research program at the Southeast South Dakota Experiment Farm has special significance for those engaged in agriculture and the agriculturally related businesses in the ten county area of Southeast South Dakota. The results shown are not necessarily complete or conclusive. Interpretations given are tentative because additional data resulting from continuation of these experiments may result in conclusions different from those based on any one year. Trade names are used in this publication merely to provide specific information. A trade name quoted here does not constitute a guarantee or warranty and does not signify that the product is approved to the exclusion of other comparable products.

South Dakota Agricultural Experiment Station
Brookings, South Dakota 57007

Delwyn Dearborn, Dean R. A. Moore, Director

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INTRODUCTION . . . . Fred E. Shubeck
Research Manager

1983 was another year with unusual weather conditions. It could be referred to as a year of extremes. We had a very wet fall in 1982, followed by a wet spring, then in June, nearly 1/2 of the total average annual rainfall fell. Then, the weather turned hot and dry. August was one of the hottest months we have had for many years. To sum it up, we had a season that was too wet, too hot, too cold and too dry.

With these conditions, very small differences in soil and drainage made rather large differences in yield results. Even well drained soils became saturated with water for several weeks and considerable amounts of nitrogen were lost due to microbial action in the absence of soil air and oxygen. This leads to greater random variability among replications and more individual yields that break away from an established pattern or response curves. Experiments involving dates of planting were severely limited because in some cases only the last planting date could be planted.

Nevertheless, several management principles were uncovered or established and we had a pretty good year.

A solar heating unit designed by Leslie Christianson, Ag Engineer from SDSU, was installed to heat the residence at the Experiment Farm.

The north cattle feedlot pens were all divided in half this year using 2 inch plank and railroad ties. The purpose was to provide more replications in feeding experiments which would give better error control.

A June Crop Tour and a Field Day in September were held in addition to one other special tour.

There were 39 educational meetings held in the office building. These included Directors' meetings, extension clubs, adult educational meetings, judging schools, 4-H clubs, hail adjusters training meeting and local groups.

An invasion of woolly bear caterpillars on soybeans caused considerable alarm in August. Their presence in large numbers presented a new problem for the Experiment Farm and surrounding area. The outbreak of woolly bears was the first time on record for South Dakota and the rest of the Midwest.

The fall harvesting and tillage work proceeded rapidly this year due to the favorable weather.

Table 1. Temperatures at Southeast Experiment Farm

Month	1983 Av. Temperature (F)[1] Maximum	Minimum	30 Year Average Maximum	Minimum	Departure From 30 Year Average Maximum	Minimum
January	28.7	10.1	25.3	4.0	+ 3.4	+ 6.1
February	31.5	17.5	32.0	10.8	- .5	+ 6.7
March	40.5	25.8	43.3	22.2	- 2.8	+ 3.6
April	50.8	32.4	61.0	35.4	-10.2	- 3.0
May	67.6	42.8	73.2	47.2	- 5.6	- 4.4
June	77.1	55.9	82.3	56.9	- 5.2	- 1.0
July	88.5	63.9	87.6	62.1	+ .9	+ 1.8
August	90.9	63.6	85.7	59.6	+ 5.2	+ 4.0
September	77.6	48.4	76.0	49.0	+ 1.6	- 0.6
October	61.7	35.2	65.0	40.0	- 3.3	- 4.8
November	41.4	26.2	40.2	24.3	+ 1.2	+ 1.9
December	10.2	-10.3	30.7	10.6	-20.5	-20.9

[1]Computed from daily observations

Table 2. Precipitation at the Southeast Experiment Farm

Month	Precipitation 1983 (inches)	30 year Average (inches)	Departure from 30-year Ave. (inches)
January	.55	.49	+ .06
February	.48	1.04	- .56
March	2.80	1.43	+1.37
April	2.00	2.25	- .25
May	3.16	3.37	- .21
June	11.02	4.12	+6.90
July	2.95	3.26	- .31
August	1.06	2.95	-1.89
September	2.16	2.53	- .37
October	.70	1.64	- .94
November	3.57	1.12	+2.45
December	.49	.73	- .24
Totals	30.94	24.93	+6.01

RATES OF NITROGEN AND

DATES OF PLANTING CORN

F. Shubeck, B. Lawrensen, D. DuBois
and B. Jurgensen

SOUTHEAST FARM 83-1

Objectives of Experiment

1. Will planting dates influence response to fertilizer?
2. What is the optimum rate of nitrogen fertilizer for a soil with a medium amount of organic matter when the same amount of nitrogen is applied each year for several years?
3. Will optimum rates of nitrogen application be influenced by drought?
4. Will high nitrogen rates influence disease or insect damage?
5. Will soil temperatures serve as a dependable guide to determine an optimum date to plant corn?

Methods and Procedures

October 27, 1982	- Plowed total plot area
May 17, 1983	- Field cultivated area; Eradicane + Bladex + Atrazine sprayed over all; field cultivated once to incorporate
May 25-26	- Spread all rates of fertilizer
May 26	- Field cultivated to incorporate fertilizer and double incorporate the herbicides; Planted all 4 ranges Variety - Curry's 1424 Final Population - 16,800 plants per acre Insecticide - Amaze 20G
July 7	- Cultivated all plots
October 13	- Combined all plots
October 17	- Plowed all plots

Table 3. Effect of Fertilizer on Yield of Corn (High Nitrogen Rates)

Broadcast Fertilizer Treatment N + P + K	Planting Date May 26
0 + 0 + 0	31
0 +11 +58	35
80 +11 +58	59
160 +11 +58	64
240 +11 +58	65

Discussion and Interpretation of Table 3

Excessive early season rainfall prohibited planting dates earlier than May 26. This breaks the continuity of several years' work regarding dates of planting. Yields were generally quite low. Soils were too wet in May and June and too dry in August. Some nitrogen may have been lost either through leaching or denitrification in the early part of the season when these soils were saturated.

Even though climatic conditions reduced check plot yields 31 bushels per acre, fertilizer was able to double the yield.

Table 4. Effect of Fertilizer on Yield of Corn (Low Nitrogen Rates)

Broadcast Fertilizer Treatment N + P + K	Planting Date May 26
0 + 0 + 0	27
20 +11 +58	30
40 +11 +58	37
60 +11 +58	45
80 +11 +58	52

Discussion and Interpretation of Table 4

The low nitrogen rates and high nitrogen rates are reported as two separate experiments even though they are located in the same replicated blocks. The reason for this, is that the high rates have been applied since 1968 and the low rate experiment was initiated in 1974. No fertilizer was applied on the low rate area in the interval between 1968 and 1974.

Substantial yield increases were obtained with increasing rates of nitrogen application.

S.E. FARM REPORT

PLANT POPULATIONS FOR CORN

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 83-2

Objectives of Experiment

1. Will a drought tolerant hybrid help reduce the expected loss when the planting rate turns out to be too high for the rainfall?
2. Will a prolific hybrid planted at moderate populations be able to take full advantage of unexpected improved growing conditions?
3. "Shortie" wheats have done very well in limited rainfall areas. How about "shortie" corn?
4. Can the population problem be solved by using a single ear hybrid that has a strong ability to increase ear size if conditions are better than expected?
5. Or is it best to use the biggest, tallest, latest corn that can be matured in most seasons?

Methods and Procedures

November 8, 1982	- Plowed all plots
May 16, 1983	- Field cultivated plot area
May 17	- Sprayed Eradicane + Bladex + Aatrex overall (4.0 + 1.5 + 0.5 ai/acre) then field cultivated to incorporate
May 23	- Broadcast 160+60+40 (oxide) on all plots and field cultivated to incorporate
May 23-24	- Planted all plots
June 22-23	- Plots thinned to desired plant populations
October 13	- Combined all plots
October 24	- Plowed total plot area

Table 5. Hybrids Used With Important Features of Each

Hybrid	Special Characteristics	Days to Maturity
Curry's SC-150	Big-tall full season	115
Frundts 8500A	Multi-ear tendency	110
Pioneer 3709	Heat and drought tolerant	105
Pioneer 3932A	Ability to increase ear size	93
Yield Warranty 35A	"Shortie" about 5-1/2 to 6 ft.	95

Discussion and Interpretation of Table 5

This experiment is centered around hybrids with unique characteristics that hopefully will help to reduce the necessity of trying to out-guess the season's weather when selecting plant populations at planting time.

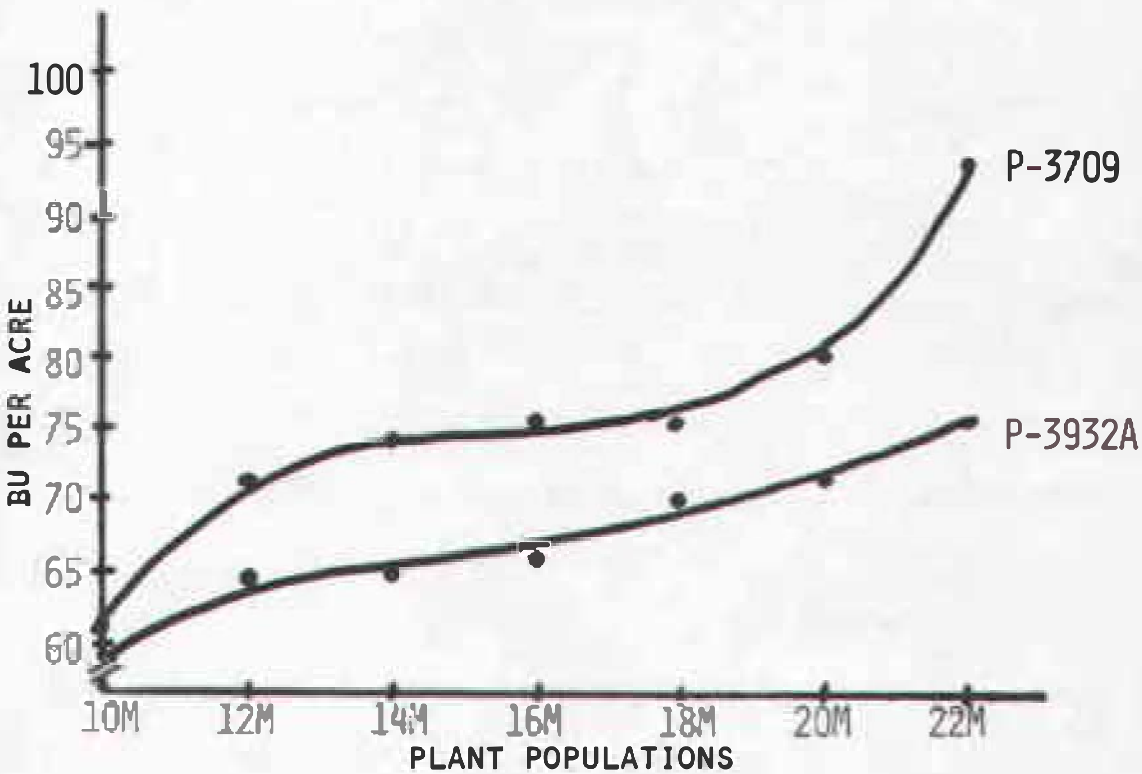
Table 6. Effect of Plant Populations and Hybrids on Corn Yield

	Populations in Thousands							
Hybrid	10	12	14	16	18	20	22	Average
Pioneer 3709	61	73	74	76	75	81	95	76.4
Pioneer 3932A	58	67	65	67	70	71	78	68.0
YW 35A	60	70	77	69	74	69	76	70.7
Curry's SC-150	76	90	88	89	90	85	79	85.3
Frundts 8500A	76	83	85	92	99	93	107	90.7
Average	66.2	76.6	77.8	78.6	81.6	79.8	87.0	78.2

Discussion and Interpretation of Table 6

Two new plant populations were initiated in 1983 - 20 and 22 thousand. For the last two years 18,000 plants per acre appeared to be insufficient. In 1983, when yields of all hybrids were averaged for each plant population, the 22,000 PPA rate had the highest average yield. However, some of the hybrids responded quite differently as populations were increased. To illustrate this in a more dramatic way, the following two figures are presented.

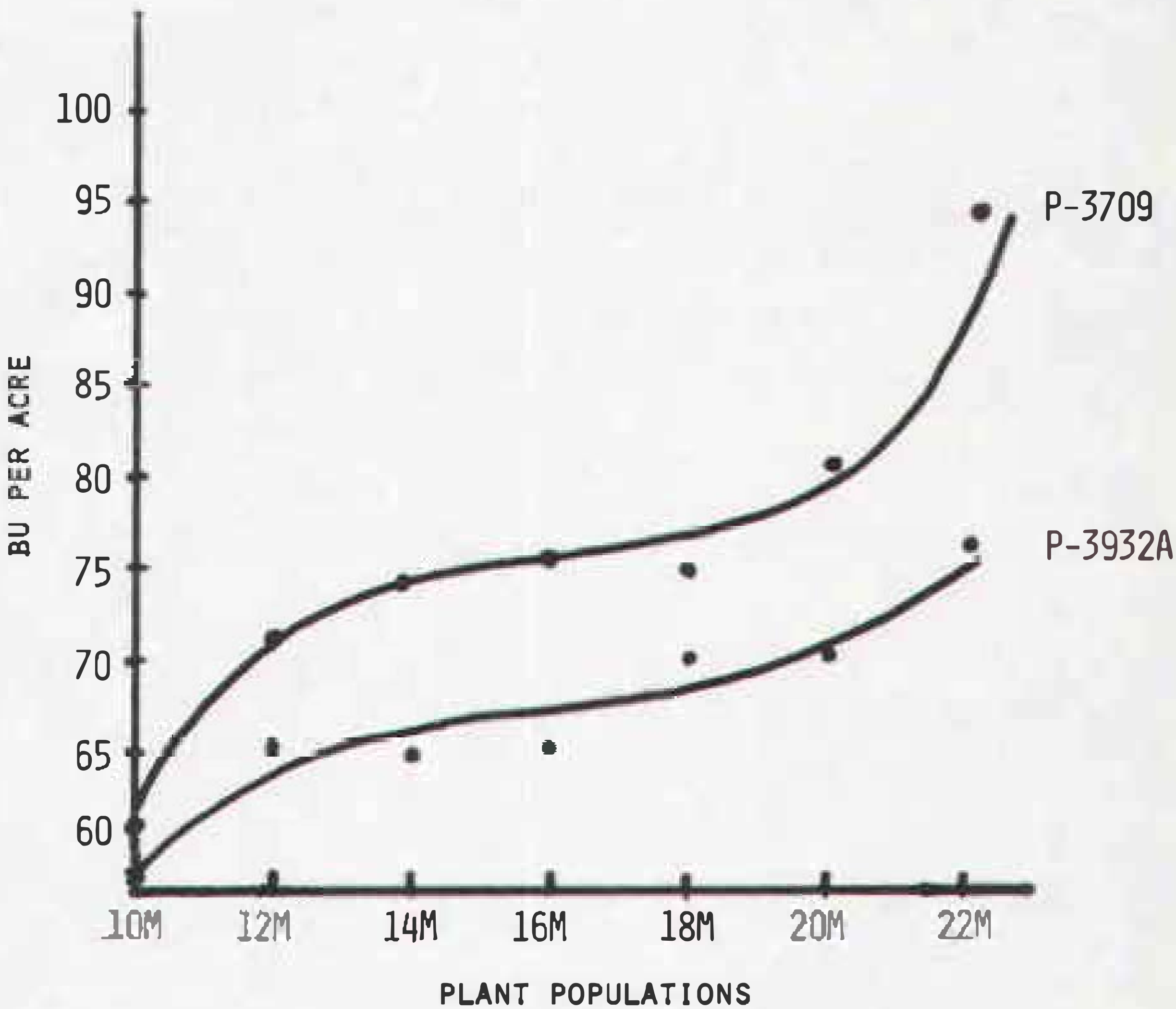
FIGURE 1. EFFECT OF CORN PLANT POPULATIONS AND HYBRIDS ON CORN YIELDS, SE FARM 1983



Discussion and Interpretation of Figure 1

For Pioneer 3709 and 3932A the curves appeared to be generally S shaped. The P-3709 is reported to be drought tolerant and P-3932A has a potential for large flex-range in ear size. Consistent with previous years' results are the relatively small yield increases from 14,000 to 18,000 PPA, but the unusual thing is the rather sharp increase in yield as populations were increased to 20,000 and 22,000. Due to the unusual climate of 1983, it would be wise to have more than one year's data before any special significance is attached to these results.

FIGURE 2. EFFECT OF CORN PLANT POPULATIONS AND HYBRIDS ON CORN YIELDS, SE FARM 1983



Discussion and Interpretation of Figure 2

Curry's SC-150 had a remarkably different type of curve with increased populations. This is a big-tall full season corn with none of the built in characteristics that have a potential for compensating for an error in matching populations to climatic conditions.

Frundts 8500A had a yield curve that was difficult to plot. From 10,000 to 16,000 plants per acre, yields followed the line rather closely, but from 16,000 to 22,000 plants per acre, results were more erratic. The amount of unexplained variation was rather high this year in several plots. With a year of excesses in climate such as 1983, very small variations in slope or drainage made disproportionately large differences in yield results.

The Frundt's hybrid has a strong multi-ear tendency but at the highest two populations, the second ear was mostly cob and not much corn.

To sum it up, it was rather difficult to evaluate specialized hybrid characteristics like multi-ear, flex-range in ear size and drought tolerance when both a drought and excessive rainfall occurred in the same year. More than one year's data with 20,000 and 22,000 plants per acre will be necessary to establish positive trends.

S.E. FARM REPORT

SILAGE REMOVAL

AND SOIL DEPLETION

F. Shubeck, B. Lawrensen, D. DuBois
G. Williamson and B. Jurgensen

SOUTHEAST FARM 83-3

Objectives of Experiment

1. By removing all crop residues from the field, but fertilizing adequately, how long can we continue raising corn without a yield decrease?
2. Can we maintain yields where residues were removed by adding manure equal to that generated by the feed produced?

Methods and Procedures

May 26, 1983	-	Broadcast all commercial fertilzer on designated plots.
May 27	-	Barnyard manure was broadcast at 10 tons per acre. Manure and commercial fertilizer were incorporated by double tandem disking. Planted all plots Variety - Curry's 1424 (104 day maturity) Insecticide - Amaze 20G
July 8	-	Broadcast sprayed Aatrex + oil post emergence
July 11	-	Cultivated all plots (1st)
July 20	-	Cultivated all plots (2nd)
October 18	-	Combined all plots Removed cornstalks from designated plots Plowed all plots.

Table 7. Effect of Commercial Fertilizer and Manure Applications on Corn Yield with Intensive Soil Depletion Management

Removed From Plot	Fertilizer Treatment N + P + K	Tons of Silage/acre	Bu of corn per acre
Corn grain only	0 + 0 + 0	---	24
Corn grain only	10 tons manure/acre	---	45
Corn grain only	0 + 0 + 0	---	14
Corn grain only	100 + 17.6 + 33.2	---	35
Grain and stover	0 + 0 + 0	---	18
Grain and stover	10 tons manure/acre	---	44
Grain and stover	0 + 0 + 0	---	22
Grain and stover	100 + 17.6 ± 33.2	---	45

Discussion and Interpretation of Table 7

In plots where both grain and stover were removed since 1975 and nutrients replenished by adding commercial fertilizer or manure, corn yields were just as high as in corresponding plots where corn only was removed and plant residues returned to the soil. The value of returning plant residues in addition to applying fertilizer or manure has not yet become apparent.

S.E. FARM REPORT

DEPTH OF PLOWING

FOR CORN

F. Shubeck, B. Lawrensen, D. DuBois
and G. Williamson

SOUTHEAST FARM 83-4

Objectives of Experiment

1. With the current price of diesel fuel, will it pay to plow deeper than 5 inches?
2. Will the greater breakdown of organic matter and nitrogen release expected from deeper plowing be of significance on yield of corn following soybeans?

Methods and Procedures

June 2, 1983	-	Plowed all 3 depths - 5", 8" and 12" Broadcast sprayed Eradicane + Bladex Incorporated with tandem disk and field cultivator Planted: Variety - Pioneer 3732 Insecticide - None (corn followed soybeans)
July 7	-	Cultivated all plots
July 13	-	Sidedressed plots with ammonium nitrate at 100 lbs a.i. nitrogen per acre.
October 18	-	Combined all plots

Table 8. Effect of Depth of Plowing on Corn Yield

Depth of plowing (inches)	Bu per acre
5	69
8	62
12	65

Discussion and Interpretation of Table 8

On these mellow silty soils, there was no yield advantage for plowing 12 inches deep.

In some areas of the farm where soils have a high content of clay, a compaction problem may develop from implement traffic due to the unusually wet conditions this spring. Deep plowing may be more beneficial in these locations.

A soil high in silt content does not compact as readily as one high in clay. The sharp angular fragments of silt are not as easily compressed as those of the expanding layer minerals that are constituents of most of the clays in this area.

DATE OF PLANTING EARLY, MEDIUM AND LATE MATURING CORN HYBRIDS

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 83-5

Objectives of Experiment

1. How late can an early, medium or late maturing hybrid be planted without decreased yield?
2. If planting is delayed by weather, when should a short or mid-season hybrid be substituted for a full season number?
3. Is there a yield advantage for planting an early maturing hybrid early? or late?

Methods and Procedures

May 23, 1983	- Broadcast 80 + 30 + 20 (oxide) on soybean stubble; incorporated by field cultivator
May 24	- First planting date Varieties - Pioneer 3932A, Pioneer 3709, Pioneer 3965A Insecticide - Amaze 20G Herbicide - Lasso II banded in the row (used on all 4 planting dates)
June 1	- Second planting date
June 8	- Third planting date
June 16	- Fourth planting date
July 8	- Cultivated all plots that could be cultivated
July 14	- Finished cultivating those plots that were too wet on July 8
July 20	- Cultivated
October 18	- Combined all plots
October 26	- Chisel plowed with twists the soybean stubble for next year's corn

Table 9. Effect of Planting Dates and Hybrids on Yield of Corn

Hybrid	Relative Maturity	Planting Dates May 24	June 1	June 8	June 16
Pioneer 3965A	90 day	82	74	77	66
Pioneer 3932A	93 day	78	73	71	47
Pioneer 3709	104 day	86	79	77	62
Average		82.0	75.3	75.0	58.3

Discussion and Interpretation of Table 9

The first planting date was delayed until May 24 due to excessively wet soil conditions. This is about one month later than originally planned. Consequently, a substitution was made for the very late maturing Pioneer 3388 (115-117 day maturity) which was used in previous years.

As expected, the general yield trend was down as planting dates were delayed. However, the downward trend for the early hybrid (P-3965A) was not quite as pronounced as that for the two later maturing hybrids.

The results this year were concentrated on the later end of the planting season with no early planting date or full season hybrid to compare to. Nevertheless, the experiment was planted as soon as weather permitted and at least some useful information was obtained.

Table 10. Effect of Planting Dates and Hybrids on Kernel Moisture at Harvest

Planting Dates	Hybrid Pioneer 3965A (90 day)	Pioneer 3932A (93 day)	Pioneer 3709 (107 day)	Average
May 24	16.1	16.3	18.4	16.9
June 1	17.1	18.0	19.8	18.3
June 8	18.0	20.0	24.5	20.9
June 16	21.6	20.9	26.3	33.9
Average	18.2	18.9	22.3	

Discussion and Interpretation of Table 10

The percent of kernel moisture increased in a normal manner as planting dates were delayed. The interesting thing is that kernel moisture was down to 16-18%-a very acceptable level for planting dates as late as May 24 and June 1 for the two early maturing hybrids.

The 90 day corn was down to 18% moisture when planted as late as June 8.

S.E. FARM REPORT

CHISEL PLOW FOR CORN AND SOYBEANS

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 83-6

Objectives of Experiment

1. How much tillage is necessary for optimum yields?
2. Will fall tillage increase soil moisture storage?
3. Can yields with chisel plowing be maintained equal to that from moldboard plowing?
4. Which is the best type of chisel point to use - sweeps or twists?

Methods and Procedures

October 29, 1982	-	Fall tillage treatments completed for corn and soybeans
May 16, 1983	-	Rotary chopped corn stalks in specified plots
May 23	-	Spring plowed designated plots; tandem disked all plowed plots
May 31	-	Chisel plow treatments in both corn and beans.
	-	Planted all corn plots Variety - Pioneer 3732 Herbicide - Lasso II banded Fertilizer - 100 lbs/acre of 8-32-16 (oxide) banded
June 1	-	Tillage treatments for chisel plow addition completed (corn following oats) Planted chisel plow addition corn Variety - Pioneer 3732 Herbicide - Lasso II banded Fertilizer - 100 lbs/acre of 8-32-16 (oxide) banded
June 2	-	Planted all bean plots Variety - Amcor Herbicide - Lasso II banded Fertilizer - 100 lbs/acre 8-32-16 (oxide) banded
June 3	-	Broadcast sprayed all bean plots with Lexone DF at 0.5 lbs of product per acre (pre-emergence)
July 8	-	Cultivated all corn and bean plots (1st)
July 12	-	Sidedressed nitrogen on all corn plots (11 lbs N a.i./acre)

Methods and Procedures Continued

August 9	-	Performed all summer tillage treatments in chisel plow addition experiment (oats preceding corn).
August 18	-	Rotary chopped grass and broadleaf weeds in chisel plow addition oats stubble. These plots had summer tillage, but weeds were a problem.
August 24	-	Broadcast sprayed all corn plots with 2,4D LV-4E at 1.5 pints per acre using drop nozzles.
September 9	-	Combined soybeans
October 5	-	Combined chisel plow corn
October 16	-	Combined corn in chisel plow addition
October 17	-	Rotary chopped cornstalks, chisel plowed and disked specified plots
October 18	-	Fall plowed all specified plots

Table 11. Effect of Tillage Treatments on Yield of Corn (Corn after Soybeans)

	Tillage Treatments In Fall	Tillage Treatments In Spring	Bu corn/ acre
1.	------------------------	Disk-drag	82
2.	------------------------	Sweeps-drag	66
3.	------------------------	Plow-disk-drag	64
4.	Plow (moldboard)	Disk-drag	78
5.	Chisel plow with twists	Disk-drag	71
6.	Chisel plow with twists	Disk-drag	68
7.	Chisel plow with twists	Sweeps-drag	66
8.	Chisel plow with sweeps	Sweeps-drag	65
9.	------------------------	Disk-drag	71
10.	Chisel plow with twists*	Sweeps-drag	42

* Treatment 10 was unfertilized. All other plots received 100 lbs. per acre of 8-32-16 (oxide) as a sideband starter. In addition, 100 lbs of nitrogen a.i. per acre was applied as a top-dressing when corn was about one foot tall.

Discussion and Interpretation of Table 11

In those plots where spring tillage only was performed, disking the bean stubble yielded as much corn as more intensive tillage with the chisel plow and moldboard plow.

There was a substantial increase in corn yield due to fertilizer.

This is one year that fall plowing (treatment no. 4) yielded more than spring plowing (treatment no. 3).

Discussion and Interpretation of Table 11 Continued

It didn't make much difference in yield sweeps or twists were used in the fall (compare treatment numbers 7 & 8)

When twists were used in the fall, yields from spring disking and spring sweeps were about the same (compare treatments 6 & 7).

It appears that for this year yield differences due to type of shovels on the chisel plow were very small.

Table 12. Effect of Tillage Treatments on Yield of Soybeans (Soybeans after Corn)

	Tillage Treatments		Bu of
	In Fall	In Spring	Soybeans/acre
1.	--------------------	Disk-disk-drag	33
2.	--------------------	Chop-sweeps-disk-drag	35
3.	--------------------	Disk-moldboard plow-disk-drag	35
4.	Disk-moldboard plow	Disk-drag	37
5.	Disk-twists	Disk-drag	40
6.	Chop-twists	Disk-drag	35
7.	Chop-twists	Sweeps-drag	35
8.	Chop-sweeps	Sweeps-drag	35
9.	Disk	Disk-drag	37
10.	Chop-twists*	Sweeps-drag	32

* Treatment 10 was unfertilized. All other plots received 100 lbs. of 8-32-16 (oxide) as a sideband starter.

Discussion and Interpretation of Table 12

Substantial yield increases were obtained by use of the sideband starter fertilizer.

Use of sweeps or twists in the fall had little effect on soybean yields sweeps were used in the spring (compare treatment number 7 & 8).

For 1983, neither type of shovel on the chisel plow, nor time of performance, had much effect on soybean yields.

Table 13. Effect of Tillage Treatments on Yield of Corn (Corn after Oats)

	Tillage Treatments In Summer	In Spring	Bu of corn per acre
1.	Sweeps	Disk-drag	61
2.	Twists	Disk-drag	63
3.	Plow	Disk-drag	70
4.	-------	Plow-disk-drag	64
5.	-------	Sweeps-disk-drag	60
6.	-------	Twists-disk-drag	56
7.	Subsoil	Disk-disk-drag	68
8.	-------	Sweeps-disk-drag*	31

* Treatment 8 was unfertilized. All other plots received 100 lbs per acre of 8-32-16 (oxide) as a sideband starter and 100 lbs/acre of nitrogen applied as a top dressing.

Discussion and Interpretation of Table 13

A large increase in corn yield occurred due to fertilizer - over 100% in some instances.

Plowing small grain stubble in the summer appeared to be one of the more successful tillage treatments. A corn and oats sequence was used in this part of the experiment to see if summer tillage on oats stubble would be more successful than late fall tillage in a corn-soybean sequence.

An average of three summer and spring combination tillage treatments yielded about 4-5 bushels more than comparable spring only tillage treatments, indicating that the summer tillage was beneficial.

DEPTH OF TILLAGE IN DRYLAND

CORN / SOYBEAN ROTATION

F. Shubeck, B. Lawrensen, T. Chisholm
D. DuBois and G. Williamson

S.E. FARM REPORT

SOUTHEAST FARM 83-7

Experimental Plan

Shallow Tillage Treatments
- Plow - Spring moldboard plow, disk twice and drag
- Chisel - Spring chisel plow, spring disk twice and drag
- Disk - Spring disk twice and drag
- Roto - Shallow spring roto-till

Deep tillage treatment
- S treatment - spring subsoil
- N treatment - not subsoiled

Soil: Well drained loam

Cropping Sequence: Corn-soybeans

Methods and Procedures

May 11, 1983	-	Rotary chopped corn stalks
May 31	-	All tillage performed in specified plots. Sprayed Eradicane + Bladex (5 pints + 1.5 qts/acre); 110 lbs of 8-32-16 (oxide) was broadcast for both corn and beans. In addition 143 a.i. lbs of nitrogen/acre was broadcast for corn. The tillage was done after fertilizer and weedicide was applied for incorporation. All plots spike-tooth harrowed except those that were roto-tilled.
June 1	-	Planted all corn plots Variety - Pioneer 3732
June 3	-	Final tillage performed on all soybean plots. Treflan broadcast (1.5 pints/acre) and incorporated with tandem disk except roto-tilled plots. All plots spike tooth harrowed except roto-till. Planted - Corsoy 79 Herbicide - Treflan PPI Broadcast sprayed all soybean plots with Lexone DF at 0.5 lbs of product/acre pre-emergence.
July 7	-	Cultivated all corn plots (1st)
July 8	-	Cultivated all bean plots (1st)

Methods and Procedures Continued

August 24	-	Broadcast sprayed all corn plots with 2,4D Ester LV 4E at 1.5 pints per acre.
October 6	-	Combined all bean plots
October 25	-	Combined all corn plots
October 27	-	Rotary chopped all corn stalks
October 28	-	Subsoiled all specified plots

Table 14. Effect of Different Tillage Treatments on Yield of Corn

Treatment	Average of 4 Replications
Plow subsoiled	70.7
Plow not subsoiled	78.9
Roto-till subsoiled	76.0
Roto-till not subsoiled	72.8
Disk subsoiled	73.3
Disk not subsoiled	74.9
Chisel plow subsoiled	70.9
Chisel plow not subsoiled	62.0

Tillage Average: Plow 74.8 Subsoiled 72.7
Roto-tilled 74.4 Not subsoiled 72.2
Disk 74.1
Chisel plow 66.5

Discussion and Interpretation of Table 14

For corn that followed soybeans there was no consistent yield advantage in favor of deep subsoiling.

Average yields in plowed, roto-tilled and disked plots were very similar. Chisel plowed plots appeared to yield less. No explanation for this apparent decrease is available at this time.

Table 15. Effect of Different Tillage Treatments on Yield of Soybeans

Treatment	Average of 4 Replications
Plow subsoiled	31.7
Plow not subsoiled	31.1
Roto-till subsoiled	34.4
Roto-till no subsoiled	32.2
Disk subsoiled	37.0
Disk not subsoiled	33.2
Chisel Plow subsoiled	30.3
Chisel Plow not subsoiled	33.1

Tillage Average:	Plow 31.4	Subsoiled 33.4
	Roto-till 33.3	Not subsoiled 32.4
	Disk 35.1	
	Chisel Plow 31.7	

Discussion and Interpretation of Table 15

For soybeans, the subsoiled plots yielded about the same as those that were not subsoiled.

Shallow tillage with disk and roto-tiller gave yields equal to those from deeper tillage with the moldboard plow.

This site had a medium textured well-drained upland soil with no heavy clay pan.

F_2 GENERATION

SEED CORN DEMONSTRATION

B. Lawrensen, F. Shubeck and D. DuBois

SOUTHEAST FARM 83-8

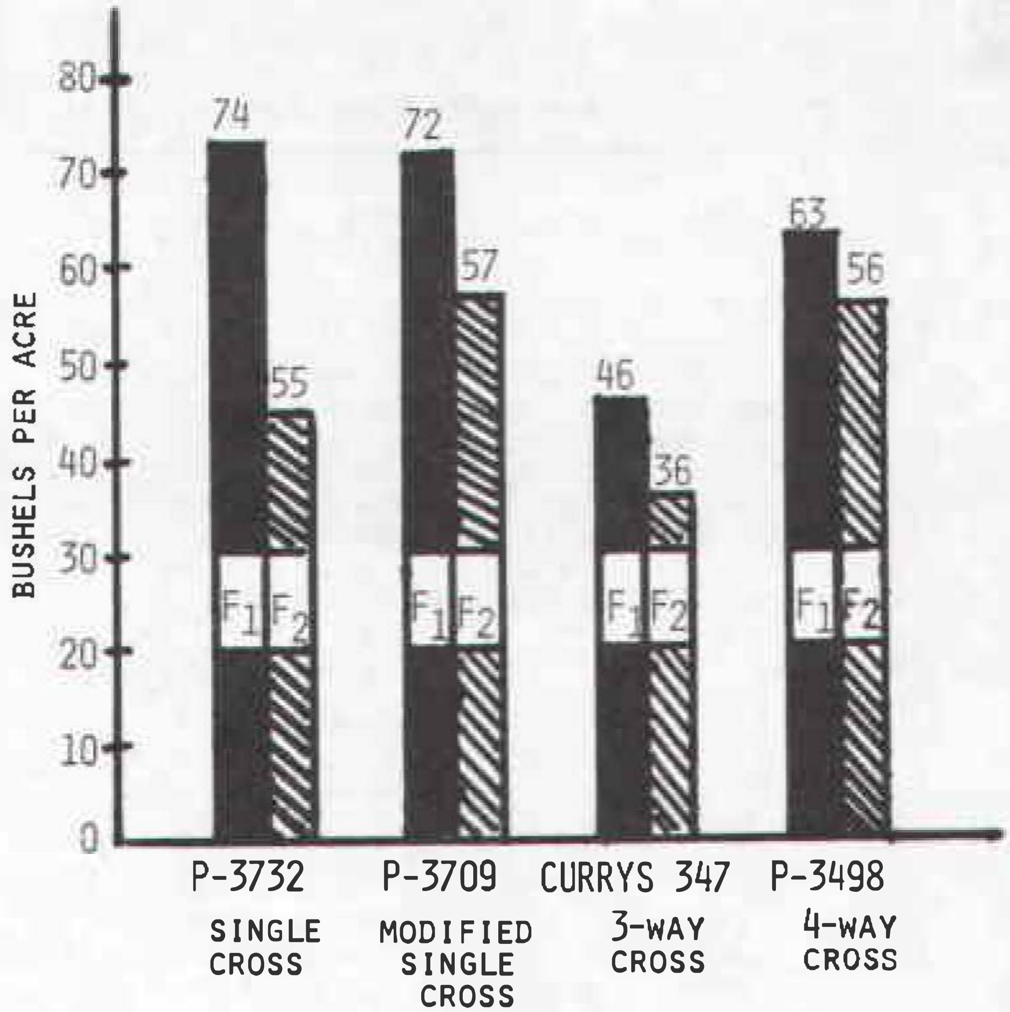
Objectives of Experiment

1. How much loss in corn yield will occur when seed from first generation hybrids is saved and planted?
2. Will there be any yield differences if the seed saved from the first generation hybrid is from a single cross?
3. With the present low price for corn grain and the high price for hybrid seed, will the expected yield decrease due to planting second generation seed (F_2) be enough to justify paying the current seed corn prices?

Methods and Procedures

May 9, 1983	-	Tandem disked plot area
May 10	-	Field cultivated all plots Planted: P-3732, P-3498, Curry's 347, P-3709 Insecticide - Amaze 20G Herbicide - Lasso II banded in the row
June 8-9	-	Field cultivated entire area because of poor stand, then replanted. Lasso II banded again in the row.
July 7	-	Cultivated all plots
July 13	-	All plots sidedressed with 100 lbs/acre actual nitrogen in the form of ammonium nitrate
October 26	-	Combined all plots
October 27	-	Plowed total plot area

FIGURE 3. EFFECT ON CORN YIELD FROM PLANTING SEED SAVED FROM FIRST GENERATION HYBRIDS.



F_1 FIRST GENERATION HYBRID SEED CORN PURCHASED FROM HYBRID DEALERS

F_2 SECOND GENERATION SEED SAVED FROM F_1 PLANTS - HAND SHELLED AND UNGRADED.

Discussion and Interpretation of Figure 3.

Note the yield differences between F_1 and F_2 plants for each of the hybrids used in the experiment. The single cross hybrid had the greatest difference and the 4-way cross the least. The double cross involves 4 different unrelated inbreds and will normally lose the least amount of hybrid vigor in the segregating generations (F_2 etc.), where the inherited characteristics are separated and redistributed.

Note that the highest yields were with the F_1 of the single cross and F_1 of the modified single cross hybrids. Generally speaking, the highest yield potential is with the F_1 of single cross corn and also the greatest decline in yield occurs when this seed is saved and planted the next year.

CONTINUOUS SOYBEANS

B. Lawrensen, F. Shubeck, D. DuBois
and B. Jurgensen

SOUTHEAST FARM 83-9

Objectives of Experiment

1. What are the possibilities of growing continuous soybeans for increasing soil nitrogen and at the same time produce an excellent cash crop? Approximately one pound of nitrogen is returned to the soil for each bushel of soybeans raised.
2. Will disease and insects gradually build up in the soil and reduce yields?
3. Is it possible to build up nitrogen reserves from symbiotic soybean nitrogen?

Methods and Procedures

Note: No previous tillage performed in the fall

May 11, 1983	-	Rotary chopped corn stalks
May 26-27	-	Applied fertilizer, tandem disked and field cultivated, planted corn plots Variety - Curry's 1424 Insecticide - Amaze 20G
May 31	-	Broadcast sprayed treflan on soybean plots (1.5 pints/acre plus Amiben) Incorporated by tandem disking
June 1	-	Spike tooth harrowed all bean plots Planted beans: Variety - Amcor
June 3	-	Sprayed corn plots with Lasso 4 EC pre-emergence at 2.5-3.0 quarts per acre.
July 8	-	Cultivated corn and soybean plots
July 20	-	Cultivated all bean plots
October 6	-	Combined corn and beans
October 28	-	Rotary chopped cornstalks
November 1	-	Plowed plot area

Table 16. Effect of Cropping Sequence on Yield of Soybeans

Cropping Sequence	Fertilizer	Bushels of corn per acre	Bushels of beans per acre
Continuous Beans	Check	---	35
Continuous Beans	Fertilized*	---	34
Rotation Beans and Corn	Check	76	38
Rotation Beans and Corn	Fertilized*	105	35

* Both Continuous and Rotation Soybeans were fertilized with 75 lbs of 6-32-16 (oxide) per acre broadcast. Corn was fertilized with 80 + 30 + 20 (oxide) broadcast.

Discussion and Interpretation of Table 16

Soybeans in a corn-bean rotation appeared to yield a little more than continuous soybeans. This difference was rather small compared to results in some of the previous years.

Corn yields were increased by the fertilizer treatment, but soybeans did not respond to fertilizer at this location. Note that the fertilizer was broadcast. At other locations on the farm where a similar small amount of fertilizer was banded for soybeans, a yield increase was obtained.

LATE PLANTING OF SOYBEANS

B. Lawrensen and F. Shubeck

SOUTHEAST FARM 83-10

Objectives of Experiment

1. When weather forces planting to be delayed until the second week in July, what maturity soybean should be planted?

Methods and Procedures

July 12, 1983	-	Area was field cultivated and planted Varieties - Group 0 - Evans, McCall Group I - Hardin Herbicide - Treflan PPI and Lexone DF pre-emergence
July 18	-	1.25 inches of rain
July 19	-	All varieties had emerged
August 1	-	Cultivated all plots
October 7	-	Combined all three varieties

Table 17. Yields of Late Planted Soybeans

Variety	Maturity Groups	Maturity compared to Corsoy	Bu/acre
Evans	Group 0	14 days earlier than Corsoy	23
McCall	Group 0	24 days earlier than Corsoy	24
Hardin	Group I	3 days earlier than Corsoy	20

Discussion and Interpretation of Table 17

Severe flooding occurred on the Vermillion and James River lowlands in the spring of 1983. Wet conditions also delayed planting on the upland. When the land finally dried enough to prepare a seedbed, the next question was "What variety should I plant?"

Soybeans have a remarkable ability to mature quickly when planted late due to their sensitivity to day length. However, when the planting date is delayed as late as July 12, as in this experiment, and the first killing frost occurs as early as September 21, Group I varieties may not reach their full yield potential.

Discussion and Interpretation of Table 17 Continued

McCall, a Group 0 bean, appears to be an excellent variety for delayed planting. It is more than 3 weeks earlier than Corsoy. Under the 1983 weather conditions at the Experiment Farm, it was just about as tall as Evans, but several days earlier in maturing and it yielded about the same. It is encouraging to see an early maturing variety that can yield so well, when planted so late.

SOYBEAN VARIETY AND ROW SPACING

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 83-11

S.E. FARM REPORT

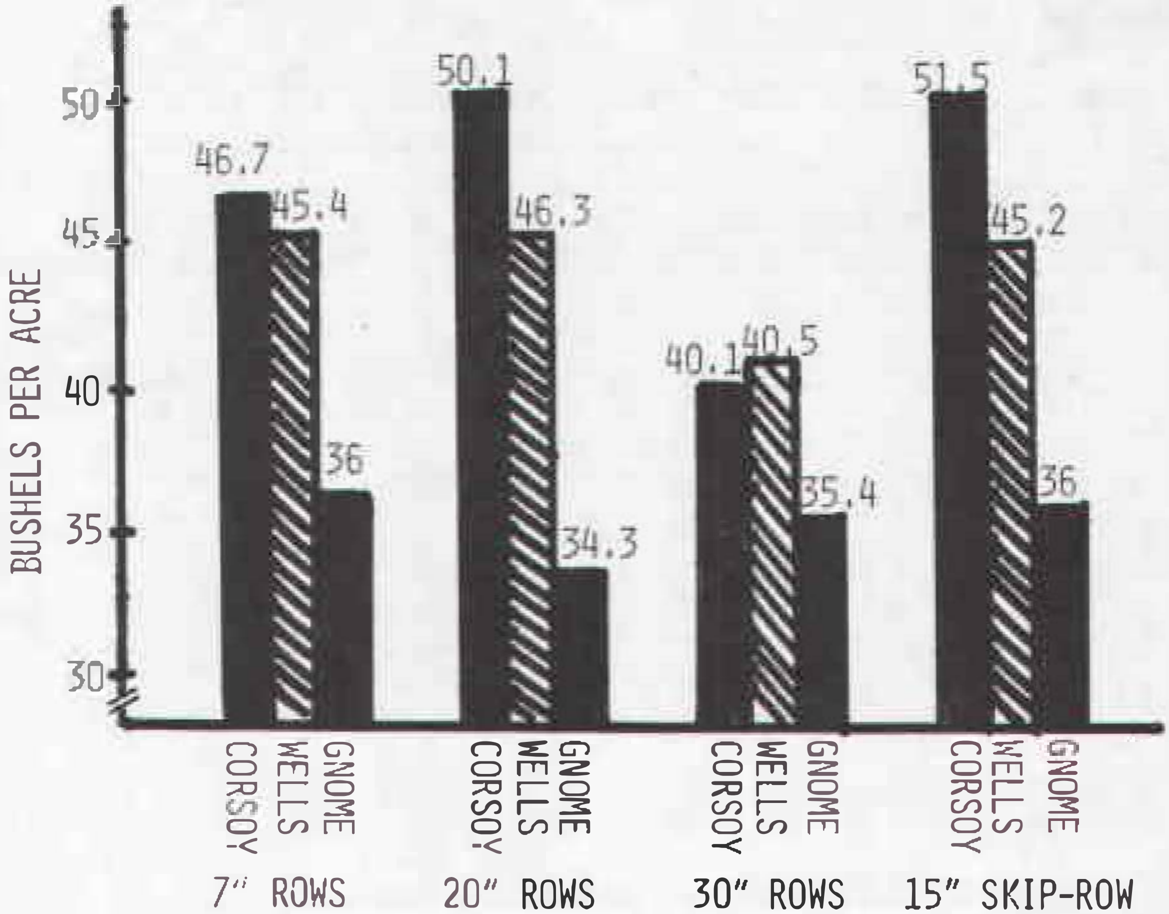
Objectives of Experiment

1. Will it pay to narrow rows from 30 inches down to 7 inches?
2. What can we expect from intermediate row spacings between 30" and 7", like 20" or skip-row allowing room for tractor wheels and a cultivator?
3. Is planting soybeans with a small grain press drill a good practice?
4. Will soybeans with a different type of growth habit respond differently - like branching type (Corsoy); a thin line (Wells); or a semi-dwarf (Gnome)?

Methods and Procedures

September 1, 1982	-	Fall plowed experimental area
June 1, 1983	-	Treflan sprayed over all at 0.75 lbs a.i. per acre and field cultivated twice to incorporate.
June 3	-	Planted all plots Varieties - Corsoy 79, Gnome and Wells II Lexone DF sprayed over all at 0.50 pounds of product per acre.
July 7-8	-	Cultivated all plots
October 5	-	Combined all plots

FIGURE 4. EFFECT OF ROW SPACING AND VARIETIES ON YIELD OF BEANS



Discussion and Interpretation of Figure 4.

For corresponding varieties, yields were fairly similar for all row spacings, except for the 30 inch rows. Corsoy and Wells yielded less in 30 inch spacings than in narrower rows, while Gnome yielded about the same with all spacings.

In previous years when yields were in the 40-50 bushel range, narrow rows often yielded more than 30 inch spacings. With yields less than 30 bushels per acre, differences due to row spacing were not as consistent.

The Gnome variety yielded rather low this year because the experiment was planted late (June 3) due to wet weather, and we had an early frost (September 21). Gnome is a full season bean and it just didn't have a long enough growing season.

There was very little difference in yield between a branching bean (Corsoy) and a thin line variety (Wells) in either solid seedings (7" rows) or in 30 inch rows. These results are not entirely in accordance with the supposition that thin line varieties do better in very narrow rows and branching varieties are better for wider rows.

S.E. FARM REPORT

MOST PROFITABLE ROTATION

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 83-12

Objectives of Experiment

1. How much will commercial fertilizer increase net profits?
2. Is it more profitable to add nitrogen from a commercial fertilizer source or grow a legume in a rotation?
3. Which cropping sequence will bring the greatest net return?
4. Will previous crops have much effect on available moisture at spring planting time?

Methods and Procedures

May 17, 1983	-	Field cultivated all oats plots. Drilled all oats plots with specified fertilizer and legumes. Varieties - Moore oats Thor alfalfa Madrid and white sweet clover mixture
May 23	-	Corn, soybean and sorghum plots field cultivated for seedbed preparation
May 23-24	-	Finished planting corn plots Variety - Curry's 1424 Herbicide - Lasso II banded Starter fertilizer applied - 75 lbs/acre of 6+11+10 (elemental)
May 25	-	Broadcast sprayed Bladex 4L on all corn plots at 1.5 quarts per acre (pre-emergence)
May 27	-	Sprayed Treflan + amiben on all soybean plots (PPI) (field cultivated)
June 2	-	Planted all soybean plots Variety - Amcor Fertilizer - Starter sideband 75 lbs of 6+11+10 (elemental)
June 6	-	Planted all grain sorghum plots Variety - DeKalb 38A Herbicide - Ramrod 20G banded Fertilizer - 75 lbs 6+11+10 (elemental) applied as a side-band starter
July 8	-	Cultivated corn and soybean plots (1st)
July 13	-	Sidedressed ammonium nitrate on all specified plots. (55 lbs N/acre on some and 70 lbs/acre on others).

Methods and Procedures Continued

July 15	-	Cultivated all grain sorghum plots
July 21	-	Cultivated all corn and sorghum plots (2nd)
July 28	-	Cultivated all soybean and sorghum plots
August 5	-	Combined oats plots
August 8	-	Chopped straw on oats plots and spread it uniformly over each plot
August 25	-	Rotary chopped oats plots for weed control
October 6	-	Combined soybeans
October 11	-	Combined grain sorghum
October 19	-	Combined corn plots
October 21	-	Plowed all specified plots in the study.

Discussion and Interpretation of Table 18

The value of good management practices for growing corn were very apparent in 1983 despite the climatic excesses of temperature and moisture. For example, where corn has been grown continuously for two decades, the unfertilized plots yielded only 38 bushels per acre, but plots that were fertilized every year yielded 75 bushels per acre in 1983.

The value of legumes in a rotation was also very apparent. Where no commercial fertilizer was added, corn in the corn-oats sequence yielded 35.9 bushels per acre. When alfalfa was added to the corn-oats sequence, first year corn after alfalfa hay yieled 50.8 bushels - about 15 more bushels per acre. In another unfertilized legume rotation, a sweet clover catch crop increased corn yield 12 bushels more than in a corn-oats sequence.

In a soybean rotation; crops following soybeans were increased in yield. When no fertility was added, corn following soybeans yielded 13 bushels more than corn in the corn-oats sequence. When nitrogen and a starter fertilizer were applied to corn in the corn-soybean rotation, corn yields were the highest in the experiment (83 bu/acre).

Oats yields were very low this year. Excessive moisture early in the season limited growth and high temperatures later in the season reduced yields.

Yields of grain sorghum were more than doubled by commercial fertilizer.

Table 18. Effect of Cropping Sequence and Fertilizer on Crop Yield, 1983

Cropping Sequence	Crop Receiving Fertilizer	Fertilizer lbs/A N + P + K	N Side Dress lbs/A	Oats Bu/A	1st Year Corn Bu/A	2nd Year Corn Bu/A	Soy-beans Bu/A	Sor-ghum Bu/A	Hay Tons/A
1. Continuous Corn	----	0 + 0 + 0	--	----	37.6	----	----	----	----
1. Continuous Corn	Corn	6 +11 +10	70	----	74.5	----	----	----	----
2. Corn-oats	----	0 + 0 + 0	--	11.7	35.9	----	----	----	----
2. Corn-oats	Corn	6 +11 +10	70	----	72.5	----	----	----	----
	Oats	30 + 7 + 0	--	29.6	----	----	----	----	----
3. Corn-Corn-Oats+Alf-Alf Hay	----	0 + 0 + 0	--	9.2	50.8	46.7	----	----	1.03
3. Corn-Corn-Oats+Alf-Alf Hay	Corn	6+ 11 +10	--	----	58.4	----	----	----	----
	Corn	6 +11 +10	70	----	----	65.8	----	----	----
	Oats	15 +26 + 0	--	28.0	----	----	----	----	----
	Alf Resid.	0 + 0 + 0	--	----	----	----	----	----	1.45
4. Oats + Sweet Clover-Corn	----	0 + 0 + 0	--	9.1	47.9	----	----	----	----
4. Oats + Sweet Clover-Corn	Oats	30 + 7 + 0	--	32.2	----	----	----	----	----
	Corn	6 +11 +10	--	----	53.4	----	----	----	----
5. Corn-Soybeans-Oats	----	0 + 0 + 0	--	16.8	31.7	----	24.7	----	----
Corn-Soybeans-Oats	Corn	6 +11 +10	70	----	62.8	----	----	----	----
	Soybeans	6 +11 +10	--	----	----	----	30.3	----	----
	Oats	30 + 7 + 0	--	32.4	----	----	----	----	----
6. Corn-Oats-Soybeans	----	0 + 0 + 0	--	13.1	49.1	----	32.1	----	----
6. Corn-Oats-Soybeans	Corn	6 +11 +10	55	----	83.2	----	----	----	----
	Oats	20 + 7 + 0	--	31.7	----	----	----	----	----
	Soybeans	6 +11 +10	--	----	----	----	33.0	----	----
7. Continuous Grain Sorghum	----	0 + 0 + 0	--	----	----	----	----	16.5	----
7. Continuous Grain Sorghum	Sorghum	6 +11 +10	70	----	----	----	----	49.5	----

BROADCAST VS DRILL

SEEDING FOR OATS

B. Lawrensen, F. Shubeck and D. DuBois

SOUTHEAST FARM 83-13

Objectives of Experiment

1. Will seeding oats with a press drill be better than broadcasting seed at a little higher rate than the drill method?
2. Will there be much difference in stands and tillering between the two methods if seeding rates are similar?

Methods and Procedures

May 16, 1983	-	Tandem disked cornstalks Broadcast fertilizer 40+15+0 (oxide) Tandem disked the non-drilled plots
May 16	-	Planted all plots Variety - Moore; test weight 40 lbs/bu.
August 5	-	All plots combined

Table 19. Effect of Seeding Methods and Rates on Oats Yield

Seeding Method	Seeding Rate Bu/Acre	Yield in Bu/Acre
Drill	2	42
Drill	3	45
Drill	4	51
Broadcast	2	39
Broadcast	3	39
Broadcast	4	46

Discussion and Interpretation of Table 19.

This year the drilling method yielded more oats than broadcasting at every one of the seeding rates.

The heaviest rate of seeding gave the highest bushels per acre for both drill and broadcast plots.

Oats yields were lower than usual due to mid-season drought and heat.

S.E. FARM REPORT

DEGREE OF TILLAGE

FOR CORN

P. Carson, F. Shubeck, B. Lawrensen
D. DuBois and B. Jurgensen

PLANT SCIENCE 83-14

The objective of this experiment is to determine the effect of degree of tillage on the productivity of the soil and to determine if tillage had an effect on the need for added phosphorus. Corn yields are used to measure these differences. The degree of tillage used are as follows:

1. Most Intense - corn on fallow
2. Intense - Continuous Corn (plow-disk)
3. Less Intense - corn following oats (plow-disk)
4. Minimum till - (Plant with a fluted disk opener)

In 1979 the experiment was started and the soil tests are as follows:

O.M. %	P lbs/A	K lbs/A	pH 1:1	Salts mmho/cm
3.3	23	725	6.8	1.0

Rates of phosphorus were included in the trial for the first 2 or 3 years. These had very little effect on the yield, but considerable difficulty was encountered in the establishment of the minimum tillage so the fertilizer treatments have been discontinued for the past 2 years in an effort to establish an equilibrium for each tillage system. The fertilizer treatment will be resumed in the near future.

The yields from the 1983 crop year are reported in Table 20.

Table 20. The Effect of Degree of Tillage on Yield of Corn, S.E. Farm 1983.

Tillage Treatment	Yield**-bu/A	Moisture Content*-%
1. Fallow	77	18.5
2. Continuous Corn	45	22.3
3. Rotation Corn (corn & oats)	94	17.6
4. Minimum Till Corn	48	19.0

* % moisture is of the grain only
** Yields are calculated on a 15% moisture basis

The weather in the fall of 1982 was wet, so it was impossible to plow the continuous corn area. This was followed by a wet spring. As a result, the continuous corn plots were plowed when too wet. This resulted in a poor seedbed, a poor stand and finally in a poor yield.

The minimum till plots were planted when the soil was still too wet resulting in a poor seedbed, poor stand and low yields.

The soil for the other two plots (fallow and rotation corn) was worked in the fall of 1982 and was in good condition for the 1983 crop. The yields from these two treatments were much better. Due to the great differences in seedbeds used for these trials in 1983, it is difficult to make comparisons concerning the effects of the degree of tillage on the yield of corn.

SPRING WHEAT SCAB

EPIDEMIOLOGY STUDY

M. D. Yahnke

PLANT SCIENCE 83-15

Losses due to scab can be highly variable from year to year. However, the past two seasons have been unusually severe, with some fields of spring wheat in eastern South Dakota having a forty to sixty percent level of infection during the 1983 season.

Two experiments were undertaken at the Southeast Farm, with the following objectives:

Experiment One

1. To obtain simple regression models for the relationship between yield loss (y) and percent scab infection (x) at two different sampling dates after anthesis.

2. To determine whether regression differed among varieties.

3. To analyze the main effects and interactions among inoculum levels and varieties with one level of dew period.

Experiment Two

1. To determine if simple regression coefficients differed for slow, medium and fast epidemics.

MATERIALS AND METHODS

Experiment One

Three early cultivars were selected for this experiment, based upon their nearly identical flowering dates to facilitate inoculation and apparent differences in susceptibility. These apparent differences were based upon screening of materials in the greenhouse during the previous winter, as well as upon field observations during the 1982 season.

The three varieties selected, namely Centa, Oslo, and 906R, were planted on May 17, at the rate of 30 seeds per hill. Main plots were composed of each of the three varieties within each replication. Subplots were composed of 12 hills in a 3 by 4 grid, surrounded by 18 hills of WS1809 around the perimeter.

Experiment One - Materials and Methods Continued

Subplots were inoculated on July 12 with *Fusarium graminearum* at the rate of 0, 63,000, 130,000 and 250,000 conidia per square foot. Application of the conidia was done with the equivalent of 92 gallons per acre of water. The plants were then immediately bagged with ice bags, fastened with rubber bands, and then covered with whited paper bags. The purpose of the bags was to maintain moisture and a moderate temperature.

Bags were removed after 48 hours of continuous wetness to allow drydown.

Experiment Two - Materials and Methods

The materials and methods for experiment two were similar except that only the 63,000 conidia per square foot level of inoculum was applied, and there were three different intervals of wetness induced in order to simulate the effects of a slow, medium, and fast epidemic. Also, a consistently scab-susceptible medium maturity variety Olaf was used instead of the early varieties used in experiment one. Those intervals were 24, 48, and 24 plus 24 hours. The last treatment implies that there were two 24 hour wetness periods, with a 24 hour drydown period in between.

RESULTS AND DISCUSSION

One week after inoculation, when adequate time for symptom development had occurred, and the first samples were to have been taken, no symptom development was observed in either experiment.

Although no obvious scalding symptoms appeared on the plants, it seems reasonable to assume that the temperature reached in the bags was excessive for the fungal organism. The other possibilities of resistance in the host, lack of free water on the plant, or loss of isolate pathogenicity in the host are not consistent with field observations in the case of the first two points and very unlikely in the latter case.

In conclusion, future field research related to scab epidemiology would probably be best conducted on irrigated land to achieve consistent moisture for dew formation or to maintain wetness directly. Inoculum could be supplied in one of three ways: Planting on corn stubble, particularly where Fusarium stalk rot was a problem, applying a measured dosage of sterilized grain on which *Fusarium graminearum* was grown, or applying conidia with a sprayer, as was done in the experimental work described above.

EFFICACY OF POAST APPLIED WITH CONTROLLED DROPLET APPLICATORS

W. E. Arnold and B. C. Laube

S.E. FARM REPORT

PLANT SCIENCE 83-16

Study was established at the Southeast South Dakota Agricultural Research and Extension Center, Beresford, SD in 1983. The experimental area has been in a soybeans-corn cropping pattern. Soil on the research site was a well drained silty clay loam consisting of 22.8% sand, 49.3% silt, 27.9% clay, 3.8% organic matter, and pH 5.9. 'Wells II' soybeans were planted on June 7 at 1.5 inch depth in 30 inch rows at 60 lb/A. The study was a three replication randomized complete block with plots 10 x 50 feet. Treatments were applied August 3. Plant growth stages at application were: Soybeans 20 to 24 inches, volunteer corn 36 to 48 inches. Application conditions on the treatment date were: time 10:00 am, cloud cover clear, relative humidity 65%, air temperature 92° F, dew point 78°F, wind E at 1 to 2 mph, soil/leaf moisture dry, soil moisture (2 inch depth) moist, soil temperature 92°F, soil condition fine. Rainfall was 0.24 inches the first week after application and 0.03 inches the second week after application. Treatments were applied with a IHC Cub sprayer using flat fan and rotary nozzles (CDA's). Tee Jet 730039 nozzles were used to apply the water carrier at 2 gpa at 3.5 mph and 16.5 psi through a 10 ft wide boom operated 18 inches high. Soybean oil carrier was applied at 2 gpa with Tee Jet 730039 nozzles at 3.5 mph and 19.0 psi. The soybean oil carrier was mixed 2 parts water:1 part soybean oil to achieve a proper spray pattern with the fan nozzles. Controlled droplet applicators were used to apply the water carrier at 1.2 gpa at 3 mph and 20 psi through a 10 ft wide boom operated 12 inches high. Soybean oil was applied with CDA's at 1.0 gpa at 3 mph and 20 psi. Plots were not harvested.

Volunteer corn was much larger than recommended for proper control with Poast, therefore control did not reach the level that would be expected. Treatments applied in the water carrier generally gave better control than those with soybean oil. Control did not differ between CDA and flat fan applications in this experiment.

Table 21. Efficacy of Poast applied with Controlled Droplet Applicators

Applicator	Herbicide rate	Soybean oil[a]	Water	COC[b]	Volunteer Corn control
	(lb ai/A)		(quarts/A)		(%)
Flat fan	.048	---	7	1	11
Flat fan	.096	---	7	1	80
Flat Fan	.191	---	7	1	89
Flat Fan	.048	5.3	2.7	--	26
Flat Fan	.096	5.3	2.7	--	41
Flat Fan	.191	5.3	2.7	--	16
CDA	.048	---	3.8	1	23
CDA	.096	---	3.8	1	74
CDA	.191	---	3.8	1	85
CDA	.048	4	---	--	3
CDA	.096	4	---	--	30
CDA	.191	4	---	--	43
Weedy Check	----				0
LSD (5 percent)					20

[a]Soybean oil = fully refined soybean oil with 7% emulsifier added.

[b]COC = petroleum crop oil concentrate

S.E. FARM REPORT

POSTEMERGENCE CONTROL OF COCKLEBUR IN CORN

W. E. Arnold, M. A. Wrucke and B. C. Laube

PLANT SCIENCE 83-17

Project was established at the Southeast South Dakota Agricultural Research and Extension Center, Beresford, SD in 1983. The experimental area has been in a corn-soybeans cropping pattern. Soil on the research site was a well-drained silty clay loam consisting of 22.8% sand, 49.3% silt, 27.9% clay, 3.8% organic matter, and pH 5.9. Sokota TS60 corn was planted May 25, 1.5 inches deep in 30 inch rows at 18,000 plants per acre. The study was a four replication randomized complete block 10 by 40 ft plots. Treatments were applied June 24 and July 8. Corn was 4-5 inches tall at the first application time. Application information for the first treatment date is: time 10:00 p.m., clear skies, relative humidity 85%, air temperature 79°F, dew point 74°F, wind (mph) 2-5 S, soil/leaf moisture dry, soil moisture (2 inch depth) moist, soil temperature 80° F, rainfall first week after application 4.97 inches, rainfall second week after application 0.67 inches. Corn was 7-9 inches tall at the second application time. Application information for the second treatment date is: time 10:00 p.m., clear skies, relative humidity 70%, air temperature 84° F, dew point 73° F, wind (mph) 2-4 S, soil/leaf moisture dry, soil moisture (2 inch depth) moist, soil temperature 84° F, no rainfall was received the first week after application, rainfall second week after application 1.27 inches. At both spray stages, treatments were applied with one-wheel bicycle sprayer using Tee Jet 8002 nozzles applying 20 gallons per acre at 2.5 mph and 40 psi through a 10 ft wide boom operated 18 inches high. Three rows 37 ft long were harvested on 9-23-83 at 25% moisture. Yields were adjusted for moisture at 15%.

Yield was significantly higher than the weedy check with all treatments except bromoxynil at 0.38 lb/A rate. No visual injury or differences in lodging were observed with any treatment. Best cocklebur control occurred with both dicamba treatments and the bromoxynil plus cyanazine treatment. Control was maintained throughout the season with all treatments.

Table 22. Postemergence control of cocklebur in corn (Arnold, Wrucke and Laube)

Herbicide	Rate	Application	% Weed Control Cocb 7-28-83	Cocb 9-23-83	Corn Yield (bu/A)
Bromoxynil	0.25	4-in	66	62	109
Bromoxynil	0.38	4-in	78	77	91
Bentazon + Crop oil conc.	1.0 + 1 qt.	4-in	67	70	109
Dicamba	.50	4-in	95	94	112
Dicamba	0.25	7-in	98	99	103
Bromoxynil + cyanazine	0.25 + 1.60	4-in	94	93	106
Hand weeded check			98	97	103
Weedy check			0	0	82
LSD (5 percent)			12	12	21

BROADLEAF HERBICIDE SCREENING IN SOYBEANS

W. E. Arnold and M. A. Wrucke

S.E. FARM REPORT

PLANT SCIENCE 83-18

Project was established at the Southeast South Dakota Agricultural Research and Extension Center, Beresford, SD in 1983. The experimental area has been in a soybeans-corn cropping pattern. Soil on the research site was a well-drained silty clay loam consisting of 22.8% sand, 49.3% silt, 27.9% clay, 3.8% organic matter and pH 5.9. 'Hodgson 78' soybeans were planted May 25 1.5 inch deep in 30 inch rows at 60 lb/A. The study was a four replication randomized complete block 10 by 35 ft plots.

Treatments were applied May 25, May 26 and July 8. Plant growth stage at the first application was: soybeans ppi. Application conditions for the first treatment date were: time 1:45 p.m., cloud cover clear, relative humidity 40%, air temperature 70°F, dew point 45°F, wind SE at 4 to 8 mph, soil/leaf moisture moist, soil moisture (2 inch depth) moist, soil temperature 64°F, soil condition fine. Rainfall was 0.08 and 0.07 inch the first and second week after application, respectively.

Plant growth stages at the second application were: soybeans popi and pre. Application conditions for the second treatment date were: time 12:30 a.m., cloud cover partly cloudy, relative humidity 50%, air temperature 50°F, dew point 33°F, wind SE at 5 to 8 mph, soil/leaf moisture dry, soil moisture (2 inch depth) moist, soil temperature 58° F, soil condition fine. Rainfall was 0.08 and 0.07 inch the first and second week after application, respectively.

Plant growth stages at the third application were: Soybeans post, smooth pigweed 1 to 3 inches, foxtail spp. 2 to 4 inches. Application conditions for the third treatment date were: time 1:30 a.m., cloud cover clear, relative humidity 80%, air temperature 75°F, dew point 67°F, wind S at 2 to 6 mph, soil/leaf moisture dry, soil moisture (2 inch depth) moist, soil temperature 80°F, soil condition fine. No rainfall occurred the first week after application. Rainfall was 1.27 inch the second week after application.

First and second stage treatments were applied with a IHC Cub sprayer using TeeJet 8002 nozzles applying 20 gpa at 3 mph and 40 psi through a 10 ft wide boom operate 18 inches high.

Third stage treatments were applied with a one wheel bicycle sprayer using TeeJet 8002 nozzles applying 20 gpa at 2.5 mph and 39 psi through a 10 ft wide boom operating 18 inches high. A 7.5 by 32 ft area was harvested October 14 with a small plot combine.

All treatments provided good to excellent foxtail spp. control. All treatments with greater than 50% smooth pigweed control yielded significantly more than the untreated check. Smooth pigweed control increased as SC-1056 rate increased, with the 0.2 lb/A rate giving excellent control. Preemergence applications of SD-95481 gave better weed control than preplant incorporated applications. Excellent weed control and highest yield was attained with pre-emergence SD-95481 at 0.75 lb/A plus metribuzin at 0.38 lb/A.

Table 23. Broadleaf herbicide screening in soybeans

Herbicide	Rate	Application	% Weed Control			Yield
			Ftsp	Smpw	Colq	
	(lb/A)		10-14-83	10-14-83	10-14-38	(bu/A)
SC-1056	0.05	Pre[a]	96	79	94	34.0
SC-1056	0.10	Pre	98	82	96	32.4
SC-1056	0.20	Pre	98	97	99	32.6
Dinitramine + bentazon	0.5 + 0.75	PPI[b]+2 inch	95	80	78	31.6
Prodiamine + bentazon	0.5 + 0.75	PPI +2 inch	95	93	85	31.8
Trifluralin + bentazon	0.75 + 0.75	PPI +2 inch	97	82	77	32.9
Alachlor	3.0	POPI[c]	94	54	0	31.3
SD-95481	0.5	POPI	69	6	0	16.6
SD-95481	0.75	POPI	96	21	32	22.7
SD-95481 + metribuzin	0.5 + 0.38	POPI	86	26	12	19.8
SD-95481	0.75	Pre	95	27	49	25.4
SD-95481	1.0	Pre	97	55	78	30.6
SD-95481 + metribuzin	0.75 + 0.38	Pre	98	96	85	36.5
Weedy Check			0	0	0	19.9
Handweeded Check			98	98	98	34.6
LSD (5 percent)			17.8	32.3	26.7	8.8

[a]Pre = pre-emergence

[b]PPI = pre-plant incorporated

[c]POPI = post plant incorporated

EVALUATION OF AC 252,214 FOR WEED CONTROL IN SOYBEANS

W. E. Arnold and S. R. Gylling

S.E. FARM REPORT

PLANT SCIENCE 83-19

Study was established at the Southeast South Dakota Agricultural Research and Extension Center, Beresford, SD in 1983. The experimental area has been in a soybeans-corn cropping pattern. Soil on the research site was a well-drained silty clay loam consisting of 22.8% sand, 49.3% silt, 27.9% clay, 3.8% organic matter and pH 5.9. 'Hodgson 78' soybeans were planted on May 25 at 1.5 inch depth in 30 inch rows at 60 lb/A. The study was a four replication randomized complete block on plots 10 by 35 ft.

Treatments were applied May 25, May 26 and July 9. Plant growth stage at the first application was: soybeans ppi. Application conditions for the first treatment date were: time 3:00 p.m., cloud cover clear, relative humidity 40%, air temperature 70°F, dew point 45°F, wind S at 4 to 8 mph, soil/leaf moisture moist, soil moisture (2 inch depth) moist, soil temperature 64°F, soil condition lumpy, rainfall was 0.08 and 0.07 inch for the first and second week after application, respectively.

Plant growth stage at the second application was: soybeans pre. Application conditions for the second treatment date were: time 1:45 a.m., cloud cover partly cloudy, relative humidity 60%, air temperature 50°F, dew point 33°F, wind SE at 5 to 8 mph, soil/leaf moisture dry, soil moisture (2 inch depth) moist, soil temperature 58°F, soil condition lumpy, rainfall was 0.08 and 0.07 inch for the first and second week after application, respectively.

Plant growth stages at the third application were: soybeans 7 inches, foxtail spp. 2 to 8 inches, smooth pigweed 2 to 4 inches, common lambsquarters 3 to 8 inches, common cocklebur 3 to 8 inches. Application conditions for the third treatment date were: time 2:30 a.m., cloud cover clear, relative humidity 80%, air temperature 70°F, dew point 63°F, wind S at 3 to 5 mph, soil/leaf moisture dry, soil moisture (2 inch depth) moist, soil temperature 75°F, soil condition fine. No rainfall occurred the first week after application. Rainfall was 1.27 inch the second week after application.

First and second stage treatments were applied with a IHC Cub sprayer using TeeJet 8002 nozzles applying 20 gpa at 3 mph and 40 psi through a 10 ft wide boom operated 18 inches high. Third stage treatments were applied with a one wheel bicycle sprayer using TeeJet 8002 nozzles applying 20 gpa at 2.5 mph and

37 psi through a 10 ft. wide boom operated 18 inches high. A 7.5 by 32 ft. area was harvested October 14 using a small plot combine.

Postemergence applications of AC 252,214 provided better weed control than either preplant incorporated or pre-emergence applications. Combinations of AC 252,214 with preplant incorporated pendimethalin or with preemergence alachlor significantly increased control of foxtail spp. and smooth pigweed. Split applications of preplant incorporated pendiem-thalin plus postemergence AC 252,214 at 0.25 lb/A gave foxtail spp. control similar to sethoxydim. Highest yields were with postemergence AC 252,214 at 0.25 lb/A.

Table 24. Evaluation of AC 252,214 for Weed Control in Soybeans (Arnold and Gylling).

Herbicide	Rate (lb/A)	Application	% Weed Control Ftsp 7-28-83	Smpw 7-28-83	Ftsp 10-14-83	Smpw 10-14-83	Yield
AC 252,214	.125	PPI	0	47	52	55	30.3
AC 252,214	.25	PPI	10	25	81	50	32.4
AC 252,214 + pendimethalin	.125 + 1.25	PPI	97	97	97	89	38.0
AC 252,214 + pendimethalin	.25 + 1.25	PPI	98	97	98	93	37.0
Metribuzin + pendimethalin	.38 + 1.25	PPI	98	97	98	95	37.4
AC 252,214	.125	Pre	0	31	30	51	27.9
AC 252,214	.25	Pre	0	23	39	31	28.5
AC 252,214 + alachlor	.125 + 2.0	Pre	92	88	91	85	33.1
AC 252,214 + alachlor	.25 + 2.0	Pre	96	98	93	98	38.7
Metribuzin + alachlor	.38 + 2.0	Pre	95	99	95	97	34.9
AC 252,214	.125	1 inch	62	92	69	81	36.0
AC 252,214[a]	.25	1 inch	88	90	93	85	39.4
Pendimethalin + AC 252,214[a]	1.25 + .125	PPI + 1 inch	98	98	97	96	38.4
Pendimethalin + AC 252,214[a]	1.25 + .25	PPI + 1 inch	99	98	98	98	39.1
Sethoxydim[b]	.20	1 inch	95	0	94	20	26.8
Bentazon[b]	.75	1 inch	0	38	37	30	28.7
Weedy Check			0	0	0	0	25.0
LSD (5 percent)			13.2	24.9	29.9	20.7	6.5

[a]Applied with Tween 20 surfactant at 0.25% v/v.
[b]Applied with crop oil concentrate at 1.0 quarter per acre.

RESIDUAL INFLUENCE OF LARGE MANURE ADDITIONS ON SOIL PROPERTIES AND CORN GROWTH

P. Fixen and R. Gelderman

PLANT SCIENCE 83-20

This study was initiated in 1974 to study the effects of application of large quantities of manure on crops, soils or runoff water. This report contains information on the residual effects of the manure applications made in 1974 and 1975.

Objectives

1. Determine the influence of past large manure applications on soil test levels.
2. Determine the influence of past large manure applications on the grain yield and leaf composition of corn.

Materials and Methods

The experiment is located on an Egan silty clay loam. Egan soils are relatively well drained soils that have developed from a silty cap over glacial till.

The study is in a completely randomized design with four replications. Treatments consisted of a check plus four levels of a low salt manure and four levels of a high salt manure. Only the low salt treatments are reported here. No fertilizer has been applied to these plots since the initial manure treatments were made.

Curry 1424 was planted on May 26, 1983. Amaze 20G was used for insect control and atrazine plus oil was applied on July 8 for weed control. Leaf samples were taken at silk initiation but analyses are not yet completed.

Results

Soil samples taken in 1982 and reported in the 1982 SE Farm report, showed that the manure additions increased soil organic matter, soil nitrate, available P, available K, salt content, and available zinc.

The experimental site was very wet in the spring and planting was delayed until the end of May. June was also excessively wet, but the end of July and August was very dry. The net effect of this poor weather and planting date was a very low yield level for this experiment. Grain yield and moisture are reported in Table 25. Differences were not significant.

Table 25. Influence of Past Heavy Manure Additions on Corn Grain Yield and Grain Moisture, SE Farm 1983

Applied Manure	Grain Yield	Grain H_2O
tons DM/A	bu/A, 15.5%	%
0	43	21.7
40	44	21.7
89	39	21.6
125	41	21.7
161	37	21.8
Significance	NS	NS
C.V., %	10	5

A COMPARISON OF SEVERAL
SOIL TESTING LABORATORY FERTILIZER RECOMMENDATIONS

P. Fixen, R. Gelderman, J. Gerwing
B. Lawrensen and B. Jurgensen

S.E. FARM REPORT
PLANT SCIENCE 83-21

Many soil test laboratory services are available to South Dakota farmers. Although accurate figures are not available, it is estimated 20-30 percent of the soil samples taken in South Dakota are tested by commercial laboratories. Most of the remainder of the samples are tested by the state's land grant college laboratory located at South Dakota State University at Brookings. Some samples are tested by bordering state universities.

The purpose of a soil testing laboratory is to evaluate the nutrient status of a soil and provide a fertilizer recommendation to meet the nutrient needs of the crop. This recommendation must also be economical. It must be profitable to fertilize the crop.

Variations in fertilizer recommendations between laboratories have been known for some time. These variations are a concern to many. These differences may be due to at least two factors: (1) a difference in analysis results, or (2) a difference in interpretation of the results.

The objectives of this experiment were to make comparisons of soil test recommendations from several laboratories. The effect of the recommendations on yield and fertilizer costs per acre are also to be evaluated.

Methods and Procedures

The experiment was conducted at the Southeast Experiment Farm east of the office building. The soil at this site was an Egan silty clay loam. Egan soils are well drained silty clay loams that formed in silty drift over glacial till. This was the third year for the continuous corn experiment. Each plot is in exactly the same place as the previous year. A yield goal of 120 bushels/acre corn was set for the experiment.

Soil samples were taken from the experimental site in the spring of 1982. A composite soil sample was taken from each lab treatment area, mixed, dried, and sent to the appropriate laboratory. None of the labs, including the SDSU lab, were aware that these samples were to be used as the basis for a comparative study. The samples were sub-divided into 0-6" and 6-24" samples to evaluate nitrate-nitrogen. All fertilizer recommended by each lab was assumed to be needed and applied.

Methods and Procedures Continued

The experimental site was spring plowed and disked three times prior to planting. Currys 1424 was planted at a rate of 21,800 seeds/acre on June 1. The late planting date was due to excessively wet soil conditions. The seedbed was cloddy at planting which eventually resulted in high seed mortality and a poor stand. Harvest population was an uneven 14,400 plants per acre, considerably below optimum. Lasso II was banded over the row with the planter, and atrazine and oil was applied on July 9. Amaze 20G was used for insect control.

Fertilizer treatments were broadcast and disked in the day of planting. Laboratories were labeled A, B, C, etc. Fertilizer and lime costs were estimated averages paid by farmers in the spring of 1982. They were set on a per pound basis as follows:

Nitrogen	$0.22
Phosphorus	$0.22
Potassium	$0.12
Sulfur	$0.33
Zinc	$0.97
Lime	$28.00/ton* (excluding transportation

*Tons of effective calcium carbonate equivalent (ECCE).

These values were used to calculate fertilizer/lime costs per acre. Application costs were not considered. The treatments were arranged in a randomized complete block design with four replications. The plots were harvested by hand with 2-3 rows of kernels from 12 ears taken for moisture determination.

Results

Results of soil tests are reported in Table 26. Much of the variability between labs for the nitrate and phosphorus tests is due to differences in fertilizer applied the year before as recommended by each lab. This was verified by SDSU analysis of subsamples from the samples sent to other labs. Results of the other tests are generally quite similar.

Recommendations for 1983 from each lab and the cost of the fertilizer recommended are reported in Table 27. The costs varied from $31.90/acre to $40.88/acre.

Yields were very depressed in 1983 (Table 28) and far from the 120 bu/A yield goal. The low yield level was due to a combination of factors, including poor stand, late planting date, excessive rain in June, drought in late July and August, and poor pollination.

A large yield response occurred to all 5 of the recommendation programs but only minor differences in yield exist between the programs. Furthermore, there is no apparent relationship between the fertilizer recommendation differences and the observed yield differences.

The two-year yield average and the total cost of the fertilizer recommended are also reported in Table 28. The differences are due largely to lime recommendations made in 1982.

No conclusions should be drawn directly from this study since each program needs to be evaluated on a long-term basis. This study will be continued.

Table 26. Soil Tests from 1983 SE Farm Lab Comparison Study

Measurement	SDSU	A	B	C	D
Nitrate-N, lbs/A-2'	31	26	79	22	----
O.M., %	3.3	2.9	4.3	3.3	3.3
Phosphorus, lbs/A	34	46	40	34**	42
Potassium, lbs/A	710	608	748	682	640
pH	7.0	6.6	6.8	6.3	6.8
Salts, mmho/cm	0.4	0.3	---	0.1	---
Zinc, ppm	1.5	1.2	1.8	1.6	1.3
Iron, ppm	52	78	85	99	----
Manganese, ppm	36	37	38	48	----
Copper, ppm	3.0	1.6	1.6	2.1	----
Sulfur (SO_4), ppm	68*	10	4	15	19
Boron, ppm	1.5	0.8	1.4	0.9	----
Magnesium, ppm	646	746	844	818	----
Calcium, ppm	2980	2842	1960	2804	----
Sodium, ppm	----	19	----	39	----
CEC, mg/100 g	----	21	18	22	----

* Average concentration, 0-24"

** Mehlich Test

Table 27. Suggested Fertilizer Recommendations for 120 bu/A Corn, SE Farm 1983

Fertilizer Nutrient	Lab: SDSU	A	B	C	D
Nitrogen, lbs/A	125	100	100	130	130
Phosphorus, lbs/A (P_2O_5)	20	55	50	30	45
Potassium, lbs/A (K_2O)	0	30	30	0	0
Sulfur, lbs/A	0	0	14	0	0
Zinc, lbs/A	0	2	2	0	0
Lime, lbs/A	0	0	0	0	0
Fertilizer Cost/A	$31.90	$39.64	$40.88	$35.20	$38.50

* Effective calcium carbonate equivalent.

Table 28. Influence of Laboratory Fertility Programs on Yields and Fertilizer Costs, 1982-1983

Laboratory	Year: 1982	1983	Yield Avg.	Total Cost
	bu/A			$
Check	80	25	53	0
SDSU	95	47	71	65.10
A	97	39	68	126.34
B	99	45	72	126.10
C	118	38	78	48.10
D	106	51	79	106.45
LSD .05	22	10		
CV, %	15	16		

S.E. FARM REPORT

RESIDUAL PHOSPHORUS

CORN YIELD RESPONSE

P. Fixen, P. Carson, R. Gelderman
B. Lawrensen and R. Nettleton

PLANT SCIENCE 83-22

Objectives

1. To determine the effects of residual fertilizer phosphorus on corn yields.
2. To monitor changes in the P soil test as phosphorus is removed through crop yields.

Materials and Methods

1. The experiment is located on an Egan silty clay loam (Udic haplustoll) south of the office building at the Southeast Experiment Farm. Egan soils are deep, friable, well-drained silty clay loams developed in a silty cap over glacial till.
2. This experiment was established in 1964 to study the effect of various rates of phosphorus (P) fertilizer on the yield of corn. From 1964-1967 five rates of P (0, 10, 20, 40, and 160 lbs. per acre) were broadcast and plowed down annually. Each of the phosphorus treatments was divided into thirds, with one-third receiving about 10 lbs of P as a starter fertilizer from 1964 through 1967, one-third receiving 10 lbs of Zn per acre in 1964 and 1965 plus 10 lbs of P as a starter, and one-third receiving no additional fertilizer. In the spring of 1978 an additional 13 lbs of P was applied to the plots which received zinc in the 1960's.
3. Cropping and soil sampling history since 1973:

73-No crop, spring sampling	79 Corn
74-Alfalfa	80-No crop (hail), spring sampling
75-Alfalfa	
76-Alfalfa	81-Grain sorghum
77-Alfalfa, after 1st cutting	82-Corn
78 Alfalfa	83-Corn,spring sampling

4. Curry 1424 was planted on May 5, 1983. Eradicane plus Bladex plus atrazine was applied preplant for weed control and Amaze 20G was used for insect control. Nitrogen was applied as ammonium nitrate at a rate of 113 lbs N/A.

Results and Discussion

Results of the 1983 soil sampling showed that the site tests 3.5% organic matter, has a pH of 6.0, and exchangeable K of 450 lbs/A. The four plots in the northeast corner have less

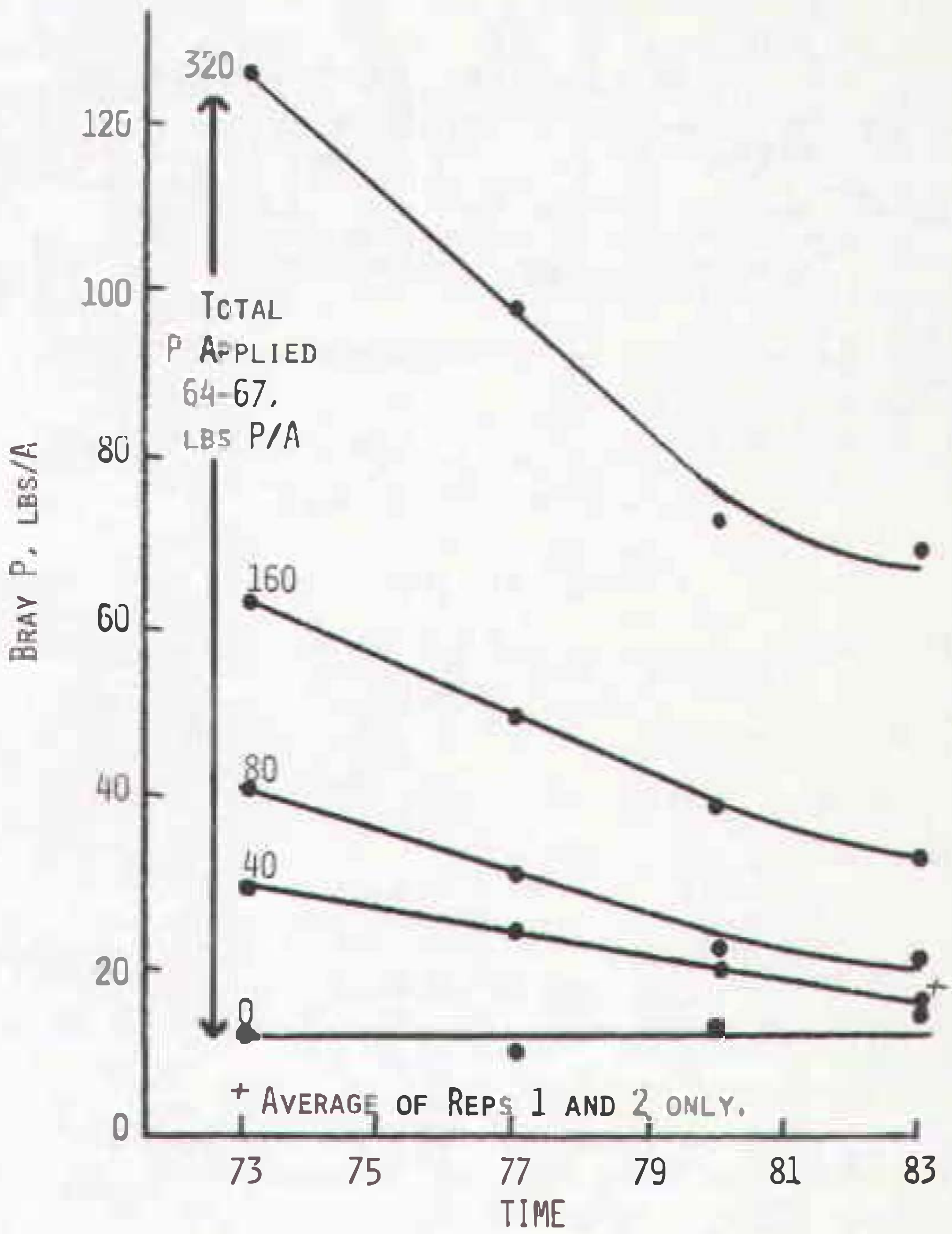


Fig. 5. Soil phosphorus depletion in an Egan silty clay loam, Southeastern South Dakota.

slope than the rest of the study and tested slightly lower in pH and organic matter (5.7, 3.5%) and higher in potassium and phosphorus. Soil test P levels for 1973 through 1983 are graphed in Figure 5. The P level prior to the 1983 sampling had been dropping at a rate of about 8% of the soil test level per year in a linear fashion. The 1983 sampling, however, indicates that the decline is beginning to slow down since rather minor differences were found between the 1980 and 1983 samplings. These plots will be sampled again in 1984 to verify this apparent change in rate of decline.

The spring was extremely wet at this location in 1983. This was one of the few sites that could be planted on time. However, the northeast corner (discussed above) remained wet in the early summer and much of the corn in these four plots flooded out. These plots are not included in the yields averages. Grain yields are reported in Table 29 for 1982 and 1983.

Table 29. Influence of Residual P on Corn Grain Yield on an Egan S:Cl, SE Farm 1982-1983.

Soil test level[1]	Grain Yield 1982	1983	Avg.
15	97	102	100
16[2]	103	97	100
21	94	103	99
33	93	106	100
70	84	107	96
Significance	NS	NS	

[1]Spring 1983, 0-4"

[2]Average of reps 1 and 2 only.

Corn did not respond to soil test P in either 1982 or 1983 at this location even though the check soil test level is in the low category. Leaf samples were collected at silking, however, analysis is not yet complete. Grain sorghum grown on these plots in 1981 did respond to soil test level and did not reach 98% of maximum yield until a soil test level of 38 lbs/A was reached. These plots will again be planted to corn in 1984.

1983 PERFORMANCE TRIALS OF SMALL GRAINS, GRAIN SORGHUM, SOYBEANS AND CORN AT THE SOUTHEAST EXPERIMENT FARM

S.E. FARM REPORT

J. J. Bonnemann

PLANT SCIENCE 83-23

Performance trials with corn, grain sorghum, soybeans and small grains (oats, barley, spring wheat and durum) were seeded at the Southeast Experiment Farm for 1983 harvest. The barley trials were abandoned.

The small grains were seeded on April 28, 1983 into a saturated soil profile. The wet, cold field conditions delayed rapid spring growth and the excessive precipitation in June saturated the soil again and slowed growth even more. The trials then went into an extended period of very limited precipitation and hot temperatures. The high daily temperatures were often accompanied by high velocity winds and evapo-transpiration exceeded the ability of the roots to provide ample moisture to maintain growth. The severe stress on the moisture delayed plants resulted in poor to very poor yields of all small grains in the trials. Data in this report are bushels per acre, test weight, height, lodging and protein where available. Additional results for small grains are found in Plant Science Pamphlet #75, 1983 Small Grain Variety Trials.

Soybeans were also grown at the southeast farm in 1983. There were 4 replications of public and proprietary varieties included in the trial. The proprietary entries are the choice of the participating companies and a nominal fee is charged to partially offset trial costs. Regional USDA trials were also grown in the same area.

The soybean trials were seeded on May 26 in paired rows 16 feet long. All plots were harvested on October 12 and 13 with an Almaco small-plot combine. The yields averaged 53 bushels per acre. There was virtually no lodging and quality was quite good with some seed discoloration due to climatic conditions. Many varieties, both proprietary and public, performed quite well. The later lines would have suffered had a very hard freeze occurred instead of the light frost on September 21.

Additional information on the trial and all trials grown in the area can be found in Plant Science Pamphlet #76, 1983 Soybean Performance Trials.

The grain sorghum trial was seeded at the southeast farm on May 24. The soil was soft and damp, the soil profile nearly saturated. The plots were seeded in 2-row plots, 36-inch spacings.

Recommended herbicides and insecticides were applied for weed and insect control.

Yields of grain sorghum were good, though the growing season was about 8-10 days behind normal, based upon time of heading. Heading usually begins about July 20 but did not begin until about August 1 this year. Some seed-set was affected by the hot, dry winds at pollination.

Additional results appear in the Plant Science Pamphlet #77, 1983 Grain Sorghum Performance Trials.

The 1983 Corn Performance Trials included 77 proprietary corn hybrids; the choices were by the participating companies.

The trials were seeded on May 24, in single row plots, 30 ft. long and 36" row spacings. The plots were replicated four times and seeded at two rates. Though two plant populations were intended, variability was so great that data presented are the average of all plots; approximately 17,500 plants per acre.

Seeding was in a soft moist seedbed over a saturated soil profile. Heavy amounts of precipitation also were recorded in June. These conditions were not favorable for rapid, uniform germination and early growth. Climatic conditions then changed to hot, dry weather in July and August often accompanied by high velocity winds. These conditions caused additional variability as pollination was affected in many entries. The stress conditions continued into September. The trials were harvested November 8.

Plot variability was high (23.5%) and the yields varied from 99 down to 40 bushels per acre. The wide range in yields could be attributed to many climatic or other effects during the season; the cool, wet seedbed and stage of growth at pollination time to suggest two major setbacks.

The trial results are presented in Table 33. Additional information will be found in Plant Science Pamphlet #78, 1983 Corn Performance Trials.

Table 30. 1983 Small Grain Variety Trials, Southeast Farm, Centerville, SD

Brand	Entry	Test Weight lb/bu	Height inches	Percent protein	Yield B/A 1983	Yield B/A 3 yr.
SPRING WHEAT						
	Chris	54	32	17	13	31
	Era	55	25	15	17	32
	Olaf	53	26	17	14	31
	Protor	51	25	17	9	--
	Lew	56	31	18	11	26
	Butte	55	30	17	13	33
	Eureka	50	30	17	12	29
	Angus	53	25	17	16	32
	Coteau	56	32	16	17	34
	Len	53	25	17	14	32
	James	54	29	17	13	32
	Pondera	52	28	16	10	27
NAPB	Oslo	49	25	15	11	31
	Alex	56	32	18	17	35
	Marshall	56	26	16	17	35
	Guard	53	25	17	14	--
	Centa	56	31	16	10	33
Dakota Oats	MPV-2	56	29	16	13	--
Dakota Oats	MPV-3	55	32	16	17	--
Causmex	A99ar	52	32	18	15	--
NAPB	Erik	56	28	18	20	--
Arrowhead	Ah Ex200	52	27	16	12	--
Agsco	Walera	53	26	15	16	31
Agsco	Solar	54	25	17	14	30
Northrup King	Probrand 711	53	26	17	12	28
	Wheaton	50	24	15	17	--
Pioneer	PR2360	54	27	15	16	--
Pioneer	PR2369	53	26	15	14	--
Westbred	Challenger	52	25	16	11	--
Westbred	Aim	43	25	13	4	30
Westbred	906R	47	26	15	6	26
	Means	53	28	16	13.4	30.8
	LSD (.05) 3.6			CV - % 16.2		
DURUM						
	Ward	55	29		11	29
	Crosby	56	30		11	31
	Rugby	55	29		7	27
	Cando	53	24		11	30
	Edmore	55	31		8	27
	Vic	55	28		7	28
	Lloyd	53	24		9	--
	Means	54	28		9	
	LSD (.05) N.S.			CV - % 30.5		

Table 30. 1983 Small Grain Variety Trials Continued

Brand	Entry	Test Weight lb/bu	Height inches	Percent protein (groat)	Yield, B/A 1983	Yield, B/A 3 yr.
OATS						
	Burnett	30	31	14	34	54
	Nodaway 70	29	31	15	25	47
	Chief	29	31	14	35	53
	Otee	29	29	13	37	51
	Dal	33	31	17	30	57
	Noble	29	29	13	37	57
	Lyon	31	33	14	37	57
	Bates	29	28	15	33	60
	Wright	28	34	16	32	57
	Lancer	29	29	14	33	56
	Lang	29	28	14	29	54
	Benson	30	33	16	29	61
	Moore	28	32	14	35	62
	Marathon	28	35	15	24	56
	Larry	28	28	15	38	56
	Ogle	29	29	13	41	63
	Porter	29	30	15	38	--
	Preston	30	30	16	38	55
	Pierce	31	29	12	36	--
	Centennial	19	28	16	17	--
Arrowhead	135E Blend	29	33	15	31	--
Arrowhead	335M Blend	28	28	14	28	--
Arrowhead	Exp 300	28	28	14	31	--
Arrowhead	Exp 400	29	30	12	43	--
	Means	29	30	14	33	56

LSD (.05) 8.2 CV - % 17.6

BARLEY

No trial harvested as drought and residual chemical damage permitted only a few plants to grow; trial abandoned.

Table 31. 1983 Grain Sorghum Performance Trials, SD Farm, Centerville, SD

Brand	Hybrid	Plant Height inches	% moist. 9-23	Test weight lb/bu	Yield, lb/A 1983	Yield, lb/A 1982-83
Asgrow	Dorado E	50	20	61	5513	5590
Asgrow	Corral	57	23	59	5513	5564
DeKalb-Pfizer	DK-38	55	23	60	4993	5337
Pioneer	8790	45	25	59	5279	----
Pioneer	8657	47	25	61	5646	----
Pioneer	8680	43	25	60	6228	----
Triumph	Two-50YG	48	27	60	6412	----
Triumph	Two-48YG	39	25	59	5485	----
Cargill	22	44	22	59	4944	5141
Stauffer	515GR	41	27	59	5260	----
O's Gold	GS 709	56	26	59	5879	5870
O's Gold	GSX58211	41	26	60	5725	---
Warner	W-564T	52	24	60	5964	----
Warner	W-655T	56	28	59	5549	5685
Funk's	G-1460	47	21	59	5020	5455
NC+	55X	40	24	60	5923	----
Growers	E110	49	21	60	5415	----
Kaltenburg	KG 901	40	26	59	5795	5111
Kaltenburg	KG 1001	51	24	59	5977	5968
Triumph	Two-54YG	54	26	59	6082	----
Cargill	40	49	29	60	6235	5621
Western	WS 205	51	24	58	4440	----
Western	WS 212	56	23	59	5637	5732
Warner	Wx 83107	50	26	59	5846	----
DeKalb-Pfizer	DK-42	45	29	58	5904	5689
P-A-G	3339	53	29	59	5141	----
Funk's	G-1560	46	30	59	6028	5747
NC+	160	54	27	58	5941	----
Growers	GSA 1060	47	22	59	6264	----
Cargill	30	52	27	58	5363	5540
Stauffer	530GR	53	27	59	6623	----
O's Gold	GS 5100	48	29	59	5916	----
NC+	157	56	27	58	5297	----
DeKalb-Pfizer	DK-58	52	30	60	5977	5543
	Means	49	25.4	59	5683	5572
	LSD (.05)				N.S.	
	CV - %				12.3	

Table 32. 1983 Soybean Performance Trial, Southeast Experiment Farm, Centerville, SD

Public Varieties		Maturity Group	Mat. date mo/day	Height Inches	Lodging	100 seed wt. grams	Yield, Bu/A 1983	Yield, Bu/A 2 yr.
Hodgson 78		II	9/20	32	I	13.2	48	41
Weber		I	9/21	34	1	10.8	48	45
Lakota		I	9/21	38	1	12.7	51	46
Hardin		I	9/22	33	1	13.0	50	46
Wells II		II	9/26	36	1	14.0	51	46
Harcor		11	9/26	35	1	12.4	50	46
Corsoy 79		II	9/27	36	1	13.1	54	49
BSR 201		II	9/29	35	1	13.5	52	47
Nebsoy		II	9/30	34	1	15/5	60	52
Amcor		II	10/1	40	1	12.8	53	49
Platte		II	10/1	35	1	13.1	53	46
Beeson 80		II	10/2	35	1	16.1	55	50
Century		II	10/2	35	1	14.6	58	53
Gnome		II	10/3	17	1	14.2	41	42
Will		III	10/4	32	1	12.3	46	48
Hobbit		III	10/5	21	1	12/4	48	49
Pella		III	10/6	38	1	15.3	55	52
Sprite		III	10/6	21	1	13.3	45	47
Mead		III	10/6	34	1	13.1	54	
Proprietary Varieties								
Brand	**Entry**							
Pro-Soy	709	II	9/17	29	1	11.3	50	
Arrowhead	8155	I	9/20	33	1	13.0	49	
Hi-Vigor	Rowtunda	II	9/21	36	1	13.0	47	
Arrowhead	2188	I	9/21	33	1	13.8	49	
Land O'Lakes	LL 4404	I	9/22	29	1	14.1	49	45
Fontanelle	4141	II	9/22	31	1	13.3	48	

Table 32 Continued. 1983 Soybean Performance Trial

Brand	Entry	Maturity Group	Mat. date mo/day	Height Inches	Lodging	100 seed wt. grams	Yield, Bu/A 1983	Yield, Bu/A 2 yr.
FFR	12003	II	9/23	34	1	15.3	55	
Cenex	7480	II	9/23	35	1	13.1	52	
Dairyland	DSR-171	I	9/23	37	1	13.5	52	
Stine	2100A	II	9/23	33	1	12.8	50	47
Agripro	AP200	II	9/24	37	1	12.8	52	46
Diamond	D180B	II	9/25	37	1	13.8	57	48
Fontanelle	42X	II	9/25	38	1	13.1	56	49
Arrowhead	2244	II	9/25	35	1	13.8	56	51
Cenex	8017	II	9/25	36	1	12.9	50	45
Northrup King	Exp 735028	II	9/26	35	1	14.6	60	
SRF	205	II	9/27	38	1	11.7	50	47
Hi-Vigor	901	II	9/27	37	1	13.4	54	
FFR	225	II	9/28	41	1	14.0	50	
Northrup King	Exp 740008	II	9/28	35	1	13.7	56	
Pride	8216	II	9/28	34	1	12.4	54	50
Sands	SOI 226	II	9/28	31	1	12.5	57	55
Pro-Soy	710	II	9/28	34	1	14.1	57	
Pride	B203	II	9/29	32	I	14.3	52	49
Pine Grove	P2450	II	9/29	35	I	14.1	54	
Pine Grove	P2320	II	9/29	36	I	12.6	52	
Dairyland	DSR-212	II	9/29	32	I	14.1	50	46
Mustang	M-1220A	II	9/30	34	I	13.1	55	
Land O'Lakes	LL 4303	II	9/30	33	I	15.1	55	50
Land O'Lakes	LL 4207	II	9/30	33	1	14.0	55	
McCurdy	204B	II	9/30	34	1	13.7	53	50
Pine Grove	P2240	II	9/30	33	1	13.2	63	54
Pine Grove	B221	II	9/30	33	1	13.6	54	
Diamond	D195B	II	9/30	34	1	13.3	55	50

Table 32 Continued. 1983 Soybean Performance Trial

Brand	Entry	Maturity Group	Mat. date mo/day	Height Inches	Lodging	100 seed wt. grams	Yield, Bu/A 1983	Yield, Bu/A 2 yr.
Stine	2220	II	9/30	33	1	13.9	61	
Stine	2920	II	9/30	34	1	14.1	55	
Pride	B242	II	10/1	36	1	14.4	56	52
Land O'Lakes	LL 4208	II	10/1	33	1	13.1	52	
Agripro	AP240	II	10/1	33	1	12.6	57	50
Sands	SOI 201-1	II	10/2	33	1	15.6	55	51
Northrup King	S2596	II	10/3	32	1	13.7	56	51
SRF	250	II	10/3	35	1	12.2	52	49
Land O'Lakes	LL 4204	II	10/3	34	1	13.1	50	
Pine Grove	P2260	II	10/3	37	1	12.4	56	50
Dairyland	DSR-227	II	10/3	40	1	12.9	54	48
DeKalb-Pfizer	CX 283	II	10/4	32	1	12.8	57	
Sands	SOI 205-1	II	10/4	38	2	12.2	59	51
Fontanelle	4545	II	10/4	34	1	12.8	54	48
Dairyland	DSR-232	II	10/4	38	1	12.8	54	48
Dairyland	DSR-312	III	10/4	41	2	13.5	55	50
Pro-Soy	714	II	10/4	36	1	12.4	55	
Pro-Soy	719	II	10/5	38	1	12.4	44	
Mustang	M-1330	III	10/6	35	1	12.9	46	47
McCurdy	375B	III	10/6	37	1	13.1	54	
Fontanelle	4747	II	10/7	35	1	15.6	52	50
DeKalb-Pfizer	EX 2011	III	10/8	38	1	13.6	52	
	Mean		9/29	34	1	13.4	52.8	48.6
	LSD (.05)						6.2	0.7
	CV - %						8.4	7.1

Table 33. 1983 Corn Performance Trial, Area E, Centerville, SD

Brand and Variety	Type and Cross		Yield B/A	Pct Root Lodged	Pct Stalk Lodged	Pct Ears Dropped	Percent Moisture	Performance Score Rating
Curry SC-1466	L	2X	98.9	0.0	3.9	0.0	17.7	1
Fontanelle 435	M	2X	97.4	0.0	0.7	0.0	20.1	2
McCurdy 7384	L	2X	94.7	0.0	0.0	0.0	22.0	4
Pioneer 3377	L	2X	9.45	0.0	0.0	0.0	20.5	3
Pioneer 3389	L	2X	87.7	0.0	0.0	0.0	20.2	5
Lynks LX-4232	M	2X	86.8	0.0	2.0	0.0	18.4	6
SDAES Check 9	M	2X	84.6	0.0	3.3	0.0	18.3	7
Wilson 1100B	E	2X	82.9	0.0	1.5	0.0	18.4	8
NC+ 3653	M	2X	82.7	0.0	2.0	0.0	18.3	9
Asgrow RX717	L	2X	82.1	0.0	2.0	0.0	18.6	10
Mc Curdy 5596	M	2X	81.8	0.0	3.8	0.0	18.3	11
Jacques 7900	L	2X	81.4	0.0	0.7	0.0	22.4	12
DeKalb EX 6261	L	2X	80.2	0.0	1.3	0.0	21.3	13
Wilson 1600A	M	2X	79.4	0.0	0.7	0.0	21.6	16
Cargill 921	M	2X	79.2	0.0	1.3	0.0	19.8	14
P-A-G SX243	M	2X	78.1	0.0	3.6	0.0	18.1	15
DeKalb XL-55A	M	2X	78.1	0.0	6.6	0.0	19.3	17
Mellow Dent 222A	L	2X	76.3	0.0	0.0	0.0	21.1	18
Fontanelle 580	L	2X	75.9	0.0	1.3	0.0	22.7	23
Pride X1153	L	2X	75.2	0.0	1.9	0.0	22.0	25
SDAES Check 1	L	2X	75.0	0.0	1.4	0.0	21.3	24
Northrup King PX9527	L	2X	74.2	0.0	2.0	0.0	19.4	21
Keltgen Exp 113	M	2X	74.1	0.0	2.1	0.0	18.5	20
Stauffer S5260	M	2X	73.9	0.0	0.7	0.0	18.3	19
Stauffer 6389	L	2X	73.7	0.0	2.8	0.0	18.4	22
Keltgen KS114	L	2X	73.6	0.0	0.0	0.0	20.9	27
Pride 6611	L	2X	72.5	0.0	1.4	0.0	19.4	28
Curry SC-1490	L	2X	72.3	0.0	0.7	0.0	24.9	36
P-A-G EXP 111571	M	2X	72.3	0.0	0.7	0.0	18.3	26

Table 33 Continued. 1983 Corn Performance Trial

Brand and Variety	Type and Cross	Yield B/A	Pct. Root Lodged	Pct. Stalk Lodged	Pct. Ears Dropped	Percent Moisture	Performance Score Rating
O's Gold	L 2X	72.3	0.0	0.0	0.0	19.5	29
NC+ 3990	M 2X	72.0	0.0	0.7	0.0	18.9	30
Stauffer S5340	M 2X	71.6	0.0	2.6	0.0	17.6	31
Curry SC-1424	M 2X	70.5	0.0	2.1	0.0	18.5	33
Western 6800	L 2X	70.3	0.0	0.7	0.0	24.1	40
Pioneer 3380	L 2X	70.3	0.0	2.1	0.0	19.8	35
Fontanelle 4528	M 2X	70.1	0.0	0.7	0.0	18.1	32
Northrup King PX9455	L 2X	69.5	0.0	2.1	0.0	18.4	34
Pioneer 3551	M 2X	68.5	0.0	2.9	0.0	20.0	39
McCurdy 6475	L 2X	67.7	0.0	1.4	0.0	18.9	38
DeKalb EX-25A	M 2X	67.0	0.0	0.0	0.0	18.2	37
Pride X1123	L 2X	66.6	0.0	0.7	0.0	19.7	42
Lynks LX4210	M 2X	66.5	0.0	2.2	0.0	18.4	41
O's Gold 2570	L 2X	65.3	0.0	1.5	0.0	22.7	45
Keltgen KS115	L 2X	64.8	0.0	1.5	0.0	26.5	56
P-A-G SX275	M 2X	63.9	0.0	0.7	0.0	19.3	43
P-A-G Exp 193084	M 2X	63.1	0.0	6.1	0.0	18.3	47
Curry SC-1450	M 2X	63.0	0.0	3.4	0.0	17.7	44
Lynks LX4315A	L 2X	63.0	0.0	0.7	0.0	21.7	50
DeKalb DK-556	M 2X	62.3	0.0	0.8	0.0	18.7	46
McCurdy 6555	L 2X	62.1	0.0	1.4	0.0	19.6	49
Curry SC-1455	L 2X	62.0	0.0	1.9	0.0	20.1	52
Cargill 891	M 2X	61.8	0.0	1.3	0.0	19.9	53
NC+ 1830	E 2X	61.6	0.0	3.5	0.0	17.9	48
Fontanelle 427	M 2X	61.3	0.0	0.7	0.0	19.7	54
Wilson 1600	M 2X	60.9	0.0	0.7	0.0	19.1	55
Pride 7759	L 2X	60.5	0.0	3.3	0.0	26.7	67
Cenex 2110	L 2X	60.4	0.0	0.0	0.0	18.0	51
Cargill 867	E 2X	59.9	0.0	2.6	0.0	18.5	57

Table 33 Continued. 1983 Corn Performance Trial

Brand and Variety	Type and Cross		Yield B/A	Pct. Root Lodged	Pct. Stalk Lodged	Pct. Ears Dropped	Percent Moisture	Performance Score Rating
Pride 6692	L	2X	59.4	0.0	2.0	0.0	19.2	58
Keltgen KS1150	L	2X	59.0	0.0	2.0	0.0	22.4	64
SDAES Check 2	L	2X	58.4	0.0	3.3	0.0	19.7	61
Mellow Dent 2014	M	2X	58.0	0.0	0.7	0.0	17.8	59
Northrup King PX9405	M	2X	57.7	0.0	2.1	0.0	18.7	60
Wilson 1400B	M	2X	56.7	0.0	0.8	0.0	18.5	63
Pioneer 3707	M	2X	56.4	0.0	0.0	0.0	18.2	62
Cenex 2114	L	2X	56.0	0.0	0.7	0.0	19.9	65
DeKalb T1100	L	2X	55.9	0.0	1.5	0.0	19.7	68
Mellow Dent 2019	M	2X	54.9	0.0	0.0	0.0	18.5	66
Cargill 861	E	2X	51.7	0.0	2.6	0.0	18.0	69
NC+ 2747	E	2X	51.2	0.0	2.0	0.0	18.2	71
P-A-G SX239	E	2X	51.0	0.0	0.7	0.0	17.9	70
Mellow Dent 217AA	M	2X	50.9	0.0	2.9	0.0	18.0	73
NC+ 2120	E	2X	50.3	0.0	0.0	0.0	17.5	72
Crows 444	M	2X	50.0	0.0	1.5	0.0	18.9	74
Jacques 7780	M	2X	48.5	0.0	0.8	0.0	19.2	75
Lynks LX4225	M	2X	45.9	0.0	4.4	0.0	19.1	76
Northrup King PX9415	M	2X	40.8	0.0	4.4	0.0	18.1	77
Means			68.2		1.7		19.6	
LSD (.05)			N.S.			C.V. % - 23.5		

PERFORMANCE OF HERBICIDES FOR CORN AND SOYBEANS IN CONVENTIONAL AND REDUCED TILLAGE

W. E. Arnold and L. J. Wrage

PLANT SCIENCE 83-24

Demonstration plots provide side-by-side comparisons of herbicide treatments. Chemical treatments demonstrated include presently labeled herbicides and those which may be labeled in the near future. Rates and application methods are based on results obtained in previous screening tests.

METHODS

Preplant and preemergence treatments were applied May 25 and May 27, respectively. A plot sprayer delivering 20 gpa water and 40 psi pressure were used. Preplant incorporated treatments were incorporated immediately with two tandem diskings set to cut 5 to 6 inches deep. Shallow preplant incorporated treatments were incorporated with one pass of the disk set at 3 inches deep. The disk was a light weight, finishing model with small blades.

Corn and soybeans were planted May 26. The herbicide treatments were applied across two seedbed tillage systems. Half of each treatment was fall plowed and half a disked seedbed. The previous crop was corn.

Total rainfall the first seven days after application was .08 inches and 3.23 inches during the second week. Annual grass species included green and yellow foxtail. Major broadleaved species were rough pigweed, lambsquarters, and tall water hemp.

RESULTS

The performance of treatments is presented in the following tables. Evaluations are based on two visual estimates for each weed group. Evaluation dates were July 11 for the preplant incorporated and preemergence chemicals, and July 26 for the postemergence chemicals. A 3-year average for early season weed control is included for those treatments in the test each year.

In the 1983 corn demonstration plots, 5 treatments in the reduced tillage and 14 in conventional tillage provided 90% or greater broadleaf and grass control. Lumpy soil conditions in 1983 reduced the control for preplant incorporated treatments compared to the 3-year average.

In the soybean plots, 1 treatment in reduced tillage and 12 in conventional tillage provided 90% or greater control of both broadleaf and grassy weeds. Postemergence and preemergence & postemergence treatments show little difference between tillage systems. The preplant incorporated and preemergence treatments are generally 10 to 20 percent lass in the disked versus the plowed seedbed system.

Tank-mixes of two or more herbicides usually provide better weed control in both corn and soybeans.

Table 34. Corn Herbicide Demonstration, SE Farm

Treatment	lb/A act.	1983 Disked Gr	1983 Disked Bdlf	1983 Plowed Gr	1983 Plowed Bdlf	2-Yr. Avg. Disked Gr	2-Yr. Avg. Disked Bdlf	2-Yr. Avg. Plowed Gr	2-Yr. Avg. Plowed Bdlf
PREPLANT INCORPORATED									
Check	--	0	0	0	0	0	0	0	0
Eradicane Extra	4	75	65	91	78	--	--	--	--
Eradicane	4	50	58	89	74	76	77	92	86
Eradicane+atrazine	3+1	60	88	89	91	78	89	92	94
Eradicane+Bladex	3+1-1/2	65	85	84	85	81	87	91	91
Eradicane+Bladex+ atrazine	3+1-1/2+1/2	70	88	86	93	81	88	92	95
Sutan+	4	58	50	86	65	74	54	89	70
Sutan++atrazine	4+1	68	86	84	85	78	88	88	91
Sutan++Bladex	4+1-1/2	75	80	85	79	82	85	87	87
Sutan++Bladex+ atrazine	4+1-1/2+1/2	78	89	86	91	84	91	90	95
SHALLOW PREPLANT INCORPORATED									
atrazine	2-1/2	58	92	70	98	63	91	73	97
Lasso	3	50	70	70	84	53	63	80	85
Dual	2-1/2	70	60	78	76	68	52	81	76
Check	--	0	0	0	0	0	0	0	0
PREEMERGENCE									
atrazine	2-1/2	83	99	89	98	56	89	75	93
Bladex	3	72	60	84	90	46	44	80	70
Lasso	3	70	74	86	84	64	65	87	73
Dual	2-1/2	75	60	86	76	66	49	85	65
propachlor	6	55	45	90	60	69	36	90	56
Mon-097	2-1/2	90	90	99	98	88	88	95	93
Lasso+atrazine	2+1	82	94	95	97	67	85	88	89
Lasso+Bladex	2+1-1/2	88	95	95	98	76	76	84	83
Dual+atrazine	2+1	90	89	92	97	75	71	77	88
Dual+Bladex	2+1-1/2	79	93	94	97	70	66	84	81
propachlor+atrazine	4+1	--	--	88	96	--	--	91	94
propachlor+Bladex	1-1/2+4	76	50	88	84	79	56	92	87
Lasso+Bladex+atrazine	2+1-1/2+1/2	82	93	96	98	76	87	91	96
Dual+Bladex+atrazine	2+1-1/2+1/2	89	95	96	98	73	84	90	95
Lasso+Bladex+Sencor/ Lexone	2+1-1/2+1/4	87	95	98	99	74	88	89	94
Lasso+atrazine+Sencor/ Lexone	2+1+1/4	92	96	98	99	75	90	86	96

Table 34 Continued. Corn Herbicide Demonstration

Treatment	lb/A act.	Percent Weed Control 1983 Disked Gr	Bdlf	Flowed Gr	Bdlf	3-Yr. Avg. Disked Gr	Bdlf	Plowed Gr	Bdlf
PREEMERGENCE (Continued)									
Dual+Bladex+Sencor/ Lexone	2+1-1/2+1/4	94	96	98	99	75	86	84	95
Dual+atrazine+Sencor/ Lexone	2+1+1/4	96	99	98	98	76	91	88	93
Lasso+Bladex+atrazine+ Sencor/Lexone	2+1+1/2+1/4	95	99	98	99	79	94	91	96
POSTEMERGENCE									
Prowl+atrazine(6/6)	1-1/2+1/2	70	90	89	93	73	92	89	95
Prowl+Bladex 80W (6/6)	1-1/2+1-1/2	74	83	89	86	81	88	87	92
atrazine+crop oil (6/24)	1-1/2+1 qt.	76	94	60	97	70	92	71	96
Bladex 80W+X-77 (6/24)	1-1/2+1/2%	72	88	52	87	59	79	60	86
Tandem+Bladex 80W+ X-77 (6/24)	1/2+1-1/2+ 1/2%	78	90	64	92	--	--	--	--
Tandem+atrazine (6/24)	1/2+1-1/2	60	94	79	94	--	--	--	--
Tandem+Bladex 80W+ atrazine	1/2+3/4+3/4	68	95	96	99	--	--	--	--
PREEMERGENCE & POSTEMERGENCE									
propachlor&Banvel (6/24)	4&1/2	60	88	96	97	72	89	93	95
propachlor&Banvel (7/9)	4&1/4	58	85	89	92	69	85	90	95
propachlor&2,4-D amine (7/9)	4&1/2	55	80	90	89	64	83	90	91
propachlor&Basagran (7/9)	4&1	64	84	87	90	67	71	89	81
propachlor&Buctril (7/9)	4&3/8	60	90	85	94	--	--	--	--
Check	--	0	0	0	0	0	0	0	0

PPI: 5/25/83
PRE: 5/27/83
Planting Date: 5/26/83
Evaluated: 7/11/73 and 7/26/83
GR= Green and yellow foxtail
BDLF = Redroot pigweed, lambsquarters, tall water hemp
Rainfall: 1st week = .08 inches
2nd week = 3.23 inches

Table 35. Soybean Herbicide Demonstration, 1983 SE Farm

		Percent Weed Control							
		1983				3-Yr. Avg.			
		Disked		Plowed		Disked		Plowed	
Treatment	lb/A act.	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf
PREPLANT INCORPORATED									
Check	--	0	0	0	0	0	0	0	0
Treflan	3/4	82	68	94	68	84	66	92	79
Basalin	1	81	48	90	60	83	60	91	71
Prowl	1-1/4	74	68	90	75	80	69	89	73
Vernam	2-1/2	48	28	72	32	68	43	82	49
Treflan+Amiben	3/4+2	74	60	87	69	81	66	90	71
Treflan+Sencor/Lexone	3/4+3/8	77	74	89	81	82	75	91	83
Vernam+Treflan	2-1/2+3/4	75	66	90	74	--	--	--	--
Treflan+Amiben+Sencor/Lexone	3/4+2+1/4								
SHALLOW PREPLANT INCORPORATED									
Lasso	3	65	52	92	86	73	52	86	74
Dual	2-1/2	78	60	92	75	79	42	83	61
Lasso+Modown	2+1-1/2	68	60	86	86	--	--	--	--
Treflan+Modown	3/4+1-1/2	56	48	84	81	76	55	87	68
PREPLANT INCORPORATED & PREEMERGENCE									
Treflan+Sencor/Lexone& Sencor/Lexone	3/4+1/4+3/8	84	92	99	99	87	91	95	96
Treflan&Sencor/Lexone	3/4&1/2	86	90	98	99	88	89	94	95
Treflan&Modown	3/4&2	73	72	96	94	82	84	93	93
Treflan&Amiben	3/4&2	68	75	94	94	82	86	95	95
Treflan&Lorox	3/4&1	62	70	93	85	74	68	93	79
PREEMERGENCE									
Check	--	0	0	0	0	0	0	0	0
Amiben	2	38	40	74	74	61	56	83	78
Lasso	3	55	55	94	90	68	71	91	88
Dual	2-1/2	85	84	92	89	73	61	86	71
Lasso+Sencor/Lexone	2+1/2	88	92	95	96	78	88	86	93
Dual+Sencor/Lexone	2+1/2	90	92	95	96	77	86	88	91
Lasso+Amiben	2+2	86	86	93	90	77	82	90	92
Dual+Amiben	2+2	83	85	90	87	77	81	89	89
Lasso+Lorox	2+1	62	80	86	88	58	73	80	81
Dual+Lorox	2+1	75	80	84	86	59	62	79	69
Lasso+CIPC	2+2	45	62	73	74	49	59	75	74
Lasso+Premerge	2+4-1/2	55	80	74	80	51	69	73	77

Table 35 Continued. 1983 Soybean Herbicide Demonstration

Treatment	lb/A act.	1983 Disked Gr	1983 Disked Bdlf	1983 Plowed Gr	1983 Plowed Bdlf	3-Yr. Avg. Disked Gr	3-Yr. Avg. Disked Bdlf	3-Yr. Avg. Plowed Gr	3-Yr. Avg. Plowed Bdlf
PREEMERGENCE (Continued)									
Lasso+Lorox+Sencor/ Lexone	2+1+1/4	73	90	96	97	61	87	83	90
Dual+Lorox+Sencor/ Lexone	2+1+1/4	86	90	94	97	--	--	--	--
Lasso+Amiben+Sencor/ Lexone	2+2+1/4	74	89	94	98	83	91	94	97
Lasso+Modown	2+1-1/2	65	82	90	92	66	82	86	91
PREPLANT INCORPORATED & POSTEMERGENCE									
Treflan&PPG-844	3/4&.15	60	62	66	62	--	--	--	--
PREEMERGENCE & POSTEMERGENCE									
Lasso&PPG-844	2-1/2&.15	66	62	70	61	--	--	--	--
Lasso&Basagran	2&1	66	22	67	21	--	--	--	--
Lasso&Blazer	2&1/2	74	93	75	94	67	89	79	91
Lasso&Dynap	2&2-1/2	68	81	69	82	60	82	77	87
Lasso&Tackle	2&1/2	72	92	75	92	68	90	94	92
Lasso&Blazer+Basagran	2&1/2+1/4	78	94	82	94	--	--	--	--
POSTEMERGENCE									
Poast+oil	.20+1 qt.	48	0	50	0	--	--	--	--
Fusilade+oil	1/4+1 qt.	25	0	25	0	--	--	--	--
Poast+oil+Blazer+ Basagran	.20+1 qt+1/4+1/2	15	90	15	88	--	--	--	--

Evaluated: 7/11/83 and 7/26/83
PPI: 5/25/83
PRE: 5/27/83
POST: 7/9/83
Planting Date: 5/26/83
GR = Green and yellow foxtail
BDLF = Redroot pigweed, lambsquarters, tall water hemp
Rainfall = 1st week - .02 inches
2nd week - 3.23 inches

S.E. FARM REPORT

EFFECT OF FOLIAR FUNGICIDE ON LATE SEASON DISEASES OF SOYBEANS

Michael W. Ferguson

PLANT SCIENCE 83-25

This is the second year of experiments related to fungicide applications for control of late season diseases that affect seed quality and yield. The objective of this test was to determine the effects of various fungicide formulations applied at two reproductive stages of the soybean.

Materials and Methods

The soybeans were planted at the rate of 150,000 plants per acre. The preplant herbicide was Treflan. Commercial soybean inoculate was applied during planting at the recommended rates of the manufacturer. Each treatment consisted of four rows each, 20 feet long spaced on 30" centers, arranged in a split-plot design. The main plot treatments were varieties, the sub-plots were the chemical treatments. Mid-season, the row length was reduced to 15 feet. The two center rows of each four row plot were harvested on November 8, 1983.

The chemicals and rates tested are listed in Table 36. Chemicals were applied with a 60" hand held boom and spray nozzle propelled with 25 lb/psi CO_2. The timing of chemical application was coordinated with the reproduction stages of the plant. These were at the R_3 and R_5 stages. The R_3 is early pod (1/4" long pods) and the R_5 stage is where beans can be felt in the pods. Plots receiving the R_3R_5 timing would receive two applications of fungicide, one at early pod and one during seed fill.

Table 36. Fungicide and Rates

Treatment[1/2/]	Rate[3/] (lb a.i./acre)
Dithane M45	1.6
Dithane M45 plus Benlate 50W	1.6 + 0.25
Benlate 50W	0.25
Water	---

1/ Each treatment rate was applied at the R_3 R_5 (two applications) stage of reproductive growth.

Table 36 Continued

[2] Triton CS-7 spreader-binder was added to each treatment (including water) at the rate of one pint/100 gallons of water.

[3] Pounds active ingredient per acre.

Results and Discussion

Data were taken on total plot yield and 100 seed weight. Neither yield nor 100 seed weight were significantly different due to fungicide treatments. These results are contrary to the results reported in the Southeast South Dakota Experiment Farm report for 1982 (Plant Science 82-21). In this report the 100 seed weight was significantly different due to chemical treatment. The reason for the difference may be explained by the fact that only one timing was used (R_3 R_5). In this timing the plants received two applications of the fungicide instead of maximum of three reported in the 1982 report. The additional spray might have made the difference. The second reason for the difference may be from the dry weather experienced in the latter part of the growing season. Data from the same test this year at Brookings, showed hundred seed weight to be significantly different due to chemical treatment (0.05 level).

This is the second year of testing for chemical control of foliar diseases of soybeans. While control of the diseases is excellent by these fungicides, no yield differences are seen. This is primarily because soybean plants can lose a high percentage of their foliage and still yield well. Our observations thus far have shown that unless there is a significant change in weather patterns (increased rainfall midseason) foliar fungicides are not economically justified. However, there may be special cases such as beans affected by early freezes that may justify use. These cases are under investigation.

S.E. FARM REPORT

A DEMONSTRATION OF CROP ALTERNATIVES FOR PIK ACRES AND LATE SEEDING

R. Hall and F. Shubeck

PLANT SCIENCE 83-26

OBJECTIVES:

1. To observe which crops may have a potential benefit on PIK acres.
2. To observe which crops may have a potential when seeded late.

METHODS AND PROCEDURES:

July 8 - Prepared conventional seedbed

July 11 - Seeded all crops with a cone small grain seeder. Crop seeding rate per acre included: Buckwheat (40 lbs), Safflower (20 lbs), Pearl and foxtail millets (15 lbs), Tyfon (5 lbs), Sorghum-sudan hybrid (15 lbs), Sunflower (20,000 seeds).

September 22 - Plots were observed and evaluated for cropping potential. Yields were not determined.

RESULTS:

All crops were observed on September 22, 1983 for their production potential. One must keep in mind there was only 73 days between seeding and when the crops were observed for production potential. The various crops and varieties and their production potential are discussed below:

1. Buckwheat -- the varieties Giant American and Mancan showed a fair production potential. Although weeds were not a problem the stands were below-average, but mature by September 22.

2. Turnip -- the production potential of both Green Globe and Calder Swede was very poor. The emergence of Green Globe was better than Calder Swede, but both stands were too light to make a good evaluation of their potential.

3. Rape -- the varieties Dwarf Essex, Rangi, and Regent showed a fair production potential compared to the other brassicas (turnips). All varieties appeared to be equal.

Results Continued

4. Safflower -- the seeding of the variety Rehbein resulted in an average stand. Although seeds had formed by September 22, they were quite immature compared to more mature safflower crops produced elsewhere. It is questionable whether safflower should be planted late in Southeast South Dakota.

5. Oriental Mustard -- a good stand of Domo mustard was obtained. The stands were good and the crop was close to harvest maturity.

6. Proso millet -- both varieties, Arise and Minsum, emerged, but died out following heavy rains shortly after seeding. These varieties should not be planted in low areas where water may accumulate.

7. Foxtail millet -- the varieties Manta and Sno-Fox produced an acceptable amount of forage after 73 days. Their potential as a late-planted source of a fine-stemmed warm season grass appear to be good.

8. Pearl millet -- both varieties, Mil-Hy 100 and Graze King, produced an excellent stand of forage by the 73rd day. These varieties could have been either harvested or used as a pasture after 60 days if needed. Both varieties appear to be an excellent source of late-planted forage.

9. Sorghum-Sudan Hybrid -- the hybrid HIPR077 produced an excellent stand of forage. HIPR077 appeared to produce about the same amount of wet forage as the pearl millets. Like the pearl millets, this hybrid appears to be an excellent source of late-planted forage.

10. Sunflowers -- the hybrid Sigco 432 produced an acceptable stand and reached full maturity in early November. It is likely that late maturing hybrids would not have reached harvest maturity.

CONCLUSIONS:

The crops showing the best production potential when seeded late at the Southeast Farm appeared to be mustard, pearl and foxtail millets, Sorghum-sudan hybrids and an early sunflower hybrid.

Buckwheat and rape may have some potential provided that a good stand is established and adequate weed control is obtained.

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S.E. FARM REPORT

A COMPARISON OF TWO FEEDING SCHEMES WITH ALFALFA HAY AND CORN ON FEEDLOT PERFORMANCE OF BULLS, STEERS AND HEIFERS

L. B. Bruce, R. Hanson and H. Miller

ANIMAL AND RANGE SCIENCES 83-27

Eighteen bulls, forty heifers and twenty steers all averaging 600 lbs were placed in eight open feedlot pens with concrete floors forming 2 pens of bulls, 4 of heifers and 2 of steers. One pen of bulls, 2 of heifers and one pen of steers were then placed on one of two nutritional schemes. The first ration was largely a mix of alfalfa hay and corn, 1:2, on a dry basis. The second ration was alfalfa hay fed to a weight of near 800 lbs, followed by a mostly corn ration to finish. All rations were balanced for protein and minerals. Bulls were more efficient and gained better, followed by steers and then heifers (2.68 lbs average daily gain and 9.83 lbs of dry feed per lb of gain, 2.06 and 10.3, and 1.90 and 11.12, respectively). The alfalfa: corn mix was more costly, less efficient and had poorer gains than alfalfa hay followed by corn ($.4338 per lb gain vs $.394; 11.08 lbs dry feed per lb gain vs 10.1; and 2.06 lbs gain per head per day vs 2.21). The alfalfa: corn mix was also less efficient energetically than the alfalfa hay followed by corn (.31 vs .34 lbs of gain per day per megacalorie of daily available net energy for gain).

Introduction

Expanding profit margins is always a goal of the cattle feeder. This trial was designed to explore the difference in two feeding schemes as well as performance difference between the sexes in feedlot animals. Scientific literature shows that certain combinations of roughages and concentrates do not give expected levels of animal performance, such a mix would be a 1:1 ratio of corn to alfalfa hay on an as fed basis. In South Dakota the typical cattle feeder raises most of his feed and the ability to trade commodities is limited. This eliminates or at least limits the ability to use least cost rations or formulate specific rations by trading commodities. The feedstuffs raised and used in South Dakota, and the combinations in which they are fed, can be in this less efficient range. In this study an alternate way of feeding fixed ingredients was studied. One of the options explored was to feed a mix of corn and alfalfa, the other option feeding hay for the first few months followed by corn for the last months of feeding. This helps establish a base from which to begin a series of follow up studies to establish recommended feeding guides for South Dakota.

Procedures

In January of 1983, 18 bulls, 40 heifers and 20 steers were shipped from Cottonwood, South Dakota to the Southeast Experiment Farm at Beresford, South Dakota. The animals were allotted into eight groups: 2 of bulls, 4 of heifers and 2 of steers. They were placed in eight open feedlot pens, with each pen having concreted floors and bunk space for 10 animals. One pen of bulls, 2 pens of heifers and one pen of steers were placed on a ration of a dry matter basis (2:1) corn to alfalfa hay (table 36). The remaining pens were fed an alfalfa hay ration until mid-April when they were switched to a corn based ration (table 36). The corn/alfalfa hay ration on a dry matter percent basis consisted of 33% alfalfa hay and 66% high moisture shelled corn. The alfalfa hay base ration consisted of (dry basis): 90% alfalfa hay and 10% high moisture shelled corn. The corn ration on a dry basis composed of: 3%-is a 45% protein supplement, 87% high moisture shelled corn and 10% alfalfa hay. The animals were weighed and introduced to their respective rations, fed free choice, on January 25, 1983, (table 37). The animals were not implanted and feed additives were not used. All animals were fed until July 6, 1983, when slaughter began.

The animals on the corn/alfalfa hay ration were fed this mixture throughout the trial. The pens fed alfalfa hay followed by corn were fed the alfalfa hay based ration until mid-April, at which time they were switched to the corn based ration. The switch point used was approximate weights of 800 lbs. which was near the half-way point in the animals feedlot stay. All rations were fed once a day, free choice.

Feedlot performance data for the period was obtained by weighing of the individual animals once a month and daily weighing of the consumed ration. The bulls in this study were managed together specifically to minimize aggressive behavior. When they were allotted to the treatment groups, bulls from the various other groups were never allowed to mix. This prevents much of the undesirable behavior often exhibited by feedlot bulls.

Table 36. Analysis of Rations Used, Cost, and Net Energy For Gain Per Lb of Ration Dry Matter

Item	Rations: Corn/alfalfa hay mix	Alfalfa hay base	Corn base
Dry matter, %	100.0	100.0	100.0
Crude protein, %	11.5	14.9	11.5
Net energy for maint. Mcal/lb	.8928	.645	.996
Net Energy for Gain Mcal/lb	.5362	.311	.877
$/lb, dmd	.0439	.0355	.0474

Table 37. Number of Animals, Sex and Nutritional Regime

Sex	Rations: Corn/alfalfa Hay Mix	Rations: Alfalfa Hay followed by corn
Steers	10	10
Heifers	10	10
Heifers	10	10
Bulls	8	9

Results and Discussion

Average daily gains and feed efficiency data are presented in Table 38. As expected, bulls gained the fastest across all treatments and were overall the most efficient. The steers were next followed by heifers. This is consistent with previous data. Bulls were also cheaper to feed (table 39), followed by steers and then heifers. As before, the poor sale markets for bulls leads us to recommend feeding steers for the most profit potential.

Comparison of the two rations (table 38) shows the alfalfa hay followed by corn to provide the best average daily gains as well as being the most efficient. The mix was more expensive (table 39) than the alfalfa followed by corn. An energy comparison (table 40) shows the mix providing .31 lbs of gain per megacalorie of net energy for gain that was available on a daily basis and the hay followed by corn .34. This indicates the hay followed by corn to be more efficient energetically. This research is by no means conclusive, but it does indicate that feed roughages and concentrates at different times is more efficient. We will further investigate and establish guidelines for South Dakota.

Table 38. Feedlot Performance of Bulls, Steers and Heifers By Treatment (January 25, 1983-July 6, 1983)

	Corn/Alfalfa Hay Mix		Alfalfa followed by corn		Averages	
	ADG	Feed Eff.	ADG	Feed Eff.	ADG	Feed Eff.
Bulls	2.56	11.03	2.80	8.63	2.68±.02	9.83±1.70
Steers	2.02	10.26	2.09	10.34	2.06±.03	10.3±.02
Heifers	1.82	11.52	1.98	10.72	1.90±.07	11.12±.56
Average	2.06±.28	11.08±.45	2.21±.32	10.1±.78		

Table 39. Feed Costs[1] Per Lb of Gain

	Corn/alfalfa hay mix	Alfalfa followed by corn	Averages
Bulls	.3836	.2836	.3336±.07
Steers	.4256	.3686	.3971±.04
Heifers	.4921	.3961	.4441±.07
Average	.4338±.05	.3494±.05	

[1]Feed Costs were $.027778 per dry lb for alfalfa hay and $.048857 per dry lb for corn.

Table 40. Ration Energy Density, Expected Gains and Actual Feedlot Gains

	Corn/Alfalfa hay mix	Alfalfa hay followed by corn
NEg, Mcal avail/da/hd	6.74	6.50
Expected ADG	2.45	2.37
Actual ADG	2.06	2.21
Lb gain/Mcal NEg	.31	.34

A COMPARISON OF TWO FEEDING SCHEMES WITH CORN AND CORN SILAGE ON FEEDLOT PERFORMANCE OF BULLS AND STEERS

L. B. Bruce, R. Hanson and D. Gee

S.E. FARM REPORT

ANIMAL AND RANGE SCIENCES 83-28

Summary

Eighty-three Angus bulls and eighty South Devon bulls of about 600 lbs were randomly placed in eight pens by breed in groups of about 20 head. Two groups from each breed were subsequently castrated. The animals were placed on two feeding schemes, with one pen of Angus steers, Devon steers, Angus Bulls and Devon bulls on each feed treatment. The two feeding schemes were a 1:1 corn:corn silage mix (as fed basis) and corn silage fed to a weight of 850 and then mostly corn to finish. All rations were balanced for protein and minerals. Bulls were more efficient (7.53 lb dry matter per lb gain vs 8.75 for steers) and gained better (2.49 average daily gain vs 2.16 for steers). The corn:corn silage mix provided for better gains (2.44 vs 2.21 for corn silage followed by corn) but feed efficiency was about the same (8.08 vs 8.09). The mix was more expensive ($.3194 per lb gain vs $.2900 for corn silage followed by corn). This can be attributed to more corn silage used in corn silage followed by corn and to the fact that the mix was less energetically efficient (.38 lb gain per Mcal of available net energy for gain vs .45 for corn silage followed by corn).

Introduction

As feed and other costs of feedlot operations increase, methods to increase profit margins should be explored. One of those methods is feeding bulls, which are more efficient, and this study concludes the research started several years ago in this area at the SE Farm. Another area that merits some work is manipulating existing feeds such that they are used more efficiently. It is well documented in scientific literature that certain combinations of feeds are not as efficient as they should be.

An example would be mid-range mixes of corn and corn silage, such as a 1:1 mix on an as fed basis. It does not provide the level of gain that is expected. In South Dakota the typical cattle feeder raises most of his feed and the ability to trade commodities is limited. This eliminates or at least limits his ability to use least cost rations or formulate specific rations by trading commodities. The feedstuffs raised and used in South Dakota, and the combinations in which they are fed, can be in this less efficient range. It is because of these conditions

that this study was used to look at alternate ways of feeding fixed quantities of feedstuffs as well as concluding the bull work.

The basis of the bull work was to conclude feedlot performance comparisons between bulls and steers. The alternate feed mix work was a preliminary study with the follow-up work to be done next year. Essentially the forage to grain ratio manipulation studied in this trial was to compare feeding a straight mix of corn and corn silage to feeding the corn silage for the first 250 lb gain followed by corn for the rest of the feedlot gain.

Procedures

In the early winter of 1982 eighty-three young Angus bulls of about 600 lb and eighty young South Devon bulls of about 600 lbs were purchased and shipped to the Southeast Experiment Farm in Beresford, South Dakota. The bulls were randomly allotted by breed into eight groups, such that there were four groups of Devons and four groups of Angus. They were placed in eight existing open feedlot pens, with each pen well mounded with windbreaks, shades and bunk space for 25 animals. Each of two pens of each ~~breed~~ were then fed a ration containing a dry matter basis 2:1 corn:corn silage (table 41). The remaining pens were fed for the first half of the trial a ration composed mostly of corn silage followed in the second half by a ration of mostly corn (table 41). The corn/corn silage ration on a dry matter percent basis consisted of: 30% corn silage, 65% high moisture shelled corn, 4% soybean meal (44%), and 1% vitamin supplement. The corn silage ration was on a dry matter basis: 82% corn silage, 11% high moisture shelled corn, 5% soybean meal (44%) and 1% vitamin supplement. The corn ration on a dry basis consisted of: 9% corn silage, 86% high moisture shelled corn, 4% soybean meal (44%) and 1% vitamin supplement. The animals were weighed and introduced to their respective rations, fed free choice, on January 3, 1983. The animals were not implanted and feed additives were not used. After 30 days, two pens of each breed in different feed groups were castrated (table 42). All animals were then fed until the 19th of July at which time slaughter began.

The animals on the corn/corn silage ration were fed this mixture throughout the trial. The pens fed corn silage followed by corn were fed the corn silage based ration until mid-April, at which time they were switched to the corn based ration. The switch point used was approximate weights of 850 lbs, which was near the half way point in the animals feedlot stay (600-1100 lb). All rations were fed once a day, free choice.

Results and Discussion

Average daily gains and feed efficiency data are presented in table 43. As expected, bulls gained faster and were more efficient, across both feed treatments. This is consistent with previous data. Bulls were also cheaper to feed (table 44).with feed costs per lb of gain less than that of steers by $.0483 per lb. As before, however, the sale market for bulls dissolved this advantage. Until viable fed bull markets are established, it will be recommended that for best potential profit steers be fed.

Comparisons of the two rations show some diversified results. Average daily gains (table 43) were better for the mix and feed efficiencies were very similar. Considering the cost per lb of gain, the mix was more expensive (table 44). Part of the reason for this is that in relation more total corn silage (cheaper feed) was fed than corn in the corn silage followed by corn group. The total picture becomes more clear by looking at ration energy density, expected gains from that density and actual feedlot gains (table 45). With the mix, there was 6.38 Mcals of energy available everyday for gain. This provided energy for about 2.5 lbs per head per day. Actual gain was 2.4. The corn silage followed by corn was different. This feeding scheme provided 4.91 Mcals of net energy for gain per head per day, which is energy for about 2.0 lb average daily gain. The actual gain was 2.2. This is a clear indication that this feeding scheme was more efficient energetically, which is represented in a lower cost per gain. While this research is not conclusive, it does give a positive response to the hypothesis that feeding mixes is not as efficient as feeding roughages and concentrates separately. We will continue to investigate this phenomenon.

Table 41. Analysis of Rations Used, Cost and Net Energy For Gain Per LB. Of Ration Dry Matter.

	Rations		
Item	Corn/Corn Silage Mix	Corn Silage Base	Corn Base
Dry Matter, %	100	100	100
Crude protein, %	11.5	11.5	11.5
Net energy for maint. Mcal/lb	.930	.744	1.100
Net energy for gain Mcal/lb	.586	.446	.645
$/lb, dmb	.0407	.0270	.0464

Table 42. Number of Animals, Sex, Breed and Nutritional Regime

Breed and Sex	Number in Pen — Ration: Corn/Corn Silage Mix	Number in Pen — Ration: Corn Silage followed by corn
Devons, bulls	20	20
Devons, steers	20	20
Angus, bulls	21	21
Angus, steers	20	21

Table 43. Feedlot Performance of Bulls and Steers by Treatment (January 3, 1983 - July 19, 1983, 197 days)

	Corn/Corn Silage Mix		Corn Silage Followed by Corn		Average	
	ADG	Feed Efficiency	ADG	Feed Efficiency	ADG	Efficiency
Bulls	2.65	7.30	2.33	7.75	2.49±.11	7.53±.26
Steers	2.23	8.87	2.09	8.64	2.16±.09	8.95±.07
Average	2.44±.13	8.08±.45	2.21±.09	8.19±.34		

Table 44. Feed Costs[1] Per Lb of Gain

	Corn/Corn Silage Mix	Corn Silage Followed by Corn	Average
Bulls	.2886	.2726	.2806 ± .0113
Steers	.3503	.3074	.3289 ± .0303
Average	.3194 ± .0436	.2900 ± .0246	

[1]Feed Costs were $.02655 per dry lb for corn silage and $.048857 per dry lb for corn.

Table 45. Ration Energy Density, Expected Gains and Actual Feedlot Gains

	Corn/Corn Silage	Corn Silage Followed by Corn
NEg, Mcal avail/24/hd	6.38	4.91
Expected ADG	2.54	2.03
Actual ADG	2.44	2.21
Lb gain/Mcal NEg	.38	.45

THE EFFECT OF SARSAPONIN ON PERFORMANCE OF FINISHING PIGS HOUSED IN CROWDED CONDITIONS

G. W. Libal, R. C. Wahlstrom and R. Hanson

ANIMALS AND RANGE SCIENCES 83-29

Sarsaponin, a naturally occurring plant steroid derived from the yucca plant is available as a feed additive. Claims are made of increased pig performance during the finishing period of growth, particularly when the pigs are in crowded, stressed conditions.

The study reported herein was designed to evaluate Micro-Aid, a commercial sarsaponin product, as a feed additive under these conditions.

Experimental Procedures

One hundred forty crossbred pigs were allotted to seven replications of two treatments based upon weight and sex. Starting weights were 100, 112, 119, 127, 132, 140 and 152 lbs. for replications 1 through 7. The pigs were housed in the environment-modified confinement building at the S.E.S.D. Experiment Farm. There were 10 pigs/pen providing 6 sq. ft. of pen space per pig. Duration of the trial was eight weeks. Composition of the experimental diets is shown in Table 46.

The experimental treatments were:

1. Control diet
2. Control diet + 2 oz. of Micro-Aid per ton

Table 46. Composition of Experimental Diets

Ingredient	Percentage
Ground Yellow Corn	81.5
Soybean meal (44%)	15.0
Dicalcium phosphate	2.0
Limestone	.8
White salt	.3
Premix[a]	.4

[a]Provided the following in ppm: zinc 100; iron, 75; copper, 7.5; manganese, 25; iodine, 175 and selenium, 1. Provided the following per lb of diet: vitamin A, 2000 IU; vitamin D, 200 IU; riboflavin, 2.25 mg; pantothenic acid, 9 mg; niacin, 12 mg; vitamin B_{12}, 9 mcg; vitamin E, 7.5 IU and vitamin K, 1.5 mg.

Results

Results of the eight week trial are summarized in Table 47. Equal gains were obtained by pigs consuming the two diets and no significant differences in feed consumption or feed conversion were observed. It might be noted that pig performance was good and feed efficiency was much better than normally would be expected for pigs in this stage of growth. No advantage for including sarsaponin in the diet was found.

Table 47. Effect of Micro-Aid as a Feed Additive in Swine Finishing Diets[a]

	Control	Micro-Aid[b]
Average daily gain, lb	1.66	1.66
Average dialy feed, lb	4.33	4.57
Feed/gain	2.61	2.76

[a] 7 replications with 10 pigs/pen provided 6 sq ft of pen space/pig. Average starting weight - 126 lbs. Average final 57 day weight - 221 lb.

[b] 4 lb supplying 2 oz sarsaponin/ton

Summary

One hundred forty pigs were utilized to study the effects of sarsaponin included in the finishing diet of pigs in crowded conditions. Pigs averaged from 100 to 152 lb at the beginning of the eight week study and were allowed six sq ft of pen space per pig. No advantage in gain, feed consumption or feed efficiency was seen due to the addition of 2 oz of Micro-Aid to the diet.

S.E. FARM REPORT

THE EFFECTS OF SARSAPONIN AND BACITRACIN MD ON PERFORMANCE OF GROWING-FINISHING PIGS

G. W. Libal, R. C. Wahlstrom and R. Hanson

ANIMAL AND RANGE SCIENCES 83-30

Feed additives have been used to promote growth and feed efficiency of growing-finishing pigs for over 30 years. Typically, greatest response is found during early stages of growth and less reponse during the finishing period under conditions of good management. Recently, sarsaponin, a naturally occurring plant steroid derived from the yucca plant, has become available as a feed additive under the commercial name, Micro-Aid. Claims for this product include increased performance of pigs during the finishing period. The antibiotic, Bactracin MD, also has been shown to improve performance during later stages of growth more than is expected of most feed additives.

The study reported herein was designed to evaluate the response of pigs to these two feed additives when fed separately or in combination.

Experimental Procedure

One hundred twenty crossbred feeder pigs from one source were randomly allotted to the four treatment groups on the basis of sex and weight. Each pen consisted of three barrows and three gilts. Experimental treatments were as follows:

1. Bacitracin MD (40 g/ton)
2. Micro-Aid (2 oz/ton) + Bacitracin MD (40 g/ton)
3. Control
4. Micro-Aid (2 oz/ton)

Starting weights for the five replications of the four treatments averaged 68.8, 63.2, 58.2, 54.2 and 49.3 lb. for replications one through five, respectively. All replications were started on test the same day, November 17, 1982. The experiment was terminated by pen when average pen weight reached 225 lb on the weekly weigh day. Terminated dates were between February 16 and March 18, 1983. Diets contained 16 and 14% protein during the growing and finishing period, respectively. Pigs were owned by and feed supplied by Farmers Cooperative Society of Sioux Center, IA who were cooperators on this study. Micro-Aid and financial support was provided by Distributors Processing, Inc. who manufacture Micro-Aid. Pigs were provided 10 sq ft of pen space and were housed in the environment-modified confinement barn at the Southeast South Dakota Experiment Farm at Beresford, South Dakota.

Results and Discussion

The results of the trial are shown in Table 48. No significant differences among treatments were observed. It is interesting to note that the slowest gains were observed for pigs receiving no feed additive during both the growing and the finishing periods. However, this difference is not significant. Performance of all pens was good, averaging over 1.6 lb gain/day. Typically, little response to feed additives is observed when performance of the pigs is at a high level.

Feed consumption varied between pens and treatments but was not consistently associated with treatments. Feed per unit of gain was unafffected by experimental treatment.

Table 48. Effect of Bacitracin MD and Micro-Aid on Performance of Growing-Finishing Pigs[a]

Bacitracin MD	+	+	+	+
Micro-Aid	-	-	-	-
Pig Weights, lb				
Start	58.8	58.5	58.9	58.8
Mid	126.1	127.1	133.6	130.1
End	228.9	231.2	229.3	229.2
Average Daily Gain, lb				
Grower	1.65	1.60	1.57	1.61
Finisher	1.64	1.63	1.55	1.65
Overall	1.64	1.62	1.56	1.63
Average Daily Feed, lb				
Grower	5.02	4.88	4.65	4.75
Finisher	6.15	6.60	6.32	7.08
Overall	5.67	5.92	5.60	6.06
Feed/Gain				
Grower	3.04	3.05	2.96	2.95
Finisher	3.75	4.05	4.08	4.29
Overall	3.46	3.65	3.59	3.72

[a]5 replications of 6 pigs/pen with starting weights averaging 68.6, 63.2, 58.2, 54.2 and 49.3 lb for replications 1 through 5, respectively.

Summary

A total of 120 feeder pigs were used in this experiment to study the effect on pig performance of feeding diets containing 40 g/ton of Bacitracin MD, 2 g/ton of Micro-Aid or the combination of these two additives in swine feed.

Under the conditions of this experiment with above average performance and management, no advantage was observed for including either Micro-Aid or Bacitracin MD in the diets of growing-finishing pigs.

RESPONSE OF SLOW-GROWING PIGS TO ANTIBIOTIC SUPPLEMENTATION

G. W. Libal, R. C. Wahlstrom and R. Hanson

ANIMAL AND RANGE SCIENCES 83-31

S.E. FARM REPORT

As pigs approach market weight, the range in weight within a pen often increases with the slow grower lagging further and further behind. These slow growers represent a management problem for producers because they occupy expensive pen space and continue to consume feed for body maintenance needs even though they may not be growing. The objective of the study reported herein was to determine if pigs identified as slow growers during the growing period would respond to high levels of dietary antibiotics during the finishing period.

Experimental Procedures

Pigs were selected as slow growers if they were in the lowest 25% of their contemporary group as determined by gain from approximately 50 to 130 lb. The lowest 5% were discarded and the next 20% were allotted to two experimental treatments. At Beresford, 42 pigs were selected out of 200 pigs and at Brookings 24 pigs were selected out of 112 pigs.

The pigs were allotted to three replications of seven pigs/pen at Beresford, and two replications of six pigs/pen at Brookings. Average starting weight was 125 lb at Beresford and 114 lb at Brookings. Pens were balanced for sex of pig. Pen space was in excess of 8 sq ft/pig at both locations. The eight week trial was conducted during the summer months and the pigs were housed in environment-modified buildings with slatted floors.

The composition of the diets fed which were calculated to contain .7% lysine is shown in Table 49. The two treatments were:

Treatment 1. No dietary antibiotic supplementation

Treatment 2. 100 gm tylan-100 gm sulfamethazine/ton for 4-weeks followed by 40gm tylan/ton for 4 weeks.

In treatment 2, the combination of Tylan and sulfamethazine was at a therapeutic level and Tylan, alone, was at a growth promoting level.

Results

A summary of the pig performance is shown in Table 50. During the first four weeks pigs which had received the therapeutic level of tylan-sulfa consumed more feed and gained faster than those receiving no antibiotic. These differences were significant at the 10% level. A numerical, but not-significant improvement in feed conversion was also observed. During the second four week period when a growth promoting level of tylan was fed, no significant response was seen in pig performance.

Table 49. Composition of Experimental Ration

Ingredient	Percentage
Ground Yellow Corn	78.4
Soybean Meal (44%)	18.8
Dicalcium Phosphate	1.2
Limestone	.9
White Salt	.3
Premix[a]	.4

[a]Provided the following in ppm: zinc, 100; iron, 75; copper 7.5; manganese, 25; iodine, .175; and selenium, .1. Provided the following per lb of diet: vitamin A, 2000 IU; vitamin D, 200 IU; riboflavin, 2.25 mg; pantothenic acid, 9 mg; niacin, 12 mg; vitamin B_{12}, 9 mcg; vitamin E, 7.5 IU and vitamin K, 1.5 mg.

Table 50. Response of Slow-Growing Finishing Pigs to Antibiotic Supplementation.[a]

	Control	Tylan-Sulfa[b]
First 28 days		
Average daily gain, lb[d]	1.78	2.01
Average daily feed, lb[d]	5.02	5.36
Feed/gain	2.85	2.69
Second 28 days	**Control**	**Tylan[c]**
Average daily gain, lb	1.66	1.72
Average daily feed, lb	5.77	5.89
Feed/gain	3.47	3.44
Overall (56 days)	**Control**	**Antibiotic**
Average daily gain, lb[d]	1.71	1.86
Average daily gain, lb	5.36	5.58
Feed/gain	3.14	3.02

[a]3 replications of 7 pigs/pen (42 pigs selected out of 200 pigs) averaging 125 lb and 2 replications of 6 pigs/pen (24 pigs selected out of 112 pigs) averaging 114 lb.

[b]100 gm tylan-100 gm sulfamethazine/ton

[c]40 gm tylan/ton

[d]Means significantly different at the 10% probability level.

Combining the two periods, revealed a response ($P \leq .10$) in daily gain due to antibiotic supplementation to the diets of slow growing pigs. This response resulted in approximately 8.4 lb heavier pigs at the end of the experiment. Differences in feed consumption and feed/gain were not significant. It should also be noted that the controls performed at a desirable level during the 56 day experimental period. It is possible that sorting the pigs into more uniform groups without competition from larger and possibly more aggressive pigs may have allowed the pigs to compensate for their earlier slow growth.

This study was a part of a regional study and the data generated will be combined with other data to evaluate the response of slow growing pigs to antibiotics. Additionally, plans have been made to study the compensatory response to sorting pigs into more uniform outcome groups during the middle of the growing-finishing period.

Summary

Slow growing pigs (50 to 130 lb) were selected from contemporary groups to evaluate the response of these pigs to antibiotic supplementation during the finishing period. Sixty-six pigs were selected from 312 pigs at Beresford and at Brookings. They were allotted to two treatments: no antibiotic or 100 gm tylan - 100 gm sulfamethazine/ton for 28 days followed by 40 gm Tylan for 28 days. Pigs ate more feed and gained faster ($P < .10$) during the initial 28 day period when they received antibiotics. No response was seen during the second 28 day period.