25th Annual . . .

SOUTHEAST SOUTH DAKOTA EXPERIMENT FARM

PROGRESS REPORT 1985

Agricultural Experiment Station
South Dakota State University
Brookings

REMARKS FROM THE DIRECTOR

This has been an important year for the Southeast South Dakota Experiment Farm. Twenty-five years ago, the plans and dreams of scores of people who saw the need for this farm were begun. At the last annual meeting, we recognized Dr. Fred Shubeck and his wife Carol for their countless efforts in making sure the wishes of the founders were to become reality. At the same meeting, we recognized those on hand who were part of that founding group and asked very candidly if their expectations had been achieved. You heard them reply, "More than we ever expected." At that meeting we also recognized Burt Lawrenson for his dedicated efforts during those 25 years, and welcomed the candidates who were vying for the Manager's position following Dr. Shubeck's retirement.

Dale Sorenson, one of our own from SDSU and Soutbeast South Dakota, was selected aa the new Manager, and under his direction, we expect the Southeast Experiment Farm to continue a great tradition that has been establshed -- that of seeking the truth and providing timely information for farmers in Southeast South Dakota. My sincere congratulations to all of you for making this such a successful institution.

-- R. A. Moore, Director
Agricultural Experiment Station

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

OLIVER WENDELL HOLMES

This twenty-fifth 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

Richard Battaglia, Dean

R. A. Moore, Director

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Visitation and Field Tours

Visitors are welcome any time of the year at the SESD Experiment Farm, located six miles west and three miles south of Beresford, South Dakota. There is always someone present each weekday between 8 am and 5 pm that would be glad to show you around the research facilities and through the field plot areas. A call to the office (563-2989 or 563-2941) would be appreciated and would assure you that someone would be present to show you around.

Some of the plot areas may appear as if we do not know how to farm. Some of these areas are allowed to look like this for a specific reason. We may be examining a new procedure for doing something, or testing a new herbicide that did not do the job that another did. We need to know if it works before it is recommended to the farmer. This is a research farm and it is where the mistakes should be made to help us better serve the farmer.

A good time to visit the research farm is on scheduled tours in early and late summer. At this time researchers and extension specialists from SDSU are present to discuss current research that is being conducted at the farm. It is also a time when you are able to talk face to face with personnel from campus and discuss general topics or specific problems in your farm operation. We have tentatively scheduled two such tours for 1986. The twilight crop tour is tentatively scheduled for July 2, 1986. The fall field day is tentatively scheduled for September 9, 1986. The research to be covered and exact schedules will be announced at a later date.

Two such tours were held in 1985. The twilight tour was held on July 12. Research viewed that evening consisted of herbicide demonstration areas, small grain varieties, and current soils research being conducted at the farm. The fall field day was held on an extremely wet, September 13. Due to the wet conditions, the tour was held inside the machine shed. Various researchers from SDSU and the farm discussed ongoing research through slides and overhead projections. A pork sandwich lunch was served by the SE Farm Corporation, and things turned out fairly well despite the weather conditions.

The research conducted each year and included in this progress report consists of many hours of work by staff from several departments at SDSU and at the SE Experiment Farm. Their efforts in contributing to this publication each year is greatly appreciated.

As was mentioned earlier, the purpose of the research conducted at the farm is to supply information that will be of value to farmers and agribusinessmen in South Dakota. Anyone wishing to comment or make suggestions for improving research that is conducted or how these results are reported would be appreciated. Address correspondence to:

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Introduction . . . . Dale R. Sorensen
Burton E. Lawrensen

1985 was a year that started out with ideal weather conditions compared to the last three springs here in southeastern South Dakota. Temperatures in 1985 ran above normal in the early part of the growing season through July, and ran below normal from August through harvest.

Because of the cooler than normal weather in late summer and fall, and frost in September, we again saw the importance of maturity ranges of the varieties and hybrids planted in this area. Because of the cool conditions, grain moistures remained high, throughout the fall, delaying harvest this season. Even though these conditions persisted, the fall work at the farm progressed rapidly, and all the fall tillage, stalk chopping, etc., was completed prior to the first snow in November.

New signs were added on Highway 46 north of the research farm which will hopefully make it easier for people to find the farm. Another new sign was added on the Wakonda road two miles south of the research farm, and a new sign was also placed at the entrance to the farm. The Green Thumb project workers did numerous tasks around the farm, including the building of a heated chemical storage room.

Because this is the 25th year of research here at the farm, I would like to turn the pen over to Burt to highlight some of the past 25 years.

This year, 1985, marks the 25th Anniversary that the Southeast Experiment Farm has been in existence. I think it is safe to say that it started with a very modest beginning. There was a minimum of personnel, machinery, storage and office facilities available. Before the experiment farm came into being, an interested group sponsored the idea that an experiment farm should be located in the southeastern South Dakota area to deal with basic agricultural problems. Groups of farmers and interested agri-business people canvassed the surrounding area in an attempt to sell enough shares, at $25 each, to purchase a suitable site for pertinent research. When enough shares were sold, the present location; 6 miles west, and 3 miles south of Beresford, SD was purchased in 1960.

The need for an experiment farm at the time was due to the lack of experimental work in the locality around 1960. Experimental work in this area was needed to develop practices more suitable for the area, variety adaptation, and to answer questions that were characteristic to this area. The purpose was to set-up research work in soil fertility, crop production and improvement, soils and drainage, disease resistance, livestock feeds and roughages, etc., and for providing information to farmers.

The first research at the Southeast Experiment Farm began with six experimental studies in 1961, and has been expanded to thirty-two in 1985. Over the years, there have been many visitors at the summer and fall tours. SDSU personnel have attempted to conduct research that is current with the times.

In my observation over the years, the Southeast Experiment Farm has "caught on". Many farmers in the area come to the farm to seek answers to their problems, especially when there is a crisis of some sort.

Table 1. Temperatures at the Southeast Experiment Farm - 1985

Month	1985 Ave. Temperatures (F)[1] Maximum	1985 Ave. Temperatures (F)[1] Minimum	33-year Average Maximum	33-year Average Minimum	Departure From 33 year Average Maximum	Departure From 33 year Average Minimum
January	23.1	3.6	25.2	3.9	-2.1	-.3
February	29.7	8.9	32.0	10.8	-2.3	-1.9
March	50.5	28.8	43.2	22.3	+7.3	+6.5
April	65.1	40.9	60.9	35.6	+4.2	+5.3
May	75.7	51.2	73.0	47.2	+2.7	+4.0
June	78.5	54.4	82.2	57.0	-3.7	-2.6
July	84.7	57.9	87.4	62.0	-2.7	-4.1
August	78.4	52.9	85.3	54.3	-6.9	-1.4
September	69.2	48.5	75.6	48.9	-6.4	-0.4
October	60.6	33.1	64.7	39.7	-4.1	-6.6
November	31.2	13.2	40.1	24.0	-8.9	-10.8
December	21.2	-3.4	30.5	10.2	-9.3	-13.6

1 Computed from daily observations

Table 2. Precipitation at the Southeast Experiment Farm, 1985

Month	Precipitation 1985 (inches)	33 Year Average (inches)	Departure from 33 year Ave. (inches)
January	.26	.48	- .22
February	T	1.03	-1.03
March	1.85	1.45	+ .40
April	4.93	2.46	+2.47
May	5.53	3.45	+2.08
June	4.42	4.25	+ .17
July	.54	3.14	-2.60
August	5.05	2.96	+2.09
September	3.22	2.52	+ .70
October	.85	1.71	- .86
November	.82	1.08	- .26
December	.58	.72	- .14
Totals	28.05	25.25	+2.80

DATE OF PLANTING CORN

B. Lawrensen, D. Sorensen, D. DuBois

SOUTHEAST FARM 85-1

S.E. FARM REPORT

Introduction

Spring weather in southeastern South Dakota, for the most part, does not warrant early planting of corn. The weather in April of 1985 was unusual, in that the temperatures were 4.2°F above the 32 year average and soil temperatures were also above normal and adequate for seed germination. To obtain the full yield potential of a hybrid what factors need to be considered? We know that fertility levels, insect control, population, moisture, hybrid selection, etc., are all important variables. One variable that has not been looked at closely is what affect will mid to late April planting have on corn yields in southeastern South Dakota? Especially on later maturing hybrids that quite often have a tough time maturing before the first frost.

Methods: A full season hybrid (116 day relative maturity) Pioneer 3377 was selected because of its yield potential as seen in crop performance yield trials here at the farm. The date of planting sequence began on April 16 with a seeding rate of 26,000 seeds per acre with one week intervals between plantings. Starter fertilizer was applied on each planting date amounting to 8 lbs of N, 32 lbs of P2O5 and 16 lbs of K2O. Herbicide was banded in the row and no insecticide was used due to the previous years crop having been soybeans. Nitrogen was sidedressed to all plots at a rate of 100 lbs actual N/acre.

Results and Discussion: The weather conditions in April and May led to quite a difference in yields in 1985. The weather gave crops a head start that was quite obvious through the season and into harvest. Table 1 reports date of planting yields for 1985.

Table 1. Effect of planting date on yield and moisture content of a late maturing corn, SE Farm, 1985

Planting Date	Harvest Date	Yield, bu/A @ 15% Moisture	% Moisture at Harvest
April 16	10/2/85	197.7	31.3
April 29	10/15/85	190.9	26.1
May 7	10/25/85	163.0	20.2
May 14	10/25/85	140.9	23.4
May 23	10/25/85	131.2	25.2

The effect of the ideal weather in April is very obvious in this experiment. For the type of growing season in 1985, planting a late maturing variety after the beginning of May was not practical. The difference in moisture at harvest was due to harvest date when comparing the first two planting dates in April, to the other three dates in May. The hybrid planted was beginning to go down this year and the wet conditions in September may have contributed to this. Because the earlier planting dates were going down harvest had to be started earlier than desired. If the standability had been better, the harvest dates of the first two planting dates may have been held off until the same time as the other three planting dates were harvested, very likely resulting in a moisture content at harvest being equivalent to the May 7 planting date.

Again, be reminded that this is just one year's data and could be completely different in other years. Several years data is required to base conclusions because results from several years could result in different conclusions from any one year.

S.E. FARM REPORT

PLANT POPULATIONS FOR CORN

D. Sorensen, B. Lawrensen, and D. DuBois

SOUTHEAST FARM 85-2

Introduction

Corn growers, through the years, have been in a quandary over the weather, which hybrids to plant, maturities, yield potential, plant populations, stress, etc. Rainfall has been so very erratic throughout the years. Take the years 1974-76: rainfall in 1974 was 15.24 inches - 9.86 inches below normal; rainfall in 1975 was 25.74 inches - 0.60 inches above normal; rainfall in 1976 was 12.82 inches - 11.82 inches below normal.

When we see the variability in rainfall over the years, it is no wonder that corn growers are at such an impasse each and every year. He knows he cannot outguess the weather so he must use other means to compensate for these abnormalities. If he could select a hybrid that could be planted at lower plant populations and still realize the full potential from that hybrid--his worries are over. As this last point is not the case, the grower must find hybrids that fit his planting strategies. Varieties were selected that were early to full season and plant populations ranging from ten (10) thousand to twenty four (24) thousand plants, inclusive.

Methods: The experimental plot area was fertilized with 160 lbs N, 60 lbs P_2O_5, and 40 lbs K_2O and incorporated. Varieties selected were Pioneer 3906, 3901, 3709 and Currys 1466 and 1490 (earliest to the latest maturity). All varieties and plant populations were planted May 10. Lasso II was banded in the row at planting and Bladex 4L sprayed pre-emergence for weed control. The early varieties were combined October 2, and the late varieties October 25, 1985.

Results and Discussion: In 1985 one additional plant population of 24,000, was included in the research across all varieties. This additional population is to try and determine at what population level do we exceed the optimum level and begin to decrease yields due to the extra plants. In past years we have not been able to see a significant decrease in yield due to high populations because we do not believe that these populations have been high enough.

Corn yields for 1985, due to different plant population levels, are reported in Table 1. As can be seen from this table, yield levels were quite high in 1985. The most interesting thing to take note of from Table 1 is that the real jump in yield does not really occur until population levels go above 18,000 plants per acre. Differences are not as dramatic below this level other than the 24 bu/acre response between 10 and 12 thousand plants/acre for the P-3906 hybrid.

Table 1. Effect of Plant Populations and Hybrids on Corn Grain Yield, SE Farm 1985

Hybrid	Relative Maturity	Population in Thousands							
		10	12	14	16	18	20	22	24
	(days)	bu/A							
PIO 3906	91	82	106	122	129	132	146	158	156
PIO 3901	93	127	123	127	122	134	150	153	153
PIO 3709	105	110	110	122	126	122	145	153	146
CURRY-1466	110	122	127	124	134	143	154	166	164
CURRY-1490	115	114	120	126	127	130	164	148	152
	Averages	111	117	124	128	132	151	156	154

Table 2. Effect of Plant Populations and Relative Maturity on Corn Grain Moisture, SE Farm 1985

Harvest Date	Hybrid	Relative Maturity	Population in Thousands							
			10	12	14	16	18	20	22	24
		(days)	% Moisture							
Oct 2	P-3906	91	22.5	25.8	25.1	24.7	26.3	22.3	22.4	24.9
Oct 2	P-3901	93	25.4	28.1	27.7	28.6	28.7	23.3	25.5	25.3
Oct 2	P-3709	105	28.1	29.8	31.3	33.1	33.7	29.3	29.1	30.6
Oct 25	C-1466	110	32.3	32.1	32.0	32.3	32.4	30.5	30.0	34.0
Oct 25	C-1490	115	33.6	34.9	35.2	35.3	35.6	33.6	37.8	31.0

Figure 1 represents the data relating yield to plant populations for 1985. As we can see, the real jump in yields did not occur until greater than 18,000 plants/acre were harvested. The increase of 2,000 plants/acre from 18 to 20 thousand averaged across all the hybrids resulted in a 19 bu/acre increase in yield due to the extra plants. Also, you will note that at 22 and 24 thousand plants/acre yields begin to level off. It may be possible that we are reaching that maximum yield level for number of plants, but we are not sure. In future years, we are going to include higher upper end plant population levels to see at what population we might significantly decrease yields.

There is one more very important factor that needs to be looked at in this study. Table 2 gives the grain moisture levels at harvest for all the hybrids at the different plant populations. An important point to note in Table 2 is the difference in harvest date and moisture content at harvest. The early maturing varieties were several points drier and harvested three weeks prior to the two later maturing hybrids. With the fall weather in 1985, this could make quite a difference to many farmers.

Let's put some of this data together and make some comparisons. An ideal comparison here would be taking the 16,000 plants/acre at harvest and comparing it to 20,000 plants/acre at harvest. This would be the equivalent of planting 17,600 seeds/acre at planting versus 22,000 seeds/acre at planting assuming a 10% loss due to germination, cultivator loss, insect damage, etc. Lets continue this economic analysis in Table 3.

FIGURE 1.

YIELDS FOR PLANT POPULATIONS,

SE FARM 1985

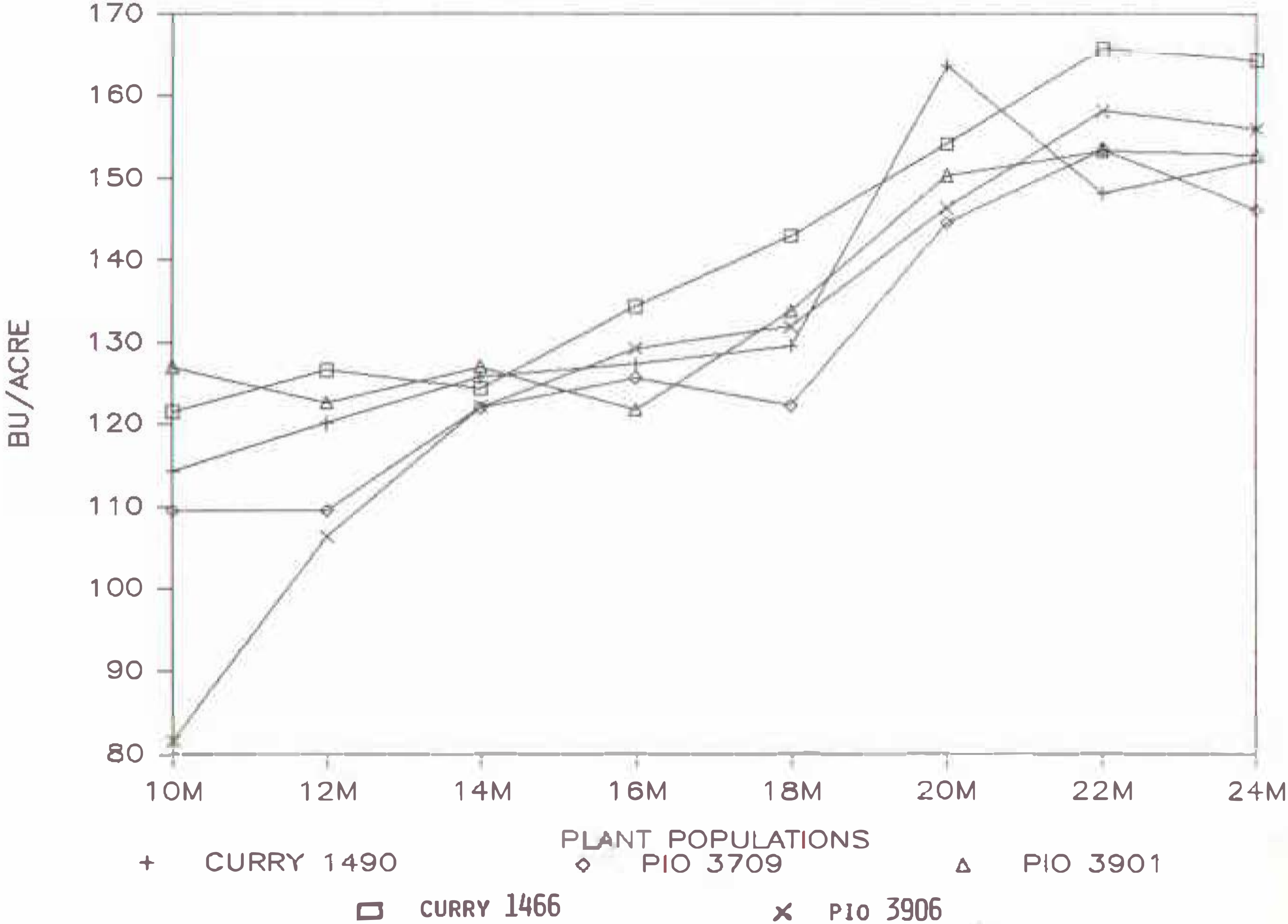


Table 3. Comparison of Gross Returns Between Two Corn Plant Population Seeding Rates, SE Farm, 1985.

Hybrid	Relative Maturity (days)	Plant Population at Harvest 16,000 Gross return/ acre after drying & seed costs	20,000 Gross return/ acre after drying & seed costs	Additional return/ acre due to higher population for 85
P-3906	91	$188.61	$228.28	$39.67
P-3901	93	154.08	228.34	$74.26
P-3709	105	129.82	177.17	$47.35
C-1466	110	145.06	179.76	$34.70
C-1490	115	115.46	165.04	$49.58

1/ Seed Cost/Acre: Average $65/80,000 seeds.
Cost for 17,600 seeds/acre = $14.30/acre
Cost for 22,000 seeds/Acre = $17.88/acre
2/ Cost of drying = $0.04/%/bu
3/ Price of corn = $2.00/bu.

There are several numbers that were estimated to come up with these values, but you would be able to put your own values in and using the yield and moisture values of Tables 1 and 2, you could calculate any combination of final two populations you would like to compare. One of the main things to look at is the seed costs. There is only a $3.58/acre difference in seed costs between the two populations used for comparison in Table 3. This table also points out the importance of examining the economics of planting early or late maturing varieties. In 1985, the relative maturity had quite an effect on dry-down and harvest date. It is possible that these earlier maturing varieties need a little higher population than the later maturing hybrids to reach the higher yield goals.

This study has been conducted for several years in the past, and some changes have been made this year. There will be several minor changes next year and then will be kept the same for several years thereafter. Remember that this is one year's data, and reflects this year. Several years of data are needed in order to make firm conclusions.

SILAGE REMOVAL AND SOIL DEPLETION

D. Sorensen, B. Lawrensen, D. DuBois
G. Williamson and B. Jurgensen

SOUTHEAST FARM 85-3

Introduction

If a farmer used the majority of his corn acres for livestock roughage, what would happen to organic matter and soil nutrients? This may be of major concern if it is on a continuous basis and no crop rotation is followed or crop residues left in the field. Could silage and grain yields be maintained by adding commercial fertilizer or manure from the livestock operation?

Methods: The total plot area was fall plowed, and as spring field conditions permitted, commercial fertilizer was broadcast (100+40+40) or 6.25 ton of manure was applied to specified plots. These applications were incorporated immediately to specified plots. Due to wet field conditions and emergence problems, the plots were all replanted June 7 to Pioneer 3732 with 22,400 plants per acre. Lasso 4EC and Counter 15G were used for weed and insect control. All plots were combined October 29, 1985 for yields.

Results and Discussion: The soil that this particular study is located on, is imperfectly drained and causes many problems in the spring. Due to the poor soil condition in this area the study was replanted in June, due to poor emergence of the first planting. This later replanting caused yields to be much lower than other experiments on the farm. Grain yields for 1985 are reported in Table 1.

Manure samples were analyzed and the amount spread was calculated to equal the nitrogen rate of commercial fertilizer. The P2O5 was slightly below that of the commercial fertilizer and the K2O was quite high in this manure compared to the commercial fertilizer rate. As can be seen from Table 1, the grain yields show a nice response to added nutrients, whether it be in a commercial fertilizer, or in an organic form of fertilizer. But, there is relatively no difference between the commercial fertilizer and the manure applications for nutrients.

Table 1. Comparison of commercial fertilizer and livestock manure on grain yield, SE Farm, 1985.

Crop Removal	Fertilizer Treatment N + P205 + K20	Grain, Bu/A
Grain only	0 + 0 + 0	56.4
Grain Only	6.25 Tons Manure/Acre 1/	77.5
Grain Only	0 + 0 + 0	47.9
Grain Only	100 + 40 + 40	77.4
Grain + Stover	0 + 0 + 0	50.5
Grain + Stover	6.25 Tons Manure/Acre	69.0
Grain + Stover	0 + 0 + 0	45.4
Grain + Stover	100 + 40 + 40	77.5

1/ 6.25 Tons Manure/Acre is equivalent to 100 lbs N, 37.5 lbs. P205 and 76.9 lbs K20/Acre according to analysis from Station Biochemistry, SDSU.

Silage yields are not reported for 1985 due to the late planting and the early frost which occurred before yields could be taken. After the grain was removed from the silage plots, stover was removed from the silage plots with a flail chopper.

This study was first established in 1975. Soil samples were taken in 1976, and again in 1985. Results from these samples are reported in Table 2. The results reported here are the values of only one replication, but, they indicate some trends that are taking place in this study.

The first two groups of samples are unfertilized check plots. Where grain and stover have been removed for several years, organic matter levels have decreased further than where only grain has been removed and the stalks left in the field. Phosphorus remained about the same over the years. Potassium levels decreased where the grain and stover were removed, but the potassium level remained constant where the crop residues have been returned each year.

Where fertilizer and manure have been used there has also been a drop in organic matter levels over ten years. This trend is appearing in several areas of the farm where continuous corn has been grown. Phosphorus soil test levels in fertilized and manured plots have increased over the duration of the experiment, whereas potassium levels have increased on the manure plots while dropping in the commercial fertilizer plots. This would be expected due to the higher levels of potassium being added in the manure, when manure has been applied at rates to equal the nitrogen applied as commercial fertilizer.

Table 2. A comparison of soil test results[1/] after ten years of grain removal versus grain and stover removal, SE Farm, 1985.

Crop Removal	Fertilizer Treat.	Year Sample Taken	Organic Matter	P lbs/A	K lbs/A	pH	Salts mmho/cm
Grain+Stover	None	1976	3.1	15	570	6.4	0.45
		1985	2.0	13	460	6.8	0.70
Grain Only	None	1976	3.0	14	600	6.7	0.70
		1985	2.4	15	610	6.5	0.40
Grain+Stover	Fertilizer	1976	3.2	15	640	6.3	0.50
		1985	2.4	34	540	6.3	0.60
Grain Only	Fertilizer	1976	3.3	26	690	6.3	0.45
		1985	2.4	38	550	6.2	0.30
Grain+Stover	Manure	1976	3.1	22	720	6.4	0.50
		1985	2.6	45	760	6.6	0.50
Grain Only	Manure	1976	3.3	21	700	6.4	0.50
		1985	2.4	48	760	6.5	0.50

1/ Results reported are for one replication and for the 0-6" soil depth.

DATE OF PLANTING EARLY, MEDIUM AND LATE MATURING CORN HYBRIDS

D. Sorensen, B. Lawrensen, and D. DuBois

SOUTHEAS' FARM 85-4

S.E. FARM REPORT

Introduction

There always seems to be a question among farmers when it comes to what maturity corn should be planted. If the long range weather could be forecast exactly, then hybrid selection and the date of planting would be simple; and the full potential of a hybrid could be realized. As we know the weather is so unpredictable year in and year out, and it becomes quite a management decision as to what hybrid should be selected. This study will hopefully answer some questions on maturity and planting dates.

Methods: A selection of corn hybrids and maturities - early, medium, and late was made; namely Pioneer 3901, Pioneer 3709, and Currys 1466. Four planting dates were set-up to test each of the hybrids as to yield potential, maturity, etc. The planting dates were May 7, May 17, May 27, and June 5 as the weather warranted. Emergence was good on all planting dates with an average plant population of 21,800 plants per acre. Lasso II was banded for weed control. All plots were combined October 8, 1985.

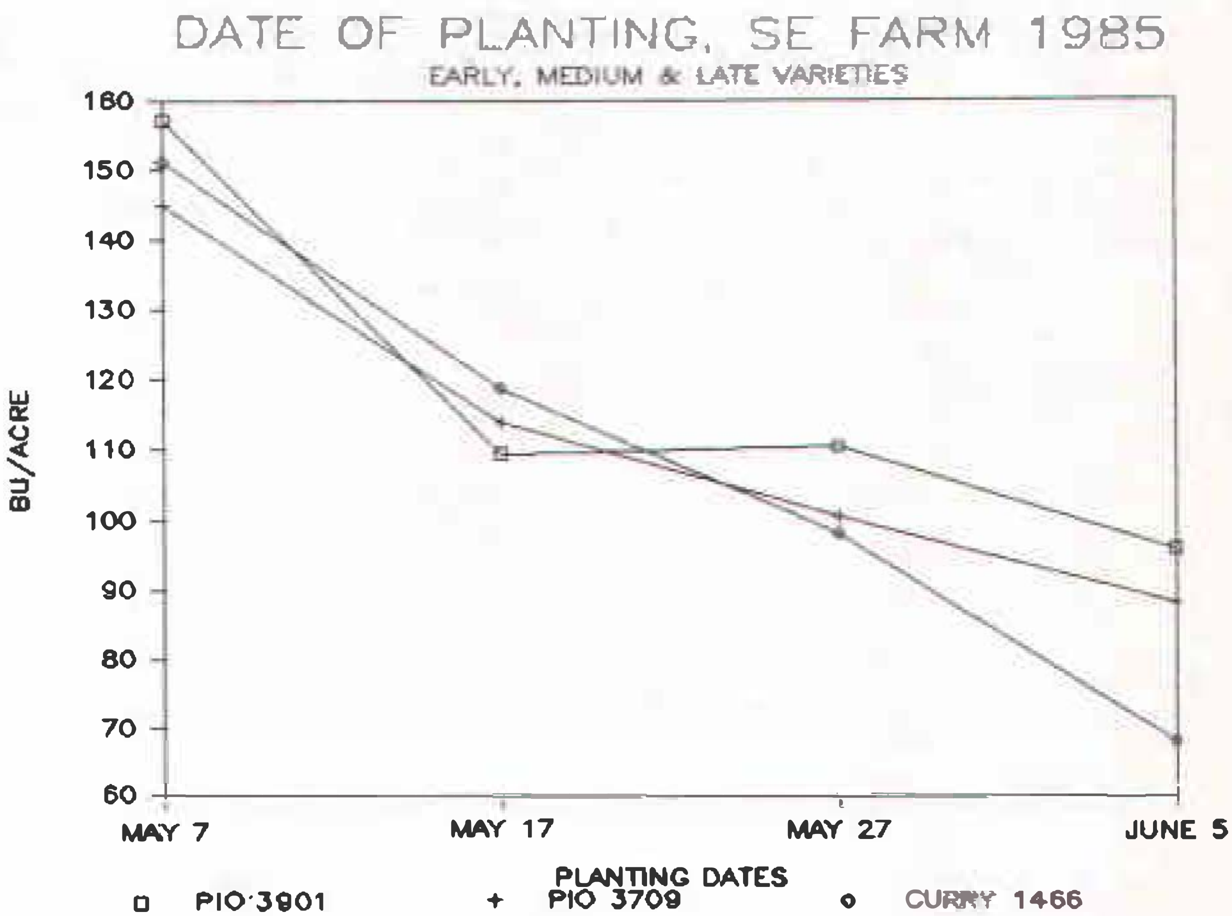
Table 1. Effect of Planting Date and Hybrids on Yield of Corn

Hybrid	Relative Maturity	Planting Dates May 7	May 17	May 27	June 8
PIO 3901	93 day	157.1	109.4	110.3	95.4
PIO 3709	104 day	145.0	113.8	100.2	87.6
Currys 1466	110 day	151.0	118.8	97.9	67.6
Averages		151.0	114.0	102.8	83.5

Results and Discussion: This year it was advantageous to have planted corn as early as possible (Table 1). The earliest planting date, May 7, was clearly the best time to have planted all varieties. The difference of 37 bu/A between May 7 and May 17 planting dates, averaged across varieties, shows the response to planting date. It appeared that corn planted May 7 took advantage of the ideal weather in May, and the cooler air temperatures in June through August. There was a period of 42 days with no appreciable moisture, but these cooler air temperatures were beneficial during the dry period.

Corn yields are graphed in Figure 1. This again points out more clearly how corn yields declined drastically from the May 7 to May 17 planting dates. It appears that the 10 day interval had a considerable effect on corn growth in 1985. Yields leveled off between the next two planting dates, May 17 and May 27, and were down quite a bit from May 27 to June 5. In a year like 1985 planting corn after May 27 was unwise, especially hybrids in excess of 100 day maturity. This would be the case in most years.

Figure 1. Date of Planting, SE Farm 1985



LATE PLANTING OF SOYBEANS

B. Lawrensen and D. Sorensen

SOUTHEAST FARM 85-5

S.E. FARM REPORT

Introduction

When soybean planting moves along smoothly in the spring with no planting delays, farmers do not have too much to worry about at this point and time. Most years' weather is very unpredictable. These conditions prevailed in July 1978 (severe hailstorm) and April-June 1983 and 1984 with above normal rainfall. When soybeans were planted on July 11, 1978—very respectable yields were obtained; from 24 bu/A (Swift) to 31 bu/A (Corsoy).

The Vermillion and James river bottomland flooded two times each year and the upland was also so wet that there was no planting of any crops as late as July 1. At this late date, many farmers were in a dilemma, as to what they should do, what to plant, what variety, etc. Soybeans planted July 11, 1978 had shown that there was some potential for planting soybeans at this late date. This previous data from the years 1978, 1983 and 1984 prompted the "Late Planted Bean" study. Yields varied, but did show that beans could be a good cash crop planted at this late date (July 11).

Methods: Soybean varieties were selected that were in Group 0 and Group I maturities; i.e., Hardin (Group I) 3 days earlier than Corsoy 79, Evans (Group 0) 14 days earlier than Corsoy 79 and McCall (Group 0) 24 days earlier than Corsoy 79. Selections of the above varieties spaced the maturities far enough apart to test their yield potential. Row spacings of 30" and 7" were used with final plant populations of 167,000 and 250,000+ respectively. The seven inch (7") row spacing was added in 1984 to compensate for the lesser vegetative growth when soybeans are planted later than normal. Maintaining uniformity in varieties, row spacings and planting date each year will give us some answers as to "just how late soybeans can be planted and be profitable."

All varieties and row spacings were combined October 28, 1985.

Table 1. Yields of Late Planted Beans

Variety	Maturity Group	Maturity Compared to Corsoy	Bus/A 30"	Bus/A 7"
McCall	Group 0	24 days earlier than Corsoy	15.4	15.9
Evans	Group 0	14 days earlier than Corsoy	16.7	18.1
Hardin	Group I	3 days earlier than Corsoy	10.2	8.2

Results and Discussions: This year all varieties and row spacings were planted on the normal late planting date, July 11. Spring planting conditions were good, but temperatures averaged much below normal in July and October and somewhat below in August and September. Summer moisture was short in July (-2.68), and August was above normal (+2.16) for the 32 year average. Yields were very similar between the individual varieties and row spacings this year, except for Hardin. Vegetative growth was similar in each row spacing. It is normally assumed that growing degree days or heat units are more important for corn yields and maturity. This year late planted soybean yields were less than expected. Dry conditions at planting and below normal temperatures appeared to be responsible, in 1985, for these lower yields.

SOYBEAN VARIETY AND ROW SPACING

D. Sorensen, B. Lawrensen and D. DuBois

SOUTHEAST FARM 85-6

Introduction

Over the years soybeans have been called the "wonder crop" and surely they have bailed out many farmers with a cash flow problem. There has been much interest in soybean varieties and row spacings for maximizing yields.

This prompted an experimental study at the SE Farm with varieties and varied row spacings. To test each variable for the full potential of each, selections were made for each grouping. Four row spacings were selected: 30", 20", 7" and skip row. Soybean varieties were chosen to test the plant growth response to the different row spacings. This will be an ongoing study and an attempt will be made to resolve some of the unanswered questions and statements posed.

Methods: Soybean varieties selected for testing were: Corsoy 79, a branching type; Wells II, a thin line; and SOI 226, also a branching type. Row spacings - 30", 20", 7" and skip row along with the selected soybean varieties were randomized and replicated in the experimental plots.

The total plot area was sprayed with Treflan at the rate of 1.5 pts/A and was incorporated immediately. All row spacings and varieties were planted on May 28. Some emergence problems were noted in all the row spacings, probably due to intense rains after planting. Soybean stands were adequate in the narrower row spacings (7" and skip-row) and acceptable in the 30" and 20" rows. All plots were combined October 24, 1985.

Results and Discussion: All row spacings and varieties were planted May 28. The total plot area received heavy rains May 29 and 31. Emergence was checked daily after the first cotyledons appeared. A decision to rotary hoe the 20" and 30" row spacings to help emergence was made. The drill seeded, 7" rows and skip-row had better emergence because of a closer proximity of seeds resulting in the ability to crack or break the crusted soil.

When one compares the more conventional row spacings, the narrowing of the rows, from 30" to 20", increased yields. In the discussion previously, emergence was a problem. Some varieties have the ability to emerge much more easily than others, and can compensate for a lesser stand by more branching.

In Table 1, Corsoy 79 has the unique capability to use this characteristic (branching) to yield more under many different conditions. This year rainfall in August, 5.05 inches, is what a soybean grower "dreams of." He knows this amount of rain will be quite beneficial to the crop.

Table 1. Effect of Row Spacings and Varieties on Yield of Beans, SE Farm 1985

Variety	Row Spacing			
	7"	20"	30"	Skip-Row
Corsoy 79	49.3	53.7	45.6	55.7
Wells II	44.8	45.4	42.2	50.2
SOI 226	54.7	48.4	46.2	60.8
Avg.	49.6	49.2	44.7	55.6

The skip-row (15" + 30" wheel track) yields appeared to be considerably better than any other row spacings when averaged across these particular varieties. Varieties do have a tendency to react differently to different row spacings. This appears for Corsoy 79 20" rows, and SOI 226 7" rows, where yield levels are similar to the skip-row yields. In past years, when the rainfall distribution and amounts were much less, yields were about the same in the 7" and 30" rows. Rainfall was adequate in August, 5.05", and this clearly shows that more plants per acre and narrower rows did respond, and therefore resulting in more bushels per acre.

Table 2. Effect of Row Spacing and Variety on Soybeans Yields for Five Years1/, SE Farm.

Variety	Row Spacing			
	7"	20"	30"	Skip-Row
Corsoy 79	44.3	48.0	40.2	46.8
Wells II	40.5	44.6	36.8	40.0

1/ Average of yields from 1981-1985.

With five years of data for four row spacings and two varieties, it still appears that narrowing the rows increases yields (30"-20"). If weed control is no problem, then narrowing rows to 7" or skip rows would be acceptable and also profitable. It appears that 20" or skip-row planting is the optimum row spacing for Corsoy 79 soybeans. Also one cultivation is possible in 20" rows or skip rows. As shown, Corsoy 79, Wells II and Gnome were chosen for this study in previous years. Gnome is a late Group II maturity and with its late planting in 1983 and 1984, did not reach maturity. It appears that this may be too far north for Gnome beans, and will usually not mature unless planted extremely early.

STRIP INTERCROPPING OF CORN AND SOYBEANS

B. Lawrensen, D. Sorensen, D. DuBois

SOUTHEAST FARM 85-7

Introduction

Strip intercropping has taken a modern role today even though it has been around for a long time. It has been adopted because of its yield advantages and important conservation benefits. The cropping strategy of this system is the practice of growing two or more crops simultaneously in the same field in strips wide enough for independent cultivation, but narrow enough for the crops to interact agronomically.

In corn, the leaf immediately below the developing ear is the most efficient in using sunlight for dry-matter production. It may be logical that giving corn plants more room would allow better light penetration to the lower canopy leaves for greater yields. But, this will also allow more light to get past the leaf canopy and be wasted. Soybeans, being a low profile plant, can be planted between the corn rows and intercept the light, which would otherwise be wasted.

It may be ideal to alternate corn and soybean plants within the same row or with no row distinction at all, called mixed-intercropping. This would achieve the highest interaction and yield benefits. When individual harvesting of corn and soybeans is desired, this method is impractical. If rows or groups of rows are alternated, this seems very practical and is gaining in popularity.

When hand labor is used, as in some parts of the world, a method of alternating rows, or pairs of rows, for various compatible crops is practiced. Twenty to sixty percent yield increases are commonly seen.

In the Midwest large mechanized equipment is used and makes one row and usually two row alternating strips impractical. The widening of the strips to use conventional equipment still can give the producer partial yield benefits. Strip intercropping can now become practical for some Midwest farmers.

Methods: The strip intercropping of corn and beans at the SE Experiment Farm was planted with a conventional four or six row planter to accommodate harvest equipment. The plot area for corn was field cultivated before planting May 3. The soybean area was prepared the same way before planting May 21. Both the corn and soybeans had 100# (8-32-16) per acre as a starter treatment and Lasso II banded as the herbicide for weed control. On June 6 the corn was sidedressed with 100# actual N. This experimental plot had corn and beans strip-intercropped with twelve (12) rows in each. Varieties: Corn-Currys 1466 - 28,000 plants per acre; soybeans-SOI 226 - 124,000 plants per acre. The corn was combined October 10, 1985, and the soybeans were combined October 17, 1985.

Results and Discussion: Strip crop yields for 1985 were considerably higher than those reported for the first year in 1984. Corn yields for 1985 are reported in Table 1.

Table 1. Effect of Strip Intercropping on Corn Yields, SE Farm 1985.

South 1/ Row #	1	2	3	4	5	6	7	8	9	10	11	North 12
bu/A	196	166	162	158	166	170	170	170	160	159	169	172

1/ Starting from southern row and ending row twelve on north

A yield of 196 bu/A was recorded for the southern most row in 1985. As we move in to row #2, the yield drops off to 166 bu/A. In similar studies where eight or twelve row planters have been used at other universities, this row usually responds to the additional sunlight. This lower yield could possibly be attributed to tractor wheel tracks. Using the twelve rows above, wheel tracks would be found between rows 2 and 3, 4 and 5, 8 and 9, and 10 and 11. In similar studies where larger planters have been used, eight or twelve row units have seen greater yield advantage due to less wheel tracks per number of rows planted in the field.

Table 2 reports soybean yields for 1985. The effect of corn rows on soybeans is quite evident in 1985. The shading effect reduced yields of the first four rows from the south below the center four or north four rows. The three averaged is 45.9 bu/A, which is a respectable soybean yield in 1985.

Table 2. Effect of Strip Intercropping on Soybean Yields, SE Farm 1985.

Corn South	South 4 Rows	Center 4 Rows	North 4 Rows	Corn North
	----------	bu/A	----------	
	42.5	48.6	46.7	

The corn yields do not show a large advantage in 1985 to strip planting. We must also state that the row direction in this study is from east to west. It appears according to other data that the row direction of north to south would be more beneficial toward increasing corn yields. This would allow more rows to benefit from the additional light than just the one row on the south. This could possibly decrease soybean yields due to more shading effect across the soybeans.

Caution has to be used in making the decision whether to go to a planting system such as this. We will continue work in this area, and will be adding north - south rows in 1986 to see what effect the row direction has on yields. Other management factors that need to be considered are fertilizing, herbicides, etc. The use of dry fertilizer is eliminated, at least using broadcast wagons, floater-spreaders, etc. Also, limitations as to herbicides that can be used need to be considered. Problems of drift with post-emergence herbicides and over-lap, etc., of preplant and preemerge herbicides needs to be considered.

MOST PROFITABLE ROTATION

D. Sorensen, B. Lawrensen, D. DuBois

SOUTHEAST FARM 85-8

S.E. FARM REPORT

Introduction

Why has a study of this sort been in force for over 20 years? In 1962, farming was still in the organic rotational stage with legumes or commercial fertilizer used for the NPK needs. Profit was still the "name of the game" as it is today. If a certain farming practice was not profitable, why use it?

A "Most Profitable Rotation" study was started in 1962 with seven (7) rotations - (1) continuous corn, (2) corn-oats, (3) corn-corn-oats + alfalfa - alfalfa hay, (4) oats + sweet clover - corn, (5) corn-soybeans-oats; (6) corn-oats-soybeans; (7) continuous grain sorghum. Each rotation was set-up to have one half of the plot fertilized and the other one-half of the plot unfertilized. The rotations would move through their cycles as planned. The total plot area consisted of six ranges, three reps, and seven rotations, all randomized.

Methods: All of the seven rotations are seeded as timely as can be. Each crop has an optimum date to be planted and these guidelines are to be followed as closely as possible. Oats was seeded April 15, Corn was planted May 8, soybeans were planted May 27, and grain sorghum May 27.

Herbicides applied: Corn-Lasso II banded, insecticide -Dyphonate 20G banded; soybeans-Treflan PPI; grain sorghum - Ramrod 20G banded, Furadan 15G banded in the row for greenbug control. Plant populations in the row crops and small grain are as follows.

Corn - 22,000 plants per acre; combined October 8, 1985
Beans - 133,000 plants per acre; combined October 17, 1985
Grain Sorghum - 66,000 plants per acre; combined October 24, 1985
Oats - 2.5 bushels/acre; combined July 17, 1985

Results and Discussion: Corn yields in 1985 were somewhat lower than other areas of the farm possibly due to the topography in that area of the farm. The highest yield rotation for corn in 1985 was the fertilized continuous corn at 107 bu/A (Table 1). The corn-oats-soybean rotation was close to this at 102.2 bu/A of corn where fertilizer was applied, but at a lower rate to allow for a nitrogen contribution from the previous years soybean crop.

The yield response to fertilizer was quite dramatic in 1985. An increase in corn yields ranging from 12 to 54.6 bu/A was observed when nitrogen fertilizer was applied to the corn. The yield increase due to N fertilizer was lower when a legume crop was included in the rotation (Rotation 3) as compared to a rotation with no legume (Rotation 1 or 2). When comparing unfertilized plots, corn yields were considerably higher when legumes were rotated with corn compared to continuous corn.

Oats yields were somewhat higher than in past years. Again, as seen in corn yields, a response to fertilizer was observed across all rotation systems. A large response was observed for Rotation 6 (corn-oats-soybeans). The unfertilized check yield of 30.7 bu/A was considerably lower than other check yields, and is unexplainable. This is two years after soybeans and nitrate levels in the soil must have been extremely low in 1985.

Soybean yields were quite respectable in 1985. A response to fertilizer occurred in both rotations (Rotation 5 and 6), but was considerably larger in Rotation 5. A response to fertilizer by soybeans would be expected due to the number of years that the unfertilized check plots have produced a crop with no commercial fertilizer or manure were added.

Sorghum yields were quite low in 1985. Crop development was quite slow and the frost in September occurred before the crop had reached maturity.

Hay yields are not reported again for 1985 due to stand problems. This resulted in only extremely small areas that were suitable for harvest and would not have been representative yields.

Table 1. Effect of Cropping Sequence and Fertilizer on Crop Yield, 1985

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	—	—	52.4	—	—	—	—
1. Continuous Corn	Corn	6 +11 +10	70	—	107.0	—	—	—	—
2. Corn-oats	—	0 + 0 + 0	—	42.9	61.9	—	—	—	—
2. Corn-oats	Corn	6 +11+ 10	70	—	97.7	—	—	—	—
	Oats	30 + 7 + 0	—	61.1	—	—	—	—	—
3. Corn-corn-oats+Alf-Alf Hay	—	0 + 0 + 0	—	52.5	69.7	77.1	—	—	—
3. Corn-corn-oats+Alf-Alf Hay	Corn	6 +11 +10	—	—	72.5	—	—	—	—
	Corn	6 +11 +10	70	—	—	89.1	—	—	—
	Oats	15 +26 + 0	—	77.3	—	—	—	—	—
	Alf Residue	0 + 0 + 0	—	—	—	—	—	—	—
4. Oats + Sweet Clover-Corn	—	0 + 0 + 0	—	52.4	75.5	—	—	—	—
4. Oats + Sweet Clover-Corn	Oats	30 + 7 + 0	—	66.9	—	—	—	—	—
	Corn	6 +11 +10	—	—	88.9	—	—	—	—
5. Corn-Soybeans-Oats	—	0 + 0 + 0	—	51.6	68.6	—	33.3	—	—
5. Corn-Soybeans-Oats	Corn	6 +11 +10	70	—	98.4	—	—	—	—
	Soybeans	6 +11 +10	—	—	—	—	50.4	—	—
	Oats	30 + 7 + 0	—	63.8	—	—	—	—	—
6. Corn-Oats-Soybeans	—	0 + 0 + 0	—	30.7	79.9	—	32.9	—	—
6. Corn-Oats-Soybeans	Corn	6 +11 +10	55	—	102.2	—	—	—	—
	Oats	20 + 7 + 0	—	81.0	—	—	—	—	—
	Soybeans	6 +11 +10	—	—	—	—	38.2	—	—
7. Continuous Grain Sorghum	—	0 + 0 + 0	—	—	—	—	—	12.6	—
7. Continuous Grain Sorghum	Sorghum	6 +11 +10	70	—	—	—	—	34.8	—

S.E. FARM REPORT

CONTINUOUS SOYBEANS

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and B. Jurgensen

SOUTHEAST FARM 85-9

Introduction

In an area where a corn-soybean rotation is dominant, would bean yields decrease if for some economic or other reason, soybeans were planted continuously for four or five years? Would soil-borne diseases come about as an end result or would an insect build-up take over? Would there be an increase in symbiotic nitrogen with this cropping system? This study was implemented as a means of answering some of these questions.

Methods: A corn-bean rotation was set-up using a 110 day maturity corn (Currys 1466) 28,000 plants per acre and a Group II bean (SOI 226). The corn was planted May 3 and the beans May 22. Each had Lasso II banded for weed control and 100# (8-32-16) as a starter. All the corn was sidedressed with 80# N a.i. per acre June 6. Corn and beans were combined October 2 and October 17, respectively.

Results and Discussion: A corn-bean rotation resulted in higher bean yields this year, as in the past, than continuous beans. (Table 1)

Table 1. Effect of Cropping Sequence on Yield of Soybeans, SE Farm, 1985

Cropping Sequence	Fertilizer	Bu. Corn per acre	Bu. Soybeans per acre
Continuous Beans	Check	--	42.6
Continuous Beans	Fertilized*	--	44.6
Rotation Beans & Corn	Check	118.3	47.8
Rotation Beans & Corn	Fertilized*	179.4	51.6

* Both Continuous and rotation beans were fertilized with 100# (8-32-16) as a starter. Corn was fertilized 100# (8-32-16) as a starter and 80# N sidedressed.

A small increase in yields (2 bu/A) is noticeable when starter fertilizer is applied to continuous soybeans. An increase in yields (3.8 bu/A) due to starter fertilizer was also observed where corn and soybeans were rotated. Corn yields also responded to fertilizer (61.1 bu/A) which is one of the largest responses to fertilizer since this study was started in 1975.

Table 2 reports results of this study for the period 1975-1985. Two of the years (1978, 1980) are not included in these averages due to the severe hail damage that occurred in those years. When comparing rotation corn-beans to continuous beans a 4.2 bushel/acre increase is observed in favor of rotated soybeans. This yield advantage is the same whether the soybeans were fertilized or unfertilized.

Table 2. Effect of cropping sequence on yield of soybeans, SE Farm 1975-1985.

Cropping Sequence	Fertilizer	Corn bu/A 2/	Soybeans bu/A 1/
Continuous Soybeans	Check	--	34.7
Continuous Soybeans	Fertilized	--	35.6
Rotation Corn & Beans	Check	81.4	38.9
Rotation Corn & Beans	Fertilized	99.9	39.8

1/ Soybean yields reflect nine year average from 1975 to 1985. Years 1978 and 1980 were not included in average due to hail damage.
2/ Corn yields reflect nine year average from 1975 to 1985. Years 1978 and 1980 were not included in average due to hail damage. Years 1975 and 1976 were included in which corn yields were drought stricken.

Corn yields reported in Table 2 are also averaged for the same years. Over a nine year period, fertilized corn in rotation with soybeans averaged 18.5 bu/acre more grain than unfertilized corn rotated with soybeans. It would appear that this increase in yield would be due primarily to the addition of nitrogen fertilizer. These average corn yields would have been higher, but 1975 and 1976 were included in the average which were very dry years and corn yields on this study were below 30 bu/acre both years.

It would appear that growing corn and soybeans in rotation would be more beneficial to long-term soybean yields than growing continuous soybeans. The only time growing continuous soybeans would be feasible, is when soybean prices would greatly exceed corn prices. Greater economic returns could be noticed with lower yields from continuous soybean production, if soybean prices compensated for lower yield levels.

S.E. FARM REPORT

PHOSPHORUS MANAGEMENT AS INFLUENCED BY TILLAGE SYSTEMS IN EASTERN SOUTH DAKOTA, 1985

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PLANT SCIENCE 85-10

Phosphorus (P) incorporation is very limited in some conservation tillage systems. Therefore, P applied to the soil surface tends to remain near the surface. This has caused concern among agronomists that topdressed P may be positionally unavailable if the soil surface becomes too dry for root uptake. Also, changes in soil physical, chemical, and biological processes that occur when tillage is reduced and their combined effects on root development may alter the effectiveness of P placement methods. Therefore, a study was designed to determine the influence of tillage systems on the optimum soil test P level and on P placement method effectiveness as influenced by soil test level.

Methods: The research site is located in the northwestern corner of Clay County on the Nelson Brothers farm. The soil is classified as an Egan silty clay loam (Udic Haplustoll), 0-2% slope. Results of soil tests on samples taken in the spring of 1985 are reported in Table 1.

Table 1. General soil test results from study site, 1985.

NO3-N 0-2 ft.	Organic Matter	NH4OAc K	pH	Electrical Conductivity	DTPA Zn
lbs/A	%	lbs/A		mmhos/cm	ppm
133	2.8	527	7.4	0.6	2.4

Tillage systems included in this study are moldboard plow (MP), ridge plant (RP), and no-till (NT). The moldboard system is fall plowed with vibra-shanking prior to planting. The ridge plant system invovles building a 6-8" ridge during the final cultivation (corn is 18" tall) to plant on the following spring. The planter is equipped with discs that prepare a level, residue free area on top of the ridge. The no-till system utilizes a fluted coulter to cut through residue and fracture the soil area in front of the planter unit. All systems are cultivated and stalks chopped in the fall. Previous crop was corn.

Pioneer 3732 was planted at a rate of 23,200 seeds/acre on May 24 (Reps 1 and 2) and on May 29 (Reps 3 and 4). Harvest population was 21,500 plants/A in MP and RP systems and 20,800 in the NT system. A hard driving rain before emergence caused some crusting and slight stand loss. Plots were harvested by hand picking on October 2. Bladex and Paraquat were sprayed preplant and Lasso II was banded over the row at planting resulting in good weed control. Furadan was banded for root worm control.

Experimental design was a split-split plot randomized complete block with four replications. Tillage was the main plot with initial soil test level the first split and P placement treatments the second split. In 1982, rates of 0, 100, and 200 lbs P205/A were applied to specific blocks and thoroughly incorporated to establish a range of initial soil test levels. The tillage variable was established in the fall of 1983. Annual phosphorus rates and placement methods are reported in Table 2. Urea ammonium nitrate (28-0-0) was knifed to bring applied N to a rate of 90 lbs N/A for all treatments when the knifed P treatment was applied. The P source for all treatments was liquid ammonium polyphosphate (10-34-0).

Table 2. Phosphorus treatments applied annually.

P205 Rate	Placement Method
lbs/A	
0	Check
25	Broadcast: topdressed prior to fall primary tillage
50	Broadcast: topdressed prior to fall primary tillage
25	Starter: 2" to the side and 2" below seed; UAN used to bring row N to 25 lbs/A (25-25-0)
25	Knife: Knifed at 18" centers to a 6" depth with the N requirement of the crop 15 days after emergence.
25	Strip: Stripped on the soil surface at 18" centers in the fall prior to primary tillage (band width = 0.5-1")

RESULTS AND DISCUSSION: Soil Test Level Effects Annual treatments have now been applied four times and when combined with the initial P applications for soil test level establishment give a range of total applied P over the 4-year period of 0 to 400 lbs P205/A. Soil test P levels resulting from these applications (broadcast treatments only) varied with tillage systems (Figure 1). Soil test level increased linearly as application rate increased, but appeared to increase more rapidly in RP and NT systems than in the MP system. Part of this effect could be due to an incorporation depth greater than 6" in the MP system. Since these soil samples were taken to only a 6" depth, any fertilizer placed below that depth would tend to decrease the 0-6" soil test level.

The lag phase shown in Figure 1 for the RP and NT systems indicates that 60-70 lbs P205/A (15-18 lbs/year) was required to maintain the initial soil test level. A maintenance level of 0 is indicated for the MP system. Other studies on the Southeast Research Farm have shown when the Egan soil is plowed it will remain at 10-15 lbs/A of soil test P without P addition for at least 20 years. The higher maintenance requirement of the RP and NT systems indicated in this study might be due to immobilization of P in soil organic matter similar to what has been observed with nitrogen under reduced tillage.

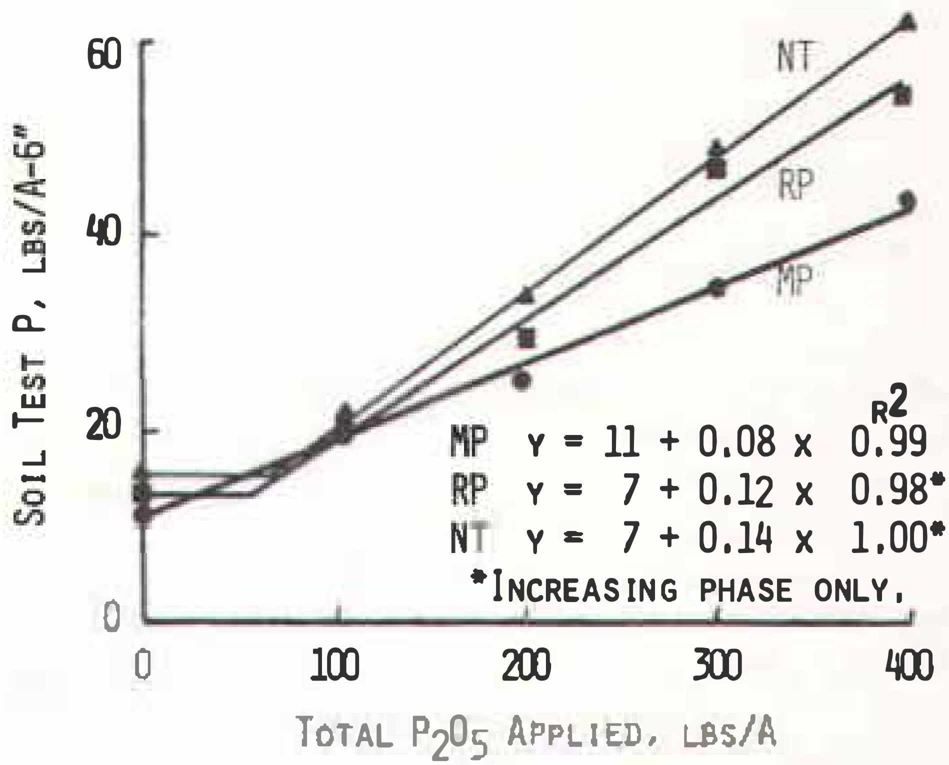

FIG. 1. INFLUENCE OF TILLAGE AND APPLIED P ON SOIL TEST LEVELS (BRAY & KURTZ NO. 1), FALL 1985.

Considerable stratification of soil test P has occurred in the RP and NT systems (Table 3). This was expected in these systems where annual P applications are topdressed. The "0" column of Table 3 indicates that this stratification occurred whether or not fertilizer P was topdressed. Soil P became stratified in unfertilized RP and NT systems because plant roots likely mined P from throughout the soil and crop residues returned it to the surface where remineralization occurred. The major question being addressed here is whether or not this surface accumulation has a significant impact on P availability to the crop.

Table 3. Stratification of soil P in three tillage systems, Fall 1985

Tillage	Depth	Annual P2O5, lbs/A 1/ 0	25	50
	Inches	- - - - -lbs/A- - - - - -		
Moldboard	0-3	12	18	21
	3-6	10	19	22
Ridge Plant 2/	0-3	17	35	54
	3-6	9	12	18
No-Till	0-3	18	31	57
	3-6	11	12	14

1/ At low initial soil test level
2/ Sampled at ridge shoulder

Early Growth and Development Early growth of corn was influenced by both tillage and P management (Table 4). The RP system produced the greatest amount of early growth at all P levels. No-till and MP systems produced similar growth at low and medium soil test levels, but the MP system had more early growth than NT at a high soil test level. Also, the MP system appeared to require a higher soil test level to reach maximum growth than either the RP or NT systems.

The largest growth increases to P occurred in the RP system while the least growth response to P occurred in the NT system. Statistically, placement methods acted similarly in all tillage system. Therefore, the averages at the bottom of Table 4 give the best indication of placement effectiveness. Broadcast, knife, and strip methods resulted in similar early growth while starter placement gave greater growth at both medium and very high soil test levels. Studies in South Dakota and other northern states have shown an early growth response of corn to starter placement regardless of soil test level in some growing seasons.

The early growth advantage of the RP system continued through the silking period. At a medium soil test level, 75% of the plants were silked on August 3, 5, and 7 for RP, MP and NT systems, respectively. At a very high soil test level, 75% silk occurred on August 2, 3 and 5 for RP, MP, and NT systems, respectively. Thus, the ridged system silked 3 to 4 days earlier than the NT system.

By harvest, some maturity differences were apparent, but the magnitude of the differences had diminished (Table 5). Grain from the RP system averaged 1 to 1.5% lower in moisture content at harvest than MP or NT systems. Grain moisture contents were not influenced markedly by placement; however, they averaged approximately 2% lower at the very high soil test level than at the low level. A killing frost (Sept. 26) occurred just as black layer formation was reached and caused moisture contents to be high when yield checks were made following the frost.

Table 4. Influence of Tillage and Soil Test Level on Corn Early Growth Response to P Placement, 1985

Tillage	Soil Test Level 1/	Check	Placement 2/ Broad.	Starter	Knife	Strip	Avg.
	lbs/A	Grams/12 Plants 3/					
Moldboard	11(L)	78					
	19(M)		87	100	80	74	85
	34(H)		115	122	98	108	111
Ridge Plant	13(L)	86					
	24(M)		111	128	118	104	115
	50(VH)		118	140	115	121	124
No-Till	15(M)	74					
	22(M)		87	81	88	96	88
	47(VH)		91	97	89	83	90
Average	13(L)	79					
	22(M)		95	103	95	91	96
	44(VH)		108	120	101	104	108

1/ Fall 1985: 0-6" Bray and Kurtz No. 1; Broadcast Treatments
2/ 25 lbs P2O5/A Annually Since 1982
3/ Sampled at 6-7 leaf Stage: LSD .10 within tillage = 22 grams
LSD .10 averaged across tillage = 10 grams

Grain and Silage Yield Grain yield was significantly influenced by both tillage and soil test P level at this location (figure 2). At the low soil test level yields from all 3 tillage systems were approximately 120 bu/A. However, as soil test level increased, yields increased to 149 bu/A in the RP system, approximately 148 bu/A in the MP system and rose to only 133 bu/A in the NT system (Figure 2).

A soil test level of approximately 19 lbs/A was required to give 95% of the maximum yield in RP and NT systems while a level of 32 lbs/A was required in the MP system (FIgure 2). A lower P soil test level requirement has also been observed for reduced tillage systems in other South Dakota studies. This apparent increased effectiveness of soil test P under reduced tillage may be due to several factors that include 1) banding type of effect caused by stratification (see Table 3), 2) increased mycorrizal infection in reduced tillage, 3) changes in organic P cycling, 4) improved P diffusion pathway or several other possibilities. Additional research is being planned on this topic.

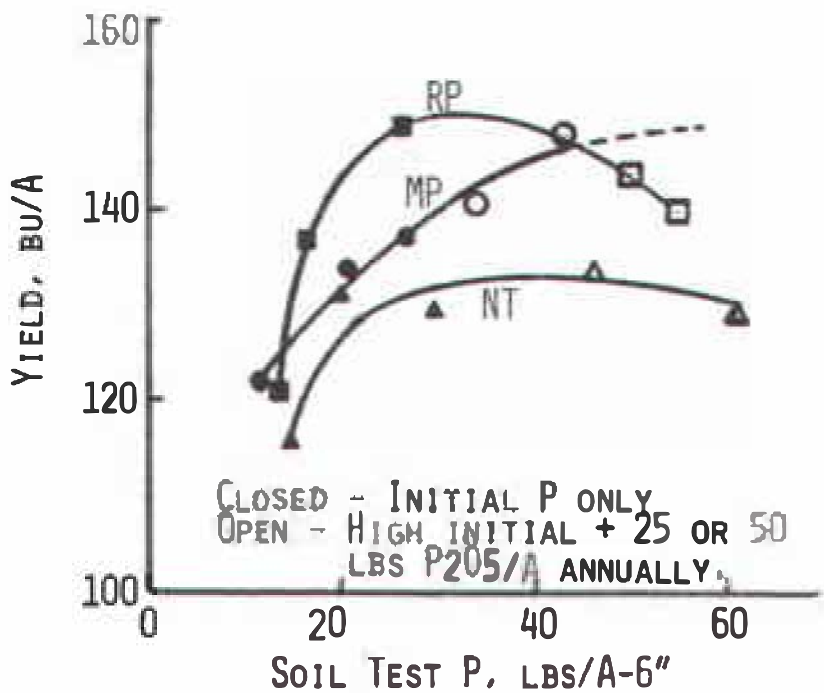

Fig. 2. Influence of tillage on corn yield response to soil test P, SE site, 1985.

Table 5. Influence of Tillage and Soil Test Level on Corn Grain Moisture Content Response to P Placement, 1985

Tillage	Soil Test Level 1/	Placement 2/ Check	Broad.	Starter	Knife	Strip	Avg.
	lbs/A	-------------------- % 3/ --------------------					
Moldboard	11(L)	40.9					
	19(M)		40.8	39.5	40.2	39.4	40.0
	34(H)		38.6	38.5	39.0	38.5	38.7
Ridge Plant	13(L)	40.4					
	24(M)		38.7	38.6	38.9	39.2	38.9
	50(VH)		37.5	38.3	38.0	38.0	38.0
No-Till	15(M)	41.1					
	22(M)		39.6	40.3	40.6	39.1	39.9
	47(VH)		39.2	39.3	40.3	39.3	39.5
Average	13(L)	40.8					
	22(M)		39.7	39.5	39.9	39.2	39.6
	44(VH)		38.4	38.7	39.1	38.6	38.7

1/ Fall 1985; 0-6" Bray and Kurtz No 1; Broadcast Treatments
2/ 25 lbs P205/A annually since 1982
3/ Harvested on Oct. 2; LSD .10 within a tillage = 1.0%
LSD .10 averaged across tillage = 0.7%

Grain yield differences between placement methods were very minor at this site. Even though starter placement produced more early season growth than other methods, no yield advantage to starter was measured (Table 6). Comparison of the check treatments (have received no P fertilizer in this study) to any of the placement treatments shows a large yield response to P. However, no significant differences between placements occurred in either the MP or RP systems.

In the NT system at a medium soil test level, the broadcast treatment yield about 9 bu/A more than any of the band treatments (starter, knife, and strip). This may have been due to the limited amount of soil fertilized in the band treatments resulting in inadequate root-fertilizer contact. These treatments have been applied since 1982, and even though the average soil test was 22 lbs/A (based on broadcast treatment), the majority of the root zone likely tested near the 15 lbs/A of the check treatment. At a very high soil test level (47 lbs/A based on the broadcast treatment at the high initial soil test level), no significant difference was measured between the broadcast and the three banded treatments.

The current soil test level of the high initial soil test level treatment that had received no annual P was 30 lbs/A and yielded 130 bu/A (data not shown). Thus, the bulk soil P concentration was likely adequate for maximum yield even though the annual P concentration was likely adequate for maximum yield even though the annual P treatments were made in concentrated bands.

Table 6. Influence of Tillage and Soil Test Level on Corn Yield Response to P Placement.

Tillage	Soil Test Level 1/	Check	Broad.	Starter	Knife	Strip	Avg.
			Placement 2/				
	lbs/A	Bu/A 3/					
Moldboard	11(L)	122					
	19(M)		131	135	135	139	135
	34(H)		141	141	140	144	142
Ridge Plant	13(L)	121					
	24(M)		136	134	137	130	134
	50(VH)		144	144	147	144	145
No-Till	15(M)	116					
	22(M)		139	131	128	130	132
	47(VH)		134	128	132	137	133
Average	13(L)	120					
	22(M)		135	133	133	133	133
	44(VH)		140	138	140	142	140

1/ Fall 1985; 0-6"; Bray and Kurtz No. 1; Broadcast Treatments
2/ 25 lbs P2O5/A Annually Since 1982
3/ at 15.55 Moisture; LSD .10 within tillage = 8.4 bu/A
LSD .10 Averaged across tillage = 6.6 bu/A

The best evaluation of placement performance at this site is likely the set of averages at the bottom of Table 6. When yields are averaged across tillage systems, all four placement methods result in very similar yields that are not significantly different.

Silage yield increased approximately 2 T/A when soil test P increased from 13 lbs/A to 28 lbs/A (Table 7). The RP system at the high soil test level produced significantly more silage than the NT system but was similar to the MP system.

SUMMARY No conclusions should be drawn from this study at this time since it is not completed. However, some summary statments about the 1985 results can be made.

1. Ridge plant and moldboard plow tillage systems produced similar grain yields in a continuous corn rotation in southeastern South Dakota.
2. The no-till system produced significantly lower yields than ridge plant or moldboard plow systems.
3. The moldboard system required a higher soil test P level to reach maximum yield than the ridge plant or no-till systems.
4. Even though a 15-25 bu/A yield increase occurred to phosphorus fertilization, broadcast, starter, knife and strip placement methods generally gave similar yields.

The placement and soil test P level effects in the reduced tillage systems being studied need to be evaulated in a relatively dry growing season. The 1985 season was one of limited moisture stress and the P stratification in the NT and RP systems did not cause positional unavailability of P. Responses may be quite different during seasons when the surface soil is dry much of the time.

Table 7. Influence of Tillage and Soil Test Level on Corn Silage Yield, 1985

Tillage System	Silage Yield Low 13 lbs/A	 High 28 lbs/A
	tons/A 1/	
Moldboard	14.3	16.5
Ridge Plant	13.6	17.1
No-till	14.3	15.3
Average	14.1	16.3

1/ at 60% water; LSD .10 = 1.6 T/A.

EFFECTIVENESS OF BROADCAST AND STARTER P ON RIDGE PLANTED CORN AND SOYBEANS

P. E. Fixen and B. G. Farber

S.E. FARM REPORT

PLANT SCIENCE 85-11

In most tillage systems it is generally accepted that starter fertilization (2" to the side and 2" below the seed) will give greater early season growth than broadcasting an equivalent rate of P. The starter band provides a concentrated zone of nutrients in close proximity to the young plant, whereas the broadcast P is diluted throughout the tillage zone and less is within reach of the plant early in the season.

In a ridge plant system, the contrast between broadcast P and starter bands may not be as great. This system tends to concentrate broadcast P in the surface two or three inches due to the combined action of the cultivator and planter disc cleaners. Thus, the P remains more concentrated even though its been broadcast. Also, the elevated, residue free ridge warms up faster in the spring than other reduced tillage systems which may lessen the need for starter P. Due to these considerations a long-term study was initiated to compare rates of broadcast P to rates of starter P in a ridge plant system in a corn-soybean rotation.

Methods: The experiment is 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 (Pachic Haplustoll, fine-silty, mixed, mesic). Due to the fine texture and moderate drainage, these soils are not particularly well suited for reduced tillage. Results of soil tests of samples taken in the spring of 1985 are reported in Table 1.

Table 1. Soil test results, Spring 1982/2

1985 CROP/1	NO3-N 0-6"	NO3-N 0-24"	Organic Matter	Extractable K	pH	DTPA Zinc
	lbs/A		%	lbs/A		ppm
Corn	36	111	3.1	700 (VH)	5.9	5.5(H)
Soybeans	59	130	3.2	720(VH)	6.0	3.3(H)

/1 Crops reversed in 1984.
/2 Sampled on May 13, 1985.

Cultural practices are reported in Table 2. Rains delayed soybean planting until June 6 and likely reduced yields. Weed control and stands were excellent in both corn and soybeans.

Table 2. Cultural practices for 1985.

Practice	Corn	Soybeans
Past Crop	Soybeans	Corn
Variety	Pioneer 3732	Corsoy 79
Planting Date	May 13	June 6
Row Spacing	36"	36"
Planting Rate	23,200	160,000
Final Population	21,000	------
Herbicide	Lasso band, Prowl + Bladex (Post)	Lasso band + Paraquat (Pre)
Harvest Date	October 8	October 21

The study was conducted in a split plot randomized complete block design with three replications. Four rates of P (0, 20, 40 and 60 lbs P205/A) were the main plots while placement methods (broadcast or starter) were the subplots. This was the second year the treatments have been applied. Broadcast treatments were applied on May 13 prior to corn planting. 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). Corn plots received 140 lbs N/A as ammonium nitrate on May 13. Ridges were formed for the first time in 1984 and corn stalks were chopped in the fall. The only tillage performed on these plots was a single cultivation. Normally a second cultivation would have been performed primarily to rebuild the ridges. This was not done because ridge height was already adequate (about 5") and weeds were not a problem.

Plant parameters measured were early dry matter production and P uptake, leaf P concentration, grain yield and corn grain moisture content. Each broadcast plot was soil sampled in 0-3" and 3-6" increments for P analysis. Corn yield was determined by hand harvesting 20' of the center two rows. Soybean yields were determined by snapping off 5 feet of the center two rows and threshing the plants with a stationary plot thresher. Plot size was 18' by 40'. Plant analysis was not completed at the time this report was written.

Results: Soil samples taken from broadcast plots in the spring of 1985 show that considerable stratification of P has already occurred (Table 3). The surface 3" have increased rapidly with fertilization while the next 3" show only a gradual increase.

Early growth of both corn and soybeans was influenced by P fertilization (Fig. 1). Statistical analysis of the data (Table 4) indicated that broadcast and starter placements were not different for corn; therefore, placement averages at each rate were plotted in the graph. Approximately 30% more growth compared to the check had occurred on June 21 where 50 lbs P205/A had been applied.

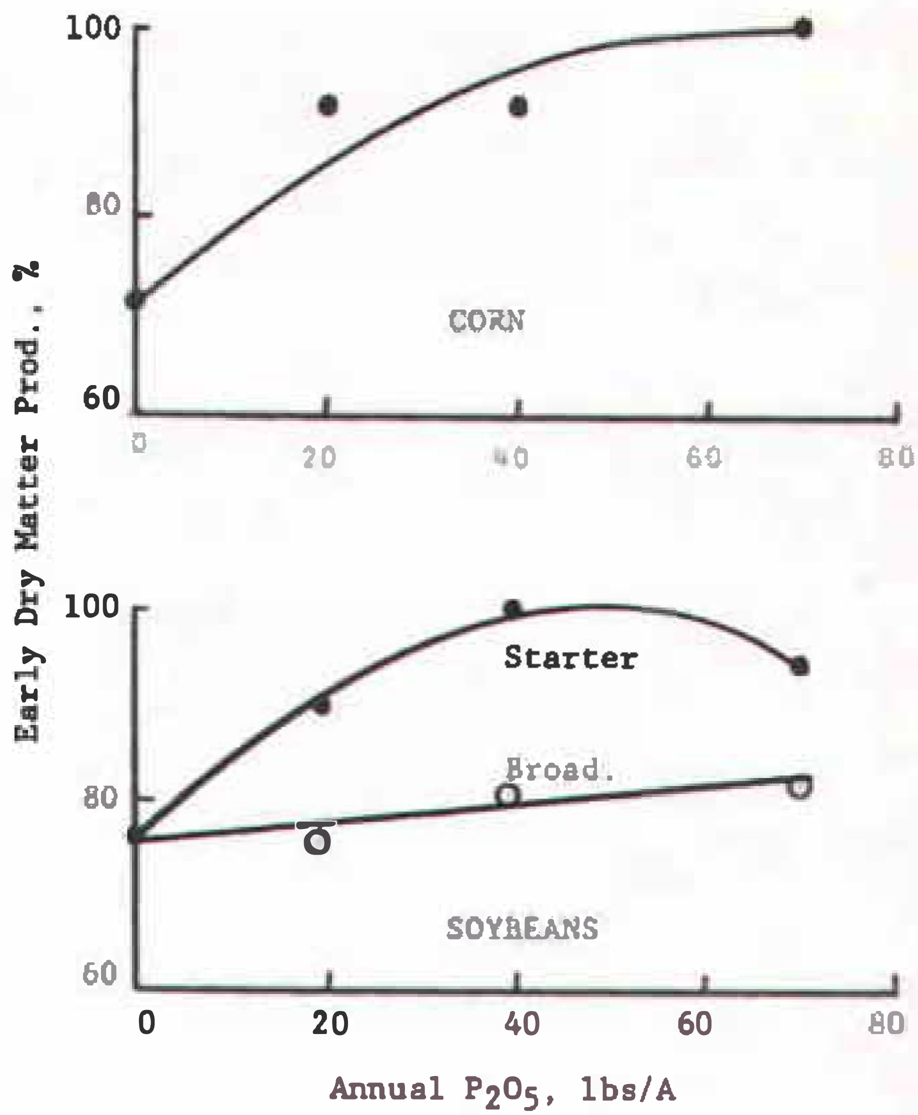

Fig. 1. Influence of P rate and placement on early growth of corn and soybeans in a ridge plant system, 1985.

Table 3. Soil test P levels from broadcast treatments after planting, 1985.

Annual P205 Rate	Depth Increment 1/ 0-3"	3-6"	Avg.
lbs/A	ppm		
0	16	11	13
20	23	12	17
40	28	13	20
60 2/	49	17	33

1/ Sample from shoulder of ridge.
2/ 80 lbs P205 in 1985.

Table 4. Early dry matter production, grain yield, and grain moisture for ridge planted corn and soybeans.

P205 Rate	Early Growth 1/ Broad.	Starter	Avg.	Grain Yield 2/ Broad.	Starter	Avg.	Grain Moisture Broad.	Starter	Avg.
	grams/12 plants			bu/A			%		
				CORN					
0	--	--	59	--	--	174	--	--	29.2
20	82	69	76	182	176	179	28.4	28.8	28.6
40	81	71	76	178	176	177	28.5	28.2	28.3
60	82	83	83	176	171	174	28.6	27.6	28.1
Avg.	82	74		179	174		28.5	28.2	
	grams/20 plants			SOYBEANS					
0	--	--	28	--	--	41			
20	28	33	31	46	43	45			
40	30	37	33	40	40	40			
60	33	35	34	39	40	40			
Avg	30	35		42	41				
Probability of F test 3/									
				CORN					
Rate	0.01			NS			NS		
Placement	NS			0.08			0.07		
Rate x Place.	NS			NS			NS		
				SOYBEANS					
Rate	0.05			NS					
Placement	0.01			NS					
Rate x Place	NS			NS					

1/Corn sampled at 6-leaf stage on June 21, soybeans sampled when 6" tall on June 24.
2/ Corn at 15.5% moisture.
3/ Probability that treatment differences were due only to chance, NS indicates that probability level was greater than or equal to 0.30.

Starter placement resulted in greater early growth of soybeans than broadcast placement (Fig. 1). Very little early soybean growth response to broadcast P was measured. It is unusual for soybeans to show more early growth response to starter than corn. Also, the soybeans were planted considerably later than the corn which in most years would decrease the importance of starter. The unusually warm April and more normal May and June may have caused the planting date effect to reverse in 1985.

Corn grain yields were excellent in this study and averaged 176 bu/A across all treatments (Table 4). This yield level was attained with no tillage other than a single cultivation. Soybean yields averaged 41 bu/A and were likely hurt by the delayed planting.

Although early growth response to the P treatments occurred, very little grain yield response was measured on either the corn or soybeans (Table 4). Statistical analysis indicated that no significant differences existed in the soybean yields or corn yields at the 0.05 probability level. A trend occurred in the corn yields showing 5 bu/A more grain with broadcast P than starter P. Corn grain moisture content trended slightly lower for the starter placement at the high rate.

This was the first year of a long-term study and no conclusions should be drawn until more data is available.

INFLUENCE OF NITROGEN ON OAT YIELD AND LODGING

R. Gelderman and J. Gerwing

S.E. FARM REPORT

PLANT SCIENCE 85-12

Introduction

Approximately 15% of South Dakota cropland is planted to oats. Oats had been shown to respond to additional nitrogen provided the soil test shows a need. Many producers, however, are reluctant to apply more than a minimum level of nitrogen on oats because of lodging concerns.

Lodging in small grains has many causes including disease, variety, growing conditions, fertility levels and wind and rain events. If disease is not a problem, lodging is primarily the inability of the plant to support its grain weight. Good growing conditions and high soil fertility promote high yields. Therefore if conditions of heavy rain and wind are present, lodging can occur. However, the use of short stiff-strawed varieties can reduce this problem. Our objectives in this study were as follows:

1. Determine the influence of added nitrogen on lodging of a short strawed oat variety.
2. To demonstrate the yield response of oats to added nitrogen.

Methods: The site was located in the northeast corner of the north quarter of the Southeast Farm on a Whitewood silty clay loam. Whitewood soils are deep somewhat poorly drained soils formed in a silty glacial drift. This experiment was located adjacent to a broad drainage way. Results of soil tests of samples taken in the spring of 1984 are reported in Table 1.

Table 1. Soil test results, Spring 1985, SE Farm.

- - -NO3N- - - -						
0-6"	0-24"	O.M.	P	K	pH	Salts
-----lb/A------		%	--lb/A-----			mmho/cm
15	37	3.0	21	550	6.9	4.0

The soil had a medium level of phosphorus, very high potassium levels and a moderate organic matter content. The soluble salts are somewhat higher than normal, but not unusual for a poorly drained area. The available nitrogen would be considered low for the 0-2' depth.

Cultural practices included fall plowing and disking. The previous year's crop was corn. Cultivar Multiline E77 was planted on April 11. The Multiline E series cultivar is a short, very early oat with strong straw strength. The variety was selected primarily for its lodging resistance.

Thirty pounds of phosphorus was applied with the seed on all plots. Nitrogen treatments were topdressed as ammonium nitrate on April 15 just prior to germination. No herbicides were applied since weeds were not a problem. Grain harvest was completed on July 15 using standard field type equipment.

The study was laid out as a randomized complete block design with four replications. Ten rates of nitrogen were used from 0-225 lb/A in 25 lb increments. Higher than recommended rates were purposely used to insure nitrogen was not limiting and a high lodging potential was present.

RESULTS AND DISCUSSION: The 1985 growing season tended to be relatively warm during the spring with adequate moisture. As a result, early growth of the oats was very good with grain heading on June 10. Dry weather during grain fill was compensated for with cool air temperatures and adequate soil moisture.

An early planting date usually promotes slow steady early growth resulting in shorter internodes and a good root system. Both of these factors would reduce the lodging potential. However, because of the warm spring temperatures, early growth was relatively rapid and this cultivar became taller than usual.

Severe nitrogen deficiency symptoms were noted on the check and the 25 lb/A rate. Fewer symptoms were noted as nitrogen increased until they completely disappeared at the 150 lb/A rate.

Yield and lodging ratings can be found in Table 2. Yield was increased by added nitrogen to the 50 lb/A rate. Additional yield response was expected from higher nitrogen rates. Recommended nitrogen application at this site for 100 bu/A oats would have been 93 lb/A of N. The reason for lower than normal fertilizer needs this year could have been due to a higher than normal rate of soil nitrogen mineralization. The warm spring temperatures and moist soil conditions would favor increased soil N mineralization.

Another reason for less nitrogen response than expected could be due to available deep (2-4') nitrogen. Usually deep nitrogen is not measured and is considered low. The available nitrogen from two to four feet at this site before planting was 40 lbs/A. A deep test again after harvest indicated that one-half of this amount was removed. With adequate water within this soil zone, above normal uptake of nitrogen may have occurred.

Table 2. Influence of nitrogen on oat yields and lodging.

N Treatment (lb/A)	0	25	50	75	100	125	150	175	200	225
Yield (bu/A)	59	73	93	93	91	91	105	95	96	91
Lodging Score*	1.0	1.0	1.0	1.0	1.3	1.8	3.3	2.5	3.3	2.3
Test wt (lb/bu)	39.4	39.6	38.8	39.1	39.2	38.6	38.3	38.4	38.1	38.1

*Rating from 1-10, where 1 = zero lodging and 10 = 100% lodging

Lodging at this site due to nitrogen treatment was low to moderate (Table 2). It is apparent, however, with excess nitrogen, lodging does increase. The nitrogen rate producing maximum yield was approximately 50 lb/A. The N treatments producing significant lodging appear to be the 125 lb/A and higher rates. Therefore, at this site, the application of recommended nitrogen would not have caused significant lodging.

The lodging that did occur took place late in the grain fill period and did not appear to affect yield to any degree. Grain test weights were lowered slightly as N application increased above 100 lbs./A (Table 2).

In summary, added nitrogen increased yields 50% over the check even though yield response was not as great as expected. Lodging was not significant at nitrogen rates producing maximum yield with the short stiff-strawed variety used.

S.E. FARM REPORT

SOIL TEST PHOSPHORUS REQUIREMENTS OF CORN

P.E. Fixen, B.G. Farber, R.H. Gelderman,
B. Lawrensen and R. Nettleton

PLANT SCIENCE 85-13

Never before has there been a higher priority on correct production input decisions by farmers. Soil testing is the best guide available for fertilizer input decisions. Thus, it is vital that accurate calibration of soil tests be performed. This study is designed to improve the calibration data base for the major phosphorus (P) soil test in use in South Dakota and has the following objectives: (1) to determine the effects of residual fertilizer P on corn yields, and (2) monitor changes in the P soil test as P is removed by crops.

Methods: 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 and developed in a silty cap over glacial till. From 1964-1967 five rates of P (0, 10, 20, 40, and 80 lbs P/A) were broadcast and plowed down annually.

Cropping and soil sampling history since 1973 is:

73	No crop, spring sampling
74	Alfalfa
75	Alfalfa
76	Alfalfa
77	Alfalfa, sampled 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
85	Corn

The study area was fall plowed, spring field cultivated and planted to Pioneer 3732 on May 6, 1985 at a rate of 20,000 seeds/A. Weed control consisted of Lasso II applied in a band at planting and Bladex 4L applied at 2 quarts/A on May 13. Dyfonate 20G was banded for insect control. Nitrogen was sidedressed as ammonium nitrate at a rate of 150 lbs N/A. Results of 1983 soil tests indicated 3.5% organic matter, 6.0 pH, and 450 lbs exchangeable K/A.

Results and Discussion: Grain yield increased from 118 bu/A at a 16 lb/A soil test level to 130 bu/A at a 30 lb/A soil test level (Fig. 1). Grain moisture content decreased from nearly 26% at a 15 lb/A soil test level to 24% at a 35 lb/A soil test level.

Ear leaf samples have been collected annually at silking for plant analysis. Table 1 shows the average P concentration found at each soil test level for 1982-1984. Leaf samples were also collected in 1985; however, analysis is not yet complete.

Corn yields from 1982 through 1985 show that the 32 lb/A soil test level has averaged 5 bu/A more corn than the 15 lb/A level (Table 2). These data also show that the response to P varied considerably across years with no response in 1982 and 1983, a small response in 1984 and a good response in 1985. This illustrates that P fertilization needs to be evaluated over a long-term period. Residual effects of the P fertilizer (in this case applied 20 years ago) cause this input to act in part as a capital investment like tile installation. The cost of P fertilization should not be attributed to a single crop because benefits may be seen for several years.

Phosphorus management becomes a complex issue in today's financial arena. We are forced in many cases to focus on cash flow and short-term returns. This may mean that P fertilizer rates are reduced below recommended levels resulting in gradual draw-down of soil test levels. In some cases this may be the best alternative available. However, risks are taken with this approach. The 1985 data from this experiment illustrates the danger involved (Table 3). The 1985 increase in crop value due to soil test elevation nearly paid for the estimated cost of the soil test increase in only one year. Except for interest costs, responses in future years would be 100% profit. The substantial economic benefits to long-term soil fertility management need to be considered by farmers, landlords and farm financial advisors.

Table 1. Influence of soil test P level on corn ear leaf P concentration, 1982-1984.

Soil Test Level 1/	YEAR 1982	1983	1984	Average
lbs/A	% P			
15	0.26	0.21	0.25	0.24
17	0.29	0.21	0.26	0.25
20	0.25	0.22	0.28	0.25
32	0.25	0.23	0.30	0.26
59	0.26	0.24	0.32	0.27

1/ Spring 1984, 0-4"

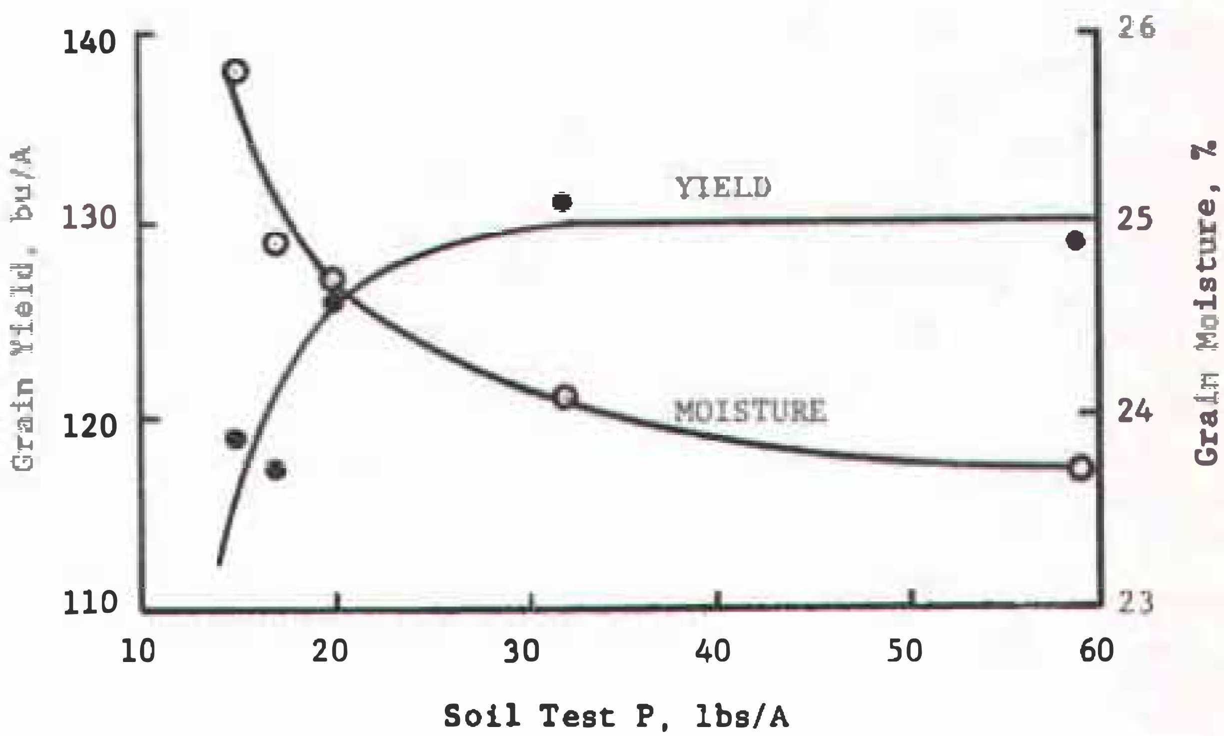

Fig. 1. **Influence** of soil test P level on grain yield **and grain** moisture content, 1985.

Table 2. Influence of soil test P level on corn grain moisture in 1985 and grain yield in 1982-1985.

Soil Test P Level	GRAIN YIELD 1982	1983	1984	1985	Avg.	Grain Moisture 1985
lbs/A1/	bu/A2/					%
15(L)	97	102	103	119	105	25.8
17(M)	103	97	101	117	105	24.9
20(M)	94	103	102	126	106	24.7
32(H)	93	106	109	131	110	24.1
59(VH)	84	107	117	129	109	23.7

1/ Bray and Kurtz No. 1, Spring 1984, 0-4"
2/ At 15.5% Moisture

Table 3. Profitability of soil test P responses in 1985.

Grain yield response, bu/A	12
Grain moisture reduction, %	1.7
Grain value increase 1/	$24.00
Grain drying savings 2/	$ 8.91
Total value of response	$32.91
Estimated cost of soil test increase3/	$33.66

1/ $2.00/bu.
2/ (0.04/bu/% x 131 bu/A.
3/ (32 lbs/A - 15 lbs/A) x 9 lbs P205/lb of soil test level = 153 lbs P205; 153 lbs x $0.22/lb = $33.66

A COMPARISON OF SEVERAL SOIL TESTING LABORATORY FERTILIZER RECOMMENDATIONS

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S.E. FARM REPORT

PLANT SCIENCE 85-14

Introduction

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

The objectives of this experiment were to make comparisons of soil test recommendations from several laboratories. The effect of the recommendations on yield and fertilizer coats 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 fifth 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 1985. 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.

The experimental site was fall plowed and disked twice and chiseled prior to planting. Pioneer 3475 was planted at a rate of 24,000 seeds/acre on May 9. Harvest population ranged from 15-23 thousand plants per acre. Lasso II was banded over the row with the planter and Bladex 4L was broadcast for weed control. Dyfonate 20G was used for insect control.

Fertilizer treatments were broadcast and disked on May 31. Fertilizer and lime costs were estimated averages paid by farmers in the spring of 1985. They were set on a per pound basis as follows:

Nitrogen	$0.25
Phosphorus	$0.20
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 on October 8 with 2 to 3 rows of kernels from 12 ears taken for moisture determination.

Laboratories had been labeled as A, B, C and D in the past. These letters correspond to the following labs:

A- Harris Laboratories, Lincoln, Nebraska
B- A & L Midwestern Ag, Laboratories, Inc.; Omaha, Nebraska
C- Servi-Tech, Inc.; Dodge City, Kansas
D- Iowa State University, (ISU); Ames, Iowa

Results: Results of soil tests are reported in Table 1. Some of the variability between labs can be explained by the differences in fertilizer applied from past years.

Recommendations for 1985 from each lab and the cost of the fertilizer recommended are reported in Table 2. The fertilizer costs varied from $26.00/acre to $51.82/acre.

In general, yields were excellent in 1985. Yields probably could have been improved by thicker stands. Variable stands in this experiment were due to excessive wind and rain in a particular storm causing loss of some plants.

The check was approximately 57% of the other yields (Table 3). The yield differences that exist between recommended treatments appear to be due to stand differences and not the fertilizer treatment applied.

The five year total yields and fertilizer costs are also shown in Table 3 for this experiment. Total yields are very similar with total fertilizer costs being very different between lab treatments. This is reflected in total dollars returned from added fertilizer (Table 3).

Table 1. Soil Test from 1985 SE Farm Lab Comparison Study

Measurement	SDSU	Harris	A & L	Servi-Tech	ISU
Nitrate-N, lbs/A-2'	62	40	100	74	----
O.M., %	2.5	3.2	4.0	3.7	----
Phosphorus, lbs/A	34	46	44	34	35
Potassium, lbs/A	620	530	608	712	635
pH	6.4	6.8	6.9	6.3	6.8
Salts, mmho/cm	0.5	0.4	----	0.3	----
Zinc, ppm	1.40	1.3	2.0	1.6	1.2
Iron, ppm	26	63	89	109	----
Manganese, ppm	35	22	43	50	----
Copper, ppm	2.0	1.2	1.9	2.2	----
Sulfur, (SO4), ppm	23	11	6	69	3.0
Boron, ppm	----	1.0	1.3	----	----
Magnesium, ppm	626	595	792	864	----
Calcium, ppm	2712	2455	1790	2784	----
Sodium, ppm	----	20	----	23	----
CEC, me/100 g	----	18	16	22	----

** Mehlich Test

Table 2. Suggested Fertilizer Recommendations for 120 bu/A Corn, SE Farm 1985

Fertilizer Nutrient	LAB				
	SDSU	Harris	A & L	Servi-Tech	ISU
Nitrogen, lbs/A	92	101	90	120	110
Phosphorus, lbs/A (P205)	15	65	50	35	45
Potassium, lbs/A (K20)	0	30	45	0	0
Sulfur, lbs/A	0	0	12	0	0
Zinc, lbs/A	0	0	1.5	0	0
Lime, ton/A	0	0	0	0	0
Fertilizer Cost/A	$26.00	$51.82	$43.32	$37.00	$37.00

*Effective calcium carbonate equivalent

Table 3. Influence of Laboratory Fertility Programs on Yield and Fertilizer Costs.

Laboratory	Yields 1985	Yields 5 Year Total	Total 5 Year Fertilizer Costs/A	Return**
	----bu/A--------		$	$
Check	71 C*	365	------	---
SDSU	129 A	503	143.40	202
Harris	125 AB	491	278.82	36
A & L	117 B	498	295.73	37
Servi-Tech	126 AB	510	156.65	206
ISU	124 AB	505	224.80	125
Sig. of F.	0.0001			
C.V. %	5.6			

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

**Return is equal to value of yield increase above check minus fertilizer cost. Assuming $2.05/bu corn.

1985 PERFORMANCE TRIALS OF SMALL GRAINS, GRAIN SORGHUM, SOYBEANS AND CORN AT THE SOUTHEAST EXPERIMENT FARM

J. J. Bonnemann

PLANT SCIENCE 85-15

S.E. FARM REPORT

Introduction

Variety or performance trials with four majors types of crops were conducted at the Southeast Farm during the 1985 crop year. Data from all trials are found in publications for each type of crop. All publications are available from the Bulletin Room, SDSU, Brookings, SD 57007.

Trials of spring wheat and oats were conducted at the farm in 1985; yields were excellent to good. (Table 1 and 2) Results of the trials are found in EC 775 (rev), 1986 Variety Recommendations (1985 crop performance results), Small Grains and Flax. This publication is also available at County Extension Offices.

Soybean trials were conducted at several locations in this area served by the Farm. In addition to the trials on the farm soybeans were also grown at Ellis, Freeman and Elk Point. (Tables 5, 6 and 7) Results of all trials are found in EC 775(rev), 1986 Variety Recommendations (1985 performance trial results), Soybeans. This publication should also be available at County Extension Offices.

Over 90 hybrids were included in the corn performance trial at the Southeast Farm in 1985. (Table 4) Yields ranged from about 125 to 195 B/A. Growing conditions were favorable for excellent yields though harvest was delayed by slow drydown. Yields of all corn performance trials in 1985 are found in Plant Science Pamphlet #93, 1985 Corn Performance Trials.

The grain sorghum trial at the Farm was one of the better trials conducted in 1985 as time of seeding and total heat units were more favorable in the southern portion of the state and especially at the Farm. (Table 3) Nearly half the hybrids entered yielded over 100 B/A. Yield results and other data for the farm trials and all other trials will be found in Plant Science Pamphlet #94, 1985 Grain Sorghum Performance Trials.

Table 1. 1985 Standard Variety Spring Wheat Trials, Southeast Experiment Farm, Beresford, SD

Variety	Height inches	Protein percent	Test wt. lb/b	Yield B/A 1985	Yield B/A 3-yr.
Alex	34	16	58	62	33
Angus	30	16	59	58	30
Apex-83	—	—	—	58	—
A99AR	36	16	56	56	30
Buckshot	30	15	56	58	29
Butte	33	15	59	54	27
Centa	33	15	59	50	25
Challenger	28	15	58	63	30
Chris	36	17	57	50	26
Erik	30	16	55	63	35
Guard	28	15	59	64	33
Leif	—	—	—	57	—
Len	29	16	57	59	29
Marshall	28	15	57	62	34
Norak	—	—	—	63	—
Norseman	—	—	—	59	—
Olaf	30	16	57	57	28
Oslo	28	14	57	59	28
Stoa	34	16	57	65	34
Success	—	—	—	63	—
Victory 283	34	16	59	53	28
Wheaton	27	15	56	62	34
2369	29	15	59	65	33
711	29	15	58	57	29

Table 2. 1985 Standard Variety Oat Trials, SE Farm, Beresford, SD

Variety	Height inches	Test weight lb/B	Yield B/A 1985	Yield B/A 3-yr.
Bates	29	35	123	69
Benson	34	34	101	59
Burnett	34	36	99	62
Centennial	33	34	106	59
Haylander II	37	34	89	60
Kelly	33	37	103	60
Lancer	32	35	107	66
Lang	30	33	114	63
Lyon	37	34	101	64
Moore	35	35	121	73
Noble	31	35	113	65
Nodaway 70	33	37	91	53
Ogle	31	33	121	72
Otee	31	36	103	65
Pierce	32	35	95	62
Porter	32	34	123	73
Preston	31	36	104	66
Proat	34	35	112	70
Steele	—	—	121	—
Webster	—	—	115	—
Wright	36	36	100	64
145E Blend	—	—	102	—
345M Blend	32	34	116	71

Table 3. 1985 Grain Sorghum Performance Trials, Area E, SE Farm, Beresford, Clay County, South Dakota

Brand	Variety	50 Pct Headed Mo-day	Plant Height inch.	Early Moist %	Stalk Lodgn %	Test Wt lb/bu	Grain Yield 1985 lb/A	Grain Yield 3-yr lb/A
Funk's	G-251	7-17	38	18.0	---	57	4617	
Pioneer Brand	8855	7-20	43	25.0	---	59	6008	
P-A-G	2250	7-22	41	22.0	---	57	5247	
Western	WS-203	7-23	47	23.0	---	58	6194	
Seedtec	8502	7-23	44	24.0	---	59	5410	
Warner	W-545T	7-23	39	25.0	---	58	5061	
Warner	W-523T	7-23	44	24.0	---	58	6354	
McCurdy	M410	7-23	46	24.0	---	57	6188	
Paymaster	930	7-24	43	30.0	---	58	5992	
Seedtec	8503	7-24	43	21.0	---	57	5065	
Pioneer Brand	8790	7-25	42	21.0	---	59	4830	5115
Seedtec	8501	7-25	47	23.0	---	57	5953	
Asgrow	Dorado E	7-26	45	22.0	---	58	5440	5489
Warner	W-501T	7-26	38	24.0	---	57	5277	
McCurdy	M450	7-26	46	28.0	---	59	5481	
Pioneer Brand	8680	7-27	42	29.0	---	59	5694	5564
Sigco	507G	7-27	47	31.0	---	57	5940	6078
Funk's	G-421	7-27	43	28.0	---	56	4880	
Warner	W-551A	7-28	48	22.0	---	56	5016	
DeKalb	X-550	7-29	48	33.0	---	59	6303	
Cargill	30	7-29	43	32.0	---	56	5201	5150
Warner	W-560T	7-29	42	24.0	---	58	5589	
DeKalb	DK-39Y	8-1	46	33.0	---	55	4521	
Paymaster	1022	8-1	46	33.0	---	58	5971	
Cargill	40	8-1	45	32.0	---	58	5769	5935
Cenex	310T	8-2	48	33.0	---	58	5867	
Asgrow	Mesa	8-3	44	30.0	---	59	5652	
Western	WS-212	8-3	48	32.0	---	57	6033	
Asgrow	Corral	8-6	50	30.0	---	56	5291	4759
Funks	HW5883	8-4	41	30.0	---	56	5170	
P-A-G	2285	8-6	46	33.0	---	56	5171	
Cenex	230T	8-6	46	33.0	---	56	4695	
McCurdy	M687	8-7	39	33.0	---	53	4486	
Entry Averages		7-28	44	27.8	---	57	5465	5441
LSD (.05)							939	395
CV-%							10.6	8.2

Table 4. 1985 Corn Performance Trial, Area E, Southeast Experiment Farm, Beresford, SD

Brand and Variety	Type and Cross	Yield B/A	Pct Stalk Lodging	Percent Moisture	Performance Score Rating
Supercrost 2989	M 2X	197.5	8.3	21.8	1
Pioneer 3475	M 2X	191.6	7.9	19.9	2
Curry SC1466	L 2X	189.5	10.5	21.5	10
Fontanelle 4230	E 2X	188.9	0.7	21.3	3
McCurdy 7384	L 2X	188.6	10.4	26.3	19
McCurdy 5750	M 2X	188.5	2.9	21.5	4
PAG SX269	M 2X	187.8	2.8	21.6	5
Keltgen KS 1090	L 2X	187.8	3.5	21.4	6
Northrup King PX9345	M 2X	L87.1	12.3	19.1	9
McCurdy 5596	M 2X	187.1	52.8	22.1	63
Cargill 889	M 2X	185.9	7.5	19.6	7
Cenex 2107	L 2X	185.4	18.3	22.0	23
NC+ 3611	M 2X	185.1	5.7	20.7	12
Cenex 2110	L 2X	184.3	1.4	21.2	8
Stauffer S5340	M 2X	184.1	1.4	21.5	11
Wilson 1500B	M 2X	183.9	2.9	21.7	14
Hoegemeyer SX2625	M 2X	182.7	0.7	21.5	13
Asgrow/O's Gold	L 2X	181.5	2.9	23.3	16
Western KX-5800	L 2X	181.1	9.9	21.7	21
Pioneer 3551	M 2X	180.8	3.5	20.2	15
Western KX-6800	L 2X	180.5	5.2	22.1	17
Lynks LX4315	L 2X	178.0	5.1	25.0	27
Paymaster 2990	M 2X	177.2	3.5	20.7	18
Stauffer S5260	M 2X	177.0	18.8	21.0	31
Lynks LX4235	M 2X	176.7	6.6	21.8	24
Interstate 645	L 2X	175.8	3.0	23.4	25
Northrup King PX9540	L 2X	175.3	6.6	25.3	38
DeKalb T1100	L 2X	174.0	9.3	24.1	42
Supercrost 4304	L 2X	173.8	4.3	24.6	34
Payco SX 925	L 2X	173.1	1.4	25.3	35
Terra 3203	L 2X	173.0	4.1	23.9	33
DeKalb DK636	L 2X	172.2	1.4	25.8	43
Terra 3100	M 2X	171.5	3.6	17.7	20
Pride 6692	L 2X	171.4	2.1	24.2	37
Betaseed KH391	M 2X	170.8	0.7	18.5	22
Pioneer 3713	M M2X	170.8	3.6	20.6	26
Cenex 2109	L 2X	170.4	4.2	21.0	28
Curry SC1477	L 2X	170.1	2.8	21.7	29
NC+ 3440	E 2X	170.0	15.8	20.8	51
SDAES CHECK 9	M 2X	169.6	6.3	21.7	39
Asgrow/O's Gold 788	L 2X	169.5	0.0	26.4	53
Payco SX 860	L 2X	169.1	6.2	23.7	52
Wilson 1100B	3 2X	168.9	8.2	22.0	47

Table 4 Continued, 1985 Corn Performance Trial

Brand and Variety	Type and Cross	Yield B/A	Pct Stalk Lodged	Percent Moisture	Performance Score Rating
Keltgen KS 114	L 2X	168.6	4.1	22.8	45
Lynks LX4304	L 2X	168.3	5.8	21.4	41
Stauffer S6596	L 2X	167.8	9.9	24.3	62
Fontanelle 435	M 2X	167.2	0.8	23.5	46
Pioneer 3378	M 2X	167.1	3.6	21.8	44
Wilson 1700	L 2X	167.0	1.4	26.2	59
Paymaster 4790	M 2X	166.9	4.3	20.8	40
Western KX-5900	L 2X	166.8	5.6	21.7	48
Keltgen KS 1150	L 2X	166.8	4.2	26.8	65
NC+ 2747	E 2X	166.4	1.4	20.1	30
Cargill 937	M 2X	165.5	2.1	30.1	79
Payco SX 847	L 2X	165.4	5.9	23.6	60
SDAES CHECK 1	L 2X	165.2	3.5	26.2	68
PAG SX310	L 2X	165.1	10.2	27.2	82
Pride 6656	L 2X	164.3	2.1	21.4	50
Pioneer 3377	L 2X	164.2	14.8	25.3	84
Land-O-Lakes 555	L 2X	163.8	0.0	21.8	49
Hoegemeyer SX2595	L 2X	163.7	7.7	21.5	57
NC+ 4710	M 2X	163.0	9.2	23.0	69
Interstate 635	M 2X	162.9	10.4	19.6	55
Top Farm SX1104	L 2X	162.8	5.0	17.3	36
Payco SX 710	M 2X	162.6	33.6	21.0	85
PAG SX297	L 2X	162.3	11.7	20.0	61
Northrup King PX9527	L 2X	162.1	5.9	23.9	72
Western KX-60	L 2X	161.6	18.6	21.6	78
Cenex 2106	L 2X	161.4	0.7	17.5	32
Western KX-70	L 2X	161.4	3.6	27.1	81
Keltgen KS 1070	M 2X	161.3	3.0	21.3	56
NC+ 5990	L 2X	160.6	1.5	25.8	75
SDAES CHECK 10	M 2X	160.3	8.0	17.8	54
Stauffer S7759	L 2X	160.0	0.7	27.6	83
Hoegemeyer SX2570	M 2X	159.7	8.7	20.1	64
Keltgen KS 1050	M 2X	159.2	2.9	20.3	58
Pride 7705	L 2X	158.7	0.7	25.9	76
Terra 3260	L 2X	158.3	2.1	22.6	70
Cargill 893	M 2X	158.1	0.8	22.5	67
Land-O-Lakes 1096MR	E 2X	157.6	12.8	17.8	66
Cenex 2108	L 2X	157.3	5.8	19.0	71
Wilson 1440	M 2X	155.9	8.5	19.0	73
Interstate 646	M 2X	155.9	1.4	24.0	77
PAG SX275	M 2X	155.9	9.7	21.2	80
Land-O-Lakes X4114	M 2X	155.8	2.2	22.4	74
Fontanelle 5230	L 2X	150.1	1.6	25.5	86
DeKalb DK562	M 2X	148.1	9.6	21.4	87
Green Acres BL7	L 2X	125.3	42.1	29.6	88
Means		169.9	6.8	22.4	
LSD (.05)		5.2	CV - %	10.3	

% Root Lodged all varieties = 0.00 % Ears Dropped All Varieties = 0.00

Table 5. 1985 Soybean Performance Trial, Southeast Experiment Farm Beresford, SD, Seeded May 24, 1985.

Brand	Variety	Maturity Group	Height inches	Yield Bu/A 1985	Yield Bu/A 83-85
	Corsoy 79 (CK)*	II	40	44.4	45.4
Agripro	HP20-20	II	38	44.6	
	Hodgson 78	I	33	45.3	42.8
Dairyland	DSR151	I	35	45.3	
Dairyland	DSR171	I	37	45.4	47.0
Cenex	7461 (BL)	II	41	45.4	
	Lakota	I	42	46.3	45.7
	Hardin	I	38	46.7	43.9
	BSR 101	I	35	46.9	
Fontanelle	4250	I	40	47.0	
Payco	PS0019	I	34	47.2	
Arrowhead	8650	I	37	48.9	
	Weber (CK)	I	37	49.7	42.9
Cenex	8212	I	37	49.7	
Hofler	Opal	I	30	50.5	
	Weber 84	I	34	51.5	
Dairyland	DST 1102	I	33	51.6	
	151026	I	33	52.0	
S-Brand	S-41	II	36	52.1	
Riverside	1405	I	38	52.9	
Mustang	M-1220A	II	35	53.4	
Cenex	8017	II	39	53.6	
S-Brand	EXP-40A	II	39	54.6	
Arrowhead	2188	I	35	54.8	47.0
Agripro	AP200	II	37	55.5	
Maturity Group Mean				48.6	45.0
Maturity Group LSD (5%)				4.5	3.1
Dairyland	DSR-205	II	36	37.4	
	Amcor	II	41	39.7	44.3
Dairyland	DSR-287	II	39	41.1	
	Mead (CK)*	III	38	41.4	43.6
	Beeson 80	II	39	41.4	45.3
Dairyland	DSR-255	II	37	41.5	
Northrup King	S 15-50	I	39	41.8	
	Platte	II	38	41.8	45.7
Pride	B242	II	39	42.9	47.8
Hoegemeyer	205	II	35	43.5	
	Miami	II	36	43.5	42.6
Payco	PS0031	II	39	43.5	
	BSR 201	II	38	43.8	45.4

Table 5 Continued; 1985 Soybean Yields, SE Farm

Brand	Variety	Maturity Group	Height Inches	Yield Bu/A 1985	Yield Bu/A 83-85
Hofler	Ruby	II	38	43.9	
Sexauer	SX 2020	II	38	44.4	
Curry	CBS-301B (BL)	II	38	44.6	
	Nebsoy	II	36	44.8	49.0
Hy-Vigor	901 (BL)	II	39	44.9	
	Harcor	II	38	45.4	42.2
Agripro	HP2530	II	36	45.4	
Northrup King	S-23-03	II	35	45.5	
McCurdy	102+ (BL)	II	37	45.8	
	Corsoy 79 (CK)	II	39	45.9	47.9
S-Brand	S-46D	II	38	46.0	
DeKalb	CX283	II	36	46.3	49.9
S-Brand	S-42B (bl)	II	35	46.3	
Hofler	GEM	II	40	46.4	
McCurdy	94+	II	39	46.5	
Agripro	AP240	II	34	46.7	47.5
Pride	B216	II	38	47.0	47.5
	Wells II	II	37	47.0	43.7
Riverside	303C	II	36	47.0	
Hy-Vigor	Derby 9	II	37	47.2	
Curry	CBS-290B (BL)	II	42	47.2	
Northrup King	S-27-10	II	33	47.3	
Riverside	3033	II	37	47.3	
Diamond	D180B (BL)	II	40	47.3	48.8
Stine	2220 (BL)	II	37	47.3	51.4
	Century 84	II	37	47.6	
McCurdy	260B (BL)	II	37	47.9	
Sexauer	SX 29	II	38	48.3	
	Century	II	38	48.4	49.0
Agripro	AP2190	II	38	48.8	
	Weber 84	II	38	48.9	
Cenex	8422	II	37	49.0	
Pride	B203	II	34	49.0	47.0
Riverside	404P	II	38	49.1	
Payco	PS0021	II	35	49.5	
Terra	Decathalon	II	35	49.6	
	Elgin	II	36	49.7	45.5
Latham	551 (BL)	II	35	49.7	
	Hack	II	38	49.8	
Fontanelle	4545	II	39	49.8	47.1
Diamond	D195B (BL)	II	35	49.8	49.4
Land-O-Lakes	GO-43 (BL)	II	41	50.0	
Hy-Vigor	ROW-T-9 (BL)	II	36	50.0	

Table 5 Continued, 1985 Soybean Trials, SE Farm

Brand	Variety	Maturity Group	Height Inches	Yield, Bu/A 1985	Yield, Bu/A 83-85
Latham	500	II	35	50.0	
Terra	TB231B (BL)	II	38	50.4	
Sands	SOI 254	II	37	50.5	
DeKalb	CX264	II	35	50.6	
Terra	Hurdle	II	36	50.8	
Hofler	Jewell	II	37	50.9	
Hoegemeyer	200	II	39	50.9	
S-Brand	S-41B (BL)	II	38	51.0	
Mustang	M-1225	II	38	51.1	
Arrowhead	2244	II	38	51.4	49.4
Sands	SOI 226	II	36	51.5	47.3
Latham	650	II	35	51.9	
Mustang	EXP-12	II	35	51.9	
Diamond	D201	II	40	52.5	
Mustang	EXP-13	II	38	56.4	
Maturity Group Mean				47.3	46.8
Maturity Group LSD (5%)				4.9	1.4

BL - Blend CK - Check Variety

Table 6. 1985 Soybean Performance Trial, Tom and Lee Wintersteen Cooperators (Sioux Falls), Seeded May 25, 1985.

Brand	Variety	Maturity Group	Height Inches	Yield, Bu/A 1985	Yield, Bu/A 83-85
	Lakota	I	40	32.5	39.8
Seedtec	801	II	42	33.4	
Cenex	7461 (BL)*	II	41	34.8	
Riverside	4042	II	34	35.7	
	Corsoy 79 (CK)	II	44	37.8	40.5
	Weber (CK)	I	40	38.0	41.1
Arrowhead	2188	I	39	38.3	37.4
Cenex	8212	I	40	38.3	
	Hodgson 78	I	40	38.4	37.1
Lincoln	LS7119	I	44	38.6	
	Weber 84	I	40	39.3	41.6
Cenex	8017	II	42	39.6	
Sands	SOI 136	I	42	39.6	
Payco	PS0015	I	42	39.9	
FFR	12003	I	43	40.2	
Dairyland	DSR151	I	40	40.2	
Arrowhead	8650	I	46	40.4	

Table 6 Continued, 1985 Soybean Trials, Wintersteen Farm (Sioux Falls)

Brand	Variety	Maturity Group	Height Inches	Yield, Bu/A 1985	Yield, Bu/A 83-85
Riverside	1405	I	42	40.8	
	Hardin	I	43	41.0	36.5
Dairyland	DSR171	I	40	41.7	42.8
	151026	I	36	42.5	
S-Brand	EXP-40A	II	44	42.8	
Terra	Runner	I	34	42.8	
Payco	PS0019	I	40	43.0	
Sands	SOI 142	I	33	43.3	
Dairyland	DST 1206	I	38	44.0	
Hoegemeyer	150	I	36	44.4	
	BSR 101	I	40	49.8	
Maturity Group Mean				39.9	39.6
Maturity Group LSD (5%)				5.2	3.7
	Miami	II	41	26.8	34.6
	Mead (ck)*	III	39	28.1	
	Amcor	II	45	29.0	37.8
	Beeson 80	II	42	29.8	
Dairyland	DSR-255	II	43	30.3	
	Wells II	II	41	30.4	36.7
	Platte	II	42	30.7	35.8
	Nebsoy	II	40	31.7	35.5
Hy-Vigor	901 (BL)	II	43	31.9	
Asgrow	A2187	II	39	32.1	
Dairyland	DSR-205	II	38	32.4	
	Harcor	II	44	32.5	36.7
	Corsoy 79 (CK)	II	45	32.7	37.8
Sands	SOI 254	II	37	33.0	
	Century	II	43	33.2	
Hofler	Pearl	II	40	33.4	
Dairyland	DSR-207	II	43	34.1	39.7
	Century 84	II	38	34.3	
Asgrow	A2522	II	42	34.7	
Cenex	8017	II	45	34.9	
	Weber 84	I	42	35.4	
Terra	Hurdle	II	38	35.9	
Stine	2610	II	39	36.2	
Sands	SOI EXP 255	II	43	36.6	
Hofler	GEM	II	41	36.6	
FFR	104248	II	40	36.6	
FFR	13004	III	42	36.7	
S-Brand	S-41B (BL)	II	41	37.2	
Sexauer	SX-29	II	39	37.4	
Land-O-Lakes	GO-43 (BL)	II	43	37.4	

Table 6 Continued, 1985 Soybean Trials, Wintersteen Farm

Brand	Variety	Maturity Group	Height Inches	Yield, Bu/A 1985	Yield, Bu/A 83-85
Mustang	EXP-12	II	38	37.5	
DeKalb	CX264	II	41	37.5	
	Hack	II	38	37.7	
Mustang	EXP-13	II	45	37.7	
Riverside	4042	II	47	38.0	
Lincoln	LS7231	II	40	38.6	
S-Brand	S-41	II	42	38.6	
Northrup King	S-14-60	II	35	38.7	
	Elgin	II	41	38.7	40.1
Hofler	Jewell	II	42	39.1	
Mustang	M-1220A	II	37	39.3	
Payco	PS0021	II	40	39.6	
Asgrow	A1937	I	39	39.6	
Cenex	8422	II	40	39.6	
Lincoln	LS7221	II	41	39.8	
	BSR 201	II	36	39.9	
Hoegemeyer	200	II	39	40.2	
Northrup King	S 23-03	II	40	40.7	
Northrup King	S 15-50	I	39	40.8	
Riverside	303C	II	42	40.9	
S-Brand	S-42B(BL)	II	37	41.2	
Terra	Decathalon	II	38	41.3	
Riverside	404P	II	41	41.8	
Land-O-Lakes	L2330	II	39	41.9	
Sands	SOI 226	II	42	42.5	
Arrowhead	2244	II	39	42.5	41.7
Stine	2720	II	43	42.6	
Stine	2330	II	38	42.8	42.9
Maturity Group Mean				36.6	38.1
Maturity Group LSD (5%)				5.0	2.0

* BL = Blend   CK = Check Variety

Table 7. 1985 Soybean Performance Trial, Gordon Brockmueller, Cooperator, (Freeman), Seeded May 22, 1985.

Brand	Variety	Maturity Group	Height Inches	Yield Bu/A 1985	Yield Bu/A 83-85
Dairyland	DST 1206	I	29	32.2	
Dairyland	DSR171	I	32	32.7	
FFR	12003	I	31	33.3	
	Hodgson 78	I	30	33.9	
Dairyland	DSR151	I	30	34.7	
Payco	PS0019	I	30	35.1	
Hofler	Opal	I	27	35.4	
	BSR 101	I	28	36.0	
	Corsoy 79 (CK)*	II	32	36.0	
	Hardin	I	32	36.1	
Cenex	8017	II	34	36.9	
Arrowhead	2188	I	31	36.9	
	Lakota	I	34	37.0	
Cenex	8212	I	32	37.2	
	Weber 84	I	29	37.2	
Arrowhead	8650	I	30	37.5	
Payco	PS0015	I	32	37.6	
	Weber (CK)	I	31	37.6	
Sands	SOI 136	I	32	38.3	
	151026	I	28	40.1	
Mustang	M-1220A	II	29	42.0	
Maturity Group Mean				36.4	
Maturity Group LSD (5%)				3.8	
Dairyland	DSR-205	II	32	35.3	
Northrup King	S 23-03	II	30	36.5	
Northrup King	S 15-50	I	29	36.9	
Cenex	8422	II	31	37.6	
	Harcor	II	34	37.9	
	Corsoy 79 (CK)*	II	34	38.2	
Lincoln	LS7225	II	31	38.3	
	Weber 84	II	30	38.3	
Dairyland	DSR-207	II	32	38.6	
	Mead (CK)	III	30	38.6	
FFR	13004	III	29	38.7	
Payco	PS0021	II	26	38.9	
	Beeson 80	II	32	39.1	
	Amcor	II	35	39.3	
	Century	II	30	39.4	
Terra	TB231B (BL)	II	30	39.6	
	Platte	II	32	40.0	
	Miami	II	34	40.0	
Sands	SOI 226	II	28	40.2	
S-Brand	S-41	II	30	40.4	

Table 7 Continued, 1985 Soybean Performance, Brockmueller Farm

Brand	Variety	Maturity Group	Height Inches	Yield, Bu/A 1985	Yield, Bu/A 83-85
	Century	II	30	40.4	
Stine	2330	II	29	40.5	
Mustang	EXP-12	II	29	40.7	
Dairyland	DSR-255	II	32	40.7	
Terra	Hurdle	II	31	41.0	
Sexauer	SX 2020	II	31	41.0	
Terra	Decathalon	II	28	41.1	
Land-O-Lakes	GO-43 (BL)	II	31	41.3	
S-Brand	S-42B (BL)	II	30	41.4	
	Hack	II	30	41.4	
	Nebsoy	II	30	41.5	
Northrup King	S 27-10	II	30	41.6	
Lincoln	LS7221	II	30	41.6	
FFR	10248	II	30	41.6	
Hofler	Jewell	II	31	41.8	
	Elgin	II	27	41.8	
Hofler	Pearl	II	28	42.0	
	BSR 201	II	31	42.0	
Hoegemeyer	200	II	29	42.0	
Hy-Vigor	903 (BL)	II	35	42.1	
Sands	SOI 254	II	30	42.1	
Mustang	EXP-13	II	31	42.3	
	Wells II	II	34	42.4	
Sexauer	SX 29	II	31	42.6	
DeKalb	CX283	II	35	43.0	
Mustang	M-1225	II	30	43.5	
Hofler	GEM	II	34	44.3	
Hoegemeyer	205	II	33	44.4	
Arrowhead	2244	II	29	44.4	
S-Brand	S-41B (BL)	II	33	45.3	
Maturity Group Mean				40.7	
Maturity Group LSD (5%)				4.8	

*BL = Blend, CK=Check Variety

HERBICIDE DEMONSTRATION - CORN AND SOYBEANS CONVENTIONAL AND REDUCED TILLAGE

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

PLANT SCIENCE 85-16

S.E. FARM REPORT

Herbicide demonstration plots provide side-by-side comparisons. Herbicide products and labeled combinations are included at recommended rates for the soil type and weeds present. Experimental herbicides which may be available in the near future are also included. Each treatment is applied to a disked (reduced tillage) or plowed seedbed.

Methods: Plots were established in 1985 corn filler area. Conventional plowed seedbed was fall plowed and disked in the spring. Reduced tillage area was chisel plowed in late fall and disked in the spring. Plots were 20 x 50 feet in each tillage system. Herbicides were applied using a plot sprayer equipped with flat fan nozzles set to deliver 20 gpa at 40 psi and 3 mph.

Preplant incorporated treatments were incorporated twice with a S-tine field cultivator/mulch treader operated 3-4 inches deep. Shallow preplant incorporated treatments were incorporated with a single pass of the above equipment at 2 inches deep. Half of each plot was cultivated at lay-by.

Results The performance of treatments is presented in the following Table (1). Visual evaluations in the uncultivated area are based on two observations per plot on July 13. A 3-year average for early season weed control is also indicated.

Conditions were favorable for performance of most herbicides. Tillage effects were apparent in 1985. Twenty-six treatments in the plowed area and one in the disked seedbed provided at least 90% grass control. Several combination treatments provide consistent control of both grass and broadleaved weeds. Sixteen treatments on the plowed seedbed have provided at least 90% control for the three year period.

Table 1. 1985 Corn Herbicide Demonstration, Southeast Research Farm

		Percent Weed Control							
		1985				3 Year Average			
		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	78	82	88	86	70	63	89	72
Eradicane+atrazine	3+1	88	92	84	96	74	83	87	93
Eradicane+Bladex	3+2	82	90	86	94	73	74	86	87
Eradicane+Bladex+ atrazine	3+1.5+.5	86	93	90	96	75	79	87	93

Table 1. Corn Herbicide Demonstration, 1985 Continued

		Percent Weed Control							
		1985				3-year Average			
		Disked		Plowed		Disked		Plowed	
Treatment	lb/A act.	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf
Sutan+	4	78	82	82	49	68	51	84	53
Sutan+ + atrazine	4+1	85	91	90	92	75	84	87	89
Sutan+ + Bladex+ atrazine	4+1.5+.5	91	95	94	94	81	89	89	91
*Marathon	4	84	81	83	48	--	--	--	--
*Marathon+Bladex	4+2	88	90	86	88	--	--	--	--
SHALLOW PREPLANT INCORPORATED									
Atrazine	2.5	79	92	89	96	70	92	81	95
Lasso	3	56	68	81	86	59	64	73	80
Dual	2.5	66	58	86	81	73	56	80	74
PREEMERGENCE									
Check	--	0	0	0	0	--	--	--	--
Atrazine	2.5	88	98	89	96	83	96	89	96
Bladex	3	60	73	76	62	66	55	80	72
Lasso	3	64	58	89	86	68	57	87	84
Dual	2.5	72	50	90	81	76	47	88	78
Ramrod	6	55	20	92	35	54	29	87	51
*Harness	2.5	65	69	94	86	74	73	94	92
Lasso+atrazine	2+1	75	78	92	95	75	86	94	96
Lasso+Bladex	2+2	69	59	90	88	79	69	93	91
Dual+atrazine	2+1	78	85	94	96	86	83	94	95
Dual+Bladex	2+2	78	78	94	92	83	66	94	93
Ramrod+atrazine	4+1	60	86	91	94	--	--	91	93
Ramrod+Bladex	4+2	65	58	92	62	72	44	90	76
Lasso+Bladex+ atrazine	2+1.5+.5	78	73	92	86	80	81	94	92
Dual+Bladex+ atrazine	2+1.5+.5	83	76	93	90	86	85	95	95
Lasso+Bladex+ Sencor/Lexone	2+1.5+ .25	71	78	94	95	80	76	96	96
Lasso+atrazine+ Sencor/Lexone	2+1+.25	72	83	96	96	84	88	96	97
Dual+Bladex+ Sencor/Lexone	2+1.5+ .25	80	84	97	96	86	82	97	96
Dual+atrazine+ Sencor/Lexone	2+1+.25	83	89	98	98	86	91	97	98
Lasso+Bladex+ atrazine+ Sencor/Lexone	2+1+.5+ .25	76	84	97	98	85	89	97	98
EARLY POSTEMERGENCE									
Prowl+atrazine	1.5+1	78	88	92	94	79	89	92	94
Prowl+Bladex	1.5+1.5	82	70	92	85	83	64	90	87

Table 1 Continued, 1985 Corn Herbicide Demonstration

Treatment	lb/A act	1985 Disked Gr	1985 Disked Bdlf	1985 Plowed Gr	1985 Plowed Bdlf	3 year Average Disked Gr	3 year Average Disked Bdlf	3 year Average Plowed Gr	3 year Average Plowed Bdlf
POSTEMERGENCE									
Atrazine+crop oil	1.5+1 qt.	55	91	82	91	75	94	78	95
Bladex+X-77	1.5+.5%	81	45	94	62	81	50	77	74
*Tandem+Bladex 80W+X-77	.5+1.5+ .5%	86	62	95	60	85	58	83	78
*Tandem+Bladex 80W+ atrazine+X-77	.5+.75+ .75+.5%	85	86	96	94	83	91	95	96
PREEMERGENCE & POSTEMERGENCE									
Ramrod&Banvel	4&.5	82	90	94	94	75	75	93	94
Ramrod&2,4-D amine	4&.5	79	78	89	80	68	68	90	87
Ramrod&Basagran	4&1	68	84	86	84	71	68	89	87
Ramrod&bromoxynil	4&.38	62	74	81	74	68	67	85	84
Ramrod&bromoxynil+ 2,4-D	4&.38+ .25	62	78	82	88	--	--	--	--
Ramrod&bromoxynil+ 2,4-D	4&.38+ .25	81	84	80	82	--	--	--	--
Ramrod&bromoxynil+ atrazine	4&.38+.5	81	84	80	82	--	--	--	--

Gr = Yellow, green foxtail (moderate)
Bdlf = Tall water hemp, redroot pigweed, lambsquarters (heavy)
*Experimental

SOYBEAN HERBICIDES

Preplant and preemergence treatments were applied and Corsoy 79 soybeans were planted May 24. Postemergence treatments were applied July 2. Total rainfall the first and second week after planting was 1.26 and 0.83 inches, respectively.

RESULTS: The performance of treatments is presented in the following table. (#2) Visual evaluations are based on two observations per plot on July 13. A three-year average for early season weed control is also included. Preplant and preemergence grass control herbicides provided very good to excellent control. Combinations provided a high level of broadleaf control. Grass control in several combinations was slightly reduced when compared to the grass herbicide used along at full rate. Four treatments in the plowed seedbed have provided over 90% control for the three-year period.

Table 2. 1985 Soybean Herbicide Demonstration, SE Farm

		Percent Weed Control							
		1985				3 Year Average			
		Disked		Plowed		Disked		Plowed	
Treatment	lb/A act.	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf
PREPLANT INCORPORATED									
Check	—	0	0	0	0	—	—	—	—
Treflan	.75	76	77	87	88	75	67	90	79
Sonalan	1.1	73	70	89	84	—	—	—	—
Prowl	1.25	83	66	88	83	72	64	88	79
Vernam	2.5	50	58	76	78	49	53	75	55
Reward	2.5	58	48	80	74	—	—	—	—
Treflan+Amiben	.75+2	92	92	96	97	79	77	90	86
Treflan+Sen/Lex	.75+.38	87	87	96	97	77	82	91	89
Reward+Treflan	2.5+.75	69	80	80	83	—	—	—	—
Treflan+Amiben+ Sencor/Lexone	.75+2+.25	77	84	87	92	66	82	90	90
Reward+Sen/Lex	2.5+.38	68	88	79	85	—	—	—	—
SHALLOW PREPLANT INCORPORATED									
Lasso	3	52	54	82	77	58	54	84	75
Dual	2.5	69	32	86	64	71	46	87	64
Lasso+Modown	2+1.5	48	48	82	68	56	55	80	74
Treflan+Modown	.75+1.5	73	45	91	49	58	52	85	68
PREPLANT INCORPORATED & PREEMERGENCE									
Treflan+Sencor/ Lexone&Sencor/Lexone	.75+.25&.38	90	89	98	98	—	—	—	—
Treflan&Sencor/Lexone	.75&.5	80	91	98	98	75	88	97	97
Treflan&Modown	.75&2	72	90	94	70	67	77	91	82
Treflan&Amiben	.75&2	80	82	91	90	69	78	91	88
Treflan&Lorox	.75&1	73	79	90	87	62	76	84	86
Reward&Dual	2.5&2	90	94	94	96	—	—	—	—
PREEMERGENCE									
Lasso	2.5	58	80	88	88	—	—	—	—
Amiben	2	30	75	57	79	30	58	66	73
Check	—	0	0	0	0	—	—	—	—
Lasso	3	65	75	92	91	59	63	92	82
Dual	2.5	74	78	90	88	76	69	92	82
*Command	1.25	62	74	87	78	—	—	—	—
*Command+Sen/Lex	1+.5	82	95	96	98	—	—	—	—
Lasso+Sencor/Lexone	2+.5	69	90	86	92	71	84	90	94
Dual+Sencor/Lexone	2+.5	78	89	87	93	78	83	91	94
Lasso+Amiben	2+2	72	88	84	92	70	78	88	89
Dual+Amiben	2+2	79	86	86	92	75	75	89	88
Lasso+Lorox	2+1	62	86	74	80	59	69	83	81
Dual+Lorox	2+1	69	81	78	78	68	63	85	84

Table 2 Continued; 1985 Soybean Herbicide Demonstration

Treatment	lb/A act.	Percent Weed Control* 1985 Disked Gr	Bdlf	1985 Plowed Gr	Bdlf	3-year Average Disked Gr	Bdlf	3-year Average Plowed Gr	Bdlf
Preemergence (Continued)									
Lasso+CIPC	2+2	58	85	74	74	52	62	77	77
Lasso+Modown	2+1.5	72	85	78	74	67	74	85	83
*Harness	2.5	84	91	90	92	—	—	—	—
*Harness+Sencor/ Lexone	2+.5	88	94	86	96	—	—	—	—
Lasso+Lorox+Sen/Lex	2+1+.25	68	93	78	85	65	82	88	91
Dual+Lorox+Sen/Lex	2+1+.25	86	95	82	85	81	82	90	92
Lasso+Amiben+ Sencor/Lexone	2+2+.25	80	94	85	91	71	80	89	94
PREEMERGENCE & POSTEMERGENCE									
Lasso&Basagran	2&1	48	92	73	91	56	62	75	64
*Lasso&Blazer/Tackle	2&.5	62	94	76	93	66	84	80	90
Lasso&Dynap	2&2.5	52	94	72	82	58	86	75	83
*Lasso&Blazer/Tackle+ Basagran+oil	2&.38+.25+1qt	52	92	81	90	64	90	85	91
POSTEMERGENCE									
*Verdict+oil	.2+1 qt	78	20	80	28	—	—	—	—
*Trophy+oil	.5+1 qt	65	0	65	0	—	—	—	—
*Trophy+Basagran+ Blazer/Tackle+X-77	.5+.5+.25+ .5%	38	90	48	82	—	—	—	—
Poast+oil	.2+ 1 qt.	68	0	69	0	62	2	70	1
Fusilade 2000+oil	.2+1 qt	—	—	—	—	—	—	—	—
*Poast+Blazer/Tackle+ Basagran+oil	.3+.25.5+ 1 qt.	—	—	—	—	—	—	—	—

Gr = Yellow foxtail, green foxtail (heavy)
Bdlf = T. waterhemp, redroot pigweed, kochia (heavy)
* Experimental

S.E. FARM REPORT

HERBICIDE DEMONSTRATION NO-TILL CORN AND SOYBEANS

L. J. Wrage and P. O. Johnson

PLANT SCIENCE 85-17

Introduction

Plots were established to demonstrate several herbicide programs used in no-till corn and soybeans. Treatments included examples of early preplant, preplant, planting time and postemergence herbicides used in no-till systems rather than all product combinations.

Methods Three no till rotations were used.

No-till Corn in Soybean Stubble. Plots were established in 1984 soybean crop residue.

No-till Soybeans in Corn Stalks. Plots were established in 1984 corn crop residue.

No-Till Soybeans on Oat Stubble. Plots were established in 1984 oat crop residue.

Plot areas received no fall tillage in 1985. Plot size was 20 x 50 feet per treatment. Herbicides were applied with a plot sprayer equipped with flat fan nozzles set to apply 20 gpa at 40 psi. Crops were planted into existing crop residue with a modified commercial slot-type planter.

Fall herbicides were applied October 21. Early preplant treatments were applied April 12 before weeds emerged. Preplant treatments were applied May 28 when weed growth was 6 to 8 inches. Plots were planted and preemergence (planting time) treatments applied June 8 for all crops. Postemergence treatments were applied July 2.

Results Fall and early preplant herbicides were applied timely and provided very good initial control. However, prolonged wet weather and heavy rainfall delayed further applications and planting considerably beyond the intended planting date. Weed growth was beyond recommended stages for some burndown or postemergence herbicides. The data presented below indicate promising levels of control could be expected under more normal conditions. Row cultivation or postemergence herbicides could have been used to maintain acceptable levels of control in commercial situations. The results demonstrate the importance of timeliness and flexibility in no-till programs. Over 90% grass and broadleaf control was achieved with at least one treatment in each demonstration.

Table 1. 1985 No-Till Soybeans in Stubble, SE Farm

Plot	Fall	E. Preemergence	Preemergence	Postemergence	% Control Gr	% Control Bdlf
1	Bladex(3)				56	45
2		Sen/Lex (.75)	Lasso (3)		65	75
3			Sen/Lex+Lasso(.5+3)		86	60
4		Prowl (1.5)	Amiben+paraquat+X-77 (3+.38+.5%)		78	65
5		Surflan+Sen/Lex (1.25+.5)			22	50
6		Harness+Sen/Lex (2.5+.5)			70	35
7		Command+Sen/Lex (.5+.5)			69	78
8		Goal+2,4-D ester+Dual (.4+.5+2.5)			88	83
9		2,4-D+oil+Lasso+Sen/Lex (1+1 qt+3+.5)			97	90
10			Paraquat+X-77+Sen/Lex+Dual (.38+.5%+5+3)		78	55
11			Roundup+Sen/Lex+Lasso (.75+.5+3)		85	28
12			Roundup+Harness (.75+2.5)		68	45
13			Paraquat+X-77+Lasso+Amiben (.38+.5%+3+2)		93	48
14			Paraquat (.38)	Blazer+Basagran+ Poast+oil (.5+.75+.3+1 qt)	90	55
15			Paraquat+X-77(.38+.5%)	Blazer+Basagran+ Poast+oil (.5+.75+3+1 qt)	58	23

( ) = lb/A act.

Gr = Green foxtail, yellow foxtail
Bdlf=Tall water hemp, lambsquarters, smartweed

Table 2. 1985 No-Till Soybeans in Corn Stalks

Plot	Fall	E. Preemergence	Preemergence	Postemergence	% Control Gr	% Control Bdlf
1	Sencor(1)	Sen/Lex (.75)			60	62
2		Sen/Lex (.5)	Lasso (3)		62	32
3		Sen/Lex (.75)	Lasso (3)		72	48
4		Prowl (1.5)	Amiben+Paraquat+X-77 (3+.38+.5%)		78	40
5		Surflan+Sen/Lex (1.25+.5)			77	32
6		Dual(3)	Paraquat+X-77 (.38+.5%)	Blazer+Basagran+ X=77 (.38+.75+.5%)	95	0
7		Dual (2)	Dual+Paraquat+ X-77 (1+.38+.5%)	Blazer+Basagran + X-77 (.38+.75+.5%)	95	0
8		Dual+Sen/Lex(2+.33)	Dual+Sen/Lex (1+.25)		85	48
9		Dual+Sen/Lex (3+.5)			84	10
10		Dual+Sen/Lex (2+.5)	Dual(1)		72	25
11			Roundup+Harness(.75+2.5)		88	55
12			Roundup+Sen/Lex+Lasso (.74+.5+3)		82	45
13			Paraquat+X-77+Sen/Lex+Dual (.38+.5%+.5+3)		89	10
14			Paraquat+X-77+Lasso+Amiben (.38+.5%+3+2)		65	5
15			Paraquat (.38)	Blazer+Basagran+ Poast+oil (.5+.75+.3+1 qt)	78	45
16			Paraquat+X-77 (.38+.5%)	Blazer+Basagran + Poast+oil(.5+.75+.3+1 qt)	78	45

( ) = lb/A act

Gr=Green foxtail, yellow foxtail
Bdlf=Tall water hemp, lambsquarters, smartweed

Table 3. 1985 No-Till Corn, SE Farm

Plot	Fall	E. Preemergence	Preemergence	Postemergence	% Control Gr	% Control Bdlf
1	Atrazine(3)				89	96
2		Bladex+atrazine+Dual (2.5+.5+2.5)			92	84
3		Bladex+atrazine+Dual (2.5+.5+2.5)	Dual(1.5)		94	75
4		Bladex (3)	Lasso (3)		86	45
5		Atrazine (3)	Dual (2.5)		95	98
6		Bladex (2.5)			91	55
7		Dual (1.5)	Banvel+atrazine(.5+3)	Bladex(1.5)	95	15
8		Dual (2.5)	Dual+Banvel+atrazine (1+.5+3)		91	68
9			Paraquat+X-77+Bladex+atrazine+Dual (.38+.5%+2.5+.5+2)		69	22
10			Roundup+Bladex+atrazine+Dual (.75+2.5+.5+2.5)		95	72
11			Paraquat+X-77+Bladex+Lasso (.38+.5%+2.5+2.5)		82	0
12			Roundup+Harness+Bladex (.75+2.5+2.5)		91	58
13			2,4-D+oil+Bladex+atrazine+Lasso (.75+1 qt+2.5+.5+2)		89	25
14			Bladex+atrazine+Lasso (2.5+.5+2)		88	32
15			Paraquat+X-77+Dual (.38+.5%+2.5)		84	18
16				Atrazine+Oil (1.5+1 qt)	72	82

( ) = lb/A act.

Gr=Green foxtail, yellow foxtail
Bdlf = Tall water hemp, lambsquarters, smartweed

S.E. FARM REPORT

OATS RESEARCH

D. L. Reeves

PLANT SCIENCE 85-18

The herbicide test was probably the one of greatest interest to most people this year. In this test, we used 10 varieties and sprayed at the recommended stage with 1/4, 1/2 or 3/4 lb/acre of 2,4-D or MCPA.

This was the second year it has been planted here. At the 1/2 lb/acre rate, yield losses varied from zero to 33 percent depending upon the variety. The average yield loss for this rate of 2,4-D was 16 percent while MCPA averaged only a 4 percent loss. Both 2,4-D and MCPA treatments averaged 3.3 percent reductions in test weights. Lodging was increased by both chemicals. The unsprayed varieties averaged 9% lodging while MCPA treated averaged 21% and the 1/2 lb rate of 2,4-D averaged 43%. These increases in lodging are greater than previously observed, but show the same trend. Spray treatments had no effect on plant height or rust incidence.

Most of the oats grown here in 1985 were part of our varietal development program. It is our farthest south testing site and is therefore used extensively for our early lines. In 1985 we had selections being tested in eight different tests at this station. A total of 245 lines were tested here. There were 800 oat plots for yield in our tests. Seven of our most promising lines were tested statewide and were included here in the Standard Variety Oat Trials.

Two regional tests are grown here. The Uniform Early Oat test is grown in about 12 states each year. It contains new entries from various states which are being considered for release as a new variety. This year there were 20 entries in this test. The other regional test is the Tristate. It is grown at three locations in each of South Dakota, North Dakota and Minnesota. Each state can have up to 10 entries. Every entry must be new each year. In this cooperative test, this location is the farthest south.

The selections in the Purity Increase tests are only one year away from regional testing. They were split into an early and late test with 36 entries in each test. These selections have been tested for five years prior to this test. Our Advanced test had 38 early entries and 29 late ones. In addition, an F3 Early test had 44 different crosses. These were all early maturing selections and was only the second year they've been planted in the field to be tested.

VOLUNTEER CORN CONTROL IN SOYBEANS WITH BAS 517 02H

W.E. Arnold, M.A. Wrucke, and D.A. Vos

PLANT SCIENCE 85-19

S.E. FARM REPORT

As farmers continue to adopt conservation tillage techniques, volunteer corn will become more troublesome. Several new herbicides are presently being evaluated for postemergence activity on this week. The purpose of this study was to compare one of these new herbicides to Poast for volunteer corn control at several rates and stages of application.

The experiment area was a silty clay loam soil with 2.7% organic matter and 6.8 pH. Corsoy 79 soybeans were planted on May 24 in 30 inch rows at 60 lb/A. All treatments were replicated four times. The 10-inch treatments were applied on July 1 when the soybeans were 7 inches tall and the volunteer corn was 8-12 inches tall. Weather conditions at the time of application were cloudy skies, 94% humidity, and 83° F air temperature. There was a total of 0.10 inches of rainfall during the two weeks following application. The 16-inch treatments were applied on July 9 when soybeans were 10 inches tall and volunteer corn was 12-16 inches tall. Skies were clear, humidity 98%, and air temperature of 65° F. Rainfall the first and second weeks after application was 0.15 and 0.09 inches, respectively. All treatments were applied with a tractor mounted sprayer in 20 gallons of water per acre and at 42 psi.

Excellent control of volunteer corn was attained with all rates of BAS 517, except the 0.05 lb/A rate, when applied to 10 inch volunteer corn. Comparable control was achieved at the 16 inch stage with BAS 517 applied at 0.1 and 0.15 lb/A. All treatments yielded significantly more than the check with little difference in yield noted between herbicide treatments.

Sethoxydim = Poast BAS 517 = Experimental

Table 1. Volunteer Corn Control in Soybeans With BAS 517 02 H

Treatment a/	Rate	Time of Applic.	% Control Voco b	% Control Voco b/	Yield
	(lbs/A)	(height)	8-1-85	10-17-85	(bu/A)
Bas 517	0.05	10-in.	63	82	46.7
Bas 517	0.075	10-in.	95	95	46.0
Bas 517	0.10	10-in.	99	98	48.1
Bas 517	0.15	10-in.	99	99	46.5
Sethoxydim	0.20	10-in.	99	99	48.9
Bas 517	0.05	16-in.	52	77	46.0
Bas 517	0.075	16-in.	80	89	42.9
Bas 517	0.10	16-in.	93	93	44.9
Bas 517	0.15	16-in.	92	95	45.5
Sethoxydim	0.20	16-in.	62	86	41.3
Weedy Check			0	0	16.3
LSD (0.05)			17	7	4.4

a/ All treatments applied with crop oil concentrate at 1.0 quart per acre
b/ Voco = Volunteer Corn

S.E. FARM REPORT

EXPERIMENTAL PREEMERGENCE AND POSTEMERGENCE HERBICIDES FOR WEED CONTROL

W.E. Arnold, M.A. Wrucke, and D.A. Vos

PLANT SCIENCE 85-20

New herbicides are constantly being researched for weed control in corn. Several herbicides show good promise when applied along or in combination with herbicides presently labeled. Most of the herbicides applied in this test were tank mixed with atrazine in order to provide broad spectrum weed control and reduce carryover potential. Several of the herbicides in this trial are experimental at this time, but may obtain label in future years.

The experiment was established on a silty clay loam soil with 2.7% organic matter and pH 6.8. 'Sokota 680' corn was planted on May 10 in 30 inch rows at 22,500 plants per acre. All treatments were replicated four times. Preemergence treatments were applied on May 13 when cloudy skies, 100% humidity, and 50° F air temperature. Rainfall the first and second weeks after application was 1.15 and 1.29 inches, respectively. Postemergence treatments were applied on June 4 under clear skies, 92% humidity and 55° F air temperature. Rainfall the first and second weeks after application was 0.13 and 0.50 inches, respectively. At the time of the postemergence treatments, the corn had 4 leaves, foxtail 3 leaves and smooth pigweed 1-2 inches. All treatments were applied with a tractor mounted sprayer in 20 gallons of water per acre.

Good weed control was observed with nearly all treatments in this experiment. SC-0051 gave best grass control at rates of 1.5 lb/A or greater when applied preemergence and at 1.0 lb/A when applied postemergence. SC-0774 also shows good potential as a preemergence herbicides at all rates tested.

Table 1. Experimental Preemerge and postemergence herbicides for grass and broadleaf weed control in corn, SE Farm 1985.

Treatment	Rate	Time of Applic.	% Control Fota a/	% Control Smpw b/	Yield
	(lb/A)		6-24-85		(bu/A)
Alachlor +	2.0 +	PRE			
atrazine	0.5 +	PRE			
PPG-1259	0.1	PRE	97	98	143
Alachlor +	2.0 +	PRE			
atrazine +	0.5 +	PRE			
PPG-1013	0.15	PRE	96	99	126
Alachlor +	2.0 +	PRE			
atrazine +	0.5 +	PRE			
PPG-844	0.15	PRE	97	99	137

Table 1 Continued; Experimental Herbicides for grass control in corn

Treatment	Rate	Time of Applic.	% Control Fota a/	% Control Smpw b/	Yield
	(lb/A)		6-24-85		(bu/A)
Alachlor +	2.0	PRE			
PPG-1013	0.15	PRE	97	98	143
Alachlor +	2.0 +	PRE			
PPG-1259	0.15	PRE	96	99	154
Alachlor +	2.0 +	PRE			
PPG-844	0.15	PRE	94	98	143
Alachlor +	2.0 +	PRE			
atrazine +	0.5 +	POST			
PPG-1259	0.1	POST	97	99	135
Alachlor +	2.0 +	PRE			
PPG-1259	0.15	POST	98	99	126
SC-0774	0.5	PRE	95	96	132
SC-0774	1.0	PRE	98	99	137
SC-0774 +	0.5+	PRE			
atrazine	1.5	PRE	98	98	146
SC-0774 +	1.0 +	PRE			
atrazine	1.5	PRE	98	98	123
SC-0051	1.0	PRE	69	99	151
SC-0051	1.5	PRE	84	99	149
SC-0051	2.0	PRE	91	99	126
SC-0051 +	1.0 +	PRE			
atrazine	1.5	PRE	90	99	109
SC-0051 +	1.5 +	PRE			
metolachlor	1.5	PRE	97	99	135
Metolachlor	2.0	PRE	98	97	112
Metolachlor +	1.5 +	PRE			
atrazine	1.5	PRE	96	99	146
Atrazine	1.5	PRE	84	93	121
SC-0051	0.5	POST	84	99	137
SC-0051	1.0	POST	92	98	126
Weedy Check			0	0	78
LSD (0.05)			13	3	40

a/ Fota - Foxtail spp
b/ Smpw = Smooth pigweed
Alachlor = Lasso
atrazine = Aatrex
PPG 1013 = Experimental
SC 0774 = Experimental

Metolachlor = Dual
PPG 844 = Experimental
PPG 1259 = Experimental
SC-0051 = Experimental

EVALUATION OF EXPERIMENTAL HERBICIDES FOR WEED CONTROL IN SOYBEANS

W.E. Arnold, M.A. Wrucke, and D.A. Vos

S.E. FARM REPORT

PLANT SCIENCE 85-21

Most currently labeled soybean herbicides control a limited spectrum of weeds. New discoveries in herbicide chemistry have produced compounds which control a wider range of species. This study was conducted to evaluate the weed control potential of several new soybean herbicides.

The experimental area had been in a corn-soybean rotation for 1 year. Soil type at the site is a silty clay loam with 9% sand, 59% silt, and 32% clay. The site is well drained, has an organic matter content of 2.7% and a pH of 6.8. Corsoy 79 soybeans were planted on June 7, 1.5 inches deep in 30 inch rows at 60 lb/a. Preplant incorporated treatments were applied on June 7 and incorporated with 2 passes of a field cultivator at right angles. Preemergence treatments were also applied on June 7 after soybean planting. Soil condition at planting time was fine with moisture present at the 2 inch depth. Rainfall the first week after planting totaled 0.61 inches. Post emergence applications were made on July 1 when soybeans were 2 trifoliate, foxtail had 2-3 leaves, redroot pigweed was 1-2 inches, and lambsquarter was 1-2 inches. Application of postemergence treatments was made at 10:30 pm under cloudy skies when relative humidity was 90%, air temp. was 79° F, wind was calm, crop canopy was dry, soil moisture (2 inch depth) was moist, and soil temperature was 74° F. Rainfall totaled 0.10 inches for the first two weeks after application. All treatments were applied with a tractor mounted sprayer in 20 gallons of water per acre at 42 psi.

Good weed control was attained with all combinations of chloramben. Adequate control was achieved when norflurazon was mixed with metribuzin. Poor control of redroot pigweed with the norfurazon and bentazon treatment resulted in reduced yield. Preplant incorporated and preemergence application of AC 263,499 provided good broadleaf weed control and adequate foxtail control. When AC 263,499 was applied postemergence, broadleaf weed control was reduced and soybean yield at the two lowest rates was reduced.

Table 1. Evaluation of Experimental Herbicides for Weed Control in Soybeans, SE Farm 1985.

Treatment	Rate	Time of Applic.	% Control			Yield
			Fota a/	Pesw b/	Rrpw c/	
	(lb/A)			7-10-85		(lb/A)
Chloramben +	1.8 +	PPI				
trifluralin	0.75	PPI	88	93	93	32.6
Chloramben +	1.8 +	PPI				
metribuzin	0.25	PPI	88	92	91	30.0
Chloramben +	1.8	PPI				
ethalfluralin	0.9	PPI	90	93	93	31.2
AC 263,499	0.063	PPI	83	90	91	33.3
AC 263,499	0.094	PPI	83	88	88	33.4
AC 263,499	0.125	PPI	82	91	91	31.3
Pendimethalin+	1.25 +	PPI				
metribuzin	0.38	PPI	93	90	91	24.9
Chloramben +	1.8 +	PRE				
alachlor	2.0	PRE	88	91	93	31.3
Chloramben +	2.25 +	PRE				
alachlor	2.0	PRE	86	85	87	29.8
Alachlor (ME) +	2.25 +	PRE				
metribuzin	0.38	PRE	92	78	93	33.1
AC 263,499	0.063	PRE	73	85	82	34.1
AC 263,499	0.094	PRE	82	85	83	32.5
AC 263,499	0.125	PRE	80	90	92	31.3
Norflurazon+	1.0 +	PRE				
metribuzin	0.38	PRE	67	86	82	28.5
Norflurazon +	1.25 +	PRE				
metributzin	0.38	PRE	72	86	81	29.2
Norflurazon +	1.0 +	PRE				
bentazon	1.0	POST	53	73	58	21.3
AC 263,499 d/	0.063	1-2L	75	76	80	25.4
AC 263,499 d/	0.094	1-2L	81	76	77	25.1
AC 263,499 d/	0.125	1-2L	77	80	82	31.2
Bentazon +	0.75 +	1-2L				
sethoxydim +	0.188 +	1-2L				
crop oil	2.00	1-2L	92	82	60	11.7
Weedy Check			0	0	0	6.2
LSD (0.05)			13	11	9	7.2

a/ Fota = Foxtail spp
b/ Pesw = Pennsylvania smartweed
c/ Rrpw = Redroot Pigweed
d/ Applied with Tween 20 surfactant at 0.25 % V/v.

chloramben = Amiben
metribuzin = Sencor/Lexone
pendimethalin = Prowl
alachlor (ME) = Lasso microtech
sethoxydim = Poast
AC 263,499 = Experimental
trifluralin = Treflan
ethalfluralin = Sonalan
alachlor = Lasso
bentazon = Basagran
norflurazon = Zorial (experimental)

TRIDIPHANE AND R/S-010 APPLICATIONS FOR WEED CONTROL IN CORN

W.E. Arnold, M.A. Wrucke and D.A. Vos

PLANT SCIENCE 85-22

S.E. FARM REPORT

Triazine herbicides have provided consistent broadleaf weed control in corn for many years. Grassy 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 silty clay loam soil with 2.7% organic matter and 6.8 ph. "Sokota 680" corn was planted on May 10 in 30 inch rows at 22,500 plants per acre. All treatments were replicated four times. Preemergence treatments were applied on May 13 under cloudy skies, 100% humidity, and 50° F air temperature. Rainfall the first week after application was 1.15 inches and 1.29 inches the second week after application. The spike treatments were applied on May 24 just after the corn had emerged. The skies were clear, humidity of 60%, and air temperature of 75° F. Rainfall the first and second weeks after application was 1.26 and 0.83 inches, respectively. The 2-3 leaf treatments were applied on June 5 to 4 leaf corn, 3 leaf foxtail and 1-2 inch smooth pigweed under clear skies, 92 humidity, and 55° F air temperature. Rainfall the first and second weeks after application was 0.13 and 0.50 inches, respectively. All treatments were applied with a plot sprayer calibrated to deliver 20 gallons of water per acre at 42 psi.

The addition of tridiphane to atrazine resulted in improved foxtail and smooth pigweed control at the spike stage. Tridiphane did not have a significant effect on weed control when applied to 2-3 leaf corn. The addition of RIS-010 produced little effect on weed control at the 2-3 leaf stage.

Table 1. Tridiphane and R/S-010 applications for weed control in corn.

Treatment	Rate	Time of Applic.	% Control Fota a/	% Control Smpw b/	Yield
	(lbs/A)		6-24-85		(bu/A)
Tridiphane +	0.5 +	Spike			
atrazine c/	1.5	Spike	91	87	149
Tridiphane +	0.75+	Spike			
atrazine c/	1.5	Spike	87	83	177
Tridiphane +	0.5 +	Spike			
atrazine +	0.8 +	Spike			
cyanazine	0.8	Spike	94	85	171
Tridiphane +	0.5 +	Spike			
atrazine +	0.8	Spike			
cyanazine d/	0.8	Spike	91	84	174

Table 1 Continued, Tridiphane and R/S-010 Applications in corn

Treatment	Rate	Time of Applic.	% Control Fota a/	% Control Smpw b/	Yield
	(lbs/A)		6-24-85		(bu/A)
Tridiphane +	0.5+	Spike			
cyanazine	1.6	Spike	87	83	168
Atrazine c/	2.0	Spike	68	65	165
Tridiphane +	0.5 +	2-3L			
atrazine c/	1.5	2-3L	85	81	165
Tridiphane +	0.75	2-3L			
atrazine c/	1.5	2-3L	86	80	165
Tridiphane +	0.5+	2-3L			
atrazine +	0.8 +	2-3L			
cyanazine	0.8	2-3L	79	84	137
Tridiphane +	0.5 +	2-3L			
atrazine c/	0.8 +	2-3L			
cyanazine d/	0.8	2-3L	83	85	157
Tridiphane +	0.5 +	2-31			
cyanazine	1.6	2-3L	70	78	154
Atrazine c/	1.0	2-3L	85	80	157
Alachlor (ME) +	2.0 +	PRE			
atrazine +	1.0 +	PRE			
Cyanazine	1.0	PRE	97	94	143
R/S-010 +	0.9 +	2-3L			
atrazine	1.0	2-3L	77	84	157
R/S-010 +	0.9 +	2-3L			
atrazine	1.5	2-3L	85	79	163
R/S-010 +	0.9 +	2-3L			
atrazine c/	1.0	2-3L	85	84	163
R/S-010 +	0.9 +	2-3L			
atrazine c/	1.5	2-3L	93	90	143
Alachlor (ME) +	2.5 +	2-3L			
R/S-010 +	0.9	2-3L			
atrazine	1.0	2-3L	87	82	146
Alachlor (ME) +	2.5 +	PRE			
R/S-010 +	0.9 +	2-3L			
atrazine	1.0	2-3L	96	91	151
R/S - 010	0.9 +	2-3L			
cyanazine	1.0	2-3L	75	79	140
R/S-010 +	0.9 +	2-3L			
cyanazine	1.5	2-3L	83	82	157
Alachlor (ME) +	2.5 +	PRE			
dicamba	0.25	2-3L	95	89	165
Alachlor (ME) +	2.5 +	PRE			
atrazine	1.5	PRE	96	90	143
Weedy Check			0	0	109
LSD (0.05)			17	16	36

a/ Fota = Foxtail spp atrazine = Aatrex Cyanazine = Bladex
b/ Smpw - Smooth Pigweed Alachlor (ME) = Lasso microtech
c/ Applied with crop oil concentrate at 1 quart per acre; dicamba=Banvel
d/ Applied with vegetable oil at 1 pint per acre
tridiphane=experimental R/S-010=experimental

Table 1, Continued Experiment 411, SE Station, 1985

Variety	Dev/Supplier	1984 Forage Yield (tons DM/A)	*Winterkill (Avg %)	1985 Forage Yield (tons DM/A) 5/28	7/2	8/19	10/8	4-cut total	2-yr Avg. T/A	% Vernal
NY 8301	Cornell University	4.05	---	2.22	2.04	2.05	1.20	7.51	5.78	96
120	Deklab-Pfizer	3.97	---	2.33	2.09	2.04	1.05	7.51	5.74	95
Apollo II	Agri-Pro	3.73	0.50	2.25	2.08	2.23	1.14	7.70	5.72	94
Endure	PAG Seeds	3.79	---	2.28	2.05	2.12	1.20	7.65	5.72	94
H-125 VW	Sexauer/Farm Seed	3.81	1.25	2.07	1.99	2.32	1.24	7.62	5.72	94
LL 3018	Land O-Lakes	4.10	---	2.19	1.90	2.10	1.13	7.32	5.71	94
IH 135	Sexauer/Farm Seed	4.79	13.75	1.66	1.73	2.14	1.08	6.61	5.70	94
Saranac	NY Ag Expt Station	3.83	---	2.35	2.04	2.03	0.99	7.41	5.62	93
WL 313	W-L Research	4.00	0.75	2.05	1.93	2.06	1.21	7.25	5.62	93
H-106R	Sexauer/Farm Seed	4.33	8.75	1.95	1.71	2.08	1.16	6.90	5.62	93
Shenandoah	Great Plains Res.	3.98	5.50	1.96	1.91	2.15	1.22	7.24	5.61	93
NAPB 21	Agri-Pro	3.46	---	2.46	2.05	2.12	1.10	7.73	5.60	92
F-144	Sexauer/Farm Seed	3.80	4.25	1.99	1.99	2.20	1.23	7.41	5.60	92
H-134	Sexauer/Farm Seed	4.12	6.25	1.94	1.78	2.13	1.18	7.03	5.58	92
H-150	Sexauer/Farm Seed	3.79	2.00	2.14	1.88	2.12	1.16	7.30	5.54	92
SX 424	Sexauer/Farm Seed	3.76	1.25	2.14	1.90	2.03	1.12	7.19	5.48	90
80-16 PCa3	Michigan State Univ.	3.38	---	2.43	2.11	1.98	1.03	7.55	5.46	90
Eagle	O's Gold Seed Co.	3.65	4.25	2.06	1.90	2.02	1.13	7.11	5.38	89
MT-O	SDSU	3.58	---	2.48	1.95	1.76	0.86	7.05	5.32	88
IH-101	Sexauer/Farm Seed	4.31	31.25	1.39	1.58	2.08	1.10	6.15	5.23	86
Heinrich's	Agric. Canada	3.40	---	2.13	1.95	1.68	0.74	6.50	4.95	82
Teton	SDSU	2.90	---	2.19	1.83	1.79	0.86	6.67	4.78	79
Travois	SDSU	2.91	---	2.32	1.70	1.37	0.65	6.04	4.48	74
147-1	SDSU	2.90	---	1.97	1.66	1.50	0.66	5.79	4.34	72
Average		3.96		2.26	2.01	2.14	1.13	7.54		
LSD (0.01)		0.80		0.26	0.22	0.28	0.21	.72		
CV (%)		10.68		6.08	5.77	6.93	9.78	5.04		

Table 1 Continued
* 5/7/85 Winterkill visual estimation, varieties without %'s showed no noticeable winterkill
Seeded: 5/16/84, 3 lb Eptam/A, 0.5 lb. Ridomil/A, 15 lb PLS/A
Plot Size: 3 x 25 feet with 5 rows at 6 inch spacings
Plot Harvested: 3 x 32 feet
Design: Randomized block, 4 replications
Soil type: Whitewood Silty Clay Loam
Soil pH: 7.1

Experiment 414 was established, in cooperation with the Nitragin Company, Inc., to determine if various inoculum carriers and/or seed adhesives would increase alfalfa nodulation, and consequently nitrogen fixing capacity, and forage yield. The precipitation recieved after seeding may also have masked the treatments by the diluting and/or leaching of the inoculum and carriers from the seed before germination. No consistent or explainable pattern in stand density, forage yield or forage protein content was obtained in 1984. No winterkill was observed on 5/7/85. A grand mean of 7.17 tons DM/A for a total (4-cut) forage yield was obtained (Table 7).

Table 2. 1985 Alfalfa Variety Trial, Expt 511
Southeast Station, Beresford, SD 1985

Variety	Dev/Supplier	1985 Forage Yield (tons DM/A)				%Vernal
		Cut 1 7/17	Cut 2 8/27	Cut 3 10/11	3-cut Total	
DS 503	Dairyland Res Int'l	2.52	1.54	0.80	4.86	142
DK-135	Dekalb-Pfizer	2.58	1.34	0.77	4.69	137
Iroquois	NY Ag Exp. Station	2.33	1.52	0.70	4.55	133
H-155	Farm Seed/ Sexauer 6	2.09	1.66	0.79	4.54	133
120	Dekalb-Pfizer	2.22	1.46	0.85	4.53	132
Spectrum	Cenex-Seeds	2.17	1.48	0.76	4.41	129
Sparta	Land-O-Lakes	2.26	1.37	0.77	4.40	129
Big 10	Great Lakes Hybrid	2.10	1.47	0.82	4.39	128
C/W 334	Cal/West Seeds	2.08	1.52	0.76	4.36	127
NY 8412	Cornell Univer.	2.18	1.44	0.72	4.34	127
Vernema	WA St/USDA	2.09	1.51	0.74	4.34	127
F-146	Farm Seed Res/ Sexaurer Co	2.11	1.40	0.80	4.31	126
Mn 6209	University of Minn	2.06	1.50	0.74	4.30	126
DS 512	Dairyland Res Int'l	1.90	1.50	0.90	4.30	126
WL 320	W-L Research Inc	2.02	1.47	0.79	4.28	125
83-3-F	W-L Research Inc	2.19	1.46	0.62	4.27	125
Futura	Dairyland Res Int'l	1.92	1.49	0.84	4.25	124
Magnum	Dairyland Res Int'l	2.13	1.30	0.81	4.24	124

Table 2 Continued, Experiment 511, SE Farm, 1985

Variety	Dev/Supplier	7/17	8/27	10/11	Total	%Vernal
Oneida	NY Ag Exp Station	2.03	1.46	0.74	4.23	124
C/W 32	Cal/West Seeds	2.00	1.45	0.78	4.23	124
DS 537	Dairyland Res Int'l	1.95	1.42	0.84	4.21	123
Endure	PAG Seeds	1.96	1.46	0.78	4.20	123
Elevation	Jacques Seed Co.	1.97	1.52	0.69	4.18	122
Agate	Univ of MN AES	2.07	1.43	0.67	4.17	122
Exp 339	Cargill, Inc.	2.02	1.48	0.66	4.16	122
H-154	Farm Seed Res Corp	1.85	1.44	0.84	4.13	121
XAF31	Pioneer Hi-Bred	1.82	1.52	0.77	4.11	120
Mohawk	Cornell Univer.	1.95	1.48	0.68	4.11	120
Cimarron	Great Plains Res Co	1.88	1.44	0.76	4.08	119
526	Pioneer Hi-Bred	1.72	1.53	0.76	4.01	117
8016	Mich. State Univ	1.83	1.48	0.69	4.00	117
XAR32	Pioneer Hi-Bred	2.12	1.29	0.69	4.00	117
Epic	Research Seeds Inc	1.88	1.36	0.75	3.96	116
532	Pioneer Hi-Bred	1.90	1.50	0.56	3.96	116
Arrow	Agri-Pro	1.88	1.44	0.64	3.96	116
82503	Northrup King	1.88	1.33	0.74	3.95	115
Saranac AR	NY Ag Exp Station	1.64	1.52	0.79	3.95	115
NAPB 23	Agri-Pro	1.88	1.43	0.61	3.92	115
C/W	Cal/West Seeds	1.91	1.37	0.62	3.90	114
Dawson	NE AES/USDA	1.97	1.36	0.56	3.89	114
Saranac AR	NY Ag Exp Station	1.88	1.35	0.64	3.87	113
Horizon	Arrowhead, Inc.	1.71	1.40	0.76	3.87	113
C/W 312	Cal/West Seeds	1.72	1.42	0.73	3.87	113
WL 316	W-L Research Inc	1.76	1.37	0.73	3.86	113
C/W 341	Cal/West Seeds	1.61	1.49	0.76	3.86	113
Stauffer	Stauffer Seeds	1.63	1.51	0.72	3.86	113
H-156	Farm Seed Res Corp	1.89	1.20	0.77	3.82	112
Peak	Research Seeds Inc	1.61	1.43	0.78	3.82	112
Mn 6216	Univ of Min	1.81	1.39	0.60	3.80	111
Oneida VR	Cornell Univ	1.70	1.39	0.71	3.80	111
Maxim	Cenex	1.80	1.32	0.67	3.79	111
Blazer	Land-O-Lakes	1.74	1.24	0.77	3.75	110
Mn 5617	Univ of Minn	1.74	1.40	0.58	3.72	109
NY 8413	Cornell Univ	1.78	1.21	0.72	3.71	108
Megaton	Arrowhead Inc	1.77	1.35	0.59	3.71	108
Baher	NE AES/USDA	1.90	1.14	0.60	3.64	106

Table 2 Continued; Experiment 511, SE Station, 1985

Variety	Dev/Supplier	7/17	8/27	10/11	Total	%Vernal
Armor	Agri-Pro	1.59	1.26	0.73	3.58	105
Max 85	Seed Tec	1.50	1.44	0.57	3.51	103
Vernal	Wis Ag Exp Station	1.61	1.15	0.66	3.42	100
DS 305	Dairyland Res Int'l	1.53	1.09	0.78	3.40	99
Average		1.92	1.41	0.72	4.06	
LSD (0.05)		NS	0.16	0.09	0.69	
CV %		21.20	8.15	9.09	12.07	

Seeded: 5/6/85, 3 lb Eptam/A, 1 lb Ridomil/A, 12 lb PLS/A
Plot Size: 3 x 25 feet with 5 rows at 6 inch spacings
Plot Harvested: 3 x 32 feet Design: Randomized block, 4 replications
Soil Type: Whitewood Silty Clay Loam (Cumulic Haplaquolls fine silty mixed mesic)

Table 3. Second-year Forage yields of alfalfa with various Rhizobium inoculum, Experiment 412, SE Station, Beresford, SD 1985

Treatment *	1984 3-cut Total Forage Yield (tons DM/A)	1985 Forage Yield (tons DM/A) 5/28	7/2	8/20	10/11	4-cut total
R5-101X	3.61	2.51	2.21	1.89	0.97	7.58
R5-103X+R5101X	3.75	2.39	2.16	1.85	1.08	7.48
R5-102X+H421	3.99	2.48	2.24	1.86	0.89	7.47
R5-103X+H421	3.62	2.44	2.20	1.86	0.92	7.42
Check	3.74	2.37	2.20	1.90	0.94	7.41
R5-102X+R5-101X	3.60	2.47	2.08	1.90	0.92	7.37
R5-103X+R5-101X+H421	3.66	2.32	2.23	1.86	0.95	7.36
P Rhizobium+H421	3.84	2.32	2.25	1.85	0.90	7.32
R5-101X+H421	3.75	2.32	2.18	1.88	0.93	7.31
P Rhizobium	3.58	2.40	2.13	1.82	0.95	7.30
Check + H421	3.70	2.37	2.15	1.85	0.91	7.28
M Rhizobium+H421	3.48	2.37	2.23	1.83	0.84	7.27
M Rhizobium	3.54	2.20	2.22	1.90	0.89	7.21
R5-102X+R5-101X+H421	3.53	2.29	2.22	1.83	0.85	7.19
R5-103X	3.42	2.31	2.22	1.68	0.94	7.15
R5-102X	3.66	2.16	2.19	1.85	0.92	7.12
Average	3.65	2.36	2.19	1.85	0.92	7.32
LSD (0.05)	0.29	NS	NS	NS	NS	NS
CV (%)	6.47	11.11	3.91	8.36	13.12	4.47

*H421 is a soil amendment applied as a preplant-incorporated spray.
1985: H4-201BX was applied after each cutting at 20 oz/A to all plots with H421
5/7/85 no noticeable winterkill
Oneida alfalfa seeded at 12 lb PLS/A on 5/18/84

Table 4. Second-year forage protein content from four harvests of alfalfa with various Rhizobium inoculums, Experiment 412, SE Station Beresford, SD 1985

Treatment *	Protein lbs/A	1985 Crude Protein 5/28	7/2	8/20	10/11	4-cut Avg.	1985 Protein lbs/A	2-year Avg lbs/A
R5-101X	1484	19.28	19.24	17.51	19.60	18.91	2867	2176
R5-103X+R5-101X	1541	18.86	19.16	17.28	19.81	18.78	2809	2175
R5-102 + H421	1636	19.11	19.31	17.68	19.22	18.83	2813	2224
R5-103X +H421	1494	19.52	18.65	17.54	19.88	18.90	2805	2150
Check	1551	18.82	19.45	18.18	20.20	19.61	2906	2228
R5-102X+R5-101X	1471	18.38	19.28	17.80	19.47	18.98	2798	2134
R5-103X+R5-101X+H421	1512	19.02	19.08	17.70	19.94	18.94	2788	2150
P Rhizobium +H421	1604	19.40	19.06	17.79	19.54	18.95	2774	2189
R5-101X+H421	1552	19.06	18.82	18.21	19.43	18.88	2760	2156
P Rhizobium	1504	19.47	19.40	18.10	19.72	19.17	2799	2152
Check + H421	1541	19.17	19.19	18.21	19.65	19.06	2775	2158
M Rhizobium + H421	1453	19.05	19.16	17.95	20.06	19.06	2771	2112
M Rhizobium	1479	18.95	19.16	17.88	20.65	19.16	2763	2121
R5-102X+R5-101X+H421	1472	19.58	19.14	17.85	20.34	19.23	2765	2118
R5-103X	1425	19.18	19.03	18.12	19.88	19.05	2724	2074
R5-102X	1496	19.49	19.20	17.96	19.78	19.11	2721	2108
Average	1513	19.21	19.14	17.86	19.82	19.01	2790	2152
LSD (0.05)		NS	NS	NS	NS	NS		
CV (%)		3.42	3.39	3.57	5.22	2.13		

*H421 is a soil amendment applied as a preplant incorporated spray
1985: H4-201BX was applied after each cutting at 20 oz/A to all plots with H421.
5/7/85: No noticeable winterkill
Oneida alfalfa seeded at 12 lb PLS/A on 5/18/84.

Table 5. Second year forage yields of Hi-Phy alfalfa planted between plots with various *Rhizobium* inoculums, Experiment 412, SE Station, Beresford, SD 1985

Treatments **	1985 Forage Yield (tons DM/A) 5/28	7/2	8/20	10/11	4-cut total
M Rhizobium + H421	2.86	2.05	1.93	1.06	7.90
R5-102X + R5-101X	2.13	2.04	1.96	1.00	7.13
R5-103X + R5-101X	2.03	1.95	1.87	1.21	7.06
R5-103X + R5-101X + H421	2.10	2.08	1.90	0.96	7.04
R5 - 102X + H421	2.00	2.06	2.00	0.95	7.01
P Rhizobium + H421	2.00	1.94	1.94	1.10	6.98
Check	2.08	2.11	1.78	0.98	6.95
R5-101X + H421	2.07	1.98	1.94	0.94	6.93
R5 - 103X + H421	2.00	1.99	1.86	1.06	6.91
R5 - 101X	2.10	1.97	1.82	0.98	6.87
Check	2.00	1.97	1.86	1.03	6.86

Table 5. Continued

Treatments	5/28	7/2	8/20	10/11	Total
R5-103X	1.92	1.94	1.66	1.30	6.82
M Rhizobium	1.92	1.98	1.86	1.05	6.81
R5-102X	2.17	1.82	1.94	0.78	6.71
R5-102X + R5-101X + H421	1.91	2.07	1.90	0.83	6.71
P Rhizobium	1.82	1.90	1.92	0.85	6.49
Average	2.07	1.99	1.88	1.00	6.95
LSD (0.01)	0.28	NS	0.21	0.14	0.62
CV (%)	7.91	7.21	6.46	8.40	5.24

*H421 is a soil amendment applied as a preplant incorporated spray.
** 1985, H4-201BX was applied to all H421 plots at 20 oz/A after each cutting
5/7/85: Hi-Phy plots showed 10-15% winterkill
Seeded: 5/18/84, not inoculated

Table 6. Second year forage yield of alfalfa following seed and soil treatments for the control of seedling diseases, Experiment 413, SE Station, Beresford, SD 1985

Treatment	lbs ai/A	1984 Yield ***	1985 Forage Yield (Tons DM/A)				
			6/6	7/8	8/19	10/8	4-cut total
Ridomil	0.25	1.16	1.68	1.45	1.32	0.78	5.23
Ridomil	0.50	1.16	1.74	1.40	1.26	0.74	5.14
Ridomil	0.125	1.18	1.44	1.26	1.18	0.69	4.57
Furadan+Apron		1.22	1.56	1.20	1.04	0.68	4.48
G. virens**		1.23	1.54	1.26	0.89	0.60	4.29
Furadan	1.00	1.11	1.57	1.00	1.00	0.71	4.28
Apron	*	1.18	1.48	1.18	0.90	0.66	4.22
Check		1.23	1.54	1.12	0.91	0.54	4.11
Average		1.18	1.57	1.23	1.06	0.68	4.54
LSD (0.05)		NS	NS	NS	NS	NS	NS
CV (%)		11.47	16.50	26.17	20.32	21.16	17.96

Iroquois alfalfa seeded at 10 lb PLS/A on 5/21/84
*Apron and G. virens seed applied at 2 oz/100 lbs. seed
**Gliocladium virens is a biological fungicide
*** Harvested once in 1984
Sprayed all treatments except G. virens and check on 5/7/85 with Ridomil at 0.25 lb ai/A.

Table 7. Second year forage yields of alfalfa seeded with various inoculum carriers, Experiment 414, SE Station, Beresford South Dakota, 1985

Treatment	1984 Forage Yield (tons DM/A)	1985 Forage Yields (Tons DM/A) 5/28	7/2	8/20	10/11	4-cut total
Vicoat	3.92	2.06	2.07	2.19	1.07	7.39
*Apron+Moist Inoc	4.26	2.02	2.15	2.03	1.18	7.38
**Rhizo-Kote	4.08	2.00	2.08	2.06	1.09	7.23
Pelinoc	4.17	2.19	2.09	1.82	1.05	7.15
Dormal	3.93	2.11	2.11	1.90	0.96	7.08
Moist Inoc.	3.72	2.04	1.99	1.91	1.12	7.06
Check (No Inoc.)	4.19	1.96	2.21	1.72	1.06	6.95
Average	4.04	2.05	2.10	1.94	1.07	7.17
LSD (0.05)	NS	NS	NS	0.15	0.14	NS
CV (%)	12.31	6.00	7.72	4.49	7.42	5.38

5/7/85 no winterkill
* Apron is a chemical fungicide
** Time-coated seed adjusted for 10 lb PLS/A seeding rate
Spectrum alfalfa seeded at 10 lb PLS/A on 5/16/84.

PRODUCTION OF EDIBLE BEANS

Robert G. Hall

PLANT SCIENCE 85-24

S.E. FARM REPORT

Objective

To conduct a yield trial for some edible bean varieties in southeastern South Dakota.

Methods and Procedures

1. Seed varieties and seeding rate:

Variety	Type	Seeding Rate (seeds/A)
Aurora	small white	70,000
Zircon	small white	70,000
PVD-967	red kidney	90,000
Royal Red	red kidney	90,000
Pilgram	red kidney	90,000
Ebony	black turtle soup	70,000
T-39	black turtle soup	70,000
Seafarer	navy	90,000

2. Seeding density on 30-inch row spacings:
Population = 70,000 seeds/A = 4 seed/foot of row
= 90,000 seeds/A = 5.2 seed/foot of row

3. Weed control - cultivation

4. Seeding date - May 27, 1985. Seeded with a cone seeder. Seed was inoculated prior to seeding.

5. Plot design-plots measured 10 x 20 feet. Varieties were replicated 3 times and arranged in a randomized complete block design.

6. Harvesting and threshing - plots were hand harvested on October 18, 1985. One 8-foot section of row was hand harvested from each plot. Samples wre dried for 72 hours, threshed and cleaned. All yields are expressed in pounds/acre and adjusted to a moisture content of 13%.

Table 1. 1985 Edible Dry Bean Yields, Southeast Farm

Variety	Average Yield
	(lbs/A)
Royal Red	2766 a*
PVD-967	2729 a
T-39	2558 ab
Ebony	2489 ab
Zircon	2420 ab
Pilgrim	1855 b
Seafarer	1799 b
Aurora	1787 b

Average yields followed by the same letter are not significantly different at the 5% level of probability.

Discussion and Interpretation of Table 1. Following seeding the beans, emerged and a good stand was established. At approximately the V2 stage the plots were exposed to one day of high winds which caused some defoliation as a result of sandblasting. Although some sandblasting occurred, the yields were higher in 1985 compared to 1984. The yield results indicated in the table show the varieties Royal Red and PVD-967 were higher yielding; the varieties T-39, Ebony, and Zircon were intermediate yielding; and higher seeding rate of 90,000 compared to 70,000 plants per acre among the varieties did not appear to influence yield. Two different rates were used because producers are encouraged to use 90,000 plants per acre on the bush type of beans and 70,000 plants per acre on the vining type of beans. This trial was harvested late and care was taken to minimize shatter losses. If the plots had been harvested by machine, there would have likely been large harvest losses. Producers are encouraged to be timely in the harvesting of edible dry beans.

EFFECT OF MIXED OR PHASE FEEDING TWO RATIOS OF CORN AND CORN SILAGE ON PERFORMANCE OF FEEDLOT STEERS

R. H. Pritchard, R. Hansen and L.B. Bruce

S.E. FARM REPORT

ANIMAL AND RANGE SCIENCES 85-25

Summary

One hundred twenty-eight Angus steer calves were used in a feedlot study to determine the effect of mixed vs phase feeding on efficiency of utilization of corn and corn silage. Mixed diets (M) containing 1/3 corn - 2/3 corn silage (1:2M) or 2/3 corn - 1/3 corn silage (2:1M) were compared with phase feeding (P) treatments where corn silage was fed during the initial 87d (2:1P) or 143d (1:2P) and followed by high corn finishing diets. Cattle fed mixed diets and higher average daily gains initially and required fewer days and less total feed to reach slaughter condition. Slow growth associated with all corn silage diets was not completely compensated for after switching to high corn diets on the phase feeding treatments.

Introduction

An important consideration for the midwestern farmer-feeder is to find a feeding program that optimizes production in the farming operation. One common option available in this region is to vary the levels of corn and corn silage used in growing and finishing diets. Variables that must be included in this decision are: 1) possible negative associative effects on digestibility caused by grain-forage mixtures; 2) possible affects on carcass weight and quality; and 3) the amount of time cattle must be on feed.

Two ratios of corn and corn silage were fed either as mixture provided throughout the feeding period or in phases as a high corn silage backgrounding period followed by a high corn finishing period. The effects of these treatments as the efficiency of feedlot production was determined.

Experimental Procedure

One hundred twenty eight Angus steer calves (averaging 526 lbs) were used to evaluate the effects of phase feeding corn-corn silage diets on the efficiency of feeder cattle production. Treatments used were: a mixture of 1/3 corn - 2/3 corn silage fed throughout the feeding study mixed (1:2M) or in phases (1:2P); and 2/3 corn - 1/3 corn silage fed mixed throughout the study (2:1M); or in phases (2:1P). The amount of silage fed on the phase treatments was projected to be similar to total silage consumption on mixed treatments. Diets fed are shown in Table 1, and Table 2 shows the sequence of feeding treatments.

Four pens of 8 steers were assigned to each of the 4 treatments. Steers were allotted to 4 weight groups based on weights taken 2 days (d) prior to the start of the trial, and then randomly assigned treatment by weight group.

All weights were taken in the morning before feeding. On the day previous to initial and final weights, steers were fed 1/2 of the previous days feed intake and water was removed in the late afternoon.

Fat probes were made periodically, as cattle approached slaughter condition using a Cook's Probe 1/ at a site between the 12th and 13th rib. All cattle within a pen were slaughtered when 6 steers within the pen had a rib fat probe >.40" and were visually estimated to grade choice. Quality and yield grade data were collected to verify that cattle were of consistent slaughter condition between slaughter dates.

Performance data was compared for 3 feeding phases. Phase 1 ended when steers fed 2:1P were switched from corn silage to high corn diet (day 87). Phase 2 ended with 1:2P steers began receiving the finishing diet (day 143). Phase 3 ended when cattle were slaughtered.

Results and Discussion: Rib fat thickness determined by probe within 14d of slaughter, carcass weight, quality grade and yield grade were not affected by treatment, indicating steers were of similar body composition when slaughtered. Since no differences exist in these variables, days on feed may be compared between treatments. Steers fed mixed diets tended to reach slaughter condition sooner than those fed separate diets (Table 3).

Energy density of the diet during phase 1 affected average daily gains (ADG) (Table 2). Steers fed diet 2:1P weighed 40.2 lb less ($P<.05$) than those fed 2:1M 87d. This weight advantage for 2:1M diet persisted through Phase 2 as well since ADG were similar for that period. Phase 3 ADG, cumulative ADG and final weight did not differ between steers fed diets 2:1S and 2:1M.

At the end of Phase 2, 1:2M steers were 44.5 lb heavier ($P<.05$) than 1:2P steers. Average daily gains to this point were 2.86 and 2.52 lb/hd/d respectively and differed ($P<.05$). As in 2:1 treatment comparisons final phase and cumulative ADG did not differ (Table 2).

Feed intake was greater for treatment 2:1M than for all other diets during Phases 1 and 2. During Phase 3 cattle on the 2:1 treatments had higher intakes than those on 1:2 treatments. Cumulative intake (lb/hd/d) were affected by treatment. Dry matter intake for the entire feeding period was greatest on treatment 2:1M, lowest on treatment 1:2M with the phase feeding treatments intermediate.

1/ Cook's Probe, Cook's Laboratory, Lusk Wyoming

Feed efficiency was lower during Phase 1 for treatment 1:2M and lower during Phase 2 on treatment 2:1P. When evaluating responses for the entire feeding period, no differences in feed efficiency due to treatment were observed.

When comparing the amounts of corn and corn silage fed, total silage intake was similar for treatments 1:2M and 1:2P as intended. However, steers on 1:2P treatment required 62% more corn than those fed the mixed diet. When the 2:1 series treatments are compared, 2:1P steers consumed 18% more corn silage and 9% more corn than 2:1M steers.

Part of this increased feed requirement can be attributed to lower ADG during Phase 1 for 2:1P steers and Phases 1 and 2 for 1:2P steers. Lower ADG during these periods caused relatively greater proportions of feed to go toward maintenance requirements as does the increased days on feed that resulted.

Another consideration is time of year when ration switches were made. The diet changes for treatment 2:1P was made February 12 and the 1:2P change was made April 9. All cattle were slaughtered by July 16. This means that treatment 1:2P steers receiving the high concentrate diet principly during April and May when moisture and mud are a problem at this feedlot. Since these conditions can have a greater impact on maintenance requirements than low winter temperatures this may inflate the corn requirement when separate diets were fed.

Feeding high corn silage diets for only 87d lowered overall production efficiency. Rapid growth associated with high concentrate feeding did not compensate for early slow growth. High roughage diets fed as long as 143d did not increase carcass weight when steers were slaughtered at a common degree of finish. The data indicate that the most effective way to utilize corn and corn silage in a feeding program is to feed a relatively high ratio of corn:corn silage mixed (2:1M), to calves. Following this program with a high corn finishing diet would also be recommended.

Table 1. Composition of Diets

Ingredient[a]	Diet: 85% corn silage[b]	60% corn silage	30% corn silage	12% corn silage[c]
Corn, %		28.87	58.23	82.95
corn silage, %	85.58	57.75	29.05	12.00
Soybean meal, 44%	12.48	11.24	10.00	3.60
Limestone, %	1.00	1.15	1.37	.90
Potassium chloride, %	.34	.59	.95	.15
Trace mineralized salt, %	.40	.40	.40	.04
Crude protein, %	13.1	13.1	13.1	11.0
NEm, Mcal/cwt	72.1	80.1	88.0	94.7
NEg, Mcal/cwt	44.3	51.2	58.0	63.8

a Percent dry matter basis
b Fed during Phase 1 2:1P, during Phases 1 and 2 1:2P
c Fed during Phases 2 and 3 2:1P, during Phase 3 1:2P. All diets were supplemented to provide 1100 IU Vitamin A/lb dry matter.

Table 2. Sequence of Diet Used by Treatment [a/]

Phase	1	2	3
Length, d	87	56	Variable
Treatment			
1:2P	85% corn silage	85% corn silage	12% corn silage
2:1P	85% corn silage	12% corn silage	12% corn silage
1:2M	60% corn silage	60% corn silage	60% corn silage
2:1M	30% corn silage	30% corn silage	30% corn silage

a/ Diets shown in Table 1.

Table 3. Feedlot Performance by Treatment and Phase of Trial

Phase		Treatment 1:2P	2:1P	1:2M	2:1M
1	Initial wt., lb	528	525	522	529
	Ending wt., lb	755[de]	751[d]	775[e]	792[f]
	ADG[a], lb/hd/d	2.61[d]	2.59[d]	2.90[e]	3.02[e]
	DMI[b], lb/hd/d	13.19[e]	13.49[e]	13.08[e]	15.00[f]
	F/G[c]	5.05[d]	5.21[d]	4.51[e]	4.97[d]
2	Ending wt., lb	888[d]	926[e]	933[e]	967[f]
	ADG, lb/hd/d	2.38[d]	3.13[e]	2.82[de]	3.13[e]
	DMI, lb/hd/d	20.19[e]	17.67[d]	19.81[d]	22.36[f]
	F/G	8.57[f]	5.67[d]	7.03[e]	7.23[e]
3	Ending wt., lb	1126[de]	1133[e]	1093[d]	1102[de]
	ADG, lb/hd/d	2.66[e]	2.49[de]	2.26[de]	2.17[d]
	DMI, lb/hd/d	23.79[e]	26.80[f]	21.61[d]	26.46[f]
	F/G	9.07[d]	10.86[de]	9.79[d]	12.29[e]
Cumulative	Days on Feed	234[e]	227[e]	216[de]	206[d]
	ADG, lb/hd/d	2.57[d]	2.68[de]	2.65[de]	2.80[f]
	DMI, lb/hd/d	18.99[e]	19.41[e]	17.72[d]	20.53[f]
	F/G	7.41	7.26	6.70	7.38

a Average daily gain

b Average daily dry matter intake

c Feed/gain

d,e,f Means in the same row with different superscripts differ (P<.05).

Table 4. Fat Thickness and Carcass Traits of Steers by Treatment

Treatment	1:2S	2:1S	1:2M	2:1M
Rib fat thicknessa/, in	.45	.46	.45	.48
Carcass weight, lb	681	692	682	679
No. Choice	26	27	26	29
No. Good b/	5	5	4	2
No. YG 2b/	12	15	19	13
No. YG 3b/	18	16	12	19

a/ Inches, measured between 12-13th rib in live animal
b/ USDA Quality and Yield Grades

Research in Progress

Limit-Fed High Energy Rations for Growing Cattle

J. J. Wagner and R. Hanson

Introduction

Backgrounding, or feedlot growing programs are designed to limit the gain of light cattle enabling them to grow frame prior to being put on full feed of a high energy finishing ration. The intent is to ensure that the cattle will not become finished at a weight lighter than what is acceptable by the packer.

Traditionally, high roughage, low energy rations have been used to background or grow light cattle. These rations are full fed and limit gain due to their lower energy density. Roughage is usually the most expensive energy source in the ration. Limit-fed high energy rations for backgrounding light cattle is based on the premise that grain is cheaper per unit of energy than roughage. The program may especially apply under drought conditions whenever pasture and hay production becomes limited.

Limit feeding high grain rations to growing cattle may decrease cost of gain and enable cattle feeders to predict average daily gain and flesh condition. After the growing phase, cattle may be sold as seven to eight weight feeders or finished for slaughter. These cattle will have less fill than cattle grown on roughage programs and therefore may command a premium if sold as feeders. cattle on high energy growing ration adapt more quickly to the finishing ration.

This program requires a higher degree of management than traditional high roughage grower programs. The feeder needs to visually evaluate the cattle on the basis of condition, frame and current weight before placing them on the program. Using the net energy system, the amount of feed needed for a prescribed daily gain is computed and fed to the cattle. Every week, cattle are assumed to gain a certain amount of weight and dry matter intake is increased accordingly.

High energy growing programs have been successfully used in southern plains commercial feedlots. The utility of the program for farmer feeders has not been demonstrated. Also, the program has not been extensively tested in colder environments. The effect of limit-fed high energy growing programs on shrink and feedlot performance during the finishing phase has not been demonstrated.

The objectives of this research are to: 1) compare performance of limit-fed and high roughage fed cattle during the growing phase, 2) compare corn silage and alfalfa hay as roughage sources in limit-fed diets, 3) study the effects of limit feeding on shrink of cattle, and 4) investigate the effects of limit feeding on intake and performance of cattle during the finishing phase of feeding period.

Experimental Procedure: One hundred and ninety-two preconditioned steer calves will be purchased and trucked to the Southeastern South Dakota Experiment Farm near Beresford, South Dakota. Cattle will be placed on a 3 week starter program prior to the limit feeding program. Cattle will then be weighed, implanted with synovex-S, stratified by weight and allotted to four experimental treatments (table 1) with 6 pens per treatment.

Treatments 1 and 3 will be fed diet 3 for 5 days. Treatments 2 and 4 will be fed diet 4 for 5 days. During the next 7 days, treatments 1 and 2 will be limit-fed a diet with moderate roughage levels (50.3% silage and 31% alfalfa hay on a DM basis, respectively). This step-up period will allow the cattle to become accustomed to the limit feeding regimen.

Cattle fed diets 3 and 4 will be allowed to consume their feed ad-libitum. Cattle will be limit fed diets 1 and 2 in amounts computed (NRC, 1984) to enable the cattle to grow at 2 lbs per head per day. Each week the limit-fed cattle will be assumed to have grown 14 lbs and daily feed intake will be increased accordingly. On days when the wind chill is between 0 and 20°F, -20 and 0°F or less than -20°F, the daily feed allowance will be increased by 10, 20 or 30%, respectively.

Variables of interest during the growing phase will be pen ADG and feed efficiency. After 84 days on trial, cattle will be switched to a high energy finishing program. Feed intake, ADG and feed efficiency will be monitored during the finishing period.

Estimated completion of the project is July, 1985.

Literature Cited: NRC, 1984. Nutrient Requirements of Domestic Animals Nutrient Requirements of Beef Cattle. Sixth Revised Ed. National Academy of Science--National Research Council, Washington, DC.

Table 5. Composition of Experimental Diets a/

Ingredient	Diet 1	2	3	4
Corn silage	35.00	—	70.00	—
Alfalfa hay	—	20.00	—	42.00
High moisture corn	47.33	66 43	19.03	46.94
Supplement	17.67	13.57	10.97	11.07
Soybean meal	15.85	12.20	10.00	1.50
Ground corn	—	—	—	4.00
Dehy alfalfa	—	—	—	5.00
Dicalcium phosphate	.50	.55	—	.25
Limestone	1.00	.50	.65	—
Trace mineral salt	.30	.30	.30	.30
Vitamin A-30	.02	.02	.01	.01
NEm b/, Mcal/cwt DM	84.85	89.03	74.23	78.98
NEg c/, Mcal/cwt DM	55.54	57.37	46.84	47.12
Crude protein	14.51	14.51	12.01	12.01
Potassium	.85	.87	.98	1.10
Calcium	.67	.68	.50	.79
Phosphorus	.46	.47	.31	.35
Dry Matter	52.28	77.25	39.90	80.59

a/ Percent of Dry Matter
b/ Net energy for maintenance, Mcal per cwt dry matter
c/ Net energy for gain, Mcal per cwt dry matter.

S.E. FARM REPORT

IMPLANTING EFFECTS ON PERFORMANCE, CARCASS CHARACTERISTICS AND REPRODUCTIVE PARAMETERS IN INTACT BEEF MALES

S.J. Gordon, H.L. Miller, D.H. Gee and R. Hanson

ANIMAL AND RANGE SCIENCES 85-26

Summary

Sixty-six Angus bulls were utilized to evaluate the effects of Ralgro, Synovex, and Compudose implants on performance, reproductive parameters, carcass characteristics and behavior. The influence of growth promoting implants on performance and reproductive parameters on the bulls were minimal. The only major differences were seen in scrotal circumference and final weight. The nonimplanted bulls had larger testicular size and therefore heavier testicular weight. The Ralgro implanted bulls weighed less at termination of the trial.

Similar to performance, carcass characteristics affects by implanting were minimal. Carcasses from Synovex implanted bulls had the most external fat and highest yield grade. Ralgro implanted bulls had the lowest carcass weight. Ribeye areas were not affected by implants.

The behavior, luteinizing hormone and growth hormone results will be reported later.

Research data reveals implanting increases fat deposition which resulted in this experiment for the Synovex implanted group. The attributes of Synovex, increasing external fat and yield grade increases the acceptability of the product for both the packer and the consumer, but the packer acceptability needs to be enhanced to make the use of intact males economically feasible for the producer.

Introduction: The beef industry is producing a leaner product due to the health conscious public. With high production costs beef must be produced more efficiently. One answer to increased gain and efficiency will be to feed young bulls, as studies reveal bulls yield a higher percentage of lean edible product, more rapid growth, more feed efficient and produce a carcass with less fat and more muscle than steers. However, the packer discriminates beef from young intact males because of lower quality grades. Also, beef from bulls has a lower consumer acceptance because of it darker lean, coarser texture and less intramuscular fat.

A possible means to improve quality grades, improve marbling and reduce aggressive behavior in bulls may be by the use of implants.

Additional research needs to be conducted, especially on the effect of implants on reproductive traits. Some research reveals the suppression of testicular development on implanted bulls. Although the mode of action of anabolic agents on testis function in young bulls is unknown, it has been reported that the suppressive effects on sexual development are not permanent. Thus, with the use of flow cytometry accurate analysis of implanting on reproductive performance in bulls will be determined.

The effects of implants on young bulls have been reported in only limited studies. This experiment was conducted to compare performance, carcass characteristics, reproductive parameters and behavior of young Angus bulls implanted with common growth-promoting compounds.

Procedure: Sixty-six Angus bulls were randomly allocated into four treatment groups: (1) nonimplanted, (2) implanted postweaning and reimplanted every 60-70 days with 36 mg of Zeranol, (3) implanted postweaning and reimplanted every 60-70 days with 200 mg progesterone and 20 mg estradiol benzoate (Synovex-S), (4) implanted postweaning and reimplanted every 180 days with 24 mg estradiol-17B (Compudose). The bulls were penned in drylot runs with 8-9 per pen. Initially weights (519 kg) hip height (126 cm) scrotal circumference (26 cm) were measured. Bulls were weighed every 28 days and bled from vena cava weekly until puberty. Blood collected will be analyzed for testosterone, growth hormone and luteinizing hormone in order to evaluate the effects of implants on testicular development, spermatogenesis and growth in intact males.

Bulls were slaughtered at approximately 15 months of age. Prior to slaughter, scrotal circumference, hip height and final shrunk weights were taken. At slaughter semen samples were collected from 10 bulls in each treatment, and testes collected and weighed. Semen will be evaluated by flow cytometry, for cell type and quality. Also at slaughter, carcass data was collected with the assistance of a USDA grader.

Bulls were managed specifically to minimize aggressive behavior that results in a reduction in quality grades, leaving the feedlot early in the morning and slaughtered upon arrival at the plant. A behavior study was attempted recording agonistic behaviors once a day around sunset. Research indicates that the most aggressive behavior is observed at sunset and sundown. The parameters evaluated were mounting, bellering, walking fence, fighting, pushing, sniffing and getting out of the pen. The bulls were ranked on a scale of 1-5, 1 being most aggressive behavior actions and 5 the least. These results will be reported on later.

Results: Performance and Reproductive Parameters:

Performance and reproductive parameter mean values are reported in Table 1. The nonimplanted bull completed the test with larger testicular size indicating that implants have some detrimental affect on testicular development. There was small differences in average daily gain, hip height, and testosterone values among the treatments.

Carcass Characteristics: The mean carcass characteristics values are presented in Table 2. Synovex and Compudose treatments resulted in heavier carcasses than the Ralgro treated bulls. Furthermore, external fat thickness was the greatest for the Synovex group. The greater fat thickness of the Synovex implanted bulls resulted in increased yield grade. No difference was present for longissimus muscle, KPH and USDA quality grade.

Table 1. Mean Values for Performance and Reproductive Parameters

Item	Nonimplanted	Ralgro	Synovex	Compudose
No. bulls	16	17	17	16
Initial wt., kg	280	274	282	289
Final wt., kg	522	497	531	524
Initial hip height,cm	111	110	112	113
Final hip height,cm	127	124	126	127
Initial scrotal circumference,cm	26	26	26	28
Final scrotal circumference, cm	39.4 f	38.8 fg	37.7 g	38.6 fg
Testosterone values ng/ml	7.7	8.9	8.7	8.1
Testicle wt., g	602	581	522	584

fg - means in same row not bearing a common subscript differ ($P < .01$)

Table 2. Mean Value for Carcass Traits by Implants

Item	Nonimplanted	Ralgro	Synovex	Compudose
No. Bulls	16	17	17	16
Carcass wt, kg	319 ed	307 e	333 d	331 d
Fat thickness, mm	9.0 g	8.32 g	11.54 h	8.72 g
Longissimus Muscle, cm 2	79	76	78	81
Yield grade	2.43	2.38	2.82	2.44
KPH, %a	1.4	1.3	1.5	1.6
Quality Grade b	5.8	5.2	5.7	5.7

ed = Means in the same row not bearing a common subscript differ ($P<.01$)
gh = Means in the same row not bearing a common subscript differ ($P<.05$)
a KPH = kidney, pelvic and heart fat
b High Standard = 5; Low choice = 6

RESPONSE OF FINISHING PIGS WITH DIFFERENT RATES OF PRIOR PERFORMANCE TO ANTIMICROBIALS FED AT GROWTH PROMOTING OR THERAPEUTIC LEVELS

C. R. Hamilton, G. W. Libal, R. C. Wahlstrom,
R. Hansen and B. Heylens

S.E. FARM REPORT

ANIMAL/RANGE SCIENCES 85-27

Previous work conducted at this station has involved sorting pigs according to prior performance during the grower period into uniform groups for the finishing period. Results of these studies suggest that pigs having slow previous growth rates continued to grow more slowly than pigs with fast or intermediate prior growth rates. Further, the use of growth promoting levels of antimicrobials appeared to stimulate growth rates without a similar improvement in the performance of slow growing pigs. Therapeutic levels of antimicrobials were observed to improve average daily gains in a study utilizing slow growing pigs. Thus, the present study was conducted to determine if the response to antimicrobials is affected by previous performance and if growth-promoting and therapeutic levels of antimicrobials elicit different responses in finishing pigs.

(Key words: Finishing Swine, Prior Performance, Antimicrobials.)

Experimental Procedure: Pig performance was monitored during the grower period from about 50 to 102 lb. Pigs were indexed according to weight per day of age and placed into either the fast or slow growing group, except for an intermediate group (12%) that was eliminated from the experiment. Within each performance group, pigs were allotted to seven replications of three dietary treatments according to weight, sex and ancestry. Four replications of four pigs per pen (96 head) remained at the SDSU Swine Unit in Brookings and three replications of five pigs per pen (90 head) were transported to the Southeast South Dakota Experiment Farm at Beresford.

Dietary treatments other than the basal diet (Table 1) were produced by additions to the basal diet of either 40 gm/ton tylan or 100 gm/ton tylan plus 100 gm/ton sulfamethazine for 28 days followed by 40 gm/ton tylan for the remainder of the study. Additions of 40 gm/ton tylan constitutes a growth promoting level while 100 gm/ton tylan in combination with 100 gm/ton sulfamethazine are therapeutic levels. The resulting combination of two previous growth rates and three antimicrobial levels produced a 2 x 3 factorial arrangement.

Pig weights were recorded biweekly and feed consumption measured every 28 days. Pigs were removed from the experiment at pen average weights of 210 lb. The study reported herein was conducted during the summer of 1985.

Table 1. Composition of Basal Diet [a]

Ingredient	Percentage of Diet
Ground Corn	78.4
Soybean meal, 44%	18.8
Dicalcium phosphate	1.2
Limestone	.9
Salt, white	.3
Premix, [bc]	.4

[a] Provided an average of 14.8% crude protein for the 12 samples analyzed.
[b] Provided the following in ppm: zinc, 100; iron, 75; copper, 7.5; manganese, 25; iodine, .175; and selenium, .1. Provided the following per lb of diet: vitamin A, 2000 IU; vitamin D, 200 IU; riboflavin, 2.25 mg; pantothenic acid, 9 mg; niacin, 12 mg; vitamin B12, 9 mcg; vitamin E, 7.5 IU and vitamin K, 1.5 mg.
[c] Dietary treatments produced by the addition of 40 gm/ton tylan or 100 gm tylan + 100 g/ton sulfamethazine for 4 weeks followed by 40 gm/ton tylan.

Results: There were no significant interactions detected in this study. Therefore, only the prior performance and level of antimicrobial main effects are presented. The effects of previous growth rate on the performance of pigs during the finisher period summarized across antimicrobial treatments are shown in Table 2. Pigs having slow or fast previous growth rates had similar levels of performance during the initial 28 day period. However, pigs with previously slow growth rates grew significantly slower and less efficiently than the previously fast growing pigs for the remainder of the finisher period and overall. Feed consumption was similar for both prior performance groups.

The response of pigs to antimicrobials in the diet are summarized across prior performance groups in Table 3. For the initial 28 day period, pig performance was not affected by dietary treatment. However, pigs fed 40 g/ton tylan utilized feed more ($P < .05$) efficiently than pigs in either of the other two treatment groups from day 29 of the study to average weights of about 210 lb. Similar results were observed for the overall finisher period. Pigs fed an antimicrobial at growth promoting levels required significantly less feed per unit of gain than those fed antimicrobials at a therapeutic level for 28 days, while pigs fed the basal diet without antimicrobial in the diet, although pigs fed 40 g/ton tylan tended to gain faster and consume less feed than pigs in the other treatment group.

Table 2. Summary of the Performance of Pigs With Different Previous Growth Rates

Item	Previous Growth Rate	
	Slow	Fast
No. of pigs	93	93
Avg initial weight, lb	91	113
Avg final weight, lb	211	216
Initial 28 days a/		
Avg daily gain, lb	1.73	1.82
Avg daily feed, lb	4.94	5.28
Feed/gain	2.89	2.91
Day 29 to 210 lb		
Avg daily gain, lb b/	1.76	2.02
Avg daily feed, lb	6.86	7.17
Feed/gain b/	3.93	3.58
Combined performance		
Avg daily gain, lb b/	1.75	1.90
Avg daily feed, lb	6.07	6.17
Feed/gain b/	3.49	3.25

a/ Prior performance had no effect (P>.10) on pig performance during this period.
b/ Previously slow growing pigs continued to grow at a slower (P<.01) and less efficient (P<.01) rate than previously fast gaining pigs.

Table 3. Summary of the Performance of Pigs Fed Different Antimicrobial Levels

Item	Antimicrobial Level		
	Basal	Sub therapeutic a/	Therapeutic b/
No. of pigs	62	62	62
Avg initial wt, lb	102	102	102
Avg final wt, lb	213	215	212
Initial 28 days c/			
Avg daily gain, lb	1.79	1.82	1.72
Avg daily feed, lb	5.05	5.16	5.13
Feed/gain	2.84	2.84	3.01
Day 29 to 210 lb			
Avg daily gain, lb	1.85	1.93	1.88
Avg daily feed, lb	7.01	6.79	7.25
Feed/gain	3.83 e/	3.53 d/	3.90 e/
Overall performance			
Avg daily gain, lb	1.81	1.87	1.80
Avg daily feed, lb	6.09	6.01	6.25
Feed/gain	3.38 d,e/	3.22 d/	3.50 e/

Table 3 Continued, Summary of The Performance of Pigs Fed Different Antimicrobial Levels

a/ 40 gm/ton tylan

b/ 100 gm/ton tylan + 100 gm/ton sulfamethazine for 28 days followed with 40 gm/ton tylan to market weight

c/ No antibiotic response (P>.10) during this period

d,e/ Means in the same row without a common superscript differ (P<.05).

The results of this study support previous conclusions that pigs with slow growth rates for the grower period will continue to grow at a slower rate than their fast growing contemporaries. However, the average growth rate of 1.75 lb/day observed for the slow growing group in the present study is very similar to industry averages for finisher pigs. The ability of slow growing pigs to attain near average daily gains when fed in the same pen with their fast growing contemporaries has yet to be evaluated experimentally. The lack of response to therapeutic levels of antimicrobials in the slow growing groups was surprising in view of previous results. However, the level of performance observed for the slow growing group and the mild environmental conditions experienced during the experimental period may have produced the inconsistent response obtained to dietary antimicrobials. The slight reduction in performance obtained from the use of therapeutic levels of tylan and sulfamethazine in this study remains unexplained.

Summary One hundred eighty-six pigs averaging about 102 lb. were ranked according to weight per day of age and placed into a slow or fast growing group. Performance groups were further subdivided into three dietary treatments. Each performance group dietary treatment combination was replicated seven times. All pigs were fed a 14.8% protein corn-soybean meal diet with either 0, 40 g/ton tylan or 100 g/ton tylan + 100 g/ton sulfamethazine for 28 days followed with 40 g/ton tylan as the dietary treatments. Pigs were fed to pen average weights of about 210 lb. Previously slow growing pigs continued to grow slower (P<.01) and less (P<.01) efficiently than pigs with fast previous rates of growth. The addition of a growth promoting level of an antimicrobial (40 g/ton tylan) improved (P<.05) feed efficiency but had no affect on rate of gain or feed intake. Antimicrobials added at therapeutic levels for 28 days did not improve pig performance. Prior performance did not affect the response to growth promoting or therapeutic levels of antimicrobials in the feed.

PERFORMANCE OF FINISHING PIGS AS AFFECTED BY PRIOR PERFORMANCE AND THE ADDITION OF AN ANTIBIOTIC DURING THE FINISHING PERIOD

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

S.E. FARM REPORT

ANIMAL/RANGE SCIENCES 85-28

In a study reported last year, we reported that pigs which had grown slowly from 50 to 115 lb continued to grow slower to market weight than their medium or fast growing counterparts. It was also found that the addition of a growth promoting level of an antibiotic failed to increase performance of the slow growing pigs. The study reported herein is a repeat of the previous study to verify the results.

(Key Words: Finishing Swine, Previous Growth Rate, Antibiotics, Aureomycin.)

Table 1. Composition of Experimental Diet

Ingredient	%
Ground yellow corn	78.4
Soybean meal, 44%	18.8
Dicalcium phosphate	1.2
Limestone	.9
Salt, white	.3
Premix a/	.4

a/ Provided the following in ppm: zinc, 100; iron, 75; copper, 7.5; manganese, 25; iodine, .175; and selenium, .1. Provided the following per lb of diet: vitamin A, 2000 IU; vitamin D, 200 IU; riboflavin, 2.25 mg; pantothenic acid, 9 mg; niacin 12 mg; vitamin B12, 9 mcg; vitamin E, 7.5 IU and vitamin K, 1.5 mg.

Experimental Procedure: Performance of 174 crossbred pigs was observed from approximately 40 to 120 lb. These pigs were sorted into slow growing, medium growing and fast growing groups. From within these growth outcome groups 140 pigs were allotted to three replications of two treatments (0 or 50 g/ton Aureomycin). All pigs were fed a 15% protein corn-soybean meal diet (Table 1). Each of the 18 pens contained 4 gilts and 4 barrows. The finishing phase of the experiment (115-220 lb) was conducted in the environment-modified confinement building at the Southeast South Dakota Experiment Farm at Beresford, South Dakota during October through December. Pig weights were recorded on a biweekly basis. Pigs were removed from test on a pen basis when average pig weight within a pen reached approximately 210 lb.

Results: A summary of overall performance is presented in Table 2 and performance summarized by previous performance and by antibiotic treatment is presented in Tables 3 and 4. Pigs which had grown slowly during the growing period gained significantly faster during the finishing period. A greater gain response for slow growing pigs over medium and fast growing pigs was obtained in those groups which had received antibiotics. However, feed consumption and feed/gain were not affected by previous performance. Overall, no response due to the presence of antibiotic was observed as summarized in Table 4. All groups of pigs performed at a level which would limit the potential for improving performance with growth promoting antibiotics.

The results of this trial are in contrast with the previously reported trial where slow growing pigs continued to grow slower than their previously faster growing counterparts. The failure to get a response to antibiotics during the growing period is in agreement with the results of the previous trial.

Table 2. Effect of Previous Performance and Antibiotic in the Diet of Pigs During the Finishing Period.

Previous Growth Rate	Slow		Medium		Fast	
Antibiotic	−	+	−	+	−	+
No. of pigs	24	24	24	24	24	24
Initial wt, lb	121	121	132	132	125	125
Final wt, lb	214	214	214	219	216	211
Avg daily gain, lb a/	2.20	2.19	2.11	2.03	2.11	2.03
Avg daily feed, lb	6.63	6.55	6.57	6.28	6.42	6.19
Feed/gain	3.03	3.00	3.12	3.09	3.05	3.07

a/ Previously slow growing pigs gained faster ($P<.01$) than previously medium or fast growing pigs.

Table 3. Effects of Previous Performance on Finishing Pig Performance

Previous Growth Rate	Slow	Medium	Fast
No. of pigs	48	48	48
Initial wt	121	132	125
Final wt	214	217	214
Avg daily gain, lb a/	2.20	2.07	2.07
Avg daily feed, lb	6.59	6.43	6.31
Feed/gain	3.02	3.11	3.06

a/ Previously slow growing pigs gained faster (P<.01) than previously medium or fast growing pigs.

Table 4. Effects of Antibiotic on Finishing Pig Performance

	Without Antibiotic	With Antibiotic
No of pigs	72	72
Initial wt, lb	126	126
Final wt, lb	215	215
Avg daily gain, lb a/	2.14	2.08
Avg daily feed, lb	6.54	6.34
Feed/gain	3.07	3.05

a/ Aureomycin, 50 g/ton.

Summary: One hundred forty-four pigs were sorted by growth rate from 40 to 120 lb into slow, medium and fast growing groups. They were then allotted to treatments of 0 or 50 g/ton Aureomycin. During the finishing period, slow growing pigs gained significantly faster than previously medium and fast growing pigs. No differences in feed intake or feed/gain was found. No difference in performance due to presence of antibiotics was observed.

FUELWOOD PLANTATION UPDATE

Tom A. Draper
S.D. Divsion of Forestry

SOUTHEAST FARM 85-29

Since the establishment of the fuelwood plantation on the Southeast Experiment Farm in the spring of 1984 progress on this study has been slow. The primary reason for delay in this study's progress was the need to replant approximately 50% of the tree plot in the spring of 1985. A total of 607 tree seedlings were replanted: 300 Honeylocust; 137 Siberian Elm; 120 Cottonwood; and 50 Green Ash. The showcase planting was not replanted though high mortality in the Black Locust and Silver Maple was evident in this planting.

There were several major reasons for the high rate of mortality following the 1984 growing season. First of all a mild fall in 1984, along with a high water table did not allow the trees to "harden off' properly causing above average winterkill. Secondly, flooding during actual growing season also added to mortality rates. A third major reason for mortality during the winter of 1984-1985 was a high degree of browse damage due to minimal snow cover. Minimal snow cover probably added to winterkill due to reduced insulation of trees.

During the fall of 1985 growth was measured to determine average caliper size of each tree species. Average tree height is as follows: Cottonwood - 30"; Siberian Elm - 40"; Green Ash - 19"; Honeylocust - 17". In comparison to 1984 average tree heights taken in fall of 1984, growth appeared to be greater in 1985.

Tree cultivation was completed three times by both experiment farm staff and prison trustees and Division of Forestry staff from Sioux Falls. Trees will be cultivated until chemical weed control is established tentatively fall of 1986.

It is hoped that no more major replanting efforts will be needed and the plot will continue to exhibit good growth throughout life of this study. If mortality problems continue due to improper "hardening off", moving of the site to a better drained location may be contemplated by SDSU forestry staff and South Dakota Division of Forestry.

SOUTHEAST EXPERIMENTAL FARM SHOWCASE TREE PLANTING AND DRIP IRRIGATION STUDY

Tom A. Draper
S.D. Division of Forestry

SOUTHEAST FARM 85-30

Through the enthusiastic efforts of former experimental farm manager manager Dr. Fred Shubeck, Stanley Jensen Chairman of Board of Directors, and all the members of the Board of Directors of the SESD Experiment Farm Corporation, a tree planting was developed for the west side of the experimental farm near the two entrance ways.

The basic reasoning for establishing this planting was to establish trees and shrubs which would not only survive eastern South Dakota weather but would highlight the farm with showy colors and fruit throughout the seasons of the year. In conjunction with having varied and interesting color schemes a drip irrigation was also set up to observe increased growth rates and survival of tree seedlings. it is hoped that by having increased survival rates plus faster than normal growth rates via use of a drip irrigation system, more tree planters will use these in difficult and highly desirable tree establishment situations.

Two plots were established with the dividing line being the southernmost entrance way.

The plot north of the entrance contained two rows. Row 1 on the west was planted entirely to the native shrub Silver Buffaloberry. Row 2 on the east was planted with the north half being Siberian Apricot and the south half being Manchurian Midwest Crabapple. These two species are hardy medium-sized trees with showy spring colors and edible fruit.

The second plot immediately south of the entrance contained five rows. Row 1 is planted entirely to Silver Buffaloberry. Row 2 north half is planted to Siberian Apricot with Row 2 south half planted to Midwest Manchurian Crabapple. Row 3 north half is planted to the colorful Sunburst Honeylocust which has yellow summer foliage, and Row 3 south half is planted to Northern Red Oak which will have bright red fall foliage colors. Note: Northern Red Oak is just north of its natural range in southeast South Dakota, but in this specialized planting and with the aid of drip irrigation it is anticipated it will be able to survive. Row 4 is planted entirely to Scotch Pine and Row 5 is planted entirely to Black Hills Spruce. These two conifer species have good winter color along with windbreak and snow catch capabilities and will provide both aesthetic and environmental benefits to the experiment farm office buildings.

Establishment costs for this project included $330.00 for tree stock and $247.00 for drip irrigation materials. Average cost to provide for irrigation to each tree is a little less than $1.00 per tree. This average tree cost is less than normally incurred due to having a well house in location providing inexpensive access to a water source.

First growing season survival was excellent and though the drip system was not used extensively, it did aid seedlings during the brief dry periods of the growing season. It is anticipated next year's growth will also be exceptional.

Technical assistance was provided by the South Dakota Department of Agriculture's Division of Forestry and tree planting completed by the Clay County Conservation District.

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