26th Annual. . .

SOUTHEAST SOUTH DAKOTA EXPERIMENT FARM

PROGRESS REPORT 1986

Agricultural Experiment Station
South Dakota State University

Brookings

This twenty-sixth 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, Acting Dean R. A. Moore, Director

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Visitation and Field Tours

The Southeast Research Farm located six miles west and three miles south of Beresford is open to anyone interested in agriculture. There is someone at the farm each weekday that would be glad to show you around. If a week day is not possible - maybe a weekend visit would be more convenient. With a phone call (563-2989 or 563-2941) we can set up a personal tour for any day of the week. Do not feel that you have to be invited to stop by the farm. The facility is here for everyone involved in agriculture to use.

During each growing season we hold a Twilight Crop and Herbicide Tour and a Fall Field Day. Attendance this past year was not as large as past years, but they both hit at busy times of the year. The Twilight Tour in 1986 highlighted corn and soybean herbicides, small grain varieties, fababeans and small grain fertilization. The Fall Field Day highlighted corn and soybean performance trials, soybean herbicide trials, corn fertilization work and management of corn and soybeans. In 1987 the Twilight Tour will be held on July 1 and the Fall Field day will be held during the last week of August.

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

The purpose of the research farm is to conduct research and supply information to the people of South Dakota. Anyone wishing to comment or make suggestions for improving research that is conducted, how these results are reported or improvements that can be made in our summer tours, please write or give us a call. Address correspondence to.

Dr. Ray Moore
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SDSU
Brookings, SD 57007
(605) 688-4149

Dale Sorensen
SESD Research Farm
RR 3 Box 93
Beresford, SD 57004
(605) 563-2989 or
563-2941

Introduction. .Dale R. Sorensen, Mgr.

One word can explain the weather for 1986 across the eastern half of South Dakota; wet. Rainfall was in abundance for a considerable part of the state during most of the growing season. At the research farm, and to the south of here, it did begin to dry out in July and August, but subsoil moisture was sufficient to produce good corn and soybean yields.

Temperatures ran below normal again during the 1986 growing season. The month of August was extremely cool, which we could see again this fall with the later maturity corns being high in moisture at harvest time.

During the early summer of 1986, new equipment was purchased at the research farm, enabling us to conduct new tillage research. As can be seen from our production fields on the north quarter, we are transferring what we have learned from ridge-till research in small plots to our production ground. We are not eliminating the moldboard plow and chisel plow, but we know we can farm the north quarter that way. We want to provide a location where the farmers of southeast South Dakota can observe ridge-till on a field scale basis, and not just on a small research plot basis.

Plans have been drafted for the new feed-room facility next to the silos, and we hope that we will be able to complete the building project in the summer of 1987.

As you will notice, this issue of the annual report has been shortened by a considerable amount. The cost of publishing a report of this size and number is getting to be quite expensive. We want to report everything that is being done at the research farm. Most reports this year are shorter than past years.

If you find that you want more information on a particular report, or one that has just a short summary, you will find a name, address and phone number at the end of each report and summary. Write or call that person and they will be glad to provide you with any additional information you may desire.

Table 1. Temperatures at the Southeast Experiment Farm - 1986

Month	1986 Ave. Temperatures (F)1 Maximum	Minimum	34-year Average Maximum	Minimum	Departure From 34 year Average Maximum	Minimum
January	32.5	9.7	25.3	4.1	+7.2	+5.6
February	27.8	9.4	32.2	10.6	-4.4	-1.2
March	47.1	24.7	43.3	22.4	+3.8	+2.3
April	59.9	34.0	60.9	35.6	-1.0	-1.6
May	71.1	46.6	73.0	47.2	-1.9	-0.6
June	83.3	57.6	82.2	57.0	-1.1	+0.6
July	87.1	60.7	87.4	62.0	-0.3	-1.3
August	79.5	50.9	85.3	59.2	-5.8	-8.3
September	72.2	46.5	75.5	48.8	-3.3	-2.3
October	62.0	38.7	64.7	39.7	-2.7	-1.0
November	39.6	21.1	40.1	23.9	-0.5	-2.8
December	37.4	15.8	30.7	10.4	+6.7	+5.4

1 Computed from daily observations

Table 2. Precipitation at the Southeast Experiment Farm - 1986

Month	Precipitation 1986 (inches)	34-year Average (inches)	Departure from 34 year Ave. (inches)
January	.27	.47	- .20
February	.02	.99	- .97
March	1.89	1.46	+ .43
April	5.17	2.53	+2.64
May	4.44	3.48	+ .96
June	3.38	4.22	- .84
July	2.31	3.12	- .81
August	2.68	2.95	- .27
September	5.26	2.60	+2.66
October	1.69	1.71	- .02
November	.90	1.08	- .18
December	.07	.71	- .64
Totals	28.08	25.32	+2.76

S.E. FARM REPORT

PLANT POPULATIONS FOR CORN

D. Sorensen, B. Lawrensen, D. DuBois

SOUTHEAST FARM 86-1

SUMMARY

Seeding rates and hybrids were tested to determine what the optimum plant population would be in Southeast South Dakota. Four varieties and five populations were used in the study. Grain yields increased up to a seeding rate of 27,000 seeds/acre (approximately 22,000 plants/acre at harvest) for a 95 day and 105 day maturity hybrids. For the two late maturing hybrids yields optimized at the lower seeding rate of 21,000 seeds/acre due to the particular traits of the hybrids. The data indicates that hybrids and populations need to be matched to optimize grain yields. Results are for one year and results are not conclusive. This study will be continued for several years.

Methods Soil test results for the 1986 crop recommended 145 pounds of nitrogen and no phosphorus or potassium. Varieties selected were Pioneer 3906, 3732 and Curry's 1466 and 1490. All varieties and populations were planted on May 2, 1986. Dual at 2 pt/A and Bladex at 1 qt/A were applied broadcast pre-emergence and Counter 15-G was the corn insecticide. Furadan 15G was applied June 26 for first brood corn borer. Final stand counts were taken and corn was combined on September 26, 1986.

Results and Discussion: In 1986 the population study was modified. The crop was planted at rates of 18,000 to 30,000 seeds per acre at increments of 3000 seeds per acre. In past years, plots were over-seeded and hand thinning was performed to obtain desired populations. Beginning in 1986 we are going to seed at the set rates and evaluate yields on what the final stands were with no hand thinning.

Grain yields for 1986 are reported in Table 1. Corn yields ranged from 126 to 184 bu/acre over the entire experiment. Final populations at harvest for the specific seeding rates are reported in Table 2. The final plants/acre indicates that no planting equipment is perfect. The plate planter that was used in this particular study does not do a good job of planting for the higher population that we desire. In 1987, a White air planter will be used to plant this particular study and hopefully we will be able to obtain better stands at the higher populations.

Table 1. Effect of Plant Populations and Hybrids on Corn Grain Yield, SE Farm 1986.

Hybrid	Relative Maturity*	Seeding Rate in Thousands 18	21	24	27	30
	(days)	- - - - - - - -bu/A @ 15% Moisture**- -				
PIO 3906	95	126	139	137	156	150
PIO 3732	105	138	146	149	161	162
Curry 1466	110	151	174	161	176	164
Curry 1490	115	166	184	169	166	159

*Maturity rounded to nearest 5-day increment
** LSD(.05) 17 bu/A between populations within a variety

Table 2. Final Plant Populations for Varieties and Seeding Rates, SE Farm 1986.

Hybrid	Relative Maturity*	Seeding Rate in Thousands 18	21	24	27	30
	(days)	- - - -Plant/Acre in Thousands**- - -				
PIO 3906	95	15.5	17.5	20.0	22.0	23.5
PIO 3732	105	16.5	18.0	20.0	22.5	23.5
Curry 1466	110	16.0	20.5	21.5	24.0	24.5
Curry 1490	115	16.4	21.0	21.5	23.0	25.0
Average		16.1	19.5	21.0	23.0	24.0

* Maturity rounded to nearest 5-day increment
** Plants at harvest rounded to nearest 500

Referring back to Table 1, we can see that yields for the two earlier varieties gradually increase to the 27,000 seeds/acre which in final stand is equivalent to 22,000 and 22,500 for the Pioneer 3906 and 3732 hybrids, respectively. For the two later maturing hybrids, grain yields topped at a slightly lower final population. The final stands were slightly better for the two Curry hybrids, but yields peaked at a seeding rate of 21,000 seeds/acre.

The data for 1986 indicates that for these particular hybrids, the early and medium maturing hybrids need higher populations to obtain maximum yield, whereas the two late maturing varieties had more range to add a second ear at the lower populations or set a considerably larger ear.

Table 3 reports grain moisture at harvest for the respective hybrids. Again, as in 1985, grain moisture was considerably higher for the late maturing hybrids, but the harvest date was September 26 which did not allow the late maturing hybrids time to field dry.

Table 3. Effect of Plant Populations and Hybrids on Grain Moisture at Harvest, SE Farm 1986.

Hybrid	Relative Maturity*	Seeding Rate in Thousands 18	21	24	27	30
	(days)	% Moisture				
PIO 3906	95	17.0	16.8	16.5	17.2	18.0
PIO 3732	105	19.3	21.4	20.1	20.7	20.1
Curry 1466	110	25.8	26.0	24.7	25.0	25.0
Curry 1490	115	29.8	30.6	30.5	30.7	31.3

*Maturity rounded to nearest 5-day increment.

This study will be continued for several years in the same manner. Conclusions should not be made from one year because of the changes in climate from year to year. If further information is desired on this particular research contact: Dale Sorensen, SE Research Farm, RR 3 Box 93, Beresford, SD 57004; (605) 563-2989.

DATE OF PLANTING SOYBEANS

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

SOUTHEAST FARM 86-2

SUMMARY

Two varieties of soybeans (Corsoy 79 and Century 84) were planted at several intervals beginning with the 7th of May and ending on June 16th. May 7th planted soybeans were 49 and 47 bu/acre for Corsoy 79 and Century 84, respectively, to a low at the last planting date (June 16) of 33 bu/acre for both varieties.

Introduction: There always has been much speculation as to how early or late a crop can be planted and still reach full yield potential. In the past, we would wait to plant soybeans until we were completely finished with corn. Maybe we should be thinking differently now with the new varieties that are available. Many of us have seen volunteer soybeans growing in late April and early May. Soil temperatures are usually lower than the suggested temperature for quick germination and emergence. It might be possible to say that, planting soybeans several days earlier than was thought in years past could be feasible.

Methods: An experimental study was initiated this year to determine what affect planting date has on soybean yield. A standard variety, Corsoy 79, medium Group II, and Century 84, three days later than Corsoy 79, were chosen for this particular study.

Five dates of planting were set up to be planted at weekly intervals - April 28, May 5, May 12, May 19 and May 26. Lasso II was banded in the row for weed control and were cultivated as needed.

Results and Discussion: Field conditions in late April were not ideal delaying the early planting date of April 28 to May 7. This also delayed the following planting dates through May and into the middle of June. Table 1 reports soybean yields for 1986. Yield results clearly show that a May 7 planting date for soybeans was advantageous in 1986.

Table 1. Date of Planting Soybean Yields, SE Farm 1986.

	Planting Dates				
Variety	May 7	May 22	June 2	June 9	June 16
Corsoy 79	49	41	41	35	33
Century 84	47	42	38	35	33

LSD (.05) = 3.0 bu/acre within a variety between planting dates

Table 2 reports gross return/acre for different planting dates.

Table 2. Gross Income/Acre for Planting Dates for Soybeans, SE Farm, 1986.

	Planting Dates				
Variety	May 7	May 22	June 2	June 9	June 16
	$/Acre*				
Corsoy 79	220.50	184.50	184.50	157.50	148.50
Century 84	211.50	189.00	171.00	157.50	148.50

* Assuming $4.50/bu.

Using Corsoy 79 in Table 2, delaying planting 15 days from May 7 to May 22 reduced returns by $36 per acre. Delaying planting another 25 days from May 22 to June 16 added another $36 per acre or a total of $72/acre from May 7 to June 16.

This is data for only one year. But, the thing we want to look at is if over several years soybean planting could be moved a little earlier in Southeast South Dakota. It may be possible that you have planted some corn, but, the remaining corn ground is too wet to plant, and planting conditions are ideal on ground that is to have soybeans grown that year. With data of this type, it may assist in determining if it would be feasible to plant some soybean acres early to spread out the work load during planting season.

For more information contact: Dale Sorensen, SE Research Farm, RR 3 Box 93, Beresford, SD 57004; (605) 563-2989.

SOYBEAN VARIETY AND ROW SPACING

D. Sorensen, B. Lawrensen, D. DuBois

SOUTHEAST FARM 86-3

S.E. FARM REPORT

SUMMARY

Three soybean varieties were planted in four different row-spacings which is a continuation of research from past years. As has been seen in past years, yield results indicate that narrowing rows from 30" to a skip-row planting or 20" row significantly increased soybean yields. Reducing row width to a grain-drill spacing of 7" did not differ significantly from the skip-row or 20" rows, except for Corsoy 79.

Methods: Soybean varieties tested were selected from public varieties - Weber 84 is one day earlier than Corsoy 79 and is resistant to race 1 of phytophtora root rot. Corsoy 79 is a Group II soybean and is resistant to races 3 and 4 of phytophtora root rot. Also selected was Century 84, which is 3 days later than Corsoy 79 and is resistant to all races of the disease except races 4 and 5.

The row spacings - 30", 20", 7" and skip-row were used and the above varieties were randomized and replicated in the experimental plots. All row spacings and varieties were planted May 22 and sprayed pre-emergence with Dual + Amiben. All plots were combined October 1.

Results and Discussion:

Table 1. Effects of Row Spacings and Varieties on Yield of Soybeans, Southeast Farm, 1986.

Variety	Row Spacings 30"	20"	7"	Skip-Row
Corsoy 79	46	54	49	54
Weber 84	46	52	53	57
Century 84	46	53	52	54
Average	46	53	51	55

LSD (.05) = 5 bu/acre between row spacing within a variety

Table 1 shows, as it did last year, that narrowing the row spacing increased yields. It also appears that when narrowing row spacings, plants per acre can also be increased. The data indicates that narrowing the row spacing and increasing plants per acre may be a factor that increased soybean yields.

Also in narrowing the rows, more equi-distant spacing occurs between soybean plants maximizing light interception, reducing competition between plants. The narrow rows also cover more quickly than wide rows which saves moisture evaporation from the soil surface. Yields were reduced for Corsoy 79 in the 7 inch drill row spacing. This could be due to the branching characteristic of Corsoy 79, which may cause more competition between plants as compared to a more upright growth type of soybean plant.

Table 2 reports 6 year averages for Corsoy 79 soybeans for the various row-spacings.

Table 2. Effect of Row-Spacing On Corsoy 79 Soybean Yields, SE Farm, 1981-1986.

	Row Spacing			
Variety	30"	20"	7"	Skip-Row
Corsoy 79	42	50	45	50

The data for six years is getting to the point of being a good average to make recommendations from. The 20" and skip-row are the same in yield. They also are quite similar in row configuration. The only difference being, a 30" gap for the tractor tires and 15" between rows, versus a 20" gap for all in the 20" row spacing. The 20" rows may not be feasible in this area, but with a small amount of equipment modification, the skip-row planting is not that difficult to obtain. Reducing row spacing from 30" to 20" is eight bushels per acre. We would also expect to see a large difference in going from 36" or 38" to 30".

For more information contact: Dale Sorensen, SESD Research Farm, RR 3 Box 93, Beresford, SD 57004; (605) 563-2989.

S.E. FARM REPORT

DATE OF PLANTING CORN

D. Sorensen, B. Lawrensen, D. DuBois
B. Jurgensen

SOUTHEAST FARM 86-4

SUMMARY

Two corn hybrids were planted (medium and late maturity range) on five dates beginning on April 11 and ending on May 22. Very small differences occurred between the first three planting dates. When changing the planting date from May 1 to May 14 to May 22 both hybrids exhibited significant yield reductions when planting after May 1. The blizzard like conditions on April 14 did not affect grain yields when comparing the April 11 date to the May 1 planting date for both hybrids.

Methods: This particular study is in its second year. This year a second hybrid was added so as to see what affects there would be on a medium and late maturity hybrid. The first planting date in this study is selected by monitoring soil temperatures. When field conditions are ideal for planting and soil temperature at the two (2") inch depth goes above 50°F during the afternoon, we will begin planting in this study. In 1986, the first planting date was April 11 because that date met the above criteria. We tried to meet a seven to ten day interval between dates if field conditions permitted. Pioneer 3377 and Pioneer 3732 were the hybrids used in the study, planted at 25,000 seeds/Acre. Lasso at 2.5 qt/acre and Bladex at 1 qt./acre plus Counter 15G were the chemical treatments used this year. Furadan 15G was applied June 26 for first brood corn borer control. All plots of Pioneer 3732, and the first three planting dates of Pioneer 3377 were combined September 29. The May 14 and 22 dates of Pioneer 3377 were combined October 16.

Results and Discussion: Three days after the April 11 planting date, blizzard-like conditions occurred and soil temperatures decreased dramatically. Table 1 reports grain yields and harvest moisture for the medium maturity hybrid and Table 2 reports values for the late maturing hybrid. The data indicates yields were not affected by these poor conditions after planting. Yield levels were high again in 1986 as they were for 1985.

Table 1. Effect of Planting Date on Medium Maturity Corn, SE Farm, 1986.

Hybrid	Relative Maturity*	Planting Dates April 11	April 22	May 1	May 14	May 22
		-bu/A, 15%**-				
Pioneer 3732	105	152	144	161	142	122
Harvest Moisture		16%	16%	17%	17%	19%

* Maturity round to nearest 5 day increment
** LSD (.05) = 10 bu/acre

Table 2. Effect of Planting Date on Late Maturity Corn, SE Farm 1986.

Hybrid	Relative Maturity*	April 11	April 22	May 1	May 14	May 22
		Planting Dates				
		bu/A 15%**				
Pioneer 3377	120	173	177	176	149	117
Harvest Moisture		24%	24%	26%	21%	25%

* Maturity rounded to nearest 5 day increment
** LSD (.05) = 15 bu/Acre

For the medium maturity hybrid, yields fluctuated during the first three planting dates. Why the April 22 planting date was so much lower than the dates before and after cannot be explained at this time. The late maturity hybrid exhibited no differences in yield until the May 14 planting date. From May 1 to May 14, both varieties showed a significant decrease in grain yield, and they both displayed a significant decrease in yield when delaying planting from May 14 to May 22.

The April 11 planting date is, of course, extreme. In 1985, April 16 was the first date and April 29 was the second date. If field conditions are ideal the data indicates that the last week of April may not be a bad time to begin planting some corn acres. As we have seen, the last two years weather conditions can become quite unfavorable at critical times. Delaying corn planting into the second week of May can become quite costly as far as grain yield. If late maturing varieties are to be used in Southeast South Dakota, the data indicates we need to be timely at planting for those hybrids to achieve their full yield potential. This research will continue in future years.

For more information contact: Dale Sorensen, SE Research Farm, RR 3 Box 93, Beresford, SD 57004; (605) 563-2989.

S.E. FARM REPORT

DATE OF PLANTING EARLY, MEDIUM AND LATE MATURING CORN HYBRIDS

D. Sorensen, B. Lawrensen, D. DuBois

SOUTHEAST FARM 86-5

SUMMARY

Three corn hybrids were planted at four different dates. Yields decreased dramatically from May 5 to May 15 for all hybrids. Planting after May 15 did not decrease yields but grain moisture at harvest increased with each delay in planting.

Methods: Three hybrids with varying maturities were planted in 1986. Pioneer 3901 and 3732 as well as Curry's 1466 were planted at a seeding rate of 25,000 seeds/acre on four planting dates (May 5 and 15 and June 2 and 9). Lasso II was banded at planting and Counter 15G was used for insecticide.

Results and Discussion: Grain yields and harvest moistures for 1986 are reported in Table 1.

Table 1. Effect of Planting Date on Early, Medium and Late Maturing Hybrids, SE Farm 1986.

Variety	Relative Maturity*	Planting Date May 5	May 15	June 2	June 9
		-15% Moisture			
PIO 3901	95	117	100	101	102
(Harvest Moisture)		(15.4)	(17.0)	(25.1)	(28.8)
PIO 3732	105	133	112	110	101
(Harvest Moisture)		(16.2)	(18.6)	(26.2)	(31.2)
Curry 1466	110	125	73***	101	96
(Harvest Moisture)		(19.4)	(25.6)	(29.4)	(35.3)

* Maturity Rounded to nearest 5-day increment
** LSD (.05) = 12 bu/acre between dates within a variety
***Considerable stand reduction due to green-snap that occurred during wind storm 7/18/86.

Yield levels for this particular study in 1986 are not as high as other research reproted in this annual report. The location of this study was extremely wet in 1986, and was evident in growth of the crop during the entire year. A wind storm on the evening of July 18 caused a considerable amount of green-snap to the Curry's 1466 May 15 planting date. This

breakage at the nodes of the stalk was quite severe on this planting date. Growth stage for this planting date must have been ideal for the damage because it was not evident in the other planting dates or varieties.

For the early and medium maturity hybrids, yields were significantly decreased in delaying planting from May 5 to May 15. Because of the reduction in stand with the late maturing hybrid, it is very likely that it would react the same, but we cannot be conclusive because of the stand reduction. From May 15 to the later planting dates, yield reductions were not as dramatic, but harvest moistures increased dramatically. When selecting hybrids, or changing hybrids due to delays in planting, information of this type can be quite valuable in selecting hybrids that will do well with late planting and not have extremely high moisture contents at harvest.

Table 2. Effect of Planting Date on Moisture Discount per Bushel for Early, Medium and Late Maturing Hybrids, SE Farm 1986.

Variety	Relative Maturity*	Planting Date			
		May 5	May 15	June 2	June 9
		$ Discount/bushel**			
PIO 3901	95	.02	.10	.51	.69
PIO 3732	105	.06	.18	.56	.81
Curry 1466	110	.22	.53	.72	$1.02

* Maturity rounded to nearest 5-day increment
** Calculated at 5 cents per point x moisture above 15%.

Table 2 reports cash discounts per bushel for grain moisture at harvest. These results do not take into account the farm program for 1986. These would be cash discounts if the grain would have been sold for cash at harvest in 1986. Five cents per point was used which is a general figure. Some areas may have been four, five or six cents. This table shows that yield is not the only factor to consider when changing hybrids due to late planting. Grain moisture at harvest can have a large effect on net profit per acre when selling corn at harvest or having to dry that corn. For more information contact: Dale Sorensen, Southeast Research Farm, RR 3 Box 93, Beresford, SD 57004; (605-563-2989).

S.E. FARM REPORT

PHYTOPHORA ROOT ROT IN SOYBEANS

D. Gallenberg

PLANT SCIENCE 86-6

Soybeans were exposed to increased levels of phytophthora (pronounced fy-tof'-thor-ah) root rot, particulary in the southeast part of the state last spring, reported Dr. Dale Gallenberg, Extension plant pathologist at South Dakota State University.

Phytophthora root rot attacks the plant at any stage of growth. It causes pre-emergence damping off of the germinating seed, post-emergence killing of the seedlings, or a more gradual killing or reduction of plant vigor throughout the season. Young plants are extremely susceptible to the disease. The fungus destroys the roots and tender stems of infected seedlings, resulting in rapid killing of the plant. When older plants become diseased, the first symptoms are yellowing and wilting of the leaves, accompanied by a dark brown discoloration of the stem.

Wet weather last spring was conducive to seedling and early-season infection by this soil-borne fungus.

In fields where phytophthora was a problem this year, growers will likely experience continued problems in future years, because the fungus can maintain itself in the soil for several years in the absence of a susceptible soybean crop, Gallenberg said.

Growers who have phytophthora root rot should consider rotating out of soybeans for several seasons to minimize the problem, he said. While rotation alone is not an effective control, this, combined with the use of resistant varieties and chemical treatment, can minimize the problem, the pathologist said.

Gallenberg advised growers to look for phytophthora resistance when choosing a soybean variety for the next growing season. The fungicide seed treatment Apron will also give early-season protection against phytophthora as well as pythium (pronounced pith'-ee-um) damping-off. Ridomil is also labeled as a planting time treatment and provides longer season control than the Apron seed treatment, Gallenberg said.

In 1986, Dr. Mike Ferguson, a research pathologist, and others at SDSU, surveyed several southeastern South Dakota counties for phytophthora root rot in soybeans. Preliminary results indicate that the root rot is quite widespread throughout the southeast. Tests on the isolates of phytopthora fungus obtained during the survey continue in an effort to determine particular races of the fungus present. Results of these tests should be available late this year or early next year, Gallenberg said.

Growers with questions about phytophthora and its control should contact their County Extension Office for more inforamtion.

S.E. FARM REPORT

A COMPARISON OF SEVERAL SOIL TESTING LABORATORY FERTILIZER RECOMMENDATIONS

R. Gelderman, J. Gerwing, P. Fixen
B. Farber, B. Lawrensen, D. DuBois

PLANT SCIENCE 86-7

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 costs per acre are also to be evaluated.

Methods and Procedures: The experiment was conducted at the Southeast Experiment Farm east of the office building. The soil at this site was an Egan silty clay loam. Egan soils are well drained silty clay loams that formed in silty drift over glacial till. This was the 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 fall 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 field-cultivated twice prior to planting. Pioneer 3475 was planted at a rate of 25,000 seeds/acre on May 5. Average harvest population ranged from 23-25 thousand plants per acre. Herbicide consisted of Dual at 2 pt/acre and Bladex at 1 qt/acre broadcast preemerge. Counter 15G was used for insect control.

Fertilizer treatments were broadcast and disked on May 3. Fertilizer and lime costs were estimated averages paid by farmers in the spring of 1986. They were set on a per pound basis as follows:

Nitrogen	$0.15
Phosphorus	$0.18
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 1986 from each lab and the cost of the fertilizer recommended are reported in Table 2. The fertilizer costs varied from $20.00/acre to $62.00/acre.

In general, yields were only mediocre in 1986. Extremely wet soil conditions during the spring and early summer were thought to have caused the poor yields.

The check was approximately 65% of the other yields (Table 3). This was apparently due to lack of nitrogen. Visual symptoms also indicated nitrogen was lacking on the check treatment.

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).
These results indicate a similar trend over the years. The experiment will be conducted one more year. Upon completion, a summary and conclusions will be made.

Table 1. Soil Test from 1986 SE Farm Lab Comparison Study.

Measurement	SDSU	Harris	A & L	Servi-Tech	ISU
Nitrate-N, lbs/A-2'	22	22	57	16	----
O.M., %	3.4	3.0	4.3	2.9	----
Phosphorus, lbs/A	34	40	42	36	22
Potassium, lbs/A	710	554	584	588	488
pH	6.4	6.5	6.4	6.6	6.8
Salts, mmho/cm	0.5	0.2	----	0.3	----
Zinc, ppm	1.57	1.0	2.4	1.1	1.2
Iron, ppm	60	68	90	65	----
Manganese, ppm	34	28	41	38	----
Copper, ppm	2.1	1.7	2.2	2.0	----
Sulfur, (SO4), ppm	40*	13	27	11	3.0
Boron, ppm	1.3	0.8	1.3	----	----
Magnesium, ppm	990	786	768	760	----
Calcium, ppm	3030	2487	1929	2506	----
Sodium, ppm	----	36	----	18	----
CEC, me/100 g	----	20	19	20	----

* Average for 0-2 feet

Table 2. Suggested Fertilizer Recommendations for 120 bu/A Corn, SE Farm 1986.

	LAB				
Fertilizer Nutrient	SDSU	Harris	A & L	Servi-Tech	ISU
Nitrogen, lbs/A	132	110	120	145	110
Phosphorus, lbs/A (P205)	0	60	65	35	80
Potassium, lbs/A (K20)	0	30	60	0	0
Sulfur, lbs/A	0	0	0	0	0
Zinc, lbs/A	0	5	0	0	0
Lime, ton/A	0	0	1800*	0	0
Fertilizer Cost/A	$19.80	$35.75	$62.10	$28.05	$30.90

*Effective calcium carbonate equivalent

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

Laboratory	Yields 1986		Yields 6 Year Total	Total 6 Year Fertilizer Costs/A	Return**
	- - -bu/A- - -			$	$
Check	53	B*	418	—	—
SDSU	84	A	587	163.20	229
Harris	78	AB	569	314.57	38
A & L	82	B	580	357.83	18
Servi-Tech	84	AB	594	184.70	224
ISU	89	AB	594	255.70	148
Sig. of F.	0.0003				
C.V. %	10.5				

* 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 $1.50/bu corn in 1986, $2.50/bu in previous years.

For more information contact: Ron Gelderman or Jim Gerwing, Plant Science Department, Ag Hall, SDSU, Brookings, SD 57007; (605) 688-5121.

S.E. FARM REPORT

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

P. E. Fixen and B. G. Farber

PLANT SCIENCE 86-8

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 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 1985 2/

1986 Crop 1/	NO3-N 0-24"	Organic Matter	Extractable K	pH	DTPA Zinc
	lbs/A	%	lb/sA		ppm
Soybeans	40	3.1	700(VH)	5.9	5.5(H)
Corn	39	3.2	720(VH)	6.0	3.3(H)

1/ Crops reversed in 1985.
2/ Sampled on May 13, 1985; NO3-N samples taken on April 8, 1986.

Cultural practices are reported in Table 2. Rains delayed corn and soybean planting until June 3 and likely reduced yields. Weed control and stands were excellent in both corn and soybeans.

Table 2. Cultural Practices for 1986.

Practice	Corn	Soybeans
Past Crop	Soybeans	Corn
Variety	Pioneer 3737	Corsoy 79
Planting Date	June 3	June 3
Row Spacing	36"	36"
Planting Rate	24,900	160,000
Final Population	20,700	-----
Herbicide	Lasso band at planting Paraquat - Dual (pre)	Paraquat - Dual (pre) Lasso band at planting
Insecticide	Counter 15G	
Harvest Date	October 2	October 16

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 P_2O_5/A) were the main plots while placement methods (broadcast or starter) were the subplots. This was the third year the treatments have been applied. Broadcast treatments were applied on May 8 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 132 lbs N/A as ammonium nitrate on May 8. 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 on July 7. Normally two cultivations would be performed, the first for early weed control and the second to rebuild ridges. Since weeds were not a problem early in the season, only the ridging operation was performed.

Plant parameters measured were early dry matter production and P uptake, leaf P concentration, grain yield and corn grain moisture content. A 0-6" soil sample was taken from all broadcast plots for P analysis. Corn yield was determined by hand harvesting 20' of the center two rows. Soybean yields were determined by snapping off 10 feet of the center two rows and threshing the plants with a stationary plot thresher. Plot size was 18' by 40'.

<u>Results:</u> Soil samples taken from broadcast plots in the spring of 1986 show that considerable soil test level differences are developing due to the annual additions of broadcast P (Table 3). The soil test level of the 60 lbs/A annual treatment is more than double the 0 treatment.

Table 3. Soil test P levels from broadcast treatments prior to planting. 1986. 1/

Annual P205 Rate	Corn	Soybeans	Avg.
lbs/A		lbs/0-6"	
0	19	23	21
20	28	27	28
40	25	37	31
60 2/	37	49	43

1/ Sample from shoulder of ridge
2/ 80 lbs P205 in 1984.

Early growth of corn was influenced by P fertilization but to a lesser extent than in 1985 (see 1985 SE Farm Report). At the higher rates of P, the starter exceeded the broadcast treatments for early growth of corn (Table 4).

Corn grain yields averaged 116 bu/A across all treatments (Table 4). Yields were likely hurt by the delayed planting and possibly by heat and/or moisture stress that occurred in July and August. Soybean yields averaged 38 bu/A across all treatments.

A significant corn yield response to rate of P fertilizer occurred, but placements were not statistically different. Corn yields were increased 18 bu/A by 60 lbs P205/A. Grain moisture content also decreased significantly as P rate increased. Corn grain moisture dropped from 32.6% in the check treatments to 30.6% at the 60 lbs P205/A rate. No significant differences occurred for rate or placement of P on the yield of soybeans in 1986.

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

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-- - - -			- - - - - -%- - - - - -		
0	-	-	44	-	-	105	-	-	32.6
20	50	50	50	115	121	118	32.1	32.0	32.1
40	46	56	51	122	114	118	31.9	30.0	30.9
60	43	57	50	123	122	123	29.3	31.9	30.6
Avg	46	54		120	119		31.1	31.3	
	grams/20 plants			SOYBEANS					
0	-	-	14	-	-	37			
20	14	16	15	37	39	38			
40	14	14	14	38	37	37			
60	14	15	14	40	39	39			
Avg	14	15		38	38				

Probability of F Test 3/

CORN

	Early Growth	Yield	Moisture
Rate	.27	.09	.02
Placement	.18	NS	NS
Rate x Place.	.10	NS	.10

SOYBEANS

	Early Growth	Yield
Rate	NS	NS
Placement	.22	NS
Rate x Place.	NS	NS

1/ Corn sampled at 6 leaf stage on June 30, soybeans sampled when 4" tall on June 30.
2/ Corn at 15.5%
3/ Probability that treatment differences were due only to chance, NS indicates that probability level was greater than or equal to 0.30.

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RESIDUAL EFFECTS OF P FERTILIZATION

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

S.E. FARM REPORT

PLANT SCIENCE 86-9

SUMMARY

Several states in the North Central Region have established long-term phosphorus studies. These experiments were designed to evaluate the residual effects of P fertilizer and also generate P soil test calibration data in a situation where a range of soil test calibration data exist on one soil. These data are extremely useful for evaluating year-to-year fluctuations in crop response to soil test P and establishing response probabilities at a given soil test level. Valuable lessons can also be learned from such studies that relate to short-term and long-term P management decisions.

METHODS: The long-term P study in South Dakota is located south of the office building on the Southeast Experiment Farm near Beresford. The soil is classified as an Egan silty clay loam (Udic haplustoll). These are deep, friable, well-drained soils developed in a silty cap over glacial till. From 1964 to 1967 five rates of P (0, 10, 20, 40, and 80 lbs P/A) were broadcast and plowed down annually to establish a range of soil test levels. Various crops have been grown in the study with the major ones being corn and alfalfa. A couple years of soybeans and sorghum were included over the 22-year period. Since 1982 the study has been planted to corn and moldboard plowed each fall.

The study area in 1986 was planted to Pioneer 3732 on May 1, 1986 at a rate of 25,000 seeds/A. Weed control consisted of a preemerge application of Dual + Bladex 4L. Counter 15G was banded for insect control. Furadan 15G was applied June 27 to control first brood corn borer. Corn was combined September 25. Nitrogen was sidedressed as 28-0-0 (UAN) at the rate of 145 lbs N/A.

RESULTS AND DISCUSSION

General soil test changes: Table 1 shows the changes that have occurred in selected soil test properties over the past 22 years. Soil pH (0-4") has declined from 6.0 to 5.4 and may be at a point where a small response to lime addition could be seen. These soils normslly must be quite low in pH before lime response is measured due to high subsoil pH and abundant exchangeable cations with limited exchangeable or soluble aluminum at any given pH level. Organic matter has remained constant while ammonium acetate extractable K has declined 150 lbs/A (still interpretated as very high).

Table 1. Changes in soil test results over 22 years.

Year	pH	Organic Matter	Bray & Kurtz No. 1 P	NH4OAc K
		%	- - - - - - - lbs/A- - -	- -
1964	6.0	2.7	16 1/	597
1986	5.4	2.8	15 2/	455

Depth 0-4" 1/ Rep 4 excluded. 2/ Check plots only.

Initial soil test P averaged 16 lbs/A for reps 1 to 3 and measured 17, 14, 16, and 27 lbs/A for reps 1 through 4, respectively. Part of rep 4 is a Tetonka soil (Argiaquic argialboll) with a lower pH and with considerably more P initially. The check plot from this rep had dropped to the level of the other reps by 1973. Essentially no change in soil test P levels occurred over the 22-year period for three of the four reps.

Fertilizer effects on Soil Test P: Soil test P levels following the four fertilizer applications of 1964 to 1967 reflected the amount of fertilizer added (Fig 1). Check plots showed very little change in soil test P over the 22 years. Soils of this type have an apparent "equilibrium" level of Bray and Kurtz No. 1 extractable P in the 10-15 lb/A range. Once this range is reached, additional draw down seems negligible.

Examination of the draw down curves of Fig. 1 reveals at least two phases of decline following fertilizer addition. An initial phase of more rapid decline that appeared to increase in duration as fertilizer rate increased and a second phase of more gradual decline. The rapid phase lasted about 5 years for the 91 lb rate and increased to at least 16 years for the highest rate.

Table 2 divides the decline rates into soil test categories. The rate of decline increased from 0 in the low category to 5 or 6 lbs/A/year in the very high categories. Although the absolute rate of decline increased with soil test level, the relative rate remained nearly constant at approximately 8% when soil test was above the "equilibrium" level. This is a useful figure for estimating decline rates on similar soils where decisions are being made concerning the consequences of reducing or ommitting P fertilization for a short period of time (i.e. cash flow problems).

Table 2. Influence of soil test level on rate of decline of Bray and Kurtz No. 1 extractable P.

S. Dakota category	Soil test level	Annual soil test decline		Drop over 5 years
	lbs/A	lbs/A	%	lbs/A
Low	6-14	0	0	0
Medium	15-25	1.4	7	7
High	26-40	3.0	9	15
V. High	41-80	5.2	9	26
V. High	80-120	6.4	6	32
		Avg. = 8%		

1/ 13-year period 1968-1980.

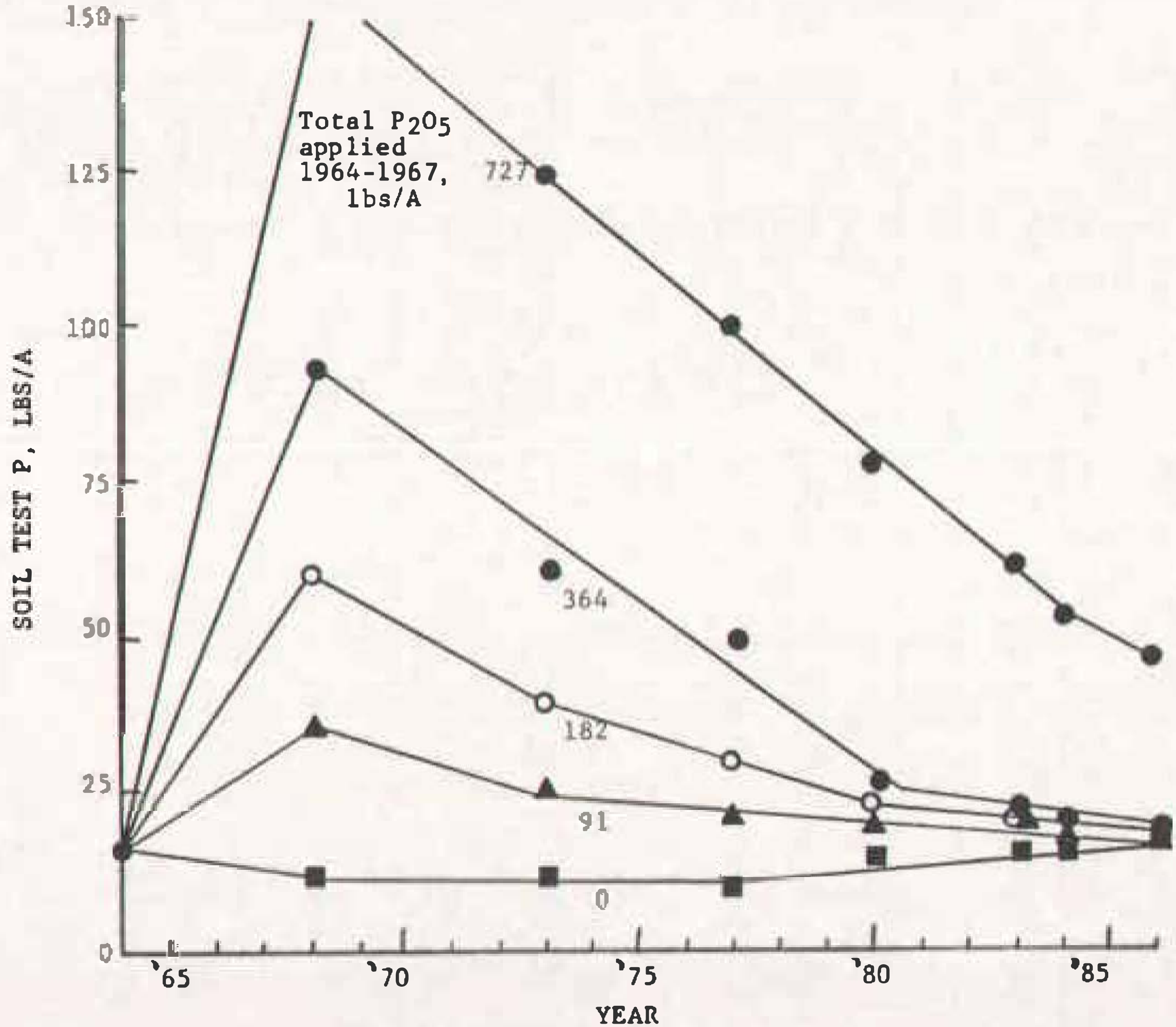

FIG. 1. Influence of fertilizer and time on soil test P levels for an Egan soil.

Fertilizer effects on grain yield and moisture content. Corn grain yields were not influenced by soil test P level difference in 1986. Grain moisture content, however, decreased from 23% at 15 lb/A soil test level to 19% at a 59 lb/A soil test level.

Ear leaf samples have been collected annually at silking for plant analysis. Table 3 shows the average P concentration found at each soil test level for 1982-1985. Leaf samples were also collected in 1986; however, analysis is not yet complete.

Table 3. Influence of soil test P level on corn ear leaf P concentration, 1982-1985.

Soil test Level 1/	Year 1982	1983	1984	1985	Average
lbs/A	- - - - -	- - - - -	% P	- - - - -	- - - - -
15	0.26	0.21	0.25	0.22	0.24
17	0.29	0.21	0.26	0.26	0.26
19	0.25	0.22	0.28	0.25	0.25
31	0.25	0.23	0.30	0.27	0.26
59	0.26	0.24	0.32	0.31	0.28

1/ Summer 1986, 0-4"

Corn yields from 1982 through 1986 show that the 31 lb/A soil test level has averaged 3 bu/A more corn than the 15 lb/A level (Table 4). These data also show that the response to P varied considerably across years with no response in 1982, 1983, and 1986, 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.

Table 4. Influence of soil test P level on corn grain moisture in 1986 and grain yield in 1982-1986.

Soil Test P level	Grain Yield 1982	1983	1984	1985	1986	Avg.	Grain Moisture 1986
lbs/A1/	-------	-------	bu/A2/	-------	-------	-------	%
15(L)	97	102	103	119	113	107	23.2
17(M)	103	97	101	117	113	106	22.4
19(M)	94	103	102	126	111	107	22.4
31(H)	93	106	109	131	113	110	21.2
59(VH)	84	107	117	129	114	110	18.9

1/ Bray and Kurtz No. 1, Summer 1986, 0-4"
2/ At 15.5% Moisture

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S.E. FARM REPORT

INFLUENCE OF FERTILIZERS AND LIME ON CORN PLANTED ON HIGH TESTING NEARLY NEUTRAL SOILS

J. Gerwing, R. Gelderman, D. Sorensen
B. Lawrensen

PLANT SCIENCE 86-10

Introduction: Some farmers in South Dakota are using potassium, sulfur, micronutrient fertilizers and lime on soils which have a high soil test. The South Dakota State University soil testing lab would not predict an economical response to these materials when soil test levels are high. A soil testing lab comparison study conducted each year for the last six years at the farm has shown that applying a combination of these nutrients as a group was not giving an economical response on corn. Each individual nutrient alone, however, was not compared to a check plot. In 1986, a demonstration was implemented at the Southeast Farm to show the effect of each of the commonly used nutrients on a high fertility soil.

Materials and Methods: The demonstration was established on the Southeast Farm east of the office building. Two soils, an Egan silty clay loam and a Tetonka silt loam were included within the site. Egan soils are well drained silty clay loams that formed in silty drift over glacial till. Tetonka soils consist of deep, poorly drained soils formed in local silty and clayey alluvium in depressions on uplands. Water permeability in Tetonka soil is slow.

Soil samples were taken to a depth of four feet in the spring of 1986. The top foot was divided into 6 inch increments and the remaining 3 feet in one foot increments. The South Dakota State University soil testing lab did regular and micronutrient analysis on all depth increments. The site had been in corn in 1985, was fall plowed and secondary tillage done in spring after fertilizer treatments had been applied. Fertilizer and lime treatments are given in Table 1. Treatment one received no fertilizer. Treatments 2-7 all received 150 lb N and 40 lbs P205 per acre plus either 50 lbs K20, 25 lbs sulfur, 5 lbs Zn or 2000 lb lime per acre. Treatment 7 received all fertilizer materials. All fertilizer was broadcast prior to secondary tillage in the spring. Each treatment was replicated 4 times. Pioneer 3475 was planted on May 5th at 25,000 seeds per acre.

Results and Discussion: Soil analysis from samples taken to a 4 foot depth are listed in Tables 2 and 3. All nutrient levels other than nitrogen and phosphorus are considered high and no recommendation would be given. The potassium soil test level was 810 lbs/A. Soil test levels over 350 lbs are considered very high. The zinc soil test level was 1.4 ppm. Levels over 1.0 are considered high. The sulfate sulfur available in the 4 foot profile was over 3600 lbs/A. Nearly 3000 lbs were in the 2 to 3 foot soil depth with 120 lbs of sulfur in the top 6 inches.

Saturated soil conditions combined with above normal spring rainfall caused water to stand in a number of plots. This was especially true for those plots on the poorly drained Tetonka soils. The poor water drainage was quite visible at midseason.

Plots were hand harvested the first week of October. The effects of saturated soils and standing water resulted in extremely variable yields between replicated plots of the same treatment. Even though the average yield across all plots receiving nitrogen and phosphorus was 130 bu per acre, yields from within a single treatment ranged from 107 to 162 bushels per acre. This variability made the yield results of the study difficult to interpret. Statistically there was no yield response to potassium, sulfur, zinc, or lime at this site.

A new location on the farm is being identified for this demonstration in 1987 to avoid soil variability and poorly drained conditions encountered in 1986.

Table 1. Fertilizer Treatments.

Treatment	N	P2O5	K2O	Sulfur	Zinc	Lime
	lb/A					
1	0	0	0	0	0	0
2	150	40	0	0	0	0
3	150	40	50	0	0	0
4	150	40	0	25	0	0
5	150	40	0	0	5	0
6	150	40	0	0	0	2000
7	150	40	50	25	5	2000

Table 2. 1986 Regular Soil Test Levels

			Regular Tests			
Depth in.	NO3-N lbs/A	OM %	P lb/A 1/	K lb/A 1/	pH	Salts mmho/cm
0-6	12	3.4	30	810	6.7	1.4
6-12	11	3.2	18	680	6.6	1.1
12-24	18	1.7	2	480	7.0	1.3
24-36	14	0.5	2	400	7.1	3.0
36-48	14	1.0	0	490	7.1	2.6

1/ ppm x 2

Table 3. Micronutrient Soil Test Levels.

Depth in.	Zn PPM	FE PPM	Mn PPM	Cu PPM	S lb/A	Ca PPM	Mg PPM	Cl lb/A
0-6	1.4	47	26	1.8	119	4,414	727	12
6-12	1.2	45	25	1.9	151	3,889	747	6
12-24	0.2	30	9	1.9	198	6,181	828	7
24-36	0.8	21	6	2.0	2999	16,544	586	4
36-48	0.4	28	12	1.9	216	6,555	677	11

For more information on this topic contact: Jim Gerwing, Plant Science Department, Ag Hall, SDSU, Brookings, SD 57007; (605) 688-5121.

1986 PERFORMANCE TRIALS OF SMALL GRAINS, GRAIN SORGHUM, SOYBEANS AND CORN AT THE SOUTHEAST EXPERIMENT FARM

J. J. Bonnemann

S.E. FARM REPORT

PLANT SCIENCE 86-11

Introduction

Variety or performance trials with four major types of crops were conducted at the Southeast Farm during the 1986 crop year. Data from all trials and for other areas around the state are found in publications for each type of crop.

Trials of spring wheat and oats were conducted at the farm in 1986, Table 1. Results of the trial are found in EC 775 (rev, 1987 Variety Recommendations, Small Grain and Flax.

Soybean trials were conducted at several locations in southeast South Dakota including the Southeast Farm. These sites were Freeman, Elk Point and Ellis (northwest of Sioux Falls). Table 2 consists of data from just the Southeast Farm. Results for the other locations and other areas of South Dakota can be found in EC 775 (rev), 1987 Variety Recommendations, Soybeans.

Over 100 hybrids were compared in the corn performance trial located at the SE Farm in 1986. Yields ranged from approximately 75 to 194 bu/acre (Table 3 & 4). Growing conditions were ideal in 1986 and dry down was considerably better than the 1985 crop year. Yields of all corn performance trials in 1986 for all locations as well as 2, 3, and 4 year averages can be found in Plant Science Pamphlet #98, 1986 Corn Performance Trials.

The 1986 grain sorghum performance results for the SE Farm are reported in Table 5. Yield results and other data for farm trials on grain sorghum can be found in Plant Science Pamphlet #99, 1986 Grain Sorghum Performance Trials.

More information on these crops can be found by listing the publication as underlined, and sending to: Bulletin Room, SDSU, Brookings, SD 57007. These publications should also be available at your county extension office.

Table 1. 1986 Small Grain Performnace Trials, CPT, Southeast Farm

OATS					SPRING WHEAT				
Entry	Hgt. in.	Test wt.	Yield 1986	B/A 3-yr.	Entry	Hgt. in.	Test wt.	Yield 1986	B/A 3-yr
Bates	37	32	74	82	Alex	45	59	39	37
Benson	42	27	51	68	A99ar	45	58	37	34
Burnett	40	27	40	63	Butte	43	58	34	31
Centennial	40	31	67	77	Butte 86	43	59	41	--
Don	30	35	93	--	Centa	45	57	36	31
Hazel	39	34	89	--	Chris(ck)	44	58	34	31
Hytest	43	37	68	76	Stoa	45	59	46	40
Kelly	43	35	66	72	Angus	37	57	43	37
Lancer	40	28	61	74	Apex 83	36	53	43	37
Lyon	44	27	47	70	Buckshot	36	57	33	32
Moore	42	29	61	82	Celtic	37	57	41	--
Noble	40	26	41	69	Challenger	37	56	43	38
Nodaway 70	45	28	43	59	Erik	36	59	42	39
Ogle	40	25	50	74	Guard	36	55	45	39
Otee	40	26	43	68	Len	40	52	36	33
Pierce	38	34	71	76	Leo 747	36	55	34	--
Porter	38	24	38	74	Marshall	36	59	35	35
Preston	41	33	72	77	Norak	34	55	43	37
Proat	41	34	70	84	Norseman	36	58	38	34
Sandy	44	31	66	81	Olaf	34	56	36	32
Starter	40	36	84	--	Oslo	35	56	39	35
Steele	42	33	84	92	Success	36	55	43	37
Webster	40	31	68	80	Wheaton	36	55	43	38
Wright	42	34	79	79	2369	36	59	43	39
Haylander II(B1)	44	30	55	72	Nordic	39	59	46	--
					Telemark	34	53	38	--
Means	41	31	64	75		39	57	41	36
LSD(.05)			8.2					4.9	
CV-%			9.1					8.5	

Seeded - April 8, 4 replications; Oats 10 pk/A, S. Wheat 5 pks/A

Table 2. Soybean Performance Trials, Southeast Farm, Beresford

Brand	Entry	Maturity Group	Maturity Date Mo-Day	Plant Ht. In	Grain Yield Bu/A
GROUP I					
Agripro	AP1776	I	9-19	37	55
Curry	CBS-190B (BL)	I	9-19	37	56
Fontanelle	4250	I	9-22	40	51
Golden Harvest	H1198(BL)	I	9-23	38	57
Hofler	Opal	I	9-17	36	58
King Brand	KG70	I	9-16	43	50
King Brand	PS80	I	9-18	41	52
King Brand	KG81	I	9-22	38	52
Prairie Brand	PB142	I	9-23	44	58
S-Brand	S-38A	I	9-19	37	55
Sands	SOI 142	I	9-16	40	56
Sands	Exp 166	I	9-19	39	59
Sands	SOI 136	I	9-22	45	58
	BSR 101	I	9-22	42	50
	Corsoy 79 C	II	9-22	41	52
	Evans	0	9-5	37	44
	Hodgson 78	I	9-16	38	46
	Hardin	I	9-20	38	48
	Lakota	I	9-18	45	52
	Sibley	I	9-19	39	54
	Weber	I	9-18	36	56
	Weber 84 C	I	9-20	38	53
Means			9-19	39.5	53
			LSD (.05)		3.8
			CV-%		5.1
GROUP II'S					
Agripro	HP20-20	II	9-24	35	52
Agripro	AP200	II	9-26	41	55
Agripro	AP2190	II	9-28	41	58
Curry	CBS-280B (BL)	II	9-26	36	56
Curry	CBS-290B (BL)	II	9-29	44	54
DeKalb	CX226	II	9-26	34	61
DeKalb	CX264	II	9-27	37	57
DeKalb	CX283	II	9-29	38	57
Diamond	D195B(BL)	II	9-26	37	54
Diamond	D180B(BL)	II	9-27	39	52
Diamond	D201	II	9-28	38	55
Fontanelle	4545	II	10-1	39	57
Golden Harvest	H-1233	II	9-28	35	56
Golden Harvest	H-1285	II	9-29	36	54

Table 2. Continued, Soybean Performance Trials

Brand	Entry	Group	Mo-Day	in.	Bu/Ac
Hoegemeyer	200	II	9-27	42	58
Hoegemeyer	205	II	9-30	39	55
Hofler	Jade	II	9-22	34	54
Hofler	Pearl	II	9-25	33	53
Hofler	Jewell	II	9-27	38	55
Hy-Vigor	ROW T-9 (BL)	II	9-25	35	55
Hy-Vigor	Derby 9	II	9-25	42	53
Hy-Vigor	Ex. 2903	II	9-27	36	57
Latham	L-650	II	9-26	34	54
Latham	L-561 (BL)	II	9-26	37	59
Latham	L-851 (BL)	II	9-28	36	57
McCurdy	94+ (BL)	II	9-25	35	53
McCurdy	102+ (BL)	II	9-27	37	52
McCurdy	260B (BL)	II	9-28	37	56
Mustang	M-1220A	II	9-27	40	54
Mustang	M-1225	II	9-27	37	57
Mustang	Exp 13	II	9-28	40	59
Northrup King	S 23-12	II	9-25	40	54
Northrup King	S 23-03	II	9-27	36	60
Northrup King	S 27-10	II	9-29	35	57
Prairie Brand	PB103A (BL)	II	9-26	36	54
Prairie Brand	PB223	II	9-27	35	56
Pride	B236	II	9-27	38	55
Pride	225 Brande (BL)	II	9-27	37	58
Pride	B242	II	9-30	37	54
SRF	Exp 266	II	9-25	36	58
SRF	Exp 255	II	9-26	37	56
SRF	Exp 256	II	9-28	35	59
S-Brand	S-42C	II	9-27	34	59
S-Brand	S-44A	II	9-27	35	55
S-Brand	S-44C	II	9-27	37	55
Sands	SOI 226	II	9-26	36	56
Sands	SOI 248	II	9-28	34	58
Sands	SOI Exp 269	II	9-29	38	58
Seedtec	EX 450B-BL	II	9-26	36	55
Seedtec	EX 501	II	9-28	34	59
Sexauer	SX 1090	II	9-25	36	56
Sexauer	SX 29	II	9-27	38	56
Sexauer	SX 2080	II	9-27	36	54
Stine	2750	II	9-27	33	61

Table 2 Continued, Soybean Performance Trials

Brand	Entry		Group	Mo-Day	in.	Bu/Ac
Terra	Hurdle		II	9-26	37	54
Terra	Decathalon		II	9-26	33	56
Terra	Dash		II	9-27	40	57
	Amcor		II	9-30	39	53
	Beeson 80		II	9-29	38	41
	BSR 201		II	9-29	32	51
	Corsoy 79		II	9-27	37	52
	Century 84		II	9-30	34	53
	Elgin		II	9-27	34	57
	Hack		II	9-29	35	54
	Harcor		II	9-28	39	54
	Hoyt S-D		II	9-29	27	55
	Mead CK		III	10-3	39	52
	Miami		II	9-27	38	46
	Nebsoy		II	9-29	35	47
	Platte		II	9-29	35	55
	Preston		II	9-28	36	48
	Weber		I	9-20	36	52
	Weber 84	CK	I	9-23	38	52
	Wells II		II	9-26	40	48
Means				9-27	37	55
				LSD(.05)		5.6
				CV-%		7.4

Table 3. 1986 Corn Performance Trial, Area B (Early) Centerville, SD

Brand and Variety	Type and Cross	Yield B/A	Pct Stalk Lodged	Percent Moisture	Performance Score Rating
Pioneer 3475	M 2X	173.0	0.0	20.6	1
Fontanelle 4280	E 2X	173.0	0.0	23.6	2
Cenex 2107	M 2X	167.3	0.0	20.7	3
NC+ 4505	M 2X	166.3	0.7	24.1	6
Seedtec KX-5800	L 2X	164.3	2.2	19.2	4
Mc Curdy 5596	M 2X	164.3	1.4	19.8	5
DeKalb DK 524	M 2X	159.6	1.4	20.6	7
NC+ 3884	M 2X	158.5	1.4	20.0	8
Lynks LX4235	M 2X	157.4	0.7	21.1	9
PAG SX269	M 2X	157.0	2.8	22.6	12
McCurdy 5750	M 2X	156.1	0.7	21.4	10
Paymaster 2990	M 2X	155.9	4.3	20.9	11
Curry SC1419	M 2X	153.1	1.4	20.4	13
Land O'Lakes 555	M 2X	152.7	0.7	21.0	15
Jacques 7750	L 2X	152.1	0.7	20.4	14
PAG 130409	M 2X	152.1	0.7	20.9	16
Horizon 4109	M 2X	151.6	1.4	20.3	17
Pioneer 3471	M 2X	151.2	3.8	22.4	22
SDAES Check 4	E 2X	149.2	0.7	20.0	19
Seedtec KX-5900	L 2X	148.7	0.7	20.5	20
Hoegemeyer SX2566	E 2X	148.6	0.7	19.2	18
Pioneer 3713	M M2X	147.1	0.0	20.4	21
Pe[illegible] SX 872	L 2X	146.7	1.4	20.9	23
Cargill 889	M 2X	145.2	0.7	20.3	24
Cenex 2110	M 2X	144.9	0.7	20.3	25
McCurdy 5990	M 2X	143.2	0.7	21.7	27
Horizon 202	M 2X	140.8	0.0	18.1	26
Jacques 7700	L 2X	140.1	1.4	22.1	33
Crow's 199	M 2X	140.0	1.5	19.7	29
Wilson 1500B	M 2X	139.9	0.0	20.3	31
NC+ 2561	E 2X	139.6	1.4	19.5	30
Terning Encore	L 2X	138.5	3.8	18.5	32
Kaltenburg KX64	M 2X	138.1	0.8	21.1	34
Crow's 181	E 2X	137.4	0.0	18.1	28
Custom CFS W96010	L 2X	135.9	2.1	23.3	43
Crow's 344	M 2X	135.7	3.9	20.8	39
DeKalb DK572	M 2X	135.7	2.2	21.3	38
Keltgen KS 1090	L 2X	135.3	1.4	20.8	36
Hoegemeyer SX2565	M 2X	134.9	0.8	18.6	35
Custom CFS 6203	L 2X	134.4	0.7	20.9	40
Keltgen KS 1070	M 2X	133.5	2.2	20.2	41
Gold Star GS-108	M 2X	132.0	0.7	20.7	44
Interstate 533	L 2X	131.5	0.7	18.3	37
Terra TR 1040	M 2X	130.9	1.4	21.2	45
Betagold Heidi	M 2X	129.8	0.8	18.3	42
King K4422	L 2X	128.4	2.3	19.8	47
Payco SX 750	M 2X	126.6	2.2	19.5	48
Hoegemeyer SX2625	M 2X	126.3	0.0	21.7	49
King K416	L 2X	125.4	0.0	18.0	46
SDAES Check 10	E 2X	122.6	5.8	18.7	50
Terning Premier	M 2X	117.6	2.9	17.6	51
Fontanelle 4253	M 2X	115.4	0.0	23.2	52
King K2204	L 2X	85.3	2.2	18.0	53
Pride EXP111	M 2X	75.0	2.6	24.4	54
LSD (.05)		23.2	CV-%	11.8	

Table 4. 1986 Corn Performance Trial, Area E(Late), Centerville, SD

Brand and Variety	Type and Cross	Yield B/A	Pct Stalk Lodged	Percent Moisture	Performance Score Rating
DeKalb T1100	L 2X	193.9	0.0	22.6	1
Cargill 937	M 2X	193.6	0.7	24.4	2
Pioneer 3377	L 2X	187.1	0.0	23.6	4
Lynks LX4315	L 2X	187.0	0.0	22.7	3
DeKalb DK636	L 2X	186.6	1.4	24.4	5
Pride 7705	L 2X	183.7	0.0	24.7	6
McCurdy 7384	L 2X	181.3	1.4	26.0	15
Wilson 1640	L 2X	180.9	0.0	22.9	7
Stauffer S6596	L 2X	180.4	0.7	22.4	8
Keltgen KS114	L 2X	179.8	1.4	24.3	12
Pride EXP117	L 2X	179.3	0.0	24.4	11
NC+ 5111	L 2X	179.1	0.0	23.6	9
King K596	L 2X	178.5	0.0	23.4	10
Custom CFS 7501	L 2X	177.7	0.0	24.0	14
Pride 6692	L 2X	176.4	0.0	23.0	13
Fontanelle 5230	L 2X	176.1	0.7	24.2	19
Stauffer S7751	L 2X	175.8	0.0	24.5	21
Supercrost 4304	L 2X	174.9	0.7	22.9	16
Asgrow/o's Gold 6882	L 2X	174.6	0.7	22.8	17
Wilson 1700	L 2X	172.8	0.7	25.1	30
Peyco SX 860	L 2X	172.3	0.0	23.3	22
Seedtec XX-6800	L 2X	172.1	0.0	21.6	18
Keltgen Exp. 192	L 2X	172.9	0.0	23.7	23
Peyco SX 925	L 2X	171.7	0.7	24.4	31
Cargill 6377	L 2X	171.4	3.6	22.4	27
Kaltenburg KX77	L 2X	171.2	0.0	26.3	36
Peyco SX 847	L 2X	171.0	0.7	22.9	25
Paymaster 6347	L 2X	170.9	1.4	22.7	26
Supercrost 2989	M 2X	170.7	0.7	20.8	20
PAG SX310	L 2X	170.0	2.1	24.2	34
Kaltenburg KX74	L 2X	169.4	0.8	23.4	33
NC+ 4650	L 2X	168.9	0.7	22.9	32
Crow's 444	L 2X	168.3	0.7	21.2	24
Interstate 593	L 2X	168.1	0.0	21.6	29
King K5574	L 2X	167.3	0.0	21.0	28
Keltgen KS 1150	L 2X	166.2	2.1	25.3	40
Cenex 2114	L 2X	165.6	0.7	23.1	38
Terra Exp 108	L 2X	164.5	0.0	21.8	35
Crow's 442	M 2X	163.7	0.7	22.3	39
Interstate 603	L 2X	163.0	2.0	20.7	37
Lynks LX4304	L 2X	158.6	0.7	21.9	41
Pride X1136	L 2X	158.4	2.9	22.7	43
Paymaster 6127	L 2X	157.5	1.4	22.1	42
Pioneer 3378	L 2X	156.4	0.0	23.8	44
PAG 132701	L 2X	153.1	0.7	23.4	47
Curry SC1466	L 2X	153.1	0.0	22.0	46
Northrup King PX9470	L 2X	152.6	0.7	21.3	45
Gold Star GS-110	L 2X	149.2	4.5	21.6	48
Terra TR 3203	L 2X	148.8	0.8	23.7	49
SDAES Check 1	L 2X	147.5	1.5	25.3	53
Horizon 4111	L 2X	145.5	1.5	21.4	50
Cargill 130409	L 2X	144.7	1.4	21.6	52
Stauffer S5340	M 2X	144.3	0.0	21.7	51
Dahlgren DC-535	L 2X	142.6	1.6	22.1	54
Seedtec EX-60	L 2X	138.8	2.3	21.0	56
Curry SC1477	L 2X	137.5	0.0	22.9	57
Land O'Lakes 644	L 2X	137.4	1.6	22.7	58
Cargill 918	L 2X	136.8	1.5	24.8	60
Northrup King Px9385	L 2X	136.4	0.0	19.6	55
SDAES Check 9	L 2X	132.6	0.8	20.8	59
Curry SC1482	L 2X	125.7	1.4	24.3	61
LSD (.05)%	22.2		CV-%	9.7	

Table 5. 1986 Grain Sorghum Performance Trial, Southeast Farm, Beresford

Entry	Height inches	Headed mo/day	9/18 Moisture Percent	Test wt lb/B	Yield, lb/A 1986	Yield, lb/A 2-yr
SeedTec 3101	54	7/27	30.1	58	5839	5896
SeedTec 3103	49	7/25	27.8	57	5658	5362
Pioneer 8855	48	7/26	27.6	58	5504	5756
Interstate 663	48	7/26	29.8	59	5434	
Stauffer 530GR	54	8/2	35.+	60	5242	
Warner W-560T	47	7/28	32.5	60	5420	5505
DeKalb X-651	50	7/31	33.3	60	5386	
Pioneer 8680	49	7/29	34.7	60	5311	5503
Warner W501T	43	7/26	31.2	58	5283	5280
McCurdy M450	50	7/28	33.0	59	5275	5378
Paymaster 1022	50	8/11	33.5	60	5284	5610
Warner W-523T	49	7/26	30.1	58	5265	5760
Interstate 665	53	7/27	30.0	55	5136	
McCurdy M410	53	7/28	30.8	55	5081	5635
Stauffer 9525	52	7/24	29.9	57	5059	
Stauffer 535GR	57	7/31	32.6	58	5059	
Pioneer 8728	47	7/28	30.9	52	5058	
Interstate 660	41	7/27	30.0	56	5027	
Warner WX86028	50	7/26	28.9	56	5021	
Pioneer 8790	47	7/26	30.2	58	5013	4922
Asgrow Dorado E	52	7/26	29.3	59	4992	5217
Paymaster 930	50	7/26	32.0	58	4981	5487
SeedTec 3102	48	7/25	29.7	59	4953	5181
Sigco Two 50YG	48	7/29	33.0	59	4925	5433
Warner 545T	42	7/27	31.1	58	4876	4969
Asgrow H8407	51	7/31	35.+	56	4856	
Warner W551A	52	7/29	30.1	55	4707	4862
DeKalb DK39Y	47	7/29	35.+	57	4322	4422
Interstate 668	47	7/29	31.1	58	4271	
Means	49	7/28	31.3	58	5113	

CV-% 9.1 LSD (.05) 932

CORN HERBICIDE DEMONSTRATION

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

Purpose: To evaluate performance of labeled herbicides for weed control when used in two tillage systems. Producers have reported changes in weed control as tillage systems changed. Demonstration plots provide side-by-side comparisons of herbicides. These plots were included on field tours and the information is used in educational programs. Evaluation of performance during 1986 provides control comparisons based on this year's conditions in the area; long-term averages give a measure of consistency under varied conditions.

Methods:

Plot Design: Demonstration
Previous Crop: Corn
Soil: Silty clay loam; 2.7% O.M.; 6.8 pH
Cultivation: None
Herbicide: PPI: 5/6/86
PRE: 5/6/86
EPOST: 5/29/86
POST: 6/18/86

Plot Size: 20' x 50' each tillage
Crop: Corn TX49
Planted: 5/6/86
Evaluated: 6/25/86
Rainfall: 1st week 1.98 inches
2nd week .92 inches

Results: Plots were visually evaluated for percent grass and broadleaf control. Herbicides were broadcast over plowed and chiseled seedbed. Spring tillage and incorporation were the same for both systems. Data are presented for evaluations in each tillage system.

Green and yellow foxtail pressure was heavy. Tall waterhemp was the predominant broadleaf; redroot pigweed and lambsquarters were also present. Sunflower and cocklebur lacked uniformity and were not evaluated. Crop stand was uniform.

Results in 1986 were excellent. Rainfall was near ideal for soil applied herbicides. Differences were apparent. Strengths and weaknesses are easily determined when reviewing the data presented in the table below. Twenty treatments provided grass and broadleaf control that exceeded 90%. Atrazine or Bladex in combinations were required for broadleaf control. Lower rates of grass herbicides tended to allow grass escapes; especially in the reduced till. Cultivation or postemergence herbicides would be required to keep weed competition to a minimal level. Herbicide performance for most treatments was 10 to 20% greater on the plowed compared to chiseled seedbed. Only two treatments in the chisel system had

90% or greater evaluation for grasses and broadleaves. Seven exceeded 80% control. The difference is primarily due to increased weed pressure. Comparative trends are similar for the 3-year (1984-86) average.

1986 CORN HERBICIDE DEMONSTRATION

		1986*				3-Year Average			
		Chisel		Plowed		Chisel		Plowed	
Treatment	lb/A act.	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf
PREPLANT INCORPORATED									
Eradicane Extra	4	62	46	89	62	66	67	88	66
Eradicane+atrazine	4+1	80	84	97	94	81	82	90	94
Eradicane+Bladex	4+2	72	78	92	92	75	72	88	89
Eradicane+Bladex+atrazine	4+1.5+.5	80	68	98	98	79	79	91	94
Sutan+	4	96	41	72	35	81	48	79	43
Sutan+ +atrazine	4+1	90	91	98	98	82	86	92	94
Sutan+ +Bladex	4+2	73	79	96	95	75	77	90	87
Sutan+ +Bladex+atrazine	4+1.5+.5	85	88	98	98	83	89	93	94
#Marathon	4	72	52	94	42	--	--	--	--
#Marathon+Bladex	4+2	78	75	94	90	--	--	--	--
SHALLOW PREPLANT INCORPORATED									
atrazine	2.5	82	90	92	95	78	91	89	94
Lasso	3	52	38	76	52	60	64	75	69
Dual	2.5	66	25	86	38	71	45	83	61
PREEMERGENCE									
atrazine	2.5	80	83	90	92	82	90	89	94
Bladex	3	48	52	86	78	58	53	81	68
Lasso	3	72	48	93	73	68	48	89	80
Dual	2.5	82	35	96	70	78	38	91	76
Prowl	1.5	72	62	78	62	--	--	--	--
Ramrod	5	56	12	83	22	55	18	88	38
#Harness	2.5	74	55	93	89	69	61	92	89
Lasso+atrazine	2+1	79	74	96	94	74	80	94	95
Lasso+Bladex	2+2	72	65	94	92	74	69	92	89
Dual+atrazine	2+1	90	84	94	95	86	81	95	95
Dual+Bladex	2+2	90	90	96	96	86	65	94	93
atrazine+Bladex	.75+2.25	83	87	93	91	--	--	--	--
Ramrod+atrazine	4+1	84	85	92	94	76	79	92	92
Ramrod+Bladex	4+2	75	63	90	81	71	49	91	75
Lasso+Bladex+atrazine	2+1.5+.5	82	70	91	92	80	73	93	90
Dual+Bladex+atrazine	2+1.5+.5	84	77	92	89	85	79	94	92
Lasso+atrazine+Sencor/Lexone	2+1+.25	78	81	95	96	79	83	95	96
Dual+Bladex+Sencor/Lexone	2+1.5+.25	84	72	94	94	83	74	95	94
Lasso+Bladex+atrazine+ Sencor/Lexone	2+1+.5+.25	78	78	92	97	79	82	95	88
EARLY POSTEMERGENCE									
Prowl+atrazine	1.5+1	74	84	90	91	81	87	92	94
Prowl+Bladex	1.5+1.5	72	62	89	72	82	67	90	82
atrazine+crop oil	1.5+1 qt	66	82	86	95	69	90	87	94
Bladex+X-77	2.0+.5%	77	38	93	42	83	33	91	59
Tandem+Bladex+X-77	.5+1.5+.5%	88	43	96	42	89	43	94	62
Tandem+Bladex+atrazine+X-77	.5+1+.5+.5%	82	60	92	74	87	79	94	88
Bladex+atrazine+X-77	1.5+.5+.5%	68	73	91	85	--	--	--	--
Bladex+atrazine+Banvel	1.5+.5+.25	67	78	88	88	--	--	--	--
Bladex (pre)&Bladex	2.5&1.0	80	22	87	71	--	--	--	--
Ramrod (pre)&Banvel	4&.5	30	90	82	93	66	76	89	92
PREEMERGENCE & POSTEMERGENCE									
Ramrod&Banvel	4&.25	34	84	74	76	--	--	--	--
Ramrod&2,4-D amine	4&.5	32	74	65	79	60	66	82	83
Ramrod&Basagran	4&1	32	69	70	62	60	60	83	77
Ramrod&bromoxynil	4&.38	32	41	65	66	69	61	78	75
Ramrod&bromoxynil+Banvel	4&.25+.25	32	62	65	83	--	--	--	--
Ramrod&bromoxynil+atrazine	4&.25+.5	32	73	72	76	67	80	82	84
Ramrod&Banvel+atrazine	4&.25+.5	30	78	69	[illegible]	--	--	--	--
Ramrod&bromoxynil+Bladex	4&.25+.5	32	72	76	58	--	--	--	--
LSD (.05)						17	18	8	13

Experimental

* Average 2 ratings/plot

SOYBEAN HERBICIDE DEMONSTRATION

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

Purpose: To evaluate performance of labeled herbicides for weed control and crop tolerance when used in two tillage systems. Demonstration plots provide side-by-side comparisons of herbicides. The plots were included on field tours and the inforamtion is used in educational programs.

Methods:

Plot Design: Demonstration	Previous Crop: Corn
Plot Size: 20' x 50' for each tillage	Crop: Corsoy 79
Soil: Silty clay loam; 2.7% O.M.; 6.8 pH	Planted: 5/14/86
Cultivation: None	
Herbicide: PPI 5/14/86	Evaluated: 6/25/86
PRE: 5/14/86	Rainfall: 1st week: .92 inches
POST: 6/18/86; grass 2-4 leaf; broadleaf 4-6 leaf	2nd week: 1.05 inches
LPOS: 6/25/86; grass 3-4 leaf; broadleaf 5-7 leaf	

Results: Plots were visually evaluated for percent grass and broadleaf weed control. Data for fall plowed and chisel seedbed for 1986 are presented in that table below. The 3-year average (1984-86) provides a measure of consistency for variable conditions.

Herbicides were broadcast over a plowed or chisel seedbed. Spring tillage and incorporation were the same for both systems.

Green and yellow foxtail pressure was heavy. Tall waterhemp, redroot pigweed, lambsquarters, and sunflower were the predominant broadleaf species. Sunflower was somewhat variable and was removed after evaluation. Crop stand was uniform. Weed control in the plowed seedbed was 10 to 20 percent higher than for soil applied treatments in chisel seedbed. This is primarily due to greater weed populations in the chisel treatments.

Control in 1986 was excellent. Rainfall was timely. Twenty-six treatments provided over 90% control of both grass and broadleaf weeds in the plowed seedbed. Only three treatments in the chisel seedbed provided that same degree of control; five treatments exceeded 80% control in the chisel area. Data for new herbicides such as Command, Scepter, Cinch or Classic give an indication of expected performance.

1986 Soybean Herbicide Demonstration

Treatment	lb/A act.	Wild Sunf	1986 Disked Gr	1986 Disked Bdlf	1986 Plowed Gr	1986 Plowed Bdlf	3-Year Average Disked Gr	3-Year Average Disked Bdlf	3-Year Average Plowed Gr	3-Year Average Plowed Bdlf
PREPLANT INCORPORATED										
Treflan	.75	0	74	72	84	86	72	68	87	85
Sonalan	1.1	0	76	73	88	87	65	66	86	84
Prowl	1.25	0	86	84	82	77	76	69	85	80
Seward	2.5	0	36	57	72	65	50	68	77	68
Treflan+Amiben	.75+2	0	78	75	92	91	80	82	91	93
Treflan+Sencor/Lexone	.75+.38	60	72	82	92	90	76	64	92	92
Treflan+Command	.75+1	52	80	74	88	84	—	—	—	—
Seward+Treflan	2.5+.75	0	70	72	83	78	63	77	83	82
Prowl+Scepter	1.25+.125	86	94	96	96	98	—	—	—	—
Treflan+Amiben+Sencor/Lexone	.75+2+.25	40	71	75	90	90	68	82	89	92
Seward+Sencor/Lexone+Treflan	2.5+.25+.5	32	54	65	87	92	—	—	—	—
SHALLOW PREPLANT INCORPORATED										
Lasso	3	0	56	52	82	71	55	54	80	70
Dual	2.5	0	64	36	85	64	66	37	88	60
Lasso+Modown	2+1.5	0	45	55	79	72	48	64	78	69
PREPLANT INCORPORATED & PREEMERGENCE										
Treflan+Sencor/Lexone& Sencor/Lexone	.75+.25&.38	65	70	77	95	95	—	—	—	—
Treflan&Sencor/Lexone	.75&.6	58	73	82	98	98	71	85	96	97
Treflan&Modown	.75&2	0	68	72	81	88	65	77	86	80
Treflan&Amiben	.75&2	0	76	72	90	91	71	77	89	87
Treflan&Lorox	.75&1	22	69	68	76	79	65	75	78	84
Reward&Dual	2.5&2	0	90	76	98	92	—	—	—	—
PREEMERGENCE										
Amiben	3	0	58	72	83	85	48	69	81	80
Lasso	3	0	69	62	96	90	62	67	91	81
Dual	2.5	0	90	68	94	85	77	64	92	80
[illegible]	2.5	0	70	68	96	93	74	84	93	92
Cinch	1.25	0	82	45	92	76	—	—	—	—
Command	1.25	35	84	64	90	82	—	—	—	—
Command+Sencor/Lexone	1+.25	32	80	77	94	96	—	—	—	—
Lasso+Sencor/Lexone	2+.5	38	76	80	98	97	67	80	90	84
Dual+Sencor/Lexone	2+.5	50	86	82	98	99	77	80	92	95
Cinch+Sencor/Lexone	1.25+.3	32	80	62	95	88	—	—	—	—
Lasso+Amiben	2+2	0	71	72	93	96	65	73	88	91
Dual+Amiben	2+2	3	82	74	98	98	75	72	92	91
Lasso+Lorox	2+1	0	68	76	96	94	61	67	86	65
Dual+Lorox	2+1	0	79	70	98	99	69	60	90	88
Lasso+CIPC	2+2	0	62	60	98	90	58	61	85	82
Lasso+Modown	2+1.5	0	69	56	98	92	68	65	88	83
Dual+Lorox+Sencor/Lexone	2+1+.25	0	79	64	96	97	78	73	91	92
Lasso+Amiben+Sencor/Lexone	2+2+.25	10	62	76	96	96	67	76	90	93
PREEMERGENCE & POSTEMERGENCE										
Lasso&Basagran+crop oil	2&1+1	90	67	88	94	97	67	84	84	89
Lasso&Blazer/Tackle+X-77	2&.5+.5%	69	90	92	98	96	71	84	88	91
Command&Blazer/Tackle+X-77	1.25&.25+.5%	82	88	93	96	96	—	—	—	—
Lasso&Dyanap	2&2.5	82	72	82	92	93	59	87	83	87
Lasso&Blazer/Tackle+ Basagran+oil	2&.38+.25+1 qt	86	80	88	98	97	65	88	90	92
POSTEMERGENCE										
~~Verdict+oil~~	.2+1	0	88	0	96	0	—	—	—	—
Cobra+X-77	.2+.25%	46	0	72	25	76	—	—	—	—
Fusilade 2000+oil	.187+1 qt	0	73	0	80	0	—	—	—	—
Poast+oil	.2+1 qt	0	82	0	88	0	73	0	83	0
Poast+Blazer/Tackle+ Basagran+oil	.3+.25+.5+1 qt	66	88	80	94	81	—	—	—	—
PREEMERGENCE & LATE POSTEMERGENCE										
Lasso&Classic+X-77	2&.016+.25%	88	0	80	0	84	—	—	—	—

* Average 2 ratings/plot

NO-TILL CORN HERBICIDE DEMONSTRATION

L. J. Wrage, P. O. Johnson

Purpose: To evaluate performance of herbicide treatments that represent systems available to producers using no-till corn systems. Treatments represent replant residual, preemergence and postemergence and postemergence systems. Treatments were identified that included only low atrazine rates to allow rotation to soybeans. Plots were observed on field tours and the information is used in educational programs.

Methods:

Plot Design: Demonstration	Plot Size: 20' x 90'
Previous Crop: Soybeans	Crop: Corn TX49
Soil: Silty clay loam; 2.7% O.M.; 6.8 pH	Planted: 5/6/86
Herbicide: ERP: 4/8/86	Evaluated: 7/3/86
PRE: 5/6/86	Rainfall: 1st week 1.98 inches
POST: 5/29/86	2nd week .92 inches

Results: Plots were visually evaluated for percent grass and broadleaf weed control. Grasses include heavy infestations of yellow and green foxtail; light density of barnyardgrass. The predominant broadleaf weeds were tall waterhemp, redroot pigweed and valvetleaf. Crop emergence was excellent. Weed pressure was more severe than would be expected after the initial years in a no-till system. Data are presented in the table below.

Early preplant treatments using Dual/Atrazine performed best as a split treatment with part of the herbicide applied at planting. Some atrazine in the treatment usually improved control. Atrazine rates could be held at 1 lb/A if Bladex was used in the combination. Broadleaf control usually decreased 10 to 15 percent if atrazine was reduced to .5 lb in the total program. Postemergence treatments performed very well when used with other treatments.

Several treatments exceeded 95% control of all weeds. Cultivation at layby would have provided a suitable program using several of the treatments included in this test.

1986 No-Till Corn Demonstration

EARLY PREPLANT	PREEMERGENCE	POSTEMERGENCE	1986 Percent Control* Gr	Bdlf
Atrazine (3)			79	96
Atrazine+Dual (2+2.5)			88	92
Atrazine (2)	Dual (2.5)		95	95
Atrazine (1.33)+Dual (2)	Atrazine (.66)+Dual (1)		96	99
Atrazine (.5)+Bladex (2)+ Dual (2)	Atrazine (.5)+Bladex (1)+ Dual (1)		92	94
Bladex (2)+Dual (2)	Bladex (1)+Dual (1)		87	74
Bladex (2)	2,4-D ester (1)	Bladex (1.5)+Banvel (.5)	92	89
Atrazine (.5)+Bladex (2)		Atrazine (.5)+Bladex (1.5)+X-77 (.1)	94	98
Atrazine (.5)+Bladex (2)		Tandem (.5)+Atrazine (.5)+Bladex (1.5)	95	98
Dual (2.5)	2,4-D ester (1)+Dual (1)	Banvel (.5)	90	89
	Paraquat (.5)+Bladex (2.5)+ Atrazine (.5)+Dual (2.5)+X-77 (.38)		92	82
	Paraquat (.5)+X-77 (.38)+Bladex (2.5)+ Atrazine (.5)+Lasso (2.5)		77	80
	2,4-D est (1)+oil (1 qt)+Bladex (2.5)+ Atrazine (.5)+Lasso (2.5)		88	91
	Roundup (.75)+Bladex (2.5)+ Atrazine (.5)+Lasso (2.5)		84	82
	Roundup (.75)+Harness (2.5)+ Bladex (2.5+Atrazine (.5)		88	86
	Paraquat (.5)+X-77 (.38)+ Dual (2.5)	Atrazine (1.5)+oil (1 qt)	98	98

* Average 2 ratings/plot

NO-TILL SOYBEANS IN CORN STALKS DEMONSTRATION
NO-TILL SOYBEANS IN STUBBLE DEMONSTRATION

L. J. Wrage and P. O. Johnson

Purpose: Plots have been established for three years. Some weed shifts are showing on the plots. This year a column for control of foxtail barley has been added. This is a perennial grass often found in no-till situations. Treatments include examples of early and late preplant, preemergence and postemergence treatments used in different combinations.

Methods:

Plot Design: Demonstration
Previous Crop: Oats and Corn
Soil: Silty clay loam; 2.7 O.M.; 6.8 pH
Cultivation: None
Herbicide: EPP: 4/8/86
LPP: 5/29/86
PRE: 6/3/86
POST: 7/3/86

Plot Size: 20' x 90'
Crop: Corsoy 79
Planted: 6/3/86
Evaluated: 7/3/86
Rainfall: 1st week 1.10 inches
2nd week .25 inches

Results: Early preplant herbicides were applied timely and provided good initial control. Planting was delayed about 3 weeks due to wet weather; however, most treatments held until planting time. These treatments in several cases showed control. All early preplant treatments had excellent control of foxtail barley, a perennial that often invades no-till situations. Preemergence treatments required the maximum rate of chemicals to burn down large weeds. Most treatments where good burndown was achieved gave good control. Postemergence treatments need to be applied timely or control will not be adequate. Several treatments provided adequate control with five treatments provided over 90% control of all weeds in plot area.

1986 NO-TILL SOYBEANS IN CORN STALKS DEMONSTRATION

EARLY PREPLANT	LATE PREPLANT	PREEMERGENCE	POSTEMERGENCE	1986* % Weed Control Gr	Bdlf	Per
Lasso MT (2)+Sen/Lex (.38)		Lasso MT (1)+Sen/Lex (.33)		65	90	100
Dual (2)+Sen/Lex (.38)		Dual (1)+Sen/Lex (.33)		90	88	100
Harness (1.5)+Sen/Lex (.38)		Harness (1)+Sen/Lex (.33)		58	80	100
Dual (3)+Sen/Lex (.38)		Sen/Lex (.33)		62	72	100
Prowl (1.5)+Sen/Lex (.38)		Sen/Lex (.33)		90	88	100
Surflan (1.5)+Sen/Lex (.38)		Sen/Lex (.33)		89	92	100
Command (1.25)+Sen/Lex (.38)		Sen/Lex (.33)		84	88	100
Dual (2)+Sen/Lex (.5)+Command (.5)				60	40	100
Dual (2)+Sen/Lex (.38)+Command (.25)		Dual (1)+Sen/Lex (.33)+ Command (.25)		96	97	100
Dual (2)		Dual (1)+Amiben (2)+ Sen/Lex (.25)		92	82	100
		Paraquat (.5)+X-77 (.5%)+ Lasso MT (3)+Amiben (2)		72	62	78
		Roundup (.75)+Sen/Lex (.5)+ Lasso MT (3)		78	89	90
		Roundup (.75)+Dual (2.5)+ Sen/Lex (.5)		91	84	86
		Roundup (.75)+Harness (2.5)+ Sen/Lex (.5)		86	86	80
	2,4-D est (.75)+ Roundup (.18)+ Ammonium Sulfate (.18)	Sen/Lex (.5)+Lasso MT (3)+ Crop Oil (1 qt)		94	95	94
	Poast (.5)+2,4-D est (.75)+ crop oil (1 qt)		Poast (.3)+Blazer (.5)+ Basagran (.75)+ X-77 (.1)	38	22	50

* Average 2 ratings/plot

1986 NO-TILL SOYBEANS IN STUBBLE DEMONSTRATION

EARLY PREPLANT	LATE PREPLANT	PREEMERGENCE	POSTEMERGENCE	1986* % Weed Control Gr	Bdlf	Per
Lasso MT(2)+Sen/Lex (.38)		Lasso MT (1)+Sen/Lex (.33)		70	86	100
Dual (2)+Sen/Lex (.38)		Dual (1)+Sen/Lex (.33)		86	78	100
Harness (1.5)+Sen/Lex (.38)		Harness (1)+Sen/Lex (.33)		51	76	100
Dual (3)+Sen/Lex (.38)		Sen/Lex (.33)		92	82	100
Prowl (1.5)+Sen/Lex (.38)		Sen/Lex (.33)		84	88	100
Surflan (1.5)+Sen/Lex (.38)		Sen/Lex (.33)		88	90	100
Command (1.25)+Sen/lex (.38)		Sen/Lex (.33)		90	86	100
Dual (2)+Sen/Lex (.5)+Command (.5)		Dual (1)+Sen/Lex (.33)+ Command (.25)		96	94	100
Dual (2)+Sen/Lex (.38)+Command (.25)		Dual (1)+Amiben (2)+ Sen/Lex (.25)		98	94	100
Dual (2)		Paraquat (.5)+X-77 (.38)+ Lasso MT (3)+Amiben (2)		84	83	92
		Paraquat (.5)+X-77 (.38)+ Lasso MT (3)+Amiben (2)		85	78	65
		Roundup (.75)+Sen/Lex (.5)+ Lasso MT (3)		55	35	50
		Roundup (.75)+Dual (2.5)+ Sen/Lex (.5)		83	61	52
		Roundup (.75)+Harness (2.5)+ Sen/Lex (.5)		78	65	72
	2,4-D est (.75)+ Roundup (.18)+ Ammonium Sulfate (.18)	Sen/Lex (.5)+Lasso MT (3)+ Crop Oil (1)		91	95	90
		Paraquat (.5)+ X-77 (.38)	Verdict (.18)+Blazer (.5)+Basagran (.75)+ X-77 (.1)	93	86	94

* Average 2 ratings/plot

BLACK NIGHTSHADE HERBICIDE SCREENING

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

Purpose: To evaluate labeled herbicide treatments for black nightshade control and crop tolerance in soybeans. There is considerable producer interest in control options. Herbicide treatments with promise for control were included at rates suggested for this weed.

Methods:

Plot Design: Randomized Complete Block	Plot Size: 10' x 30'
Previous Crop: Soybeans	Crop: Corsoy 79
Soil: Silty Clay Loam; 2.7% O.M.; 6.8 pH	Planted: 6/4/86
Cultivation: None	Evaluated: 10/6/86
Herbicide: PPI: 6/3/86	Rainfall: 1st week 1.10 inches
PRE: 6/4/86	2nd week .25 inches
POST: 7/10/86	

Results: Plots were established in an area with a black nightshade history. Pressure from green foxtail is very light; tall waterhemp was moderate. Black nightshade continued to emerge as the season progressed. Plots were evaluated visually for percent weed control. Plots were harvested with a plot combine and yields determined. Data are presented for 1986 and for a two year (1985-86) average.

Nightshade control exceeded 85% for several treatments in 1986. Control in 1986 was greater than for the same treatments in 1985; possibly due to ample rain after application. Combination treatments generally were superior to herbicides used alone in 1986; this was not evident in 1985. Pigweed control was very good (above 90%) for several combination treatments.

The data indicate weed control and crop tolerance were factors in plot yield. Those treatments which yielded less than 36 bu/A were significantly lower than the highest yielding plot. Some treatments in the low yielding group provided very good weed control so weed competition is not considered a significant factor in the reduced yield. The data suggest very similar results for the 2-year period. These treatments do not consistently reduce yield in all other tests; this is considered a response to the conditions and rates used in this test.

1986 Black Nightshade in Soybean Demonstration

Treatment	lb/A act.	1986 Percent Weed Control Nightshade	Control Pigweed	1986 Yield bu/A	2-Year Average % Nightshade	2-Year Average Yield bu/A
PREPLANT INCORPORATED						
Check	—	0	0	33.9	0	28.7
Treflan	.75	16	75	39.3	8	36.3
Sonalan	1.25	60	88	29.3	44	31.2
Lasso	3.5	92	89	42.6	86	44.1
Dual	3	86	66	40.3	70	43.3
Sonalan+Lasso	1.25+2.5	88	90	32.0	76	35.1
Sonalan+Dual	1.25+2	92	95	21.1	76	29.1
Sonalan+Amiben	1.25+2	86	96	30.7	73	32.2
Lasso+Amiben	3.5+2	96	95	40.2	85	43.1
PREPLANT INCORPORATED & PREEMERGENCE						
Sonalan&Amiben	1.25&2	90	96	32.3	75	36.9
Sonalan&Lasso	1.25&2.5	97	97	32.3	84	35.5
Sonalan&Dual	1.25&2	96	97	32.4	83	36.0
PREEMERGENCE						
Amiben	3	88	86	38.6	78	38.9
Lasso	3	93	64	36.6	85	42.4
Dual	2.5	64	50	41.1	68	46.4
Harness	2.5	94	76	40.7	88	42.6
Command	1.25	44	61	38.6	45	43.5
Lasso+Amiben	2+2	97	96	44.3	81	43.6
Dual+Amiben	2+2	96	94	42.0	83	45.2
Check	—	0	0	28.0	0	27.5
PREPLANT INCORPORATED & POSTEMERGENCE						
Treflan&Blazer+X-77	.75&.5+.375	37	89	39.3	58	40.0
Treflan&Basagran+ crop oil	.75&1+1	34	88	36.6	30	38.7
Treflan&Blazer+ Basagran+10-34-0	.75&.125+.25+1	36	82	38.4	54	37.7
Treflan&Blazer+ Basagran+X-77	.75&.25+.5+.375	38	91	38.2	56	40.8
PREEMERGENCE & POSTEMERGENCE						
Command&Blazer+X-77	1&.25+.38	52	78	45.4	—	—
LSD (.05)		15	12	9.2	34	8.4

VELVETLEAF CONTROL IN SOYBEANS WITH SC-0098

W. E. Arnold, D. A. Vos, and P. J. Hutchinson

Velvetleaf is a significant weed problem in soybeans in many parts of the United States. Presently there are only small areas of infestation in South Dakota. The purpose of this experiment was to evaluate the experimental herbicide SC-0098 at several rates and two application timings for velvetleaf control.

The research site was located on the Mike Brienzo farm near Jefferson, South Dakota. The soil is classified as a clay loam with 3.6% organic matter and 2.5 pH. 'Corsoy 79' soybeans were planted on May 21, 1986, in 36-inch rows at 70 lb/A. Treatments were replicated four times. Postemergence treatments applied on June 19 when the soybeans were at the 2 trifoliate stage, and the velvetleaf and foxtails each had 3 leaves. At the second application stage, on July 2, the soybeans were in the 3-4 trifoliate stage, the velvetleaf was 4-6 inches, and the foxtails were 6-8 inches. Fusilade 2000 (0.4 lb/A) was also applied over the entire experiment on July 2 after the SC-0098 and Bentazon treatments to control foxtails. All treatments were applied with a tractor mounted sprayer in 20 gallons of water.

SC-0098 at 0.50 and 1.0 oz/A with crop oil concentrate gave excellent control of velvetleaf at both application stages. When SC-0098 was applied alone, 1.0 oz/A was required to attain 90% control of velvetleaf. SC-0098 also gave some grass control with 2.0 oz/A along with 1.0 oz crop oil giving greater than 80% control at the July 2 rating. A possible antagonism occurred between SC-0098 and Fusilade 2000 applied on the same day (July 2). Foxtail control rated on October 29 was significantly less than the check with SC-0098 (2-3T) applied at 0.5 oz/A or greater. For SC-0098 treatments applied two weeks before Fusilade 2000, foxtail control was improved over SC-0098 alone.

Velvetleaf Control in Soybeans with SC-0098

Treatment	Rate	Time of Applic.	% Control		
			Fota a/	Fota	Vele b/
	(oz/a)	(trifoliate)	7-2-86	10-29-86	8-6-86
SC-0098	0.25	1-2T	12	76	62
SC-0098	0.50	1-2T	37	80	87
SC-0098	1.00	1-2T	53	78	90
SC-0098	2.00	1-2T	86	94	98
SC-0098 + COC c/	0.25	1-2T	50	88	77
SC-0098 + COC	0.50	1-2T	47	82	95
SC-0098 + COC	1.00	1-2T	85	94	92
SC-0098 + COC	.125	1-2T	40	88	36
Bentazone+COC d/	16.0	1-2T	0	85	80
SC-0098	0.25	2-3T	0	72	51
SC-0098	0.50	2-3T	0	60	73
SC-0098	1.00	2-3T	0	52	91
SC-0098	2.00	2-3T	0	51	98
SC-0098 + COC	0.25	2-3T	0	63	70
SC-0098 + COC	0.50	2-3T	0	60	95
SC-0098 + COC	1.00	2-3T	0	56	97
SC-0098 + COC	.125	2-3T	0	71	72
Bentazon + COC	16.0	2-3T	0	80	61
Weedy Check			0	75	0
LSD (.05)			10	11	18

a/ Fota = Foxtail spp.
b/ Vele = Velvetleaf
c/ COC = Crop Oil Concentrate at 1/4 pint/A
d/ COC - Crop Oil Concentrate at 1 qt/A
SC-0098 = Experimental
Bentazon = Basagran

For more information on any of these studies, contact: Leon Wrage, Paul Johnson, or Gene Arnold, Plant Science Department, Ag Hall, SDSU, Brookings, SD 57007; (605) 688-5121.

ALFALFA RESEARCH, 1986

Robin Bortnem

PLANT SCIENCE 86-13

The following tables report alfalfa tonnage and other research information from 1984-86 for SE Farm research plots. More information can be obtained by contacting: Robin Bortnem, Plant Science, SDSU, Brookings, SD 57007, (605) 688-5121.

Table 1: 1984 Alfalfa Variety Trial, Expt 411, Southeast Research Station, Beresford, SD 1986

Variety	Dev/Supplier	1984 Forage Yld (Tons DM/A)	1985 Forage Yld (Tons DM/A)	% Winterkill *	1986 Forage Yld (Tons DM/A) [illegible]	[illegible]	[illegible]	[illegible]	Total	3-year average Yld	% [illegible]
532	Pioneer Hi-Bred	4.07	8.36	5.0	2.63	2.10	1.66	0.65	7.04	6.47	108
NY 8302	Cornell University	4.34	8.09	16.6	2.36	1.90	1.46	0.65	6.37	6.27	107
Advantage	Dekalb-Pfizer	4.55	8.01	9.5	2.51	1.74	1.36	0.60	6.21	6.76	102
576	Pioneer Hi-Bred	3.81	8.12	6.5	2.50	1.98	1.61	0.60	6.69	6.21	101
Challenger	Cargill Seeds	3.96	8.20	8.8	2.41	2.00	1.40	0.60	6.41	6.18	101
Hi-PR7	Ceres Seed	4.38	7.97	14.5	2.22	1.86	1.40	0.38	6.12	6.14	101
Saranac AR	NY Ag Expt Sta	4.13	7.85	10.2	2.43	1.98	1.42	0.58	6.41	6.13	100
LL 3110A	Research Seeds	4.25	8.27	19.2	2.16	1.70	1.35	0.66	5.87	6.13	100
Vernal	Wisc Ag Expt Sta	4.16	7.94	20.2	2.54	1.83	1.35	0.54	6.26	6.12	100
82-5	W-L Research	3.85	8.05	7.2	2.54	1.83	1.48	0.54	6.39	6.10	100
Valor	Land O'Lakes	4.11	8.04	6.2	2.37	1.94	1.38	0.44	6.13	6.09	100
Magnum	Dairyland Research	4.21	7.99	10.2	2.36	1.64	1.44	0.60	6.04	6.08	99
DS 303	Dairyland Research	4.33	7.95	23.0	2.11	1.75	1.68	0.61	5.95	6.08	99
DS 215	" "	4.31	8.08	17.8	2.10	1.78	1.42	0.50	5.80	6.06	99
LL 3010	Land O'Lakes	4.30	7.32	5.5	2.52	2.12	1.49	0.60	6.73	6.05	99
Mohawk	Cornell University	4.70	7.75	12.0	2.22	1.92	1.50	0.57	6.21	6.05	99
Oneida	NY Ag Expt Sta	3.82	8.03	17.0	2.62	1.88	1.40	0.58	6.28	6.04	99
NY 8103	Cornell University	4.05	7.51	10.2	2.59	1.86	1.39	0.58	6.42	5.99	98
Decathlon	Cargill Seeds	3.83	7.88	13.2	2.46	1.84	1.31	0.57	6.18	5.96	97
Iroquois	NY Ag Expt Sta	3.99	7.95	10.8	2.44	1.73	1.28	0.45	5.92	5.95	97
Big 10	Great Lakes Hybrid	4.72	7.98	23.5	2.24	1.53	1.30	0.54	5.61	5.94	97
Blazer	Land O'Lakes	4.16	7.83	11.2	2.20	1.69	1.33	0.49	5.71	5.90	96
Endure	FAC Seeds	3.79	7.65	15.0	2.50	1.75	1.38	0.60	6.23	5.89	96
MAPS 20	AgriPro	3.77	7.84	18.0	2.32	1.68	1.20	0.68	5.88	5.83	95
DK-135	Dekalb-Pfizer	4.52	7.43	26.5	2.08	1.64	1.27	0.54	5.53	5.83	95
MAPS 21	AgriPro	3.46	7.73	9.8	2.66	1.70	1.31	0.61	6.28	5.82	95
H-125VW	Sexauer/Farm Seed	3.81	7.62	14.8	2.36	1.80	1.31	0.52	5.99	5.81	95
SX 217	" " "	4.19	7.67	26.8	2.09	1.73	1.41	0.52	5.75	5.80	95
Trumpor	Northrup King	4.11	7.57	19.5	2.27	1.71	1.25	0.46	5.69	5.79	95
JH-135	Sexauer/Farm Seed	4.79	6.61	13.8	1.96	1.89	1.54	0.52	5.91	5.77	94
Co 7031-32	W-L Research	4.77	7.36	19.0	1.90	1.77	1.38	0.62	5.67	5.77	94
WL 313	" "	4.00	7.25	19.8	2.16	1.86	1.40	0.60	6.02	5.78	94
H-140	Sexauer/Farm Seed	3.93	7.79	30.0	2.11	1.64	1.31	0.50	5.56	5.78	94
Apollo II	AgriPro	3.73	7.70	25.5	2.14	1.77	1.28	0.56	5.75	5.73	94
Shenandoah	Great Plains Res	3.98	7.24	14.2	2.32	1.69	1.25	0.64	5.90	5.71	93
Saranac	NY Ag Expt Sta	3.83	7.41	4.2	2.42	1.61	1.31	0.43	5.77	5.67	93
Cimarron	Great Plains Res	4.13	7.98	34.5	1.68	1.45	1.22	0.54	4.89	5.67	93
120	Dekalb-Pfizer	3.97	7.51	21.8	2.16	1.41	1.26	0.66	5.49	5.66	92
Spectrum	Ceres Seed	3.39	8.78	18.8	1.97	1.60	1.14	0.59	5.30	5.66	92
H-150	Sexauer/Farm Seed	3.79	7.30	15.8	2.01	1.72	1.30	0.54	5.57	5.55	91
SX 424	Sexauer/Farm Seed	3.76	7.19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
H-134	" " "	4.22	7.03	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
H-106R	Sexauer/Farm Seed	4.33	6.90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
80-16 PCal	Mich State Univ	3.38	7.55	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MT-0	SD State Univ	3.58	7.05	4.2	2.67	1.48	1.01	0.37	5.53	5.39	88
Eagle	O's Gold Seed Co	3.65	7.11	17.5	2.06	1.60	1.24	0.49	5.39	5.38	88
F-144	Sexauer/Farm Seed	3.80	7.61	37.2	1.60	1.40	1.26	0.58	4.82	5.34	87
LH-101	Sexauer/Farm Seed	4.31	6.15	18.5	1.97	1.38	1.30	0.54	5.29	5.28	86
Teton	SD State Univ	2.90	6.67	12.5	2.55	1.60	1.11	0.30	5.56	5.04	83
Heinrichs	Agric Canada	3.40	6.53	7.0	2.04	1.56	1.10	0.24	4.94	4.95	81
Travois	SD State Univ	2.91	6.04	3.8	2.53	1.22	0.86	0.37	4.98	4.64	76
MT-1	SD State Univ	2.90	5.79	7.5	2.23	1.17	0.86	0.23	4.49	4.39	72
Average		3.96	7.54	15.18	2.25	1.72	1.32	0.54	5.82		
LSD (0.05)		0.39	0.53	NS	0.44	0.32	0.27	0.14	1.01		
CV (%)		10.68	5.06	95.93	14.05	13.38	14.68	19.89	12.52		

* 5/13/86 Winterkill visual estimation, winterkill appeared to be related more to topography than variety

Seeded: 5/16/84, 3 lb Eptam/A, 0.5 lb Ridomil/A, 15 lb PLS/A

Soil type: Whitewood Silty Clay Loam (Cumulic Haplaquolls fine-silty, mixed, mesic)

Soil pH: 7.0

Table 2: 1985 Alfalfa Variety Trial, Expt 511, Southeast Research Station, Beresford, SD 1986

Variety	Dev/Supplier	1985 Forage Yld (tons DM/A)	Winter Kill* (avg %)	1986 Forage Yld (tons DM/A) Cut 1	Cut 2	Cut 3	Cut 4	Total	2-Year Average T/A	% Vernal
DS 503	Dairyland Research	4.86	7.2	2.16	1.84	1.46	0.70	6.16	5.51	126
Iroquois	NY Ag Expt Sta	4.55	5.2	2.58	1.93	1.27	0.54	6.32	5.44	124
Arrow	AgriPro	3.96	25.5	2.66	1.95	1.47	0.74	6.87	5.39	123
Oneida	NY Ag Expt Sta	4.23	4.2	2.54	1.79	1.44	0.66	6.43	5.33	121
DS 512	Dairyland Research	4.30	9.8	2.30	1.72	1.62	0.72	6.36	5.33	121
82503	Northrup King	3.95	4.8	2.57	1.86	1.50	0.64	6.57	5.26	120
Surpass	Cenex Seeds	3.92	23.5	2.46	1.87	1.49	0.75	6.57	5.24	119
Crown	Paymaster	4.16	5.5	2.18	1.87	1.46	0.82	6.28	5.22	119
120	Dekalb-Pfizer	4.53	10.8	2.14	1.70	1.46	0.62	5.92	5.22	119
Elevation	Jacques Se Son	4.18	12.8	2.34	1.63	1.44	0.76	6.17	5.18	118
Sparta	Land O'Lakes	4.40	10.0	2.24	1.70	1.34	0.68	5.96	5.18	118
Vernema	WA St/USDA	4.34	13.0	2.15	1.74	1.46	0.63	5.98	5.16	118
MN 6209	Univ of Minn	4.30	2.5	2.35	1.71	1.40	0.52	5.98	5.14	117
NY 8412	Cornell Univ	4.34	10.8	2.22	1.67	1.33	0.72	5.94	5.14	117
MN 6316	Univ of Minn	3.80	1.2	2.68	1.86	1.36	0.56	6.46	5.13	117
Future	Dairyland Research	4.25	3.0	2.32	1.62	1.40	0.64	5.98	5.12	117
5432	Pioneer Hi-Bred	4.00	24.8	2.19	1.87	1.56	0.58	6.20	5.10	116
8016 PCa3	Mich St Univ	4.00	8.0	2.37	1.89	1.39	0.53	6.18	5.09	116
Big 10	Great Lakes Hybrid	4.39	14.2	2.02	1.58	1.42	0.74	5.76	5.08	116
Magnum	Dairyland Research	4.24	11.5	2.27	1.60	1.34	0.66	5.87	5.06	115
WL 320	W-L Research	4.28	3.8	1.92	1.66	1.44	0.82	5.84	5.06	115
Shield	Great Lakes Hybrid	4.36	11.0	2.02	1.64	1.34	0.75	5.75	5.06	115
Dawson	NE AES/USDA	3.89	6.2	2.56	1.68	1.38	0.53	6.15	5.02	114
Peak	Research Seeds	3.82	5.8	2.30	1.71	1.53	0.66	6.20	5.01	114
526	Pioneer Hi-Bred	4.01	18.2	2.14	1.73	1.39	0.75	6.01	5.01	114
Agate	Univ of Minn AES	4.17	5.0	2.24	1.62	1.36	0.60	5.82	5.00	114
DS 537	Dairyland Research	4.21	24.0	1.90	1.70	1.48	0.70	5.78	5.00	114
H-155	Farm Seed Research	4.54	17.5	1.93	1.60	1.31	0.62	5.46	5.00	114
DK-135	Dekalb-Pfizer	4.69	32.0	1.85	1.56	1.28	0.63	5.32	5.00	114
532	Pioneer Hi-Bred	3.96	7.0	2.22	1.76	1.37	0.64	5.99	4.98	113
MN 5417	Univ of Minn	3.72	2.0	2.51	1.78	1.36	0.56	6.21	4.96	113
Endure	PAG Seeds	4.20	23.5	2.03	1.65	1.21	0.70	5.59	4.90	112
Cimarron	Great Plains Res	4.08	18.0	2.03	1.60	1.33	0.73	5.69	4.88	111
C/W 327	Cal/West Seeds	4.23	31.2	1.92	1.56	1.29	0.74	5.51	4.87	111
Slater	Land O'Lakes	3.75	8.5	2.32	1.70	1.27	0.68	5.97	4.86	111
Saranac AR	NY Ag Expt Sta	3.95	12.5	2.02	1.57	1.36	0.81	5.76	4.86	111
Oneida VR	Cornell Univ	3.80	15.2	2.12	1.69	1.42	0.62	5.85	4.82	110
Mohawk	Cornell Univ	4.11	13.5	2.04	1.44	1.25	0.80	5.53	4.82	110
XAP31	Pioneer Hi-Bred	4.11	22.0	2.08	1.53	1.29	0.63	5.53	4.82	110
Saranac	NY Ag Expt Sta	3.87	4.5	2.15	1.64	1.42	0.54	5.75	4.81	110
NY 8413	Cornell Univ	3.71	12.0	2.14	1.71	1.34	0.69	5.88	4.80	109
Verta +	NC+ Hybrids	3.87	16.7	2.07	1.62	1.34	0.70	5.73	4.80	109
DS 305	Dairyland Research	3.40	7.2	2.30	1.80	1.36	0.71	6.17	4.78	109
Maxim	Cenex Seeds	3.79	10.2	2.01	1.71	1.46	0.60	5.78	4.78	109
Spectrum	Cenex Seeds	4.41	34.2	1.70	1.50	1.30	0.64	5.14	4.78	109
83-3-P	W-L Research	4.37	26.2	1.87	1.47	1.25	0.64	5.18	4.77	108
Summit	Stauffer Seeds	3.86	13.2	1.92	1.61	1.28	0.75	5.56	4.71	107
Max 85	Seed Tec	3.51	20.7	2.30	1.62	1.40	0.56	5.88	4.70	107
C/W 315	Cal/West Seeds	3.90	9.5	1.98	1.60	1.19	0.66	5.43	4.66	106
Baker	NE AES/USDA	3.64	13.5	2.04	1.60	1.28	0.60	5.52	4.58	104
Armor	AgriPro	3.58	43.5	1.98	1.56	1.35	0.68	5.59	4.56	104
WL 316	W-L Research	3.86	18.2	1.74	1.47	1.29	0.66	5.16	4.51	103
Sure	Research Seeds	3.86	22.2	1.68	1.47	1.29	0.71	5.15	4.50	102
Horizon	Arrowhead	3.87	38.0	1.72	1.46	1.29	0.66	5.13	4.50	102
Hegeton	Arrowhead	3.71	23.2	2.15	1.40	1.19	0.45	5.19	4.45	101
H-154	Farm Seed Research	4.13	23.8	1.49	1.40	1.23	0.64	4.76	4.44	101
Epic	Research Seeds	3.96	29.5	1.72	1.42	1.15	0.60	4.89	4.42	101
Vernal	Wisc Ag Expt Sta	3.42	8.2	2.02	1.60	1.20	0.54	5.36	4.39	100
P-146	Farm Seed Research	4.31	46.8	1.34	1.28	1.21	0.56	4.39	4.35	99
W-156	Farm Seed Research	3.86	16.8	1.46	1.48	1.22	0.63	4.79	4.32	98
Average		4.06	15.40	2.11	1.65	1.36	0.66	5.77		
LSD (0.05)		0.68	NS	0.53	0.31	0.19	0.12	0.99		
CV (%)		12.07	139.97	18.19	13.57	9.80	13.72	12.39		

* 5/13/86 Winterkill visual estimation; winterkill appeared to be related more to topography than variety.

Fertilized: 4/8/86, 14 lbs P/A

Seeded: 5/6/85, 3 lb ai/A Eptam, 1 lb ai/A Ridomil, 12 lb PLS/A

Soil Type: Whitewood Silty Clay Loam (Cumulic Haplaquolls fine-silty, mixed, mesic)

Soil pH: 6.8

Table 3: 1986 Alfalfa Variety Trial, Expt 631, Southeast Station, Beresford SD, 1986

Variety	Dev/Supplier	1986 Forage Yield (Tons DM/A)			
		Cut 1 7/[illegible]	Cut 2 10/13	2-cut Total	% Vernal
Crown	Paymaster	2.27	1.01	3.28	156
DK 120	Dekalb-Pfizer	2.20	0.91	3.11	148
Rambler	Agric Canada	2.55	0.41	2.96	141
5432	Pioneer Hi-Bred Int'l	2.12	0.80	2.92	139
SX 424	Sexauer Seeds	2.45	0.47	2.92	139
Saluta	United Agriseeds	2.07	0.74	2.81	134
DK 135	Dekalb-Pfizer	1.96	0.85	2.81	134
Dart	AgriPro	1.78	0.99	2.77	132
AP 45	AgriPro	1.86	0.91	2.77	132
MTO S82	SDSU	2.32	0.44	2.76	131
Sparta	Land O'Lakes	1.96	0.79	2.75	131
Drummor	Northrup King	2.08	0.66	2.74	130
Magnum Plus	Dairyland Research	1.85	0.84	2.69	128
WL 225	W-L Research	1.87	0.80	2.67	127
526	Pioneer Hi-Bred	1.79	0.84	2.63	125
LL 3387	Land O'Lakes	1.82	0.76	2.58	123
SX 217	Sexauer Seeds	1.82	0.73	2.55	121
Rangelander	Agric Canada	2.08	0.44	2.52	120
Surpass	Canex Seeds	1.86	0.65	2.51	120
Eagle	Asgrow Seed	1.59	0.91	2.50	119
LL 3510	Research Seeds	1.60	0.87	2.47	118
Edge	Payco Seeds	1.78	0.68	2.46	117
RS 341	Research Seeds	1.68	0.77	2.45	117
H-150R	Farm Seed Research	1.50	0.91	2.41	115
Cimarron	Great Plains Research	1.62	0.78	2.40	114
RS 7890	Research Seeds	1.54	0.85	2.39	114
H-168	Farm Seed Research	1.82	0.55	2.37	113
Heinrichs	Agric Canada	1.91	0.42	2.33	111
Arrow	AgriPro	1.66	0.63	2.29	109
WL 320	W-L Research	1.33	0.95	2.28	108
Summit	Stauffer Seeds	1.41	0.84	2.25	107
Dynasty	Dairyland Research	1.49	0.73	2.22	106
C/W-541	Cal/West Seeds	1.58	0.62	2.20	105
C/W-540	" " "	1.50	0.68	2.18	104
F-144 VWR	Farm Seed Research	1.51	0.66	2.17	103
Epic	Interstate Seeds	1.42	0.75	2.17	103
RS 3309	Research Seeds	1.39	0.78	2.17	103
Vernal	Wisc AES	1.59	0.51	2.10	100
532	Pioneer Hi-Bred	1.50	0.54	2.04	97
Roamer	Agric Canada	1.24	0.74	1.98	94
MTO N82	SDSU	1.54	0.38	1.92	91
Drylander	Agric Canada	1.32	0.48	1.80	86
Average		1.77	0.72	2.48	
LSD (0.05)		0.48	0.26	0.55	
CV (%)		19.60	26.18	15.81	

Seeded:	5/5/86, 12 lbs PLS/A
Fertilized:	5/13/86 with P2O5 at 100 lbs/A
	8/11/86, experiment cut to control weeds
Soil Type:	Whitewood Silty Clay Loam (Cumulic Haplaquolls fine-silty, mixed, mesic)
Soil pH:	6.7

Alfalfa varieties in their second or third year of production produced total yield (4-cuts) grand means of 5.77 and 5.82 tons DM/A, respectively. Some winterkill occurred but appeared to be related more to topography than variety (Table 1 & 2).

Forty two alfalfa varieties were established this year. The grand mean for the 2-cut total was 2.48 tons DM/A (Table 3).

S.E. FARM REPORT

LIMIT-FED, HIGH ENERGY RATIONS FOR GROWING CATTLE

J. J. Wagner, R. Hanson

ANIMAL/RANGE SCIENCE 86-14

SUMMARY

Limit-fed, high energy (57 Mcal per cwt dry matter) rations were compared to full-fed, low energy (46 Mcal per cwt dry matter) corn silage and alfalfa hay rations. Feed conversions were 5.79 and 5.88 lbs of dry matter per lb of gain for the full-fed corn silage and alfalfa diets, respectively. Breakeven roughage prices were calculated from feed efficiency and ration cost information. If corn is valued to the bunk at $1.75/bu and SBM is worth $200/ton, limit-feeding is more economical than full-feeding if corn silage and alfalfa cost more than $20.98 and $57.80 per ton to the bunk, respectively.

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. Traditionally, high roughage, low energy rations have been used to 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-feeding of high energy rations for light cattle is based on the premise that grain is usually cheaper per unit energy than roughage. Limit-feeding of high energy rations may decrease cost of gain when grain is priced relatively cheap and roughage is priced relatively high.

In order to more precisely describe the economics of limit-feeding, reliable estimates of feed efficiency are needed. High energy growing programs have been successfully used in southern plains commercial feedlots. The utility of the program in colder environments has not been demonstrated.

The objectives of this research were to: 1) compare performance of limit-fed and full-fed cattle during the growing phase, 2) compare corn silage and alfalfa hay as roughage sources in limit-fed diets and 3) use performance data to study the economics of limit-feeding for farmer-feeders.

Experimental Procedure: One hundred and ninety-two preconditioned Angus steer calves were purchased from Western South Dakota and trucked to the Southeastern South Dakota Experiment Farm near Beresford. Cattle were placed on a 3 week starter program prior to the limit-feeding program. Cattle were weighed, implanted with Synovex-S, stratified by weight and allotted to four experimental treatments (table 1) with 6 pens per treatment on December 3, 1985.

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

Cattle fed diets 3 and 4 were allowed to consume their feed ad libitum. Cattle were offered diets 1 and 2 in amounts computed to enable the cattle to grow at 2 lbs per head per day. Each week the limit-fed cattle were assumed to have grown 14 lbs and daily feed intake was increased accordingly. On days when the wind chill was between 0 and 20°F, -20 and 0°F or less than -20°F at 8:00 a.m., the daily feed allowance was increased by 10, 20 or 30 % respectively.

Cattle were weighed in the morning prior to feeding at 14 day intervals. Variables of interest were pen ADG and feed efficiency. The trial lasted 96 days.

Results and Discussion: Performance of cattle during the trial is displayed in table 2. Differences in average daily gains between treatments were not significant. All cattle gained considerably more than the projected 2 lbs per head per day. For the full-fed cattle, the quality of the corn silage and alfalfa hay that we used may have been greater than what was predicted from the NRC feed composition tables. Short of doing a net energy (NE) trial, it is difficult to access the energy value of forages. For the limit-fed cattle, the efficiency of energy use for gain may have been improved. Based on NE relationships the predicted NEg content of the limit-fed rations was 60 mcal per cwt dry matter (table 2). These values are considerably higher than the 57 mcal value obtained from feed composition tables. Predicted NEg figures that are greater than "book" values may indicate that the efficiency of energy utilization was improved. Feed intake for the limit-fed cattle was increased 10, 20 and 30% when morning wind chills were from 0-20°F, -20-0°F and <-20°F, respectively. These adjustments may have been greater than necessary to meet the increase in energy requirements due to cold stress.

By design of the experiment, limit-fed cattle consumed less dry matter than full-fed cattle (14.47 vs 19.33 lbs per head daily). Cattle consuming the full-fed alfalfa ration tended to eat slightly more feed than cattle on the full-fed corn silage ration.

As expected, feed/gain was improved by limit feeding. Limit-fed cattle required approximately 5.84 lbs dry matter per lb of gain compared to 7.12 lbs of dry matter per lb of gain for the full-fed cattle.

High energy rations generally cost more per cwt dry matter than high roughage rations. For limit-feeding to be economical, the improvement in feed efficiency must pay for higher ration costs. Solving the following equations provide estimates of the breakeven cost silage and alfalfa prices for limit-feeding versus full-feeding.

Table 1. Composition of Experimental Diets

Item	Limit-fed Corn silage(1)	Limit-fed Alfalfa(2)	Full-fed Corn silage(3)	Full-fed Alfalfa(4)
Ingredient[a]				
Corn silage	35.00	—	70.00	—
Alfalfa hay	—	22.00	—	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
Composition				
NEm[b]	84.85	89.03	74.23	78.98
NEg[c]	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 from NRC (1984).
b Net energy for maintenance, Mcal per cwt dry matter.
c Net energy for gain, Mcal per cwt dry matter.

Table 2. Performance of Cattle During Growing Phase

Item	Limit-fed Corn silage	Limit-fed alfalfa	Full-fed Corn silage	Full-fed alfalfa
Initial wt., lbs	552	552	556	552
ADG, lbs	2.59	2.40	2.67	2.76
Dry matter intake, lbs	14.93	14.01	18.26	20.40
Feed/gain[a]	5.79	5.88	6.85	7.39
Calculated NEm[bc]	90.49	90.90	76.79	71.55
Calculated NEg[bd]	60.23	60.48	50.41	45.66

a Limit-fed versus full-fed, P<.005.
Limit-fed corn silage versus limit-fed alfalfa, NS.
Full-fed corn silage versus full-fed alfalfa, P<.25.
b Calculated from weight, ADG, days on feed and dry matter intake.
c Net energy for maintenance, Mcal/cwt dry matter.
d Net energy for gain, Mcal/cwt dry matter.

Ration cost(limit) * feed/gain(limit) = Ration cost(full) * feed/gain(full)

Ration cost(limit) = .35 * corn silage cost + .4733 * corn cost + .1585 * soybean meal cost + .0182 * mineral supplement cost[1]

or .20 * alfalfa cost + .6643 * corn cost + .122 * soybean meal cost + .0137 * mineral supplement cost[1]

Ration cost(full) = .70 * corn silage cost + .1903 * corn cost + .10 * soybean meal cost + .0097 * mineral supplement cost[1]

or .47 * alfalfa cost + .5094 * corn cost + .015 * soybean meal cost + .0056 * mineral supplement cost[1]

Table 3 shows this breakeven data in tabular form. If roughage costs are above those listed, feed costs favor limit feeding. If roughage costs are below those listed, feed costs favor full-feeding. If corn is priced at $1.75 per bushel to the bunk and soybean meal is priced at $200 per ton, the breakeven price for corn silage is $20.98 and for alfalfa is $57.80 per ton.

These breakeven values assume that non-feed costs for limit-feeding will be the same as non-feed costs for full-feeding. Limit-feeding requires a higher degree of management than traditional high roughage growing rations. Limit-fed cattle are hungrier than full-fed cattle and may be susceptible to increased acidosis and bloat problems. Additional bunk space may be needed to enable all cattle to eat their required ration. Feeding two times daily at 9 and 11 a.m. may alleviate bunk space shortage. These potential management costs must be accounted for when accessing the economics of limit feeding.

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1 Dicalcium phosphate, limestone, vitamin A-30 and trace mineralized salt were valued at 14.58, 5.21, 6.67 and 8.94 per cwt dry matter.

Table 3. Breakeven Corn Silage and Alfalfa Prices for Limit-Feeding Versus Full-Feeding[a]

SBM[b] ($/ton)	Roughage[c]	Corn price ($/bu) 1.25	1.75	2.25	2.75
150	CS	15.45	19.34	23.11	26.88
	Alf	43.80	44.75	45.67	46.59
200	CS	17.09	20.98	24.76	28.54
	Alf	56.85	57.80	58.72	59.64
250	CS	18.74	22.63	26.40	30.17
	Alf	69.94	70.89	71.81	72.73

a $/ton as-fed, corn silage 35% dry matter, alfalfa hay 88% dry matter and 14% protein.
b Soybean meal, $/ton as-fed.
c CS = corn silage, Alf = alfalfa.

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S.E. FARM REPORT

EFFECTS OF SORTING ACCORDING TO PRIOR GROWTH RATE ON THE PERFORMANCE OF PIGS DURING THE FINISHING PERIOD

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Research conducted and reported in 1985 was not conclusive as to the benefits of sorting pigs according to prior performance for the grower period into uniform outcome groups for the finishing period. Those studies included the use of antibiotics at therapeutic or growth promoting levels. A control pen having a mixture of pigs with various different previous growth rates has not been previously considered. Thus, the following study was conducted to further evaluate the value of sorting pigs between the growing and finishing periods as a management practice and determine if pigs perform differently when penned according to prior rates of performance when compared with control groups of pigs having mixed previous growth rates.

(Key Words: Finishing Swine, Prior Performance, Postsorting Performance.)

Experimental Procedure

One hundred fifty feeder pigs averaging about 45 lb and originating from two different sources were purchased through the Sioux Falls Stockyards in late December of 1985. Pigs received sulfamethazine treatment in water upon arrival at the Southeast Experiment Farm near Beresford and were ad libitum fed the standard corn-soybean meal diet (table 1) that was used for the entire experiment.

Table 1. Composition of Experimental Diet

Ingredient	%
Corn	75.9
Soybean meal, 44%	20.9
Dicalcium phosphate	1.35
Limestone	.85
Trace mineralized salt[a]	.50
Vitamin premix [b]	.50

[a] source of salt and trace minerals.
[b] source of vitamins and provided 50 g chlortetracycline per ton

A 3-week adjustment period was allowed before initial weights were taken. Subsequent pig performance was monitored and daily gains calculated using the initial weight and grower period ending weight taken at about 115 lbs. Pigs were then indexed according to previous growth rate and placed into either the fast or slow intermediate growing groups. The intermediate group (25%) were removed from the experiment.

Within each performance group, pigs were allotted to three replications of three treatments in each of two trials according to sex, weight and original source. Treatments within each of the two trials consisted of a slow growing, fast growing and control group. Only the ratio of pigs having slow or fast previous growth rates differed between the two control groups, with ratios of 4 slow:2 fast and 2 slow:4 fast used for trials 1 and 2, respectively. A total of 54 pigs were utilized in each trial with six pigs per pen. The study was conducted for a 56-day period. Pig weights were taken biweekly and feed consumption measured every 28 days.

RESULTS: No trial x treatment interactions were obtained upon statistical analysis of the data. Further, all response criteria for the control groups in trial 1 were similar (P<.01) to those of trial 2. Thus, data for the two trials were combined and reported in table 2. Means for the control group reflect the performance for both ratios of slow:fast growth rates used.

Pigs having slow previous growth rates had lighter (P<.05) 28-day and 56-day weights than either the fast growing or the control groups. This response was not surprising for the initial 28-day period in view of the lighter initial weights for pigs in the slow growing treatment group. However, results reported last year suggested the pigs having slow previous rates of growth will gain faster than pigs having fast prior growth rates and would be expected to have similar weights at the end of the finisher period.

During the initial 28-day period, pigs having fast previous growth rates required more (P<.05) feed per unit of gain than pigs having slow previous growth rates, while those in the control group were intermediate. Previous growth rate had no effect (p>.10) on feed efficiency for the second 28-day period or average daily gains and feed consumption for either period. Overall, pigs having slow prior growth rates gained faster (P<.05) and more efficiently (P<.07) than the previously fast growing group, while the control group was intermediate. Average daily feed intake was not affected (P>.10) by previous growth rate.

The coefficients of variation for each pen were averaged within treatment group and are shown in table 2 for the initial and final weights. Sorting at the end of the grower period reduced the within pen variation, especially for the previously fast growing groups. However, the within pen variation appeared to be similar for all treatment groups at the end of the study. Variation within the previously fast growing group appeared to increase over time, while within pen variation decreased for the control group. The coefficients of variation for the previously slow growing group were similar for both the initial and final weights.

Based on these results, similar performance can be expected for pens of pigs having two different ratios of slow:fast previous growth rates for a 56-day finisher period. Further, pigs having slow prior growth rates gained faster than previously fast growing pigs. It also appeared that variation in growth rate was less for previously slow growing pigs than for previously fast growing pigs. Because postsorting performance for the previously slow growing group was not different from that of the control

group, the practice of sorting for growth rate at the end of the grower period has little apparent value.

Table 2. Effect of Sorting According to Previous Growth Rate On The Performance of Pigs For the Subsequent 56 Days.

	Previous growth rate		
Item	Control	Fast	Slow
	Initial 28 days		
Initial wt lb	117.1	125.6	103.4
Avg of pen coefficients of variation for initial wt, %	11.7	4.0	6.4
28-day wt, lb	175.0a	177.6a	162.1b
Avg daily gain, lb.	2.07	1.87	2.09
Avg daily feed, lb	7.30	7.31	7.12
Feed/gain, lb	3.56ab	3.97a	3.42b
	Final 28 Days		
56-day wt, lb	226.6a	228.8a	215.9b
Avg of pen coefficients of variation for 56-day wt, %	8.6	7.4	6.6
Avg daily gain, lb	1.85	1.83	1.92
Avg daily feed, lb	7.54	7.60	7.71
Feed/gain	4.11	4.19	4.02
	Overall		
Avg daily gain, lb	1.96c	1.84d	2.01c
Avg daily feed, lb	7.43	7.45	7.42
Feed/gain	3.80d	4.07c	3.70d

a,b Means in the same row without a common superscript are different ($P<.05$).

c,d Means in the same row without a common superscript tend to be different ($P<.07$).

SUMMARY A total of 108 pigs were utilized in a study to evaluate the effects of sorting according to performance during the grower period and two different ratios of slow:fast previous growth rates on the performance of pigs during a 56-day finisher period. Daily gains of purchased feeder pigs were calculated for the period from 3 weeks postarrival to about 115 lb to facilitate placing pigs into prior performance groups. Sorting according to prior performance did not affect ($P>.10$) pig performance for the initial or second 28-day period. However, for the overall 56-day period, pigs having slow previous growth rates gained significantly faster and tended to require less feed per unit of gain than pigs having fast prior growth rates. Control groups having ratios of either 2 slow:4 fast or 4 slow:2 fast growing pigs per pen had similar levels of performance for all periods. Postsorting performance for previously slow growing pigs was not different from that for the control groups for any period studied.

EFFECTS OF METHOD USED TO FORMULATE BARLEY-SOYBEAN MEAL DIETS ON THE GROWTH AND CARCASS TRAITS OF PIGS

SUMMARY

Two hundred four pigs were utilized in an experiment designed to evaluate the effects of various barley-soybean meal diet formulations on pig performance and carcass traits. Pigs were fed either the corn-soybean meal control diet or one of the five barley-soybean meal diets from about 63 to 220 lb. The various barley diets were produced by formulating for different nutrients or pelleting. Pigs fed the pelleted barley diet formulated to be isolysinic with the corn-soybean meal control grew at a level similar (P>.10) to those fed corn. Replacing corn with barley on an equal weight basis produced performance levels that were not different (P>.10) from the control when pigs were fed nonpelleted diets. Formulating barley-soybean meal diets to be isonitrogenous with the control diet resulted in slower and less efficient pig gains.

EFFECTS OF LYSINE AND ENERGY CONCENTRATION ON THE PERFORMANCE OF GROWING AND FINISHING PIGS FED DIETS CONTAINING BARLEY

SUMMARY

A total of 90 pigs were utilized to study the effects of lysine level and(or) fat additions in barley-soybean meal diets on pig performance and carcass data from about 63 to 213 lb. Dietary treatments included a corn-soybean meal control and five barley diets produced by equal weight substitutions of barley for corn, formulated to be isolysinic to the control by adding synthetic lysine and(or) adding fat to be isocaloric to the control diet. Pigs fed barley substituted for corn, either with or without added fat, or barley balanced for lysine with added fat gained faster (P<.05) and more (P<.05) efficiently than those fed the control diet or barley with synthetic lysine added. Overall, the addition of fat to barley diets improved (P<.05) feed utilization by pigs. The performance of pigs fed the control diet was depressed, possibly because poor quality corn was used for the grower and early finisher periods. Additional work is needed to confirm the results obtained in this study.

If you wish more information concerning the swine research being conducted at the Southeast Research Farm contact Ross Hamilton, Animal/Range Science Department, SDSU, Brookings, SD 57007. (605-688-5165)

S.E. FARM
REPORT