Southeast Research Farm
29974 University Road
Beresford, South Dakota 57004

The purpose of this page is to grab your attention and convince you to join the Southeast Experiment Farm Corporation. The Southeast Farm Corporation consists of people just like you from southeast South Dakota and the surrounding area.

Around 1955, a group of progressive farmers began efforts to create an association that would be concerned with agricultural research in southeast South Dakota. On May 3, 1956, a non-profit organization, the Southeast Experiment Farm Corporation, was formed. The purpose of the corporation was to acquire and disseminate information concerning crop and livestock production.

The business affairs of the corporation are handled by a very active Board of Directors. Members of the board are elected for a two-year term from each participating county. An annual meeting is held each year to allow members to review the activities of the corporation and hear reports on progress of research projects and make suggestions on research that may need to be added to solve upcoming problems. Because the corporation is non-profit, all funds generated by the corporation are used to advance research through improvement of buildings and facilities located at the station.

We are currently working to add more new members to the Southeast Experiment Farm Corporation. Lifetime memberships to the corporation are $25. You will not be asked for more than that. This is a one-time $25 membership. These memberships are also transferable, so if you know of someone who has retired from farming and is a member, that membership can be transferred to you or anyone else.

This membership to the corporation is not a large amount, but it helps us in many ways. If you become a member, you will automatically receive our annual report, right off the press, in January; as well as letters during the year to keep you informed of activities at the farm and what dates and times tours will be held. Another important benefit is the more members we have demonstrates strong support and proof that there is a great deal of interest and need for agricultural research throughout southeast South Dakota.

We hope if you are not a member that you will join us. If you decide to join, send a check to the Southeast Farm Corporation for $25 to the above address. If you have a membership that needs to be transferred, clip this page out on the line and fill out the information needed on the other side. We will be glad to process your certificate and add you to our permanent mailing list. Thanks.

Southeast Experiment Farm Corporation
29974 University Road
Beresford, South Dakota 57004
2007

Subject: Transfer of Membership

The Board of Directors would like to see existing memberships, that are not active, transferred to a relative or an interested party participating in agriculture located in the same county, if possible. The reason for this transfer, is that a county must maintain a certain number of voting shares in order to elect a director. The directors look after the business affairs of the research farm, make known the research needs of each county, and participate in management decisions of the farm. It is important that each county maintain their representation in order to participate in these affairs.

If this transfer meets with your approval, please enter the name of the party you wish to transfer the membership to, sign your name in the proper blanks below and send this letter, together with the membership share, if possible, to the address listed above.

If there are no interested relatives, you may wish to use Option # 2, and delegate the responsibility to the Board of Directors to locate any interested party in the same county.

Option #1:
Please transfer membership to: ________________________________

Address: ________________________________

____
Signature

Address: ________________________________

Option #2:
I wish to transfer this membership to the Board of Directors, authorizing them to give this voting membership to an interested party within the county.

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Signature

Address: ________________________________

This forty-sixth 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. Some herbicide treatments may be experimental and not labeled. Read and follow the entire label before using.

South Dakota Agricultural Experiment Station
Brookings, SD 57007

Dr. Gary Lemme, Dean

Dr. John Kirby, Director

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Wyatt Lunning, Ag Technician (Summer)

Brad Rops, Research Assistant
Ruth Stevens, Statistical Assistant
Garold Williamson, Ag Technician
Wyatt Petersen, Ag Technician (Summer)

SOUTHEAST SOUTH DAKOTA EXPERIMENT FARM
46th ANNUAL PROGRESS REPORT 2006

TABLE OF CONTENTS

Land Use Map ....1 pg

0601 Weather and Climate Summary *(Stevens, Berg, Wiebesiek, and Williamson)*........7 pg

0602 Soybean Inoculation Study
(Berg, Wiebesiek, Stevens, Jurgensen, and Williamson) ....5 pg

0603 Seed Technology Effects on Corn Performance and Rootworm
Population in a Corn-Soybean Rotation
(Berg, Kieckhefer, Catangui, Wiebesiek, Stevens, Jurgensen, and Williamson).....pending

0604 Crop Nutrient Management Using Manure from Rations Containing Distillers Grain
(Gelderman, Gerwing, Berg, Rops, Bly, and Bortnem)...6 pg

0605 Nitrogen Rates for Corn *(Gelderman, Gerwing, and Bly)*..5 pg

0606 Nitrogen Application Timing Influence on Soil Nitrate-N and Corn Grain Yield,
Beresford, 2006 *(Gerwing, Gelderman, Bly, and Berg)* ....2 pg

0607 Fertilizer Potassium, Sulfur, Zinc, Phosphorus, Boron and Lime Effects on
Corn Yield on High Testing Soil *(Gerwing, Gelderman, Bly, and Berg)*...................4 pg

0608 Nitrogen Management in a Corn Soybean Rotation
(Gerwing, Gelderman, Bly, and Berg) ....4 pg

0609 Poly Urea Influence on Corn Yield, Beresford, Brookings and Aurora, 2006
(Gerwing, Gelderman, Bly, and Berg) ....2 pg

0610 Soybean Cyst Nematode Studies, 2006 *(Smolik)* ....6 pg

0611 Nematode Populations in Alternative Cropping Systems Studies *(Smolik)* ....2 pg

0612 Insects on transgenic corn at the Southeast Research Farm
(Kieckhefer, Catangui, and Berg)...5 pg

0613 Soybean Yield Response to Different Soybean Aphid Thresholds (*Tilmon*)............4 pg

0614 Oat Project (*Hall, L.)*..4 pg

0615 2006 Alfalfa Production (*Owens, Jeranyama, and Lee*)..3 pg

0616 Forage Grass Variety Performance Trial at Southeast Research Farm
(*Jeranyama, Owens, and Lee*) ....2 pg

TABLE OF CONTENTS CONTINUED

0617 2006 Soybean Fungicide Sprayer Trials
(B. Ruden, Draper, and K. Ruden) ....5 pg

0618 2006 Soybean Foliar Fungicide Trials
(K. Ruden, Draper, B. Ruden, and Thompson) ....6 pg

0619 Oat and Field Pea – East South Dakota Test Performance Results
for 2006. *(R. Hall and Kirby)* .... 5 pg

0620 2006 Soybean Variety Performance Trials Beresford and Geddes
(*R. Hall and Kirby)* ....13 pg

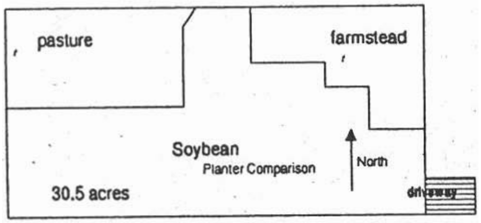
0621 2006 Precision Planted Corn Performance Trials
(R. Hall and Kirby) ....7 pg

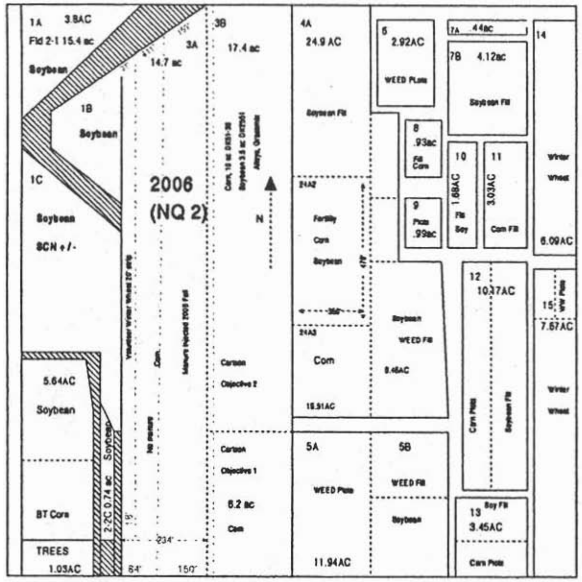
0622 Weed Control Demonstrations and Evaluation Tests for 2006
(Moechnig, Deneke, and Vos) ....46 pg

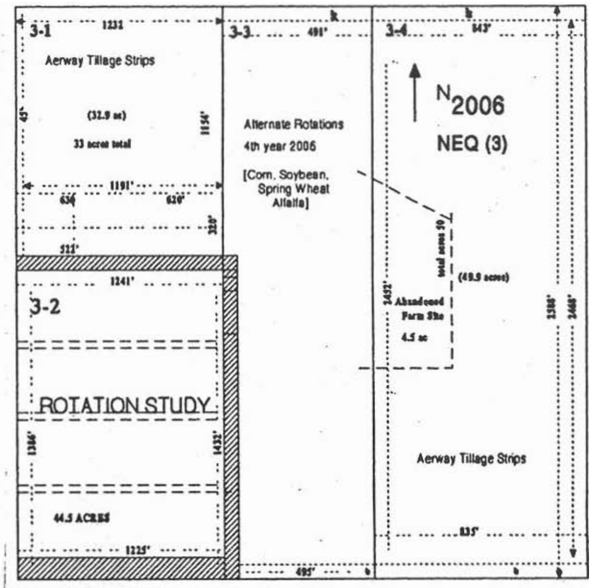
0623 The Effect of Vomitoxin-Contaminated Straw on Grower Pig Performance
in a Deep Bedded System – A Demonstration *(Thaler and Rops)*........................... 3 pg

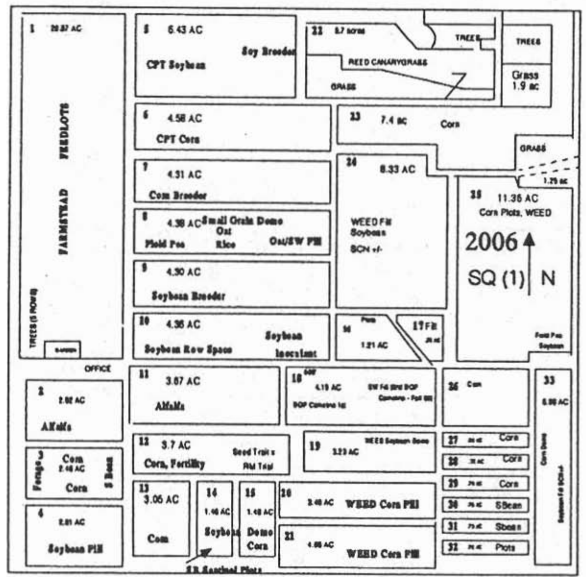
0624 Swine Research Summaries (*Thaler and Rops*) .... 1 pg
1. Effect of Reduced Nocturnal Temperature (RNT) During the Nursery Phase On Nursery and Overall Growth Performance
2. Efficacy of Paylean in Alleviating Heat Stress in Finishing Pigs

2006 LAND USE MAP
Southeast Research Farm
Beresford, South Dakota









WEATHER AND CLIMATE SUMMARY

R. Stevens, R. Berg, A. Wiebesiek, and G. Williamson

Southeast Farm 0601

Climate for 2006 is summarized in tables and graphs on pages 2 to 7. Annual precipitation and growing season precipitation were slightly above normal this year. We received 25.7 inches of annual precipitation, which is 0.6 inches above our long-term average (102% of normal). Our growing season precipitation measured from April through September was 20.1 inches (107% of normal, +1.3 inches). This was also a year of extremes with July receiving only 0.4 inches (12% of normal, -3.1) while September received 7.8 inches of rainfall (287% of normal, +5.1). Precipitation was normal or above for five months of the year, while the other seven months averaged 1.1 inches below normal (0.1 to 2.8 inches). Our annual snowfall was 23 inches, with 19 inches received the first half of the year and 4 inches during the last half.

The growing season accumulation of heat units was 3,082 units, slightly below the normal (96% of normal). The coldest temperature of the year was recorded on February 18 at -19°F and the hottest temperature recorded was 101°F on July 20, giving a 120-degree temperature range. Our frost-free season was 147 and 169 days on a 32°F and 28°F-basis, respectively. The average annual high temperature was 61°F and our average annual low temperature was 38°F. Evaporation exceeded rainfall during May through August by 4 to 10 inches per month. September rainfall exceeded evaporation by 3.4 inches, an extremely rare occurrence. We lost more than twice as much moisture by open pan evaporation than we gained by rainfall, with a total of nearly 39 inches of water evaporated from May through September while receiving 17 inches of precipitation.

Table 1. Temperatures[a] at the Southeast Research Farm - 2006

	2006 Average Air Temps. (°F)		54-year Average Air Temps. (°F)		Departure from 54-year Average	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
January	41.1	24.7	26.6	5.5	+14.5	+19.2
February	34.6	11.9	32.7	11.4	+1.9	+0.5
March	45.0	24.7	43.8	22.6	+1.2	+2.1
April	64.3	41.5	60.4	35.2	+3.9	+6.3
May	72.7	46.9	72.2	47.2	+0.5	-0.3
June	81.9	58.2	81.6	57.5	+0.3	+0.7
July	88.8	63.4	86.2	62.0	+2.6	+1.4
August	83.7	61.2	84.4	59.3	-0.7	+1.9
September	69.7	47.3	75.5	48.9	-5.8	+1.6
October	59.9	35.5	63.8	37.6	-3.9	-2.1
November	48.4	23.7	45.0	23.7	+3.4	0.0
December	38.5	17.5	31.0	11.6	+7.5	+5.9

[a]Computed from daily observations

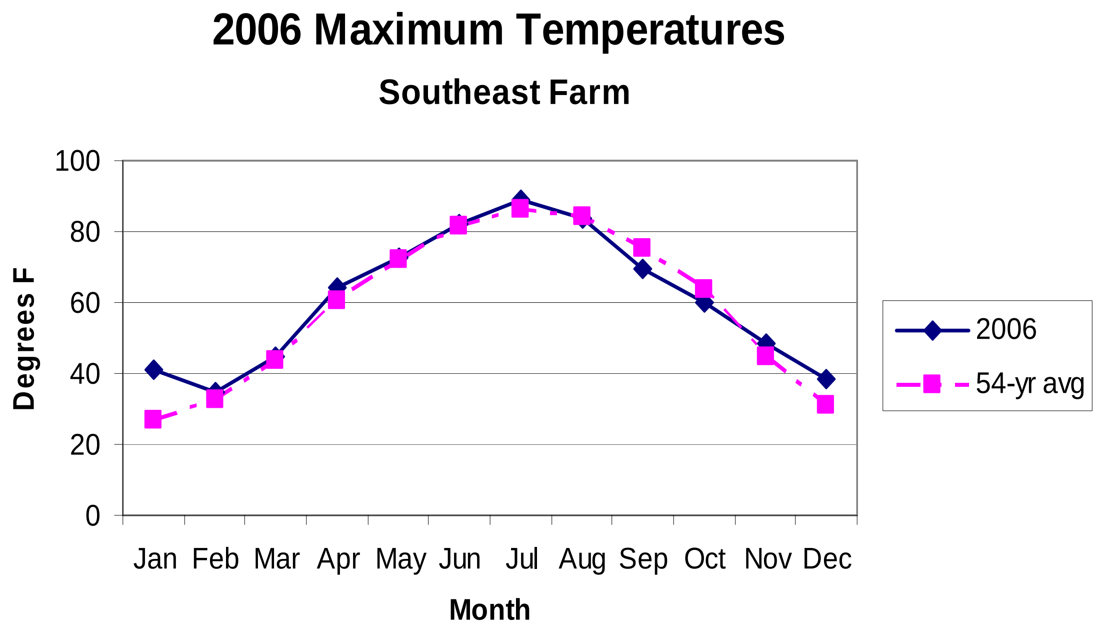
Table 2. Precipitation at the Southeast Research Farm - 2006

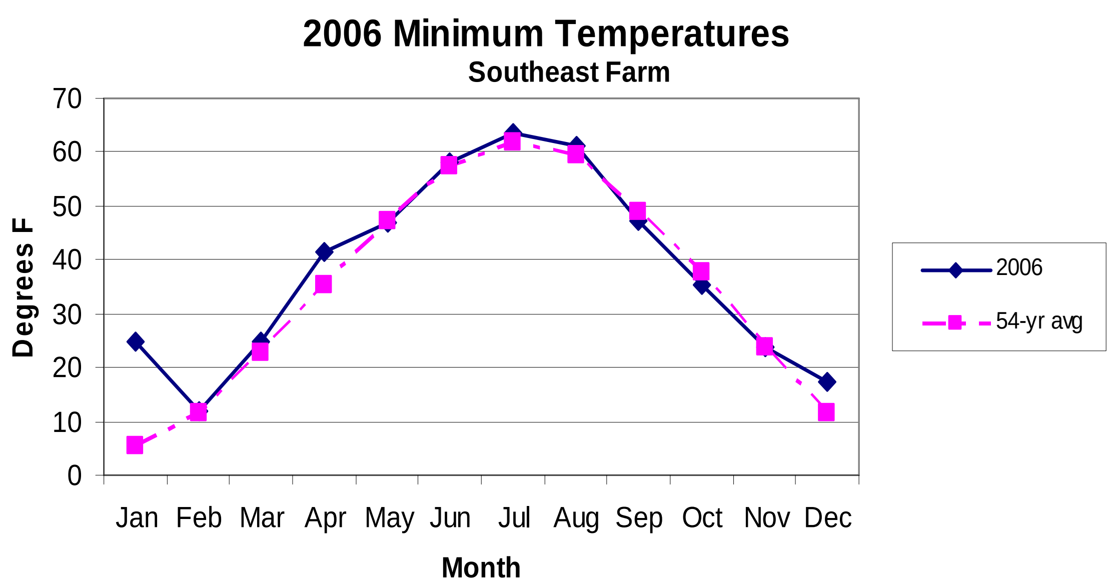
Month	Precipitation 2006 (inches)	54-year Average (inches)	Departure from Avg. (inches)
January	0.42	0.46	-0.04
February	0.12	0.82	-0.70
March	1.81	1.49	+0.33
April	3.44	2.56	+0.88
May	1.51	3.36	-1.85
June	3.72	4.08	-0.36
July	0.39	3.19	-2.80
August	3.23	2.88	+0.35
September	7.84	2.73	+5.11
October	0.38	1.70	-1.32
November	0.80	1.25	-0.45
December	2.04	0.62	+1.42
Totals	25.70	25.13	+0.57

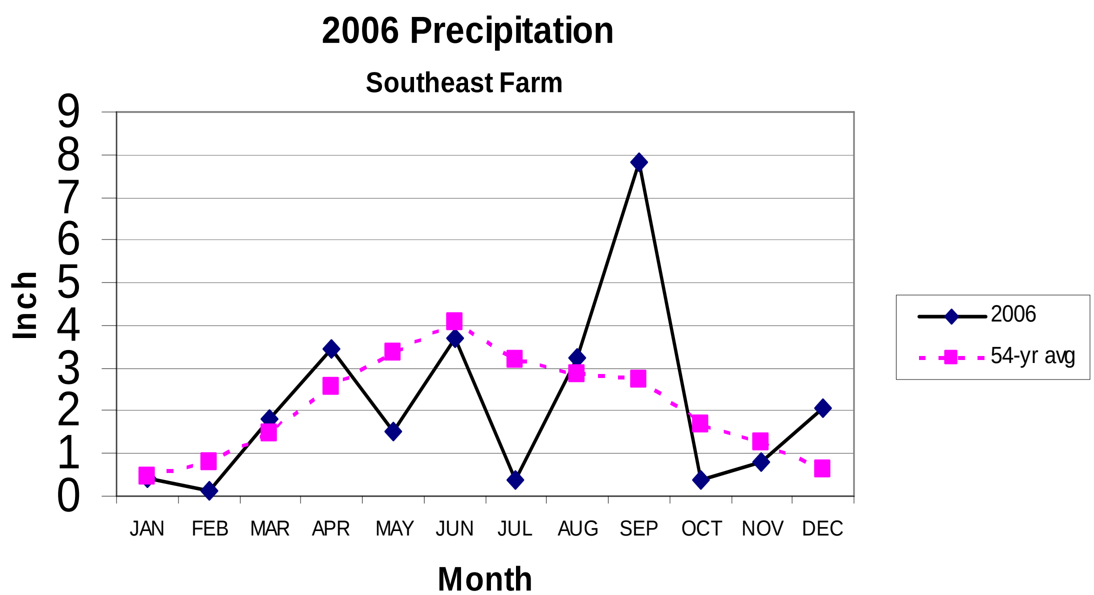
2006 CLIMATE SUMMARY
SOUTHEAST RESEARCH FARM

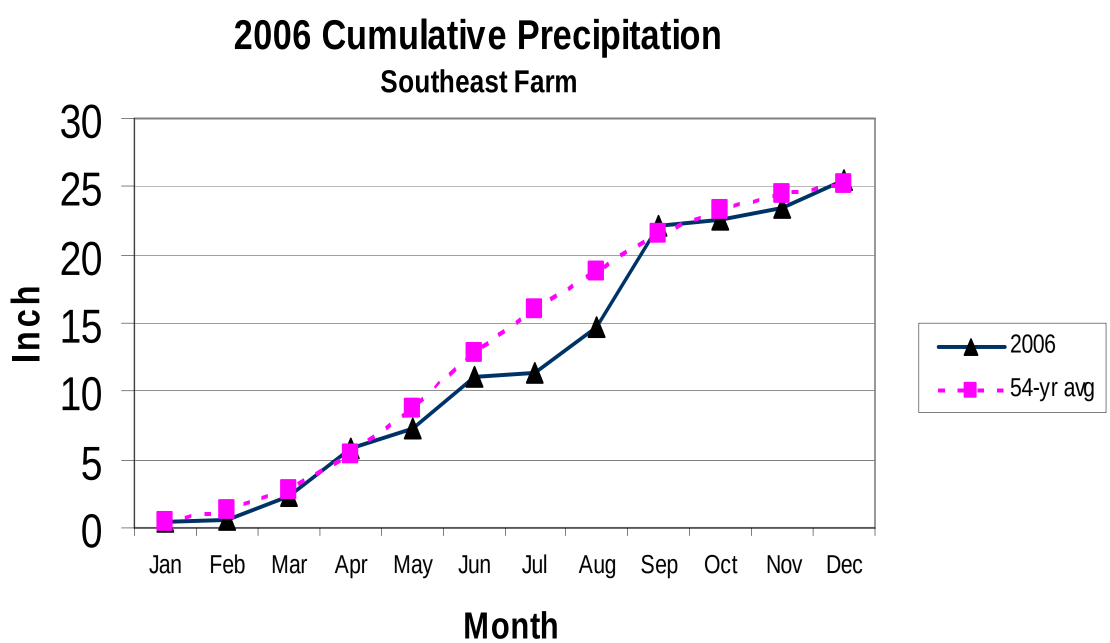
Annual Precipitation (inch)	25.70	102%*
Growing Season Precip (Apr-Sep, inch)	20.13	107%
Jan-Mar	2.35	85%
Apr-Jun	8.67	87%
Jul-Sep	11.46	130%
Oct-Dec	3.22	90%
Annual Snow (inch); (Jan-Jun/Jul-Dec)	23	19 / 4
Growing Degree Units (GDU)	3,082	96%
Minimum / Maximum Air Temp, ºF	-19º F, Feb 18	101º F, Jul 20
Last Spring Frost	29º F, Apr 26	29º F, Apr 26
First Fall Frost	31º F, Sep 20	23º F, Oct 12
Frost Free Period (days); 32º / 28º basis	147	169
Average Annual High / Low	61 /38	+2.0 / +3.0

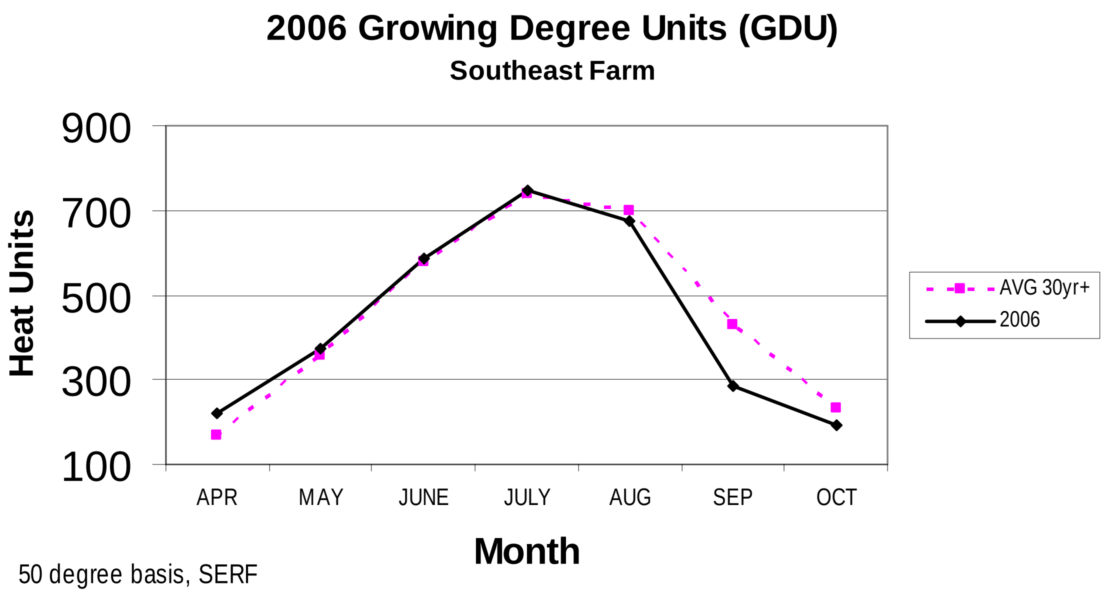
*% of normal

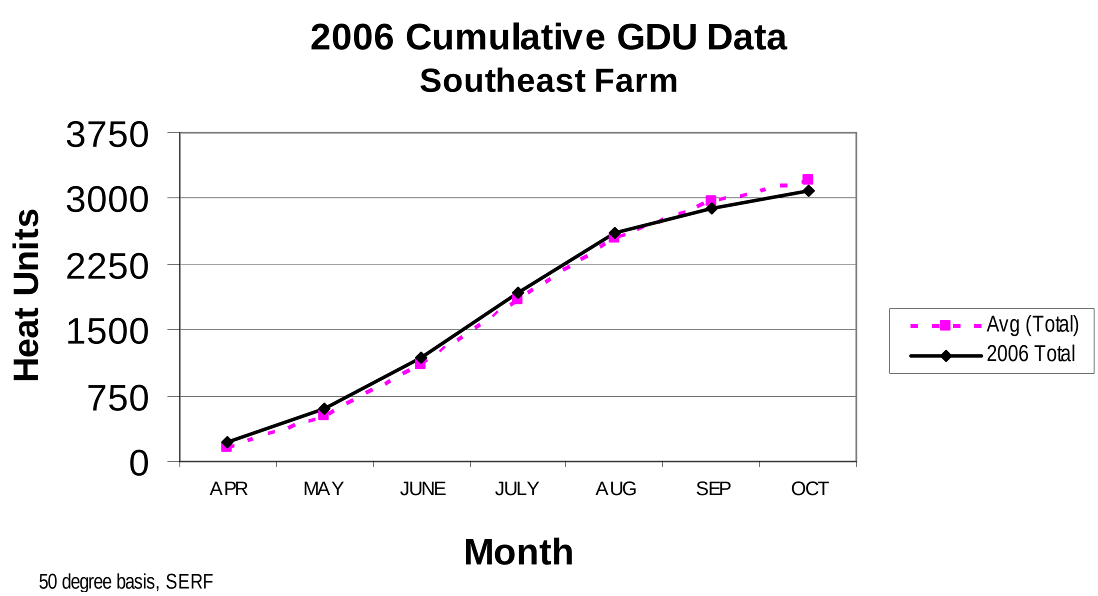

2006 Maximum Temperatures
Southeast Farm
100
80
60
40
20
0
Degrees F
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month
2006
54-yr avg


2006 Minimum Temperatures
Southeast Farm
70
60
50
40
30
20
10
0
Degrees F
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month
2006
54-yr avg

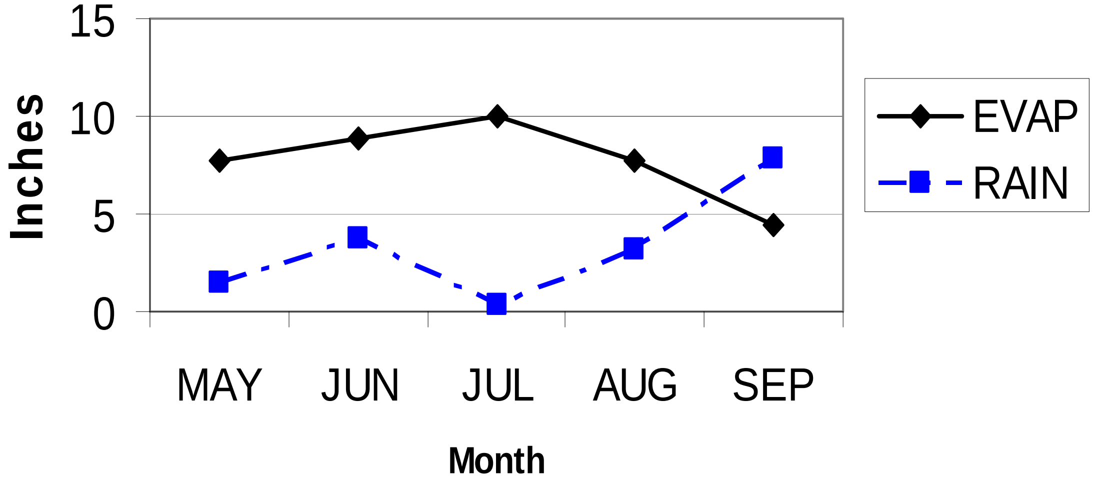

2006 Precipitation
Southeast Farm
Inch
9
8
7
6
5
4
3
2
1
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Month
2006
54-yr avg


2006 Cumulative Precipitation
Southeast Farm
Inch
30
25
20
15
10
5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
2006
54-yr avg

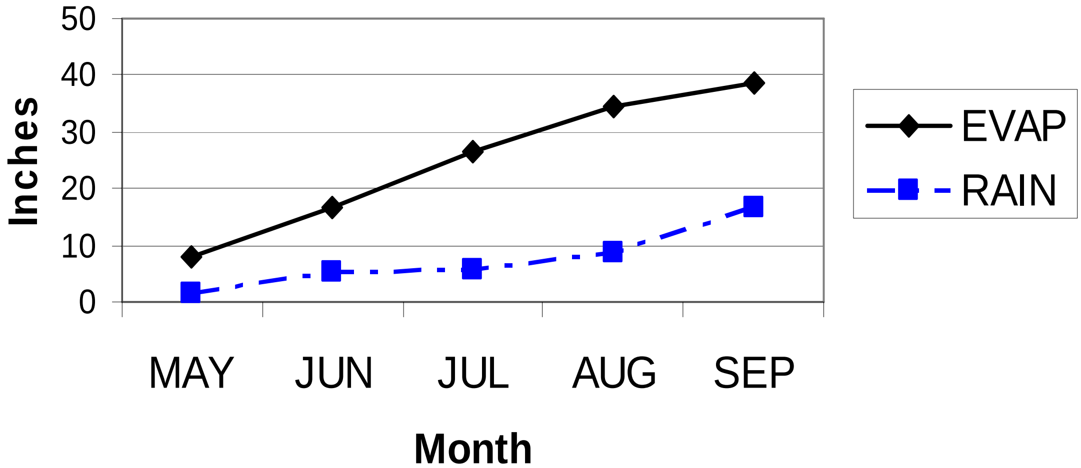

2006 Growing Degree Units (GDU)
Southeast Farm
Heat Units
900
700
500
300
100
APR
MAY
JUNE
JULY
AUG
SEP
OCT
Month
AVG 30yr+
2006
50 degree basis, SERF


2006 Cumulative GDU Data
Southeast Farm
Heat Units
3750
3000
2250
1500
750
0
APR
MAY
JUNE
JULY
AUG
SEP
OCT
Month
Avg (Total)
2006 Total
50 degree basis, SERF

2006 Growing Season
Rainfall vs. Evaporation
Southeast Farm



2006 Growing Season
Cumulative Rainfall vs. Evaporation
Southeast Farm



SOYBEAN INOCULATION STUDY

R. Berg, A. Wiebesiek, R. Stevens,
B. Jurgensen, and G. Williamson

Southeast Farm 0602

INTRODUCTION

Relying on legumes to convert atmospheric nitrogen for their own needs and for subsequent crops has played an important role in cropping systems for centuries. However, strategies used to inoculate legumes with beneficial microorganisms have changed dramatically in the past decade.

This experiment evaluated both commercial and experimental microbial inoculant formulations with and without *Bradyrhizobium* and *Bacillus* bacteria in a reduced tillage soybean field at Southeast Research Farm in 2006.

METHODS

Fifteen combinations of microbial inoculants (Table 1) provided by Becker Underwood, Inc. were manually applied as soybean seed treatments according to the manufacturer's recommendations the same day the seed was planted. A representative soil sample was collected at planting for lab analysis.

Four replications of each treatment were established as a completely randomized block design using six-row plots (30-inch row spacing) approximately 15 ft wide by 85 ft long. Pesticides were applied as needed to control weeds and insects.

Plant color was monitored throughout the growing season. Plant counts were taken in late June and again at harvest - along with plant height and lodging in the fall. Grain was harvested from four middle rows (10 ft wide) with a plot combine to determine yield. Grain moisture, test weight, dry matter, protein, and oil were also measured for each plot. A relative yield index was calculated as the grain yield of each plot divided by the corresponding grain yield of the non-inoculated control within each replication.

Net economic return per acre reflects soybean marketed on a fresh weight basis at $5/bu less the cost of seed and microbial inoculant.

Inferences were based on analysis of variance using the General Linear Model with SAS (Statistical Analysis Software). Differences among treatment means were compared using Least Significant Difference (LSD) at the 90% probability level. Additional management information is summarized in Table 2.

RESULTS AND DISCUSSION

Stand establishment and pest control were very good throughout this study. Insecticide was applied to control soybean aphid and bean leaf beetle during pod fill. We received almost no precipitation in July, but had good rainfall in August.

No plant color differences were noted among the microbial treatments during the growing season. Lodging, shatter, or other problems were not observed. Canopy height averaged 32 inches tall at harvest.

Soybean grain yield was a little below average at 38 bu/ac with relative yields that were 90 to 110% of the non-inoculated control. Grain quality was very consistent among all microbial products tested at 38% protein and 22% oil on a dry matter basis. Grain moisture was a little higher and test weight a little lower for one of the SC1 experimental bradyrhizobial treatments because of a border effect observed on the ends of a few plots in the northeast part of the field that matured a little slower than normal.

Applying microbial treatments significantly influenced plant population at harvest, but had very little if any impact on plant density in June - or on grain yield, quality, or any other measured response (Table 3, June population data not shown). Soybean plant population at harvest was generally 10 to 15% higher when the inoculum applied contained both types of bacteria, either as Vault, Integral, or Subtilex versus applying the non-nodulating *Bacillus* bacteria alone. This trend seemed to occur with nearly all of the Becker Underwood bradyrhizobia strains, except the four-way combination treatment.

Plant population was adequate at both sampling dates, but declined nearly 22,000 plants/ac (14%) by harvest. Plant population averaged 156,000 plants/ac in June and 134,000 plants/ac at harvest, which was 94 and 80% of the initial seeding rate, respectively.

Becker Underwood products that contained both bradyrhizobia plus Extender and/or *Bacillus* had slightly better yield and economic return. Experimental SC1 and SC2 products alone (without adding Extender or *Bacillus*) performed a little weaker. Becker Underwood products also performed at least as good as or maybe slightly better than similarly packaged products from Nitragin Inc.

Soybean yield increases of 0.5 to 1 bu/ac should cover the $3 to 5/ac cost to buy these products and have them applied as seed treatments before planting. Yield responses with microbial products in this field were + 3 to - 4 bu/ac compared to the non inoculated control.

Theoretically, we could expect a net return of nearly $10/ac with the better yielding treatments compared to the control. Thirty percent of the 14 microbial products applied returned $5/ac ($3-6/ac) and 70% of them lost an average of $12/ac ($5-23/ac).

SUMMARY

Applying seed treatments with *Bradyrhizobium* and/or *Bacillis* bacteria had a minor effect on soybean plant population at harvest. Plant population in general declined an average of 14% from late June until harvest. The microbial products tested did not affect plant population early in the season, but differences were detected at harvest. Either wet or dry *Bacillus* formulations without commercial bradyrhizobia, had 15,000 to 20,000 fewer plants per acre, but it did not reduce soybean yield.

A corn-soybean rotation has been the primary cropping system used in this field for decades. Competition by native populations of bradyrhizobia already established in the soil, along with high levels of residual soil nitrogen from the previous crop and drought-like conditions in July made it challenging to see dramatic results using microbial inoculants as seed treatments for soybean this year.

Even though using microbial inoculants wasn't feasible for this field, they may still play an important role in cropping systems where soybean is being introduced or grown less frequently and/or have less residual soil nitrogen.

ACKNOWLEDGEMENT

Support for this project was provided by the South Dakota Agricultural Experiment Station, the Southeast South Dakota Experiment Farm Corporation, and Becker Underwood, Inc. Laboratory analyses for grain quality was provided by Kevin Kirby with soil analyses conducted at the Soil and Plant Testing Laboratory in the Plant Science Department, at South Dakota State University in Brookings, SD.

Table 1. Microbial inoculation treatments tested on soybean.
Southeast Research Farm; Beresford, SD; 2006.

Treatment	Bradyrhizobia	Bacillus [1]	Extender	Source [2]
Non inoculated control	----- [3]	-----	-----	-----
Nod+	Nod+	-----	-----	B. U.
Nod+ & Extender 1	Nod+	-----	B. U. 1	B. U.
Nod++ & Vault	Nod++	Integral	B. U. 2	B. U.
SC1 & Vault	SC1	Integral	B. U. 2	B. U.
SC2 & Vault	SC2	Integral	B. U. 2	B. U.
Integral	-----	Integral	-----	B. U.
Nod+ & Integral	Nod+	Integral	-----	B. U.
Subtilex	-----	Subtilex	-----	B. U.
Nod+ & Subtilex	Nod+	Subtilex	-----	B. U.
Optimize & Extender 2	Optimize	-----	Nitragin	Nitragin
SC1	SC1	-----	-----	B. U.
SC2	SC2	-----	-----	B. U.
Optimize	Optimize	-----	-----	Nitragin
4-way combination	Nod+/SC1/SC2	Subtilex+	-----	B. U.

[1] Bacterial strain *Bacillus subtilis*, strain MBI 600 (Integral = wet formulation, Subtilex = dry formulation)
[2] Becker Underwood Inc. (B. U.) and Nitragin Inc.
[3] ----- = None applied

Table 2. Management summary for soybean inoculation study (1-10B).
Southeast Research Farm, Beresford, SD; 2006.

Previous Crop	**Corn**
Variety	Prairie Brand 2141RR
Seeding Rate	166,400 seeds/ac
Planting Date	May 26
Fertilizer	None
Tillage System	Reduced tillage (Aerway®)
Herbicide	Roundup, early post & post
Insecticide	Proaxis
Harvest Date	October 4
0-6 inch [1]	Organic matter = 3.2%, Olsen P = 21 ppm, K = 386 ppm, pH = 6.5, salts = 0.5 mmoh/cm
0-24 inch	NO3-N = 103 lb/ac

[1] Spring, 2006 soil test

Table 3. Effect of microbial inoculation on soybean performance. Southeast Research Farm; Beresford, SD; 2006.

Inoculant [1]	Plant Height	Plant Population [2]	Grain Yield [3]	Mois-ture	Test Weight	Relative Yield	DM [4] Protein	DM [4] Oil	Net Return
	inch	plants/ac	bu/ac	%	lb/bu	%	%	%	$/ac
Check [5]	32	133,000	38	12.0	54.2	100	38.6	22.1	152
Nod+	32	133,000	38	11.1	57.5	99	38.3	22.0	145
Nod+ & Extender 1	32	128,000	41	11.1	56.2	107	38.6	22.1	158
Nod+ & Vault	33	132,000	41	10.6	57.3	110	38.4	22.1	158
SC1 & Vault	32	141,000	37	13.3	54.8	98	38.2	22.0	143
SC2 & Vault	31	140,000	40	12.3	53.8	106	38.3	22.0	155
Integral	31	124,000	38	11.1	56.3	102	38.2	22.1	147
Nod+ & Integral	31	143,000	39	10.9	57.0	102	38.5	22.2	147
Subtilex	32	130,000	40	11.5	56.2	103	38.4	21.9	156
Nod+ & Subtilex	31	144,000	38	11.3	54.9	101	38.4	22.2	142
Optimize & Extender 2	30	132,000	36	11.5	56.2	94	37.8	22.1	132
SC1	30	139,000	34	14.5	52.3	90	38.5	22.1	131
SC2	31	140,000	35	11.4	56.1	91	38.4	22.1	129
Optimize	31	131,000	38	10.8	57.9	102	38.3	22.1	144
Nod+/SC1/SC2/Subtilex	33	123,000	39	12.5	54.9	105	38.5	22.1	142
Average	32	134,000	38	11.7	55.7	101	38.4	22.1	145
LSD $_{(0.10)}$	NS [6]	11,000	NS	NS	NS	NS	NS	NS	NS
CV, %	8.2	6.7	13.0	20.5	7.1	13.4	1.1	0.8	16.6

[1] Becker Underwood Inc. inoculants, except Optimize (Nitragin Inc.) with four replications per treatment
[2] Plant population at harvest
[3] Grain yield at 13% moisture and 60-lb/bu test weight.
[4] 100% dry matter basis (avg. dry matter = 90.1%, std. dev. = 0.4%)
[5] Non-inoculated control
[6] NS = not significant

CROP NUTRIENT MANAGEMENT USING MANURE FROM RATIONS CONTAINING DISTILLERS GRAIN

R. Gelderman, J. Gerwing, R. Berg,
B. Rops, A. Bly, and T. Bortnem

Plant Science 0604

INTRODUCTION

The rapid growth of the ethanol industry in South Dakota has a benefit of producing large amounts of a feedstuff in the form of distillers' grain. Utilization of the wet distillers grain (WDG) may lead to concentrated animal feeding operations (CAFOs) near the ethanol plants. Feeding of dry distillers grain (DDG) could lead to more feeding operations (especially ruminants) through out the state.

Distillers' grain is essentially corn with the starch removed resulting in a higher concentration of phosphorus (P) when compared to the original grain. Research has shown as dietary P increases above the animals P needs, excreted P increases. Therefore, manure from animal diets utilizing distillers' grain may be higher in P.

Manure has been shown to be an excellent source of plant nutrients. However, over application of manure near some CAFOs can lead to ground water (nitrate-N) and surface water (P) contamination. South Dakota has regulated land application of manure from CAFOs for a number of years based on crop nitrogen needs. Since the ratio of N to P in manure is much narrower than in grain, this can lead to over application of P because more P will be applied than is needed by the crop. In December, 2002 the EPA directed states to also consider P management in land application of manure.

There is a need to agronomically evaluate the SD Department of Environment and Natural Resources (DENR) rules (February, 2003) pertaining to manure application rates that are based on nitrogen and phosphorus. The producer needs to be assured that these rates will not limit yields when compared to commercial fertilizer application. In addition, buildup of soil nitrate-N and soil test P needs to be monitored.

Purpose: To agronomically evaluate rates of distiller's grain derived manure based on nitrogen and phosphorus crop needs.

OBJECTIVES

1) To determine if manure rates applied according to rules set by the SD DENR for CAFOs meet crop nutrient needs (grain yield and crop growth) as compared to commercial fertilizer.
2) To compare P buildup rates when manure is applied according to either the N or P needs of the crop.
3) To compare nitrate-N carryover from manure and commercial fertilizer.

METHODS

Two field sites were established to evaluate the study objectives. A site is located on an Egan soil just south of the office building at the Southeast Farm near Beresford on which beef feedlot manure was applied. The other site is located on the east Agronomy Farm at Brookings on Vienna-Lamoure soils (Range D-1) on which daily-scrape solid dairy cow manure was applied.

Beginning soil tests for 2006 can be found in Table 1. The P soil test from the P manure treatment was used to calculate the manure needed for that treatment. If the P soil test is high enough where no P recommendation would be made, the average crop P removal was used to calculate manure P rate. Similarly, the nitrate-N soil test from the N manure treatment was used to calculate the manure needed for that treatment. Both the P and nitrate-N soil tests were used from the fertilizer treatment to make the phosphate and N recommendations for the fertilizer treatment.

The manure was applied on October 28, 2005 and incorporated with a disc three days later at the Beresford site and applied on November 14, 2005 and incorporated in the spring at Brookings. The analysis of the beef feedlot manure and the dairy barn manure are given in Table 2. The treatments established and nutrients applied are listed in Table 3. Treatments were arranged in a randomized complete block design with four replications.

At Beresford, Asgrow 2403RR soybean was planted on May 16 in 30 inch rows. Harvest was completed with a plot combine on October 4. At Brookings, Producers Hybrid 5154 YGCBRR was planted in 30 inch rows on May 23. Harvest was completed with a plot combine on October 17.

RESULTS

Previous manure applications for the N and 2N treatments have increased most soil tests over the other treatments (Tables 1 and 4). Soybean yields at Beresford were somewhat stressed by low rainfall in July. Soybean grain yields from the check were not significantly different from treatment yields although the check was 3 to 6 bu/a lower than yields from treatment plots (Table 3).

Corn grain yields were not significantly different due to applied treatments at the Brookings site (Table 3.). However the yields from check plots were 8 to 23 bu less than treatment yields. High spring soil moisture caused plant growth variability at this site in 2006. The east two replicates were especially affected.

Post-harvest soil tests at both sites indicate increases in soil tests especially with the higher two rates of applied manure (Table 4).

Four Year Summary

The first four years of this experiment has been summarized and results are given here. The total manure and nutrients applied are shown in Table 5. The N values are available N and not total N in the manure. More N is applied for the manure N treatment compared to the fertilizer treatment because the manure treatment is applied each year including for soybean while N is only applied on corn years for the fertilizer treatment. Phosphorus additions for the fertilizer treatment compared to the manure P treatment are similar at the Beresford site. Because soil test P is low both rates are dependent on P soil test recommendations. Soil test P in 2006 is also similar between these two treatments (Table 4).

At the Brookings site, the manure P treatment has had much more P applied compared to the fertilizer treatment. Here the soil test is high and P is applied in the manure P treatment at crop removal rates.

Four year total yields are significant among treatments even though individual year yields may not be different (Tables 6 & 7). In general higher manure rates gave higher yields than the fertilized treatment.

Phosphorus soil tests have increased over four years with the manure N and manure 2N treatments (Figures 1 and 2). In general the phosphorus applied with manure or fertilizer increased soil test P values similarly.

CONCLUSIONS

Manured treatments produced grain yields similar or better than fertilized treatments.

Soil test P from manure is changing soil test P similarly to fertilizer P.

The study will be continued with one change. A "high fertilizer" treatment will be added to determine if higher yields from manure treatments are because of higher added nutrient levels or some other factor.

ACKNOWLEDGEMENTS

These studies were funded in part by the South Dakota Corn Utilization Council, the South Dakota Ag. Experiment Station and the Southeast South Dakota Research Farm.

Table 1. Soil tests[1] after third year of manure studies, 2006

Treatment	O.M.	NO_3-N	SO_4-S	Olsen P	K	Zinc	pH	salts
------ Beresford site ------								
	%	-lb/ac in 2 feet-		------- ppm -------				mmho/cm
Check	4.0	44	22	4	289	1.17	6.5	0.4
Fert	4.0	184	24	14	260	0.97	5.9	0.4
P	4.2	100	30	20	416	2.80	6.4	0.4
N	4.4	120	40	25	481	2.80	6.7	0.4
2N	4.5	180	80	60	833	3.87	6.8	0.6
------ Brookings site ------								
Check	3.1	48	68	19	158	1.31	7.7	0.4
Fert	3.0	56	74	21	153	1.28	7.7	0.4
P	3.2	36	98	23	170	1.24	7.9	0.5
N	3.4	56	76	45	134	2.21	7.9	0.4
2N	3.2	74	90	45	248	2.46	7.8	0.4

[1] Samples taken fall of 2005.

Table 2. Manure nutrient analysis for manure studies for 2006.

Analysis	units	------ Manure[1] ------	
		Beef (from apron)	Dairy (daily scrape with straw bedding)
Total N	lb/ton	24.7	10.2
Organic-N	lb/ton	23.3	9.5
Ammonium-N	lb/ton	1.4	0.7
Total Available-N	lb/ton	13.1	5.4
P_2O_5	lb/ton	8.6	6.0
K_2O	lb/ton	37.9	2.8
Moisture	%	65.0	61.5

[1] Manure collected and analyzed in November, 2005, as received basis.

Table 3. Treatments, nutrients applied and influence on grain yields, 2006.

Treatment	Manure applied[1]	Manure N-P_2O_5-K_2O applied	Fertilizer N-P_2O_5-K_2O applied	Grain Yield
	ton/ac	---------------- lb/ac	---------------	bu/ac
----------------------------- Beresford site (soybean) --------------------------				
check	0	0-0-0	0-0-0	44
Fertilizer	0	0-0-0	0-0-0	48
Manure – P[2]	3.5	38-39-133	0-0-0	47
Manure – N[3]	17.4	190-197-659	0-0-0	50
Manure - 2N[4]	34.8	380-394-1318	0-0-0	48
LSD				5.0
Pr>F				0.28 (NS)
C.V.%				6.9
------------------------ Brookings site (corn) -----------------------------				
check	0	0-0-0	0-0-0	109
Fertilizer	0	0-0-0	50-12-0	120
Manure – P[2]	11.3	50-12-76	0-0-0	117
Manure – N[3]	16.7	90-100-112	0-0-0	125
Manure - 2N[4]	33.3	180-200-224	0-0-0	132
LSD $_{(0.05)}$				18.1
Pr>F				0.15 (NS)
C.V.%				9.7

[1] Applied fall 2005
[2] P manure rate based on P recommendation from soil test or on P removal from crop, which ever is greater.
[3] N manure rate is based on N requirement of 1.2 lb/bu for corn or 3.8 lb/bu for beans minus soil test nitrate-N and legume credit.
[4] 2N manure rate of twice the N rate above.
* Yields followed by different letters are significantly different at the 0.05 level.

Table 4. Soil tests[1] after fourth year of manure studies, 2006.

Treatment	O.M.	NO_3-N	SO_4-S	Olsen P	K	Zinc	pH	salts
------------------------------------- Beresford site -------------------------------								
	%	-lb/ac in 2 feet-		------- ppm	-------			mmho/cm
Check	3.6	28	19	6	249	0.86	6.5	0.4
Fert	3.7	28	18	15	274	0.81	6.3	0.3
P	4.0	44	46	15	433	1.71	6.4	0.3
N	4.0	90	72	37	612	2.62	6.8	0.4
2N	3.9	232	118	68	968	3.13	7.0	0.5
-- Brookings site ----------------------------------								
Check	3.5	14	117	23	159	0.96	7.6	0.4
Fert	3.8	14	155	29	162	1.38	7.3	0.4
P	3.6	22	180	28	164	1.31	7.5	0.5
N	3.8	22	188	43	208	1.77	7.6	0.5
2N	3.6	35	204	54	270	2.04	7.4	0.4

[1] Samples taken fall 2006.

Table 5. Manure and nutrients applied, 2003 – 2006.

Treatment	----- Beresford -----				----- Brookings -----			
	manure	N	P_2O_5	K_2O	manure	N	P_2O_5	K_2O
	ton/ac	----- lb/ac ----			- ton/ac -	----- lb/ac ----		
Fert	0	193	162	0	0	153	12	0
Man P	17	183 + 59[1]	186	339	40	199 + 44[1]	193	268
Man N	50	518	626	908	99	446	454	706
Man 2N	100	1036	1252	1808	176	832	822	1244

[1] Fertilizer N added to supplement manure

Table 6. Yields from manure study, Beresford, 2003-2006

Treatment	2003 corn	2004 soybean	2005 corn	2006 soybean	4 year Total
		------------------ bu/ac--------------------			
Check	143	41	88	44	316
Fert.	139	45	109	48	341
Man. P	151	44	102	47	345
Man. N	152	47	121	50	371
Man. 2N	142	48	105	48	342
Pr>F	0.30 NS	0.14 NS	0.003	0.71 NS	0.03
L.S.D.	---	---	12	--	30

Table 7. Yields from manure study, Brookings, 2003-2006

Treatment	2003 soybean	2004 corn	2005 soybean	2006 corn	4 year Total
		------------------ bu/ac --------------------			
Check	32	147	59	109	347
Fert.	30	151	59	120	361
Man. P	33	152	60	117	362
Man. N	32	166	61	125	383
Man. 2N	32	172	61	132	397
Pr>F	0.30 NS	0.04	0.34 NS	0.14 NS	0.03
L.S.D.	---	18.2	---	---	30.5

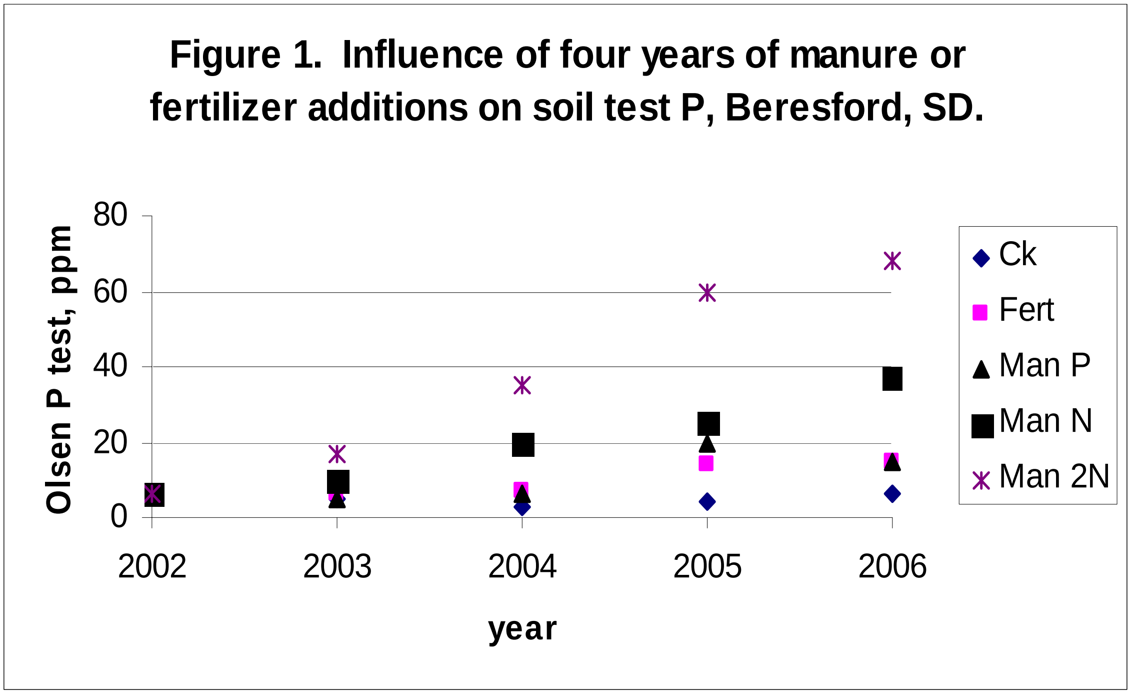


Figure 1. Influence of four years of manure or fertilizer additions on soil test P, Beresford, SD.
Olsen P test, ppm
0
20
40
60
80
2002
2003
2004
2005
2006
year
Ck
Fert
Man P
Man N
Man 2N

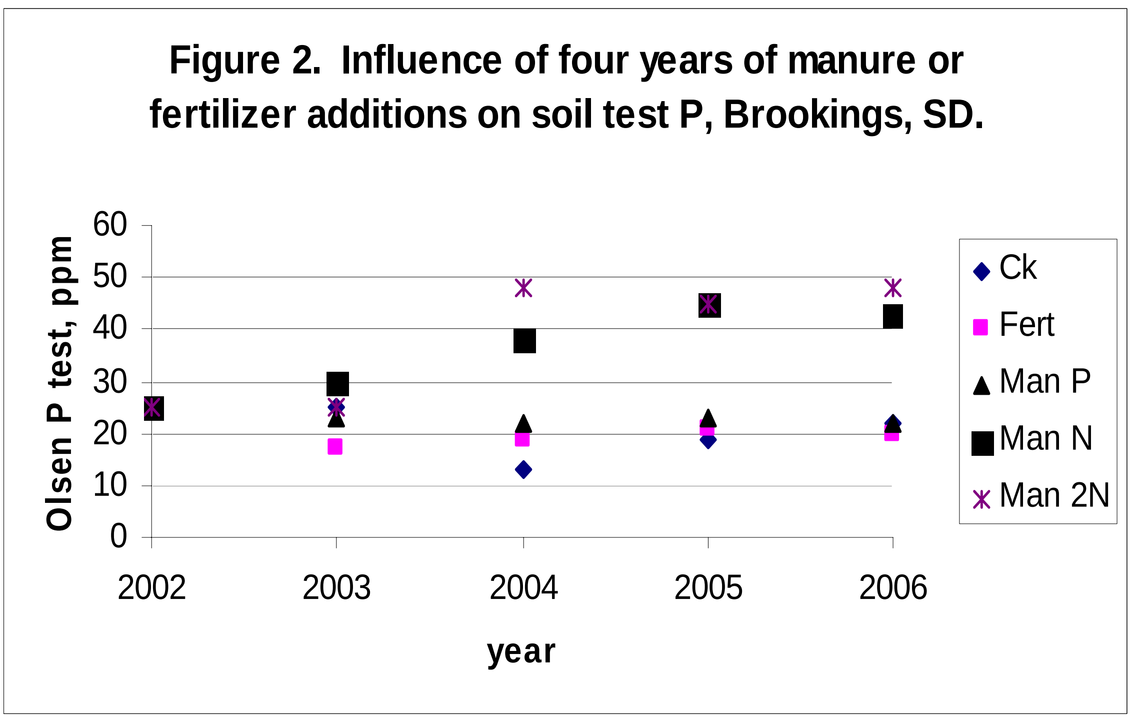


Figure 2. Influence of four years of manure or fertilizer additions on soil test P, Brookings, SD.
Olsen P test, ppm
0
10
20
30
40
50
60
2002
2003
2004
2005
2006
year
Ck
Fert
Man P
Man N
Man 2N

SE FARM REPORT
SDSU

NITROGEN RATES FOR CORN

R. Gelderman, J. Gerwing, and A. Bly

Plant Science 0605

INTRODUCTION

Nitrogen rates for corn are receiving renewed attention because of high nitrogen fertilizer prices. Environmental concerns with nitrate-N leaching, hypoxia in the Gulf, and the Conservation Security Program (CSP), are also having an impact in renewing questions about nitrogen rates for corn.

Much of the recent work for corn N rates has been on corn following soybean. However, more corn on corn rotations are also being used because of favorable economics with this rotation. Little N calibration work has been done on corn following low residue, non-legume crops such as corn silage or sunflower. In theory, N rate needed for maximum economic corn yield may be less following these crops than following a high residue corn or small grain crop. Less N may be immobilized because of lower residue amounts that contain high C:N ratios.

The nitrogen rate for corn following soybean has always been found to be lower than for corn following corn. This so called 'nitrogen credit' given for soybean is actually a misnomer. It implies that the soybean crop has provided 40 lbs of N in the soil for the corn crop. In reality it just means that corn grown after soybean takes less N for maximum yield than corn following corn or following another high residue crop. The extra N needed for the corn after corn is probably needed for the microbes breaking down the low N residue. In fact, we should probably base our N rates for corn when it follows soybean and add another 40 lbs for corn following a high residue crop. Much like we add another 30 lb N/ac if the tillage system is no-till or strip-till.

Our objectives in this study are:

1) to determine the maximum economic N rate for:
   a) corn following soybean
   b) corn following corn
   c) corn following corn (above ground residues removed CC_{rr}).

2) to measure and compare soil nitrate-N, total soil N and total soil carbon after each of the above rotations and N treatments.

METHODS

A tilled site was established on the north quarter of the Southeast Research Farm near Beresford (SERF) in the spring of 2005 to answer the above objectives. The site consists of Egan silty clay loam soils which are deep well drained soils found in glacial till. The slope is from 2-3%. Beginning soil tests are OM % = 3.5, P ppm = 13, K ppm = 301, Zn ppm = 1.4, Sulfate-S lb/ac in 2 '= 46, pH = 7.2 and salts = 0.8 mmho/cm. All nutrients are high to very high levels. The beginning 2006 soil nitrate-N values after corn or soybean ranged from 30 to 40 lb/ac in 2 feet.

Nitrogen treatments are 0, 30, 60, 90, 120, 150, and 180 lb N/ac as urea. The N rates are over-laid on three rotations; corn on soybean (CS), corn on corn (CC), and corn on corn with above-ground residue removed (CC_{rr}). The experimental design is a split-strip with four replications. The N rates are the splits within each rotation strip. Plot size is 15 by 50 feet. The urea was broadcast with a Gandy air applicator on April, 27 2006. The field was disked the same day and then field cultivated on April 28 just before planting

Corn (Dekalb DK58-73 RR2/YGPL) was planted at 30,000 seeds/ac on April 28, 2006. Weeds were controlled as needed. SPAD 502 meter readings (indicates greenness of plant tissue) were taken on mid-V6 leaf and whole plant samples were taken at V6 stage on 8 June 2007. Ear leaf samples were taken for N concentration on July 17. Grain was harvested in the four center rows, each 45 foot in length, on 12 Oct with a plot combine. Four soil cores were sampled in 0-12, 12-24, and 24-36 inch increments and composited by depth on Oct. 25. Stalks were chopped, raked and baled on the low residue strips. No fall tillage was done.

RESULTS

Rate of N significantly increased plant greenness at V6 to roughly the 60 lb/ac N rate (Table 1). Rotation also significantly influenced plant greenness. On average the plants on the corn after corn residue were 4 to 5 SPAD meter units less than the other two rotations. Much lower SPAD readings were found on plants in the zero N rate under the CC rotation than under the other two rotations.

Rate, rotation and the interaction also influenced plant growth at V6 (Table 1). The largest weight increase at this growth stage occurred with the first 30 lb N rate. The CC plants were the smallest at V6. There was a much larger increase in plant growth to the 30 lb N/ac rate for the CC plants compared to plants in the other two rotations. Additional nitrogen increased growth for plants under the CC rotation but did not increase plant weights to levels from the other two rotations. There is a relatively good relationship between V6 dry weight and greenness for the CC rotation (Figure 1). This relationship was much poorer for the CS or CC_{rr} rotations. Ear leaf N concentrations are not yet complete.

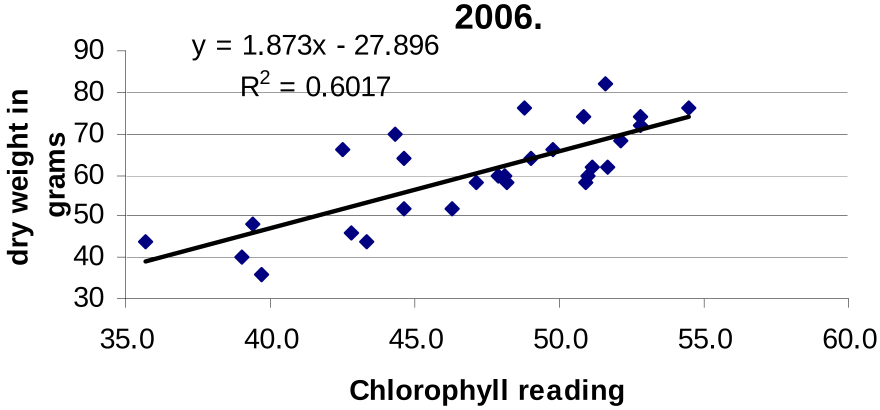
Grain yield was increased by N rate and influenced by rotation but not by the rate by rotation interaction (Table 2). Partly because of drought stress, there is variability with yield response to N rate. The response to N over all rotations indicates a grain yield increase to 60 lb N/ac, then yields are stable through 120 lb N/ac and a response is seen again at the 150 lb N rate. This rate is relatively high for a 115 bu/ac yield level. However, this is often seen with plants under stress. There is less N efficiency in such years. Lower N efficiency could be due to less root system and therefore lower uptake of available N or just less effective uptake of N in dry areas of the root zone.

Table 1. Influence of N rate, crop rotation and residue removal on SPAD meter readings and dry plant weight at V6 stage, Beresford SD, 2006.

N Rate	CS[1]	CC[2]	CC_{rr}[3]	**Mean**
	------- Rotation/residue -----			
	------------------ SPAD meter reading[4] ---------------			
0	47.2	39.4	47.6	**44.7**
30	50.9	45.6	46.7	**47.7**
60	53.4	50.7	51.8	**52.0**
90	49.8	50.5	54.5	**51.6**
120	52.5	47.1	49.9	**49.8**
150	54.0	46.7	52.0	**50.9**
180	53.5	50.3	52.1	**52.0**
Mean	**51.6**	**47.2**	**50.7**	**49.8**
Stats	CV=6.0%. Pr>F: rate=0.001, rot. = 0.02, rate x rot. = 0.10.			
	--------------- V6 dry weight, gm ------------------			
0	68.3	41.0	70.5	**59.9**
30	72.3	62.0	86.5	**73.6**
60	93.5	65.5	79.0	**79.3**
90	66.3	62.5	84.5	**71.1**
120	79.0	59.5	71.8	**70.1**
150	79.5	67.0	80.0	**75.5**
180	67.0	65.5	78.5	**70.3**
Mean	**75.1**	**60.4**	**78.7**	**71.4**
Stats	CV = 13.6%. Pr>F: rate = 0.02, rot. = 0.02, rate x rot. = 0.04.			

[1] CS = corn after soybean
[2] CC = corn after corn
[3] CC_{rr} = corn after corn, residue removed
[4] higher readings = higher measure of greenness or chlorophyll

Figure 1. Chlorophyll readings vs V6 dry weight (corn after corn, residue maintained), Beresford 2006.



Average grain yield (over all N rates) is highest after soybean, followed by the rotation with the corn residue removed (Table 2). The CC rotation averages 22% lower in yield than the corn after soybean rotation. This is higher than the 10 to 15% lower yields reported by other studies in good years. The relative decrease is consistent with other studies under a stressed environment. Less extensive roots with the CC rotation is thought to have limited water uptake. The CC_{rr} rotation produced 13% less yield than the CS rotation. Plants under less residue did produce better yields in a corn – corn rotation.

In general, residual soil nitrate-N increased with additional N for all rotations (Table 2). The largest soil nitrate increase occurs from the last 30 lb N/ac addition. This makes sense in that little yield response was seen from this addition. The effect of rotation was significant at the 0.10 level with regard to carryover nitrate. Even though the CC rotation had significantly less yield, the carryover nitrate-N was lower compared to the other rotations. This effect may suggest that microbial immobilization of N is a factor with this high C:N residue rotation (i.e. the microbes are utilizing the available soil N to breakdown residue). Carryover nitrate-N averaged higher with the CC_{rr} management compared to the CS rotation. Perhaps this is due to lower yields with this rotation compared to CS.

SUMMARY AND CONCLUSIONS

Drought decreased yields for the first year of this long term study. Nitrogen rate increased early plant green color, early growth, grain yield, and carryover soil nitrate-N. The corn after corn rotation with residue produced less early growth and grain yield. Lower N efficiency occurred in this stress year. It is too early in the study to suggest N rate needs for each rotation/residue combination.

ACKNOWLEDGEMENTS:

These studies are funded in part by the South Dakota Ag Experiment Station, and the Southeast Research Farm.

Table 2. Influence of N rate, crop rotation and residue removal on corn grain yields and residual soil nitrate-N, Beresford SD, 2006.

N Rate	------- Rotation/residue -----			
	CS[1]	CC[2]	CC_{rr}[3]	**Mean**
	----------------- corn grain yield, bu/ac ---------------			
0	96	53	73	**74**
30	96	73	96	**88**
60	119	93	101	**104**
90	122	92	104	**106**
120	112	95	105	**104**
150	134	108	105	**116**
180	128	108	115	**117**
Mean	**115**	**89**	**100**	**101**
Stats	CV=10.2%. Pr>F: rate = 0.00001, rot. = 0.002, rate x rot. = 0.28.			
	---------------- nitrate-N, lb/ac in 3 feet [4]------------------			
0	46	34	49	**43**
30	45	44	39	**43**
60	65	47	79	**64**
90	81	69	84	**78**
120	100	84	98	**94**
150	99	71	131	**100**
180	123	140	165	**143**
Mean	**80**	**70**	**92**	**81**
Stats	CV=34%. Pr>F: rate = 0.00001, rot. = 0.10, rate x rot. = 0.62.			

[1] CS = corn after soybean
[2] CC = corn after corn
[3] CC_{rr} = corn after corn, residue removed
[4] sampled Oct. 25, 2006.

SE FARM REPORT
SDSU

NITROGEN APPLICATION TIMING INFLUENCE ON SOIL NITRATE-N AND CORN GRAIN YIELD, BERESFORD, 2006

J. Gerwing, R. Gelderman, A. Bly, and R. Berg

Plant Science 0606

INTRODUCTION

Many opportunities for application of nitrogen occur during the year. It can be applied from the fall after soybean harvest until side-dress when corn has six leaves. During this time, conditions for N leaching and/or denitrification can occur. These losses reduce N availability to corn and may reduce yield potential. A research project was initiated to measure the affect of N application timing on N availability to corn in a corn soybean rotation.

MATERIALS AND METHODS

A site was selected on the Southeast Research Farm near Beresford, South Dakota. Five application timings and a 0 N check were included in a randomized complete block plot design with four replications. N application timings were: 1) soon after soybean harvest (early fall = EF), 2) after soil temps cooled below 50 degrees F (late fall = LF), 3) during March or April (early spring = ES), 4) immediately before planting (late spring = LS), and 5) when the corn was at the six leaf stage (side dress = SD). Application dates for each timing treatment can be found in Table 1. No Tillage was done after the LF and ES urea applications, but all plots were tilled after the EF and LS applications that prevented volatilization losses from those timings. Urea was used for all treatments except the side dress treatment. Ammonium nitrate was used in the side dress treatment to prevent volatilization losses since plots were not cultivated. It was assumed that cool conditions during the LF and ES application times would minimize volatilization losses of N from these treatments. The nitrogen rate for all timings was 140 pounds per acre. The previous crop was soybeans. Corn was harvested with a field plot combine. Soil samples were taken to a depth of 24 inches on June 15, 2006 from the check, EF, LF, ES, and LS treatments (table 2). Plot replications were composited for soil nitrate analysis.

RESULTS AND DISCUSSION

Corn was severely stressed by hot, dry conditions in July (Table 2). Average yield across all treatments was only 88 bushels per acre and was not affected by nitrogen application or timing (Table 1). Since there was no response to nitrogen, any losses of nitrogen or inefficient nitrogen use could not be estimated this year with corn yields.

Soil samples taken on June 15th to a depth of two feet for soil nitrate indicated losses of fertilizer N to volatilization did not occur in the late fall non incorporated treatment since the nitrate in this treatment was higher than the earlier incorporated urea (Table 3). Nitrate levels in the top foot were also highest in the April 4th application (194 lb) even though this treatment was not incorporated for almost a month. The high levels of nitrate found in the fertilized plots compared to the check (24 lb) would indicate leaching did not occur this spring. Leaching losses were not expected due to dry conditions but volatilization losses were possible with the late fall and early spring surface applied treatment. The more than 2.5 inches of rain in November and nearly 3.5 inches in April apparently moved the Urea N into soil before significant volatilization losses occurred. Subsequent dry conditions prevented leaching losses.

ACKNOWLEDGMENTS

Support for this study came from various sources including the Ag Experiment Station, Plant Science Dept, Extension Service and the SDSU Soil Testing Lab.

Table 1. N Application Timing Effect on Corn Grain Yield at the Southeast Research Farm, Beresford, SD in 2006.

N Application Timing	Date	Corn Yield
		bu/ac
Check	None	79
Early Fall (EF)	10/29/05	82
Late Fall (LF)	11/18/05	83
Early Spring (ES)	4/4/06	88
Late Spring (LS)	4/27/06	96
Side-dress (SD)	6/7/06	98
Pr>F		0.25
CV%		14.8
LSD (.05)		NS

Table 2. Precipitation at the SE Experiment Farm, Beresford, Nov. 1, 2005 to Oct. 31, 2006.

Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct
------inches------											
2.56	1.23	0.42	0.12	1.81	3.44	1.51	3.72	0.39	3.23	7.84	0.38

Table 3. June Soil Nitrate Levels from Nitrogen Timing Study, Beresford, SD 2006.

Sample Depth	N Application[1] Date				
	None	10/29/05	11/18/05	4/4/06	4/27/06
Inches	------lb NO_3-N[2]------				
0-6	20	110	120	168	100
6-12	4	30	36	26	10
12-24	20	48	52	92	24
Total	44	188	208	286	134

[1]140 lb N

[2]sampled 6/15/2006

FERTILIZER POTASSIUM, SULFUR, ZINC, PHOSPHORUS, BORON AND LIME EFFECTS ON CORN YIELD ON HIGH TESTING SOIL

J. Gerwing, R. Gelderman, A. Bly, and R. Berg

Plant Science 0607

INTRODUCTION

Some farmers in South Dakota are using phosphorus, potassium, sulfur, zinc, or lime on soils with high soil tests. Research by soil fertility staff at South Dakota State University during the last 30 years has not shown consistent economical responses to these fertilizer nutrients or lime when soil test levels are high. Therefore, the SDSU Soil Testing Lab does not recommend fertilizer nutrient application unless soil test levels are lower. The studies reported here were established in 1988 and 1990 to determine the effects of each of these commonly used nutrients and lime on corn and soybean yields and soil test levels when applied to high testing soils.

MATERIALS AND METHODS

Two experimental sites were established, one on the SE Experiment Farm near Beresford in 1988 and another on the Agronomy Farm near the SDSU campus in Brookings in 1990. Fertilizer treatments have continued at each location on the same plots since establishment. A corn-soybean rotation was followed at both locations. Corn was the 2006 crop. The soil at the SE Farm site is an Egan silty clay loam. Egan soils are well drained soils formed in silty drift over glacial till. The soil at the Brookings Agronomy Farm is classified as a Vienna loam. Vienna soils are well drained medium textured loam and clay loam soils formed from glacial till. Both soils are typical upland soils for their respective areas in the state. Fertilizer treatments were 50 lbs K_2O, 25 lbs sulfur (as gypsum), 5 lbs zinc (as zinc sulfate) and lime at both locations (Table 1). In addition, the Brookings site had a 40 lb P_2O_5 treatment and the Beresford site a boron treatment (2 lb/ac). The fertilizer treatments were applied each spring since the establishment year (1988 at Beresford and 1990 at Brookings) on the same plots. An exception is the boron treatment at Beresford that was initiated in 1997. Lime was applied only twice (1988 & 2003) at the SE Farm location and twice (1990 & 1992) at Brookings. Nitrogen (140 lbs/ac) was broadcast just prior to tillage and planting in spring. All fertilizer treatments were broadcast and followed by either disking or field cultivation. Herbicides were applied as needed at both locations. A randomized complete block design with four replications was used at both sites. Plot size was 15 by 65 feet at Beresford and 20 by 40 feet at Brookings. Harvest was done with a plot combine at both locations.

RESULTS AND DISCUSSION

Soil test results from soil samples taken before 2006 fertilizer applications are presented in Table 2. Potassium soil tests were in the very high range at Beresford and Brookings. Adding 50 lb/ac of K_2O per year since 1988 at Beresford and 1990 at Brookings raised the K soil test by 175 and 77 ppm, respectively. The sulfur soil test in the check plots was low at Beresford and medium at Brookings. Adding 25 lb/ac sulfur each year had a residual effect at Beresford, raising the soil test 22 lb/ac, but no residual effect at Brookings. The zinc soil test in the check was high at Beresford (0.82 ppm) and Brookings (0.40). Applying 5 lb/ac zinc each year raised the soil test to 14.40 and 15.80 ppm at Beresford and Brookings, respectively. The lime treatments made during this study had residual effect on soil pH. The check pH at Beresford was 5.8 and where lime was applied it was 6.8. At Brookings the check pH was 6.6 and limed treatments 6.7. The phosphorus soil test level at the Brookings site was 8 ppm without the phosphorus applications. The 40 lb/ac annual phosphorus applications raised the Olson soil test level to 35 ppm. There was no phosphorus treatment at Beresford and all plots receive phosphorus as needed. The 2 lb/a boron treatment started at Beresford in 1997 raised the boron soil test from 0.72 ppm to 1.53 ppm. The check soil test was in the high range (>0.50 ppm) and no boron would have been recommended.

Moisture stress adversely affected yields at Beresford and to some extent at Brookings. Corn yields averaged only 93 bushels per acre at Beresford (Table 3). No treatment significantly increased yield over the check. At Brookings corn yields averaged 137 bushels per acre (Table 4) and similar to Beresford, none of the treatments increased yield over the check. Since soil tests were generally high for the nutrients tested at these locations, little or none of the nutrients in question would have been recommended and little or no response was expected.

Yield results and soil test levels from previous years for these two studies can be found in the SE Farm Progress Reports (1988-2005) and in the 1988-2005 SDSU Plant Science Department Soil/Water Science Research annual report, Technical Bulletin Nos. 97 or 99.

ACKNOWLEDGMENTS: Support for these studies came from various sources including the Ag Experiment Station, Plant Science Dept, Extension Service and the SDSU Soil Testing Lab.

Table 1. Fertilizer Treatments, Fertilizer and Lime Study, Beresford and Brookings, 2006.

Treatment	Fertilizer Rates	
	Beresford[1]	Brookings[2]
	- - - - - - - lb/ac - - - - - - -	
Check	0	0
Phosphorus (P_2O_5)	-----[3]	40
Potassium (K_2O)	50	50
Sulfur	25	25
Zinc	5	5
Boron	2	-----[3]
Lime	-----[4]	-----[5]

[1] Applied each spring, 1988 - 2006 except boron applied only since 1997.
[2] Applied each spring, 1990 - 2006.
[3] Not a treatment at this location.
[4] 4000 lb and 3800 lb $CaCO_3$ equivalent applied spring 1988 and 2003, respectively.
[5]2500 lb and 2400 lb $CaCO_3$ equivalent applied spring 1990 and 1992, respectively.

Table 2. Soil Test Levels, Fertilizer and Lime Study, Beresford and Brookings.

Soil Test	Soil Test Level			
	Beresford[1, 3]		Brookings[2]	
	Check	Treatment	Check	Treatment
Potassium ppm	231	375	161	238
Sulfur, lb/ac, 0 - 6 in	6	16	6	4
lb/ac, 6 - 24 in	12	24	18	18
Zinc, ppm	0.82	14.40	0.90	15.80
pH	5.8	6.8	6.6	6.7
Olson Phosphorus, ppm	19	-----	8	35
Boron	0.72	1.53	-----	-----
NO_3-N, lb/A 2 ft	30	-----	36	-----
Organic Matter, %	3.1	-----	3.1	-----
Salts, mmho/cm	0.3	-----	0.4	-----

[1]Sampled 10/26/05
[2]Sampled 11/2/05
[3]160 lb P_2O_5 applied 11/19/01 and 4/01/03

Table 3. Fertilizer Effects on Corn Yield, Beresford, 2006.

Fertilizer Treatment	Yield
	bu/ac
Check	92
Potassium	93
Sulfur	85
Zinc	102
Boron	90
Lime	95
Prob of > F	0.07
C.V. %	7.6
LSD .05	NS

Table 4. Fertilizer Effects on Corn Yield, Brookings, 2006.

Fertilizer Treatment	Yield
	bu/ac
Check	141
Phosphorus	136
Potassium	142
Sulfur	134
Zinc	133
Lime	135
Prob of > F	0.95
C.V. %	12.0
LSD .05	NS

NITROGEN MANAGEMENT IN A CORN-SOYBEAN ROTATION

J. Gerwing, R. Gelderman, A. Bly, and R. Berg

Plant Science 0608

INTRODUCTION

There is increasing concern about the effects of nitrogen fertilizer on the environment, especially ground water quality. This concern has been intensified by reports of NO_3 - N of greater than 10 ppm in several locations in eastern South Dakota, especially where aquifers are shallow and soils are very coarse. In some instances, nitrogen fertilizer moving below the root zone has been implicated.

This nitrogen management experiment was established to study the effects of N rates in a corn-soybean rotation on nitrogen movement below the root zone. The typical rooting depth of corn, soybeans and wheat in South Dakota is four to five feet. In most situations in South Dakota, if nitrogen moves below the root zone it stays there and only rarely moves back up. Therefore, once out of reach of crop roots, nitrate has the potential to move down to the groundwater with percolating water during wet periods.

MATERIALS AND METHODS

This nitrogen management experiment was established on the Southeast South Dakota Experiment Farm near Beresford in 1988. It is located on an Egan silty clay loam soil. Egan soils are well drained soils formed in silty drift over glacial till.

Corn was planted on the site in even numbered years since 1988 and soybean was planted in the odd numbered years. The rates and timing of nitrogen fertilizer applied to the corn in 2006 are listed in Table 1. The treatments included a check (no N), the recommended rate applied in fall, spring or split between spring and 6 leaf stage and 200 and 400 lb rates spring applied regardless of the previous soil test. These treatments were applied to the same plots each year that corn was planted in the rotation. The recommended rate was adjusted according to the NO_3 - N soil test level and for credit given because of the previous years' soybeans. The recommended nitrogen rate was 123, 62, 90, 95, 95, 110, 125, 90, 100 and 110 lb/A respectively for the even numbered years 1988 through 2006. Nitrogen was broadcast as urea and immediately incorporated by tillage except the fall application was not incorporated until the following spring. The June portion of the split application was surface broadcast ammonium nitrate. Ammonium nitrate was used for this treatment to prevent volatilization losses. Years when soybeans were planted (odd numbered years) no nitrogen fertilizer was applied. Results reported here are from 2006 when corn was the test crop.

Phosphorus, potassium and pH soil test levels at the site are 17 and 247 ppm and 5.7 respectively. One hundred sixty pounds P_2O_5 was broadcast in the fall of 2001 and spring 2003 as 0-46-0 to raise the phosphorus soil test. A randomized complete block design was used on the experiment with four replications. Plot size was 15 feet by 65 feet. Corn was planted in 30 inch rows after tillage with a disc. No fertilizer was applied at planting. Four center rows from each plot were harvested with a plot combine. Soil samples were taken to a depth of six feet in one foot increments on October 20, 2006. Only the 0, spring recommended (110 lb rate), 200 and 400 lb/ac N rates were soil sampled.

RESULTS AND DISCUSSION

Corn yields in 2006 (Table 2) were limited by a relatively hot dry summer. July was particularly hot and dry with only 0.39 inches of precipitation (Table 3). Yields ranged from 52 bushels in the O N check to 99 bushels in the 200 lb N treatment. The spring and split applied treatment ranged from 91 to 99 bu/ac and were not significantly affected by timing or rate. That was expected since the dry condition reduced demand far below the 150 bushel yield goal and prevented any leaching losses. The fall N treatment, applied on November 15, had a yield of 84 bu/ac which was numerically lower than the other fertilizer treatments and statistically lower than the 200 lb/ac N treatment. This fall urea treatment was not incorporated until spring. Past experiments have shown volatilization losses of fall surface applied urea. Losses appeared to be larger in dry open winters like the winter of 2005-2006. It is likely this treatment trended lower at least in part due to volatilization losses.

Nitrate soil tests taken in the fall to a depth of six feet in the check and spring applied 110, 200, and 400 pound N rates showed nitrate leaching did not occur in 2006 (Table 4). The 400 pound N rate nitrate soil test in the top foot of soil was 192 lb/ac while the 2nd foot had only 40 lb/ac NO_3-N. The lack of leaching in 2006 was expected because of the relatively dry summer.

These plots will be rotated back to soybeans in 2007 and soil samples taken in the fall to a depth of 6 feet to determine carryover N levels and possible losses by leaching. Corn and soybean yields and soil tests from previous years of this study can be found in the Southeast Farm Progress Reports and in the Plant Science Dept Soil/Water Science Research Annual Reports.

ACKNOWLEDGMENTS:

Support for this study came from various sources including the Ag Experiment Station, Plant Science Dept, Extension Service and the SDSU Soil Testing Lab.

Table 1. Nitrogen Fertilizer Treatments Applied in 2006, Nitrogen Fertilizer Management Study, Beresford, SD.

	Time of Application		
Treatment	Spring[1]	7 leaf[2]	Fall[3]
	------------------------------ lb N/ac ------------------------------		
Check	0	-----	-----
Spring	110	-----	-----
Split	30	80	-----
Fall	-----	-----	110
Spring	200	-----	-----
Spring	400	-----	-----

[1] April 27, 2006
[2] June 15, 2006
[3] November 18, 2005

Table 2. Nitrogen Management Study Corn Yields, SE Experiment Farm, Beresford, SD; 2006

2006 Nitrogen		
Time	Rate	Corn Yield
	lb/ac	bu/ac
Check	0	52 a
Fall[1]	110	84 b
Spring[2]	110	91 b c
Split[3]	110	95 b c
Spring	200	99 c
Spring	400	91 b c
Pr > F		< 0.01
CV%		10.7
LSD .05		13.7

[1] Fall = 11/18/05
[2] Spring = 4/27/06
[3] Split = 30 lb 4/27/06, 80 lb 6/15/06

Table 3. Rainfall at the SE Experiment Farm, Beresford, SD; Nov. 1, 2005 to Oct. 31, 2006.

Nov[1]	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct
----------------inches----------------											
2.56	1.23	0.42	0.12	1.81	3.44	1.51	3.72	0.39	3.23	7.84	0.38

Table 4. Fall Nitrate Soil Test Levels, Nitrogen Management Study, Beresford, SD; 2005 - 2006.

	Fertilizer N Applied, lb/a, even years, 1988 through 2006							
	- - - - 0 - - - -		Recommended[1]		- - - 200 - - -		- - - 400 - - -	
Depth	2005	2006	2005	2006	2005	2006	2005	2006
feet	Soil NO_3 - N, lb/ac[2]							
0 – 1	26	12	16	12	24	88	32	192
1 - 2	16	12	12	16	16	32	12	40
2 – 3	8	12	8	16	8	40	16	40
3 – 4	8	12	8	16	16	20	48	48
4 – 5	8	16	12	16	28	32	68	84
5 - 6	8	20	16	20	28	40	68	100

[1] Rates applied were 123, 62, 90, 95, 95, 110, 125, 90, 100 and 110 lb N/ac in spring of even years 1988 –2006 respectively, yield goal 1988 – 1996 = 130 bu/ac, 1998 – 2002 = 145, 2004 – 2006 = 150 bu.

[2] Soil sampling dates: Oct 26, 2005, Oct 20, 2006.

SE FARM REPORT
SDSU

POLY UREA INFLUENCE ON CORN YIELD, BERESFORD, BROOKINGS, AND AURORA, 2006

J. Gerwing, R. Gelderman, A. Bly, and R. Berg

Plant Science 0609

INTRODUCTION

Nitrogen losses by leaching and/or volatilization when nitrogen fertilizer materials are surface applied are always possible in South Dakota. Heavy rains in May and June can leach N applied at planting. Dry condition in May and June can lead to volatilization losses from surface applied non-incorporated urea. It may be possible to minimize both these losses by using a slow release nitrogen source. A relatively new slow release material to the agriculture market is poly coated urea. The function of the poly coating is to prevent moisture from rapidly converting urea to ammonia and ultimately to nitrate. Ammonia can be lost by volatilization under some conditions and nitrate can leach before plants can use it if heavy rains occur early in the season.

MATERIAL AND METHODS

Three experimental sites were established to test the effectiveness of surface applied poly coated urea (PU) compared to regular urea (U). One site was on each of the SDSU Experiment Stations at Beresford, Aurora and Brookings.

The Beresford site had corn as the previous crop and had been fall disked and finished with a field cultivator in spring before planting corn. The Aurora and Brookings sites were long term (6+ years) no-till corn soybean rotations. Soybean was the 2005 crop at these locations and the corn was planted no-till in 2006. These two sites had essentially 100% residue cover except for a 6 to 8 inch band removed over the row with the planter at planting. Nitrogen was surface broadcast on May 25 at all locations when corn was in the 2-3 leaf stage. No tillage was done after N application. Plots were 10 to 15 feet wide and 40 to 55 feet long depending on location with 4 replication of each treatment. Nitrogen rates at all locations were 0, 40 lbs N/ac as urea and poly urea, 80 lbs N/ac as urea and poly urea, and 160 lbs N as urea at Aurora and Brookings. As a measure of the speed of conversion of each material to nitrate, the 0, 80 U, and 80 PU plots were sampled for nitrate to a depth of 2 feet on June 15. All plots were harvested with a field plot combine.

RESULTS AND DISCUSSION

Hot dry condition, especially during July, limited maximum corn yields to about 95 bu/ac at Beresford, 115 bu/ac at Brookings and 125 bu/ac at Aurora (Table 1). Nitrogen rate, however, did significantly increase yield at all locations making it possible to test weather urea or poly urea resulted in more efficient nitrogen use by corn. The 40 lb nitrogen rate increased yield about 13, 17, and 18 bu/ac at the Brookings, Aurora and Beresford sites respectively. The yield increase, however, was not different between the U and PU treatments at any of the locations indicating that if there were volatilization losses from regular urea, poly urea did not reduce the losses. Further evidence of this was the 80 lb rates of both the Aurora and Brookings sites where those rates yielded higher than the 40 lb rates but again there was no significant difference between U and PU. Since there was no ammonia nitrate treatment in these experiments, the extent of urea volatilization, if any, could not be determined.

Soil samples taken three weeks after N application (June 15) in the 80 lb rate plots showed 28 and 20 lb less nitrate N at Beresford and Brookings respectively in the top 6 inches of the PU treatment when compare to the U treatment. That would indicated the poly coating was performing as it was designed to do, that is slow the conversion of urea to more available form of N. Visual observation further confirmed this slower release of N from PU. Poly urea plots appeared more N deficient (lighter color) early in the season and were visibly shorter at all locations. This slower release of N from the PU, however, did not apparently reduce volatilization losses if there were any since yields were not affected.

Dry conditions in 2006 prevented leaching so it was not a factor in N use efficiency this year. If it had been an issue the slower release of N from the poly urea may have prevented some N losses.

ACKNOWLEDGMENTS: Support for these studies came from various sources including the Ag Experiment Station, Plant Science Dept, Extension Service and the SDSU Soil Testing Lab.

Table 1. Poly Urea Influence on Corn Yield, SDSU, 2006

N Rate[1]/	Corn Yield			
Material	Beresford[3]	Aurora	Brookings	Avg
	-----------------------	bu/ac	-----------------------	
0	77 a	78 a	89 a	81
40 U[2]	94 b	94 b	102 b	97
40 PU[2]	93 b	91 ab	103 b	96
80 U	96 b	125 c	110 bc	110
80 PU	98 b	116 c	117 c	110
160 U		128 c	108 c	
P ^ >F	< .01	< .01	< .01	
CV, %	10.0	9.9	6.4	
LSD .05	11.7	15.7	10.1	

[1]N applied May 25
[2]U = urea, PU = poly urea
[3]Beresford site was tilled, Aurora and Brookings were no-till

Table 2. Poly Urea Influence on Soil Nitrate, SDSU, 2006

N Rate/	NO_3-N Soil Test[1]			
Material	Depth	Beresford	Aurora	Brookings
	inches	-----------------	lb/ac	-----------------
0	0-6	20	10	22
	6-12	6	6	12
	12-24	16	8	20
80 U	0-6	72	24	60
	6-12	14	6	14
	12-24	32	8	20
80 PU	0-6	44	20	40
	6-12	8	6	12
	12-24	20	8	20

[1]Sampled 6/15/06, N applied 5/25/06

SE FARM REPORT
SDSU

Soybean Cyst Nematode Studies, 2006

James D. Smolik

Plant Science 0610

OBJECTIVES:

1) Determine distribution of soybean cyst nematode (SCN) in South Dakota.
2) Determine effect of SCN on soybean yields in small plot and field-scale tests.
3) Determine crop rotation effects on SCN population densities.
4) Measure reproduction of SCN on resistant, susceptible, and experimental soybean lines, and assist SDSU soybean breeder in development of SCN-resistant lines.

RESULTS:

We continued to determine the distribution of SCN through samples received by the SDSU Nematode Testing Service. Approximately 1200 samples were processed for SCN in 2006, and nearly 50% were positive for SCN. This was the highest infestation rate recorded in our surveys over the past 12 years. The number of counties where SCN has been found remains at nineteen. A large number of samples were received from Lincoln County and 68% were positive for SCN. Thus, Lincoln County joins Union, Clay, and Turner as counties with very high levels of SCN-infested fields. The distribution of SCN in Lincoln County based on the 2006 samples is shown in Figure 1.

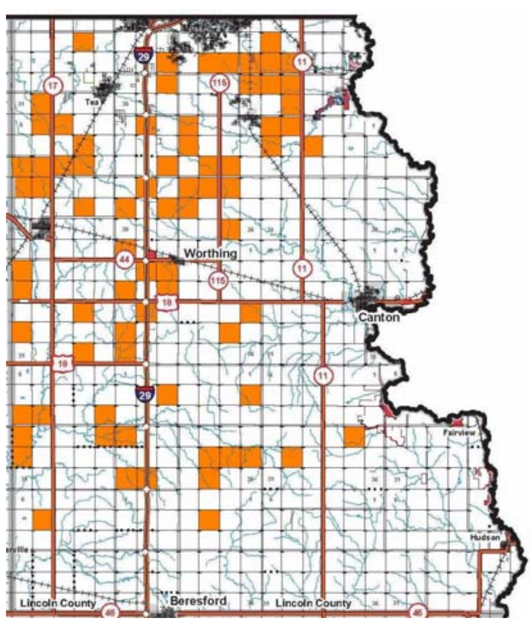


Figure 1. Map of Lincoln County. Shaded sections contain a field or fields that were positive for SCN in 2006.

A replicated, field-scale strip test was established in a cooperator's irrigated field in Turner County. Yields of the resistant varieties were 15 to 32% higher than the susceptible varieties (Table 1). Population densities of SCN were substantially lower on the resistant varieties at harvest.

Table 1. Soybean yields and SCN populations in irrigated Tri-Ag Plot, Turner County.

Entry	Response to SCN	Yield (Bu/ac)	No. of SCN eggs + J-2 per 100 cm^3 soil at harvest\[a]
92M91\[a]	S	40.5\[b]	27993
92M70	R	53.5	1583
92M30	R	53.4\[c]	1500
92M61	R	52.2	2050
DKB 25-51	S	49.5	13550
DKB 26-52	R	48.3	5100
93M13	R	46.4	4450
		lsd.05= 4.1\[d]	

[a]/ Population density of SCN at planting was 500 eggs + J-2 per 100 cm^3 soil.
[b]/ Average of three replications.[c]/ Non-replicated entries.[d]/ Based on the replicated entries.

A second strip trial was also established in Turner County. Plots in this trial were severely damaged in a June hail storm and yields were very low (Table 2). All of the resistant varieties suppressed reproduction of SCN, and populations at harvest were substantially reduced from the at-planting levels.

Table 2. Soybean yields and SCN populations in hail damaged Turkey Ridge Agri-Service plot, Turner County.

Entry	Response to SCN	Yield (Bu/A)	No. of SCN eggs + J-2 per 100 cm^3 soil at harvest\[a]
DKB 25-51	S	5.6\[b]	9867
Garst 2721	R	10.5	183
M 286N	R	7.0	483
NK 26-V6	R	16.5\[c]	450
Garst 3236	R	14.3	950
PB 2183	R	11.2	350
NK 19-L7	R	10.3	50
PB 2794	R	7.7	475

[a]/ Population density of SCN at planting was 2066 eggs + J-2 per 100 cm^3 soil.
[b]/ Average of three replications. [c]/ Non-replicated entries.

Soybean yields and SCN populations were measured in a strip trial near Burbank. Yields of the resistant varieties were 8 to 27% higher than the susceptible (Table 3). In general, population densities of SCN at harvest were substantially lower on the resistant varieties. In a nearby second strip trial yields of the resistant varieties were 5-20% above the susceptible (Table 4), and SCN populations at harvest were lower on the resistant varieties.

Table 3. Soybean yields and SCN populations in Ray Hall plot, Clay County.

Entry	Response to SCN	Yield (Bu/ac)	No. of SCN eggs + J-2 per 100 cm^3 soil at harvest\[a]
Pioneer 92M91	S	52.2\[b]	17300
DeKalb 25-51	S	53.7	20867
Garst 2721	R	61.1	1717
NK 529-J6	R	66.2\[c]	3450
Croplan RC 2300	R	65.6	2650
Croplan RC 2754	R	64.3	1800
Stine 2032-4	R	64.0	950
Wensman 2195N	R	62.9	2600
SOI 2642 N	R	61.9	2450
Pioneer 93M13	R	61.4	3750
Wensman W2200	R	60.4	8500
NK S28-G1	R	59.4	8900
Great Lakes GL 2719	R	59.3	650
Asgrow AG 3006	R	59.2	2950
Asgrow AG 2802	R	58.5	7350
Garst 2251 N	R	57.9	4750
Pioneer 92M61	R	57.0	1800
Croplan RC 2964	R	56.3	2700
Asgrow 2403	S	53.9	9850
Stine 2505	S	51.9	14050
Pioneer 92B74	S	50.6	23650
		lsd.05= 3.1/[d]	

[a]/ Population density of SCN at planting was 1233 eggs + J-2 per 100 cm^3 soil.
[b]/ Average of three replications. [c]/ Non replicated entries. [d]/ Based on replicated entries.

Table 4. Soybean yields and SCN populations in Tom Hall strip trial, Clay County.

Entry	Response to SCN	Yield (Bu/A)	No. of SCN eggs + J-2 per 100 cm^3 soil at harvest\[a]
DeKalb 25-51	S	45.9	16050
SOI 26-42E	R	55.1	2050
NK 26V6	R	50.5	3400
Garst 2921	R	48.0	1800

[a]/ Population density of SCN at planting was 550 eggs + J-2 per 100 cm^3 soil.

We continued to investigate the status of field pea as a host for SCN in a SE Research Farm field trial. The trial measured reproduction of SCN on two varieties of field pea and on resistant and susceptible soybean. Population densities of SCN declined from initial levels on both field peas, increased slightly on the resistant soybean and increased nearly 6-fold on the susceptible soybean variety (Table 5). Yield of the SCN-resistant variety was nearly 50% greater than the susceptible variety. Based on this and previous years field and greenhouse studies it appears that rotating to field peas in SCN-infested fields will not result in increased SCN population densities.

Table 5. Reproduction of SCN on field pea and SCN resistant or susceptible soybean in SE Farm field trial.

Entry	No. of SCN eggs + J-2 per 100 cm^3 soil at harvest	Soybean yield (Bu/A)
Asgrow 2106 (S)	32750\[a]	24
Asgrow 2107 (R)	6750	35
Field pea - Salute	2475	
Field pea - Mozart	3750	

[a]/ Average of two replications.
Population density of SCN at planting was 5225 eggs + J-2 per 100 cm^3soil.

We thank the SE Research Farm personnel for planting, maintaining, and harvesting this research trial.

In cooperation with Dr. Roy Scott, SDSU soybean breeder, population densities of SCN on experimental and commercial soybean lines were measured in a Turner County field. This plot was damaged in a June hail storm and yield data was not obtained, however, the remaining plant stand was sufficient to allow a comparison of SCN populations. Several of the experimental lines in Test I appeared to possess a useful level of SCN resistance (Table 6). In Test II most of the experimental lines allowed substantial increases in population densities of SCN.

Table 6. Population densities of SCN on experimental and commercial soybean lines, Turner County, SD.

Test I		Test II	
Entry	# SCN eggs+ J-2/100 cm^3\[a]	Entry	# SCN eggs+ J-2/100 cm^3
AG 1501	1400	AG2403	3900
SD1111 RR	8300	DKB 20-52	900
MN 1803 RR	4300	DKB 26-52	450
DKB 20-52	650	AG 2801	500
LD03-23480R	11300	SDX00R-046-28	1650
SDX00R-020-41	800	U03-811125	1550
SDX00R-026-42	450	U03-813111	3150
SD03-2452R	450	U03-820043	2300
SD03-2478R	600	U03-840036	11150
SD03-3217R	1250	U03-850019	9050
SD03-3250R	4900	SD04R-4460	2600
SD03-3266R	2650	SD04R-4437	4250
SD03-3267R	3900	SD04R-3380	4400
SD03-3862	8500	SD04R-3264	11500
SD03-3868	2350	SD04R-2716	1900
SD03-3872R	350	SD04R-2703	2450
SD03-3879R	700	SD04R-3345	1050
U03-820038	6100	SD04R-3330	2250

[a]/ Sampled on 20 September, population density of SCN at planting was 850 eggs+ J-2/100cm^3 soil.

The reproduction of SCN on experimental soybean lines was also measured in a greenhouse study. Several of the SD experimentals appeared resistant to SCN (Table 7), and one of the lines (SDX00R-026-42) also performed well in the field study (Table 6).

Table 7. Reproduction of SCN on experimental soybean lines in 2006 Greenhouse study

Entry	# SCN eggs	Entry	# SCN eggs	Entry	# SCN eggs
SDX00R-026-42	25\[a]	SD04R 3347	4275	SD04R 4419	450
SD04-CV-517	100	SD04R 3326	900	SD04R 4406	450
SD04-CV-512	125	SD04R 3324	275	SD04R 4392	1325
SD04-CV 511	0	SD04R 3289	1125	SD04R 3407	825
SD04-CV 510	50	SD04R 3264	200	SD04R 3388	4500
SD04-CV 504	1800	SD04R 2722	1100	SD04R 3368	1375
SD04-CV 491	350	SD04R 2721	500	SD04R 3364	1750
SD04-CV 490	175	SD04R 2716	350	SD04R 3357	1700
SD04-CV 506	0	SD04R 2714	975	SD04R 3345	275
SD04-CV 492	1800	SD04R 2703	100	SD04R 3338	1825
SD04-CV 487	950	SD04R 2701	725	SD04R 3330	200
SD04-CV 520	975	SD04R 2700	1200	SD04R 2708	250
SD04-CV 509	800	SD04R 2696	1975	SD04R 2707	1675
SD04-CV 499	850	SD04R 2682	2650	SD04R 2705	625
SD04-CV 498	1300	SD04R 2663	2850	SD04R 2685	2750
SD04-CV 494	2600	SD04R 2590	1450	SD04R 2659	5400
SD04R 4437	300	SD04R 2575	2450	SD04R 2657	625
SD04R 4437	225	SD04R 2573	1075	SD04R 2654	1050
SD04R 4426	450	SD04R 2570	525	SD04R 2577	775
SD04R 4423	950	SD04R 2564	950	SD04R 2569	1275
SD04R 4411	850	SD04R 2551	975	SD04R 2535	2700
SD04R 4401	550	SD04R 2544	500	SD04R 2525	650
SD04R 4394	1800	SD04R 2543	250	PI - 88788	225
SD04R 3381	550	SD04R 2541	800	PI - 90763	25
SD04R 3380	300	SD04R 4452	3575	Surge	1350
SD04R 3361	1825	SD04R 4442	2375	SoDak 1091	1250
SD04R 3360	650	SD04R 4430	925		

[a]/ Average of 2 replications.

ACKNOWLEDGEMENT:

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I also wish to thank Jeff Rippentrop, Brian Jurgens, Paul Peterson, Curt Adrian, Mary, Ray, and Tom Hall, Chuck Wirth, and Jim Reiners for their cooperative efforts over the past several years.

Nematode Populations in Alternative Cropping Systems Studies

J. D. Smolik

Plant Science 0611

Nematode populations were measured in late May and in October following row crop harvest. Soil samples were collected from all crops in replications one and four. Nematodes were extracted from soil by the Christie-Perry method, identified, and counted. The first six taxa listed in Table 1 include the plant parasites, the next taxonomic grouping (dorylaims) are primarily predaceous, and the last group (microbial feeders) are associated with decaying organic material. The latter two taxa are generally considered to be beneficial. The predaceous nematodes aid in regulating populations of other soil animals including plant parasitic nematodes, and the microbial feeders aid in the breakdown of crop residue and the recycling of nutrients.

Nematode numbers in five cropping systems were compared over the growing season. Numbers of stunt nematodes were low in all systems (Table 1). The highest population densities of spiral nematodes occurred on corn. Numbers of pin nematode were highest on soybean, which was also observed the previous year. Dagger nematode numbers in excess of 100 per 100 cm^3 soil will significantly reduce yield, and it appears that corn and soybean yields were reduced by this nematode in several of the systems. Highest numbers of lesion nematodes occurred on continuous corn. In general, the lowest populations of plant feeding nematodes occurred on spring wheat. Cropping system had little consistent effect on numbers of dorylaims. The lowest population densities of microbial feeding nematodes occurred in continuous soybean

Table 1. Nemathode Populations in Rotation Study - SE Farm, 2006

System\[a]	Stunt		Spiral		Pin		Tylenchinae		Dagger		Lesion		Dorylaims		Microbial feeders	
	Nematode taxa															
	5/23	10/16	5/23	10/16	5/23	10/16	5/23	10/16	5/23	10/16	5/23	10/16	5/23	10/16	5/23	10/16
continuous																
C-C-C-C	0\[b]	0	400	275	85	590	133	193	42	235	16	150	35	92	535	735
S-S-S-S	25	0	218	375	485	1785	16	100	143	200	0	16	60	16	150	310
W-W-W-W	0	0	125	110	32	8	350	290	0	50	0	0	224	60	441	225
A-A-A-A	0	0	0	200	343	558	42	160	118	50	0	32	150	108	450	360
modified																
C-C-S-C-C-S	0	116	325	500	185	626	16	93	32	93	16	35	107	100	483	468
Corn-soybean																
C-S-C-S	0	0	143	393	260	801	235	135	68	41	16	16	65	135	550	701
S-C-S-C	0	100	243	935	310	816	65	465	318	410	32	168	132	335	241	550
Wheat-soybean																
W-S-W-S	0	100	660	425	1050	5676	135	126	16	175	16	0	16	85	618	716
S-W-S-W	0	16	575	426	510	285	32	85	167	0	25	0	185	110	367	285
stacked																
C-C-S-S-W-W	16	0	275	565	92	85	200	16	0	150	42	16	16	92	575	533
S-S-W-W-C-C	16	0	260	308	250	135	193	32	58	16	0	0	116	135	408	605
W-W-C-C-S-S	25	0	335	610	110	510	160	133	35	32	116	75	42	185	576	235

[a]/ Fourth year of study, C=corn, S=soybean, W=spring wheat, A=alfalfa.
[b]/ Average of two replications, number of nematodes per 100 cm^3 soil.

SE FARM REPORT
SDSU

INSECTS ON TRANSGENIC CORN AT THE SOUTHEAST RESEARCH FARM

J. Kieckhefer, M. Catangui, and R. Berg

Plant Science 0612

Research continued at South Dakota State University's Southeast Research Farm west of Beresford, South Dakota, in the summer of 2006 to examine the changing ecology of insects associated with transgenic corn. In particular, the projects should help provide information on changing population patterns of insect pests and help identify emerging pest species in transgenic corn, including both insects that have not been recognized as species in corn previously and species that have been present in corn crops for years without reaching economically damaging levels until the use of transgenic corn became widespread.

CORN ROOTWORMS AND TRANSGENIC CORN

Corn rootworms have earned a reputation as serious pests of corn. In South Dakota, the northern corn rootworm, *Diabrotica barberi* Smith and Lawrence, and the western corn rootworm, *Diabrotica virgifera* LeConte, are the most common species of Chrysomelidae (Coleoptera) that attack corn roots.

Several brands offer corn with transgenic resistance to corn rootworm larvae. These hybrids have been trademarked with designations such as "YG-RW," abbreviated from "YieldGard – Rootworm." Transgenic hybrids are marketed as methods to reduce the damage to corn roots caused by feeding activities of corn rootworm larvae. The larvae tunnel through the roots, reducing the root masses available to support the plants. By incorporating genes from *Bacillus thuringiensis*, seed corn companies have imparted upon these varieties of corn the ability to produce insecticidal chemicals. The rootworm larvae begin feeding on roots of these transgenic corn plants, and the chemicals produced by the plants kill the feeding larvae.

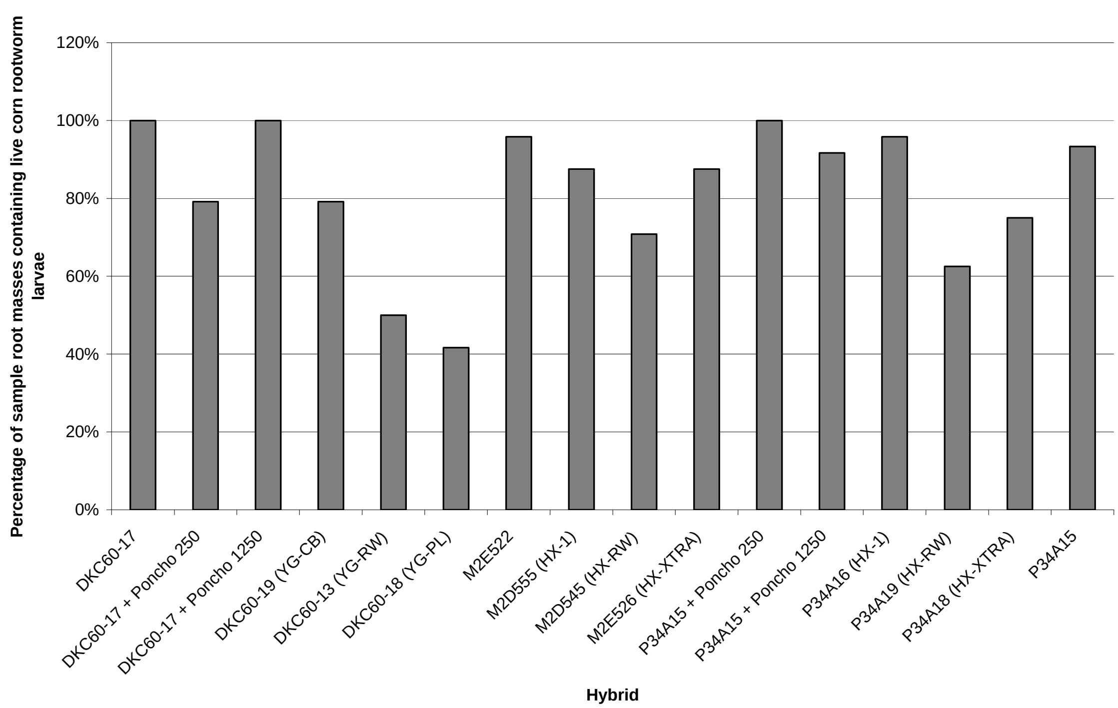
Theoretically, larger root masses result in greater yields of corn. The damage from the rootworm larvae, then, should reduce yield, and the hybrids with transgenic resistance to rootworms should suffer less yield loss from corn rootworms than conventional hybrids of corn.

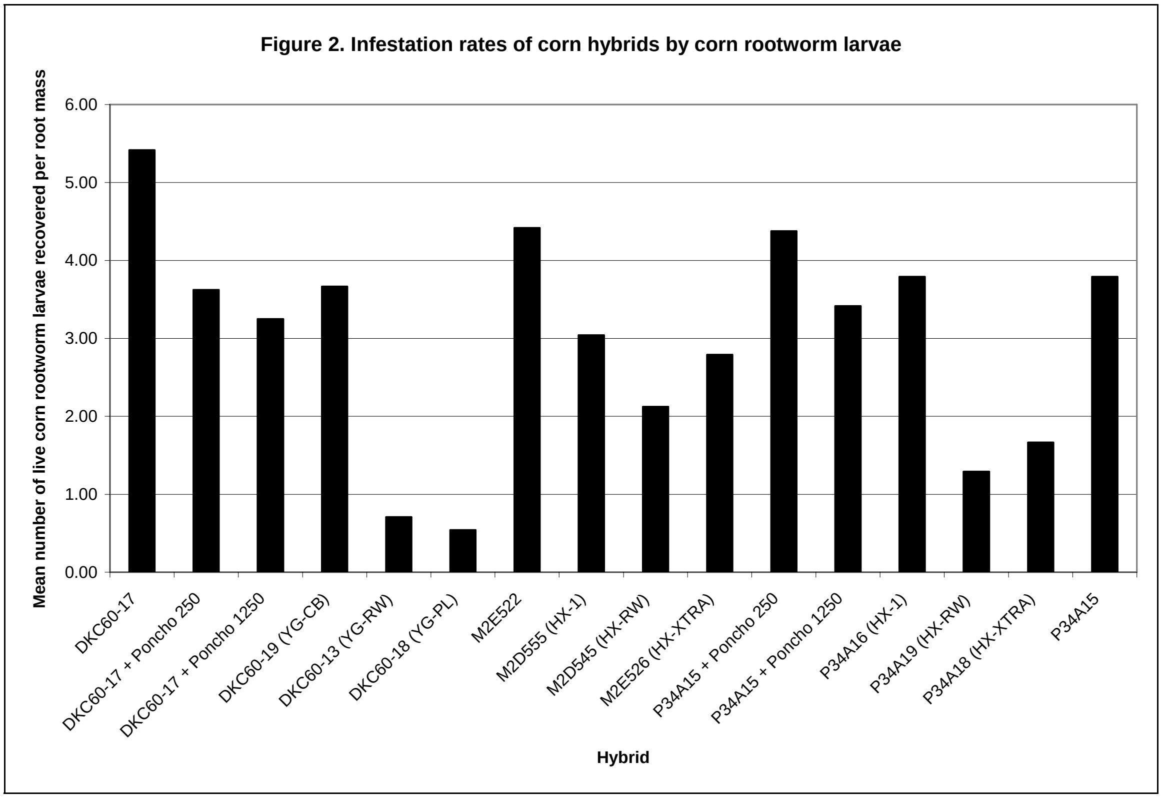
In an effort to count actual rootworm larvae, rather than simply rating the damage to the root systems, root systems from individual corn plants were placed in funnels following a design proposed by Fromm *et al.* (Colorado State University, poster presented at the 1998 annual meeting of the Entomological Society of America). Larvae drop out of drying corn roots through screens into water below the roots. Efforts to recover living rootworm larvae from corn roots were a continuation in 2006 of work started in 2005.

Funnels were made from 18-ounce, plastic Solo® beverage cups and fiberglass window screen. To produce a funnel, the bottom third of one plastic cup was cut off, and the flat bottom of a second cup was also cut out. The piece consisting of the upper two-thirds of the former cup was inserted into the latter cup with a 20-centimeter square patch of window screen between the two. This combination then sat in the piece consisting of the bottom third of the first cup.

To load corn roots into these funnels, the roots of individual plants were excavated from the soil, as much soil as possible was removed from the root systems, and each root mass was supported in a funnel on the piece of window screen. Water in the piece consisting of the bottom third of the first cup trapped larvae dropping out of the root system, and prevented any larvae from drying out before the funnels were checked a few days after collecting the root masses.

Figure 1. Percentages of corn plants containing live corn rootworm larvae





Corn roots were collected June 14 and June 30, 2006, from the test plots at the Southeast Research Farm. Larvae were counted and removed from the funnels on June 16 and July 3, 2006, respectively.

As shown in Figures 1 and 2, corn hybrids with the YieldGard – Rootworm or the YieldGard – Plus transgenic traits were host to considerably fewer corn rootworm larvae than other hybrids of corn, both in terms of average numbers of rootworm larvae per plant and in terms of the percentages of plants infested with rootworm larvae.

In 2005, at least a few corn rootworm larvae were collected from each hybrid, surprisingly. Even more surprising, corn rootworm larvae were captured from each plot in 2006, and not just from each hybrid (each hybrid is grown in at least four plots). These findings suggest some resistance exists in the rootworm population to the toxins produced by transgenic corn that target rootworm larvae.

The corn in this study grew in a field planted annually as corn for several years. In addition, corn rootworm sampling was conducted from fields grown in rotation with soybean at the Southeast Research Farm. Root masses collected from these other plots also yielded live corn rootworm larvae, although at far lower rates than the field grown as continuous corn. The larvae collected from fields grown in rotation suggest that either female corn rootworm beetles are laying eggs promiscuously, or the eggs remain in an extended diapause (i.e. over winter twice before hatching). This finding appears to be the first instance in South Dakota of corn rootworm larvae found in corn grown in rotation.

Overall, corn rootworm populations were considerably higher at the Southeast Research Farm in 2006 than in 2005. Adult populations appeared to significantly damage yield by clipping silk and by feeding directly on developing kernels.

LEPIDOPTERANS IN CORN EARS

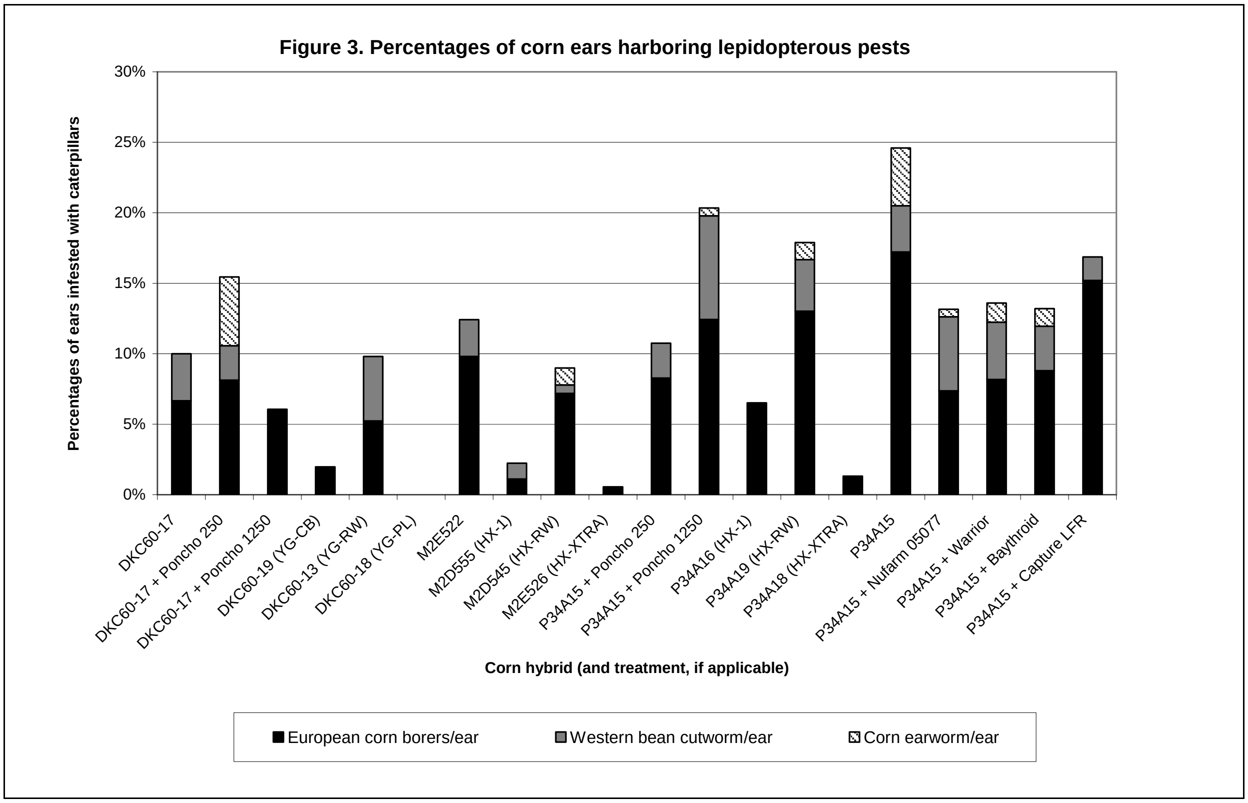
Several species of caterpillars feed directly on corn ears, damaging the kernels primarily or by creating microhabitats favorable for the growth of fungi that damage entire ears of corn. The corn earworm, *Helicoverpas zea* (Boddie), and the European corn borer, *Ostrinia nubilalis* (Hübner), as well as the western bean cutworm, *Richia albicosta* (Smith), can all feed on the kernels of developing or drying ears. Many of these caterpillars show at least some degree of cannibalism, so finding more than one individual or more than one species per ear is unlikely.

The first hybrids of Bt corn released on the market specifically targeted the European corn borer. Larvae tunneling through the stalks or feeding on plant tissues consume the Bt toxins and die. Accordingly, larvae feeding under the husks of corn ears should also succumb on Bt corn. Later transgenic hybrids, such as Herculex-Xtra ("HX-XTRA") and YieldGard – Plus ("YG-PL"), were developed to target corn earworm and western bean cutworm, as well as European corn borers.

To determine the levels of infestation by these three species, all ears in the last, or sixth, row of each plot were examined for caterpillars. Rates of infestation were calculated by dividing the number of ears infested with each species by the total number of ears sampled for each hybrid. Apparently due to climatic conditions, many plants in the plots were "barren," or did not produce ears. Several hybrids produced very few ears across all four replications. These low numbers tend to skew some of the results. For example, hybrid DKC60-18 (YG-PL) harbored no caterpillars in the ears examined, but only 62 plants of the 326 examined produced ears.

In 2005, most hybrids with transgenic traits targeting European corn borers specifically (YG-CB) or containing the YieldGard – Plus (YG-PL) trait showed no evidence of attack by corn borers. By contrast, only one hybrid in 2006 – DKC60-18 (YG-PL) – harbored no European corn borer caterpillars in the ears checked. The transgenic hybrids that target lepidopterous pests seemed to have fewer infested ears, generally (Figure 3).

Light trap collections in 2006 showed two peaks in western bean cutworm flights, seemingly not correlated with weather patterns. This pattern has never been observed in South Dakota previously. At this time, no reason for the second peak in the flight pattern is known.



OTHER INSECTS

Like data from 2005, counts of corn leaf aphids, *Rhopalosiphum maidis,* in 2006 indicated some effects of corn hybrid on populations of aphids on those plants.

Sap beetle (Coleoptera: Nitidulidae) numbers varied among plots, too, and initial analyses seem to suggest some patterns based on hybrid. Sap beetles may be responsible for transferring some fungi among corn ears, and the damage they cause by feeding in the ears may impact yields.

European corn borers primarily tunnel through corn stalks, rather than attacking ears. Adult corn borers collected in the black light trap operating at the Southeast Research Farm in 2006 were fewer than in "average" years. Data from splitting corn stalks and counting larvae revealed fewer corn borers than in 2005. Numbers of corn borer caterpillars found in corn ears were higher than in 2005, though.

ACKNOWLEDGEMENTS

Support for this work was provided by the South Dakota Corn Utilization Council. Summer assistants Paul Wilson, Hans Gildemeister, and the crew from the Southeast Research Farm (Wyatt Lunning and Wyatt Petersen) deserve recognition for their help digging and preparing corn roots, and splitting corn stalks.

SE FARM REPORT
SDSU

SOYBEAN YIELD RESPONSE TO DIFFERENT SOYBEAN APHID THRESHOLDS

Kelley J. Tilmon, Ph.D.

Plant Science 0613

INTRODUCTION

Economic thresholds are a critical component of the integrated pest management of deleterious insect. Thresholds should ideally be based on insect population growth rates under realistic field conditions and should incorporate the yield response of the crop to different pest densities. Yield-loss experiments that manipulate pest density under open-plot field conditions and measure the resulting impact on yield can provide the biological information used in combination with economic variables to determine appropriate economic thresholds.

The soybean aphid, *Aphis glycines*, has emerged in recent years as the most important new insect pest of Midwestern soybeans. This Asian aphid was first detected in North America in 2000, and by 2001 it was considered an outbreak pest through much of the Midwest. By 2005, entomologists in six states (IA, MI, MN, NE, ND, and WI) had performed 19 yield-loss experiments over a three year period, encompassing a wide range of environmental conditions and geographic locations. The result of this large-scale cooperative project was a common threshold recommendation now in effect through most of the Midwest. However, as of 2005, such open-plot yield loss experiments had not been conducted in South Dakota.

The purpose of this study at the Southeast Research Farm was to test a range of different potential soybean aphid thresholds to evaluate their impact on crop yield. This experiment is part of a larger effort to devise economic thresholds for the soybean aphid in South Dakota.

METHODS

The idea behind this experiment was to manipulate the amount of aphid pressure experienced by different treatments (different “test thresholds”) and to measure the resulting yield. Aphid pressure was manipulated by the timing of insecticide application rather than by attempting to artificially create different infestation levels (logistically difficult under realistic field conditions). We intended for there to be seven threshold treatments replicated four times in a randomized complete block design, with each treatment receiving insecticide application when it reached a given threshold level. The intended thresholds were: (1) “0” aphids per plant (with aphid numbers kept as low as logistically possible); (2) 10 aphids per plant; (3) 100; (4) 250; (5) 500; (6)1000; (7) maximum aphid growth with no treatment. In practice, natural aphid populations failed to build up to levels to permit treatments (4) through (7). Thus, the test thresholds were “0”, “10”, and “100” aphids per plant, and the remaining treatments served as no-insecticide controls. Plots were 100 feet long by four 30” rows wide, separated from each other by bare-soil borders.

We counted all soybean aphids on 20 arbitrarily selected plants per plot each week from July 12 through September 6. When the 80-plant soybean aphid average for a given treatment (20 plants per plot x 4 replications) reached a given test threshold we treated all four plots with Warrior (3.2 oz/acre) within a few days of the aphid count. If aphid numbers later built up in a given treatment to its threshold point we applied insecticide again in order to maintain aphid densities below the test threshold. At the end of the season soybean plots were harvested and yield measured. Yields reported in this paper are adjusted to 13% moisture.

RESULTS

Aphid Density

The peak average number of aphids/plant for the different treatments (i.e., the average number of aphids per plant during the *one week* in the season when a given treatment reached its maximum aphid peak for the season) ranged from 30 to 116 aphids per plant. On an individual plot-by-plot basis (as opposed to a treatment basis), the aphid peak points ranged from 4 to 193 average aphids/plant. 12 plots had aphid peak points of 50 aphids/plant or less, 5 plots had peaks between 50-100 aphids/plant, 7 plots had peaks between 100-150, and 4 plots had peaks between 150-200. Thus, the majority of plots (17/28) had aphid peaks during the season of 100 aphids/plant or fewer.

Season-wide (i.e., across the eight weeks of sampling) aphid/plant averages for the different test threshold treatments are presented in Figure 1. On an individual plot-by-plot basis (as opposed to treatments), the season-wide aphid/plant averages ranged from 2 to 60.

A general linear models analysis of variance of aphid numbers by treatment showed a significant treatment effects on aphid number ($p<0.03$). This is expected, as we manipulated aphid numbers with insecticide as part of the experiment.

Yield

Average treatment yields ranged from 43.9 to 48.6 bu/ac (Figure 1). General linear model analysis of variance showed no significant treatment effects on yield. Tukey HSD multiple comparison of yields by treatment showed no significant differences among any treatments. A linear regression, by individual plot, of the peak aphid density experienced by that plot vs. the yield for that plot showed no significant relationship (R^2= 0.09; Figure 2).

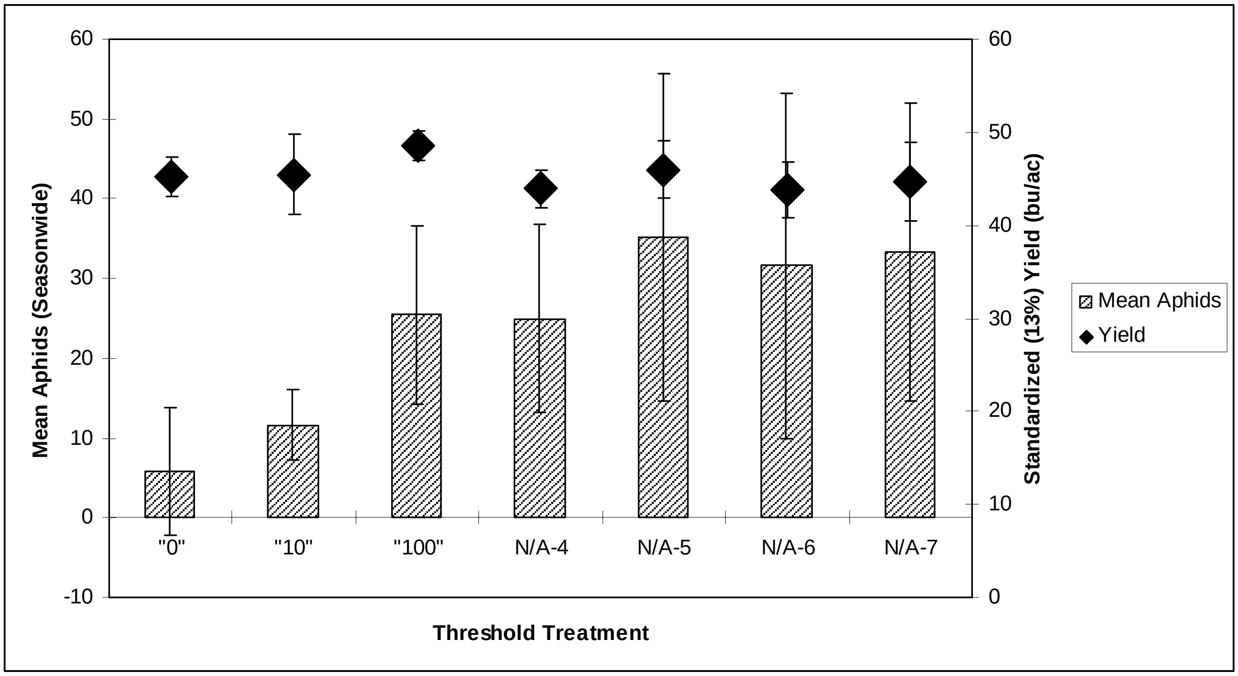


Figure 1. Season-wide aphids/plant and yield by threshold treatment, +/- standard deviation. Aphid numbers (left Y-axis) are represented by striped bars and yield (right Y-axis) by diamonds. Low aphid number only permitted three test treatments to be initiated (“0”, “10”, and “100” aphids/plant). Other treatments were kept as no-insecticide controls and are labeled N/A-4 through N/A-7.

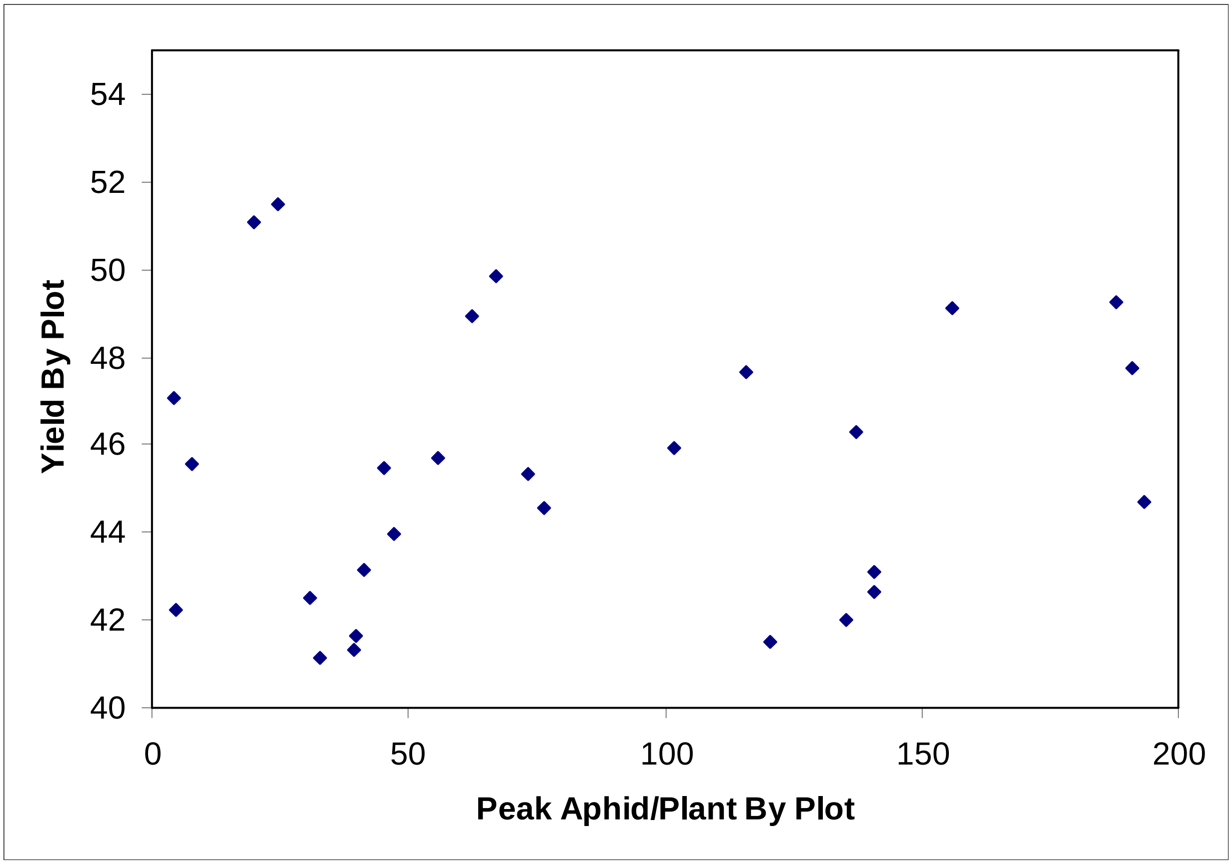


Figure 2. Peak average aphids/plant by plot (i.e., the aphid "high point" for the season) vs. plot yield.

DISCUSSION

Aphid numbers in our field at the Southeast Research Farm were too low to test the full range of test thresholds planned for this experiment. However, among the test thresholds we could test (treatment at "0", "10", and "100" aphids/plant) there was no significant difference in yield among treatments. This suggests that at relatively low aphid densities (i.e., less than 100 aphids per plant) there is no yield loss, and that thresholds can be safely set above this level. How much above will depend on economic variables, as well as an assessment of yield response at higher aphid densities.

ACKNOWLEDGMENTS

I wish to thank Ana Micijevic and my summer research crew for data collection, Brad and Kay Ruden for help with insecticide treatment, and the staff of the Southeast Research Farm for their help with planting, cultivation, and harvest. This work was supported by the South Dakota Soybean Research and Promotion Council and the North Central Soybean Research Program.

SE FARM REPORT

SDSU

OAT PROJECT

Lon Hall

Plant Science 0614

My objective is to develop oat varieties for producers in South Dakota and surrounding states. Multipurpose varieties are being developed to satisfy more than one market. These varieties may be used in double cropping, as a companion crop, forage, and/or harvested for grain. The desired agronomic traits are a high grain and/or forage yield potential, high-test weight, disease resistance, straw strength, and maturity adaptation for different regional environments. Desired seed traits for hulled oats include a white hull, high groat percentage, and large seeds; the hulless seed traits include a light color seed, few trichomes (hairless), and large seed. The quality traits desired by the millers are low oil, high protein, and beta-glucan grain. The horse feed community want a white hull and high protein grain, and the livestock feeders want high Relative Feed Value forage, high oil, and high protein grain.

Parents in the crossing block were selected for specific traits. The desired combination of traits cannot always be acquired in two-way crosses; therefore, some combinations were made specifically for three-way crosses. The 2006 spring crossing block yielded 321 successful unique genetic combinations. Two hundred and fifty one of these were selected for F1 increase in the fall greenhouse cycle. Fifteen crosses were selected, based on pedigree, for single seed descent generation advancement. These crosses theoretically possess exceptional gene combinations, hence, the effort to advance three generations a year. There were a total of 4432 yield plots grown in the field. The numbers of unique bulk populations grown were 192 bulk F2s and 96 bulk F3s. There were 2016 lines derived from F5, F7, F8, and/or F9 generations grown in unreplicated Preliminary Yield Trials (PYT) at the Northeast Farm or the Brookings location. The number of unique lines grown in replicated Advanced Yield Trials (AYT) and regional nurseries were 304 and 120 respectively. Forty five preliminary seed increases were grown at the Brookings or Northeast Farm locations. Twenty thousand plants consisting of 87 populations and three backcrosses consisting of 144 single backcross single seed descent subpopulations were screened for kernel type and crown rust in the fall greenhouse cycle. Approximately 6,000 selected single seed descent seeds will be planted in the spring greenhouse cycle. They will be inoculated with crown rust, and the susceptible plants will be discarded. Two thousand and forty single seed descent plants, as well as 384 single plant increases in the fall greenhouse cycle will be yield tested in 2007 PYT.

Stallion', a white hulled spring oat, was developed by the South Dakota

Agricultural Experiment Station (SDAES) and released in 2006. Stallion was tested as experimental line SD000366-36. SD89507/Settler//SD93068 is the three-parent pedigree. The complete pedigree is Settler/4/Nodaway70 /Dal//MN73231/3/Dumont/5/Settler/6/ND 750432/Moore//Il75-3402/4/MN72-3/72-29//Dal/Nodaway70/3/Spear/Kelsey//Nodaway70/MN72-3. Stallion, when compared to 'Jerry', has superior grain yield, test weight, groat percentage, and crown rust resistance. Stem rust, Barley Yellow Dwarf Virus, and smut resistance are similar to Jerry's and on average Stallion is 1.4 inches taller and heads 3.4 days later.

SD020301-20 and SD030883's derivatives have undergone a preliminary increase and are the two most advanced lines. SD030301-20, a hulless line, has excellent forage quality and agronomic traits. This line is a multi-purpose oat that may be harvested for forage, straw, and/or grain. SD020883's very early maturity makes it an option for double cropping, companion crop, or harvested for grain. SD020883-29, SD020883-109, SD020883-171, and SD030883-187 are derivatives out of SD020883. Upon approval, one of the SD020883 siblings and SD030301-20 will be scheduled for release in 2009.

In the following tables the highlighted lines are the most advanced and are currently being purified. South Dakota's most recent releases 'Buff', 'Reeves', and Stallion are also high lighted for comparison. The lines selected for purification possess disease resistance in addition to superior agronomic traits.

ACKNOWLEDGEMENTS:

This work is supported by the SD Agricultural Experiment Station, Foundation Seed Stocks, and the Crop Improvement Association.

South Dakota Standard Variety Oat Trials

	2005 yld bu/a 7lo c	2006yld bu/a 7loc	2006 tw lbs/bu 7loc	2006 mat. head days relat.to Don	2006 ht inches 7loc	2006 protein percent 7loc
SD 011315-15	106	106	37	8	32	15.5
SD 030324		106	36	5	34	16.3
Souris		104	37	6	29	15.9
SD 021021	108	101	36	4	30	17.6
SD 020701	106	101	37	4	33	16.5
SD 030888		101	38	4	27	15.9
HiFi	102	100	36	8	33	15.6
SD 020536	102	100	38	8	30	16.2
Stallion	98	100	39	8	34	17.2
Baker		98	35	4	32	15.9
Beach	95	97	39	6	34	15.5
Morton	96	94	37	7	34	16.5
Loyal	95	94	38	8	34	17.8
SD 031128		91	37	2	32	16.3
Maida		88	36	7	34	17.4
Jerry	96	80	37	5	32	16.6
SD 020883	104	79*	38	-1	31	17.2
Don	97	79	36	1	28	15.6
Reeves	90	74	36	2	33	16.1
Hytest	77	73	39	4	36	19.5
GG-304		69	30	8	21	16.1
Buff, Hls	73	64	44	3	29	18.2
Paul, Hls	62	63	42	9	33	18.2
Stark, Hls	63	54	40	9	34	17.8
mean	92	88	37	5	32	17

*severe bird damage at Warner, considerable damage at Brookings and possibly other locations caused a significant yield loss. Birds select the first lines to reach the milk stage.

BROOKINGS FORAGE TRIAL AND HULLESS AYT
(Focus on the AYT)

Cultivar	Dry Matter tons/a Yield	CP %	NDF %	ADF %	RFV %
Everleaf 126	4.36	11.5	48.2	28.3	133
AC Pinnacle	4.27	10.8	59.2	32.9	103
Loyal	4.22	9.8	62.9	37.4	91
Everleaf 114	4.21	11.9	52.3	30.6	119
SD-030301(hulless)	4.11	10	59.7	34.9	100
Stallion	4.1	10	60.2	34.6	99
SD-127	3.92		58.9	34.3	102
Paul	3.88	10.8	57.8	33.2	104
Morton	3.87	10.6	59.8	34.6	100
Magnum	3.68	10.4	61.3	36	95
Jerry	3.19	10.2	60.1	33.5	101
Buff (hulless)	3.11	11	57.3	32.1	107
Stark (hulless)	2.8	11.8	53.7	30	117
LSD (5%)	*0.38*	*1*	*2.7*	*1.7*	*6.7*
CV, %	*6.98*	*4.1*	*2.8*	*3*	*3.8*
ADVANCED YIELD TRIALS	Dry Matter tons/a Yield	CP % 3loc	NDF % 3loc	ADF % 3loc	RFV % 3loc
SD020301-20 (hulless)	NA	12	54	33	114
BUFF (hulless)	NA	13	58	33	106
AYT Grain and Plant Traits	Yield bu/a 4loc	Protein % 3loc	TW lbs/bu 4loc	Snap O-5 4loc	CR % lloc
SD020301-20 (hulless)	70	21.0	46	3	9
BUFF (hulless)	66	18.6	44	2	73

CP=Crude protein
ADF=Acid detergent fiber, lower number is better
NDF=Neutral detergent fiber, lower number is better
RFD=Relative Feed Value, higher number is better

2006 ALFALFA PRODUCTION

V. Owens, P. Jeranyama, and C. Lee

Plant Science 0615

Alfalfa cultivars are tested at several South Dakota research stations. Our objective is to provide producers with yield data from currently available alfalfa cultivars to aid them in their selection process. Even though our yield trial does not contain all available cultivars, it should be a helpful tool in identifying those suitable for the area.

Data from two separate trials were gathered in 2006. Table 1 provides forage production data for 25 alfalfa cultivars planted in 2003. Tons of dry matter yield are shown for three cuttings in 2006, total production in 2005, 2004, 2003, and a cumulative total for 2003-06. Table 2 contains data from 15 alfalfa cultivars planted in a new trial established in 2005. This trial was also harvested three times in 2006. Cultivars are ranked from highest to lowest based on the cumulative yield. The least significant difference (LSD) listed at the bottom of Tables 1 and 2 is used to identify significant differences between the cultivars. If the difference in yield between two cultivars exceeds the given LSD, then they are significantly different.

Six replications of each cultivar were planted at 18 lbs pure live seed/acre. Fifty pounds of super phosphate (P_2O_5) was applied and incorporated before planting each trial. Later fertilizer application was made when necessary as recommended by the South Dakota State Soil Testing Laboratory.

Forage was harvested with a sickle-type harvester equipped with a weigh bin for obtaining fresh plot weights. Random subsamples from the fresh herbage were taken to determine percent dry matter. Alfalfa cultivars were evaluated for maturity prior to harvest. Yield differences among cultivars were tested using the LSD at the 0.10 level of probability when significant F-tests were detected by analysis of variance (Table 1 and 2).

ACKNOWLEDGEMENTS:

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Table 1. Forage yield of 25 alfalfa cultivars entered in the South Dakota State University alfalfa testing program. Trial is located at the Southeast Research Station near Beresford, SD. Alfalfa was planted 29 April 2003 into plots arranged in a randomized complete block design with six replications.

	2006				2005	2004	2003	4-year
Entry	18-May	17-Jun	12-Jul	Total	Total	Total	Total	Total
	Tons DM/acre							
FSG 406	2.12	1.59	0.52	4.22	5.53	6.75	2.37	18.88
6420	2.27	1.45	0.51	4.23	5.34	6.55	2.64	18.76
Alfastar II	1.99	1.33	0.47	3.80	5.29	7.12	2.53	18.73
54V46	2.29	1.40	0.44	4.13	5.52	6.25	2.50	18.40
Abundance	2.47	1.09	0.33	3.89	5.80	6.33	2.18	18.20
Somerset	2.12	1.28	0.41	3.80	5.45	6.53	2.34	18.13
Extreme	2.20	1.13	0.40	3.73	5.69	6.32	2.37	18.12
Evermore	2.17	1.03	0.26	3.46	5.21	6.71	2.51	17.90
Rebel	2.13	1.29	0.40	3.83	5.47	6.08	2.49	17.87
FSG 351	2.19	1.30	0.40	3.90	5.06	6.32	2.33	17.60
WL 319HQ	2.32	0.86	0.20	3.38	5.73	6.15	2.32	17.58
54Q25	2.08	1.10	0.34	3.53	5.05	6.41	2.45	17.43
A 30-06	2.07	1.09	0.24	3.40	5.14	6.40	2.47	17.41
Husky Supreme	2.20	1.02	0.26	3.48	5.27	6.11	2.48	17.34
WL 357HQ	2.16	0.98	0.27	3.41	5.39	6.16	2.33	17.29
Gold Rush 747	2.13	1.05	0.25	3.43	4.93	6.47	2.44	17.27
420	2.06	1.26	0.35	3.67	4.75	6.46	2.35	17.23
FSG 505	2.11	1.19	0.31	3.60	5.07	6.20	2.28	17.15
Hybriforce-420/Wet	2.19	1.11	0.30	3.60	5.09	5.90	2.50	17.09
Rugged	1.98	1.17	0.37	3.52	4.72	6.02	2.60	16.87
Journey 204 Hyb. Alf.	2.11	0.98	0.30	3.39	4.93	6.11	2.42	16.84
Bullseye	1.95	0.89	0.22	3.06	4.63	6.27	2.71	16.66
Notice II	2.23	1.01	0.25	3.49	4.79	6.07	2.20	16.55
4500	1.90	1.01	0.29	3.19	4.92	5.99	2.23	16.33
Vernal	1.90	0.92	0.18	3.00	4.54	6.32	2.44	16.30
Average	2.13	1.14	0.33	3.61	5.17	6.32	2.42	17.52
Maturity (Kalu & Fick)								
LSD (P=0.10)	0.22	0.33	NS	0.57	NS	NS	NS	NS
CV (%)	10.9	30.1	60.8	16.5	15.9	11.8	12.3	11.1
P-value	0.010	0.033	0.163	0.028	0.368	0.714	0.285	0.648

NS = not significant at 0.10 level of probability

Treflan applied before planting

50 lbs P2O5/Acre - preplant

Table 2. Forage yield of 15 alfalfa cultivars entered in the South Dakota State University alfalfa testing program. Trial is located at the Southeast Research Station near Beresford, SD. Alfalfa was planted 2 May 2005 into plots arranged in a randomized complete block design with six replications.

	2006				2005	2-year
Entry	18-May	17-Jun	12-Jul	Total	Total	Total
	------------------------------- Tons DM/acre -------------------------------					
4S419	2.59	1.82	0.95	5.36	1.51	6.87
6400 HT	2.43	1.71	0.93	5.08	1.61	6.68
Genoa	2.38	1.78	1.00	5.16	1.34	6.51
54V46	2.31	1.73	0.95	5.00	1.49	6.49
Meadowlark	2.43	1.71	0.88	5.02	1.41	6.43
FSG 408DP	2.38	1.73	0.82	4.93	1.43	6.36
Marvel	2.31	1.78	0.91	5.01	1.29	6.29
Integrity	2.35	1.78	0.86	4.99	1.29	6.28
WL 357HQ	2.32	1.63	0.95	4.91	1.32	6.23
6415	2.24	1.68	0.88	4.80	1.36	6.16
4A421	2.35	1.68	0.92	4.94	1.09	6.03
Escalade	2.29	1.58	0.85	4.71	1.31	6.02
Vernal	2.45	1.49	0.76	4.70	1.31	6.00
361 HY	2.43	1.60	0.83	4.87	1.11	5.98
54H91	2.47	1.42	0.70	4.58	1.38	5.97
Average	2.38	1.67	0.88	4.94	1.35	6.29
Maturity (Kalu & Fick)	3.4	4.2	4.4			
LSD (P=0.10)	NS	0.21	0.13	NS	0.25	NS
CV (%)	8.4	13.1	14.9	9.2	19.3	10.4
P-value	0.332	0.097	0.013	0.376	0.098	0.414

NS = not significant at 0.10 level of probability

Treflan applied before planting

50 lbs P2O5/Acre - preplant

FORAGE GRASS VARIETY PERFORMANCE TRIAL AT SOUTHEAST RESEARCH FARM

P. Jeranyama, V. N. Owens, and C. Lee

Plant Science 0616

ESTABLISHMENT AND MANAGEMENT

On 2 May 2005 several cool-season grass species (Table 1) and varieties were planted at the Southeast Research Farm. Plots were 3 feet and 20 feet long and planted with a plot planter with a cone seeder (Carter Manufacturing, Brookston, IN). Each plot comprised 5 rows with 6-inch spacing in a randomized complete block design replicated four times.

Winter injury was scored for each plot on 9 May 2006 at the onset of spring growth and was based on a visual assessment with a ranking of 1= no injury; 6 = completely dead plants. A sickle-bar harvester (Swift Machine) was used to harvest all plots on 6 June 2006. Fresh grass samples were obtained randomly from each species during harvest. The wet weight of samples was measured and samples were oven dried to determine yield on a dry matter basis. Herbicides and insecticides were used as needed to successfully establish and manage grass pests. Soil fertility was maintained throughout the trial at levels recommended by the SDSU soil testing laboratory.

Table 1. Grass Common Name and Seeding Rates in the Grass Forage Performance Trial at the Northeast Research Farm.

Grass Common Name	Seeding Rate (lb PLS/ Acre)
Meadow bromegrass	12
Orchardgrass	8
Perennial ryegrass	20
Reed canarygrass	8
Tall fescue	10
Timothy	8

2006 RESULTS

Winter injury score and forage yields (tons dry matter per acre) are reported in Tables 2 and 3. Released and experimental (when present) names of each cultivar were reported as provided by the Seed Company at the time of entry.

There was noticeable winter injury in perennial ryegrass varieties that in turn affected forage yield. Because of the drought of 2006, grass species did not produce sufficient forage mass to justify a second cutting.

Table 2. Grass Forage Dry Matter Yield and Winter Injury Score at Southeast Research Farm, Beresford in 2006

Cultivar	Winter injury*	6 June
		DM tons/ acre
Tall fescue		
Tuscany II	2.4	1.85
PST-5NF	3.1	1.61
Seine	2.5	1.75
Fawn	2.0	1.60
Bromegrass		
Montana	2.8	1.59
Orchardgrass		
Pauite 2	2.0	1.48
Potomoc	1.5	1.59
Timothy		
Winnetou	1.9	1.76
Perennial ryegrass		
Aubisque	1.6	0.35
Linn	1.5	0.85
Reed canarygrass		
Chiefton	4.1	3.37
Creeping bentgrass		
PSTORAF	2.9	1.29
$LSD_{0.05\ tall\ fescue}$	0.7	NS
$LSD_{0.05\ orchardgrass}$	NS	NS
$LSD_{0.05\ perennial\ ryegrass}$	NS	NS
$LSD_{0.05\ ALL}$	0.7	0.4
CV %	20	17

NS = non-significant;

* Winter injury; 1= no injury; 6=dead; evaluated on 9 May 2006

2006 Soybean Fungicide Sprayer Trials

B. E. Ruden, M. A. Draper, and K. R. Ruden

Plant Science 0617

INTRODUCTION

Soybeans can be damaged by a number of foliar diseases throughout the season. Diseases such as frogeye leaf spot, target spot and recently, soybean rust have increased interest from soybean producers to consider fungicides for disease control. Soybean rust, a relatively new fungal pathogen of soybeans in the United States, has caused significant losses in the southeastern states. During the 2006 season the disease was reported in 236 counties across the United States, reaching as far north as central Indiana. This represents a dramatic increase as compared to 2005, when soybean rust was reported in 132 counties. Foliar fungicide applications have proven to be effective at controlling this organism and protecting yield in the presence of soybean rust. Although soybean rust has not been detected in South Dakota, the risk of infection remains possible and producers must be prepared to effectively apply a fungicide to soybeans, if needed.

The lower and mid- soybean canopy is a challenging target for fungicide application. Foliar disease development usually begins at the lower levels of the crop canopy. Fungicides have widely variable systemic properties within a soybean plant, depending on the product chosen. However, foliar fungicides, at best, will only show movement upward and outward from the lowest point at which they are applied to the plant. Given this fact, droplet penetration and distribution to points low in the crop canopy may be significant issues for producers. There will likely also be an interaction with specific products. For example, immobile products or products with lesser systemic/in-plant movement capabilities would be better paired with application technologies that optimize coverage and canopy penetration. Conversely, products that move broadly and quickly in the plant may be more forgiving and not require such extensive coverage. Nonetheless, the movement of products with water flow in the plant creates special challenges that differ from common practices used for glyphosate application.

These studies were initiated to try to address concerns about droplet/product penetration into the soybean canopy and to compare the performance of several droplet sizes and commonly used nozzles.

MATERIALS AND METHODS

Over the past three seasons, seven different studies have been performed at the Southeast Research Farm (SERF) for the purpose investigating spray parameters for effective fungicide application in soybeans. A large block of soybeans (30 inch rows) planted using standard field practices was chosen for the studies each year. Alleyways were mowed to create field plots of 12 rows (30 ft) wide by 50 ft long, allowing access for the tractor-mounted sprayer with 30 ft boom that was used in all studies. Plots were treated at approximately R3 (with 75% canopy) and again at approximately R5 (with 90-100% canopy) with Quadris (azoxystrobin) at 6.4 fl oz/a (467.5 ml/ha) plus crop oil (1% v/v) mixed with 96 fl oz/100 gallons Vision Pink foam marker dye (GarrCo, Inc.). Various spray nozzles, nozzle configurations and application volumes were used, depending on the study.

Surface spray coverage was measured on 2 x 3 inch (5.08 x 7.62 cm) white glossy paper cards (Kromecoat S2S cardstock). Cards were clipped to aluminum trays and placed among the leaves at the widest portion of the crop canopy, which occurred at approximately 2/3 of the plant height. Spray coverage, Volume Median Diameter (VMD), and number of droplets per card were analyzed digitally using DropletScan software (Devore Systems). Statistical design was a randomized complete block with four replications at each location and treatment date. Statistical analysis was completed using ARM Software (Gylling Data Management, Brookings, SD).

South Dakota participated in two regional sprayer trials, sponsored through the North Central Soybean Research Project (NCSRP) from 2004 to 2006, developed two sprayer trials in cooperation with the University of Nebraska, Lincoln, each focusing on limited sprayer variables (2005 and 2006) and developed three additional small studies to investigate nozzle angle, droplet size and nozzle orientation in twin nozzle configurations. South Dakota data from these cooperative studies is shown.

In Study One, applications were made at 10 GPA (93.5 l/ha) carrier volume. Six different single orifice nozzles were used (Table 2) oriented straight down. The Turbo TeeJet nozzle has a spray pattern being slanted 15° forward, due to nozzle design. Two application pressures- 50 psi (345 kPa) and 75 psi (517 kPa) were used for each nozzle tested. Application speed was varied to adjust application to 10 gpa (93.5 l/ha).

In Study Two, applications were made at 20 gpa (187 l/ha) carrier volume. Three single orifice and nine dual-orifice or dual nozzle configurations were tested (Table 3). All treatments were run at 50 psi (345 kPa), with the exception of the Hypro ULD 120 treatments, which were run at 80 psi (552 kPa). Application speed was again adjusted to maintain the desired application rate.

RESULTS AND DISCUSSION

Nozzles performed in the expected range for the listed nozzle VMD at each pressure. Nozzles used in the studies provided fine, medium or coarse droplet patterns as defined by the American Society of Agricultural Engineers standards. Air induction nozzles, as expected, returned the highest VMD values in Study One, especially when the pressure was at the lower level of 50 psi. At the higher pressure range (75 psi), the air induction nozzles produced finer droplets, but these droplets were larger, on average, than the droplets produced by other (non-air induction) nozzles.

Table 1. Nozzle Configurations Used in Soybean Fungicide Application Studies

Treatment	Nozzle	Fan Angle	Nozzle Body	**Nozzle Fan Orientation** °forward/°backward	Angle between fans
TT11001 *(and alike)*	Turbo TeeJet	110	Straight	0/0 (15° built into nozzle)	---
AI110015 *(and alike)*	Air Induction TeeJet	110	Straight	0/0	---
HYPR-2-TT110015 *(and alike)*	Turbo TeeJet	110	Hypro TwinCap (60° between nozzles)	15/15	30
TJ60 11003	TwinJet	110	Straight	30/30	60
DUO-2-TT110015	Turbo TeeJet	110	TeeJet Duo (90° between nozzles)	30/30	60
TTI110015	Turbo TeeJet Air Induction	110	Straight	0/0 (15° built into nozzle)	---
DUO-2-TTI110015	Turbo TeeJet Air Induction	110	TeeJet Duo (90° between nozzles)	30/30	60
HYPRO ULD120-15	Hypro Ultra Low Drift Air Induction	120	Straight	0/0	---
HYPRO-2-ULD 120-15	Hypro Ultra Low Drift Air Induction	120	Hypro TwinCap (60° between nozzles)	30/30	60

Table 2. Spray Parameters, Study One- 10 Gallon Per Acre Application Rate

Trt No.	Parameter / Application Date / Treatment Name[4]	VMD[1] First Date	VMD Second Date	AVE % COVERAGE[2] First Date	AVE % COVERAGE Second Date	TOTAL # DROPS[3] First Date	TOTAL # DROPS Second Date
1	TT11001 (50)	345.53 cd	313.83 ab	4.96 bcd	1.37 ab	14683.75 a	4301.00 ab
2	TT11001 (75)	310.53 d	251.03 b	3.18 b-e	0.36 b	11339.00 a	2425.00 ab
3	TT110015 (50)	339.14 cd	312.69 ab	4.45 bcd	0.32 b	14153.00 a	1583.50 ab
4	TT110015 (75)	296.25 d	252.61 b	2.38 cde	0.13 b	10830.50 a	791.25 b
5	TT11002 (50)	371.08 bc	331.89 ab	6.22 ab	0.77 b	11957.00 a	3033.50 ab
6	TT11002 (75)	297.14 d	319.31 ab	1.93 de	0.45 b	7903.00 a	1949.25 ab
7	TT11003 (50)	382.14 bc	345.11 ab	5.26 bc	1.46 ab	12997.75 a	4786.50 ab
8	TT11003 (75)	311.89 d	333.31 ab	3.62 b-e	1.88 ab	11668.25 a	5653.25 a
9	AI110015 (50)	465.58 a	457.69 a	9.01 a	3.55 a	8827.00 a	4221.25 ab
10	AI110015 (80)	403.03 b	303.50 b	6.46 ab	2.19 ab	11416.50 a	5796.25 a
11	AI11002 (50)	457.86 a	455.08 a	8.61 a	3.60 a	9853.50 a	4667.00 ab
12	AI11002 (80)	310.14 d	385.28 ab	1.26 e	2.48 ab	3658.75 b	6120.50 a
LSD (P=.05)		32.97	92.88	2.14	1.45	4103.17	2899.69
Grand Mean		357.53	338.44	4.78	1.54	10774.00	3777.35

[1]VMD= Volume Median Diameter. The droplet diameter where 50% of the spray volume is in droplets larger/smaller than the diameter.
[2]Coverage= Average percent coverage on the nine cards placed per plot.
[3]Total Drops= Total number of drops counted in the measured area of each card. A relative measure comparing nozzle to nozzle.
[4]Treatment Names: Number in parentheses indicates application pressure.

Table 3. Spray Parameters, Study Two- 20 Gallon Per Acre Application Rate

Trt No.	Parameter / Application Date / Treatment Name[4]	VMD[1] First Date	VMD Second Date	AVE % COVERAGE First Date	AVE % COVERAGE Second Date	TOTAL # DROPS[3] First Date	TOTAL # DROPS Second Date
1	TT110015 (50)	378.56 bcd	325.11 bc	7.68 cd	2.43 c	16732.75 abc	6075.75 cd
2	TT11002 (50)	381.86 bcd	451.44 ab	6.01 d	3.69 bc	12917.00 bc	8847.50 a-d
3	HYPR-2-TT110015 (50)	400.47 bcd	262.72 c	11.99 bcd	2.33 c	20888.75 ab	6723.00 bcd
4	HYPR-2-TT11002 (50)	439.03 ab	388.89 bc	16.62 bc	3.77 bc	24143.25 a	7682.25 a-d
5	TJ60 11003 (50)	387.97 bcd	386.39 bc	11.89 bcd	6.93 abc	17799.50 abc	10059.00 abc
6	TJ60 11004 (50)	428.28 bc	410.72 b	11.82 bcd	7.59 abc	16021.25 abc	11991.00 ab
7	DUO-2-TT110015 (50)	362.61 cd	363.39 bc	10.05 cd	4.55 bc	21142.25 ab	10463.50 abc
8	DUO-2-TT11002 (50)	397.28 bcd	390.17 bc	6.96 cd	4.32 bc	12547.75 bc	10775.75 abc
9	TTI110015 (50)	305.83 e	556.44 a	3.39 d	8.45 ab	10431.75 c	4147.00 d
10	DUO-2-TTI110015 (50)	336.19 de	556.61 a	5.78 d	9.00 ab	14080.00 bc	4189.75 d
11	HYPR ULD120-15 (80)	485.28 a	455.42 ab	20.05 ab	12.04 a	18086.00 abc	12012.00 ab
12	HYPR-2-ULD 120-15 (80)	485.08 a	427.94 b	25.30 a	11.81 a	17870.50 abc	13207.75 a
LSD (P=.05)		40.36	80.25	5.80	3.36	5574.55	3209.85
Grand Mean		399.04	414.60	11.46	6.41	16888.40	8847.86

[1]VMD= Volume Median Diameter. The droplet diameter where 50% of the spray volume is in droplets larger/smaller than the diameter.
[2]Coverage= Average percent coverage on the nine cards placed per plot.
[3]Total Drops= Total number of drops counted in the measured area of each card. A relative measure comparing nozzle to nozzle.
[4]Treatment Names: Number in parentheses indicates application pressure.

Coarse spray droplets (Trt. 9 through 12, Study Two), which provide excellent drift reduction and appear to provide adequate, even superior coverage percentages, may not provide the thorough canopy coverage needed for a relatively immobile fungicide to provide adequate control of a plant disease. The distance between droplets may be too far for the fungicide to completely protect the entire leaf. If these nozzles are chosen, a mobile fungicide may be needed to provide adequate product throughout entire volume of leaves in the canopy. While these nozzles may perform well for glyphosate, they would not provide coverage as well matched to a fungicide.

Fine spray droplets (Trt. 2-6, Study One, Date 2) appear to not be able to penetrate a heavy crop canopy to a great extent. This should be expected, as previous studies (data not shown) clearly show the finer spray droplets are largely held in the upper canopy. Under South Dakota application conditions, significant spray volume is lost due to drift when nozzles produce fine quality spray droplets.

Clearly, canopy at later season/later crop development spray dates can dramatically affect coverage (Study One, comparing Date 1 and Date 2). This difference is particularly due to the loss of fine droplets which are caught in the upper canopy (data not shown), which again supports the premise that a medium quality droplet offers the best trade off between drift reduction and coverage.

As canopy volume increases, increased gallonages may provide superior coverage. The results of these studies do not indicate what the ideal volume of application may be. However, the 20 GPA treatments improved coverage (percentage) as compared to 10 GPA treatments at both application dates, with the largest increase at the later application date.

The previous results lead to the conclusion that a medium spray droplet may provide the best compromise of adequate spray coverage and canopy penetration. Medium spray droplets can be produced by single nozzles at acceptable application pressures and somewhat lower application speeds. However, as application speed increases, twin orifice nozzles or twin nozzle configurations may provide a means to maintain droplet size while also allowing adequate carrier volume to be applied. When paired orifices or twin nozzles are used, data indicates that maintaining a medium droplet with angles of canopy penetration that are near vertical will provide the best combination of coverage and canopy penetration.

Overall the recommendation based on these studies would be to optimize coverage by using any nozzle that produces a medium droplet at the desired speed and pressure. The same would hold true when paired nozzles or orifices are used. Droplet class is the most important factor to provide the best coverage and canopy penetration.

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2006 SOYBEAN FOLIAR FUNGICIDE TRIALS

K. R. Ruden, M. A. Draper, B. E. Ruden,
and S. M. Thompson

Plant Science 0618

INTRODUCTION

Soybeans can be damaged by several foliar diseases throughout the growing season. Major foliar diseases in the United States cause significant yield losses each year throughout soybean production areas and fungicide applications for the control of these diseases are required. Although South Dakota has, to date, been free of the major yield robbing foliar diseases present in the southern United States, such as soybean rust (*Phakopsora pachyrhiza*), frogeye leafspot (*Cercospora sojina*) and target spot (*Corynespora cassiicola*), yield losses from foliar diseases may still occur, but are largely undocumented. Foliar diseases were of minor importance in 2006. Septoria brown spot (*Septoria glycines*), a common disease in SD was fairly minor and generally not observed until August when the crop was in the R4 to R6 growth stage. Late in the season, Septoria brown spot become more common, but remained low in the canopy at insignificant levels. Bacterial blight (*Pseudomonas syringae glycinea*) was common, but at a very low incidence and severity. Bacterial pustule (*Xanthomonas campestris* pv *glycinea*) was identified at a few locations at low severity. Brown spot and occasionally bacterial blight can cause economic yield loss if environmental conditions are favorable for disease development.

Brown spot is the most commonly observed fungal foliar disease of soybean and therefore presumably the most important. Wet, humid conditions and heavy crop canopies tend to favor foliar disease development. Brown spot occurs in South Dakota every year in every field at varying severities. The brown spot pathogen survives in crop residues. The pathogen can be dispersed from the infected residues to soybean plants by splashing rain. The brown spot pathogen normally infects older leaves, but soybeans weakened by other diseases or environmental conditions become susceptible to this disease. Normally, no significant yield losses results from brown spot unless premature defoliation occurs in the mid and upper canopy. Fungicide application, if environmental conditions favor development of the disease, may be an effective management strategy. However, fungicides vary in their activity against this pathogen. Fungicide application for the purpose of increasing plant health, even in the absence of obvious disease, is also receiving significant producer interest and is being investigated.

MATERIALS AND METHODS

Asgrow AG1903RR was planted at 150,000 seeds/acre at the Southeast Research Farm (SERF) near Beresford, SD and at the SDSU Experiment Farm at Brookings.

The experiment was planted in randomized complete blocks (RCBD) with four replications of each treatment. The plots were planted, rated and harvested on the dates listed in Table 1. Plants were rated for fungal foliar diseases and yield. While Asian soybean rust was being scouted for, it did not occur in SD in 2006, so only brown spot was rated. Treatments in this study were compared to an untreated check.

RESULTS AND DISCUSSION

No significant differences were observed among treatments for brown spot and yield at the Brookings location. At the SE Farm, there were significant differences among treatments for brown spot although those differences did not translate to differences in yield. At the SERF location, there was considerable variation across the trial for brown spot development, as is reflected in the differences across the three untreated entries (Table 3 bold). As such, while there were identifiable differences statistically, under the level of disease observed under the dry conditions of 2006, no specific recommendations can be made for which fungicides best control brown spot. Nonetheless it can be inferred that under the conditions of 2006, when brown spot remains in the lower canopy, it is not causing any significant impact on yield.

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Table 1. Dates of planting, plot evaluations, and harvest at study locations.

Activity	**Date of activity by location**	
	SE Research Farm	Brookings AES
Planting	May 23,2006	May 31,2006
Disease Rating	September 7, 2006	September 11, 2006
Harvest	October 3, 2006	October 24, 2006

Table 2. Products, rates and growth stages of fungicides applied as foliar treatments in 2006.

Product	Rate		Growth Stage
Untreated			
Headline	4.4	fl oz/A	R3
Caramba	7.7	fl oz/A	R3
Headline	3.6	fl oz/A	R3
Caramba	6.1	fl oz/A	R3
Headline	6	fl oz/A	R3
Induce NIS	0.25	% V/V	R3
Headline	6	fl oz/A	R3
Induce NIS	0.25	% V/V	R3
Caramba	8	fl oz/A	21days after
Headline	6	fl oz/A	R3
Induce NIS	0.25	% V/V	R3
Headline	3.6	fl oz/A	21days after
Caramba	6.1	fl oz/A	21days after
Headline	4.7	fl oz/A	R3
Folicur	3.2	fl oz/A	R3
Headline	3.6	fl oz/A	R3
Folicur	2.4	fl oz/A	R3
Untreated			
Folicur	4	fl oz/A	R3
Absolute 500 SC	5	fl oz/A	R3
Stratego	10	fl oz/A	R3
Induce NIS	0.125	% V/V	R3
Untreated			
Topguard	7	fl oz/A	R1-R2
Topguard	14	fl oz/A	R1-R2
Topguard	7	fl oz/A	R1-R2
Topguard	7	fl oz/A	R3-R4
Topguard	7	fl oz/A	R1-R2
Induce NIS	0.25	% V/V	R1-R2
Topguard	7	fl oz/A	R1-R2
Headline	6	fl oz/A	R1-R2
Spectra	4	fl oz/A	R1-R2
Untreated			
Laredo	7	fl oz/A	R1-R3
Induce NIS	0.125	% V/V	R1-R3
Headline	6	fl oz/A	21days after
Induce NIS	0.125	% V/V	21days after
Enable	7	fl oz/A	R1-R3
Prime Oil COC	1	% V/V	R1-R3
Enable	5	fl oz/A	21days after
Headline	6	fl oz/A	21days after
Prime Oil COC	1	% V/V	21days after

Table 2 cont'd. Products, rates and growth stages of fungicides applied as foliar treatments in 2006.

Product	Rate		Growth Stage
Dithane	2.5	lb/A	R5
Induce NIS	0.125	% V/V	R5
Laredo	7	fl oz/A	R1-R3
Induce NIS	0.125	% V/V	R1-R3
Laredo	5	fl oz/A	21days after
Dithane	2.5	lb/A	21days after
Induce NIS	0.125	% V/V	21days after
Dithane	2.5	lb/A	R1-R3
Induce NIS	0.125	% V/V	R1-R3
Dithane	2.5	lb/A	R5
Induce NIS	0.125	% V/V	R5
Untreated			
Punch	4	fl oz/A	R3
Punch	4	fl oz/A	21days after
Punch	3	fl oz/A	R3
Headline	4.5	fl oz/A	R3
Punch	3	fl oz/A	21days after
Headline	4.5	fl oz/A	21days after
Uppercut	4	fl oz/A	R3
Uppercut	4	fl oz/A	21days after
Headline	6.2	fl oz/A	R3
Headline	6.2	fl oz/A	21days after
Untreated			
Quadris	5.5	fl oz/A	R3
Experimental A	4	fl oz/A	R3
Induce NIS	0.25	% V/V	R3
Quadris	5.5	fl oz/A	R3 + 21 days after
Experimental A	4	fl oz/A	R3 + 21 days after
Induce NIS	0.25	% V/V	R3 + 21 days after
Quilt	14	fl oz/A	R3 + 21 days after
Prime Oil COC	1	% V/V	R3 + 21 days after
Quadris	6	fl oz/A	R3 + 21 days after
Prime Oil COC	1	% V/V	R3 + 21 days after
Domark 230 ME	4	fl oz/A	R3
Orthene 97	0.75	lb/A	R3
Domark 230 ME	4	fl oz/A	R3
Orthene 97	0.75	lb/A	R3
Domark 230 ME	4	fl oz/A	R3
Quadris	4	fl oz/A	R3
Orthene 97	0.75	lb/A	R3
Domark 230 ME	4	fl oz/A	R3
Quadris	4	fl oz/A	R3

Table 3. Soybean Foliar Fungicide Study: Disease rating and yield associated with various foliar treatments at Beresford and Brookings, SD.

Foliar Treatment	**Brown Spot Disease Rating %**		**Yield (bu/ac)**	
	SE Farm	**Brookings**	**SE Farm**	**Brookings**
Untreated	**2.75**	**0.75**	**56.48**	**47.27**
Headline Caramba	0.25	2.25	61.35	57.47
Headline Caramba	0.50	0.75	56.76	60.38
Headline Induce NIS	0.25	1.25	66.59	52.45
Headline Induce NIS Caramba	0.25	1.00	55.07	56.75
Headline Induce NIS Headline Caramba	0.25	1.75	52.48	55.64
Headline Folicur	0.00	1.00	61.51	56.28
Headline Folicur	0.00	0.50	60.47	56.23
Untreated	4.00	0.75	51.89	57.02
Folicur	3.50	2.25	55.89	53.24
Absolute 500 SC	0.25	1.50	69.06	59.65
Stratego Induce NIS	0.75	0.00	55.45	54.85
Untreated	**1.50**	**0.50**	**64.16**	**58.99**
Topguard	1.25	0.75	65.90	59.63
Topguard	0.75	1.00	65.87	58.44
Topguard Topguard	1.75	0.75	60.25	54.94
Topguard Induce NIS	1.00	1.75	63.02	56.72
Topguard Headline	0.75	0.25	56.25	55.22
Spectra	3.75	1.25	49.51	61.64
Untreated	**3.25**	**2.00**	**58.16**	**54.25**
Laredo Induce NIS Headline Induce NIS	2.00	3.00	51.78	54.19
Enable Prime Oil COC Enable Headline Prime Oil COC	1.00	2.00	48.62	55.90
F-LSD(P=0.05)	2.09	NS	NS	NS
CV	96.38	137.90	17.66	10.26

Table 3 con't. Soybean Foliar Fungicide Study: Disease rating and yield associated with various foliar treatments at Beresford and Brookings, SD.

Foliar Treatment	Brown Spot Disease Rating %		Yield (bu/ac)	
	SE Farm	Brookings	SE Farm	Brookings
Dithane Induce NIS	2.50	1.00	60.10	57.28
Laredo Induce NIS Laredo Dithane Induce NIS	2.00	0.50	50.22	55.54
Dithane Induce NIS Dithane Induce NIS	1.25	1.25	51.97	55.30
Untreated	4.50	0.75	43.35	59.63
Punch Punch	2.75	0.75	46.23	54.62
Punch Headline Punch Headline	0.50	0.50	53.56	56.67
Uppercut Uppercut	1.75	1.75	58.80	55.38
Headline Headline	0.25	0.50	56.26	55.35
Untreated	5.25	0.50	54.01	56.22
Quadris Experimental A Induce NIS	1.25	0.75	57.52	59.88
Quadris Experimental A Induce NIS	0.25	1.50	60.41	58.89
Quilt Prime Oil COC	0.25	0.75	55.69	53.56
Quadris Prime Oil COC	0.50	0.50	56.91	57.29
Domark 230 ME	2.25	0.25	58.28	56.23
Orthene 97	3.25	0.00	57.90	55.54
Domark 230 ME Orthene 97	1.75	2.75	57.27	55.73
Domark 230 ME Quadris Orthene 97	1.00	0.75	51.79	56.82
Domark 230 ME Quadris	1.00	0.25	53.74	56.68
F-LSD(P=0.05)	2.09	NS	NS	NS
CV	96.38	137.90	17.66	10.26

Oat and Field Pea - Eastern South Dakota Test Performance Results for 2006

Robert G. Hall[1] and Kevin K. Kirby[2]

Plant Science 0619

TRIAL METHODS

A random complete block design is used in all trials. Plots were 5 feet wide and either 12 or 14 feet long and harvested with a small plot combine. Yield means were generated from four variety replications per location per year. Oat plots were fertilized with 60 lb. per acre of 18-46-0 (10.8 pounds of N and 27.6 pounds of phosphorous per acre) down the seed tube at seeding. In addition, a post-emergence application of Bronate (1.0 pint) was applied for weed control. Oat plots were seeded at 28 pure live seeds per square foot to obtain a density of about 25 seedlings per square foot. Field peas were seeded at 7 pure live seeds per square foot and inoculated seed. Field pea weed control included pre-emergence Spartan (6 oz) and Dual (1.5 pt) and post-emergence Raptor 4L (4 oz) per acre.

PERFORMANCE TRIAL RESULTS

Oat (Tables 1a-b) - The top performing entries for yield for the past 3-years (2004-06) by variety and top yield frequency included **HiFi, Morton, Loyal, and Stallion at 100%;** and **Jerry at 60%** (table 1a.). These varieties exhibited very good yield stability or the ability to adapt to a wide range of production environments by being in the top-performance group for yield at more than 60% of the test locations for the past three years. The top-performing entries for yield in 2006 were the experimental lines **SD 011315-15 at 83%; SD 020701 and SD 030888 at 67%;** and **Baker, Beach, Souris, SD 030324, and SD 021021 at 50%** of the test locations. In 2006, on a state basis, **the hull-less entries Buff, Paul, and Stark at 44, 42, and 40 pounds,** respectively, had the best bushel or test weight average across all locations (table 1b). Among the standard hulled entries the varieties **Hytest, Beach, and Stallion at 39 pounds** followed by **Loyal, SD 020883, SD 020536, SD 030888 at 38 pounds** were the highest in bushel weight. In contrast, the entry **GG-304 at 30 lbs** was the lowest state bushel weight among the standard hulled varieties. Among the entries tested **Hytest at 36 inches** was the tallest and **GG-304 at 21 inches** was the shortest in height in 2006. In 2006, there was little if any lodging across the state. The **standard variety Hytest at 19.5%** and the **hull-less varieties Buff and Paul at 18.2%** exhibited the highest grain protein levels for 2006.

Field Pea (Tables 2a-b) - The top entries for yield for 2006 were the varieties **Polstead, Cooper, Stratus, Tudor and CDC Mozart**. The entries **Aragon at 65, WS Midas at 63, SW Salute and Topeka at 62, Tudor at 61; and Carneval, CDC Mozart, DS-Admiral, Eclipse, and SW Capri at 60 pounds per bushel** were the top test weight varieties for 2006. Protein levels were not determined for 2006. The

[1] Extension agronomist – crops, SDSU
[2] Agricultural research manager, SDSU

common field pea traits for the various entries tested in 2006 are listed in table 2b.

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Table 1a. Oat yield results - South Dakota East River locations, 2004-2006.

Variety (Hdg.)* - sorted by 3-yr then 2006 state average	Location Yield Avg. (Bu/A at 13% moist.)								State Yield Avg. (Bu/A)		State Yield Freq. ** (%)	
	Brookings		So. Shore		Beresford		Brown Co.					
	2006	3-Yr	2006	3-Yr	2006	3-Yr	2006	3-Yr	2006	3-Yr	2006	3-Yr
HiFi (8)	129	143+	112	143+	137	131+	112+	128+	100	119	17	100
Stallion (8)	136+	132+	120	131+	139	139+	96	118+	100	115	17	100
Morton (7)	117	130+	112	138+	132	127+	97	115+	94	113	0	100
Loyal (8)	124	133+	112	127+	130	125+	99	108+	94	109	0	100
Jerry (5)	111	120	114	118	103	121+	50	100+	80	103	0	60
Don (1)	105	115	110	116	103	113	53	98	79	99	17	0
Reeves (2)	101	110	106	113	99	111	48	96	74	95	0	20
Hytest (4)	91	102	100	107	85	86	71	95	73	88	0	20
Buff, Hls (3)	88	96	91	102	79	92	48	73	64	81	0	0
Stark, Hls (6)	76	86	70	95	48	79	70	80	54	74	0	0
Paul, Hls (7)	78	83	77	92	75	70	77	83	63	72	0	0
SD 011315-15	142+	.	130+	.	137	.	103+	.	106	.	83	.
SD 030324	140+	.	123	.	151+	.	116+	.	106	.	50	.
SD 020701	125	.	125+	.	144+	.	92	.	101	.	67	.
SD 021021	124	.	124+	.	137	.	103+	.	101	.	50	.
SD 030888	140+	.	132+	.	144+	.	75	.	101	.	67	.
SD 020536	123	.	115	.	146+	.	102+	.	100	.	50	.
Baker (4)	125	.	118	.	131	.	98	.	98	.	33	.
Beach (6)	127	.	118	.	123	.	100+	.	97	.	50	.
SD 031128	118	.	128+	.	125	.	62	.	91	.	34	.
Maida (7)	114	.	110	.	124	.	78	.	88	.	17	.
SD 020883	93	.	112	.	117	.	49	.	79	.	17	.
GG-304	94	.	96	.	63	.	69	.	69	.	0	.
Test avg.:	115	114	112	117	117	109	83	99				
High avg. :	142	143	132	143	151	139	118	128				
Low avg. :	76	83	70	92	48	70	48	73				
# Lsd(.05) :	9	20	8	16	11	24	18	29				
## TPG-value :	133	123	124	127	140	115	100	99				
### C.V. :	5	8	5	7	7	12	15	10				

* Heading, the relative days to heading, compared to the variety - Don.
# Lsd, the amount two values in a column must differ to be significantly different.
TPG-value, the minimum value required for the top-performance group (TPG) for yield.
A plus sign (+) indicates values within a column that qualify for the TPG.
Coef. of variation, a measure of trial experimental error, 15% or less is best.
** Frequency or percent of all test locations that a variety was in the TPG for yield.

Table 1b. HRS wheat averages for bushel weight (BW), Height (HT), lodging (LDG) by location along with stage average for grain protein (PRT) in 2006.

Variety (Hdg.)* - sorted by state BW avg.	Location Avg. - BW, HT, LDG												State Avg. - BW, HT, LDG, PRT			
	Brookings			South Shore			Beresford			Brown Co.						
	BW lb	HT in	LDG **	BW lb	HT in	LDG **	BW lb	HT in	LDG **	BW lb	HT in	LDG **	BW lb	HT in	LDG **	PRT %
Buff, Hls (3)	45+	35	1+	42+	33	1+	46+	35	1+	44+	27	1+	44	29	1	18.2
Paul, Hls (7)	42	42	2+	41+	37	1+	42	38	1+	46+	32	1+	42	33	1	18.2
Stark, Hls (6)	41	42	1+	41+	37	1+	40	38	1+	42	32	1+	40	34	1	17.8
Hytest (4)	39	42	3	41+	40	3	41	40	1+	39	36	1+	39	36	1	19.5
Beach (6)	38	42	2+	43+	39	2+	40	40	1+	39	33	1+	39	34	1	15.5
Stallion (8)	39	42	2+	40	37	2+	41	40	1+	39	33	1+	39	34	1	17.2
SD 030888	40	33	2+	38	31	1+	40	32	1+	38	27	1+	38	27	1	15.9
SD 020536	38	39	2+	37	33	3	40	34	1+	39	29	1+	38	30	1	16.2
SD 020883	39	37	2+	38	35	2+	38	34	1+	36	29	1+	38	31	1	17.2
Loyal (8)	38	41	2+	40	38	3	40	38	1+	38	34	1+	38	34	1	17.8
SD 031128	38	39	1+	38	37	1+	39	36	1+	35	29	1+	37	32	1	16.3
SD 020701	36	40	2+	39	36	3	39	37	1+	37	33	1+	37	33	1	16.5
SD 011315-15	36	41	2+	36	36	2+	39	37	1+	39	30	1+	37	32	1	15.5
Jerry (5)	38	40	2+	36	38	2+	39	37	1+	34	31	1+	37	32	1	16.6
Morton (7)	38	43	1+	38	37	1+	38	40	1+	37	35	1+	37	34	1	16.5
Reeves (2)	37	39	2+	38	37	3	38	38	1+	33	32	1+	36	33	1	16.1
SD 030324	34	42	2+	38	38	3	40	38	1+	38	33	1+	36	34	1	16.3
Maida (7)	36	42	2+	38	37	2+	36	40	1+	37	32	1+	36	34	1	17.4
SD 021021	37	37	1+	37	34	1+	38	35	1+	38	30	1+	36	30	1	17.6
HiFi (8)	36	42	1+	36	36	1+	38	37	1+	36	32	1+	36	33	1	15.6
Don (1)	36	32	2+	36	32	1+	37	32	1+	34	26	1+	36	28	1	15.6
Baker (4)	34	38	1+	36	35	1+	38	36	1+	35	31	1+	35	32	1	15.9
GG-304	29	25	1+	28	23	1+	31	24	1+	34	20	1+	30	21	1	16.1
Test avg. :	37	39	2	38	35	2	39	36	1	38	30	1				
High avg. :	45	43	3	43	40	3	46	40	1	46	36	1				
Low avg. :	29	25	1	28	23	1	31	24	1	33	20	1				
# Lsd(.05) :	2	2	1	2	2	1	2	2	NS^	3	3	NS^				
## TPG-value :	43	.	2	41	.	2	44	.	1	43	.	1				
### C.V. :	4	3	35	4	3	26	4	3	0	5	7	0				

* Heading, the relative days to heading, compared to the variety - Don.

** Lodging score: 0= all plants erect, 3= 50% of plants lodged at 45^o-angle, 5= all plants flat.

Lsd, the amount two values in a column must differ to be significantly different.

TPG-value, the minimum or maximum value required for the top-performance group (TPG).

A plus sign (+) indicates values within a column that qualify for the TPG.

Coef. of variation, a measure of trial experimental error.

^ Variable differences within a column are non-significant (NS) at the .05 level of probability.

Table 2a. Field pea yield and bushel weight averages at the Southeast Research Station, Beresford, SD - 2006.

Variety (Mat.)*- sorted by yield	Yield (Bu/A) 13% moist.	Bushel Wt. lb
Polstead (M)	79+	60
Cooper (L)	76+	59
Stratus (M)	77+	58
Tudor (M)	74+	61+
CDC Mozart (M)	72+	60+
SW Salute (E)	70	62+
SW Midas (E)	68	63+
SW Marquee (E)	68	59
Topeka (E)	67	62+
Eclipse (M)	67	60+
SW Capri (E)	66	60+
Fusion (M)	66	59
Camry (M)	64	58
CEB 1093 (M)	64	60
SW Cabot (E)	64	57
Tamora (L)	63	56
Aragorn (M)	62	65+
DS-Admiral (E)	62	60+
AP-18 (M)	60	58
Grande (M)	60	59
CDC Striker (M)	59	59
Cruiser (M)	56	59
Carneval (M)	54	60+
Integra (E)	54	56
K2 (M)	45	58
Majoret (E)	39	56
Test avg. :	64	59
High avg. :	79	65
Low avg. :	39	56
# Lsd (.05) :	7	5
## TPG-value :	72	60
### C.V. :	8	6

* Early- E, medium- M, or late- L maturity.
# Lsd, the amount two values in a column must differ to be significantly different.
TPG-value, the minimum value required for the top-performance group (TPG) for yield.
A plus sign (+) indicates values within a column that qualify for the TPG.
Coef. of variation, a measure of trial experimental error.

Table 2b. Origin, traits, and disease reactions for field pea entries tested in 2006.

Variety	Rel.* mat.	Seed color	Leaf# type	Ht.## (inch)	Lodging (0-10)~	Powdery mildew@	Mycos-phaerella blight@	Fusarium Wilt@	Seeds per lb	PVP$ or PBR Status
DS-Admiral	E	Yellow	SL	25	1	VG	F	F	2000	Yes
Aragorn	M	Green	SL	.	.	.	.	.	2200	.
AP-18	M	Green	SL	22	1	.	.	.	2100	.
SW Cabot	E	Yellow	SL	.	.	P	P	P	1900	.
Camry	M	Green	SL	19	1	VG	F	F	2000	Yes
CEB 1093	M	Green	SL	.	.	.	.	.	1700	.
SW Capri	E	Yellow	SL	.	.	P	F	P	2200	.
Carneval	M	Yellow	SL	22	0	F	F	P	2100	Yes
Cooper	L	Green	SL	26	0	VG	F	F	1700	Yes
Cruiser	M	Green	SL	24	3	P	F	P	2200	.
Eclipse	M	Yellow	SL	23	1	VG	F	F	1900	Yes
Fusion	M	Yellow	SL	.	.	.	.	.	2000	.
Grande	M	Yellow	N	28	6	P	F	P	2300	Yes
Integra	E	Yellow	SL	25	1	P	P	F	1900	.
K2	M	Green	SL	.	.	.	.	.	2200	.
Majoret	E	Green	SL	24	1	P	F	P	2100	Yes
SW Marquee	E	Yellow	SL	26	0	.	.	.	2300	.
SW Midas	E	Yellow	SL	24	0	VG	F	F	2200	Yes
CDC Mozart	M	Yellow	SL	22	4	VG	P	F	2100	.
Polstead	M	Yellow	SL	.	.	.	.	.	1900	.
SW Salute	E	Yellow	SL	26	3	VG	F	P	2000	Yes
Stratus	M	Green	SL	21	5	VG	F	P	1900	Yes
CDC Striker	M	Green	SL	.	.	F	F	G	1900	.
Tamora	L	Green	SL	.	.	.	.	.	1700	.
Topeka	E	Yellow	SL	21	6	VG	F	P	2100	Yes
Tudor	M	Yellow	SL	27	0	VG	P	F	1700	Yes

$ Plant variety protection (PVP, US) or Plant breeders rights (PBR, CAN) application is pending or anticipated.

* Early- E, medium- M, or late- L maturity.

Normal- N or semi-leafless- SL leaf type.

~ 1 = all plants erect, 3 = 50% lodged at45o angle, 5 = all flat.

** Very good- VG, good- G, fair- F, poor- P disease resistance.

SE FARM REPORT
SDSU

2006 SOYBEAN VARIETY PERFORMANCE TRIALS - BERESFORD AND GEDDES

Robert G. Hall[1] and Kevin K. Kirby[2]

Plant Science 0620

GENERAL TEST PROCEDURES

Test trials consisted of 4-row plots, 20 feet long, and with three replications. A row spacing of 30 inches and seeding rate of 165,000 seeds per acre was used in all plots. The seed furrow was inoculated with Nitragin brand Soybean Soil Implant down the seed tube using label rates at planting. Seeding was accomplished using a Monosem precision row crop planter. In the Roundup Ready™ plots weed control consisted of one post application of Roundup at both Beresford and Geddes. Weed control in the Non-Roundup Ready™ plots at Beresford consisted of a pre application of a Dual-Python tank mix at label rates. The center two rows of each 4-row plot were harvested with Massey Ferguson 8XP small plot combine.

Yield: Plots were harvested at 15% seed moisture or less. Yields were calculated on a 13% moisture content basis and expressed in bushels per acre.

Variety maturity: Maturity is reported as "Days to maturity" (DTM); obtained by averaging the number of days from seeding to maturity (95% of pods brown) for two replicates. If the DTM value is missing the entry did not reach maturity before the first killing frost.

Lodging Score: Scores at maturity are based on average erectness of the main stem of plants within each variety. 1 = all plants erect, 2 = slight lodging, 3 = lodging at a 45 degree angle, 4 = severe lodging, and 5 = all plants flat.

Protein and Oil Content: A sub-sample from each replication (3 in total) of each variety was combined, mixed, re-sampled, and tested for protein and oil. The analysis was done using a FOSS TECATOR Model Infratec 1229 grain analyzer. Samples of known protein and oil previously tested by the SDSU Agricultural Experiment Station Biochemistry Laboratory were then used to calibrate the analyzer. Protein and oil values were adjusted to 13% moisture.

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[1] Extension agronomist – crops/Manager – crop testing; SDSU
[2] Agricultural research manager – crop testing; SDSU

Roundup Ready™ Soybean Variety Performance Results – Beresford & Geddes

Note: Yields are reported as 2006 averages or 2-yr averages (2005-06).

Beresford, Group-I varieties (Tables 1a & 1b): The 2006 and two-year yield averages were **61** and **56** bushels per acre, respectively (Table 1a)**.** Varieties averaging 62 bushels or higher were in the top yield group. There were no significant yield differences among varieties for two years so all varieties were in the top yield group. Yield averages had to differ by 5 bushels in 2006 to be significantly different from one another. The 2006 protein, oil, and lodging score test averages were **36.6%, 19.7%,** and **2**, respectively (Table 1b)**.** Lodging was evident and entries scoring 2 or less were in the top performance group for resistance to lodging.

Geddes, Group-I varieties (Tables 1a & 1b): The 2006 and two-year yield averages were **46** and **36** bushels per acre, respectively (Table 1a)**.** Varieties that averaged at least 48 bushels in 2006 or 35 bushels for two years were in a top yield group. Yield averages had to differ by 4 bushels in 2006 and 6 bushels for two years to be significantly different. The 2006 protein, oil, and lodging score test averages were **36.9%, 19.7%,** and **1**, respectively (Table 1b)**.** A lodging score average of 1 and LSD value of 0 indicated lodging did not occur.

Southern test zone, Group-I varieties (Tables 1a & 1b): The 2006 and two-year yield averages in the Southern zone were **53** and **46** bushels per acre, respectively (Table 1a)**.** Varieties had to average 57 bushels or higher in 2006 to be in the top yield group; while there were no significant yield differences among varieties for two years. Yield averages had to differ by 3 bushels in 2006 to be significantly different. In contrast, for the two-year period a high CV indicated there was too much experimental error associated with the data over locations to make valid determinations of yield differences among entries. The 2006 protein, oil, and lodging score test averages were **36.8%, 19.7%, and 1**, respectively over locations (Table 1b)**.** A lodging score average of 1 and LSD value of 0.4 (less than 1) indicated some lodging occurred and entries scoring 1 were in the top performance group for lodging resistance.

Beresford, Group-II varieties (Tables 2a & 2b): The 2006 and two-year yield averages were **63 and 59** bushels per acre, respectively (Table 2a)**.** Varieties that averaged at least 69 bushels in 2006 or 60 bushels for two years were in a top yield group. Yield averages had to differ by 7 bushels in 2006 and 6 bushels for two years to be significantly different. The 2006 protein, oil, and lodging score test averages were **36.4%, 19.3%,** and **2**, respectively (Table 2b)**.** A top performance group value of 2 indicates varieties scoring 2 or less were in the top group for lodging resistance.

Geddes, Group-II varieties (Tables 2a & 2b): The 2006 and two-year yield averages were **45 and 36** bushels per acre, respectively (Table 2a)**.** Varieties averaged at least 46 bushels in 2006 or 36 bushels for two years were in a top yield group. Yield averages had to differ by 4 bushels in both 2006 and for two years to be significantly different. The 2006 protein, oil, and lodging score test averages were **36.5%, 19.5%,** and **1**, respectively (Table 2b)**.** A lodging score average of 1 and LSD value of 0 indicated lodging did not occur.

Southern test zone, Group-II varieties (Tables 2a & 2b): The 2006 and two-year yield averages in the Southern zone were **54** and **48** bushels per acre, respectively (Table 2a)**.** Varieties that averaged 58 bushels or higher in 2006 were in the top yield group. Yield averages had to differ by

4 bushels in 2006 to be significantly different. Valid yield differences for the two-year period over locations could not be determined. The high CV of 19% indicated too much experimental error was associated with this trial to make valid yield determinations. Therefore, growers are encouraged to look at both the 2006 and the two-year yield averages at each location separately to evaluate average yield trends at each location. The 2006 protein, oil, and lodging score test averages were **36.4%, 19.4%,** and **1**, respectively over locations (Table 2b)**.** A lodging score average of 1 and LSD value of 0.4 (less than 1) indicated lodging occurred and entries scoring 1 were in the top performance group for lodging resistance.

Non-Roundup Ready™ Soybean Variety Performance Results – Beresford

Note: Yields are reported as 2006 averages or 2-yr averages (2005-06).

Beresford, Group-I varieties (Tables 3a & 3b): The 2006 and two-year yield averages were **55** and **52** bushels per acre, respectively (Table 3a)**.** Varieties that averaged at least 55 bushels in 2006 or 52 bushels for two years were in the top performance group for yield. Yield averages had to differ by 5 bushels in 2006 to be significantly different, while there were no significant differences among entries tested two years. The 2006 protein, oil, and lodging score test averages were **36.4%, 19.8%,** and **3**, respectively (Table 3b)**.** A top performance group value of 2 indicates varieties scoring 2 or less were in the top group for lodging resistance.

Beresford, Group-II varieties (Tables 3a & 3b): The 2006 and two-year yield averages were **61** and **52** bushels per acre, respectively (Table 3a)**.** Varieties had to average 62 bushels or higher in 2006 and 50 bushels or higher for two years to be in the top performance group for yield group. Yield averages had to differ by 6 bushels in 2006 to be significantly different; while there were no significant differences among varieties tested two years. The 2006 protein, oil, and lodging score test averages were **36.6%, 19.3%,** and **2**, respectively (Table 3b)**.** A top performance group value of 2 indicates varieties scoring 2 or less were in the top group for lodging resistance.

Table 1a. Roundup Ready maturity group-I soybean variety yield averages - Southern locations, 2005-06.

Brand/Variety (By 2-yr then 2006 zone yield)	DTM*	Yield Averages by Location: Beresford Bu/Acre 2006	Beresford Bu/Acre 2-Yr	Geddes Bu/Acre 2006	Geddes Bu/Acre 2-Yr	Southern Zone Averages Bu/Acre 2006	Southern Zone Averages Bu/Acre 2-Yr
THOMPSON/ T-7205+RR	124	64	59	48	38	56	49
ASGROW/ AG1903	120	60	56	50	41	55	49
NORTHSTAR/ NS 1809RR	122	65	57	47	38	56	48
KRUGER/ K-195+RR/SCN	121	64	59	48	35	56	47
NUTECH/ NT-1909RR	123	57	57	48	37	53	47
KRUGER/ K-177RR	118	63	58	46	33	55	46
PRAIRIE BRAND/ PB-1954RR	122	59	56	48	36	54	46
PUBLIC/ SDX00R-026-42N	123	61	57	44	34	53	46
KRUGER/ K-156RR	117	57	56	39	32	48	44
PUBLIC/ SD01-3219R	123	56	51	44	33	50	42
SODAK GENET./ SD1111RR	113	47	49	38	30	43	40
PRAIRIE BRAND/ PB-1956RR	125	67	.	52	.	60	.
ASGROW/ AG1702	118	61	.	50	39	56	.
HEFTY/ 195RR	124	64	.	47	.	56	.
KRUGER/ K-188RR/SCN	121	67	.	45	.	56	.
PRAIRIE BRAND/ PB-1916RR	125	65	.	47	.	56	.
WENSMAN/ W 2195NRR	124	61	.	50	.	56	.
NUTECH/ NT-1991RR	123	61	.	49	.	55	.
KRUGER/ K-194RR	123	61	.	49	.	55	.
SANDS/ SOI 1874NRR	120	60	.	48	.	54	.
PRAIRIE BRAND/ PB-1885NR	122	62	.	45	.	54	.
WENSMAN/ W 2172NRR	121	62	.	46	.	54	.
WENSMAN/ W 2163RR	119	61	.	45	.	53	.
NORTHSTAR/ NS 1521NRR	116	60	.	43	.	52	.
WENSMAN/ W 2168NRR	118	55	.	43	.	49	.
KRUGER/ K-140RR	116	54	.	42	.	48	.
COYOTE/ 4719RR	128	.	.	51	38	.	.
MUSTANG/ M-194NRR	123	63	.	.	.	.	.
WECO/ EXP 6 1.5RR	123	.	.	48	.	.	.
G. COUNTRY SEED/2717NR	117	62	.	.	.	.	.
STINE/ 1918-4	118	62	58	.	.	.	.
Test avg. :	121	61	56	46	36	53	46
# Lsd (.05) :		5	NS	4	6	3	.
## TPG-avg. :		62	49	48	35	57	.
@ Coef. Var. :		5	6	6	8	5	20+

* DTM= average days from seeding (Beresford- May 17, Delmont- May 25 , 2006) to maturity; a missing value indicates the site received a hard frost before the variety reached maturity.

Lsd,(.05)= amount values in a column must differ to be significantly different, if differences are not significant (NS), NS is indicated.

TPG-avg. = minimum value to qualify for top performance group.

@ Coef. Var. = a measure of trial experimental error, 15% or less is best.

+ Lsd and TPG-avg. values are not reported because the Coef. of Variation exceeds 20%.

Table 1b. Roundup Ready maturity group-I soybean variety protein, oil, and lodging score Southern averages, 2006

Brand/Variety (By 2006 zone protein)	DTM*	Averages by Location						Southern Zone Averages		
		Beresford			Geddes					
		Protein (%)	Oil (%)	Lodging (1-5)*	Protein (%)	Oil (%)	Lodging (1-5)*	Protein (%)	Oil (%)	Lodging (1-5)*
KRUGER/ K-156RR	117	36.9	19.6	1	38.3	19.2	1	37.6	19.4	1
WENSMAN/ W 2168NRR	118	37.1	19.7	2	37.9	19.7	1	37.5	19.7	2
WENSMAN/ W 2163RR	119	37.3	19.3	2	37.3	19.6	1	37.3	19.5	1
NORTHSTAR/ NS 1521NRR	116	37.0	19.8	2	37.5	19.8	1	37.3	19.8	2
PUBLIC/ SDX00R-026-42N	123	37.0	19.4	2	37.5	19.4	1	37.3	19.4	2
KRUGER/ K-140RR	116	36.3	19.8	2	37.6	19.4	1	37.0	19.6	1
SODAK GENET./ SD1111RR	113	36.4	20.0	3	37.5	19.7	1	37.0	19.9	2
WENSMAN/ W 2195NRR	124	36.7	19.7	2	37.1	19.9	1	36.9	19.8	1
ASGROW/ AG1903	120	36.8	19.3	1	37.0	19.5	1	36.9	19.4	1
ASGROW/ AG1702	118	36.5	19.8	2	37.2	19.6	1	36.9	19.7	2
KRUGER/ K-195+RR/SCN	121	36.6	19.8	2	37.1	20.0	1	36.9	19.9	2
NUTECH/ NT-1909RR	123	36.8	19.6	2	36.9	19.7	1	36.9	19.7	1
HEFTY/ 195RR	124	36.8	19.6	2	36.9	19.8	1	36.9	19.7	2
PUBLIC/ SD01-3219R	123	36.5	19.5	2	37.0	19.5	1	36.8	19.5	2
WENSMAN/ W 2172NRR	121	36.5	19.8	2	36.8	19.8	1	36.7	19.8	1
SANDS/ SOI 1874NRR	120	36.5	20.0	2	36.7	19.9	1	36.6	20.0	1
THOMPSON/ T-7205+RR	124	36.7	19.5	2	36.5	19.8	1	36.6	19.7	1
KRUGER/ K-188RR/SCN	121	36.4	19.9	2	36.7	20.1	1	36.6	20.0	2
PRAIRIE BRAND/PB-1954RR	122	36.4	19.5	2	36.7	19.7	1	36.6	19.6	2
KRUGER/ K-177RR	118	36.4	19.6	2	36.6	19.5	1	36.5	19.6	2
KRUGER/ K-194RR	123	36.8	19.3	2	36.2	19.9	1	36.5	19.6	1
PRAIRIE BRAND/PB-1916RR	125	36.6	19.4	2	36.4	19.7	1	36.5	19.6	1
PRAIRIE BRAND/PB-1885NR	122	36.2	19.9	2	36.6	19.9	1	36.4	19.9	1
NORTHSTAR/ NS 1809RR	122	36.6	19.4	2	36.2	19.6	1	36.4	19.5	2
NUTECH/ NT-1991RR	123	36.5	19.5	2	36.2	19.7	1	36.4	19.6	1
PRAIRIE BRAND/PB-1956RR	125	35.9	19.7	3	35.7	19.9	1	35.8	19.8	2
COYOTE/ 4719RR	128	.	.	.	36.5	19.7	1	.	.	.
MUSTANG/ M-194NRR	123	36.5	19.8	2	.	.	.	.	.	.
WECO/ EXP 6 1.5RR	123	.	.	.	36.8	20.0	1	.	.	.
G. COUNTRY SEED/2717NR	117	36.4	20.0	2	.	.	.	.	.	.
STINE/ 1918-4	118	36.8	19.7	2	.	.	.	.	.	.
Test avg. :	121	36.6	19.7	2	36.9	19.7	1	36.8	19.7	1
* Lsd(.05) :		.	.	1	.	.	0	.	.	0.4
## TPG-avg. :		.	.	2	.	.	1	.	.	1
@ Coef. Var. :		.	.	22	.	.	0	.	.	22

* DTM= average days from seeding (Beresford- May 17, Geddes- May 25, 2006) to maturity; a missing value indicates a site received a hard frost before the variety reached maturity.

** Lodging, 1= all plants erect, 5= all plant flat.

Lsd,(.05)= amount values in a column must differ to be significantly different, if differences are not, significant (NS), NS is indicated.

TPG-avg. = minimum value to qualify for top performance group.

@Coef. Var. = a measure of trial experimental error, 20% or less is best.

Table 2a. Roundup Ready maturity group-II soybean variety yield averages- Southern locations, 2005-06.

Brand/Variety (By 2-yr then 2006 zone yield)	DTM*	Yield Averages by Location: Beresford Bu/Acre 2006	Beresford Bu/Acre 2-Yr	Geddes Bu/Acre 2006	Geddes Bu/Acre 2-Yr	Southern Zone Averages Bu/Acre 2006	Southern Zone Averages Bu/Acre 2-Yr
DEKALB/ DKB25-51	127	76	66	48	40	62	53
SANDS/ SOI 2448RR	127	67	63	47	38	57	51
KRUGER/ K-233+RR	126	68	62	46	37	57	50
KRUGER/ K-289+RR	131	66	61	46	39	56	50
SANDS/ SOI 2754RR	131	64	58	49	39	57	49
PRAIRIE BRAND/ PB-2141RR	125	69	62	43	36	56	49
PRAIRIE BRAND/ PB-2421RR	126	68	61	44	36	56	49
PRAIRIE BRAND/ PB-2643RR	130	65	58	47	38	56	48
ASGROW/ AG2403	124	66	62	43	33	55	48
MUSTANG/ M-264RR	130	65	59	44	37	55	48
COYOTE/ 9524RR	127	61	59	45	36	53	48
LATHAM/ L2635R	129	65	57	47	37	56	47
DAIRYLAND/ DSR2500RRSTS	128	63	57	48	37	56	47
SANDS/ SOI 2673RR	126	66	60	42	34	54	47
SANDS/ SOI 2884RR	130	64	58	44	35	54	47
PRAIRIE BRAND/ PB-2243RR	125	64	59	44	34	54	47
NUTECH/ NT-2890RR	129	61	57	44	37	53	47
RENK/ RS265RR	129	60	59	44	34	52	47
DAIRYLAND/ DSR-234/RR	124	62	56	45	36	54	46
NUTECH/ NT-2770RR/SCN	129	57	55	48	37	53	46
DAIRYLAND/ DSR-2600/RR	129	63	56	42	35	53	46
PRAIRIE BRAND/ PB-2565RR	131	59	55	47	36	53	46
KRUGER/ K-255RR	127	64	54	45	35	55	45
KRUGER/ K-223+RR	124	61	56	41	32	51	44
DAIRYLAND/ DSR-2300/RR	126	68	.	49	.	59	.
THOMPSON/ T-2220ARR	126	68	.	50	.	59	.
ASGROW/ AG2605	127	70	.	46	.	58	.
MUSTANG/ M-207RR	124	67	.	48	.	58	.
KRUGER/ K-259RR	131	66	.	49	.	58	.
LATHAM/ EXP-E2810R	131	66	.	49	.	58	.
DAIRYLAND/ DSR-2200/RR	127	68	.	48	.	58	.
LATHAM/ L2500R	126	68	.	46	.	57	.
LATHAM/ L2646R	128	67	.	46	.	57	.
PRAIRIE BRAND/ PB-2645RR	130	70	.	44	.	57	.
CROW'S/ C2917R	133	66	.	47	.	57	.
SANDS/ SOI 2609RR	131	66	.	45	.	56	.
DAIRYLAND/ DSR-2511/RR	133	64	.	47	.	56	.
MIDWEST SEED/ GR2731	131	65	.	46	.	56	.
THOMPSON/ T-2213ARR	127	66	.	45	.	56	.
THOMPSON/ T-2666RR	129	68	.	44	.	56	.
FARM ADVANTAGE/ 7224	126	66	.	44	.	55	.
NUTECH/ NT-2777RR/SCN	132	60	.	49	.	55	.
NUTECH/ NT-2890+RR	130	64	.	45	.	55	.
KRUGER/ K-234RR	126	64	.	45	.	55	.
LATHAM/ L2775R	129	63	.	47	.	55	.

Table 2a. (continued) Roundup Ready maturity group-II soybean variety yield averages.

Brand/Variety (By 2-yr then 2006 zone yield)	DTM*	Yield Averages by Location: Beresford Bu/Acre 2006	Beresford Bu/Acre 2-Yr	Geddes Bu/Acre 2006	Geddes Bu/Acre 2-Yr	Southern Zone Averages Bu/Acre 2006	Southern Zone Averages Bu/Acre 2-Yr
DAIRYLAND/ DSR2000RRSTS	123	66	.	44	.	55	.
DAIRYLAND/ DSR-2820/RR	125	67	.	43	.	55	.
WENSMAN/ W 2253RR	129	62	.	47	.	55	.
WENSMAN/ W 2200NRR	123	66	.	43	.	55	.
WENSMAN/ W 2226RR	127	63	.	46	.	55	.
THOMPSON/ T-2300RR	127	63	.	47	.	55	.
CROW'S/ C2618R	128	62	.	47	.	55	.
FARM ADVANTAGE/ 7253	129	60	.	47	.	54	.
NUTECH/ NT-2333RR	123	64	.	43	.	54	.
NUTECH/ NT-2220RR	125	62	.	45	.	54	.
WECO/ EXP 6 2.0RR	125	67	.	40	.	54	.
WECO/ EXP 6 2.8RR-SCN	135	64	.	44	.	54	.
DAIRYLAND/ DSR2702RRSTS	129	62	.	46	.	54	.
PRAIRIE BRAND/ PB-2456RR	127	59	.	48	.	54	.
PRAIRIE BRAND/ PB-2536RR	129	62	.	46	.	54	.
THOMPSON/ T-2707RR	131	59	.	49	.	54	.
THOMPSON/ T-2999RR	132	65	.	42	.	54	.
PUBLIC/ SD02R-48	122	61	.	46	.	54	.
MUSTANG/ M-227RR	126	65	.	41	.	53	.
MUSTANG/ M-237RR	125	61	.	45	.	53	.
DEKALB/ DKB27-53	131	59	.	47	.	53	.
NUTECH/ NT-2213RR	126	60	.	45	.	53	.
WECO/ EXP 6 2.5RR-STS	129	60	.	46	.	53	.
PRAIRIE BRAND/ PB-2216RR	126	61	.	45	.	53	.
MIDWEST SEED/ GR2037	124	63	.	43	.	53	.
MIDWEST SEED/ GR2651	128	60	.	45	.	53	.
THOMPSON/ T-2626RR	126	59	.	47	.	53	.
ASGROW/ AG2802	132	57	.	47	.	52	.
MUSTANG/ M-257RR	129	61	.	43	.	52	.
NUTECH/ NT-2232RR	130	62	.	42	.	52	.
HEFTY/ 226RR	123	60	.	44	.	52	.
HEFTY/ 266RR	130	59	.	45	.	52	.
KRUGER/ K-235RR/SCN	125	59	.	45	.	52	.
PRAIRIE BRAND/ PB-2636NR	130	59	.	44	.	52	.
RENK/ RS246NRR	124	57	.	46	.	52	.
MUSTANG/ M-246NRR	125	59	.	42	.	51	.
WECO/ EXP 6 2.6RR-SCN	128	57	.	45	.	51	.
KRUGER/ K-211+RR	125	61	.	40	.	51	.
PUBLIC/ SD02R-5	123	60	.	41	.	51	.
PUBLIC/ SD02R-51	124	61	.	41	.	51	.
SANDS/ SOI 2675NRR	126	60	.	40	.	50	.
KRUGER/ K-287RR/SCN	131	56	.	43	.	50	.
LATHAM/ EXP-E2976R	132	56	.	44	.	50	.
DAIRYLAND/ DST22-003/RR	124	57	.	43	.	50	.
MUSTANG/ M-247NRR	127	57	.	41	.	49	.

Table 2a. (continued) Roundup Ready maturity group-II soybean variety yield averages.

Brand/Variety (By 2-yr then 2006 zone yield)	DTM*	Yield Averages by Location				Southern Zone Averages	
		Beresford		Geddes			
		Bu/Acre 2006	Bu/Acre 2-Yr	Bu/Acre 2006	Bu/Acre 2-Yr	Bu/Acre 2006	Bu/Acre 2-Yr
SANDS/ SOI 2511NRR	128	56	.	42	.	49	.
THOMPSON/ T-2444RR/SCN	126	56	.	40	.	48	.
COYOTE/ 4523RR	127	.	.	43	.	.	.
COYOTE/ 4527RR	132	64	59	.	.	.	.
COYOTE/ EXP 622RR	127	.	.	46	.	.	.
COYOTE/ EXP 625NRR	125	54	.	.	.	.	.
COYOTE/ EXP 626RR	133	66	.	.	.	.	.
MUSTANG/ M-203RR	122	66	61	.	.	.	.
DEKALB/ DKB22-52	123	66	61	.	.	.	.
DEKALB/ DKB26-53	126	64	59	.	.	.	.
SANDS/ SOI 2151NRR	125	.	.	46	36	.	.
KALTENBERG/ KB256RR	128	62	58	.	.	.	.
KALTENBERG/ KB276RR	131	69	62	.	.	.	.
KALTENBERG/ KB258RR	126	64	.	.	.	.	.
KALTENBERG/ KB266RR	129	64	.	.	.	.	.
ZILLER/ BT 7227NR	121	60	.	.	.	.	.
Test avg. :	128	63	59	45	36	54	48
# Lsd (.05) :		7	6	4	4	4	.
## TPG-avg. :		69	60	46	36	58	.
@ Coef. Var. :		7	6	6	7	7	19+

* DTM= average days from seeding (Beresford- May 17, Geddes- May 25, 2006) to maturity; a missing value indicates the site received a hard frost before the variety reached maturity.

Lsd,(.05)= amount values in a column must differ to be significantly different, if differences are not significant (NS), NS is indicated.

TPG-avg. = minimum value to qualify for top performance group.

@ Coef. Var. = a measure of trial experimental error, 15% or less is best.

+ Lsd and TPG-avg. values are not reported because the Coef. of Variation exceeds 15%.

Table 2b. Roundup Ready maturity group-II soybean variety protein, oil, and lodging score Southern averages, 2006.

Brand/Variety (By 2006 zone protein)	DTM*	Averages by Location: Beresford Protein (%)	Oil (%)	Lodging (1-5)*	Geddes Protein (%)	Oil (%)	Lodging (1-5)*	Southern Zone Averages Protein (%)	Oil (%)	Lodging (1-5)*
DAIRYLAND/DSR2000RRSTS	123	37.6	19.3	2	37.1	19.5	1	37.4	19.4	1
MUSTANG/ M-227RR	126	36.9	19.5	2	37.3	19.5	1	37.1	19.5	2
NUTECH/ NT-2770RR/SCN	129	36.8	18.9	2	37.4	19.2	1	37.1	19.1	2
THOMPSON/ T-2707RR	131	36.8	19.2	3	37.3	19.2	1	37.1	19.2	2
LATHAM/ L2500R	126	37.0	19.3	2	37.0	19.5	1	37.0	19.4	2
WENSMAN/ W 2226RR	127	37.1	19.4	2	36.9	19.5	1	37.0	19.5	2
NUTECH/ NT-2213RR	126	36.8	19.4	2	37.1	19.4	1	37.0	19.4	2
DAIRYLAND/ DSR-2200/RR	127	36.9	19.4	2	37.0	19.5	1	37.0	19.5	1
PRAIRIE BRAND/PB-2565RR	131	36.9	19.0	2	37.0	19.4	1	37.0	19.2	2
THOMPSON/ T-2213ARR	127	36.8	19.5	2	37.1	19.7	1	37.0	19.6	2
FARM ADVANTAGE/ 7224	126	36.9	19.4	2	36.9	19.7	1	36.9	19.6	2
CROW'S/ C2618R	128	37.0	19.2	2	36.8	19.4	1	36.9	19.3	2
MIDWEST SEED/ GR2651	128	36.7	19.2	2	37.0	19.4	1	36.9	19.3	1
FARM ADVANTAGE/ 7253	129	36.8	19.1	2	36.9	19.4	1	36.9	19.3	2
WECO/ EXP 6 2.5RR-STS	129	36.9	19.2	3	36.8	19.4	1	36.9	19.3	2
KRUGER/ K-255RR	127	36.9	19.2	2	36.8	19.5	1	36.9	19.4	2
PRAIRIE BRAND/PB-2216RR	126	36.6	19.6	2	37.0	19.6	1	36.8	19.6	2
WENSMAN/ W 2253RR	129	36.7	19.2	2	36.9	19.4	1	36.8	19.3	2
WECO/ EXP 6 2.6RR-SCN	128	36.8	19.4	2	36.7	19.6	1	36.8	19.5	2
LATHAM/ L2635R	129	36.6	19.4	2	36.9	19.4	1	36.8	19.4	2
DAIRYLAND/DSR2702RRSTS	129	36.7	19.3	2	36.8	19.3	1	36.8	19.3	1
THOMPSON/T-2444RR/SCN	126	36.8	18.8	3	36.7	19.4	1	36.8	19.1	2
RENK/ RS265RR	129	36.7	19.1	2	36.8	19.5	1	36.8	19.3	2
MUSTANG/ M-247NRR	127	36.7	19.0	3	36.7	19.2	1	36.7	19.1	2
MUSTANG/ M-257RR	129	36.6	19.1	2	36.8	19.4	1	36.7	19.3	2
KRUGER/ K-223+RR	124	36.7	19.2	1	36.7	19.4	1	36.7	19.3	1
LATHAM/ EXP-E2976R	132	36.5	19.1	3	36.9	19.3	1	36.7	19.2	2
DAIRYLAND/ DST22-003/RR	124	36.6	19.4	2	36.8	19.4	1	36.7	19.4	2
THOMPSON/ T-2626RR	126	36.6	19.5	1	36.8	19.5	1	36.7	19.5	1
SANDS/ SOI 2511NRR	128	36.6	18.9	3	36.7	19.2	1	36.7	19.1	2
PRAIRIE BRAND/PB-2141RR	125	36.6	19.6	1	36.7	19.6	1	36.7	19.6	1
DAIRYLAND/ DSR-234/RR	124	36.5	19.4	1	36.8	19.4	1	36.7	19.4	1
DAIRYLAND/DSR2500RRSTS	128	36.6	19.2	2	36.6	19.5	1	36.6	19.4	2
WENSMAN/ W 2200NRR	123	36.7	19.6	1	36.5	19.6	1	36.6	19.6	1
KRUGER/ K-287RR/SCN	131	36.3	19.1	3	36.9	19.3	1	36.6	19.2	2
MUSTANG/ M-246NRR	125	36.1	19.5	2	37.0	19.4	1	36.6	19.5	2
HEFTY/ 266RR	130	36.6	19.2	1	36.5	19.3	1	36.6	19.3	1
PRAIRIE BRAND/PB-2243RR	125	36.6	19.5	1	36.5	19.6	1	36.6	19.6	1
RENK/ RS246NRR	124	36.5	19.3	1	36.6	19.4	1	36.6	19.4	1
CROW'S/ C2917R	133	36.5	19.2	3	36.6	19.6	1	36.6	19.4	2
HEFTY/ 226RR	123	36.7	19.5	1	36.3	19.6	1	36.5	19.6	1
KRUGER/ K-233+RR	126	36.5	19.5	1	36.5	19.6	1	36.5	19.6	1
KRUGER/ K-235RR/SCN	125	36.5	19.4	1	36.5	19.7	1	36.5	19.6	1
PRAIRIE BRAND/PB-2456RR	127	36.5	19.5	2	36.5	19.3	1	36.5	19.4	2
MIDWEST SEED/ GR2037	124	36.7	19.6	1	36.3	19.7	1	36.5	19.7	1

Table 2b. (cont.) Roundup Ready maturity group-II soybean variety protein, oil, and lodging score averages.

		Averages by Location						Southern Zone Averages		
		Beresford			Geddes					
Brand/Variety (By 2006 zone protein)	DTM*	Protein (%)	Oil (%)	Lodging (1-5)*	Protein (%)	Oil (%)	Lodging (1-5)*	Protein (%)	Oil (%)	Lodging (1-5)*
THOMPSON/ T-2220ARR	126	36.3	19.1	2	36.7	19.4	1	36.5	19.3	1
ASGROW/ AG2403	124	36.3	19.6	1	36.6	19.6	1	36.5	19.6	1
ASGROW/ AG2605	127	36.4	19.4	2	36.5	19.4	1	36.5	19.4	2
MUSTANG/ M-207RR	124	36.4	19.4	1	36.5	19.6	1	36.5	19.5	1
MUSTANG/ M-237RR	125	36.5	19.4	2	36.4	19.4	1	36.5	19.4	1
LATHAM/ EXP-E2810R	131	36.3	19.0	2	36.6	19.4	1	36.5	19.2	2
PRAIRIE BRAND/PB-2643RR	130	36.5	19.2	2	36.3	19.6	1	36.4	19.4	2
PUBLIC/ SD02R-5	123	36.4	19.5	1	36.4	19.7	1	36.4	19.6	1
KRUGER/ K-289+RR	131	36.6	19.2	2	36.1	19.7	1	36.4	19.5	2
SANDS/ SOI 2754RR	131	36.3	19.2	2	36.4	19.4	1	36.4	19.3	1
KRUGER/ K-211+RR	125	36.3	19.5	1	36.4	19.7	1	36.4	19.6	1
LATHAM/ L2775R	129	36.4	19.3	1	36.3	19.6	1	36.4	19.5	1
ASGROW/ AG2802	132	35.8	19.4	3	36.8	19.3	1	36.3	19.4	2
SANDS/ SOI 2675NRR	126	36.2	19.7	2	36.4	19.6	1	36.3	19.7	1
NUTECH/ NT-2220RR	125	36.2	19.2	1	36.4	19.3	1	36.3	19.3	1
THOMPSON/ T-2300RR	127	36.3	19.4	2	36.3	19.6	1	36.3	19.5	2
NUTECH/ NT-2333RR	123	36.3	19.4	2	36.2	19.6	1	36.3	19.5	2
WECO/ EXP 6 2.0RR	125	36.6	19.3	1	35.9	19.8	1	36.3	19.6	1
KRUGER/ K-234RR	126	36.3	19.4	2	36.2	19.6	1	36.3	19.5	1
LATHAM/ L2646R	128	36.3	19.1	2	36.2	19.3	1	36.3	19.2	2
DAIRYLAND/ DSR-2300/RR	126	36.2	19.4	2	36.3	19.6	1	36.3	19.5	1
DAIRYLAND/ DSR-2820/RR	125	36.3	19.1	1	36.2	19.5	1	36.3	19.3	1
DAIRYLAND/ DSR-2511/RR	133	36.1	19.3	2	36.4	19.6	1	36.3	19.5	2
PRAIRIE BRAND/PB-2421RR	126	36.2	19.4	1	36.3	19.4	1	36.3	19.4	1
PRAIRIE BRAND/PB-2536RR	129	36.4	19.2	2	36.1	19.4	1	36.3	19.3	1
MUSTANG/ M-264RR	130	36.5	19.1	3	35.9	19.5	1	36.2	19.3	2
KRUGER/ K-259RR	131	36.5	19.3	2	35.9	19.6	1	36.2	19.5	2
SANDS/ SOI 2884RR	130	35.7	19.6	2	36.5	19.5	1	36.1	19.6	2
MIDWEST SEED/ GR2731	131	36.1	19.4	3	36.1	19.6	1	36.1	19.5	2
PUBLIC/ SD02R-48	122	36.2	19.5	1	36.0	19.7	1	36.1	19.6	1
NUTECH/ NT-2777RR/SCN	132	35.9	19.5	2	36.3	19.5	1	36.1	19.5	2
NUTECH/ NT-2890RR	129	36.2	19.1	2	35.9	19.6	1	36.1	19.4	1
NUTECH/ NT-2890+RR	130	36.2	19.2	1	35.9	19.7	1	36.1	19.5	1
PRAIRIE BRAND/PB-2645RR	130	36.2	19.2	2	35.9	19.7	1	36.1	19.5	2
SANDS/ SOI 2448RR	127	36.1	19.5	2	35.9	19.9	1	36.0	19.7	1
WECO/ EXP 6 2.8RR-SCN	135	35.4	19.3	3	36.6	19.3	1	36.0	19.3	2
PRAIRIE BRAND/PB-2636NR	130	35.7	19.5	3	36.3	19.4	1	36.0	19.5	2
DAIRYLAND/ DSR-2600/RR	129	36.2	19.0	2	35.7	19.4	1	36.0	19.2	2
PUBLIC/ SD02R-51	124	36.0	19.5	1	35.8	19.7	1	35.9	19.6	1
NUTECH/ NT-2232RR	130	36.0	19.5	2	35.7	19.9	1	35.9	19.7	2
DEKALB/ DKB27-53	131	35.8	19.4	3	35.9	19.8	1	35.9	19.6	2
SANDS/ SOI 2609RR	131	35.9	19.5	2	35.7	19.7	1	35.8	19.6	2
DEKALB/ DKB25-51	127	35.8	19.7	2	35.6	19.9	1	35.7	19.8	2
THOMPSON/ T-2666RR	129	35.6	19.8	1	35.7	19.8	1	35.7	19.8	1
COYOTE/ 9524RR	127	35.4	19.6	1	35.6	19.9	1	35.5	19.8	1

Table 2b. (cont.) Roundup Ready maturity group-II soybean variety protein, oil, and lodging score averages.

Brand/Variety (By 2006 zone protein)	DTM*	Averages by Location: Beresford Protein (%)	Beresford Oil (%)	Beresford Lodging (1-5)*	Geddes Protein (%)	Geddes Oil (%)	Geddes Lodging (1-5)*	Southern Zone Averages Protein (%)	Oil (%)	Lodging (1-5)*
THOMPSON/ T-2999RR	132	35.4	19.8	3	35.5	19.6	1	35.5	19.7	2
SANDS/ SOI 2673RR	126	35.6	19.5	2	34.8	19.2	1	35.2	19.4	1
COYOTE/ 4523RR	127	.	.	.	36.2	19.5	1	.	.	.
COYOTE/ 4527RR	132	36.3	19.3	1	.	.	.	.	.	.
COYOTE/ EXP 622RR	127	.	.	.	37.1	19.6	1	.	.	.
COYOTE/ EXP 625NRR	125	36.9	19.0	2	.	.	.	.	.	.
COYOTE/ EXP 626RR	133	36.5	19.0	2	.	.	.	.	.	.
MUSTANG/ M-203RR	122	36.8	19.4	1	.	.	.	.	.	.
DEKALB/ DKB22-52	123	36.8	19.6	1	.	.	.	.	.	.
DEKALB/ DKB26-53	126	37.0	19.4	2	.	.	.	.	.	.
SANDS/ SOI 2151NRR	125	.	.	.	36.1	20.1	1	.	.	.
KALTENBERG/ KB256RR	128	36.4	19.3	1	.	.	.	.	.	.
KALTENBERG/ KB276RR	131	36.1	19.3	2	.	.	.	.	.	.
KALTENBERG/ KB258RR	126	36.7	19.4	2	.	.	.	.	.	.
KALTENBERG/ KB266RR	129	36.8	19.0	3	.	.	.	.	.	.
ZILLER/ BT 7227NR	121	37.0	19.4	1	.	.	.	.	.	.
Test avg. :	128	36.4	19.3	2	36.5	19.5	1	36.4	19.4	1
* Lsd(.05) :		.	.	1	.	.	0	.	.	0.4
## TPG-avg. :		.	.	2	.	.	1	.	.	1
@ Coef. Var. :		.	.	28	.	.	o	.	.	26

* DTM= average days from seeding (Beresford- May 17, Geddes- May 25, 2006) to maturity; a missing value indicates the site received a hard frost before the variety reached maturity.

** Lodging, 1= all plants erect, 5= all plant flat.

Lsd,(.05)= amount values in a column must differ to be significantly different, if differences are not significant (NS), NS is indicated.

TPG-avg. = minimum value to qualify for top performance group.

@ Coef. Var.= a measure of trial experimental error.

Table 3a. Non-Roundup Ready maturity group-I & -II soybean variety yield Averages - Beresford, SD, 2005-06.

Brand/Variety (By maturity group & 2006 yield)	DTM*	Averages by Maturity Group: MG-I Bu/Acre 2006	MG-I Bu/Acre 2-Yr	MG-II Bu/Acre 2006	MG-II Bu/Acre 2-Yr
PUBLIC/ SD03-1607	117	60	.	.	.
PUBLIC/ SD00-632	120	57	52	.	.
PUBLIC/ SD02-906	117	57	52	.	.
PUBLIC/ SD03-1899	114	53	.	.	.
PUBLIC/ SD00-266	112	52	.	.	.
PUBLIC/ SD02-1138	112	51	.	.	.
SANDS/ EXP2879N	132	.	.	68	.
SANDS/ SOI 239N	123	.	.	66	.
PUBLIC/ SD02-22	122	.	.	64	56
COYOTE/ 5525	132	.	.	63	53
DAIRYLAND/ DSR-22/STSUL	122	.	.	62	.
PUBLIC/ SD00-732	122	.	.	61	50
PUBLIC/ SD02-195	122	.	.	60	.
PUBLIC/ SD02-26	125	.	.	57	50
PUBLIC/ SD02-96	123	.	.	57	.
PUBLIC/ SD00-1587	115	.	.	51	.
Test avg. :	120	55	52	61	52
# Lsd (.05) :		5	NS	6	NS
## TPG-avg. :		55	52	62	50
@ Coef. Var. :		5	5	5	6

* DTM= average days from seeding on May 17, 2006 to maturity; a missing value indicates the site received a hard frost before the variety reached maturity.

Lsd,(.05)= amount values in a column must differ to be significantly different, if differences are not significant (NS), NS is indicated.

TPG-avg. = minimum value to qualify for top performance group.

@ Coef. Var. = a measure of trial experimental error, 15% or less is best.

Table 3b. Non-Roundup Ready maturity group-I & -II soybean variety protein, oil, and lodging score averages - Beresford, SD, 2006.

		2006 Averages by Maturity Group					
		MG-I			MG-II		
Brand/Variety (By maturity group & protein)	DTM*	Protein %	Oil %	Lodging* (1-5)	Protein %	Oil %	Lodging * (1-5)
PUBLIC/ SD00-632	120	37.0	19.4	3	.	.	.
PUBLIC/ SD02-906	117	36.8	19.7	2	.	.	.
PUBLIC/ SD03-1607	117	36.5	19.7	2	.	.	.
PUBLIC/ SD00-266	112	36.4	20.1	2	.	.	.
PUBLIC/ SD03-1899	114	36.4	19.7	3	.	.	.
PUBLIC/ SD02-1138	112	35.5	20.3	4	.	.	.
PUBLIC/ SD02-96	123	.	.	.	37.1	19.4	1
PUBLIC/ SD00-1587	115	.	.	.	37.1	19.4	1
SANDS/ SOI 239N	123	.	.	.	37.0	19.0	2
PUBLIC/ SD00-732	122	.	.	.	36.6	19.3	1
PUBLIC/ SD02-195	122	.	.	.	36.6	19.7	1
DAIRYLAND/ DSR-22/STSUL	122	.	.	.	36.5	19.2	2
PUBLIC/ SD02-22	122	.	.	.	36.5	19.1	2
PUBLIC/ SD02-26	125	.	.	.	36.5	19.0	2
SANDS/ EXP2879N	132	.	.	.	36.2	19.3	5
COYOTE/ 5525	132	.	.	.	35.6	19.2	4
Test avg. :	120	36.4	19.8	3	36.6	19.3	2
* Lsd(.05) :		.	.	1	.	.	1
## TPG-avg. :		.	.	2	.	.	2
@ Coef. Var. :		.	.	18	.	.	30

* DTM= average days from seeding on May 17, 2006 to maturity; a missing value indicates the site received a hard frost before the variety reached maturity.

** Lodging, 1= all plants erect, 5= all plant flat.

Lsd,(.05)= amount values in a column must differ to be significantly different, if differences are not significant (NS), NS is indicated.

TPG-avg. = minimum value to qualify for top performance group.

@ Coef. Var. = a measure of trial experimental error.

SE FARM REPORT SDSU

2006 PRECISION-PLANTED CORN PERFORMANCE TRIALS

Robert G. Hall[1] and Kevin K. Kirby[2]

Plant Science 0621

TEST PROCEDURES

General Procedures: Entries were seeded in three replications with each replicate randomly located within each trial. Plots consisted of four 30-inch rows and measuring 20 feet long. A Monosem precision row crop planter was used for seeding plots. In 2006, the planter was calibrated and delivered 27,878 seeds per acre, regardless, of seed quality and germination percentage. No seeding rate adjustment was made for low germination. Therefore, percent stand is an indication of initial seed quality and the ability of the seed to cope with the production environment. Seedbed preparation was good at planting. A starter fertilizer of 100 pounds/acre of 37-18-00 was applied 2” below and 2” to the side (2 x 2) of the seed row. Force insecticide was applied in-furrow at label rates for corn rootworm control. Weed control in the non-Roundup Ready™ plots consisted of a pre Dual-Python application at label rates. In the Roundup Ready™ hybrid corn trials weed control included a pre Dual-Python application and one post application of Roundup™ at label rates. The center two rows of each 4-row plot were
.
harvested with a Massey Ferguson 8XP small plot combine.

Yield: Yields are an average of three replications, and are expressed as bushels per acre, adjusted to 15.5% moisture on a dry-matter basis and a bushel weight of 56 pounds. The CV value in a given test trial is a measure of experimental error associated with the test trial. Ideally, this value should not exceed 20%. In cases where the CV value exceeds 20% it is recommended that the test data be used with caution in making hybrid selection decisions.

Grain moisture content: Moisture content is expressed as the percentage of moisture in the shelled corn at harvest. During harvest, random moisture values was determined by the on-board moisture meter on the combine and was checked with a Dickey-John GAC II to verify that the on-board moisture meter was within calibration limits

[1] Extension Agronomist; Project Leader, Crop Performance Testing; SDSU
[2] Agricultural Research Manager, Crop Performance Testing; SDSU

Performance Trial Results - for two years (2005-06) and one year (2006).

Early - Non-Roundup Ready™ hybrids, Table 1a. The test trial yield average was 159 bu/ac in 2006 and 184 bu/ac for two years. Hybrids that yielded at least 167 bu/ac in 2006 or 166 bu/ac for two years qualified for the top yield group. Hybrids had to differ in yield by 23 bu/ac in 2006 to be significantly different from one another. There was no difference in yield averages among the five hybrids tested two years. In 2006, bushel weights averaged 60 lbs, grain moisture averaged 17%, lodging averaged 11% and the final percent stand averaged 98%. In order for a hybrid to be in the top performance group for these factors it had to equal 60 lbs. or more in bushel weight, 16% or less in grain moisture, 12% or less in stalk lodging, and 97% or more for percent stand.

Late - Non-Roundup Ready™ hybrids, Table 1b. The test trial yield average was 188 bu/ac in 2006 and 192 bu/ac for two years. Hybrids that yielded at least 184 bu/ac in 2006 or 174 bu/ac for two years qualified for the top yield group. Hybrids had to differ in yield by 26 bu/ac in 2006 to be significantly different from one another. There was no difference in yield averages among the ten hybrids tested two years. In 2006, bushel weights averaged 59 lbs, grain moisture averaged 19%, lodging averaged 18% and the final percent stand averaged 96%. In order for a hybrid to be in the top performance group for these factors it had to equal 58 lbs. or more in bushel weight, 17% or less in grain moisture, 17% or less in stalk lodging, and 96% or more for percent stand.

Early - Roundup Ready™ hybrids, Table 2a. The test trial yield average was 171 bu/ac in 2006 and 181 bu/ac for two years. Hybrids that yielded at least 170 bu/ac in 2006 and 172 bu/ac for two years qualified for the top yield group. Hybrids had to differ in yield by 33 bu/ac in 2006 to be significantly different from one another. There was no difference in yield averages among the nine hybrids tested two years. In 2006, bushel weights averaged 60 lbs, grain moisture averaged 17%, lodging averaged 15% and the final percent stand averaged 97%. In order for a hybrid to be in the top performance group for these factors it had to equal 61 lbs. or more in bushel weight, 16% or less in grain moisture, 19% or less in stalk lodging, and 91% or more for percent stand.

Late - Roundup Ready™ hybrids, Table 2b. The test trial yield average was 188 bu/ac in 2006 and 195 bu/ac for two years. Hybrids that yielded at least 192 bu/ac in 2006 and 179 bu/ac for two years qualified for the top yield group. Hybrids had to differ in yield by 21 bu/ac in 2006 to be significantly different from one another. There was no difference in yield average among the five hybrids tested two years. In 2006, bushel weights averaged 60 lbs, grain moisture averaged 19%, lodging averaged 9% and the final percent stand averaged 96%. In order for a hybrid to be in the top performance group for these factors it had to equal 60 lbs. or more in bushel weight, 17% or less in grain moisture, 8% or less in stalk lodging, and 93% or more for percent stand.

Table 1a. Early maturity Non-Roundup Ready corn hybrid test trial results, Southeast Experiment Station, 2005-06.

Brand/Hybrid (By 2-year then '06 yields)	Brand Rel. Mat.	Hybrid performance variable at harvest					
		2-yr Yield bu/ac	'06 Yield bu/ac	'06 Bu Wt lb	'06 Grain Moist %	'06 Lodging %	'06 Pct.* Stand
TWO-YEAR ENTRIES:							
HEINE/ H818YGCB	109	206	190	59	17	30	99
KRUGER/ EXP0610	110	185	155	61	16	14	98
KRUGER/ 0508	109	183	172	60	15	3	98
HEINE/ H820YGCB	109	179	154	61	18	20	97
KRUGER/ 8609HX	109	166	129	60	16	7	100
ONE-YEAR ENTRIES:							
KRUGER/ EXP8508HX	108	.	171	60	17	1	98
KRUGER/ EXP5310YGCB	110	.	168	59	18	12	97
MYCOGEN/ 2G677	109	.	168	58	18	1	96
MYCOGEN/ 2R570	104	.	166	59	16	9	100
KRUGER/ EXP0309	109	.	165	58	15	2	98
DEKALB/ DKC55-12 (YGCB)	105	.	164	59	15	11	98
HEINE/ H824YGCB	110	.	164	60	19	2	94
KRUGER/ 0409	109	.	163	59	16	3	99
KRUGER/ 5109YGCB	109	.	162	60	18	17	100
KRUGER/ 9310YG+	110	.	159	61	16	2	100
DAIRYLAND/ STEALTH-1806	106	.	155	60	16	2	96
FARM ADVANTAGE/ 5406	106	.	143	61	16	18	100
KRUGER/ 5509YGCB	107	.	139	62	17	55	99
FARM ADVANTAGE/ 1065	105	.	136	59	15	5	96
Trial avg.:	108	184	159	60	17	11	98
** Lsd (.05):		NS	23	2	1	12	3
# Min. TPG-value:		166	167	60	-	-	97
## Max. TPG-value:		-	-	-	16	12	-
+ Coef. of var.:		6	9	2	3	62	2

* Seeded May 8, 2006 at 28,750 seeds per acre.
** Lsd= the amount values in a column must differ to be significantly different.
If Lsd = NS then differences among values in a column are non-significant (NS).
Min. TPG-value= minimum value required for the top performance group.
Max. TPG-value= maximum value required for the top performance group.
+ Coef. of Variation = a measure of trial experimental error, 20% or less is best for yield.

Table 1b. Late maturity Non-Roundup Ready corn hybrid test trial results, Southeast Experiment Station, 2005-06.

Brand/Hybrid (By 2-year then '05 yields)	Brand Rel. Mat.	Hybrid performance variable at harvest					
		2-yr Yield bu/ac	'06 Yield bu/ac	'06 BuWt lb	'06 Grain Moist %	06 Lodging %	'06 Pct.* Stand
TWO-YEAR ENTRIES:							
KRUGER/ 8616HX	116	203	194	59	20	34	99
KRUGER/ 8414HX	114	199	207	58	20	76	100
KRUGER/ 9115YGCB	115	197	194	60	20	2	97
DEKALB/ DKC62-31 (YGCB)	112	197	187	60	20	1	98
KRUGER/ 5416YGCB	115	196	197	60	20	9	97
KRUGER/ 9111YGCB	111	195	190	60	16	2	97
KRUGER/ 9313YGCB	113	193	195	59	19	11	98
KRUGER/ 9212YGCB	112	185	189	59	18	17	95
HEINE/ H851YGCB	112	182	177	60	20	4	97
KRUGER/ 5517YGCB	116	174	170	58	22	40	98
ONE-YEAR ENTRIES:							
MYCOGEN/ 2C727	112	.	210	59	19	24	96
HEINE/ H822	111	.	193	60	17	9	88
RENK/ RK888YGCB	112	.	191	59	19	1	93
KRUGER/ 7613YG+	113	.	188	60	16	20	96
KRUGER/ 0612	112	.	187	61	17	15	95
RENK/ RK789YGPL	111	.	185	61	16	5	97
MYCOGEN/ 2T780	114	.	180	59	20	56	96
MYCOGEN/ 2K717	113	.	174	59	19	9	94
HEINE/ H856YGCB	113	.	173	59	20	10	96
Trial avg.:	113	192	188	59	19	18	96
** Lsd (.05):		NS	26	NS	1	17	4
# Min. TPG-value:		174	184	58	-	-	96
## Max. TPG-value:		-	-	-	17	17	-
+ Coef. of var.:		8	8	2	5	58	3

* Seeded May 8, 2006 at 28,750 seeds per acre.

** Lsd= the amount values in a column must differ to be significantly different.

If Lsd = NS then differences among values in a column are non-significant (NS).

Min. TPG-value= minimum value required for the top performance group.

Max. TPG-value= maximum value required for the top performance group.

+ Coef. of Variation = a measure of trial experimental error, 20% or less is best for yield.

Table 2a. Early maturity Roundup Ready corn hybrid test trial results, Southeast Experiment Station, 2005-06.

		Test trial variable at harvest					
Brand/Hybrid (By 2-year then '06 yields)	Brand Rel. Mat.	2-yr Yield bu/ac	'06 Yield bu/ac	'06 BuWt lb	'06 Grain Moist %	'06 Lodging %	'06 Pct.* Stand
TWO-YEAR ENTRIES:							
DEKALB/DKC52-47RR2YGCB	102	198	188	58	15	1	98
WENSMAN/W 6318BTRR	103	189	196	60	17	1	99
NUTECH/NT-5507 RR/YGCB	105	188	172	59	16	17	97
DEKALB/DKC60-19RR2YGCB	110	187	170	60	18	8	98
DAIRYLAND/STEALTH-1606	107	182	172	59	16	12	98
HEINE/H750RR/YGCB	105	182	166	60	17	3	99
KALTENBERG/K6744RRBT	108	173	160	58	15	7	97
WENSMAN/W 6422BTRR	107	173	152	61	18	7	98
WENSMAN/W 6315BTRR	101	172	153	58	15	1	95
KRUGER/ 2506RR/YGCB	106	171	152	60	19	5	98
ONE-YEAR ENTRIES:							
WENSMAN/ W7439BTRWRR	110	.	203	59	17	1	95
KRUGER/ 6607TS	107	.	193	59	15	1	96
CROWS/ 4843X	110	.	191	60	18	6	91
HEINE/ H785RR	107	.	191	61	17	10	98
NUTECH/ 5210 RR/YGCB	110	.	190	59	17	2	95
MIDWEST/ 77124X	110	.	187	59	18	5	95
NUTECH/ 9410 RR/YGPL	110	.	185	61	19	30	99
HEINE/ H818RR	109	.	184	60	17	31	99
FARM ADVANTAGE/ 6504	104	.	183	61	16	5	99
KRUGER/ 1606RR	106	.	181	58	16	6	98
LEGEND/ LR9708RRYG+	108	.	180	61	16	58	95
WENSMAN/ W 7316BTRWRR	101	.	180	59	15	5	98
NUTECH/ 7808 RR/YGRW	108	.	179	60	16	8	97
KALTENBERG/ K5685RRBT	105	.	179	62	16	0	96
HEINE/ H766RRYGPL	106	.	178	60	16	45	97
NUTECH/ 9006 RR/YGPL	105	.	176	60	16	52	97
NUTECH/ 7110 RR/YGRW	110	.	176	59	18	36	97
INTEGRA/ INT 6710RRYG	110	.	175	59	17	40	96
KRUGER/ 9310TS	110	.	173	60	17	2	97
DEKALB/ DKC58-19 (RR2)	108	.	172	61	16	14	99
GOLD COUNTRY/ 106-02CBR	106	.	172	60	16	1	99
WENSMAN/ W 7423BTRWRR	107	.	171	60	16	2	95
NUTECH/ 5006A RR/YGCB	105	.	168	60	16	55	98
NUTECH/ 9908 RR/YGPL	108	.	168	60	16	3	96
DAIRYLAND/ STEALTH-4006	106	.	167	58	16	5	99
NUTECH/ 9507 RR/YGPL	105	.	167	59	16	1	99
ASGROW/ RX674RR2	109	.	165	59	17	10	98
INTEGRA/ INT 6609RRYG	106	.	165	61	16	44	98
NUTECH/ 9013 RR/YGCB	110	.	163	63	18	14	98
WILBUR ELLIS/ HB9601RB	110	.	162	60	18	29	99

Table 2a. (cont) Early maturity Roundup Ready corn hybrid test trial results, Southeast Experiment Station.

Brand/Hybrid (By 2-year then '06 yields)	Brand Rel. Mat.	2-yr Yield bu/ac	'06 Yield bu/ac	'06 BuWt lb	'06 Grain Moist %	'06 Lodging %	'06 Pct.* Stand
		Test trial variable at harvest					
KRUGER/ 9407TS	107	.	161	61	16	2	94
HEINE/ H796RR	108	.	161	61	17	10	98
HEINE/ H724RR/YGCB	102	.	159	59	15	3	98
WILBUR ELLIS/ HB9531RB	103	.	157	62	16	4	97
WENSMAN/ W 6374BTRR	105	.	156	59	15	2	97
HEINE/ H749RR/YGCB	104	.	147	60	16	29	98
KRUGER/ 2509RR/YGCB	107	.	140	61	16	68	97
LEGEND/ LR9510RR	110	.	128	59	19	28	98
Trial avg.:	107	181	171	60	17	15	97
** Lsd (.05):		NS	33	2	1	19	NS
# Min. TPG-value:		172	170	61	-	-	91
## Max. TPG-value:		-	-	-	16	19	-
+ Coef. of var.:		7	12	2	3	79	3

* Seeded May 8, 2006 at 28,750 seeds per acre.
** Lsd= the amount values in a column must differ to be significantly different.
If Lsd = NS then differences among values in a column are non-significant (NS).
Min. TPG-value= minimum value required for the top performance group.
Max. TPG-value= maximum value required for the top performance group.
+ Coef. of Variation = a measure of trial experimental error, 20% or less is best for yield.

Table 2b. Late maturity Roundup Ready corn hybrid test trial results, Southeast Experiment Station, 2005-06.

Brand/Hybrid (By 2-year then '06 yields)	Brand Rel. Mat.	Test trial variable at harvest: 2-yr Yield bu/ac	'06 Yield bu/ac	'06 BuWt lb	'06 Grain Moist %	'06 Lodging %	'06 Pct.* Stand
TWO-YEAR ENTRIES:							
ASGROW/RX715RR2YGCB	111	211	186	60	20	1	94
HEINE/H851RR/YGCB	113	203	192	58	21	11	98
DEKALB/DKC61-72 (RR2)	111	199	182	59	18	3	96
KRUGER/9313RR/YGCB	113	184	195	59	19	4	99
KRUGER/2517RR/YGCB	116	179	176	59	22	34	98
ONE-YEAR ENTRIES:							
MIDWEST/ 77323T	111	.	213	60	20	9	99
FONTANELLE/ 7K733	111	.	203	60	19	15	97
KRUGER/ 9212TS	112	.	200	60	18	11	98
KRUGER/ EXP6611TS	111	.	199	61	18	36	99
RENK/ RK870RRYGPL	112	.	195	60	18	13	99
CROWS/ 4982X	112	.	193	61	19	1	95
CROWS/ 4940T	111	.	190	60	19	7	98
HEINE/ H851RRYGPL	112	.	190	60	21	2	93
KRUGER/ EXP2511RR/YGCB	111	.	189	60	18	1	94
MIDWEST/ 78133X	112	.	188	61	19	2	97
KRUGER/ EXP6612TS	112	.	185	61	18	2	94
FONTANELLE/ 8K389	112	.	183	59	18	18	93
KRUGER/ 9115TS	115	.	179	60	21	4	98
DEKALB/ DKC61-22 (RR2)	111	.	174	60	20	4	98
KRUGER/ EXP2414RR/YGCB	114	.	172	60	19	5	98
KRUGER/ 2613RR/YGCB	113	.	155	59	16	4	93
Trial avg.:	112	195	188	60	19	9	96
** Lsd (.05):		NS	21	1	1	8	NS
# Min. TPG-value:		179	192	60	-	-	93
## Max. TPG-value:		-	-	-	17	8	-
+ Coef. of var.:		5	7	1	3	56	3

* Seeded May 8, 2006 at 28,750 seeds per acre.
** Lsd= the amount values in a column must differ to be significantly different.
If Lsd = NS then differences among values in a column are non-significant (NS).
Min. TPG-value= minimum value required for the top performance group.
Max. TPG-value= maximum value required for the top performance group.
+ Coef. of Variation = a measure of trial experimental error, 20% or less is best for yield.

WEED CONTROL DEMONSTRATIONS and EVALUATION TEST for 2006

M. J. Moechnig, D. L. Deneke, and D. A. Vos

PLANT SCIENCE 0622

INTRODUCTION:

Conducting weed control research at the Southeast Experiment Farm provides an opportunity to evaluate weed control techniques in an environment that reflects the climate and weed species spectrum of the region. Corn and soybean cropping systems are the primary focus for weed control evaluation. Primary weed species present often include common waterhemp, velvetleaf, cocklebur, common lambsquarters, and foxtail.

SITE CONDITIONS for 2006:

Early season precipitation was adequate for good crop establishment and activation of pre-emergence herbicides, but subsequent dry weather suppressed later weed flushes. Therefore, weed control was likely greater than would be expected in a year with precipitation that is closer to the long-term average. Crop yields were relatively high for such a dry growing season.

Several studies were established at the Southeast Experiment Station to evaluate new and experimental herbicide products, weed control techniques, and herbicide programs. Studies generally focused on corn and soybean production in conventional tillage and no-till systems. There were also studies conducted to evaluate pre- and post-emergence herbicide options in camelina, an alternative oil-seed crop, and weed seed bank evaluations in the large cropping systems study conducted by Bob Berg. In corn and soybeans, weed control was generally similar among herbicide programs that included pre-emergence, pre- followed by post-emergence, post-emergence, or late post-emergence applications. This may be partially due to the dry weather that suppressed late season weed flushes.

A series of studies were sponsored by the SD Soybean Research and Promotion Council to evaluate the benefits of adding additional herbicides into Roundup Ready programs. Previous research suggests that soybean yield loss may occur from weeds when Roundup is applied after the third trifoliate. Studies were established to evaluate yield loss associated with late Roundup applications, but weed pressure was too low to achieve a competition response. Studies were also established to evaluate weed control associated with several rates of soil residual herbicides to determine adequate rates for weed suppression in fields that will receive a post-emergence application of glyphosate. These dose response curves will be analyzed in a spread sheet program to determine optimum tank-mix ratios for suppression of grass and broadleaf weeds. Herbicide recommendations resulting from this analysis will be evaluated with continued field research in 2007.

NOTE: **Data reported in this publication are results from field tests that include product uses, experimental products or experimental rates, combinations or other unlabeled uses for herbicide products. Tradenames of products used are listed; there frequently are other brand products available in the market. Users are responsible for applying herbicide according to label directions. Refer to the appropriate weed control fact sheet available from county extension offices for herbicide recommendations.**

Studies listed below are summarized in the following tables. Information for each study is included as part of the summary.

1. Corn Herbicide Demonstration
2. Corn Herbicide Demonstration in Resistant Corn
3. Early Postemergence Program in RR Corn
4. Tank-Mixes to Enhance Weed Control with Glyphosate
5. Glyphosate Programs in Corn
6. Sequential and Total Postemergence Programs with Glyphosate in Corn
7. Comparison of Weed Control Programs in RR Corn
8. Weed Control Programs in Corn
9. Program Approaches for Weed Control in Corn
10. Pre Followed by Post Weed Control in GT Corn
11. Weed Control in Corn with Pre- and Post-Emergence Combinations
12. Weed Control in Corn with Stout Tank-Mixtures
13. Postemergence Broadleaf Control in RR Corn
14. Postemergence Broadleaf Control in Corn
15. Evaluation of Impact for Weed Control in Corn
16. Impact Combinations with Glyphosate
17. Weed Control in Corn with Laudis
18. Evaluation of Glyphosate Adjuvants in Corn
19. Evaluation of Adjuvants in Corn
20. Reduced Rates of Preemergence Herbicides - Study 1
21. Reduced Rates of Preemergence Herbicides - Study 2
22. Evaluation of RR Corn Control with Gramoxone Tank-Mix Partners
23. Evaluation of RR Corn Control with Select Max
24. Soybean Herbicide Demonstration
25. Herbicide Resistant Soybean Demonstration
26. No-Till Soybean Demonstration
27. Evaluation of Oil Adjuvants for Volunteer Corn Control
28. Annual Weed Control in RR Soybeans
29. Weed Control in Soybean with Glyphosate Plus 2,4-DB
30. Water Quality and AMS Replacements
31. Reduced Pre-Emergence Herbicide Rates in Soybean - Study 1
32. Reduced Pre-Emergence Herbicide Rates in Soybean - Study 2
33. Camelina Postemergence Herbicide Tolerance

The most relevant results are presented in this publication. Additional research trials were also conducted at this station to evaluate experimental herbicides or additives.

1. Effects of Glyphosate Application Timing in RR Corn
2. Weed Control in Corn with Glufosinate (Liberty) Formulations
3. Weed Control in Corn with Liberty Plus Adjuvants
4. Evaluation of Oil Adjuvants in Corn
5. Cocklebur Control in Corn with Experimental Preemergence Herbicide
6. Corn Response to Select Max Applied Preemergence
7. Evaluation of Glyphosate Programs in Soybeans
8. Effects of Glyphosate Application Timing in RR Soybean
9. Volunteer GT Corn Control in Soybeans
10. Control if Volunteer GT Corn in Soybean with Targa
11. Camelina Preemergence Herbicide Tolerance

ACKNOWLEDGEMENTS:

We greatly appreciate the cooperation and assistance provided by the station personnel. Due to the distance from the SDSU campus, assistance with field preparation and daily oversight of the fields is critical to the success of the weed control research. We also appreciate the participation of extension educators who provide assistance with tours and use the research results for their recommendations to growers. In addition to the Southeast Farm Report, research results will be published in the annual Weed Control Field Test Data Book (EMC 678), weed control fact sheets updated annually for major South Dakota commodities, and on the internet at http://plantsci.sdstate.edu/weeds/.

Program support was provided by the South Dakota Soybean Research and Promotion Council and crop protection industries.

Table 1. Corn Herbicide Demonstration

Demonstration
Variety: DKC 58-73
Planting Date: 5/11/06
PRE: 5/12/06
EPOST: 6/1/06; Corn V2, 4lf; Grft 1-4 lf; Cowh 1-3 in; Colq 1-3 in; Pesw 2-4 in.
POST: 6/7/06; Corn V3-4; Grft 2-5 lf, 2-4 in; Cowh 2-5 in; Colq 2-5 in; Pesw 4-6 in.
Soil: Silty clay loam; 3.2% OM; 5.9 pH

Precipitation:

PRE:	1st week	0.10 inches
	2nd week	0.50 inches
EPOST:	1st week	1.20 inches
	2nd week	0.22 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Grft=Green foxtail
Cowh=Common waterhemp
Colq=Common lambsquarters
Pesw=Pennsylvania smartweed

Comments: *Pre-emergence*: Several pre-emergence herbicides resulted in very good grass and broadleaf weed control. The low rate of Harness (1.5 pt/A) resulted in similar weed control as the higher rate (2.3 pt/A). Green foxtail control was slightly greater with Dual II Magnum (S-metolachlor) than with Stalwart C (metolachlor), otherwise broadleaf weed control was similar between these herbicides. Weed control was similar between Epic and Radius, which both contain slightly different ratios of flufenacet (e.g. Define) and isoxaflutole (e.g. Balance). Several other pre-emergence applications resulted in very good control of grasses, broadleaf weeds, or both. Weed control was generally very good due in part because rainfall after the herbicide application was adequate to incorporate these herbicides in the soil and subsequent dry conditions minimized later weed emergence.

Pre-emergence followed by post-emergence: Many treatments resulted in nearly complete weed control. Green foxtail control was slightly greater when Balance Pro (isoxaflutole) was followed by a grass herbicide (Option or Stout) than a broadleaf herbicide (Callisto). Green foxtail control was similar between treatments with Option and Stout. Stout is a new pre-mix of nicosulfuron (e.g. Accent) and thifensulfuron (e.g. Harmony). Green foxtail control was slightly better with a higher rate of Balance Pro (isoxaflutole) at 2.25 oz/A than a reduced rate of Balance + Resolve (1.75 oz/A + 1 oz/A).

Early post-emergence: All treatments resulted in nearly complete control of grass and broadleaf weed species. When tank-mixed with Option (foramsulfuron), Callisto (mesotrione) at 2 oz/A or atrazine at 1.5 pt/A resulted in very good broadleaf weed control. Adding a low rate of Define (flufenacet) for residual grass control with Option was not necessary in this environment.

Treatment	***Rate/A***	***% Grft 10/2/06***	***% Cowh 10/2/06***	***% Colq 10/2/06***	***% Pesw 10/2/06***
Check	----	0	0	0	0
PREEMERGENCE					
Harness	1.5 pt	94	98	98	70
Harness	2.3 pt	98	98	98	70
Surpass	2.5 pt	98	98	98	75
Dual II Magnum	2 pt	95	98	98	75
Stalwart C	2 pt	88	95	98	78

Treatment	***Rate/A***	***% Grft 10/2/06***	***% Cowh 10/2/06***	***% Colq 10/2/06***	***% Pesw 10/2/06***
PREEMERGENCE					
Outlook	21 oz	96	97	98	73
Degree	4.25 pt	97	98	60	78
Define SC	21 oz	97	98	70	85
Balance Pro	2.25 oz	88	98	92	92
Epic	14.5 oz	98	98	96	98
Radius	18 oz	94	98	98	98
Lumax	3 qt	88	98	98	96
Bicep II Magnum	2 qt	97	97	92	97
Stalwart Xtra	2.1 qt	80	98	96	95
G-Max Lite	3.5 pt	90	98	90	92
Harness Xtra 6L	2.1 qt	93	98	85	95
Keystone LA	2.2 qt	96	98	96	93
Balance Pro+Define SC+atrazine	2.25 oz+12 oz+.75 qt	97	98	98	95
Python+Surpass	1.25 oz+2.5 pt	98	98	95	93
PREEMERGENCE & POSTEMERGENCE					
Dual II Magnum&Callisto+ COC+28% N	1.67 pt& 3 oz+ 1%+2 qt	90	99	99	99
Balance Pro&Callisto+ COC+28% N	2.25 oz&3 oz+ 1%+2 qt	87	99	99	98
Balance Pro&Option+ MSO+28% N	2 oz&1.5 oz+ 1.5 pt+2 qt	98	99	99	85
Balance Pro&Stout+ COC+AMS	2 oz&.75 oz+ 1%+2 lb	98	98	99	99
Balance Pro&Buctril+atrazine	2.25 oz&1 pt+1 pt	95	99	99	99
Balance Pro+Resolve& Buctril+atrazine	1.75 oz+1 oz& 1 pt+1 pt	86	99	99	96
Outlook&Distinct+ NIS+28% N	21 oz&6 oz+ .25%+2 qt	98	99	99	99
Outlook&Marksman+ NIS+28% N	21 oz&2 pt+ .125%+2 qt	98	99	99	99
Surpass&2,4-D amine	2.5 pt&1 pt	98	99	99	99
Surpass&Aim+atrazine+ COC+28% N	2.5 pt&.5 oz+2 pt+ 1%+2 qt	99	99	99	99
Surpass&WideMatch	2.5 pt&1.33 pt	99	99	97	99
Keystone LA&Hornet WDG+ Clarity+NIS+AMS	2 qt&3 oz+ 4 oz+.25%+2.5 lb	99	99	99	99
Surpass&Accent+atrazine+ COC+28% N	1.25 pt&.67 oz+1.5 pt+ 1%+2 qt	99	99	99	99
Surpass&Stout+atrazine+ COC+28% N	1.25 pt&.5 oz+1.5 pt+ 1%+2 qt	99	99	95	99

Treatment	***Rate/A***	***% Grft 10/2/06***	***% Cowh 10/2/06***	***% Colq 10/2/06***	***% Pesw 10/2/06***
PREEMERGENCE & POSTEMERENCE (Continued . . .)					
Dual II Magnum&Northstar+	1.67 pt&5 oz+				
NIS+28% N	.25%+2 qt	99	99	98	99
Cinch&Steadfast+Callisto+	.67 pt&.75 oz+2 oz+				
Atrazine+COC+AMS	1 pt+1%+2.5 lb	99	99	99	99
Cinch&Steadfast+Marksman+	1 pt&.75 oz+1 pt+				
COC+28% N	1%+2 qt	99	99	99	97
Define SC&Buctril+atrazine	21.7 oz&1 pt+1 pt	96	99	99	99
Define SC&Buctril+	12 oz&1 pt+				
Atrazine+Callisto	1 pt+1 oz	96	99	99	99
EARLY POSTEMERGENCE					
Option+atrazine+MSO+28% N	1.5 oz+1.5 pt+1.5 pt+2 qt	94	98	98	96
Option+Callisto+MSO+28% N	1.5 oz+2 oz+1.5 pt+1.5 qt	95	99	99	99
Define SC+Option+Callisto+	12 oz+1.5 oz+1 oz+				
MSO+28% N	1.5 pt+2 qt	98	99	99	97
Define SC+Option+Distinct+	12 oz+1.5 oz+4 oz+				
MSO+28% N	1.5 pt+2 qt	99	99	99	99
Option+Distinct+MSO+28% N	1.5 oz+4 oz+1.5 pt+2 qt	97	99	97	99
Option+Northstar+MSO+28% N	1.5 oz+3 oz+1.5 pt+2 qt	93	95	99	97
Steadfast+atrazine+COC+28% N	.75 oz+1.5 pt+1%+2 qt	98	98	96	95
Steadfast+Starane+atrazine+	.75 oz+.5 pt+2 pt+				
COC+28% N	1%+2 qt	96	96	98	98
Cinch ATZ Lite+Steadfast+	2 pt+.75 oz+				
Callisto+NIS+28% N	2 oz+.25%+2.5 lb	98	99	99	99
Lumax+Steadfast+COC+AMS	1.5 qt+.75 oz+1%+2.5 lb	99	99	99	97
Steadfast+atrazine+Callisto+	.75 oz+3 pt+2 oz+				
COC+AMS	1%+2.5 lb	98	99	99	99

Table 2. Corn Herbicide Demonstration in Resistant Corn

Demonstration
Variety: Pio 38H69 RR/LL
Planting Date: 5/11/06
PRE: 5/12/06
EPOST: 6/1/06; Corn V2-4 lf; Grft 1-4 lf;
Colq 1-3 in; Cowh 1-3 in; Pesw 1-3 in.
POST: 6/7/06; Corn V3-4; Grft 2-5 lf, 2-4 in;
Colq 2-5 in; Cowh 2-5 in; Pesw 4-6 in.
Soil: Silty clay loam; 3.2% OM; 5.9 pH

Precipitation:

PRE:	1st week	0.10 inches
	2nd week	0.50 inches
EPOST:	1st week	1.20 inches
	2nd week	0.22 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Grft=Green foxtail
Cowh=Common waterhemp
Colq=Common lambsquarter
Pesw=Pennsylvania smartweed

Comments: These plots were established to demonstrate the efficacy of various herbicide programs in Liberty Link or Roundup Ready corn.

Liberty Link Corn:
Green foxtail and Pennsylvania smartweed control was slightly less in the early post-emergence treatments than the post-emergence treatments. Tank mix options in the post-emergence treatments were established to demonstrate different options to improve control of lambsquarters. Each treatment resulted in nearly complete lambsquarters control with each tank mix partner costing approximately $6/A or less. Split applications of Liberty and pre- followed by post-emergence programs also resulted in very good weed control.

Roundup Ready Corn:
Early Post-Emergence: A single early post-emergence application of Roundup or Touchdown resulted in nearly complete weed control. Tank mix partners with residual weed control were also added, but these treatments were not necessary this year as the relatively dry spring conditions did not induce late weed emergence.

Post-Emergence: A single application of Roundup resulted in nearly complete weed control. Tank mix partners were added to demonstrate control of weeds that may be less susceptible to Roundup due to their large size at the post-emergence timing. However, the relatively dry spring conditions suppressed weed emergence, which may have partially minimized the ability for the weeds to reach advanced growth stages by the post-emergence timing. Therefore, a single application of Roundup alone was adequate to achieve nearly complete weed control.

Pre- Followed by Post-Emergence: All treatments resulted in nearly complete weed control. Pre-emergence applications are often beneficial as they minimize early-season weed competition which can result in significant corn yield loss at the end of the season.

2006 Corn Herbicide Demonstration in Resistant Corn
Southeast Research Farm
Page 2

Treatment	*Rate/A*	*% Grft 10/2/06*	*% Cowh 10/2/06*	*% Colq 10/2/06*	*% Pesw 10/2/06*
Liberty Link Check	----	0	0	0	0
EARLY POSTEMERGENCE					
Liberty+atrazine+AMS	32 oz+1 pt+3 lb	85	97	97	88
POSTEMERGENCE					
Liberty+atrazine+AMS	32 oz+1 pt+3 lb	95	98	98	93
Liberty+Resolve+AMS	32 oz+1 oz+3 lb	95	98	98	95
Liberty+Callisto+AMS	32 oz+1.5 oz+3 lb	96	98	95	95
EARLY POSTEMERGENCE & POSTEMERGENCE					
Liberty+AMS&Liberty+AMS	24 oz+3 lb&24 oz+3 lb	95	98	90	97
PREEMERGENCE & POSTEMERGENCE					
Define SC&Liberty+atrazine+AMS	12 oz&32 oz+1 pt+3 lb	97	98	96	98
Balance Pro+atrazine& Liberty+AMS	1.5 oz+1.5 pt& 32 oz+3 lb	99	99	97	99
Dual II Magnum&Liberty+ atrazine+AMS	1.67 pt&32 oz+ 1 pt+3 lb	99	99	99	99
Roundy Ready Check	----	0	0	0	0
EARLY POSTEMERGENCE					
Roundup WeatherMax+AMS	22 oz+2.5 lb	96	98	92	97
Touchdown Total+AMS	32 oz+2.5 lb	93	98	96	98
Touchdown Total+Lumax+AMS	24 oz+1.5 qt+2.5 lb	99	99	99	99
Roundup WeatherMax+ Resolve+AMS	22 oz+ 1 oz+2.5 lb	98	99	98	98
Roundup WeatherMax+Resolve+ atrazine+AMS	22 oz+1 oz+ 2 pt+2.5 lb	99	99	99	99
Roundup WeatherMax+ atrazine+AMS	22 oz+ 2 pt+2.5 lb	99	99	99	99
Roundup WeatherMax+ Harness+AMS	22 oz+ 1 pt+2.5 lb	99	99	99	99
Roundup WeatherMax+ Stalwart C+AMS	22 oz+ 1 pt+2.5 lb	99	99	99	99
Roundup WeatherMax+ Outlook+AMS	22 oz+ .75 pt+2.5 lb	99	99	99	99
Roundup WeatherMax+ Prowl H_2O+AMS	22 oz+ 2.5 pt+2.5 lb	99	99	99	99

2006 Corn Herbicide Demonstration in Resistant Corn
Southeast Research Farm
Page 3

Treatment	***Rate/A***	***% Grft 10/2/06***	***% Cowh 10/2/06***	***% Colq 10/2/06***	***% Pesw 10/2/06***
POSTEMERGENCE					
Roundup WeatherMax+AMS	22 oz+2.5 lb	98	99	99	99
Roundup WeatherMax+Resource+AMS	22 oz+4 oz+2.5 lb	97	99	99	99
Roundup WeatherMax+Callisto+AMS	22 oz+1.5 oz+2.5 lb	99	99	99	99
Roundup WeatherMax+ 2,4-D amine+AMS	22 oz+ 8 oz+2.5 lb	99	99	99	99
Roundup WeatherMax+Clarity+AMS	22 oz+8 oz+2.5 lb	88	99	99	99
Roundup WeatherMax+Aim+AMS	22 oz+.5 oz+2.5 lb	94	97	98	99
Roundup WeatherMax+Priority+ NIS+AMS	22 oz+1 oz+ .25%+2.5 lb	99	99	99	99
EARLY POSTEMERGENCE & POSTEMERGENCE					
Roundup WeatherMax+AMS& Roundup WeatherMax+AMS	22 oz+2.5 lb& 22 oz+2.5 lb	94	99	99	99
PREEMERGENCE & POSTEMERGENCE					
Atrazine&Roundup WeatherMax+AMS	2 pt&22 oz+2.5 lb	97	99	99	99
Harness&Roundup WeatherMax+AMS	2 pt&22 oz+2.5 lb	99	99	99	99
Harness&Roundup WeatherMax+AMS	1 pt&22 oz+2.5 lb	99	99	99	99
Micro-Tech&Roundup WeatherMax+AMS	2 qt&22 oz+2.5 lb	99	99	99	99
Dual II Magnum& Roundup WeatherMax+AMS	1.67 pt& 22 oz+2.5 lb	99	99	99	99
Keystone LA& Roundup WeatherMax+AMS	1.1 qt& 22 oz+2.5 lb	99	99	99	99
Outlook&Roundup WeatherMax+AMS	12 oz&22 oz+2.5 lb	99	99	99	99
Outlook&Roundup WeatherMax+ Clarity+NIS+AMS	12 oz&22 oz+ 8 oz+.25%+2.5 lb	99	99	99	99
Lumax&Touchdown Total+AMS	1.5 qt&24 oz+2.5 lb	99	99	99	99

Table 3. Early Postemergence Program in RR-Corn

RCB; 4 reps
Variety: DKC 5873RR
Planting Date: 5/9/06
EPOST: 6/1/06; Corn V2, 4 lf; Colq 1-4 in; Cowh 1-4 in.
Soil: Clay; 3.8% OM; 7.4 pH

Precipitation:
EPOST: 1st week 1.20 inches
2nd week 0.22 inches

Colq=Common lambsquarter
Cowh=Common waterhemp

Comments: Herbicide tank mix partners were evaluated for residual weed control after an early post-emergence application. Dry spring conditions may have suppressed weed emergence relative to years with more precipitation. Consequently, few treatment differences were observed. All tank mix partners increased control of common lambsquarters relative to Roundup alone.

Treatment	***Rate/A***	***% Colq 9/29/06***	***% Cowh 9/29/06***
Check	-----	0	0
EARLY POSTEMERGENCE			
Roundup WeatherMax+AMS	22 oz+2.5 lb	88	97
Roundup WeatherMax+Resolve+AMS	22 oz+1 oz+2.5 lb	93	99
Roundup WeatherMax+Resolve+atrazine+AMS	22 oz+1 oz+1 pt+2.5 lb	99	99
Roundup WeatherMax+Prowl H_2O+AMS	22 oz+2.5 pt+2.5 lb	92	99
Roundup WeatherMax+Lumax+AMS	22 oz+1 qt+2.5 lb	99	99
Roundup WeatherMax+Define SC+AMS	22 oz+12 oz+2.5 lb	96	99
Roundup WeatherMax+Outlook+AMS	22 oz+10 oz+2.5 lb	97	99
Roundup WeatherMax+Harness+AMS	22 oz+1.5 pt+2.5 lb	98	99
Roundup WeatherMax+Cinch ATZ+AMS	22 oz+1 qt+2.5 lb	98	99
Roundup WeatherMax+Stalwart Xtra+AMS	22 oz+1.6 qt+2.5 lb	99	99
Roundup WeatherMax+Stalwart Xtra+AMS	22 oz+1 qt+2.5 lb	98	98
LSD (.05)		3	1

Table 4. Tank-Mixes to Enhance Weed Control with Glyphosate

RCB: 4 reps
Variety: DKC 58-73RR
Planting Date: 5/9/06
POST: 6/7/06; Corn V4, 8-11 in; Cowh 2-5 in; Colq 2-5 in; Vele 2-4 lf
Soil: Clay; 3.8% OM; 7.4 pH

Precipitation:

POST:	1st week	0.04 inches
	2nd week	1.62 inches

Cowh=Common waterhemp
Colq=Common lambsquarter
Vele=Velvetleaf

Comments: This study was established to evaluate the benefit of adding AMS or low herbicide rates to Roundup. Velvetleaf densities were low and difficult to evaluate for control. Common lambquarters and common waterhemp control declined at the lowest rate of Roundup applied alone. Adding AMS did not result in greater control of common lambsquarters at the lowest application rate. The addition of Aim (0.5 oz/A) or Callisto (1 oz/A) increased common lambsquarters control at the lowest Roundup rate. The addition of Impact (topramezone) or Buctril (bromoxynil) resulted in greater lambsquarters control compared to 10 oz/A Roundup + AMS, but not 20 oz/A Roundup + AMS.

Treatment	***Rate/A***	***% Cowh 8/30/06***	***% Colq 8/30/06***	***% Vele 8/30/06***
Check	----	0	0	0
POSTEMERGENCE				
Roundup WeatherMax	30 oz	98	94	94
Roundup WeatherMax	20 oz	97	93	92
Roundup WeatherMax	10 oz	95	91	93
Roundup WeatherMax	5 oz	88	63	93
Roundup WeatherMax+AMS	30 oz+2.5 lb	99	97	95
Roundup WeatherMax+AMS	20 oz+2.5 lb	98	94	94
Roundup WeatherMax+AMS	10 oz+2.5 lb	98	76	94
Roundup WeatherMax+AMS	5 oz+2.5 lb	95	69	92
Roundup WeatherMax+Aim+AMS	30 oz+.5 oz+2.5 lb	97	94	95
Roundup WeatherMax+Aim+AMS	20 oz+.5 oz+2.5 lb	96	93	95
Roundup WeatherMax+Aim+AMS	10 oz+.5 oz+2.5 lb	91	90	95
Roundup WeatherMax+Aim+AMS	5 oz+.5 oz+2.5 lb	90	83	94
Roundup WeatherMax+Callisto+AMS	30 oz+1 oz+2.5 lb	99	97	97
Roundup WeatherMax+Callisto+AMS	20 oz+1 oz+2.5 lb	99	99	98
Roundup WeatherMax+Callisto+AMS	10 oz+1 oz+2.5 lb	97	93	97
Roundup WeatherMax+Callisto+AMS	5 oz+1 oz+2.5 lb	95	85	95
Roundup WeatherMax+Impact+AMS	20 oz+.25 oz+2.5 lb	96	90	94
Roundup WeatherMax+Impact+AMS	10 oz+.25 oz+2.5 lb	97	84	92
Roundup WeatherMax+Buctril+AMS	20 oz+5 oz+2.5 lb	96	86	88
Roundup WeatherMax+Buctril+AMS	10 oz+5 oz+2.5 lb	98	89	91
LSD (.05)		3	7	4

Table 5. Glyphosate Programs in Corn

RCB; 4 reps
Variety: DKC 58-73; RR 2YG Plus
Planting Date: 5/9/06
PRE: 5/9/06
EPOST: 6/1/06; Corn V2, 4 lf; Cowh 1-4 in; Colq 1-4 in.
POST: 6/7/06; Corn V4, 8-11 in; Cowh 2-5 in; Colq 2-5 in.
Soil: Clay; 3.8% OM; 7.4 pH

Precipitation:

PRE:	1st week	0.18 inches
	2nd week	0.00 inches
EPOST:	1st week	1.20 inches
	2nd week	0.22 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Cowh=Common waterhemp
Colq=Common lambsquarter

Comments: Herbicide programs were established to measure potential yield loss associated with early-season weed competition. Nearly complete weed control resulted from each treatment.

Treatment	*Rate/A*	*% Cowh 9/25/06*	*% Colq 9/25/06*	*Yield bu/A*
Check	----	0	0	107
EARLY POSTEMERGENCE				
Roundup WeatherMax+AMS	22 oz+2.5 lb	99	97	118
POSTEMERGENCE				
Roundup WeatherMax+AMS	22 oz+2.5 lb	99	98	120
EARLY POSTEMERGENCE & POSTEMERGENCE				
Roundup WeatherMax+AMS& Roundup WeatherMax+AMS	22 oz+2.5 lb& 22 oz+2.5 lb	99	97	121
PREEMERGENCE & POSTEMERGENCE				
Harness Xtra 6L& Roundup WeatherMax+AMS	3 pt& 22 oz+2.5 lb	99	98	128
Harness Xtra 6L& Roundup WeatherMax+AMS	1.5 pt& 22 oz+2.5 lb	99	99	128
LSD (.05)		0	1	15

Table 6. Sequential and Total Postemergence Programs with Glyphosate in Corn

RCB; 4 reps
Variety: DKC 58-73
Planting Date: 5/5/06
PRE: 5/5/06
POST: 6/7/06; Corn V4, 10-12 in; Cowh 2-8 in; Colq 2-7 in; Pesw 5-10 in.
POST2: 6/15/06; Corn 12-16 in; Cowh 2-8 in; Colq 4-8 in; Pesw 8-12 in.
Soil: Silty clay; 4.2% OM; 7.3 pH

Precipitation:

PRE:	1st week	0.08 inches
	2nd week	0.10 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches
POST2:	1st week	1.70 inches
	2nd week	0.24 inches

Colq=Common lambsquarter
Cowh=Common waterhemp
Pesw=Pennsylvania smartweed

Comments: Status (dicamba + diflufenzopyr + isoxidifen) was evaluated with other programs in Roundup Ready corn for enhanced broadleaf weed control. All treatments, including Roundup alone, provided nearly complete weed control.

Treatment	***Rate/A***	***% Colq 7/11/06***	***% Cowh 7/11/06***	***% Pesw 7/11/06***	***% Colq 9/29/06***	***% Cowh 9/29/06***	***% Pesw 9/29/06***	***Yield bu/A***
Check	----	0	0	0	0	0	0	124
POSTEMERGENCE								
Roundup WeatherMax+AMS	22 oz+3 lb	98	99	98	97	98	99	190
POSTEMERGENCE 2								
Roundup WeatherMax+AMS	22 oz+3 lb	98	98	95	97	99	97	183
POSTEMERGENCE								
Glyphosate Plus 3L+ Status+AMS	24 oz+ 2.5 oz+3 lb	99	99	98	97	99	99	186
Glyphosate Plus 3L+ Prowl H_2O+AMS	24 oz+ 2.5 pt+3 lb	96	99	99	97	99	99	186
Glyphosate Plus 3L+ Outlook+Clarity+AMS	24 oz+ 12 oz+8 oz+3 lb	99	99	99	98	99	99	177
PREEMERGENCE & POSTEMERGENCE								
Outlook& Glyphosate Plus 3L+AMS	12 oz& 24 oz+3 lb	98	99	95	96	99	98	185
Outlook& Glyphosate Plus 3L+ Status+AMS	12 oz& 24 oz+ 2.5 oz+3 lb	99	99	99	97	99	99	186
LSD (.05)		1	1	3	1	1	1	13

Table 7. Comparison of Weed Control Programs in RR Corn

RCB; 4 reps
Variety: DKC 58-73
Planting Date: 5/5/06
PRE: 5/5/06
EPOST: 6/1/06; Corn V3, 4-5 lf; Grft 1-4 lf; Colq1-4 in; Cowh 1-3 in; Pesw 3-6 in.
POST: 6/7/06; Corn V4, 10-12 in; Grft 2-5 in, 2-5 lf; Colq 2-7 in; Cowh 2-6 in; Pesw 5-9 in.
Soil: Silty clay; 4.2% OM; 7.3 pH

Precipitation:

PRE:	1st week	0.08 inches
	2nd week	0.10 inches
EPOST:	1st week	1.20 inches
	2nd week	0.22 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Grft=Green foxtail
Colq=Common lambsquarter
Cowh=Common waterhemp
Pesw=Pennsylvania smartweed

Comments: Pre- and post-emergence weed control programs were evaluated in Roundup Ready corn. The pre-emergence herbicides, Lumax and Radius, each provided nearly complete weed control. Soil residual herbicides applied early post-emergence with Roundup or Touchdown also resulted in nearly complete weed control.

Treatment	Rate/A	% Grft 7/11/06	% Colq 7/11/06	% Cowh 7/11/06	% Pesw 7/11/06	% Grft 9/29/06	% Colq 9/29/06	% Cowh 9/29/06	% Pesw 9/29/06	Yield bu/A
Check	----	0	0	0	0	0	0	0	0	0
PREEMERGENCE										
Lumax	2.5 qt	96	99	99	99	93	99	99	99	93
Radius	18 oz	97	99	98	97	93	99	99	98	93
PREEMERGENCE & POSTEMERGENCE										
Harness Xtra 6L&	2.4 pt&									
Roundup Original Max	21.3 oz	99	99	99	97	99	99	99	99	99
Atrazine&	2 qt&									
Roundup Original Max	21.3 oz	98	99	99	98	97	99	99	99	99
EARLY POSTEMERGENCE										
Harness Xtra 6L+	2.4 pt+									
Roundup Original Max	21.3 oz	99	99	99	98	99	99	99	98	98
Degree Xtra+	2 qt+									
Roundup Original Max	21.3 oz	99	97	99	96	98	96	99	98	99
Lumax+	2 qt+									
Touchdown Total	24 oz	99	99	99	99	99	99	99	99	97
LSD (.05)		3	1	1	3	7	1	1	2	7

Table 8. Weed Control Programs in Corn

RCB; 4 reps
Variety: Pioneer 38H69 RR/LL
Planting Date: 5/5/06
PRE: 5/5/06
EPOST: 6/1/06; Corn V3, 4-5 lf; Cowh 1-3 in.
POST: 6/7/06; Corn V4, 6-12 in; Cowh 2-7 in.
Soil: Silty clay; 3.9% OM; 7.0 pH

Precipitation:

PRE:	1st week	0.08 inches
	2nd week	0.10 inches
EPOST:	1st week	1.20 inches
	2nd week	0.22 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Cowh=Common waterhemp

Comments: Weed management programs were evaluated for conventional, Roundup Ready, and Liberty systems. All treatments resulted in nearly complete weed control.

Treatment	***Rate/A***	***% Cowh 6/30/06***	***% Cowh 9/25/06***	***Yield bu/A***
Check	----	0	0	138
PREEMERGENCE				
Lumax	3 qt	100	99	167
PREEMERGENCE & EARLY POSTEMERGENCE				
Lumax&Lumax+NIS	2 qt&1 qt+.25%	99	99	171
PREEMERGENCE & POSTEMERGENCE				
Dual II Magnum&Callisto+atrazine+ COC+AMS	1.67 pt&3 oz+1 pt+ 1%+15 lb/100 gal	100	99	170
Surpass&Hornet WDG+atrazine+ COC+AMS	2.5 pt&3 oz+1 pt+ 1%+15 lb/100 gal	99	99	168
Outlook&Distinct+atrazine+ NIS+AMS	18 oz&4 oz+1 pt+ .25%+15 lb/100 gal	99	99	171
Lumax&Liberty+AMS	1.5 qt&24 oz+15 lb/100 gal	100	99	167
EARLY POSTEMERGENCE				
Lumax+Liberty+AMS	1.5 qt+24 oz+15 lb/100 gal	100	99	172
PREEMERGENCE & POSTEMERGENCE				
Define&Liberty+atrazine+AMS	13 oz&32 oz+1 pt+15 lb/100 gal	99	99	162
Radius&Liberty+atrazine+AMS	13 oz&32 oz+1 pt+15 lb/100 gal	100	99	164
Dual II Magnum&Touchdown Total+AMS	1.33 pt&24 oz+15 lb/100 gal	98	98	178
Dual II Magnum&Touchdown Total+ Callisto+AMS	1.33 pt&24 oz+ 3 oz+15 lb/100 gal	100	99	168
Lumax&Touchdown Total+AMS	1.5 qt&24 oz+15 lb/100 gal	100	99	170
POSTEMERGENCE				
Touchdown Total+AMS	24 oz+15 lb/100 gal	97	95	164

2006 Weed Control Programs in Corn
Southeast Research Farm
Page 2

Treatment	***Rate/A***	***% Cowh 6/30/06***	***% Cowh 9/25/06***	***Yield bu/A***
EARLY POSTEMERGENCE				
Touchdown Total+AMS	24 oz+15 lb/100 gal	96	95	168
Lumax+Touchdown Total+AMS	1.5 pt+24 oz+15 lb/100 gal	99	98	157
Camix+Touchdown Total+AMS	1.5 pt+24 oz+15 lb/100 gal	99	99	165
Resolve+atrazine+	1 oz+1 pt+			
Touchdown Total+AMS	24 oz+15 lb/100 gal	97	97	176
Lumax+Touchdown Total+AMS	1.5 qt+24 oz+15 lb/100 gal	100	99	175
PREEMERGENCE & POSTEMERGENCE				
Harness Xtra 6L&	1 qt&			
Roundup WeatherMax+AMS	22 oz+15 lb/100 gal	100	99	175
POSTEMERGENCE				
Roundup WeatherMax+AMS	22 oz+15 lb/100 gal	96	96	165
EARLY POSTEMERGENCE & POSTEMERGENCE				
Roundup WeatherMax+AMS&	22 oz+15 lb/100 gal&			
Roundup WeatherMax+AMS	22 oz+15 lb/100 gal	98	98	165
POSTEMERGENCE				
Roundup WeatherMax+Resolve+AMS	22 oz+1 oz+15 lb/100 gal	98	99	164
PREEMERGENCE & POSTEMERGENCE				
Outlook&Roundup WeatherMax+	12 oz&11 oz+			
Distinct+AMS	4 oz+15 lb/100 gal	98	98	169
LSD (.05)		2	1	13

Table 9. Program Approaches for Weed Control in Corn

RCB; 4 reps
Variety: Pioneer 38H69 RR/LL
Planting Date: 5/5/06
PRE: 5/5/06
EPOST: 6/1/06; Corn V3, 4-5 lf; Cowh 1-3 in.
POST: 6/7/06; Corn V4, 6-12 in; Cowh 2-7 in.
Soil: Silty clay; 3.9% OM; 7.0 pH

Precipitation:

PRE:	1st week	0.08 inches
	2nd week	0.10 inches
EPOST:	1st week	1.20 inches
	2nd week	0.22 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Cowh=Common waterhemp

Comments: Weed management programs were evaluated for conventional, Roundup Ready, and Liberty systems. All treatments resulted in nearly complete weed control.

Treatment	***Rate/A***	***% Cowh 6/30/06***	***% Cowh 9/25/06***	***Yield bu/A***
Check	----	0	0	138
PREEMERGENCE				
Lumax	3 qt	100	99	167
PREEMERGENCE & EARLY POSTEMERGENCE				
Lumax&Lumax+NIS	2 qt&1 qt+.25%	99	99	171
PREEMERGENCE & POSTEMERGENCE				
Dual II Magnum&Callisto+atrazine+ COC+AMS	1.67 pt&3 oz+1 pt+ 1%+15 lb/100 gal	100	99	170
Surpass&Hornet WDG+atrazine+ COC+AMS	2.5 pt&3 oz+1 pt+ 1%+15 lb/100 gal	99	99	168
Outlook&Distinct+atrazine+ NIS+AMS	18 oz&4 oz+1 pt+ .25%+15 lb/100 gal	99	99	171
Lumax&Liberty+AMS	1.5 qt&24 oz+15 lb/100 gal	100	99	167
EARLY POSTEMERGENCE				
Lumax+Liberty+AMS	1.5 qt+24 oz+15 lb/100 gal	100	99	172
PREEMERGENCE & POSTEMERGENCE				
Define&Liberty+atrazine+AMS	13 oz&32 oz+1 pt+15 lb/100 gal	99	99	162
Radius&Liberty+atrazine+AMS	13 oz&32 oz+1 pt+15 lb/100 gal	100	99	164
Dual II Magnum&Touchdown Total+AMS	1.33 pt&24 oz+15 lb/100 gal	98	98	178
Dual II Magnum&Touchdown Total+ Callisto+AMS	1.33 pt&24 oz+ 3 oz+15 lb/100 gal	100	99	168
Lumax&Touchdown Total+AMS	1.5 qt&24 oz+15 lb/100 gal	100	99	170
POSTEMERGENCE				
Touchdown Total+AMS	24 oz+15 lb/100 gal	97	95	164

2006 Weed Control Programs in Corn
Southeast Research Farm
Page 2

Treatment	*Rate/A*	*% Cowh 6/30/06*	*% Cowh 9/25/06*	*Yield bu/A*
EARLY POSTEMERGENCE				
Touchdown Total+AMS	24 oz+15 lb/100 gal	96	95	168
Lumax+Touchdown Total+AMS	1.5 pt+24 oz+15 lb/100 gal	99	98	157
Camix+Touchdown Total+AMS	1.5 pt+24 oz+15 lb/100 gal	99	99	165
Resolve+atrazine+	1 oz+1 pt+			
Touchdown Total+AMS	24 oz+15 lb/100 gal	97	97	176
Lumax+Touchdown Total+AMS	1.5 qt+24 oz+15 lb/100 gal	100	99	175
PREEMERGENCE & POSTEMERGENCE				
Harness Xtra 6L&	1 qt&			
Roundup WeatherMax+AMS	22 oz+15 lb/100 gal	100	99	175
POSTEMERGENCE				
Roundup WeatherMax+AMS	22 oz+15 lb/100 gal	96	96	165
EARLY POSTEMERGENCE & POSTEMERGENCE				
Roundup WeatherMax+AMS&	22 oz+15 lb/100 gal&			
Roundup WeatherMax+AMS	22 oz+15 lb/100 gal	98	98	165
POSTEMERGENCE				
Roundup WeatherMax+Resolve+AMS	22 oz+1 oz+15 lb/100 gal	98	99	164
PREEMERGENCE & POSTEMERGENCE				
Outlook&Roundup WeatherMax+	12 oz&11 oz+			
Distinct+AMS	4 oz+15 lb/100 gal	98	98	169
LSD (.05)		2	1	13

Table 10. Pre Followed by Post Weed Control in GT-Corn

RCB; 4 reps
Variety: DKC 58-73
Planting Date: 5/5/06
PRE: 5/5/06
EPOST: 6/1/06; Corn V3, 4-5 lf; Cowh 1-3 in; Colq 1-4 in; Pesw 3-6 in.
POST: 6/7/06; Corn V9, 10-12 in; Cowh 2-6 in; Colq 2-7 in; Pesw 5-9 in.
Soil: Silty clay; 4.2% OM; 7.3 pH

Precipitation:

PRE:	1st week	0.08 inches
	2nd week	0.10 inches
EPOST:	1st week	1.20 inches
	2nd week	0.22 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Colq=Common lambsquarter
Cowh=Common waterhemp
Pesw=Pennsylvania smartweed

Comments: Low rates of Epic (flufenacet + isoxaflutole) and atrazine were evaluated in programs with Buccaneer (glyphosate). All treatments resulted in nearly complete weed control, including the lowest rates of Epic. However, the spring was relatively dry which may have suppressed weed emergence.

Treatment	Rate/A	% Colq 7/11/06	% Cowh 7/11/06	% Pesw 7/11/06	% Colq 9/29/06	% Cowh 9/29/06	% Pesw 9/29/06	Yield bu/A
PREEMERGENCE & POSTEMERGENCE								
Epic+atrazine& Buccaneer Plus+Array	5 oz+1 qt& 32 oz+9 lb/100 gal	99	99	99	99	99	99	187
Epic+atrazine& Buccaneer Plus+Array	6 oz+1 qt& 32 oz+9 lb/100 gal	99	99	98	99	99	98	192
Epic+atrazine& Buccaneer Plus+Array	7 oz+1 qt& 32 oz+9 lb/100 gal	99	99	99	98	99	99	193
Epic+atrazine& Buccaneer Plus+Array	8 oz+1 qt& 32 oz+9 lb/100 gal	99	99	99	99	99	99	185
Epic+Volley ATZ& Buccaneer Plus+Array	5 oz+1.8 qt& 32 oz+9 lb/100 gal	99	99	99	99	99	99	186
Volley ATZ& Buccaneer Plus+Array	1.8 qt& 32 oz+9 lb/100 gal	99	99	98	98	99	99	194
Propel ATZ& Buccaneer Plus+Array	2.67 pt& 32 oz+9 lb/100 gal	99	99	98	98	99	98	196
Atrazine& Buccaneer Plus+Array	1 qt& 32 oz+9 lb/100 gal	98	99	98	99	99	98	190
EARLY POSTEMERGENCE								
Volley ATZ+atrazine+ Buccaneer Plus+Array	1.8 qt+1 qt+ 32 oz+9 lb/100 gal	99	99	99	98	99	99	161
EARLY POSTEMERGENCE & POSTEMERGENCE								
Buccaneer Plus+Array& Buccaneer Plus+Array	32 oz+9 lb/100 gal& 32 oz+9 lb/100 gal	94	98	99	92	99	99	186
Check	----	0	0	0	0	0	0	160
LSD (.05)		2	0	1	1	0	1	16

Table 11. Weed Control in Corn with Pre and Postemergence Combinations

RCB; 4 reps
Variety: Pioneer 38H69 RR/LL
Planting Date: 5/5/06
PRE: 5/5/06
EPOST: 6/4/06; Corn V3, 4-5 lf; Cowh 1-3 in; Colq 1-4 in.
POST: 6/7/06; Corn V4, 10-12 in; Cowh 2-7 in; Colq 2-7 in.
Soil: Silty clay; 3.9% OM; 7.0 pH

Precipitation:

PRE:	1st week	0.08 inches
	2nd week	0.10 inches
EPOST:	1st week	1.20 inches
	2nd week	0.22 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Cowh=Common waterhemp
Colq=Common lambsquarter

Comments: Various weed control programs in conventional and Liberty programs. All treatments resulted in nearly complete weed control.

Treatment	Rate/A	% Cowh 6/30/06	% Colq 6/30/06	% Cowh 9/25/06	% Colq 9/25/06
Check	----	0	0	0	0
PREEMERGENCE					
Radius	18 oz	98	99	97	99
Radius+atrazine	18 oz+2 pt	100	99	99	98
Balance Pro+atrazine	2.5 oz+2 pt	99	100	98	99
PREEMERGENCE & POSTEMERGENCE					
Balance Pro&Liberty+ atrazine+AMS	1.5 oz&32 oz+ 1 pt+3 lb	100	100	99	99
Balance Pro&Option+ MSO+28% N	1.5 oz&1.5 oz+ 1.5 pt+1.5 qt	92	100	92	99
Define&Liberty+atrazine+AMS	12 oz&32 oz+1 pt+3 lb	100	100	98	98
EARLY POSTEMERGENCE					
Liberty+atrazine+AMS	32 oz+1 pt+3 lb	98	99	98	96
PREEMERGENCE & POSTEMERGENCE					
Define&Liberty+Callisto+AMS	12 oz&32 oz+1.5 oz+3 lb	99	100	98	98
EARLY POSTEMERGENCE					
Liberty+Define+atrazine+AMS	32 oz+10 oz+1 pt+3 lb	99	97	99	96
POSTEMERGENCE					
Define+Option+Distinct+ MSO+28% N	12 oz+1.5 oz+4 oz+ 1.5 pt+1.5 qt	96	100	99	97
Option+Distinct+MSO+28% N	1.5 oz+4 oz+1.5 pt+1.5 qt	96	100	98	96
LSD (.05)		2	1	1	2

Table 12. Weed Control in Corn with Stout Tank-Mixtures

RCB; 4 reps
Variety: DKC 58-73
Planting Date: 5/5/06
POST: 6/7/06; Corn V4, 10-12 in; Grft 2-5 lf, 2-5 in.; Cowh 2-7 in.
Soil: Silty clay loam; 3.7% OM; 6.8 pH

Precipitation:
POST: 1st week 0.04 inches; 2nd week 1.62 inches

Grft=Green foxtail
Cowh=Common waterhemp

Comments: Weed control programs with Stout were evaluated. Stout is a new herbicide premix of nicosulfuron (e.g. Accent) and thifensulfuron (e.g. Harmony) which is primarily intended for grass control. However, Stout alone resulted in nearly 90% control of common waterhemp on the July evaluation date. Common waterhemp was nearly completely controlled when low rates of broadleaf herbicides, such as Callisto or atrazine, were applied with Stout.

Treatment	***Rate/A***	***% Grft 7/20/06***	***% Cowh 7/20/06***	***% Grft 9/29/06***	***% Cowh 9/29/06***	***Yield bu/A***
Check	-----	0	0	0	0	167
POSTEMERGENCE						
Stout+COC+AMS	.5 oz+1%+2 lb	94	88	97	94	186
Stout+COC+AMS	.75 oz+1%+2 lb	97	92	99	95	179
Stout+Callisto+COC+AMS	.5 oz+1.5 oz+1%+2 lb	96	99	97	99	186
Stout+Callisto+COC+AMS	.75 oz+1.5 oz+1%+2 lb	96	99	96	99	179
Stout+Callisto+Atrazine 90DF+ COC+AMS	.5 oz+1.5 oz+.56 lb+ 1%+2 lb	95	99	96	99	189
Stout+Callisto+Atrazine 90DF+ COC+AMS	.75 oz+1.5 oz+.56 lb+ 1%+2 lb	95	99	96	99	191
Stout+Atrazine 90DF+COC+AMS	.5 oz+.56 lb+1%+2 lb	93	97	92	98	186
Stout+Atrazine 90DF+COC+AMS	.75 oz+.56 lb+1%+2 lb	96	98	96	99	191
Stout+Impact+COC+AMS	.5 oz+.75 oz+1%+2 lb	98	99	98	99	187
Stout+Impact+COC+AMS	.75 oz+.75 oz+1%+2 lb	98	99	99	99	187
Stout+Impact+Atrazine 90DF+ COC+AMS	.5 oz+.75 oz+.56 lb+ 1%+2 lb	98	99	98	99	183
Stout+Impact+Atrazine 90DF+ COC+AMS	.75 oz+.75 oz+.56 lb+ 1%+2 lb	98	99	98	99	194
Steadfast+Callisto+Atrazine 90DF+ COC+AMS	.75 oz+1.5 oz+.56 lb+ 1%+2 lb	97	99	96	99	192
Stout+Clarity+COC+AMS	.5 oz+4 oz+1%+2 lb	97	97	95	98	177
Stout+Clarity+COC+AMS	.75 oz+4 oz+1%+2 lb	96	96	96	98	180
Stout+Lumax+NIS+AMS	.5 oz+2 pt+.25%+2 lb	97	99	97	99	182
Stout+Lumax+NIS+AMS	.75 oz+2 pt+.25%+2 lb	97	99	97	99	183
Stout+Lexar+NIS+AMS	.5 oz+2.3 pt+.25%+2 lb	96	99	97	99	175
Stout+Lexar+NIS+AMS	.75 oz+2.3 pt+.25%+2 lb	97	99	98	99	186
Stout+Distinct+COC+AMS	.5 oz+2 oz+1%+2 lb	95	98	95	99	189
Stout+Distinct+COC+AMS	.75 oz+2 oz+1%+2 lb	98	99	99	99	181
LSD (.05)		3	1	4	2	13

Table 13. Postemergence Broadleaf Control in RR-Corn

RCB; 4 reps
Variety: DKC-5873
Planting Date: 5/5/06
PRE: 5/5/06
EPOST: 6/1/06; Corn V3, 4-5 lf; Vema 1-3 in; Colq 1-4 in; Cowh 1-3 in.
Soil: Silty clay; 4.2% OM; 7.3 pH

Precipitation:

PRE:	1st week	0.08 inches
	2nd week	0.10 inches
EPOST:	1st week	1.20 inches
	2nd week	0.22 inches

Vema=Venice mallow
Colq=Common lambsquarter
Cowh=Common waterhemp

Comments: This study was established to evaluate herbicide programs with low rates of Permit and Dual in Roundup Ready corn. A single application of Roundup resulted in nearly complete weed control. The low rate of Dual II Magnum also provided nearly complete control of common waterhemp and about 80% control of common lambsquarters. The pre- and early post-emergence programs all resulted in nearly complete weed control.

Treatment	*Rate/A*	*% Vema 7/11/06*	*% Colq 7/11/06*	*% Cowh 7/11/06*	*% Colq 9/29/06*	*% Cowh 9/29/06*	*Yield bu/A*
Check	-----	0	0	0	0	0	154
PREEMERGENCE & EARLY POSTEMERGENCE							
Dual II Magnum&	.8 pt&						
GWN-3039+	4 oz+						
Roundup WeatherMax+NIS	22 oz+.125%	99	99	99	99	99	171
Dual II Magnum&	.8 pt&						
Permit+	.5 oz+						
Roundup WeatherMax+NIS	22 oz+.125%	99	99	99	99	99	181
Dual II Magnum&	.8 pt&						
Permit+	.66 oz+						
Roundup WeatherMax+NIS	22 oz+.125%	99	99	99	98	99	172
EARLY POSTEMERGENCE							
Roundup WeatherMax+NIS	22 oz+.125%	96	99	99	98	99	181
PREEMERGENCE							
Dual II Magnum	.8 pt	96	81	91	84	98	171
LSD (.05)		3	5	1	2	1	21

Table 14. Postemergence Broadleaf Control in Corn

RCB; 4 reps
Variety: DKC 58-73
Planting Date: 5/5/06
PRE: 5/5/06
EPOST: 6/7/06; Corn V4, 10-12 in; Grft 2-5 in, 2-5 lf; Colq 2–7 in; Cowh 2-7 in; Pesw 5-10 in.
Soil: Silty clay loam; 3.7% OM; 6.8 pH

Precipitation:

PRE:	1st week	0.08 inches
	2nd week	0.10 inches
EPOST:	1st week	0.04 inches
	2nd week	1.62 inches

Grft=Green foxtail
Colq=Common lambsquarter
Cowh=Common waterhemp
Pesw=Pennsylvania smartweed

Comments: Broadleaf weed control programs were evaluated for conventional corn. The reduced rate of Dual II Magnum resulted in 73-87% green foxtail control. All treatments resulted in nearly complete control of the broadleaf weed species. The most economical broadleaf treatment may have been Aim+atrazine, which may cost about $6/A.

Treatment	***Rate/A***	*% Grft 7/11/06*	*% Colq 7/11/06*	*% Cowh 7/11/06*	*% Pesw 7/11/06*	*% Grft 9/29/06*	*% Colq 9/29/06*	*% Cowh 9/29/06*	*% Pesw 9/29/06*
Check	----	0	0	0	0	0	0	0	0
PREEMERGENCE & EARLY POSTEMERGENCE									
Dual II Magnum& Permit+atrazine+ COC+AMS	1 pt& .66 oz+1 pt+ 1%+8.5 lb/100 gal	79	97	98	94	79	98	99	96
Dual II Magnum& Permit+Callisto+ COC+AMS	1 pt& .66 oz+1 oz+ 1%+8.5 lb/100 gal	73	99	98	97	75	99	99	97
Dual II Magnum& Permit+Impact+ COC+AMS	1 pt& .66 oz+.5 oz+ 1%+8.5 lb/100 gal	86	97	97	96	86	98	99	98
Dual II Magnum& Callisto+atrazine+ COC+AMS	1 pt& 3 oz+.66 pt+ 1%+8.5 lb/100 gal	77	99	99	97	79	99	99	99
Dual II Magnum& Hornet WDG+ MSO+28% N	1 pt& 3 oz+ 1%+2.5%	87	99	95	97	85	99	98	99
Dual II Magnum& Aim+atrazine+ COC+28% N	1 pt& .5 oz+2 pt+ 1%+2 qt	78	98	98	97	75	98	99	99
LSD (.05)		12	2	4	4	15	2	1	3

Table 15. Evaluation of Impact for Weed Control in Corn

RCB; 4 reps
Variety: DKC 58-73
Planting Date: 5/9/06
EPOST: 6/1/06; Corn V2, 4 lf; Vele 2-3 lf; Colq 1-4 in; Cowh 1-4 in; Pesw 2-5 in.
POST: 6/7/06; Corn V4, 8-11 in; Vele 2-4 lf; Colq 2-5 in; Cowh 2-5 in; Pesw 4-8 in.
Soil: Clay; 3.8% OM; 7.4 pH

Precipitation:

EPOST:	1st week	1.20 inches
	2nd week	0.22 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Vele=Velvetleaf
Colq=Common lambsquarter
Cowh=Common waterhemp
Pesw=Pennsylvania smartweed

Comments: Herbicide programs in conventional corn with Impact (topramezone) were evaluated for weed control. Impact was applied at 0.5 oz/A, but recommended rates range from 0.5-0.75 oz/A. All treatments applied early post- or post-emergence resulted in nearly complete weed control.

Treatment	***Rate/A***	***% Vele 7/11/06***	***% Colq 7/11/06***	***% Cowh 7/11/06***	***% Pesw 7/11/06***	***% Cowh 9/25/06***	***% Colq 9/25/06***
Check	----	0	0	0	0	0	0
EARLY POSTEMERGENCE							
Impact+Outlook+atrazine+ NIS+28% N	.5 oz+14 oz+1 qt+ .25%+2.5%	99	99	99	98	99	99
Impact+Prowl H_2O+atrazine+ MSO+28% N	.5 oz+48 oz+1 qt+ 1%+2.5%	99	99	99	98	99	99
Lumax+atrazine+NIS	2 qt+1 pt+.25%	99	99	99	99	99	99
POSTEMERGENCE							
Steadfast+atrazine+ MSO+28% N	.75 oz+1 pt+ 1%+2.5%	99	98	97	98	98	98
Impact+Steadfast+atrazine+ MSO+28% N	.5 oz+.75 oz+1 pt+ 1%+2.5%	99	99	99	97	99	99
Callisto+Steadfast+atrazine+ COC+28% N	2 oz+.75 oz+.5 pt+ 1%+2.5%	98	99	99	98	99	99
Impact+Accent+atrazine+ MSO+28% N	.5 oz+.66 oz+1 pt+ 1%+2.5%	99	99	99	98	99	99
LSD (.05)		1	1	1	2	1	1

Table 16. Impact Combinations with Glyphosate

RCB; 4 reps
Variety: DKC 58-73 RR
Planting Date: 5/9/06
PRE: 5/9/06
POST: 6/7/06; Corn V4, 8-11 in; Vele 2-4 lf; Colq 2-5 in; Cowh 2-5 in; Pesw 4-8 in.
Soil: Clay; 3.8% OM; 7.4 pH

Precipitation:

PRE:	1st week	0.18 inches
	2nd week	0.00 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Vele=Velvetleaf
Colq=Common lambsquarter
Cowh=Common waterhemp
Pesw=Pennsylvania smartweed

Comments: Two pass programs with Impact (topramezone) were evaluated for weed control in corn. Impact provides broadleaf weed control, but also has some activity on foxtails, barnyardgrass, and crabgrass. Low rates of Impact were applied. Nearly complete weed control resulted from each treatment.

Treatment	*Rate/A*	*% Vele 7/11/06*	*% Colq 7/11/06*	*% Cowh 7/11/06*	*% Pesw 7/11/06*	*% Cowh 9/25/06*	*% Colq 9/25/06*	*% Vele 9/25/06*	*Yield bu/A*
Check	----	0	0	0	0	0	0	0	126
PREEMERGENCE & POSTEMERGENCE									
Harness&	1.25 pt&								
Roundup WeatherMax+	22 oz+								
AMS	8.5 lb/100 gal	99	99	99	98	99	98	98	146
Harness&Impact+	1.25 pt&.5 oz+								
Roundup WeatherMax+	22 oz+								
AMS	8.5 lb/100 gal	99	98	99	99	98	98	98	155
Harness&Impact+	1.25 pt&.5 oz+								
Roundup WeatherMax+	22 oz+								
atrazine+AMS	1 pt+8.5 lb/100 gal	99	99	99	98	99	97	98	157
LSD (.05)		0	1	0	2	1	1	1	12

Table 17. Weed Control in Corn with Laudis

RCB; 4 reps
Variety: Pioneer 38H69 RR/LL
Planting Date: 5/5/06
PRE: 5/5/06
EPOST: 6/1/06; Corn V3, 4-5 lf; Cowh 1-3 in; Colq 1-4 in.
POST: 6/7/06; Corn V4, 10-12 in; Cowh 2-7 in; Colq 2-7 in.
Soil: Silty clay; 3.9% OM; 7.0 pH

Precipitation:

PRE:	1st week	0.08 inches
	2nd week	0.10 inches
EPOST:	1st week	1.20 inches
	2nd week	0.22 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Cowh=Common waterhemp
Colq=Common lambsquarters

Comments: Laudis (tembotrione) is a new herbicide chemistry for control of broadleaf weeds and some grass weed species in corn. Laudis is an HPPD-inhibiting herbicide with a similar site of action as Callisto (mesotrione) or Impact (topramezone). In this study, Laudis was evaluated for broadleaf weed control in conventional, Roundup Ready, and Liberty Link corn weed control programs. Most treatments resulted in nearly complete broadleaf weed control.

Treatment	Rate/A	% Cowh 6/30/06	% Colq 6/30/06	% Cowh 9/25/06	% Colq 9/25/06
Check	----	0	0	0	0
PREEMERGENCE & POSTEMERGENCE					
Radius&Laudis+COC+28% N	18 oz&3 oz+1%+1.5 qt	100	100	99	99
Radius&Laudis+atrazine+ MSO+28% N	8 oz&3 oz+1 pt+ 1%+1.5 qt	100	100	99	99
Balance Pro&Laudis+atrazine+ MSO+28% N	1.5 oz&3 oz+1 qt+ 1%+1.5 qt	100	100	99	99
Balance Pro+atrazine& Laudis+MSO+28% N	1.5 oz+1 pt& 3 oz+1%+1.5 qt	100	100	99	99
Define&Laudis+atrazine+ COC+28% N	21 oz&3 oz+1 pt+ 1%+1.5 qt	100	100	99	98
POSTEMERGENCE					
Liberty+Laudis+AMS	32 oz+1 oz+17 lb/100 gal	99	93	99	88
Liberty+atrazine+AMS	32 oz+1 pt+17 lb/100 gal	99	97	99	94
Liberty+Laudis+ atrazine+AMS	32 oz+1 oz+ 1 pt+17 lb/100 gal	100	99	99	97
Laudis+ Roundup WeatherMax+AMS	1 oz+ 22 oz+8.5 lb/100 gal	99	95	99	93
Roundup WeatherMax+ atrazine+AMS	22 oz+ 1 pt+8.5 lb/100 gal	99	97	99	97
Roundup WeatherMax+ Laudis+atrazine+AMS	22 oz+ 1 oz+1 pt+8.5 lb/100 gal	100	99	99	98

2006 Weed Control in Corn with AE-747
Southeast Research Farm
Page 2

Treatment	***Rate/A***	***% Cowh 6/30/06***	***% Colq 6/30/06***	***% Cowh 9/25/06***	***% Colq 9/25/06***
EARLY POSTEMERGENCE					
Laudis+Option+MSO+28% N	3 oz+1.5 oz+1%+1.5 qt	100	100	98	97
Laudis+Accent+MSO+28% N	3 oz+.25 oz+1%+1.5 qt	99	99	99	96
Laudis+Stout+MSO+28% N	3 oz+.5 oz+1%+1.5 qt	100	99	99	97
Laudis+atrazine+Resolve+ MSO+28% N	3 oz+1 pt+1 oz+ 1%+1.5 qt	100	99	99	99
PREEMERGENCE & EARLY POSTEMERGENCE					
Dual II Magnum&Laudis+ Atrazine+MSO+28% N	1 pt&3 oz+ 1 pt+1%+1.5 qt	100	100	99	98
LSD (.05)		1	2	1	3

Table 18. Evaluation of Glyphosate Adjuvants in Corn

RCB; 4 reps
Variety: DKC 58-73 RR
Planting Date: 5/5/06
POST: 6/7/06; Corn V4, 10-12 in; Cowh 2-7 in; Colq 2-7 in; Pesw 5-10 in.
Soil: Silty clay; 4.2% OM; 7.3 pH

Precipitation:

POST:	1st week	0.04 inches
	2nd week	1.62 inches

Cowh=Common waterhemp
Colq=Common lambsquarter
Pesw=Pennsylvania smartweed

Comments: Various herbicide adjuvants were evaluated for effects on weed control. Touchdown Total alone provided nearly complete weed control at 24 oz/A, so the benefits of adjuvants were not measurable for the weeds present in this study.

Treatment	***Rate/A***	***% Cowh 6/6/06***	***% Colq 6/6/06***	***% Pesw 6/6/06***	***% Cowh 9/29/06***	***% Colq 9/29/06***	***% Pesw 9/29/06***	***Yield bu/A***
Check	-----	0	0	0	0	0	0	162
POSTEMERGENCE								
Touchdown Total	24 oz	99	99	95	99	96	99	190
Touchdown Total+ Premium AMS	24 oz+ 8.5 lb/100 gal	100	100	99	99	96	99	194
Touchdown Total+ Cornbelt N -Tense	24 oz+ 2 qt/100 gal	100	99	97	99	94	99	195
Touchdown Total+ Establish+ Cornbelt N-Tense	24 oz+ 10 oz+ 2 qt/100 gal	100	100	99	99	97	99	199
Touchdown Total+ Atrazine+ Cornbelt N -Tense	24 oz+ 2 pt+ 2 qt/100 gal	100	99	99	99	99	99	197
LSD (.05)		1	2	2	2	0	1	17

Table 19. Evaluation of Adjuvants in Corn

RCB: 4 reps
Variety: Pro 38H69 RR/LL
Planting Date: 5/5/06
POST: 6/7/06; Corn V4, 10-12 in; Colq 2-7 in;
Cowh 2-7 in. Cowh=Common waterhemp
Soil: Silty clay; 3.9% OM; 7.0 pH

Precipitation:
POST: 1st week 0.04 inches
2nd week 1.62 inches

Colq=Common lambsquarter

Comments: The effect of herbicide adjuvants on weed control was evaluated in Liberty and conventional weed control programs with Steadfast and Callisto. Each adjuvant added to Liberty increased control of lambsquarters. Programs with Steadfast and Callisto resulted in nearly complete weed control.

Treatment	***Rate/A***	***% Cowh 6/30/06***	***% Colq 6/30/06***	***% Cowh 9/25/06***	***% Colq 9/25/06***	***Yield bu/A***
POSTEMERGENCE						
Liberty	20 oz	88	76	99	66	142
Liberty+Premium AMS	20 oz+3 lb	97	88	97	83	141
Liberty+Cornbelt N-Tense	20 oz+.75%	97	91	99	83	150
Liberty+Premium AMS	32 oz+3 lb	99	90	99	85	133
Liberty+Cornbelt N-Tense	32 oz+.75%	98	92	99	86	148
Steadfast+Callisto+ Premium COC+Premium AMS	.5 oz+2 oz+ 1%+8.5 lb/100 gal	96	100	97	98	146
Steadfast+Callisto+ Premium COC+Cornbelt N-Tense	.5 oz+2 oz+ 1%+.5%	96	99	97	99	143
Steadfast+Callisto+ Trophy Gold+Premium AMS	.5 oz+2 oz+ .25%+8.5 lb/100 gal	95	99	95	99	153
Steadfast+Callisto+ Trophy Gold+Cornbelt N-Tense	.5 oz+2 oz+ .25%+.5%	94	99	98	99	156
Steadfast+Callisto+ Base+Cornbelt N-Tense	.5 oz+2 oz+ 1%+.5%	95	100	97	99	150
Check	----	0	0	0	0	98
LSD (.05)		3	7	2	5	14

Table 20. Reduced Rates of Preemergence Herbicides - Study 1

RCB; 4 reps
Variety: Heine 750RR
Planting Date: 5/8/06
PRE: 5/9/06
Soil: Silty clay; 3.4% OM; 6.4 pH

Precipitation:

PRE:	1st week	0.18 inches
	2nd week	0.00 inches

Cowh=Common waterhemp
Grft=Green foxtail

Comments: This study was established to evaluate weed control with reduced rates of pre-emergence herbicides in pre- followed by post-emergence programs where complete weed control with the pre-emergence herbicide may not be necessary. Recommended rates are 1.5-2.5 qt/A for Lumax, 8-20 oz/A for Epic, 1.8-2.3 qt/A for Harness Xtra, and 7-28 oz/A for Radius. Rates often vary for different soil types or weed species. Except for Harness Xtra, green foxtail control declined more rapidly with decreasing rates than common waterhemp. Green foxtail control was greater at low rates of Epic than at low rates of Radius. Both Epic and Radius contain flufenacet (e.g. Define) and isoxaflutole (e.g. Balance), but Radius contains a lower proportion of flufenacet which is an herbicide generally intended for grass control. Green foxtail control did not differ between Epic and Radius at the higher application rates. Common waterhemp control was approximately equivalent to or greater than 80% at rates of 0.5 qt/A of Lumax (about $6/A), 2 oz/A of Epic (about $5/A), 6 oz/A of Radius (about $8/A), or 1 pt/A or Harness Xtra (about $6/A). These results suggest that reduced rates of pre-emergence herbicides may provide adequate weed suppression in pre-followed by post-emergence programs. However, these results may vary among years and locations as weed control is typically less consistent when using herbicide rates less than label recommendations.

Treatment	***Rate/A***	***% Cowh 8/30/06***	***% Grft 8/30/06***
Check	----	0	0
PREEMERGENCE			
Lumax	2.5 qt	97	92
Lumax	1.5 qt	93	89
Lumax	1 qt	90	81
Lumax	.5 qt	87	49
Epic	15 oz	98	99
Epic	10 oz	94	94
Epic	5 oz	92	87
Epic	2 oz	82	68
Radius	18 oz	92	93
Radius	12 oz	92	91
Radius	6 oz	78	65
Radius	3 oz	70	35
Harness Xtra 6L	2 qt	93	95
Harness Xtra 6L	1 qt	89	89
Harness Xtra 6L	1 pt	82	78
Harness Xtra 6L	.5 pt	52	56
LSD (.05)		5	6

Table 21. Reduced Rates of Preemergence Herbicides - Study 2

RCB; 4 reps
Variety: Heine 750RR
Planting Date: 5/8/06
PRE: 5/9/06
Soil: Silty clay; 3.4% OM; 6.4 pH

Precipitation:

PRE:	1st week	0.18 inches
	2nd week	0.00 inches

Cowh=Common waterhemp
Grft=Green foxtail

Comments: This study was established to evaluate weed control with reduced rates of pre-emergence herbicides in pre- followed by post-emergence programs where complete weed control with the pre-emergence herbicide may not be necessary. Recommended rates are 1-2 pt/A for Dual II Magnum, 1.6-2 qt/A for atrazine (4L), 1.25-3 pt/A for Harness, 1.5-4.5 oz/A for Balance, and 15-25 oz/A for Define. Dual and Define primarily provided grass control. Green foxtail control with Dual was less than 70% at rates less than 1 pt/A (about $14/A) and control with Define was less than 80% at rates less than 1 qt/A (1 lb a.i., about $3/A) or at rates of Balance less than 1.25 oz/A (about $9/A). Green foxtail at this Balance rate was also nearly 60%. Control of common waterhemp and green foxtail with Harness was less than 70% at rates lower than 1 pt/A (about $10/A). These results suggest that atrazine was the most economical option for suppressing common waterhemp. If suppression of green foxtail is also desired, herbicides that also result in suppression of common waterhemp (i.e. Harness or Balance) were nearly just as economical as the grass herbicides (Outlook or Dual).

Treatment	***Rate/A***	***% Cowh 8/30/06***	***% Grft 8/30/06***
Check	----	0	0
PREEMERGENCE			
Dual II Magnum	2 pt	52	75
Dual II Magnum	1 pt	50	74
Dual II Magnum	.5 pt	43	39
Dual II Magnum	.25 pt	19	15
Atrazine	2 qt	83	33
Atrazine	1 qt	80	38
Atrazine	1 pt	60	3
Atrazine	.5 pt	20	4
Harness	3 pt	90	95
Harness	2 pt	87	95
Harness	1 pt	74	73
Harness	.5 pt	57	14
Balance Pro	2.25 oz	92	85
Balance Pro	1.75 oz	87	85
Balance Pro	1.25 oz	76	58
Balance Pro	.75 oz	62	23
Define SC	20 oz	43	87
Define SC	10 oz	46	85
Define SC	5 oz	39	55
Define SC	2 oz	6	17
LSD (.05)		10	7

Table 22. Evaluation of RR-Corn Control with Gramoxone Tankmix Partners

RCB; 4 reps
Variety: DKC 58-73
Planting Date: 5/12/06
EPOST: 5/29/06; Corn 1 collar; 3-4 in, 2-2.5 lf
POST: 6/7/06; Corn
Soil: Silty clay; 3.5% OM; 6.7 pH

Precipitation:

EPOST:	1st week	1.20 inches
	2nd week	0.04 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Comments: Treatments were established to evaluate herbicide options to remove Roundup Ready corn if it had been severely damaged in a no-till field. However, the corn was not damaged prior to herbicide application in this study. Photosynthesis inhibiting herbicides, Sencor and Lorox, were added to Gramoxone to determine if these tank mix partners increased corn control. Corn control was greater for the post- than early post-emergence treatments for the Gramoxone treatments, but not the Gramoxone treatments with either Sencor or Lorox as these treatments increased corn control at the early post-emergence timing. Corn control was greater than 90% for all the post-emergence applications except for the low rate (12 oz/A) of Gramoxone applied without a tank-mix partner. The low Gramoxone rate resulted in similar control as the higher rates at the post-emergence timing. Therefore, the addition of Sencor or Lorox improved corn control at the early post-emergence timing, but not at the post-emergence timing.

Treatment	***Rate/A***	***% Corn 6/30/06***	***% Corn 9/6/06***
Check	----	50	51
EARLY POSTEMERGENCE			
Liberty+AMS	32 oz+3 lb	75	72
Gramoxone Max+COC	24 oz+1%	74	70
Gramoxone Max+COC	12 oz+1%	64	64
Gramoxone Max+COC+Sencor DF	12 oz+1%+3 oz	87	88
Gramoxone Max+COC+Sencor DF	24 oz+1%+3 oz	97	96
Gramoxone Max+COC+Lorox DF	12 oz+1%+16 oz	85	81
Gramoxone Max+COC+Lorox DF	24 oz+1%+16 oz	96	95
POSTEMERGENCE			
Liberty+AMS	32 oz+3 lb	99	97
Gramoxone Max+COC	27 oz+1%	100	98
Gramoxone Max+COC	12 oz+1%	89	86
Gramoxone Max+COC+Sencor DF	12 oz+1%+3 oz	95	95
Gramoxone Max+COC+Sencor DF	27 oz+1%+3 oz	100	99
Gramoxone Max+COC+Lorox DF	12 oz+1%+16 oz	96	98
Gramoxone Max+COC+Lorox DF	27 oz+1%+16 oz	100	98
LSD (.05)		13	13

Table 23. Evaluation of RR-Corn Control with Select Max

RCB; 4 reps
Variety: DKC 58-73
Planting Date: 5/12/06
EPOST: 5/29/06; Corn 1-collar, 3-4 in, 2-2.5 lf
POST: 6/7/06; Corn V4, 8-10 in.
Soil: Silty clay; 3.5% OM; 6.7 pH

Precipitation:

EPOST:	1st week	1.20 inches
	2nd week	0.04 inches
POST:	1st week	0.04 inches
	2nd week	1.62 inches

Comments: Treatments were established to evaluate corn control with Select Max applied at different rates and application times. Nearly complete corn control was obtained with 2 oz/A of Select Max at the early post-emergence timing but with 4 oz/A at the post-emergence. Results demonstrated that Select Max may provide excellent corn control but labeled guidelines must be followed for increasing rates as corn plants mature.

Treatment	***Rate/A***	***% Corn 6/30/06***	***% Corn 9/6/06***
EARLY POSTEMERGENCE			
Select Max+COC	2 oz+1 qt	97	97
Select Max+COC	4 oz+1 qt	99	98
Select Max+COC	6 oz+1 qt	99	99
POSTEMERGENCE			
Select Max+COC	2 oz+1 qt	87	84
Select Max+COC	4 oz+1 qt	99	98
Select Max+COC	6 oz+1 qt	100	99
LSD (.05)		5	4

Table 24. Soybean Herbicide Demonstration

Demonstration
Variety: Asgrow 2403
Planting Date: 5/17/06
PRE: 5/17/06
EPOST: 6/15/06; Soybean 2 tri; Grft 1-3 in; Cowh 1-4 in; Colq 1-4 in.
POST: 6/22/06; Soybean 3 tri; Grft 4-7 in; Cowh 3-8 in; Colq 3-7 in.
Soil: Silty clay loam; 3.75 OM; 7.2 pH

Precipitation:

PRE:	1st week	0.50 inches
	2nd week	0.03 inches
EPOST:	1st week	1.70 inches
	2nd week	0.24 inches
POST:	1st week	0.24 inches
	2nd week	0.00 inches

Grft=Green foxtail
Cowh=Common waterhemp
Colq=Common lambsquarter

COMMENTS: <u>Pre-Emergence</u>*:* All treatments resulted in good to very good green foxtail control. Tank mix applications of Outlook + Valor + Python and Intrro + Blanket also resulted in good control of common waterhemp and common lambsquarters. Intrro application resulted in good control of waterhemp, but not lambquarters. Pursuit Plus resulted in good control of lambsquarters but not waterhemp.

<u>Pre- Followed by Post-Emergence</u>*:* Treatments that resulted in more than 90% control of grass and broadleaf weeds included Prowl H_2O + Pursuit + Flexstar, Valor + Poast Plus, and Valor + Python + Select. Valor applied at 3 oz/A resulted in greater control of lambsquarters than the 2 oz/A rate. Results demonstrated that broadleaf weed control with pre-emergence herbicides alone was generally not adequate without a post-emergence herbicide that also provided broadleaf weed control.

<u>Early Post- and Post-Emergence</u>*:* Only Poast Plus followed by Flexstar resulted in greater than 90% control of all three weed species evaluated. The PPO-inhibiting herbicides (Ultra Blazer, Phoenix, or Flexstar) generally resulted in greater control of waterhemp than lambsquarters. The ALS-inhibiting herbicides (FirstRate or Harmony) were generally more effective on lambsquarters than waterhemp.

<u>Post-Emergence</u>*:* All treatments resulted in excellent grass control. Raptor, an ALS-inhibiting herbicide, resulted in poor waterhemp control whereas Flexstar or Flexstar + FirstRate resulted in less than 90% lambsquarters control.

Treatment	***Rate/A***	***% Grft 10/2/06***	***% Cowh 10/2/06***	***% Colq 10/2/06***
Check	----	0	0	0
PREEMERGENCE				
Prowl H_2O	2.75 pt	90	40	50
Boundary	2.5 pt	88	80	70
Pursuit Plus	2.5 pt	98	60	95
Outlook+Valor+Python	16 oz+2 oz+1 oz	98	95	90
Intrro+Blanket	1.5 qt+4 oz	93	92	95
Intrro	2 qt	98	95	40

2006 Soybean Herbicide Demonstration
Southeast Research Farm
Page 2

Treatment	Rate/A	% Grft 10/2/06	% Cowh 10/2/06	% Colq 10/2/06
PREEMERGENCE & POSTEMERGENCE				
Prowl H_2O&Pursuit DG+Flexstar+ MSO+28% N	2.25 pt&.72 oz+10 oz+ 1 qt+1 qt	96	96	92
Boundary&Poast Plus+COC	2.5 pt&1.5 pt+1 qt	99	78	70
Valor&Poast Plus+COC	2 oz&1.5 pt+1 qt	99	93	80
Valor&Poast Plus+COC	3 oz&1.5 pt+1 qt	99	90	94
Python&Select+COC	1.33 oz&7 oz+1 qt	99	83	85
Valor+Python&Select+COC	2 oz+1 oz&7 oz+1 qt	99	93	95
Valor+FirstRate&Select+COC	2 oz+.3 oz&7 oz+1 qt	99	94	88
Blanket&Assure II+COC	3.5 oz&7 oz+1 qt	99	82	97
Intrro&Raptor+MSO+28% N	2 qt&4 oz+1 qt+1 qt	99	75	98
Intrro&FirstRate+MSO+28% N	2 qt&.3 oz+1 qt+1 qt	90	93	88
EARLY POSTEMERGENCE & POSTEMERGENCE				
Poast Plus+COC&Ultra Blazer+NIS	1.5 pt+1 qt&1.5 pt+.25%	99	97	84
Poast Plus+COC&Phoenix+COC	1.5 pt+1 qt&.8 pt+.25%	99	96	82
Poast Plus+COC&Flexstar+ MSO+28% N	1.5 pt+1 qt&16 oz+ 1 qt+1 qt	99	97	93
Poast Plus+COC&FirstRate+ MSO+28% N	1.5 pt+1 qt&.3 oz+ 1 qt+1 qt	99	70	78
Poast Plus+COC& Harmony GT 75WG+NIS	1.5 pt+1 qt& .083 oz+.25%	99	81	96
POSTEMERGENCE				
FirstRate+Flexstar+Select+ MSO+28% N	.3 oz+10 oz+6 oz+ 1 qt+1 qt	99	97	77
Flexstar+Select+MSO+28% N	15 oz+6 oz+1 qt+1 qt	99	93	86
Raptor+MSO+28% N	5 oz+1 qt+1 qt	98	60	97

Table 25. Herbicide Resistant Soybean Demonstration

Demonstration
Variety: Asgrow 2403
Planting Date: 5/17/06
PRE: 5/17/06
EPOST: 6/15/06; Soybean 2 tri; Grft 1-3 in; Cowh 1-4 in; Colq 1-4 in.
POST: 6/22/06; Soybean 3 tri; Grft 3-8 in; Cowh 3-8 in; Colq 3-7 in.
POST2: 6/29/06; Soybean 8-10 in; Grft 6-10 in; Cowh 10-20 in; Colq 5-10 in.
Soil: Silty clay loam; 3.7% OM; 7.2 pH

Precipitation:

PRE:	1st week	0.50 inches
	2nd week	0.03 inches
EPOST:	1st week	1.70 inches
	2nd week	0.24 inches
POST:	1st week	0.24 inches
	2nd week	0.00 inches
POST2:	1st week	0.00 inches
	2nd week	0.00 inches

Grft=Green foxtail
Cowh=Common waterhemp
Colq=Common lambsquarters

Comments: These treatments were established to demonstrate different weed management programs and strategies in Roundup Ready systems. Residual herbicides were evaluated in pre-emergence and early post-emergence applications. Post- and late post-emergence treatments included herbicides that may increase control of weeds that may be less sensitive to Roundup. All treatments resulted in greater than 93% control of grass and broadleaf weed species. Good weed control was obtained with single post-emergence applications of Roundup in part because the relatively dry spring conditions minimized emergence of late weed flushes.

Treatment	*Rate/A*	*% Grft 10/2/06*	*% Cowh 10/2/06*	*% Colq 10/2/06*
Check	----	0	0	0
PREEMERGENCE & POSTEMERGENCE				
Prowl H_2O&Extreme+NIS+AMS	2.25 pt&1.5 qt+.25%+2.5 lb	99	99	99
Python&Roundup WeatherMax+AMS	1 oz&22 oz+2.5 lb	99	99	99
Valor&Roundup WeatherMax+AMS	2 oz&22 oz+2.5 lb	99	99	99
Valor+Python& Roundup WeatherMax+AMS	1.5 oz+1 oz& 22 oz+2.5 lb	99	99	99
Valor+FirstRate& Roundup WeatherMax+AMS	1.5 oz+.3 oz& 22 oz+2.5 lb	99	99	99
Spartan 4F& Roundup WeatherMax+AMS	3 oz& 22 oz+2.5 lb	99	99	99
Axiom&Roundup WeatherMax+AMS	10 oz&22 oz+2.5 lb	99	99	99
Domain&Roundup WeatherMax+AMS	10 oz&22 oz+2.5 lb	99	99	99
Sencor DF& Roundup WeatherMax+AMS	8 oz& 22 oz+2.5 lb	99	99	99
Boundary& Roundup WeatherMax+AMS	1.5 pt& 22 oz+2.5 lb	99	99	99

2006 Herbicide Resistant Soybean Demonstration
Southeast Research Farm
Page 2

Treatment	Rate/A	% Grft 10/2/06	% Cowh 10/2/06	% Colq 10/2/06
EARLY POSTEMERGENCE				
Roundup WeatherMax+AMS	22 oz+2.5 lb	95	95	95
Extreme+NIS+AMS	1.5 qt+.25%+2.5 lb	99	93	99
Roundup WeatherMax+	22 oz+			
Dual II Magnum+AMS	1.5 pt+2.5 lb	99	96	99
Roundup WeatherMax+Intrro+AMS	22 oz+1.5 qt+2.5 lb	99	97	99
Roundup WeatherMax+FirstRate+AMS	22 oz+.3 oz+2.5 lb	99	99	99
POSTEMERGENCE				
Roundup WeatherMax+AMS	22 oz+2.5 lb	99	99	99
Roundup WeatherMax+	11 oz+			
Harmony GT 75WG+AMS	.083 oz+2.5 lb	99	99	99
Roundup WeatherMax+Aim+AMS	11 oz+.25 oz+2.5 lb	99	97	99
Roundup WeatherMax+	11 oz+			
Resource+AMS	4 oz+2.5 lb	99	98	99
Roundup WeatherMax+Flexstar+AMS	11 oz+8 oz+2.5 lb	99	98	99
POSTEMERGENCE 2				
Roundup WeatherMax+AMS	22 oz+2.5 lb	99	99	99
Roundup WeatherMax+AMS	44 oz+2.5 lb	99	99	99
Roundup WeatherMax+	22 oz+			
Harmony GT 75WG+AMS	.083 oz+2.5 lb	99	99	99
Roundup WeatherMax+Aim+AMS	22 oz+.25 oz+2.5 lb	99	99	99
Roundup WeatherMax+	22 oz+			
Resource+AMS	4 oz+2.5 lb	99	99	97
Roundup WeatherMax+	22 oz+			
Flexstar+AMS	8 oz+2.5 lb	99	99	99
Roundup WeatherMax+	22 oz+			
FirstRate+AMS	.3 oz+2.5 lb	99	99	99

Table 26. No-Till Soybean Demonstration

Demonstration	Precipitation:			
Variety: PB 2141	PRE:	1st week	0.50 inches	
Planting Date: 5/18/06		2nd week	0.03 inches	
PRE: 5/17/06	EPOST:	1st week	1.70 inches	
EPOST: 6/15/06; Soybean 2 tri; Cowh 1-3 in; Grft 1-3 in.		2nd week	0.24 inches	
POST: 6/22/06; Soybean 3 tri; Cowh 3-8 in; Grft 3-7 in.	POST:	1st week	0.24 inches	
POST2: 6/29/06; Soybean 8-10 in; Cowh 6-10 in;		2nd week	0.00 inches	
Grft 6-10 in.	POST2:	1st week	0.00 inches	
Soil: Silty clay loam; 3.2% OM; 6.6 pH		2nd week	0.00 inches	

Cowh=Common waterhemp
Grft=Green foxtail

Comments: Plots were established to demonstrate no-till soybean herbicide programs that include soil residual herbicides with pre- or early-post emergence applications and tank-mix herbicides to improve control of weeds that are less susceptible to Roundup (glyphosate). Roundup alone provided nearly complete weed control, which marginalized the benefits of preemergence herbicide application or herbicide tank mix partners. Under many circumstances, one application of Roundup may not be sufficient for complete weed control as later weed flushes may not be controlled, late herbicide applications may result in incomplete weed control as larger weeds may be less susceptible to glyphosate, or late applications (after the fourth soybean trifoliate) may result in yield loss due to early-season competition. However, the relatively dry spring conditions delayed weed emergence and did not induce late weed flushes, which likely contributed to the excellent weed control obtained with just one application of Roundup.

Treatment	***Rate/A***	***% Cowh 8/30/06***	***% Grft 8/30/06***
Check	----	0	0
PREEMERGENCE & POSTEMERGENCE			
Prowl H_2O&Extreme+NIS+AMS	2.25 pt&1.5 qt+.25%+2.5 lb	99	99
Python&Roundup WeatherMax+AMS	1 oz&22 oz+2.5 lb	99	99
Valor&Roundup WeatherMax+AMS	1.5 oz&22 oz+2.5 lb	99	99
Valor+Python&Roundup WeatherMax+AMS	1.5 oz+1 oz&22 oz+2.5 lb	99	99
Valor+FirstRate&Roundup WeatherMax+AMS	1.5 oz+.3 oz&22 oz+2.5 lb	99	99
Intrro&Roundup WeatherMax+AMS	1.5 qt&22 oz+2.5 lb	99	99
Spartan 4F&Roundup WeatherMax+AMS	3 oz&22 oz+2.5 lb	99	99
Axiom&Roundup WeatherMax+AMS	10 oz&22 oz+2.5 lb	99	99
Domain&Roundup WeatherMax+AMS	10 oz&22 oz+2.5 lb	99	99
Sencor DF&Roundup WeatherMax+AMS	8 oz&22 oz+2.5 lb	99	99
Boundary&Roundup WeatherMax+AMS	1.5 pt&22 oz+2.5 lb	99	99
EARLY POSTEMERGENCE			
Roundup WeatherMax+AMS	22 oz+2.5 lb	99	99
Extreme+NIS+AMS	1.5 qt+.25%+2.5 lb	99	99
Roundup WeatherMax+Dual II Magnum+AMS	22 oz+1.5 pt+2.5 lb	99	99
Roundup WeatherMax+Intrro+AMS	22 oz+1.5 qt+2.5 lb	99	99
Roundup WeatherMax+FirstRate+AMS	22 oz+.3 oz+2.5 lb	99	99

2006 No-Till Soybean Demonstration
Southeast Research Farm
Page 2

Treatment	***Rate/A***	***% Cowh 8/30/06***	***% Grft 8/30/06***
POSTEMERGENCE			
Roundup WeatherMax+AMS	22 oz+2.5 lb	99	99
Roundup WeatherMax+	22 oz+		
Harmony GT 75WG+AMS	.083 oz+2.5 lb	99	99
Roundup WeatherMax+Aim+AMS	22 oz+.25 oz+2.5 lb	99	99
Roundup WeatherMax+Resource+AMS	22 oz+4 oz+2.5 lb	99	99
Roundup WeatherMax+Flexstar+AMS	22 oz+8 oz+2.5 lb	99	99
POSTEMERGENCE 2			
Roundup WeatherMax+AMS	22 oz+2.5 lb	99	99
Roundup WeatherMax+AMS	44 oz+2.5 lb	99	99
Roundup WeatherMax+	22 oz+		
Harmony GT 75WG+AMS	.083 oz+2.5 lb	99	99
Roundup WeatherMax+Aim+AMS	22 oz+.25 oz+2.5 lb	99	99
Roundup WeatherMax+Resource+AMS	22 oz+4 oz+2.5 lb	99	99
Roundup WeatherMax+Flexstar+AMS	22 oz+8 oz+2.5 lb	99	99
Roundup WeatherMax+FirstRate+AMS	22 oz+.3 oz+2.5 lb	99	99

Table 27. Evaluation of Oil Adjuvants for Volunteer Corn Control

RCB; 3 reps
Variety: Asgrow 2403
Planting Date: 5/23/06
POST: 6/22/06; Soybean 2.5 tri, 8"; Voco 16-20 in
Soil: Clay; 3.1% OM; 7.1 pH

Precipitation:
POST: 1st week 0.24 inches
2nd week 0.00 inches

Voco=Volunteer corn

Comments: Study established to evaluate volunteer RR corn control in soybean associated with different adjuvants used with the grass herbicide, Select. The addition of adjuvants improved volunteer corn control. Volunteer corn control was slightly less with N Pak AMS or Class Act relative to many of the other treatments.

Treatment	***Rate/A***	***% Voco 7/7/06***	***% Voco 9/6/06***
Check	----	0	0
POSTEMERGENCE			
Roundup WeatherMax+Select	11 oz+2 oz	72	69
Roundup WeatherMax+Select+N Pak AMS Liquid	11 oz+2 oz+2.5%	88	85
Roundup WeatherMax+Select+Class Act NG	11 oz+2 oz+2.5%	91	94
Roundup WeatherMax+Select+ Preference+N Pak AMS Liquid	11 oz+2 oz+ .25%+2.5%	94	97
Roundup WeatherMax+Select+ Superb HC+N Pak AMS Liquid	11 oz+2 oz+ .5%+2.5%	95	98
Roundup WeatherMax+Select+ Superb HC+Alliance	11 oz+2 oz+ .5%+1.25%	96	99
LSD (.05)		2	2

Table 28. Annual Weed Control in RR Soybeans

RCB; 4 reps
Variety: Asgrow 2403
Planting Date: 5/17/06
PRE: 5/17/06
POST: 6/22/06; Soybean 3 tri; Grft 4-7 in; Cowh 3-8 in; Colq 3-7 in.
POST2: 6/29/06; Soybean 8-10 in; Grft 6-10 in; Cowh 8-20 in; Colq 5-10 in.
Soil: Silty clay loam; 3.7% OM; 7.2 pH

Precipitation:

PRE:	1st week	0.50 inches
	2nd week	0.03 inches
POST:	1st week	0.24 inches
	2nd week	0.00 inches
POST2:	1st week	0.00 inches
	2nd week	0.00 inches

Grft=Green foxtail
Cowh=Common waterhemp
Colq=Common lambsquarter

Comments: Treatments were established to evaluate weed control with pre-emergence herbicides followed by Glyphomax (glyphosate) or split applications of Glyphomax. All treatmetns resulted in nearly complete weed control.

Treatment	***Rate/A***	***% Grft 10/2/06***	***% Cowh 10/2/06***	***% Colq 10/2/06***
PREEMERGENCE & POSTEMERGENCE				
Python&Glyphomax-XRT+AMS	.5 oz&24 oz+2.5 lb	99	99	99
Python&Glyphomax-XRT+AMS	.8 oz&24 oz+2.5 lb	99	99	99
FirstRate&Glyphomax-XRT+AMS	.3 oz&24 oz+2.5 lb	99	99	99
POSTEMERGENCE & POSTEMERGENCE 2				
GF-1280+AMS&GF-1280+AMS	24 oz+2.5 lb&24 oz+2.5 lb	99	99	99
LSD (.05)		0	0	0

Table 29. Weed Control in Soybean with Glyphosate Plus 2,4-DB

RCB; 4 reps
Variety: Asgrow 2403
Planting Date: 5/12/06
EPOST: 6/22/06; Soybean 3 tri; Cowh 3-8 in.
POST: 6/29/06; Soybean 8-10 in; Cowh 10-20 in.
Soil: Silty clay loam; 3.7% OM; 7.2 pH

Precipitation:

EPOST:	1st week	0.24 inches
	2nd week	0.00 inches
POST:	1st week	0.00 inches
	2nd week	0.00 inches

Cowh=Common waterhemp

Comments: This study was established to evaluate the weed control associated with tank mixes of 2,4-DB with Roundup. Nearly complete weed control resulted from an application of Roundup alone at the early post- or post-emergence timing. Greater weed control resulted from the 0.72 oz/A rate than the 0.48 oz/A rate of 2,4-DB. Since nearly complete weed control resulted from Roundup alone, increased weed control with tank mixes of 2,4-DB and Roundup were not observed.

Treatment	***Rate/A***	***% Cowh 10/2/06***
Check	----	0
EARLY POSTEMERGENCE		
Roundup WeatherMax+AMS	22 oz+17 lb/100 gal	98
2,4-DB	.48 oz	39
Roundup WeatherMax+ 2,4-DB+AMS	22 oz+ .48 oz+17 lb/100 gal	99
2,4-DB	.72 oz	53
Roundup WeatherMax+ 2,4-DB+AMS	22 oz+ .72 oz+17 lb/100 gal	99
POSTEMERGENCE		
Roundup WeatherMax+AMS	22 oz+17 lb/100 gal	98
2,4-DB	.48 oz	35
Roundup WeatherMax+ 2,4-DB+AMS	22 oz+ .48 oz+17 lb/100 gal	98
2,4-DB	.72 oz	49
Roundup WeatherMax+ 2,4-DB+AMS	22 oz+ .72 oz+17 lb/100 gal	97
LSD (.05)		9

Table 30. Water Quality and AMS Replacements

RCB; 4 reps
Variety: Asgrow 2403
Planting Date: 5/17/06
POST: 6/22/06; Soybean 3 tri, 8-10 in;
Cowh 3-7 in; Colq 3-7 in.
Soil: Clay loam; 2.7% OM; 6.6 pH

Precipitation:
POST: 1st week 0.24 inches
2nd week 0.00 inches

Cowh=Common waterhemp
Colq=Common lambsquarter

Comments: Study established to evaluate weed control associated with different Roundup adjuvants. Roundup WeatherMax rates were reduced by half to better observe the effects of herbicide adjuvants. The treatment differences were greatest on the July evaluation, but treatment differences were minimal. Weed control was greater with Class Act and Interlock than N Pak AMS or Powerhouse.

Treatment	***Rate/A***	***% Cowh 7/11/06***	***% Cowh 9/29/06***	***% Colq 9/29/06***
Check	----	0	0	0
POSTEMERGENCE				
Roundup WeatherMax	11 oz	88	99	97
Roundup WeatherMax+N Pak AMS Liquid	11 oz+.5%	91	99	97
Roundup WeatherMax+Class Act NG	11 oz+1.25%	98	99	98
Roundup WeatherMax+Class Act NG	11 oz+.75%	99	99	99
Roundup WeatherMax+Alliance+Interlock	11 oz+1.25%+4 oz	98	99	96
Roundup WeatherMax+ Class Act NG+Interlock	11 oz+ 2.5%+4 oz	99	99	99
Roundup WeatherMax+Powerhouse	11 oz+1.25%	90	99	96
LSD (.05)		4	1	3

Table 31. Reduced Pre-Emergence Herbicide Rates in Soybean - Study 1

RCB; 4 reps
Variety: Asgrow 2403
Planting Date: 5/17/06
PRE: 5/17/06
Soil: Silty clay; 3.4% OM; 6.4 pH

Precipitation:
PRE: 1st week 0.50 inches
2nd week 0.03 inches

Cowh=Common waterhemp
Grft=Green foxtail
Colq=Common lambsquarters

Comments: This study was established to evaluate the potential for reducing pre-emergence herbicide rates in pre- followed by post-emergence programs. The labeled rate range is 2-3 qt/A for Intrro, 1.5-3 oz/A for Valor, 10-21 oz/A for Outlook, 5-10 oz/A for Sencor DF, and 1-2 pt/A for Dual II Magnum. Recommended rates may vary for soil types or specific weed infestations.

For grass control, herbicides such as Intrro, Outlook, or Dual may be considered. Applications of Intrro and Dual also resulted in approximately 80% control of common waterhemp at the high rates, but the cost of Intrro is approximately 1/3 that of Dual at these high rates. At the rates applied, green foxtail control was not less than 50% with Intrro, but was less than 50% for Outlook at rates less than 10 oz/A or Dual at rates less than 1 pt/A. These results suggest that Intrro may provide the best opportunity to reduce weed control costs by reducing rates for grass suppression.

For broadleaf weed control, Valor or Sencor may be considered. If only suppression is desired, Valor applied at 1 oz/A may be adequate as broadleaf weed control was approximately 60%. Sencor applied at 4 oz/A resulted in 73% control of common waterhemp and 30% control of common lambquarters. Therefore, Sencor at 4 oz/A may provide less control of common lambsquarters than Valor at 1 oz/A. Each of these applications may cost around $5/A.

Treatment	***Rate/A***	***% Cowh 8/30/06***	***% Grft 8/30/06***	***% Colq 8/30/06***
Check	----	0	0	0
PREEMERGENCE				
Intrro	2 qt	80	90	41
Intrro	1.5 qt	57	89	29
Intrro	1 qt	18	75	31
Intrro	1 pt	10	64	5
Valor	3 oz	88	0	68
Valor	2 oz	83	0	63
Valor	1 oz	57	0	60
Valor	.5 oz	11	0	24
Outlook	20 oz	35	98	17
Outlook	15 oz	39	95	21
Outlook	10 oz	9	83	7
Outlook	5 oz	9	17	6
Sencor DF	16 oz	90	0	79
Sencor DF	12 oz	89	0	75
Sencor DF	8 oz	74	0	44
Sencor DF	4 oz	73	0	30
Dual II Magnum	2 pt	79	88	49
Dual II Magnum	1.5 pt	60	80	19
Dual II Magnum	1 pt	9	60	13
Dual II Magnum	.5 pt	3	28	3
LSD (.05)		12	8	27

Table 32. Reduced Pre-Emergence Herbicide Rates in Soybean - Study 2

RCB; 4 reps
Variety: Asgrow 2403
Planting Date: 5/17/06
PRE: 5/17/06
Soil: Silty clay; 3.4% OM; 6.4 pH

Precipitation:

PRE:	1st week	0.50 inches
	2nd week	0.03 inches

Cowh=Common waterhemp
Grft=Green foxtail

Comments: This study was established to evaluate weed control with reduced rates of Boundary (metolachlor + metribuzin) and Axiom (flufenacet + metribuzin) applied pre-emergence. It is often beneficial to apply pre-emergence herbicides in Roundup Ready programs to minimize early-season weed competition, but reduced rates of pre-emergence herbicides may be adequate if Roundup will be applied post-emergence. The labeled rate of Boundary is 1 - 2.5 pt/A and Axiom is 7 - 13 oz/A, with rates varying for different soil types. Applications of Boundary at 0.5 pt/A or Axiom at 4 oz/A resulted in more than 80% control of common waterhemp and green foxtail in soybean. The approximate cost of these low rates may be approximately $5/A for Boundary or Axiom. However, it should be noted that weed control is typically less consistent when the applied herbicide rate is less than that recommended on the herbicide label.

Treatment	***Rate/A***	***% Cowh 8/30/06***	***% Grft 8/30/06***
Check	----	0	0
PREEMERGENCE			
Boundary	2.5 pt	96	95
Boundary	1.5 pt	96	95
Boundary	1 pt	90	88
Boundary	.5 pt	87	83
Axiom	13 oz	96	86
Axiom	10 oz	89	86
Axiom	7 oz	86	84
Axiom	4 oz	84	81
LSD (.05)		3	3

Table 33. Camelina Postemergence Herbicide Tolerance

RCB; 4 reps
Variety: Penza
Planting Date: 3/10/06
POST: 5/17/06; Camelina 8 in; Howe 8-12 in.
Soil: Silty clay; 3.7% OM; 5.8 pH

Precipitation:

POST:	1st week	0.50 inches
	2nd week	0.03 inches

VCRR=Visual Crop Response Rating
(0=no injury; 100=complete kill)

Howe=Horseweed

Comments: Post-emergence herbicides were evaluated for weed control in camelina. Horseweed was the dominant weed species present. Few grasses were competitive with the camelina. Stinger application resulted in the greatest horseweed control with minimal camelina injury observed. The Clarity application at 8 oz/A also resulted in very good horseweed control, but also caused significant injury to the camelina. Lower Clarity rates (4 oz/A) caused less crop injury, but also resulted in less weed control.

Treatment	***Rate/A***	***% Howe 7/8/06***	***% VCRR 7/8/06***
POSTEMERGENCE			
Stinger	.33 pt	94	0
MCPA amine	8 oz	3	14
Clarity	8 oz	94	57
Clarity	4 oz	74	8
Select+COC	6 oz+1%	0	4
LSD (.05)		8	5

SE FARM REPORT
SDSU

THE EFFECT OF VOMITOXIN-CONTAMINATED STRAW ON GROWER PIG PERFORMANCE IN A DEEP BEDDED SYSTEM – A DEMONSTRATION

Robert C. Thaler[1] and Bradley D. Rops[2]

Animal Science 0623

INTRODUCTION

Deep bedded housing systems provide an alternative to confinement housing for pigs, and are popular in "natural/organic" systems, as well as in less intensively managed production systems. A typical hoop-barn will finish 180 head of market hogs and requires approximately 26 tons of straw. During recent years, weather conditions have resulted in vomitoxin (DON) problems in small grains in SD. While it has been established that feeding diets containing over 1 PPM DON will reduce growth performance in pigs, there has been no work to determine if DON contaminated straw has any effect on pig performance.

MATERIAL AND METHODS

The hoop barn located at the Southeast Research Farm (30 x 85 ft) was split in half lengthwise with cattle panels, and was bedded with clean straw (0 ppm DON) on one side and vomitoxin contaminated straw (98 ppm DON) on the other side. Two trials, one in the winter and one in the summer, were conducted. Trial two was terminated early due to an outbreak of circovirus. One hundred eighty (180) barrows of Babcock genetics weighing approximately 57 lbs were divided into two groups based on body weight, and 90 pigs were placed on each side of the hoop barn in each trial. Each side had its own waterer and self feeder. Pigs on both treatments received the same corn-SBM based diet (Table 1). A 2-phase grower feeding program was utilized containing the following total lysine levels: 1.00% from 57 to 90 lbs BW, and 85% from 91 to 120 lbs BW. Pigs were weighed at the initiation and termination of the trial. Phase changes were made at the desired weight breaks utilizing a standard feed budget. Since there was only one observation / treatment / season, the data could not be statistically analyzed and the values presented are simply raw means, and care should be taken when interpreting the data.

RESULTS AND DISCUSSION

The growth performance from each trial is shown in Table 2. As can be seen from the table, performance of the summer trial is significantly lower than that of the winter trial, again due to the outbreak of circovirus. Therefore, this section will focus on the results of the winter trial. In the winter trial, pigs housed on DON-

[1] Head, Dept. of Animal & Range Sciences, SDSU
[2] Livestock Manager, Southeast Research Farm

contaminated straw grew 11% slower and consumed less feed than pigs housed on clean straw. Also, pigs on DON straw were less efficient than pigs housed in clean straw. Deathloss was similar between the two treatments in the winter trial (3.3-3.4%) but was 45% higher for the DON treatment in the summer trial.

Since the pigs were not consuming DON-contaminated feed, the question becomes “By what mode of action does DON-contaminated straw inhibit pig performance?”. Since DON is produced by a mold, one possibility is that the mycotoxin could have become airborne and was inhaled by the pig, thereby causing the reduction in performance. An interesting observation is that DON did not affect deathloss in healthy pigs, but in diseased-challenged pigs, DON exposure resulted in a 45% higher deathloss. Since some mycotoxins inhibit the immune system that may be one explanation why pigs housed on DON straw were less able to resist a disease challenge.

IMPLICATIONS

This demonstration is the first trial to show that DON-contaminated straw may adversely affect growth performance in normal pigs, and may leave pigs immuno-compromised. Therefore, care needs to be taken to when purchasing straw for deep-bedded systems for swine.

1. Dietary Composition (%)

	Phase 1	Phase 2
Ingredient		
Corn	72.28	78.70
SBM, 46.5%	24.00	17.75
Dical Phosphate	1.47	1.40
Limestone	.79	.69
Salt	.34	.31
L-lysine HCl	.12	.15
Vit-Min Premix	1.00	1.00
Calc Analysis		
Lysine, %	1.00	.85
Ca, %	.70	.63
P, %	.61	.57

Table 2. Growth performance and carcass characteristics

Item	Winter Clean	Winter DON	Summer Clean	Summer DON
Initial weight, lbs	59.4	58.9	53.9	54.8
Final weight, lbs	127.3	120.0	93.1	96.0
Avg daily gain, lbs	1.69	1.51	1.00	1.01
Avg daily feed intake, lbs	4.51	4.42	2.84	2.84
Feed/Gain	2.67	2.92	2.84	2.81
Deathloss, %	3.3	3.4	5.6	8.1
Avg of 2 trials	Clean	DON		
Initial weight, lbs	56.7	56.9		
Final weight, lbs	110.2	108		
Avg daily gain, lbs	1.35	1.26		
Avg daily feed intake, lbs	3.68	3.63		
Feed/Gain	2.76	2.87		
Deathloss, %	4.45	5.75		

SE FARM REPORT
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SWINE RESEARCH SUMMARIES

Robert C. Thaler and Bradley D. Rops

Animal Sciences 0624

1. Effect of Reduced Nocturnal Temperature (RNT) During the Nursery Phase on Nursery and Overall Growth Performance.

As energy costs have dramatically risen the past year, pork producers are looking for ways to reduce utility costs. Since the highest temperatures are maintained in the nursery, it makes sense that this would be the first place to lower temperature. Work done in the 1980's has shown that nocturnal temperature can be reduced without hurting pig performance. However, this was done with pigs weaned at 28 days of age. Today pigs are weaned at 17 days of age or less, and they are a totally different animal physiologically than one weaned at 28 days of age. Therefore, research needs to be conducted to determine if nocturnal temperatures for early-weaned pigs can be reduced without affecting growth performance or disease susceptibility. The two treatments will be either normal nursery temperatures (CON) or Reduced Nocturnal Temperature (RNT) beginning on day 7 post weaning, with target temperature lowered 10 degrees F from 1900 to 0700 from CON.

Preliminary results indicate that there is no difference on nursery or overall performance when nursery temperatures are reduced during the night. This can result in significant energy savings for pork producers.

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2. Efficacy of Paylean in Alleviating Heat Stress in Finishing Pigs

Summer heat stress results in reduced feed intake, and subsequently, reduced growth performance in market hogs. Since most producers have very few extra days worked into the pigflow, producers have to empty barns at lighter weights in the summer to get ready for the next group. This results in lost profitability. There appears to be an added benefit of feeding the beta agonist Paylean in the summer as compared to more thermal-neutral times like spring and fall. However, this involves different pigs at different seasons, so there are several confounding factors. In order to remove those factors, trials are being run at the Confinement Barn with one room (10 pens) at normal temperatures and the other room (10 pens) at a higher temperature. At 6 weeks prior to harvest, half of the pigs in each group were fed diets containing Paylean.

Preliminary results indicate that Paylean does support normal growth during times of heat stress. This now allows producers to strategically use Paylean during summer heat stress to maintain performance and profitability.