24th Annual . . .

SDSU

SOUTHEAST SOUTH DAKOTA EXPERIMENT FARM

PROGRESS REPORT 1984

Agricultural Experiment Station
South Dakota State University
Brookings

This twenty-fourth 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

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INTRODUCTION . . . . Fred E. Shubeck
Research Manager

The two years, 1984 and 1983, were strikingly similar in weather patterns. Both years experienced extremes in temperatures and rainfall. Rainfall in May and June was so abundant that many farmers on fairly well drained land in Southeast South Dakota, were unable to plant their crops until July. The Vermillion River and James River flooded two times. Some of the bottom land was never planted at all.

Air temperatures were below normal for most of the growing season. Rainfall was below normal for July, August and September, but subsoil moisture helped to maintain the growing plants so that excellent yields were obtained on the well drained soils. In those areas where planting was delayed due to excessive moisture, selection of the proper variety was of great importance. Immature green soybeans were a serious problem for many farmers. Nitrogen fertilizer applications increased corn yields remarkably in some plots.

Stalk rot and corn borers were problems this year leading to more stalk breakage and lodging.

The favorable weather in late fall permitted all the desired tillage to be accomplished.

Sixty-nine loads of gravel were hauled in to fill the ruts and to elevate the driveways leading to the feedbunks, in order to avoid the mud problems of last year.

Some tiling and ditch work was done near the north feedlot to help excess water drain away.

A Summer Crop Tour was held in July and a Fall Field Day was held in September. There were 36 educational meetings at the Experiment Farm last year. The facilities are being well used.

About a hundred pear trees were planted between the north feedlot shelterbelt, and the feedlot. These will be used as a source for grafting wood for several years. Afterward, they can be used for fruit production.

A farm woodlot was planted in 1984. Several species and plant densities are being experimented with. Some of the species made a very rapid growth in one growing season.

The corn crib was remodeled on the south side to hold shelled corn and small grain. The Green Thumb workers helped with remodeling. We have very little need for a corn crib because all of our corn is now combined. We do have a need for several small bins to hold feed grains.

A computer and word processor was put into operation. This equipment aids in the recordkeeping, calculations and processing of experimental data, and in producing the annual reports. It also opens many new horizons and possibilities for compiling information and aiding in research work.

Table 1. Temperatures at The Southeast Experiment Farm - 1984

Month	1984 Ave. Temperatures (F)[1] Maximum	Minimum	32 Year Average Maximum	Minimum	Departure From 32 Year Average Maximum	Minimum
January	26.3	4.6	24.8	4.0	1.5	0.6
February	35.5	20.6	32.1	10.9	3.4	9.7
March	32.8	18.7	43.0	22.1	-10.2	-3.7
April	53.9	37.0	60.8	35.4	-6.9	1.6
May	66.8	45.6	73.0	47.1	-6.2	-1.5
June	80.3	59.7	82.3	57.0	-2.0	2.7
July	84.5	61.7	87.5	62.1	-3.0	-0.4
August	85.6	60.5	85.7	59.6	-0.1	0.9
September	71.4	43.2	75.8	48.9	-4.4	-5.7
October	60.9	39.2	64.9	40.0	-4.0	-0.8
November	47.2	27.2	40.4	24.4	6.8	2.8
December	31.9	12.4	30.8	10.7	1.1	1.7

[1] Computed From Daily Observations

Table 2. Precipitation at the Southeast Experiment Farm 1984

Month	Precipitation 1984 (inches)	32 Year Average (inches)	Departure from 32-year Ave. (inches)
January	.31	.48	-0.17
February	1.78	1.06	0.72
March	1.67	1.44	0.23
April	6.43	2.38	4.05
May	4.06	3.39	.67
June	7.94	4.24	3.70
July	2.06	3.22	-1.16
August	1.15	2.89	-1.74
September	1.43	2.50	-1.07
October	4.99	1.74	3.25
November	0.16	1.09	-0.93
December	0.78	.73	+0.05
Totals	32.76	25.16	+7.60

S.E. FARM REPORT

RATES OF NITROGEN AND DATES OF PLANTING CORN

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

SOUTHEAST FARM 84-1

OBJECTIVES OF EXPERIMENT

Objectives were changed this year because scheduled planting dates could not be met due to excessive moisture.

One other major change was made - no fertilizer was applied. All the results are from residual applications.

METHODS AND PROCEDURES

October 17, 1983	- Plowed total plot area
May 25, 1984	- Field cultivated all plot area
	- Planted all plots Variety - Currys 1466 Herbicide - Lasso II Banded Fertilizer - None
May 28	- Sprayed plot area with Bladex 4L pre-emergence at 2 quarts per acre
June 15	- Cultivated all plots
July 12	- Cultivated all plots
Oct. 30 - Nov. 1	- Combined all plots
November 1	- Plowed entire area

Table 3. Effect of Residual Fertilizer On Yields of Corn (High Nitrogen Rates)

Broadcast Fertilizer applied annually except 1984 N + P + K	Bu of No. 2 corn per acre
0 + 0 + 0	53
0 +11 +58	57
80 +11 +58	57
160 +11 +58	71
240 +11 +58	74

Discussion and Interpretation of Table 3.

Since it was impossible to include the date of planting variable this year, the above yields are the average of 16 replications. No fertilizer was applied in 1984 so all yield effects are due to residual fertilizer applied in previous years.

There was little or no increase in corn yields due to residual effects of 80 lbs of N applied previously. Where previous annual applications of 160 or 240 lbs of N were made, yield increases were more substantial.

Yields in general were rather low on this site due to imperfect drainage conditions and above average rainfall.

With several other experiments on well drained soils, both total yields and responses to nitrogen were much greater.

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

Broadcast Fertilizer Applied annually except 1984 N + P + K	Yield of No 2 corn per acre
0 + 0 + 0	40
20 + 11 +58	40
40 + 11 +58	41
60 + 11 +58	44
80 + 11 +58	46

Discussion and Interpretation of Table 4.

Here again, the residual yield increases from lower rates of nitrogen applications were rather small.

The low rates of nitrogen experiment began in 1974 and the high rate experiment began in 1968. These were reported as separate experiments even though they are located in the same blocks with the same imperfectly drained soil. Yield figures above are the average of 16 replications. Too much water is the primary reason for the low yields, when taking into consideration loss of soil nitrogen by leaching and denitrification.

SDSU

S.E. FARM REPORT

PLANT POPULATIONS FOR CORN

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 84-2

Objectives of Experiment

1. Will a drought tolerant hybrid help reduce the expected loss when the planting rates turn 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

October 24, 1983 - Plowed all plots
May 21, 1984 - Broadcast 160+60+40 (Oxide) on all plots and field cultivated.
May 24 - Planted all eight populations and five varieties:
Pioneer 3901 - flex range in ear size
Pioner 3906 - smaller, early maturing
Frundts 8500A - multi-ear
Curry's SC150 - big tall full season
Pioneer 3709 - drought tolerant
May 26 - Sprayed all plots with Bladex 4L at 2 quarts per acre pre-emergence.
June 19-26 - Thinned all plots to desired populations.
June 26 - Cultivated after thinning was completed.
October 29 - Combined all corn plots
October 30 - Plowed total plot area

Table 5. Effect of Plant Populations and Hybrids on Corn Yield

Hybrid	Relative Maturity	Populations in Thousands							Average
		10	12	14	16	18	20	22	Bu/A
Pioneer 3906	91	69	89	104	114	115	132	136	108.4
Pioneer 3901	93	83	91	106	107	113	123	127	107.1
Pioneer 3709	105	82	98	108	112	115	128	126	109.9
Frundts 8500A	110	92	90	95	101	105	113	107	100.4
Curry's SC150	115	79	97	103	106	109	113	112	102.7
Average		81.0	93.0	103.0	108.0	114.0	121.8	121.6	

Discussion and Interpretation of Table 5.

Populations of 20 and 22 thousand plants per acre were included this year similar to that of 1983. Previously, populations of 18,000 were the upper limit in the experiment. Work prior to 1983 indicated that in years with above average rainfall, corn yields may be improved with densities over 18,000. It also indicated that in years with severe drought, yields decreased as populations were increased.

The interrelationships in 1984 of plant densities, relative maturity and plant type proved to be very interesting. For instance, when yields of all 5 hybrids were averaged for each plant population, 20,000 plants per acre appeared to be sufficient for this years' climatic conditions. However, note that yields for the two earlier maturing hybrids were still increasing as populations reached 22,000.

Yields from the two latest maturing hybrids were not proportionately as high as in other years when temperatures were higher and the growing season longer. It was rather surprising to see yields from the earliest 3 hybrids surpass those from the later maturing numbers at populations over 14,000. One of the original objectives of this experiment was to see if an early corn could compete with the big full-season types by increasing the number of plants per acre. This year it did. Work from previous years suggests, however, that it is rather difficult to surpass the yields of big full season hybrids when planted early at their best populations and row spacings.

Special plant characteristics such as a big flex-range in ear size, multi-ear tendency, and drought resistance had rather limited effects for maintaining the same yield over a broad range in populations as they have in other years. This year the relative maturity and the number of plants per acre played the most dominant role.

When results are compared over the last 10 years, yields in the area of 130 bushels of number two corn are pretty good for hybrids in the 91 to 93 day maturity range, but it required populations of 20 to 22 thousand to do it.

In summary, these results emphasize the need for relatively high plant densities for the smaller, earlier maturing hybrids for maximum yields, but only when there is sufficient moisture to sustain their needs.

S.E. FARM REPORT

SILAGE REMOVAL AND SOIL DEPLETION

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

SOUTHEAST FARM 84-3

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

October 18, 1983	-	Plowed total plot area
June 8, 1984	-	Broadcast all commercial fertilizer and manure on designated plots
		Field cultivated
	-	Planted
		Variety Pioneer 3720
		Herbicide; Lasso II banded, Bladex 4L sprayed at 2 qts. per acre pre-emergence
		Manure - 10 ton per acre
		Insecticide - Counter 15G
June 27	-	Field cultivated entire area because of poor stand
June 28	-	Replanted entire experiment
		Variety - Pioneer 3906
		Herbicide - Lasso II banded
		Insecticide - Counter 15G
July 11	-	Cultivated all plots (1st)
July 30	-	Cultivated all plots (2nd)
Nov. 6	-	Combined all plots
Nov. 7	-	Plowed all plots (no fertilizer added)

Table 6. Effect of Commercial Fertilizer and Manure Application On Corn Yield with Intensive Soil Depletion Management

Removal from plot	Fertilizer Treatment N + P + K	Tons of Silage/acre @ 65% Moisture	Bu of #2 corn per acre
Corn grain only	0 + 0 + 0	—	20.1
Corn grain only	10 tons manure/acre	—	29.6
Corn grain only	0 + 0 + 0	—	20.5
Corn grain only	100 + 17.6 + 33.2	—	32.3
Grain & Stover	0 + 0 + 0	5.7	15.3
Grain & Stover	10 tons manure/acre	8.1	24.2
Grain & Stover	0 + 0 + 0	7.1	16.5
Grain & Stover	100 + 17.6 + 33.2	9.8	33.7

Discussion and Interpretation of Table 6.

This area has imperfectly drained soils and has been a problem in wet years. The rainfall in April, May and June of 1984 was 18.43 inches.

The first planting was drowned out. The area was then field cultivated and replanted on June 28. There was a question as to how much information we would get out of the experiment, but we decided to try replanting and see what developed.

Grain yields were very low. This can be attributed in part to the late planting, to nitrogen loss by leaching or denitrification, to excess water and the accompanying reduced rate of mineralization of organic matter and soil oxygen deficiency.

Even though yields were low, there was an increase in grain and silage in each case where manure or commercial fertilizer was applied.

Under these adverse conditions, it was somewhat surprising to see average check plot yields higher where grain only was removed compared to where grain and stover were removed over the past several years. This trend was not always apparent in years with more normal rainfall. It was anticipated that it would take several more years of removing all stover and grain from the field before the beneficial effects of returning crop residues to the soil could be measured in yield responses.

S.E. FARM REPORT

DATE OF PLANTING EARLY, MEDIUM AND LATE MATURING CORN HYBRIDS

F. Shubeck, B. Lawrensen and D DuBois

SOUTHEAST FARM 84-4

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

October 26, 1983	-	Chisel plowed (twists) the entire experimental area. Previous crop - soybeans.
May 21, 1984	-	Broadcast 80+30+20 (oxide) per acre on plot area and incorporated with field cultivator.
May 22	-	First planting date Planted all three varieties Heribicide - Lasso II banded Insecticide - Counter 15G (Note - these products were used on all 4 planting dates).
June 1	-	Second planting date
June 7	-	Third planting date
June 29	-	Cultivated all plots where soil was dry enough
June 2	-	Field cultivated plots for fourth planting date Planted fourth date
July 19	-	Cultivated first planting
July 30	-	Cultivated remaining plantings
November 5	-	Combined all plots
November 6	-	Plowed total plot area

Table 7. Effect of Planting Dates and Hybrids on Yields of Corn

Hybrid	Relative Maturity	Planting Dates May 22	June 1	June 7	July 2	Average
Pioneer 3901	93 day	117	116	89	20	107.3
Pioneer 3709	104 day	110	98	93	12	100.3
Currys' 1466	110 day	118	101	81	6	100.0
Average		115	105	87.7	12.7	

Discussion and Interpretation of Table 7.

The first planting date was delayed until May 22 due to excessive moisture, therefore the latest maturity hybrid used was Curry's 1466 which is a 110 day corn.

Results for the last two years were concentrated on the later end of the planting season with no early planting date or full season hybrid to compare to.

Growing degree days in 1984 were below normal for several of the growing season months.

For the growing conditions of 1984, the early hybrid (93 day) could be planted as late as June 1 and still come up with over 100 bushels per acre. When planting was delayed until June 7, yields were decreased, but were still quite satisfactory. By July 2, perhaps it would be better to plant a much earlier corn or go with early soybeans.

S.E. FARM REPORT

CHISEL PLOW FOR CORN AND SOYBEANS

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 84-5

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 17-18, 1983		Fall tillage treatments completed for corn and soybeans
May 23-24, 1984	-	All specified spring tillage treatments complete Planted corn in designated plots Variety - Pioneer 3732 Herbicide - Lasso II banded Insecticide - None Fertilizer 100# of 8-32-16 banded Final stand - 25,000 plants per acre
May 23	-	Planted corn in the corn - oats sequence Variety - Pioneer 3732 Herbicide - Lasso II banded Insecticide - None
May 25	-	Planted all soybean plots Final stand - 181,209 plants per acre Variety - Corsoy 79 Herbicide - Lasso II banded Fertilizer - 100# of 8-32-16 banded in row
May 26	-	Sprayed all corn plots with Bladex 4L at 2 quarts per acre pre-emergence.
June 27	-	Sidedressed all corn plots with 100 lbs/acre of nitrogen (a.i.) All corn plots cultivated after sidedressing
July 16	-	Cultivated all soybean plots for the first time
August 3	-	Rogued all bean plots for broadleaf weeds
August 14	-	Rotary chopped oats stubble in the corn-oats sequence.
August 15	-	Performed all summer tillage in the oats stubble of the corn-oats sequence.
October 2	-	Combined soybean plots

Methods and Procedures Cont.

October 23-24 - Combined all corn plots
October 24-25 - Performed all fall tillage treatments in the corn-soybean sequence

Table 8. Effect of Tillage Treatments on Yield of Corn (Corn After Soybeans)

Tillage Treatments In Fall	In Spring	Bu of corn/acre
1. ------------------------	Disk-drag	100
2. ------------------------	Sweeps-drag	110
3. ------------------------	Plow-disk-drag	102
4. Plow - moldboard	Disk-drag	106
5. Chisel plow with twists	Disk-drag	119
6. Chisel plow with twists	Disk-drag	104
7. Chisel plow with twists	Sweeps-drag	90
8. Chisel plow with sweeps	Sweeps-drag	107
9. ------------------------	Field cultivate	102
10. Chisel plow with twists*	Sweeps Drag	66

*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 per acre was applied as a side-dressing where corn was about one foot tall.

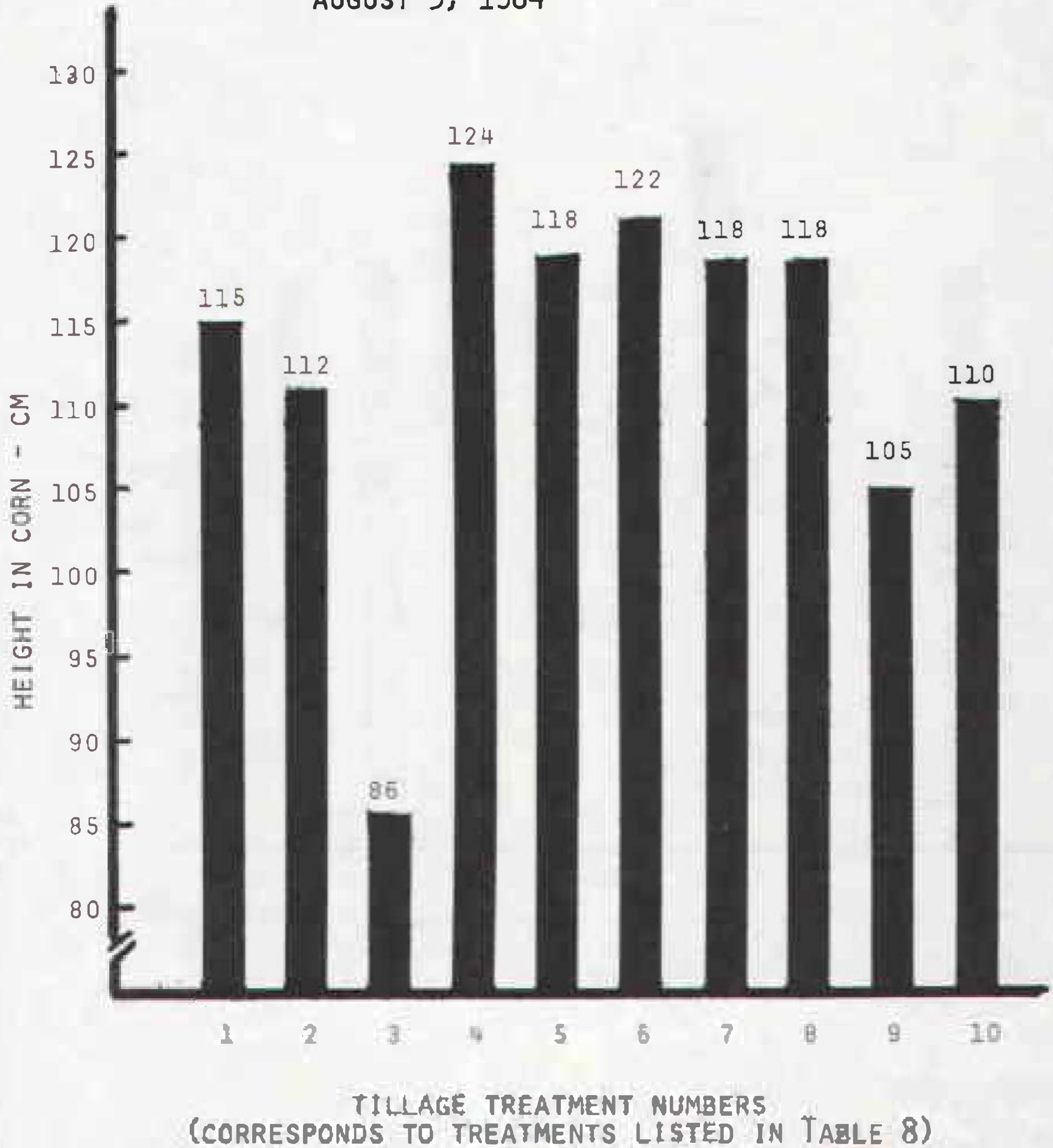
Discussion and Interpretation of Table 8.

Table 8 shows yields of corn in the corn soybean sequence. Yield of 100 bushels or more were harvested in most of the fertilized plots. Yield increases of 40 bushels/acre were obtained in some plots due to the fertilizer treatment.

The soil in this area is well drained. Planting dates were delayed only about a week or ten days from what we consider optimum for most years. Yields were fairly good and the response to fertilizer was very substantial.

Yields from fall plowing were not much different from those with spring plowing. The value of the fall tillage methods compared to spring tillage varied from year to year depending on rainfall distribution and other climatic variations. There appeared to be no consistent advantage for either spring or fall tillage in 1984. The type of spring tillage whether it be moldboard plowing, chisel plowing or disking had only minor effects on yield regardless of the type of fall tillage that preceded it. For the conditions of 1984, it appeared that a wide variety of tillage combinations were successful.

FIGURE 1. EFFECTS OF TILLAGE TREATMENTS ON CORN HEIGHT
AUGUST 5, 1984

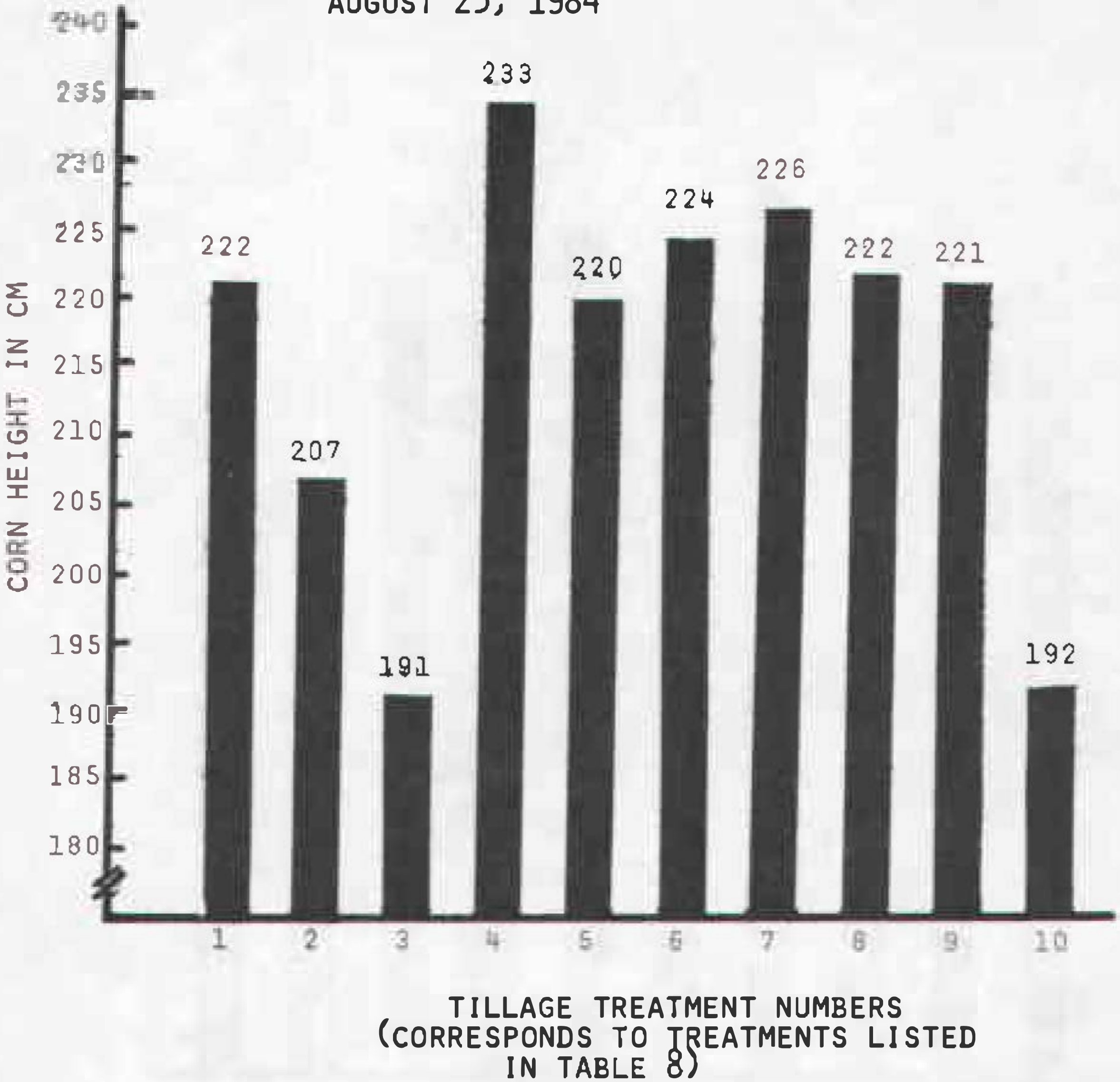


Discussion and Interpretation of Figure 1.

Treatments 1, 2, 3 and 9 had no fall tillage. Treatment 3 was spring plowed. Spring plowing in wet years often leads to a lumpy seedbed with poor seed-soil contact and a slower start in germination and early growth.

Treatment 10 was unfertilized. Early plant growth in this plot was about the same as those plants that received a starter fertilizer. Judging by the large yield increase due to commercial fertilizer, a spurt in early growth was expected where a sideband starter was applied, but it didn't appear. Evidently the yield increase was due primarily to the 100 lbs of nitrogen sidedressed.

FIGURE 2. EFFECT OF TILLAGE TREATMENTS ON CORN HEIGHT
AUGUST 23, 1984

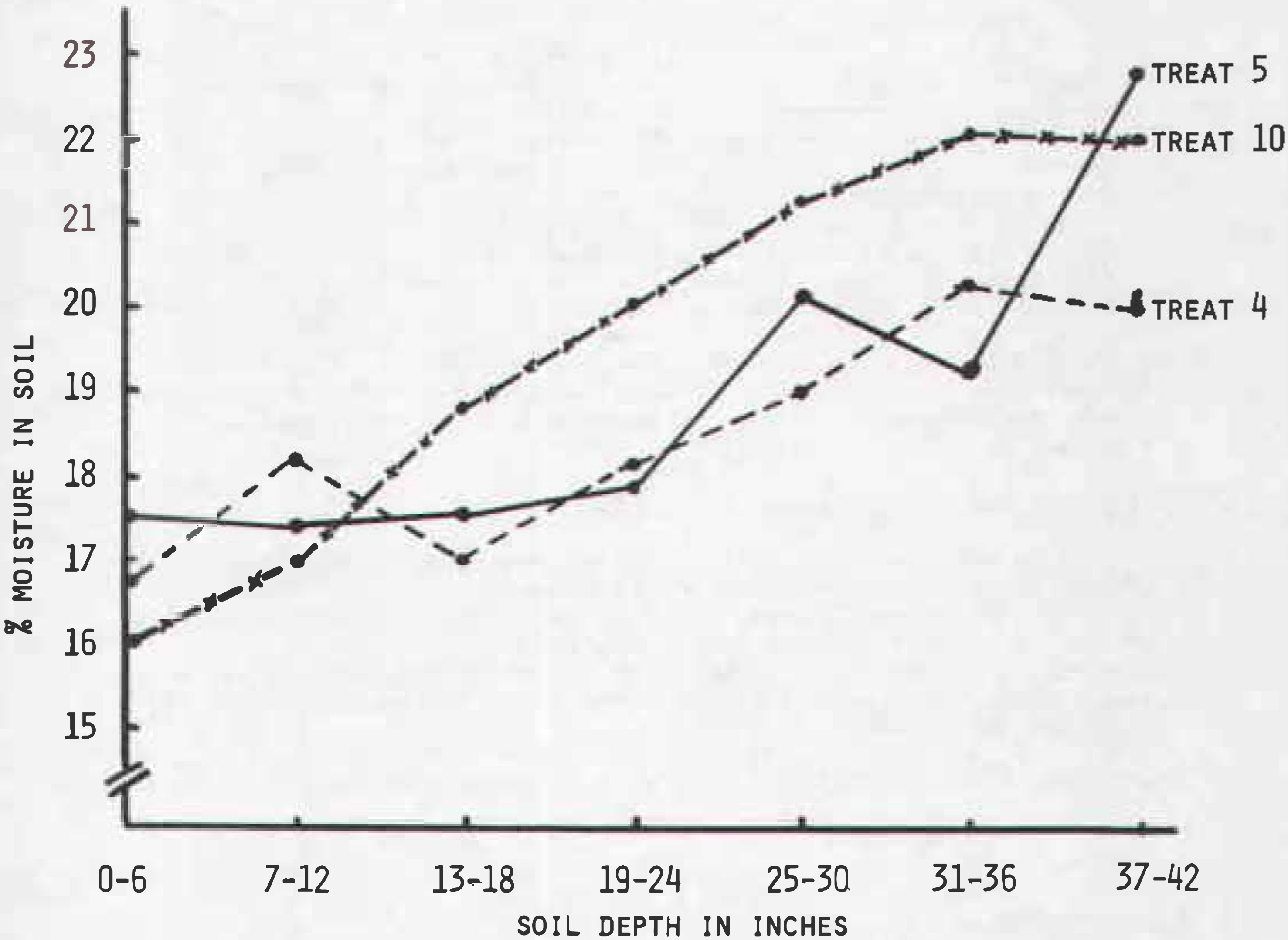


Discussion and Interpretation of Figure 2.

By August 23, the unfertilized corn in treatment 10 was lagging behind most of the others in rate of growth.

Corn in the spring plowed plot (No. 3) hadn't recovered yet from its slow start. It must have recovered later on in the season because the grain yield and ear moisture at harvest time were comparable to the other treatments.

FIGURE 3. EFFECT OF TILLAGE AND FERTILIZER TREATMENTS ON SOIL MOISTURE, AUGUST 9, 1984



Discussion and Interpretation of Figure 3.

All three treatments had both fall and spring tillage. Numbers 4 and 5 were fertilized but number 10 received no fertilizer.

For the first 12 inches in soil depth, there were only minor differences in percent of soil moisture for any of the three treatments. From 12 inches on to deeper depths there appeared to be a little more moisture in the unfertilized plots (Treatment No. 10). We could expect root elongation and proliferation to be greater where fertilizer was applied and consequently a more complete draw down of existing soil moisture. This would help to explain the 40 bushel per acre increase in yield where fertilizer was applied.

Table 9. Effect of Tillage Treatments on Yield of Soybeans (Soybeans after Corn)

In Fall	In Spring	Bu soybeans/acre
1. ————————————	Disk-disk-drag	36
2. ————————————	Chop-sweeps-disk-drag	38
3. ————————————	Disk-moldboard plow-disk-drag	38
4. Disk-moldboard plow	Disk-drag	38
5. Disk-chisel with twists	Disk-drag	31
6. Chop stalks-chisel with twists	Disk-drag	36
7. Chop stalks chisel with twists	Disk-drag	37
8. Chop stalks-Chisel with sweeps	Sweeps-drag	37
9. Disk	Disk-drag	33
10. Chop stalks-chisel with twists*	Sweeps-drag	30

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

Discussion and Interpretation of Table 9.

Plots that had spring tillage only yielded about as well as several treatments that had both fall and spring tillage.

The response to a sideband starter fertilizer was consistent and was considerably greater than the long time average.

For the conditions of 1984, it appeared that yields were very similar for a wide range of tillage intensities, tillage types and times of performance.

Table 10. Effect of Tillage Treatments on Yield of Corn (Corn after Oats)

Tillage Treatments In Summer	In Spring	Bu of corn per acre
1. Chisel plow with sweeps	Disk-drag	120
2. Chisel plow with twists	Disk-drag	120
3. Moldboard plow	Disk-drag	132
4. ————————————	Plow-disk-drag	85
5. ————————————	Sweeps-disk-drag	117
6. ————————————	Twists-disk-drag	127
7. Subsoil	Disk-disk-drag	123

*All plots received 100 lbs per acre of 8-32-16 (oxide) as a sideband starter and 100 lbs per acre of nitrogen applied as a side dressing.

Discussion and Interpretation of Table 10.

The purpose of experimenting with a corn-oats sequence in addition to the corn-soybean rotation was to see if mid-summer tillage after oats would be more helpful than late fall tillage after soybeans.

For the conditions of this experiment, it looks like moldboard plowing of the oats stubble in the summer was one of the better tillage treatments.

When moldboard plowing was delayed until spring, the yield of corn dropped considerably.

Corn yields in general were higher in the corn-oats sequence (Table 10) than in the corn-soybean (Table 8) sequence due in part to better drainage.

Subsoiling the oats stubble in the summer had only minor effects on the next year's corn crop.

DEPTH OF TILLAGE IN DRYLAND CORN / SOYBEAN ROTATION

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

SOUTHEAST FARM 84-6

Experimental Plan

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

Deep Tillage Treatment
- S Treatment - subsoiled
- N treatment - not subsoiled

Cropping sequence: corn - soybeans

Methods and Procedures

October 28, 1983	- Subsoiled specified plots
June 1, 1984	- Fertilized all corn and soybean plots with 109.6 lbs/A of 8-32-16 (oxide) Performed all spring tillage All plots tandem disked except roto plots
June 1	- All soybean plots were sprayed with Treflan at 1.5 pints per/acre before tandem disking
	- Planted all corn plots Variety - Curry's 1424 (final stand 22,000/acre) Herbicide - Lasso II banded Insecticide - None
	- Planted all beans Variety - Corsoy 79 (Final stand 176,563/acre) Herbicide - Treflan 1.5 pints/acre
June 26	- Sidedressed all corn plots with 100 lbs of nitrogen (actual) per acre.
June 29	- Cultivated all corn and bean plots
July 9	- Cultivated all corn and bean plots
October 1	- Combined bean plots
October 24	- Combined corn plots
November 8	- Subsoiled all specified plots

Table 11. Effect of Different Tillage Treatments on Yield of Corn

Tillage Treatment	Average of 4 replications Bu of Corn/acre
Moldboard plow - subsoiled	80.4
Moldboard plow - not subsoiled	81.5
Roto-till - subsoiled	96.0
Roto-till - not subsoiled	101.8
Disk - subsoiled	94.9
Disk - not subsoiled	90.6
Chisel plow - subsoiled	91.5
Chisel plow - not subsoiled	84.7

Tillage Averages: Plow - 81.0
Roto-till - 98.9
Disk - 92.8
Chisel plow - 88.1

Subsoiled - 90.7
Not subsoiled - 89.7

Disucssion and Interpretation of Table 11.

There was no consistent yield advantage in favor of deep subsoiling. The average of all subsoiled plots was about the same as the average of all non-subsoiled plots.

Moldboard plowing in the spring appeared to yield less than the other tillage treatments.

Table 12. Effect of Tillage Treatments on Yield of Soybeans

Tillage Treatments	Average of 4 replications
Moldboard plow - subsoiled	39.4
Moldboard plow - not subsoiled	37.3
Roto-till - subsoiled	37.6
Roto-till - not subsoiled	38.9
Disk - subsoiled	33.9
Disk - not suboiled	34.9
Chisel plow - subsoiled	32.1
Chisel plow - not subsoiled	33.5

Table 12 Continued.

Tillage averages:

Plow - 38.4
Roto-till - 38.3
Disk - 34.4
Chisel plow - 32.8

Subsoiled - 35.8
Not subsoiled - 35.8

Discussion and Interpretation of Table 12.

Subsoiled plots yielded about the same as those that were not subsoiled.

Soybean yields from moldboard plowing and roto-tilling appeared to yield a little more than disking and chisel plowing. Less cornstalk residue was left on the surface with the plowing and roto-tilling than with the other two treatments. From visual observations and height measurements, soybeans in the roto-tilled plots got off to a little faster start than the other treatments. Soil moisture and soil temperature measurements indicated no great differences due to any of the tillage treatments.

S.E. FARM REPORT

CONTINUOUS SOYBEANS

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

SOUTHEAST FARM 84-7

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

Nov. 1, 1983	- Fall plowed plot area
May 16, 1984	- Field cultivated plot area
	- Planted all corn plots Variety - Curry's 1466 Herbicide - Lasso II Banded Fertilizer - 100 lbs of 8-32-16(oxide) banded 2 x 2
May 18	- Sprayed all corn plots with Bladex 4L at 1.5 quarts /acre pre-emergence
June 27	- Sidedressed corn plots with 80 lbs of N per acre Cultivated all corn plots after sidedressing
July 5	- Sprayed Pyridin at 0.15 grams active ingredient per acre for control of first brood corn borer.
July 12	- Cultivated all soybean plots
July 30	- Rogued all bean plots for broadleaf weeds
October 1	- Combined all bean plots
October 22	- Combined all corn plots
October 25	- Plowed total plot area

Table 13. Effect of Cropping Sequence on Yield of Soybeans

Cropping Sequence	Fertilizer	Bu of Corn per acre	Bu of Soybeans per acre
Continuous beans	Check	—	32
Continuous beans	Fertilized	—	31
Rotation beans and corn	Check	81	37
Rotation beans and corn	Fertilized*	125	36

*Both continuous and rotation beans were fertilized with 75 lbs of 8-32-16 (oxide) per acre banded. Corn was fertilized with 100 lbs of 8-32-16 (oxide) banded and 80 lbs of N sidedressed.

Discussion and Interpretation of Table 13

Rotation beans yielded more than continuous beans. This has been the trend for several years, but the differences have varied somewhat from year to year.

Soybeans did not respond to the fertilizer treatment. Response to phosphorus by beans in this experiment has not always been spectacular. Evidently a serious phosphorus deficiency does not exist at this site.

There was a big response to the fertilizer treatment by corn (over 40 bushels per acre) probably due mostly to the nitrogen treatment.

S.E. FARM REPORT

LATE PLANTING OF SOYBEANS

B. Lawrensen and F. Shubeck

SOUTHEAST FARM 84-8

Objectives of Experiment

1. When weather forces planting to be delayed until July, what maturity soybean should be planted?
2. Will variations in row spacing and plant populations become more important when planting is delayed?

Methods and Procedures

July 11, 1984	-	Field cultivated plot area
July 12	-	Planted all three varieties and two row spacings (30" and 7") Varieties - McCall, Hardin and Evans Herbicide - Treflan at 1.5 pints/acre broadcast
July 20	-	All varieties and row spacings fully emerged Interval between planting and full emergence was was 8 days. Rainfall in this period was 7/10 inch
August 1	-	Cultivated 30 inch rows
August 7	-	Cultivated 7 inch rows with Allis Chalmers G - garden tractor
August 8	-	Sprayed all 7 inch rows with Blazer at 1.5 pints per acre
August 22	-	Sprayed all 30 inch rows with Blazer 4L (one pint/acre)
October 26	-	Combined all bean plots

Table 14. Yields of Late Planted Soybeans (Planted July 12, 1984)

Variety	Row Spacing	Maturity Compared to Corosy	Plants per acre	Bu per acre
Hardin	7"	3 days earlier	169,000	11
Hardin	30"	3 days earlier	93,000	6
Evans	7"	14 days earlier	239,000	18
Evans	30"	14 days earlier	103,000	11
McCall	7"	24 days earlier	373,000	22
McCall	30"	24 days earlier	161,000	17

Discussion and Interpretation of Table 14.

This year, a row spacing variable was added to the study.

When planted July 12, the earliest maturing variety with the highest number of plants per acre gave the highest yield. This was not a good year for late planted beans. Climatic conditions slowed rate of growth and maturity, resulting in many green, immature beans.

The optimum plants per acre for a normal planting date (approximately 150,000/acre) may not be the same for late planted beans and earlier maturing varieties. The combination of narrow rows and higher plant populations gave increases in yield for all three varieties.

In an area adjacent to this study, McCall beans were planted 15 days earlier (June 27) in 30 inch rows and approximately 175,000 plants per acre. They yielded 31 bushels per acre. This is 9 bushels more than McCall beans, planted July 12. Even though a variety with a maturity rating of 3 weeks earlier than Corsoy is used, a drop in yield can be expected when planting is delayed to the first week or two in July. However, the yield decrease due to late planting was the least with the earliest maturing variety used in the experiment.

SOYBEAN VARIETY AND ROW SPACING

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 84-9

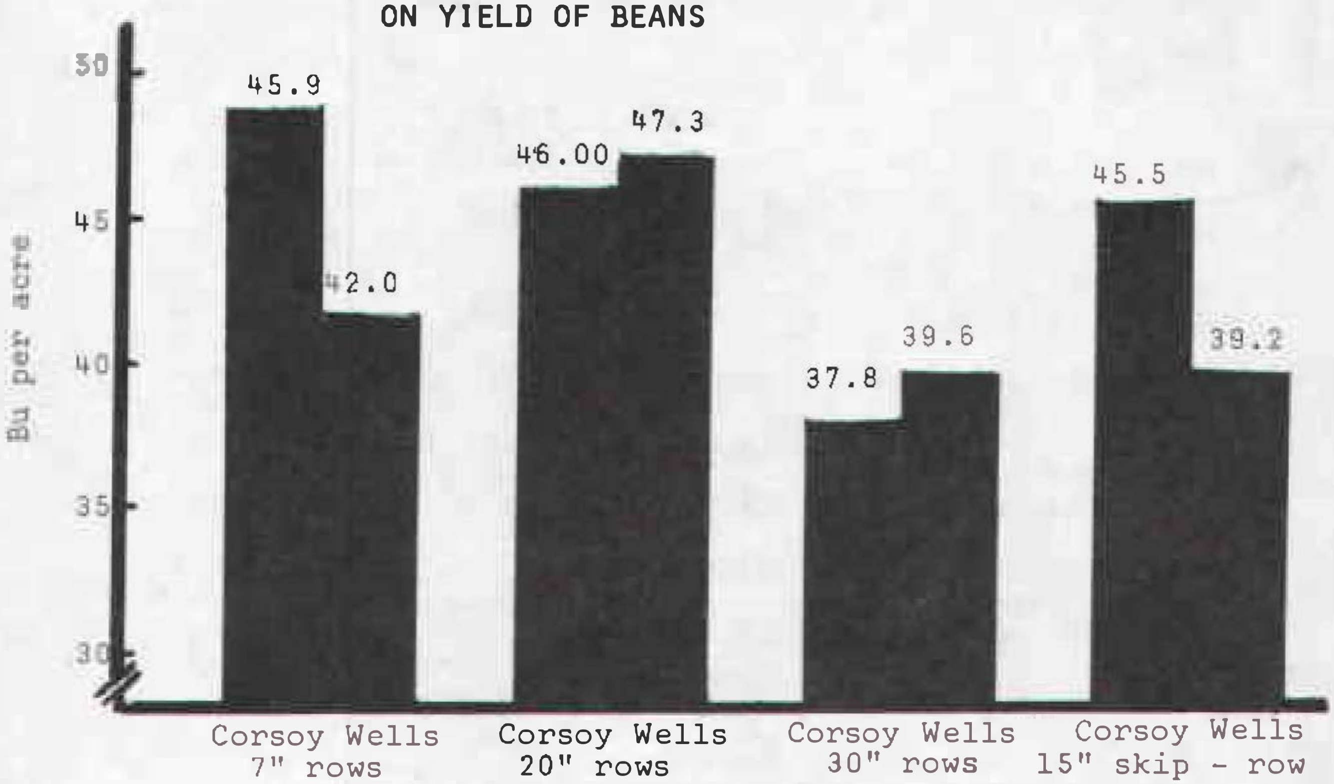
Objectives of Experiment

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

June 1	- Sprayed fall plowed area with Treflan at 1.5 pints per acre and double incorporated by disking.
June 6	- Planted all varieties and row spacings
June 7	- Sprayed area with Lexone DF at 0.5 lbs of product pre-emergence.
June 27	- Cultivated beans with G Allis Tractor and small grain cultivator
	- Cultivated 30" row spacings with John Deere 6-row tool bar cultivator.
October 4	- Combined all soybean plots

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



Discussion and Interpretation of Figure 4.

The semi-dwarf Gnome was planted, but not harvested. Germination of Gnome was not very good and stands were erratic. Gnome is a late maturing variety. We need an earlier maturing semi-dwarf for this experiment, especially when planting is delayed as it was in 1984.

From Figure 4, it appears that the 30" row spacings yielded less than the other row widths. Plant populations fell a little under the desired 150,000 in these plots which may have influenced yields.

Yields in general were very good. The site selected for this experiment was on well drained soils, so excess water was not such a severe problem. Planting date was delayed by only a couple of weeks. The group II varieties Corsoy 79 & Wells II were 8 to 10% moisture at harvest on October 4.

One of the most crucial questions in this experiment was to see if a thin-line like Wells II would out-perform a branching type like Corsoy 79 when rows were narrowed down to 7 inches. It looks as though Corsoy 79 is a very versatile variety that will do well under a wide range of conditions including several different row spacings. For the conditions of 1984, it looks like the thin line Wells II did better in the narrower rows (7" and 20") than in the 30" and 15" rows. The 15" skip-row had some spacings of 30 inches where the rows were "skipped" or omitted so it had a mixture of 15 inch and 30 inch row spacings.

MOST PROFITABLE ROTATION

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 84-10

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

October 21, 1983	- Plowed plot area
May 18, 1984	- Field cultivated area
May 22	- Seeded oats, seeded legumes and fertilized designated plots
May 23	- All corn plots planted Variety - Pioneer 3720 Herbicide - Lasso banded in row Fertilizer - 75 lbs of 8-32-16 banded
May 26	- Sprayed corn plots with Bladex 4L at 2 quarts per acre (pre-emergence)
May 31	- Spike tooth harrowed and planted sorghum plots Variety - Pioneer 8585 Insecticide - Furadan 15G Herbicide - Ramrod 20G
June 27	- Sidedressed all corn and grain sorghum plots with ammonium nitrate at specified rates.
June 29	- First cultivation of corn, bean and sorghum plots.
July 12	- Cultivated grain sorghum (2nd time)
July 16	- Cultivated corn and bean plots (2nd time)
August 3	- Rogued grain sorghum and bean plots
October 3	- Combined beans
October 23	- Combined corn
October 24	- Harvested grain sorghum
November 1	- Plowed plot area except alfalfa.

Table 15. Effect of Cropping Sequence and Fertilier on Crop Yield, 1984

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	—	—	48.3	—	—	—	—
1. Continuous Corn	Corn	6 +11 +10	70	—	98.1	—	—	—	—
2. Corn-oats	—	0 + 0 + 0	—	17.5	50.4	—	—	—	—
2. Corn-oats	Corn	6 + 11 +10	70	—	93.6	—	—	—	—
	Oats	30 + 7 + 0	—	42.8	—	—	—	—	—
3. Corn-corn-oats+Alf-Alf Hay	—	0 + 0 + 0	—	24.6	58.4	65.5	—	—	—
3. Corn-corn-oats+Alf-Alf Hay	Corn	6 +11 +10	—	—	64.6	—	—	—	—
	Corn	6 +11 +10	70	—	—	81.4	—	—	—
	Oats	15 +26 + 0	—	44.2	—	—	—	—	—
	Alf Resid	0 + 0 + 0	—	—	—	—	—	—	—
4. Oats + Sweet Clover-Corn	—	0 + 0 + 0	—	21.6	52.3	—	—	—	—
4. Oats + Sweet Clover-Corn	Oats	30 + 7 + 0	—	36.3	—	—	—	—	—
	Corn	6 +11 +10	—	—	90.4	—	—	—	—
5. Corn-Soybeans-Oats	—	0 + 0 + 0	—	23.6	52.3	—	34.0	—	—
5. Corn-Soybeans-Oats	Corn	6 +11 + 10	70	—	90.4	—	—	—	—
	Soybeans	6 +11 + 10	—	—	—	—	33.0	—	—
	Oats	30 + 7 + 0	—	42.8	—	—	—	—	—
6. Corn-Oats-Soybeans	—	0 + 0 + 0	—	22.9	54.7	—	26.1	—	—
6. Corn-Oats-Soybeans	Corn	6 +11 +10	55	—	96.1	—	—	—	—
	Oats	20 + 7 + 0	—	42.2	—	—	—	—	—
	Soybeans	6 +11 +10	—	—	—	—	30.1	—	—
7. Continuous Grain Sorghum	—	0 + 0 + 0	—	—	—	—	—	17.6	—
7. Continuous Grain Sorghum	Sorghum	6 +11 +10	70	—	—	—	—	87.9	—

Disucssion and Interpretation of Table 15.

No hay yields were reported for 1984. The stands were partially drowned out and were quite variable.

Corn yields in general were considerably less than those on the well drained areas of the farm. This situation is reversed, however, in years of below average moisture. The top corn yield was 98.1 bushels per acre and it occurred in a fertilized continuous corn sequence. The increase from fertilizer was nearly 50 bushels per acre. This shows how continuous corn can drag down the fertility level after the removal of 23 crops of corn with no added commecial fertilizer. It also shows how effective commercial fertilizer is for maintaining yields in the fertilized plots.

In rotation 3 with alfalfa hay, the check plot yielded 58.4 bushels of corn per acre. Since no fertilizer was added, the 10 bushel increase over the check plot in continuous corn may be attributed to symbiotic nitrogen from the legume. Legumes are helpful, but to get top yields, extra nitrogen is necessary and it will become more necessary as time goes on and more nutrients are removed from our soil.

In unfertilized plots, the sweet clover catch crop increased corn yields about 4 bushels over that of continuous corn. This increase varies from year to year depending on environmental conditions, but this is a conservative figure on what to expect.

In unfertilized plots, where corn followed soybeans, (rotation 6), the soybeans in the rotation increased yield of corn over that in continous corn by about 6 bushels per acre. Corn and soybeans make an excellent rotation.

Growing oats without fertilizer severely reduced the yield potential. Yields in some unfertilized rotations were as low as 18-20 bushels per acre. Fertilizer nearly doubled the yield even though planting dates were delayed several weeks.

The yield increase in grain sorghum due to fertilizer (ammonium nitrate) was spectacular. This was truly a year that favored the maximum use of additional plant food whether it came from manure, legumes or commercial fertilizer.

STRIP INTERCROPPING OF CORN AND SOYBEANS

B. Lawrensen, F. Shubeck and D. DuBois

SOUTHEAST FARM 84-11

Objective of Experiment

1. If corn and beans are planted alternately in 12 row strips will the border rows of each crop be exposed to more sunlight and moisture sufficiently to increase yield?

Methods and Procedures

May 15	-	Double tandem disked the fall plowing
	-	Planted all corn plots Variety Curry's 1466 Insecticide - Counter 15G Herbicide - Lasso II Banded Fertilizer - 100 lbs/acre of 8-32-16 (oxide) banded
May 16	-	Planted all soybean plots Variety - Century Herbicide - Lasso II Banded Fertilizer - 100 lbs/acre of 8-32-16 (oxide) banded
May 23	-	Emergence of corn and soybeans
June 19	-	Cultivated corn and bean plots Sidedressed corn plots with 100 lbs N/acre
October 22	-	Combined beans
October 25	-	Plowed plot area

Table 16. Effect of Strip Cropping on Yield of Corn and Soybeans

Row Placement Corn	Bus of corn/acre	Row Placement Soybeans	Bu of beans/acre
North 3 rows	111	North 4 rows	23.4
Center 6 rows	100	Center 4 rows	24.7
South 3 rows	103	South 4 rows	24.3

Discussion and Interpretation of Table 16

There is a border effect on yield with just about every experimental plot. To avoid this source of error in most experiments, we very carefully move into the plot at least 5 feet from a grass alleyway before taking a yield sample. We maintain one and preferably two rows of border on each side of the rows harvested for yield determination.

The border effect can be positive or negative. Corn growing close to a grass alleyway will frequently be decreased in yield. Corn growing adjacent to a fallowed area or a low growing intertilled crop may show an increase in yield.

This experiment is an attempt to harness the positive border effect by strip cropping corn and beans. Twelve 30" rows of corn were alternated with twelve 30" rows of soybeans. The row grouping in Table 16 was predetermined by row widths of our harvest machinery. Rows extended in a east-west direction.

From visual observation, the soybean row closest to the corn showed a positive border effect by an increase in height over the other rows. The second row in from the corn showed little or no distinquishable border effects.

It was somewhat surprising to see no yield increase of beans for border effect (Table 16) but an apparent positive border effect for corn.

S.E. FARM REPORT

1984 PERFORMANCE TRIALS OF SMALL GRAINS, GRAIN SORGHUM, SOYBEANS AND CORN AT THE SOUTHEAST EXPERIMENT FARM

J. J. Bonnemann

PLANT SCIENCE 84-12

Small grains (oats and spring wheat), soybean, grain sorghum and corn performance trials were seeded at the Southeast Farm in 1984. Wet field conditions delayed the usual seeding dates for all the crops and the subsequent prolonged wet period in early June caused stand problems in the soybeans and grain sorghum especially. The saturated soil and late seeding restricted growth of the small grain trials, though stands were satisfactory.

The small grains were seeded in mid-May. The wet, cool conditions favored good germination but growth was slow due to cool, saturated soil through most of June. Yields ranged from 77 to 42 bushels per acre for oats with a wide range of test weights, 38 to 31 lb/Bu. Spring wheat yields were low and the quality poor. The delays of seeding and cool, wet conditions throughout the year caused the crops to be quite susceptible to diseases and heat when filling and ripening in late July. Results appear in Tables 17 and 18.

Additional data on 1984 Small Grain trials will be found in EC774, 1985 Recommendations, Spring Grains and Flax yields, found at County Extension Offices.

Seventy-eight proprietary corn hybrids were grown in the 1984 Corn Performance Trials at the Farm. The corn was seeded May 21, single row plots, 36 inches apart, with cone-seeders mounted above flexi-planter units. A recommended granular herbicide and insecticide were applied for weed and insect control respectively. Two seeding rates were intended; final counts being just over 17,700 and 21,300 plants per acre in late August. Significant yield differences were found in favor of the higher populations, but only averages of the 2 populations are reported. The results are reported in Table 19.

Numerous corn hybrids produced excellent yields. A killing frost, 19° F, occurred on September 26 and harvest would usually have begun in a couple of weeks. The cool, foggy October with recurrent rains delayed drydown and stalk lodging became a more severe problem than had the trial been harvested in mid-October. Corn borer damage was also the cause of some lodging.

Further details about the 1984 corn trials will be found in Plant Science Pamphlet #84, 1984 Corn Performance Trials.

The grain sorghum performance trial was also seeded on May 21. Twenty-seven proprietary hybrids were included in this trial and 18 regional entries. The trial was seeded with a flexi-planter equipped with cone seeders. Row spacing was 36 inches. Standing water during early growth stages greatly reduced stands forcing abandonment of two replications. The variability is evident in yields reported. Yields ranged from 7000 down to about 2700 lbs/A and test weights ranged from 58 to 49 lbs/Bu, which was closely correlated to yields. Bird damage was also a problem for some entries, with maturity stages not too great a factor.

The results and related data appear in Table 20. Further details about the 1984 trials will be found in Plant Science Pamphlet #85, 1984 Grain Sorghum Performance Trials.

Public and proprietary entries of soybeans are grown in trials at the Farm and several surrounding sites. A trial was grown near Crooks, a new trial established near Freeman, and the trial intended at Elk Point was canceled when seeding could not be completed by June 22. Most entries at Elk Point were Group II and III maturity, and would not have a reasonable probability of maturing if seeded on that date or later.

The proprietary entries, varieties or blends, are the choice of the participating companies and a nominal fee is charged to partially offset trial expenses. The sites at Centerville and Elk Point also include entries from State and Federal breeding programs in Regional Trials. Potential new releases are screened in these trials. Regional Group I trials are grown at the SE Farm and Group III's near Elk Point.

Wet conditions delayed seeding at Crooks and Centerville. The Freeman trial was seeded May 18; the SE Farm trial May 24 and the Crooks trial on May 25. The extended cool, saturated soil conditions in early June caused stand problems at Crooks and Centerville. All trials were seeded as paired rows 16 feet long, 12 feet harvested for yield with a small plot combine. The trials at Freeman were harvested on September 21. The cool, foggy conditions and recurrent rains delayed soybean harvest at the other two sites until October 24 at Crooks and October 26 at Centerville.

Though some good yields are reported, the quality of most entries was fair to poor, the later the maturity the poorer the quality. Green seeds in moldy pods were not uncommon. The cooler than normal temperatures in September delayed maturation and killing frosts occurred over much of eastern South Dakota on September 25-26. Many of the late maturity entries were still green at first frost and some remained so when harvested a month later. The problem was especially bad in the later Group II and Group III beans at the SE Farm and the late Group I and Group II entries at Crooks.

The past several years Group II's have had a problem maturing naturally north of I-90 and later Group II soybeans have presented problems in the Centerville area. The Freeman area was somewhat drier and all the plants had matured naturally by harvest, nearly a week before the first frost.

The yields and other agronomic data for the soybean trials are found in Tables 21, 22 and 23. Data on all 1984 Soybean Trials and 1985 Recommendations will be found in an upcoming Extension Circular, EC775, to be available at County Extension offices.

Table 17. 1984 Standard Variety Oat Trials, Southeast Farm, Beresford, SD

Variety	Height inches	weight lb/B	Yield, B/A 1984	3-yr
Steele	40	33	73	—
Moore	41	35	62	54
Haylander II(B1)	39	36	60	—
Porter	36	32	59	63
Wright	40	36	58	52
Pierce	35	35	57	—
Lancer	35	35	57	49
Preston	36	36	55	52
Webster	36	33	55	—
345M(B1)	35	33	54	—
Lyon	41	35	54	46
Otee	36	33	53	43
Burnett	39	36	53	47
Centennial	38	35	53	43
Ogle	37	32	53	50
Bates	36	33	52	49
Exp 100 (B1)	36	37	49	—
Larry	34	33	48	47
Chief	39	34	48	45
Lang	32	32	47	43
Benson	38	33	47	51
Kelly	37	38	45	42
Noble	39	32	44	47
Nodaway 70	39	36	42	40
Means	37	35	56	

CV-% 11.1 LSD(.05) 8.7

Table 18. 1984 Standard Variety Spring Wheat Trial, Southeast Experiment Farm, Beresford, SD

Variety	Height inches	Protein percent	Test Weight lb/b	Yield, B/A 1984	Yield, B/A 3-yr
Standard height					
Chris	33	17.1	56	16	21
Butte	30	16.5	57	13	22
Eureka	34	17.2	54	16	20
James	33	17.3	57	15	21
Pondera	31	16.2	56	13	16
Alex	32	17.1	57	19	25
Centa	32	16.7	58	15	22
Vistory 283	36	16.2	58	19	—
Causmex A88	19	16.5	55	13	—
Causmex A99ar	35	16.3	56	20	—
Stoa	36	16.9	54	19	—
Semi-dwarf					
Era	27	16.4	54	18	23
Olaf	30	17.0	53	14	21
Angus	30	17.7	54	17	20
Len	29	18.2	53	14	22
Oslo	27	16.5	54	14	20
Marshall	29	15.9	56	25	28
Guard	29	16.2	58	19	24
Buckshot	31	15.9	54	17	—
Success	31	17.1	52	17	—
Erik	30	16.4	55	22	—
711	30	15.9	57	17	19
Leif	30	17.5	54	16	—
Norak	27	16.3	55	13	—
Wheaton	28	16.2	55	22	—
2369	29	16.6	57	20	23
Challenger	29	16.4	57	16	—
Apex	28	16.7	58	19	—
Means	30		56	17	

CV-% 13.7 LSD(.05) 3.2

Table 19. 1984 Corn Performance Trial, Southeast Experiment Farm
Beresford, South Dakota

Brand and Hybrid	Mat. and Cross	Yield B/A	% Stalk Lodging	Percent Moisture	Performance Score Rating
Pioneer 3377	L 2X	158.8	17.2	20.8	1
McCurdy 7384	L 2X	151.9	17.5	24.7	8
Quality Plus Q+1132	L 2X	149.1	7.3	21.5	3
Curry SC1477	L 2X	148.9	6.7	18.6	2
Curry SC1466	L 2X	147.2	16.8	19.5	5
Hoegemeyer SX2684	L 2X	147.0	20.7	24.3	20
Supercrost 2989	M 2X	145.9	16.0	19.5	7
PAG SX241	L 2X	145.2	10.8	18.5	4
Pioneer 3475	M 2X	143.5	12.0	20.2	9
Pride 6692	L 2X	142.6	16.2	21.2	15
Stauffer S5340	M 2X	142.1	20.1	19.5	18
Cargill 889	M 2X	140.7	6.7	18.8	6
NC+ 2747	E 2X	140.5	6.1	20.2	10
McCurdy 5750	M 2X	140.2	15.1	19.7	16
Wilson 1500b	M 2X	139.1	19.6	19.1	22
Wilson 1700	L 2X	138.4	17.6	23.1	29
Lynks LX4235	M 2X	138.3	20.2	19.6	24
DeKalb T1100	L 2X	137.9	3.1	20.7	11
Hoegemeyer SX2630	L 2X	137.6	3.1	21.0	12
Paymaster 4790	M 2X	137.1	6.8	19.3	13
Pioneer 3551	M 2X	137.0	25.6	19.7	32
NC+ 4710	L 2X	136.6	4.2	21.2	17
Paymaster 6990	L 2X	136.5	12.7	20.8	23
Keltgen KS114	L 2X	136.1	24.3	21.5	36
Pioneer 3540	M 2X	135.7	25.3	18.0	30
Paymaster 7190	L 2X	135.4	22.8	29.5	54
NC+ 3440	M 2X	135.2	3.1	19.8	14
Fontanelle 435	M 2X	135.0	23.2	22.2	37
Disco DS5433	L 2X	134.8	17.9	21.2	33
Pride Exp 115	L 2X	134.6	19.9	23.4	38
PAG SX275	L 2X	134.1	3.0	19.7	19
Stauffer S5650	M 2X	133.7	15.6	19.7	28
Northrup King PX9527	M 2X	133.6	9.2	21.4	26
Quality Plus Q+1152	L 2X	133.6	16.7	25.7	41
Quality Plus Q+1082	M 2X	133.5	18.5	19.2	31
Keltgen KS1050	M 2X	133.4	13.9	19.1	25
Cargill 937	M 2X	133.3	19.2	28.0	50
Wilson 1440	M 2X	132.0	2.0	19.6	21
SDAES Check 9	M 2X	132.0	35.6	20.2	51
Keltgen KS1070	M 2X	131.4	17.3	19.6	35

Table 19 Continued, Corn Performance 1984

Brand and Hybrid	Mat. and Cross	Yield B/A	% Stalk Lodging	Percent Moisture	Performance Score Rating
Quality Plus Q+1102	M 2X	130.7	9.9	18.6	27
Agrow RX777	L 2X	129.6	25.9	22.5	53
Lynks LX4315A	L 2X	129.0	22.5	21.7	47
O's Gold 6882	L 2X	128.7	18.0	21.6	44
Pioneer 3378	L 2X	128.7	34.0	19.8	57
Fontanelle 4528	M 2X	126.5	14.3	19.6	39
Western KX-6800	L 2X	126.5	22.2	19.9	48
Keltgen KS1090	L 2X	126.2	18.6	18.8	43
Pride X1094	M 2X	126.2	19.5	18.8	45
Wilson 1100b	E 2X	125.9	17.4	18.9	42
Northrup King PX 9410	M 2X	124.8	3.7	18.7	34
DeKalb DK656	L 2X	124.7	25.2	26.6	68
McCurdy 5596	M 2X	124.4	25.5	18.9	55
O's Gold 2545	L 2X	123.7	26.8	26.1	69
Hoegemeyer SX2625	M 2X	122.7	25.6	19.6	62
Fontanelle 4570	M 2X	122.7	10.5	18.7	40
PAG SX267	L 2X	122.6	23.8	21.1	63
SDAES Check 1	L 2X	122.4	27.8	24.8	70
Fontanelle 427	M 2X	121.6	13.6	22.0	56
McCurdy 7372	L 2X	120.8	33.1	25.7	74
Stauffer S5260	M 2X	119.5	9.7	18.4	46
NC+ 4303	M 2X	118.6	11.6	20.7	58
Cargill 974	E 2X	118.3	7.8	19.1	49
Hoegemeyer SX2570	M 2X	118.1	12.3	17.9	52
Fontanelle 5230	L 2X	117.5	18.3	22.7	67
Cargill 891	M 2X	117.4	10.6	20.3	59
Northrup King PX9353	M 2X	117.4	33.9	20.4	72
DeKalb DK587	M 2X	117.4	7.7	22.1	61
Curry SC1485	L 2X	117.3	20.4	24.5	71
Northrup King PX9455	M 2X	117.2	20.8	20.5	65
NC+ 3653	M 2X	115.7	12.7	18.1	60
Pride X1123	L 2X	115.6	13.4	21.0	64
Pride 7759	L 2X	114.6	72.1	25.9	78
Supercrost 5438	L 2X	113.4	19.0	25.9	75
Disco DS5429	M 2X	111.9	14.6	18.9	66
SDAES Check 10	M 2X	109.3	46.7	18.2	76
Lynks LX4210	M 2X	105.7	15.7	17.9	73
Lynks LX4225	M 2X	95.9	35.4	19.5	77
Means		129.8	17.8	21.0	

LSD (.05) 5.0 CV-% = 12.0

Table 20. 1984 Grain Sorghum Performance Trial, Southeast Experiment Farm
Centerville, SD

Brand and Hybrid	Height inches	Lodging Percent	Test Weight	LB/Acre 3-yr	LB/Acre 1984
Warner W564T	46	60	56		7037
Funks G-499	42	8	57		6343
Warner WX-48041	43	27	55		6204
DeKalb X-350	50	62	53		6067
Triumph Two 50YG	46	40	56		5882
Cargill 40	46	25	57	5681	5801
Asgrow Nugget	45	12	58		5730
Western WS-210	44	77	55		5672
PAG 3385	46	55	52		5609
DeKalb DK-42	41	50	54	5643	5551
Asgrow Dorado E	44	87	52	5565	5514
Pioneer 8790	41	10	58		5235
Funk's G-550	50	60	52		5098
Disco 200R	44	82	55		5094
Cargill 30	47	95	47	5322	4886
Pioneer 8680	44	15	59		4770
Funks G-1460	46	65	55	5214	4733
PAG 3339	46	80	53	4733	
Quality +MT30	41	52	56		4676
Triumph Two 54YG	50	92	49		4175
Quality + M35	47	92	51		3976
Warner W-655T	51	90	52	5086	3886
Asgrow Dorado DR	49	95	53		3868
Quality + ET21	41	85	55		3483
Asgrow Corral	53	87	52	4867	3471
O's Gold GS709	54	72	53	5048	3402
DeKalb DK-38	50	85	53	4457	2697
Means	46	62	54	5209	4946

CV-% = 14.8 LSD (.05) 1468

Table 21. 1984 Soybean Performance Trial, Southeast Experiment Farm
Beresford, South Dakota

Brand	Entry	Mat Group	Mature mo/day	Height inches	Grams 100-K	Lodging percent	Yield B/A 1984	Yield B/A 3-yr
Group II's								
Sands	SOI 248	II	9/28	32	15.9	1	51	
Land O'Lakes	LL4303	II	9/27	35	16.9	1	50	50
Mustang	Exp 10	II	9/25	33	15.2	1	49	
Lincoln	LS7225	II	10/1	34	13.3	1	49	
Hofler	Jewell	II	9/25	32	15.9	1	47	
Land O'Lakes	L2212	II	9/26	31	16.0	1	46	
Stine	2220 (B1)	II	9/27	31	15.4	1	46	
DeKalb	CX283	II	9/28	32	13.7	1	46	
Sands	SOI 229	II	9/29	31	13.0	1	46	
Curry	CBS-280B(B1)	II	9/29	32	15.6	1	46	
Curry	CBS-290B(B1)	II	9/25	38	14.7	1	45	
Agripro	HP2530	II	9/26	32	14.1	1	45	
Hofler	Ruby	II	9/30	32	15.2	1	45	
Land O'Lakes	GO-42 (B1)	II	9/30	35	13.9	1	45	
Pro-Soy	7110 (B1)	II	9/26	31	16.0	1	45	
Northrup King	S2596	II	9/27	29	14.8	1	45	49
Mustang	M-1220A	II	9/25	32	12.9	1	45	
Hofler	Onyx	II	9/25	33	14.8	1	44	
Pride	B242	II	9/29	33	15.4	1	44	49
FFR	10297	II	9/26	35	15.6	1	44	
	Corsoy 79	II	9/22	34	14.3	1	44	47
S-Brand	S-42	II	9/26	34	14.5	1	44	
Mustang	M-1225	II	9/24	29	15.3	1	44	
Diamond	D195B(B1)	II	9/25	31	14.0	1	44	48
Land O'Lakes	GO-43 (B1)	II	9/23	31	14.7	1	43	
Lincoln	LS7231	II	9/24	32	16.2	1	43	
Curry	CBS-295B(B1)	II	9/27	33	13.6	1	43	
	Platte	II	9/27	33	14.4	1	43	45
FFR	13004	II	9/25	36	16.1	1	43	
Roebke	S-200	II	9/25	35	13.3	1	43	
Fontanelle	4250	II	9/26	34	13.2	1	43	
Pro-Soy	710	II	9/26	32	15.9	1	42	
Diaryland	DSR227	II	9/28	37	13.8	1	42	46
	Nebsoy	II	9/25	32	15.6	1	42	49
Diamond	D180B(B1)	II	9/21	32	13.7	1	42	46
Lincoln	LS7234	II	9/30	31	13.8	1	42	
Fontanelle	4545	II	9/30	31	14.4	1	42	45
Pro-Soy	711	II	9/25	32	14.9	1	41	
Dairyland	DSR232	II	10/1	36	13.9	1	41	46
Pride	B216	II	9/28	31	14.2	1	41	47
	BSR 201	II	9/28	31	14.3	1	41	45

Table 21 Continued, Soybeans Beresford

Brand	Entry	Mat Group	Mature mo/day	Height inches	Grams 100-K	Lodging percent	Yield 1984	B/A 3-yr
Arrowhead	2244	II	9/24	30	14.3	1	41	48
S-Brand	S-40	II	9/24	28	15.4	1	41	
	Century	II	9/28	31	15.4	1	41	49
Hoegemeyer	205	II	9/30	32	13.7	1	41	
	Amcor	II	9/28	36	13.9	1	40	46
Pride	B203	II	9/27	31	13.9	1	40	46
Land O'Lakes	L2456	II	9/28	29	17.2	1	40	
	Beeson	II	9/28	31	16.3	1	40	46
Hofler	Gem	II	9/29	33	14.0	1	40	
Agripro	AP240	II	9/25	28	13.1	1	39	47
	Century 84	II	9/28	29	15.8	1	39	
	Hack	II	9/27	29	14.6	1	39	
Sexauer	SX29	II	9/26	32	12.9	1	38	
Arrowhead	8650	II	9/18	33	15.8	1	38	
Sexauer	19169	II	9/25	32	12.7	1	37	
Curry	CBS-301B(B1)	II	9/30	31	14.6	1	36	
Fontanelle	4141	II	9/22	30	15.2	1	36	
	Mead	III	10/3	32	13.7	1	36	
	Elgin	II	9/26	28	14.3	1	35	43
S-Brand	S-38	II	9/19	32	14.8	1	35	
Cenex	8017	II	9/20	30	14.3	1	35	42
Stine	2510	II	9/25	29	14.1	1	35	
Fontanelle	42X	II	9/20	31	13.9	1	35	44
Stine	2330	II	9/26	29	15.0	1	34	
Northrup King	S 23-30	II	9/24	31	15.6	1	34	
Agripro	AP200	II	9/23	29	14.8	1	34	42
Sands	SOI 226	II	9/22	28	15.3	1	34	48
	Miami	II	9/26	31	16.0	1	34	
	Wells II	II	9/25	30	15.3	1	33	42
Curry	CBS-302B(B1)	II	9/29	34	15.1	1	33	
Lincoln	LS7221	II	9/26	28	14.6	1	33	
Pro-Soy	714	II	9/30	31	14.3	1	32	
McCurdy	260B (B1)	II	9/28	30	15.1	1	32	
	Harcor	II	9/23	32	13.3	1	31	
Cenex	8423	II	9/29	35	15.6	1	31	
	Gnome (s-d)	II	10/1	16	15.5	1	27	37
Means			9/26	31	14.7	1	40	46
LSD (.05)							9.0	1.3
CV - %							16.1	7.1

Table 21 Continued, Soybeans Beresford

Brand	Entry	Mat Group	Mature Mo/day	Height inches	Grams 100 K	Lodging Percent	Yield B/A 1984	3-yr
GROUP I'S								
Diaryland	DSR171	I	9/21	33	13.3	1	44	
Hy-Vigor	EX 33	I	9/19	34	13.9	1	44	
	Weber 84	I	9/20	32	9.9	1	43	
Hy-Vigor	901 (B1)	I	9/19	33	13.6	1	42	
Mustang	M-1120A	I	9/18	32	13.3	1	42	
Arrowhead	8155	1	9/18	32	13.3	1	41	
	Lakota	I	9/17	35	11.8	1	40	44
Roebke	S-180	I	9/16	30	14.0	1	40	
Hy-Vigor	Rocker 9(B1)	I	9/19	32	13.9	1	40	
Roebke	S-190	I	9/18	32	13.6	1	40	
	Corsoy 79	II	9/21	33	13.2	1	38	45
Arrowhead	2188	I	9/17	29	14.1	1	38	
	Hodgson 78	I	9/15	28	13.5	1	36	39
	Hardin	I	9/20	32	12.9	1	35	43
	Weber	I	9/19	31	11.6	1	31	40
Means			9/18	32	13.1	1	40	42
LSD (.05)							N.S.	3.0
CV – %							15.1	6.2
GROUP III'S								
Sands	SOI 337	III	10/2	31	12.8	1	46	
McCurdy	375B (B1)	III	10/1	33	13.4	1	45	
Sands	SOI 335	III	10/5	31	14.9	1	44	
Hoegemeyer	350	III	10/2	32	13.9	1	43	
	Harper	III	10/6	32	15.9	1	42	
	Corsoy 79	II	9/22	33	14.1	1	39	46
DeKalb	CK324	III	10/2	31	14.1	1	39	
	Mead	III	10/2	32	14.5	1	37	
	Sprite	III	10/3	18	15.3	1	35	43
	Cumberland	III	10/4	31	13.8	1	35	
	Will	III	10/4	28	14.7	1	34	43
	Pella	III	10/3	31	16.8	1	33	46
	Williams 82	III	10/7	33	13.6	1	33	
	Williams 79	III	10/5	36	13.8	1	32	
	Zane	III	10/2	32	17.2	1	30	
	Hobbit	III	10/3	19	14.2	1	29	42
	Fayette	IV	10/8	31	12.7	1	18	
Means			10/3	30	14.4	1	36	44
LSD (.05)							8.4	4.5
CV-%							16.6	9.2

Table 22. 1984 Soybean Performance Trials, Gordon Brockmueller, Cooperator
Freeman, SD

Brand	Entry	Mat Group	Mature mo/day	Height inches	Grams 100K	Lodging rate	Yield B/A 1984	3-yr
GROUP I'S								
	Corsoy 79	II	9/16	32	13.7	1.0	30	
	Hardin	I	9/13	33	13.3	1.0	30	
	Weber 84	I	9/16	33	11.6	1.0	29	
Interstate	595	I	9/15	35	14.9	1.0	28	
	Weber	I	9/14	32	11.5	1.0	28	
	Lakota	I	9/13	34	12.8	1.0	27	
Arrowhead	8155	I	9/12	32	13.1	1.0	27	
Dairyland	DSR171	I	9/12	36	13.4	1.0	27	
Northrup King	S 14-60	I	9/9	27	13.8	1.0	27	
Arrowhead	2188	I	9/8	31	15.0	1.0	26	
Interstate	575	I	9/12	27	13.6	1.0	26	
	Hodgson 78	I	9/10	30	14.8	1.0	25	
Mustang	M-1120A	I	9/13	31	14.3	1.0	25	
Means			9/13	32	13.5	1.0	27	
LSD (.05)							N.S.	
CV=%							8.8	
GROUP II'S								
Northrup King	S 23-03	II	9/15	31	14.6	1.0	32	
Mustang	M-1220A	II	9/16	30	12.5	1.0	32	
	Hack	II	9/23	29	15.0	1.0	31	
Land O'Lakes	GO-43 (B1)	II	9/20	32	13.8	1.0	31	
DeKalb	CX283	II	9/23	29	13.4	1.0	31	
Dairyland	DSR207	II	9/20	31	15.0	1.0	30	
	Corosy 79	II	9/18	34	14.1	1.0	30	
Mustang	M-1225	II	9/20	31	13.6	1.0	30	
Arrowhead	2244	II	9/15	28	13.3	1.0	30	
S-Brand	S-42	II	9/18	32	15.5	1.0	29	
	Century 84	II	9/22	29	14.8	1.0	29	
	Miami	II	9/20	32	14.7	1.0	29	
Dairyland	DSR212	II	9/17	31	14.7	1.0	29	
	Elgin	II	9/19	29	13.0	1.0	29	
	Century	II	9/22	30	11.0	1.0	29	
Sands	SOI X227	II	9/22	33	16.3	1.0	29	
	Amcor	II	9/21	33	14.1	1.0	29	
Sands	SOI 226	II	9/18	28	14.3	1.0	29	
	Beeson 80	II	9/20	29	17.1	1.0	29	
Cenex	8221	II	9/16	33	11.9	1.0	28	

Table 22 Continued. 1984 Soybean Performance, Freeman, SD

Brand	Entry	Mat Group	Mature mo/day	Height inches	Grams 100 K	Lodging rate	Yield B/A 1984	Yield B/A 3-yr
Dekalb	CX324	III	9/28	31	14.8	1.0	28	
	Harcor	II	9/16	31	13.0	1.0	28	
Cenex	8017	II	9/19	31	13.8	1.0	28	
Arrowhead	8650	II	9/14	31	14.1	1.0	28	
	BSR 201	II	9/20	28	11.9	1.0	27	
Northrup King	S2596	II	9/19	28	14.6	1.0	27	
Land O'Lakes	L2330	II	9/16	31	15.2	1.0	27	
Mustang	Exp 10	II	9/16	31	15.7	1.0	27	
	Nebsoy	II	9/12	30	14.6	1.0	27	
Sexauer	SRF 205	II	9/19	31	12.5	1.0	26	
	Platte	II	9/20	32	13.7	1.0	26	
Land O'lakes	L4303	II	9/19	29	15.5	1.0	26	
	Wells II	II	9/17	31	15.1	1.0	26	
	Mead	III	10/1	33	14.4	1.0	25	
S-Brand	S-38	II	9/17	32	13.8	1.0	24	
S-Brand	S-40	II	9/20	27	13.9	1.0	23	
	Gnome (s-d)	II	9/24	25	13.5	1.0	19	
Means			9/19	30	14.2	1.0	26	
LSD (.05)							4.4	
CV-%							11.3	

Table 23. 1984 Soybean Performance Trial, Lee and Tom Wintersteen Cooperators, Crooks, SD

Brand	Entry	Mat Group	Mature mo/day	Height inches	Grams 100 K	Lodging rate	Yield 1984	B/A 3-yr
GROUP I'S								
Dairyland	DSR171	I	9/26	40	15.3	1.0	46	
Sands	SOI133	I	9/20	30	16.1	1.0	45	
	Lakota	I	9/22	41	14.9	1.5	44	43
Pro-Soy	704	I	9/21	33	18.1	1.0	43	
	Corsoy 79	II	9/27	41	15.6	1.25	43	44
	Weber 84	I	9/26	37	13.5	1.0	43	
Lincoln	LS7119	I	9/21	36	16.0	1.0	43	
Arrowhead	8155	I	9/18	37	14.2	1.0	42	
	Weber	I	9/25	35	13.6	1.25	42	43
Roebke	R-190	I	9/20	35	15.3	1.0	42	
Sands	SOI 136	I	9/22	35	15.4	1.0	41	
Dairyland	DSR141	I	9/22	40	16.9	1.0	40	
Hy-Vigor	Rocker 9(B1)	I	i/20	36	15.0	1.0	40	
Interstate	595	I	9/29	39	17.8	1.0	40	
Roebke	R-180	I	9/17	34	16.3	1.0	40	
Interstate	575	I	9/21	29	14.9	1.0	39	
Sands	SOI 125	I	9/20	34	16.5	1.0	37	
Arrowhead	2188	I	9/19	35	15.9	1.0	36	
	Hodgson 78	I	9/20	34	17.0	1.0	34	39
	Hardin	I	9/24	39	14.9	1.0	25	39
Means			9/22	36	15.8	1.04	41	42
LSD (.05)							5.7	N.S.
CV - %							10.0	12.2
GROUP II'S								
Lincoln	LS7221	II	9/26	34	15.0	1.0	51	
Land O'Lakes	L2330	II	9/28	36	16.0	1.0	46	
Sands	SOI222	II	9/27	36	14.5	1.0	46	
DeKalb	CX324	III	10/5	38	13.1	1.0	45	
Hofler	Gem	II	9/30	40	14.4	1.0	45	
DeKalb	CX283	II	10/1	40	14.6	1.0	44	
Cenex	8017	II	9/24	34	15.7	1.0	44	
Pro-Soy	711	II	9/29	35	14.7	1.0	43	
FFR	13004	II	9/29	40	17.2	1.0	43	
Hofler	Onyx	II	9/29	42	15.8	1.25	43	
Land O'Lakes	L4303	II	9/29	33	16.4	1.0	43	
	Amcor	II	10/1	41	14.6	1.5	43	
Arrowhead	2244	II	9/27	36	14.2	1.0	43	44
Dairyland	DSR207	II	9/30	36	15.8	1.0	42	43
Roebke	R-200	II	9/26	38	14.5	1.0	42	
Pro-Soy	7110 (B1)	II	9/28	36	15.6	1.0	42	
FFR	10297	II	9/27	44	18.0	1.5	42	
Lincoln	LS7231	II	9/29	35	16.9	1.0	42	
Land O'Lakes	GO-43 (B1)	II	9/27	40	14.8	1.0	42	

Table 23 Continued, Crooks Soybeans

Brand	Entry	Mat Group	Mature Mo/day	Height inches	Grams 100-K	Lodging rate	Yield, B/A 1984	3-yr
S-Brand	S-40	II	9/28	35	14.9	1.	41	
Hofler	Ruby	II	10/2	37	16.8	1.0	41	
	Hack	II	9/30	32	15.8	1.0	41	
S-Brand	S-38	II	9/22	37	14.7	1.0	40	
S-Brand	S-42	II	9/28	35	16.1	1.0	40	
	Corsoy 79	II	9/28	42	14.9	1.25	40	43
Stine	2330	II	9/28	34	15.4	1.0	39	
Arrowhead	8650	II	9/24	35	15.3	1.0	39	
Sexauer	X19169	II	9/29	37	14.3	1.0	39	
	Wells II	II	9/28	37	15.5	1.0	39	42
	Century	II	10/2	35	16.4	1.0	38	
	Nebsoy	II	9/30	36	18.6	12.0	38	40
Pro-Soy	710	II	9/29	36	15.3	1.0	38	
	Elgin	II	9/29	30	15.3	1.0	38	
Northrup King	S2596	II	9/29	31	16.2	1.0	38	
Dairyland	DSR212	II	10/1	34	17.3	1.0	37	42
Northrup King	S 23-03	II	9/29	37	15.1	1.0	37	
	Miami	II	9/29	36	17.3	1.0	37	
	Platte	II	10/1	36	16.1	1.0	37	40
	Beeson 80	II	10/1	37	17.8	1.0	37	
	Harcor	II	9/27	38	14.4	1.0	37	41
	BSR 201	II	10/2	34	15.6	1.0	37	
Hofler	Jade	II	9/26	33	15.1	1.0	37	
	Mead	III	10/9	37	14.0	1.0	35	
Stine	2510	II	10/1	32	15.8	1.0	34	
	Gnome(s-d)	II	10/3	27	15.3	1.0	34	38
	Century 84	II	10/3	33	17.0	1.0	34	
Cenex	8221	II	9/29	37	14.7	1.0	30	
Cenex	8423	II	10/4	37	14.7	1.0	30	
Means			9/29	36	15.7	1.05	40	42
LSD (.05)							6.6	1.2
CV - %							11.8	4.2

S.E. FARM REPORT

PRODUCTION OF EDIBLE BEANS

Robert G. Hall

PLANT SCIENCE 84-13

Objective

To conduct a preliminary evaluation for the yield potential of some edible dry beans in southeastern South Dakota.

Methods and Procedures

1. Seed varieties

Variety	Type
Zircon	Small White
US1140	Great Northern (experimental)
UI-114	Pinto
Pindak	Pinto

2. Population and row spacing - population = 70,000 seeds/acre on 30" row spacings with 4 seeds/foot of row.

3. Weed control - 1.5 pints/acre of treflan applied and incorporated prior to planting.

4. Seeding date - seeded with a JD row crop seeder on May 24, 1984. Seed was inoculated prior to seeding.

5. Plot design - plots measured 15 x 60 feet. Varieties were replicated four times and arranged in a randomized complete block design.

6. Harvesting and threshing - plots were hand harvested on September 7, 1984. Two 10 ft. sections of row were hand harvested from each plot, bagged and dried to 12% moisture. Each sample was threshed with a portable thresher and yields were adjusted to 13% moisture.

Table 24. 1984 Edible Dry Bean Variety Study, Southeast Farm

Variety	Type	Average Yield —lbs/acre—
Zircon	Small White	2442 a
UI-114	Pinto	2329 ab
Pindak	Pinto	2203 bc
US1140	Great Northern	1937 c

*Average yields followed by the same letter are not significantly different according to the Duncan/Waller Test.

Discussion and Interpretation of Table 24.

All varieties were mature and ready for havesting on August 17 or 85 days after planting. Of the varieties tested, Zircon tended to be more erect and the tips of its lowest pods remained 1 to 2" above the soil surface. The remaining varieties tended to be more prostrate in growth habit with many of their pods touching the soil surface. Regardless of variety, however, specialized equipment would have been needed to mechanically harvest the crop. Unless harvested with specialized equipment it appears that the production potential of these varieties may be limited in the southeastern part of the state.

The yield data indicates that in 1984 Zircon had the most yield potential, US 1140 the least yield potential, and the two pinto varieties UI-114 and Pindak an intermediate yield potential. The market price at harvest time indicated a gross profit of $250 to $375 per acre depending on the type of bean and yield per acre.

One must keep in mind, however, that all these beans were hand harvested and threshed with little field or harvest loss. At harvest time there was no shattering evident but mechanical harvesting at that time would likely have caused some harvest losses due to the closeness of the pods to the ground. One week after harvest, severe shattering was evident and either hand or mechanical harvesting would have resulted in large harvest losses.

All the varieties appear to have some yield potential in South Dakota. The main question to be resolved is whether there are other varieties which may grow more erect and be easier to harvest and whether farmers want to mechanize with special equipment in order to harvest the crop.

S.E. FARM REPORT

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

W. E. Arnold and L. J. Wrage

PLANT SCIENCE 84-14

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 test.

Methods

Preplant and preemergence treatments were applied May 18 and post treatments on May 8, 13, 25. 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 18. 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 .54 inches and 1.85 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 24 and July 20, respectively. A 3-year average for early season weed control is included for those treatments in the test each year.

In the 1984 corn demonstration plots, 3 treatments in the reduced tillage and 21 in conventional tillage provided 90% or greater broadleaf and grass control. Lumpy soil conditions in 1983 and very moist conditions at planting in 1984 reduced the control for preplant incorporated treatments also on the 3-year average.

In the soybean plots, no treatments in reduced tillage and 8 in conventional tillage provided 90% or greater control or both broadleaf and grassy weeds. Postemergence/preemergence and postemergence treatments show little difference between tillage systems. The preplant incorporated and preemergence treatments are generally 10 to 20 percent less 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 25. 1984 Corn Herbicide Demonstration, Southeast Research Farm

		Percent Weed Control							
		1984				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	--	--	--	--
Eradicane Extra	4	58	42	88	51	--	--	--	--
Eradicane+atrazine	3+1	75	69	89	91	73	81	91	92
Eradicane+Bladex	3+2	71	48	87	81	74	72	88	86
Eradicane+Bladex+ atrazine	3+1.50+.50	70	56	86	89	75	77	89	93
Sutan+	4	68	22	83	45	70	37	87	62
Sutan+ +atrazine	4+1	71	76	87	91	74	83	88	90
Sutan+ +Bladex	4+2	65	60	82	79	76	75	85	83
Sutan+ +Bladex+atrazine	4+1.50+.50	74	83	86	89	79	87	88	92
SHALLOW PREPLANT INCORPORATED									
atrazine	2.5	74	91	85	91	64	91	75	96
Lasso	3	72	55	67	69	56	58	74	80
Dual	2.5	82	51	76	64	72	47	80	71
Check	--	0	0	0	0	--	--	--	--
PREEMERGENCE									
atrazine	2.5	78	90	88	93	67	90	78	92
Bladex	3	67	33	80	63	53	42	78	66
Lasso	3	69	38	85	81	61	56	85	72
Dual	2.5	81	32	88	78	70	44	85	64
Ramrod	6	53	22	79	57	63	30	85	51
Harness	2.5	68	59	90	93	82	79	93	94
Harness+Bladex	2+2	64	66	88	92	--	--	--	--
Harness+atrazine	2+1	74	83	92	94	--	--	--	--
Lasso+atrazine	2+1	67	87	94	95	66	86	90	89
Lasso+Bladex	2+2	81	52	93	88	78	67	83	81
Dual+atrazine	2+1	91	74	96	93	82	70	79	87
Dual+Bladex	2+2	91	28	93	90	76	52	84	80
Ramrod+atrazine	4+1	82	65	93	89	--	--	92	93
Ramrod+Bladex	4+2	74	25	90	81	76	45	90	84
Lasso+Bladex+atrazine	2+1.50+.50	79	77	95	91	76	84	92	94
Dual+Bladex+atrazine	2+1.50+.50	87	84	97	97	78	85	92	96

Table 25 Continued. 1984 Corn Herbicide Demonstration

Treatment	lb/A Act	Percent Weed Control 1984 Disked Gr	Disked Bdlf	Plowed Gr	Plowed Bdlf	3 Yr. Avg. Disked Gr	Disked Bdlf	Plowed Gr	Plowed Bdlf
PREEMERGENCE(Cont.)									
Lasso+Bladex+Sencor/ Lexone	2+1.50+.25	82	56	95	93	78	79	91	94
Lasso+atrazine+Sencor/ Lexone	2+1+.25	87	84	94	96	82	90	88	96
Dual+Bladex+Sencor/Lexone	2+1.50+.25	84	67	95	93	81	80	88	94
Dual+atrazine+Sencor/ Lexone	2+1+.25	80	84	96	97	80	88	90	93
Lasso+Bladex+atrazine+ Sencor/Lexone	2+1+.50+.25	83	83	95	98	83	90	91	96
POSTEMERGENCE 1/									
Prowl+atrazine	1.50 +1	90	90	94	96	77	91	89	94
Prowl+Bladex 80W	1.50 +1.50	93	40	90	89	83	71	86	90
atrazine+crop oil	1.50 + 1 qt	95	96	93	96	82	94	74	95
Bladex 80W+X-77	1.50 +.5%	91	17	86	74	75	64	65	84
Tandem+Bladex 80W+X-77	.5+1.5 + .5%	92	23	90	83	77	68	78	88
Tandem+atrazine	.5+ 1.50	93	96	94	97	—	—	—	—
Tandem+Bladex 80W+atrazine	.5 +.75+.75	95	92	94	96	—	—	—	—
PREEMERGENCE & POASTEMERGENCE									
Ramrod&Banvel 2/	4&.50	82	48	90	90	75	75	93	95
Ramrod&Banvel 3/	4&.50	78	68	94	95	71	79	92	95
Ramrod&2,4-D amine 2/	4&.50	70	47	91	91	68	69	91	91
Ramrod&Basagran 3/	4&1	81	37	93	86	74	60	90	84
Ramrod&bromoxynil 2/	4&.38	82	38	90	84	—	—	—	—
Ramrod&bromoxynil+2,4-D 2/	4&.38+.25	85	55	92	90	—	—	—	—
Ramrod&bromoxynil+ atrazine 2/	4&.38+.50	89	82	95	96	—	—	—	—

Evaluated: 7/24/84
PPI & PRE: 5/18/84
POST: 1/ 6/8/84
2/ 6/13/84
3/ 6/25/84

Planting Date: 5/18/84
Gr= Green and yellow foxtail
Bdlf=Smooth and rough pigweed
Rainfall: 1st week 0.24 inches
2nd week 2.15 inches

Table 26. 1984 Soybean Herbicide Demonstration, Southeast Reasearch Farm

		Percent Weed Control							
		1984				3-yr Avg			
		Disked		Plowed		Disked		Plowed	
Treatment	lb/A act.	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf
PREPLANT INCORPORATION									
Check	—	0	0	0	0	—	—	—	—
Treflan	.75	66	55	89	81	78	65	90	74
Sonalan	1.1	46	55	81	81	—	—	—	—
Prowl	1.25	59	58	85	80	71	64	86	71
Vernam	2.50	48	72	77	56	58	44	78	40
Reward	2.50	58	68	78	55	—	—	—	—
Treflan+Amiben	.75 + 2	70	80	86	91	77	67	88	70
Treflan+Sencor/Lexone	.75 + .38	66	84	87	90	78	77	89	81
Reward+Treflan	2.5 + .75	50	78	85	85	—	—	—	—
Treflan+Amiben+ Sencor/Lexone	.75+2+.25	55	85	90	93	69	74	92	85
Reward+Sencor/Lexone	2.5+ .38	38	84	87	89	—	—	—	—
SHALLOW PREPLANT INCORPORATED									
Lasso	3	58	55	77	61	68	51	81	66
Dual	2.5	66	45	84	53	75	42	84	53
Lasso+Modown	2+1.50	51	58	73	67	—	—	—	—
Treflan+Modown	.75 + 1.5	45	64	79	74	62	50	82	64
PREPLANT INCORPORATED & PREEMERGENCE									
Treflan&Sencor/Lexone	.75&.38	52	72	96	96	—	—	—	—
Treflan&Sencor/Lexone	.75&.50	60	82	94	95	78	87	93	95
Treflan&Modown	.75&2	55	70	82	83	71	78	88	88
Treflan&Amiben	.75&2	58	78	87	81	72	82	91	89
Treflan&Lorox	.75&1	52	78	68	85	68	69	84	76
PREEMERGENCE									
Check	—	0	0	0	0	0	0	0	0
Amiben	2	22	60	68	65	49	61	76	74
Lasso	3	58	58	90	66	66	67	90	81
Dual	2.5	68	45	93	68	76	60	88	70
Lasso	2+ .5	56	70	88	93	74	84	86	94
Dual+Sencor/Lexone	2+ .5	66	68	92	93	75	81	89	92
Lasso+Amiben	2+2	53	59	88	84	76	79	89	89
Dual+Amiben	2+2	63	55	92	84	79	77	90	88

Table 26 Continued. Soybean Herbicide Demonstration

		Percent Weed Control							
		1984				3-Yr. Avg.			
		Disked		Plowed		Disked		Plowed	
Treatment	lb/A act.	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf
PREEMERGENCE (CONT.)									
Lasso+Lorox	2+1	52	40	88	76	60	66	81	80
Dual+Lorox	2+1	59	28	94	88	66	51	82	73
Lasso+CIPC	2+2	54	38	84	82	52	55	74	74
Lasso+Premerge	2+4.5	56	32	86	87	52	61	76	79
Harness	2 1/2	68	50	92	92	--	--	--	--
Harness+Sencor/Lexone	2.5	66	74	92	97	--	--	--	--
Lasso+Lorox+Sencor/Lexone	2+1+.25	54	62	90	91	56	78	83	89
Dual+Lorox+Sencor/Lexone	2+1+.25	70	60	95	94	--	--	--	--
Lasso+Amiben+Sencor/Lexone	2+2+.25	60	58	89	93	74	80	91	96
Lasso+Modown	2+1.5	64	55	87	82	66	73	84	86
PREEMERGENCE & POSTEMERGENCE									
Lasso&Basagran	2&1	55	72	86	80	61	59	76	61
Lasso&Blazer/Tackle	2&.50	62	65	89	84	70	83	81	90
Lasso&Dynap	2&2.50	54	84	85	86	58	84	76	85
Lasso&Blazer+Basagran	2&.38+.25	62	84	91	90	67	89	85	91
POSTEMERGENCE									
Poast+oil	.20+1 qt	70	5	92	2	--	--	--	--
Fusilade+oil	.25+1 qt	46	10	56	7	--	--	--	--
Poast+oil+Blazer+Basagran	.20+1 qt+ .25+.50	60	78	80	46	--	--	--	--

Evaluated: 7/20/84
PPI & PRE: 5/18/84
POST: 6/25/84
Planting Date: 5/18/84
Gr=Green and yellow foxtail
Bdlf=Smooth and redroot pigweed
Rainfall: 1st week 0.24 inches
2nd week 2.15 inches

S.E. FARM REPORT

PREPLANT INCORPORATED AND PREEMERGENCE TREATMENTS FOR WEED CONTROL IN SOYBEANS

W. E. Arnold, Mark A. Peterson and Duane E. Auch

PLANT SCIENCE 84-15

Herbicide incorporation has long been of concern for farmers. One question frequently asked is whether one pass incorporation provides weed control equal to that with two passes. This study examines this question in regard to a new soybean herbicide and several established herbicides.

The research site was a well-drained silty clay loam soil with 3.8% organic matter and pH 5.9. 'Hodgson 78' soybeans were planted May 18 in 30 inch rows at 75 lb/A. The experimental design was a randomized complete block with four replications. Preplant incorporated treatments were applied on May 18 and incorporated immediately with either one or two passes of a multiweeder type implement. Preemergence treatments were applied on May 19. Rainfall for the first and second weeks after application was 0.53 and 1.85 inches, respectively. All herbicides were applied with a tractor mounted sprayer in 20 gallons of water per acre. Weed control was evaluated on October 2 and plots were harvested October 4 with a small plot combine.

Preplant incorporated metribuzin + trifluralin followed by preemergence metribuzin provided the best broad spectrum weed control and the highest soybean yields. Ethalfluralin followed by one pass incorporation resulted in weed control comparable to two incorporation passes. Weed control and yields from ethalfluralin were similar to trifluralin.

Table 27. Preplant Incorporated and Preemergence Treatments for Weed Control in Soybeans.

Treatment(a)	Rate	Time of Application	% Weed Control Fota	Smpw	Cocb	Yield
	(lb/A)		10-2-84	10-2-84	10-2-84	(bu/A)
Ethalfluralin	0.75	PPI(b)	76	47	5	35.1
Ethalfluralin	0.75	PPI(c)	77	39	0	37.1
Ethalfluralin	0.94	PPI(c)	84	51	0	37.0
Trifluralin + oryzalin(d)	0.75	PPI(c)	74	66	5	37.8
Trifluralin + oryzalin(d)	0.94	PPI(c)	86	79	2	37.3
Trifluralin	0.75	PPI(c)	67	40	0	37.2
Pendimethalin	1.25	PPI(c)	88	56	5	37.5
Alachlor	3.00	PPPI(c)	93	89	6	40.2
Metolachlor	2.50	PPI(c)	89	85	7	39.8
Chloramben + trifluralin	1.8 + 0.75	PPI(b)	79	74	7	37.9
Chloramben + ethalfluralin	1.8 + 1.12	PPI(b)	95	73	23	35.6
Chloramben + metribuzin	1.8 + 0.25	PPI(b)	90	78	68	37.0
Chloramben + alachlor	1.8 + 2.0	Pre	90	88	7	37.9
Chloramben + metolachlor	1.8 + 2.5	Pre	98	97	12	37.2
(Trifluralin + metribuzin) + metribuzin	0.75+0.38+0.25	PPI(b)+Pre	96	99	98	41.4
Weedy Check			0	0	0	23.7
LSD (0.05)			22	31	25	7.2

(a) Herbicides within parentheses represent a single application.
(b) Incorporation was done with two passes of a combination tool.
(c) Incorporation was done with one pass of a combination tool.
(d) Premixed formulation.

ethalfluralin = Sonalan
trifluralin + oryzalin = Conserve
trifluralin = Treflan
pendimethalin = Prowl
alachlor = Lasso
metolachlor = Dual
chloramben = Amiben
metribuzin = Sencor/Lexone

Fota = Foxtail
Smpw = Smooth Pigweed
Cocb = Cocklebur

S.E. FARM REPORT

ADDITIVES FOR INCREASED WEED CONTROL WITH ATRAZINE AND CYANAZINE IN CORN

W. E. Arnold, Mark A. Peterson and Mark A. Wrucke

PLANT SCIENCE 84-16

Triazine herbicides have provided consistent broadleaf weed control in corn for many years. Grass weed control has been less consistent and often times, less than adequate. Additives which increase grass control with triazine herbicides are presently being evaluated. This experiment evaluated the effect of additives on weed control when applied with triazine herbicides at several growth stages.

The experiment was established on a well drained silty clay loam soil with 3.8% organic matter and pH 5.9. 'Sokota TS 46' corn was planted on May 18 in 30 inch rows at 22,000 seeds/A. Herbicide treatments were applied on June 7, June 13, June 26 and July 6 at corn stages of spike, 1-3 leaf, 4-6 leaf, and retreatment, respectively. At the time of the spike treatments, the foxtail had 1-leaf and pigweed was 1 inch tall. Rainfall was 1.93 inches the first week and 3.91 inches the second week following application. At the 1-3 leaf treatments, foxtail had 1-3 leaves and pigweed was 1-3 inches tall. Rainfall was 2.54 inches the first week and 2.45 inches the second week after application. Foxtail had 3-4 leaves and pigweed was 3-6 inches tall when the 4-6 leaf treatments were applied. Rainfall for the first and second week after application was 0.0 and 0.17 inches respectively. When the retreatments were applied, foxtail had 5-6 leaves and pigweed was 8 inches tall. Rainfall for the first and second week after application was 0.61 and 0.70 inches, respectively. All herbicide treatments were applied in 20 gallons of water per acre. Evaluation was made on August 23 and yields were taken on October 24.

Greater than normal precipitation in May and early June resulted in generally good weed control with most herbicide combinations. Atrazine and cyanazine provided very good yellow foxtail control with no improvement in control from addition of CL 11.344 or tridiphane. Weed control generally was better with the spike and 1 to 3 leaf treatments than with the later treatments. All treatments gave greater corn yield than the weedy check.

Table 28. Additives for Increased Weed Control with Atrazine and Cyanazine in Corn.

Treatment(a)	Rate	Time of Application	% Weed Control Yeft	Smpw	Yield
	(lb/A)		8-23-84	8-23-84	(bu/A)
Atrazine(b)	1.5	Spike	95	98	93
CL 11.344 + atrazine	0.9 + 1.0	Spike	95	98	91
CL 11.344 + cyanazine	0.9 + 0.6	Spike	94	94	90
CL 11.344 + atrazine + alachlor(c)	0.9 + 1.0 + 1.5	Spike	94	94	78
CL 11.344 cyanzine alachlor(c)	0.9 + 0.6 + 1.5	Spike	91	88	79
Tridiphane + atrazine(b)	0.5 1.5	Spike	97	98	89
Tridiphane + cyanazine	0.5 + 1.6	Spike	95	93	93
Tridiphane + atrazine + cyanazine	0.5 + 0.8 + 0.8	Spike	97	97	89
Atrazine(b)	1.5	1-3L	90	98	93
Cyanazine + X-77	2.0 + 0.25%	1-3L	92	6	85
Cyanazine + veg oil	2.0 + 1 pt.	1-3L	95	7	85
Tridiphane + atrazine(b)	0.5 + 1.5	1-3L	94	99	94
Tridiphane + cyanazine	0.5 + 1.6	1-3L	96	64	87
Tridiphane + atrazine + cyanazine	0.5 + 0.8 + 0.8	1-3L	94	97	108
Tridiphane + cyanazine + X-77	0.5 + 1.6 + 0.25%	1-3L	94	12	99
Tridiphane + cyanazine + veg. oil	0.5 + 1.6 + 1 pt.	1-3L	95	47	94
Tridiphane + cyanazine + atrazine + veg. oil	0.5+0.8+0.8+1 pt	1-3L	94	96	93
Tridiphane + cyanazine + atrazine + X-77	0.5+0.8+0.8+0.25%	1-3L	95	94	95
Tridiphane + atrazine(b)	0.75 + 2.0	4-6L	55	98	100
(Tridiphane + atrazine(b)) + (tridiphane + atrazine(b))	0.5+1.5+0.25+1.5	4-6L + Retr	75	99	109
(Tridiphane + cyanazine) + (tridiphane + cyanazine)	0.5+1.6+0.5+1.6	4-6L + Retr	37	92	87
(Atrazine(b)) + (atrazine(b))	2.0 + 2.0	4-6L + Retr	77	98	102
Weedy Check			0	0	60
LSD (0.05)			11	20	16

(a) Herbicides within parentheses represent a single application
(b) Applied with crop oil concentrate at 1.0 quart per acre.
(c) The methyl ester form of alachlor.

atrazine = Aatrex
cyanazine = Bladex
CL 11.344 = experimental
tridiphane = Tandem

Yeft = Yellow foxtail
Smpw = Smooth Pigweed

A COMPARISON OF PREEMERGENCE AND POSTEMERGENCE HERBICIDE SYSTEMS WITH SEVERAL TILLAGE SYSTEMS IN SOYBEANS

Arnold, W. Eugene and Mark A. Wrucke

PLANT SCIENCE 84-17

Weed pressure generally increases as tillage decreases. This may result in increased use of herbicides, particularly postemergence herbicides. This study was designed to examine whether a total postemergence herbicide system can provide weed control equal to a preemergence system under several tillage regimes. Also, does row width affect weed control with these herbicide systems. The experiment was established at Beresford, SD on a well drained silty clay loam with 3.8% organic matter and pH 5.9. The experimental area was planted to rye the last 2 years and a rye silage crop was removed June 15, 1984. Due to wet conditions, tillage treatments were delayed until July with 'McCall' soybeans planted July 6 in 36 inch rows at 60 lb/A and in 18 inch rows at 80 lb/A. The study had a split-plot design with four replications of subplots measuring 20 by 70 ft. Main plots were tillage systems consisting of no-till with 18 inch rows, no-till with 36 inch rows, chisel-disk with 18 inch rows, plow-disk with 18 inch rows, and plow-disk with 36 inch rows. Subplots consisted of herbicide systems, preemergence versus postemergence. The preemergence system consisted of alachlor at 3.5 lb/A + metribuzin at 0.38 lb/A. Glyphoasate at 0.5 lb/A + X-77 at 0.25% was also applied to the no-till plots.

The post emergence system of bentazon at 0.75 lb/A + acifluorfen at 0.25 lb/A + crop oil concentrate at 1 qt/A was applied at the 2 inch stage. Sethoxydim at 0.2 lb/A + crop oil concentrate at 1 qt/A was applied at the 5 to 6 inch stage. Sethoxydim at 0.1 lb/A + 2,4-D ester at 0.5 lb/A + crop oil concentrate at 1 qt/A was also applied preemergence to the no-till plots. Preemergence treatments were applied July 11 under partly cloudy skies, 81 degrees F air temperature, 52% relative humidity, and southwest winds at 1 to 2 mph. Rainfall was 1.45 and 0.17 inches the first and second week after application, respectively. At this time, grass and broadleaf weeds were 4 to 5 inches tall. The broadleaf herbicides were applied in the postemergence system August 1 under partly cloudy skies, 80 degrees F air temperature, 62% relative humidity, and south winds at 2 to 4 mph. Rainfall was 0.42 and 0.03 inches the first and second week after application, respectively. Soybeans had 2 to 3 trifoliolate leaves and broadleaf weeds were 3 to 4 inches tall. The grass herbicides were applied in the postemergence system August 24 under cloudy skies, 63 degrees F air temperature, 30% relative humidity, and southeast winds at 2 to 5 mph. No rainfall was recorded the first week after application, and 0.36 inch fell the second week after application. Yellow foxtail was 10 to 12 inches tall and starting to head. Weed control evaluations and height measurements were taken September 14. A 9 by 65 ft area was harvested October 4 with a small plot combine.

Broadleaf weeds consisted of a light infestation of smooth pigweed, redroot pigweed, and common lambsquarters. Both herbicide systems in all tillage systems gave good broadleaf weed control. Yellow foxtail control was significantly better with preemergence herbicides in all tillage systems except the no-till with 36 inch rows. These plots were cultivated to form ridges for next year's plots resulting in much improved foxtail control. Poor control in the postemergence system was related to the late stage application of sethoxydim. The very poor control in the no-till with 18 inch row system was also a result of less than adequate control with sethoxydim at 0.1 lb/A applied at planting time. Glyphosate at 0.5 lb/A provided better burndown of grass plants at planting time. Soybean height and yield were significantly greater in the preemergence than in the comparable postemergence plots for each tillage system.

Table 29. A comparison of Preemergence and Postemergence Herbicide Systems with Several Tillage Systems in Soybeans.

Tillage System	Herbicide system	% Control Yeft	% Control Bdlf	Soybean height	Yield
				(cm)	(bu/A)
No-till - 18 inch row	Pre*	85	95	61	24.3
	Post**	29	99	38	8.0
No-till - 36 inch row	Pre	99	98	60	19.2
	Post	98	99	47	13.6
Chisel, disk-18 inch row	Pre	99	97	58	21.3
	Post	85	99	49	11.8
Conventional-18 inch row	Pre	99	94	59	21.5
	Post	73	99	48	10.4
Conventional-36 inch row	Pre	99	98	68	25.2
	Post	64	99	54	11.1
LSD (0.05)		13	2	6	5.5

*Pre = Alachlor at 3.5 lb/A + metribuzin at 0.38 lb/A were applied preemergence. Glyphosate at 0.5 lb/A + X-77 at 0.25% was also applied preemergence to the no-till plots.

**Post = Sethoxydim at 0.2 lb/A + crop oil concentrate at 1 qt/A and bentazon at 0.75 lb/A + acifluorfen at 0.25 lb/A + crop oil concentrate at 1 qt/A were applied postemergence. Sethoxydim at 0.1 lb/A + 2,4-D ester at 0.5 lb/A + crop oil concentrate at 1 qt/A was also applied preemergence to the no-till plots.

alachlor = Lasso
metribuzin = Sencor/Lexone
glyphosate = Roundup
sethoxydim = Poast
bentazon = Basagran
acifluorfen = Blazer

Yeft = Yellow foxtail
Bdlf = Broadleaf weeds

S.E. FARM REPORT

ALTERNATIVE SPRAYER TECHNIQUES FOR HERBICIDE APPLICATION

W. E. Arnold, Mark A. Wrucke
and Mark A. Peterson

PLANT SCIENCE 84-18

Recent claims of effective weed control at reduced application rates when applied in lower carrier volumes has sparked considerable interest. Reduced rates and carrier volume would result in savings of both time and money for farmers. However, these alternative sprayers require a large initial investment. Therefore, this research was conducted to determine the efficacy of a postemergence broadleaf herbicide applied at reduced rates with both alternative and conventional spraying equipment.

Acifluorfen was applied in 2 gpa with rotary nozzles (CDA), in 5 gpa with the air blast sprayer (tradename Sprayfoil) in 20 gpa with TeeJet Bidirectional Flat Fan spray tips and compared to application with conventional flat fan spray tips at 20 gpa. 'Mellow Dent MD-30' soybeans were planted May 26, 1984 in 30 inch rows at 60 lb/A. The soil is a well drained silty clay loam with 3.8% organic matter and pH 5.9. Acifluorfen treatments were applied on July 17 when the soybeans were at early bloom and the smooth pigweed was 20-24 inches tall. Skies were clear with 85% relative humidity, 75° F air temperature, and calm winds. Smooth pigweed control was evaluated on July 20, 1984.

Best weed control was achieved with the full label rate (0.5 lb/A) of acifluorfen applied with conventional flat fan nozzles, the bidirectional flat fan nozzles, and the air blast applicator. The 0.25 lb/A rate applied with the air blast sprayer and the high rate applied with the rotary nozzles was not significantly different from the best treatments. Generally, the reduced rates did not give adequate control of smooth pigweed with any applicators; however, this may be due to the large size of the pigweed. Application with conventional flat fan nozzles gave control equal to that with all other sprayers tested in this study. Further evaluation will be required to determine full potential of these applicators.

Table 30. Alternative Sprayer techniques for Herbicide Application

Applicator	Herbicide* Rate	Carrier Volume	Percent Smooth Pigweed Control
	(lb/A)	(GPA)	7-20-84
Flat Fan	.125	20	50
Flat Fan	.25	20	53
Flat Fan	.50	20	83
Bidirectional FF	.125	20	33
Bidirectional FF	.25	20	48
Bidirectional FF	.50	20	83
CDA	.125	2	20
CDA	.25	2	35
CDA	.50	2	65
Air Blast	.125	5	55
Air Blast	.25	5	73
Air Blast	.50	5	83
LSD			19

*Acifluorfen (tradename Blazer) was applied wtih Ag-98 surfactant at 0.5% v/v.

S.E. FARM REPORT

POSTEMERGENCE GRASS CONTROL IN SOYBEANS

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and Mark A. Wrucke

PLANT SCIENCE 84-19

Use of postemergence herbicides in soybeans has increased greatly the past few years. Presently, several companies are developing postemergence grass herbicides for use in soybeans. Many of these compounds are scheduled to be labeled within 2 to 3 years. Therefore, the object of this experiment is to compare performance of several of these compounds when applied at various rates and growth stages.

The research site is a well drained silty clay loam soil with 3.4% organic matter and pH 6.0. 'Hodgson 78' soybeans were planted May 18 in 30 inch rows at 75 lb/A. The study was a randomized complete block design with four replications. Herbicide treatments were applied on May 29, June 13, June 25 and July 6 when foxtain was at the preemergence, 1-2 leaf, 3-4 leaf, and 10 inch stage. Rainfall the first and second week after the preemergence application was 0.53 and 1.85 inches, respectively. At the time of the 1-2 leaf application, relative humidity was 60%, air temperature 68° F, and winds were 0-2 mph. Rainfall was 2.54 inches the first week and 2.45 inches the second week after application.

When the 3-4 leaf treatments were applied relative humidity was 50%, 59° F air temperature, and winds calm. Rainfall for the first and second week after application was 0.61 and 0.70 inches, respectively. All herbicides were applied in 20 gallons of water per acre. Foxtail control was evaluated on July 18 and October 3, and yields determined on October 4 with a small plot combine.

Low rates of MON-0139 did not control foxtail spp. SC-1084 did not control foxtail spp. when applied at 0.125 or 0.25 lb/A, but 0.50 lb/A provided 85% control. Early application of haloxyfop at 0.06 lb/A resulted in good control of foxtail spp. but higher rates were required for later applications. The following treatments generally controlled foxtail spp. but did not result in significant yield increases: fluazifop, DPX-Y6202, sethoxydim at the 3 to 4 leaf stage, and haloxyfop at 0.25 lb/A applied at the 1 to 2 leaf stage. This study shows that several of these new compounds have excellent potential for control of annual grasses in soybeans.

Table 31. Postemergence Grass Control in Soybeans.

Treatment(a)	Rate	Time of Application	% Weed Control Yeft	Yeft	Yield
	(lb/A)		7-18-84	10-3-84	(bu/A)
Haloxyfop(b)	0.06	1-2L	93	94	30.4
Haloxyfop(b)	0.13	1-2L	95	94	32.3
Haloxyfop(b)	0.25	1-2L	94	95	25.7
Sethoxydim(b)	0.25	1-2L	94	89	30.3
Fluazifop(b)	0.25	1-2L	91	88	26.6
DPX-Y6202(b)	0.13	1-2L	97	97	30.4
Haloxyfop(b)	0.06	3-4L	71	79	29.1
Haloxyfop(b)	0.13	3-4L	94	97	30.9
Haloxyfop(b)	0.25	3-4L	95	96	32.8
Sethoxydim(b)	0.25	3-4L	89	92	28.9
Flauzifop(b)	0.25	3-4L	79	89	28.5
DPX-Y6202(b)	0.13	3-4L	93	95	28.4
MON-0139	0.13	3-4L	22	40	25.3
MON-0139	0.19	3-4L	58	46	28.4
Clopropoxydim(b)	0.10	3-4L	80	88	30.1
Clopropoxydim(b)	0.20	3-4L	91	94	30.0
SC-1084(b)	0.13	3-4L	32	52	27.7
SC-1084(b)	0.25	3-4L	60	53	30.0
SC-1084(b)	0.50	3-4L	87	86	31.7
(Metribuzin) + (fenoxaprop(b))	0.38 + 0.10	Pre + 10-in	98	97	30,2
(Metribuzin) + (fenoxaprop(b))	0.38 + 0.15	Pre + 10 in	97	98	30.8
Weedy Check			0	0	24.6
LSD (0.05)			20	13	4.8

(a) Herbicides within parentheses represent a single application.
(b) Applied with crop oil concentrate at 1.0 quart per acre.

haloxyfop = Verdict
sethoxydim = Poast
fluazifop = Fusilade
DPX-Y6202 = Assure
MON-0139 = experimental
clopropoxydim = Selectone
SC-1084 = experimental
metribuzin = Sencor/Lexone
fenoxaprop = Whip

Yeft = Yellow Foxtail

S.E. FARM REPORT

PERFORMANCE OF HERBICIDES ON NO-TILL CORN AND SOYBEANS

W. E. Arnold, L. J. Wrage and P. O. Johnson

PLANT SCIENCE 84-20

Demonstration plots provided side-by-side comparisons of herbicide treatments and concepts in no-till corn and soybeans. Chemical treatments demonstrated include presently labeled herbicides and those which may be labeled in the near future. Treatments selected for the first year are intended to demonstrate the various herbicide systems useful in no-till row crops.

METHODS

Early preplant treatments were applied April 19, preemergence treatments on June 13 and postemergence treatments on June 25. A plot sprayer delivering 20 gpa water and 40 psi pressure were used. Corn and soybeans were planted June 9.

Total rainfall the first and second week after early preplant treatments were 1.53 and .59 inches respectively. Rainfall the first and second week after preemergence treatments were 3.91 and 1.08 inches, respectively. Rainfall the first and second week after postemergence treatments were 0 and .12 inches respectively.

RESULTS

The performance of treatments is presented in Tables 31 and 32. Evaluations are based on two visual estimates for each weed group. Evaluations were made on July 20.

In the 1984 no-till corn demonstration plots, three treatments provided better than 85% control. In the no-till soybeans seven treatments provided better than 85% control.

Corn and soybean stands were spotty due to heavy rains after planting; however, weed control concepts could still be evaluated. Heavy rain and extended delay between early preplant treatments (50 days) and planting reduced the effectiveness of some early preplant treatments. However, most of the preemergence treatments performed well. Systems using total postemergence treatments were ineffective due to the unusually large weeds and heavy pressure.

Table 32. Herbicide Performance No-Till Corn, 1984

Early Preplant	Preemergence	Postemergence	% Weed Control Gr	Bdlf
Bladex-atrazine+ Dual (2.5+.5+2.5)			69	71
Bladex+atrazine+ Dual (2.5+.5+2.5)	Dual (1.5)		80	75
Bladex+atrazine (2.5+.5)			18	48
Bladex(3)	Lasso (3)		28	25
Atrazine (3)	Dual (2.5)		50	78
Bladex (2.5)		Bladex (1.5)	40	25
Bladex (3)		atrazine+Banvel (1+.25)	20	65
	Paraquat+X-77 Bladex+atrazine+ Dual (.38+.5%+2.5+.5+2)		96	94
	Roundup+Bladex+ atrazine +Dual (.75+2.5+.5+2)		94	82
	Paraquat+X-77+ Bladex+Lasso (.38+.5%+2.5+2.5)		84	68
	Roundup+Harness (.75+2.5)		86	65
	Roundup+Harness+ Bladex (.75+2.5+2.5)		91	52
	2,4-D est+oil+Bladex+ atrazine+Lasso (.75+1 qt+2.5+.5+2)		86	87
	Bladex+atrazine+ Lasso (2.5+.5+2)		90	8
	Paraquat+X-77+ Dual (.38+.5%+2.5)	atrazine+oil (1.5+1qt)	92	88
Check			0	0

Early Preplant: 4/19/84
Rain: 1st wk .94"; 2nd wk 1.07"
PRE: 6/13/84
Rain: 1st wk 2.54"; 2nd wk 2.45"
POST: 6/25/84
Rain: 1st wk .12"; 2nd wk .12"
Planting Date: 6/9/84

GR=Green, yellow foxtail, fall panicum
Bdlf=Smooth, redroot pigweed, lsmbsquarters

Table 33. Herbicide Performance No-Till Soybeans, 1984

Early Preplant	Preemergence	Postemergence	% Weed Control Gr	% Weed Control Bdlf
Sen/Lex (.75)	Lasso (3)		87	88
Sen/Lex (.5)	Lasso (3)		32	78
Bladex 80W (3)	Dual (3)		81	63
Sen/Lex+Dual (.5+1.5)	Dual (1.5)		96	85
Bladex+Dual (3+1.5)	Dual (1.5)		94	91
Bladex+Dual (3+3)			89	51
Prowl (1.25)	Amiben (3)		78	84
	Paraquat+X-77+ Sen/Lex+Dual (.38+.5%+.5+3)		94	95
	Roundup+Sen/Lex+ Lasso (.75+.5+3)		88	92
	Paraquat+X-77+Amiben+ Lorox+Surflan (.38+.5%+2+1+1.25)		83	86
	Roundup+Harness (.75+2.5)		92	85
	Paraquat+X-77+Lasso+ Amiben (.38+.5%+3+2)		72	82
Bladex+Surflan+ Sen/Lex (3+1.25+.25)			93	88
	Paraquat (.38)	Blazer+Basagran+ Poast (.38+.75+.3)	84	77
		Blazer+Basagran+ Poast+oil (.38+.75+.3+1 qt)	77	30
Check			0	0

Early Preplant: 4/19/84
Rain: 1st wk .94"; 2nd wk 1.07"
PRE: 6/13/84
Rain: 1st wk 2.54"; 2nd wk 2.45"
POST: 6/25/84
Rain: 1st wk .12"; 2nd wk .12"
Planting Date: 6/9/84
Gr=Green foxtail
Bdlf=Smooth and redroot pigweed, lambsquarters

S.E. FARM REPORT

RESIDUAL PHOSPHORUS

CORN YIELD RESPONSE

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B. Lawrensen and R. Nettleton

PLANT SCIENCE 84-21

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 106 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
   - 74 - Alfalfa
   - 75 - Alfalfa
   - 76 - Alfalfa
   - 77 - Alfalfa, after 1st cutting
   - 78 - Alfalfa
   - 79-Corn
   - 80-No crop (Hail), spring sampling
   - 81 - Grain sorghum
   - 82 - Corn
   - 83 - Corn, spring sampling
   - 84 - Corn, spring sampling
4. The study area was tilled with a field cultivator and then planted to Pioneer 3732 on May 21, 1984. Weed Control consisted of Lasso II applied in a band at planting, Bladex 4L applied pre-emergence, and 2-4,D ester applied for broadleaf control on August 10. Counter 15G was applied at planting for insect control. Nitrogen was sidedressed as ammonimum nitrate at a rate of 150 lbs N/A.

Results and Discussion

Results of soil sampling in 1983 showed that the study 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 slope than the rest of the study and tested slightly lower in pH and organic matter (5.7, 3.1%) and higher in potassium and phosphorus. Soil test P levels for 1973 through 1984 are graphed in Figure 5. The soil P level has been dropping at a rate of about 8% of the soil test level per year. The 1983 and 1984 samplings, however, indicate that the decline may be slowing down.

Similar to 1983, the spring of 1984 was extremely wet at this location. This delayed planting until the latter part of May. 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 yield averages for 1983 and 1984. Corn grain yields are reported in Table 34 for 1982-84.

Table 34. Influence of Residual P on Corn Grain Yield on an Egan S:CL SE Farm 1982-1984.

Soil test level 1/	Grain Yield - Bu/A 1982	1983	1984	Avg.
15	97	102	103	103
17 2/	103	97	101	100
20	94	103	102	100
32	93	106	109	103
59	84	107	117	103
Significance	NS	NS	NS	

1/ Spring 1984, 0-4"
2/ Average of reps 1 and 2 only

Corn did not show a significant response to soil test P in 1982, 1983 or 1984 at this location even though the check soil test level is in the low category. There was, however, a trend for a response at the higher soil test levels in 1983 and 1984. Grain sorghum grown on these plots in 1981 did not respond to soil test level and did not reach 98% of maximum yield until a soil test level of 38 lbs/A was reached.

Ear leaf samples have been collected annually at silking for plant analysis. Table 35 shows the average P concentration found at each soil test level for 1982 and 1983. Leaf samples were also collected in 1984; however, analysis is not yet complete.

Table 35. Influence of Residual P on Corn Ear Leaf P Concentration, SE Farm, 1982-83.

Soil Test Level 1/	Corn Ear Leaf P - % 1982	1983	Avg.
15	0.261	0.206	0.234
17 2/	0.292	0.208	0.250
20	0.254	0.220	0.237
32	0.246	0.233	0.240
59	0.263	0.238	0.251

1/ Spring 1984, 0-4"

2/ Average of reps 1 and 2 only

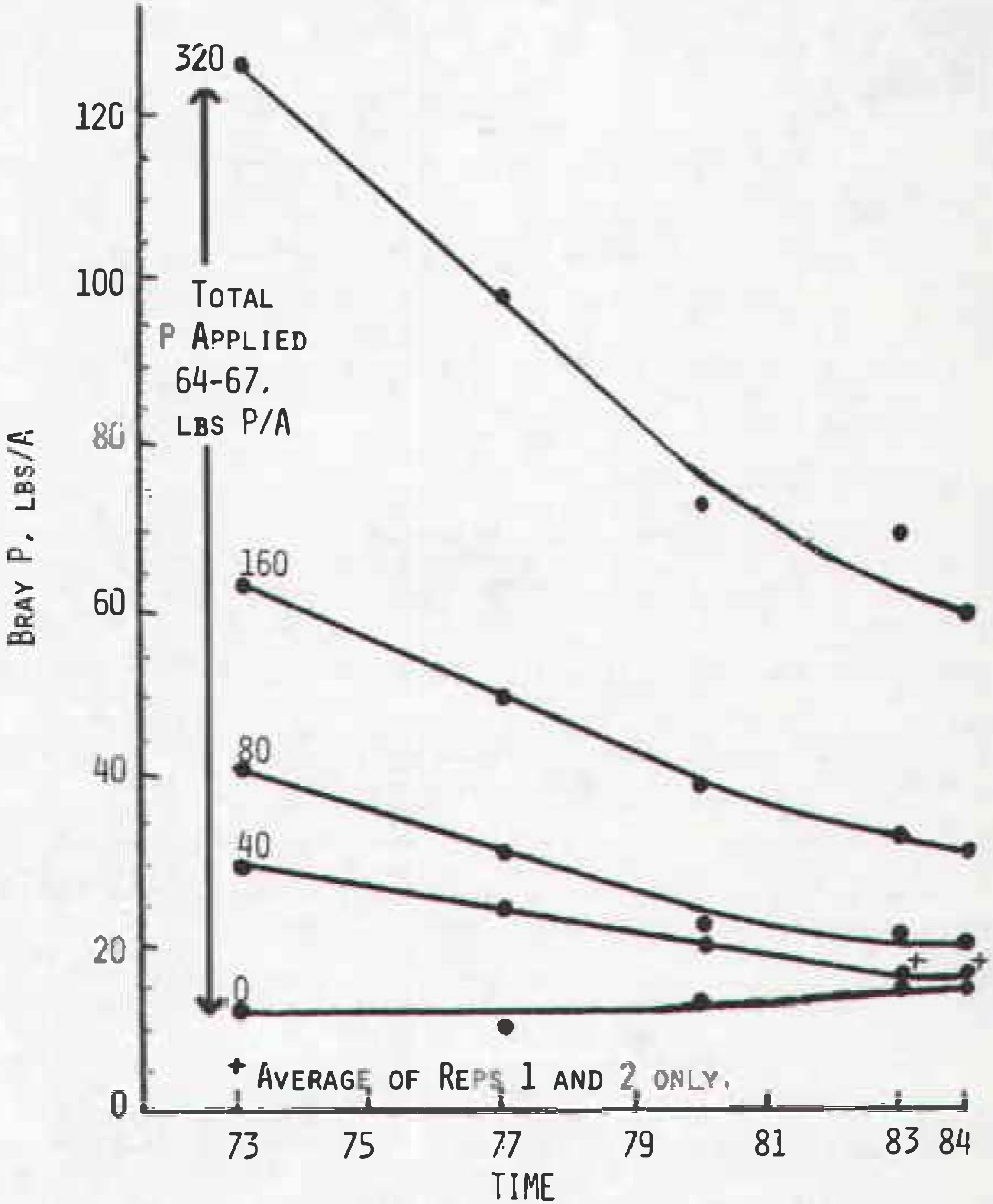


FIG. 5. SOIL PHOSPHORUS DEPLETION IN AN EGAN SILTY CLAY LOAM, SOUTHEASTERN SOUTH DAKOTA.

S.E. FARM REPORT

ALTERNATE FARMING STUDY

J. Gerwing, L. Wrage
B. Farber and B. Lawrensen

PLANT SCIENCE 84-22

Objective

To determine the influence of a corn soybean rotation on yield of corn and soybeans with and without chemical (fertilizer, herbicide, insecticide) inputs.

Materials and Methods

This was the first year of this long term study. It 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. Soil test levels at the site are listed in Table 36.

Table 36. Soil Test Levels, Alternative Farming Study, Beresford, SD

NO3-N	O.M.	P	K	pH	salts	texture
lb/A 0-2'	%	lb/A	lb/A	---	mmho/cm	-----
31	3.0	17	570	6.8	3.2	fine

The site was planted to corn in 1983; plowed in the fall and disked prior to planting. Treatments were established on eight 36' x 85' plots providing 4 replications each of corn and soybeans. Half of each plot received chemical inputs (fertilizer, herbicide and insecticide) according to SDSU recommendations. The other half of each plot received none. The fertilizer consisted of 30 lbs P205 as a starter on both crops and 122 lbs of nitrogen topdressed on May 31 as ammonium nitrate on the corn. Lasso was applied in a 12 inch band (22 lb/A broadcast equivalent) at planting. Corn plots received 8 lbs Furadan 15G. Pioneer 3732 corn was planted at 23,000 seeds per acre and Corsoy 79 soybeans were planted at 160,000 seeds per acre. Plots were cultivated twice. Corn was ridged at the second cultivation. Ridges will be established on all plots in 1985.

Corn and soybean yields are given in Table 37. Corn yield increased signficantly on the treatment receiving fertilizer, herbicide, and insecticide. A large part of the increase can be attributed to nitrogen fertilization, because the available soil nitrogen level was low at planting and the previous crop was corn. In future years, soybeans should contribute some nitrogen for corn in the rotation.

Soybean yield was similar for plots treated with and without chemical inputs. The low soil nitrate level did not affect soybean yield in untreated plots because it is a legume. In addition, weed density was not sufficient after cultivation to influence yield.

Table 37. Yield of Corn and Soybeans with and without chemical inputs, Beresford, SD 1984

Chemical Treatment 1/	Grain Yield Corn	Grain Yield Soybeans
	bu/A	
No	40	26
Yes	90	27
Stat. Sig.	.02	NS

1/ 30 lb/A P205, 122 lb/N, 7.3 lb/A Lasso banded, 8 lb/A Furadan banded

S.E. FARM REPORT

PHOSPHORUS REQUIREMENTS OF CORN AND SOYBEANS FOLLOWING FALLOW

P. E. Fixen, J. R. Gerwing and B. G. Farber

PLANT SCIENCE 84-23

Occassionally South Dakota farmers and farmers in other states plant corn following fallow. The PIK program of 1983 caused an unusually large number of these situations in 1984. Past experience has shown that severe early growth problems of corn occur when this crop is planted in a field that has been fallowed the year before.

Starter phosphorus has corrected this early growth problem in past studies. However, no increases in grain yields were reported. Therefore, this abnormally large starter growth response has been called a "cosmetic effect".

In 1984, the decision was made to initiate a long term study comparing rates of starter phosphorus (P) to rates of broadcast P in a ridge plant system for a corn-soybean rotation. The area available for the experiment had been mechanically fallowed in 1983, so no ridges existed for planting. This site, however, provided an opportunity to study the "fallow-syndrome" in 1984 and address the following objectives:

1. Compare the effectiveness of starter and broadcast P for alleviating the early growth problems of corn following fallow.
2. Determine if the early growth problem occurs on soybeans as well as corn.
3. Determine the optimum rate for starter and broadcast P for corn and soybeans.
4. Determine if the early growth response carries through to yield increases.

Materials and Methods

The site was located in the southeast corner of the Southeast Experiment Farm on a Viborg silty clay loam soil. Viborg soils are deep, friable moderately well-drained soils developed in a silty cap over glacial till. Results of soil tests of samples taken in the spring of 1984 are reported in Table 38.

Table 38. Soil Test Results, Spring 1984, SE Farm

NO3-N 1/		Organic Matter	P & K Available			DTPA
0-6"	0-24"	%	P	K	pH	Zn 2/
lb/A			lb/A			ppm
44	213	3.4	16(M)	730(VH)	6.9	0.93(M)

1/ Sampled on June 27, 1984   2/ Sampled in Fall of 1983
M = Medium   VH = Very High

Cultural practices used are reported in Table 39. Frequent rainfall in May delayed planting until May 24 which is 2 to 4 weeks later than normal. This was likely one of the yield limiting factors in this study.

Table 39. Cultural Practices for 1984.

Practice	Corn	Soybeans
Past Crop	Fallow	Fallow
Variety	Pioneer 3732	Corsoy 79
Planting Date	May 24	May 24
Row Spacing	36"	36"
Planting rate	23,000 PPA	160,000 PPA
Final populations	22,000 PPA	-----
Herbicide	Lasso band	Lasso band
Harvest date	October 17	October 17

The study was laid out in a split plot randomized complete block design with three replications. Four rates of P (0, 20, 40, and 80 lbs P205/A) were the main plots while placement methods (broadcast vs starter) were the subplots. Broadcast treatments were applied the day of planting and incorporated with a field cultivator. Starter treatments were applied with the planter in a band approximately 2" to the side and 2" below the seed. The P source used was 0-46-0 (concentrated superphosphate). All corn plots received 100 lbs N/A and 10 lbs Zn/A as ammonium nitrate and zinc sulfate respectively. Soybean plots received only the Zn treatment. Since these plots will be ridge planted in 1985, the corn ground was ridged to a height of about 7" when the corn was in the 4-6 leaf stage. Soybean plots were ridged after harvest.

Parameters measured were: early dry matter production on June 27; July 3, plant height, leaf P concentrations for corn and on July 20 for soybeans; plant P concentrations and uptake at 4 leaf stage of corn, grain yield, and corn grain moisture. Plant analysis was not completed at the time this report was written. Corn yield was determined by hand harvesting 20' of the center two rows. Soybean yields were determined by snapping off 5' of the center two rows and threshing the plants with a stationary plot thresher. Plot size was 18' by 40'.

Results and Discussion

The 1984 growing season tended to be cool and wet throughout the spring. Some moisture stress occurred on these plots in August but, generally the growing season was quite conducive to good phosphorus response and relatively high corn yields (Table 40) despite the late planting date. (See manager's report for weather summary). Tremendous early season growth response to starter P occurred for both corn and soybeans. Relative plant height is plotted in Figure 6.

Early growth of both corn and soybeans was increased by P addition. Even though plant height is a relatively insensitive measure of early growth, corn fertilized with starter P was twice as tall as unfertilized corn on July 3. Check plots of soybeans were 70% of the height of soybeans receiving starter.

Broadcast P was ineffective in increasing early growth of corn, but resulted in nearly the same soybean height as starter P. However, 4 times as much P was required to reach maximum early growth when the P was broadcast.

Frequently, when large early growth response to starter P occurs in South Dakota, grain yields are not increased. This was not the case in 1984 (Figure 7). Corn Yields were increased with both broadcast and starter P, however, yields reached a maximum of 146 bu/A with starter and only 123 bu/A with broadcast P. There was no indication that high broadcast rates would have improved yields of corn. Approximately 60 to 70 lbs of P205 applied as a starter were required to maximize yield.

Use of starter P decreased grain moisture at harvest 4% (Figure 8), with corn from check plots containing 27% moisture and corn at the 60 lb starter rate containing 23% moisture. If it costs $0.02/bu/% moisture for drying, this represents a savings of $11.52/acre. If P costs $.22/lb of P205, 60 lbs/A will cost $13.20. The cost of the fertilizer was nearly paid for in drying expenses alone.

The apparent increase in moisture at the 80 lb rate may be a real one. In many other starter rate studies on corn an excessive rate of P has resulted in declining yield. Whatever has caused this decline in yield may also be responsible for the increase in moisture noted here. It is doubtful that a P induced Zn deficiency is responsible since 10 lbs Zn/A was applied at planting. Plant analysis should shed some light on this issue.

Soybean yields are graphed in Figure 9. Statistically the two placements were not different (Table 40),therefore, yields were averaged across placement methods. A rate of 60 to 70 lbs of P205/A was required to reach maximum soybean yield regardless of whether it was applied broadcast or as a starter. Although similar rates of P were required for corn and soybeans following fallow, for corn the P had to be applied as a starter for maximum yield to be reached, while for soybeans, application could be either broadcast or starter.

The question remains as to what effect fallowing had on the P response obtained. No non-fallow treatments were included in this study so a direct comparison of P responses in a fallowed and a non-fallowed situation cannot be made. A summary of starter and broadcast P response in South Dakota in 1984 is shown in Table 41. The advantage of starter over broadcast P varied from 3 to 23 bu/A, with the least response occurring under late planting and reduced tillage and the greatest response occurring in the fallow study being reported here.

It is interesting to note that greater starter response occurred in a moldboard plow (MP) system at the Viborg site, than in ridge plant or no till corn. Planting at this location was delayed until July 5 due to continual rainfall and wet soil. However, there was time for secondary tillage operations near the end of May and again just prior to planting in the MP system. Thus, the plowed plots were essentially mechanically "fallowed" during May and June. Also, at this location and at another location in Brookings County, data collected suggests that intensive tillage decreased the availability of soil P. The mechanisms causing a decrease in availability of soil P with intensive tillage and the mechanism causing greater P need following fallow may be the same.

Considering that the greatest starter benefit measured in these studies occurred in the fallow experiment and that an abnormally large rate of P was also required following fallow, it is very likely that the fallowing history of the SE Farm site did increase the magnitude of yield response and/or the P rate required over what would have been experienced if the site had been cropped in 1983.

Summary

1. Starter P at a rate of 60-70 lbs P205/A was required to maximize corn grain yield following fallow. This rate exceeded the recommended maximum starter rate for non-fallow corn of 30 lbs P205/A.
2. Either broadcast or starter P at a rate of 60-70 lbs P205/A was required to maximize soybean yield following fallow. This rate is nearly twice the normally recommended rate for the soil test level and yield potential.
3. Broadcast P at any reasonable rate was ineffective in meeting P requirements of corn following fallow.
4. If starter attachments are not available to growers in Southeastern South Dakota, it may be advisable to broadcast some extra P and plant fallowed ground to a crop other than corn, such as soybeans.

Table 40. Plant height, early dry matter production, grain yield and grain moisture in fallow study, 1984.

Trt. No.	P205 Placement	Rate	Early dry matter prod.	Plant Height corn	Plant Height soybeans	Grain Yield corn	Grain Yield soybeans	Corn grain moisture
		lb/A	grams/plant	----cm----		bu/A		%
1	Broadcast	0	0.8	37	18	115	37	27.0
2	Broadcast	20	1.2	42	21	124	40	26.1
3	Broadcast	40	1.3	39	19	119	40	26.6
4	Broadcast	80	1.3	44	25	123	40	25.6
5	Starter	0	0.8	36	18	117	35	27.0
6	Starter	20	3.2	69	26	135	39	24.8
7	Starter	40	3.3	68	26	132	39	22.5
8	Starter	80	3.6	76	26	146	45	24.2
Probability of F test:								
Rate						0.14	0.02	0.00
Placement						0.07	NS	0.06
Rate x Place						0.09	NS	0.03

Table 41. Starter vs Broadcast P for Corn in South Daktoa in 1984.

Location	Tillage System	P2O5 Rate	Grain Yield Broadcast	Starter	Difference
		lb/A	bu/A		
Brookings(62)	CH	30	138	147	9
Estelline (05)	MP	25	135	146	11
	CH	25	125	145	20
	NT	25	125	146	21
SE Farm (37)	MP (Fallow)	80	123	146	23
Viborg(03) 1/	MP	25	36	45	9
	RP	25	48	51	3
	NT	25	50	53	3

1/ Planting delayed until July 5 due to rain and wet soil

CH = chisel plow
MP = moldboard plow
NT = no-till
RP = Ridge planting

FIGURE 6. INFLUENCE OF P RATE AND PLACEMENT ON EARLY GROWTH OF CORN AND SOYBEANS FALLOW STUDY, 1984

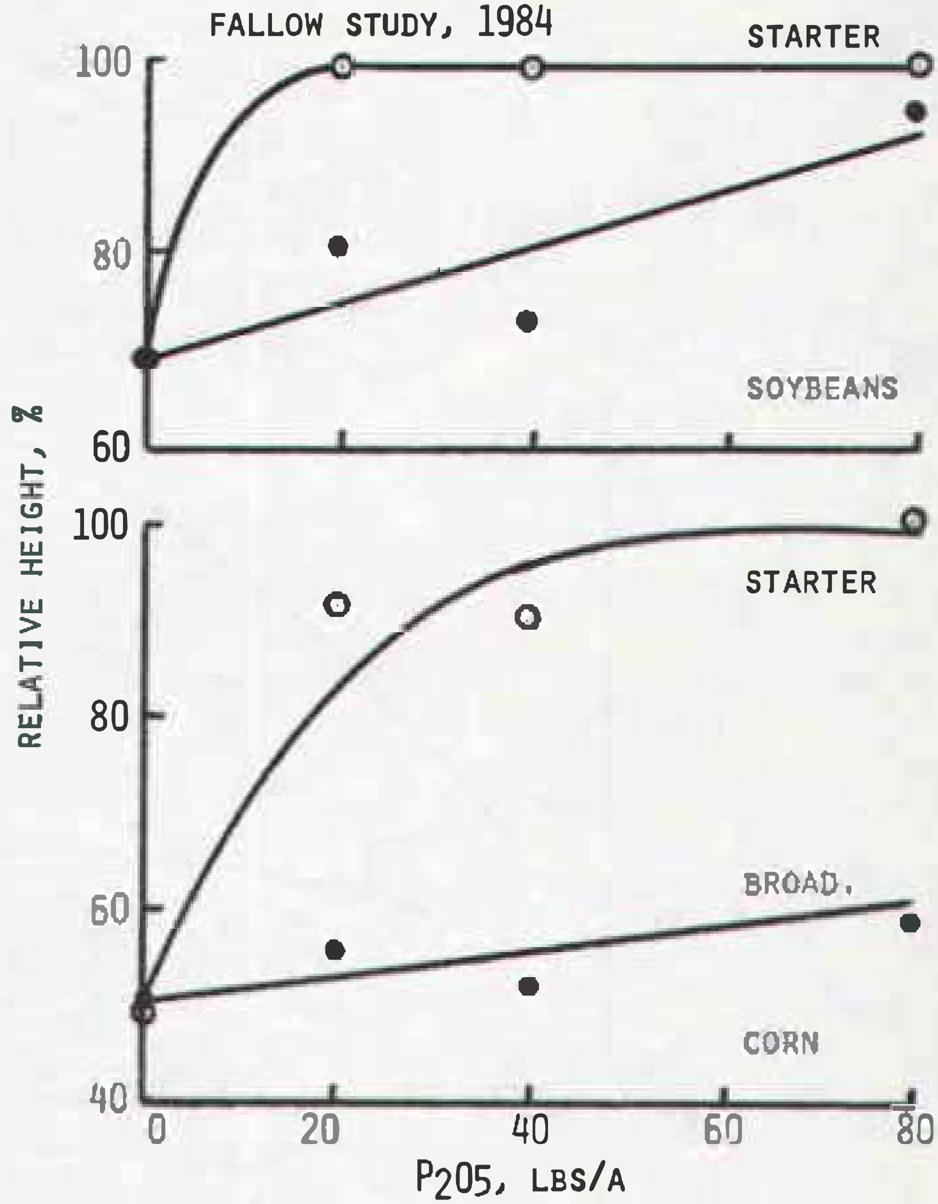


FIGURE 7. INFLUENCE OF APPLIED P ON CORN YIELD ON SE FARM, 1984 (FOLLOWING FALLOW)

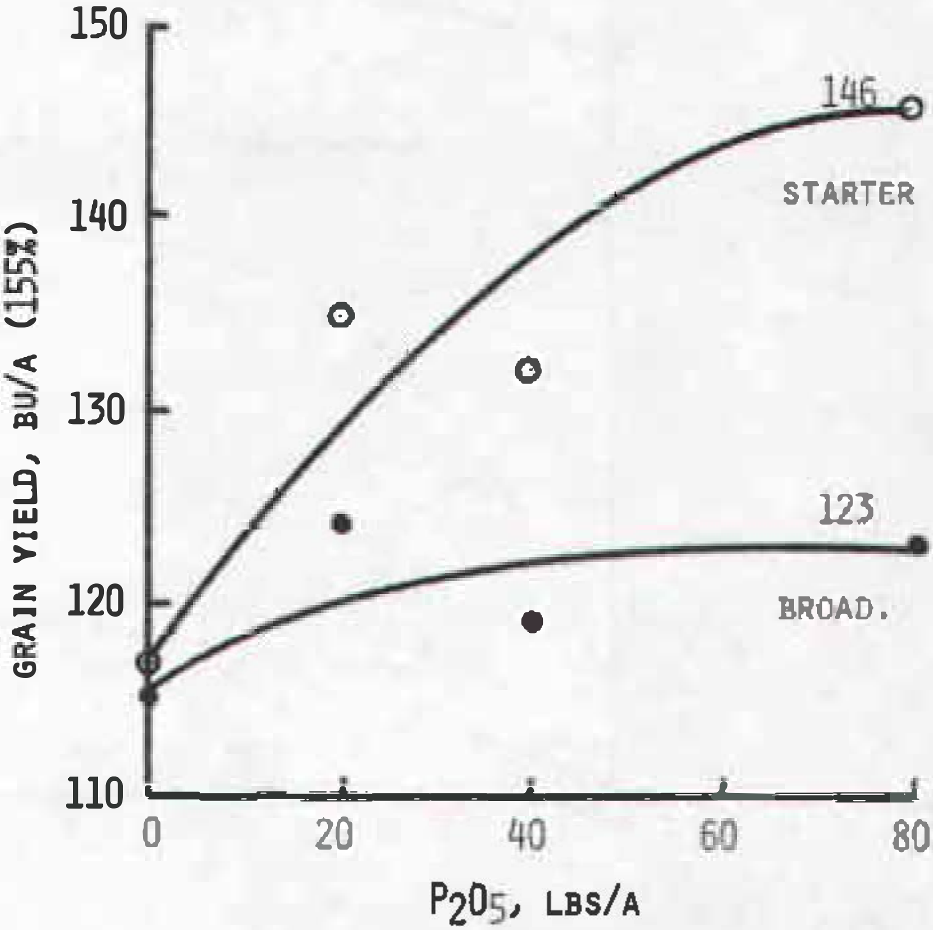


FIGURE 8. INFLUENCE OF P RATE AND PLACEMENT ON CORN GRAIN MOISTURE AT HARVEST, FALLOW STUDY, 1984

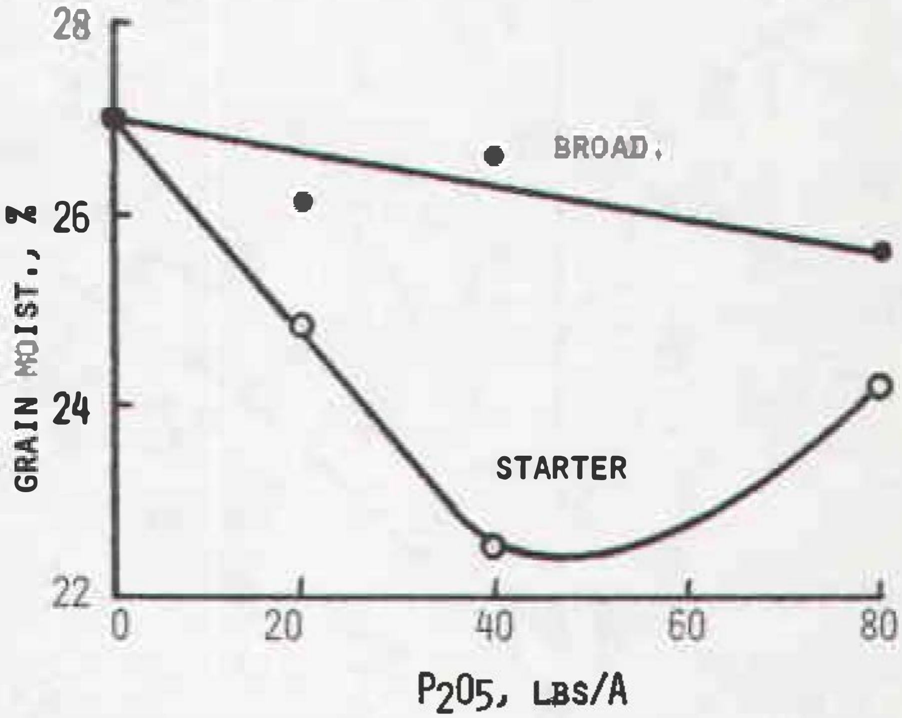
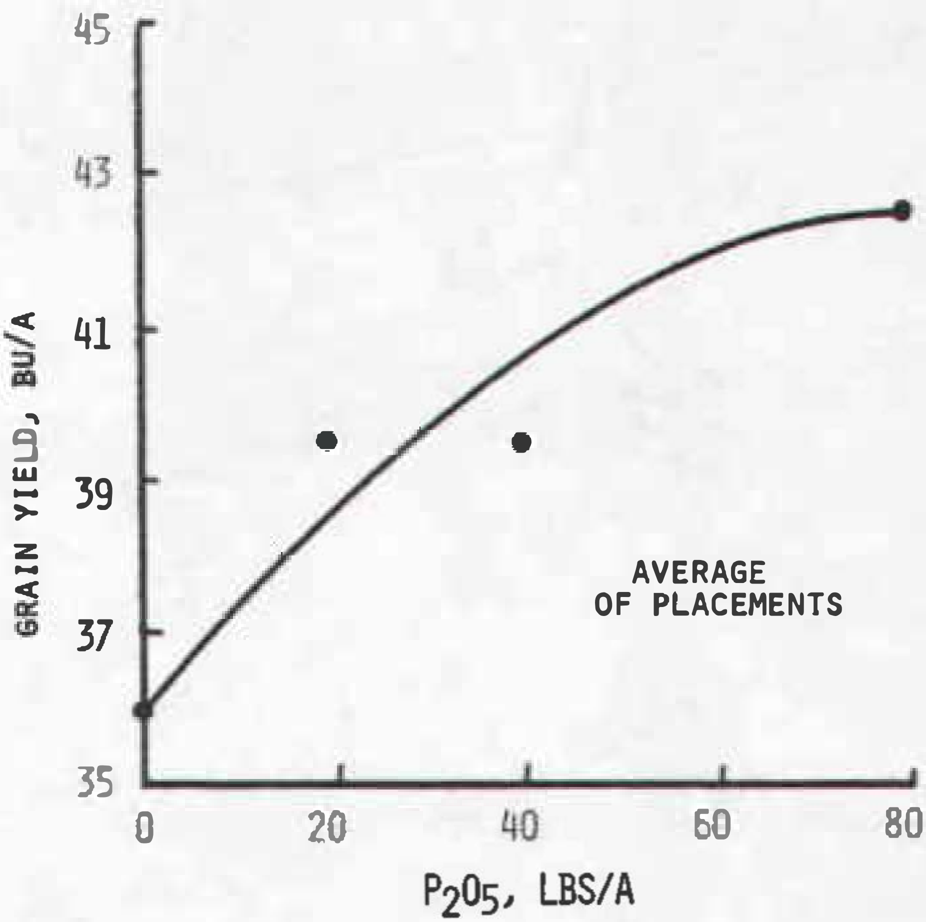


FIGURE 9. INFLUENCE OF APPLIED P ON SOYBEAN YIELD AT SE FARM, 1984 (FOLLOWING FALLOW)



S.E. FARM REPORT

ALFALFA PRODUCTION AND MANAGEMENT

Clive Holland, Robin Halvorson

PLANT SCIENCE 84-24

Small-plot alfalfa research was initiated in the spring of 1984. Ideal seeding conditions were not a part of the 1984 planting season and alfalfa seedings were delayed for almost a month after the recommended seeding date by wet soil conditions. Research has shown that under normal conditions, in the North Central United States, mid-April is the most desirable time to make alfalfa seedings for the best stand establishment and maximum seeding-year yields.

The delay in seeding did not appear to adversely affect forage yields, mainly because of the continued above normal precipitation during the month of June. July and August were drier than normal, but residual ground moisture was sufficient to help produce excellent seeding-year yields in three of the four trials.

Experiment 1

Objectives:

1. To evaluate under South Dakota's climatic conditions various alfalfa varieties for yield, persistence, winterhardiness, and diesease resistance.
2. To determine what alfalfa varieties are suitable to be recommended for use by South Dakota producers.

Methods and Procedures

May 16 - Sprayed Eptam herbicide at 3 lb ai/A and field cultivated twice to incorporate.
- Cultipacked ground
- Seeded 52 alfalfa varieties at 15 lb PLS/A in plots 3 x 25 feet

July 31 - Cut 1
Aug. 30 - Cut 2
Oct. 26 - Cut 3

ai = active ingredient
PLS = Pure live seed

Discussion

Excellent weed control was gained by the Eptam herbicide in spite of the very wet conditions following seeding. Wild sunflowers and pigweed were the noticeable exceptions. Slight *Phytophthora* root-rot injury was sustained in those varieties without resistance to this disease.

Vernal alfalfa is normally used as a standard to measure the performance of other alfalfas and in Table 40 all varieties are ranked, from best to poorest, in total yield and also as a percentage of Vernal yield. Seeding-year yields of alfalfa must be viewed with caution and no conclusive decisions should be made on these data. Winterhardiness is most important for South Dakota conditions and this factor is not measured at all until after at least one winter. Persistence and disease resistance also take time to evaluate and variety-yield differences are more pronounced after periods of stress such as drought or excess moisture. This study will be continued for a minimum of two more years.

Table 42. E-411 Alfalfa Varieties, SE Station, 1984

		Forage Yield (Tons DM/A)				%
Varieties	Dex/Supplier	7/31	8/30	10/16	Total	Vernal
IH-135	Sexauer/Farm Seed	2.01	1.54	1.24	4.79	115
Advantage	Dekalb-Pfizer	2.05	1.61	0.89	4.55	109
DK-135	Dekalb-Pfizer	1.94	1.66	0.92	4.52	109
Hi-phy	Cenex Seed	1.94	1.56	0.88	4.38	105
NY 8302	Cornell Univ.	1.87	1.56	0.91	4.34	104
DS 305	Dairyland Research	1.93	1.58	0.82	4.33	104
H-106R	Sexauer/Farm Seed	1.83	1.58	0.92	4.33	104
DS 215	Dairyland Research	2.02	1.52	0.77	4.31	104
IH-101	Sexauer/Farm Seed	1.88	1.50	0.93	4.31	104
CA 7931-32	W-L Research	1.83	1.57	0.87	4.27	103
IL 3110A	Research Seeds	1.85	1.51	0.89	4.25	102
Big 10	Great Lakes Hybrid	1.92	1.46	0.84	4.22	101
Magnum	Dairyland Research	1.74	1.60	0.87	4.21	101
NY 3501	Cornell Univ.	1.95	1.46	0.79	4.20	101
SX 217	Sexauer/Farm Seed	1.82	1.62	0.75	4.19	101
Blazer	Land O'Lakes	1.90	1.50	0.76	4.16	100
Vernal	Ws. Ag. Expt. Sta.	1.91	1.60	0.65	4.16	100
Saranac AR	NY Ag. Expt. Sta.	1.81	1.47	0.85	4.13	99
Cimarron	Great Plains Research	1.69	1.52	0.92	4.13	99
H-134	Sexauer/Farm Seed	1.75	1.52	0.85	4.12	99
Valor	Land O'Lakes	1.82	1.54	0.75	4.11	99
Drummer	Northrup King	1.85	1.47	0.79	4.11	99
LL 3018	Land O'Lakes	1.95	1.35	0.80	4.10	99
NY 8301	Cornell Univ.	1.91	1.37	0.77	4.05	97
532	Pioneer Hi-Bred Intl.	1.80	1.41	0.81	4.02	97
WL 313	W-L Research	1.56	1.53	0.91	4.00	96
Iroquois	NY Ag. Expt. Sta.	1.79	1.49	0.71	3.99	96
Shenandoah	Great Plains Res.	1.72	1.41	0.85	3.98	96
120	Dekalb-Pfizer	1.75	1.45	0.77	3.97	95
Challenger	Cargill Seeds	1.69	1.49	0.76	3.94	95
Spectrum	Cenex Seed	1.58	1.49	0.86	3.93	94
H-140	Sexauer/Farm Seed	1.64	1.47	0.82	3.93	94
82-5	W-L Research	1.76	1.33	0.76	3.85	93
Saranac	NY Ag. Expt. Sta.	1.90	1.34	0.59	3.83	92
Decathlon	Cargill Seeds	1.69	1.32	0.82	3.83	92

Table 42 Continued, Alfalfa Varieties, 1984

Varieties	Dev/Supplier	Forage Yield (Tons DM/A) 7/31	8/30	10/26	Total	% Vernal
Oneida	NY Ag. Expt. Sta.	1.72	1.36	0.74	3.82	92
H-125 W	Sexauer/Farm Seed	1.63	1.35	0.83	3.81	92
526	Pioneer Hi-bred Intl.	1.68	1.45	0.68	3.81	92
F-144	Sexauer/Farm Seed	1.59	1.38	0.83	3.80	91
H-150	Sexauer/Farm Seed	1.45	1.47	0.87	3.79	91
Endure	PAG Seeds	1.65	1.33	0.81	3.79	91
NAPB 20	AgriPro.	1.63	1.45	0.69	3.77	91
SX 424	Sexauer/Farm Seed	1.69	1.32	0.75	3.76	90
Apollo II	Agripro	1.53	1.32	0.88	3.73	90
Eagle	O's Gold Seed CO.	1.43	1.38	0.84	3.65	88
MT-0	SDSU	1.96	1.29	0.33	3.58	86
NAPB 21	AgriPro	1.55	1.21	0.70	3.46	83
Heinrichs	Agric. Canada	1.71	1.34	0.35	3.40	82
Mich. 80-16	Mich. State Univ.	1.55	1.21	0.62	3.38	81
Travois	SDSU	1.72	1.06	0.13	2.91	70
MT-1	SDSU	1.69	1.06	0.15	2.90	70
Teton	SDSU	1.37	1.26	0.27	2.90	70
Average		1.76	1.44	0.76	3.96	
LSD (0.05)		NS	0.21	0.12	0.59	
CV (%)		16.80	10.49	11.45	10.68	

Experiment 2

Objective: To compare the effectiveness of various strains of Rhizobium inoculum to increase alfalfa yield, nodulation and protein content.

Methods and Procedures

May 18
- Sprayed Eptam herbicide at 3 lb ai/A and field cultivated twice to incorporate
- Cultipacked ground
- Seeded Oneida alfalfa at 12 lb PLS/A in plots 3 x 25 feet.
- The Rhizobuim inoculum was applied to the seed as a moist slurry half a day before seeding and allowed to dry.

June 28 - Took stand counts

July 7 - Cut 1

Aug. 31 - Cut 2

Oct. 26 - Cut 3
- Samples from each harvest were taken from every plot for protein analysis.

Nov. 6 - Dug plants from selected treatments and test for type of Rhizobium in root nodules.

Discussion

No consistent differences in stand density were obtained, but there was a general increase in plant numbers with the addition of the product H421 as shown in Table 43. Where yield differed, generally the higher yield was obtained from alfalfa with H421 added.

Protein analysis have not been completed, but they will be made available as an addition to this report.

The *Rhizobium* inoculums tested in this study have not yet been released for commercial use and this is only a preliminary stage of evaluation. The extremely wet, spring conditions during 1984 may have masked any real differences between these products and further testing will need to be conducted.

Table 43. E-412 Alfalfa-*Rhizobium* Inoculants, SE Station 1984

Treatments*	plants/ft2	Forage Yield (Tons DM/A) 7/30	8/31	10/26	Total
R5-101X	42.41	1.68	1.29	0.64	3.61
P. Rhizobium	42.56	1.56	1.30	0.72	3.58
M. Rhizobium	37.37	1.60	1.30	0.64	3.54
R5-102X	38.17	1.72	1.26	0.68	3.66
R5-103X	36.26	1.54	1.24	0.64	3.42
R5-102X + R5-101X	39.06	1.69	1.27	0.64	3.60
R5-103X + R5-101X	40.59	1.70	1.35	0.70	3.75
Check	36.78	1.75	1.32	0.67	3.74
R5-101X +H421	46.31	1.74	1.34	0.67	3.75
P Rhizobium + H421	46.78	1.77	1.35	0.72	3.84
M. Rhizobium + H421	42.02	1.63	1.26	0.59	3.48
R5-102X + H421	37.74	1.90	1.37	0.72	3.99
R5-103X + H421	39.06	1.71	1.28	0.63	3.62
R5-102X + R5-101X + H421	42.32	1.58	1.27	0.68	3.53
R5-103X + R5-101X + H421	43.24	1.73	1.26	0.67	3.66
Check + H421	40.48	1.81	1.28	0.61	3.70
Average	40.70	1.69	1.29	0.66	3.65
LSD (0.05)	4.82	0.19	NS	NS	0.27
CV (%)	10.82	9.51	12.84	12.84	6.47

Oneida alfalfa seeded at 12 lb PLS/A on 5/18/84
*All inoculums applied preplant as a moist slurry

Experiment 3

Objective: To evaluate the effectiveness of Apron seed treatment of alfalfa, Ridomil soil treatment and other SDSU chemical combinations and developments in combating the soil borne diseases of Pythium and Phytophthora and nematode infestations that destroy new alfalfa seedlings.

Methods and Procedures

May 21 - Sprayed Eptam herbicide at 2 lb ai/A and field cultivated twice to incorporate
- Seeded Iroquois alfalfa at 10 lb. PLS/A in plots 3 x 25 feet.

July 6 - Took stand counts
July 31 - Mowed experiment to remove weeds
Aug. 10 - Sprayed with Poast herbicide to remove grassy weeds
Aug. 31 - Cut 1

Discussion

This seeding was quite adversely affected by the above-normal, spring precipitation. Seedbed preparation was difficult and the soil too cloddy to produce the best stand as is shown in Table 44. Weeds were not adequately controlled by the herbicide and became a serious threat to the survival of the alfalfa. One mowing and an application of Poast (This herbicide is not presently cleared for use when forage is to be fed to cattle) enabled one harvest to be made.

The objectives of the experiment were not met because of the reasons outlined above, but this seeding can be used as an indication of management techniques in less than desirable conditions. Iroquois alfalfa is not a Phytophthora resistant variety and generally would not recommended for seeding in the southeast area of the state.

Table 44. E-413 Alfalfa-Seeding Disease Control, SE Station, 1984

Treatments	lbs ai/A**	Plants/ft2	Forage Yield (tons DM/A) 8/31
Ridomil	0.125	25.25	1.18
Ridomil	0.25	31.70	1.16
Ridomil	0.5	30.33	1.16
Apron		17.53	1.16
Furadan	1.0	32.06	1.11
Fur. + Apron		31.86	1.22
G. virens***		31.00	1.23
Check		25.05	1.23
Average		29.35	1.18
LSD (0.05)		NS	NS
CV (%)		23.26	11.74

Iroquois alfalfa seeded at 10 lb PLS/A on 5/21/84
** Apron and G. virens seed applied (2 oz./100 lb/seed)
***Gliocladium virens is a biological fungicide

Experiment 4

Objectives: To compare the effectiveness of various Rhizobium carrier and seed-adhesive agents in more effectively adding Rhizobium meliloti (inoculant) to alfalfa seed.

Methods and Procedures

May 16 - Sprayed Eptam herbicide at 3 lb ai/A and field cultivated twice to incorporate
June 28 - Cultipacked ground
July 30 - Cut 1
Aug. 30 - Cut 2
Oct. 26 - Cut 3

Discussion

No large differences in stand density were obtained by the most commonly used method of inoculating alfalfa seed (moist inoculation) did produce a good stand (Table 45). Alfalfa inoculant does not affect early stand establishment in any way, but by the formation of root nodules, it strongly influences the legume-plant survival past the first few weeks of growth.

Excellent overall seeding year forage yields of 4 tons per acre were obtained, but no treatment yielded significantly different in any of the harvests. The extremely wet spring conditions quite likely masked any effectiveness of one Rhizobium carrier over another. Protein analysis is being conducted on forage samples from each treatment in each harvest and will be made available as an addition to this report.

Table 45. E-414 Alfalfa-Rhizobium Carriers, SE Station, 1984

Treatments	plants/ft2	Forage Yield (tons DM/A) 7/30	8/30	10/26	Total
Vicoat	32.39	1.57	1.47	0.88	3.92
Dormal	38.67	1.66	1.49	0.78	3.93
Pelinoc	33.89	1.76	1.53	0.88	4.17
Moist Inoc.	40.00	1.52	1.42	0.78	3.72
Apron** + Moist Inoc	42.20	1.86	1.54	0.86	4.26
Rhizo-Kote***	35.36	1.61	1.56	0.91	4.08
Check (No Inoc.)	38.20	1.70	1.59	0.90	4.19
Average	37.24	1.67	1.51	0.86	4.04
LSD (0.05)	7.23	NS	NS	NS	NS
CV (%)	13.07	19.12	10.73	10.54	12.31

Spectrum alfalfa seed at 10 lb PLS/A on 5/16/84
** Apron is a chemical fungicide
*** Lime-coated seed adjusted for 10 lb/A PLS seeding rate

S.E. FARM REPORT

OATS RESEARCH

Dale Reeves

PLANT SCIENCE 84-25

The Southeast Research Farm is the farthest south testing station where we test oats. Because of this, it is our main testing location for early oats. In 1984, we had several different tests at this station. In addition to our tests, six of our most advanced lines were included for testing in the Standard Variety Oat Test.

The Uniform Early Oat test is a regional trial grown at 12 locations and usually contains 15 to 20 entries each year. These selections are too early for most of the state, so this station is our main test site for them.

Our Purity Increase trial contained 64 of our most promising selections. The most promising of this test will be placed in the regional test next year.

The Tri-State test is grown at three locations each in South Dakota, North Dakota and Minnesota. Each state can test up to 10 entries of their better looking selections in this test. The Southeast Farm is the most southern test site in this test. No selection can be entered in this test for two years, therefore 30 new entries are examined in this test each year. The best entries from this test are entered in the regional test at 20 locations the following year. The oats performing well in the Purity Increase and Tri-State tests are the ones selected for more extensive testing and increase, so these are very important tests in our breeding program.

Replicated test of 73 entries of our advanced yield trials were grown here. The best of these will go into the Tri-State test next year. There was also one test of 50 different entries of early oats. These were in an early stage of testing to determine which crosses should be tested further.

At the Southeast Research Farm in 1984, we tested 214 different entries as a part of our variety development program.

We also treated 10 different oat varieties with MCPA and three different rates of 2,4-D. This is part of a study to see if presently grown varieties are injured by recommended rates of 2,4-D. A limited test the previous year indicated some varieties are sensitive to 2,4-D even when recommendations are followed.

S.E. FARM REPORT

A COMPARISON OF SEVERAL SOIL TESTING LABORATORY FERTILIZER RECOMMENDATIONS

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PLANT SCIENCE 84-26

Many soil test laboratory services are available to South Dakota farmers. Although accurate figures are not available, it is estimated that 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 know 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 fourth 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 1984. 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 fall plowed and disked three times prior to planting. Pioneer 3906 was planted at a rate of 24,000 seeds/acre on June 28. The late planting date was due to excessively wet soil conditions. Harvest population ranged from 23-25 thousand plants per acre. Lasso II was banded over the row with the planter. Counter 15G was used for insect control.

Fertilizer treatments were broadcast and disked on May 31. Laboratories were labeled A, B, C, etc. Fertilizer and lime costs were estimated averages paid by farmers in the spring of 1984. They were set on a per pound basis as follows:

Nitrogen	$0.25
Phosphorus	$0.25
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 46. Much of the variability between labs for the nitrate and phosphorus tests is due to differences in fertilizer applied from past years 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 1984 from each lab and the cost of the fertilizer recommended are reported in Table 47. The costs varied from $37.00/acre to $77.85/acre.

Yields were fair in 1984 (table 48) considering the very late planting date. The check yield was only 50% of the highest fertilizer treatment. Nitrogen deficiency was very apparent on the check plot. A 12 bu/A difference separated the highest and lowest yielding fertilizer treatments. This difference is difficult to explain in that both of these fertilizer treatments were similar. Again, as in previous years there is no relationship between fertilizer recommendation differences and the observed yield differences. This can also be seen from the four year yield averages versus total fertilizer costs (table 48).

Table 46. Soil Test from 1984 SE Farm Lab Comparison Study

Measurement	SDSU	A	B	C	D
Nitrate-N, lbs/A-2'	36	22	64	54	——
O.M., %	2.7	3.3	4.6	3.4	——
Phosphorus, lbs/A	28	40	40	34**	35
Potassium, lbs/A	620	608	780	698	635
pH	6.8	6.7	6.5	6.4	6.8
Salts, mmho/cm	0.3	0.1	0.4	0.2	——
Zinc, ppm	1.4	1.6	2.5	1.5	1.2
Iron, ppm	29	73	92	95	——
Manganese, ppm	40	43	60	67	——
Copper, ppm	2.1	1.6	2.0	2.0	——
Sulfur (SO4), ppm	——	11	6	17	3.0
Boron, ppm	——	0.9	1.8	0.45	——
Magnesium, ppm	505	786	793	763	——
Calcium, ppm	2626	2509	1846	2401	——
Sodium, ppm	——	31	43	26	——
CEC, mg/100 g	——	20	18	19	——

** Mehlich Test

Table 47. Suggested Fertilizer Recommendations for 120 bu/A Corn, SE Farm 1984

	Lab				
Fertilizer Nutrient	SDSU	A	B	C	D
Nitrogen, lbs/A	118	127	115	120	110
Phosphorus, lbs/A (P2O5)	30	68	70	30	70
Potassium, lbs/A (K2O)	0	30	30	0	0
Sulfur, lbs/A	0	0	12	0	0
Zinc, lbs/A	0	0	0	0	0
Lime, ton/A	0	0	1.0	0	0
Fertilizer Cost/A	$37.00	$52.35	$77.85	$37.50	$45.00

*Effective calcium carbonate equivalent

Table 48. Influence of Laboratory Fertility Programs on Yield and Fertilizer Costs.

Laboratory	Yields 1984	Yields 4 year avg.	Total 4 year Fertilizer Costs/A
	------ bu/A -------		
Check	48 C*	74	0
SDSU	95 A	94	$117.40
A	84 B	92	$227.00
B	92 AB	95	$256.37
C	89 AB	96	$119.65
D	83 B	95	$187.80
Sig. of F.	0.0001		
C.V. %	9.1		

*Yields followed with the same letter are not significantly different at the 0.05 level.

This study and other similar experiments from this state and nearby states are showing similar trends. Not all soil test laboratories are making the most economical fertilizer recommendations. In these very tough financial times, the laboratory selected needs to be chosen very carefully. This study will be continued.

FUELWOOD PLANTATION

Norman Baer, Larry Helwig, Peter Schaefer
Foresters from SDSU
Steve Schwab, Tom Draper, Bruce Lane
Foresters from SD Div of Forestry

SOUTHEAST FARM 84-27

A marketing survey conducted in 1982 by the South Dakota Division of Forestry determined that nearly 40,000 cords of wood were burned annually in a six county area in southeastern South Dakota. Of those 40,000 cords, 34,000 cords were used as a primary or secondary heat source. The survey area contains only 9,800 acres of commercial forest land capable of an annual growth of about 19,000 cords. It is evident then that wood for fuel is being harvested from non-commercial forestland or windbreaks as well as commercial forestland to meet this demand.

Given the information derived from this fuelwood study and interest expressed by individuals in growing fuelwood, the South Dakota Farm Forestry Council undertook the establishment of an experimental fuelwood plantation. Dr. Fred Shubeck, Director of the Southeast Experimental Farm and the Advisory Board for the farm were presented a fuelwood plantation proposal at the winter board meeting in 1983 and expressed an interest in this type of reserach. Consequently, the plantation was established in the spring of 1984 in the northeast corner of the south quarter, of the farm. Three foresters from the South Dakota Division of Forestry; Bruce Lane, Steve Schwab and Tom Draper; three foresters from South Dakota State University, Larry Helwig, Dr. Peter Schaefer and Dr. Norman Baer and several summer employees from the farm planted the plantation on June 11, 1984. Prior to planting, the area was treated with Treflan at 1-1/2 pints per acre (1 lb. ai acre) to control weeds. This rate is slightly above the rate recommended on the label for use in trees.

The plantation consisted of four tree species and three spacings. Tree species used were; two fast-growing deciduous trees, hybrid poplar and Siberian elm and two, semi-fast growing deciduous tress, green ash and honeylocust. The spacing used between tree rows was 10 feet and was determined by the width of the cultivation equipment on hand at the farm. Spacing between trees within rows was five feet, seven feet or nine feet. The purpose of testing various within row spacings was to determine if close spacing, which results in more stems per acre would slow the rate of tree growth.

Weed control between rows after the Treflan began to break down was done mechanically, once with a cultivator and twice with a rototiller. Weed control within rows was done by a four-man inmate crew. The area within tree rows was hand weeded three times using a total of 30 man hours.

In late summer of 1984 survival and height measurements were taken. Table 49 shows the overall survival and height for each tree species.

Table 49. Survival and height of tree species in fuelwood plantation.

Species	Survival (%)	Height (Inches)
Hybrid poplar	86	34
Siberian elm	86	26
Green ash	98	18
Honeylocust	90	11

A complete cost accounting has been kept for this project. harvesting will begin when tree trunks are 6" to 3" in diameter. At that time we will be able to determine if wood can be grown for a profit on land similar to this in southeastern South Dakota.

PRE EMERGENT HERBICIDE APPLICATIONS IN NEWLY PLANTED TREES

Tom Draper, SD Div of Forestry
John Hatting, DuPont Chemial

S.E. FARM REPORT

SOUTHEAST FARM 84-28

Abstract

Weed control is always an important facet of establishing and maintaining tree plantings in southeastern South Dakota. A recent study was conducted at the southeast experimental farm during the past growing season to evaluate new methods and materials for weed control in shelterbelt plantings, particularly newly planted trees. Very instrumental in developing this project was John Hatting of Dupont Chemical. They provided all the necessary materials needed to establish and treat this test plot. A special thanks also goes to the Clay County Conservation District who helped plant the trees.

Objectives of Study

1) To determine use rates of materials required for adequate control of competing weeds and/or perennial grasses (such as smooth bromegrass).
2) To determine rates of materials tolerated by various species commonly used in shelterbelt plantings in South Dakota.
3) To compare newer materials with those in common use for this purpose.
4) To determine which species will tolerate application of materials directly over the rows of newly planted trees, without significant injury.

Herbicides Tested

1) Simazine (Princep): Immediate application over the row following planting activities - 4 lbs Active Ingredient per acre.
2) Oust (sulfometuron methyl): Immediate application over the row following planting activities. Four various application rates will be tested.
   a) Oust .5 oz = 0.02 lbs. Active Ingredient per acre
   b) Oust 1 oz = 0.05 lbs. Active Ingredient per acre
   c) Oust 2 oz = 0.10 lbs. Active Ingredient per acre
   d) Oust 4 oz = 0.20 lbs. Active Ingredient per acre

Tree Species and Spray Design

A total of 17 various tree species in nine rows were planted in this experimental plot. It should be noted that all rows run east and west. Row 1 is the northernmost row and Row 9 is the southernmost row. Below is listed species and row configuration for this test plot:

Row 1. Colorado Blue Spruce (24 seedlings)
Row 2. Eastern Red Cedar (30 seedlings) Honeysuckle (30 seedlings)
Row 3. Scotch Pine (30 seedlings) Russian Olive (30 seedlings)
Row 4. Silver Maple (30 seedlings) Cottonwood (30 seedlings)

Row 5. Green Ash (30 seedlings) Siberian Elm (30 seedlings)
Row 6. Ponderosa Pine (30 seedlings) Austrian Pine (30 seedlings)
Row 7. Apricot (30 seedlings) Harbin Pear (29 seedlings)
Row 8. Cotoneaster (30 seedlings) Sand Cherry (30 seedlings)
Row 9. American Plum (30 seedlings) Lilac (30 seedlings)

Application rates of the tested herbicides were as follows:

Row 1
- Tree 1-4: Check
- Tree 5-8: Oust .5 oz 0.02 lbs A.I./Ac*
- Tree 9-12: Oust 1 oz 0.05 lbs A.I./Ac
- Tree 13-16: Oust 2 oz 0.10 lbs A.I./Ac
- Tree 17-20: Oust 4 oz 0.20 lbs A.I./Ac
- Tree 21-24: Simazine 4 lbs A.I./Ac

Row 2-9
- Tree 1-5: Check
- Tree 6-10: Oust .5 oz 0.02 lbs A.I./Ac
- Tree 11-15: Oust 1 oz 0.05 lbs A.I./Ac
- Tree 16-20: Oust 2 oz 0.10 lbs A.I./Ac
- Tree 21-25: Oust 4 oz 0.20 lbs A.I./Ac
- Tree 26-30: Simazine 4 lbs A.I./Ac

*A.I./Ac - Active Ingredient per Acre

The following attachment is a table summarizing results and comments made during an evaluation on July 20, 1984. It should be noted that a second evaluation was made on September 20, 1984 with no difference in results:

Row 1. Colorado Blue Spruce

Tree No.	No. Alive	Weed Infestation
1-4	2	Heavy-completely overgrown
5-8	3	Light
9-12	4	Light
13-16	3	Light
17-20	4	Light
21-12	4	Light

Comments: Herbicide treatments have minimized weed growth on all treated areas. Growth of tree seedlings appears to be equal on both the check and treated segments of this row.

Row 2. Eastern Red Cedar

Tree No.	No. Alive	Weed Infestation
1-5	5	This segment of plot is completely overgrown with weeds
6-10	5	Light
11-15	5	Light
16-20	5	Light
21-25	5	No Weeds
26-30	5	No weeds

Comments: Growth of trees in the segment of this row treated with herbicides appears to be stunted as compared to the check trees' growth. Question: If growth is stunted through use of herbicides is it an advantage to use chemical weed control over good mechanical weeding?

Row 2. Honeysuckle

Tree No.	No. Alive	Weed Infestation
1-5	5	Heavy
6-10	5	Light
11-15	5	Light
16-20	5	No weeds
21-25	5	No weeds
26-30	5	Moderate

Comments: Growth appears to be stunted on the areas treated with herbicides.

Row 3. Scotch Pine

Tree No.	No. Alive	Weed Infestation
1-5	4	Heavy
6-10	5	Moderate
11-15	5	Light
16-20	5	No Weeds
21-25	4	No Weeds
26-30	3	Light

Comments: No difference in growth rates between untreated and treated areas.

Row 3. Russian Olive

Tree No.	No. Alive	Weed Infestation
1-5	3	Heavy
6-10	5	No Weeds
11-15	4	Light
16-20	3	Light
21-25	5	No Weeds
26-30	5	Heavy

Comments: Russian Olive seedlings treated with Princep appear to be stunted.

Row 4. Silver Maple

Tree No.	No. Alive	Weed Infestation
1-5	5	Heavy
6-10	5	Moderate
11-15	5	Light
16-20	4	Light
21-25	5	Light
26-30	5	Light

Comments: Seedlings planted in Oust treated segments appear to have stunted growth as compared to check plot and Simazine segment.

Row 4. Cottonwood

Tree No.	No. Alive	Weed Infestation
1-5	5	Heavy
6-10	4	Moderate
11-15	5	Light
16-20	4	Light
21-25	3	Light
26-30	4	Heavy

Comments: Best growth in check trees. In Rep 16-20 and 21-25 some seedlings appear to have sprout from roots. Question: has the herbicide applied over the top of seedlings top-killed cottonwood whips?

Row 5. Green Ash

Tree No.	No. Alive	Weed Infestation
1-5	5	Heavy
6-10	5	Moderate
11-15	4	Light
16-20	5	Light
21-25	5	Light
26-30	5	Moderate

Comments: Growth does not appear to have been affected by herbicide application except in Reps 21-25 and 26-30.

Row 5. Siberian Elm

Tree No.	No. Alive	Weed Infestation
1-5	5	Heavy
6-10	5	
11-15	5	
16-20	5	
21-25	5	
26-30	5	

Comments: Rep 6-10 last two trees alive. Reps 6-10; 11-15; 16-20; 21-25; stunted growth and rabbit damage. Rep 26-30 growth is better as compared to previous 4 reps. No rabbit damage in this rep.

Row 6. Ponderosa Pine

Tree No.	No. Alive	Weed Infestation
1-5	2	Heavy
6-10	5	Moderate
11-15	2	Light
16-20	4	Light
21-25	5	No weeds
26-30	3	Light

Comments: No visible detrimental affects on treated areas.

Row 6. Austrian Pine

Tree No.	No. Alive	Weed Infestation
1-5	4	Heavy
6-10	4	Moderate
11-15	4	No weeds
16-20	5	No weeds
21-25	4	No weeds
26-30	5	Moderate

Comments: Austrian Pine exhibited rabbit damage.

Row 7. Apricot

Tree No.	No. Alive	Weed Infestation
1-5	0	Heavy
6-10	0	Light
11-15	1	Light
16-20	1	Light
21-25	0	No weeds
26-30	0	Light

Comments: Possible herbicide damage; leaves sprouted then curled and turned brown. Some evidence of rabbit damage. This row was extremely wet following planting and herbicide application which may have influenced survival rates of seedlings.

Row 7. Harbin Pear

Tree No.	No. Alive	Weed Infestation
1-5	4	Heavy
6-10	3	Light
11-15	3	Light
16-20	3	Light
21-25	4	No weeds
26-30	4	Moderate

Comments: Possible herbicide damage. Leaves emerged then died back. This row was extremely wet following planting and herbicide application which may have influenced survival rates.

Row 8. Cotoneaster

Tree No.	No. Alive	Weed Infestation
1-5	1	Heavy
6-10	0	Light
11-15	1	Light
16-20	1	Light
21-25		No weeds
26-30		Light

Comments: Rabbit damage evident. Leaves sprouted then died. Area of water inundation and possible flooding impacts.

Row 8. Sand Cherry

Tree No.	No. Alive	Weed Infestation
1-5	6	Heavy
6-10	5	Light
11-15	5	Light
16-20	5	Light
21-25	5	No weeds
26-30	5	Light

Comments: Excellent survival; no signs of herbicide stress. This area also experienced water inundation but showed no signs of deterimental affects.

Row 9. American Plum

Tree No.	No. Alive	Weed Infestation
1-5	4	Heavy
6-11	3	Moderate
11-15	1	Light
16-20	1	Light
21-25	1	Light
26-30	3	Moderate

Comments: Reps treated with larger rates of Oust appear to have poorer survival. This area was also inundated with water.

Row 9. Lilac

Tree No.	No. Alive	Weed Infestation
1-5	0	Heavy
6-11	0	Light
11-15	0	Light
16-20	0	Light
21-25	3	Light
26-30	3	No Weeds

Comments: Rep 21-25 exhibits herbicide stress. Area was also inundated with water plus seedlings when planted had broken dormancy.

Discussion

As noted in the evaluation there appears to be many interesting relationships between herbicide type, rates applied, tree species involved and moisture content of soil. One major question brought to light was even though good to excellent weed control is realized by post plant application of herbicides, first year growth in some species appears to be stunted by these chemicals. Will this stunted growth have long term negative affects on a shelterbelt planting is a question that remains to be answered.

Like other test plots many more questions seem to arise than are answered. The unanswered questions warrant continuation of this study. By evaluating this tree planting for several growing seasons relationships between herbicide, soil moisture, and tree species may be better understood.

S.E. FARM REPORT

SWEET SORGHUM FOR ALCOHOL FUEL

M D. Brue

SOUTHEAST FARM 84-29

Objectives of Experiment

1. To determine the total biomass yield per acre of serveral varieties of sweet sorghum.
2. To determine the sugar content of the juice of these varieties.
3. To determine the potential yield of fermentation fuel ethanol from these varieties.

Methods and Procedures

The seedbed was fertilized with 160 lb of N, 60 lb of P205 and 40 lb K20: Ramrod was applied at the recommended rate. The sorghum was planted on June 28 (an earlier planting was drowned out) in 20" rows on soybean ground. The crop was cultivated once on July 23 and thinned to a population of approximately 30,000 plants per acre. Sugar content was measured with a Brix hydrometer just following the frost on September 15. The crop was chopped and weighed on October 1.

Comments

The yield of sweet sorghum is highly dependent on length of growing season. The replanting and early frost effectively shortened the growing season by two months. The shortness of the season is especially reflected in the low sugar content. These varieties would normally be expected to have a 15-18% sugar content with a full growing season. Thus the yields of ethanol listed in the table could reasonably be expected to increase substantially in a more "average" year. Also, a certain weight loss would have occurred due to drying during the period of time from frost until harvest; this would result in our measured yield being somewhat lower than the true value. Ordinarily the sorghum would be harvested before or immediately following frost.

It may be of interest to point out that others raising sweet sorghum for ethanol production have achieved considerably higher yields than we have here. In 1980 a group at Louisiana State University(1/) achieved a yield of 707 gallons per acre for the variety Wray which was planted April 21 and harvested September 2, a season which would be comparable to our planting May 15 and harvesting in late September. It may also be of interest to note that ethanol can be marketed for $1.75 per gallon for 200 proof and $1.35 per gallon for 190 proof (August 1984 prices at Mankato, Minnesota).

Results

The following table gives the weight yield of the total biomass harvested, the sugar content of the juice, and the estimated ethanol yield (200 proof) per acre. The ethanol yield estimate was computed by using a 70% juice extraction rate(2/) and a sugar to ethanol conversion factor of 50%(3/).

Variety	Total Biomass Yield (lb/acre)	Sugar Content of Juice (%)	Estimated Yield of Ethanol (gal/acre)
NK X8361	41818	6	133
NK X8363	41927	9	200
NK X8368F	50911	9	243

1/ R. Ricaud, A. Arceneaux, F. Martin, B. Cochran, G. Newton, "Sweet Sorghum for Sugar and Biomass Production in Louisiana", Reports of Projects, Department of Agronomy, Louisiana State University, 1980.

2/ The extraction rate will depend upon the press used. The author has achieved a 70% rate by repeatedly running the material through a small hand press.

3/ The theoretical conversion factor of glucose to ethanol is 51.1% (Keenan and Wood, General College Chemistry, Second edition, Harper & brothers, New York 1961).

S.E. FARM REPORT

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

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

ANIMAL AND RANGE SCIENCES 84-30

Summary

One hundred seventy-six Angus steers were randomly allotted to 16 pens and placed on trial in December 1983. The pens were allotted into one of four groups: 1) a ration mix on a dry basis of two parts corn to one part corn silage fed 186 days, 2) a ration mix on a dry basis of one part corn to two parts corn silage fed 186 days, 3) a ration of 100% corn silage fed for 59 days followed by a 90% corn ration for 127 days (a two parts corn to one part corn silage feeding scheme with corn and corn silage separated) and 4) a ration of 100% corn silage fed for 130 days followed by a 90% corn ration for 56 days (a one part corn to two parts corn silage feeding scheme with corn and corn silage separated). The experiment indicated that the rations with ratios of two parts corn to one part corn silage to be less efficient in feedlot performance, but provided higher average daily gains. Energetic efficiency was enhanced by the mixed feeding scheme at the one part corn to two parts corn silage level, but mixing was detrimental at the higher corn level. Corn silage also decreased dry matter intake. The more corn silage in a ration, the poorer the dry matter intake.

Introduction

Corn silage is a major constituent of cattle rations in South Dakota. It is an especially important component for drylot calves. Corn silage when fed in certain combinations with corn has produced animal performance poorer than expected with the energy available in those combinations. Money making opportunities in feeding cattle are slim and any decrease in efficiency can hurt profit making potential. It is important that we understand the best combinations for mixing corn silage and corn and avoid those rations that do not live up to their potential. The purpose of this study was to determine feedlot steer performance on two rations with different rations of corn and corn silage and two different feeding schemes for those rations.

Procedures

In November 1983, 176 Angus steers were purchased in South Dakota and trucked to the Southeast Experiment Farm, Beresford. These steers were preconditioned before purchase and upon arrival placed in lots and allowed a one month warm up period. The steers were randomly allotted in equal numbers to sixteen pens, weighed and placed on trial the last week in December. The pens were divided into four groups with a separate ration for each group. The four rations were: 1) a ration mix on a dry basis of two parts corn to one part corn silage fed 186 days, 2) a ration mix on a

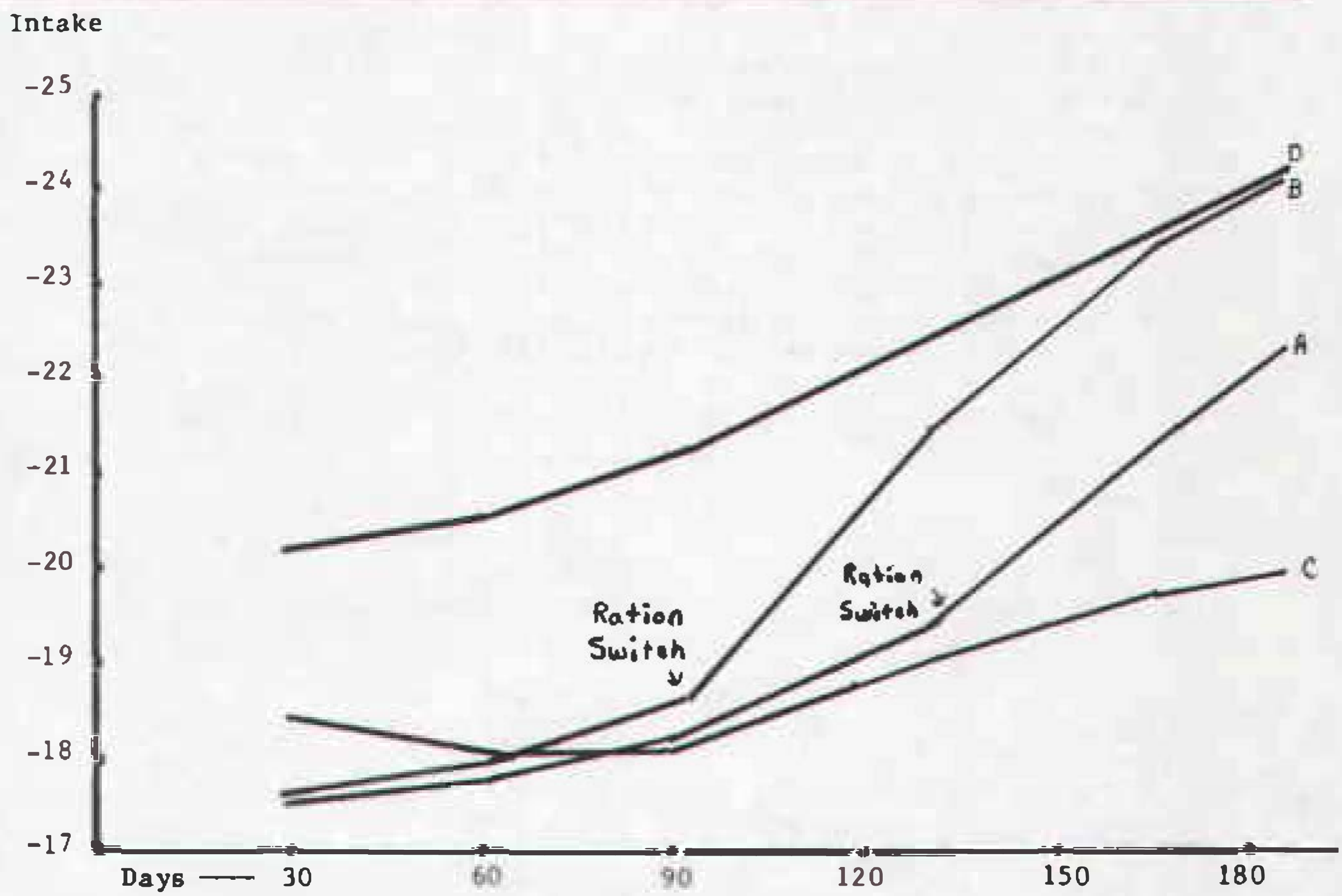
dry basis of one part corn to two parts corn silage fed 186 days, 3) a ration of 100% corn silage fed for 59 days followed by a 90% corn ration for 127 days (a two parts corn to one part corn silage feeding scheme with corn and corn silage separated) and 4) a ration of 100% corn silage fed for 130 days followed by a 90% corn ration for 56 days (a one part corn to two parts corn silage feeding scheme with corn and corn silage separated). This arrangement allows the comparisons of two different rations, and two different feeding schemes (mixed corn and corn silage versus starting on corn silage and finishing on corn). The steers were weighed once a month and feed intake measured each day for each pen. Feed was offered free choice and was regulated only to minimize feed waste. Feedstuffs were analyzed for proximate analysis, neutral detergent fiber and acid detergent fiber (Table 50). From this information feedlot performance data including costs of gain were calculated and analyzed.

Results and Discussion

The two mixed produced better average daily gains when compared to the two groups fed corn and corn silage separately (table 51). The biggest difference was between the two groups receiving two parts corn versus the two receiving one part corn (table 51). Either feeding scheme (mix versus silage then corn) with two parts corn clearly provided the best average daily gains. While average daily gain provides information as to the rate of growth it does little to examine the efficiency of that growth. In table 2 lbs of feed per lb of gain and energetic efficiency (a comparison of the actual net energy for gain consumed to the calculated net energy need to produce the observed gain) are presented. The two ratios were significant in their effects as well as the two feeding schemes for lbs of feed needed to produce a lb of gain. The groups fed one part corn took less feed to produce a lb of gain than the two parts corn groups and the groups fed the mixed diets more lbs gain per lb of feed than the groups fed corn and silage separately. The one part corn mixed with two parts corn silage was the group producing the most gain per lb of feed. The efficiency of which energy available was used presented a slightly different picture. The ratio of one part corn to two parts corn silage produced the most energetically efficient gains, but there was little difference between the mixed feeding and the separate feeding. The effect of mixing at the higher corn ratio appears deterimental, and mixing at lower corn ratios appears better.

Steer intakes were affected by both ratio and feeding scheme (table 51). The higher corn silage ratios (both feeding schemes) produced much lower intakes. At the high level of corn, intakes were not much different for either feeding scheme. At the low level of corn the group fed corn and corn silage separately were much higher in their intakes. Figure 10 shows the response on a cumulative dry matter intake over time basis. This figure shows a definite difference in intake between the low corn mix and the high corn mix throughout the entire trial, with low corn mix (high silage) with reduced intakes. The figure also points out the immediate increase in intake when the groups fed the major ingredients separately were switched to corn.

Figure 10. Cummulative daily dry matter intake (lbs) by angus steers fed four different rations[1]



[1] A = 1 part corn/2 parts corn silage, fed separately
B = 2 parts corn/1 part corn silage, fed separately
C = 1 part corn/2 parts corn silage, mixed
D = 2 parts corn/1 part corn silage, mixed

The feed cost of a lb of gain is listed in Table 51. The two ratios were different (one part corn cheaper) but the mix and the separate feeding schemes similar. A strong interaction between the feeding scheme and the ratios was evident. At the lower level of corn feeding separately or mixed provided little difference. A ratio of two parts corn to one part silage gave a strong price advantage to the mix feeding scheme for feed cost per lb of gain.

This experiment indicates some feed cost advantage to feeding corn at a ratio of one part corn to two parts corn silage in a separate feeding scheme, but this also produced the lowest average daily gains. Interest rates and feedlot overhead will probably negate this advantage. Daily dry matter intake by steers showed a clear pattern, increasing of high levels of silage decreases dry matter intake. When total feedlot costs and the effect intake can have on the rate of growth are considered, the biggest disadvantage of silage may be its effect on intake. The work described in this paper indicates that at the ratio of two parts corn to one part corn silage is not as efficient and does not perform at desired levels. Corn, when a high average dialy gain is desired, should be fed at higher levels. Continuing research should help to describe this level.

Table 50. Feed composition and analysis of rations fed to Angus Steers

	Rations[1]			
Item	Corn silage base	corn base	1 part corn 2 parts corn silage	1 part corn silage 2 parts corn
Corn , %	0	84.0	29	60
Corn Silage, %	93.6	10.5	63.2	32.9
Soybean meal, %	6.1	4.8	7.3	6.1
Mineral Supplement, %	.3	.7	.5	1.0
Net Energy for Maintenance, Mcal/lb	.75	.98	.83	.91
Net Energy for gain, Mcal/lb	.48	.67	.55	.61
Crude Protein	10.1	12.0	11.5	11.9
Calcium	.3	.3	.3	.3
Phosphorus	.3	.3	.3	.3
Cost, $/lb	.040	.065	.050	.059
Neutral Detergent Fiber, %	46	17	35	25
Acid detergent Fiber, %	23	4	16	9

[1]All Values are presented dry matter basis

Table 51. Feedlot performance and feed costs of Angus Steers fed four different corn/corn silage rations.

	Rations[1]			
	separate		mixed	
item	corn silage followed by corn	corn silage followed by corn	1 part corn, 2 parts corn silage	2 parts corn, 1 part corn silage
Days on corn silage	130	59	--	--
Days on corn	56	127	--	--
Days on feed	186	186	186	186
Beginning wt, lbs	664	641	629	643
End wt, lbs	995	1000	980	1006
Average daily gain, lbs	2.16	2.30	2.26	2.38
Daily dry matter intake, lbs	22.20	24.04	20.17	24.09
Lbs feed/lb gain	10.29	10.47	8.98	10.14
Energetic efficiency, %	73	65	77	58
Feed cost, $/lb,	.50	.59	.53	.51

[1] all values are presented on a dry matter basis

BARLEY IN SWINE FINISHING DIETS

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ANIMAL AND RANGE SCIENCES 84-31

Barley has long been used as a principle energy cource in diets for growing-finishing swine. The use of barley instead of corn results in poorer feed efficiency, due to the higher fiber content of barley. Barley contains more total protein than corn. However, reduction of soybean meal in the diet is limited because of the deficient lysine level in barley. The study reported herein was designed to evaluate diets balanced to be equal in lysine content and ranging in barley content from 0 to 100% of the grain.

Experimental Procedure

Eighty crossbred pigs were allotted to four replications of five treatments with four pigs/pen. Each pen consisted of two barrows and two gilts. The treatments consisted of diets ranging in proportions of corn and barley as the energy sources. The experimental treatments were as follows:

1. 100% corn
2. 75% corn, 25% barley
3. 50% corn, 50% barley
4. 25% corn, 75% barley
5. 100% barley

Composition of the experimental diets is shown in Table 52. It should be noted that proportion of grain and soybean meal changed as the mixture of corn and barley changed to balance the diet to be equal in lysine content.

Initital pig weight averaged approximately 143 lb. Allotment to replications was on the basis of pig weight. Initial weights of replication 1 through 4, respectively were approximately 155 lb., 145 lb., 140 lb. and 130 lb. The experiment was terminated on an individual pen basis when average weight in the pen was approximately 210 lb. Duration of the experiment for individual pens ranged from 34 to 45 days.

Pigs were housed in the environment-modified confinement building at the Southeast South Dakota Experiment Farm at Beresford, South Dakota. The trial was conducted during the months of June and July.

Results

A summary of pig performance is provided in Table 53. Average daily gain ranged from 1.65 to 1.84 lb/day. The highest gain was observed in pens where the pigs received equal proportions of corn and barley in their diet. The poorest gain was seen when pigs were fed diets containing

barley at 75% of the grain. These differences were a direct reflection of observed daily feed consumption. These differences among treatment groups were not significant. Feed/gain ranged from 3.23 to 3.43. Differences in these values were also not significant and are very acceptable for pigs during this stage of growth. However, it should be noted that the poorest feed conversion was observed in the diets in which barley made up 75% or 100% of the grain source.

In this experiment, substituting barley for corn up to 100% of the grain portion of the diet during the finishing period, resulted in acceptable performance which did not vary statistically from performance of pigs fed diets where corn was the sole grain source.

Summary

Eighty crossbred pigs averaging 143 lb. were allotted to diets balanced on a lysine basis and containing barley ranging from 0 to 100% of the grain portion of the diet. During the finishing period to 210 lb. no significant differences in average daily gain, average daily feed or feed/gain were observed.

Table 52. Composition of Experimental Diets (%)

Ingredient	Diets(a) 1	2	3	4	5
Ground yellow corn	85.90	65.45	44.28	22.50	----
Ground barley	----	21.80	44.28	67.50	91.50
Soybean Meal (44%)	12.00	10.80	9.40	8.00	6.60
Dicalcium phosphate	1.05	1.35	1.00	.95	.75
Limestone	.65	.20	.65	.65	.75
Salt, white	.30	.30	.30	.30	.30
Premix	.10	.10	.10	.10	.10

(a) Calculated to contain .555% lysine, .525% calcium and .515% phosphorus.

Table 53. Effect of Substitution of Barley for Corn on Performance of Finishing Pigs.

	Percentage of Grain in Diet				
Corn	100	75	50	25	0
Barley	0	25	50	75	100
Initial wt, lb.	142.8	143.0	142.8	143.0	142.9
Final wt, lb.	210.3	210.9	214.3	206.8	209.7
Avg daily gain, lb	1.75	1.74	1.84	1.65	1.72
Avg daily fee, lb	5.66	5.72	5.92	5.59	5.89
Feed/gain	3.26	3.29	3.23	3.39	3.43

S.E. FARM REPORT

PERFORMANCE OF FINISHING PIGS AS AFFECTED BY PRIOR PERFORMANCE AND ADDITION OF AN ANTIBIOTIC TO THE DIETS

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ANIMAL AND RANGE SCIENCES 84-32

Although pigs may be fairly uniform in weight when they are placed in growing-finishing facilities, uneven performance and thus a wide range in weight at market time is a common occurrence. Poor performing pigs during the growing period seem to continue to grow slower than their faster growing counterparts if they are left in the same pen during the finishing period. The study reported herein is designed to determine if sorting pigs by performance during the growing period will lead to better performance during the finishing period. The effect of addition of antibiotic to the finishing diet was also evaluated.

Experimental Procedure

Growth performance of 153 pigs was evaluated from approximately 50 lb to 115 lbs. From that group the slowest growing pigs (6%) and the fastest growing pigs (4.5%) were eliminated from the experiment. The remaining pigs were allotted to three outcome groups based upon slow, medium and fast growth. Within each performance outcome group the heaviest 14 pigs were allotted to two pens in replication 1, the second 14 pigs by weight were allotted to two pens in replication 2 and the lightest 14 pigs were allotted to two pens in replication 3. One of the two pens of pigs in each replicaton was then fed 50 gm/ton of aureomycin. All pigs were fed the same 15% protein corn-soybean meal diet. The only difference was the presence or absence of antibiotic. Gain, feed consumption and feed efficiency were then monitored from approximately 113 lb to 210 lb. The pigs were housed in the environment-modified confinement building at the Southeast South Dakota Experiment Farm at Beresford, South Dakota. The pens, which were 50% slats over a scraper system, provided adequate pen space for the seven pigs/pen. The study was conducted during the months of January through March.

Results

The results of the finishing trial are shown in Table 54. Average daily gain varied among treatment groups from 1.78 for the slow growing pigs receiving no antibiotics to 2.02 for pigs from the medium growth group receiving antibiotics. A significant interaction was observed for both average daily gain and average daily feed. Within the antibiotic fed groups, the medium and fast growing groups of pigs consumed significantly more feed and gained significantly faster than pigs from the slow growing group. Differences in feed efficiency also approached significance, however, these differences were not observed among groups of pigs which did not receive antibiotics.

Table 54. Summary of Performance of Pigs with Different Previous Growth Rates and the effect of Addition of Antibiotics to the Finishing Diet

Previous growth rate	Slow		Medium		Fast	
Antibiotic	-	+	-	+	-	+
No. of pigs	21	21	21	21	21	21
Initial wt. lb	104	104	113	112	121	121
Final wt., lb	208	208	211	211	211	210
Avg daily gain, lbb	1.78	1.79	1.88	2.02	1.94	1.91
Avg Daily feed, lbb	6.45	6.07	6.47	6.63	6.45	6.39
Feed/gain	3.62	3.39	3.44	3.31	3.32	3.35

Aureomycin, 50 gm/ton
Within the antibiotic fed groups, the medium and fast growing groups consumed more feed ($P<.05$) and gained faster ($P<.05$) than the slow growing group.

Table 55 summarizes performance of pigs based upon previous growth rate and averaged across antibiotic treatments. The previously slow growing pigs gained significantly slower (1.78 lb/day). Feed consumption figures followed the same pattern, but the differences only approached significance.

Table 55. Summary of Performance of Pigs with Different Previous Growth Rates.

Previous Growth Rates	Slow	Medium	Fast
No. of pigs	42	42	42
Initial wt., lb	104	113	121
Final wt., lb	208	211	211
Avg daily gain, lb (a)	1.78	1.95	1.93
Avg daily feed, lb	6.26	6.55	6.42
Feed/gain	3.51	3.37	3.33

(a) Previously slow growing pigs continued to grow slower than the medium or fast growing pig group ($P<.05$).

Performance of pigs based upon antibiotic supplementation is shown in Table 56. Average daily gain, feed consumption and feed/gain were similar between pigs fed diets during the finishing period with or without aureomycin included at 50 gm/ton.

Table 56. Summary of Performance (113-210 lbs) of Pigs With or Without Antibiotic Included in the Finishing Diet.

	Finishing Diet	
	Without Antibiotic	With Antibiotic
No. of pigs	63	63
Initial wt., lb	113	113
Final wt, lb	210	210
Avg daily gain, lb	1.87	1.91
Avg daily feed, lb	6.46	6.36
Feed/gain	3.46	3.35

The results of this experiment indicate that pigs which were gaining slowly during the growing period (up to 115 lb) will not gain as well as previously fast growing pigs, even when sorted into uniform groups. It should be pointed out that rate of gain even of the slow growing pigs was close to that normally expected of pigs during the finishing period. Failure to receive a response to antibiotic is not surprising given the level of performance of all pigs.

Summary

One hundred twenty-six pigs were allotted to three outcome groups based upon growth rate during the growing period (slow, medium and fast growth). During the finishing period, they received a 15% protein diet with or without 50 gm/ton aureomycin. Pigs which had previously grown slowly continued to grow at a slower rate than those which had gained at a medium or fast rate. No differences in performance were seen due to presence of an antibiotic except that within the antibiotic fed groups, medium and fast growing pig groups consumed more feed and gained faster than pigs from the slow gaining group. These differences were not observed among groups of pigs not receiving a antibiotic.