27th Annual. . .

SOUTHEAST SOUTH DAKOTA
EXPERIMENT FARM
BERESFORD

PROGRESS REPORT 1987

Agricultural Experiment Station
South Dakota State University

Brookings

This twenty-seventh annual report of the research program at the Southeast South Dakota Research 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

Dr. David Bryant, Dean | Dr. 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 the past growing season several events were held for the public. A 4-H judging school was held in mid-June with many youngsters from the southeastern area involved. A Twilight Crop Tour was held on July 1 this past year. There were about 250 people attending that night. Some of the things seen on that tour consisted of the herbicide demonstration area comparing herbicide treatments for corn and soybeans on conventional and reduced tillage. Also, herbicide treatments on no-till soybeans and corn were seen. A new addition to the herbicide program this year was Velvetleaf Valley. Herbicide treatments to specifically control velvetleaf in soybeans and corn were viewed. Also, on the Twilight tour were small grain varieties and diseases, herbicide damage on oats, corn borer control and planting dates for corn.

Other activities during the summer consisted of an Ag Chemical Dealer Day and an evening tour was also held for ridge-tillers, showing some of the ridge-till research work being conducted at the farm.

In September a Fall Field Day was held. Approximately 18 different presentations were given on many of the research projects currently being conducted at the Southeast Research Farm.

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, Director
Ag Experiment Station
SDSU
Brookings, SD 57007
(605) 688-4149

Dale R. Sorensen
Research Manager
SESD Research Farm
RR 3 Box 93
Beresford, SD 57004
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563-2941

Introduction. Dale R. Sorensen, Mgr.

The past year was quite unusual compared to the past several years in Southeast South Dakota. We saw field work during the month of March for the first time in several years and a lot of corn was in the ground before May 1st. Planting was completed ahead of schedule and timely rainfall during May, June and July was quite welcome after the dry winter and early spring.

The extreme hot spell in late July and early August did not affect crop yields greatly. Humidity was high and we did not have a great deal of wind during that time enabling the crop to hold its own. That weather and through to September made for early harvest and a very dry crop.

Construction of the new beef facilities was completed in early October. Thanks to the Southeast Farm Corporation, we have up-to-date beef research facilities. They consist of a new feedroom, a semi-enclosed feeding facility and an enclosed working area with modern facilities for handling cattle.

We also added a concrete sorting area and loading chute to our swine unit to improve handling hogs coming in and going out from the farm.

If you wish to gather more information on a particular project at the farm, contact us at the farm or contact the person listed at the end of each report.

Table 1. Temperatures at the Southeast Research Farm - 1987

Month	1987 Ave Temperatures (F)a		35-year Average		Departure From 35 Year Average	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
January	36.2	12.5	25.8	4.4	+10.4	+ 8.1
February	46.3	21.5	32.6	10.9	+13.7	+10.6
March	47.2	28.6	43.5	22.5	+ 3.7	+ 6.1
April	67.5	38.1	61.1	35.6	+ 6.4	+ 2.5
May	77.2	53.5	73.1	47.4	+ 4.1	+ 6.1
June	85.0	59.2	82.3	57.1	+ 2.7	+ 2.1
July	85.5	64.3	87.4	62.0	- 1.9	+ 2.3
August	79.9	57.1	85.2	59.1	- 5.3	- 2.0
September	76.4	48.2	75.6	48.8	+ 0.8	- 0.6
October	58.6	30.4	64.5	37.7	- 5.9	- 7.3
November	48.3	30.5	40.4	24.1	+ 7.9	+ 6.4
December	33.9	19.4	30.8	10.7	+ 3.1	+ 8.7

a Computed from daily observations

Table 2. Precipitation at the Southeast Research Farm - 1987

Month	Precipitation 1987 (inches)	35-year Average (inches)	Departure from 35 year Ave. (inches)
January	.04	.46	- .42
February	.15	.97	- .82
March	4.15	1.54	+2.61
April	.50	2.48	-1.98
May	3.15	3.47	- .32
June	3.58	4.20	- .62
July	4.75	3.16	+1.59
August	1.42	2.91	-1.49
September	2.67	2.60	+ .07
October	.25	1.67	-1.42
November	1.26	1.08	+ .18
December	.89	.71	+ .18
Totals	22.81	25.25	-2.44

PLANT POPULATIONS FOR CORN

D. Sorensen, B. Lawrensen, D. DuBois

SOUTHEAST FARM 87-1

Summary

Seeding rates and hybrids were tested to determine what the optimum plant population would be in Southeast South Dakota. Four hybrids and five populations were used in the study. Grain yields in 1987 had small yield increases with each increase in plant population for the 91 and 101 day hybrids. For the 110 and 114 day hybrids yields were quite similar throughout all populations, but the higher populations did not decrease yields significantly either.

Methods: Four hybrids were tested at five plant populations in 1987. These are the same hybrids and populations that were selected for the establishment of this experiment in 1986. Hybrids used again in 1987 were Pioneer 3906 and 3732, Curry's 1466 and 1490 with actual planting rates of 18,400, 21,900, 24,500, 27,900 and 30,200 seeds per acre. Table 1 reports all other management factors for the experiment in 1987.

Table 1. Crop Management for Plant Population Study in 1987.

		NO3-N	P	K
Soil Test Results		- - - - - -	lbs/A - - -	-
	0-6"	12	45	720
	6-24"	24		

1986 Crop	Soybeans
Tillage	Ridge-Till
Planting Date	April 27
Herbicide	Lasso+Bladex (Broadcast)
Insecticide	Furadan
Phosphorus	25 lbs 2 x 2 in. starter
Nitrogen	75 lbs sidedress after emergence
	75 lbs sidedress at lay-by
Harvest Date	September 22

Results and Discussion: Yield levels for 1987 were considerably higher than 1986. Ideal weather to permit early planting and timely rains in early July were the primary factors involved. With the addition of a new planter and ridge-till to this study the capability to achieve more uniform stands has eliminated the need to over-plant and thin back to the final stands. Table 2 and Table 3 report final stands and grain yields for 1987, respectively.

Table 2. Final Stands Prior to Harvest for Corn Plant Population Study, SE Farm, 1987.

Hybrid	S. Dak Maturity	Seeding Rate 18,400	21,900	24,500	27,900	30,200
		Plants/Acre				
PIO-3906	91	18,100	21,200	24,200	26,000	28,200
PIO-3732	101	18,400	20,100	23,500	24,700	28,600
CURRY 1466	110	19,300	22,300	23,100	26,300	28,400
CURRY 1490	114	18,400	21,600	22,700	26,100	27,900
	Avg.	18,550	21,300	23,375	25,775	28,275

In 1987 this study was planted on ridge-till soybean stubble. Final stands are very acceptable this year, which we feel is due to the addition of ridge-till to this study. The average stand loss across all populations for the study was 4.1%. This is very good considering the dry conditions during planting season. The planting conditions with ridge-till were ideal. Ideal moisture was present making germination very uniform and very small loss of seed at planting.

Yields in 1987 were also very good. The lowest yield recorded in this study was 142 bushel/acre with a top yield of 202 bushel/acre. There is a considerable amount of yield difference between hybrids, which we would expect. The numbers of most interest are the difference in yield between populations for a single hybrid. To determine if the yields are different between populations for one hybrid use the value at the bottom of Table 3. If the difference in yield is 13 bushel/acre or greater, then the population is significantly better than the other population. As in the case of Pioneer 3906 planted at 18,400 seeds/acre compared to all populations from 24,500 seeds/acre and up.

Table 3. Effect of Plant Populations and Hybrids on Corn Grain Yield, SE Farm, 1987.

Hybrid	S. Dak Maturity	Seeding Rate 18,400	21,900	24,500	27,900	30,200
		bu/A @ 15% Moisture *				
PIO 3906	91	144	148	157	158	163
Harvest Moisture		(14)	(14)	(13.3)	(13.5)	(13.8)
PIO 3732	101	142	148	155	157	168
Harvest Moisture		(14)	(14.5)	(14)	(13.5)	(13.5)
Curry 1466	110	161	160	154	168	160
Harvest Moisture		(17.5)	(17.5)	(16.3)	(16.5)	(16)
Curry 1490	114	192	190	184	202	197
Harvest Moisture		(23.3)	(24.5)	(23)	(22)	(21.8)

*LSD .05 = 13 bu/acre to compare yields between populations within the same hybrid.

The two early hybrids, 91 and 101 day maturity do continue increasing to the highest planted population, but are not significantly higher than the 24,500 seeds/acre planting rate. For the two late maturing hybrids, yields do not differ significantly between populations except at the 24,500 seeds/acre planting rate. It cannot be explained at this time why

these are lower when all other populations for these two hybrids do not differ.

The main point, is that there is room for error in populations with later maturing hybrids due to the plant's characteristics. The earlier maturing hybrids have less room for error and need to be planted at somewhat higher populations to bring out their full yield potential.

This study will be continued in 1988, and we will be able to have a 3-year average for this study next year. For further information contact, Dale Sorensen, SE Research Farm, RR 3 Box 93, Beresford, SD 57004; (605) 563-2989.

DATE OF PLANTING CORN

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

S.E. FARM REPORT

SOUTHEAST FARM 87-2

Summary

Two corn hybrids (medium and late maturity range) were planted on five dates beginning on April 17 and ending May 29. Again, as in 1986, very little difference occurred in yield between the first three planting dates; but, grain moisture at harvest increased quite dramatically by the third date for the late maturing hybrid. The fourth and fifth planting dates were significantly lower in yield than the first three planting dates for both hybrids.

Methods: Two hybrids were tested at five different planting dates in 1987. Pioneer 3732 and Pioneer 3377 were planted on five dates through April and May. Planting started when field conditions would allow and soil temperatures were adequate for germination of corn. A ten day interval was followed from the first planting date. Table 1 reports all other management factors for the experiment in 1987.

Table 1. Crop Management for Date of Planting Corn Study, SE Farm, 1987.

Soil Test Results		NO3-N	P	K
		- - - - - -	lbs/A-	- - - - -
	0-6"	7	26	570
	6-24"	17		
1986 Crop		Small Grain		
Tillage		Fall plow, spring field cultivate		
Planting Rate		24,500 seeds/acre		
Herbicide		Lasso & Bladex (15" band)		
Insecticide		Furadan		
Phosphorus		25 lbs. 2 x 2 in. starter		
Nitrogen		75 lbs sidedress after emergence		
		75 lbs. sidedress at lay-by		
Harvest Date		October 1		

Results and Discussion: The time to begin planting this experiment in 1987 was very difficult to determine. There were days during March that met the criteria for this experiment mentioned in the methods. We held off planting so that it was in the same time frame as the past two years. Table 2 reports yields for the different planting dates for 1987. The yield potential of the two hybrids is quite different.

For the first time in the three years of this experiment, we have broken the 200 bushel per acre barrier. The data does show trends similar to that of 1986, and with the long, warm growing season you would not expect to see

Table 2. Effect of Planting Date on Corn Grain Yield, SE Farm 1987.

Hybrid	Relative Maturity	Planting Date April 17	April 27	May 7	May 17	May 29
		- - - - - - -	bu/A @ 15%	moisture - - -	- - -	- - -
PIO 3732	101	151	154	154	130	129
Harvest Moisture %		(11)	(12.3)	(16.7)	(18.7)	(19)
PIO 3377	116	204	199	192	166	132
Harvest Moisture %		(14.7)	(17.7)	(21.3)	(27.7)	(37.3)

LSD .05 = 10 bu/Acre for differences between planting date within a variety.

many differences in the data. The first three planting dates, April 17 through May 7 show no significant difference in yield for either hybrid. But, comparing the first three dates to the remaining two, we see a significant decrease in yield for both hybrids for the final two dates. The final planting date was not planted on time, but two days late, which could not be avoided due to weather conditions. But, these two days later should not have a large effect on the data.

Table 3. Effect of Planting Date on Grain Yield for Pioneer 3377 (3 year average), SE Farm, 1987.

1985 Planting Date	1985 Yield bu/A	1986 Planting Date	1986 Yield Bu/A	1987 Planting Date	1987 Yield Bu/A	3 yr. Avg. Date	3 yr. Avg. Yield	Bu/ Day*
4/16	198	4/11	173	4/17	204	4/15	192	
4/29	191	4/22	177	4/27	199	4/26	189	.27
5/7	163	5/1	176	5/7	192	5/5	177	1.3
5/14	141	5/14	149	5/17	166	5/15	152	2.5
5/23	131	5/22	117	5/29	132	5/25	127	2.5

* Bu/Day = Loss in grain yield for each days' delay in planting. Example; .27 bu/day is yield reduction for period April 15 through April 26.

Table 3 reports yield for the past three years for Pioneer 3377 and the average planting dates and yields for three years of data. Only two years of data exists for Pioneer 3732 and is not included for the averages. The additional column in the three year average gives the reduction in yield for each day planting is delayed. The large break occurs from the average date of May 5th to May 15th where yield reductions increase from 1.3 bushel per acre per day to 2.5 bushel per acre reduction in yield for each day delayed in planting from May 5th to the 25th of May.

This study will continue in 1988 and after harvest we will be able to get a three year average for the early hybrid and continue to work for a long term average for the late maturing hybrid.

For more information contact: Dale R. Sorensen, Research Manager, Southeast 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 87-3

Summary

Three corn hybrids (early, medium and late maturity) were planted on four different dates. Yield reductions were not as dramatic as planting date was delayed compared to previous years. The reduction in yields that occurred for the third planting date could be attributed due to pollination during the extremely warm weather during the later part of July and into early August.

Methods: Three hybrids with varying maturities (Pioneer 3901, Pioneer 3732, Curry 1466) were planted on four planting dates (May 1, May 11, May 21, June 2). Other management factors concerning the study are reported in Table 1.

Table 1. Crop Management for EML Study in 1987.

Soil Test Results		NO3-N	P	K
		lbs/A		
	0-6"	9	16	530
	6-24"	14		

1986 Crop	Soybeans
Tillage	Fall Chisel-Spring field cultivate
Seeding Rate	20,000
Herbicide	None
Insecticide	Furadan
Nitrogen	75 lbs sidedress at lay-by
Harvest Date	October 2

Results and Discussion: Because we have two studies that deal with planting dates for corn, we manage the two studies differently. For the Date of Planting Corn study, all management factors are kept at optimum levels. In this study, some management factors are kept at lower levels; such as fertility, herbicide and seeding rate.

Table 2. Effect of Planting Date on Early, Medium and Late Maturing Hybrids, SE Farm, 1987.

Hybrid	Relative Maturity	Planting Date May 1	May 11	May 21	June 2
		---------bu/acre @ 15% moisture---------------			
PIO-3901	93	129	111	107	112
Harvest Moisture		(13.3)	(15)	(18)	(24)
PIO-3732	101	123	120	111	122
Harvest Moisture		(14.3)	(18.5)	(19.8)	(27.3)
Curry-1466	110	152	141	124	101
Harvest Moisture		(18)	(21.3)	(27.8)	(50.3)

LSD .05 = 12 bu/A between planting dates within a hybrid.

Yields for 1987 are reported in Table 2. As can be seen from yields, the levels are close but not to the same level as the Date of Planting Corn Study reported in 87-1.

For the 93 day hybrid, the first planting date had a significantly higher yield than the later planting dates. The 101 day hybrid had fewer differences and it is hard to say if the lower yield for May 21 is true. The final date is similar to the first two planting dates which does not explain the decrease in yield for the third planting date. It may be that this date was pollinating about the time of our hot spell this summer, which occurred from about July 26 to August 3.

The 110 day hybrid had a much higher yield potential and yield decreased significantly after the second planting date. An error was made during harvest for the fourth planting date. It should not have been harvested because it was not physiologically mature. The yield may have been higher if left in the field longer. But, a killing frost occurred October 3 which was only the day after this experiment was harvested. Therefore, this hybrid would not have accumulated a significant amount of dry matter after this date, but it would have dried down.

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

S.E. FARM REPORT

SILAGE REMOVAL & SOIL DEPLETION

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

SOUTHEAST FARM 87-4

Summary

The effect of stover and grain removal compared to only grain removal has been studied for several years. In 1987, there was a 61 bushel response to the addition of fertility whether in the form of livestock manure or commercial fertilizer. There was no difference between the types of fertility treatments, and there was no difference in yields when the grain and stover have been removed each year compared to removing only the grain and leaving stalk residue.

Methods: In 1987, manure was applied at a rate of 10 tons per acre to specified plots and incorporated with a field cultivator (April 20). All other cultural practices are given in Table 1.

Table 1. Cultural Practices for Silage Removal and Soil Depletion, SE Farm, 1987.

Planting Date	May 5
Hybrid	Pioneer 3704
Seeding Rate	24,000
Herbicide	Dual + atrazine PPI
Insecticide	Furadan
Harvest Date	September 22

Those plots that were designated to be fertilized received nitrogen at a rate of 150 lbs. per acre. No phosphorus was applied to the fertilized plots in 1987.

Results and Discussion: Grain yields in this particular study are the best we have seen for several years. This is a lower area, with poorly drained soils and has been extremely wet during most of the growing season the past several years. Grain yields and harvest moistures for 1987 are reported in Table 2.

Table 2. Grain Yields and Harvest Moistures for Silage Removal and Soil Depletion Study, SE Farm, 1987.

Method of Crop Removal	Fertility Treatment	Grain Yield bu/A @ 15%	Harvest Moisture
Stover + Grain	Fertilizer	132 A*	20.5 A*
Grain Only	Fertilizer	132 A	19.5 A
Grain Only	Manure	125 A	21.0 A
Stover & Grain	Manure	123 A	20.8 A
Grain Only	No Manure	72 B	25.3 B
Stover + Grain	No Manure	71 B	25.8 B
Grain Only	No Fertilizer	65 BC	25.8 B
Stover + Grain	No Fertilizer	59 C	26.5 B

* Yields and grain moisture followed by the same letter are not significantly different at the .05 level.

The response to 10 tons of manure to the acre or 150 lbs per acre nitrogen were equal in final yield and harvest moisture. But, the non-manure and no fertilizer plots were significantly lower in yield. Averaging across all treatments, there was a 61 bushel reponse to the addition of some type of fertility, whether it be in the form of manure or nitrogen fertilizer. The manure treatment does show a few bushels less in yield, but not large enough to be significantly different. It may be possible that we may be just a few pounds short on nitrogen when comparing the manure to the nitrogen fertilizer.

The use of fertility (manure or N fertilizer) also significantly reduced grain moisture at harvest. This reduction in grain moisture is due primarily to phosphorus rather than nitrogen. The phosphorus levels are considerably higher on the manure and fertilized plots compared to the no manure, no fertilizer plots. Phosphorus was not applied to the fertilized plots in 1987, because with a soil test the phosphorus level would call for no recommendation for phosphorus fertilizer for the desired yield goal in this experiment.

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

S.E. FARM REPORT

SOYBEAN VARIETY AND ROW SPACING

D. Sorensen, B. Lawrensen, D. DuBois

SOUTHEAST FARM 87-5

Summary

A new soybean variety and row-spacing study was initiated in 1987. The study was changed to include 36" rows and drilled (7") and 20" rows were dropped from the study. Past research had shown that 15 inch skip-rows were narrow enough to optimize yields. In 1987, yield differences were not as dramatic between row spacings as in the past several years.

Methods: Several changes were made in the soybean variety row-spacing study in 1987. The new study consists of two varieties and three row-spacings. Varieties used were Corsoy 79 and Wells II. The row-spacings consisted of 36 inch rows, 30 inch rows and 15 inch skip-rows. Drilled (7 inch rows) and 20 inch rows were dropped from the study. Past research had determined that 15 inch skip-row was the narrowest row-spacing required to optimize yields. All management factors for the study in 1987 are given in Table 1.

Table 1. Crop Management Factors for Soybean Variety Row Spacing Study, SE Farm, 1987.

Soil Test Results		NO3-N	P	K
		- - - -	-lbs/A-	- - -
	0-6"	15	66	880
	6-24"	65		
1986 Crop		Corn		
Tillage		Fall plow, spring field cultivate		
Planting Date		May 8		
Herbicide		Lasso + Amiben, pre-emerge		
Harvest Date		September 28		

Results and Discussion: Soybean yields for 1987 were above average. Yield results are reported in Table 2. Compared to past years, differences between row-spacings in 1987 were not as large. For Corsoy 79, each decrease in row width gave a two bushel increase in yield.

Table 2. Soybean Variety and Row-Spacing Yield Results, SE Farm, 1987

Variety	Row Spacing		
	36"	30"	15" Skip-Row
	- - - - -bu/A @ 13% Moisture - - - - -		
Corsoy 79	47	49	51
Wells II	40	42	39

LSD (.05) = 3 bu/A for differences between row-spacings within a variety.

Therefore, the only significant difference would occur when decreasing row width from 36 inches to 15 inch skip-rows for Corsoy 79 in 1987. For the past six years, we saw a significant increase in yields when reducing row width from 30 inch to 15 inch skip-rows. This, could in part, be due to the type of growing season. A long warm growing season created a large amount of vegetative growth for Corsoy 79, possibly making row width less important in 1987.

Wells II responded quite differently than the Corsoy 79. The yield potential for Wells II is less than that of Corsoy 79, and 30 inch rows were just significantly better than 15 inch skip-rows. This is quite surprising considering Wells II is a non-branching type plant unlike Corsoy 79. It would be expected that Wells II would respond to the narrower rows than Corsoy 79, but it was the opposite in 1987.

This study will be continued in 1988 to see if trends continue in this direction. For more information contact: Dale R. Sorensen, Research Manager, Southeast Research Farm, RR 3 Box 93, Beresford, SD 57004, (605) 563-2989.

S.E. FARM REPORT

DATE OF PLANTING SOYBEANS

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

SOUTHEAST FARM 87-6

Summary

Soybean yields for 1987 were not affected as greatly by planting date as in 1986. For Corsoy 79, there was no difference in planting dates. For Century 84, the final planting date had significantly lower yields than the other three dates. This would be expected for a late group II bean compared to Corsoy 79.

Methods: This is the second year of looking at the planting date for soybeans in Southeast South Dakota. The study consists of two soybean varieties and five planting dates. In 1987, an error in seed handling occurred which eliminated the fifth planting date. This study is set-up to have one planting date earlier than normal, one date at the recommended start for planting soybeans and the remaining dates being delayed after the recommended start date for Southeast South Dakota. Table 1 reports all management factors for the study in 1987.

Table 1. Management Factors for Date of Planting Soybeans, SE Farm, 1987.

Soil Test Results		NO3-N	P	K
		- - - - - -	lbs/A-	- - - - - -
	0-6"	21	50	490
	6-24"	38		
Tillage		Ridge-Till		
Past Crop		Corn		
Herbicide		Sencor/Lexone, Early Pre-Plant		
		Dual 15" Band		
		Basagran Post-Emerge		
Phosphorus		25 lbs. 2 x 2 in. starter		
Harvest Date		September 29		

Results and Discussion: Current recommendations for beginning to plant soybeans in southeast South Dakota is around May 10. Therefore, our goal has been to begin planting soybeans in this study during the last week of April. In 1987, we were able to start on April 29, with the following dates falling on a 10 day interval. Table 2 reports yields for soybean planting dates in 1987.

Table 2. Date of Planting Soybeans Yield Results, SE Farm, 1987.

Variety	Planting Date April 29	May 9	May 19	May 29
	bu/A @ 13% moisture			
Corsoy 79	45	45	43	45
Century 84	41	40	39	31

LSD (.05) = 7 bushel/acre for differences between planting dates within a variety.

Due to the ideal growing season, we did not see the dramatic response to planting date for soybeans in 1987, that we saw in 1986. Corsoy 79 was not affected by planting date in 1987 regardless of planting date. Century 84, which is a few days later than Corsoy 79 did have a significant decrease in yield when comparing the first three planting dates (April 29, May 9, May 19) to the last planting date (May 29).

This reduction is due to the lateness of the variety and possibly the extremely hot weather in late July, occurring during the reproductive growth stage of this planting date.

This study will be continued in 1988 to continue gathering data for soybean planting dates in Southeast South Dakota. For further information contact: Dale Sorensen, Research Manager, Southeast Research Farm, RR 3 Box 93, Beresford, SD 57004 (605) 563-2989.

A. Boe, C. H. Chen, K. Robbins
D. Sorensen

SOUTHEAST FARM 87-7

ROW-SPACING EFFECTS ON FORAGE YIELDS OF COWPEA AND MUNGBEAN

A. Boe, C. H. Chen, and K. Robbins

Introduction

Cowpea and mungbean are drought-tolerant, warm-climate, annual legumes that have potential to produce high quality forage during the summer in our region. Both species are utilized for hay and silage in the southern Great Plains.

Materials and Methods

An experiment was planted on 16 June 1987. Populations of approximately 200,000 plants/acre were established for cowpea and mungbean in 3 row-spacing (10-, 20-, and 30-inch) treatments replicated 3 times in a randomized complete block design. The cowpea was a black-eye type and the mungbean was a green-seeded type. Dry matter forage yields were obtained on 14 August 1987 when plants were in late flower-early pod stage.

Results and Discussion

Cowpea produced significantly more forage than mungbean across all row-spacing treatments. Forage yields for both legumes decreased significantly with increased row-spacing (Table 1). These preliminary data indicate that intra-row plant competition (1-inch compared to 3-inch intra-row plant spacings for 30- and 10-inch row spacings, respectively) was an important factor influencing vegetative production during the summer of 1987. The same experiment was also conducted at Brookings in 1987 and similar results were obtained. Although these data represent only one year of experimentation, the high forage yields produced by these legumes over an approximately 60-day growing period during mid-summer indicate they may have potential as late-planted forage crops in southern South Dakota. Experiments involving more varieties and cultural practices are planned for the future.

Table 1. Mean Dry Matter Forage Yields For 2 Annual Legumes Grown At Beresford, SD in 1987.

Legume*		Row-spacing (inches)*		
Cowpea	Mungbean	10	20	30
------tons/acre-------		-------------tons/acre-------------		
2.5 a	2.2 b	2.8 a	2.3 b	2.0 c

* Means in same row followed by a different letter are significantly different by LSD .05.

ALTERNATIVE FORAGES RESEARCH

A. Boe and D. Sorensen

Approximately 5 acres of SD 100 teff (*Eragrostis tef*), a warm-season annual grass selected from an Ethiopian introduction, were planted on June 16, 1987. The purpose of the planting was to provide hay for a feeding trial comparing SD 100 with millets and Sudangrass. An excellent stand was obtained and approximately 2.5 tons/acre of forage were harvested at early head on August 24. SD 100 has looked promising in forage yield trails at Brookings and Highmore, but animal performance data are needed before its value as a forage can be accurately determined.

A research project on fababeans was also initiated in 1987. Four varieties of fababeans (Aladin, Ackarperle, Herzfreya, Outlook) were drilled in 7" rows on April 28, and harvested for forage on July 22. This date was about one month later than recommended, and is evident in forage yields for 1987 as reported in Table 1.

Table 1. Dry Matter Forage Yields for Four Fababean Varieties, SE Farm. 1987.

Aladin	Ackarperle	Herzfreya	Outlook
-------------	tons/Acre	-------------	
1.088 A*	1.364 A	1.323 A	1.244 A

* Means followed by the same letter are not significantly different at the .05 level.

Ackarperle and Herzfreya are newer varietal releases and were slightly higher yielding, but not significantly higher than the older varieties Aladin and Outlook. This research will be continued in the future and planting date effects will also be studied to determine how early fababeans need to be planted to optimize yields.

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 87-8

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 seven 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 1987, a demonstration was implemented at the Southeast Farm to show the effect of each of these commonly used nutrients on a high fertility soil.

Materials and Methods: The demonstration was established on the SE Farm just east of the office building. Soil type at the site was an Egan silty clay loam. Egan soils are well drained soils formed in silty drift over glacial till.

Soil samples were taken to a depth of two feet in the spring of 1987. Samples were divided into 0-6 and 6-24 inch depths. The SDSU testing lab did regular and micronutrient analysis on the surface soil and also nitrate and sulfate analysis on the subsoil (Table 1). The site had been in barley in 1986 and was fall moldboard plowed. Secondary tillage (field cultivation) was done in the spring immediately following broadcast fertilizer application. Fertilizer and lime treatments are given in Table 2. Treatment one received no fertilizer. Treatments 2-7 received 115 lbs N and 50 lbs P205 per acre as recommended by the SDSU soil testing lab for a 140 bushel per acre corn yield goal. In addition to N and P, treatments 3-6 received either 50 lbs K20, 25 lbs sulfur, 5 lbs zinc or 2000 lbs lime per acre. Treatment 7 received all fertilizer materials. Each treatment was replicated 4 times.

Pioneer 3475 corn was planted on April 24 at 24,500 seeds per acre. The herbicides and insecticides used were Lasso+Bladex banded over the row, and Furadan. Plots were hand harvested on September 9.

Results and Discussion: Soil test levels (Table 1) for potassium, sulfur and zinc were high. The SDSU soil testing lab would not predict an economical yield response to the addition of these nutrients. The pH at the site was 6.4. Lime would not have been recommended by the SDSU soil testing lab.

Yields and grain moisture at harvest are given in Table 3. There was a significant increase in yield when nitrogen and phosphorus were applied.

There were no further increases in yields when potassium, sulfur, zinc or lime were applied in addition to the nitrogen and phosphorus. Grain moisture at harvest was reduced when nitrogen and phosphorus were applied but no further reduction occurred with the addition of potassium, sulfur, zinc or lime.

The results of this demonstration support SDSU recommendations that potassium, sulfur and zinc fertilizers should not be used when soil test levels are high and that lime should not be used when the pH is only slightly acid.

Table 1. Soil Test levels, 1987 Micronutrient and Lime Demonstration.

Regular Soil Tests						
Depth	NO_3-N	P	K	OM	pH	Salts
inches	lb/A			%		mmho/cm
0-6	12	22	550	3.2	6.4	0.3
6-24	57					

Other Soil Tests							
Depth	S	Zn	Fe	Mn	Cu	Ca	Mg
inches	lb/A	PPM					
0-6	20	1.39	106	62	1.92	2788	788
6-24	162						

Table 2. Fertilizer Treatments, 1987 Micronutrient and Lime Demonstration.

Treatment	N	P_2O_5	K_2O	Sulfur	Zinc	Lime
	lb/A					
1	0	0	0	0	0	0
2	115	50	0	0	0	0
3	115	50	50	0	0	0
4	115	50	0	25	0	0
5	115	50	0	0	5	0
6	115	50	0	0	0	2000
7	115	50	50	25	5	2000

Table 3. Corn Grain Yields and Moisture, 1987 Micronutrient and Lime Demonstration.

Fertilizer Treatment	Grain Yield	Grain Moisture
lb/A	bu/A	%
None	131 A 1/	23.4 A1/
115 N. 50 P2O5	172 B	20.1 B
115 N, 50 P2O5, 50 K2O	172 B	19.7 B
115 N, 50 P2O5, 25 S	168 B	18.2 B
115 N, 50 P2O5, 5 Zn	168 B	19.7 B
115 N, 50 P2O5, 2000 Lime	174 B	19.5 B
115 N, 50 P2O5, 50 K2O, 25 S, 5 Zn, 2000 Lime	169 B	18.8 B

1/ Yields and grain moisture followed by the same letter are not significantly different at the .05 level.

S.E. FARM REPORT

A COMPARISON OF SEVERAL SOIL TESTING LABORATORY FERTILIZER RECOMMENDATIONS - SUMMARY REPORT

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PLANT SCIENCE 87-9

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 in 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 needs of the crop. This recommendation must also be economical. It must be profitable to fertilize the crop.

Variations in fertilizer recommendatins 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 seventh 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 1986. 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 prior to planting. Pioneer 3475 was planted at a rate of 24,500 seeds/acre on April 24. Average harvest population ranged from 23-25 thousand plants per acre. Herbicide consisted of Lasso/Bladex banded. Furadan was used for rootworm control.

Fertilizer treatments were broadcast and field cultivated on April 15. Fertilizer and lime costs were estimated averages paid by farmers in the spring of 1987. They were set on a per pound basis as follows:

Nitrogen	$0.15
Phosphorus	$0.18
Potassium	$0.12
Boron	$2.00
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 September 9 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, NE
C - Servi-Tech, Inc., Dodge City, Kansas
D - Iowa State University, (ISU), Ames, Iowa

Results:

Results of soil tests for 1987 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 1987 from each lab and the cost of the fertilizer recommended are reported in Table 2. The fertilizer costs varied from $21.54/acre to $62.89/acre.

In general, yields were very good in 1987. The check was only 57% of other yields (Table 3). The check was significantly different from other lab treatments. The SDSU treatment was significantly lower (9 bu/A) than the Servi-Tech treatment in 1987. No other significant differences existed between treatments. The yield difference here can't be explained based on fertilizer treatments, since both treatments are very similar. Servi-Tech plots averaged 22 pounds more residual nitrate-N than did the SDSU treatment. However, the A & L treatment was also higher in residual nitrate with no significant yield advantage.

The seven year total yields and fertilizer costs are also shown in Table 3. Total yields are very similar with the exception of the check. Total fertilizer costs between treatments for the seven years of the experiment are very different ranging from $185 to $421 per acre. This difference is reflected in the total dollars returned from added fertilizer (Table 3).

Conclusions

This was the last year of this long-term study. The data from the experiment, along with others conducted by SDSU and other universities is very similar. Some soil testing laboratories are not making the most economical fertilizer recommendations possible even though soil test results are similar. In all studies, including this one, the university lab for the area is providing the most economical recommendations. Some private testing labs are also doing an excellent job. The data would indicate that a farmer using labs other than the area university labs should be cautious. They should be sure the lab's recommendation does not vary greatly from the area university recommendations. If it does, alternate recommendations should be sought.

Table 1. Soil test results from 1987 Southeast Farm Lab Comparison Study.

Measurement	SDSU	Harris	A & L	Servi-Tech	ISU
Nitrate-N, lbs/A-2'	32	26	60	54	---
O.M., %	2.8	2.7	3.1	2.9	---
Phosphorus, lbs/A	33	48	46	42	46
Potassium, lbs/A	490	580	576	658	652
pH	6.1	6.5	6.4	6.2	6.7
Salts, mmho/cm	0.4	0.3	---	0.3	---
Zinc, ppm	1.77	2.3	1.8	1.2	1.8
Iron, ppm	56	77	63	85	---
Manganese, ppm	38	39	25	23	---
Copper, ppm	2.3	1.6	1.6	2.1	---
Sulfur, (SO4), ppm	35*	10	24	14	14
Boron, ppm	0.9	1.0	0.8	---	---
Magnesium, ppm	707	715	742	729	---
Calcium, ppm	2333	2528	2006	2605	---
Sodium, ppm	---	22	---	16	---
CEC, me/100 g	---	19	19	22	---

*Average for 0-2 feet.

Table 2. Suggested fertilizer recommendations for 120 bu/A corn, Southeast Farm, 1987.

Fertilizer Nutrient	LAB SDSU	Harris	A & L	Servi-Tech	ISU
Nitrogen, lbs/A	122	120	135	125	110
Phosphorus, lbs/A (P205)	18	55	35	30	45
Potassium, lbs/A (K20)	0	30	60	0	0
Boron, lbs/A	0	0	1.0	0	0
Zinc, lbs/A	0	0	2.0	0	0
Lime, ton/A	0	0	1800*	0	0
Fertilizer Cost/A	$21.54	$27.90	$62.89	$24.15	$24.60

*Effective calcium carbonate equivalent.

Table 3. Influence of laboratory fertility programs on yield and fertilizer costs.

Laboratory	Yields 1987		Yields 7 Year Total	Total 7 Year Fert. Costs/A	Return**
	bu/A		bu/A	$	$
Check	77	A*	495	------	---
SDSU	132	B	719	184.74	263
Harris	135	BC	704	342.47	76
A & L	135	BC	715	420.72	19
Servi-Tech	141	C	735	208.85	256
ISU	137	BC	731	280.36	192
Sig. of F.	0.0001				
C.V. %	4.9				

* 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 an average of $2.00/bu corn over the 7 years.

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S.E. FARM REPORT

TILLAGE AND ROTATION EFFECTS ON SOIL PHOSPHORUS AVAILABILITY TO CORN

Manjula Vivekanandan and P. E. Fixen

PLANT SCIENCE 87-10

The "Fallow syndrome" is a phenomenon that has been recognized in the northwestern corn belt for many years. Past experience has shown that severe early growth problems of corn occur when this crop is planted in a field that has been fallowed the year before. Previous studies carried out on phosphorus (P) requirements of corn and soybean following fallow, have shown tremendous early season growth response to starter P on both crops. The question remains as to what specific effect fallowing has on P nutrition. Mycorrhizal effects or labile organic P effects could be involved. Little information exists on the effects of crop rotation and tillage and associated fertilizer P application on the distribution of P within inorganic pools.

This study was initiated in 1986 and has the following objectives:

To determine the influence of tillage and previous crop on:
1. soil P availability to corn;
2. labile inorganic, labile organic and soil solution P;
3. and on mycorrhizal infection levels of corn.

Methods: This study is located on 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.

The study was laid out in a split-plot randomized block design with four replications. Treatments were as follows:

1. corn on mechanical fallow (fallow/corn rotation)
2. moldboard corn/barley rotation
3. moldboard continuous corn
4. ridge plant continuous corn
5. ridge plant corn/soybeans rotation

Each plot was split to receive P fertilizer treatments: no P vs 520 lbs P_2O_5/A (P non-limiting condition) as concentrated super phosphate. The P treatments along with 20 lbs Zn/A were applied in the fall of 1985 after which the study area was disked and plowed. Rotations and tillage systems were established in 1986.

The study area was planted to Pioneer 3475 on April 23, at the seeding rate of 24,500 seeds/A. A Lasso and Bladex band was used for weed control and Furadan for insect control. A split application of liquid nitrogen as 28-0-0 was made at a rate of 75 lbs N/A at emergence

and another 75 lbs N/A at lay-by stage. In the ridge plant system 6-8" ridges were built during final cultivation (corn 18" tall). Corsoy 79 soybeans and Bowman barley were used.

Parameters measured were early dry matter production and P uptake, leaf P concentration, date of silking, grain yield, grain moisture and stover yield. Soil sampling and root sampling were done periodically. Soil samples were taken at depth increments of 0-2", 2-4" and 4-6" for analysis of labile inorganic and labile organic phosphorus fractions. Root samples were estimated for mycorrhizal infection rate. Corn yield was determined by hand harvesting of 20' of the center two rows. Plant and soil analysis were not completed at the time this report was written.

Results and Discussion: Soil test P levels for the check P and 520 lbs P205/A treatments at the beginning of study (Spring 1986) averaged 24 lbs/A and 89 lbs/A respectively. Substantial early season growth (6-leaf stage) response in corn to P was observed in all crop rotations. In the fallow rotation there was a 384% increase in early dry matter production (Table 1). This was followed by the barley/corn rotation (119%) and continuous corn (53%) in the molboard plow (MP) system. In the ridge plant (RP) system the response was comparatively lower than in the MP system. In the RP system continuous corn showed greater response (23%) than a soybean corn rotation (8%). The ranking of early dry matter response agreed with theoretical expectations based on mycorrhizal relationships. The stage is now set to determine why these differences occur.

Date of silking response to P as affected by previous crop and tillage is given in Table 2. Silking date was delayed by P deficiency 8 days, 2 days, and 3 days respectively for fallow, barley, and continuous rotations in the MP system. No P effects on silking date were measured in the RP system.

Mycorrhizal rating at the 6-leaf stage was significantly affected by crop rotation and tillage systems (Table 3). As expected, mycorrhizal infection rate was higher in the RP system when compared to the MP system. It is interesting to note that within the MP system there were differences in infection for different crop rotations. The fallow corn rotation had the lowest rating which was expected because there was no host plant for mycorrhizae during the fallow period. This was followed by the barley/corn rotation where there is a partial fallowing effect experienced since barley was harvested in July. In the RP system continuous corn and soybean/corn rotations resulted in similar infections, both of which were higher than the MP system rotations.

Grain yield responses didn't follow the trend observed in early dry matter production. There were significant yield responses to P observed for corn following fallow and for continuous corn in the MP system and in continuous corn in the RP system. Although there was a tremendous early growth response to P observed for different crop rotations and tillage systems, the crop appeared to catch up later in the season thus not reflecting the same pattern in grain yield response.

Table 1. Early growth response of corn to P as affected by previous crop at the Southeast Experiment Farm in 1987.

Tillage system	Previous crop	Early growth PO	Early growth P520	Increase	Increase
		grams per 12 plants			%
Moldboard	Fallow	11.6	56.1	44.5	384(1)
Moldboard	Barley	20.5	44.8	24.3	119
Moldboard	Corn	30.8	47.1	16.3	53
Ridgeplant	Soybeans	47.6	51.3	3.7	8
Ridgeplant	Corn	28.7	35.4	6.7	23

(1) Dry matter production at 6-leaf stage expressed as:
(P520 - PO)/PO x 100
CV = 14.2%; LSD .10 = 6.7 g

Table 2. Date of silking response of corn to P as affected by previous crop/tillage at the Southeast Experiment Farm, 1987.

Tillage system	Previous crop	Silking Date* PO	Silking Date* P520	Difference
		------July	--------	---days--
Moldboard	Fallow	11	3	8
Moldboard	Barley	[illegible]	5	2
Moldboard	Corn	7	4	3
Ridgeplant	Soybeans	5	5	0
Ridgeplant	Corn	6	6	0

*Day 50% of plants had visible silks.

Table 3. Influence of cropping system and tillage on Mycorrhizal rating.

Tillage system	Previous crop	Check mycorrhizal infection rating(1)
Moldboard	Fallow	1.23
Moldboard	Barley	1.50
Moldboard	Corn	1.72
Ridgeplant	Soybeans	1.88
Ridgeplant	Corn	2.07

CV = 10%
LSD .10 = 0.21

(1) 1 to 5 with 5 indicating 100% infection.

Table 4. Influence of cropping system and P on grain moisture and grain yield of corn at Southeast Experiment Farm, 1987.

Tillage system	Previous crop	Grain moisture % PO	Grain moisture % P520	Grain moisture % Resp	Grain yield in bu/A PO	Grain yield in bu/A P520	Grain yield in bu/A Resp
Moldboard	Fallow	[illegible]	[illegible]	--	141	170	29
Moldboard	Barley	18.6	19.1	--	153	160	7
Moldboard	Corn	15.2	16.7	--	127	158	31
Ridgeplant	Soybeans	19.7	20.4	--	179	175	-4
Ridgeplant	Corn	21.1	18.1	--	135	156	21
LSD .10				NS			18

S.E. FARM REPORT

RESIDUAL EFFECTS OF P FERTILIZATION

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PLANT SCIENCE 87-11

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 exists in 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 one 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 1987 was planted to Pioneer 3732 on May 8, 1987 at a rate of 25,000 seeds/A. Weed control consisted of a preemerge application of Lasso and Atrazine. Furadan was banded for insect control. A split application of nitrogen as 28-0-0 was made with 75 lbs/A at emergence and 75 lbs/A at lay-by.

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 normally 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 interpreted 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 26 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. Essentinlly no change in soil test P levels occurred over the 22-year period for three of the four reps.

Fertilizer effects on grain yield and moisture content. Corn grain yields were not influenced by soil test P level difference in 1987. Grain moisture content, however, decreased from 23% at 15 lb/A soil test level to 20% at a 59 lb/A soil test level.

Ear leaf samples have been collected annually at silking for plant analysis. Table 2 shows the average P concentration found at each soil test level for 1982-1986.

Table 2. Influence of soil test P level on corn ear leaf P concentration, 1982-1986.

Soil Test Level (1)	Year					
	1982	1983	1984	1985	1986(2)	Average
lbs/A	--------------------		% P	--------------------		
15	0.26	0.21	0.25	0.22	0.18	0.22
17	0.29	0.21	0.26	0.26	0.17	0.24
19	0.25	0.22	0.28	0.25	0.16	0.23
31	0.25	0.23	0.30	0.27	0.19	0.25
59	0.26	0.24	0.32	0.31	0.24	0.27

(1) Summer 1986, 0-4"
(2) Average of 2 reps

Corn yields from 1982 through 1987 show that the 31 lb/A soil test level has averaged 4 bu/A more corn than the 15 lb/A level (Table 3). These data also show that the response to P varied considerably across years with no response in 1982, 1983, 1986 and 1987, 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 3. Influence of soil test P level on corn grain moisture in 1987 and grain yield in 1982-1987.

Soil Test P Level	Grain Yield 1982	1983	1984	1985	1986	1987	Avg.	Grain Moisture 1987
lbs/A(1)	bu/A(2)							%
15(L)	97	102	103	119	113	108	107	22.7
17(M)	103	97	101	117	113	112	107	22.2
19(M)	94	103	102	126	111	107	107	22.0
31(H)	93	106	109	131	113	113	111	20.8
59(VH)	84	107	117	129	114	115	111	19.6

(1) Bray and Kurtz No. 1, Summer 1986, 0-4"
(2) At 15.5% moisture

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S.E. FARM REPORT

EFFECTS OF STARTER FERTILIZATION OF CORN UNDER VARYING CULTURAL AND ENVIRONMENTAL CONDITIONS, 1987

Paul E. Fixen and Brad G. Farber

PLANT SCIENCE 87-12

Few agricultural areas of the United States contain the diverse set of climatic conditions found in South Dakota. The warm humid environment of the southeast corner grades into the semiarid central and western reaches of the state. South Dakota farmers grow corn in the most variable climate found in the corn belt. Yield levels vary tremendously across years and locations, ranging from no grain (harvested for silage) to over 200 bu/A.

Superimposed on this variable climate we find an increasingly diverse set of cultural practices. Areas that have historically been moldboard plowed now may be chisel plowed, disked, ridge planted with no additional tillage, or even planted with no tillage at all. Most information available indicates that an increase in this diversity is likely in the future.

The efficacy of starter fertilizer on corn in South Dakota, at this time, is exceedingly difficult to predict. Recent studies in South Dakota have shown that the importance of starter fertilizer increases when tillage is reduced. However, other data shows that under certain environmental conditions, starter fertilization can actually decrease corn yields. A need exists to better predict the probability of both positive and negative starter responses under the variable climatic, cultural, and soil conditions of South Dakota.

Objectives:

1. Develop a model based on field data that predicts early season corn growth response to starter fertilizer.

2. Develop a model that predicts the portion of early growth response that carries through to total dry matter production at maturity and grain yield.

3. Develop starter response probabilities for geographic regions of South Dakota.

Methods: Arrangements were made with cooperating farmers to plant the experiments. Two treatments were included at each of 19 sites (with and without starter) and planted in strips across the field. The paired strips were repeated four times to provide an estimate of natural variability. A multitude of soil, crop, and weather parameters were measured and cultural practices were recorded in order to describe in detail the total environment of each site. Some of the parameters are reported in Tables 1 through 6.

Results: The sites are sorted by tillage system in Table 2 and throughout this report. Residue cover following planting was quite variable between sites but generally increased with less tillage. Bulk density (weight per unit volume) is a measure of natural soil density and compaction and also varied across sites (Table 2). For the texture classes in these studies, bulk densities are considered nonlimiting up to approximately 1.4. Root growth is partially restricted from 1.5 to 1.6 and drops off rapidly after 1.6 is reached. Out of 19 sites, 5 had bulk densities that were partially restrictive (> 1.4) somewhere in the top 12 inches (2 chisel sites, 2 ridge till sites, and the no-till site).

General soil tests are reported in Table 3. Soil Zn levels were in the medium category at 8 sites and in the low category at one location, however, no deficiency symptoms were noted at any location.

Soil test P levels are reported in Table 4. Both Bray I and Olsen tests were run on all samples, but because the Olsen test consistently gave equal or lower values than the Bray I test, only the Bray I values are reported here. Soil test levels ranged from a low of 5 ppm to a high of 139 ppm. Eight sites tested over 20 ppm where no P response is expected. Many of the reduced till sites showed marked stratification of soil P while others were not severely stratified.

Water use across sites varied from 8.2 inches in Sully County to over 24 inches at an irrigated site in Lake County (Table 6). The relationship between water and grain yield is shown in Figure 1. Once 3 inches was reached, yield increased 9 bu per inch of additional water. Approximately 83% of the variation in yield between sites was due to available water when three sites were excluded (86, 87, and 92). These three sites had unusually high water use efficiency.

Early growth response, grain yield response, and total dry matter (grain plus stover) response are reported in Table 7. Early growth response to starter occurred at 10 sites out of 19. Six of the 10 sites giving early growth response showed increases in total dry matter production while three sites showed an increase in total dry matter but no increase in early growth. Grain yield increases occurred at five sites while a yield decrease appeared at one location. The average yield increase at responsive sites was 15 bu/A.

Unlike the past several years, the major factor influencing starter response in 1987 was soil test P level (Fig. 2). All sites giving a significant yield increase had soil test P levels less than or equal to 16 ppm (32 lbs/A). In the previous three years (84-86), starter response on corn in eastern South Dakota appeared to occur regardless of soil test level. This was not the case in 1987.

Summary:

Since this is the first year of a 4 or 5 year project no conclusions can be drawn relative to predicting starter response. Apparently, the 1987 weather was such that true "starter" yield responses did not occur but rather the increases measured were simply due to efficient applications of phosphorus on low P soils.

Table 1. Site locations and corn hybrid used.

Site No.	County	Cooperator	Planting Date	Hybrid	Relative Maturity
8187	Campbell	Paul Wiesbeck	5/14	Pioneer 3790	92
8687	Roberts	Bob Metz	5/5	Sigco 1588	92
8587	Grant	Bruce Kneeland	5/1	Sigco 1486	85
7987	Clay	S.E. Farm	4/30	Pioneer 3471	115
8287	Beadle	Dennis Cronin	5/11	Keltjen KS114	114
9187	Sully	David Trumble	5/16	Pioneer 3965A	85
8987	Potter	Ralph Holzwarth	5/2	Pioneer 3790	93
7087	Brookings	Elden Balo	4/26	Mallard	105
7187	Union	Ron Carlson	4/25	Pioneer 3475	110
7787	Lake	Ron Alverson	4/22	Pioneer 3475	110
9287	Clay	S.E. Farm	4/28	Northrup King 4325	104
7287	Hand	R. & D. Bottum	5/17	Jacques JX97	95
7487	Spink	Bill St. Clair	4/29	Curries 1466	110
7587	Lake	Doug Erickson	5/10	Paymaster 2900	95
7687	Brookings	Scott VanderWal	4/29	Pioneer 3732	101
8787	Spink	David Nelson	4/27	Keltjen KS1090	109
8887	Spink	David Nelson	5/3	Keltjen KS1010	102
9087	Grant	Jerald Zubke	5/4	Pioneer 3737	95
7987	Brown	Dennis Dinger	5/7	SeedTec KX3400	92

Table 2. Residue cover and bulk densities in 1987.

Site No.	Tillage System[1]	Prev. Crop	Residue Cover	Bulk Density[2]				Avg. B.D.	
				0-3	3-6	6-9	9-12	0-6	0-12
			%	g/cm³					
8187	MP	wheat	2	1.2	1.2	1.3	1.4	1.2	1.3
8687	CH	barley	47	1.1	1.3	1.2	1.2	1.2	1.2
8587	CH	soy	18	1.2	1.4	1.5	1.4	1.3	1.4
7987	CH	soy	19	1.1	1.4	1.3	1.2	1.2	1.2
8287	CH	corn	25	1.3	1.5	1.6	1.5	1.4	1.5
9187	DK	sun	10	1.3	1.4	1.3	1.3	1.3	1.3
8987	DK	corn	39	1.2	1.3	1.4	1.2	1.2	1.3
7087	RP	soy	8	1.0	1.2	1.2	1.3	1.1	1.2
7187	RP	soy	23	1.1	1.4	1.3	1.3	1.2	1.3
7787	RP	soy	45	1.0	1.1	1.3	1.2	1.0	1.1
9287	RP	soy	21	1.0	1.1	1.2	1.3	1.1	1.2
7287	RP	corn	41	1.4	1.4	1.4	1.4	1.4	1.4
7487	RP	corn	48	1.1	1.4	1.6	1.5	1.3	1.4
7587	RP	corn	85	1.1	1.1	1.1	1.2	1.1	1.1
7687	RP	corn	14	1.0	1.2	1.3	1.2	1.1	1.2
8787	RP	corn	54	1.0	1.2	1.3	1.3	1.1	1.2
8887	RP	corn	50	1.2	1.5	1.6	1.5	1.3	1.4
9087	RP	corn	28	1.2	1.3	1.3	1.2	1.2	1.2
7887	NT	wheat	83	1.3	1.4	1.5	1.5	1.3	1.4

[1] MP = moldboard plow, CH = chisel plow, DK = disk, RP = ridge plant, NT = no till.

[2] In row at growth stage V 12.

Table 3. General soil test results at planting.

Site	NO_3-N 0-2'	NO_3-N 2-4'	Organ. matter	DTPA Zn	Ext. K	pH by depth, in. 0-3	3-6	6-9	9-12
	---lbs/A----		%	----ppm----					
8187	119	51	3.4	1.21	825	7.8	7.7	7.6	7.9
8687	235	48	4.0	2.20	400	7.4	7.4	7.5	7.7
8587	152	29	3.4	0.76	130	6.8	6.5	6.7	7.0
7987	49	34	2.9	0.80	260	7.2	7.0	7.2	7.4
8287	100	66	1.5	0.61	153	7.6	7.9	8.0	8.0
9187	36	17[1]	2.4	0.59	358	7.1	7.0	7.1	7.4
8987	109	20[1]	2.9	1.69	538	7.0	6.9	7.0	7.0
7087	69	30	3.5	0.82	150	7.0	6.6	6.8	6.9
7187	63	30[2]	3.1	0.61	210	7.0	7.4	7.5	7.6
7787	111	39[2]	3.7	1.47	213	6.9	6.5	6.4	6.5
9287	117	149	3.5	1.26	303	7.8	7.8	7.7	7.7
7287	109	51	2.0	0.49	273	6.4	6.4	6.6	7.3
7487	53	9	1.6	0.96	150	7.5	7.6	7.7	8.0
7587	52	27	3.9	0.86	215	6.9	6.5	6.8	7.3
7687	85	62	3.5	1.57	265	5.8	5.9	6.2	6.8
8787	130	161	3.2	3.63	700	6.6	6.3	6.6	6.8
8887	101	77	2.0	1.00	213	6.6	6.7	6.8	7.0
9087	158	47	4.6	1.75	512	6.9	6.7	6.6	6.7
7887	116	59	2.9	0.49	196	7.8	7.8	7.9	8.1

Surface textures were all fine or medium (mechanical analysis has not yet been completed).

[1] 2-3'
[2] 2-3.5'

Table 4. Phosphorus soil test (Bray I) results at planting.

Site	Depth, Inches 0-3	3-6	6-9	9-12	12-24	Avg. 0-6
	-------------------	----------	ppm	----------	-------------------	
8187	47	56	36	3	1	52 VH
8687	160	118	145	41	1	139 VH
8587	21	10	8	5	1	16 H
7957	8	6	5	2	1	7 L
8287	29	15	1	2	2	22 M
9187	14	6	4	3	1	10 M
8987	67	30	18	19	17	49 VH
7087	14	11	3	2	1	13 H
7187	6	3	2	0	0	5 L
7787	23	15	12	4	3	19 H
9287	34	34	6	33	1	34 VH
7287	50	54	25	2	6	52 VH
7487	7	6	5	3	1	7 L
7587	13	5	5	3	1	9 M
7687	74	24	9	6	5	49 VH
8787	133	143	74	22	1	138 VH
8887	15	9	3	2	2	12 H
9087	45	21	16	14	1	33 VH
7887	12	5	3	3	1	9 M

Table 5. Fertilizer applied at each site

Site	Location[1]	Starter N	Starter P_2O_5	Starter K_2O	Total N	Broadcast P_2O_5	Broadcast K_2O
	inches			lbs/A			
8187	3x2	21	29	0	64	22	0
8687	2x2	6	27	13	6[2]	40	0
8587	3x2	13	34	28	73	0	0
7987	2x2	7	34	0	157	0	0
8287	2x2	8	27	0	123	37	93
9187	2x1	7	24	0	24	0	0
8987	2x2	30	15	8	225	75	0
7087	2x2	7	21	7	7	0	0
7187	0x1	11	39	0	85	30	40
7787	2x2	15	32	15	235	0	0
9287	2x2	7	25	0	175	0	0
7287	0x0	6	20	0	96	0	0
7487	3x3	15	50	0	240	0	0
7587	0x1	3	6	3	44	0	0
7687	2x0	8	23	8	90	0	0
8787	2x2	8	29	0	128	0	0
8887	2x2	8	29	0	128	0	0
9087	0x1.5	6	19	0	131	0	0
7887	2x2	18	46	0	78	0	80

[1] Position of band relative to seed (to side x below).
[2] Manured

Table 6. Precipitation and water use.

Site	May	June	July	Aug.	Sept.	Total	Soil water use[1]	Estim. water use	Check bu/A
	Growing season precipitation or irrigation								
	inches								
8187	0.9	1.2	4.7	0.8	0.5	8.1	4.4	12.4	5.6
8687	2.7	3.0	2.9	0.2	0.9	9.6	3.4	13.0	12.5
8567	1.4	2.6	1.8	2.5	0.1	6.3	3.0	11.3	7.2
7987	2.7	3.6	4.7	1.4	2.7	15.1	1.1	16.2	9.2
8287	0.7	1.3	2.5	1.8	0.6	6.9	12.0	18.9	8.1
9187	0	1.5	1.3	1.8	0.0	4.6	3.6	8.2	5.5
8957	0.4	4.3	10.7	3.5	0.5	19.3	-1.0	18.3	7.2
7087	1.5	3.7	4.9	0.9	0	11.0	4.8	15.7	7.3
7187	2.3	3.3	4.9	1.3	0	11.7	4.2	15.9	6.7
7787	3.5	5.3	8.6	3.9	1.2	22.5	2.5	24.5	9.1
9287	2.7	3.6	4.7	1.4	2.7	15.1	0.5	15.6	12.1
7287	0	0.9	1.2	0.6	0.1	2.7	5.7	8.5	8.6
7487	2.0	2.3	6.6	5.3	1.6	17.8	0.4	18.2	6.8
7587	1.2	2.2	5.8	2.1	2.2	13.5	1.7	15.2	4.9
7687	1.7	2.8	5.8	2.6	2.0	14.9	2.2	17.1	8.9
8787	0.4	0.9	2.0	0.7	0	3.9	4.7	8.6	12.3
8887	0.7	1.0	2.2	0.7	0.2	4.9	4.1	9.0	6.7
9087	1.8	0.1	4.8	1.0	0.6	8.0	8.6	16.6	6.7
7887	2.4	1.5	6.5	1.3	0.6	12.3	5.7	17.9	6.5

[1] Initial - Final soil water content, 0 to 4 ft.

Table 7. Starter effects on early growth and yield.

Site No.	Early growth, V6			Grain Yield			Total Dry Matter		
	Check	Starter	Resp.	Check	Starter	Resp.	Check	Starter	Resp.
	------grams/plant------			------bu/A---------			-----1000 lbs/A------		
8187	10.4	9.7	-0.7	70	71	1	7.3	7.2	-0.1
8687	18.4	17.3	-1.1	162	165	3	15.1	15.4	0.3
8587	5.7	8.6	2.9**	81	89	8*	7.2	8.0	0.8**
7987	2.5	3.2	0.7**	149	163	14	15.0	16.7	1.7
8287	15.2	16.9	1.7**	153	141	-12	15.5	15.2	-0.3
9187	9.2	10.7	1.5*	45	55	10	4.8	6.1	1.3*
8987	7.8	10.0	2.2**	132	135	3	12.5	13.5	1.0**
7087	7.5	8.2	0.7	115	107	8	10.8	10.8	0.0
7187	2.4	2.9	0.5*	107	124	17**	9.7	11.6	1.9**
7787	2.4	2.8	0.4*	223	218	-5	21.1	21.0	-0.1
9287	2.3	2.9	0.6**	188	190	2	17.0	16.9	-0.1
7287	9.7	9.8	0.1	73	61	-12	8.4	7.4	-1.0
7487	9.9	10.4	0.5	124	130	6*	11.8	12.4	0.6**
7587	3.3	6.3	3.0*	75	110	35**	7.0	9.8	2.8**
7687	11.6	11.8	0.2	153	162	9	14.6	16.6	2.0**
8787	10.6	11.8	1.2	106	93	-13	10.5	9.3	-1.2
8887	9.3	10.0	0.7	60	53	- 7*	6.0	5.6	-0.4
9087	13.2	14.1	0.9	112	81	-31	9.6	7.5	-2.1*
7887	6.3	7.1	0.9*	116	128	11**	10.9	11.9	1.1**

** Response significant at 0.10 level.
* Response significant at 0.20 level.

FIG. 1.WATER USE VS GRAIN YIELD
CHECK,1987

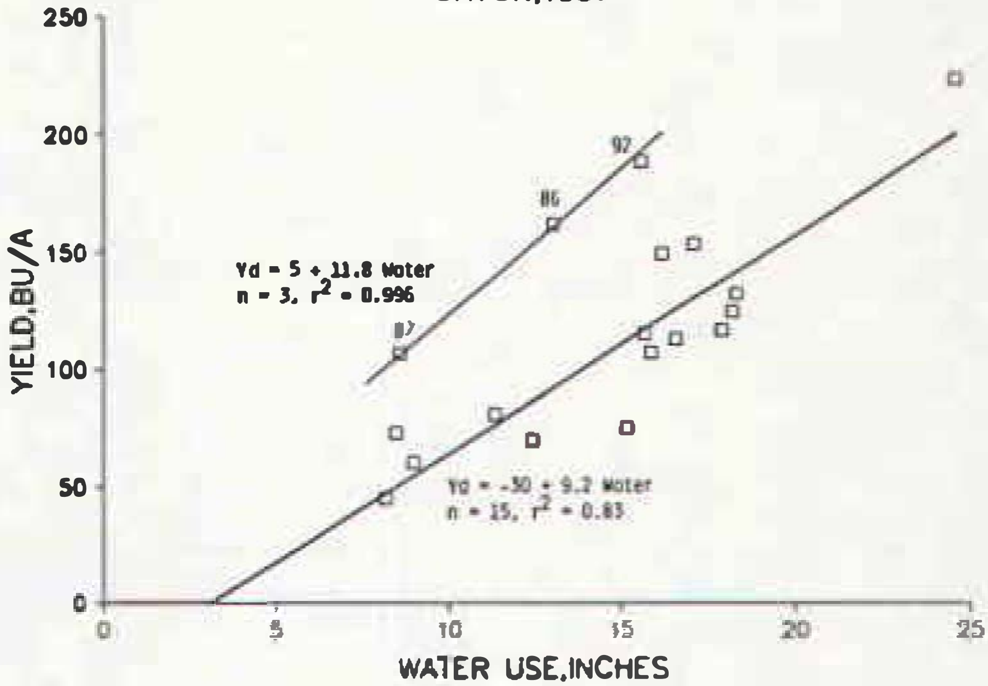
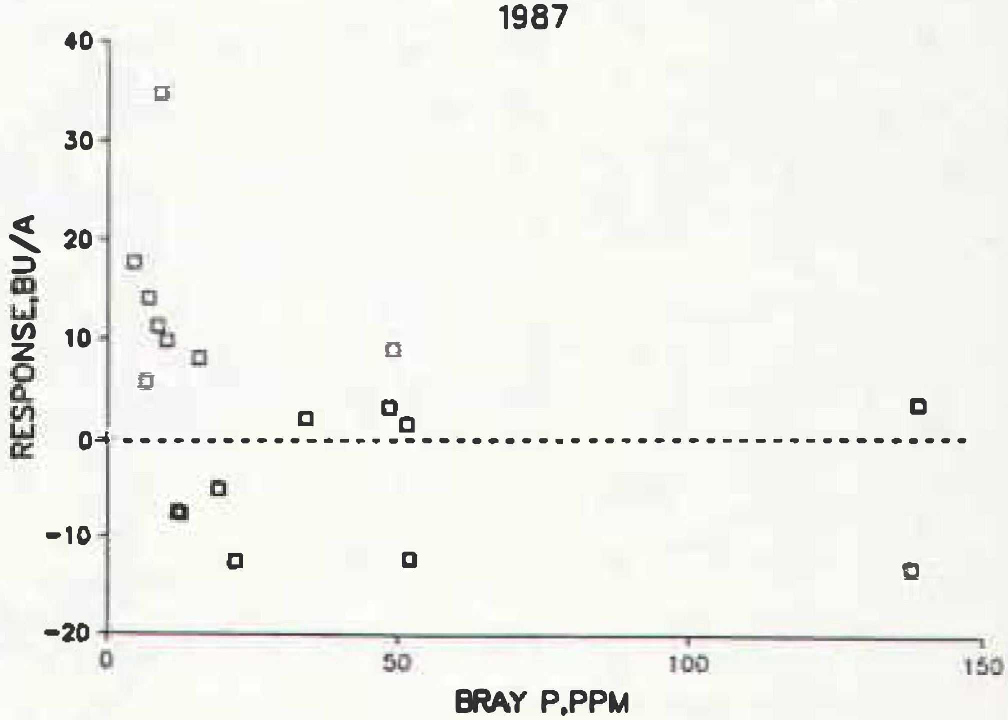


Fig 2. BRAY P VS YIELD RESPONSE
1987



S.E. FARM REPORT

TILLAGE AND LANDSCAPE POSITION EFFECTS ON CORN AND SOYBEAN YIELD

T.E. Schumacher, D. Sorensen, Z. Wicks, and G. Lemme

PLANT SCIENCE 87-13

Tillage systems which leave a high residue cover on the surface generally perform as well as or better than other systems with little or no residue cover. This is especially the case on soils which are well suited to crop production. However, there has been some hesitation about using conservation tillage systems in areas where soil temperatures remain cool and soil moisture levels are relatively high during the early part of the growing season. Due to the rolling topography of Eastern South Dakota, well drained and less well drained soils occur in an intricate pattern across most fields. This study is designed to provide information on the benefits and difficulties associated with selected tillage systems on soils which have different moisture and temperature environments, (well drained vs. less well drained). The study also provides information for the corn breeding program on hybrids being developed to withstand stress environments.

Methods: The two soils in the study are an Egan soil located east of the farm feedlot and a Wentworth soil located in the lower landscape position in the southeast part of the farm. The Egan soil is formed in silty glacial drift and has a silty clay loam surface texture. The Wentworth soil is similar to the Egan soil, however, it is typically found in lower positions in the landscape and have deeper silty horizons. Last year the sites were cropped and managed uniformly prior to establishing the tillage treatments. Tillage systems include ridge till (RT), no till (NT), and a fall moldboard plow - field cultivate (MP) system. A starter phosphorus fertilizer, P205, was applied to half of each tillage plot at a rate of 25 lbs/acre. Early growth, soil moisture , bulk density , and root branching were measured for the treatments. Yield was determined by machine harvesting the center rows of each treatment. There were four replications of each treatment. The cultural practices are outlined in Table 1. Soil test results were used to determine application rates of fertilizer. Test results are given in Table 2 for the two soils.

Table 1. Cultural Practices For 1987.

Practice	Corn	Soybeans
Past Crop	Soybeans	Corn
Variety	Pioneer 3475	Corsoy 79
Planting Date	May 1	May 13
Row Spacing	30 in.	30 in.
Planting Rate	23,000 s/a	200,000 s/a
Final Population	22,000 Plt/A	-------
Herbicide	Lasso+Bladex Band	Dual+Lexone Band
Insecticide	Furadan	
Harvest Date	9-11-87	9-30-87

Table 2. Soil Test Results, Spring 1987.

	NO3-N	P	K	Soil
	--------lb/A-------			
0-6"	13	62	680	Egan
0-24"	21			
0-6"	6	21	650	Wentworth
0-24"	16			

Six corn hybrids were also included in each tillage plot and phosphorus starter subplot for both soils. The six corn hybrids were planted and harvested for yield by hand. Differences in stand were corrected using an analysis of covariance and the yields are reported as adjusted yields.

Results and Discussion: The residue coverage after planting is given in Table 3. The no-till and ridge-till systems had higher surface residue coverage early in the season. However, the soybean residue on the corn plots was rapidly degraded early in the growing season.

Table 3 - Residue Cover For Each Tillage System and Soil.

	Egan		Wentworth	
Tillage	Corn	Soybean	Corn	Soybean
	--------------	%	----------------	
NT	55	68	59	52
RT	39	44	40	36
MP	1	4	2	5

Yield data for the Egan and Wentworth soils are given in Tables 4, 5, and 6. Response to tillage systems differed between the two soils. The advantage of the moldboard - field cultivate system on the Egan soil for corn is not easy to explain in a year that was relatively dry. However, part of the apparent response may be associated with establishment of the no-till and ridge-till treatments in the current year. The highest

yield in the soybean plots was on the ridge-till treatment. Additional data must be collected over more years before conclusions may be reached on tillage system effects. A starter response was observed only on the Wentworth soil. The Wentworth soil environment at this site is likely to have a poorer environment for early season root growth. Starter phosphorus applications are most likely to give a response in soils which are less favorable for early season root growth.

Table 4. Corn Yield on the Egan Soil.

Tillage	Starter	No Starter	Ave.
	Bu/A		
MP	160	158	159a
RT	145	138	142 b
NT	143	150	147 b
AVE	149 a	149 a	

Table 5. Corn Yield on the Wentworth Soil.

Tillage	Starter	No Starter	Ave.
	Bu/A		
MP	127	122	125 a
RT	147	132	140 a
NT	138	127	133 a
AVE	137 a	127 b	

Averages followed by the same letter are not significantly different at the 5% probability level using the F-restricted LSD.

Table 6. Soybean Yield Data.

Tillage	Egan	Wentworth
	Bu/A	
MP	51	45
RT	56	*
NT	54	46

* data unavailable.

Yield data for the experimental hybrids on the two soils are given in Table 7. The data from the six hybrids was not statistically significant across tillage and starter treatments although some trends were observed. Only the yield data for the hybrids in the two soil environments are given in this report. There were significant differences between hybrids. These experimental hybrids are currently

being evaluated by the corn breeding program for their ability to withstand drought stress in dry years, while providing high yields in years with optimal moisture. Some hybrids responded similarly to both soil environments while others tended to yield lower in the Wentworth soil. These results will be compared to data from other location studies and to an irrigation line source study designed to examine yield stability across stress environments. Additional years are needed to properly evaluate the effects of tillage, starter, and soils.

Table 7 - Hybrid Yield Data - adjusted for plant population differences. Means are averaged over tillage and starter treatments.

Hybrid	Soil: Egan	Soil: Wentworth
	Bu/A	Bu/A
1	126	122
2	136	125
3	135	134
4	140	141
5	130	119
6	148	134
LSD.05	9	9

The data given in this report should be viewed with caution since this is from the first year of the study. However, there appears to be significant differences in tillage and starter response. The specific response observed depended on the landscape position in the study. The annual weather patterns for a particular year may cause these relationships to change.

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S.E. FARM REPORT

1987 PERFORMANCE TRIALS ON SMALL GRAINS, GRAIN SORGHUM, SOYBEANS AND CORN AT THE SOUTHEAST EXPERIMENT FARM

J. J. Bonnemann

PLANT SCIENCE 87-14

Introduction

Variety or performance trials with four major types of crops were conducted at the Southeast Farm during the 1987 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 1987, Table 1. Results of the trial are found in EC 775 (rev, 1988 Variety Recommendations, Small Grain and Flax.

The 1987 Grain Sorghum Performance results for the SE Farm are reported in Table 2. Yield results and other data for farm trials on grain sorghum can be found in Plant Science Pamphlet #4, 1987 Grain Sorghum Performance Trials.

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). Tables 3 and 4 consist 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), 1988 Variety Recommendations, Soybeans.

Over 100 hybrids were compared in the corn performance trial located at the SE Farm in 1987. Yields ranged from approximately 90 to 198 bu/acre (Tables 5 & 6). Growing conditions were good in 1987 and dry down was considerably better than prior crop years. Yields of all corn performance trials in 1987 for all locations as well as 2, 3, and 4 year averages can be found in Plant Science Pamphlet #3, 1987 Corn 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. [illegible]

Variety	Yield Bu/A	Test Wt.		Variety	Yield Bu/A	Test Wt.
Bronson	[illegible]	[illegible]		Standard Height		
Burnett	[illegible]	[illegible]		Alex	21.4	[illegible]
Don	[illegible]	[illegible]		Butte	29.5	[illegible]
Hazel	[illegible]	[illegible]		[illegible] 86	30.4	57.1
Hyred	[illegible]	[illegible]		Christ (ck)	26.6	[illegible]
Kelly	[illegible]	[illegible]		Stoa	43.7	[illegible]
Lancer	[illegible]	[illegible]		Shield	38.1	57.7
Lyon	[illegible]	[illegible]		Semidwarfs		
Moore	[illegible]	[illegible]		Angus	30.6	56.9
Nodaway 70	[illegible]	[illegible]		Apex 83	29.1	56.3
Ogle	[illegible]	[illegible]		Celtic	37.6	57.0
Otee	[illegible]	[illegible]		Challenger	30.3	58.2
Porter	[illegible]	[illegible]		Guard	40.1	57.4
Preston	[illegible]	[illegible]		Len	37.3	55.6
Proat	[illegible]	[illegible]		Leo 747	35.2	57.9
Sandy	[illegible]	[illegible]		Marshall	46.7	56.8
Starter	[illegible]	[illegible]		Norak	29.8	55.3
Steele	[illegible]	[illegible]		Nordic	43.5	56.2
Webster	[illegible]	[illegible]		Norseman	42.2	54.5
Wright	[illegible]	[illegible]		Success	36.2	53.2
				Telemark	30.9	54.6
Means	64.5	29.7		Wheaton	35.5	54.5
LSD (.05)	12.7			2369	33.9	57.6
CV - %	14.1			[illegible]	[illegible]	56.7
				Means	36.3	56.5
				LSD (.05)	3.8	
				CV - %	7.5	

Table 2. 1987 Grain Sorghum Performance Trial, Area C, SE Farm.

Variety Name	Yield Lb/A	Test Weight	Plant Height	Moisture Percent	Headed Mo/Da
			VARIETY MEANS		
Dekalb D-757	9254	56.5	55	19.7	7/26
Cargill 40	8650	55.3	52	23.0	7/26
Cargill 1022	8280	59.2	53	17.3	8/6
Cargill 1385	8216	56.9	57	25.6	7/24
Garst 5517	7976	56.6	56	15.5	7/25
Agrow Dorado E	7695	57.1	53	13.3	7/20
Triumph Tax 500G	7591	58.2	51	15.5	7/21
Sigco 1070	7563	57.3	53	13.4	7/18
Seedtec 65DR	7535	57.2	63	14.2	7/23
Seedtec WS203	7480	57.5	53	12.6	7/19
Garst 5613	7458	58.2	59	15.9	7/24
Seedtec 3101	7339	55.7	56	13.5	7/20
Garst 5715	7336	57.3	54	12.9	7/18
Cargill 2295	7206	56.0	68	19.0	7/27
Sigco 1080	7058	58.0	51	13.8	7/20
Interstate 665	7007	55.4	52	13.1	7/19
Seedtec 3103	6996	50.1	49	14.9	7/18
Warner W-523T	6925	56.9	54	14.3	7/18
Warner WX86028	6859	54.7	47	12.3	7/18
Warner WX87151	6846	57.5	48	16.8	7/18
Interstate 764	6831	56.3	47	12.4	7/19
Warner WX86029	6823	55.9	51	13.2	7/17
Cargill 22	6797	58.5	51	14.5	7/18
Warner W-560T	6707	57.9	50	13.9	7/22
Warner W-545T	6580	56.1	41	14.2	7/20
(Overall Mean)	7397	57.1	52	15.2	7/21

LSD (.05) = 705 CV - 5.9%

Table 3. Group I Soybean Performance Trial, Southeast Farm.

		VARIETY MEANS		
Variety Name	Mat Group	Yield Bu/A	Plant Height	Mature Mo/Da
Agripro EX1989	I	60.1	45	9/9
Corsoy 79 CK	II	54.5	51	9/12
Agripro AP 1776	I	52.9	45	9/9
Hy-Vigor K198T (BL)	I	51.9	47	9/12
Weber	I	51.4	46	9/9
Hy-Vigor Derby 9	I	51.4	50	9/9
Prairie Brand PB171	I	51.0	46	9/7
Interstate IS622	I	50.6	44	9/7
Sands SOI EXP 24147	I	50.2	42	9/7
Weber 84 CK	I	50.0	46	9/11
S-Brand S-38A	I	49.9	44	9/7
Seedtec 701	I	49.7	49	9/9
Hofler Sapphire	I	49.7	44	9/10
Sands SOI 136	I	49.5	47	9/8
Riverside 1405	I	49.3	48	9/9
Hodgson 78	I	49.0	44	9/6
Fontanelle 3850	I	48.7	45	9/7
Sands SOI 166	I	48.3	43	9/9
Garst 8101	I	48.0	53	9/9
Mustang M-1150	I	47.8	45	9/7
Hofler Jade	I	47.7	43	9/9
Sibley	I	47.6	45	9/7
Curry 175 (BL)	I	47.1	46	9/9
BSR 101	I	46.8	48	9/10
Mustang M-1180A (BL)	I	46.6	43	9/8
Sexauer SX 1020	I	46.4	50	9/7
Fontanelle 3900	I	45.6	49	9/8
Hardin	I	45.1	50	9/8
Lakota	I	43.4	52	9/9
Evans CK	0	37.4	40	8/30
Means		49.0	46	9/9
LSD (.05) =		5.8	(CV - 8.5%)	

Table [illegible]

Variety Name	Mat. Group	Yield Bu/A	Plant Height	Mature Date
Dekalb CX226	II	62.8	43	9/15
S-Brand S-451	II	61.0	49	9/17
Golden Harvest X277	II	60.0	46	9/18
Latham L-650	II	59.8	44	9/15
Agripro AP2021	II	59.5	47	9/12
Stine 2750	II	58.9	48	9/17
Curry CBS-270 (BL)	II	58.8	47	9/17
Mustang M-1220A	II	58.4	46	9/12
Preston	II	58.0	48	9/16
Northrup King S27-10	II	57.6	45	9/18
Horgemeyer 280	II	57.4	46	9/14
Northrup King S2[illegible]	II	57.4	48	9/13
Sands SOI 260	II	57.0	49	9/17
Pride X726	II	56.4	48	9/14
Garst 8204	II	56.0	52	9/24
Pride B2[illegible]	II	[illegible]	46	9/15
Riverside [illegible]	II	55.4	48	9/16
Hy-Vigor [illegible]	II	55.2	48	9/15
Hoffler GHI II	II	55.2	46	9/18
Pioneer 9271	II	55.2	45	9/16
Sands SOI EXP 268	II	55.1	48	9/19
Horgemeyer 208	II	55.1	45	9/15
Latham L-[illegible] (BL)	II	55.0	48	9/14
Garst 8201	II	55.0	49	9/11
Dekalb CX204	II	54.9	45	9/14
S-Brand S-[illegible]	II	54.7	43	9/12
Sands SOI 206	II	54.6	43	9/13
Pride X720	II	54.[illegible]	42	9/11
[illegible] 260P (PL)	II	54.2	47	9/15
[illegible]	II	54.2	[illegible]	9/13
[illegible]	II	54.0	[illegible]	9/[illegible]
Diamond [illegible] (BL)	II	54.0	[illegible]	9/14
Latham L-[illegible] (BL)	II	[illegible]	[illegible]	9/16
Holler GCB	II	[illegible]	[illegible]	[illegible]
Golden Harvest [illegible]	II	53.5	[illegible]	9/15
[illegible]	II	[illegible]	[illegible]	9/[illegible]
Lincoln [illegible]	II	53.4	[illegible]	9/1[illegible]
[illegible] EXP [illegible]	II	[illegible]	[illegible]	9/1[illegible]
Curry CB-[illegible] (BL)	II	[illegible]	[illegible]	9/14
Mustang M-[illegible]	II	[illegible]	[illegible]	9/15
Diamond [illegible]	II	53.[illegible]	[illegible]	9/15
S-Brand S-4[illegible]	II	[illegible]	[illegible]	9/17
Diamond D[illegible]	II	52.[illegible]	[illegible]	9/[illegible]
SPI EXP 256	II	52.[illegible]	[illegible]	9/17
Hack	II	52.2	[illegible]	9/15
PSR 201	II	52.1	48	9/15
Sexauer SX [illegible]	II	52.0	47	9/14
Agripro AP2190	II	51.9	47	9/13
Mead CK	III	51.5	51	9/23
Wells II	II	51.1	50	9/14
Weber	I	50.9	[illegible]	9/9
Harcor	II	50.8	45	9/14
Sexauer 79-1606	II	49.8	47	9/15
Nebsoy	II	49.7	50	9/16
Sexauer 80-62098	II	49.5	50	9/16
Elgin 87	II	49.4	44	9/17
Beeson 80	II	49.2	50	9/17
Miami	II	49.2	49	9/13
Hoyt (S-D)	II	49.1	39	9/17
Northrup King S29-20	II	48.6	48	9/19
Interstate IS624	II	48.6	50	9/11
Platte	II	48.2	50	9/16
Amcor	II	48.1	54	9/17
Century 84	II	48.0	49	9/18
Weber 84 CK	I	47.9	45	9/11
	Means	53.9	47	9/15

LSD (.05) = 6.9 (CV 9.25%)

Table 5. 1987 Corn Performance Trial, Area E (Early), Southeast Farm.

Brand and Variety	Type and Cross	Yield B/A	Pct Stalk Lodged	Percent Moisture	Performance Socre Rating
Top Farm 1112	M 2X	174.5	1.9	15.1	1
Asgrow/O'Gold RX578	L 2X	172.5	0.0	14.2	2
Agripro AP391	E 2X	171.3	0.6	14.2	4
Asgrow/O'Gold RX626	L 2X	171.2	0.0	14.0	3
Kaltenburg K6300	M 2X	171.0	1.3	13.9	5
Hawkeye SX43	M 2X	170.2	0.6	14.4	6
Top Farm 1106	M 2X	164.9	0.0	13.7	7
Terra TR 1040	M 2X	162.8	0.0	14.2	8
Dekalb T1100	M 2X	162.4	0.6	14.9	11
Mc Curdy 5750	M 2X	162.3	0.6	14.5	9
Top Farm 109	M 2X	161.5	0.0	14.4	10
Pioneer 3615	M 2X	159.8	0.0	13.8	12
Wilson 1500B	M 2X	155.5	0.0	14.7	13
Pioneer 3569	M 2X	154.7	0.6	14.1	14
Terra TR 3203	M 2X	153.4	0.6	16.2	17
Cargill 893	M 2X	152.5	0.0	14.9	15
Kaltenburg K6400	M 2X	151.1	0.0	14.1	16
King K5574	M 2X	150.7	0.0	14.2	18
Cargill 6127	M 2X	150.3	0.0	14.4	19
Agripro 644	E 2X	149.5	0.0	13.8	20
Supercrost 2989	M 2X	148.2	0.0	14.6	23
Fontanelle 4230	M 2X	148.1	0.0	14.1	21
Horizon 4111	M 2X	147.9	0.6	14.2	24
Lynks LX4235	M 2X	147.7	0.0	14.4	25
Betagold Hanna	M 2X	147.6	0.6	13.6	22
Agripro HP470	E 2X	147.1	1.3	14.9	27
NC+ 4505	M 2X	146.7	1.3	14.4	26
NC+ 3884	E 2X	143.5	0.6	13.5	28
Fontanelle 4030	M 2X	143.0	0.0	13.9	29
King K4464	M 2X	141.4	0.0	14.1	30
Horizon 4108	M 2X	140.4	0.0	14.8	31
Horizon 6103	M 2X	138.8	1.3	14.4	33
Agripro 680	E 2X	138.5	1.3	14.5	34
Interstate 543	M 2X	138.3	0.0	14.0	32
Horizon 4112	M 2X	136.1	1.3	14.8	37
Stauffer S3303	E 2X	136.1	0.0	12.9	35
Hoegemeyer SX2570	M 2X	136.0	1.9	13.7	36
Seedtec ST5960	M 2X	134.6	0.0	14.3	38
Hoegemeyer SX2566	E 2X	133.7	0.6	14.0	39
Seedtec KX6800	E 2X	133.4	0.0	14.4	42
Disco 5445	M 2X	133.2	0.6	13.7	40
Crow's 210	M 2X	132.9	1.3	13.7	43
Hoegemeyer SX2576	M 2X	132.7	0.6	13.5	41
Stauffer S4474	E 2X	131.4	0.0	13.6	44
Curry SC1423	M 2X	131.1	0.6	13.2	45
Pride 5547	M 2X	130.9	0.6	14.4	48
Betagold Heidi	M 2X	130.3	0.0	13.0	46
Crow's 199	M 2X	129.8	0.0	13.5	47
Northrup-King PX 9384	M 2X	127.6	0.0	13.9	49
Crow's 344	M 2X	127.8	1.3	14.9	51
Interstate 523	M 2X	125.9	0.6	13.0	50
Dekalb DX524	M 2X	124.2	0.0	13.9	52
Northrup-King PX 9292	M 2X	120.8	1.3	13.6	53
Seedtec KX5400	E 2X	113.1	1.3	13.6	54
SDAES Check 10	E 2X	111.6	0.6	13.0	55
SDAES Check 4	E 2X	108.5	1.3	14.0	56
	Means	143.9	0.5	14.1	
	LSD (.05)	26.7		CV - % 13.2	

Table 6. 1987 Corn Performance Trial, Area E(Late) Southeast Farm

Brand and Variety	Type and Cross	Yield Bu/A	Pct Stalk Lodged	Percent Moisture	Performance Score Rating
Terra TR1120	L 2X	198.1	1.3	16.9	1
Stauffer S7751	L 2X	190.7	1.3	17.5	2
Cargill 7993	L 2X	187.8	1.3	16.5	3
Curry SC1479	L 2X	184.9	0.0	15.2	4
NC+ 5990	L 2X	182.6	1.3	17.3	5
Northrup King PX9540	L 2X	181.0	0.0	17.0	6
Hawkeye SX56	L 2X	178.1	3.2	16.7	9
Dekalb DK636	L 2X	178.0	1.3	17.2	8
Crow's 488	L 2X	177.6	1.3	16.1	7
NC+ 5891	L 2X	177.2	1.3	16.8	10
Custom CFS 7707	L 2X	176.8	4.4	17.0	12
Dahlgren DC-545	L 2X	176.4	0.0	16.7	11
Pioneer 3377	L 2X	174.6	3.8	16.5	13
Wilson 1700	L 2X	173.0	3.8	16.3	14
King K647	L 2X	172.1	1.3	16.9	15
Mc Curdy 7372	L 2X	170.5	1.9	18.2	18
Custom CFS 7501	L 2X	169.6	0.0	17.0	16
Pride EXp 117	L 2X	167.9	1.9	17.8	22
Kaltenberg K7400	L 2X	167.8	0.0	16.3	17
Fontanelle 4280	M 2X	167.0	1.9	16.2	19
Hoegemeyer SX2632	L 2X	166.8	0.6	16.8	20
Wilson 1640	L 2X	166.0	3.1	15.7	21
Pride 7705	L 2X	163.5	1.3	17.3	25
Kaltenberg K7500	L 2X	163.0	2.5	15.3	23
NC+ 4131	M 2X	159.4	0.0	14.3	24
Pride X1137	L 2X	155.7	0.0	17.6	27
Pioneer 3475	M 2X	152.0	0.6	14.3	26
King K5574	M 2X	150.3	0.6	14.4	28
Curry SC1480	L 2X	149.4	3.2	15.1	30
Stauffer S5340	M 2X	148.4	0.0	14.2	29
Lynks DS432	L 2X	148.4	0.6	15.8	31
Pride 6692	L 2X	144.1	1.3	14.9	33
King K596	L 2X	143.8	0.0	15.1	32
Northrup King PX9444	L 2X	142.6	2.5	15.2	36
Supercrost 4304	L 2X	142.3	0.0	14.6	34
Interstate 593A	L 2X	141.9	1.3	14.4	35
Cargill 937	L 2X	141.7	2.5	16.8	38
Interstate 613	L 2X	140.0	1.3	14.3	37
Custom CFS W96010	L 2X	135.9	1.3	15.4	41
Lynks LX4304	L 2X	135.6	0.0	15.4	40
Seedtec ST7640	L 2X	134.6	0.0	14.2	39
Crow's 442	L 2X	131.5	3.2	14.2	42
Cargill 7567	L 2X	131.4	1.3	15.1	43
SDAES Check 1	L 2X	129.1	3.8	17.4	44
SDAES Check 9	L 2X	89.8	3.3	13.4	45
Means		159.1	1.5	15.9	
LSD (.05)		23.3		CV - % 10.5	

S.E. FARM REPORT

OATS RESEARCH

D. L. Reeves

PLANT SCIENCE 87-15

Lon Hall, the oat project technician, in cooperation with the extension weed specialist, conducted a herbicide experiment with five varieties of oats and 16 different treatments. The treatments used five herbicides: 2,4-D amine, MCPA amine, MCPA ester, Bromoxynil, and Banvel. They were either applied alone or as a tank mix at different rates at the 3-4 or 6-7 leaf stage.

The following data indicates where yields were significantly less than the untreated oats.

HERBICIDE	RATE lb ai/A	LEAF STAGE	YIELD (Bu/A)
untreated	--	--	57.8
2,4-D	1.0	3-4	49.0
Bromoxynil + MCPA ester	0.38 0.38	6-7	47.0
Banvel + MCPA amine	0.12 0.25	3-4	48.9

Our results from several tests indicate farmers need to be certain their oats are sprayed at the proper rate and stage.

This station is our primary testing site for the early maturity oats. All of our experimental lines in this maturity are grown here. This year we had over 230 different selections in yield tests here. This station serves an important role in helping us determine how our selections will respond in this type environment.

Two regional tests are grown here. The Uniform Early Oat Performance Nursery is a USDA coordinated test grown in several states while the Tristate involves only South Dakota, North Dakota and Minnesota. This station was selected as one of the ten locations in the three state region for this latter test.

S.E. FARM REPORT

ALFALFA VARIETY YIELD TEST

K. Kephart, E. Twidwell, R. Bortnem

PLANT SCIENCE 87-16

Three alfalfa variety yield experiments were conducted at the SE Station during 1987. The objective of the studies was to determine the yield performance of various alfalfa cultivars and experimental lines when grown in SE South Dakota.

The first of these experiments included 60 cultivars and was planted in early May of 1985. Three harvests were obtained during the 1987 growing season, and this the last year that yield data will be collected from this study. The average total seasonal dry matter yield for this experiment was 6.44 tons per acre with a range of 2.21 tons per acre (Table 2). Although there was one less harvest in 1987. Average dry matter yields over the three year duration of the study ranged from 6.0 to 4.7 tons per acre per year.

The second experiment was established in early May of 1986 and consisted of 42 cultivars. Similar to the first study, three harvests were obtained for the 1987 growing season; however, the average total seasonal dry matter yield was 5.92 tons per acre (Table 3), about one half ton per acre less than the first study. This difference in yield was primarily caused by the inclusion of some extremely winterhardy cultivars in the second experiment which typically express a lower seasonal yield than less winterhardy types. The differences in yield between 1986 and 1987 reflect typical yield increases in the second year of production.

The third experiment consisted of 35 alfalfa cultivars and was planted on 21 April 1987. A single harvest was obtained on 22 October, after a killing frost. The average dry matter yield was 0.76 tons per acre with a range of about 0.5 tons per acre (Table 1). There was no significant difference in yield among cultivars. Additionally, the study was cut once in July; however, yield data were not determined because of extremely weedy conditions. Most of the weed species were annual grasses, and apparently an inconsistency in weed suppression was experienced from the pre-plant herbicide Eptam at a rate of 3 lb ai/A.

Results of these studies are useful in selection of alfalfa cultivars for forage production. Measurements of forage yield taken over several harvest or years of production are usually more useful than are averages from a single harvest. Also, yield data from the seeding year is of limited use because differences associated with winterhardiness will not be expressed.

Examination of the 3-year and 2-year average yields for the first (Table 2) and second studies (Table 3), respectively, reveal that no single cultivar stands out as being superior. Most of the higher yielding cultivars in these two studies are relatively modern and have moderate (not extreme) winterhardiness. Improved disease and pest resistance is one of the major advantages of using modern alfalfa varieties. The major factors to consider when selecting an alfalfa cultivar include multiple disease and pest resistance, moderate winterhardiness, high yield potential, and cost per unit of pure live seed.

For more information, contact: Kevin D. Kephart or Ed Twidwell, Plant Science Department, SDSU, Brookings, SD 57007 (605-688-4751, or 688-4754).

Table 1: 1987 Alfalfa Variety Trial, Southeast Research Station, Beresford, SD 1987

Variety	Forage Yield (tons DM/A) Cut 1 10/22	% Relative Performance
FSRC III-171	1.03	136
DK 135	1.02	134
Fortress	0.97	128
Dynasty	0.95	125
Big 10	0.94	124
Magnum III	0.94	124
SX 217	0.93	122
WL 225	0.88	116
CH 737	0.87	114
FSRC II-172	0.84	110
Saranac	0.80	105
ISRC II-170	0.79	104
Blazer	0.79	104
Cimarron	0.78	103
MO S82	0.77	101
FSRC II-174	0.77	101
Commander	0.77	101
120	0.76	100
Dart	0.72	95
XPH 2001	0.72	95
636	0.71	93
NAPB 31	0.71	93
Vernal	0.69	91
Arrow	0.68	89
SX 424	0.67	88
NAPB 32	0.67	88
Mohawk	0.65	88
Saranac AR	0.65	86
5532	0.64	84
Saltic	0.64	84
Endure	0.62	82
532	0.62	82
Iroquois	0.62	82
526	0.59	78
MTO N82	0.52	68
Average	0.76	
LSD (0.05)	NS	

[illegible]

Fertilized: 5/6/87 at 50 lbs P_2O_5/A.

% Relative Performance based on the average yield.

Table 2: 1985 Alfalfa Variety Trial, Southeast Research Station, Beresford, SD 1987

Variety	[illegible]	1986 4-Cut Total	[illegible] Yield (tons/A)				3-Year Average	% Relative Performance
			Cut 1 6/1	Cut 2 6/23	Cut 3 7/30	3-Cut Total		
Arrow	[illegible]	6.22	3.05	1.51	2.64	7.21	6.00	111
Surpass	3.92	6.57	3.01	1.56	2.78	7.40	5.96	110
Magnum III	[illegible]	6.16	2.71	1.34	2.52	6.56	5.86	108
DS 512	[illegible]	6.16	2.73	1.39	2.67	6.84	5.83	108
Crown	4.16	6.28	2.78	1.38	2.54	6.70	5.71	105
Oneida	4.23	6.03	2.72	1.41	2.34	6.47	5.71	105
5432	4.00	6.20	2.84	1.56	2.46	6.90	5.70	105
Elevation	4.18	6.17	2.84	1.28	2.61	6.73	5.69	105
WL 320	4.28	5.84	2.72	1.53	2.70	6.95	5.69	105
82503	3.95	6.57	2.64	1.28	2.58	6.50	5.67	105
DS 537	4.21	5.78	2.80	1.54	2.70	7.04	5.67	105
Sparta	4.40	5.96	2.76	1.34	2.50	6.60	5.66	105
NY 8412	4.34	5.94	2.68	1.43	2.55	6.65	5.65	104
Fip 10	4.39	5.76	2.74	1.31	2.72	6.77	5.64	104
Futura	4.25	5.98	2.88	1.34	2.43	6.65	5.63	104
Endure	4.20	5.59	3.02	1.46	2.60	7.08	5.62	104
PK 125	4.23	5.51	3.02	1.36	2.63	7.01	5.58	103
Harmor	4.24	5.87	2.80	1.29	2.55	6.63	5.59	103
Vernema	4.15	5.98	2.68	1.48	2.26	6.42	5.58	103
120	4.53	5.92	2.75	1.20	2.32	6.27	5.57	103
MN 6209	4.30	5.98	2.70	1.38	2.22	6.30	5.53	102
Shield	4.36	5.75	2.76	1.29	2.43	6.47	5.53	102
532	3.96	5.99	2.73	1.39	2.46	6.58	5.51	102
MN 6216	3.80	6.46	2.72	1.32	2.17	6.21	5.50	101
526	4.01	6.01	2.69	1.44	2.32	6.45	5.49	101
Iroquois	4.35	6.32	2.48	1.19	1.89	5.56	5.48	101
Magnum Plus	3.40	6.17	2.83	1.46	2.60	6.89	5.48	101
Penk	3.82	6.20	2.80	1.28	2.34	6.42	5.48	101
Mohawk	4.11	5.53	2.89	1.36	2.53	6.78	5.48	101
NY 8413	3.71	5.88	2.79	1.48	2.55	6.82	5.46	101
Saranac AR	3.95	5.76	2.72	1.28	2.57	6.57	5.42	100
H-155	4.54	5.46	2.60	1.19	2.47	6.26	5.42	100
PK 135	4.61	5.32	2.54	1.20	2.50	6.24	5.42	100
Agate	4.17	5.82	2.57	1.37	2.30	6.24	5.41	100
Blazer	3.75	5.07	2.17	1.23	2.36	6.46	5.39	99
Cimarron	4.08	5.69	2.60	1.28	2.46	6.34	5.37	99
Verta +	3.57	5.73	2.66	1.25	2.60	6.51	5.37	99
Oneida VR	3.80	5.85	2.70	1.29	2.44	6.43	5.36	99
Summit	3.86	5.56	2.81	1.32	2.50	6.61	5.34	98
9016 PCn3	4.00	6.18	2.59	1.27	1.97	5.83	5.34	98
XAF31	4.11	5.53	2.69	1.34	2.32	6.35	5.33	98
Maxim	3.70	5.78	2.54	1.43	2.18	6.35	5.31	98
MN 5617	3.72	6.21	2.45	1.41	2.08	5.94	5.29	98
Max 85	3.51	5.88	3.01	1.29	2.18	6.48	5.28	97
WL 316	3.36	5.16	2.68	1.39	2.61	6.68	5.24	97
Kingstar	4.27	5.18	2.56	1.26	2.41	6.23	5.22	96
Armor	3.58	5.55	2.73	1.34	2.48	6.55	5.22	96
Top Gun	3.90	5.43	2.63	1.20	2.49	6.32	5.22	96
Baker	3.64	5.52	2.68	1.20	2.60	6.48	5.20	96
Dawson	3.89	6.15	2.31	1.17	1.99	5.47	5.18	96
Spectrum	4.41	5.14	2.54	1.14	2.26	5.94	5.16	95
Saranac	3.87	5.75	2.48	1.21	2.11	5.80	5.14	95
H-154	4.13	4.76	2.64	1.25	2.54	6.43	5.11	94
Sure	3.86	5.15	2.59	1.21	2.52	6.32	5.10	94
Horizon	3.87	5.13	2.75	1.34	2.22	6.31	5.10	94
H-156	3.82	4.79	2.43	1.28	2.60	6.31	4.98	92
Epic	3.96	4.89	2.42	1.27	2.27	5.96	4.94	91
Vernal	3.42	5.36	2.57	1.26	2.10	5.93	4.90	90
F-146	4.31	4.39	2.29	1.14	2.45	5.88	4.86	90
Magnaton	3.71	5.19	2.15	0.97	2.07	5.19	4.70	87
Average	4.00	5.77	2.69	1.32	2.42	6.44	5.42	
LSD (0.05)	0.69	0.99	0.38	0.21	0.25	0.59	1.11	

Seeded: 5/6/85, 12 lbs PLS/A, 3 lb ai/A Eptam, 1 lb ai/A Ridomil
Fertilized: 6/1/87 at 45 lbs of P_2O_5/A according to SDSU soil testing results
Soil pH: 6.9
% Relative Performance based on the 3-year average.

Table 3: 1986 Alfalfa Variety Trial, Southeast Research Station, Beresford, SD 1987

Variety	1986 2-Cut Total	1987 Forage Yield (Tons DM/A) Cut 1 5/20	Cut 2 6/24	Cut 3 7/30	3-Cut Total	2 Year Avg	% Relative Performance
Sparta	2.75	2.91	1.49	2.26	6.66	4.70	111
Crown	3.28	2.40	1.33	2.37	6.10	4.70	111
Dart	2.77	2.67	1.57	2.34	6.58	4.68	111
Salute	2.81	2.61	1.53	2.31	6.45	4.63	110
DK 135	2.81	2.80	1.50	2.10	6.40	4.60	109
RS 341	2.45	2.91	1.48	2.34	6.73	4.58	108
SX 424	2.92	2.44	1.52	2.18	6.14	4.53	107
DK 120	3.11	2.54	1.37	2.02	5.93	4.52	107
Summit	2.25	2.77	1.59	2.33	6.69	4.47	106
Cimarron	2.40	2.65	1.62	2.20	6.47	4.44	105
G 2841	2.20	2.72	1.52	2.39	6.63	4.42	105
F 144 VWR	2.17	2.39	1.89	2.37	6.65	4.41	104
SX 217	2.55	2.60	1.48	2.17	6.25	4.40	104
AP 45	2.77	2.47	1.25	2.28	6.00	4.38	104
5432	2.92	2.25	1.42	2.14	5.81	4.36	103
Magnum Plus	2.69	2.32	1.35	2.38	6.05	4.36	103
WL 225	2.67	2.62	1.27	2.07	5.96	4.31	102
Drummor	2.74	2.26	1.42	2.20	5.88	4.31	102
Arrow	2.29	2.63	1.41	2.28	6.32	4.31	102
Surpass	2.51	2.50	1.28	2.23	6.01	4.27	101
526	2.63	2.42	1.32	2.16	5.90	4.26	101
NTO N82	1.92	2.08	1.17	1.71	4.96	4.24	100
GH 747	2.47	2.53	1.25	2.25	6.03	4.24	100
RS 7890	2.39	2.39	1.38	2.28	6.05	4.22	100
H 150R	2.41	2.32	1.62	2.08	6.02	4.21	100
LL 3387	2.58	2.32	1.42	2.08	5.82	4.20	100
Edge	2.46	2.22	1.30	2.38	5.90	4.18	99
WL 320	2.28	2.45	1.40	2.20	6.05	4.16	98
532	2.04	2.57	1.36	2.24	6.17	4.11	97
Eagle	2.50	2.26	1.36	2.11	5.73	4.11	97
RS 3309	2.17	2.64	1.29	2.10	6.03	4.10	97
H 168	2.37	2.34	1.46	1.97	5.77	4.06	96
Dynasty	2.22	2.31	1.50	2.09	5.90	4.06	96
Olds "98"	2.18	2.36	1.34	2.22	5.92	4.05	96
NTO S82	2.76	2.12	1.12	1.83	5.07	3.92	93
Heinrich's	2.33	2.18	1.40	1.85	5.43	3.88	92
Epic	2.17	2.21	1.42	1.94	5.57	3.88	92
Rambler	2.96	2.09	0.95	1.64	4.68	3.82	91
Vernal	2.10	2.35	1.26	1.90	5.51	3.81	90
Rangelander	2.52	1.99	1.20	1.69	4.88	3.69	87
Roamer	1.98	2.11	1.00	1.79	4.90	3.44	82
Drylander	1.80	2.04	0.91	1.74	4.69	3.25	77
Average	2.48	2.42	1.37	2.12	5.92	4.22	
LSD (0.05)	0.55	0.46	0.33	0.25	0.77	0.76	

Seeded: 5/5/86 at 12 lbs PLS/A.
Fertilized: 6/1/87 with 35 lbs P_2O_5/A according to SDSU soil testing recommendations.
pH: 6.5
% Relative Performance based on the 2-year average.

HERBICIDE DEMONSTRATIONS AND HERBICIDE RESEARCH

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

S.E. FARM REPORT

PLANT SCIENCE 87-17

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 1987 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
Plot Size: 20' x 50' each tillage
Previous Crop: Corn
Soil: Silty clay loam; 3.8% O.M.; 6.7 pH
Crop: Corn 3732
Planted: 4/29/87
Cultivation: None
Herbicide: PPI: 4/29/87
PRE: 4/29/87
EPOST: 5/14/87
POST: 6/2/87
Evaluated: 6/11/87
Rainfall: 1st week .44 inches
2nd week .00 inches

RESULTS:

Plots were visually evaluated for percent grass and broadleaf weed 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 foxtail pressure was heavy. Tall waterhemp was the predominant broadleaf; redroot pigweed and lambsquarters were also present. Crop stand was uniform.

Results in 1987 were good. Rainfall was below normal for the season. Herbicides requiring minimal rainfall for activation were good. Other herbicides were somewhat erratic. Four treatments exceeded 90% control of all weed species. Mixtures with Ramrod tended to give good to excellent grass control. This would coincide with the low rainfall requirement for activation.

[illegible] Herbicide Demonstration

Treatment	lb/A act.	Percent Weed Control — [illegible] — Raked [illegible]			Planed [illegible]			5-Year Average — Raked [illegible]		Planed [illegible]	
PREPLANT INCORPORATED											
Eradicane	4	83	50	81	72	54	45	74	59	83	67
Eradicane+atrazine	4+1	88	91	94	80	91	94	85	89	87	94
Eradicane+Bladex	4+2	94	82	92	90	86	89	83	83	89	91
Eradicane+atrazine+Bladex	4+.5+1.5	96	92	94	91	95	83	87	91	93	96
Check	-----	0	0	0	0	0	0	0	0	0	0
Sutan+	4	68	55	45	62	42	10	81	59	72	42
Sutan+ +atrazine	4+1	82	90	82	84	91	86	86	91	91	94
Sutan+ +Bladex	4+2	84	89	72	80	78	80	81	87	89	86
Sutan+ +atrazine+Bladex	4+.5+1.5	82	86	81	90	92	89	86	90	94	95
SHALLOW PREPLANT INCORPORATED											
Atrazine	2.5	82	88	88	87	94	83	81	90	89	95
Lasso	3	62	56	15	70	62	25	57	54	76	67
Dual	2.5	68	40	18	76	53	30	67	41	83	57
Check	-----	0	0	0	0	0	0	0	0	0	0
PREEMERGENCE											
Atrazine	2.5	85	89	87	89	94	90	84	90	89	94
Bladex	3	77	38	10	94	48	38	62	54	82	63
Dual	2.5	76	46	20	85	74	52	77	44	90	75
Lasso	3	69	45	10	88	74	60	68	50	90	78
Prowl	1.5	44	50	28	85	67	35	--	--	--	--
Ramrod	6	80	30	05	96	69	0	64	21	90	42
+Harness	2.5	84	70	10	96	91	10	74	67	94	89
Lasso+atrazine	2+1	61	85	28	90	92	40	72	79	93	94
Lasso+Bladex	2+2	81	68	25	92	87	38	74	64	92	89
Dual+atrazine	2+1	64	69	38	87	85	71	77	79	92	92
Dual+Bladex	2+2	72	58	25	87	70	60	80	75	92	86
Atrazine+Bladex	.75+2.25	72	45	10	84	72	45	--	--	--	--
Ramrod+atrazine	4+1	70	83	35	92	82	75	71	85	92	90
Ramrod+Bladex	4+2	75	52	10	92	68	43	72	58	91	70
Lasso+Bladex+atrazine	2+1.5+.5	69	68	10	88	93	20	76	70	90	90
Dual+Bladex+atrazine	2+1.5+.5	66	72	16	89	92	30	78	75	91	90
Lasso+Bladex+atrazine+ Sencor/Lexone	2+1+.5+.25	72	82	25	91	92	55	75	81	93	96
EARLY PREEMERGENCE											
Prowl+atrazine	1.5+1	77	90	77	88	95	82	76	87	90	93
Prowl+Bladex	1.5+1.5	78	72	64	94	76	65	77	68	92	78
Prowl+Bladex+atrazine	1.5+1.5+.5	84	84	[illegible]	92	92	79	--	--	--	--
Atrazine+crop oil	1.5+1 qt.	58	91	90	82	95	85	56	88	83	94
Bladex+X-77	2+.5%	76	62	52	86	72	60	78	48	91	59
Tandem+Bladex+X-77	.5+1.5+.5%	68	48	40	84	68	40	81	51	92	57
Tandem+Bladex+ atrazine+X-77	.5+1+.5+.5%	83	50	40	89	64	58	83	65	92	77
Bladex+atrazine+X-77	1.5+.5+.5%	81	75	78	86	69	65	--	--	--	--
+Bladex+atrazine+Banvel	1.5+.5+.25	84	82	92	91	89	92	--	--	--	--
PREEMERGENCE & EARLY POSTEMERGENCE											
[illegible]	[illegible]	86	57	78	90	78	80	--	--	--	--
Ramrod&Banvel+Bladex	4&.25+1.5	91	91	96	96	95	94	--	--	--	--
Ramrod&Banvel[1]	4&.5	69	84	90	91	94	92	60	88	89	94
PREEMERGENCE & POSTEMERGENCE											
Ramrod&Banvel	4&.25	62	82	48	86	92	78	58	83	83	81
Ramrod&2,4-D amine	4&.5	62	82	49	89	84	79	58	78	81	81
Ramrod&Basagran+crop oil	4&1+1 qt.	55	82	85	86	91	86	52	75	81	79
Ramrod&Buctril	4&.38	58	84	64	82	80	80	51	66	76	73
Ramrod&Buctril+Banvel	4&.25+.25	68	90	76	92	96	82	--	--	--	--
Ramrod&Buctril+atrazine	4&.25+.5	71	91	86	93	96	92	[illegible]	[illegible]	[illegible]	[illegible]
Ramrod&Banvel+atrazine	4&.25+.5	74	94	62	90	94	74	--	--	--	--
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--
LSD (.05)								17.9	14.2	[illegible]	15.1

* Average 2 rati[illegible]
+ Experimental

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 information is used in educational programs.

METHODS:

Plot Design: Demonstration
Plot Size: 20' x 50' for each tillage
Previous Crop: Corn
Soil: Silty clay loam; 3.8% O.M.; 6.7 pH
Crop: Corsoy 79
Planted: 5/11/87
Cultivation: None
Herbicide:
  PPI: 5/11/87
  PRE: 5/11/87
  POST: 6/11/87; grass 2 leaf; broadleaf 1-2 inches
Evaluated: 7/06/87
Rainfall: 1st week: .01 inches
  2nd week: .44 inches

RESULTS:

Plots were visually evaluated for percent grass and broadleaf weed control. Data for fall plowed and chisel seedbed for 1987 are presented in the Table 2. The 3-year average (1985-87) 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 foxtail pressure was heavy. Tall waterhemp, redroot pigweed and lambsquarters were the predominant broadleaf species. 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 1987 was good. Rainfall was variable and below normal for the season. Ten treatments provided over 90% control of both grass and broadleaf weeds in the plowed seedbed. Nine treatments also in the chiseled seedbed provided that same degree of control. Data for new herbicides such as Cinch, Classic, Command, Pursuit, Scepter and Whip gives an indication of expected performance.

Table 2. 1987 Soybean Herbicide Demonstration

Treatment	lb/A act.	Percent Weed Control 1987 Disked Gr	Bdlf	Tawh	1987 Plowed Gr	Bdlf	Tawh	3-Year Avg. Disked Gr	Bdlf	Plowed Gr	Bdlf
PREPLANT INCORPORATED											
Check		00	00	00	00	00	00	00	00	00	00
Vernam	2.5	58	60	25	78	52	10	—	—	—	—
Treflan	.75	76	74	75	82	80	68	75	74	84	84
Sonalan	1	83	80	68	84	84	55	77	74	87	85
Prowl	1.25	79	76	73	78	79	40	83	75	83	80
Treflan+Amiben	.75+2	94	96	95	88	93	86	88	88	92	94
Treflan+Sencor/Lexone	.75+.38	92	96	97	90	88	70	84	88	93	92
Vernam+Treflan	2.5+.75	86	86	80	88	86	35	—	—	—	—
Treflan+Amiben+ Sencor/Lexone	.75+2+.25	90	94	75	90	90	67	79	85	89	91
Command	1	80	20	5	81	22	5	—	—	—	—
Treflan/Command (Commence)	1.31	76	69	55	76	72	60	—	—	—	—
Treflan+Command	.75+.75	80	71	58	81	64	56	—	—	—	—
Amiben+Command	1.8+.5	75	72	53	85	72	50	—	—	—	—
Sonalan+Command	1+.56	85	85	60	93	66	40	—	—	—	—
Command+Sencor/Lexone	.75+.25	90	62	52	90	46	33	—	—	—	—
+Treflan+Pursuit	.75+.06 (4 oz)	98	99	88	94	97	95	—	—	—	—
+Treflan+Scepter	.75+.125 (.6 pt)	94	98	94	91	94	98	—	—	—	—
+Commence+Sencor/Lexone	1.31+.3	86	84	75	92	73	62	—	—	—	—
+Prowl+Scepter	1.25+.125 (.6 pt)	90	98	88	94	96	94	—	—	—	—
+Prowl+Pursuit	1+.078 (5 oz)	93	99	98	97	99	99	—	—	—	—
SHALLOW PREPLANT INCORPORATED											
Lasso	3	73	75	45	80	66	50	60	60	81	71
Dual	2.5	84	59	40	86	56	40	72	42	86	61
Lasso+Modown	2+1.5	76	88	35	70	69	37	56	64	77	70
Dual+Command	2+.75	80	61	30	77	48	20	—	—	—	—
Dual+Treflan	2+.75	86	75	50	79	56	45	—	—	—	—
+Lasso+Pursuit	2+.078 (5 oz)	86	94	68	85	86	67	—	—	—	—
+Lasso+Scepter	2+.125 (.6 pt)	83	96	88	81	85	70	—	—	—	—
PREPLANT INCORPORATED & PREEMERGENCE											
Treflan+Sencor/Lexone& Sencor/Lexone	.75+.25&.38	94	98	98	96	98	98	85	88	96	97
Treflan&Sencor/Lexone	.75&.5	97	98	95	93	96	94	83	90	96	97
+Commence&Lorox	1.31&1	86	90	80	86	80	60	—	—	—	—
PREEMERGENCE											
Amiben	3	82	94	93	93	96	96	57	80	78	87
Lasso	3	84	92	90	82	80	84	73	76	90	87
Dual	2.5	82	84	78	78	73	79	82	77	87	82
Lasso+Sencor/Lexone	2+.5	80	96	92	72	90	90	75	89	84	93
Dual+Sencor/Lexone	2+.5	76	88	86	56	90	83	80	86	80	94
Lasso+Amiben	2+2	92	96	95	90	96	95	78	85	89	95
Lasso+Lorox	2+1	76	82	83	60	62	74	69	81	77	80
Lasso+CIPC	2+2	74	77	60	66	74	62	65	74	79	79
Lasso+Amiben+Sencor/Lexone	3+2+.25	93	97	94	94	98	93	78	89	92	95
+Cinch+Sencor/Lexone	1.3+.43	88	92	85	81	88	80	—	—	—	—
+Cinch+Lorox	1.3+1	81	78	48	78	38	55	—	—	—	—
+Cinch+Scepter	1.3+.125 (.6 pt)	94	98	97	86	97	96	—	—	—	—
+Sencor/Lexone+Pursuit	.25+.06 (4 oz)	88	99	98	59	99	98	—	—	—	—
PREEMERGENCE & POSTEMERGENCE											
Lasso&Basagran+crop oil	2&1+1 qt.	78	94	88	74	94	90	64	91	80	94
Lasso&Blazer/Tackle+X-77	2&.5+.5%	86	96	93	91	95	96	79	94	88	95
Lasso&Cobra+X-77	2&.2+.25%	89	95	94	88	75	96	—	—	—	—
Lasso&Blazer/Tackle+ Basagran+X-77	2&.38+.25+.5%	86	96	94	80	97	95	73	92	86	95
Lasso&Classic+X-77	2&.012+.25%	80	90	95	74	80	95	—	—	—	—
POSTEMERGENCE											
Fusilade+crop oil	.187+1 qt.	80	00	00	85	00	00	—	—	—	—
Poast+crop oil	.2+1 qt.	96	00	00	99	00	00	82	00	85	00
+Whip+crop oil	.15+1 qt.	89	00	00	97	00	00	—	—	—	—
Poast+Blazer/Tackle+ Basagran+crop oil	[illegible] +1 qt.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	91	87	[illegible]	[illegible]	[illegible]
LSD (.05)								16.2	11.2	16.3	8.5

+ Experimental [illegible]   * Average [illegible] rating/plot

NO-TILL CORN HERBICIDE DEMONSTRATION

L. J. Wrage, P. O. Johnson

PURPOSE:

To evaluate performance of herbicide treatments that represents systems available to producers using no-till corn systems. Treatments represent preplant residual, preemergence 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
Soil: Silty clay loam; 4.5% O.M.; 6.7 pH
Crop: Pioneer 3732
Planted: 4/29/87
Herbicide: EPP: 4/7/87
PRE: 4/29/87
POST: 6/2/87
Evaluated: 7/28/87, 9/9/87
Rainfall:

	1st week	2nd week
EPP:	.38 inches	.12 inches
PRE:	.44 inches	.00 inches

RESULTS:

Plots were visually evaluated for percent grass and broadleaf weed control. Grasses include moderate infestations of green foxtail. The predominant broadleaf weed was velvetleaf. Crop emergence was excellent. Data are presented in the following table.

Grass control was best with treatments that included grass and broadleaf herbicides applied at least in part as early preplant. Conditions were very good for early treatments. 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.

Velvetleaf control varied considerably. Atrazine rates in excess of 1.5 lb/A active provided the highest control; full rates exceeded 95% control. Cultivation at layby would have provided a suitable program using several of the treatments included in this test.

NO-TILL SOYBEANS IN CORN STALKS DEMONSTRATION

L. J. Wrage and P. O. Johnson

PURPOSE:

Plots have been established for four years. Treatments include examples of early preplant and preemergence herbicides used in different combinations.

METHODS:

Plot Design: Demonstration
Plot Size: 20' x 90'
Previous Crop: Corn
Soil: Silty clay loam; 3.8 O.M.; 6.7 pH
Crop: Corsoy 79
Planted: 5/11/87
Cultivation: None
Herbicide:
- EPP: 4/7/87
- PRE: 5/12/87

Evaluated: 9/15/87
Rainfall: 1st week .01 inches
2nd week .44 inches

RESULTS:

Early preplant herbicides were applied timely. All treatments provided good to excellent initial control. Final evaluation was delayed until leaf drop. Crop canopy was extremely competitive. Grass pressure was light with most treatments providing good control. Tall waterhemp was the predominant small-seeded broadleaf; velvetleaf was the most agressive broadleaf with 8 treatments providing at least 80% control at harvest. Cultivation or follow-up postemergence treatments would have improved control.

Table 3. No-Till Corn Demonstration

Fall	EARLY PREPLANT	PREEMERGENCE	POSTEMERGENCE	% Control Gr	% Control Vele
Atrazine (3)				83	98
	Atrazine (3)			73	97
	Atrazine (2)+Dual (2.5)			92	40
	Atrazine (2)	Dual (2.5)		[illegible]	[illegible]
	Atrazine (1.33)+Dual (2)	Atrazine (.66)+Dual (1)		[illegible]	[illegible]
		Gramoxone Super (.5)+X-77 (.38)+ atrazine (1.5)+Dual (2)		80	[illegible]
	Atrazine (.5)+Bladex (2)+ Dual (2)	Atrazine (.5)+Bladex (1)+ Dual (1)		86	15
	Bladex (2)+Dual (2)	Bladex (1)+Dual (1)		[illegible]	[illegible]
	Bladex (2)	2,4-D est (1)	Bladex (1.5)+Banvel (.5)	75	98
	Atrazine (.5)+Bladex (2)		Atrazine (.5)+Bladex (1.5)+X-77 (.1)	72	96
	Dual (2.5)	2,4-D est (1)+Dual (1)	Banvel (.5)	74	94
		Gramoxone Super (.5)+X-77 (.38)+ atrazine (.5)+ Bladex (2.5)+Dual (2.5)		83	27
		Gramoxone Super (.5)+X-77 (.38)+ atrazine (.5)+ Bladex (2.5)+Lasso (2.5)		88	45
		2,4-D est (1)+crop oil (1 qt)+ atrazine (.5)+ Bladex (2.5)+Lasso (2.5)		64	82
		Roundup (.75)+atrazine (.5)+ Bladex (2.5)+Lasso (2.25)		63	40
		Gramoxone Super (.5) +X-77 (.38)+Dual (2.5)	atrazine (1.5)+crop oil (1 qt)	93	57

Notes: [illegible]

Table 4. 1987 NO-TILL SOYBEANS IN CORN STALKS DEMONSTRATION

FALL	EARLY PREPLANT	PREEMERGENCE	% Control Gr	% Control Velf	% Control Vele
Scepter (.125)	Dual (2)	Dual (1)	97	93	89
	Scepter (.125)+Dual (2)	Dual (1)	92	89	80
	Pursuit (.09)+Dual (2)	Dual (1)	97	95	[illegible]
	Preview (.42)+Dual (2)	Dual (1)	93	95	[illegible]
	Scepter (.125)+Prowl (1.5)		97	92	88
	Dual (3)+Sencor/Lexone (.38)	Sencor/Lexone (.33)	95	80	74
	Prowl (1.5)+Sencor/Lexone (.38)	Sencor/Lexone (.33)	97	77	[illegible]
	Surflan (1.5)+Sencor/Lexone (.38)	Sencor/Lexone (.33)	97	75	60
	Lasso MT (2)+Sencor/Lexone (.38)	Lasso MT (1)+Sencor/Lexone (.33)	87	60	50
	Lasso MT (2)+Sencor/Lexone (.38)	Lasso (1)+Sencor/Lexone (.33)	87	55	55
	Dual (2)+Sencor/Lexone (.38)	Dual (1)+Sencor/Lexone (.33)	94	65	55
	Harness (1.5)+Sencor/Lexone (.38)	Harness (1)+Sencor/Lexone (.33)	75	78	67
	Dual (2)+Sencor/Lexone (.38)+ Command (.25)	Dual (1)+Sencor/Lexone (.33)+ Command (.25)	93	90	90
	Dual (2)	Dual (1)+Amiben (2)+ Sencor/Lexone (.25)	94	84	73
		Gramoxone Super(.5)+X-77 (.38)+ Dual (2.5)+Sencor/Lexone (.5)	93	88	87
		Roundup (.75)+Lasso MT (3)+ Sencor/Lexone (.5)	93	92	85

Rates: [illegible]

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. 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
Soil: Silty clay loam; 3.8% O.M.; 5.9 pH
Crop: Dawson
Planted: 6/2/87
Cultivation: None
Herbicide:
  PPI: 6/2/87
  PRE: 6/2/87
  POST: 7/15/87
Evaluated: 8/4/87
Rainfall: 1st week Trace
  2nd week .35 inches

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 emerged very slowly; postemergence herbicide were delayed to allow for additional emergence. Final density was less than in previous years. Plots were evaluated visually for percent weed control. Plots were harvested with a plot combine and yields determined. Data are presented for 1987 and for a 3-year (1985-87) average.

Nightshade control exceeded 90% for several treatments in 1987. Control in 1987 was greater than for the same treatments in 1986. Combination treatments generally were superior to herbicides used alone in 1987. not evident

The data during the 3-year period indicate weed control and crop tolerance were factors in plot yield. 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. These treatments do not consistently reduce yield. This is considered a response to the conditions and rates used. Yield differences due to direct herbicide effects were not as apparent in 1987.

Table 5. 1987 Black Nightshade in Soybean Demonstration

Treatment	lb/A act.	1987 % Control Blns	1987 Yield bu/a	3-Year Avg. Blns	3-Year Avg. Yield bu/A
PREPLANT INCORPORATED					
Check	----	00	18	00	25
Treflan	.75	22	37	13	36
Sonalan	1.25	39	34	42	32
Lasso	3.5	89	39	87	42
Dual	3	88	40	76	42
Sonalan+Lasso	1.25+2.5	91	36	81	35
Sonalan+Dual	1.25+2	92	35	81	31
Prowl+Pursuit	1+.063	91	38	--	--
Prowl+Scepter	1.25+.12	92	40	--	--
Command+Sonalan	.75+1.25	51	37	--	--
SHALLOW PREPLANT INCORPORATED					
Treflan+Lasso	.5+2	83	39	--	--
PREPLANT INCORPORATED & PREEMERGENCE					
Sonalan&Amiben	1.25&2	90	33	79	35
Sonalan&Lasso	1.25&2.5	92	32	86	34
Sonalan&Dual	1.25&2	92	35	86	35
PREEMERGENCE					
Amiben+Dual	2+2	90	31	85	40
Lasso+Amiben	2.5+2	88	34	84	40
Dual	2	90	30	75	42
Amiben	3	81	32	--	--
Lasso	3	90	35	87	40
Check	-----	00	22	00	26
PREPLANT INCORPORATED & POSTEMERGENCE					
Treflan&Cobra+X-77	.75&.2+.1	18	35	--	--
Treflan&Blazer+X-77	.75&.5+.375	84	33	67	38
Treflan&Basagran+ crop oil	.75&1+1 qt.	68	39	42	39
Treflan&Blazer+ Basagran+X-77	.75&.125+.25+ .375	84	37	--	--
Treflan&Blazer+ Basagran+X-77	.75&.25+.5+ .375	90	38	68	40
Treflan&Blazer+ Basagran+28% N	.75&.25+.5+ 1 gal.	91	34	--	--

COCKLEBUR CONTROL IN SOYBEANS

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

PURPOSE:

To evaluate performance of herbicides for the control of cocklebur in soybeans. These plants provide side-by-side comparisons of these treatments. The plots were included in field tours and the information is used in educational programs. Evaluations of performance during 1987 is given. This provides information on control comparisons based on this year's conditions.

METHODS:

Plot Design: Randomized Complete Block
Plot Size: 10' x 50'
Previous Crop: Fallow
Soil: Silty clay loam; 3.8% O.M.; 6.7 pH
Crop: Soybeans - Corsoy 79
Planted: 6/2/87
Cultivation: None
Herbicide:
PPI: 6/2/87
PRE: 6/2/87
EPOST: 7/7/87
POST: 7/15/87
Evaluated: 7/9/87
Rainfall: 1st week Trace
2nd week .35 inches

RESULTS:

Plots were visually evaluated for percent cocklebur control. Plot yields were harvested with a plot combine. Spring tillage was provided with a field cultivator. All treatments were broadcasted. Cocklebur pressure was heavy. Crop stand was uniform.

Results in 1987 were good. Rainfall was below normal and variable. Several treatments show excellent control. Postemergence treatments provided the best control under these conditions. Some significant yield differences were noted due to cocklebur control.

Table 6. 1987 Cocklebur in Soybeans

Treatment	lb/A act.	Control Cocklebur	Yield bu/A
PREPLANT INCORPORATED			
Prowl+Pursuit	1+.078	25	38
Prowl+Pursuit	1+.06	18	35
Prowl+Scepter	1.25+.12	60	36
Sencor/Lexone+Command	.25+.75	38	39
PREPLANT INCORPORATED & PREEMERGENCE			
Treflan+Sencor/Lexone&Sencor/Lexone	.75+.25&.38	80	38
Treflan&Amiben	.75&3	20	26
Treflan&Lorox	.75&1.5	22	35
PREPLANT INCORPORATED & EARLY POSTEMERGENCE			
Treflan&Classic+X-77	.75&.0117+.187	98	40
Treflan&Cobra+X-77	.75&.2+.1	98	36
PREEMERGENCE & EARLY POSTEMERGENCE			
Lexone&Classic+X-77	.5&.0117+.187	98	41
PREPLANT INCORPORATED & EARLY POSTEMERGENCE & POSTEMERGENCE			
Treflan&Classic+X-77&Classic+X-77	.75&.0078+.187& .0078+.187	99	38
Treflan&Basagran+DAX&Basagran+DAX	.75&.38+1&.38+1	98	40
PREPLANT INCORPORATED & 14 INCHES			
Treflan&Rescue+Blazer/Tackle+X-77	.75&1+.125+.38	98	41
Treflan&Rescue+Blazer/Tackle+X-77	.75&1+.25+.38	96	42
Treflan&Rescue+Blazer/Tackle+X-77	.75&1.5+.125+.38	96	42
Treflan&Blazer/Tackle+X-77	.75&.38+.38	86	42
Treflan&Basagran+X-77	.75&.75+.38	92	41
PREPLANT INCORPORATED			
Treflan (Check)	.75	00	31
PREPLANT INCORPORATED & EARLY POSTEMERGENCE			
Treflan&Basagran+DAX	.75&.75+1	98	37
Treflan&Basagran+28% N	.75&.75+4	98	37
PREPLANT INCORPORATED & PREEMERGENCE			
Treflan&Sencor/Lexone	.75&.5	20	30
PREPLANT INCORPORATED & EARLY POSTEMERGENCE			
Prowl&Pursuit+crop oil	1&.063+1 qt.	98	40
Command&Classic+X-77	.75&.0117+.187	99	35
LSD (.05)		7.9	8.4

VELVETLEAF CONTROL IN CORN

Leon J. Wrage and P. O. Johnson

PURPOSE:

Plots were established in a designated velvetleaf area to evaluate comparative performance of herbicide options available. Treatments were selected to identify the most efficient approach to velvetleaf control.

METHODS:

Plot Design: Ramdomized Complete Block; 2 reps
Plot Size: 10' x 50'
Previous Crop: Corn
Soil: Silty clay loam; 3.8% O.M.; 5.9 pH
Variety: Pioneer 3732
Planted: 5/14/87
Cultivation: None
Herbicides:
PPI: 5/14/87
PRE: 5/14/87
EPOS: 6/2/87
POST: 6/11/87

RESULTS:

Plots were established in an area with a light natural velvetleaf infestation. The area was overseeded before initial spring tillage. Grass pressure was very light; other broadleaf species were not a factor. Velvetleaf stand was uniform and moderately heavy. Emergence was somewhat more uniform than may be experienced in field situations with a weed history. Plots were evaluated visually for percent control.

Several treatments provided over 90% control. Full rates of atrazine or lower atrazine rates in postemergence treatments were effective. Effective control is achieved with planting-time herbicides used in combination with postemergence herbicides. A residual component was necessary for most postemergence treatments if there was no at-planting program.

Table [illegible]. [illegible] Velvetleaf Control in Corn

Treatment	lb/A ai.	Percent [illegible] Control Velvetleaf*
PREPLANT INCORPORATED		
Check	-----	00
Eradicane	4	79
Eradicane	6	90
Sutan+	6	78
Eradicane+atrazine	4+1.5	90
Eradicane+Bladex	4+2	90
Eradicane+Bladex+atrazine	4+1.5+1	90
Atrazine	3	98
PREPLANT INCORPORATED & POSTEMERGENCE		
Eradicane&atrazine+crop oil	4&1.5+1 qt.	72
Eradicane&2,4-D amine	4&.5	81
PREEMERGENCE		
Atrazine	3	80
Princep	1.0	78
Bladex+atrazine	3+1	88
Lasso+Bladex	2+2	73
Dual+atrazine	2+1.5	72
Dual+atrazine	2+2	72
Dual+atrazine+Bladex	2+1+1.5	78
Dual+atrazine+Sencor/Lexone	2+1+.25	90
Atrazine+Banvel	2+.38	98
Sandoz		96
EARLY POSTEMERGENCE		
Sandoz		99
Prozine	2.8	98
Prowl+Bladex	1.5+1.5	90
Atrazine+crop oil	1+1 qt.	78
Atrazine+crop oil	2+1 qt.	92
Bladex+X-77	2+.25%	86
Bladex+atrazine+X-77	1.5+.5+.25%	97
PREEMERGENCE & POSTEMERGENCE		
Ramrod&Banvel	5&.5	99
Ramrod&bromoxynil+atrazine	5&.38+.5	99
Ramrod&bromoxynil&atrazine	5&.38&1.5	99
Ramrod&Banvel+atrazine	5&.13+.5	99
Ramrod&Banvel+atrazine	5&.25+1.5	99
Ramrod&Basagran+atrazine+ crop oil	5&1.5+.75+1 qt.	99
PREEMERGENCE & LATE POSTEMERGENCE		
Ramrod&Banvel	5&.25	73
Ramrod&2,4-D amine	5&.5	75
Ramrod&2,4-D ester	5&.25	72
Ramrod&bromoxynil	5&.38	62
Ramrod&2,4-D amine+Banvel	5&.125+.25	68
PREEMERGENCE & POSTEMERGENCE & LATE POSTEMERGENCE		
Ramrod&bromoxynil+atrazine& bromoxynil	5&.38+1.2&.25	99
Check	-----	0
LSD (.05)		12.5

VELVETLEAF CONTROL IN SOYBEANS

L. J. Wrage and P. O. Johnson

PURPOSE:

Plots were established in an area designated for velvetleaf studies. Treatments having potential for control were included.

METHODS:

Plot Design: Randomized Complete Block
Plot Size: 10' x 50'
Previous Crop: Corn
Soil: Silty clay loam; 3.8% O.M.; 6.7 pH
Planted: 5/14/87
Cultivation: None
Herbicide:
    PPI: 5/14/87
    PRE: 5/14/87
    POST: 6/11/87
    LPOS: 6/30/87
Evaluated: 7/15/87
Rainfall: 1st week .25 inches
    2nd week 2.14 inches

RESULTS:

The plot area had a light natural velvetleaf infestation; the area was overseeded with additional weed seed prior to spring tillage. The resulting weed stand was uniform and moderately heavy. Grass pressure was not significant. Emergence was somewhat more uniform than may be experienced in fields with a severe history of velvetleef. Plots were visually evaluated for percent control. Yields were determined from samples harvested with a plot combine.

Differential control was easily noted. Several treatments provided very high levels of control. The use of fertilizer additives enhanced velvetleaf control in postemergence treatments. Crop yields were 15 to 20 bushels higher for treatments with the highest control.

Average control may be 5 to 10% less in heavy soils or in fields with a long term history. The top performing treatments and higher rates should be considered for these situations.

Table 8. [illegible]

Treatment	lb/A a.i.	Percent Weed Control: Vote 7/1/87	Percent Weed Control: Vote 8/4/87	Yield bu/A
PREPLANT INCORPORATED				
Check	----	00	00	24
Prowl	1.25	8	10	31
Vernam	2.5	52	30	31
Treflan+Sencor/Lexone	.75+.38	94	97	52
Command	.75	96	97	54
Command	1	98	97	49
Commence	1.31	90	94	49
Treflan+Command	.75+.75	96	97	43
Prowl+Command	1.25+.55	91	81	45
Sencor/Lexone+Command	.25+.55	98	97	50
Sencor/Lexone+Command	.38+.38	95	97	44
Amiben+Command	2+.55	96	97	46
Commence+Sencor/Lexone	1.31+.3	95	97	52
Prowl+Scepter	1.25+.125	86	88	53
Squadron	3	90	95	50
Treflan+Scepter	.75+.125	94	96	45
Treflan+Pursuit	.75+.09	97	97	51
Prowl+Pursuit	1+.078	98	96	36
Sencor/Lexone+Pursuit	.25+.078	94	91	53
SHALLOW PREPLANT INCORPORATED				
Salute	[illegible]	86	83	39
Salute+Command	[illegible]	96	94	46
Dual+Scepter	[illegible]	86	80	54
Dual+Command	[illegible]	92	92	55
Dual+Command	[illegible]	94	94	50
Lasso+Command	[illegible]	98	96	49
Lasso+Command	[illegible]	94	96	48
Dual+Sencor/Lexone+Command	[illegible]	98	97	[illegible]
PREPLANT INCORPORATED & PREEMERGENCE				
Treflan+Sencor/Lexone & Sencor/Lexone	.75+.25&.45	9[illegible]	[illegible]	[illegible]
Prowl+Sencor/Lexone & Sencor/Lexone	1+.25&.38	98	[illegible]	42
[illegible] Sencor/Lexone	[illegible]	90	[illegible]	44
[illegible] & Sencor/Lexone	[illegible]	98	[illegible]	44
PREEMERGENCE				
[illegible]	[illegible]	93	[illegible]	45
Dual+Sencor/Lexone	2+.	94	[illegible]	42
Amiben	3	82	[illegible]	43
Lasso+Lorox	2+1	[illegible]	[illegible]	20
Lasso+Amiben	2+2	81	[illegible]	42
Lasso+Amiben+Sencor/Lexone	2+2+.25	90	[illegible]	42
Check	----	00	[illegible]	16
PREPLANT INCORPORATED & POSTEMERGENCE				
Treflan&Blazer/Tackle+X-77	.75&.38+.5%	57	[illegible]	14
Treflan&Blazer/Tackle+28% N	.75&.38+1 gal.	67	42	18
Treflan&Blazer/Tackle+[illegible]	.75&.38+1 qt.	52	32	27
Treflan&Basagran+crop oil	.75&1+1 qt.	78	68	44
Treflan&Basagran+28% N	.75&1+1 gal.	88	87	44
Treflan&Basagran+crop oil	.75&.75+1 qt.	83	76	39
Treflan&Basagran+DAX	.75&.75+1 qt.	91	77	38
Treflan&Basagran+28% N	.75&.75+1 gal.	90	88	44
Treflan&Basagran+DAX+28% N	.75&.75+1 qt.+1 gal.	9[illegible]	86	40
PREPLANT INCORPORATED & POSTEMERGENCE & LATE POSTEMERGENCE				
Treflan&Basagran+crop oil& Basagran+crop oil	.75&.5+1 qt.&.5+1 qt.	90	80	39
Treflan&Basagran+28% N& Basagran+28% N	.75&.5+1 gal.&.5+1 gal.	98	[illegible]	4[illegible]
PREPLANT INCORPORATED & POSTEMERGENCE				
Treflan&Cobra+X-77	.75&.2+.1%	74	52	25
Treflan&Cobra+crop oil	.75&.2+.25 pt.	[illegible]	[illegible]	29
Treflan&Classic+X-77	.75&.75 oz+.25%	62	[illegible]	32
Treflan&Classic+X-77	.75&.5 oz+.25%	48	21	20
PREPLANT INCORPORATED & POSTEMERGENCE & LATE POSTEMERGENCE				
Treflan&Classic+X-77& Classic+X-77	.75&.5 oz+.25%& .5 oz+.25%	72	57	34
PREPLANT INCORPORATED & POSTEMERGENCE				
Treflan&Pursuit+X-77 +[illegible]	.75&.4 oz+.25%+1 qt.	74	72	[illegible]
LSD (.05)		8.7	10.1	10.[illegible]

S.E. FARM REPORT

FIRST GENERATION EUROPEAN CORN BORER CONTROL

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D. D. Walgenbach

PLANT SCIENCE 87-18

The 1987 season was very unusual with heat unit accumulations well above normal in most locations. A small first flight of European corn borers was followed by very large second and third flights at the Southeast Experiment Farm. An experimental trial was established on 26 June and experimental and registered insecticides evaluated for first generation European corn borer control. The experimental design was a randomized complete block with three replications. Individual plots were single-row treatments 100 feet long. Ten plants with shot-hole injury and/or midrib feeding were evaluated per replicate from each treatment. Damage was measured on the basis of one cavity equalling 1.0 inch of tunneling. Granular materials were applied with a pneumatic applicator powered by a 3.5 horse power engine mounted on a high clearance ground applicator. Insecticide was metered by Noble metering units that were chain driven by a 12V DC motor. Insecticide was delivered in a 7-inch band over the whorl. Liquid insecticides were applied with a backpack sprayer. One 1.5 LE Even Flat Nozzle/row, pressurized at 15 psi was used to apply 19.5 gpa at 3.5 mph. Stalks were split on 3 August and damage measured.

Corn treated with Pounce 1.5G (0.1 lb AI/acre) had the lowest number of cavities/plant, however, this treatment did not significantly differ from most experimental and/or registered compounds. Furadan 15G ([illegible].5 lb AI/acre) offered the least protection and was not significantly different from untreated corn.

Table 1. European Corn Borer Control with Granular and Liquid Insecticides

Chemical	Form	Rate(1)	Cavity(2)	Mean(3)
Pounce	1.5G	0.1	0.1	A
Lorsban	15G	0.50	0.2	A
Counter	15G	0.5	0.2	A
Fortress	15C	0.5	0.23	AB
XRD-522	0.3EC	0.015	0.25	AB
Pounce	3.2EC	0.15	0.30	AB
Aastar	15G	1.0	0.30	AB
SC-0567	10G	1.0	0.30	AB
SAN4151	G	10.0*	0.30	AB
Fortress	15G	1.0	0.30	AB
Counter	15G	1.0	0.37	AB
Aastar	15G	0.5	0.37	AB
Capture	2EC	0.05	0.40	AB
Lorsban	15G	0.25	0.45	AB
Force	1.5G	0.125	0.47	AB
Lorsban	15G	0.75	0.47	AB
SAN4151	G	7.5*	0.50	AB
Thimet	20G	0.5	0.50	AB
Lorsban	15G	1.0	0.60	AB
Dyfonate	20GM	1.0	0.60	AB
Dyfonate	20G	0.5	0.63	ABC
Dyfonate	20G	1.0	0.65	ABC
Dyfonate	20GM	0.5	0.70	ABC
Force	1.5G	0.10	0.73	ABC
XRD-522	0.3EC	0.19	0.75	ABC
SC-0567	10G	0.5	0.77	ABC
Force	1.5G	0.075	0.77	ABC
Furadan	15G	1.0	0.77	ABC
Thimet	20G	1.0	0.80	ABC
Furadan	15G	0.5	1.07	BC
Untreated Check	--	--	1.43	C

(1) Expressed as lbs. a.i. per acre. Granular insecticides applied with a pneumatic applicator. Liquid insecticides were applied with a hand held single nozzle wand. All insecticides were applied to the whorl.
(2) One cavity is equal to one inch of tunneling.
(3) Means sharing the same letter do not differ significantly according to Duncan's New Multiple Range Test (P=0.05).
* Pounds of product per acre.

EVALUATIONS OF INSECTICIDE PERFORMANCE ON VARIOUS INSECTICIDE HISTORIES GARRETSON AND HURLEY, SD, 1987

G. L. Hein, M. E. Gray, D. D. Walgenbach

S.E. FARM REPORT

PLANT SCIENCE 87-19

In 1985 and 1986, four insecticide histories (Counter, Dyfonate, and Lorsban) were established in a field near Hurley, SD. This field has been reported to be a Lorsban problem in 1984. Each of these history areas was 0.7 acres. Also, in 1985 and 1986, five insecticide histories (Broot, Counter, Dyfonate, Furadan. and Lorsban) were established in a field near Garretson, SD. The Garretson field has been reported to be a Dyfonate-Furadan problem field in 1983-84. The history areas established here were 1.2 acres.

In 1987 a portion of each of the history areas was used to test the performance of various rootworm insecticides. Six chemicals (Broot, Counter, Dyfonate, Furadan, Lorsban, and Thimet) were tested at rates of 0.75 and 1.0 lb a.i./acre, along with an untreated check. The design in all areas was a randomized complete block with four (Hurley) or five (Garretson) replications. Treatment plots were 45 feet by one row. All insecticides were applied in a 7-inch band with modified Noble metering units mounted on a John Deere 71 Flexi-planter.

Soil insecticide effectiveness was evaluated by using root damage ratings. The Iowa 1-6 damage rating scale was used, where 1 = no feeding damage present and 6 = 3 nodes of roots completely destroyed (Table 1 and 2).

Severe damage occurred in the plots at Hurley in 1987 (root ratings of 4 to 5). The trials at Hurley (Table 1) do not indicate that Lorsban, which had been reported to have provided poor control in 1984, is suspect to poor performance in this field. All the insecticides used in the trials performed well in all history plots. The damage occurring at Garretson (Table 2) was moderate in severity, ranging from 3.5 - 4.3. All treatments provided good to excellent control in the Lorsban, Dyfonate, and Counter histories. However, poor control was obtained for Furadan in the Broot and Furadan history plots and for Broot in the Broot history plots. All other insecticides performed well in both the Broot and Furadan histories. It appears likely that because of the extended use of carbamate insecticides (Furadan and Broot) in these history areas that the effectiveness of Furadan and Broot have been severely reduced in these history areas. Broot does not seem to be affected as much in the Furadan soil asFuradan in the Broot soil. This phenomenon is known as enhanced microbial degradation and occurs because some soil microbes are able to use carbamate insecticides as energy sources. Because these microbes have a survival advantage over other microbes that cannot use these chemicals, populations of these microbes increase to levels that degrade the insecticide so fast that the insecticide is not able to perform adequately. The trials at Garretson and Hurley and at other locations throughout the Midwest indicate the carbamates are especially susceptible to this problem.

Table 1. Root damage ratings and percent root protection for planting-time corn rootworm insecticide trials from various insecticide histories established within the same field. Hurley, SD 1987.

Chemical	Form	Rate(1)	Place(2)	Root Rating(3)		% RP(4)
Counter History						
Counter	15G	1.0	A	2.0	A	75
Counter	15G	0.75	A	2.1	A	73
Dyfonate	20GM	0.75	A	2.1	A	73
Broot	15GX	1.0	A	2.1	A	73
Lorsban	15G	0.75	A	2.2	A	71
Thimet	20G	0.75	A	2.2	AB	70
Lorsban	15G	1.0	A	2.2	AB	70
Dyfonate	20G	1.0	A	2.3	AB	68
Broot	15GX	0.75	A	2.4	AB	66
Thimet	20G	1.0	A	2.4	AB	65
Furadan	15G	0.75	A	2.5	AB	63
Furadan	15G	1.0	A	2.7	B	57
Untreated	--	--	--	4.0	C	
Dyfonate History						
Counter	15G	1.0	A	2.2	A	77
Lorsbarn	15G	1.0	A	2.2	A	76
Broot	15GX	0.75	A	2.2	A	76
Counter	15G	0.75	A	2.3	A	75
Thimet	20G	0.75	A	2.3	A	74
Lorsban	15G	0.75	A	2.4	A	73
Dyfonate	20GM	0.75	A	2.4	A	72
Furadan	15G	0.75	A	2.5	A	71
Furadan	15G	1.0	A	2.6	AB	69
Broot	15GX	1.0	A	2.6	AB	68
Dyfonate	20GM	1.0	A	3.1	AB	59
Thimet	20G	1.0	A	3.5	B	50
Untreated	--	---	--	5.0	C	
Lorsbarn History						
Counter	15G	1.0	A	2.1	A	76
Counter	15G	0.75	A	2.2	AB	74
Broot	15GX	1.0	A	2.2	AB	74
Broot	15GX	0.75	A	2.4	AB	70
Thimet	20G	0.75	A	2.4	AB	69
Dyfonate	20Gm	0.75	A	2.4	AB	69
Lorsban	15G	1.0	A	2.6	ABC	65
Dyfonate	20GM	1.0	A	2.8	ABC	61
Lorsban	15G	0.75	A	2.8	ABC	61
Thimet	20G	1.0	A	2.9	BC	58
Furadan	15G	1.0	A	3.2	CD	52
Furadan	15G	0.75	A	3.7	D	41
Untreated	--	---	--	4.6	E	

(1) Expressed as lbs. a.i. per acre.
(2) A = 7" band ahead of furrow-closing wheels.
(3) Means sharing the same letter do not differ significantly according to Duncan's New Multiple Range Test.
(4) Percent Root Protection.

Table 2. Root damage ratings and percent root protection for planting-time corn rootworm insecticide trials from various insecticide histories established within the same field. [illegible]

Chemical [illegible]	[illegible]	[illegible] (1)	Placement(2)	Root Rating [illegible]		[illegible] (4)
[illegible] History						
[illegible]	[illegible]	[illegible]	A	2.0	[illegible]	[illegible]
Dyfonate	20GM	1.0	A	2.1	A	71
Counter	15G	1.0	A	2.1	AB	70
Dyfonate	20GM	0.75	A	2.1	AB	70
Lorsban	15G	1.0	A	2.3	AB	65
Thimet	20G	1.0	A	2.5	ABC	59
Furadan	15G	1.0	A	2.6	ABC	57
Lorsban	15G	0.75	A	2.7	ABC	55
Broot	15GX	1.0	A	2.7	ABC	55
Thimet	20G	0.75	A	2.8	BC	53
Broot	15GX	0.75	A	3.0	C	45
Furadan	15G	0.75	A	3.1	C	44
Untreated	—	—	—	3.7	D	
Dyfonate History						
Counter	15G	0.75	A	2.0	A	73
Broot	15GX	0.75	A	2.0	A	73
Counter	15G	1.0	A	2.0	A	73
Dyfonate	20GM	1.0	A	2.1	A	71
Furadan	15G	1.0	A	2.1	A	71
Furadan	15G	0.75	A	2.1	A	70
Dyfonate	20GM	0.75	A	2.2	A	67
Lorsban	15G	0.75	A	2.2	A	67
Thimet	20G	1.0	A	2.2	A	66
Thimet	20G	0.75	A	2.3	A	65
Lorsban	15G	1.0	A	2.3	A	65
Broot	15GX	1.0	A	2.4	A	63
Untreated	—	—	—	3.7	B	
Counter History						
Counter	15G	1.0	A	2.1	A	68
Broot	15GX	1.0	A	2.1	A	70
Lorsban	15G	0.75	A	2.1	A	69
Dyfonate	20GM	0.75	A	2.1	A	68
Thimet	20G	1.0	A	2.2	A	66
Dyfonate	20GM	1.0	A	2.2	A	64
Thimet	20G	0.75	A	2.3	A	63
Counter	15G	0.75	A	2.4	A	61
Lorsban	15G	1.0	A	2.4	A	61
Broot	15GX	0.75	A	2.5	A	56
Furadan	15G	0.75	A	2.6	A	55
Furadan	15G	1.0	A	2.6	A	54
Untreated	—	—	—	3.5	B	
Broot History						
Counter	15G	0.75	A	2.0	A	78
Counter	15G	1.0	A	2.0	A	76
Dyfonate	20GM	0.75	A	2.2	A	73
Dyfonate	20GM	1.0	A	2.2	A	71
Lorsban	15G	1.0	A	2.2	A	71
Thimet	20G	1.0	A	2.4	AB	69
Lorsban	15G	0.75	A	2.4	AB	68
Thimet	20G	0.75	A	2.8	BC	57
Broot	15GX	1.0	A	3.2	CD	50
Furadan	15G	1.0	A	3.6	D	41
Broot	15GX	0.75	A	3.6	D	41
Furadan	15G	0.75	A	4.1	E	28
Untreated	—	—	—	4.3	E	
Furadan History						
Counter	15G	0.75	A	1.9	A	79
Counter	15G	1.0	A	2.0	A	76
Lorsban	15G	1.0	A	2.2	AB	71
Dyfonate	20GM	1.0	A	2.3	AB	68
Dyfonate	20GM	0.75	A	2.4	AB	66
Lorsban	15G	0.75	A	2.4	AB	65
Broot	15GX	0.75	A	2.7	B	58
Thimet	20G	1.0	A	2.8	B	56
Broot	15GX	1.0	A	2.9	B	55
Thimet	20G	0.75	A	2.9	B	54
Furadan	15G	0.75	A	3.7	C	35
Furadan	15G	1.0	A	4.0	C	27
Untreated	—	—	—	[illegible]	C	

(1) Expressed as lbs. a.i. per acre
(2) A = 7" band ahead of furrow-closing wheels.
(3) Means showing the same letter do not differ significantly according to Duncan's New Multiple Range Test.
(4) Percent Root Protection.

S.E. FARM REPORT

LIVESTOCK RESEARCH

J. Wagner, B. Borg, R. Hamilton, G. Libal,
R. Wahlstrom and R. Hanson

ANIMAL/RANGE SCIENCES 87-20

Cattle Feeding Research Summary

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Four research trials pertaining to receiving programs for new cattle, growing programs and finishing programs were completed during the past year. The overall objective of the cattle research program is to increase the profitability of cattle feeding through more efficient utilization of home grown feed commodities. Cattle provide farmers with marketing alternatives for their crops. Improving the efficiency of cattle production will increase the net return to the farming operation. Detailed research reports summarizing these trials are published in the 1987 South Dakota Beef Report.

Receiving Programs: Rumen injectable probiotics and probiotic feed additives for newly arrived feedlot calves were examined using five treatments in a 28 day receiving trial. Treatments consisted of 1) control - no intraruminal injection, no feed additive, 2) intraruminal injection only, 3) intraruminal injection and probiotic feed additive containing 500 x 10 organisms, 4) intraruminal injection and probiotic feed additive containing 2 x 10 organisms and 5) intraruminal injection and probiotic feed additive containing 20 x 10 organisms. The probiotic used in this trial was streptococcus facium. All cattle were fed a standard receiving diet consisting of 52% high moisture corn, 20% corn silage, 20% alfalfa hay and 8% supplement on a dry matter basis. The diet was formulated to contain 12.6% crude protein, .6% calcium, .36% phosphorus, .89% potassium and .53 mcal net energy for gain (NEg) and 1400 IU vitamin A per lb dry matter.

Performance of the cattle during the first 14 and 28 days in the feedlot is displayed in table 1. Cattle weighed 516 lb near the ranch and shrank 9.1% in transit. This heavy shrink explains the high average daily gains and tremendous feed conversions that were observed in this study. Average daily dry matter intake, gain and feed conversion were 9.75 lb/day, 3.78 lb/day and 2.59 lb feed/lb gain, respectively, and were not significantly different between treatments.

Table 1.Performance of Cattle injected with or fed probiotics.(a)

Item(c)	Treatment(b) 1	2	3	4	5
Initial wt, lb	471	469	469	468	474
ADG14, lb/day	4.35	3.83	3.75	3.82	4.32
ADG28, lb/day	4.06	3.62	3.61	3.71	3.92
DMI14, lb/day	6.43	6.33	6.36	6.37	6.42
DMI28, lb/day	9.71	9.70	9.71	9.73	9.91
F/G14	1.49	1.69	1.70	1.69	1.49
F/G28	2.41	2.69	2.70	2.63	2.53

(a)Least square means.
(b)Defined in text.
(c)ADG = average daily gain, DMI = dry matter intake, F/G = feed/gain, 14 = day 14 and 28 = day 28.

No differences between treatments were observed for cattle health. Very little sickness was observed in these cattle. Only 26 head were treated with oxytetracycline and sulfamethazine. Of these cattle, only one head was treated a second time.

These data demonstrate no advantage to using the intraruminal probiotic injection or the probiotic feed additive.

Growing Programs: Urea, corn gluten meal and soybean meal were compared as sources of supplemental crude protein for limit-fed growing steers. Urea was fed at 0, .33, .67 or 1.00% of total diet dry matter. Soybean meal and corn gluten meal were fed in combinations such that 0, 33, 67 or 100% of the supplemental natural protein was supplied by soybean meal. The remaining supplemental natural protein was provided by corn gluten meal and corn. All cattle were limit-fed 13.53 lb of dry matter for 91 days. On a dry matter basis, the diet consisted of 52.85% high moisture corn, 35% corn silage and 12.15% supplement and provided 12.01% crude protein, .67% calcium, .47% phosphorus, .5750 mcal NEg per lb and 2700 IU vitamin A per lb.

Interactions between level of urea and natural protein source were not significant, indicating that source of natural protein did not influence urea utilization. Level of urea did not influence average daily gain (Table 2) indicating that up to 1.00% of diet dry matter as urea can be effectively utilized by limit-fed cattle. Replacing soybean meal with corn gluten meal as a source of natural protein did not affect average daily gain (Table 3) indicating no advantage to feeding a high "escape" protein.

Table 2. Effect of Urea Level on Performance.

Item	Urea(a) 0	.33	.67	1.00
Initial wt., lb	585	599	580	576
Average daily gain 28(b), lb	2.51	2.45	2.61	2.33
Average daily gain, lb	2.75	2.70	2.79	2.72

(a)Percentage of diet dry matter.
(b)First 28 days.

Table 3. Effect of Natural Protein Source on Performance.

Item	Treatment(a)			
	100	67	33	0
Initial wt., lb	597	581	[illegible]	589
Average daily gain 28(h), lb	2.20	2.72	2.60	2.37
Average daily gain, lb	2.58	2.79	2.91	2.68

(a) Percentage of supplemental natural protein from soybean meal. The balance is from corn gluten meal and corn.
(b) First 28 days

<u>Finishing programs:</u> Yearling Angus steers (800 lb) were utilized in a trial to determine if feeding the concentrate portion of a 40% corn silage finishing diet separately from the silage would result in improved feedlot performance. Steers were fed either a completely mixed diet two times daily or were fed the concentrate portion of the same diet in the morning and the silage in the evening. Cattle fed the concentrate in the morning consumed less feed (20.70 vs 22.19 lb), achieved similar average daily gains (2.26 vs 2.24 lb) and tended to have slightly better feed efficiency (9.21 vs 9.89) than cattle fed the completely mixed diet. Performance by both groups of cattle was significantly less than that attainable by feeding higher concentrate diets. Feeding concentrate separately from the silage did not improve performance enough to warrant feeding lower concentrate diets to finishing steers.

Yearling Angus steers (830 lb) were used to investigate the impact of restricting feed intake during the finishing period on feed conversion and dietary energy utilization. In one experiment, four pens of cattle were allowed to consume ad libitum amounts of dry matter and four pens were fed approximately 85% of what the full-fed cattle consumed. These cattle were slaughtered as five of eight head in each pen reached an anticipated low choice grade. In a second experiment, four pens of cattle served as a control and were allowed to consume ad libitum amounts of dry matter, four pens were fed approximately 93% and eight pens were fed approximately 85% of what the ad libitum cattle consumed. After 56 days on experiment, four of the 85% pens were fed ad libitum amounts of dry matter. Control cattle were slaughtered as five of eight head in each pen reached an anticipated low choice grade. Restricted intake cattle were slaughtered as each pen achieved similar cumulative net energy for gain intakes as the ad libitum fed cattle.

Table 4. Effect of Restricting Intake During the Finishing Phase.

Item	Exp. one: Ad lib.	Exp. one: Restr.	Exp. two: Ad lib.	Exp. two: 93%	Exp. two: 85%	Exp. two: 85+
In. wt., lb	826	830	828	824	827	827
DMI 56(a), lb	19.33	14.42	19.31	18.12	17.12	16.88
ADG 56(b), lb	2.88	2.25	3.34	3.01	2.93	2.60
F/G 56(c)	6.83	6.37	5.81	6.08	5.85	6.49
DMI T(d), lb	19.42	16.13	19.34	18.22	17.46	17.95
ADG T, lb	2.53	2.04	2.79	2.47	2.43	2.39
F/G T	7.79	7.86	7.00	7.39	7.21	7.53
Slgtr wt.(e), lb	1090	1065	1106	1098	1120	1098
Days on feed	106	115	100	111	120	113
NEm(f), mcal/cwt	89.74	93.87	97.58	93.97	98.54	93.50
NEg(g), mcal/cwt	59.15	62.00	63.53	62.13	64.54	61.83

(a)Average dry matter intake first 56 days.
(b)Average daily gain first 56 days.
(c)Feed/gain first 56 days.
(d)T = total trial.
(e)Slaughter weight.
(f)Calculated net energy for maintenance.
(g)Calculated net energy for gain.

Restricting dry matter intake tended to increase days on feed and reduce average daily gains. Feed conversion and calculated dietary energy values were not improved by restricting the intake of finishing cattle.

Acknowlegements: The big news concerning the cattle research at the farm is the completion of the new feed handling, cattle working and feeding facilities. A special thanks goes to the Board of Directors of the farm and the farm manager, Dale Sorensen for their time and efforts making this project possible. Thank you Roland Hanson, cattle manager at the farm, and the rest of the crew for conducting this research. The following companies have contributed funding, commercial products or technical support for the cattle research program at the farm: Syntex Animal Health, Triple F Feeds, Iowa Beef Processors, International Minerals and Chemical Company and Elanco Products Company.

Effects of Lysine and Energy Concentration on the Performance of Growing and Finishing Pigs Fed Diets Containing Barley

B. S. Borg, C. R. Hamilton, G. W. Libal, R. C. Wahlstrom & R. Hanson

Barley has been shown to be an effective alternative grain source in growing and finishing swine diets. However, diet formulation method (i.e. protein, lysine and(or) metabolizable energy basis) is important in maintenance of efficient pig performance. Previous trials at this station have suggested that lysine availability and(or) metabolizable energy content of barley diets may limit maximum pig performance. This trial, along with a similar trial reported in last year's Southeast Farm Report, was conducted to determine if poor lysine availability and(or) low metabolizable energy content of barley diets contribute to the usual depression in performance when growing pigs are fed barley based diets.

Experimental Procedure: A group of feeder pigs, purchased from two sources through the Sioux Falls Stock Yards and weighing 40 to 45 pounds were transported to the Southeast Experiment Station in late October, 1986. Following a two week adjustment period 108 pigs were allotted to three replications of six experimental treatments according to pig source, weight and sex. Average initial weight at the beginning of the experiment was approximately 51 pounds. The experimental treatments applied were:

1. Corn-soybean meal control diet.
2. Barley-soybean meal diet with barley substituted for corn in the control diet pound for pound.
3. Barley-soybean meal diet formulated to be isolysinic with the control diet.
4. Diet 3 plus L-lysine HCL to be isolysinic with diet 2
5. Diet 2 plus stabilized animal fat to be isocaloric with diet 1.
6. Diet 3 plus stabilized animal fat to be isocaloric with diet 1.

Results: In this trial, there were no differences (P>.05) in pig performance between pigs fed the corn-soybean meal or barley-soybean meal diets. Numerically, pig performance tended to follow similar trends as those reported in the 1986 Southeast Experiment Farm Progress Report for trial one. Since there was no trial x treatment interaction data from the two trials were combined. The following discussion concerns the combined results. Overall, pigs fed a diet containing barley substituted on an equal weight basis for corn with fat added (trt 5) gained faster (P<.05) than pigs fed barley diets with synthetic lysine additions (trt 4) or a diet formulated to be isolysinic with the barley for corn diet (trt 3). pigs fed either the corn-soybean meal control diet (trt 1), barley substituted for corn diet (trt 2) or a diet isolysinic and isocaloric with the control diet (trt 6) had gains that were intermediate. Feed intake was lowest (P<.05)) for pigs fed barley diets containing added fat (trt 5 & 6) but was not different (P>.05) than that of pigs fed either the corn-soybean meal diet (trt 1)

or a diet containing synthetic lysine (trt 4). Addition of fat to the diet of pigs fed the barley substituted for corn diet (trt 5) or a diet formulated to be isolysinic with the control diet (trt 6) resulted in depressed ($P<.05$) daily feed intake and improved feed efficiency ($P<.05$) as compared to pigs fed barley diets formulated on a similar basis, but without added fat (trt 2 & 3). Feed efficiency of pigs fed barley diets with additional (trt 5 & 6) did not differ ($P>.05$) from pigs fed the control diet (trt 1).

Data from these trials suggest that dietary metabolizable energy content is limiting in barley based diets fed to growing and finishing pigs. However, additional research is needed to study the effects of added lysine to barley diets containing fat. A more complete report on this trial and the combined results of the two trials can be found in the 1987 SDSU Swine Field Day Report or by contacting B. S. Borg, or C. R. Hamilton, Animal/Range Science, SDSU, Brookings, SD 57007 (605) 688-5417.

THE EFFECT OF LYSINE AND ENERGY CONCENTRATION ON PERFORMANCE OF PIGS FED BARLEY BASED DIETS FROM 56 LB TO MARKET WEIGHT.

Various methods of combining barley with other swine diet ingredients and the effects of these formulations on the performance of pigs during the grower and finisher periods have been studied extensively at this station. The objective of the present study was to further investigate the effects of increased lysine availability and (or) increased metabolizable energy (ME) concentration of the diet on the performance of pigs fed barley based diets during the grower and finisher period. Stabilized animal fat and L-lysine.HCl were used as highly available sources of energy and lysine, respectively.

A total of 120 feeder pigs purchased from two sources were used to study the effects of energy and lysine concentration on the performance of pigs from about 56 lb to market weight. Dietary treatments included a corn-soybean meal control and four barley diets. Barley diets were produced by equal weight substitutions of barley for corn with or without added fat or balanced to be isolysinic to the control plus added lysine with or without added fat. All barley diets contained similar lysine levels and those with added fat were isocaloric to the control diet. Pigs fed corn gained faster ($P<.05$) than pigs fed any of the barley diets during the grower period. Pigs fed barley diets with added fat gained faster ($P<.05$) and more efficiently ($P<.10$) during the finisher period and faster ($P<.10$) overall than those fed barley diets without added fat. Pigs fed corn had gains that were intermediate for the finisher period and overall. These data suggest that barley based diets are limiting in energy for growing and finishing pigs when compared to corn based diets. Barley diets with fat added to make them isocaloric to diets containing corn will support levels of pig performance that are similar to those obtained using corn. Lysine availability did not appear to be a limiting factor under the conditions of this experiment. A more detailed report of this study may be found in the 1987 SDSU Swine Research Reports.

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