2009
SOUTHERN MINNESOTA REGIONAL RESEARCH & DEMONSTRATION SUMMARY

FINAL – MAY 2010

The University of Minnesota Extension, University of Minnesota Southern Research and Outreach Center (Waseca), University of Minnesota Southwest Research and Outreach Center (Lamberton), Minnesota Soybean Research & Promotion Council, and University Center Rochester, as well as many local cooperators and agribusinesses, collaborated to conduct field trials throughout southern Minnesota.

The majority of these projects are funded through grant dollars, entry fees, and support from our cooperators.

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FIELD TRIALS – 2009

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Amanda Welter, Ag Intern
Jason Welter, Ag Intern

- **Southern Research & Outreach Center**
- **Southwest Research & Outreach Center**
- **University Center Rochester**

WASECA (SROC – Waseca Co.)

Corn Hybrid
Waxy Corn
92-95 RM Corn
96-100 RM Corn
101 – 107 RM Corn
Hybrid Family
Conventional Corn

Soybean Variety
Soybean Cyst Nematode
Low-Linolenic
Roundup Ready® Soybean (1.2-1.8)
Roundup Ready® Soybean (1.9-2.5)
Liberty Link vs. Roundup Ready
Short Season RR Date of Planting (June 25-July 15)
Food Grade & Special Use

LAMBERTON (SWROC – Redwood Co.)

Low-Linolenic Soybean Variety
Liberty Link Compared to Roundup Ready Soybeans
Evaluation of BMP Rates of Atrazine and Replacements for Atrazine
Weed Control Strategies in a Hypothetical Glyphosate Resistant Weed Situation

ROCK DELL (Olmsted Co.)

Corn Hybrid
92-95 RM Corn Hybrid
96-100 RM Corn Hybrid
101 – 107 RM Corn Hybrid
Hybrid Family
Conventional Corn
Corn Silage

Soybean Variety
Soybean Cyst Nematode
Low-Linolenic
Liberty Link vs. Roundup Ready
Short Season RR Variety (0.8-1.5)
Short Season RR Date of Planting (June 25 -July 15)

Soybean Aphid Insecticide Trial

RICE COUNTY

Tillage

HOPE (Steele Co.)

Waxy Corn
Food Grade & Special Use

GAYLORD (Sibley Co.)

Low-Linolenic Soybeans

THEILMAN (Wabasha Co.)

Corn Nematode

ROCHESTER (Olmsted Co.)

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Corn
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Corn Weed Management – Economics and Effectiveness
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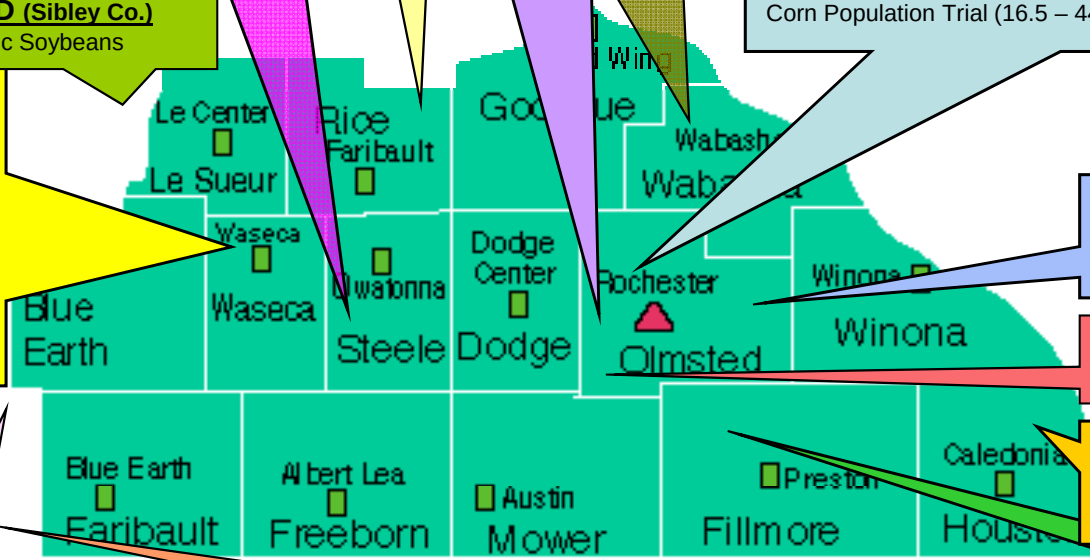

CHESTER (Olmsted Co.)

Manganese Fertilizer in Soybeans
Nitrogen Sidedress in Corn

HIGH FOREST (Olmsted Co.)

Soybean Cyst Nematode

LeCRESCENT (Houston Co.)

Corn Silage
Corn Fungicide

SPRING VALLEY (Fillmore Co.)

Roundup Ready® Soybean (1.2-1.8)
Roundup Ready® Soybean (1.9-2.5)

WESTBROOK (Cottonwood Co.)

Low Linolenic Soybeans

2009 Southeast Minnesota Regional Research and Demonstration Summary

I want to thank our many partners in making this research report possible. University of Minnesota Extension and the research team including Faculty from Extension, the Southern Research and Outreach Center and the Campus, have worked to ensure these field research trials are directly applied and adapted to the local region and address the complex needs of Southern Minnesota production agriculture. The regional producers, industry sponsors and state and county partners who have provided land, financial contributions and expertise to make these research trials possible are very much appreciated.

Crop Management Tours, such as those conducted in Rochester and Waseca, provide hands-on events that bring meaning and an applied perspective to the crop trials. These tours give producers and industry professionals the opportunity to ask questions and have one-on-one time with University of Minnesota researchers and Extension Educators.

The many student interns involved in this important research are our workforce of the future! Their summer academic experience provides opportunities to accelerate their own professional careers and give them hands-on experiences working with Minnesota agriculture. We are actively promoting future projects and collaboration that will provide additional experiences with University of Minnesota Extension for students and future leaders of Minnesota.

Extension is committed to providing Minnesotans working in production agriculture with faster and more comprehensive access to the research and resources of the University through specialized educators at our Regional Offices.

This report is exemplary of the University's commitment of providing timely and relevant research results. Again, congratulations to all partners involved!

Together, you and Extension continue to make a difference in Minnesota.

Respectfully,

Dr. LuAnn Hiniker
Campus Regional Director

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Check These Web Sites:

http://www.extension.umn.edu
http://appliedweeds.cfans.umn.edu
http://sroc.cfans.umn.edu/index.html
http://www.soybeans.umn.edu/home.htm
http://www.extension.umn.edu/forages
http://www.mnipm.umn.edu/BugWeb/
http://www.roch.edu

For More Information, Call or E-Mail:

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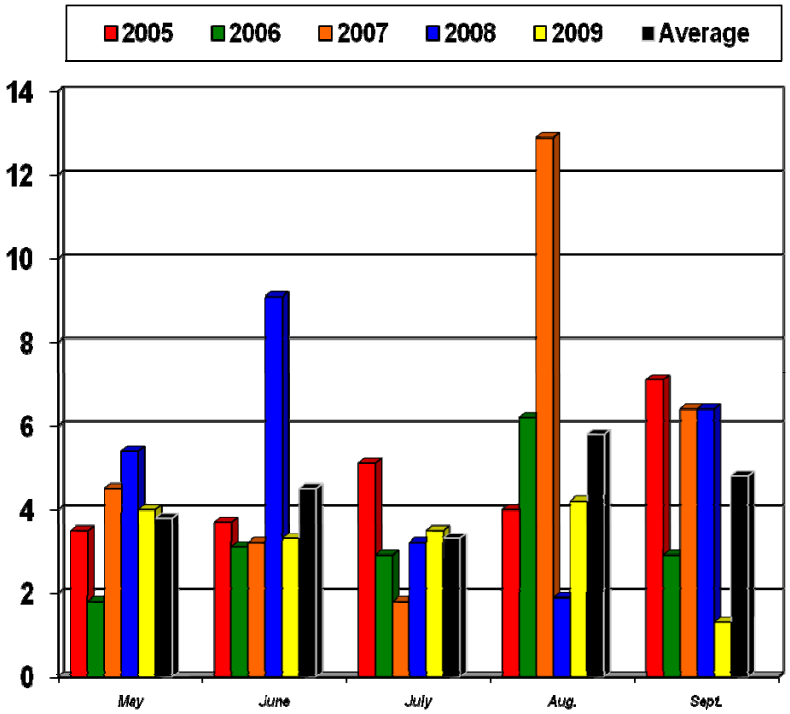
Contact Fritz, Lisa, Ryan, or Mary Jane if interested in receiving the "Crops Connection" Newsletter sent via e-mail

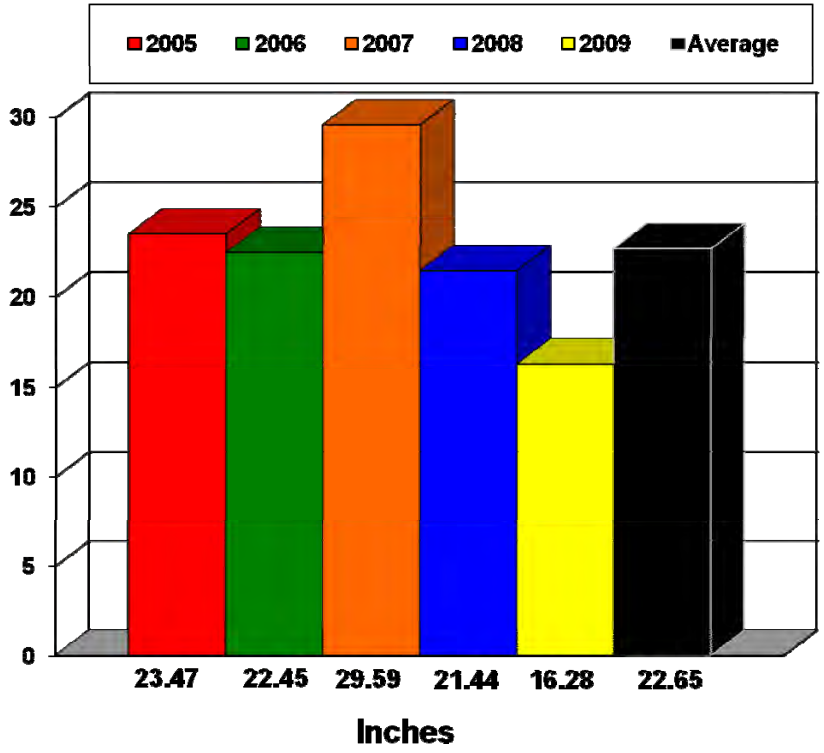
Monthly Rainfall Totals

(inches)
Comparison by Month
2005 - 2009



Monthly Rainfall

(inches)
Season Totals
2005 - 2009



Rainfall totals are obtained from National Weather Service measurements at the Rochester International Airport.

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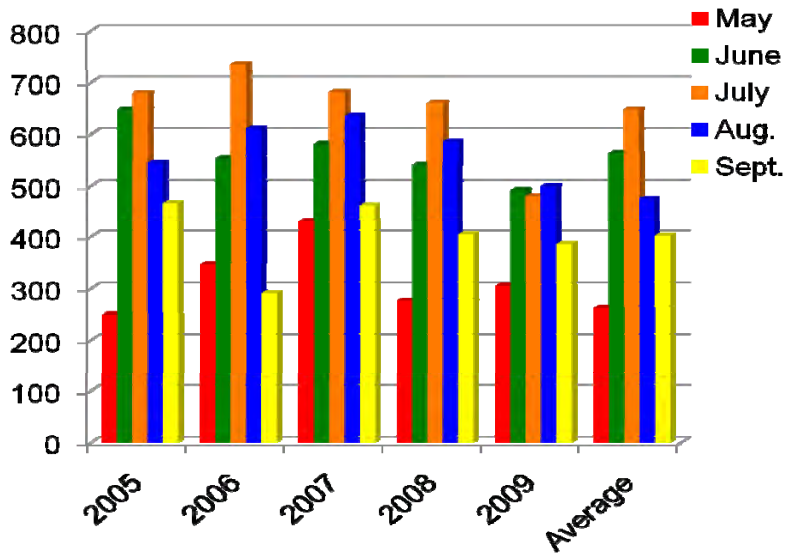
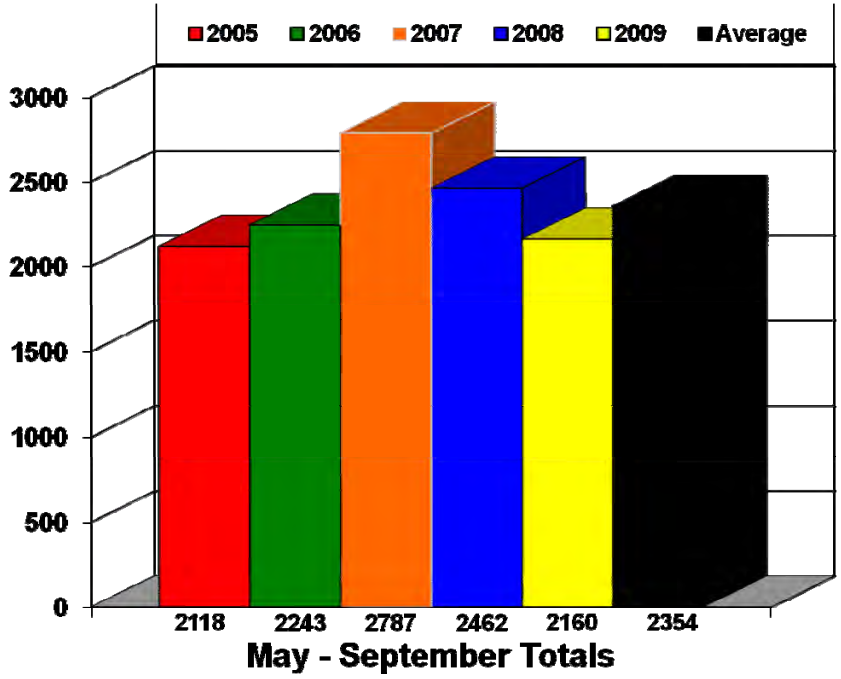
Growing Degree Days

Comparison by Month
2005 - 2009



Growing Degree Days

Season Totals
2005 - 2009



A corn growing degree day (GDD) is an index used to express and track crop development through maturity. The index is calculated by subtracting a base temperature of 50°F from the average of the maximum and minimum temperatures for the day.

If the maximum temperature is greater than 86°F, then 86 is used in the equation. If the minimum temperature is less than 50°F, then 50 is used in the equation. These substitutions indicate that no appreciable growth takes place with temperatures greater than 86°F or lower than 50°F.

GDD = ((Maximum temp + Minimum temp) / 2) - 50

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Extension and Research Team Members

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Minnesota Crop Improvement Association

Roger Wippler	Manager

SECTION A

CORN

HYBRID TRIALS

2009 Minnesota Hybrid Corn Silage Performance Trials

Prepared by the corn silage hybrid testing consortium: C.C. Sheaffer, D.R. Swanson, T.R. Hoverstad, M.D. Bickell, L.M. Behnken, F.R. Breitenbach, D.L. Holen, and P. Glogoza; University of Minnesota Agricultural Experiment Station and Extension.

The Minnesota Hybrid Corn Silage Evaluation Program evaluates the silage potential of corn hybrids in Minnesota. The goal of the program is to provide unbiased forage yield and quality information for educational and marketing programs. The program is financed in part by entry fees from private seed companies that chose to enter hybrids for testing. These companies are listed in this publication. Results presented are from corn silage performance trials in regions of extensive corn silage use: southeastern, central, and west-central Minnesota. The locations are in important dairy regions of Minnesota.

TEST SITES

Silage hybrids entered in the southeast or central region trials were tested at two sites within each region. Hybrids entered in the west-central region were tested at one site. Sites within regions were as follows:

Southeast Dairy Region
LaCrescent, MN (Houston County)
Rochester, MN (Olmsted County)

Central Dairy Region
Paynesville, MN (Stearns County)
Melrose, MN (Stearns County)

West-Central Dairy Region
Ottertail, MN (Otter Tail County)

TEST PROCEDURES

Southeast and Central

Design: Plots were established at LaCrescent, Rochester, Paynesville and Melrose in randomized complete block designs with 4 replications. Hybrids were planted at 33,000 seed per acre with 30-inch row spacing on May 3 at the SE sites (LaCrescent and Rochester) on April 27 and April 24, respectively. The Central MN sites (Paynesville and Melrose) were planted on May 7. Plant nutrients as manure or inorganic fertilizer were applied according to University of Minnesota recommendation. Cultivation and herbicides applied by University of Minnesota recommendation were used to control weeds.

Harvesting: Plots were harvested and whole-plant herbage sampled for dry matter and forage quality analysis at each site. Each test site was harvested when the average whole-plant moisture across entries was estimated to be 65%. In 2009, harvest dates at LaCrescent, Rochester, Paynesville and Melrose were September 18, September 23, September 24 and September 29, respectively.

West-central

Design: Plots were established May 5 near Ottertail, MN under center pivot irrigation in a randomized complete block design with 3 replications. Hybrids were planted at 35,700 seeds per acre with 30-inch row spacing. Fertilizer was fall applied liquid manure at 8000 gallons per acre plus 150 pounds of urea in 2009. Pre-emergent herbicide was applied to control weeds.

Harvesting: Plots were harvested and whole-plant herbage sampled for yield and forage quality analysis on September 30.

RESULTS PROVIDED

Tables 1-5 summarize hybrid yield and forage quality results from LaCrescent, Rochester, Paynesville, Melrose and Ottertail, respectively. Moisture content, whole-plant dry matter (DM) yield and silage yield are listed, and hybrids are ranked in descending order of milk yield per acre (Milk Yield, lb/acre). Genetic trait information is supplied by companies entered in the hybrid corn silage performance trial.

Whole-plant forage quality traits listed include crude protein (CP), neutral detergent fiber (NDF), 48-hour *in vitro* digestibility (IVD), 48-hour neutral detergent fiber digestibility (NDFD), and starch concentration. With the exception of NDFD, all forage quality traits are expressed as a percent of dry matter. NDFD is expressed as a percent of NDF.

Milk production potentials per ton (lb milk/ton forage) and per acre (lb milk/acre forage) of forage were calculated using the MILK2006 spreadsheet developed by the University of Wisconsin. MILK2006 approximates animal performance based on a standard cow weight and milk production level (1350 lb body weight and 90 lb/day at 3.8% fat). Field values for moisture and DM yield at harvest; laboratory values for CP, NDF, NDFD, starch, oil and ash concentration; and book values for NDFCP (1.3%) were used for spreadsheet calculations. For MILK2006 predictions, we assumed that kernel processing occurred.

HOW TO USE RESULTS

NDF is a negative indicator of forage intake potential; higher NDF concentration generally implies lower animal performance potential. IVD provides an estimate of forage dry matter digestibility, and NDFD estimates digestibility of the fiber fraction. Starch concentration is positively associated with digestibility because it is assumed to be 100% digestible. Relatively higher IVD, NDFD and/or starch concentrations generally imply greater animal performance potential. Milk yield per acre represents the combined effects of yield and quality.

Corn hybrids differed in yield, forage quality, and milk production potential at all sites. Means and least significant difference (LSD) values at the 10% probability level are shown for each parameter at each site. Where the difference between two hybrids for a particular yield or quality trait is greater than the LSD value, there is a 90% probability that there is a statistically significant difference between the two hybrids for that parameter (i.e. moisture, yield, quality concentration, or milk production).

PARTICIPATING COMPANIES

AgriGold Hybrids	www.agrigold.com
Anderson Seeds, 37825 County Road 63, St. Peter, MN 56082	
Channel Seeds	www.monsanto.com
Dahlco Seeds	www.dahlco seeds.com
Dairyland Seed Co, Inc.	www.dairylandseed.com
DeKalb (Monsanto Co)	www.dekalb.com
Dyna-Gro Seeds	www.dynagroseed.com
G2 Genetics	www.yieldleader.com
Hyland Seeds	www.hylandseeds.com
Legacy Seeds, Inc	www.legacyseeds.com
Mycogen Seeds	www.mycogen.com
Nu Tech Seed Co	www.yieldleader.com
Pioneer Hi-Bred, Int'l	www.pioneer.com
Producers Hybrids	www.producershybrids.com
Renk Seed Co.	www.renkseed.com
Trelay Seeds	www.trelay.com
Wensman Seed Co.	www.wensmanseed.com

Table 1. *Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at LaCrescent, MN (Houston County) in 2009.*

Brand/ Hybrid entry	Traits [1]	RM	Moist	Yield [2]		Quality (concentration) [3]					Milk Yield [4]	
				DM	silage	CP	NDF	IVD	NDFD	Starch	Ton	Acre
			%	- ton/ acre -				%			lb/ ton	lb/ acre
Mycogen/ TMF2Q716	Bt,CRW,GLY,LL	109	66.2	13.1	38.6	7.5	41	80	48	36	3,160	41,400
AgriGold Hybrids/ A6439VT3	Bt,CRW,GLY	109	68.6	12.4	39.4	8.2	41	79	49	36	3,230	40,000
Legacy Seeds Inc/ L-5350 GTCBLL	Bt,GLY,LL	104	63.7	11.8	32.4	6.8	37	81	49	41	3,360	39,600
DeKalb/ DKC53-41(VT3)	Bt, CRW, GLY	103	60.4	12.5	31.5	6.7	40	79	49	38	3,150	39,200
DeKalb/ DKC59-64(VT3)	Bt, CRW, GLY	109	68.1	12.2	38.2	6.9	41	79	49	37	3,220	39,200
Legacy Seeds Inc/ L-5309 GT	GLY	104	65.9	11.7	34.2	6.9	38	81	49	39	3,340	39,000
Renk/ RK829VT3	Bt, CRW, GLY	112	68.0	12.0	37.6	7.4	40	78	47	38	3,230	38,800
Renk/ RK711RRHXTRA	Bt,CRW,GLY,LL	107	68.9	12.5	40.1	7.4	43	79	48	35	3,090	38,500
Trelay/ 6VT981	Bt,CRW,GLY	107	66.8	11.5	34.6	7.4	38	79	48	40	3,340	38,400
Producers Hybrids/ 7325 VT3	Bt, CRW, GLY	113	70.4	12.0	40.6	7.8	42	79	47	36	3,150	37,900
Legacy Seeds Inc/ L-6609 HXTRR	Bt,CRW.GLY,LL	108	69.4	12.0	39.3	7.1	41	80	47	36	3,140	37,700
Pioneer Brand/ 34A89	Bt, CRW, GLY	110	67.8	11.9	37.0	7.4	41	79	48	35	3,150	37,600
DeKalb/ DKC61-69(VT3)	Bt, CRW, GLY	111	66.8	11.6	34.8	7.4	40	80	48	37	3,240	37,500
Anderson Seeds/ 103R	GLY	102	65.0	11.3	32.2	7.5	39	81	49	38	3,290	37,100
Renk/ RK844VT3	Bt, CRW, GLY	111	68.9	11.5	36.9	7.4	41	79	48	36	3,180	36,400
Channel/ 210-61VT3 Brand	Bt, CRW, GLY	110	68.2	11.7	36.8	7.3	42	78	48	35	3,110	36,300
G2 Genetics/ 5X-909 RR/HXT	Bt,CRW,GLY,LL	109	68.0	11.7	36.5	7.8	42	79	48	35	3,110	36,300
Channel/ 209-77VT3 Brand	Bt, CRW, GLY	109	67.3	10.9	33.2	7.5	39	79	50	38	3,310	36,000
Mycogen/ TMF2Q759	Bt,CRW,GLY,LL	113	71.0	11.7	40.3	7.3	43	78	48	33	3,080	36,000
NuTech Seed/ 5N-809 GT/CB/LL	Bt,CRW,GLY,LL	109	69.3	11.4	37.2	7.0	42	79	48	34	3,140	35,800
Renk/ RK744VT3	Bt, CRW, GLY	107	67.1	11.3	34.3	7.1	41	79	47	37	3,160	35,600
NuTech Seed/ 3T-013 VT3	Bt, CRW, GLY	113	68.6	10.8	34.5	7.5	39	79	48	38	3,280	35,500
Mycogen/ TMF2R521	Bt,CRW,GLY	98	65.4	10.7	31.0	7.2	39	80	47	39	3,260	35,000
AgriGold Hybrids/ A6309VT3	Bt,CRW,GLY	103	67.6	10.7	33.0	6.6	39	80	47	39	3,250	34,800
Anderson Seeds/ 103 VT3	Bt, CRW, GLY	103	66.5	10.6	31.8	7.1	40	80	49	38	3,260	34,700
Trelay/ 7T231	Bt,CRW,GLY	111	69.1	10.6	34.4	7.1	40	79	48	38	3,250	34,500
AgriGold Hybrids/ A6323CL	CL	103	66.7	10.5	31.6	6.7	41	80	49	36	3,230	34,100
AgriGold Hybrids/ A6459VT3	Bt,CRW,GLY	110	69.7	10.6	35.0	7.4	41	80	47	37	3,170	33,600
Trelay/ 6T226	Bt,CRW,GLY	106	66.1	10.5	31.1	7.0	42	79	48	36	3,130	33,000
Wensman Seed/ W 7562VT3	Bt, CRW, GLY	111	70.2	10.2	34.3	7.5	41	79	48	37	3,220	32,900
DeKalb/ DKC50-44(VT3)	Bt, CRW, GLY	100	67.5	10.0	30.7	7.2	40	79	49	38	3,290	32,800
DeKalb/ DKC57-50(VT3)	Bt, CRW, GLY	107	66.9	10.5	31.7	6.2	43	79	48	36	3,110	32,700
NuTech Seed/ 3T-413 VT3	Bt, CRW, GLY	113	69.2	10.4	33.8	7.1	42	79	48	35	3,140	32,700
AgriGold Hybrids/ A6279VT3	Bt,CRW,GLY	101	68.7	10.2	32.8	7.5	42	78	48	36	3,160	32,400
Mycogen/ 2W587	Bt,CRW,GLY,LL	104	68.4	10.0	31.8	8.2	42	79	47	37	3,120	31,300
Trelay/ 5T429	Bt,CRW,GLY	102	67.6	9.9	30.6	7.3	42	79	49	35	3,160	31,300

Table 1. *Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at LaCrescent, MN (Houston County) in 2009.*

Brand/ Hybrid entry	Traits [1]	RM	Moist	Yield [2]		Quality (concentration) [3]					Milk Yield [4]	
				DM	silage	CP	NDF	IVD	NDFD	Starch	Ton	Acre
			%	- ton/ acre -				%			lb/ ton	lb/ acre
Channel/ 207-07VT3 Brand	Bt, CRW, GLY	107	69.1	10.0	32.2	7.5	42	80	47	36	3,110	31,000
Producers Hybrids/ 7077 VT3	Bt, CRW, GLY	110	72.1	10.1	36.1	8.0	43	80	47	33	3,010	30,300
Pioneer Brand/ 33D14	Bt, CRW, GLY	113	69.3	9.8	31.8	7.4	44	78	48	33	3,040	29,700
Wensman Seed/ W 7455VT3	Bt, CRW, GLY	107	69.8	9.6	31.8	7.6	42	79	47	35	3,090	29,700
DeKalb/ DKC55-07(VT3)	Bt, CRW, GLY	105	64.3	10.2	28.5	7.4	43	74	47	36	2,900	29,500
DeKalb/ DKC54-49(VT3)	Bt, CRW, GLY	104	69.6	8.6	28.1	7.2	43	79	48	35	3,090	26,400
mean			**67.8**	**11.0**	**34.3**	**7.3**	**41**	**79**	**48**	**37**	**3,180**	**35,000**
LSD(0.10)			**3.4**	**1.6**	**3.4**	**0.4**	**ns**	**ns**	**2**	**ns**	**ns**	**5,400**
CV			**4.3**	**12.5**	**8.3**	**4.8**	**7.2**	**2.3**	**2.9**	**9.5**	**6.3**	**13.1**

[1] Bt, CRW, GLY, LL, CL, Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate, Liberty Link and Clearfield herbicide resistance, and leafy trait, respectiv

[2] **DM** yield is whole-plant corn yield at 100% dry matter; **Silage** yield is whole-plant corn yield at harvest moisture.

[3] Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to *Results Provided text for additional information.*

[4] Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to *Results Provided text for additional information.*

Table 2. *Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at Rochester, MN (Olmsted County) in 2009.*

Brand/ Hybrid entry	Traits [1]	RM	Moist	Yield [2]		Quality (concentration) [3]					Milk Yield [4]	
				DM	silage	CP	NDF	IVD	NDFD	Starch	Ton	Acre
			%	- ton/ acre -				%			lb/ ton	lb/ acre
Channel/ 209-77VT3 Brand	Bt, CRW, GLY	109	69.0	10.8	34.8	7.5	44	78	49	35	3,090	33,400
AgriGold Hybrids/ A6323CL	CL	103	69.3	10.4	33.7	6.4	41	79	49	37	3,200	33,100
AgriGold Hybrids/ A6309VT3	Bt,CRW,GLY	103	68.0	10.4	32.3	6.4	41	78	47	39	3,160	32,800
AgriGold Hybrids/ A6439VT3	Bt,CRW,GLY	109	69.7	11.3	37.4	7.3	46	76	47	32	2,900	32,800
Channel/ 210-61VT3 Brand	Bt, CRW, GLY	110	70.1	11.0	36.8	7.2	46	77	50	32	2,980	32,700
Trelay/ 7T231	Bt,CRW,GLY	111	70.2	10.6	35.7	7.4	43	78	47	35	3,010	31,900
Pioneer Brand/ 34A89	Bt, CRW, GLY	110	71.2	10.7	37.0	7.2	47	77	50	31	2,960	31,500
Mycogen/ TMF2Q716	Bt,CRW,GLY,LL	109	70.1	10.3	34.3	7.5	46	77	48	33	2,960	30,400
Trelay/ 6VT981	Bt,CRW,GLY	107	70.6	9.8	33.5	7.4	42	79	48	35	3,090	30,300
NuTech Seed/ 3T-413 VT3	Bt, CRW, GLY	113	70.2	10.0	33.5	6.7	44	78	46	35	2,990	29,900
Channel/ 207-07VT3 Brand	Bt, CRW, GLY	107	70.2	9.7	32.6	7.4	43	77	48	36	3,060	29,700
Pioneer Brand/ 33D14	Bt, CRW, GLY	113	69.9	10.1	33.6	7.3	47	76	48	31	2,870	29,000
Anderson Seeds/ 103R	GLY	102	68.4	9.7	30.9	7.0	46	77	48	32	2,960	28,800
DeKalb/ DKC53-41(VT3)	Bt, CRW, GLY	103	70.5	9.5	32.1	7.3	45	77	49	34	3,040	28,800
Renk/ RK844VT3	Bt, CRW, GLY	111	71.2	9.4	32.7	7.3	43	78	48	34	3,060	28,800
DeKalb/ DKC57-50(VT3)	Bt, CRW, GLY	107	68.8	9.4	30.2	6.0	45	76	49	34	3,050	28,700
Producers Hybrids/ 7325 VT3	Bt, CRW, GLY	113	70.7	9.8	33.4	7.3	46	77	48	31	2,920	28,700
AgriGold Hybrids/ A6279VT3	Bt,CRW,GLY	101	68.5	9.2	29.1	7.4	44	78	50	35	3,110	28,600
DeKalb/ DKC59-64(VT3)	Bt, CRW, GLY	109	69.6	10.1	33.3	7.0	47	75	47	30	2,820	28,500
Anderson Seeds/ 103 VT3	Bt, CRW, GLY	103	68.5	9.1	28.9	7.2	43	78	48	36	3,110	28,300
Renk/ RK744VT3	Bt, CRW, GLY	107	71.3	9.0	31.5	6.9	42	79	48	36	3,120	28,200
Producers Hybrids/ 7077 VT3	Bt, CRW, GLY	110	71.4	9.3	32.6	7.8	45	78	49	33	3,020	28,100
DeKalb/ DKC55-07(VT3)	Bt, CRW, GLY	105	68.7	8.8	28.3	7.1	42	79	49	37	3,160	27,900
Renk/ RK829VT3	Bt, CRW, GLY	112	71.4	9.5	33.3	7.1	47	76	49	30	2,920	27,900
Legacy Seeds Inc/ L-6609 HXTRR	Bt,CRW.GLY,LL	108	72.0	9.5	34.0	7.4	47	76	49	31	2,900	27,500
Mycogen/ 2W587	Bt,CRW,GLY,LL	104	70.0	9.1	30.3	6.9	45	77	48	34	3,020	27,500
Legacy Seeds Inc/ L-5350 GTCBLL	Bt,GLY,LL	104	71.3	8.8	30.6	6.6	43	79	49	36	3,130	27,400
DeKalb/ DKC61-69(VT3)	Bt, CRW, GLY	111	70.0	9.2	30.6	7.5	45	77	48	33	2,970	27,300
G2 Genetics/ 5X-909 RR/HXT	Bt,CRW,GLY,LL	109	71.1	9.1	31.6	7.5	46	77	49	32	2,980	27,100
Mycogen/ TMF2Q759	Bt,CRW,GLY,LL	113	72.3	9.9	35.6	7.2	50	76	49	25	2,740	27,100
NuTech Seed/ 3T-013 VT3	Bt, CRW, GLY	113	71.8	9.0	32.0	7.7	46	77	50	32	2,940	26,400
Renk/ RK711RRHXTRA	Bt,CRW,GLY,LL	107	71.0	8.8	30.4	7.2	47	76	48	32	2,930	25,800
Trelay/ 6T226	Bt,CRW,GLY	106	70.2	8.9	30.0	6.7	49	75	49	30	2,870	25,600
DeKalb/ DKC50-44(VT3)	Bt, CRW, GLY	100	68.4	8.3	26.3	6.6	45	77	49	35	3,040	25,300
Mycogen/ TMF2R521	Bt,CRW,GLY	98	71.2	8.1	28.1	7.2	43	78	49	35	3,110	25,200
Legacy Seeds Inc/ L-5309 GT	GLY	104	71.4	8.2	28.7	7.2	45	77	50	34	3,040	25,000

Table 2. *Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at Rochester, MN (Olmsted County) in 2009.*

Brand/ Hybrid entry	Traits [1]	RM	Moist	Yield [2]		Quality (concentration) [3]					Milk Yield [4]	
				DM	silage	CP	NDF	IVD	NDFD	Starch	Ton	Acre
			%	- ton/ acre -				%			lb/ ton	lb/ acre
Trelay/ 5T429	Bt,CRW,GLY	102	69.9	8.2	27.3	6.9	46	77	49	33	2,980	24,500
NuTech Seed/ 5N-809 GT/CB/LL	Bt,CRW,GLY,LL	109	71.6	8.4	29.5	6.9	47	76	48	30	2,870	24,000
Wensman Seed/ W 7562VT3	Bt, CRW, GLY	111	72.8	8.4	30.7	7.6	47	77	48	31	2,860	23,900
Wensman Seed/ W 7455VT3	Bt, CRW, GLY	107	72.0	8.2	29.2	7.4	45	77	47	32	2,900	23,800
AgriGold Hybrids/ A6459VT3	Bt,CRW,GLY	110	72.1	7.9	28.4	7.3	45	78	47	33	2,960	23,400
DeKalb/ DKC54-49(VT3)	Bt, CRW, GLY	104	70.4	7.7	26.1	6.9	45	77	48	34	2,980	23,100
mean			**70.4**	**9.4**	**31.7**	**7.1**	**45**	**77**	**48**	**33**	**2,990**	**28,100**
LSD(0.10)			**2.1**	**1.5**	**4.4**	**0.6**	**2**	**1**	**2**	**3**	**130**	**5,000**
CV			**2.6**	**13.8**	**12.0**	**7.1**	**4.2**	**1.4**	**2.8**	**6.7**	**3.6**	**15.2**

[1] Bt, CRW, GLY, LL, CL, Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate, Liberty Link and Clearfield herbicide resistance, and leafy trait, respectively.

[2] **DM** yield is whole-plant corn yield at 100% dry matter; **Silage** yield is whole-plant corn yield at harvest moisture.

[3] Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to *Results Provided text for additional information.*

[4] Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to *Results Provided text for additional information.*

Table 3. *Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at Paynesville, MN (Stearns County) in 2009.*

Brand/ Hybrid entry	Traits [1]	RM	Moist	Yield [2]		Quality (concentration) [3]					Milk Yield [4]	
				DM	silage	CP	NDF	IVD	NDFD	Starch	Ton	Acre
			%	- ton/ acre -				%			lb/ ton	lb/ acre
Legacy Seeds Inc/ L-5350 GTCBLL	Bt,GLY,LL	104	68.6	10.0	31.7	7.1	39	80	48	41	3,290	32,800
Dyna-Gro/ V4592VTNS	Bt, CRW, GLY	105	72.9	10.5	38.9	9.2	43	79	47	36	3,080	32,500
Trelay/ 6VT981	Bt,CRW,GLY	107	70.1	9.8	32.6	7.8	40	79	47	40	3,200	31,200
DeKalb/ DKC53-41 (VT3)	Bt, CRW, GLY	103	68.9	10.1	32.4	7.1	44	77	47	36	3,040	30,600
DeKalb/ DKC55-07 (VT3)	Bt, CRW, GLY	105	68.0	9.3	29.1	8.0	41	79	49	41	3,260	30,400
Dahlco/ 8041 GTCBLL	Bt,GLY,LL	104	68.3	9.5	29.8	7.2	41	78	47	39	3,180	30,100
DeKalb/ DKC52-59 (VT3)	Bt, CRW, GLY	102	70.7	9.4	32.0	7.0	41	79	48	39	3,190	29,900
Renk/ RK698VT3	Bt, CRW, GLY	103	69.0	9.6	30.9	7.1	43	78	47	37	3,090	29,500
Renk/ RK692GTCBLLRW	Bt,CRW,GLY,LL	105	71.3	9.7	33.8	8.7	42	79	45	37	3,050	29,500
DeKalb/ DKC50-44 (VT3)	Bt, CRW, GLY	100	69.3	9.2	29.9	7.1	40	80	47	39	3,200	29,300
DeKalb/ DKC59-64 (VT3)	Bt, CRW, GLY	109	73.6	10.2	38.6	7.2	46	76	46	32	2,880	29,300
Legacy Seeds Inc/ L-5309 GT	GLY	104	72.7	8.7	31.8	7.4	39	80	49	40	3,320	28,800
Wensman Seed/ W 7433VT3	Bt, CRW, GLY	105	69.9	9.4	31.1	7.3	42	78	46	38	3,070	28,800
Mycogen/ 2W587	Bt,CRW,GLY,LL	104	70.1	9.4	31.6	7.9	42	78	44	38	3,030	28,500
Channel/ 201-13VT3 Brand	Bt, CRW, GLY	105	70.3	9.0	30.3	7.5	42	79	49	36	3,150	28,400
Mycogen/ TMF2Q716	Bt,CRW,GLY,LL	109	71.6	10.3	36.2	7.7	47	76	43	32	2,760	28,400
Hyland Seeds/ HL SR59	GLY	101	73.8	9.8	37.5	7.7	46	77	46	31	2,880	28,300
Channel/ 200-22VT3 Brand	Bt, CRW, GLY	100	70.0	9.0	29.9	7.2	42	79	47	38	3,120	28,100
DeKalb/ DKC50-66 (VT3)	Bt, CRW, GLY	100	70.0	9.1	30.5	7.3	43	77	48	37	3,070	28,000
Trelay/ 5T128		101	69.7	8.8	29.2	7.7	40	79	46	39	3,160	27,900
Trelay/ 5T429	Bt,CRW,GLY	102	70.0	8.9	29.7	8.0	42	79	48	38	3,120	27,800
Producers Hybrids/ 6464 VT3	Bt, CRW, GLY	104	72.3	9.5	34.4	7.5	45	76	46	33	2,880	27,400
NuTech Seed/ 3T-098 VT3	Bt, CRW, GLY	96	70.3	9.2	31.0	7.8	44	76	45	37	2,960	27,300
DeKalb/ DKC61-69 (VT3)	Bt, CRW, GLY	111	72.4	9.5	34.3	7.8	45	77	45	34	2,880	27,200
NuTech Seed/ 5X-100 RR/HXT	Bt,CRW,GLY,LL	100	72.5	9.3	33.7	8.1	44	78	46	34	2,940	27,200
Pioneer Brand/ 35F40	Bt,GLY	105	71.1	9.1	31.5	8.1	45	77	47	35	2,990	27,200
Dyna-Gro/ 55R10	Bt,CRW,GLY,LL	101	72.3	9.0	32.6	7.8	43	78	45	36	2,980	26,900
Pioneer Brand/ 34A89	Bt, CRW, GLY	110	72.9	9.9	36.5	7.7	49	75	46	29	2,720	26,900
Wensman Seed/ W 7455VT3	Bt, CRW, GLY	107	73.8	8.8	33.5	8.0	44	78	47	34	2,980	26,200
DeKalb/ DKC55-64 (VT3)	Bt, CRW, GLY	105	69.7	8.6	28.4	8.2	45	77	46	37	2,980	25,600
NuTech Seed/ 3T-600 VT3	Bt, CRW, GLY	97	71.3	8.7	30.4	7.2	46	76	45	35	2,880	25,200
Pioneer Brand/ 36V53	Bt,GLY	102	71.1	8.0	27.8	8.0	42	78	47	37	3,100	24,900
DeKalb/ DKC48-37 (VT3)	Bt, CRW, GLY	98	67.1	7.9	24.1	7.4	41	78	45	40	3,080	24,400
Hyland Seeds/ HL SVT50	Bt,CRW,GLY	100	70.1	8.8	29.5	7.7	46	75	42	34	2,770	24,400
Producers Hybrids/ 5684 VT3	Bt, CRW, GLY	96	70.5	8.0	27.2	7.6	44	76	46	37	3,000	24,100
DeKalb/ DKC54-49 (VT3)	Bt, CRW, GLY	104	73.2	7.8	29.1	8.0	45	77	48	35	3,040	23,700

Table 3. *Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at Paynesville, MN (Stearns County) in 2009.*

Brand/ Hybrid entry	Traits [1]	RM	Moist	Yield [2]		Quality (concentration) [3]					Milk Yield [4]	
				DM	silage	CP	NDF	IVD	NDFD	Starch	Ton	Acre
			%	- ton/ acre -				%			lb/ ton	lb/ acre
Dyna-Gro/ V3593VT3	Bt, CRW, GLY	95	69.0	7.8	25.2	7.0	45	76	44	36	2,880	22,600
NuTech Seed/ 3T-295 VT3	Bt, CRW, GLY	95	66.3	7.3	21.6	7.5	43	78	46	39	3,030	22,100
Trelay/ 2RR530	GLY	86	64.2	7.2	20.2	7.0	42	77	47	35	2,950	21,300
mean			**70.5**	**9.1**	**31.0**	**7.6**	**43**	**78**	**46**	**36**	**3,030**	**27,500**
LSD(0.10)			**2.7**	**1.3**	**3.3**	**0.5**	**4**	**2**	**2**	**4**	**210**	**4,900**
CV			**3.3**	**12.4**	**9.0**	**6.4**	**7.0**	**2.3**	**4.1**	**10.2**	**5.9**	**15.3**

[1] Bt, CRW, GLY, LL, CL, Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate, Liberty Link and Clearfield herbicide resistance, and leafy trait, respectiv

[2] **DM** yield is whole-plant corn yield at 100% dry matter; **Silage** yield is whole-plant corn yield at harvest moisture.

[3] Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to *Results Provided text for additional information.*

[4] Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to *Results Provided text for additional information.*

Table 4. *Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at Melrose, MN (Stearns County) in 2009.*

Brand/ Hybrid entry	Traits [1]	RM	Moist	Yield [2]		Quality (concentration) [3]					Milk Yield [4]	
				DM	silage	CP	NDF	IVD	NDFD	Starch	Ton	Acre
			%	- ton/ acre -				%			lb/ ton	lb/ acre
DeKalb/ DKC61-69 (VT3)	Bt, CRW, GLY	111	63.9	9.7	26.8	7.7	40	81	48	37	3,150	30,400
DeKalb/ DKC50-44 (VT3)	Bt, CRW, GLY	100	61.0	9.1	23.3	7.4	39	82	51	40	3,250	29,500
DeKalb/ DKC53-41 (VT3)	Bt, CRW, GLY	103	62.0	8.8	23.2	8.2	38	82	50	40	3,300	29,100
Wensman Seed/ W 7433VT3	Bt, CRW, GLY	105	63.1	9.0	24.3	7.7	38	82	50	39	3,240	29,100
Trelay/ 6VT981	Bt,CRW,GLY	107	66.4	8.8	26.2	8.4	39	82	50	39	3,300	29,000
Pioneer Brand/ 35F40	Bt, GLY	105	66.0	8.7	25.7	7.9	39	81	49	39	3,290	28,700
Mycogen/ 2W587	Bt,CRW,GLY,LL	104	64.3	8.9	24.9	8.4	40	82	49	37	3,210	28,500
NuTech Seed/ 3T-295 VT3	Bt, CRW, GLY	95	56.4	8.4	19.2	7.8	35	84	51	44	3,250	27,200
Trelay/ 5T128	Bt,CRW,GLY	101	61.6	8.6	22.4	8.0	39	81	50	38	3,170	27,200
Dahlco/ 8041 GTCBLL	Bt, GLY, LL	104	61.9	8.6	22.5	7.0	40	81	48	37	3,160	27,000
Dyna-Gro/ V4592VTNS	Bt, CRW, GLY	105	66.3	8.3	24.6	8.7	39	82	49	37	3,250	27,000
Hyland Seeds/ HL SR59	GLY	101	67.5	8.6	26.4	8.1	43	81	51	32	3,120	26,800
Legacy Seeds Inc/ L-5350 GTCBLL	Bt,GLY,LL	104	65.5	7.8	22.6	7.0	39	82	52	38	3,330	25,900
Dyna-Gro/ 55R10	Bt,CRW,GLY,LL	101	67.3	8.0	24.5	7.9	42	81	50	34	3,160	25,300
Mycogen/ TMF2Q716	Bt,CRW,GLY,LL	109	65.7	8.3	24.2	7.5	45	78	49	31	2,980	24,700
DeKalb/ DKC52-59 (VT3)	Bt, CRW, GLY	102	65.9	7.6	22.2	7.8	39	81	49	39	3,250	24,600
Producers Hybrids/ 5684 VT3	Bt, CRW, GLY	96	62.4	7.6	20.2	8.5	38	82	49	40	3,230	24,600
NuTech Seed/ 5X-100 RR/HXT	Bt,CRW,GLY,LL	100	66.2	7.6	22.4	8.0	40	82	48	37	3,230	24,400
DeKalb/ DKC55-64 (VT3)	Bt, CRW, GLY	105	62.2	7.7	20.3	7.9	41	80	51	37	3,160	24,300
Pioneer Brand/ 34A89	Bt, CRW, GLY	110	66.1	7.9	23.2	8.5	44	80	52	31	3,090	24,300
Channel/ 200-22VT3 Brand	Bt, CRW, GLY	100	68.1	7.5	23.5	7.9	40	82	50	38	3,220	24,100
DeKalb/ DKC59-64 (VT3)	Bt, CRW, GLY	109	65.4	7.7	22.3	7.7	43	80	53	32	3,120	24,100
Wensman Seed/ W 7455VT3	Bt, CRW, GLY	107	69.6	7.6	24.9	8.6	41	81	51	34	3,170	24,000
Channel/ 201-13VT3 Brand	Bt, CRW, GLY	105	66.4	7.5	22.2	7.7	40	81	49	36	3,190	23,900
DeKalb/ DKC50-66 (VT3)	Bt, CRW, GLY	100	63.7	7.2	19.9	7.5	38	82	49	40	3,270	23,600
NuTech Seed/ 3T-600 VT3	Bt, CRW, GLY	97	63.1	7.5	20.4	7.5	41	81	49	36	3,110	23,400
Producers Hybrids/ 6464 VT3	Bt, CRW, GLY	104	66.1	7.5	22.1	7.2	43	79	50	34	3,120	23,400
DeKalb/ DKC55-07 (VT3)	Bt, CRW, GLY	105	62.0	7.3	19.1	7.8	39	81	51	37	3,210	23,300
NuTech Seed/ 3T-098 VT3	Bt, CRW, GLY	96	66.0	7.1	20.8	8.8	39	81	51	39	3,270	23,100
Hyland Seeds/ HL B337	Bt,GLY	108	65.9	7.2	21.2	8.6	41	81	50	34	3,170	22,900
DeKalb/ DKC54-49 (VT3)	Bt, CRW, GLY	104	67.3	7.4	22.6	7.8	44	80	51	31	3,050	22,600
Renk/ RK692GTCBLLRW	Bt,CRW,GLY,LL	105	63.5	7.0	19.1	8.0	39	81	48	39	3,230	22,600
Dyna-Gro/ V3593VT3	Bt, CRW, GLY	95	64.1	7.0	19.5	7.9	40	81	50	37	3,210	22,500
Hyland Seeds/ HL SVT50	Bt,CRW,GLY	100	66.5	7.3	21.8	7.8	43	79	49	34	3,080	22,500
Trelay/ 5T429	Bt,CRW,GLY	102	66.4	7.2	21.5	7.7	43	79	50	33	3,090	22,300
Renk/ RK698VT3	Bt, CRW, GLY	103	66.1	6.8	19.9	8.0	41	81	50	35	3,150	21,300

Table 4. *Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at Melrose, MN (Stearns County) in 2009.*

Brand/ Hybrid entry	Traits [1]	RM	Moist	Yield [2]		Quality (concentration) [3]					Milk Yield [4]	
				DM	silage	CP	NDF	IVD	NDFD	Starch	Ton	Acre
			%	- ton/ acre -				%			lb/ ton	lb/ acre
Pioneer Brand/ 36V53	Bt ,GLY	102	65.3	6.6	19.0	7.7	40	80	49	38	3,200	21,100
Legacy Seeds Inc/ L-5309 GT	GLY	104	67.1	6.7	20.5	7.9	43	80	50	33	3,120	21,000
Trelay/ 2RR530	GLY	86	59.9	6.7	16.6	8.5	41	80	51	36	3,060	20,400
DeKalb/ DKC48-37 (VT3)	Bt, CRW, GLY	98	64.6	6.1	17.3	7.7	41	81	49	36	3,130	19,100
mean			**64.7**	**7.8**	**22.1**	**7.9**	**40**	**81**	**50**	**36**	**3,180**	**24,700**
LSD(0.10)			**3.5**	**1.5**	**3.6**	**0.6**	**3**	**2**	**ns**	**4**	**150**	**5,000**
CV			**4.7**	**16.6**	**14.2**	**7.1**	**6.9**	**1.7**	**4.2**	**10.3**	**4.0**	**17.3**

[1] Bt, CRW, GLY, LL, CL, Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate, Liberty Link and Clearfield herbicide resistance, and leafy trait, respectively.

[2] **DM** yield is whole-plant corn yield at 100% dry matter; **Silage** yield is whole-plant corn yield at harvest moisture.

[3] Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to *Results Provided text for additional information.*

[4] Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to *Results Provided text for additional information.*

Table 5. *Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at Ottertail, MN (Otter Tail County) in 2009.*

Brand/ Hybrid entry	Traits [1]	RM	Moist	Yield [2]		Quality (concentration) [3]					Milk Yield [4]	
				DM	silage	CP	NDF	IVD	NDFD	Starch	Ton	Acre
			%	- ton/ acre -				%			lb/ ton	lb/ acre
Pioneer Brand/ 35F44	Bt, CRW, GLY, LL	105	67.8	10.3	32.2	7.0	43	78	49	32	3,150	32,600
NuTech/ 3A-804 GT	Bt, GLY	104	61.4	10.3	26.6	5.6	42	78	50	34	3,150	32,400
Dekalb/ DKC54-49 VT3	Bt, CRW, GLY	104	66.3	9.2	27.2	6.3	45	77	51	31	3,070	28,100
NuTech/ 3U-306	Bt, CRW, GLY, Lf	106	65.9	9.4	27.7	6.4	48	76	52	25	2,930	27,700
Dyna-Gro/ V3593 VT3	Bt, CRW, GLY	95	57.1	9.3	21.8	6.2	45	77	50	32	2,880	26,900
Dyna-Gro/ V4592VTNS	CRW, GLY	105	62.2	9.0	23.9	6.4	47	76	51	29	2,950	26,600
Dairyland/ 8208	Bt, CRW, LL	108	67.4	8.7	26.8	6.3	45	77	49	29	3,030	26,500
Hyland Seeds/ HL CVR48 VT3	Bt, CRW, GLY	88	62.3	8.7	23.1	5.6	45	78	51	31	3,030	26,400
Dyna-Gro/ 55R10	Bt, CRW, GLY, LL	100	66.8	8.9	26.8	6.3	47	76	50	28	2,960	26,200
Pioneer Brand/ 37N16	Bt, CRW, GLY, LL	99	61.5	9.1	23.8	6.4	47	76	48	30	2,820	25,800
NuTech/ 3T-098 VT3	Bt, CRW, GLY	98	60.4	8.7	22.0	5.8	44	76	49	33	2,940	25,600
Dekalb/ DKC45-79 VT3	Bt, CRW, GLY	95	61.1	8.5	21.8	6.0	47	76	50	30	2,870	24,400
Wensman/ 7107 VT3	Bt, CRW, GLY	90	58.7	7.8	18.8	6.4	40	80	51	37	3,140	24,300
Wensman/ 7273 VT3	Bt, CRW, GLY	98	62.1	8.1	21.3	6.2	46	75	48	31	2,870	23,200
Hyland Seeds/ HL SR35	GLY, Lf	88	58.5	8.8	21.1	6.5	53	72	50	23	2,550	22,300
Dekalb/ DKC50-44 VT3	Bt, CRW, GLY	100	62.3	6.9	18.4	5.7	49	75	51	28	2,860	19,800
mean			**62.6**	**8.9**	**23.9**	**6.2**	**46**	**76**	**50**	**30**	**2,950**	**26,200**
LSD(0.10)			**2.0**	**ns**	**4.9**	**0.6**	**3**	**2**	**2**	**4**	**180**	**5,800**
CV			**2.3**	**14.4**	**14.9**	**7.2**	**5.9**	**2.3**	**2.5**	**9.4**	**4.5**	**16.0**

[1] Bt, CRW, GLY, LL, CL, Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate, Liberty Link and Clearfield herbicide resistance, and leafy trait, respectively.

[2] **DM** yield is whole-plant corn yield at 100% dry matter; **Silage** yield is whole-plant corn yield at harvest moisture.

[3] Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to *Results Provided text for additional information.*

[4] Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to *Results Provided text for additional information.*

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2009 Performance of Early Maturity (90-95 Day Relative Maturity) Corn Hybrids at Rock Dell and Waseca, MN

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, and Thomas R. Hoverstad

The objective of this trial was to compare the performance of early maturity (90-95 day relative maturity) corn hybrids in southern Minnesota. The trials were located at Rock Dell and Waseca, MN. Field histories are reported in Table 1. The trials were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 35,000 seeds per acre with seed planted at a depth of 1.5 inches. The plots were four rows wide. A randomized complete block design was implemented and replicated four times at Waseca and six times at Rock Dell. The two center rows of each plot at Rock Dell and Waseca were machine harvested with moisture and grain weight recorded at all sites. Table 2 provides moisture and grain yield at both sites, and the 2-site average for moisture and grain yield. In general, grain yield is still the best indicator of hybrid performance. However, grain moisture is important when looking at gross dollar return. (University of Minnesota Extension Regional Office, Rochester, and Southern Research and Outreach Center, Waseca, MN).

Table 1. Research site field history for early maturity (90-95 day relative maturity) corn hybrids in 2009.

	Rock Dell	Waseca
Planting Date	May 2, 2009	May 4, 2009
Harvest Date	November 15, 2009	November 10, 2009
Soil Type	Kenyon loan	Webster clay loam
Fertilizer	160-64-97-25 (N-P-K-S)	150# AA + Nserve
Herbicide (Pre/Post)	Harness PRE / Lumax + Accent POST	6 pts Lumax PRE
Tillage	Conventional	Field cultivated
Previous Crop	soybean	soybean

Table 2. Early maturity (90-95 day relative maturity) corn hybrid moisture content and grain yield (15.5%) at Rock Dell and Waseca, MN, and the average of both sites in 2009.

Entry Name	Traits	Description	Rock Dell		Waseca		2-Site Average	
90-95 Day Relative Maturity		Relative Maturity (Days)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)
AgriGold A6149	VT3 Poncho 250	92	22.7	159	23.2	213	23.0	186
Agventure R5141VBW	Triple Poncho 250	95	23.9	162	25.6	220	24.7	191
Channel 195-46	VT3 ApronXL + Dynasty + MaximXL + Poncho 250	95	23.1	165	24.2	230	23.7	197
Croplan 3424	VT3 Cruiser Dynasty	94	20.5	175	24.2	236	22.4	206
Crows 1725	VT3	95	22.6	157	24.6	247	23.6	202
Dahlman R48-07	VT3 Trilex + MaximXL + Poncho 250	95	22.1	164	23.4	255	22.7	210
Dekalb DKC 43-27	VT3 Poncho	93	23.0	167	23.3	211	23.1	189
Fielder's Choice NG6446	VT3	94	22.4	156	22.6	238	22.5	197
Gold Country 95-11	VT3 Poncho	95	22.2	156	22.5	231	22.3	193
Golden Harvest H-6845GT/CB/LL Brand	Crusier	95	22.8	156	22.9	226	22.8	191
Jung 7385	VT3 Poncho 250	95	22.9	156	25.0	224	23.9	190
Kaltenberg K3843	VT3 Poncho 250	95	22.5	157	25.1	242	23.8	199
LG Seeds LG 2426	VT3 Poncho	94	22.5	161	23.1	231	22.8	196
Mycogen 2J463	Cruiser	95	21.3	148	23.3	242	22.3	195
Pioneer 38H08	Cruiser	92	20.9	149	22.0	241	21.4	195
Pioneer 38P40		95	23.2	148	24.4	222	23.8	185
Pioneer 38P43		95	23.8	140	25.2	228	24.5	184
Producers 5314	VT3 Maxim XL Poncho	93	22.9	165	23.5	235	23.2	200
Renk RK438RRYGPL	Poncho	92	23.9	146	23.7	230	23.8	188
Renk RK570	VT3 Poncho	95	21.9	168	24.3	238	23.1	203
Stine 9204	VT3 Poncho	90	22.6	161	22.7	222	22.7	192
Trelay 3T851	Trilex + MaximXL + Poncho 250	95	23.2	165	24.4	226	23.8	196
Viking A71-95R	Cruiser	95	24.3	156	25.6	225	24.9	190
Wensman W 8180	VT3 Poncho	95	24.2	167	24.1	244	24.1	205
		LSD (P=0.10)	1.7	13	1.0	NS	1.1	12

2009 Performance of Mid-Season (96-100 Day Relative Maturity) Corn Hybrids at Rock Dell and Waseca, MN

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, and Thomas R. Hoverstad

The objective of this trial was to compare the performance of mid-season hybrids (96 to 100 day relative maturity) in southern Minnesota. The trials were located at Rock Dell and Waseca, MN. Field histories are reported in Table 1. The trials were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 35,000 seeds per acre and seed was planted at a depth of 1.5 inches. The plots were four rows wide. A randomized complete block design was implemented and replicated four times at Waseca and six times at Rock Dell. The two center rows of each plot were machine harvested with moisture and grain weight recorded at all sites. Table 2 provides moisture and grain yield at both sites, and the 2-site average for moisture and grain yield. In general, grain yield is still the best indicator of hybrid performance. However, grain moisture is important when looking at gross dollar return. (University of Minnesota Extension Regional Office, Rochester, and Southern Research and Outreach Center, Waseca, MN).

Table 1. Research site field history for mid-season maturity corn hybrid varieties in 2009.

	Rock Dell	Waseca
Planting Date	May 2, 2009	May 4, 2009
Harvest Date	November 15, 2009	November 10, 2009
Soil Type	Kenyon loan	Webster clay loam
Fertilizer	160-64-97-25 (N-P-K-S)	150# AA + Nserve
Herbicide (Pre/Post)	Harness PRE / Lumax + Accent POST	6 pts Lumax PRE
Tillage	Conventional	Field cultivated
Previous Crop	soybean	soybean

Table 2. Mid-season (96-100 day relative maturity) corn hybrid moisture content and grain yield (15.5%) at Rock Dell and Waseca, MN and the average of both sites in 2009.

Entry Name	Traits	Maturity	Rock Dell		Waseca		2-Site Average	
96-100 Day Relative Maturity		Day	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)
Agrigold A6220VT3	VT3 Poncho 250	98	23.3	250	23.4	233	23.3	241
Agventure 5480V3R	Triple Poncho 250	98	23.2	244	23.8	241	23.5	243
Channel 199-55VT3	Apron XL + Dynasty + Maxim XL + Poncho	99	22.6	244	23.3	245	23.0	245
Croplan 4228 VT3	Cruiser Dynasty	100	23.7	239	24.2	232	23.9	235
Crows 1929VT3		99	22.1	248	23.4	234	22.7	241
DeKalb DKC 50-66	VT3 Poncho	100	22.6	240	23.3	249	22.9	245
Dahlman R48-55VT3	Maxim XL + Trilex + Poncho	97	23.4	232	23.5	210	23.5	221
Dyna Gro 54v29	Poncho	96	22.4	222	23.9	238	23.2	230
Fielder's Choice NG6510	VT3	98	23.8	229	24.4	230	24.1	230
Gold Country 96-22VT3	VT3 Poncho 250	96	22.5	245	22.9	214	22.7	230
Gold Country 98-10VT3	VT3 Poncho 250	97	23.5	240	24.3	233	23.9	236
Golden Harvest H-7143GT/CB/LL Brand	Cruiser	97	23.3	231	23.7	233	23.5	232
Golden Harvest H-7254 3000GT Brand	Cruiser	98	21.1	208	23.3	233	22.2	220
Jung 7487VT3	Poncho 250	99	22.4	244	23.1	236	22.7	240
Kaltenberg K4149 LLGT3	Poncho 250 + Maxim XL	98	23.7	222	23.7	253	23.7	237
LG Seeds LG2496VT3	Poncho	100	22.9	234	24.2	238	23.6	236
Mycogen 2M495	Cruiser	99	22.4	211	24.4	237	23.4	224
LG Seeds 2498 BT		98	22.5	234	23.2	203	22.9	218
Nutech 3T-098	VT3 Cruiser Extreme 250	98	23.6	233	23.9	221	23.8	227
Pioneer 37K11	HX1 LL RR2 Cruiser 250	99	23.5	238	23.1	220	23.3	229
Producers 5734VT3	Maxim XL + Poncho	97	23.2	224	24.1	218	23.7	221
Trelay 5T750	Maxim XL + Trilex + Poncho	100	23.2	241	22.9	238	23.0	239
Viking 7809VT3	Cruiser	98	23.3	228	23.5	209	23.4	218
Wensman W7273VT3	Poncho	98	21.8	240	23.2	234	22.5	237
	LSD (P=0.10)		NS	21	NS	20	NS	15

2009 Performance of Late Season (101-107 Day Relative Maturity) Corn Hybrids at Rock Dell and Waseca, MN

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, and Thomas R. Hoverstad

The objective of this trial was to compare the performance of late season corn hybrids (101 to 107 day relative maturity) in southern Minnesota. The trials were located at Rock Dell and Waseca, MN. Field histories are reported in Table 1. The trials were planted with a John Deere 7000 planter equipped with cone units. The seeding rate was 35,000 seeds per acre with seed planted at a depth of 1.5 inches. The plots were four rows wide. A randomized complete block design was implemented and replicated four times at Waseca and six times at Rock Dell. The two center rows of each plot at Rock Dell and Waseca were machine harvested with moisture and grain weight recorded at all sites. Table 2 provides moisture and grain yield at both sites, and the 2-site average for moisture and grain yield. In general, grain yield is still the best indicator of hybrid performance. However, grain moisture is important when looking at gross dollar return. (University of Minnesota Extension Regional Office, Rochester, and Southern Research and Outreach Center, Waseca, MN).

Table 1. Research site field history for late maturity (101-107 day relative maturity) corn hybrids in 2009.

	Rock Dell	Waseca
Planting Date	May 2, 2009	May 4, 2009
Harvest Date	November 15, 2009	November 10, 2009
Soil Type	Kenyon loan	Webster clay loam
Fertilizer	160-64-97-25 (N-P-K-S)	150# AA + Nserve
Herbicide (Pre/Post)	Harness PRE / Lumax + Accent POST	6 pts Lumax PRE
Tillage	Conventional	Field cultivated
Previous Crop	soybean	soybean

Table 2. Late season (101-107 day relative maturity) corn hybrid moisture content and grain yield (15.5%) at Rock Dell and Waseca, MN, and the average of both sites in 2009.

Entry Name	Traits	Maturity	Rock Dell		Waseca		2-Site Average	
		Day	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)
AgriGold A6309VT3	VT3 Poncho 250	103	26.1	260	25.5	233	25.8	247
Ag Venture RL6061HBW	Quad Poncho 250	101	24.7	216	23.5	217	24.1	217
Channel 207-07VT3	Apron XL + Dynasty + MaximXL + Poncho	107	30.3	215	31.3	207	30.8	211
Croplan 5338 VT3	Cruiser/Dynasty	103	25.9	235	26.7	240	26.3	237
Crow's 3848VT3		105	28.3	205	27.2	227	27.7	216
DeKalb DKC 52-59		102	22.8	227	23.2	251	23.0	239
NuTech 3T-603	VT3	103	26.2	185	25.5	232	25.8	209
Dyna Gro 55V24	Poncho	102	26.5	231	23.5	225	25.0	228
Fielder's Choice NG6583	VT3	101	25.3	208	25.0	227	25.2	217
Gold Country 101-01VT3	VT3 Poncho 250	101	25.0	233	24.5	218	24.7	225
Golden Harvest H-7807CB/LL/RW BRAND	Cruiser	102	26.0	222	25.9	203	26.0	212
Jung 7514VT3	Poncho	102	26.0	234	25.0	238	25.5	236
Kaltenberg K5355LLGTBT	Poncho Maxim XL	104	25.6	209	26.3	223	25.9	216
LG Seeds LG2510	Poncho	103	26.1	233	26.3	244	26.2	238
Mycogen 2Y547	Cruiser	103	25.8	227	24.8	245	25.3	236
NuTech 5X-005	Herculean Xtra Cruiser Extreme 250	105	29.6	168	27.9	194	28.7	181
Pioneer 36V53	HX1 LL RR2 Cruiser 250	102	24.5	219	24.9	222	24.7	220
Pioneer 35F37 **	RR2	105	26.2	223	25.2	234	25.7	229
Producers 6374VT3	Maxim XL Poncho	103	25.3	225	26.4	251	25.8	238
Renk RK698VT3	Poncho	104	22.9	205	22.4	216	22.6	210
Stine 9417VT3	Poncho	101	24.2	227	22.9	237	23.5	232
Trelay 5T429	Maxim LX Trilex Poncho 250	101	25.4	222	23.9	218	24.6	220
Viking GT5781	Cruiser	104	24.7	227	24.7	222	24.7	224
Wensman W7433VT3	Poncho	105	27.6	229	26.3	234	27.0	232
		LSD (P=0.10)	**1.4**	**20**	**1.1**	**21**	**1.0**	**15**

2009 Performance of Conventional (94-103 Day Relative Maturity) Corn Hybrids at Rock Dell and Waseca, MN

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, and Thomas R. Hoverstad

The objective of this trial was to compare the performance of conventional corn hybrids in southern Minnesota. The trials were located at Rock Dell and Waseca, MN. Field histories are reported in Table 1. The trials were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 35,000 seeds per acre with seed planted at a depth of 1.5 inches. The plots were four rows wide. A randomized complete block design was implemented and replicated four times at Waseca and six times at Rock Dell. The two center rows of each plot were machine harvested with moisture and grain weight recorded at all sites. Table 2 provides moisture and grain yield at both sites, and the 2-site average for moisture and grain yield. (University of Minnesota Extension Regional Office, Rochester, and Southern Research and Outreach Center, Waseca, MN).

Table 1. Research site field history for conventional corn hybrid trials in 2009.

	Rock Dell	Waseca
Planting Date	May 2, 2009	May 4, 2009
Harvest Date	November 15, 2009	November 10, 2009
Soil Type	Kenyon loan	Webster clay loam
Fertilizer	160-64-97-25 (N-P-K-S)	150# AA + Nserve
Herbicide (PRE/POST)	Harness PRE / Lumax + Accent POST	6 pts Lumax PRE
Tillage	Conventional	Field cultivated
Previous Crop	soybean	soybean

Table 2. Conventional corn hybrid moisture content and grain yield (15.5%) at Rock Dell and Waseca, MN, and the average of both sites in 2009.

Entry Name	Seed Treatment	Maturity	Rock Dell		Waseca		2-site Average	
		Day	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)
AgriGold A6323CL	Poncho 250	103	24.9	215	23.0	225	23.9	220
Fielders Choice 7435		94	23.1	218	20.5	218	21.8	218
Golden Harvest H-7961	Cruiser 250	103	24.9	209	22.6	229	23.7	219
Kaltenberg K4030	Maxim XL Poncho 250	97	25.1	225	22.7	211	23.9	218
LG Seeds LG2509	Poncho 250	103	25.0	210	22.8	235	23.9	222
Pioneer 35F38	Cruiser 250	105	26.0	221	23.8	241	24.9	231
Producers 6360		103	24.9	194	22.9	230	23.9	212
Renk RK584		100	25.5	200	22.2	214	23.9	207
Viking 60-01N	Cruiser 250	101	24.3	212	22.4	232	23.4	222
LSD (P=0.10)			1.1	NS	0.9	NS	0.7	NS

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2009 Performance of Corn Hybrid Families at Rock Dell and Waseca, MN

Behnken, Lisa M., Fritz R. Breitenbach, Ryan P. Miller, and Thomas R. Hoverstad

The objective of this trial was to compare the performance of corn hybrids families in southern Minnesota. The trials were located at Rock Dell and Waseca, MN. Field histories are reported in Table 1. The trials were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 35,000 seeds per acre with seed planted at a depth of 1.5 inches. The plots were four rows wide. A randomized complete block design was implemented and replicated four times at Waseca and five times at Rock Dell. The two center rows of each plot were machine harvested with moisture and grain weight recorded at all sites. Table 2 provides moisture and grain yield at both sites, and the 2-site average for moisture and grain yield. (University of Minnesota Extension Regional Office, Rochester, and Southern Research and Outreach Center, Waseca, MN).

Table 1. Research site field history for corn hybrid families in 2009.

	Rock Dell	Waseca
Planting Date	May 2, 2009	May 4, 2009
Harvest Date	November 15, 2009	November 10, 2009
Soil Type	Kenyon loan	Webster clay loam
Fertilizer	160-64-97-25 (N-P-K-S)	150# AA + Nserve
Herbicide (Pre/Post)	Harness PRE / Lumax + Accent POST	6 pts Lumax PRE
Tillage	Conventional	Field cultivated
Previous Crop	soybean	soybean

Table 2. Corn grain yield (15.5%) and moisture of hybrid families at Rock Dell and Waseca, MN, and the average of both sites in 2009.

Entry Name Family	Traits	Description Relative Maturity (Days)	Rock Dell Moisture (%)	 Yield (bu/A)	Waseca Moisture (%)	 Yield (bu/A)	2-Site Average Moisture (%)	 Yield (bu/A)
DKC 52-62	RR2	102	21.8	216	22.4	224	22.1	220 ab
DKC 52-63	RR2 YGCB	102	21.5	208	22.3	227	21.9	217 abc
DKC 52-59	VT3	102	21.2	223	22.0	235	21.6	229 a
LSD (P=0.10)			NS	9	NS	NS	NS	NS
DKC 50-47	RR2	100	22.4	180	23.5	216	22.9	198 cd
DKC 50-44	VT3	100	23.0	217	23.3	244	23.2	231 a
DKC 50-48	RR2 YGCB	100	23.6	206	23.8	224	23.7	215 abc
LSD (P=0.10)			NS	NS	NS	NS	NS	20
Pioneer 35F37	RR2	105	24.2	199	24.7	228	24.5	213 abc
Pioneer 35F40	HX1 LL RR2	105	25.8	206	25.8	235	25.8	220 ab
Pioneer 35F44	HXX LL RR2	105	25.4	190	24.6	244	25.0	217 ab
LSD (P=0.10)			NS	NS	1.0	21	0.8	20
Pioneer 38P40	RR2	99	21.6	190	21.8	219	21.7	205 bc
Pioneer 38P43	HXX LL RR2	99	22.2	172	23.2	196	22.7	184 d
LSD (P=0.10)			NS	NS	1.0	21	0.8	20

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2009 Performance of Waxy Corn Hybrids at Hope and Waseca, MN

Miller, Ryan P., Lisa M. Behnken, and Fritz R. Breitenbach

The objective of this trial was to compare the performance of waxy corn hybrids in southern Minnesota. The trials were located at Hope and Waseca, MN. Field histories are reported in Table 1. The trials were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 35,000 seeds per acre with seed planted at a depth of 1.5 inches. The plots were four rows wide. A randomized complete block design was implemented and replicated four times at both locations. The two center rows of each plot were machine harvested at Waseca and eight feet of the center two rows was hand harvested at Hope. Table 2 provides test weight and grain yield at Hope, and moisture and grain yield at Waseca. (University of Minnesota Extension Regional Office, Rochester, and Southern Research and Outreach Center, Waseca, MN).

Table 1. Research site field history for waxy corn trials at Hope and Waseca, MN in 2009.

	Hope	Waseca
Planting Date	May 14, 2009	May 28, 2010
Harvest Date	October 19, 2009	October 20, 2009
Soil Type	Biscay Loam	Nicollet/Webster clay loam
Tillage	Conventional	Cultivated twice, rolled after planting
Herbicide (Pre/Post)		Treflan + Pursuit PRE, Basagran POST
Previous Crop	Soybean	Soybean

Table 2. Waxy corn hybrid test weight, grain yield at 15.5% at Hope and and moisture content and yield at Waseca, MN, in 2009.

Entry Name		Description	Hope		Waseca	
		Relative Maturity (Days)	Test Weight (lb/bu)	Yield (bu/A)	Moisture (%)	Yield (bu/A)
Agrigold A6333WX	Poncho 250	104	46.3	208.9	27.9	195.2
Agrigold A6326WX	Poncho 250	104	53.6	171.2	25.2	206.7
Agrigold A6395WXBT	(CB-MON 810) Poncho 250	108	46.9	167.1	28.7	217.1
Agrigold A6426WX		108	49.7	177.0	30.0	221.5
Cappel 2150		108	51.0	149.9	24.4	211.9
Cappel 2260		106	52.5	162.9	27.3	224.9
Cappel 2350		105	52.1	187.5	26.9	196.0
Cappel 3130		96	49.6	164.1	21.4	193.9
Pioneer 35F36	(HX1 LL RR2) Cruiser 250	105	51.9	178.5	25.5	243.3
Pioneer 37F71	Cruiser 250	101	47.9	176.3	24.3	232.1
Viking 60-01	Day Gaucho	101	52.4	189.6	23.4	244.1
Viking 40-09N	Day Poncho 250	109	51.2	168.0	26.1	229.9
		LSD (P=0.10)	4.0	NS	1.1	17.8

SECTION B

CORN

HERBICIDE TRIALS

New Corn Herbicides for 2010 found in the 2009 Reports

1. ***Halex GT =*** s-metolachlor (*Dual II*) + glyphosate + mesotrione (*Callisto*) [SYNGENTA]
2. ***Integrity*** = saflufenacil (*Sharpen*) + dimethenamid-P (*Outlook*) [BASF]
3. ***Callisto Xtra*** = mesotrione (*Callisto*) + atrazine [SYNGENTA]
4. ***Capreno*** = thiencarbazone-methyl + tembotrione (*Laudis*) [BAYER]

Performance of Integrity and Sharpen Herbicide Programs for Weed Control in Field Corn in SE Minnesota

Behnken, Lisa B., Fritz R. Breitenbach, Ryan P. Miller, Ceara L. Suther and Sarah A. Stellpflug.

The objective of this trial was to evaluate the performance of Integrity and Sharpen herbicide programs for weed control in corn in Southeastern Minnesota. The research site was a Lawler loam series with a pH of 7.0 and soil test P and K levels of 73 ppm and 191 ppm, respectively. Spring fertilizer was broadcast ahead of planting on April 17, at a rate of 126-35-120-24 (N-P-K-S). This area was side dressed with an additional 30 lb/a of N on June 15. The field was spring disked and field cultivated once prior to planting. The corn hybrid, Pioneer 35F44, was planted on May 8, 2009, at a depth of 1.5 inches in 30 inch rows at 35,000 seeds per acre. A randomized complete block design was used with four replications. Pre-plant incorporated (PPI), preemergence (PRE), and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on June 1, 9, 15, and 24, and July 20. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on November 13, 2009.

Date	**5/8**	**5/11**	**6/5**
Treatment	PPI	PRE	POST I
Temperature (F)			
Air	66	59	75
Soil	64	57	
Relative Humidity (%)	37	36	33
Wind (mph)	9	0	18
Soil Moisture	Inadequate	Adequate	Inadequate
Corn			
Stage			V4
Height (inch)			6.0
Giant Ragweed			
Weed density (ft^2)			8.5
Height (inch)			4.0
Common Lambsquarters			
Weed density (ft^2)			4.3
Height (inch)			2.3
Common Waterhemp			
Weed density (ft^2)			43
Height (inch)			1.8
Giant foxtail			
Weed density (ft^2)			5
Height (inch)			2.5
Rainfall after each application (inch)			
Week 1	0.61	0.61	1.97
Week 2	0	0.19	1.03
Week 3	1.95	1.76	0.17

Table 1. Performance of Integrity and Sharpen herbicide for giant ragweed control in field corn at Rochester, MN, in 2009.

Treatment	Rate	Giant Ragweed Control					Yield
		6/1	6/9	6/15	6/24	7/20	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	7 c
PPI							
Integrity	20 fl oz/a	96	96	94	92	92	167 b
PRE							
Integrity	20 fl oz/a	85	91	88	87	85	169 b
Camix	2.0 qt/a	74	86	83	84	87	169 b
PRE / POST I							
Integrity / Roundup PowerMax + Status + NIS + AMS	13 fl oz/a / 22 fl oz/a + 2.5 oz wt/a + 0.25% v/v + 17 lb/100 gal	78	86	97	95	96	189 a
Sharpen + Harness / Roundup PowerMax + NIS + AMS	3 fl oz/a + 1.25 pt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	84	90	97	97	96	176 ab
SureStart / Rounup PowerMax + NIS + AMS	1.75 pt/a / 22 fl oz/a + 0.35% v/v + 17 lb/100 gal	72	78	95	95	93	183 ab
Harness / Roundup PowerMax + NIS + AMS	1.25 pt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	68	62	95	92	88	176 ab
	LSD (P=0.10)	**4**	**5**	**2**	**3**	**3**	**19**

Table 2. Performance of Integrity and Sharpen herbicide for common lambsquarters control in field corn at Rochester, MN, in 2009.

Treatment	Rate	Common Lambsquarters Control					Yield
		6/1	6/9	6/15	6/24	7/20	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	7 c
PPI							
Integrity	20 fl oz/a	99	96	98	96	84	167 b
PRE							
Integrity	20 fl oz/a	98	96	98	94	89	169 b
Camix	2.0 qt/a	99	96	99	99	94	169 b
PRE / POST I							
Integrity / Roundup PowerMax + Status + NIS + AMS	13 fl oz/a / 22 fl oz/a + 2.5 oz wt/a + 0.25% v/v + 17 lb/100 gal	95	96	99	99	92	189 a
Sharpen + Harness / Roundup PowerMax + NIS + AMS	3 fl oz/a + 1.25 pt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	95	97	99	99	92	176 ab
SureStart / Rounup PowerMax + NIS + AMS	1.75 pt/a / 22 fl oz/a + 0.35% v/v + 17 lb/100 gal	91	93	96	96	88	183 ab
Harness / Roundup PowerMax + NIS + AMS	1.25 pt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	92	93	98	97	91	176 ab
	LSD (P=0.10)	**4**	**3**	**2**	**5**	**4**	**19**

Table 3. Performance of Integrity and Sharpen herbicide for common waterhemp control in field corn at Rochester, MN, in 2009.

Treatment	Rate	Common Waterhemp Control					Yield
		6/1	6/9	6/15	6/24	7/20	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	7 c
PPI							
Integrity	20 fl oz/a	99	97	96	95	85	167 b
PRE							
Integrity	20 fl oz/a	95	92	93	95	88	169 b
Camix	2.0 qt/a	94	92	91	91	88	169 b
PRE / POST I							
Integrity / Roundup PowerMax + Status + NIS + AMS	13 fl oz/a / 22 fl oz/a + 2.5 oz wt/a + 0.25% v/v + 17 lb/100 gal	91	97	99	99	95	189 a
Sharpen + Harness / Roundup PowerMax + NIS + AMS	3 fl oz/a + 1.25 pt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	96	98	99	99	95	176 ab
SureStart / Rounup PowerMax + NIS + AMS	1.75 pt/a / 22 fl oz/a + 0.35% v/v + 17 lb/100 gal	94	96	99	98	91	183 ab
Harness / Roundup PowerMax + NIS + AMS	1.25 pt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	97	97	99	99	95	176 ab
	LSD (P=0.10)	**4**	**4**	**4**	**5**	**6**	**19**

Table 4. Performance of Integrity and Sharpen herbicide for giant foxtail control in field corn at Rochester, MN, in 2009.

Treatment	Rate	Giant Foxtail Control					Yield
		6/1	6/9	6/15	6/24	7/20	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	7 c
PPI							
Integrity	20 fl oz/a	94	97	96	96	86	167 b
PRE							
Integrity	20 fl oz/a	87	92	96	93	83	169 b
Camix	2.0 qt/a	81	86	93	82	78	169 b
PRE / POST I							
Integrity / Roundup PowerMax + Status + NIS + AMS	13 fl oz/a / 22 fl oz/a + 2.5 oz wt/a + 0.25% v/v + 17 lb/100 gal	81	90	99	98	96	189 a
Sharpen + Harness / Roundup PowerMax + NIS + AMS	3 fl oz/a + 1.25 pt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	84	92	99	99	96	176 ab
SureStart / Rounup PowerMax + NIS + AMS	1.75 pt/a / 22 fl oz/a + 0.35% v/v + 17 lb/100 gal	93	94	99	99	96	183 ab
Harness / Roundup PowerMax + NIS + AMS	1.25 pt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	96	98	99	99	97	176 ab
	LSD (P=0.10)	**7**	**5**	**3**	**3**	**7**	**19**

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Comparison of the Impact of BMP Rates of Atrazine Tank Mixed with Several Broadleaf Herbicides in Field Corn at Rochester, MN, in 2007, 2008 and 2009

Behnken, Lisa M., Fritz R. Breitenbach, Ryan P. Miller, Jeffrey L. Gunsolus, Jodie Getting, Anthony D. Gehling, Katherine M. Sheehan, and Jason Welter.

The Minnesota Department of Agriculture has developed voluntary Best Management Practices (BMP) for the use of atrazine in areas where it is frequently detected in ground and surface waters. The purpose of these BMPs is to prevent the degradation of water resources while maintaining atrazine's effectiveness as part of an integrated weed management program. The objectives of this trial were: 1) To evaluate weed control of herbicide programs with and without atrazine applied at BMP rates, 2) To evaluate performance of herbicides used as replacements for atrazine and 3) To evaluate crop safety and economics of potential replacements in field corn in southeastern Minnesota.

In 2007, the research site was a Lawler loam series with a pH of 7.0 and soil test P and K levels of 16 ppm and 160 ppm, respectively. Spring fertilizer was broadcast ahead of planting on April 13, at a rate of 99-23-60-24 (N-P-K-S). The area was side dressed with an additional 30 lb/A of N on June 7. The field was spring disked twice and field cultivated once prior to planting. The corn hybrid, Pioneer 38H65, was planted on April 27, 2007 at a depth of 1.5 inches in 30 inch rows at 32,000 seeds per acre. Evaluations of the plots were taken on May 30, June 4, June 11, and June 28 and August 10, 2007.

In 2008, the research site was a Lawler loam series with a pH of 6.7, organic matter 3.2%, and soil test P and K levels of 22 ppm and 126 ppm, respectively. Spring fertilizer was broadcast ahead of planting on April 16, at a rate of 120-36-86-28 (N-P-K-S). The area was side dressed with an additional 35 b/A of N on June 25. The field was fall chisel plowed, spring disked once and field cultivated once prior to planting. The corn hybrid, DeKalb DKC50-19 101RM, was planted on May 9, 2008, at a depth of 2.0 inches in 30 inch rows at 35,000 seeds per acre. Evaluations of the plots were taken on June 9, 18, July 1 and 30, 2008.

In 2009, treatments were modified to evaluate additional atrazine replacement options. The research site was a Lawler loam series with a pH of 6.8 and soil test P and K levels of 37 ppm and 115 ppm, respectively. Spring fertilizer was broadcast ahead of planting on April 17th at a rate of 126-35-120-24 (N-P-K-S). The area was side dressed with an additional 30 lb/A of N on June 15. The field was spring disked and field cultivated once prior to planting. The corn hybrid, Pioneer 35F44, was planted on May 8th, 2009, at a depth of 1.5 inches in 30 inch rows at 35,000 seeds per acre.

Evaluations of the plots were taken on May 28, June 11, 16, and 24, and August 27. Application dates, environmental conditions, and weed stages are listed below.

A randomized complete block design was used with four replications. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Application dates, environmental conditions, and weed stages are listed below in Tables 1, 2, and 3. The center two rows of each plot were machine harvested on September 26, 2007, November 3, 2008, and November 13, 2009.

CONCLUSIONS

In 2007, soil applied atrazine (Bicep Lite II Mag) applied at recommended BMP rates for SE Minnesota resulted in no improvement of broadleaf weed control compared to the no atrazine control of Dual II Mag (data not shown). Postemergence programs that included atrazine at 0.5 lb/A, which is lower than the BMP rate of 0.8 ln/A for SE Minnesota, significantly improved postemergence weed control.

In 2007 and 2008, giant ragweed control was improved when postemergence treatments included atrazine. In 2008, Callisto + either Buctril or Clarity provided giant ragweed control similar to Callisto + AAtrex 4L. However, Callisto + Buctril resulted in 20% injury to corn. Hornet + AAtrex 4L or Callisto at a reduced rate, 1 fl oz/a, provided significantly greater giant ragweed control than Hornet applied alone. Hornet + Callisto provided greater giant ragweed control than Hornet + AAtrex 4L, 97 compared to 91%, respectively. In 2008, Clarity + Callisto provided giant ragweed control equivalent to Clarity + AAtrex 4L.

In 2007 and 2008, common waterhemp and common lambsquarters control were similar for Callisto and Callisto + AAtrex 4L. Hornet + AAtrex 4L and Clarity + AAtrex 4L provided greater control of common waterhemp and common lambsquarters in 2007. In 2008, common waterhemp control was improved significantly with the addition of either the BMP rate of atrazine or Callisto to Hornet as compared to Hornet alone. Also, common waterhemp control with Hornet + Callisto at 1 fl oz/a was significantly greater than with Hornet + AAtrex 4L, 94 compared to 80%, respectively.

In 2009, the addition of AAtrex 4L provided no additional control of common waterhemp, common lambsquarters, velvetleaf or woolly cupgrass for the preemergence programs of SureStart or Camix. For the postemergence programs in 2009, the addition of AAtrex 4L to Ignite improved common waterhemp and common lambsquarters control compared to Ignite alone or with Buctril. The addition of Buctril to Ignite reduced common lambsquarters to 83% control and woolly cupgrass to 87% control compared to Ignite alone (87 and 94%) or Ignite + AAtrex 4L (98 and 93%), respectively. The addition of AAtrex 4L or Buctril to Capreno or Halex GT did not improve common waterhemp, common lambsquarters or velvetleaf control. However, woolly cuprass control was reduced with the addition of AAtrex 4L or Buctril to Capreno.

Corn grain yields were greater for both Callisto + AAtrex 4L and Hornet + AAtrex 4L when compared to their non-atrazine partners in 2007. Due to plot variability in 2008, corn yields were not significantly different at the P≤ 0.10. In 2009, corn grain yields for comparisons with and without AAtrex 4L were not different. However, Ignite + Buctril resulted in lower grain yield compared to Ignite alone or with AAtrex 4L, 163 compared to 182 and 180 bu/A, respectively.

BMP rates of atrazine can improve the effectiveness of Callisto, Hornet and Clarity on certain weeds and increase grain yields. The data from 2008 would indicate that Buctril, Callisto, and Clarity may be potential replacements for atrazine. However more research is necessary and crop safety is a concern with Buctril. (University of Minnesota Extension, Regional Office – Rochester).

Table 1. Application dates, conditions, and plant stages in 2007, 2008, and 2009.

Date	**4/27/2007**	**5/23/2007**	**5/9/2008**	**6/2/2008**	**5/8/2009**	**6/11/2009**	**6/20/2009**
Treatment	PRE	POST	PRE	POST I	PRE	POST I	POST II
Temperature (F)							
Air	71	70	61	72	69	67	83
soil	62.1	69.4	61	62	56	68.7	78.0
Relative Humidity (%)	34	70	32	57	33	48	39
Wind (mph)	10	23	9	8	0	10	13
Soil moisture	Adequate	Excessive	Adequate	Excessive	Inadequate	Adequate	Adequate
Corn							
stage	--	3 collar	--	V1-V2	--		7-collar
height (inch)	--	4.0	--	3.5	--	6.0	20.0
Giant Ragweed							
weed density (ft^2)	--	24.9	--	1.8	--	2.9	2.9
height (inch)	--	1.6	--	2.6	--	3.9	2.3
Common Lambsquarters							
weed density (ft^2)	--	4	--	21.5	--	12.1	12.1
height (inch)	--	1.1	--	1.3	--	6.6	
Common Waterhemp							
weed density (ft^2)	--	3.5	--	89.4	--	3.0	3.0
height (inch)	--	1.1	--	0.7	--	2.9	3.0
Giant Foxtail							
weed density (ft^2)	--	1.5	--	3	--	23.5	23.5
height (inch)	--	1.3	--	1.7	--	4.1	5.0
Velvetleaf							
weed density (ft^2)	--	1.5	--		--	0	0
height (inch)	--	2.0	--		--	1.5	
Rainfall after each application (inch)							
week 1	0.52	2.04	1.07	4.79	0.61	1.24	0.32
week 2	0.52	1.28	0.08	3.52	0.00	0.15	0.21
week 3	0.34	0.38	2.15	0.00	1.95	0.17	0.85

Table 2. Performance of herbicide systems for giant ragweed control in field corn on May 30, June 4, 11, 28, and August 10 at Rochester, MN in 2007.

Treatment	Rate	Giant Ragweed Control					Yield
		5/30	6/4	6/11	6/28	8/10	15.5%
	(rate/A)	(%)					(bu/A)
PRE							
Dual II Mag	1 pt	0	0	0	0	0	5
Bicep Lite II Mag	2.3 pt	0	0	0	0	0	4
PRE / POST I							
Dual II Mag / Callisto + COC + 28% UAN	1 pt / 3 fl oz + 1% v/v + 2.5% v/v	73	88	82	87	84	124
Dual II Mag / Callisto + Aatrex + COC + 28% UAN	1 pt / 3 fl oz + 16 fl oz + 1% v/v + 2.5% v/v	95	96	94	96	95	159
Dual II Mag / Hornet + COC + 28% UAN	1 pt / 3 oz + 1% v/v + 2.5% v/v	76	78	73	89	81	109
Dual II Mag / Hornet + Aatrex + COC + 28% UAN	1 pt / 3 oz + 16 fl oz + 1% v/v + 2.5% v/v	92	93	90	92	93	142
Dual II Mag / Clarity + 28% UAN	1 pt / 1 pt + 2.5% v/v	76	85	79	77	74	97
Dual II Mag / Clarity + Aatrex + 28% UAN	1 pt / 1 pt + 16 fl oz + 2.5% v/v	93	94	88	90	86	120
	LSD (P=0.10)	**4**	**3**	**3**	**3**	**3**	**25**

Table 3. Performance of herbicide systems for giant ragweed control in field corn on June 9, 18, July 1 and 30 at Rochester, MN, in 2008.

Treatment	Rate	Giant Ragweed Control				Yield
		6/9	6/18	7/1	7/30	
	(rate/A)	(%)				(bu/A)
PRE / POST I						
Dual II Mag / Callisto + COC + 28% UAN	1 pt / 3 fl oz + 1% v/v + 2.5% v/v	71	84	86	86	187
Dual II Mag / Callisto + Aatrex + COC + 28% UAN	1 pt / 3 fl oz + 16 fl oz + 1% v/v + 2.5 % v/v	90	96	96	98	227
Dual II Mag / Callisto + Buctril + COC + 28% UAN	1 pt / 3 fl oz + 6 fl oz + 1% v/v + 2.5% v/v	95	96	96	96	234
Dual II Mag / Callisto + Clarity + COC + 28% UAN	1 pt / 3 fl oz + 4 fl oz + 1% v/v + 2.5% v/v	78	96	96	99	234
Dual II Mag / Hornet + COC + 28% UAN	1 pt / 3 oz wt + 1% v/v + 2.5% v/v	75	83	92	86	194
Dual II Mag / Hornet + Aatrex + COC + 28% UAN	1 pt / 3 oz wt + 16 fl oz + 1% v/v + 2.5% v/v	90	95	96	91	216
Dual II Mag / Hornet + Callisto + COC + 28% UAN	1 pt / 3 oz wt + 1 fl oz + 1% v/v + 2.5% v/v	80	92	92	97	212
Dual II Mag / Clarity + 28% UAN	1 pt / 1 pt + 2.5% v/v	72	92	89	92	209
Dual II Mag / Clarity + Aatrex + 28% UAN	1 pt / 1 pt + 16 fl oz + 2.5% v/v	91	97	95	97	230
Dual II Mag / Clarity + Callisto + COC + 28% UAN	1 pt / 1 pt + 1 fl oz + 1% v/v + 2.5% v/v	78	97	95	97	218
	LSD (P=0.10)	**4**	**4**	**5**	**3**	**NS**

Table 4. Performance of herbicide systems for common lambsquarters control in field corn on May 3, June 4, 11, 28, and August 10 at Rochester, MN in 2007.

Treatment	Rate	Common Lambsquarters Control					Yield
		5/30	6/4	6/11	6/28	8/10	15.5%
	(rate/A)	(%)					(bu/A)
PRE							
Dual II Mag	1 pt	30	40	0	0	0	5
Bicep Lite II Mag	2.3 pt	36	40	0	0	0	4
PRE / POST I							
Dual II Mag / Callisto + COC + 28% UAN	1 pt / 3 fl oz + 1% v/v + 2.5% v/v	85	93	99	99	99	124
Dual II Mag / Callisto + Aatrex + COC + 28% UAN	1 pt / 3 fl oz + 16 fl oz + 1% v/v + 2.5% v/v	99	99	99	99	99	159
Dual II Mag / Hornet + COC + 28% UAN	1 pt / 3 oz + 1% v/v + 2.5% v/v	70	78	70	71	68	109
Dual II Mag / Hornet + Aatrex + COC + 28% UAN	1 pt / 3 oz + 16 fl oz + 1% v/v + 2.5% v/v	98	99	99	99	99	142
Dual II Mag / Clarity + 28% UAN	1 pt / 1 pt + 2.5% v/v	75	73	77	81	74	97
Dual II Mag / Clarity + Aatrex + 28% UAN	1 pt / 1 pt + 16 fl oz + 2.5% v/v	97	98	99	99	99	120
	LSD (P=0.10)	**4**	**6**	**4**	**4**	**3**	**25**

Table 5. Performance of herbicide systems for common lambsquarter control in field corn on June 9, 18, July 1 and 30 at Rochester, MN, in 2008.

Treatment	Rate	Common Lambsquarter Control				Yield
		6/9	6/18	7/1	7/30	
	(rate/A)	(%)				(bu/A)
PRE / POST I						
Dual II Mag / Callisto + COC + 28% UAN	1 pt / 3 fl oz + 1% v/v + 2.5% v/v	81	99	99	98	187
Dual II Mag / Callisto + Aatrex + COC + 28% UAN	1 pt / 3 fl oz + 16 fl oz + 1% v/v + 2.5 % v/v	96	99	99	99	227
Dual II Mag / Callisto + Buctril + COC + 28% UAN	1 pt / 3 fl oz + 6 fl oz + 1% v/v + 2.5% v/v	97	99	99	97	234
Dual II Mag / Callisto + Clarity + COC + 28% UAN	1 pt / 3 fl oz + 4 fl oz + 1% v/v + 2.5% v/v	80	99	99	99	234
Dual II Mag / Hornet + COC + 28% UAN	1 pt / 3 oz wt + 1% v/v + 2.5% v/v	76	95	97	98	194
Dual II Mag / Hornet + Aatrex + COC + 28% UAN	1 pt / 3 oz wt + 16 fl oz + 1% v/v + 2.5% v/v	94	99	99	98	216
Dual II Mag / Hornet + Callisto + COC + 28% UAN	1 pt / 3 oz wt + 1 fl oz + 1% v/v + 2.5% v/v	78	99	99	99	212
Dual II Mag / Clarity + 28% UAN	1 pt / 1 pt + 2.5% v/v	74	95	96	99	209
Dual II Mag / Clarity + Aatrex + 28% UAN	1 pt / 1 pt + 16 fl oz + 2.5% v/v	92	99	99	99	230
Dual II Mag / Clarity + Callisto + COC + 28% UAN	1 pt / 1 pt + 1 fl oz + 1% v/v + 2.5% v/v	81	99	99	99	218
	LSD (P=0.10)	**5**	**2**	**2**	**NS**	**NS**

Table 6. Performance of herbicide systems for common lambsquarters control in field corn on May 28, June 11, 16, and 24 and August 27 at Rochester, MN, in 2009.

Treatment	Rate	Common Lambsquarters Control					Yield
		5/28	6/11	6/16	6/24	8/27	
	(rate/A)			(%)			(bu/A)
Untreated Check		0	0	0	0	0	24
Weed Free		100	100	100	100	100	171
PRE							
SureStart	1.75 pt	89	96	96	81	82	162
SureStart+ Aatrex 4L	1.75 pt + 20 fl oz	86	95	94	81	82	160
PRE/POST I							
Dual II Mag/Laudis + MSO + UAN	1 pt/3 fl oz + 1% v/v + 1.5 qt	63	63	60	93	99	163
Dual II Mag/Laudis + Clarity + COC + UAN	1 pt/3 fl oz + 4 fl oz + 1% v/v +0.5 qt	61	61	60	93	99	168
Dual II Mag/Ignite + AMS	1 pt/22 fl oz + 10 lb/100 gal	56	61	71	93	87	182
Dual II Mag/Ignite + Aatrex 4L + AMS	1 pt/22 fl oz + 1 pt + 10 lb/100 gal	60	60	73	98	98	180
Dual II Mag/Ignite + Buctril + AMS	1 pt/22 fl oz + 6 fl oz + 10 lb/100 gal	56	60	71	85	83	163
Dual II Mag/Capreno + MSO + UAN	1 pt/3 fl oz + 1% v/v + 1.5 qt	54	61	61	84	98	175
Dual II Mag/Capreno + Aatrex 4L + MSO + UAN	1 pt/3 fl oz + 1 pt + 1% v/v + 1.5 qt	58	61	63.	99	99	162
Dual II Mag/Capreno + Buctril + COC + UAN	1 pt/3 fl oz + 6 fl oz + 1% v/v + 1.5 qt	59	63	65	99	98	178
PRE/POST II							
Camix/Accent + MSO + UAN	2 qt/0.67 oz wt + 1% v/v + 1.5 qt	90	99	99	99	99	180
Lumax/Accent + MSO + UAN	2.5 qt/0.67 oz wt + 1% v/v + 1.5 qt	95	99	99	99	99	175
POST I							
Halex GT + NIS + AMS	3.6 pt + 0.25 % v/v + 10 lb/100 gal	0	0	69	97	98	166
Halex GT + Aatrex 4L + NIS + AMS	3.6 pt + 1 pt + 0.25 % v/v + 10 lb/100 gal	0	0	66	99	99	176
Halex GT + Buctril + NIS + AMS	3.6 pt + 6 fl oz + 0.25 % v/v + 10 lb/100 gal	0	0	69	99	99	173
	LSD (P=0.10)	**5**	**2**	**4**	**4**	**3**	**17**

Table 7. Performance of herbicide systems for common waterhemp control in field corn on May 30, June 4, 11, 28, and August 10 at Rochester, MN in 2007.

Treatment	Rate	Common Waterhemp Control					Yield
		5/30	6/4	6/11	6/28	8/10	15.5%
	(rate/A)	(%)					(bu/A)
PRE							
Dual II Mag	1 pt	40	70	0	0	0	5
Bicep Lite II Mag	2.3 pt	40	73	0	0	0	4
PRE / POST I							
Dual II Mag / Callisto + COC + 28% UAN	1 pt / 3 fl oz + 1% v/v + 2.5% v/v	96	92	97	90	94	124
Dual II Mag / Callisto + Aatrex + COC + 28% UAN	1 pt / 3 fl oz + 16 fl oz + 1% v/v + 2.5% v/v	99	99	99	98	98	159
Dual II Mag / Hornet + COC + 28% UAN	1 pt / 3 oz + 1% v/v + 2.5% v/v	81	91	78	82	70	109
Dual II Mag / Hornet + Aatrex + COC + 28% UAN	1 pt / 3 oz + 16 fl oz + 1% v/v + 2.5% v/v	87	95	86	83	86	142
Dual II Mag / Clarity + 28% UAN	1 pt / 1 pt + 2.5% v/v	83	92	84	87	73	97
Dual II Mag / Clarity + Aatrex + 28% UAN	1 pt / 1 pt + 16 fl oz + 2.5% v/v	96	94	87	88	88	120
	LSD (P=0.10)	**4**	**5**	**4**	**4**	**4**	**25**

Table 8. Performance of herbicide systems for common waterhemp control in field corn on June 9, 18, July 1 and 30 at Rochester, MN, in 2008.

Treatment	Rate	Common Waterhemp Control				Yield
		6/9	6/18	7/1	7/30	
	(rate/A)	(%)				(bu/A)
PRE / POST I						
Dual II Mag / Callisto + COC + 28% UAN	1 pt / 3 fl oz + 1% v/v + 2.5% v/v	83	99	98	93	187
Dual II Mag / Callisto + Aatrex + COC + 28% UAN	1 pt / 3 fl oz + 16 fl oz + 1% v/v + 2.5 % v/v	92	99	98	94	227
Dual II Mag / Callisto + Buctril + COC + 28% UAN	1 pt / 3 fl oz + 6 fl oz + 1% v/v + 2.5% v/v	97	99	98	95	234
Dual II Mag / Callisto + Clarity + COC + 28% UAN	1 pt / 3 fl oz + 4 fl oz + 1% v/v + 2.5% v/v	78	99	97	95	234
Dual II Mag / Hornet + COC + 28% UAN	1 pt / 3 oz wt + 1% v/v + 2.5% v/v	63	71	50	41	194
Dual II Mag / Hornet + Aatrex + COC + 28% UAN	1 pt / 3 oz wt + 16 fl oz + 1% v/v + 2.5% v/v	81	87	84	80	216
Dual II Mag / Hornet + Callisto + COC + 28% UAN	1 pt / 3 oz wt + 1 fl oz + 1% v/v + 2.5% v/v	74	99	98	94	212
Dual II Mag / Clarity + 28% UAN	1 pt / 1 pt + 2.5% v/v	76	97	92	91	209
Dual II Mag / Clarity + Aatrex + 28% UAN	1 pt / 1 pt + 16 fl oz + 2.5% v/v	96	99	94	92	230
Dual II Mag / Clarity + Callisto + COC + 28% UAN	1 pt / 1 pt + 1 fl oz + 1% v/v + 2.5% v/v	86	99	96	92	218
	LSD (P=0.10)	**7**	**2**	**2**	**3**	**NS**

Table 9. Performance of herbicide systems for common waterhemp control in field corn on May 28, June 11, 16, and 24 and August 27 at Rochester, MN, in 2009.

Treatment	Rate	Common Waterhemp Control					Yield
		5/28	6/11	6/16	6/24	8/27	
	(rate/A)	(%)					(bu/A)
Untreated Check		0	0	0	0	0	24
Weed Free		100	100	100	100	100	171
PRE							
SureStart	1.75 pt	93	99	97	95	93	162
SureStart+ Aatrex 4L	1.75 pt + 20 fl oz	92	98	97	94	94	160
PRE/POST I							
Dual II Mag/Laudis + MSO + UAN	1 pt/3 fl oz + 1% v/v + 1.5 qt	69	65	86	92	93	163
Dual II Mag/Laudis + Clarity + COC + UAN	1 pt/3 fl oz + 4 fl oz + 1% v/v +0.5 qt	70	65	88	87	95	168
Dual II Mag/Ignite + AMS	1 pt/22 fl oz + 10 lb/100 gal	65	66	93	96	84	182
Dual II Mag/Ignite + Aatrex 4L + AMS	1 pt/22 fl oz + 1 pt + 10 lb/100 gal	66	66	90	98	98	180
Dual II Mag/Ignite + Buctril + AMS	1 pt/22 fl oz + 6 fl oz + 10 lb/100 gal	64	64	90	92	85	163
Dual II Mag/Capreno + MSO + UAN	1 pt/3 fl oz + 1% v/v + 1.5 qt	69	65	82	96	99	175
Dual II Mag/Capreno + Aatrex 4L + MSO + UAN	1 pt/3 fl oz + 1 pt + 1% v/v + 1.5 qt	68	63	86	99	99	162
Dual II Mag/Capreno + Buctril + COC + UAN	1 pt/3 fl oz + 6 fl oz + 1% v/v + 1.5 qt	69	66	83	99	99	178
PRE/POST II							
Camix/Accent + MSO + UAN	2 qt/0.67 oz wt + 1% v/v + 1.5 qt	88	97	98	97	99	180
Lumax/Accent + MSO + UAN	2.5 qt/0.67 oz wt + 1% v/v + 1.5 qt	94	99	99	99	99	175
POST I							
Halex GT + NIS + AMS	3.6 pt + 0.25 % v/v + 10 lb/100 gal	0	0	90	99	97	166
Halex GT + Aatrex 4L + NIS + AMS	3.6 pt + 1 pt + 0.25 % v/v + 10 lb/100 gal	0	0	84	98	97	176
Halex GT + Buctril + NIS + AMS	3.6 pt + 6 fl oz + 0.25 % v/v + 10 lb/100 gal	0	0	85	98	98	173
	LSD (P=0.10)	**5**	**2**	**3**	**3**	**4**	**17**

Table 10. Performance of herbicide systems for grass control in field corn on May 28, June 11, 16, and 24 and August 27 at Rochester, MN, in 2009.

Treatment	Rate	Grass Control					Yield
		5/28	6/11	6/16	6/24	8/27	
	(rate/A)			(%)			(bu/A)
Untreated Check		0	0	0	0	0	24
Weed Free		100	100	100	100	100	171
PRE							
SureStart	1.75 pt	96	89	92	80	71	162
SureStart+ Aatrex 4L	1.75 pt + 20 fl oz	95	88	89	82	69	160
PRE/POST I							
Dual II Mag/Laudis + MSO + UAN	1 pt/3 fl oz + 1% v/v + 1.5 qt	89	81	91	90	89	163
Dual II Mag/Laudis + Clarity + COC + UAN	1 pt/3 fl oz + 4 fl oz + 1% v/v +0.5 qt	87	79	91	88	86	168
Dual II Mag/Ignite + AMS	1 pt/22 fl oz + 10 lb/100 gal	89	78	98	97	94	182
Dual II Mag/Ignite + Aatrex 4L + AMS	1 pt/22 fl oz + 1 pt + 10 lb/100 gal	87	80	97	95	93	180
Dual II Mag/Ignite + Buctril + AMS	1 pt/22 fl oz + 6 fl oz + 10 lb/100 gal	84	75	87	94	87	163
Dual II Mag/Capreno + MSO + UAN	1 pt/3 fl oz + 1% v/v + 1.5 qt	90	79	95	90	86	175
Dual II Mag/Capreno + Aatrex 4L + MSO + UAN	1 pt/3 fl oz + 1 pt + 1% v/v + 1.5 qt	89	79	93	89	83	162
Dual II Mag/Capreno + Buctril + COC + UAN	1 pt/3 fl oz + 6 fl oz + 1% v/v + 1.5 qt	89	76	94	88	77	178
PRE/POST II							
Camix/Accent + MSO + UAN	2 qt/0.67 oz wt + 1% v/v + 1.5 qt	93	81	89	81	94	180
Lumax/Accent + MSO + UAN	2.5 qt/0.67 oz wt + 1% v/v + 1.5 qt	93	82	87	79	95	175
POST I							
Halex GT + NIS + AMS	3.6 pt + 0.25 % v/v + 10 lb/100 gal		0	10	96	92	166
Halex GT + Aatrex 4L + NIS + AMS	3.6 pt + 1 pt + 0.25 % v/v + 10 lb/100 gal		0	6	93	94	176
Halex GT + Buctril + NIS + AMS	3.6 pt + 6 fl oz + 0.25 % v/v + 10 lb/100 gal		0	10	92	94	173
	LSD (P=0.10)	**4**	**5**	**2**	**3**	**3**	**17**

Table 11. Performance of herbicide systems for velvetleaf control in field corn on May 28, June 11 and 24, and August 27 at Rochester, MN, in 2009.

Treatment	Rate	Velvetleaf Control				Yield
		5/28	6/11	6/24	8/27	
	(rate/A)			(%)		(bu/A)
Untreated Check		0	0	0	0	24
Weed Free		100	100	100	100	171
PRE						
SureStart	1.75 pt	89	90	78	81	162
SureStart+ Aatrex 4L	1.75 pt + 20 fl oz	86	86	77	76	160
PRE/POST I						
Dual II Mag/Laudis + MSO + UAN	1 pt/3 fl oz + 1% v/v + 1.5 qt	0	0	92	91	163
Dual II Mag/Laudis + Clarity + COC + UAN	1 pt/3 fl oz + 4 fl oz + 1% v/v +0.5 qt	0	0	94	98	168
Dual II Mag/Ignite + AMS	1 pt/22 fl oz + 10 lb/100 gal	0	0	87	81	182
Dual II Mag/Ignite + Aatrex 4L + AMS	1 pt/22 fl oz + 1 pt + 10 lb/100 gal	0	0	90	83	180
Dual II Mag/Ignite + Buctril + AMS	1 pt/22 fl oz + 6 fl oz + 10 lb/100 gal	0	0	92	89	163
Dual II Mag/Capreno + MSO + UAN	1 pt/3 fl oz + 1% v/v + 1.5 qt	0	0	94	94	175
Dual II Mag/Capreno + Aatrex 4L + MSO + UAN	1 pt/3 fl oz + 1 pt + 1% v/v + 1.5 qt	0	0	99	98	162
Dual II Mag/Capreno + Buctril + COC + UAN	1 pt/3 fl oz + 6 fl oz + 1% v/v + 1.5 qt	0		98	95	178
PRE/POST II						
Camix/Accent + MSO + UAN	2 qt/0.67 oz wt + 1% v/v + 1.5 qt	92	99	98	98	180
Lumax/Accent + MSO + UAN	2.5 qt/0.67 oz wt + 1% v/v + 1.5 qt	98	99	99	99	175
POST I						
Halex GT + NIS + AMS	3.6 pt + 0.25 % v/v + 10 lb/100 gal			98	99	166
Halex GT + Aatrex 4L + NIS + AMS	3.6 pt + 1 pt + 0.25 % v/v + 10 lb/100 gal			99	97	176
Halex GT + Buctril + NIS + AMS	3.6 pt + 6 fl oz + 0.25 % v/v + 10 lb/100 gal			99	98	173
	LSD (P=0.10)	**6**	**3**	**5**	**5**	**17**

Table 12. Corn injury on June 9 and additional cost per acre over base herbicide program at Rochester, MN, in 2008.

Treatment	Rate	Injury	Economics[1]
	(rate/A)	6/9	($/A additional cost over base program)
PRE / POST I			
Dual II Mag / Callisto + COC + 28% UAN	1 pt / 3 fl oz + 1% v/v + 2.5% v/v	0	
Dual II Mag / Callisto + Aatrex + COC + 28% UAN	1 pt / 3 fl oz + 16 fl oz + 1% v/v + 2.5 % v/v	1	**+ 1.50**
Dual II Mag / Callisto + Buctril + COC + 28% UAN	1 pt / 3 fl oz + 6 fl oz + 1% v/v + 2.5% v/v	20	**+ 3.40**
Dual II Mag / Callisto + Clarity + COC + 28% UAN	1 pt / 3 fl oz + 4 fl oz + 1% v/v + 2.5% v/v	0	**+ 3.30**
Dual II Mag / Hornet + COC + 28% UAN	1 pt / 3 oz wt + 1% v/v + 2.5% v/v	0	
Dual II Mag / Hornet + Aatrex + COC + 28% UAN	1 pt / 3 oz wt + 16 fl oz + 1% v/v + 2.5% v/v	0	**+1.50**
Dual II Mag / Hornet + Callisto + COC + 28% UAN	1 pt / 3 oz wt + 1 fl oz + 1% v/v + 2.5% v/v	0	**+5.00**
Dual II Mag / Clarity + 28% UAN	1 pt / 1 pt + 2.5% v/v	0	
Dual II Mag / Clarity + Aatrex + 28% UAN	1 pt / 1 pt + 16 fl oz + 2.5% v/v	0	**+1.50**
Dual II Mag / Clarity + Callisto + COC + 28% UAN	1 pt / 1 pt + 1 fl oz + 1% v/v + 2.5% v/v	0	**+6.20**
	LSD (P=0.10)	**1**	

1. Aatrex @ 16 oz = $1.50, Buctril @ 6 oz = $3.40, Callisto @ 1 oz/A = $5.00, Clarity @ 4 oz = $3.30.

Table 13. Performance and comparison of herbicide systems with and without atrazine in field corn at Rochester, MN, in 2007 and 2008

Treatment	Rate(s)	Injury[1]	Giant Ragweed[1]		Common Waterhemp[1]		Common Lambsquarters[1]		Yield	
		(%)	---------- % control ----------						Bu/A	
POSTEMERGENCE[2]	**(rate/A)**	**2008**	**2007**	**2008**	2007	2008	**2007**	**2008**	**2007**	**2008**
Callisto	3 fl oz	0	84	86	94	93	99	98	124	187
Callisto + atrazine	3 fl oz + 16 fl oz	1	95	98	98	94	99	99	159	227
Callisto + Buctril	3 fl oz + 6 fl oz	20	---	96	---	95	---	97	---	234
Callisto + Clarity	3 fl oz + 4 fl oz	0	---	99	---	95	---	99	---	234
Hornet	3 oz	0	81	86	70	41	68	98	109	194
Hornet + atrazine	3 oz + 16 fl oz	0	93	91	86	80	99	98	142	216
Hornet + Callisto	3 oz + 1 fl oz	0	---	97	---	94	---	99	---	212
Clarity	1 pt	0	74	92	73	91	74	99	97	209
Clarity + atrazine	1 pt + 16 fl oz	0	86	97	88	92	99	99	120	230
Clarity + Callisto	1 pt + 1 fl oz	0	---	97	---	92	--	99	---	218
	LSD (P=.10)	**1**	**3**	**3**	**4**	**3**	**3**	**NS**	**25**	**NS**

1. Injury only occurred in 2008. Injury rating taken on 6/9/2008. Weed control rating 8/10/2007 and 7/30/2008.
2. All treatments had Dual II Magnum applied preemergence at 1 pt per acre.

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Evaluation of BMP Rates of Atrazine Tank-Mixed with Broadleaf Herbicides at Lamberton, MN in 2009

Getting, Jodie K., Lisa M. Behnken, Fritz R. Breitenbach, Jeffrey L. Gunsolus, Thomas Hoverstad, and Ryan P. Miller.

The objective of this study was to evaluate corn herbicide combinations with and without atrazine for annual grass and annual broadleaf weed control in corn. This study was conducted on a Normania loam soil containing 4.2% organic matter, pH 6.1 and soil test P and K levels of 68 and 376 lb/A, respectively. A randomized complete block design with four replications and a plot size of 10 by 30 ft was used. The site was planted to oats in 2008 and was fall chiseled. The area was fertilized with 170-60-60. On May 11, 2009, Pioneer '35F44' glufosinate resistant/glyphosate resistant field corn was planted in 30-inch rows at a seeding rate of 33,000 seeds/A. All treatments were applied with a tractor-mounted sprayer delivering 20 gpa at a pressure of 40 psi. The sprayer was equipped with 8002 flat-fan nozzles spaced 15 inches apart on the boom. Application dates, environmental conditions, plant sizes and rainfall data are listed below: (Southwest Research and Outreach Center, University of Minnesota, Lamberton).

Date	May 11	June 1
Treatment	PRE	POST
Temperature (F)		
air	68	75
soil (4 inch)	62	72
Relative humidity (%)	28	24
Wind (mph)	S 10	E 8
Sky	clear	clear
Soil moisture	dry	dry
Corn		
leaf no.	-	V3
height (inch)	-	5
Yellow foxtail		
leaf no.	-	2 to 4
height (inch)	-	2 to 5
no./ft^2	-	38
Common lambsquarters		
leaf no.	-	4 to 6
height (inch)	-	2 to 4
no./ft^2	-	9
Tall waterhemp		
leaf no.	-	1 to 3
height (inch)	-	1 to 2
no./ft^2	-	2
Rainfall after application (inch)		
1 week	0.01	1.36
2 week	0.34	0.13
3 week	0.16	1.22

Table. Evaluation of BMP rates of atrazine tank-mixed with broadleaf herbicides at Lamberton, MN in 2009 (Getting, Behnken, Breitenbach, Gunsolus, Hoverstad, Miller).

Treatment[a]	Rate	Yellow foxtail				Common lambsquarters				Tall waterhemp				Yield[b]
		Jun 2	Jun 16	Jun 25	Aug 18	Jun 2	Jun 16	Jun 25	Aug 18	Jun 2	Jun 16	Jun 25	Aug 18	
	(oz/A, pt/A, lb/A or %)	----------(% control)----------												(bu/A)
Preemergence/POST (2 to 5-inch weeds)														
Dual II Magnum / Laudis + MSO + 28%N	1 pt / 3 oz + 1% + 1.5 qt	28 de	93 cd	91 c-e	84 fg	23 e	99 a	99 a	97 a	35 e	99 a	98 a	95 c-e	**205 ab**
Dual II Magnum / Laudis + Aatrex + MSO + 28%N	1 pt / 3 oz + 1 pt + 1% + 1.5 qt	30 de	99 a	95 bc	89 b-e	25 de	99 a	99 a	99 a	38 e	99 a	99 a	99 ab	**208 ab**
Dual II Magnum / Laudis + Buctril + MSO + 28%N	1 pt / 3 oz + 6 oz + 1% + 1.5 qt	25 e	92 cd	90 de	87 c-g	25 de	99 a	99 a	97 a	38 e	99 a	99 a	98 a-c	**216 a**
Dual II Magnum / Laudis + Clarity + MSO + 28%N	1 pt / 3 oz + 4 oz + 1% + 1.5 qt	28 de	94 b-d	90 de	84 fg	33 d	99 a	99 a	99 a	35 e	99 a	99 a	99 ab	**203 ab**
Dual II Magnum / Ignite + AMS	1 pt / 22 oz + 10 lb/100 gal	33 d	91 d	89 e	83 g	33 d	97 a	98 a	95 a	40 e	98 a	96 a	94 d-f	**206 ab**
Dual II Magnum / Ignite + Aatrex + AMS	1 pt / 22 oz + 1 pt + 10 lb/100 gal	33 d	94 b-d	93 b-e	86 d-g	33 d	99 a	99 a	98 a	40 e	99 a	99 a	97 a-d	**205 ab**
Dual II Magnum / Ignite + Buctril + AMS	1 pt / 22 oz + 6 oz + 10 lb/100 gal	28 de	93 cd	90 de	85 e-g	28 de	99 a	99 a	95 a	38 e	99 a	97 a	93 ef	**208 ab**
Camix / Accent + MSO + 28%N	2 qt / 0.67 oz + 1% + 1.5 qt	43 c	91 d	94 b-d	90 a-d	45 c	92 b	98 a	95 a	50 d	97 a	97 a	91 f	**199 b**
Lumax / Accent + MSO + 28%N	2.5 qt / 0.67 oz + 1% + 1.5 qt	48 bc	91 d	94 b-d	91 a-c	53 c	92 b	96 a	96 a	66 c	99 a	97 a	96 a-e	**213 a**
Surestart	1.75 pt	45 bc	33 e	20 f	20 i	53 c	40 d	28 c	18 c	70 bc	73 c	73 c	70 h	**131 d**
Surestart + Aatrex	1.75 pt + 1.25 pt	50 b	35 e	23 f	28 h	69 b	61 c	53 b	35 b	75 b	78 b	75 b	75 g	**144 c**
Dual II Magnum / Capreno + MSO + 28%N	1 pt / 3 oz + 1% + 1.5 qt	33 d	96 a-c	97 ab	91 a-c	33 d	99 a	99 a	97 a	40 e	99 a	99 a	98 a-c	**203 ab**
Dual II Magnum / Capreno + Aatrex + MSO + 28%N	1 pt / 3 oz + 1 pt + 1% + 1.5 qt	25 e	99 a	96 a-c	91 ab	25 de	99 a	99 a	98 a	38 e	99 a	99 a	98 a-c	**208 ab**
Dual II Magnum / Capreno + Buctril + MSO + 28%N	1 pt / 3 oz + 6 oz + 1% + 1.5 qt	28 de	93 cd	95 bc	89 b-e	25 de	99 a	98 a	97 a	35 e	99 a	99 a	99 a	**207 ab**
POST (2 to 5-inch weeds)														
Halex GT + NIS + AMS	3.6 pt + 0.25% + 10 lb/100 gal	0 f	99 a	95 a-c	88 b-f	0 f	99 a	99 a	98 a	0 f	99 a	99 a	97 a-e	**206 ab**
Halex GT + Aatrex + NIS + AMS	3.6 pt + 1 pt + 0.25% + 10 lb/100 gal	0 f	99 a	95 bc	95 a	0 f	99 a	99 a	99 a	0 f	99 a	99 a	99 ab	**204 ab**
Halex GT + Buctril + NIS + AMS	3.6 pt + 6 oz + 0.25% + 10 lb/100 gal	0 f	98 ab	97 ab	92 ab	0 f	99 a	98 a	98 a	0 f	99 a	99 a	99 ab	**209 ab**
Checks														
Weed free	-	100 a	100 a	100 a	94 a	100 a	100 a	100 a	96 a	100 a	100 a	100 a	99 ab	**203 ab**
Weedy check	-	0 f	0 f	0 g	0 j	0 f	0 e	0 d	0 d	0 f	0 d	0 c	0 i	**82 e**
	LSD (P=0.10)	5.9	4.3	4.8	4.6	9.4	4.3	4.5	5.5	8.9	5.0	5.0	3.7	**13.6**

[a] COC = crop oil concentrate; MSO = methylated seed oil; NIS = nonionic surfactant; 28%N = an aqueous solution of urea and ammonium nitrate; AMS = spray grade ammonium sulfate.
[b] Yield adjusted to 15.5% moisture.

Evaluation of Capreno Herbicide Programs in Field Corn in SE Minnesota in 2009

Behnken, Lisa M., Fritz R. Breitenbach, Ryan P. Miller, Theresa Twohey and Nicole Behnken

The objective of this trial was to evaluate the performance of Capreno herbicide programs for weed control in corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 7.0 and soil test P and K levels of 73 ppm and 191 ppm, respectively. Spring fertilizer was broadcast ahead of planting on April 17, 2009 at a rate of 126-35-120-24 (N-P-K-S). The area was side dressed with an additional 30 lb/A of N on June 15. The field was spring disked and field cultivated once prior to planting. The corn hybrid, Pioneer 35F44, was planted on May 8, 2009 at a depth of 1.5 inches in 30 inch rows at 35,000 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on June 2, 9, 16, 24 and July 20. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on November 13, 2009.

Date	**5/11**	**5/29**	**6/5**	**6/18**
Treatment	PRE	POST I	POST II	POST III
Temperature (F)				
Air	59	73	75	80
Soil	57	75.2	70.5	75.2
Relative Humidity (%)	36	29	33	69
Wind (mph)	0	12	18	17
Soil Moisture	Adequate	Adequate	Inadequate	Excessive
Corn				
Stage		V2-V3	V4	V6
Height (inch)		5.0	6.0	17.0
Giant Ragweed				
Weed density (ft^2)		6.4	6.4	6.4
Height (inch)		2.5	5.8	3.8
Common Lambsquarters				
Weed density (ft^2)		5.4	5.4	5.4
Height (inch)		1.3	2.0	3.5
Common Waterhemp				
Weed density (ft^2)		13.8	13.8	13.8
Height (inch)		1.1	2.0	3.2
Giant foxtail				
Weed density (ft^2)		3.5	3.5	3.5
Height (inch)		2.6	3.6	4.2
Rainfall after each application (inch)				
Week 1	0.61	0.02	1.97	0.21
Week 2	0.19	1.97	1.03	0.17
Week 3	1.76	1.03	0.17	0.90

Table 1. Performance of Capreno herbicide systems for giant ragweed control in field corn on June 2, 9, 16, 24 and July 20 at Rochester, MN in 2009.

Treatment	Rate	Giant Ragweed Control					Yield
		6/2	6/9	6/16	6/24	7/20	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	7 e
PRE/POST III							
Corvus / Capreno + COC + UAN	3 fl oz/a / 3 fl oz/a + 1% v/v + 1.5 qt/a	69	73	82	87	99	185 a
Corvus / Capreno + MSO + UAN	3 fl oz/a / 3 fl oz/a + 0.5% v/v + 1.5 qt/a	65	69	82	87	99	187 a
Lumax / Capreno + Atrazine + COC + UAN	2.5 qt/a / 3 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	83	96	97	99	99	178 abc
POST I							
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/100 gal	0	89	89	90	87	178 abc
Capreno + Atrazine + COC + UAN	3 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	0	86	94	96	91	161 d
Impact + Atrazine + COC + UAN	0.75 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	0	89	88	87	79	165 cd
Capreno + Atrazine + MSO + UAN	3 fl oz/a + 16 fl oz/a + 0.5% v/v + 1.5 qt/a	0	88	90	92	87	181 ab
Laudis + Atrazine + MSO + UAN	2.607 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	0	93	95	94	95	167 bcd
POST II							
Capreno + Roundup PowerMax + AMS	2 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	0	0	95	95	96	175 a-d
Capreno + Roundup PowerMax + Superb HC + AMS	3 fl oz/a + 11 fl oz/a + 12 fl oz/a + 8.5 lb/100 gal	0	0	97	95	96	179 abc
Capreno + Ignite 280 + AMS	2 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	0	0	96	97	97	180 ab
	LSD (P=0.10)	2	2	3	3	5	15

Table 2. Performance of Capreno herbicide systems for common lambsquarters control in field corn on June 2, 9, 16, 24 and July 20 at Rochester, MN in 2009.

Treatment	Rate	Common Lambsquarters Control					Yield
		6/2	6/9	6/16	6/24	7/20	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	7 e
PRE/POST III							
Corvus / Capreno + COC + UAN	3 fl oz/a / 3 fl oz/a + 1% v/v + 1.5 qt/a	92	98	98	99	98	185 a
Corvus / Capreno + MSO + UAN	3 fl oz/a / 3 fl oz/a + 0.5% v/v + 1.5 qt/a	88	98	98	99	95	187 a
Lumax / Capreno + Atrazine + COC + UAN	2.5 qt/a / 3 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	99	99	99	99	98	178 abc
POST I							
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/100 gal	0	99	99	99	95	178 abc
Capreno + Atrazine + COC + UAN	3 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	0	99	99	99	92	161 d
Impact + Atrazine + COC + UAN	0.75 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	0	99	99	99	92	165 cd
Capreno + Atrazine + MSO + UAN	3 fl oz/a + 16 fl oz/a + 0.5% v/v + 1.5 qt/a	0	99	99	99	93	181 ab
Laudis + Atrazine + MSO + UAN	2.607 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	0	99	99	99	95	167 bcd
POST II							
Capreno + Roundup PowerMax + AMS	2 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	0	0	98	98	94	175 a-d
Capreno + Roundup PowerMax + Superb HC + AMS	3 fl oz/a + 11 fl oz/a + 12 fl oz/a + 8.5 lb/100 gal	0	0	84	97	91	179 abc
Capreno + Ignite 280 + AMS	2 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	0	0	84	97	91	180 ab
	LSD (P=0.10)	4	1	2	2	3	15

Table 3. Performance of Capreno herbicide systems for common waterhemp control in field corn on June 2, 9, 16, 24 and July 20 at Rochester, MN in 2009.

Treatment	Rate	Common Waterhemp Control					Yield
		6/2	6/9	6/16	6/24	7/20	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	7 e
PRE/POST III							
Corvus / Capreno + COC + UAN	3 fl oz/a / 3 fl oz/a + 1% v/v + 1.5 qt/a	70	80	71	86	97	185 a
Corvus / Capreno + MSO + UAN	3 fl oz/a / 3 fl oz/a + 0.5% v/v + 1.5 qt/a	71	79	80	91	95	187 a
Lumax / Capreno + Atrazine + COC + UAN	2.5 qt/a / 3 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	99	99	99	99	98	178 abc
POST I							
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/100 gal	0	99	99	94	93	178 abc
Capreno + Atrazine + COC + UAN	3 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	0	99	97	95	89	161 d
Impact + Atrazine + COC + UAN	0.75 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	0	99	90	88	88	165 cd
Capreno + Atrazine + MSO + UAN	3 fl oz/a + 16 fl oz/a + 0.5% v/v + 1.5 qt/a	0	99	97	97	92	181 ab
Laudis + Atrazine + MSO + UAN	2.607 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	0	99	97	97	94	167 bcd
POST II							
Capreno + Roundup PowerMax + AMS	2 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	0	0	96	96	89	175 a-d
Capreno + Roundup PowerMax + Superb HC + AMS	3 fl oz/a + 11 fl oz/a + 12 fl oz/a + 8.5 lb/100 gal	0	0	89	94	85	179 abc
Capreno + Ignite 280 + AMS	2 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	0	0	96	95	89	180 ab
	LSD (P=0.10)	2	1	4	4	4	15

Table 4. Performance of Capreno herbicide systems for giant foxtail control in field corn on June 2, 9, 16, 24 and July 20 at Rochester, MN in 2009.

Treatment	Rate	Giant foxtail Control					Yield
		6/2	6/9	6/16	6/24	7/20	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	7 e
PRE/POST III							
Corvus / Capreno + COC + UAN	3 fl oz/a / 3 fl oz/a + 1% v/v + 1.5 qt/a	65	70	71	78	92	185 a
Corvus / Capreno + MSO + UAN	3 fl oz/a / 3 fl oz/a + 0.5% v/v + 1.5 qt/a	68	76	76	83	92	187 a
Lumax / Capreno + Atrazine + COC + UAN	2.5 qt/a / 3 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	83	91	95	98	97	178 abc
POST I							
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/100 gal	0	96	92	94	91	178 abc
Capreno + Atrazine + COC + UAN	3 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	0	95	90	92	86	161 d
Impact + Atrazine + COC + UAN	0.75 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	0	92	90	91	87	165 cd
Capreno + Atrazine + MSO + UAN	3 fl oz/a + 16 fl oz/a + 0.5% v/v + 1.5 qt/a	0	93	88	92	87	181 ab
Laudis + Atrazine + MSO + UAN	2.607 fl oz/a + 16 fl oz/a + 1% v/v + 1.5 qt/a	0	97	82	82	88	167 bcd
POST II							
Capreno + Roundup PowerMax + AMS	2 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	0	0	98	99	94	175 a-d
Capreno + Roundup PowerMax + Superb HC + AMS	3 fl oz/a + 11 fl oz/a + 12 fl oz/a + 8.5 lb/100 gal	0	0	97	99	95	179 abc
Capreno + Ignite 280 + AMS	2 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	0	0	97	97	92	180 ab
	LSD (P=0.10)	3	5	5	4	5	15

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Evaluation of Rimsulfuron and Nicosulfuron Programs Plus Mesotrione for Weed Control in Field Corn in 2009

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, Sarah Stellpflug and Kyle Poss

The objective of this trial was to evaluate the performance of rimsulfuron and nicosulfuron programs plus mesotrione for weed control in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.8 and soil test P and K levels of 37 ppm and 115 ppm, respectively. Spring fertilizer was broadcast ahead of planting on April 17th at a rate of 126-35-120-24 (N-P-K-S). The area was side dressed with an additional 30 b/A of N on June 15. The field was spring disked and field cultivated once prior to planting. The corn hybrid, Pioneer 35F44, was planted on May 8th, 2009, at a depth of 1.5 inches in 30 inch rows at 35,000 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on May 28, June 9, 16, and 24, and August 27. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on November 13, 2009. (University of Minnesota Extension Regional Office, Rochester, MN).

Date	**5/8**	**6/4**
Treatment	PRE	POST I
Temperature (F)		
Air	69	73
Soil	56	78.6
Relative Humidity (%)	35	17
Wind (mph)	7	8
Soil Moisture	Inadequate	Inadequate
Corn		
Stage		V4
Height (inch)	6	6
Common Lambsquarters		
Weed density (ft^2)	12.4	
Height (inch)	3.1	2.4
Common Waterhemp		
Weed density (ft^2)	1.4	
Height (inch)	1.8	1.5
Grass		
Weed density (ft^2)	20.8	
Height (inch)	2.9	3..5
Rainfall after each application		
Week 1	0.61	1.76
Week 2	0	1.24
Week 3	1.95	0.15

Table 1. Performance of herbicide systems for common lambsquarters control in field corn on May 28, June 16 and 24, and August 27 at Rochester, MN, in 2009.

Treatment	Rate	Common Lambsquarters Control				Yield
		5/28	6/16	6/24	8/27	
	(rate/A)	(%)				(bu/A)
Untreated Check		0	0	0	0	22 c
PRE/POST I						
Cinch ATZ / Rimsulfuron + Safener + Mesotrione + COC + AMS	1 qt/a / 0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a	63	99	99	99	183 a
POST I						
Rimsulfuron + Safener + Mesotrione + COC + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a		76	94	99	157 ab
Rimsulfuron + Safener + Mesotrione + Roundup PowerMax + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 22 fl oz/a + 2 lb/a		99	99	99	158 ab
Rimsulfuron + Safener + Mesotrione + Ignite 280 + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 22 fl oz/a + 2 lb/a		97	99	99	182 a
Rimsulfuron + Safener + Mesotrione + Aatrex 90 DF + COC + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 8 oz wt/a + 1% v/v + 2 lb/a		99	99	99	165 ab
Rimsulfuron + Thifensulfuron + Safener + Mesotrione + COC + AMS	0.25 oz/a+ 0.05 oz/a+ 0.115 oz/a+ 1.25 oz/a+ 1% v/v + 2 lb/a		80	94	98	162 ab
Accent + Mesotrione + COC + AMS	0.5 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a		74	93	99	145 b
Steadfast + Safener + Mesotrione + COC + AMS	0.5625 oz/a + 0.125 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a		80	95	99	159 ab
	LSD (P=0.10)		**3**	**2**	**1**	**30**

Table 2. Performance of herbicide systems for common waterhemp control in field corn on May 28, June 16 and 24, and August 27 at Rochester, MN, in 2009.

Treatment	Rate	Common Waterhemp Control				Yield
		5/28	6/16	6/24	8/27	
	(rate/A)	(%)				(bu/A)
Untreated Check		0	0	0	0	22 c
PRE/POST I						
Cinch ATZ / Rimsulfuron + Safener + Mesotrione + COC + AMS	1 qt/a / 0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a	63	99	99	99	183 a
POST I						
Rimsulfuron + Safener + Mesotrione + COC + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a		76	87	95	157 ab
Rimsulfuron + Safener + Mesotrione + Roundup PowerMax + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 22 fl oz/a + 2 lb/a		99	99	95	158 ab
Rimsulfuron + Safener + Mesotrione + Ignite 280 + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 22 fl oz/a + 2 lb/a		99	99	98	182 a
Rimsulfuron + Safener + Mesotrione + Aatrex 90 DF + COC + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 8 oz wt/a + 1% v/v + 2 lb/a		99	99	99	165 ab
Rimsulfuron + Thifensulfuron + Safener + Mesotrione + COC + AMS	0.25 oz/a+ 0.05 oz/a+ 0.115 oz/a+ 1.25 oz/a+ 1% v/v + 2 lb/a		80	91	96	162 ab
Accent + Mesotrione + COC + AMS	0.5 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a		74	85	96	145 b
Steadfast + Safener + Mesotrione + COC + AMS	0.5625 oz/a + 0.125 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a		80	90	96	159 ab
	LSD (P=0.10)		**3**	**2**	**3**	**30**

Table 3. Performance of herbicide systems for grass control in field corn on May 28 at Rochester, MN, in 2009.

Treatment	Rate	Grass Control 5/28	6/16	6/24	8/27	Yield
	(rate/A)	(%)				(bu/A)
Untreated Check		0	0	0	0	22 c
PRE/POST I						
Cinch ATZ / Rimsulfuron + Safener + Mesotrione + COC + AMS	1 qt/a / 0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a	90	89	88	86	183 a
POST I						
Rimsulfuron + Safener + Mesotrione + COC + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a		73	72	65	157 ab
Rimsulfuron + Safener + Mesotrione + Roundup PowerMax + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 22 fl oz/a + 2 lb/a		99	98	89	158 ab
Rimsulfuron + Safener + Mesotrione + Ignite 280 + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 22 fl oz/a + 2 lb/a		96	95	78	182 a
Rimsulfuron + Safener + Mesotrione + Aatrex 90 DF + COC + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 8 oz wt/a + 1% v/v + 2 lb/a		78	75	69	165 ab
Rimsulfuron + Thifensulfuron + Safener + Mesotrione + COC + AMS	0.25 oz/a+ 0.05 oz/a+ 0.115 oz/a+ 1.25 oz/a+ 1% v/v + 2 lb/a		75	72	68	162 ab
Accent + Mesotrione + COC + AMS	0.5 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a		76	74	65	145 b
Steadfast + Safener + Mesotrione + COC + AMS	0.5625 oz/a + 0.125 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a		74	72	69	159 ab
	LSD (P=0.10)		**4**	**6**	**5**	**30**

Table 4. Crop response to herbicide systems in field corn on June 9 and 16 at Rochester, MN, in 2009.

Treatment	Rate	Injury 6/9	6/16	Yield
	(rate/A)	(%)		(bu/A)
Untreated Check		12	0	22 c
PRE/POST I				
Cinch ATZ / Rimsulfuron + Safener + Mesotrione + COC + AMS	1 qt/a / 0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a	20	6	183 a
POST I				
Rimsulfuron + Safener + Mesotrione + COC + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a	18	6	157 ab
Rimsulfuron + Safener + Mesotrione + Roundup PowerMax + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 22 fl oz/a + 2 lb/a	11	9	158 ab
Rimsulfuron + Safener + Mesotrione + Ignite 280 + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 22 fl oz/a + 2 lb/a	20	9	182 a
Rimsulfuron + Safener + Mesotrione + Aatrex 90 DF + COC + AMS	0.3 oz/a + 0.15 oz/a + 1.25 oz/a + 8 oz wt/a + 1% v/v + 2 lb/a	32	8	165 ab
Rimsulfuron + Thifensulfuron + Safener + Mesotrione + COC + AMS	0.25 oz/a+ 0.05 oz/a+ 0.115 oz/a+ 1.25 oz/a+ 1% v/v + 2 lb/a	20	7	162 ab
Accent + Mesotrione + COC + AMS	0.5 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a	16	8	145 b
Steadfast + Safener + Mesotrione + COC + AMS	0.5625 oz/a + 0.125 oz/a + 1.25 oz/a + 1% v/v + 2 lb/a	19	8	159 ab
	LSD (P=0.10)	**11**	**3**	**30**

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Comparison of the Performance of Callisto Xtra Premix to Callisto, Laudis, Impact, Status and Halex GT Systems for Weed Control in Field Corn at Rochester, MN, 2009

Miller, Ryan P., Lisa M. Behnken. Fritz R. Breitenbach, Jason Welter, and Brent Breitenbach

The objective of this trial was to compare and evaluate the performance of Callisto Xtra premix to Callisto, Laudis, Impact, Status and Halex GT herbicide systems for weed control in corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 7.0 and soil test P and K levels of 73 ppm and 191 ppm, respectively. Spring fertilizer was broadcast ahead of planting on April 17th at a rate of 126-35-120-24 (N-P-K-S). The area was side dressed with an additional 30 b/A of N on June 15. The field was spring disked and field cultivated once prior to planting. The corn hybrid, Pioneer 35F44, was planted on May 8th, 2009, at a depth of 1.5 inches in 30 inch rows at 35,000 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on June 2, 9, 16, 24 and July 20, 2009. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on November 13, 2009.

Date	**5/11**	**5/29**
Treatment	PRE	POST I
Temperature (F)		
air	59	71
soil		70.9
Relative Humidity (%)	36	33
Wind (mph)	0	9
Soil Moisture	Adequate	Adequate
Corn		
stage		V2-V3
height (inch)		4
Giant Ragweed		
weed density (ft^2)		11
height		2.4
Common Lambsquarters		
weed density (ft^2)		9.8
height		1.9
Common Waterhemp		
weed density (ft^2)		12
height		1.1
Giant foxtail		
weed density (ft^2)		0.3
height		1.4
Rainfall after each application (inch)		
week 1	0.61	0.02
week 2	0.19	1.97
week 3	1.76	1.03

Table 1. Comparison of the performance of Callisto Xtra to other herbicide systems for giant ragweed control in field corn at Rochester, MN, in 2009.

Treatment	Rate	Giant Ragweed					Yield
		6/2	6/9	6/16	6/24	7/20	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	18 d
PRE/POST I							
Bicep II Magnum/ Callisto Xtra +Touchdown Total+ N-Pak AMS	1.2 qt/20 fl oz+24 fl oz+2.5%v/v	80	91	92	94	91	217 a
POST							
Callisto Xtra + Touchdown Total+ N-Pak AMS	20 fl oz+ 24 fl oz+2.5 %v/v	0	89	91	94	91	207 a
Callisto+ Touchdown Total + N-Pak AMS	3 fl oz+24 fl oz+2.5 %v/v	0	84	85	87	85	215 a
Laudis 3.5 SC+ Touchdown Total + N-Pak AMS	2 fl oz+24 fl oz+2.5 %v/v	0	84	74	76	73	167 b
Impact 2.8 SC+ Touchdown Total + N-Pak AMS	0.5 fl oz+24 fl oz+2.5 %v/v	0	82	70	68	61	140 c
Status 56 WG+ Touchdown Total	2.5 oz wt+24 fl oz	0	87	74	74	64	139 c
Halex GT+ Buctril + NIS+ N-Pak AMS	3.6 pt+6 fl oz+0.25 %v/v 2.5 %v/v	0	90	85	90	89	210 a
	LSD (P=0.10)	2	4	5	6	9	20

Table 2. Comparison of the performance of Callisto Xtra to other herbicide systems for common lambsquarters control in field corn at Rochester, MN, in 2009.

Treatment	Rate	Common Lambsquarters					Yield
		6/2	6/9	6/16	6/24	7/20	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	18 d
PRE/POST I							
Bicep II Magnum/ Callisto Xtra +Touchdown Total+ N-Pak AMS	1.2 qt/20 fl oz+24 fl oz+2.5%v/v	99	99	99	99	95	217 a
POST							
Callisto Xtra + Touchdown Total+ N-Pak AMS	20 fl oz+ 24 fl oz+2.5 %v/v	0	99	99	99	95	207 a
Callisto+ Touchdown Total + N-Pak AMS	3 fl oz+24 fl oz+2.5 %v/v	0	99	99	98	93	215 a
Laudis 3.5 SC+ Touchdown Total + N-Pak AMS	2 fl oz+24 fl oz+2.5 %v/v	0	98	95	95	90	167 b
Impact 2.8 SC+ Touchdown Total + N-Pak AMS	0.5 fl oz+24 fl oz+2.5 %v/v	0	98	89	91	87	140 c
Status 56 WG+ Touchdown Total	2.5 oz wt+24 fl oz	0	99	90	93	86	139 c
Halex GT+ Buctril + NIS+ N-Pak AMS	3.6 pt+6 fl oz+0.25 %v/v 2.5 %v/v	0	98	99	99	95	210 a
	LSD (P=0.10)	1	1	3	2	2	20

Table 3. Comparison of the performance of Callisto Xtra to other herbicide systems for common waterhemp control in field corn at Rochester, MN, in 2009.

Treatment	Rate	Common Waterhemp					Yield
		6/2	6/9	6/16	6/24	7/20	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	18 d
PRE/POST I							
Bicep II Magnum/ Callisto Xtra +Touchdown Total+ N-Pak AMS	1.2 qt/20 fl oz+24 fl oz+2.5%v/v	99	99	99	99	96	217 a
POST							
Callisto Xtra + Touchdown Total+ N-Pak AMS	20 fl oz+ 24 fl oz+2.5 %v/v	0	99	99	98	93	207 a
Callisto+ Touchdown Total + N-Pak AMS	3 fl oz+24 fl oz+2.5 %v/v	0	98	99	98	93	215 a
Laudis 3.5 SC+ Touchdown Total + N-Pak AMS	2 fl oz+24 fl oz+2.5 %v/v	0	97	92	96	89	167 b
Impact 2.8 SC+ Touchdown Total + N-Pak AMS	0.5 fl oz+24 fl oz+2.5 %v/v	0	96	86	88	97	140 c
Status 56 WG+ Touchdown Total	2.5 oz wt+24 fl oz	0	95	88	88	97	139 c
Halex GT+ Buctril + NIS+ N-Pak AMS	3.6 pt+6 fl oz+0.25 %v/v 2.5 %v/v	0	98	99	97	95	210 a
	LSD (P=0.10)	1	2	4	4	3	20

Table 4. Comparison of the performance of Callisto Xtra to other herbicide systems for giant foxtail control in field corn at Rochester, MN, in 2009.

Treatment	Rate	Giant Foxtail					Yield
		6/2	6/9	6/16	6/24	7/20	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	18 d
PRE/POST I							
Bicep II Magnum/ Callisto Xtra +Touchdown Total+ N-Pak AMS	1.2 qt/20 fl oz+24 fl oz+2.5%v/v	97	98	98	98	96	217 a
POST							
Callisto Xtra + Touchdown Total+ N-Pak AMS	20 fl oz+ 24 fl oz+2.5 %v/v	0	89	84	88	89	207 a
Callisto+ Touchdown Total + N-Pak AMS	3 fl oz+24 fl oz+2.5 %v/v	0	97	80	83	85	215 a
Laudis 3.5 SC+ Touchdown Total + N-Pak AMS	2 fl oz+24 fl oz+2.5 %v/v	0	97	84	83	86	167 b
Impact 2.8 SC+ Touchdown Total + N-Pak AMS	0.5 fl oz+24 fl oz+2.5 %v/v	0	98	79	82	76	140 c
Status 56 WG+ Touchdown Total	2.5 oz wt+24 fl oz	0	97	80	82	80	139 c
Halex GT+ Buctril + NIS+ N-Pak AMS	3.6 pt+6 fl oz+0.25 %v/v 2.5 %v/v	0	97	89	93	92	210 a
	LSD (P=0.10)	1	2	5	4	5	20

Table 5. Injury ratings for herbicide systems in field corn at Rochester, MN, in 2009.

Treatment	Rate	Injury		
		6/4	6/9	6/16
	(rate/A)		(%)	
Untreated Check				
PRE/POST I				
Bicep II Magnum/ Callisto Xtra +Touchdown Total+ N-Pak AMS	1.2 qt/20 fl oz+24 fl oz+2.5%v/v	10	17	8
POST				
Callisto Xtra + Touchdown Total+ N-Pak AMS	20 fl oz+ 24 fl oz+2.5 %v/v	8	17	6
Callisto+ Touchdown Total + N-Pak AMS	3 fl oz+24 fl oz+2.5 %v/v	6	15	5
Laudis 3.5 SC+ Touchdown Total + N-Pak AMS	2 fl oz+24 fl oz+2.5 %v/v	5	15	6
Impact 2.8 SC+ Touchdown Total + N-Pak AMS	.5 fl oz+24 fl oz+2.5 %v/v	5	14	6
Status 56 WG+ Touchdown Total	2.5 oz wt+24 fl oz	3	16	9
Halex GT+ Buctril + NIS+ N-Pak AMS	3.6 pt+6 fl oz+0.25 %v/v 2.5 %v/v	49	28	18
	LSD (P=0.10)	4	2	3

Weed Control and Crop Tolerance with SureStart Herbicide Programs in Field Corn

Breitenbach, Fritz R, Lisa M. Behnken, Ryan P. Miller, Nicole Behnken and Katherine Sheehan

The objective of this trial was to evaluate the performance of SureStart herbicide and comparable herbicide programs for weed control in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.5 and soil test P and K levels of 60 ppm and 222 ppm, respectively. Spring fertilizer was broadcast ahead of planting on April 17, at a rate of 126-35-120-24 (N-P-K-S). The area was side dressed with an additional 30 lb/A of N on June 15. The previous crop was field corn. The field was fall chisel plowed, spring disked, field cultivated and roto-tilled prior to planting. The corn hybrid, Pioneer 35F44 (quad stacked), was planted on April 23, 2009, at a depth of 1.5 inches in 30 inch rows at 32,000 seeds per acre. A large amount of crop residue was still present at planting time. Heavy crop residue coupled with a common stalk borer infestation led to reduced stands in several plots. A randomized complete block design was used with four replications. Postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on May 27, June 4 and June 18. Application dates, environmental conditions and weed stages are listed below. The center two rows of each plot were machine harvested on November 13, 2009.

The general trend for weed control was slightly higher for the 2X rates compared to the 1X rates for all weeds evaluated; giant ragweed, common lambsquarters, common waterhemp and giant foxtail. The Durango DMA and the Ignite 280 1X and 2X rates provided similar weed control at each rate. However, weed control was significantly lower than the other treatments, 6/18 rating date.

CROP RESPONSE

Necrosis – SureStart at the 1X rate plus Ignite 280 resulted in a higher percentage of necrosis. SureStart at the 2X rate plus Durango DMA, atrazine or Ignite 280 and Ignite 280 alone resulted in a higher level of necrosis compared to the Durango DMA or Halex GT treatments. (5/27 rating date)

Chlorosis – SureStart at the 1X rate plus atrazine and Durango DMA or plus Ignite 280 resulted in a higher percentage of chlorosis compared to the other treatments (5/27 rating). Surestart at the 2X rate plus Durango DMA, or plus atrazine and Durango DMA, or Ignite 280 alone dramatically increased chlorosis compared to the other treatments. (5/27 rating date)

Purpling was noted in the plots but showed no significant pattern.

Stunting was observed in the treatments that included 2X rates of SureStart.

Date	**5/21**
Treatment	POST I
Temperature (F)	
Air	65
Soil	70.2
Relative Humidity (%)	50
Wind (mph)	8
Soil Moisture	Adequate
Corn	
Stage	V2-V3
Height (inch)	5.0
Giant Ragweed	
Weed density (ft^2)	4.4
Height (inch)	4.8
Common Lambsquarters	
Weed density (ft^2)	8.3
Height (inch)	4.6
Common Waterhemp	
Weed density (ft^2)	11.6
Height (inch)	2.0
Giant Foxtail	
Weed density (ft^2)	6.4
Height (inch)	4.5
Rainfall after each application	
Week 1	1.93
Week 2	0.02
Week 3	1.34

Table 1. Performance of herbicide systems for giant ragweed control in field corn on June 4 and 18 at Rochester, MN, in 2009

Treatment	Rate	Giant Ragweed Control		Yield
		6/4	6/18	
	(rate/A)		(%)	(bu/A)
Untreated Check		0	0	7 e
1X RATES				
SureStart + Durango DMA + N-Pa-K AMS	1.74 pt/a + 1.5 pt/a + 5% v/v	93	92	176 ab
SureStart + Aatrex 4L + Durango DMA + N-Pa-K AMS	1.74 pt/a + 2 pt/a + 1.5 pt/a + 5% v/v	98	96	163 b
Durango DMA + N-Pa-K AMS	1.5 pt/a + 5% v/v	84	83	110 d
SureStart + Ignite 280 + N-Pa-K AMS	1.74 pt/a + 22 fl oz/a + 5% v/v	90	93	158 bc
Ignite 280 + N-Pa-K AMS	22 fl oz/a + 5% v/v	89	87	135 cd
Halex GT + N-Pa-K AMS	3.6 pt/a + 5% v/v	95	94	180 ab
2X RATES				
SureStart + Durango DMA + N-Pa-K AMS	3.48 pt/a + 3 pt/a +10% v/v	96	94	158 bc
SureStart + Aatrex 4L + Durango DMA + N-Pa-K AMS	3.48 pt/a + 4 pt/a + 3 pt/a + 10% v/v	99	98	185 ab
Durango DMA + N-Pa-K AMS	3 pt/a + 10% v/v	88	84	117 d
SureStart + Ignite 280 + N-Pa-K AMS	3.48 pt/a + 44 fl oz/a + 10% v/v	96	96	185 ab
Ignite 280 + N-Pa-K AMS	44 fl oz/a + 10% v/v	90	85	114 d
Halex GT + N-Pa-K AMS	7.2 pt/a + 10% v/v	97	97	195 a
	LSD (P=0.10)	3	4	27

Table 2. Performance of herbicide systems for common lambsquarters control in field corn on June 4 and 18 at Rochester, MN, in 2009.

Treatment	Rate	Common Lambsquarters Control		Yield
		6/4	6/18	
	(rate/A)	(% Control)		(bu/A)
Untreated Check		0	0	7 e
1X RATES				
SureStart + Durango DMA + N-Pa-K AMS	1.74 pt/a + 1.5 pt/a + 5% v/v	100	99	176 ab
SureStart + Aatrex 4L + Durango DMA + N-Pa-K AMS	1.74 pt/a + 2 pt/a + 1.5 pt/a + 5% v/v	100	98	163 b
Durango DMA + N-Pa-K AMS	1.5 pt/a + 5% v/v	100	91	110 d
SureStart + Ignite 280 + N-Pa-K AMS	1.74 pt/a + 22 fl oz/a + 5% v/v	100	99	158 bc
Ignite 280 + N-Pa-K AMS	22 fl oz/a + 5% v/v	99	87	135 cd
Halex GT + N-Pa-K AMS	3.6 pt/a + 5% v/v	100	99	180 ab
2X RATES				
SureStart + Durango DMA + N-Pa-K AMS	3.48 pt/a + 3 pt/a +10% v/v	100	96	158 bc
SureStart + Aatrex 4L + Durango DMA + N-Pa-K AMS	3.48 pt/a + 4 pt/a + 3 pt/a + 10% v/v	100	99	185 ab
Durango DMA + N-Pa-K AMS	3 pt/a + 10% v/v	100	87	117 d
SureStart + Ignite 280 + N-Pa-K AMS	3.48 pt/a + 44 fl oz/a + 10% v/v	100	99	185 ab
Ignite 280 + N-Pa-K AMS	44 fl oz/a + 10% v/v	100	85	114 d
Halex GT + N-Pa-K AMS	7.2 pt/a + 10% v/v	100	99	195 a
	LSD (P=0.10)	**1**	**4**	27

Table 3. Performance of herbicide systems for common waterhemp control in field corn on June 4 and 18 at Rochester, MN, in 2009.

Treatment	Rate	Common Waterhemp Control		Yield
		6/4	6/18	
	(rate/A)	(% Control)		(bu/A)
Untreated Check		0	0	7 e
1X RATES				
SureStart + Durango DMA + N-Pa-K AMS	1.74 pt/a + 1.5 pt/a + 5% v/v	100	99	176 ab
SureStart + Aatrex 4L + Durango DMA + N-Pa-K AMS	1.74 pt/a + 2 pt/a + 1.5 pt/a + 5% v/v	100	98	163 b
Durango DMA + N-Pa-K AMS	1.5 pt/a + 5% v/v	100	83	110 d
SureStart + Ignite 280 + N-Pa-K AMS	1.74 pt/a + 22 fl oz/a + 5% v/v	100	99	158 bc
Ignite 280 + N-Pa-K AMS	22 fl oz/a + 5% v/v	98	81	135 cd
Halex GT + N-Pa-K AMS	3.6 pt/a + 5% v/v	100	99	180 ab
2X RATES				
SureStart + Durango DMA + N-Pa-K AMS	3.48 pt/a + 3 pt/a +10% v/v	100	95	158 bc
SureStart + Aatrex 4L + Durango DMA + N-Pa-K AMS	3.48 pt/a + 4 pt/a + 3 pt/a + 10% v/v	100	99	185 ab
Durango DMA + N-Pa-K AMS	3 pt/a + 10% v/v	99	84	117 d
SureStart + Ignite 280 + N-Pa-K AMS	3.48 pt/a + 44 fl oz/a + 10% v/v	100	99	185 ab
Ignite 280 + N-Pa-K AMS	44 fl oz/a + 10% v/v	100	82	114 d
Halex GT + N-Pa-K AMS	7.2 pt/a + 10% v/v	100	99	195 a
	LSD (P=0.10)	**1**	**3**	27

Table 4. Performance of herbicide systems for giant foxtail control in field corn on June 4 and 18 at Rochester, MN, in 2009.

Treatment	Rate	Giant Foxtail Control		Yield
		6/4	6/18	
	(rate/A)	(% Control)		(bu/A)
Untreated Check		0	0	7 e
1X RATES				
SureStart + Durango DMA + N-Pa-K AMS	1.74 pt/a + 1.5 pt/a + 5% v/v	100	97	176 ab
SureStart + Aatrex 4L + Durango DMA + N-Pa-K AMS	1.74 pt/a + 2 pt/a + 1.5 pt/a + 5% v/v	100	97	163 b
Durango DMA + N-Pa-K AMS	1.5 pt/a + 5% v/v	95	85	110 d
SureStart + Ignite 280 + N-Pa-K AMS	1.74 pt/a + 22 fl oz/a + 5% v/v	99	94	158 bc
Ignite 280 + N-Pa-K AMS	22 fl oz/a + 5% v/v	92	84	135 cd
Halex GT + N-Pa-K AMS	3.6 pt/a + 5% v/v	100	98	180 ab
2X RATES				
SureStart + Durango DMA + N-Pa-K AMS	3.48 pt/a + 3 pt/a +10% v/v	96	95	158 bc
SureStart + Aatrex 4L + Durango DMA + N-Pa-K AMS	3.48 pt/a + 4 pt/a + 3 pt/a + 10% v/v	100	99	185 ab
Durango DMA + N-Pa-K AMS	3 pt/a + 10% v/v	95	84	117 d
SureStart + Ignite 280 + N-Pa-K AMS	3.48 pt/a + 44 fl oz/a + 10% v/v	100	99	185 ab
Ignite 280 + N-Pa-K AMS	44 fl oz/a + 10% v/v	89	83	114 d
Halex GT + N-Pa-K AMS	7.2 pt/a + 10% v/v	100	99	195 a
	LSD (P=0.10)	**3**	**4**	27

Table 5. Crop response to herbicides applied postemergence at 1X and 2X labeled rates on May 27, June 4 and June 18 at Rochester, MN in 2009.

Treatment	Rate	Injury										
		Necrosis			Chlorosis			Purpling		Stunting	Height	
		5/27	6/4	6/18	5/27	6/4	6/18	5/27	6/4	5/27	6/4	6/18
	(rate/A)	---------- (%) ----------									(inches)	
Untreated Check		0	0	0	0	0	0	5	0	0	9.6	NA
1X Rates												
SureStart + Durango DMA + N-Pa-K AMS	1.74 pt/a + 1.5 pt/a + 5% v/v	6	5	5	9	6	8	21	6	0	9.3	19.0
SureStart + Aatrex 4L + Durango DMA + N-Pa-K AMS	1.74 pt/a + 2 pt/a + 1.5 pt/a + 5% v/v	5	6	5	20	5	6	1	1	0	9.7	19.6
Durango DMA + N-Pa-K AMS	1.5 pt/a + 5% v/v	3	5	1	8	4	9	11	3	0	10.1	20.8
SureStart + Ignite 280 + N-Pa-K AMS	1.74 pt/a + 22 fl oz/a + 5% v/v	18	13	5	24	8	9	3	1	0	9.8	19.8
Ignite 280 + N-Pa-K AMS	22 fl oz/a + 5% v/v	11	10	4	15	7	6	20	1	0	10.0	21.3
Halex GT + N-Pa-K AMS	3.6 pt/a + 5% v/v	6	7	4	8	6	8	8	1	0	9.9	20.7
2X Rates												
SureStart + Durango DMA + N-Pa-K AMS	3.48 pt/a + 3 pt/a +10% v/v	19	16	4	33	8	11	1	1	1	9.2	19.4
SureStart + Aatrex 4L + Durango DMA + N-Pa-K AMS	3.48 pt/a + 4 pt/a + 3 pt/a + 10% v/v	23	19	5	35	8	9	1	5	3	8.5	18.1
Durango DMA + N-Pa-K AMS	3 pt/a + 10% v/v	11	11	4	8	9	9	9	0	0	9.5	20.2
SureStart + Ignite 280 + N-Pa-K AMS	3.48 pt/a + 44 fl oz/a + 10% v/v	45	23	4	46	9	9	0	0	8	8.4	17.9
Ignite 280 + N-Pa-K AMS	44 fl oz/a + 10% v/v	41	21	5	8	9	6	11	5	0	8.7	19.0
Halex GT + N-Pa-K AMS	7.2 pt/a + 10% v/v	11	9	4	10	8	11	9	3	0	9.5	19.9
LSD (P=0.10)		7	5	3	9	3	5	9	5	2	0.7	1.8

Table 6. Residue ratings and corn population on June 4 at Rochester, MN in 2009.

Treatment	Rate	Residue	Population
		6/4	6/4
	(rate/A)	1 – 5 scale 1=none	plants/a
Untreated Check		NA	9758
1X RATES			
SureStart + Durango DMA + N-Pa-K AMS	1.74 pt/a + 1.5 pt/a + 5% v/v	2	27269
SureStart + Aatrex 4L + Durango DMA + N-Pa-K AMS	1.74 pt/a + 2 pt/a + 1.5 pt/a + 5% v/v	3	24237
Durango DMA + N-Pa-K AMS	1.5 pt/a + 5% v/v	2	27129
SureStart + Ignite 280 + N-Pa-K AMS	1.74 pt/a + 22 fl oz/a + 5% v/v	3	25535
Ignite 280 + N-Pa-K AMS	22 fl oz/a + 5% v/v	2	27312
Halex GT + N-Pa-K AMS	3.6 pt/a + 5% v/v	2	24516
2X RATES			
SureStart + Durango DMA + N-Pa-K AMS	3.48 pt/a + 3 pt/a +10% v/v	4	22660
SureStart + Aatrex 4L + Durango DMA + N-Pa-K AMS	3.48 pt/a + 4 pt/a + 3 pt/a + 10% v/v	2	28331
Durango DMA + N-Pa-K AMS	3 pt/a + 10% v/v	3	25979
SureStart + Ignite 280 + N-Pa-K AMS	3.48 pt/a + 44 fl oz/a + 10% v/v	3	27164
Ignite 280 + N-Pa-K AMS	44 fl oz/a + 10% v/v	2	26885
Halex GT + N-Pa-K AMS	7.2 pt/a + 10% v/v	3	25396
	LSD (P=0.10)	**1**	**4486**

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Weed Control and Crop Tolerance of Adjuvant Programs with Buccaneer Plus Herbicide in Field Corn

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, Brent R. Breitenbach and Ceara L. Suther

The objective of this trial was to evaluate the performance and crop tolerance of adjuvant systems with Buccaneer Plus herbicide in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.6 and soil test P and K levels of 72 ppm and 208 ppm, respectively. Spring fertilizer was broadcast ahead of planting on April 17, at a rate of 126-35-120-24 (N-P-K-S). The area was side dressed with an additional 30 lb/A of N on June 15. The field was spring disked and field cultivated once prior to planting. The corn hybrid, DeKalb DKC 50-44, was planted on May 8, 2009, at a depth of 1.5 inches in 30 inch rows at 35,000 seeds per acre. A randomized complete block design was used with four replications. Postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on June 16 and 24, 2009. Application dates, environmental conditions and weed stages are listed below. The center two rows of each plot were machine harvested on November 13, 2009.

Date	**6/3**
Treatment	POST I
Temperature (F)	
Air	66
Soil	76.3
Relative Humidity (%)	37
Wind (mph)	3
Soil Moisture	Inadequate
Corn	
Stage	
Height (inch)	6
Common Lambsquarters	
Weed density (ft^2)	13
Height (inch)	3.3
Common Waterhemp	
Weed density (ft^2)	10.1
Height (inch)	2.1
Rainfall after each application	
Week 1	1.76
Week 2	1.24
Week 3	0.15

Table 1. Performance of adjuvant systems with Buccaneer Plus herbicide for common lambsquarters and common waterhemp control in field corn on June 16 and 24 at Rochester, MN, in 2009.

Treatment	Rate	Common Lambsquarters Control		Common Waterhemp Control		Yield
		6/16	6/24	6/16	6/24	
	(rate/A)	(%)				(bu/A)
POST I						
Buccaneer Plus	16 fl oz	88	85	97	88	183 a
Buccaneer Plus + N-Tense	16 fl oz + 0.25 % v/v	94	92	98	92	183 a
Buccaneer Plus + Laudis + N-Tense	16 fl oz + 1.5 fl oz + 0.25 % v/v	95	96	98	93	199 a
Buccaneer Plus + Laudis + N-Tense + Trophy Gold	16 fl oz + 1.5 fl oz + 0.25 v% v/v + 0.25 % v/v	92	94	98	93	197 a
Buccaneer Plus + Laudis + N-Tense + WC074	16 fl oz + 1.5 fl oz + 0.25 % v/v + 0.25 % v/v	94	96	97	93	197 a
Buccaneer Plus + Laudis + N-Tense + WC074	16 fl oz + 1.5 fl oz + 0.25 % v/v + 0.5 % v/v	96	95	98	92	190 a
Buccaneer Plus + Laudis + N-Tense + Premium COC	16 fl oz + 1.5 fl oz + 0.25 % v/v + 1.0 % v/v	93	93	98	92	188 a
Buccaneer Plus + N-Tense	16 fl oz + 0.5 % v/v	96	93	98	89	184 a
Buccaneer Plus + Laudis + N-Tense	16 fl oz + 1.5 fl oz + 0.5 % v/v	96	96	99	94	198 a
Buccaneer Plus + Laudis + N-Tense + WC074	16 fl oz + 1.5 fl oz + 0.5 % v/v + 0.25 % v/v	97	97	98	94	190 a
	LSD (P=0.10)	2	2	2	4	NS

Table 2. Crop response to adjuvant systems with Buccaneer Plus herbicide in field corn on June 16 and 24 at Rochester, MN, in 2009.

Treatment	Rate	Injury		Yield
		6/16	6/24	
	(rate/A)	(%)		(bu/A)
POST I				
Buccaneer Plus	16 fl oz	5	0	183 a
Buccaneer Plus + N-Tense	16 fl oz + 0.25 % v/v	7	0	183 a
Buccaneer Plus + Laudis + N-Tense	16 fl oz + 1.5 fl oz + 0.25 % v/v	9	3	199 a
Buccaneer Plus + Laudis + N-Tense + Trophy Gold	16 fl oz + 1.5 fl oz + 0.25 v% v/v + 0.25 % v/v	8	0	197 a
Buccaneer Plus + Laudis + N-Tense + WC074	16 fl oz + 1.5 fl oz + 0.25 % v/v + 0.25 % v/v	8	1	197 a
Buccaneer Plus + Laudis + N-Tense + WC074	16 fl oz + 1.5 fl oz + 0.25 % v/v + 0.5 % v/v	10	1	190 a
Buccaneer Plus + Laudis + N-Tense + Premium COC	16 fl oz + 1.5 fl oz + 0.25 % v/v + 1.0 % v/v	9	1	188 a
Buccaneer Plus + N-Tense	16 fl oz + 0.5 % v/v	7	0	184 a
Buccaneer Plus + Laudis + N-Tense	16 fl oz + 1.5 fl oz + 0.5 % v/v	9	1	198 a
Buccaneer Plus + Laudis + N-Tense + WC074	16 fl oz + 1.5 fl oz + 0.5 % v/v + 0.25 % v/v	9	3	190 a
	LSD (P=0.10)	2	2	NS

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2009 Evaluation of Weed Management Systems in Field Corn

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The objective of this trial was to evaluate the performance of herbicide programs for weed control in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.8 and soil test P and K levels of 65 ppm and 184 ppm , respectively. Spring fertilizer was broadcast ahead of planting on April 17, at a rate of 126-35-120-24 (N-P-K-S). The area was side dressed with an additional 30 lb/A of N on June 15. The field was spring disked and field cultivated once prior to planting. The corn hybrid, Pioneer 35F44, was planted on May 8, 2009 at a depth of 1.5 inches in 30 inch rows at 35,000 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on June 1, 9, 18, 26 and July 20, 2009. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on November 13, 2009.

Date	**5/11**	**5/29**	**6/4**	**6/18**
Treatment	PRE	POST I	POST II	POST III
Temperature (F)				
Air	60	70	67	80
Soil		74.5	70.2	78.6
Relative Humidity (%)	38	34	28	66
Wind (mph)	0	10	6	15
Soil Moisture	Adequate	Adequate	Inadequate	Excessive
Corn				
Stage		V2-V3	V4	V6
Height (inch)		4.0	8.0	17.0
Giant Ragweed				
Weed density (ft^2)		5.4	5.4	5.4
Height (inch)		2.2	5.1	4.1
Common Lambsquarters				
Weed density (ft^2)		2.4	2.4	2.4
Height (inch)		2.1	4.9	1.6
Common Waterhemp				
Weed density (ft^2)		45.9	45.9	45.9
Height (inch)		1.0	1.8	1.8
Grass				
Weed density (ft^2)		1.1	1.1	1.1
Height (inch)		1.9	2.9	2.9
Velvetleaf				
Weed density (ft^2)				
Height (inch)			0	0
Rainfall after each application (inch)				
Week 1	0.61	0.02	1.76	0.21
Week 2	0.19	1.97	1.24	0.17
Week 3	1.76	1.03	0.15	0.90

Table 1. Performance of herbicide systems for giant ragweed control in field corn on June 1, 9, 18, and 26 at Rochester, MN, in 2009

Treatment	Rate	Giant Ragweed Control					Yield
		6/1	6/9	6/18	6/26	7/20	
	(rate/A)	(%)					(bu/A)
Untreated Check		0	0	0	0	0	12
Weed Free		100	100	100	100	100	208
PRE/POST I							
Dual II Magnum / Halex GT + NIS + N-Pa-K AMS	1 pt/a / 3.6 pt/a + 0.25% v/v + 3 qt/a	24	92	91	94	89	203
PRE/POST II							
Harness / Laudis + Atrazine + COC + 28%N	1.75 pt/a / 3 oz/a + 16 oz/a + 1% v/v + 1.5 qt/a	26		97	97	97	198
Harness / Laudis + Buctril + COC + 28%N	1.75 pt/a / 3 oz/a + 6 oz/a + 1% v/v + 1.5 qt/a	25		97	98	98	178
Harness / Ignite + N-Pa-K AMS	1.75 pt/a / 22 oz/a + 2 qt/a	26		94	90	86	192
Harness / Capreno + COC + 28%N	1.75 pt/a / 3 oz/a + 1% v/v + 1.5 qt/a	25		79	98	96	190
BreakFree / Rimsulfuron + Mesotrione + Safener + Atrazine + COC + N-Pa-K AMS	1 pt/a / 1.2 oz/a + 2.5 oz/a + 0.3 oz/a + 16 oz/a + 1% v/v + 3 qt/a	19		96	97	95	194
BreakFree / Resolve Q + Roundup Original Max + N-Pa-K AMS	1 pt/a / 1.25 oz/a + 22 oz/a + 3 qt/a	19		96	93	89	197
Harness / Roundup WeatherMax + N-Pa-K AMS	1.25 pt/a / 22 oz/a + 3 qt/a	25		95	90	85	172
Lumax / Touchdown Total + N-Pa-K AMS	3 pt/a / 24 oz/a + 3 qt/a	60		96	95	94	194
Camix / Touchdown Total + N-Pa-K AMS	2.5 pt/a / 24 oz/a + 3 qt/a	56		96	96	92	185
SureStart / Durango + N-Pa-K AMS	1.75 pt/a / 24 oz/a + 3 qt/a	70		94	93	89	191
SureStart / Durango + N-Pa-K AMS	2.5 pt/a / 24 oz/a + 3 qt/a	81		96	93	90	191
SureStart + Atrazine / Durango + N-Pa-K AMS	1.75 pt/a + 1.5 pt/a / 24 oz/a + 3 qt/a	64		93	93	90	191
Integrity / Roundup Power Max + Status + NIS + N-Pa-K AMS	17 oz/a / 22 oz/a + 2.5 oz/a + 0.25% v/v + 3 qt/a	79		98	97	95	191
Harness / Impact + Atrazine + MSO + 28%N	1.75 pt/a / 0.75 oz/a + 16 oz/a + 1% v/v + 2.5% v/v	25		97	96	92	188
Harness / Impact + Atrazine + Roundup Power Max + N-Pa-K AMS	1.25 pt/a / 0.5 oz/a + 16 oz/a + 22 oz/a + 3 qt/a	19		95	94	93	187
POST I							
Surestart + Durango + N-Pa-K AMS	1.7 pt/a + 24 oz/a + 3 qt/a	0	93	90	88	84	184
Halex GT + Atrazine + NIS + N-Pa-K AMS	3.6 pt/a + 16 oz/a + 0.25% v/v + 3 qt/a	0	94	97	98	97	185
Rimsulfuron + Mesotrione + Safener + Roundup Original Max + N-Pa-K AMS	1.2 oz/a + 2.5 oz/a + 0.3 oz/a + 22 oz/a + 3 qt/a	0	89	89	88	87	187
Steadfast + Safener + Callisto + Atrazine + COC + N-Pa-K AMS	0.75 oz/a + 0.25 oz/a + 2 oz/a + 16 oz/a + 1% v/v + 3 qt/a	0	87	91	93	90	187
Resolve Q + Atrazine + Roundup Original Max + N-Pa-K AMS	1.25 oz/a + 16 oz/a + 22 oz/a + 3 qt/a	0	87	85	79	65	165
POST I/POST III							
Roundup WeatherMax + N-Pa-K AMS / Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	88	83	97	96	199
	LSD (P=0.10)	7	4	3	2	4	28

Table 2. Performance of herbicide systems for common lambsquarters control in field corn on June 1, 9, 18, and 26 at Rochester, MN, in 2009

Treatment	Rate	Common Lambsquarters Control					Yield
		6/1	6/9	6/18	6/26	7/20	
	(rate/A)	(%)					(bu/A)
Untreated Check		0	0	0	0	0	12
Weed Free		100	100	100	100	100	208
PRE/POST I							
Dual II Magnum / Halex GT + NIS + N-Pa-K AMS	1 pt/a / 3.6 pt/a + 0.25% v/v + 3 qt/a	55	99	99	99	99	203
PRE/POST II							
Harness / Laudis + Atrazine + COC + 28%N	1.75 pt/a / 3 oz/a + 16 oz/a + 1% v/v + 1.5 qt/a	43		99	99	99	198
Harness / Laudis + Buctril + COC + 28%N	1.75 pt/a / 3 oz/a + 6 oz/a + 1% v/v + 1.5 qt/a	44		99	99	99	178
Harness / Ignite + N-Pa-K AMS	1.75 pt/a / 22 oz/a + 2 qt/a	38		94	92	89	192
Harness / Capreno + COC + 28%N	1.75 pt/a / 3 oz/a + 1% v/v + 1.5 qt/a	39		94	98	98	190
BreakFree / Rimsulfuron + Mesotrione + Safener + Atrazine + COC + N-Pa-K AMS	1 pt/a / 1.2 oz/a + 2.5 oz/a + 0.3 oz/a + 16 oz/a + 1% v/v + 3 qt/a	38		99	99	99	194
BreakFree / Resolve Q + Roundup Original Max + N-Pa-K AMS	1 pt/a / 1.25 oz/a + 22 oz/a + 3 qt/a	40		98	99	96	197
Harness / Roundup WeatherMax + N-Pa-K AMS	1.25 pt/a / 22 oz/a + 3 qt/a	38		98	9	97	172
Lumax / Touchdown Total + N-Pa-K AMS	3 pt/a / 24 oz/a + 3 qt/a	93		99	99	99	194
Camix / Touchdown Total + N-Pa-K AMS	2.5 pt/a / 24 oz/a + 3 qt/a	91		99	99	99	185
SureStart / Durango + N-Pa-K AMS	1.75 pt/a / 24 oz/a + 3 qt/a	49		99	98	97	191
SureStart / Durango + N-Pa-K AMS	2.5 pt/a / 24 oz/a + 3 qt/a	56		98	99	99	191
SureStart + Atrazine / Durango + N-Pa-K AMS	1.75 pt/a + 1.5 pt/a / 24 oz/a + 3 qt/a	91		99	98	99	191
Integrity / Roundup Power Max + Status + NIS + N-Pa-K AMS	17 oz/a / 22 oz/a + 2.5 oz/a + 0.25% v/v + 3 qt/a	95		99	99	94	191
Harness / Impact + Atrazine + MSO + 28%N	1.75 pt/a / 0.75 oz/a + 16 oz/a + 1% v/v + 2.5% v/v	38		99	99	99	188
Harness / Impact + Atrazine + Roundup Power Max + N-Pa-K AMS	1.25 pt/a / 0.5 oz/a + 16 oz/a + 22 oz/a + 3 qt/a	43		98	98	98	187
POST I							
Surestart + Durango + N-Pa-K AMS	1.7 pt/a + 24 oz/a + 3 qt/a	0	99	93	97	92	184
Halex GT + Atrazine + NIS + N-Pa-K AMS	3.6 pt/a + 16 oz/a + 0.25% v/v + 3 qt/a	0	99	99	99	96	185
Rimsulfuron + Mesotrione + Safener + Roundup Original Max + N-Pa-K AMS	1.2 oz/a + 2.5 oz/a + 0.3 oz/a + 22 oz/a + 3 qt/a	0	98	97	99	98	187
Steadfast + Safener + Callisto + Atrazine + COC + N-Pa-K AMS	0.75 oz/a + 0.25 oz/a + 2 oz/a + 16 oz/a + 1% v/v + 3 qt/a	0	99	98	99	98	187
Resolve Q + Atrazine + Roundup Original Max + N-Pa-K AMS	1.25 oz/a + 16 oz/a + 22 oz/a + 3 qt/a	0	99	99	98	98	165
POST I/POST III							
Roundup WeatherMax + N-Pa-K AMS / Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	94	89	96	97	199
	LSD (P=0.10)	6	2	2	2	3	28

Table 3. Performance of herbicide systems for common waterhemp control in field corn on June 1, 9, 18, and 26 at Rochester, MN, in 2009

Treatment	Rate	Common Waterhemp Control					Yield
		6/1	6/9	6/18	6/26	7/20	
	(rate/A)	(%)					(bu/A)
Untreated Check		0	0	0	0	0	12
Weed Free		100	100	100	100	100	208
PRE/POST I							
Dual II Magnum / Halex GT + NIS + N-Pa-K AMS	1 pt/a / 3.6 pt/a + 0.25% v/v + 3 qt/a	95		99	99	98	203
PRE/POST II							
Harness / Laudis + Atrazine + COC + 28%N	1.75 pt/a / 3 oz/a + 16 oz/a + 1% v/v + 1.5 qt/a	97	99	99	99	98	198
Harness / Laudis + Buctril + COC + 28%N	1.75 pt/a / 3 oz/a + 6 oz/a + 1% v/v + 1.5 qt/a	99		99	99	98	178
Harness / Ignite + N-Pa-K AMS	1.75 pt/a / 22 oz/a + 2 qt/a	99		99	99	97	192
Harness / Capreno + COC + 28%N	1.75 pt/a / 3 oz/a + 1% v/v + 1.5 qt/a	99		99	99	97	190
BreakFree / Rimsulfuron + Mesotrione + Safener + Atrazine + COC + N-Pa-K AMS	1 pt/a / 1.2 oz/a + 2.5 oz/a + 0.3 oz/a + 16 oz/a + 1% v/v + 3 qt/a	92		99	99	95	194
BreakFree / Resolve Q + Roundup Original Max + N-Pa-K AMS	1 pt/a / 1.25 oz/a + 22 oz/a + 3 qt/a	92		99	98	92	197
Harness / Roundup WeatherMax + N-Pa-K AMS	1.25 pt/a / 22 oz/a + 3 qt/a	96		99	99	96	172
Lumax / Touchdown Total + N-Pa-K AMS	3 pt/a / 24 oz/a + 3 qt/a	96		99	99	95	194
Camix / Touchdown Total + N-Pa-K AMS	2.5 pt/a / 24 oz/a + 3 qt/a	90		99	98	99	185
SureStart / Durango + N-Pa-K AMS	1.75 pt/a / 24 oz/a + 3 qt/a	98		99	95	92	191
SureStart / Durango + N-Pa-K AMS	2.5 pt/a / 24 oz/a + 3 qt/a	98		99	98	96	191
SureStart + Atrazine / Durango + N-Pa-K AMS	1.75 pt/a + 1.5 pt/a / 24 oz/a + 3 qt/a	98		99	98	96	191
Integrity / Roundup Power Max + Status + NIS + N-Pa-K AMS	17 oz/a / 22 oz/a + 2.5 oz/a + 0.25% v/v + 3 qt/a	97		99	96	94	191
Harness / Impact + Atrazine + MSO + 28%N	1.75 pt/a / 0.75 oz/a + 16 oz/a + 1% v/v + 2.5% v/v	98		99	99	97	188
Harness / Impact + Atrazine + Roundup Power Max + N-Pa-K AMS	1.25 pt/a / 0.5 oz/a + 16 oz/a + 22 oz/a + 3 qt/a	94		99	97	93	187
POST I							
Surestart + Durango + N-Pa-K AMS	1.7 pt/a + 24 oz/a + 3 qt/a	0	94	87	85	89	184
Halex GT + Atrazine + NIS + N-Pa-K AMS	3.6 pt/a + 16 oz/a + 0.25% v/v + 3 qt/a	0	96	99	98	96	185
Rimsulfuron + Mesotrione + Safener + Roundup Original Max + N-Pa-K AMS	1.2 oz/a + 2.5 oz/a + 0.3 oz/a + 22 oz/a + 3 qt/a	0	97	95	94	90	187
Steadfast + Safener + Callisto + Atrazine + COC + N-Pa-K AMS	0.75 oz/a + 0.25 oz/a + 2 oz/a + 16 oz/a + 1% v/v + 3 qt/a	0	98	98	98	91	187
Resolve Q + Atrazine + Roundup Original Max + N-Pa-K AMS	1.25 oz/a + 16 oz/a + 22 oz/a + 3 qt/a	0	91	80	62	82	165
POST I/POST III							
Roundup WeatherMax + N-Pa-K AMS / Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	86	69	84	88	199
	LSD (P=0.10)	3	2	1	3	4	28

Table 4. Performance of herbicide systems for grass control in field corn on June 1, 9, 18, and 26 at Rochester, MN, in 2009

Treatment	Rate	Grass					Yield
		6/1	6/9	6/18	6/26	7/20	
	(rate/A)	(%)					(bu/A)
Untreated Check		0	0	0	0	0	12
Weed Free		100	100	100	100	100	208
PRE/POST I							
Dual II Magnum / Halex GT + NIS + N-Pa-K AMS	1 pt/a / 3.6 pt/a + 0.25% v/v + 3 qt/a	91	99	99	99	99	203
PRE/POST II							
Harness / Laudis + Atrazine + COC + 28%N	1.75 pt/a / 3 oz/a + 16 oz/a + 1% v/v + 1.5 qt/a	97		99	97	98	198
Harness / Laudis + Buctril + COC + 28%N	1.75 pt/a / 3 oz/a + 6 oz/a + 1% v/v + 1.5 qt/a	96		98	98	93	178
Harness / Ignite + N-Pa-K AMS	1.75 pt/a / 22 oz/a + 2 qt/a	95		99	98	99	192
Harness / Capreno + COC + 28%N	1.75 pt/a / 3 oz/a + 1% v/v + 1.5 qt/a	97		99	98	95	190
BreakFree / Rimsulfuron + Mesotrione + Safener + Atrazine + COC + N-Pa-K AMS	1 pt/a / 1.2 oz/a + 2.5 oz/a + 0.3 oz/a + 16 oz/a + 1% v/v + 3 qt/a	90		97	98	96	194
BreakFree / Resolve Q + Roundup Original Max + N-Pa-K AMS	1 pt/a / 1.25 oz/a + 22 oz/a + 3 qt/a	89		99	99	98	197
Harness / Roundup WeatherMax + N-Pa-K AMS	1.25 pt/a / 22 oz/a + 3 qt/a	91		99	99	99	172
Lumax / Touchdown Total + N-Pa-K AMS	3 pt/a / 24 oz/a + 3 qt/a	91		99	99	99	194
Camix / Touchdown Total + N-Pa-K AMS	2.5 pt/a / 24 oz/a + 3 qt/a	89		99	99	98	185
SureStart / Durango + N-Pa-K AMS	1.75 pt/a / 24 oz/a + 3 qt/a	94		99	99	98	191
SureStart / Durango + N-Pa-K AMS	2.5 pt/a / 24 oz/a + 3 qt/a	96		99	99	99	191
SureStart + Atrazine / Durango + N-Pa-K AMS	1.75 pt/a + 1.5 pt/a / 24 oz/a + 3 qt/a	96		99	98	98	191
Integrity / Roundup Power Max + Status + NIS + N-Pa-K AMS	17 oz/a / 22 oz/a + 2.5 oz/a + 0.25% v/v + 3 qt/a	88		99	98	98	191
Harness / Impact + Atrazine + MSO + 28%N	1.75 pt/a / 0.75 oz/a + 16 oz/a + 1% v/v + 2.5% v/v	96		99	99	99	188
Harness / Impact + Atrazine + Roundup Power Max + N-Pa-K AMS	1.25 pt/a / 0.5 oz/a + 16 oz/a + 22 oz/a + 3 qt/a	95		99	98	98	187
POST I							
Surestart + Durango + N-Pa-K AMS	1.7 pt/a + 24 oz/a + 3 qt/a	0	93	89	93	87	184
Halex GT + Atrazine + NIS + N-Pa-K AMS	3.6 pt/a + 16 oz/a + 0.25% v/v + 3 qt/a	0	95	96	96	94	185
Rimsulfuron + Mesotrione + Safener + Roundup Original Max + N-Pa-K AMS	1.2 oz/a + 2.5 oz/a + 0.3 oz/a + 22 oz/a + 3 qt/a	0	93	95	94	94	187
Steadfast + Safener + Callisto + Atrazine + COC + N-Pa-K AMS	0.75 oz/a + 0.25 oz/a + 2 oz/a + 16 oz/a + 1% v/v + 3 qt/a	0	89	93	93	88	187
Resolve Q + Atrazine + Roundup Original Max + N-Pa-K AMS	1.25 oz/a + 16 oz/a + 22 oz/a + 3 qt/a	0	92	94	92	92	165
POST I/POST III							
Roundup WeatherMax + N-Pa-K AMS / Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	91	80	98	98	199
	LSD (P=0.10)	7	4	3	2	6	28

Table 5. Performance of herbicide systems for injury in field corn on June 9 and 18 at Rochester, MN, in 2009.

Treatment	Rate	Injury 6/9	Injury 6/18	Yield
	(rate/A)	(%)		(bu/A)
Untreated Check		5	0	12
Weed Free		10	25	208
PRE/POST I				
Dual II Magnum / Halex GT + NIS + N-Pa-K AMS	1 pt/a / 3.6 pt/a + 0.25% v/v + 3 qt/a	12	0	203
PRE/POST II			0	
Harness / Laudis + Atrazine + COC + 28%N	1.75 pt/a / 3 oz/a + 16 oz/a + 1% v/v + 1.5 qt/a	8	0	198
Harness / Laudis + Buctril + COC + 28%N	1.75 pt/a / 3 oz/a + 6 oz/a + 1% v/v + 1.5 qt/a	18	0	178
Harness / Ignite + N-Pa-K AMS	1.75 pt/a / 22 oz/a + 2 qt/a	13	0	192
Harness / Capreno + COC + 28%N	1.75 pt/a / 3 oz/a + 1% v/v + 1.5 qt/a	19	0	190
BreakFree / Rimsulfuron + Mesotrione + Safener + Atrazine + COC + N-Pa-K AMS	1 pt/a / 1.2 oz/a + 2.5 oz/a + 0.3 oz/a + 16 oz/a + 1% v/v + 3 qt/a	16	0	194
BreakFree / Resolve Q + Roundup Original Max + N-Pa-K AMS	1 pt/a / 1.25 oz/a + 22 oz/a + 3 qt/a	18	0	197
Harness / Roundup WeatherMax + N-Pa-K AMS	1.25 pt/a / 22 oz/a + 3 qt/a	10	0	172
Lumax / Touchdown Total + N-Pa-K AMS	3 pt/a / 24 oz/a + 3 qt/a	15	0	194
Camix / Touchdown Total + N-Pa-K AMS	2.5 pt/a / 24 oz/a + 3 qt/a	15	0	185
SureStart / Durango + N-Pa-K AMS	1.75 pt/a / 24 oz/a + 3 qt/a	17	0	191
SureStart / Durango + N-Pa-K AMS	2.5 pt/a / 24 oz/a + 3 qt/a	14	0	191
SureStart + Atrazine / Durango + N-Pa-K AMS	1.75 pt/a + 1.5 pt/a / 24 oz/a + 3 qt/a	12	0	191
Integrity / Roundup Power Max + Status + NIS + N-Pa-K AMS	17 oz/a / 22 oz/a + 2.5 oz/a + 0.25% v/v + 3 qt/a	10	0	191
Harness / Impact + Atrazine + MSO + 28%N	1.75 pt/a / 0.75 oz/a + 16 oz/a + 1% v/v + 2.5% v/v	14	0	188
Harness / Impact + Atrazine + Roundup Power Max + N-Pa-K AMS	1.25 pt/a / 0.5 oz/a + 16 oz/a + 22 oz/a + 3 qt/a	13	0	187
POST I				
Surestart + Durango + N-Pa-K AMS	1.7 pt/a + 24 oz/a + 3 qt/a	12	0	184
Halex GT + Atrazine + NIS + N-Pa-K AMS	3.6 pt/a + 16 oz/a + 0.25% v/v + 3 qt/a	16	0	185
Rimsulfuron + Mesotrione + Safener + Roundup Original Max + N-Pa-K AMS	1.2 oz/a + 2.5 oz/a + 0.3 oz/a + 22 oz/a + 3 qt/a	14	0	187
Steadfast + Safener + Callisto + Atrazine + COC + N-Pa-K AMS	0.75 oz/a + 0.25 oz/a + 2 oz/a + 16 oz/a + 1% v/v + 3 qt/a	10	0	187
Resolve Q + Atrazine + Roundup Original Max + N-Pa-K AMS	1.25 oz/a + 16 oz/a + 22 oz/a + 3 qt/a	10	0	165
POST I/POST III				
Roundup WeatherMax + N-Pa-K AMS / Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	11	0	199
	LSD (P=0.10)	5	12	28

2009 Corn Herbicide Evaluation - Lamberton

	Herbicide	Rate	Yellow foxtail	Common lambsquarters	Tall waterhemp	H2O	Yield	Cost	Returns
		(product/A)		(% control)		(%)	(bu/A)	($/A)	($/A)
	Preemergence/POST III (V4 corn)								
1	Harness / Laudis + atrazine + COC + 28%	1.75 pt / 3 oz + 16 oz + 1% + 1.5 qt	93	99	99	19.1	202	59.25	566
	Preemergence/POST I (V2 - V 3 corn)								
2	Dual II Magnum / Halex GT + NIS + AMS	1 pt / 3.6 pt + 0.25% + 3 qt	97	99	99	18.4	203	63.56	572
	Preemergence/POST III (V4 corn)								
3	Harness / Laudis + Buctril + COC + 28%	1.75 pt / 3 oz + 6 oz + 1% + 1.5 qt	90	99	97	18.5	207	60.41	585
4	Harness / Ignite + AMS	1.75 pt / 22 oz + 2 qt	88	84	94	19.9	203	50.28	572
5	Harness / Capreno + COC + 28%	1.75 pt / 3 oz + 1% + 1.5 qt	93	99	99	19.0	205	58.83	576
6	Breakfree / Rims + meso + Isox-e + atrazine + COC + AMS	pt / 1.2oz + 2.5oz + 0.3oz + 16oz + 1% + 3	86	99	99	19.0	205		
7	Breakfree / Resolve Q + Roundup Original Max + AMS	1 pt / 1.25 oz + 16 oz + 22 oz + 3 qt	89	98	98	19.3	202	53.80	569
8	Harness / Roundup WeatherMax + AMS	1.25 pt / 22 oz + 3 qt	91	99	97	18.8	210	50.99	602
9	Lumax / Touchdown Total + AMS	3 pt / 24 oz + 3 qt	91	99	99	19.6	199	57.41	553
10	Camix / Touchdown Total + AMS	2.5 pt / 24 oz + 3 qt	90	99	97	19.4	199	55.67	557
11	SureStart / Durango + AMS	1.75 pt / 24 oz + 3 qt	91	97	98	18.9	200	48.59	571
12	SureStart / Durango + AMS	2.5 pt / 24 oz + 3 qt	95	98	99	20.0	198	55.88	547
13	SureStart + atrazine / Durango + AMS	1.75 pt + 1.5 pt / 24 oz + 3 qt	93	98	99	18.6	211	52.04	606
14	Integrity / Roundup WeatherMax + Status + NIS + AMS	17 oz / 22 oz + 2.5 oz + 0.25% + 3 qt	92	99	98	19.1	204	66.29	566
15	Harness / Impact + atrazine + MSO + 28%	1.75 pt / 0.75 oz + 16 oz + 1% + 2.5%	93	99	99	18.7	211	62.55	594
16	Harness / Impact + atrazine + Roundup WeatherMax + AMS	1.25 pt / 0.5 oz + 16 oz + 22 oz + 3 qt	94	99	99	19.3	203	63.05	562
	POST I (1" Weeds) / POST IV (4" weeds)								
17	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	92	98	95	19.0	207	47.58	595
	POST I (V2 corn)								
18	SureStart + Durango + AMS	1.75 pt + 24 oz + 3 qt	96	99	99	19.6	204	41.59	585
19	Halex GT + atrazine + NIS + AMS	3.6 pt + 16 oz + 0.25% + 3 qt	95	99	99	19.1	201	43.93	577
	POST II (V3 corn)								
20	Rims + meso + Isox-e + Roundup Original Max + AMS	1.2oz + 2.5oz + 0.3oz + 22oz + 3qt	80	99	98	19.5	204		
21	Steadfast Q + Callisto + atrazine + COC + AMS	1 oz + 2 oz + 16 oz + 1% + 3 qt	80	99	99	18.8	207	33.94	610
22	Resolve Q + atrazine + Roundup Original Max + AMS	1.25 oz + 16 oz + 22 oz + 3 qt	80	98	94	19.3	194	39.41	561
	Checks								
23	Weedy Check	-	0	0	0	20.1	74	0.00	225
24	Weed-Free Check	-	100	100	100	19.2	204	0.00	631
		LSD (0.10)	**3**	**3**	**2**	**ns**	**13**		**42**

2009 Corn Herbicide Evaluation - Rochester

	Herbicide	Rate	Grass mix	Giant ragweed	Common lambsquarters	Tall waterhemp	H2O	Yield	Cost	Returns
		(product/A)		(% control)			(%)	(bu/A)	($/A)	($/A)
	Preemergence/POST III (V4 corn)									
1	Harness / Laudis + atrazine + COC + 28%	1.75 pt / 3 oz + 16 oz + 1% + 1.5 qt	98	97	99	98	23.4	198	59.25	514
	Preemergence/POST I (V2 - V 3 corn)									
2	Dual II Magnum / Halex GT + NIS + AMS	1 pt / 3.6 pt + 0.25% + 3 qt	99	89	99	98	23.1	203	63.56	527
	Preemergence/POST III (V4 corn)									
3	Harness / Laudis + Buctril + COC + 28%	1.75 pt / 3 oz + 6 oz + 1% + 1.5 qt	93	98	99	98	24.1	201	60.41	514
4	Harness / Ignite + AMS	1.75 pt / 22 oz + 2 qt	99	86	89	97	23.3	178	50.28	467
5	Harness / Capreno + COC + 28%	1.75 pt / 3 oz + 1% + 1.5 qt	95	96	98	97	23.7	192	58.83	494
6	Breakfree / Rims + meso + Isox-e + atrazine + COC + AMS	pt / 1.2oz + 2.5oz + 0.3oz + 16oz + 1% + 3	96	95	99	95	23.4	190		
7	Breakfree / Resolve Q + Roundup Original Max + AMS	1 pt / 1.25 oz + 16 oz + 22 oz + 3 qt	98	89	96	92	24.0	194	53.80	504
8	Harness / Roundup WeatherMax + AMS	1.25 pt / 22 oz + 3 qt	99	85	97	96	23.0	197	50.99	522
9	Lumax / Touchdown Total + AMS	3 pt / 24 oz + 3 qt	99	94	99	95	23.2	172	57.41	442
10	Camix / Touchdown Total + AMS	2.5 pt / 24 oz + 3 qt	98	92	99	99	23.6	194	55.67	505
11	SureStart / Durango + AMS	1.75 pt / 24 oz + 3 qt	98	89	97	92	22.9	185	48.59	493
12	SureStart / Durango + AMS	2.5 pt / 24 oz + 3 qt	99	90	99	96	23.1	191	55.88	499
13	SureStart + atrazine / Durango + AMS	1.75 pt + 1.5 pt / 24 oz + 3 qt	98	90	99	96	22.6	191	52.04	508
14	Integrity / Roundup WeatherMax + Status + NIS + AMS	17 oz / 22 oz + 2.5 oz + 0.25% + 3 qt	98	95	94	94	23.5	191	66.29	485
15	Harness / Impact + atrazine + MSO + 28%	1.75 pt / 0.75 oz + 16 oz + 1% + 2.5%	99	92	99	97	22.9	188	62.55	487
16	Harness / Impact + atrazine + Roundup WeatherMax + AMS	1.25 pt / 0.5 oz + 16 oz + 22 oz + 3 qt	98	93	98	93	24.3	187	63.05	470
	POST I (1" Weeds) / POST IV (4" weeds)									
17	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	98	96	97	88	22.9	199	47.58	533
	POST I (V2 corn)									
18	SureStart + Durango + AMS	1.75 pt + 24 oz + 3 qt	87	84	92	89	23.2	183	41.59	492
19	Halex GT + atrazine + NIS + AMS	3.6 pt + 16 oz + 0.25% + 3 qt	94	97	96	96	22.9	185	43.93	498
	POST II (V3 corn)									
20	Rims + meso + Isox-e + Roundup Original Max + AMS	1.2oz + 2.5oz + 0.3oz + 22oz + 3qt	94	87	98	90	23.1	187		
21	Steadfast Q + Callisto + atrazine + COC + AMS	1 oz + 2 oz + 16 oz + 1% + 3 qt	88	90	98	91	23.0	187	33.94	512
22	Resolve Q + atrazine + Roundup Original Max + AMS	1.25 oz + 16 oz + 22 oz + 3 qt	92	65	98	82	22.8	165	39.41	443
	Checks									
23	Weedy Check	-	0	0	0	0	23.3	13	0.00	37
24	Weed-Free Check	-	100	100	100	100	23.7	208	0.00	600
		LSD (0.10)	**5**	**4**	**3**	**4**	**1.4**	**28**		**75**

2009 Corn Herbicide Evaluation - Waseca

Common ragweed Site

	Herbicide	Rate	Giant foxtail	Common ragweed	Common lambsquarters	Velvetleaf	Redroot pigweed	Wild buckwheat	H2O	Yield	Cost	Returns
		(product/A)	(% control)						(%)	(bu/A)	($/A)	($/A)
	Preemergence/POST III (V4 corn)											
1	Harness / Laudis + atrazine + COC + 28%	1.75 pt / 3 oz + 16 oz + 1% + 1.5 qt	91	99	99	99	99	99	28.3	167	59.25	387
	Preemergence/POST I (V2 - V 3 corn)											
2	Dual II Magnum / Halex GT + NIS + AMS	1 pt / 3.6 pt + 0.25% + 3 qt	75	64	96	96	99	99	28.2	149	63.56	338
	Preemergence/POST III (V4 corn)											
3	Harness / Laudis + Buctril + COC + 28%	1.75 pt / 3 oz + 6 oz + 1% + 1.5 qt	89	99	99	98	99	99	29.0	166	60.41	379
4	Harness / Ignite + AMS	1.75 pt / 22 oz + 2 qt	91	83	89	89	99	99	28.3	171	50.28	408
5	Harness / Capreno + COC + 28%	1.75 pt / 3 oz + 1% + 1.5 qt	83	81	88	98	93	97	30.1	179	58.83	404
6	Breakfree / Rims + meso + Isox-e + atrazine + COC + AMS	pt / 1.2oz + 2.5oz + 0.3oz + 16oz + 1% + 3	94	99	99	99	99	98	28.2	185		
7	Breakfree / Resolve Q + Roundup Original Max + AMS	1 pt / 1.25 oz + 16 oz + 22 oz + 3 qt	97	97	99	95	99	98	28.3	177	53.80	420
8	Harness / Roundup WeatherMax + AMS	1.25 pt / 22 oz + 3 qt	95	89	99	98	99	99	28.2	179	50.99	430
9	Lumax / Touchdown Total + AMS	3 pt / 24 oz + 3 qt	93	99	99	98	99	99	28.3	189	57.41	450
10	Camix / Touchdown Total + AMS	2.5 pt / 24 oz + 3 qt	93	98	99	99	99	98	27.6	178	55.67	425
11	SureStart / Durango + AMS	1.75 pt / 24 oz + 3 qt	97	99	99	99	99	99	28.5	181	48.59	434
12	SureStart / Durango + AMS	2.5 pt / 24 oz + 3 qt	98	99	99	99	99	98	28.4	171	55.88	402
13	SureStart + atrazine / Durango + AMS	1.75 pt + 1.5 pt / 24 oz + 3 qt	96	98	99	97	99	99	28.2	183	52.04	439
14	Integrity / Roundup WeatherMax + Status + NIS + AMS	17 oz / 22 oz + 2.5 oz + 0.25% + 3 qt	96	99	99	98	99	99	28.0	161	66.29	367
15	Harness / Impact + atrazine + MSO + 28%	1.75 pt / 0.75 oz + 16 oz + 1% + 2.5%	98	99	99	99	99	99	27.8	166	62.55	386
16	Harness / Impact + atrazine + Roundup WeatherMax + AMS	1.25 pt / 0.5 oz + 16 oz + 22 oz + 3 qt	99	99	99	99	99	99	28.2	169	63.05	389
	POST I (1" Weeds) / POST IV (4" weeds)											
17	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	99	99	99	99	99	99	28.3	182	47.58	441
	POST I (V2 corn)											
18	SureStart + Durango + AMS	1.75 pt + 24 oz + 3 qt	93	90	91	85	99	99	28.4	195	41.59	480
19	Halex GT + atrazine + NIS + AMS	3.6 pt + 16 oz + 0.25% + 3 qt	73	80	99	99	99	99	28.1	151	43.93	361
	POST II (V3 corn)											
20	Rims + meso + Isox-e + Roundup Original Max + AMS	1.2oz + 2.5oz + 0.3oz + 22oz + 3qt	70	87	99	99	99	99	28.4	133		
21	Steadfast Q + Callisto + atrazine + COC + AMS	1 oz + 2 oz + 16 oz + 1% + 3 qt	73	94	99	99	99	99	28.8	156	33.94	379
22	Resolve Q + atrazine + Roundup Original Max + AMS	1.25 oz + 16 oz + 22 oz + 3 qt	64	83	99	96	99	99	28.9	143	39.41	341
	Checks											
23	Weedy Check	-	0	0	0	0	0	0	29.7	81	0.00	211
24	Weed-Free Check	-	100	100	100	100	100	100	29.0	171	0.00	454
		LSD (0.10)	**9**	**10**	**6**	**6**	**3**	**1**	**1.3**	**26**		**73**

2009 Corn Herbicide Evaluation - Waseca

Giant ragweed Site

	Herbicide	Rate	Giant foxtail	Giant ragweed	H2O	Yield	Cost	Returns
		(product/A)	(% control)		(%)	(bu/A)	($/A)	($/A)
	Preemergence/POST III (V4 corn)							
1	Harness / Laudis + atrazine + COC + 28%	1.75 pt / 3 oz + 16 oz + 1% + 1.5 qt	99	93	28.8	175	59.25	406
	Preemergence/POST I (V2 - V 3 corn)							
2	Dual II Magnum / Halex GT + NIS + AMS	1 pt / 3.6 pt + 0.25% + 3 qt	99	63	28.2	145	63.56	327
	Preemergence/POST III (V4 corn)							
3	Harness / Laudis + Buctril + COC + 28%	1.75 pt / 3 oz + 6 oz + 1% + 1.5 qt	99	92	29.4	170	60.41	387
4	Harness / Ignite + AMS	1.75 pt / 22 oz + 2 qt	99	86	27.9	166	50.28	397
5	Harness / Capreno + COC + 28%	1.75 pt / 3 oz + 1% + 1.5 qt	99	88	28.5	166	58.83	385
6	Breakfree / Rims + meso + Isox-e + atrazine + COC + AMS	pt / 1.2oz + 2.5oz + 0.3oz + 16oz + 1% + 3	98	96	28.4	177		
7	Breakfree / Resolve Q + Roundup Original Max + AMS	1 pt / 1.25 oz + 16 oz + 22 oz + 3 qt	99	89	28.3	181	53.80	431
8	Harness / Roundup WeatherMax + AMS	1.25 pt / 22 oz + 3 qt	99	92	28.6	178	50.99	422
9	Lumax / Touchdown Total + AMS	3 pt / 24 oz + 3 qt	99	96	27.7	183	57.41	437
10	Camix / Touchdown Total + AMS	2.5 pt / 24 oz + 3 qt	99	95	29.0	176	55.67	411
11	SureStart / Durango + AMS	1.75 pt / 24 oz + 3 qt	99	93	27.9	180	48.59	438
12	SureStart / Durango + AMS	2.5 pt / 24 oz + 3 qt	99	92	28.2	174	55.88	412
13	SureStart + atrazine / Durango + AMS	1.75 pt + 1.5 pt / 24 oz + 3 qt	99	89	27.1	167	52.04	405
14	Integrity / Roundup WeatherMax + Status + NIS + AMS	17 oz / 22 oz + 2.5 oz + 0.25% + 3 qt	99	94	28.9	184	66.29	421
15	Harness / Impact + atrazine + MSO + 28%	1.75 pt / 0.75 oz + 16 oz + 1% + 2.5%	99	95	28.5	180	62.55	419
16	Harness / Impact + atrazine + Roundup WeatherMax + AMS	1.25 pt / 0.5 oz + 16 oz + 22 oz + 3 qt	99	96	28.7	193	63.05	452
	POST I (1" Weeds) / POST IV (4" weeds)							
17	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	99	99	28.3	183	47.58	443
	POST I (V2 corn)							
18	SureStart + Durango + AMS	1.75 pt + 24 oz + 3 qt	99	76	28.0	190	41.59	471
19	Halex GT + atrazine + NIS + AMS	3.6 pt + 16 oz + 0.25% + 3 qt	76	59	29.5	170	43.93	404
	POST II (V3 corn)							
20	Rims + meso + Isox-e + Roundup Original Max + AMS	1.2oz + 2.5oz + 0.3oz + 22oz + 3qt	94	65	27.9	191		
21	Steadfast Q + Callisto + atrazine + COC + AMS	1 oz + 2 oz + 16 oz + 1% + 3 qt	97	68	28.8	160	33.94	392
22	Resolve Q + atrazine + Roundup Original Max + AMS	1.25 oz + 16 oz + 22 oz + 3 qt	95	45	28.5	158	39.41	382
	Checks							
23	Weedy Check	-	0	0	30.3	26	0.00	67
24	Weed-Free Check	-	100	100	28.3	179	0.00	480
		LSD (0.10)	**11**	**13**	**1.2**	**21**		**60**

2009 Corn Herbicide Evaluation - Waseca

Common cocklebur Site

	Herbicide	Rate	Giant foxtail	Common cocklebur	Common lambsquarters	H2O	Yield	Cost	Returns
		(product/A)		(% control)		(%)	(bu/A)	($/A)	($/A)
	Preemergence/POST III (V4 corn)								
1	Harness / Laudis + atrazine + COC + 28%	1.75 pt / 3 oz + 16 oz + 1% + 1.5 qt	99	85	99	27.3	208	59.25	508
	Preemergence/POST I (V2 - V 3 corn)								
2	Dual II Magnum / Halex GT + NIS + AMS	1 pt / 3.6 pt + 0.25% + 3 qt	83	78	63	27.4	194	63.56	463
	Preemergence/POST III (V4 corn)								
3	Harness / Laudis + Buctril + COC + 28%	1.75 pt / 3 oz + 6 oz + 1% + 1.5 qt	92	90	99	26.6	211	60.41	522
4	Harness / Ignite + AMS	1.75 pt / 22 oz + 2 qt	99	85	99	27.6	216	50.28	533
5	Harness / Capreno + COC + 28%	1.75 pt / 3 oz + 1% + 1.5 qt	87	91	99	27.5	206	58.83	502
6	Breakfree / Rims + meso + Isox-e + atrazine + COC + AMS	pt / 1.2oz + 2.5oz + 0.3oz + 16oz + 1% + 3	98	85	99	27.6	216		
7	Breakfree / Resolve Q + Roundup Original Max + AMS	1 pt / 1.25 oz + 16 oz + 22 oz + 3 qt	99	88	99	27.1	209	53.80	516
8	Harness / Roundup WeatherMax + AMS	1.25 pt / 22 oz + 3 qt	99	91	99	27.8	223	50.99	551
9	Lumax / Touchdown Total + AMS	3 pt / 24 oz + 3 qt	99	90	99	26.9	222	57.41	550
10	Camix / Touchdown Total + AMS	2.5 pt / 24 oz + 3 qt	99	92	99	27.0	215	55.67	534
11	SureStart / Durango + AMS	1.75 pt / 24 oz + 3 qt	99	91	99	25.8	226	48.59	581
12	SureStart / Durango + AMS	2.5 pt / 24 oz + 3 qt	99	91	99	27.1	216	55.88	535
13	SureStart + atrazine / Durango + AMS	1.75 pt + 1.5 pt / 24 oz + 3 qt	99	92	99	26.1	227	52.04	579
14	Integrity / Roundup WeatherMax + Status + NIS + AMS	17 oz / 22 oz + 2.5 oz + 0.25% + 3 qt	99	98	99	27.2	218	66.29	528
15	Harness / Impact + atrazine + MSO + 28%	1.75 pt / 0.75 oz + 16 oz + 1% + 2.5%	99	88	99	26.7	213	62.55	524
16	Harness / Impact + atrazine + Roundup WeatherMax + AMS	1.25 pt / 0.5 oz + 16 oz + 22 oz + 3 qt	99	98	99	26.5	210	63.05	515
	POST I (1" Weeds) / POST IV (4" weeds)								
17	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	99	99	99	26.7	212	47.58	537
	POST I (V2 corn)								
18	SureStart + Durango + AMS	1.75 pt + 24 oz + 3 qt	89	89	65	27.3	223	41.59	565
19	Halex GT + atrazine + NIS + AMS	3.6 pt + 16 oz + 0.25% + 3 qt	74	79	60	26.8	187	43.93	470
	POST II (V3 corn)								
20	Rims + meso + Isox-e + Roundup Original Max + AMS	1.2oz + 2.5oz + 0.3oz + 22oz + 3qt	74	74	94	26.9	219		
21	Steadfast Q + Callisto + atrazine + COC + AMS	1 oz + 2 oz + 16 oz + 1% + 3 qt	70	86	54	26.7	185	33.94	476
22	Resolve Q + atrazine + Roundup Original Max + AMS	1.25 oz + 16 oz + 22 oz + 3 qt	70	81	96	27.7	208	39.41	522
	Checks								
23	Weedy Check	-	0	0	0	29.1	76	0.00	200
24	Weed-Free Check	-	100	100	100	27.0	210	0.00	574
		LSD (0.10)	**6**	**8**	**12**	**1.2**	**19**		**56**

2009 Corn Herbicide Evaluation - Waseca

Tall waterhemp Site

	Herbicide	Rate	Giant foxtail	Tall waterhemp	Velvetleaf	H2O	Yield	Cost	Returns
		(product/A)		(% control)		(%)	(bu/A)	($/A)	($/A)
	Preemergence/POST III (V4 corn)								
1	Harness / Laudis + atrazine + COC + 28%	1.75 pt / 3 oz + 16 oz + 1% + 1.5 qt	90	94	95	32.7	162	59.25	345
	Preemergence/POST I (V2 - V 3 corn)								
2	Dual II Magnum / Halex GT + NIS + AMS	1 pt / 3.6 pt + 0.25% + 3 qt	88	75	78	31.0	180	63.56	396
	Preemergence/POST III (V4 corn)								
3	Harness / Laudis + Buctril + COC + 28%	1.75 pt / 3 oz + 6 oz + 1% + 1.5 qt	81	94	95	32.1	154	60.41	326
4	Harness / Ignite + AMS	1.75 pt / 22 oz + 2 qt	95	94	84	31.6	173	50.28	386
5	Harness / Capreno + COC + 28%	1.75 pt / 3 oz + 1% + 1.5 qt	84	93	90	32.6	171	58.83	367
6	Breakfree / Rims + meso + Isox-e + atrazine + COC + AMS	pt / 1.2oz + 2.5oz + 0.3oz + 16oz + 1% + 3	64	88	95	30.8	157		
7	Breakfree / Resolve Q + Roundup Original Max + AMS	1 pt / 1.25 oz + 16 oz + 22 oz + 3 qt	95	93	90	31.4	169	53.80	377
8	Harness / Roundup WeatherMax + AMS	1.25 pt / 22 oz + 3 qt	96	96	94	32.2	173	50.99	381
9	Lumax / Touchdown Total + AMS	3 pt / 24 oz + 3 qt	96	96	95	30.0	181	57.41	414
10	Camix / Touchdown Total + AMS	2.5 pt / 24 oz + 3 qt	95	95	91	30.8	175	55.67	393
11	SureStart / Durango + AMS	1.75 pt / 24 oz + 3 qt	95	96	95	31.1	182	48.59	414
12	SureStart / Durango + AMS	2.5 pt / 24 oz + 3 qt	96	96	95	29.9	188	55.88	435
13	SureStart + atrazine / Durango + AMS	1.75 pt + 1.5 pt / 24 oz + 3 qt	95	96	95	29.8	176	52.04	407
14	Integrity / Roundup WeatherMax + Status + NIS + AMS	17 oz / 22 oz + 2.5 oz + 0.25% + 3 qt	94	96	96	31.3	178	66.29	387
15	Harness / Impact + atrazine + MSO + 28%	1.75 pt / 0.75 oz + 16 oz + 1% + 2.5%	96	93	88	31.8	174	62.55	376
16	Harness / Impact + atrazine + Roundup WeatherMax + AMS	1.25 pt / 0.5 oz + 16 oz + 22 oz + 3 qt	96	96	95	31.6	186	63.05	409
	POST I (1" Weeds) / POST IV (4" weeds)								
17	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	97	97	95	31.2	180	47.58	412
	POST I (V2 corn)								
18	SureStart + Durango + AMS	1.75 pt + 24 oz + 3 qt	89	59	38	31.0	168	41.59	388
19	Halex GT + atrazine + NIS + AMS	3.6 pt + 16 oz + 0.25% + 3 qt	83	81	66	31.3	180	43.93	415
	POST II (V3 corn)								
20	Rims + meso + Isox-e + Roundup Original Max + AMS	1.2oz + 2.5oz + 0.3oz + 22oz + 3qt	70	66	76	31.4	168		
21	Steadfast Q + Callisto + atrazine + COC + AMS	1 oz + 2 oz + 16 oz + 1% + 3 qt	39	59	43	31.8	138	33.94	318
22	Resolve Q + atrazine + Roundup Original Max + AMS	1.25 oz + 16 oz + 22 oz + 3 qt	55	68	30	30.5	156	39.41	362
	Checks								
23	Weedy Check	-	0	0	0	33.3	15	0.00	36
24	Weed-Free Check	-	100	100	100	31.3	188	0.00	477
		LSD (0.10)	**9**	**13**	**15**	**ns**	**26**		**75**

2009 Corn Herbicide Evaluation

Combined across locations

	Herbicide	Rate	Giant foxtail	Yellow foxtail	Grass mix	Common lambsquarters	Tall waterhemp	Velvetleaf	Giant ragweed	Common cocklebur	Common ragweed	Redroot pigweed	Wild buckwheat	H2O	Yield	Cost	Returns	S.E.
			Number of Locations Evaluated															
			4	1	1	5	3	2	2	1	1	1	1	7	7		7	
		(product/A)	(% control)											(%)	(bu/A)	($/A)	($/A)	
	Preemergence/POST III (V4 corn)																	
1	Harness / Laudis + atrazine + COC + 28%	1.75 pt / 3 oz + 16 oz + 1% + 1.5 qt	95	93	98	99	97	97	95	85	99	99	99	26.6	184	59.25	448	16.6
	Preemergence/POST I (V2 - V 3 corn)																	
2	Dual II Magnum / Halex GT + NIS + AMS	1 pt / 3.6 pt + 0.25% + 3 qt	86	97	99	87	91	87	76	78	64	99	99	26.0	177	63.56	428	20.4
	Preemergence/POST III (V4 corn)																	
3	Harness / Laudis + Buctril + COC + 28%	1.75 pt / 3 oz + 6 oz + 1% + 1.5 qt	90	90	93	99	96	97	95	90	99	99	99	26.6	182	60.41	441	22.2
4	Harness / Ignite + AMS	1.75 pt / 22 oz + 2 qt	96	88	99	88	95	87	86	85	83	99	99	26.4	183	50.28	454	15.8
5	Harness / Capreno + COC + 28%	1.75 pt / 3 oz + 1% + 1.5 qt	88	93	95	97	96	94	92	91	81	93	97	26.9	183	58.83	444	17.9
6	Breakfree / Rims + meso + Isox-e + atrazine + COC + A	pt / 1.2oz + 2.5oz + 0.3oz + 16oz + 1% + 3	88	86	96	99	94	97	95	85	99	99	98	26.2	184			M
7	Breakfree / Resolve Q + Roundup Original Max + AMS	1 pt / 1.25 oz + 16 oz + 22 oz + 3 qt	98	89	98	96	94	92	89	88	97	99	98	26.4	184	53.80	454	17.4
8	Harness / Roundup WeatherMax + AMS	1.25 pt / 22 oz + 3 qt	97	91	99	97	96	96	88	91	89	99	99	26.4	187	50.99	466	18.7
9	Lumax / Touchdown Total + AMS	3 pt / 24 oz + 3 qt	97	91	99	98	97	97	95	90	99	99	99	26.0	187	57.41	460	15.5
10	Camix / Touchdown Total + AMS	2.5 pt / 24 oz + 3 qt	96	90	98	98	97	95	93	92	98	99	98	26.2	185	55.67	456	15.6
11	SureStart / Durango + AMS	1.75 pt / 24 oz + 3 qt	97	91	98	95	95	97	91	91	99	99	99	25.9	187	48.59	472	17.7
12	SureStart / Durango + AMS	2.5 pt / 24 oz + 3 qt	98	95	99	95	97	97	91	91	99	99	98	26.1	185	55.88	455	15.6
13	SureStart + atrazine / Durango + AMS	1.75 pt + 1.5 pt / 24 oz + 3 qt	97	93	98	97	97	96	90	92	98	99	99	25.4	189	52.04	477	16.9
14	Integrity / Roundup WeatherMax + Status + NIS + AMS	17 oz / 22 oz + 2.5 oz + 0.25% + 3 qt	97	92	98	98	96	97	94	98	99	99	99	26.3	184	66.29	443	17.9
15	Harness / Impact + atrazine + MSO + 28%	1.75 pt / 0.75 oz + 16 oz + 1% + 2.5%	98	93	99	99	96	93	93	88	99	99	99	26.1	184	62.55	448	18.1
16	Harness / Impact + atrazine + Roundup WeatherMax +	1.25 pt / 0.5 oz + 16 oz + 22 oz + 3 qt	98	94	98	98	96	97	95	98	99	99	99	26.4	187	63.05	451	16.0
	POST I (1" Weeds) / POST IV (4" weeds)																	
17	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	99	92	98	98	93	97	97	99	99	99	99	26.1	191	47.58	481	15.4
	POST I (V2 corn)																	
18	SureStart + Durango + AMS	1.75 pt + 24 oz + 3 qt	92	96	87	84	82	61	80	89	90	99	99	26.2	189	41.59	481	17.0
19	Halex GT + atrazine + NIS + AMS	3.6 pt + 16 oz + 0.25% + 3 qt	76	95	94	89	92	83	78	79	80	99	99	26.3	177	43.93	446	16.3
	POST II (V3 corn)																	
20	Rims + meso + Isox-e + Roundup Original Max + AMS	1.2oz + 2.5oz + 0.3oz + 22oz + 3qt	77	80	94	90	85	88	76	74	87	99	99	26.2	180			M
21	Steadfast Q + Callisto + atrazine + COC + AMS	1 oz + 2 oz + 16 oz + 1% + 3 qt	70	80	88	90	83	71	79	86	94	99	99	26.3	172	33.94	445	20.5
22	Resolve Q + atrazine + Roundup Original Max + AMS	1.25 oz + 16 oz + 22 oz + 3 qt	71	80	92	96	81	63	55	81	83	99	99	26.3	170	39.41	432	17.7
	Checks																	
23	Weedy Check	-	0	0	0	0	0	0	0	0	0	0	0	27.6	51	0.00	139	19.1
24	Weed-Free Check	-	100	100	100	100	100	100	100	100	100	100	100	26.4	191	0.00	527	17.0
		LSD (0.10)	**4**	**3**	**5**	**3**	**4**	**8**	**7**	**8**	**10**	**3**	**1**	**0.6**	**8**		**24**	

SECTION C

CORN

PRODUCTION MANAGEMENT

Performance of Corn Hybrids Planted at Populations from 16,500 to 44,000 plants/Acre at Rochester, MN in 2009.

Coulter, Jeffrey, Lisa M.Behnken, Fritz R. Breitenbach, and Ryan P. Miller

The objective of this trial was to evaluate the performance and grain yields of corn hybrids planted at varying rates per acre in southern Minnesota. The trials were located at Rochester, MN. Field histories are located in Table 1. Corn hybrids used in this trial were Pioneer 38P43 (95-day), Pioneer 37N68 (101-day), and Pioneer 35F44 (105-day). All had resistance to corn rootworm, European corn borer, glyphosate herbicide, and glufosinate herbicide. The trials were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rates were 16.5, 22.0, 27.5, 33.0, 38.5, and 44.0K per acre planted at a depth of 1.5 inches.

This small-plot experiment had 18 treatments, consisting of all combinations of three hybrids of varying maturity and six final plant populations (16,500, 22,000, 27,500, 33,000, 38,500, and 44,000 plants/acre). The experimental design was a randomized complete block with six replications. Desired final plant populations were established by overplanting followed by hand thinning. The two center rows of each plot were harvested on November 13, 2009 with a plot combine. Yields were adjusted to 15% moisture. Data were analyzed at the 5% probability level. (University of Minnesota Extension Regional Center, Rochester, MN).

Table 1. *Field History.*

	Rochester
Planting Date	April 29, 2009
Harvest Date	November 13, 2009
Soil Type	Port Byron Silt loam with non-limiting fertility
Fertilizer	
Herbicide Pre/Post	
Tillage	Chisel plow in Fall – field cultivator in Spring
Previous Crop	Soybean

Table 2. *Corn response to hybrid maturity at Rochester, MN in 2009, averaged across six plant populations.*

Hybrid	**Hybrid relative maturity**	**Grain yield at 15% moisture (bu/A)**	**Grain moisture at harvest (%)**
Pioneer 38P43	95-day	170	18.2
Pioneer 37N68	101-day	190	19.4
Pioneer 35F44	105-day	204	21.4
LSD (0.05)	**---**	**11**	**0.4**

RESULTS

- Total rainfall amounts at Rochester, MN in May, June, July, August and September were 3.9, 3.4, 3.5, 4.2, and 1.3 inches, respectively.
- There was no root or stalk lodging in this experiment, even at the high plant populations.
- Corn grain yield and harvest moisture increased as hybrid relative maturity increased (Table 2.)
- The response of corn grain yield to plant population did not differ by hybrid (Figure 1). Averaged across hybrids, grain yield was maximized with a final stand of 41,300 plants/acre.
- Based on the yield response curve in Figure 1, economically optimum seed rates were calculated for various seed costs and corn prices (Table 2). Required seeding rates were assumed to be 5% higher than the desired final plant populations.
- Grain moisture at harvest was not significantly influenced by final plant population, and this was consistent among hybrids (Figure 2).

CONCLUSIONS

The results from this experiment support the use of full-season hybrids for normal planting dates. In this experiment, economically optimum seeding rates ranged from 36,200 to 38,400 seeds/acre for seed costs of $225 to $250/bag and corn prices of $3.25 to 4.25/bushel.

Table 3. *Seeding rates (seeds/acre) to maximize net return to seed cost, averaged across three hybrids at Rochester, MN in 2009. The seeding rates listed below are 5% higher than the targeted final plant populations.*

Seed cost ($/bag)	Corn price ($/bushel)				
	2.75	**3.25**	**3.75**	**4.25**	**4.75**
175	37,300	38,300	39,000	39,500	40,000
200	36,500	37,500	38,400	38,900	39,400
225	35,700	36,800	37,800	38,400	38,900
250	34,800	36,200	37,100	37,900	38,400
275	34,000	35,400	36,500	37,300	38,000
300	33,100	34,700	35,900	36,700	37,400

Figure 1. *Response of corn grain yield to plant population at Rochester, MN in 2009, averaged across three hybrids.*

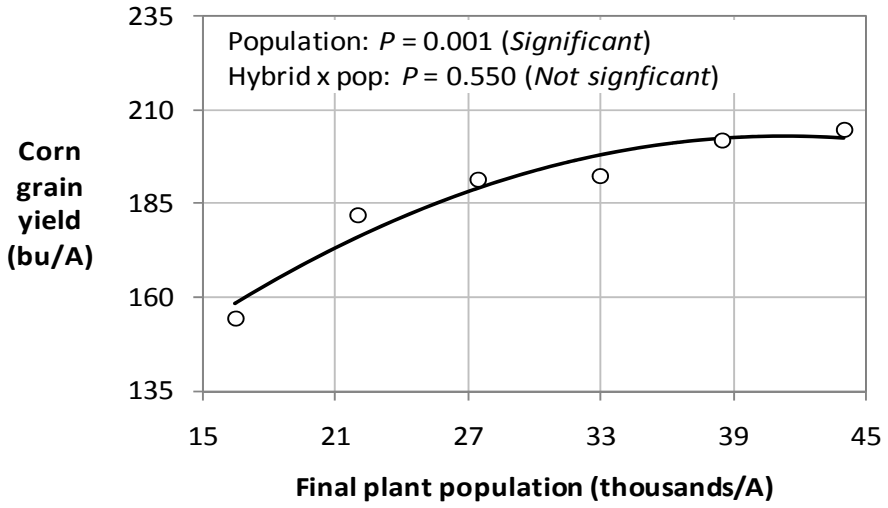
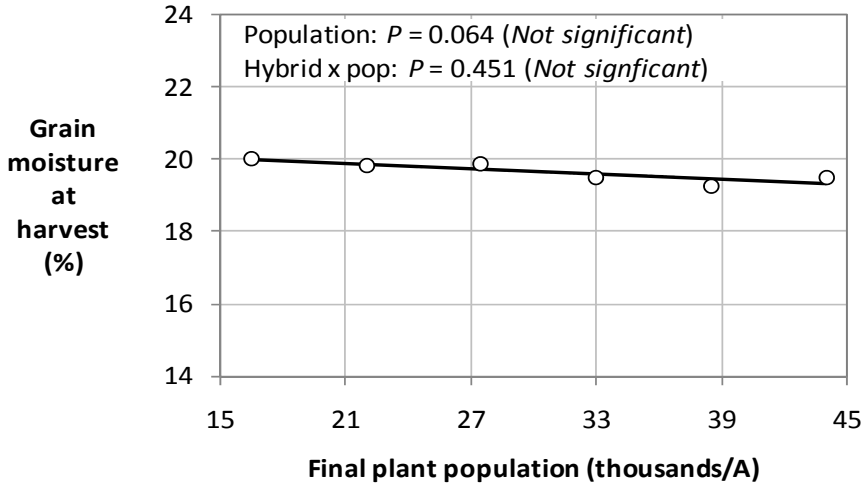


Figure 2. *Response of corn harvest moisture to plant population at Rochester, MN in 2009, averaged across three hybrids.*



Evaluation of Seed Treatments for Nematode Control in Field Corn at Wabasha County in 2009

Miller, Ryan P., Fritz R. Breitenbach, Lisa M. Behnken, and Kyle Poss

The objective of this trial was to evaluate corn nematode management products in southeastern Minnesota. The research site was a Fayette Silt Loam series with a pH of 7.0 and soil test P and K levels of 35 and 154, respectively. Three corn hybrids were planted in the trial; all three were glyphosate tolerant, corn rootworm and european corn borer resistant. All syngenta seed had a base treatment of the cruiser insecticide and fungicide package and all pioneer seed was treated with maxim XL fungicide and Poncho 250 insecticide. All hybrids were planted with a John Deere 7000 planter equipped with cone units on May 4th, 2009. Seeding depth was 1.5 inches, row spacing was 30 inches and the seeding rate was 35,000 per acre. A randomized complete block design was used with four replications. Glyphosate was applied postemergence to control weeds. Eight inch soil samples were taken from the plot area on April 15th, 2009 to establish baseline nematode populations for the plot. Additional eight inch samples were taken within the row of each plot on June 3rd and August 17th. The center two rows of each plot were hand harvested on October 20th, 2009. (University of Minnesota Extension, Regional Office – Rochester).

Table 1. Field History

	Rochester
Planting Date	May 4th, 2009
Soil Type	Fayette Silt Loam
Herbicide (Post)	Glyphosate
Harvest Date	October 20th, 2009
Tillage	Spring FC
Previous Crop	Corn
Nematode Count (Pre)	April 15th, 2009
Lesion	169
Pin	12
Stunt	62
Spiral	25

Table 2. Plant population and height for field corn at Wabasha County, MN, in 2009

Treatment	Rate	Date 6/3		6/22	
		Plants/a	**Height (inches)**	**Plants/a**	**Height (inches)**
Syngenta Hybrid 1		37,827	5.3	36,738	16.2
Syngenta Hybrid 1 + Avicta		31,023	5.4	36,194	15.9
Syngenta Hybrid 1 + Counter	1.2 g ai per 1000 ft of row	35,378	5.3	37,010	11.6
Syngenta Hybrid 1 + Avicta & Counter	1.2 g ai per 1000 ft of row	34,017	5.2	33,473	11.3
Pioneer 37Y14		36,194	6.1	34,833	19.5
Pioneer 37Y14 + Bayer Compound		36,466	6.1	35,650	18.1
Pioneer 37Y14 + Counter	1.2 g ai per 1000 ft of row	31,023	6.1	32,928	16.1
Pioneer 35F44		35,105	5.7	37,010	17.9
Pioneer 35F44 + Bayer Compound		38,915	5.5	35,105	16.5
Pioneer 35F44 + Counter	1.2 g ai per 1000 ft of row	31,296	5.3	34,561	14.8
	LSD (P=0.10)	3,516	0.4	4,197	1.6

Table 3. Grain moisture and yield for field corn at Wabasha County, MN, in 2009

Treatment	Rate	Date 10/20	
		% Moisture	**(bu/A)**
Syngenta Hybrid 1		8.6	221.8
Syngenta Hybrid 1 + Avicta		8.8	216.0
Syngenta Hybrid 1 + Counter	1.2 g ai per 1000 ft of row	8.5	206.3
Syngenta Hybrid 1 + Avicta & Counter	1.2 g ai per 1000 ft of row	9.0	192.6
Pioneer 37Y14		10.0	229.8
Pioneer 37Y14 + Bayer Compound		10.8	232.9
Pioneer 37Y14 + Counter	1.2 g ai per 1000 ft of row	10.2	226.6
Pioneer 35F44		11.3	252.1
Pioneer 35F44 + Bayer Compound		10.4	241.0
Pioneer 35F44 + Counter	1.2 g ai per 1000 ft of row	10.0	241.3
	LSD (P=0.10)	1.1	23.4

Table 4. Performance of seed treatments for nematode control in field corn at Wabasha County, MN, in 2009

Treatment	Rate	Nematodes/100 cc of soil 8/17				
		Lesion	Spiral	Stunt	Dagger	Pin
Syngenta Hybrid 1		392	12	12	0	0
Syngenta Hybrid 1 + Avicta		192	0	0	0	0
Syngenta Hybrid 1 + Counter	1.2 g ai per 1000 ft of row	74	0	0	0	0
Syngenta Hybrid 1 + Avicta & Counter	1.2 g ai per 1000 ft of row	36	0	0	12	0
Pioneer 37Y14		59	12	12	0	0
Pioneer 37Y14 + Bayer Compound		169	0	11	0	0
Pioneer 37Y14 + Counter	1.2 g ai per 1000 ft of row	137	0	0	0	0
Pioneer 35F44		165	0	0	0	11
Pioneer 35F44 + Bayer Compound		77	0	0	0	0
Pioneer 35F44 + Counter	1.2 g ai per 1000 ft of row	0	11	22	0	0
LSD (P-=0.10)						

Table 5. Lesion nematodes per gram of fresh weight root tissue in field corn at Wabasha County,MN, in 2009

Treatment	Rate	Date 8/17
		# Lesion Nematodes/ 4.5 g. f.wt. root tissue
Syngenta Hybrid 1		252
Syngenta Hybrid 1 + Avicta		73
Syngenta Hybrid 1 + Counter	1.2 g ai per 1000 ft of row	46
Syngenta Hybrid 1 + Avicta & Counter	1.2 g ai per 1000 ft of row	0
Pioneer 37Y14		86
Pioneer 37Y14 + Bayer Compound		61
Pioneer 37Y14 + Counter	1.2 g ai per 1000 ft of row	120
Pioneer 35F44		35
Pioneer 35F44 + Bayer Compound		52
Pioneer 35F44 + Counter	1.2 g ai per 1000 ft of row	50
LSD (P=0.10)		

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Evaluation of Strip-Tillage in a Corn on Corn Rotation in Southern Minnesota (2008-2009).

Stahl, Lizabeth A.B., J. DeJong-Hughes, R. Miller, B. Carlson, and J. Lamb

INTRODUCTION AND OBJECTIVES

Concern over higher surface residue levels that result in a corn on corn rotation compared to a corn/soybean rotation has often led to the use of more aggressive tillage practices, such as the moldboard plow, in continuous corn. Conservation tillage systems, where at least 30% residue cover remains after planting, help minimize soil erosion and runoff potential while potentially leading to reduced fuel use, labor costs, and trips across the field. Strip-tillage is a conservation tillage practice where a strip 6 to 8 inches wide is tilled, typically in the fall, while the area between these strips is left undisturbed. Although there are many documented benefits of conservation tillage, concern about the effects of higher surface residues in heavy clay soils, particularly in corn on corn, has hindered the adoption of conservation tillage in southern Minnesota. Soil conditions are already typically cool at planting time in the region, so there is concern high residue levels could delay crop growth and development and ultimately have a negative impact on yield.

This study was established in the fall of 2007 to determine the viability of practicing strip tillage in a corn on corn rotation. Specifically the objective of this study is to evaluate the effects of strip-tillage in a corn on corn rotation on percent residue cover, corn yield, and economic return.

MATERIALS AND METHODS

Trials were established at six sites across southern Minnesota in fall of 2007. Four sites were established on-farm with farmer cooperators, using farm-scale equipment (Boyd, Cannon City, Heron Lake, and Holloway). Two sites were established at University of MN Research and Outreach Centers (Lamberton and Morris). The previous crop at each site was corn. Further details regarding the field history at each site are listed in Table 1.

Tillage treatments were arranged at each site in a randomized complete block design with four replications. Tillage treatments included 1) Strip tillage (ST), targeted in the fall with no tillage operation in the spring, 2) Moldboard plot (MP) in the fall followed by a field cultivation in the spring, and 3) a moderately aggressive tillage system consisting (CPDR) of a disk/rip, in-line ripper, DMI, or disc/chisel in the fall followed by a field cultivation in the spring. For strip-tillage, plots were offset by 15 inches from the previous year's rows so soil was disturbed between the previous year's corn rows. At most locations, stalks were chopped in the MP and CPDR treatments with a stalk chopper before performing the primary tillage pass while ST was conducted between standing corn stalks. At some locations, producers had a stalk chopping corn head so at these sites, stalks were chopped in all treatments during harvest. Fertilizer was applied at each site according to soil test results utilizing U of MN guidelines. Starter was applied at planting at most locations (10-34-0) at a consistent rate across tillage treatments within a location. At planting, the same planter equipped with residue managers, was used across all tillage treatments within a location. The same herbicide program was used across tillage treatments within a site for weed control. Hybrids with resistance to corn rootworm and European corn borer were planted at each location.

Residue cover was measured at two locations in each plot using the line-transect method after planting. When corn was 4 to 8 inches in height (approximately the V3 to V5 crop stage), stand counts were taken by recording the number of plants in 17 feet 5 inches at four locations per plot. At this time, extended leaf height was also measured on 10 plants per plot. Corn height was recorded at only one site in 2008 and all sites in 2009. Plots were checked for visible differences in foliar disease levels during the growing season.

The middle section of each plot was harvested for yield. Small plot combines were used at Lamberton and Morris to determine yield and grain moisture. Farm-scale combines and weigh wagons were used at Boyd, Cannon City, Heron Lake, and Holloway to determine yield. Grain moisture for the on-farm trials was determined either by hand-held moisture units or when possible, grain subsamples were collected at harvest and moisture determined using a local elevator's moisture meter. ANOVA was used for statistical analysis and means compared using Fisher's Protected LSD at the 0.05 and 0.10 significance levels.

RESULTS AND DISCUSSION

Table 1 shows the field background on the sites established the fall of 2007 into a previous crop of corn. Corn was planted in 30 inch rows, except for at the Boyd location, where corn was planted in 22 inch rows. Tables 2 and 3 show tillage, planting and harvest information by site for the 2008 and 2009 growing seasons, respectively.

In 2008, precipitation was above normal in the beginning of the season across sites. This led to planting delays, and planting progress was behind the 5-year average across the state. The growing season started out cool, with April and May temperatures 3.2 and 3.0 °F below normal at Lamberton, respectively, and 4.7 and 4.6 °F below normal at Morris. The later part of the season was warmer across sites and dryer, particularly in August, where 0.59 inches of precipitation fell in August at Lamberton (2.8 inches below normal). Precipitation was above normal in October across most sites, such as Heron Lake (nearby Worthington recorded 2.78 inches above normal), which delayed harvest at several locations and hindered the ability to conduct all tillage systems at several sites in the fall of 2008. Harvest challenges at the Cannon City site where a plot combine set to collect corn stover failed to collect grain yield, resulted in a loss of grain yield data in 2008. At the Holloway site, conditions were too wet to conduct any tillage the fall of 2008 and conditions continued to be too wet to conduct the MP and CPDR in the spring, thus the site was dropped from the trial. Where ST was delayed until spring, this led to planting delays. For example at Heron Lake, wet soil conditions early in the planting season combined with logistical challenges in lining up strip tillage equipment in the spring led to planting delays at this site.

The 2009 growing season was cooler and dryer than normal throughout southern Minnesota, which led to delayed crop maturity and wet grain at harvest. By July 26th, precipitation at Lamberton and Morris was 4.18 and 7.84 inches behind normal, respectively, and growing degree days were 180 and 182 units behind normal, respectively. By September 13th, precipitation at Lamberton and Morris was 5.23 and 7.18 inches behind normal, respectively, and growing degree days were 224 and 297 units behind normal, respectively. At the Boyd location, where strip tillage was attempted in 22" rows, the cooperator withdrew from the study in 2009. Early-season data (residue, plant height and stand counts) were the only data collected at the site this year due to a misapplication of nitrogen in the MP and CPDR treatments in the spring of 2009.

Percent residue cover:

ST consistently resulted in the greatest amount of surface residue after planting across all locations and years (Table 4), with levels ranging from 46.3 to 76.6 % depending on the site and year. MP consistently resulted in the least amount of surface residue after planting with levels ranging from a low of 5.6% in Lamberton in 2009 to a high of 20.6 % at Heron Lake in 2009. CPDR consistently resulted in residue levels less than ST but greater than MP at for all sites both years, ranging from 18.1 to 34.1 %. Residue levels in CPDR in 2 of 11 site years were below 30%, which is the minimum level to be considered a conservation tillage practice. The amount of residue in MP was consistently below this standard.

Plant population:

No difference was detected in plant populations across tillage systems in 8 of 11 site years. There was no consistent trend across the 3 site years where plant population was significantly affected by tillage system. Population was greatest in MP at Boyd in 2009, in the CPDR in Cannon City in 2008, and in ST at Morris in 2008.

Plant height:

In 5 of 6 site years, plant height early in the season was significantly affected by tillage system, with MP resulting in the tallest plants. At these locations, ST resulted in the shortest plants, although differences were not always significant between ST and the CPDR treatment. A similar trend has been observed in plant height differences among tillage systems in trials conducted in southeastern Minnesota in a corn-corn-soybean rotation (Vetsch and Randall, 2010).

Grain moisture:

In 4 of 9 site years, grain moisture at harvest was affected by tillage system. In general, ST and the CPDR treatments resulted in similar grain moisture at harvest, with MP resulting in slightly lower grain moisture at harvest. Heron Lake in 2008 did not follow this trend, however, where ST resulted in lower moisture at harvest compared to MP and CPDR.

Grain yield:
Grain yield differed among tillage systems at 1 of 5 sites in 2008 and at 3 of 4 sites in 2009 for a total of 4 of 9 sites years. When differences were found, MP resulted in the highest yields, while the CPDR and ST systems were similar in yield except for Lamberton in 2009 where ST resulted in significantly lower yields than the other two systems. MP was consistently the top yielding treatment in 2009, which was an unusually cool growing season, although differences in yield were not always statistically significant. Yields at the Heron Lake site were significantly lower in 2009 compared to 2008. Yield potential was reduced by a combination of a late planting date and an unseasonably cool growing season that resulted in the corn still being immature before a killing frost killed the crop in the fall. Grain moisture was also high at harvest at this site in 2009.

CONCLUSIONS

- Percent residue cover after planting was significantly affected by tillage system, with sites consistently following the trend of ST > CPDR > MP.
- ST consistently resulted in residue levels above 30%, the minimum required to be considered a conservation tillage practice, while CPDR met this minimum 9 of 11 sites years. MP never achieved this level of residue cover.
- Tillage system did not have a consistent effect on plant population.
- Plant height early in the season was affected by tillage system at most sites, with heights generally being the greatest in MP and shortest in ST.
- Grain moisture was affected by tillage system 4 of 9 sites years, with MP having the lowest harvest moisture except for the Heron Lake site in 2008 where ST resulted in lower grain moisture at harvest than MP.
- Yield was affected by tillage system 4 of 9 site years, with MP resulting in the highest yields in these cases.
- Economic analysis, which will help determine the viability of strip-tillage in a continuous corn production system, has to be conducted yet on this data.
- Although strip-tillage has been conducted in the spring elsewhere in the Corn Belt, delaying strip-tillage until the spring led to planting delays in our study. Late planting in southern Minnesota can lead to significant reductions in yield potential. Targeting strip tillage in the fall in southern MN should help maximize yield potential by reducing the risk of an untimely planting date.
- This study is planned to continue in 2010 and 2011 at the four remaining sites.

ACKNOWLEDGEMENTS

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Table 1. Background information for sites established in the fall of 2007.

	Boyd	Cannon City	Heron Lake	Holloway	Lamberton	Morris
Crop in 2007	Corn	Corn	Corn	Corn	Corn	Corn
Soil Type	Clay loam	*na**	Clay loam	*na*	Normania Loam & Ves loam	Clay loam
Row Spacing	22 inch	30 inch	30 inch	30 inch	30 inch	30 inch
Primary implement in CPDR	*na*	Chisel Plow	Disk rip	*na*	In-line ripper	*na*
Notes	Abandoned 2009	---	---	Abandoned 2009	---	---

**na = Information not available at the time of this printing.*

Table 2. Field histories for the 2008 growing season at Boyd, Cannon City, Heron lake, Holloway, Lamberton, and Morris.

	Boyd	Cannon City	Heron Lake	Holloway	Lamberton	Morris
Tillage: MP	Fall 2007	Fall 2007	Fall 2007	Fall 2007	Fall 2007	Fall 2007
Tillage: CPDR	Fall 2007	Fall 2007	Fall 2007	Fall 2007	Fall 2007	Fall 2007
Tillage: ST	Fall 2007	Fall 2007	Fall 2007	Fall 2007	Fall 2007	Fall 2007
Stalk chopping	All-chopping corn head	Not in ST	Not in ST	Not in ST	Not in ST	Not in ST
Planting Date	5/15/2008	*na**	5/20/2008	5/23/2008	5/20/2008	5/22/2008
Planting Population	34,000 ppa	*na*	34,400 ppa	32,000 ppa	34,000 ppa	34,000 ppa
Variety/Hybrid	K-6298VT3	*na*	DKC52-59	*na*	DKC52-40	Pioneer 37Y14
Starter @ planting	10 gpa 10-34-0	*na*	4.5 gpa 10-34-0	None	5 gpa 10-34-0	5 gpa 10-34-0
Harvest Date	11/3/2008	----------	11/3/2008	11/21/2008	11/1/2008	10/23/2008

**na = Information not available at the time of this printing.*

Table 3. Field histories for the 2009 growing season at Boyd, Cannon City, Heron lake, Lamberton, and Morris.

	Boyd	Cannon City	Heron Lake	Lamberton	Morris
Tillage: MP	Fall 2008	Fall 2008	Fall 2008	Fall 2008	Fall 2008
Tillage: CPDR	Fall 2008	Fall 2008	Fall 2008	Fall 2008	Fall 2008
Tillage: ST	Fall 2008	Fall 2008	Spring 2009	Fall 2008	Spring 2009
Stalk chopping	All-chopping corn head	Not in ST	Not in ST	Not in ST	Not in ST
Planting Date	5/7/2009	*na**	5/26/2009	5/9/2009	5/24/2009
Planting Population	34,000 ppa	*na*	36,000 ppa	34,000 ppa	35,700 ppa
Variety/Hybrid	K-6298VT3	*na*	DKC50-66	DKC52-59	Pioneer 37Y14
Starter @ planting	10 gpa 10-34-0	*na*	4.5 gpa of 10-34-0	5 gpa of 10-34-0	6 gpa 10-34-0
Harvest Date	----------	*na*	11/30/2009	11/5/2009	10/28/2009

**na = Information not available at the time of this printing.*

Table 4. Percent Residue cover after planting as affected by tillage system at Boyd, Cannon City, Heron Lake, Holloway, Lamberton, and Morris in 2008 and 2009.

	Boyd		Cannon City		Heron Lake		Holloway	Lamberton		Morris	
	2008	2009	2008	2009	2008	2009	2008	2008	2009	2008	2009
	% residue cover										
CPDR	40.1	39.4	31.8	44.8	26.8	47.3	31.8	34.8	43.6	26.5	39.0
MP	10.8	13.0	9.5	19.0	8.9	20.6	13.0	8.4	5.6	12.0	13.5
ST	55.6	76.6	58.5	65.3	69.9	62.8	46.3	56.6	58.3	64.5	63.0
p value	**0.0000**	**0.0001**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0001**	**0.0000**	**0.0000**	**0.0001**
LSD (.05)	**7.5**	**13.3**	**11.8**	**6.9**	**5.3**	**7.9**	**4.9**	**10.0**	*****	**5.0**	**10.2**

*Data did not meet criteria for ANOVA even after transformation, thus no LSD was computed.

Table 5. Plant population in plants per acre, as affected by tillage system at Boyd, Cannon City, Heron Lake, Holloway, Lamberton, and Morris in 2008 and 2009.

	Boyd		Cannon City		Heron Lake		Holloway	Lamberton		Morris	
	2008	2009	2008	2009	2008	2009	2008	2008	2009	2008	2009
	plants per acre										
CPDR	32284	29331	29000	31875	33125	35938	35500	30688	34063	33541	34957
MP	32908	32144	27562	32250	32875	34813	34938	30500	34313	33432	34086
ST	33311	27213	28438	32375	33438	35875	35913	31813	34313	35066	33541
p value	**.4250**	**.0149**	**0.0628**	**0.7343**	**0.1677**	**0.2384**	**0.2499**	**0.1279**	**0.9352**	**0.0367**	**0.1963**
LSD (.10)	**NS**	**2156**	**920**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**1022**	**NS**

Table 6. Early-season extended leaf plant height (in centimeters) as affected by tillage system at Boyd, Cannon City, Heron Lake, Lamberton, and Morris in 2008 (Morris only) and 2009.

	Boyd	Cannon City	Heron Lake	Lamberton	Morris	
	2009	2009	2009	2009	2008	2009
	plant height (cm)					
CPDR	18.1	33.5	28.4	34.1	32.7	27.2
MP	21.5	38.7	31.5	40.6	36.2	33.7
ST	14.8	31.0	32.4	33.1	29.0	24.9
p value	**0.0242**	**0.0029**	**0.0603**	**0.0009**	**0.0012**	**0.0001**
LSD (.05)	**3.9**	**4.6**	**NS**	**2.6**	**2.4**	**2.1**

Table 7. Percent grain moisture as affected by tillage system at Boyd, Cannon City, Heron Lake, Holloway, Lamberton, and Morris in 2008 and 2009.

	Boyd	Cannon City	Heron Lake		Holloway	Lamberton		Morris	
	2008	2009	2008	2009	2008	2008	2009	2008	2009
	grain moisture (%)								
CPDR	18.0	21.7	17.0	32.5	20.7	16.1	29.3	27.2	38.9
MP	17.9	19.6	17.1	30.5	20.8	16.0	26.7	25.4	38.4
ST	17.9	22.2	16.5	32.3	19.4	16.2	32.6	27.6	40.0
p value	0.9454	0.0467	0.0757	0.0738	0.1822	0.5987	0.0989	0.1596	0.2822
LSD (.10)	NS	2.0	.5	1.4	NS	NS	4.3	NS	NS

Table 8. Grain yield in bushels/acre as affected by tillage system at Boyd, Cannon City, Heron Lake, Holloway, Lamberton, and Morris in 2008 and 2009.

	Boyd	Cannon City	Heron Lake		Holloway	Lamberton		Morris	
	2008	2009	2008	2009	2008	2008	2009	2008	2009
	grain yield (bu/ac)								
CPDR	153.2	195.2	196.6	125.7	139.3	132.1	185.0	120.8	126.2
MP	159.4	212.7	197.8	154.0	142.7	140.2	194.3	120.8	134.1
ST	156.8	188.9	197.9	129.7	146.8	121.3	152.0	116.8	122.3
p value	0.4944	0.0563	0.9915	0.0317	0.3618	0.0706	0.0008	0.5224	0.1350
LSD (.10)	NS	15.0	NS	16.3	NS	12.6	11.3	NS	NS

2009 Corn Silage Foliar Fungicide Research Trial

Project cooperators: Bill Halfman, Bryan Jensen, Steve Huntzicker, Paul Esker, Fritz Breitenbach, Lisa Behnken, Matt Bicknell, Ryan Miller, Jerry Tesmer

Project Description: There has been a significant increase in the promotion of foliar fungicide use for corn grain and silage production over the last three years by fungicide manufacturers with claims of large yield and quality increases. There has not been any third party unbiased research data to support the use of foliar fungicides in corn grain or silage production. To evaluate foliar fungicide use in corn silage production the University of Wisconsin Extension Service and the University of Minnesota Extension Service cooperated on conducting a trial near La Crescent, Minnesota where Minnesota has one of the locations for their corn silage variety trials.

Materials and methods: The trial included two hybrids (Pioneer P34A98 and De Kalb DKC 57-79) which were selected based on their performance in the 2008 Minnesota and Wisconsin corn silage hybrid trials, three fungicides (Headline @ 6oz/a, Stratego @ 10 oz/a and Quilt @ 14 oz./a), and an untreated check treatment. The trial was set up in a randomized complete block design, with four replications. Each treatment bed was four 30” rows, thirty feet long. Fungicide was applied with a back-pack sprayer using an extended boom equipped with 11003XR flat fan nozzles at 40 psi delivering a total volume of 20.6 gallons per acre.

The plot was rated for foliar disease pressure based on percentage of leaf area infected at the time of fungicide application and at harvest. The fungicide treatments were applied 6 August 2009 when the corn was at R1 maturity. The plot was harvested 18 September 2009, when the corn was approximately 70% moisture to replicate approximate moisture when farmers typically harvest corn silage. 2009 was a cooler than normal year and corn growth and maturity were running about 2 weeks behind average. Silage samples were collected at harvest and analyzed at UW forage testing labs and quality was determined using the MILK 2006 equation for calculating corn silage quality. Only the center two rows of each treatment replication were harvested, measured for yield, and sampled for quality.

Results and Discussion: At application time there was no significant difference between any of the treatments with the percentage of leaf showing disease at 0.5% or less. At the time of harvest there was also no significant difference between any treatments with the percentage of leaf with disease pressure showing 1.25 to 2.25% across the trial. Rust was the foliar disease that was found in the plot. The untreated check treatments did not yield less than any of the fungicide treatments, nor did they have lower quality, based on milk per ton, than any of the fungicide treatments. The following table shows the results of the trials.

Treatment	Disease rating 8/6	Disease Rating 9/18	% DM	Adjusted DM Yield (T/A)	CP	NDF	NDFd	Starch	Fat	Milk/T	Milk/A
DeKalb DKC57-79	0.25 a	2.25 a	29.86 ab	10.55 ab	7.67 bc	41.53 a	59.09 c	30.08 ab	2.60 ab	3281.8 a	34014 ab
DeKalb DKC57-79 Headline, 6 fl oz/a	0.0 a	1.25 a	31.26 a	10.90 a	7.72 abc	45.02 a	58.99 c	34.58 ab	2.89 a	3392.8 a	35222 a
DeKalb DKC57-79 Quilt 14 fl. oz/a	0.25 a	2.25 a	30.14 ab	10.13 ab	7.48 c	37.5 a	60.20 bc	36.15 a	2.92 a	3481 3 a	32726 ab
DeKalb DKC57-79 Stratego 10 fl. oz/a	0.50 a	1.75 a	29.12 ab	10.63 ab	7.90 abc	40.64 a	60.21 bc	30.37 ab	2.75 ab	3298.8 a	34293 ab
Pioneer P34A98	0.25 a	1.25 a	30.32 ab	10.83 ab	8.11 a	38.64 a	61.13 ab	34.56 ab	2.77 ab	3411.5 a	35003 a
Pioneer P34A98 Headline 6 fl oz/a	0.0 a	1.75 a	29.61 ab	10.2 ab	7.65 bc	40.92 a	62.26 a	33.11 ab	2.60 ab	3384.3 a	32891 ab
PioneerP34A98 Quilt 14 fl. oz/a	0.0 a	1.75 a	28.58 b	9.62 ab	7.95 ab	40.97 a	62.16 a	33.68 ab	2.69 ab	3407.8 a	31169 ab
Pioneer P34A98 Stratego 10 fl. oz/a	0.0 a	1.75 a	29.05 ab	9.22 b	7.83 abc	42.49 a	62.04 a	28.63 b	2.56 b	3285.3 a	29766 b

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SECTION D

SOYBEAN

VARIETY TRIALS

Performance of Early Maturity Glyphosate Tolerant (GT) Roundup Ready® (RR) Soybean Varieties (1.2 to 1.9 maturity) at Spring Valley and Waseca, MN, in 2009.

Behnken, Lisa M., Fritz R. Breitenbach, Ryan P. Miller, and Jerry A. Tesmer

The objective of this study was to compare the performance of early maturity GT/RR® soybean (1.2 to 1.9 maturities) in southern Minnesota. The trials were located at Spring Valley and Waseca, MN. Field histories are reported in Table 1. At Spring Valley, the trials were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 150,000 seeds per acre with seed planted at a depth of 1.0 inch. Plots were four 30-inch rows wide by 22 feet in length. At Waseca, plots were planted at 175,000 seeds per acre in 10-inch rows by 12 feet in length. A randomized complete block design was implemented and replicated four times. The center two rows at Spring Valley and the center six rows at Waseca of each plot were machine harvested with grain weight and moisture recorded at all sites. Table 2 provides moisture and yield at both sites and the 2-site average yield. Table 3 provides the 2-site average yield and the oil and protein content at Spring Valley, ranked by yield. Table 4 lists soybean variety traits. Table 5 lists the 2008 early maturity GT/RR® trial results. (University of Minnesota Extension Regional Office, Rochester, and Southern Research and Outreach Center, Waseca, MN).

Table 1. Field history at Spring Valley and Waseca, MN in 2009.

	Spring Valley	Waseca
Planting Date	May 12, 2009	May 28, 2010
Harvest Date	October 28, 2009	October 20, 2009
Soil Type	Kasson Silt loam	Nicollet/Webster clay loam
Tillage	Conventional	Cultivated twice, rolled after planting
Herbicide	Glyphosate	Treflan + Pursuit PRE, Basagran POST
Insecticide	Chlorpyrifos	Warrior
Previous Crop	Corn	Corn

Table 2. Yield (at 13%) and moisture of early maturity soybeans (1.2 – 1.9) at Spring Valley and Waseca, MN, and the 2-site average, in 2009.

Entry Name	Description	Spring Valley		Waseca		2-site Average
1.2 to 1.9 maturity	Maturity	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Yield @ 13% (bu/A)
AgVenture 18X1	1.8	20.2	40.0	13.0	29.4	34.7
AgVenture 19P1	1.8	21.4	42.5	16.0	36.4	39.4
Asgrow AG1403	1.4	20.9	39.5	14.8	37.3	38.4
Asgrow AG1506	1.5	21.0	37.7	16.1	32.4	35.0
Croplan RT1692	1.6	21.1	39.5	14.3	34.0	36.7
Croplan RC1820	1.8	21.2	39.9	14.9	31.5	35.7
Crows 1617	1.6	21.0	37.3	115.0	35.0	36.1
Kaltenberg KB1210RR	1.2	21.4	40.3	16.3	29.7	35.0
Kaltenberg KB1809RR	1.8	20.9	38.9	14.7	35.6	37.3
Latham E1548R	1.5	21.0	38.7	15.0	35.9	37.3
Latham L1738R	1.7	20.0	39.2	14.6	35.2	37.2
LG Seeds C1665RR2	1.6	21.7	41.2	13.7	37.4	39.3
Midwest Seed Genetics GR1632	1.6	20.9	40.9	14.4	29.9	35.4
Mycogen Atlas Brand 5N142RR	1.4	20.7	38.4	14.8	33.3	35.9
Mycogen Atlas Brand X59180NRR	1.8	20.8	40.6	15.0	32.3	36.5
NK Brand S17-B5	1.7	20.7	42.6	14.4	36.6	39.6
NK Brand S19-A6	1.9	21.0	40.8	15.9	32.0	36.4
NuTech G2-6159	1.5	21.4	38.3	15.5	41.9	40.1
NuTech G2-7179	1.7	21.6	41.4	14.6	33.0	37.2
Pioneer 91Y70	1.7	21.3	40.2	14.8	40.9	40.5
Pioneer 91Y80	1.8	22.2	40.2	15.6	38.7	39.1
Prairie Brand PB-158X	1.5	20.9	43.2	14.5	41.0	42.1
Prairie Brand PB-199X	1.8	20.7	38.8	15.0	43.0	40.9
Producers Hybrids 15NR07	1.5	21.0	40.3	15.0	35.5	37.9
Producers Hybrids 175NR	1.7	21.1	40.6	15.5	30.0	35.3
Renk RS147RR	1.4	21.4	37.8	15.4	31.3	34.6
Renk RS179NRR	1.7	20.1	40.7	14.4	37.5	39.1
Stine S17-M2	1.7	21.1	37.8	14.1	32.3	35.0
Trelay 2165	1.6	21.1	38.2	15.2	35.4	36.8
Trelay 2166	1.6	21.0	39.5	15.1	36.3	37.9
Viking 1600R2N	1.6	20.9	39.2	15.4	31.3	35.3
Viking 1788NRR	1.7	21.3	41.0	14.6	42.3	41.6
Wensman W2166RR	1.6	20.3	38.8	14.4	27.2	33.0
Wensman W3186R2	1.8	21.2	42.9	15.1	38.5	40.7
	LSD (P=0.10)	**0.3**	**2.9**	**0.5**	**7.0**	**3.8**

Table 3. Early maturity GT/RR® soybean 2-site average yield at 13% and oil and protein content for Spring Valley, MN, ranked by yield in 2009.

Entry Name	Description	2-Site Average Yield @ 13%	Spring Valley	
1.2 – 1.9 Maturity	Maturity	bu/A	Oil %	Protein %
Prairie Brand PB-158X	1.5	**42.1**	18.6	32.3
Viking 1788NRR	1.7	**41.6**	19.5	31.9
Prairie Brand PB-199X	1.8	**40.9**	17.8	33.4
Wensman W3186R2	1.8	**40.7**	17.3	33.7
Pioneer 91Y70	1.7	**40.5**	19.6	31.8
NuTech G2-6159	1.5	**40.1**	19.4	32.4
NK Brand S17-B5	1.7	**39.6**	17.9	31.6
AgVenture 19P1	1.8	**39.4**	19.5	31.5
LG Seeds C1665RR2	1.6	**39.3**	18.8	32.9
Renk RS179NRR	1.7	**39.1**	17.1	34.7
Pioneer 91Y80	1.8	**39.1**	18.6	33.3
Asgrow AG1403	1.4	**38.4**	18.1	33.0
Trelay 2166	1.6	**37.9**	18.2	32.8
Producers Hybrids 15NR07	1.5	**37.9**	19.5	31.8
Latham E1548R	1.5	**37.3**	19.4	32.8
Kaltenberg KB1809RR	1.8	**37.3**	18.4	32.6
Latham L1738R	1.7	**37.2**	17.1	34.3
NuTech G2-7179	1.7	**37.2**	18.4	33.5
Trelay 2165	1.6	**36.8**	19.5	31.7
Croplan RT1692	1.6	**36.7**	18.7	33.1
Mycogen Atlas Brand X59180NRR	1.8	**36.5**	18.7	32.2
NK Brand S19-A6	1.9	**36.4**	18.3	31.7
Crows 1617	1.6	**36.1**	19.5	32.2
Mycogen Atlas Brand 5N142RR	1.4	**35.9**	19.3	33.4
Croplan RC1820	1.8	**35.7**	19.5	31.4
Midwest Seed Genetics GR1632	1.6	**35.4**	19.3	32.3
Producers Hybrids 175NR	1.7	**35.3**	19.6	31.4
Viking 1600R2N	1.6	**35.3**	18.7	33.3
Asgrow AG1506	1.5	**35.0**	19.6	32.2
Stine S17-M2	1.7	**35.0**	18.6	33.0
Kaltenberg KB1210RR	1.2	**35.0**	17.7	32.7
AgVenture 18X1	1.8	**34.7**	18.7	33.1
Renk RS147RR	1.4	**34.6**	18.2	34.1
Wensman W2166RR	1.6	**33.0**	19.5	31.4
	LSD (P=0.10)	**3.8**	**0.4**	**0.5**

Table 4. Traits of early maturity GT/RR® soybean varieties in 2009.

Company	Entry	Maturity Rating	Hilum Color	Flower Color	Pubescence Color	Pod Color
AgVenture	**18X1**	1.8	Black	Purple	Tawny	Brown
AgVenture	**19P1**	1.8	Imperfect Black	Purple	Gray	Tan
Asgrow	**AG1403**	1.4	Brown	White	Tawny	Tan
Asgrow	**AG1506**	1.5	Imperfect Black	Purple	Gray	Tan
Croplan	**RT1692**	1.6	Tan	White	Tawny	Tan
Croplan	**RC1820**	1.8	Imperfect Black	Purple	Gray	Tan
Crows	**1617**	1.6	Imperfect Black	Purple	Gray	Tan
Kaltenberg	**KB1210RR**	1.2		Purple		
Kaltenberg	**KB1809RR**	1.8	Brown	Purple	Light Tawny	Brown
Latham	**E1548R**	1.5		Purple		
Latham	**L1738R**	1.7	Brown	Purple	Light Tawny	Tan
LG Seeds	**C1665RR2**	1.6	Imperfect Black	Purple	Gray	Tan
Midwest Seed Genetics	**GR1632**	1.6	Black	Purple	Gray	Tan
Mycogen Atlas Brand	**5N142RR**	1.4	Black	Purple	Light Tawny	Brown
Mycogen Atlas Brand	**X59180NRR**	1.8	Black	White	Light Tawny	Brown
NK Brand	**S17-B5**	1.7	Black	Purple	Light Tawny	Brown
NK Brand	**S19-A6**	1.9	Imperfect Black	Purple	Gray	Tan
NuTech	**G2-6159**	1.5	Brown	Purple	Light Tawny	Brown
NuTech	**G2-7179**	1.7	Black	Purple	Light Tawny	Tan
Pioneer	**91Y70**	1.7	Black	Purple	Tawny	Tan
Pioneer	**91Y80**	1.8	Black	White	Light Tawny	Tan
Prairie Brand	**PB-158X**	1.5	Imperfect Black	Purple	Gray	Brown
Prairie Brand	**PB-199X**	1.8	Imperfect Black	Purple	Gray	Tan
Producers Hybrids	**15NR07**	1.5	Imperfect Black	Purple	Gray	Tan
Producers Hybrids	**175NR**	1.7	Imperfect Black	Purple	Gray	Tan
Renk	**RS147RR**	1.4	Brown	Purple	Light Tawny	Tan
Renk	**RS179NRR**	1.7	Brown	Purple	Light Tawny	Tan
Stine	**S17-M2**	1.7		Purple		
Trelay	**2165**	1.6	Imperfect Black	Purple	Gray	Tan
Trelay	**2166**	1.6	Tan	White	Tawny	Tan
Viking	**1600R2N**	1.6		Purple		
Viking	**1788NRR**	1.7	Imperfect Black	Purple	Gray	Tan
Wensman	**W2166RR**	1.6	Brown	Purple	Light Tawny	Tan
Wensman	**W3186R2**	1.8	Imperfect Black	Purple	Gray	Tan

Table 5. Early maturity GT/RR® soybean moisture and yield at 13% for Rock Dell, Fountain and Waseca, MN and the 3-site average moisture and yield in 2008.

Entry Name	Description	Rock Dell		Fountain		Waseca		Averages	
								3-site	
1.3 to 1.9 maturities	Relative Maturity	% moisture	bu/A	% moisture	bu/A	% moisture	bu/A	% moisture	bu/A
AgVenture 18X1NRR	1.8	12.2	41.1	11.8	47.3	12.9	62.7	**12.3**	**50.4**
AgVenture 18X2NRR	1.8	12.3	37.9	12.2	52.8	13.5	54.6	**12.6**	**48.4**
Asgrow AG1403	1.4	12.7	42.9	12.5	50.3	13.4	58.7	**12.9**	**50.6**
Asgrow AG1802	1.8	12.6	37.5	12.2	47.7	13.9	62.0	**12.9**	**49.1**
Atlas 5N153NRR	1.5	12.6	36.0	12.3	43.2	13.5	58.6	**12.8**	**46.0**
Atlas 5B171RR	1.7	12.6	37.5	12.5	53.2	13.9	62.4	**13.0**	**51.0**
Croplan RT1692	1.6	12.8	36.5	12.3	47.8	13.7	63.9	**12.9**	**49.4**
Croplan RC1820	1.8	12.7	39.9	12.3	45.6	13.5	60.5	**12.8**	**48.7**
Croplan 1784**	1.7	12.8	44.1	12.4	45.8	13.5	64.5	**12.9**	**51.5**
Crows C1617R	1.5	12.6	42.9	12.3	48.5	13.8	60.3	**12.9**	**50.5**
Crows C1815R**	1.8	12.9	42.8	12.4	46.2	13.5	61.4	**12.9**	**50.1**
Crows C1816R	1.8	13.1	35.8	12.8	41.8	14.3	55.0	**13.4**	**44.2**
Dairyland 1302**	1.3	12.9	40.3	12.5	47.1	14.5	55.3	**13.3**	**47.6**
Dairyland 1601**	1.3	12.9	41.4	12.5	48.4	13.6	58.6	**13.0**	**49.5**
DynaGro 36B14	1.6	12.6	40.6	12.4	45.9	13.7	59.9	**12.9**	**48.8**
Gold Country 1918RR	1.6	13.0	36.7	12.8	41.3	14.2	58.7	**13.3**	**45.6**
Gold Country 2717 NRR	1.8	12.8	42.2	12.4	43.4	13.8	57.5	**13.0**	**47.7**
Jung 8164RR	1.7	12.8	42.6	12.4	51.6	13.6	64.4	**12.9**	**52.9**
Jung 8168NRR	1.6	12.6	39.1	12.1	46.7	13.5	62.3	**12.7**	**49.3**
Kaltenberg KB1609RR	1.6	12.6	39.7	12.4	48.7	13.6	58.1	**12.9**	**48.9**
Kaltenberg KB1809RR	1.8	12.4	39.0	12.4	51.4	13.1	60.7	**12.6**	**50.4**
LG Seeds C1401RR	1.4	12.4	40.3	12.1	52.3	13.8	57.5	**12.8**	**50.0**
Latham L1538R	1.5	12.7	36.4	12.2	41.1	13.8	60.7	**12.9**	**46.1**
Latham L1738R	1.7	12.9	45.7	13.2	53.7	13.1	57.5	**13.1**	**52.3**
Midwest Seed GR1632	1.6	12.7	37.4	12.2	48.6	13.5	64.5	**12.8**	**50.2**
Midwest Seed GR1833	1.8	12.8	30.6	12.9	45.9	14.0	54.3	**13.2**	**43.6**
NK S17-B5	1.7	12.4	41.8	12.4	52.7	13.6	59.9	**12.8**	**51.5**
NK S18-Y3	1.8	12.6	41.7	12.3	51.2	13.5	64.5	**12.8**	**52.5**
NuTech NT-1717RR/SCN	1.7	12.7	41.6	12.4	47.9	13.7	58.0	**12.9**	**49.2**
NuTech NT-1808RR/SCN	1.8	13.0	45.0	13.5	51.2	13.6	64.4	**13.4**	**53.6**
Pioneer 91Y70	1.7	12.6	40.0	12.3	51.7	14.2	64.0	**13.0**	**51.9**
Pioneer 91Y90	1.9	12.5	41.4	12.2	49.9	13.6	61.3	**12.8**	**50.9**
Prairie Brand PB-1607RR	1.6	12.7	40.6	12.4	54.1	13.7	66.1	**12.9**	**53.6**
Prairie Brand PB-1838NRR	1.8	12.6	38.5	12.3	48.5	14.0	55.6	**13.0**	**47.5**
Producers 175NRR	1.7	12.6	42.2	12.3	44.0	13.7	64.8	**12.8**	**50.3**

Table 5. Early maturity GT/RR® soybean moisture and yield at 13% for Rock Dell, Fountain and Waseca, MN and the 3-site average moisture and yield in 2008.

Entry Name	Description	Rock Dell		Fountain		Waseca		Averages	
								3-site	
1.3 to 1.9 maturities	Relative Maturity	% moisture	bu/A	% moisture	bu/A	% moisture	bu/A	% moisture	bu/A
Renk RS147RR	1.4	12.9	44.8	12.9	53.7	14.0	61.0	**13.3**	**53.2**
Renk RS179NRR	1.7	12.6	42.4	13.3	52.1	13.3	64.2	**13.1**	**52.9**
Stine 1366-4	1.3	12.6	37.0	12.4	54.1	13.4	59.2	**12.8**	**50.1**
Stine 1568-4	1.5	12.6	42.9	12.5	52.7	13.6	57.2	**12.9**	**50.9**
Trelay 2135RR	1.3	12.6	35.6	12.3	51.1	13.4	56.0	**12.8**	**47.6**
Trelay 2165RR	1.6	12.6	39.2	12.4	43.9	13.7	63.0	**12.9**	**48.7**
Viking 1788NRR	1.7	12.7	42.3	12.4	47.4	13.9	61.1	**13.0**	**50.3**
Wensman W2152NRR	1.5	12.6	46.6	12.3	44.9	13.6	64.0	**12.8**	**51.8**
Wensman W2172NRR	1.7	12.7	43.2	12.3	44.8	13.6	61.3	**12.9**	**49.8**
Ziller Exp 47615NR	1.5	12.6	44.2	12.3	45.2	13.7	60.3	**12.9**	**49.9**
Ziller BT 7186NR	1.8	13.6	37.7	12.5	44.1	12.8	60.0	**13.0**	**47.3**
LSD (P=0.10)			**5.5**		**3.8**		**NS**		**3.4**

Performance of Late Maturity Glyphosate Tolerant (GT) Roundup Ready® (RR) Soybean Varieties (1.9 to 2.5 maturity) at Spring Valley and Waseca, MN, in 2009

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The objective of this trial was to compare the performance of late maturity GT/RR® soybean varieties (1.9 to 2.5 maturities) in southern Minnesota. The trials were located at Spring Valley and Waseca, MN. Field histories are reported in Table 1. At Spring Valley, the trials were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 150,000 seeds per acre with seed planted at a depth of 1.5 inches. Plots were four 30-inch rows wide by 22 feet in length. At Waseca, plots were planted at 175,000 seeds per acre in 10-inch rows by 12 feet in length. A randomized complete block design was implemented and replicated four times. The center two rows at Spring Valley and the center six rows at Waseca of each plot were machine harvested with grain weight and moisture recorded at all sites. Table 2 provides moisture and yield at both sites and the 2-site average yield. Table 3 provides the 2-site average yield and the oil and protein content at Spring Valley, ranked by yield. Table 4 lists soybean variety traits. Table 5 lists the 2008 early maturity GT/RR® trial results. (University of Minnesota Extension Regional Office, Rochester, and Southern Research and Outreach Center, Waseca, MN).

Table 1. Field history at Spring Valley and Waseca, MN in 2009.

	Spring Valley	Waseca
Planting Date	May 12, 2009	May 28, 2010
Harvest Date	October 28, 2009	October 20, 2009
Soil Type	Kasson Silt loam	Nicollet/Webster clay loam
Tillage	Conventional	Cultivated twice, rolled after planting
Herbicide	Glyphosate	Treflan + Pursuit PRE, Basagran POST
Insecticide	Chlorpyrifos	Warrior
Previous Crop	Corn	Corn

Table 2. Yield and moisture of late maturity soybeans (1.9 – 2.5) at Spring Valley and Waseca, MN, and the 2-site average, in 2009.

Entry Name	Description	Spring Valley		Waseca		2-site Average
1.9 to 2.5 maturities	Maturity	% moisture	bu/A	% moisture	bu/A	bu/A
AgVenture 20A3	2.0	20.7	41.8	15.0	45.6	43.7
AgVenture 22A3	2.1	21.3	37.4	15.2	38.5	38.0
Asgrow AG1906 BT7208NR	1.9	21.5	39.0	15.2	37.6	38.3
Asgrow AG2108r	2.1	21.2	39.9	14.8	42.2	41.0
Asgrow AG2406	2.4	20.9	38.8	16.4	42.7	40.8
Croplan RC2068	2.0	21.2	37.0	14.4	42.4	39.7
Croplan RC2257	2.2	21.9	37.1	15.7	43.1	40.1
Crows 2115	2.1	21.6	38.2	15.6	40.1	39.1
Gold Country 1940EXP	1.9	21.2	41.6	15.2	42.5	42.0
Gold Country 2140	2.1	21.0	40.7	15.1	44.3	42.5
Kaltenberg KB196RR	1.9	20.8	35.4	14.3	39.3	37.4
Kaltenberg KB2010RR	2.0	20.4	44.1	15.2	40.2	42.2
Latham L1983R	1.9	21.7	36.3	15.1	42.1	39.2
Latham L2082R	2.0	21.4	38.6	15.3	40.2	39.4
LG Seeds C2175RR2	2.1	21.4	41.9	15.7	48.4	45.1
Midwest Seed Genetics GR2131	2.1	21.7	39.8	15.6	41.8	40.8
Midwest Seed Genetics GR2551	2.5	21.4	39.7	15.7	44.4	42.1
Mycogen Atlas Brand 2N222RR	2.2	21.1	37.4	15.4	40.2	38.8
Mycogen Atlas Brand 5N250RR	2.5	22.4	41.8	20.7	50.8	46.3
NorthStar NS2105NR2	2.1	21.4	44.1	15.5	44.6	44.3
NK Brand S20-P3	2.0	21.6	41.1	15.1	52.3	46.7
NK Brand S21-B1	2.1	20.9	44.8	14.8	47.1	46.0
NuTech 7212	2.1	21.6	37.8	15.5	48.5	43.1
NuTech 7226	2.2	21.2	38.3	17.1	49.5	43.9
Pioneer 92Y30	2.3	21.7	39.5	14.8	36.9	38.2
Pioneer 92M40	2.4	21.2	43.1	16.4	47.1	45.1
Prairie Brand PB-2056NRR	2.0	20.7	37.0	14.8	43.1	40.1
Prairie Brand PB-2099NRR2	2.0	21.3	39.2	15.1	44.7	41.9
Producers 205NRR	2.0	21.4	39.8	15.0	42.1	40.9
Producers 225RR	2.5	21.3	39.6	16.4	40.5	40.0
Renk RS204NRR	2.0	21.2	34.9	14.8	35.5	35.2
Renk RS223RR	2.1	21.0	35.1	14.9	36.4	35.7
Stine 2062-4	2.2	21.7	39.8	15.2	43.8	41.8
Trelay 2214	2.1	21.4	35.2	15.4	40.6	37.9
Trelay 2253	2.5	21.3	40.3	15.9	45.2	42.8
Viking 1908CNRR	1.9	22.0	37.1	15.0	35.0	36.0
Viking 2000R2N	2.0	21.8	40.8	14.8	43.5	42.2
Wensman W3212NR2	2.1	21.2	45.3	15.5	41.4	43.4
Wensman W3244NR2	2.4	21.7	42.5	16.6	43.9	43.2
Ziller BT7208NR	2.0	22.0	38.5	15.1	46.1	42.3
LSD (P=0.10)		**0.5**	4.4	**1.0**	**7.4**	**4.3**

Table 3. Late maturity GT/RR® soybean 2-site average yield at 13% and oil and protein content for Spring Valley, MN, ranked by yield in 2009.

Entry Name		2-site Average Yield	Spring Valley	Spring Valley
1.9 to 2.5 maturities	Maturity	bu/A	% oil	% protein
NK Brand S20-P3	2.0	**46.7**	18.0	32.5
Mycogen Atlas Brand 5N250RR	2.5	**46.3**	18.3	32.2
NK Brand S21-B1	2.1	**46.0**	19.3	30.1
LG Seeds C2175RR2	2.1	**45.1**	18.8	31.7
Pioneer 92M40	2.4	**45.1**	18.9	32.0
NorthStar NS2105NR2	2.1	**44.3**	18.8	31.5
NuTech 7226	2.2	**43.9**	19.1	31.6
AgVenture 20A3	2.0	**43.7**	19.2	31.8
Wensman W3212NR2	2.1	**43.4**	19.1	31.5
Wensman W3244NR2	2.4	**43.2**	18.2	33.3
NuTech 7212	2.1	**43.1**	19.3	30.7
Trelay 2253	2.5	**42.8**	18.0	32.1
Gold Country 2140	2.1	**42.5**	19.1	31.4
Ziller BT7208NR	2.0	**42.3**	19.6	31.4
Viking 2000R2N	2.0	**42.2**	17.7	32.6
Kaltenberg KB2010RR	2.0	**42.2**	18.1	33.0
Midwest Seed Genetics GR2551	2.5	**42.1**	18.4	31.7
Gold Country 1940EXP	1.9	**42.0**	17.3	33.9
Prairie Brand PB-2099NRR2	2.0	**41.9**	19.1	31.5
Stine 2062-4	2.2	**41.8**	19.4	31.2
Asgrow AG2108	2.1	**41.0**	19.1	31.5
Producers 205NRR	2.0	**40.9**	19.7	31.1
Midwest Seed Genetics GR2131	2.1	**40.8**	19.6	31.0
Asgrow AG2406	2.4	**40.8**	19.4	32.6
Croplan RC2257	2.2	**40.1**	19.4	31.1
Prairie Brand PB-2056NRR	2.0	**40.1**	19.4	32.1
Producers 225 RR	2.5	**40.0**	18.4	32.5
Croplan RC2068	2.0	**39.7**	19.3	31.2
Latham L2082R	2.0	**39.4**	19.2	31.8
Latham L1983R	1.9	**39.2**	19.4	31.5
Crows 2115	2.1	**39.1**	19.5	30.6
Mycogen Atlas Brand 2N222RR	2.2	**38.8**	18.6	32.4
Asgrow AG1906	1.9	**38.3**	19.4	31.9
Pioneer 92Y30	2.3	**38.2**	19.3	31.0
AgVenture 22A3	2.1	**38.0**	19.7	30.6
Trelay 2214	2.1	**37.9**	17.9	34.2
Kaltenberg KB196RR	1.9	**37.4**	19.0	32.5
Viking 1908CNRR	1.9	**36.0**	19.5	32.2
Renk RS223RR	2.1	**35.7**	18.7	32.4
Renk RS204NRR	2.0	**35.2**	19.5	32.3
LSD (P=0.10)		**4.3**	**0.5**	**0.8**

Table 4. Traits of late maturity GT/RR® soybean varieties in 2009.

Company	Entry	Relative Maturity	Hilum Color	Flower Color	Pubescence Color	Pod Color
AgVenture	20A3	2.0	Black	Purple/White	Tawny	Brown
AgVenture	22A3	2.1	Mix	Purple	Gray	Tan
Asgrow	AG1906 BT7208NR	1.9	Imperfect Black	Purple	Gray	Brown
Asgrow	AG2108r	2.1	Imperfect Black	Purple	Gray	Tan
Asgrow	AG2406	2.4	Black	Purple	Tawny	Brown
Croplan	RC2068	2.0	Imperfect Black	Purple	Gray	Brown
Croplan	RC2257	2.2	Imperfect Black/Buff	Purple	Gray	Tan
Crows	2115	2.1	Imperfect Black	Purple	Gray	Tan
Gold Country	1940EXP	1.9	Imperfect Black	Purple	Gray	Tan
Gold Country	2140	2.1	Imperfect Black	Purple	Gray	Tan
Kaltenberg	KB196RR	1.9	Imperfect Black	Purple	Gray	Brown
Kaltenberg	KB2010RR	2.0		Purple		
Latham	L1983R	1.9		Purple		
Latham	L2082R	2.0	Imperfect Black	Purple	Gray	Tan
LG Seeds	C2175RR2	2.1	Imperfect Black	Purple	Gray	Tan
Midwest Seed Genetics	GR2131	2.1	Black	Purple	Gray	Tan
Midwest Seed Genetics	GR2551	2.5	Black	Purple	Gray	Tan
Mycogen Atlas Brand	2N222RR	2.2	Buff	Purple	Gray	Tan
Mycogen Atlas Brand	5N250RR	2.5	Black	White	Tawny	Tan
NorthStar	NS2105NR2	2.1	Imperfect Black	Purple	Gray	Tan
NK Brand	S20-P3	2.0	Brown	White	Light Tawny	Tan
NK Brand	S21-B1	2.1	Black	White	Light Tawny	Brown
NuTech	7212	2.1	Buff	Purple	Gray	Tan
NuTech	7226	2.2	Black	Purple	Tawny	Brown
Pioneer	92Y30	2.3	Imperfect Black	Purple	Gray	Brown
Pioneer	92M40	2.4	Black	White	Light Tawny	Brown
Prairie Brand	PB-2056NRR	2.0	Black	Mixed	Tawny	Brown
Prairie Brand	PB-2099NRR2	2.0	Imperfect Black	Purple	Gray	Tan
Producers	205NRR	2.0	Imperfect Black	Purple	Gray	Tan
Producers	225RR	2.5		Purple		
Renk	RS204NRR	2.0	Imperfect Black	Purple	Gray	Tan
Renk	RS223RR	2.1	Brown	White	Tawny	Tan
Stine	2062-4	2.2	Imperfect Black/Buff	Purple	Gray	
Trelay	2214	2.1	Buff	White	Gray	Tan
Trelay	2253	2.5	Imperfect Black	Purple	Gray	Tan
Viking	1908CNRR	1.9	Imperfect Black	Purple	Gray	Tan
Viking	2000R2N	2.0	Imperfect Black	Purple	Gray	Brown/Tan
Wensman	W3212NR2	2.1	Imperfect Black	Purple	Gray	Tan
Wensman	W3244NR2	2.4	Imperfect Black	Purple	Gray	Tan
Ziller	BT7208NR	2.0	Imperfect Black	Purple	Gray	Tan

Table 5. Late maturity GT/RR® soybean moisture and yield at 13% for Rock Dell, Fountain and Waseca and a combined average moisture and yield for Rock Dell, Fountain, and Waseca, MN, in 2008.

Entry Name	Description	Rock Dell		Fountain		Waseca		3-site Average	
1.9 to 2.5 maturities	Relative Maturity	% moisture	bu/A	% moisture	bu/A	% moisture	bu/A	% moisture	bu/A
AgVenture 20G0NRR	2.0	13.0	39.4	12.2	46.0	12.9	53.2	12.7	46.2
AgVenture 6204NRR	2.0	13.3	40.9	12.1	39.5	13.4	46.9	12.9	42.5
Asgrow AG2002	2.0	13.1	40.0	12.4	45.7	12.9	52.7	12.8	46.2
Asgrow AG2107	2.1	12.9	38.6	11.9	41.4	13.3	52.0	12.7	44.0
Atlas 5B193RR	1.9	12.9	40.3	11.9	46.4	13.1	49.9	12.6	45.5
Atlas 5N203RR	2.1	13.2	39.9	11.7	39.9	13.3	54.3	12.7	44.7
Croplan RT2092	2.0	13.3	39.5	12.6	47.2	13.1	58.9	13.0	48.5
Croplan RC2257	2.2	13.2	42.8	13.0	42.9	13.6	52.3	13.3	46.0
Crows C2115R	2.1	13.2	36.9	12.3	43.2	13.8	51.3	13.1	43.8
Crows C2216R	2.2	13.4	39.8	12.6	45.3	13.3	54.3	13.1	46.5
DynaGro DG31D20	2.1	12.9	39.1	12.3	43.9	12.6	59.3	12.6	47.4
DynaGro DG38G23	2.3	13.3	37.7	14.3	42.1	13.9	53.0	13.8	44.3
Gold Country 2820NRR	2.0	13.4	39.7	12.0	41.2	13.3	47.0	12.9	42.7
Gold Country 8820NRR	2.0	13.2	42.9	12.7	43.8	13.5	50.1	13.2	45.6
Jung 8219RR	2.1	13.3	41.3	11.9	43.9	14.1	45.7	13.1	43.6
Jung 8237NRR	2.3	13.3	41.7	15.0	46.4	13.7	50.4	14.0	46.2
Kaltenberg KB203RR	2.0	12.8	40.5	12.6	47.0	13.3	52.0	12.9	46.5
Kaltenberg KB2309RR	2.3	13.2	40.2	14.4	46.3	13.3	51.6	13.6	46.0
LG Seeds C1945NRR	1.9	13.3	39.7	11.9	40.3	13.6	51.8	12.9	43.9
LG Seeds C2238NRR	2.2	13.3	41.0	13.0	43.8	13.4	54.7	13.2	46.5
Latham E1958R	1.9	13.2	42.1	14.0	46.7	12.9	51.3	13.4	46.7
Latham L2348R	2.3	13.3	39.4	13.5	47.7	13.3	51.5	13.3	46.2
Midwest Seed GR2131	2.1	13.3	39.2	12.5	42.3	13.6	60.0	13.1	47.2
Midwest Seed GR2334	2.3	13.3	40.7	17.3	44.4	13.5	53.7	14.7	46.3
NK S20-P3	2.0	13.0	42.7	12.5	55.1	13.2	51.6	12.9	49.8
NK S23-N7	2.3	13.2	40.6	13.1	50.9	13.1	45.3	13.1	45.6
NK S-21-N6 **	2.1	13.0	44.8	14.7	53.2	13.1	55.3	13.6	51.1
NuTech 7222	2.2	13.3	39.2	12.8	46.4	13.6	53.6	13.2	46.4
NuTech NT-2324RR/SCN	2.3	13.0	39.7	16.6	54.9	12.9	56.9	14.1	50.5
Pioneer 92Y20	2.2	13.0	43.3	12.0	49.5	13.2	53.4	12.7	48.7
Pioneer 92Y30	2.3	13.0	41.8	13.8	53.1	13.4	56.9	13.4	50.6
Prairie Brand PB-2056NRR	2.0	12.9	40.5	11.9	44.8	13.0	56.8	12.6	47.4
Prairie Brand PB-2117NRR	2.1	13.1	42.5	12.2	45.5	13.7	59.0	13.0	49.0
Producers 205NRR	2.0	13.2	40.8	12.0	41.1	13.1	56.7	12.7	46.2
Renk RS204NRR	2.0	13.2	39.4	12.0	41.8	13.2	49.3	12.8	43.5

Table 5. Late maturity GT/RR® soybean moisture and yield at 13% for Rock Dell, Fountain and Waseca and a combined average moisture and yield for Rock Dell, Fountain, and Waseca, MN, in 2008.

Entry Name	Description	Rock Dell		Fountain		Waseca		3-site Average	
1.9 to 2.5 maturities	Relative Maturity	% moisture	bu/A	% moisture	bu/A	% moisture	bu/A	% moisture	bu/A
Renk RS239NRR	2.3	13.0	41.9	16.8	48.6	13.2	56.6	14.3	49.0
Stine 1932-4	1.9	12.8	36.0	11.9	45.0	12.8	50.5	12.5	43.8
Stine 2062-4	2.0	13.3	39.1	12.7	44.6	13.4	55.5	13.1	46.4
Trelay 2214	2.1	12.9	40.0	12.0	50.1	12.9	51.8	12.6	47.3
Trelay 2252	2.5	13.0	41.1	16.2	48.7	13.0	58.1	14.1	49.3
Viking 2090NRR	2.0	12.9	36.6	11.9	47.7	12.6	51.1	12.5	45.1
Viking 2198NRR	2.1	13.1	39.1	12.4	45.8	13.2	47.6	12.9	44.2
Wensman W2200NRR	2.0	12.9	42.5	12.1	48.3	12.9	54.1	12.6	48.3
Wensman W2222NRR	2.2	13.2	37.7	12.8	44.2	13.6	50.0	13.2	44.0
Ziller BT 7208NR	2.0	13.2	39.7	12.0	40.5	13.2	51.2	12.8	43.8
Ziller Exp 67820NR	2.0	13.0	40.0	13.3	49.3	12.9	49.5	13.1	46.3
LSD (P=0.10)		**0.3**	**4.9**	**1.1**	**4.5**	**0.3**	**7.1**		**3.2**

2009 Short Season (0.5 to 1.7 maturity) Roundup Ready Soybean Variety Trial at Rock Dell , MN

Miller, Ryan P., Lisa M. Behnken, Fritz R. Breitenbach and Jason Welter

About 80,000 acres of peas are planted in southern Minnesota each year with approximately 40,000 of these acres being double cropped with short season soybean. Minimal information is available to growers to help them choose varieties for planting after peas. The objective of this trial is to provide agronomic information on short season, 0.4 to 1.5, GT/RR® soybean varieties. The trial was located at Rock Dell, MN. The trial was planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 160,000 seeds per acre planted at a depth of 1.5 inches. The plots were four rows wide by 22 feet in length. The center two rows of each plot were machine harvested with grain weight and moisture recorded. Table 1 provides the field history. Table 2 provides information on moisture, grain yield, oil and protein content of short season GT/RR® soybean varieties. Table 3 provides details on soybean variety characteristics. Table 4 lists the results from 2008 short season trials.

As cropping systems evolve and pest problems shift across the landscape, additional production issues need to be considered along with the economic returns when deciding to double crop soybeans. Production concerns include 1) increased likelihood of soil borne diseases and insects, 2) soybean cyst nematode (SCN) management – double cropping with soybeans may shorten the crop rotation and increase SCN egg numbers in fields, and 3) glyphosate tolerant or resistant weeds – additional use of glyphosate in the landscape may speed the development of glyphosate resistant weeds. (University of Minnesota Extension Regional Office, Rochester, MN).

Table 1. Field history for short season GT/RR® soybean varieties at Rock Dell, MN.

	Rock Dell
Planting Date	June 25, 2009
Harvest Date	November 5, 2009
Soil Type	Kenyon Loam
Herbicide	Glyphosate , POST
Insecticide	Warrior II
Tillage	Conventional
Previous Crop	Corn

Table 2. Percent oil, protein, grain moisture and grain yield (13%) of short season GT/RR® soybean varieties at Rock Dell, MN, in 2009.

Entry Name		Rock Dell			
0.8 – 1.7	Maturity Rating	Oil (%)	Protein (%)	Moisture (%)	Yield (bu/A)
Asgrow AG0803	0.8	17.3	32.2	22.6	29.9
Asgrow AG1102	1.1	17.5	32.2	23.9	25.4
Asgrow AG1403	1.4	17.5	33.4	22.1	22.0
Latham L1548	1.5	18.4	35.4	24.8	23.0
Midwest Seed Genetics GR1	1.1	17.1	34.3	21.6	28.6
Midwest Seed Genetics GR1	1.3	17.3	34.3	22.2	24.6
NK Brand S09-N6	0.9	16.8	33.9	23.4	24.3
NK Brand S12-T8	1.2	16.6	34.5	22.7	27.5
NK Brand S13-A4	1.3	17.0	33.3	21.9	28.0
NuTech 0889RR	0.8	17.5	33.0	21.6	33.9
NuTech 1212RR	1.2	17.0	33.2	23.5	17.7
Pioneer 90Y50	0.5	16.4	34.7	19.8	36.6
Pioneer 90M80	0.8	17.8	32.2	22.2	31.1
Pioneer 91Y21	1.2	17.4	34.4	21.1	29.9
Prairie Brand PB-087X	0.8	17.0	34.4	23.2	22.1
Prairie Brand PB-141X	1.4	17.1	34.6	23.8	19.0
Prairie Brand PB-179X	1.5	18.5	35.6	23.8	13.8
Producers 15NR07	1.5	18.9	33.7	24.0	17.2
Mycogen Atlas 5N142	1.4	18.0	35.2	24.4	25.3
Renk RS107RR	1.0	17.3	34.2	21.4	32.5
Renk RS147NRR	1.4	17.6	34.4	24.7	20.9
Stine S17M2	1.7	17.9	34.5	23.9	15.5
Viking 0985RR	0.9	17.2	34.3	20.6	30.7
Viking 1400R2N	1.4	16.9	34.8	23.3	20.3
Viking 1500R2N	1.5	16.2	36.8	23.4	19.0
Wensman W215NRR	1.5	18.6	33.1	23.2	19.2
Wensman W3101R2	1.0	16.3	34.7	21.4	31.2
Wensman W3142NR2	1.4	17.5	34.5	22.9	19.5
LSD (P=0.10)		0.6	0.9	0.7	2.4

Table 3. Traits of short season GT/RR® soybean entries in 2009

Company	Entry	Maturity Rating	Hilium Color	Flower Color	Pubescence Color	Pod Color
Asgrow	**AG0803**	0.8	Black	Purple	Tawny	Brown
Asgrow	**AG1102**	1.1	Black	Purple	Tawny	Brown
Asgrow	**AG1403**	1.4	Brown	White	Tawny	Tan
Latham	**L1548**	1.5		Purple		
Midwest Seed Genetics	**GR1**	1.1	Black	Purple	Light Tawny	Tan
Midwest Seed Genetics	**GR1**	1.3	Black	Purple	Light Tawny	Tan
NK Brand	**S09-N6**	0.9	Brown	White	Light Tawny	Tan
NK Brand	**S12-T8**	1.2	Gray	Purple	Tawny	Tan
NK Brand	**S13-A4**	1.3	Black	Purple	Light Tawny	Tan
NuTech	**0889RR**	0.8	Brown	Purple	Light Tawny	Brown
NuTech	**1212RR**	1.2	Buff	Purple	Light Tawny	Brown
Pioneer	**90Y50**	0.5	B	Purple	Light Tawny	Brown
Pioneer	**90M80**	0.8	Imperfect Black	Purple	Gray	Tan
Pioneer	**91Y21**	1.2	Black	Purple	Tawny	Brown
Prairie Brand	**PB-087X**	0.8	Imperfect Black	Purple	Gray	Brown
Prairie Brand	**PB-141X**	1.4	Imperfect Black	Purple	Gray	Brown
Prairie Brand	**PB-179X**	1.5	Imperfect Black	Purple	Gray	Tan
Producers	**15NR07**	1.5	Imperfect Black	Purple	Gray	Tan
Mycogen Atlas	**5N142**	1.4	Black	Purple	Light Tawny	Brown
Renk	**RS107RR**	1.0	Brown	Purple	Light Tawny	Brown/Tan
Renk	**RS147NRR**	1.4	Brown	Purple	Light Tawny	Tan
Stine	**S17M2**	1.7		Purple		
Viking	**0985RR**	0.9	Black	Purple	Light Tawny	Tan
Viking	**1400R2N**	1.4	Black	Purple	Gray	Brown
Viking	**1500R2N**	1.5	Black	Purple	Gray	Brown
Wensman	**W215NRR**	1.5	Imperfect Black	Purple	Gray	Tan
Wensman	**W3101R2**	1.0	Brown	Purple	Light Tawny	Brown/Tan
Wensman	**W3142NR2**	1.4	Imperfect Black	Purple	Gray	Brown
LSD (P=0.10)						

Table 4. Moisture, grain yield (13%), 2-site averages and oil and protein content (Rock Dell only) of short season GT/RR® soybean varieties simulating soybean grown after cannery peas at Rock Dell and Waseca, MN, in 2008.

Entry Name		Rock Dell		Waseca		2-site average		Rock Dell	
0.5 to 1.5 maturities	Maturity Rating	Moisture (%)	Yield bu/A	Moisture (%)	Yield bu/A	Moisture (%)	Yield bu/A	% oil	% protein
Asgrow AG0808	0.8	12.0	38.7	12.6	41.3	12.3	40.0	18.9	30.8
Asgrow AG0701	0.7	12.0	37.6	12.8	43.9	12.4	40.8	19.2	30.2
Asgrow AG1002	1.0	12.2	37.2	13.9	47.9	13.0	42.6	18.6	32.9
Asgrow AG1403	1.4	12.0	39.9	12.9	50.3	12.5	45.1	18.4	32.3
Crows C0420R	0.4	11.8	34.6	12.4	33.5	12.1	34.1	19.1	31.5
Crows C0620R	0.6	11.9	37.8	12.7	44.4	12.3	41.1	19.0	31.2
Crows C0915R	0.9	12.0	35.2	13.0	40.2	12.5	37.7	18.6	31.4
DynaGro 30B04	0.4	11.7	30.9	12.4	36.8	12.1	33.8	19.6	31.3
Gold Country 2509RR	0.9	12.2	40.6	12.9	45.7	12.5	43.1	18.7	32.3
Latham L1538R	1.5	12.0	42.6	13.3	51.9	12.6	47.3	19.7	31.1
Latham L1553R	1.5	11.9	37.8	13.1	41.5	12.5	39.7	19.6	31.6
Midwest Seed GR0931	0.9	11.8	33.5	13.1	40.1	12.4	36.8	18.7	31.2
Midwest Seed GR1111	1.1	11.8	36.3	12.6	39.9	12.2	38.1	19.6	31.8
Midwest Seed GR1510	1.5	11.9	35.6	12.8	45.7	12.3	40.7	19.6	30.9
Mycogen 5B077RR	0.8	12.1	38.0	13.4	38.2	12.8	38.1	18.5	33.7
Mycogen 5B098RR	0.9	12.0	40.2	13.1	47.0	12.5	43.6	18.8	32.7
Mycogen 5B111RR	1.1	12.2	38.1	13.8	40.2	13.0	39.2	18.4	32.8
NK S08-C3	0.8	12.0	37.3	12.5	46.8	12.2	42.1	19.4	29.8
NK S10-K1	1.0	12.1	42.7	13.2	49.6	12.7	46.2	17.6	33.5
NK S12-P4	1.2	11.9	43.8	13.0	47.9	12.4	45.9	18.7	33.2
Pioneer 90M80	0.8	11.7	41.5	12.6	52.7	12.1	47.1	20.1	28.3
Pioneer 91M20	1.2	12.0	36.9	12.5	40.4	12.2	38.7	18.6	32.6
Renk RS115NRR	1.1	11.7	37.5	12.8	39.3	12.3	38.4	19.2	31.4
Renk RS129NRR	1.2	12.1	39.4	12.8	44.9	12.4	42.1	17.4	34.6
Renk RS147RR	1.4	12.3	39.5	14.0	44.7	13.1	42.1	18.7	32.5
Stine 1108-4	1.1	12.0	36.6	13.7	52.1	12.8	44.4	18.6	32.3
Stine 1366-4	1.3	12.1	39.1	13.3	45.9	12.7	42.5	18.6	33.0
Stine 1423-4	1.4	12.0	40.3	13.2	51.9	12.6	46.1	19.6	29.9
Viking 1585RR	1.5	12.2	42.5	13.3	46.6	12.8	44.5	18.3	33.4
Wensman W2090RR	0.9	12.1	39.4	13.0	44.3	12.6	41.8	19.0	32.6
Wensman W2108RR	1.0	12.1	37.8	13.3	51.4	12.7	44.6	18.5	32.4
Wensman W2126RR	1.2	12.0	36.8	13.2	41.0	12.6	38.9	18.8	32.9
Ziller BT 7131NR	1.3	11.7	37.9	13.0	47.0	12.3	42.4	19.4	31.5
Ziller Exp 47615NR	1.5	12.0	44.5	13.0	51.6	12.5	48.0	19.2	30.3
Ziller BT 7156NR	1.5	11.8	35.3	12.7	55.9	12.2	45.6	19.1	33.0
LSD (P=0.10)		**0.2**	**3.4**	**0.4**	**8.0**		**4.3**	**0.4**	**0.9**

Performance of Short Season Soybeans Planted Over Four Weeks at Rock Dell and Waseca, MN, in 2009

Behnken, Lisa M, Fritz R. Breitenbach, Ryan P. Miller, and Theresa Twohey.

The objective of this trial was to compare the performance of short season GT/RR® soybean varieties (0.2 to 1.3 relative maturities) planted weekly, from late June through mid-July, in southern Minnesota. The trials were located at Rock Dell and Waseca, MN. Field histories are reported in Table 1. At Rock Dell, the trials were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 160,000 seeds per acre planted at a depth of 1.5 inches. Plots were four 30-inch rows by 22 feet in length. At Waseca, plots were planted at 175,000 seeds per acre in 10-inch rows by 12 feet in length. A randomized complete block design was implemented and replicated four times. The center two rows at Rock Dell and the center six rows at Waseca of each plot were machine harvested with grain weight and moisture recorded at all sites. Table 2 provides oil, protein, moisture, yield and the 2-site average yield. Table 3 provides the average variety yield over all planting dates. Table 4 provides the average yield of each planting date combine over varieties. Figure 1 provides average yield by planting date in 2007, 2008, and 2009. (University of Minnesota Extension Regional Office, Rochester, and Southern Research and Outreach Center, Waseca, MN).

Table 1. Field history at Rock Dell and Waseca, MN in 2009.

	Rock Dell	Waseca
Planting Dates	June 25, July 1, July 11, and July 15	June 25, July 2, July 8, July 16
Harvest Date	Novermber 5, 2009	October 20, 2009
Soil Type	Kenyon loam	Nicollet/Webster clay loam
Tillage	Conventional, Rolled after planting	Cultivated twice, rolled after planting
Herbicide	Glyphosate POST	Glyphosate POST
Insecticide	Warrior	Warrior
Previous Crop	Corn	Corn

Table 2. Soybean oil and protein content, moisture and yield at Rock Dell, yield at Waseca, MN and 2-site average yield in 2009.

Entry Name	Maturity	Planting Date	Rock Dell				Waseca	2-Site Average
			Oil (%)	Protein (%)	Moisture (%)	Yield (bu/A)	Yield (bu/A)	Yield (bu/A)
PIONEER 90Y20	0.2	Planting Date I	17.8	35.4	17.6	34.7	31.4	33.0
PIONEER 90Y50	0.5	Planting Date I	16.5	33.5	19.2	37.3	31.8	34.5
PIONEER 90Y80	0.8	Planting Date I	17.5	35.3	21.7	34.3	28.0	31.2
NK Brand S12-T8	1.2	Planting Date I	17.0	33.2	22.4	30.6	35.3	32.9
PIONEER 90Y20	0.2	Planting Date II	16.9	33.7	22.0	18.5	19.6	19.1
PIONEER 90Y50	0.5	Planting Date II	16.5	33.4	21.8	23.4	27.8	25.6
PIONEER 90Y80	0.8	Planting Date II	17.2	34.2	24.5	15.2	19.0	17.1
NK Brand S12-T8	1.2	Planting Date II	16.8	35.0	23.7	12.6	17.3	14.9
PIONEER 90Y20	0.2	Planting Date III	16.9	32.5	24.7	4.0	19.0	11.5
PIONEER 90Y50	0.5	Planting Date III	16.8	35.8	28.4	6.1	21.6	13.8
PIONEER 90Y80	0.8	Planting Date III	16.7	33.5	28.7	3.8	15.6	9.7
NK Brand S12-T8	1.2	Planting Date III	16.6	34.8	25.8	2.9	8.4	5.7
PIONEER 90Y20	0.2	Planting Date IV	16.9	34.2	27.7	0.6	0.5	0.6
PIONEER 90Y50	0.5	Planting Date IV	16.9	32.8	27.7	0.5	0.9	0.7
PIONEER 90Y80	0.8	Planting Date IV	16.6	33.8	27.7	0.5	0.6	0.6
NK Brand 12-T8	1.2	Planting Date IV	16.7	33.4	27.7	0.3	0.8	0.5
		LSD (P=0.10)	**NS**	**NS**		**2.3**	**5.4**	**2.9**

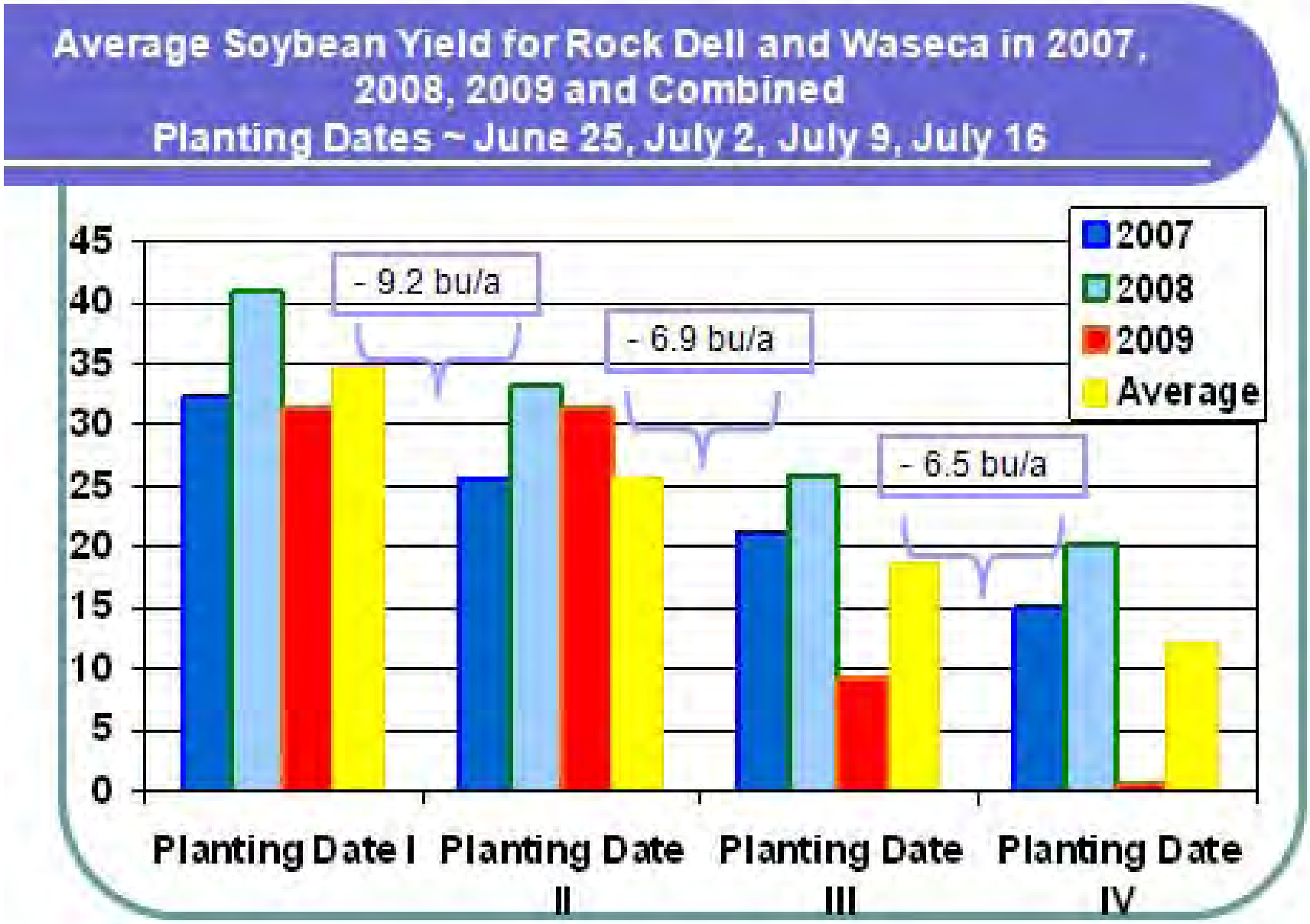
Table 3. Soybean yield of each variety combined over four planting dates and the 2-site average yield in 2009.

Average Yield over all planting dates	Rock Dell	Waseca	2-Site Average
	Yield (bu/A)	Yield (bu/A)	Yield (bu/A)
PIONEER 90Y20	14.4	17.6	16.0
PIONEER 90Y50	16.8	20.5	18.7
PIONEER 90Y80	13.4	15.8	14.6
NK S12-T8	11.6	15.5	13.5
LSD (P =0.10)	**1.1**	**2.6**	**1.4**

Table 4. Soybean yield by planting date, combined over varieties and the 2-site average yield.

	Rock Dell	Waseca	2-Site Average
	Yield (bu/A)	Yield (bu/A)	Yield (bu/A)
Average Planting Date I	34.2	31.6	32.9
Average Planting Date II	17.4	20.9	19.2
Average Planting Date III	4.2	16.1	10.2
Average Planting Date IV	0.5	0.7	0.6
LSD (P =0.10)	**1.5**	**3.4**	**1.8**

Figure 1


Average Soybean Yield for Rock Dell and Waseca in 2007, 2008, 2009 and Combined
Planting Dates ~ June 25, July 2, July 9, July 16
45
40
35
30
25
20
15
10
5
0
- 9.2 bu/a
- 6.9 bu/a
- 6.5 bu/a
2007
2008
2009
Average
Planting Date I
Planting Date II
Planting Date III
Planting Date IV

Food Grade and Special Use Soybean Trial at Hope and Waseca, MN, in 2009

Miller, Ryan P., Fritz R. Breitenbach, Lisa M. Behnken, Thomas R. Hoverstad, and Roger A. Wippler

Food grade and special use soybeans are used in many different markets and can be grown conventionally, organically, or produced and designed as chemical-free. Producers can add income from producing these varieties. However, soybean producers growing for special use markets need to have their production under contract. If done correctly, producers can obtain a premium for their efforts. Producers need to evaluate potential contracts carefully and make sure that the contract will work for their marketing plan. Contracts change from year to year, as do varieties and amounts needed. Producers need to check with local dealers/agents to find a contract that will work for their operation.

Agronomic information about the adaptability of food grade or special use soybeans to southern Minnesota conditions continues to be needed. The objective of this trial is to evaluate the agronomic characteristics of soybean varieties grown in southern Minnesota for special use markets. Trials were conducted in Hope and Waseca in 2009. The trials were planted with a 4-row John Deere 7000 planter equipped with cone units at Hope. The seeding rate was 150,000 seeds per acre planted at a depth of 1.5 inches. The plots were four rows wide by 22 feet in length. At Waseca, plots were planted at 160,000 seeds per acre in 10 inch rows by 12 feet in length. A randomized complete block design was implemented and replicated four times at both sites. The center two rows at Hope and the center six rows at Waseca of each plot were machine harvested with grain weight and moisture recorded at all sites. Field histories are reported in Table 1. 2009 soybean yield and moisture for Hope and Waseca are reported individually and averaged across locations in Table 2. Table 3 lists the results from the 2008 trial. (University of Minnesota Extension, Regional Center – Rochester, Southern Research and Outreach Center, Waseca, and Minnesota Crop Improvement Association).

Table 1. Field histories for 2009.

	Hope	Waseca
Planting Date	May 14, 2009	May 28, 2009
Harvest Date	October 27, 2009	October 19, 2009
Soil Type	Biscay Loam	Nicollet/Webster clay loam
Herbicide	Domain PRE / Raptor POST, FirstRate POST, Select POST	Treflan + Pursuit, PPI
Tillage	Conventional Till	Field cultivated once. PPI herbicide applied then field cultivated twice
Previous Crop	Corn	Corn

Table 2. Soybean protein, oil, moisture and yield at Hope and moisture and yield at Waseca and the 2-site average in Minnesota in 2009.

Entry	Hope				Waseca		Average
	Protein (%)	Oil (%)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Yield (Bu/A)
eMerge 209F.HPC	37.5	16.3	19.6	38.5	16.6	41.1	39.8
eMerge T23Y	36.1	16.9	21.0	41.0	16.3	45.7	43.4
IA-1008BC	35.3	17.3	13.4	38.0	14.8	46.5	42.3
Kandi	36.6	17.2	18.2	31.8	14.6	36.3	34.1
KIN	35.3	17.0	18.6	37.5	15.3	45.4	41.5
Lariet	36.1	17.5	18.1	30.9	13.9	42.5	36.7
MN-1410	34.5	17.6	19.3	45.1	14.6	48.8	47.0
MN-1505 SP	37.5	16.4	18.2	37.5	15.4	41.3	39.4
MN-1701CN	35.7	17.5	19.1	41.7	14.8	46.5	44.1
Northland North Pro 7	36.1	16.6	20.2	32.7	15.2	29.6	31.2
Northland Royal Pro	35.9	16.6	19.0	32.7	15.2	26.7	29.7
Northland SurePro	38.2	16.9	19.6	37.7	15.3	40.9	39.3
NK S21-N6	34.3	17.8	19.8	53.2	16.6	55.1	54.2
Pioneer 91M10	35.1	17.4	17.5	43.7	15.2	36.0	39.9
Pioneer 92M10	34.2	18.1	19.0	43.3	16.0	43.1	43.2
Sheyenne	34.5	17.8	17.1	29.2	14.4	35.9	32.6
SR-08LF	34.7	17.2	19.3	41.8	15.1	47.6	44.7
SR-099	35.2	17.1	18.2	34.4	14.6	35.4	34.9
SR-11	35.8	17.3	18.4	42.6	15.8	42.9	42.8
SR-110-3	36.1	15.5	23.1	35.9	16.2	42.7	39.3
SR-122	33.9	17.4	20.7	48.3	15.6	49.5	48.9
SR-20	36.8	16.1	19.6	38.0	15.5	42.1	40.1
SR-327	37.5	15.8	25.2	48.7	19.7	49.6	49.2
SR-327LF/IA3027LF	36.6	15.7	27.7	45.7	17.6	53.5	49.6
SR-53	36.1	16.3	20.1	39.8	15.6	42.0	40.9
SR-53LF	36.4	16.7	19.3	36.8	15.0	47.2	42.0
SR-67	37.2	16.8	19.9	38.6	15.4	38.2	38.4
SRN-14	36.8	16.1	17.6	28.7	14.6	39.4	34.1
Viking 0.1706N	35.3	17.9	17.8	47.2	14.4	43.1	45.2
Viking 0.2078N	35.6	16.9	19.1	49.8	15.0	45.0	47.4
EXP M02385041	34.8	18.4	19.5	42.4	15.6	44.3	43.4
EXP MN1702SP	35.5	17.0	19.1	39.2	14.9	38.0	38.6
LSD (P=0.10)	1.8	1.1	2.3	4.8	2.2	8.4	

Table 3. Soybean protein, oil, moisture and yield at Hope and moisture and yield at Waseca and the 2-site average in Minnesota in 2008.

Entry	Maturity	Hope				Waseca		Average
		Protein (%)	Oil (%)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Yield (Bu/A)
1010LF	1.8	35.2	16.6	14.0	39.7	13.6	46.7	43.2
Asoyia 2308	2.3	36.2	17.3	14.1	42.2	14.9	54.9	48.6
Kin	1.9	34.6	17.8	14.4	44.5	15.1	53.4	48.9
Lariet	1.6	34.1	19.3	14.3	41.4	14.9	55.3	48.3
Latham E2319	2.3	37.5	17.7	14.4	36.6	15.3	42.6	39.6
Latham E2429	2.4	36.9	17.6	14.1	42.7	14.7	44.7	43.7
MN - 1012SP	1.0	32.7	18.4	14.8	27.2	16.1	34.1	30.6
MN – 1104SP	1.1	34.6	19.2	14.2	36.1	15.6	39.8	38.0
MN – 1203SP	1.2	31.8	18.5	14.9	30.5	17.4	39.4	35.0
MN – 1401BL	1.4	36.3	18.2	13.5	41.5	13.4	50.4	46.0
MN – 1401SP	1.4	34.9	18.6	14.8	41.4	15.3	49.8	45.6
MN - 1410	1.4	33.8	19.3	14.9	48.1	15.7	61.0	54.5
MN- 1505SP	1.5	37.4	18.3	14.9	40.6	15.4	45.7	43.1
MN- 1607	1.6	36.2	18.3	14.0	36.2	14.5	49.4	42.8
MN – 1701CN	1.7	33.4	18.8	14.7	44.9	15.2	53.8	49.4
MN1310SP	1.3	33.5	18.7	14.2	37.9	15.5	42.1	40.0
M02-474385	1.5-1.8	33.8	18.1	14.5	38.6	15.8	53.4	46.0
Northland SurePro	2.0	38.3	17.4	14.7	37.7	15.5	39.5	38.6
Northland NL66	1.5	37.2	16.0	14.7	38.5	15.6	45.2	41.8
Northland NL59	1.4	36.8	16.0	14.9	35.8	15.9	51.5	43.6
SR - EXP22	1.9	30.7	19.9	14.7	51.5	16.4	63.6	57.6
SR - EXP23	2.0	33.7	18.5	14.3	43.4	15.2	61.4	52.4
SR – 08LF	2.0	34.2	18.3	14.2	47.6	14.8	58.1	52.8
SR – 09	0.9	32.6	19.9	13.9	37.8	14.3	41.8	39.8
SR – 11	1.1	34.6	18.8	14.5	40.6	15.0	58.4	49.5
SR – 53	2.3	37.4	17.1	13.8	42.9	14.6	47.9	45.4
SR – 67	2.3	36.9	17.8	14.2	36.3	15.1	47.7	42.0
SRN – 14	1.4	35.0	18.8	14.4	36.8	15.6	39.0	37.9
Stine 1906	1.8	33.3	19.0	14.0	39.3	14.7	50.6	45.0
Viking 0.1898N	1.8	32.5	19.5	14.9	48.6	16.1	63.7	56.2
Viking 0.2022	2.0	32.5	19.3	14.4	47.9	15.9	52.6	50.2
NK S18-Y3	1.8	34.1	18.2	14.3	50.7	14.5	61.9	56.3
LSD (P=0.10)		**0.8**	**0.5**	**0.4**	**5.2**	**0.6**	**13.5**	7.3

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Evaluation of Soybean Cyst Nematode (SCN) Resistant Varieties - Performance and Impact on SCN Egg Counts at High Forest, Rock Dell, and Waseca, MN, in 2009

Miller, Ryan P., Fritz R. Breitenbach, Lisa M. Behnken and Kyle J. Poss

The objective of this trial was to evaluate SCN resistant soybean varieties for yield performance and impact on SCN egg counts in southeastern Minnesota. At each site field preparation was conventional tillage and the previous crop was corn. At High Forest, and Rock Dell, the trial was planted with a 4-row John Deere 7000 planter equipped with cone units at a depth of 1.5 inches in 30-inch rows, and a seeding rate of 150,000 seeds/A. At Waseca, plots were planted at 160,000 seeds per acre in 10 inch rows by 25 feet in length. A randomized complete block design with four replications was used at all sites. Initial SCN egg counts were determined for each site by sampling every plot. The initial egg count is an average of the four replications at each site. The initial SCN egg counts for Waseca, Rock Dell and High Forest were 75, 138, 1750 eggs/ 100 cc of soil, respectively (Table 1). Waseca and Rock Dell were considered non-infested and High Forest was considered infested. Soil at High Forest was sampled again at planting to determine SCN egg counts, and SCN egg counts had dropped significantly across the experimental area. SCN egg counts were 213, 175, 100, and 275 eggs/ 100 cc for replications 1,2,3,and 4 respectively. Final SCN soil samples for egg counts were collected at all sites after the soybeans had reached the R6 stage. High Forest samples were collected from each plot and were bulked by variety across replications. Final samples were taken at Rock Dell and Waseca from plots containing variety 92M32, samples were bulked by site and included soil samples from each replication. The reproductive index (RI) was calculated for High Forest by dividing the final egg counts for each variety by the initial (at planting) average egg count of 191 eggs/ 100 cc of soil (Table 2). Please note that egg counts at planting were substantially lower than early season numbers and numbers at the end of the season were lower yet, resulting in some unusually low reproductive indices. Varieties with a RI of less than .5 are generally considered resistant. Yields were adjusted to 13% moisture and results are shown in tables 3 and 4. Varieties were also ranked by yield and RI (Figure 1). (University of Minnesota Extension, Regional Office - Rochester, MN.)

Table 1. Field histories for Soybean Cyst Nematode (SCN) resistant soybean variety trials in southern Minnesota in 2009.

	High Forest	Rock Dell	Waseca
Planting Date	May 5, 2009	May 18, 2009	May 28, 2009
Harvest Date	November 2, 2009	November 3, 2009	October 19, 2009
Soil Type	Waukee Loam, Marshan & Skyberg Silt Loams	Kenyon Loam	Nicollet/Webster Clay Loam
Herbicide	Glyphosate 2 pass	Glyphosate 2 pass	Glyphosate 2 pass
Tillage	Conventional	Conventional	Conventional
Previous Crop	Corn	Corn	Corn
Preplant SCN Egg Count (Eggs/100 cc soil)	1750	138	75

Table 2. Reproductive Index for Infested Sites in 2009.

Variety	Resistance Source/Type	High Forest Reproductive Index
Asgrow 1703	88788	0.13
Asgrow 2002	88788	0
Asgrow 2110	Peking	0
Asgrow 2108	88788	0.26
Kruger 201 RR SCN	88788	0
Latham L1401RX	Cystx	0
Latham L1738R	88788	0
Latham L1983R	88788	0
Latham E1700RX	Cystx	0
Latham E1800RX	Cystx	0
NK Brand S19 - A6	88788	0
NK Brand S21 - B1	88788	0
NK Brand S21 - N6	Susceptible	2.09
NK Brand S22 - C5	88788	0.26
NK Brand S23 - N7	88788	0
NuTech 7186	Peking	0
NuTech 7199	88788	0
NuTech 7226	Peking	1.7
NuTech 7176	88788	0
Pioneer 92Y20	Peking	0
Pioneer 92Y30	88788	0
Pioneer 92M32	Susceptible	0
Prairie Brand PB-1999NRR	88788	0
Prairie Brand PB-2056NRR	88788	0
Viking 1788NRR	88788	0
Viking 2198NRR	88788	0

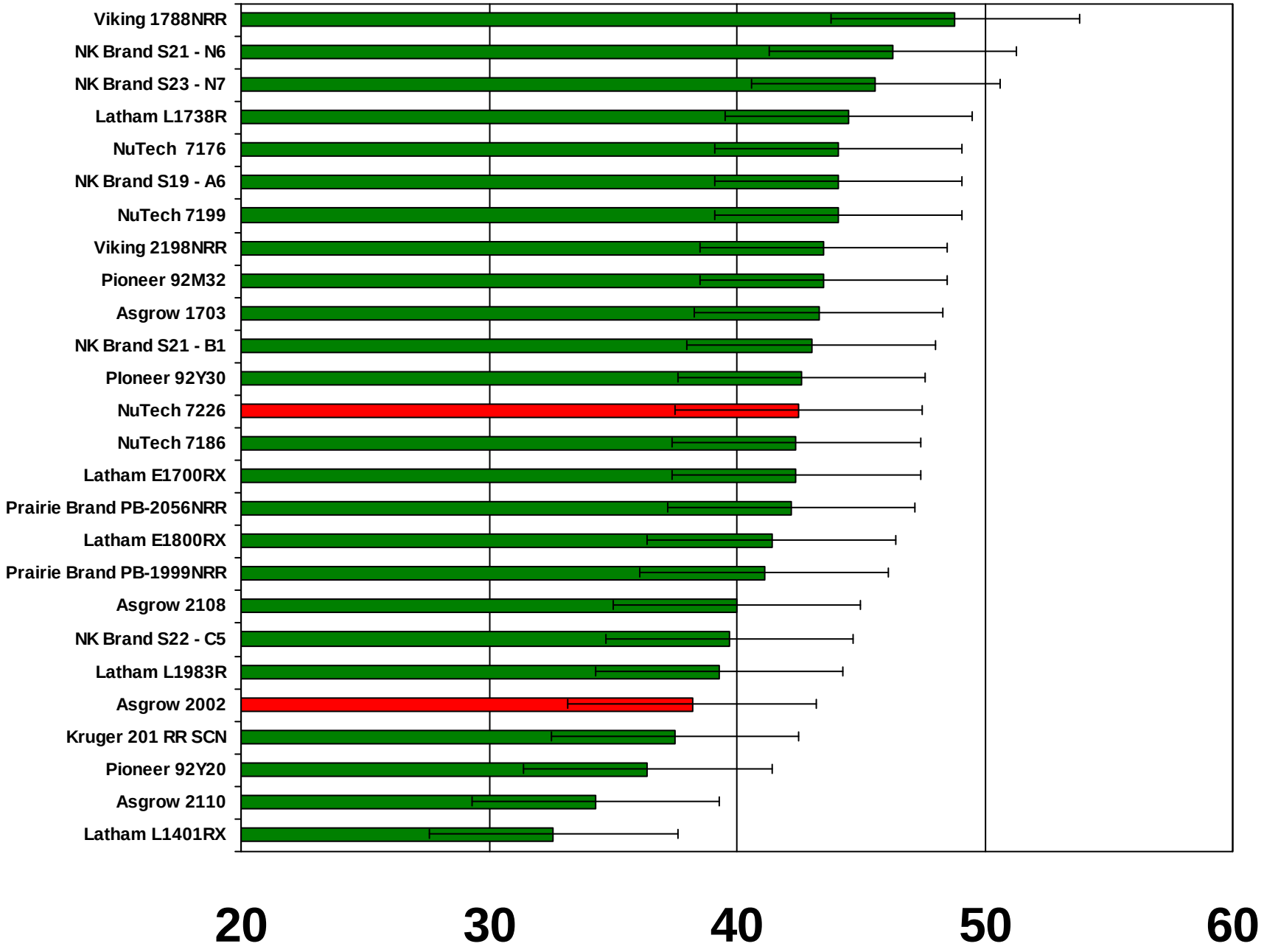
Table 3. SCN Soybean Variety Trial Moisture (%) and Yield (bu/A) at High Forest, Rock Dell, and Waseca in 2009.

Variety	Description		High Forest		Rock Dell		Waseca	
	Maturity	Resistance Source	Soybean Moisture (%)	Soybean Yield (bu/A)	Soybean Moisture (%)	Soybean Yield (bu/A)	Soybean Moisture (%)	Soybean Yield (bu/A)
Asgrow 1703	1.7	88788	16.4	43.3	15.5	37.9	15.0	48.3
Asgrow 2002	2.0	88788	16.4	38.2	16.4	42.6	15.4	46.8
Asgrow 2110	2.1	Peking	16.9	34.3	16.1	38.2	15.3	44.6
Asgrow 2108	2.1	88788	16.3	40.0	15.5	40.4	14.6	49.5
Kruger 201 RR SCN	2.0	88788	16.2	37.5	15.9	43.1	14.7	48.9
Latham L1401RX	1.4	Cystx	15.8	32.6	15.0	30.4	14.0	42.5
Latham L1738R	1.7	88788	16.7	44.5	15.9	41.5	14.6	49.9
Latham L1983R	1.9	88788	17.3	39.3	15.6	40.3	14.8	40.9
Latham E1700RX	1.7	Cystx	16.4	42.4	15.5	33.3	15.3	39.8
Latham E1800RX	1.8	Cystx	16.6	41.4	15.7	38.9	15.1	40.7
NK Brand S19 - A6	1.9	88788	17.6	44.1	16.8	39.5	15.8	47.0
NK Brand S21 - B1	2.1	88788	16.4	43.0	15.3	40.5	14.9	53.3
NK Brand S21 - N6	2.1	Susceptible	16.9	46.3	16.0	43.1	15.1	57.1
NK Brand S22 - C5	2.2	88788	16.1	39.7	15.5	35.4	14.9	46.6
NK Brand S23 - N7	2.3	88788	17.1	45.6	16.4	37.8	14.9	55.0
NuTech 7186	1.8	Peking	16.9	42.4	15.9	41.6	14.2	41.2
NuTech 7199	1.9	88788	16.0	44.1	15.7	45.6	14.6	42.7
NuTech 7226	2.2	Peking	16.5	42.5	16.7	40.0	15.0	51.4
NuTech 7176	1.7	88788	17.9	44.1	16.3	43.2	14.8	44.0
Pioneer 92Y20	2.2	Peking	17.0	36.4	16.1	42.7	14.7	43.1
Pioneer 92Y30	2.3	88788	18.0	42.6	16.8	42.0	15.0	44.4
Pioneer 92M32	2.3	Susceptible	16.6	43.5	15.8	42.1	15.5	49.4
Prairie Brand PB-1999NRR	1.9	88788	16.9	41.1	16.0	41.7	14.9	51.9
Prairie Brand PB-2056NRR	2.0	88788	16.1	42.2	15.4	44.0	14.9	42.6
Viking 1788NRR	1.7	88788	16.6	48.8	15.5	36.1	15.0	50.1
Viking 2198NRR	2.1	88788	16.3	43.5	15.8	39.2	14.8	48.4
		LSD (P=0.10)	**0.54**	**5.0**	**0.4**	**4.9**	**0.6**	**9.7**

Table 4. Combined Yield Results for Infested and Non-infested Sites in 2009.

Variety		Infested	Non infested		
		H. Forest	Rock Dell	Waseca	Average
	Resistance Source/Type	bu/A	bu/A		
Asgrow 1703	88788	43.3	37.9	48.3	43.1
Asgrow 2002	88788	38.2	42.6	46.8	44.7
Asgrow 2110	Peking	34.3	38.2	44.6	41.4
Asgrow 2108	88788	40.0	40.4	49.5	45.0
Kruger 201 RR SCN	88788	37.5	43.1	48.9	46.0
Latham L1401RX	Cystx	32.6	30.4	42.5	36.5
Latham L1738R	88788	44.5	41.5	49.9	45.7
Latham L1983R	88788	39.3	40.3	40.9	40.6
Latham E1700RX	Cystx	42.4	33.3	39.8	36.6
Latham E1800RX	Cystx	41.4	38.9	40.7	39.8
NK Brand S19 - A6	88788	44.1	39.5	47.0	43.3
NK Brand S21 - B1	88788	43.0	40.5	53.3	46.9
NK Brand S21 - N6	Susceptible	46.3	43.1	57.1	50.1
NK Brand S22 - C5	88788	39.7	35.4	46.6	41.0
NK Brand S23 - N7	88788	45.6	37.8	55	46.4
NuTech 7186	Peking	42.4	41.6	41.2	41.4
NuTech 7199	88788	44.1	45.6	42.7	44.2
NuTech 7226	Peking	42.5	40.0	51.4	45.7
NuTech 7176	88788	44.1	43.2	44.0	43.6
Pioneer 92Y20	Peking	36.4	42.7	43.1	42.9
Pioneer 92Y30	88788	42.6	42.0	44.4	43.2
Pioneer 92M32	Susceptible	43.5	42.1	49.4	45.8
Prairie Brand PB-1999NRR	88788	41.1	41.7	51.9	46.8
Prairie Brand PB-2056NRR	88788	42.2	44.0	42.6	43.3
Viking 1788NRR	88788	48.8	36.1	50.1	43.1
Viking 2198NRR	88788	43.5	39.2	48.4	43.8
	LSD (P=0.10)	**5.0**	**4.9**	**9.7**	

Figure 1. Average Yield Ranking and Reproductive Index for High Forest in 2009.



1. *Green indicates egg counts decreased over the season (Reproductive Index = 0.0 to 0.7)*
2. *Yellow indicates egg counts remained the same over the season (Reproductive Index = 0.71 to 1.3)*
3. *Red indicates egg counts increased over the season (Reproductive Index =1.31 and greater)*
4. ***All egg count were less than or equal to 400 eggs per 100 cc of soil*

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Performance of Liberty Link Soybean Varieties Compared to Four RR/GT Soybean Standards at Rock Dell, Waseca, and Lamberton, MN, in 2009

Behnken, Lisa M., Fritz R. Breitenbach, Ryan P. Miller, Lizabeth A.B. Stahl, and David A. Nicolai

The objective of this study was to evaluate the performance of Liberty Link soybean varieties compared to four standard, top-producing RR/GT soybean varieties in southern Minnesota. The trials were located at Rock Dell, Waseca, and Lamberton, MN. Field histories are reported in Table 1. At Rock Dell and Lamberton, the trials were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 150,000 seeds per acre planted at a depth of 1.5 inches. Plots were four 30-inch rows wide by 22 feet in length. At Waseca, plots were planted at 175,000 seeds per acre in 10-inch rows by 12 feet in length. A randomized complete block design was implemented and replicated four times. The center two rows at Rock Dell and Lamberton, and the center six rows at Waseca of each plot were machine harvested with grain weight and moisture recorded at all sites. Table 2 provides moisture and yield at Rock Dell and Waseca and the 2-site average yield. Due to compaction problems at Lamberton, this data will not be reported. (University of Minnesota Extension Regional Office, Rochester, Southern Research and Outreach Center, Waseca and the Southwestern Research and Outreach Center, Lamberton, MN).

Table 1. Field histories for Rock Dell, Waseca, and Lamberton, MN, in 2009.

	Rock Dell	Waseca	Lamberton
Planting Date	May 18, 2009	May 28, 2009	May 22, 2009
Harvest Date	November 3, 2009	October 20, 2009	Nov 5, 2009
Soil Type	Kenyon Loam	Nicollet/Webster clay loam	Webster clay loam
Tillage	Conventional	Cultivated twice and rolled after planting	Field cultivator twice
Herbicide	Conventional	Treflan + Pursuit PRE/Basagran POST	Outlook PPI
Insecticide	Warrior II	Warrior	Tundra
Previous Crop	Corn	Corn	Corn

Table 2. Grain yield, moisture, oil and protein content of Liberty Link soybean varieties at Rock Dell and Waseca, MN and the 2-site average in 2009.

Entry Name	Description	Rock Dell				Waseca		2-Site Average Yield
	Maturity	%Oil	% Protein	%	bu/A	%	bu/A	bu/A
Asgrow 2108 RR	2.1 Standard	17.9	31.0	16.0	42.1	15.3	49.9	46.0
Croplan LT1829	1.8	17.4	33.7	16.9	43.2	16.6	53.1	48.1
Dahlman 4916LL	1.6	17.4	33.3	16.5	44.2	15.0	43.4	43.8
LG Seeds LG1829LL	1.8	17.8	33.5	16.4	41.0	15.4	50.3	45.7
NK S21-N6RR	2.1 Standard	18.1	31.5	18.3	40.9	15.2	60.2	50.5
NuTech 3199L	1.9	17.0	33.0	18.9	38.9	17.7	58.9	48.7
Bayer S080114/SG2077 LL	2.0	18.0	32.6	15.3	36.8	15.5	43.6	40.0
NuTech 3248L	2.4	17.3	32.2	20.4	41.0	18.9	62.1	51.3
Pioneer 92Y30	2.3 Standard	18.1	32.2	17.3	39.1	14.9	51.1	45.1
Prairie Brand PB-2089XNLL	2.0	16.5	33.0	19.2	39.7	19.1	56.1	48.1
Prairie Brand PB-2299NLL	2.2	17.3	33.7	17.3	35.7	16.4	64.5	50.1
Renk RS170LL	1.7	17.5	33.0	16.0	36.6	15.4	47.2	41.9
Stine 2062-4 RR	2.0 Standard	18.8	30.5	16.0	40.6	15.5	44.5	42.4
Stine 16LA06	1.5	17.1	32.2	16.4	42.7	14.9	44.4	43.5
Stine 23LA23	2.3	18.2	32.3	16.6	43.9	16.3	58.5	51.2
Stine 24LA08	2.4	16.8	32.9	16.7	44.6	15.4	56.5	50.5
Viking L199	1.9	17.6	33.4	16.2	40.2	15.6	55.0	47.6
Viking L200N	2.0	16.8	32.5	19.1	39.5	17.3	54.8	47.1
	LSD (P=0.10)	**0.5**	**1.0**	**0.8**	**4.1**	**1.2**	**8.0**	**4.6**

Performance of Low Linolenic (Vistive) Soybean Varieties at Gaylord, Westbrook, Rock Dell, Waseca, and Lamberton, MN, in 2009

Nicolai, Dave A., Ryan P. Miller, Fritz R. Breitenbach, Lisa M. Behnken, Lizabeth A.B. Stahl, Jim Orf, and Seth Naeve.

Introduction

Soybean oil is made up of five major fatty acids: palmitic, stearic, oleic, linoleic, and linotenic. For many food applications, traditional soy oil undergoes a process called partial hydrogenation, primarily to improve the natural flavor, stability, and shelf life of the product. Linolenic acid is the fatty acid most responsible for making soybean oil spoil, prompting the use of partial hydrogenation. Partial hydrogenation leads to the formation of trans fat in foods. The U.S. Food and Drug Administration mandate requiring trans fat content to be listed on all retail food nutrition labels beginning Jan. 1, 2006, has spurred many food manufacturers to seek alternatives to ingredients that add trans fat or saturated fat to foods. Excessive levels of trans and saturated fats in diets have been linked by leading medical authorities to coronary heart disease and other health concerns.

Soybeans will typically produce oil that is 6-8% linolenic acid. To address the concerns of health-conscious Americans' increasing demand for foods with improved nutritional profiles, public and private soybean breeders in the United States have released soybean varieties with less than 3% linolenic acid. One variety, Asoyia, has only 1% linolenic acid and is classed as “Ultra Low Linolenic”. Soybeans bred to have low levels of linolenic acid produce soybean oil that is less likely to deteriorate or go rancid, and therefore does not need to be hydrogenated. This will significantly reduce the amount of trans fats in the foods made with these “Low Linolenic” soybean oils and enable food companies to reduce or eliminate trans fat from processed foods. When used in frying applications, low linolenic oil can eliminate the need for partial hydrogenation, resulting in foods with negligible amounts of trans fat absorbed from the frying oil. Low linolenic oil is well suited for many food products consumed on a daily basis, including foodservice frying, snack foods, salad oils, spray oils and some bakery applications.

The objective of this study was to evaluate the performance of low linolenic soybean varieties in southern Minnesota. The trial was conducted at five locations, Gaylord, Westbrook, Lamberton, Rock Dell and Waseca, MN. The seeding rate was 150,000 seeds per acre planted at a depth of 1.5 inches. A randomized complete block design was implemented and replicated four times at all sites. Plots were machine harvested with grain weight and moisture recorded at all sites. Field histories are reported in Table 1. Soybean yield and moisture are reported in Table 2. The 5-site average yield and oil and protein content at Rock Dell are reported in Table 3. (University of Minnesota Extension, Regional Center, Rochester, Southern Research and Outreach Center, Waseca, Southwestern Research and Outreach Center, Lamberton).

Table 1. Field Histories for low linolenic variety trials in southern MN in 2009.

	Rock Dell	Waseca	Lamberton
Planting Date	May 18, 2009	May 28, 2009	May 20, 2009
Harvesting Date	November 3, 2009	October 19, 2009	October 27, 2009
Soil Type	Kenyon Loam	Nicollet/Webster clay loam	Normania loam
Herbicide	Conventional	Cultivated twice and rolled after planting	Field cultivator twice
Insecticide	Conventional	Treflan + Pursuit PRE/Basagran POST	Outlook PPI / Cornerstone Plus + Select Max POST
Tillage	Warrior II	Warrior	Tundra
Previous Crop	Corn	Corn	Corn

Table 2. Low linolenic soybean yield at Gaylord, Lamberton, Rock Dell, Waseca and Westbrook, Minnesota in 2009.

Entry	Maturity	Gaylord	Lamberton	Rock Dell	Waseca	Westbrook
		Yield @13% (bu/A)				
Renk RS 179	1.7 Standard			38.5	50.4	
Asgrow AG2108	2.1 Standard	51.8	51.0	43.3	49.9	37.4
Asgrow AG2222V	2.2	45.4	44.9	31.1	49.6	37.0
Asgrow AG2423V	2.4	49.4	48.7	39.0	52.2	39.7
Asgrow AG2521V	2.5	47.9	48.4	39.1	54.9	42.6
Crow Vistive CV241R	2.4	39.4	48.9	27.6	48.2	41.6
Kruger K-220 RR/SCN/LINO	2.2	46.1	46.7	37.1	47.2	45.4
Kruger K-245 RR/SCN/LINO	2.4	52.9	47.6	28.7	46.4	40.4
Latham L2238RV	2.2	44.1	47.3	35.5	45.9	41.1
Latham L2458RV	2.4	50.2	49.6	28.6	46.9	45.9
Midwest Seed Genetics RV1551	1.5	50.1	47.7	34.1	47.3	40.5
Midwest Seed Genetics RV2490	2.4	48.1	45.6	27.1	45.3	39.2
NK S21-N6	2.1 Standard	53.1	51.7	39.1	57.3	31.7
Prairie Brand PB2056	2.0 Standard			40.1	55.8	
Pioneer 92Y30	2.3 Standard	53.8	57.6	40.8	51.1	46.2
Prairie Brand PB-2217VNRR	2.2	47.2	49.4	37.6	45.4	44.1
Prairie Brand PB-2377VNRR	2.3	49.1	46.5	30.1	47.8	32.1
Prairie Brand PB-2438VNRR	2.4	50.3	48.4	25.6	42.1	46.4
Stine 2062-4	2.0 Standard	56.2	48.7	40.9	53.8	42.7
Stine 2332-94	2.3	50.2	50.7	27.0	46.9	43.8
	LSD (P=0.10)	10.5	4.4	5.6	5.5	9.8

Table 3. Low linolenic average soybean yield at Gaylord, Lamberton, Rock Dell, Waseca and Westbrook, and oil and protein at Rock Dell, Minnesota in 2009.

Entry	Maturity	Average over sites	Rock Dell	
		Yield @13% (bu/A)	Oil (%)	*Protein (%)*
Renk RS 179[1]	1.7 Standard	**44.5**[1]	**15.8**	**34.8**
Asgrow AG2108	2.1 Standard	**46.7**	**17.3**	**32.5**
Asgrow AG2222V	2.2	**41.6**	**16.9**	**33.3**
Asgrow AG2423V	2.4	**45.8**	**17.2**	**33.5**
Asgrow AG2521V	2.5	**46.6**	**16.6**	**33.4**
Crow Vistive CV241R	2.4	**41.1**	**16.7**	**33.2**
Kruger K-220 RR/SCN/LINO	2.2	**44.5**	**17**	**33.9**
Kruger K-245 RR/SCN/LINO	2.4	**43.2**	**16.5**	**33.5**
Latham L2238RV	2.2	**42.8**	**16.6**	**34.0**
Latham L2458RV	2.4	**44.2**	**16.5**	**33.3**
Midwest Seed Genetics RV1551	1.5	**43.9**	**16.1**	**35.0**
Midwest Seed Genetics RV2490	2.4	**41.1**	**16.1**	**33.6**
NK S21-N6	2.1 Standard	**46.6**	**17.7**	**32.8**
Prairie Brand PB2056[1]	2.0 Standard	**48.0**[1]	**17.8**	**33.0**
Pioneer 92Y30	2.3 Standard	**49.9**	**17.4**	**32.8**
Prairie Brand PB-2217VNRR	2.2	**44.7**	**16.6**	**34.5**
Prairie Brand PB-2377VNRR	2.3	**41.1**	**16.2**	**33.4**
Prairie Brand PB-2438VNRR	2.4	**42.6**	**15.9**	**33.7**
Stine 2062-4	2.0 Standard	**48.5**	**18.5**	**31.3**
Stine 2332-94	2.3	**43.7**	**16.7**	**33.8**
LSD (P=0.10)			0.5	0.7

1. Average yield is from 2 sites only, Rock Dell and Waseca.

SECTION E

SOYBEAN

HERBICIDE TRIALS

New Soybean Herbicides for 2010 found in the 2009 Reports

1. ***Ignite 280 =*** glufosinate [BAYER]
2. ***OpTill*** = saflufenacil (*Sharpen*) + imazethapyr (*Pursuit*) [BASF]

Performance of Ignite 280 Herbicide Systems for Weed Control in Soybean at Rochester, MN, in 2009

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, Jeffrey L. Gunsolus and Jason Welter

The objective of this trial was to evaluate the performance of Ignite 280 herbicide programs for weed control in soybeans in southeastern Minnesota, 2009. The research site was a Lawler loam series with a pH of 6.6, O.M of 2.6%, and soil test P and K levels of 62 ppm and 188 ppm, respectively. The field was spring disked and field cultivated once prior to planting. The soybean variety, BAYER CROPSCIENCE S62077LL, was planted on May 19, 2009, at a depth of 1.5 inches in 30 inch rows at 150,000 seeds an acre. A randomized complete block design was used with four replications. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on June 16, 29, July 6, 13, 20, and 28. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on October 20, 2009. (University of Minnesota Extension Regional Office, Rochester).

Date	**5/19**	**6/20**	**6/22**	**7/13**
Treatment	PRE	POST I	POST II	POST III
Temperature				
Air	93	83	84	75
Soil	69.4	78.2	75.9	74.7
Relative Humidity (%)	23	39	62	43
Wind (mph)	23	13	5	6
Soil Moisture	Inadequate	Adequate	Excessive	Inadequate
Soybean				
Stage		V1	V2	V6-R1
Height (inches)		5.0	7.2	15.8
Giant Ragweed				
Weed density (ft^2)		8.3	8.3	8.3
Height (inches)		5.0	7.6	9.4
Common Lambsquarters				
Weed density (ft^2)		9.4	9.4	9.4
Height (inches)		2.0	2.9	5.1
Common Waterhemp				
Weed density (ft^2)		6.9	6.9	6.9
Height (inches)		0.5	2.8	5.8
Giant foxtail				
Weed density (ft^2)		1.8	1.8	1.8
Height (inches)		3.0	3.6	4.8
Rainfall after each application				
Week 1	1.13	0.32	0.18	0.0
Week 2	0.82	0.21	0.27	1.80
Week 3	1.75	0.85	0.79	0.99

Table 1. Performance of Ignite 280 herbicide systems for giant ragweed control in soybeans at Rochester, MN, in 2009

Treatment	Rate	Giant Ragweed Control						Yield	
		6/16	6/29	7/6	7/13	7/20	7/28		
	(rate/A)	(% Control)						(bu/A)	
Untreated		0	0	0	0	0	0	3.6	d
PRE/POST II									
Valor SX / Ignite 280 + AMS	2 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	61	95	93	83	92	87	31.0	c
Sonic or Authority First / Ignite 280 + AMS	4 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	82	97	95	92	96	93	37.1	ab
Enlite / Ignite 280 + AMS	2.8 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	66	97	95	91	96	93	37.1	ab
Optill / Ignite 280 + AMS	2 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	81	97	95	91	97	95	35.4	b
Prefix / Ignite 280 + AMS	1.5 pt/a / 22 fl oz/a + 8.5 lb/100 gal	75	96	96	93	97	97	38.8	a
Gangster FR + Gangster V / Ignite 280 + AMS	0.3 oz wt/a + 1.5 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	80	96	95	88	95	93	37.3	ab
POST I/POST III									
Ignite 280 + AMS / Ignite 280 + AMS	22 fl oz/a + 8.5 lb/100 gal / 22 fl oz/a + 8.5 lb/100 gal	0	93	90	78	93	99	36.1	ab
	LSD (P=0.10)	**5**	**3**	**3**	**4**	**2**	**4**	**3.1**	

Table 2. Performance of Ignite 280 herbicide systems for common lambsquarters control in soybeans at Rochester, MN, in 2009

Treatment	Rate	Common Lambsquarters Control						Yield	
		6/16	6/29	7/6	7/13	7/20	7/28		
	(rate/A)	(% Control)						(bu/A)	
Untreated		0	0	0	0	0	0	3.6	d
PRE/POST II									
Valor SX / Ignite 280 + AMS	2 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	72	97	94	90	92	93	31.0	c
Sonic or Authority First / Ignite 280 + AMS	4 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	96	99	99	99	99	99	37.1	ab
Enlite / Ignite 280 + AMS	2.8 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	96	98	97	95	96	97	37.1	ab
Optill / Ignite 280 + AMS	2 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	98	99	99	96	97	98	35.4	b
Prefix / Ignite 280 + AMS	1.5 pt/a / 22 fl oz/a + 8.5 lb/100 gal	71	98	95	89	93	93	38.8	a
Gangster FR + Gangster V / Ignite 280 + AMS	0.3 oz wt/a + 1.5 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	91	99	95	92	94	92	37.3	ab
POST I/POST III									
Ignite 280 + AMS / Ignite 280 + AMS	22 fl oz/a + 8.5 lb/100 gal / 22 fl oz/a + 8.5 lb/100 gal	0	85	86	76	85	95	36.1	ab
	LSD (P=0.10)	**3**	**1**	**3**	**3**	**3**	**3**	**3.1**	

Table 3. Performance of Ignite 280 herbicide systems for common waterhemp control in soybeans at Rochester, MN, in 2009

Treatment	Rate	Common Waterhemp Control						Yield	
		6/16	6/29	7/6	7/13	7/20	7/28		
	(rate/A)	(% Control)						(bu/A)	
Untreated		0	0	0	0	0	0	3.6	d
PRE/POST II									
Valor SX / Ignite 280 + AMS	2 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	90	99	98	98	99	95	31.0	c
Sonic or Authority First / Ignite 280 + AMS	4 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	89	99	99	99	99	97	37.1	ab
Enlite / Ignite 280 + AMS	2.8 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	87	99	99	99	99	98	37.1	ab
Optill / Ignite 280 + AMS	2 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	71	99	97	94	98	94	35.4	b
Prefix / Ignite 280 + AMS	1.5 pt/a / 22 fl oz/a + 8.5 lb/100 gal	91	99	99	99	99	98	38.8	a
Gangster FR + Gangster V / Ignite 280 + AMS	0.3 oz wt/a + 1.5 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	91	99	99	99	99	98	37.3	ab
POST I/POST III									
Ignite 280 + AMS / Ignite 280 + AMS	22 fl oz/a + 8.5 lb/100 gal / 22 fl oz/a + 8.5 lb/100 gal	0	92	89	76	96	96	36.1	ab
	LSD (P=0.10)	**5**	**1**	**3**	**1**	**1**	**3**	**3.1**	

Table 4. Performance of Ignite 280 herbicide systems for giant foxtail control in soybeans at Rochester, MN, in 2009

Treatment	Rate	Giant Foxtail Control						Yield	
		6/16	6/29	7/6	7/13	7/20	7/28		
	(rate/A)	(% Control)						(bu/A)	
Untreated		0	0	0	0	0	0	3.6	d
PRE/POST II									
Valor SX / Ignite 280 + AMS	2 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	79	98	98	97	97	97	31.0	c
Sonic or Authority First / Ignite 280 + AMS	4 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	63	99	98	96	97	98	37.1	ab
Enlite / Ignite 280 + AMS	2.8 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	71	99	98	96	98	97	37.1	ab
Optill / Ignite 280 + AMS	2 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	64	99	99	98	99	98	35.4	b
Prefix / Ignite 280 + AMS	1.5 pt/a / 22 fl oz/a + 8.5 lb/100 gal	88	99	99	98	98	99	38.8	a
Gangster FR + Gangster V / Ignite 280 + AMS	0.3 oz wt/a + 1.5 oz wt/a / 22 fl oz/a + 8.5 lb/100 gal	81	98	97	94	95	97	37.3	ab
POST I/POST III									
Ignite 280 + AMS / Ignite 280 + AMS	22 fl oz/a + 8.5 lb/100 gal / 22 fl oz/a + 8.5 lb/100 gal	0	98	98	95	97	99	36.1	ab
	LSD (P=0.10)	**5**	**1**	**2**	**4**	**3**	**2**	**3.1**	

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Performance of OpTill Herbicide Systems for Weed Control in Soybean at Rochester, MN, in 2009

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, Jeffrey L. Gunsolus and Katherine Sheehan

The objective of this trial was to evaluate the performance of OpTill herbicide programs for weed control in soybeans in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.8 and soil test P and K levels of 95 ppm and 225 ppm, respectively. The field was spring disked and field cultivated once prior to planting. The soybean hybrid, NK S19-A6, was planted on May 19, 2009 at a depth of 1.5 inches in 30 inch rows at 150,000 seeds per acre. A randomized complete block design was used with four replications. Preplant incorporated (PPI), Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. The PPI treatment was incorporated with a field cultivator immediately after application. Evaluations of the plot were taken on June 15 and 25, July 6, 13, 20 and 28 . Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on October 20, 2009. (University of Minnesota Extension Regional Office, Rochester)

Date	**5/19**	**5/19**	**6/22**
Treatment	PPI	PRE	POST I
Temperature (F)			
Air	83	93	84
Soil	69.8	67.5	75.4
Relative Humidity	38	23	62
Wind (mph)	16	23	5
Soil Moisture	Inadequate	Inadequate	Excessive
Soybean			
Stage			V2
Height (inches)			5.0
Giant Ragweed			
Weed Density (ft^2)			7.3
Height (inches)			5.4
Common Lambsquarters			
Weed Density (ft^2)			5.1
Height (inches)			1.7
Common Waterhemp			
Weed Density (ft^2)			2.0
Height (inches)			1.9
Velvetleaf			
Weed Density (ft^2)			2.0
Height (inches)			1.9
Giant foxtail			
Weed Density (ft^2)			2.1
Height (inches)			3.4
Rainfall after each application			
Week 1	1.13	1.13	
Week 2	0.82	0.82	
Week 3	1.75	1.75	

Table 1. Performance of OpTill herbicide systems for giant ragweed control in soybeans at Rochester, MN, in 2009.

Treatment	Rate	Giant Ragweed Control					Yield
		6/15	6/25	7/13	7/20	7/28	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	4.7
PPI / POST I							
OpTill + Prowl H2O / Roundup PowerMax + NIS + AMS	2 oz wt/a + 32 fl oz/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	83	96	97	99	99	33.0
PRE / POST I							
OpTill / Roundup PowerMax + NIS + AMS	2 oz wt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	82	96	96	98	98	33.2
Valor SX / Roundup PowerMax + NIS + AMS	2.5 oz wt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	58	95	94	97	97	31.6
	LSD (P=0.10)	**5**	**2**	**3**	**2**	**1**	**3.0**

Table 2. Performance of OpTill herbicide systems for common lambsquarters control in soybeans at Rochester, MN, in 2009.

Treatment	Rate	Common Lambsquarters Control					Yield
		6/15	6/25	7/13	7/20	7/28	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	4.7
PPI / POST I							
OpTill + Prowl H2O / Roundup PowerMax + NIS + AMS	2 oz wt/a + 32 fl oz/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	99	99	99	99	99	33.0
PRE / POST I							
OpTill / Roundup PowerMax + NIS + AMS	2 oz wt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	99	99	99	99	99	33.2
Valor SX / Roundup PowerMax + NIS + AMS	2.5 oz wt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	66	97	97	98	97	31.6
	LSD (P=0.10)	**7**	**2**	**2**	**1**	**2**	**3.0**

Table 3. Performance of OpTill herbicide systems for common waterhemp control in soybeans at Rochester, MN, in 2009.

Treatment	Rate	Common Waterhemp Control					Yield
		6/15	6/25	7/13	7/20	7/28	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	4.7
PPI / POST I							
OpTill + Prowl H2O / Roundup PowerMax + NIS + AMS	2 oz wt/a + 32 fl oz/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	91	99	98	99	99	33.0
PRE / POST I							
OpTill / Roundup PowerMax + NIS + AMS	2 oz wt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	91	99	97	99	97	33.2
Valor SX / Roundup PowerMax + NIS + AMS	2.5 oz wt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	93	99	98	99	97	31.6
	LSD (P=0.10)	**4**	**1**	**2**	**1**	**2**	**3.0**

Table 4. Performance of OpTill herbicide systems for velvetleaf control in soybeans at Rochester, MN, in 2009.

Treatment	Rate	Velvetleaf Control					Yield
		6/25	7/6	7/13	7/20	7/28	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	4.7
PPI / POST I							
OpTill + Prowl H2O / Roundup PowerMax + NIS + AMS	2 oz wt/a + 32 fl oz/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	99	99	99	99	99	33.0
PRE / POST I							
OpTill / Roundup PowerMax + NIS + AMS	2 oz wt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	99	99	99	99	99	33.2
Valor SX / Roundup PowerMax + NIS + AMS	2.5 oz wt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	99	99	99	99	99	31.6
	LSD (P=0.10)	**1**	**1**	**1**	**1**	**1**	**3.0**

Table 5. Performance of OpTill herbicide systems for giant foxtail control in soybeans at Rochester, MN, in 2009.

Treatment	Rate	Giant Foxtail Control					Yield
		6/15	6/25	7/13	7/20	7/28	
	(rate/A)	(% Control)					(bu/A)
Untreated Check		0	0	0	0	0	4.7
PPI / POST I							
OpTill + Prowl H2O / Roundup PowerMax + NIS + AMS	2 oz wt/a + 32 fl oz/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	89	99	99	99	99	33.0
PRE / POST I							
OpTill / Roundup PowerMax + NIS + AMS	2 oz wt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	80	99	99	99	99	33.2
Valor SX / Roundup PowerMax + NIS + AMS	2.5 oz wt/a / 22 fl oz/a + 0.25% v/v + 17 lb/100 gal	85	98	99	99	99	31.6
	LSD (P=0.10)	**3**	**1**	**1**	**1**	**1**	**3.0**

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Evaluation of Weed Control Strategies for Roundup Ready Soybean in a Hypothetical Glyphosate Resistant Weed Situation in Soybean at Rochester, MN, in 2007, 2008, and 2009

Miller, Ryan P., Fritz R. Breitenbach, Lisa M. Behnken, Lizabeth A.B. Stahl, Jeffrey L. Gunsolus, and Jodie K. Getting

INTRODUCTION AND BACKGROUND

According to the 2008 and 2009 Minnesota Integrated Pest Management Assessment, approximately one-third of Southern MN farmers believe they have glyphosate resistant weeds on their farm. Approximately 60% of those farmers indicated they would manage glyphosate resistant weeds by tank mixing additional herbicides with glyphosate, while 40% would use a preemergence product. In 2008 and 2009, we experienced an increase in the number of fields with poor glyphosate performance, especially in soybean. The following weeds were most frequently reported: giant ragweed, common ragweed, tall waterhemp, common lambsquarters, barnyardgrass, and wild buckwheat. The most likely cause for the increase in glyphosate's lack of performance is an area of uncertainty. It may be due to poor application technique, poor timing, environment, weed spectrum with extended or delayed emergence patterns, and/or inherent tolerance to glyphosate; or repeated use of the same herbicide resulting in selection for resistance. The following species have demonstrated resistance to glyphosate at 4 to 8 X rates: giant ragweed (south central and west central MN), common ragweed (central and northwest MN), tall waterhemp (south central, southwest, and west central MN). Note there are indicators that some of these biotypes could also be resistant to ALS herbicides. Fields with the highest frequency to glyphosate resistance (giant and common ragweed) are associated with lack of crop rotation, no-till, total postemergence weed control practices, one or two applications of glyphosate per year, lack of chemical rotation, and continuous glyphosate applications in corn and soybean rotation. It is difficult to verify the percent of farms with glyphosate resistant weeds, but glyphosate resistant populations of common waterhemp and giant ragweed have been identified in Minnesota (Heap, 2008).

Glyphosate is a valuable tool. It provides broad-spectrum weed control, is low in cost and has excellent crop safety. Glyphosate also controls larger weeds, has no soil residual and low environmental and human health risks. Diversification of weed management systems has been in decline in Midwestern corn and soybean production since the adoption of glyphosate-resistant crops over ten years ago. A high percentage of Minnesota acres are planted to glyphosate tolerant crops. For soybeans, approximately 98% of acres are treated with glyphosate with minimal use of preemergence herbicides. For corn, approximately 85% of acres are treated with glyphosate, and less than 50% of acres use a preemergence grass herbicide at the "glyphosate rate" (~1/2 of label rate). Tank mixing a second herbicide with glyphosate can reduce convenience, increase costs and the risk of crop injury, as well as limit the window of application for other herbicide (s) in the tank mix. Management of glyphosate resistant weeds in glyphosate tolerant crops will be a major problem facing the farmers in Minnesota.

The good news, there is still time to adopt good management practices, limit the selection of additional glyphosate resistant weeds, and extend the benefit of glyphosate and Roundup-Ready crop technology. Strategies to adopt include:

1. Increase chemical diversity in corn and soybean acres to help delay herbicide resistance development. Consider alternating Roundup Ready crops with Liberty Link technology or a conventional herbicide program. Consider in which crop you could most easily substitute other herbicides for glyphosate or consider in which crop you are most dependent upon the effectiveness of glyphosate. Also, don't forget to consider the influence of herbicide selection on crop rotation interval.
2. Utilize other modes of action by using a preemergence herbicide or tank-mix partners.
3. Increase the use of residual herbicides
4. Scout fields soon after herbicide applications to detect escapes and take timely action.
5. Avoid multiple glyphosate applications

OBJECTIVE

The objective of this trial was to evaluate weed control strategies for glyphosate tolerant soybean in a hypothetical glyphosate resistant weed situation in soybean in southeastern Minnesota. The intent of this study was to determine how to improve weed control above and beyond glyphosate by itself.

Field research was conducted at Rochester, MN in 2007, 2008 and 2009 to determine which tank mix components and sequential herbicide applications improved glyphosate efficacy. In 2007, the research site was a Lawler loam series with a pH of 6.8 and soil test P and K levels of 12 ppm and 171 ppm, respectively. In 2008, the research site was a Lawler loam series with a pH of 6.9 and soil test P and K levels of 19 ppm and 112 ppm, respectively. In 2009, the research site was a Lawler loam series with a pH 6.6 and soil test P and K levels of 62 ppm and 188 ppm, respectively. The fields were spring disked and field cultivated once prior to planting. A randomized complete block design with four replications was used. Soybean varieties 'Dairyland DSR 199', 'Dairyland DSR 1302' and 'Asgrow AG2108', were planted on May 17, 2007, May 23, 2008, and May 19, 2009, respectively. Seeds were planted 1.0 inch deep in 30 inch rows at a rate of 150,000 seeds/acre. All herbicide applications were made with a tractor-mounted sprayer delivering 20 gallons/acre at 32 psi using 11002 Turbo-Tee nozzles.

A reduced rate of glyphosate at 16 fl oz/acre was evaluated and compared to a series of glyphosate tank mixtures and sequential herbicide applications. The reduced glyphosate rate was used to better determine the effect of the tank mix and sequential herbicide treatments on weed control. Visual weed control ratings were conducted for giant ragweed, common lambsquarters, common waterhemp, velvetleaf and giant foxtail. Ratings were conducted multiple times each season, (June 6, 14, 20, 28, July 6, 18, and September 14, 2007), (June 23 and 30, July 7, 16, 28, and September 19, 2008), and (June 15, 30, July 7, 13, 20, and 29, 2009). Table 1 lists application dates, environmental conditions, crop and weed stages. Tables 2 through 7 provide the herbicide results by weed species, crop injury and grain yield for 2009. Tables 8, 9, and 10, provide performance details of herbicide tank mix partners and preemergence sequential programs in 2007, 2008, and 2009. The center two rows of each plot were machine harvested on October 4, 2007, October 10, 2008 and October 20, 2009.

CONCLUSIONS

- Over 90% control of giant ragweed was achieved with two sequential programs in 2007 and 2008 and four in 2009. Prefix provided over 90% control in all years. Only one tank mix program in 2007, FirstRate, achieved 90% control of giant ragweed. Across years, four tank mixes and one sequential program resulted in significantly reduced control of giant ragweed compared to glyphosate alone.
- All sequential programs obtained 90% or greater control of common lambsquarters, except for Prowl H_2O in 2008 and Prefix in 2009. Only two tank mix programs provided over 90% control in 2007 and 2009 and none gave over 90% control in 2008.
- All sequential programs provided over 90% control of common waterhemp, except Prowl H_2O. Only one tank mix, Prowl H_2O / Flexstar gave over 90% control. However, four tank mix programs resulted in significantly reduced common waterhemp control compared to glyphosate alone.
- All tank mix programs caused significant crop injury in 2009 because STS soybean varieties were unavailable.
- In 2009, soybean yield for tank mix programs were either no different or significantly lower than glyphosate alone, except for FirstRate which gave significantly greater weed control with the least crop injury at 13%. The majority of the sequential programs had significantly higher yields compared to glyphosate alone or the tank mix programs, and achieved significantly greater overall weed control.
- Sequential herbicide programs provide the best choice for improved weed control and soybean yield. Although some sequential treatments had weaknesses with certain weed species, weaknesses were more evident with the tank mix treatments to the point that some tank mix treatments were antagonistic. For appropriate product selection it is important to know what weeds are the major problem in a field. Weed populations with cross resistance to multiple modes of action will further complicate product selection. (University of Minnesota Extension Regional Office, Rochester)

Table 1. Application dates, environmental conditions, crop, and weed stages for 2007, 2008, and 2009.

	2007				2008				2009				
Date	**5/18**	**6/15**	**6/20**	**7/6**	**5/23**	**5/23**	**6/30**	**7/8**	**5/19**	**5/19**	**6/19**	**6/22**	**6/26**
Treatment	**PRE**	**POST I**	**POST II**	**POST III**	**PPI**	**PRE**	**POST I**	**POST II**	**PPI**	**PRE**	**POST I**	**POST II**	**POST III**
Temperature (F)													
Air	69	82	86	79	67	67	77	80	83	93	78	89	86
soil	--	79	81.7	79	68	68	76	84	69.8	72.3	75	81	84.2
Relative Humidity (%)	48	50	30	50	45	45	32	46	38	23	68	51	37
Wind (mph)	12	8	15	3	14	14	7	15	16	23	14	8	0
Soil moisture	Inadequate	Adequate	Adequate	Inadequate	Inadequate	Inadequate	Adequate	Adequate	Inadequate	Inadequate	Excessive	Excessive	Inadequate
Soybean													
stage		V2	V3	R1			V2	R1			V1	V2	V3
height (inch)		5.0	8.5	13.0			8.0	12.0			3.0	7.0	7.6
Giant Ragweed													
weed density (ft^2)		11.4	11.4	11.4			4.0	4.0			7.5	7.5	7.5
height (inch)		6.8	9.7	5.3			8.0	13.5			8.9	9.6	9.8
Common Lambsquarters													
weed density (ft^2)		5.4	5.4	5.4			3.7	3.7			2.6	2.6	2.6
height (inch)		1.6	4.2	4.1			2.1	3.3			1.8	1.5	2.3
Common Waterhemp													
weed density (ft^2)		13.8	13.8	13.8			77.1	77.1			8.4	8.4	8.4
height (inch)		2.4	2.9	4.0			1.9	7.5			1.4	1.5	3.3
Giant Foxtail													
weed density (ft^2)		20.3	20.3	20.3			7.7	7.7					
height (inch)		2.4	6.6	2.9			5.9	3.3			2.5	4.4	4.7
Velvetleaf													
weed density (ft^2)							1.6	1.6				1.5	2.0
height (inch)							2.0	3.0					
Rainfall after each application (inch)													
week 1	2.41	2.97	2.09	0.66	2.15	2.15	0.87	0.92	1.13	1.13	0.21	0.18	0.18
week 2	1.25	0.52	0.21	0.50	2.61	2.61	0.92	0.60	0.82	0.82	0.17	0.27	0.99
week 3	0.44	0.21	0.66		5.86	5.86	0.59	0.03	1.75	1.75	0.15	0.79	0.06

Table 2. Performance of herbicide systems for giant ragweed control in soybeans and grain yield at 13% at Rochester, MN, in 2009.

Treatment	Rate	Giant Ragweed Control						Yield
		6/15	6/30	7/6	7/13	7/20	7/29	
	(rate/A)	(%)						(bu/A)
PPI/POST I								
Prowl H_2O / Flexstar + Glyphosate + NIS + AMS	3 pt/a / 12 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	94	93	90	88	85	25.8 ghi
Prowl H_2O / Glyphosate + NIS + AMS	3 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	0	82	90	86	87	82	30.4 def
PRE/POST I								
Gangster V + Gangster FR / Glyphosate + NIS + AMS	2.5 oz wt/a + 0.5 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	85	74	88	84	86	85	35.4 ab
Enlite / Glyphosate + NIS + AMS	2.8 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	65	85	96	93	93	91	34.6 abc
Valor / Glyphosate + NIS + AMS	2.5 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	26	84	95	91	96	89	31.1 c-f
OpTill / Glyphosate + NIS + AMS	2 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	70	89	96	95	95	93	35.7 a
Sonic / Glyphosate + NIS + AMS	4.5 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	89	80	95	93	94	92	36.8 a
Prefix / Glyphosate + NIS + AMS	2 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	77	71	97	97	97	96	34.8 abc
Boundary / Glyphosate + NIS + AMS	1.8 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	24	83	94	94	92	89	33.9 a-d
Authority Assist / Glyphosate + NIS + AMS	12 fl oz/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	80	77	92	87	90	87	33.6 a-d
POST I								
Glyphosate + NIS + AMS	16 fl oz/a + 0.25% v/v + 2 lb/a	0	83	86	82	78	74	28.3 e-h
Flexstar + Glyphosate + NIS + AMS	12 fl oz/a +16 fl oz/a + 0.25% v/v + 2 lb/a	0	95	94	91	87	81	27.9 fgh
Cobra + Glyphosate + NIS + AMS	6 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	91	93	89	84	79	23.0 ij
Flexstar + Harmony SG + Glyphosate + NIS + AMS	12 fl oz/a + 0.125 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	94	96	89	87	76	23.3 ij
Cadet + Glyphosate + NIS + AMS	0.4 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	74	85	78	73	69	24.8 hi
FirstRate + Glyphosate + NIS + AMS	0.3 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	85	94	91	91	86	31.8 b-e
Synchrony XP + Glyphosate + NIS + AMS	0.375 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	77	89	85	83	76	20.2 j
Classic + Glyphosate + NIS + AMS	0.33 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	80	88	85	78	75	26.0 ghi
Harmony SG + Glyphosate + NIS + AMS	0.125 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a		79	88	85	80	70	21.1 j
Pursuit + Glyphosate + NIS + AMS	4 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	83	92	91	91	87	28.7 efg
	LSD (P=0.10)	**4**	**5**	**3**	**4**	**6**	**5**	**3.7**

Table 3. Performance of herbicide systems for common lambsquarters control in soybeans and grain yield at 13% at Rochester, MN, in 2009.

Treatment	Rate	Common Lambsquarters Control						Yield
		6/15	6/30	7/6	7/13	7/20	7/29	
	(rate/A)	(%)						(bu/A)
PPI/POST I								
Prowl H_2O / Flexstar + Glyphosate + NIS + AMS	3 pt/a / 12 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	86	94	95	94	90	89	25.8 ghi
Prowl H_2O / Glyphosate + NIS + AMS	3 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	88	95	95	91	93	90	30.4 def
PRE/POST I								
Gangster V + Gangster FR / Glyphosate + NIS + AMS	2.5 oz wt/a + 0.5 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	99	90	93	77	85	84	35.4 ab
Enlite / Glyphosate + NIS + AMS	2.8 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	99	99	99	95	96	94	34.6 abc
Valor / Glyphosate + NIS + AMS	2.5 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	53	92	97	93	92	93	31.1 c-f
OpTill / Glyphosate + NIS + AMS	2 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	99	99	99	97	97	96	35.7 a
Sonic / Glyphosate + NIS + AMS	4.5 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	99	98	98	96	98	95	36.8 a
Prefix / Glyphosate + NIS + AMS	2 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	75	77	86	81	79	75	34.8 abc
Boundary / Glyphosate + NIS + AMS	1.8 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	98	99	99	97	97	94	33.9 a-d
Authority Assist / Glyphosate + NIS + AMS	12 fl oz/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	97	99	99	98	99	94	33.6 a-d
POST I								
Glyphosate + NIS + AMS	16 fl oz/a + 0.25% v/v + 2 lb/a	0	90	92	87	86	71	28.3 e-h
Flexstar + Glyphosate + NIS + AMS	12 fl oz/a +16 fl oz/a + 0.25% v/v + 2 lb/a	0	86	82	78	76	74	27.9 fgh
Cobra + Glyphosate + NIS + AMS	6 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	91	92	85	86	82	23.0 ij
Flexstar + Harmony SG + Glyphosate + NIS + AMS	12 fl oz/a + 0.125 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	93	94	90	89	86	23.3 ij
Cadet + Glyphosate + NIS + AMS	0.4 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	93	93	78	85	80	24.8 hi
FirstRate + Glyphosate + NIS + AMS	0.3 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	92	95	94	90	91	31.8 b-e
Synchrony XP + Glyphosate + NIS + AMS	0.375 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	94	95	92	91	88	20.2 j
Classic + Glyphosate + NIS + AMS	0.33 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	94	95	87	87	86	26.0 ghi
Harmony SG + Glyphosate + NIS + AMS	0.125 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a		91	92	83	85	85	21.1 j
Pursuit + Glyphosate + NIS + AMS	4 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	97	97	93	93	93	28.7 efg
	LSD (P=0.10)	**4**	**6**	**4**	**8**	**7**	**7**	**3.7**

Table 4. Performance of herbicide systems for common waterhemp control in soybeans and grain yield at 13% at Rochester, MN, in 2009.

Treatment	Rate	Common Waterhemp Control						Yield
		6/15	6/30	7/6	7/13	7/20	7/29	
	(rate/A)	(%)						(bu/A)
PPI/POST I								
Prowl H_2O / Flexstar + Glyphosate + NIS + AMS	3 pt/a / 12 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	89	97	97	97	96	94	25.8 ghi
Prowl H_2O / Glyphosate + NIS + AMS	3 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	92	97	94	92	92	86	30.4 def
PRE/POST I								
Gangster V + Gangster FR / Glyphosate + NIS + AMS	2.5 oz wt/a + 0.5 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	93	97	98	96	97	92	35.4 ab
Enlite / Glyphosate + NIS + AMS	2.8 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	96	99	98	97	98	94	34.6 abc
Valor / Glyphosate + NIS + AMS	2.5 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	80	99	99	97	97	95	31.1 c-f
OpTill / Glyphosate + NIS + AMS	2 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	70	97	97	94	91	91	35.7 a
Sonic / Glyphosate + NIS + AMS	4.5 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	96	99	98	97	98	95	36.8 a
Prefix / Glyphosate + NIS + AMS	2 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	96	98	99	95	98	95	34.8 abc
Boundary / Glyphosate + NIS + AMS	1.8 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	96	99	98	99	97	93	33.9 a-d
Authority Assist / Glyphosate + NIS + AMS	12 fl oz/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	96	99	99	98	99	95	33.6 a-d
POST I								
Glyphosate + NIS + AMS	16 fl oz/a + 0.25% v/v + 2 lb/a	0	85	87	74	73	68	28.3 e-h
Flexstar + Glyphosate + NIS + AMS	12 fl oz/a +16 fl oz/a + 0.25% v/v + 2 lb/a	0	95	96	91	88	86	27.9 fgh
Cobra + Glyphosate + NIS + AMS	6 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	95	96	89	89	82	23.0 ij
Flexstar + Harmony SG + Glyphosate + NIS + AMS	12 fl oz/a + 0.125 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	93	93	90	91	89	23.3 ij
Cadet + Glyphosate + NIS + AMS	0.4 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	89	86	78	74	71	24.8 hi
FirstRate + Glyphosate + NIS + AMS	0.3 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	92	90	87	87	76	31.8 b-e
Synchrony XP + Glyphosate + NIS + AMS	0.375 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	90	92	87	83	73	20.2 j
Classic + Glyphosate + NIS + AMS	0.33 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	88	92	85	81	75	26.0 ghi
Harmony SG + Glyphosate + NIS + AMS	0.125 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	91	91	84	79	74	21.1 j
Pursuit + Glyphosate + NIS + AMS	4 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	86	90	83	80	70	28.7 efg
	LSD (P=0.10)	**5**	**5**	**3**	**4**	**4**	**5**	**3.7**

Table 5. Performance of herbicide systems for giant foxtail control in soybeans and grain yield at 13% at Rochester, MN, in 2009.

Treatment	Rate	Giant Foxtail Control					Yield
		6/15	6/30	7/6	7/13	7/20	
	(rate/A)	(%)					(bu/A)
PPI/POST I							
Prowl H_2O / Flexstar + Glyphosate + NIS + AMS	3 pt/a / 12 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	83	98	98	98	98	25.8 ghi
Prowl H_2O / Glyphosate + NIS + AMS	3 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	86	99	98	98	98	30.4 def
PRE/POST I							
Gangster V + Gangster FR / Glyphosate + NIS + AMS	2.5 oz wt/a + 0.5 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	83	78	98	98	97	35.4 ab
Enlite / Glyphosate + NIS + AMS	2.8 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	73	99	98	97	97	34.6 abc
Valor / Glyphosate + NIS + AMS	2.5 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	65	99	99	99	97	31.1 c-f
OpTill / Glyphosate + NIS + AMS	2 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	63	97	99	98	96	35.7 a
Sonic / Glyphosate + NIS + AMS	4.5 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	78	79	98	99	98	36.8 a
Prefix / Glyphosate + NIS + AMS	2 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	93	86	99	99	99	34.8 abc
Boundary / Glyphosate + NIS + AMS	1.8 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	91	99	99	98	98	33.9 a-d
Authority Assist / Glyphosate + NIS + AMS	12 fl oz/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	81	83	99	99	99	33.6 a-d
POST I							
Glyphosate + NIS + AMS	16 fl oz/a + 0.25% v/v + 2 lb/a	0	99	98	96	92	28.3 e-h
Flexstar + Glyphosate + NIS + AMS	12 fl oz/a +16 fl oz/a + 0.25% v/v + 2 lb/a	0	99	96	94	93	27.9 fgh
Cobra + Glyphosate + NIS + AMS	6 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	97	97	95	94	23.0 ij
Flexstar + Harmony SG + Glyphosate + NIS + AMS	12 fl oz/a + 0.125 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	97	98	97	96	23.3 ij
Cadet + Glyphosate + NIS + AMS	0.4 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	98	97	91	91	24.8 hi
FirstRate + Glyphosate + NIS + AMS	0.3 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	98	97	93	91	31.8 b-e
Synchrony XP + Glyphosate + NIS + AMS	0.375 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	97	93	93	92	20.2 j
Classic + Glyphosate + NIS + AMS	0.33 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	99	98	96	93	26.0 ghi
Harmony SG + Glyphosate + NIS + AMS	0.125 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	97	97	94	93	21.1 j
Pursuit + Glyphosate + NIS + AMS	4 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	99	98	93	89	28.7 efg
	LSD (P=0.10)	**5**	**3**	**2**	**3**	**4**	**3.7**

Table 6. Performance of herbicide systems for velvetleaf control in soybeans and grain yield at 13% at Rochester, MN, in 2009.

Treatment	Rate	Velvetleaf Control 6/30	7/6	7/13	7/20	Yield
	(rate/A)	(%)				(bu/A)
PPI/POST I						
Prowl H_2O / Flexstar + Glyphosate + NIS + AMS	3 pt/a / 12 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	99	99	99	99	25.8 ghi
Prowl H_2O / Glyphosate + NIS + AMS	3 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	98	99	99	97	30.4 def
PRE/POST I						
Gangster V + Gangster FR / Glyphosate + NIS + AMS	2.5 oz wt/a + 0.5 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	99	99	99	99	35.4 ab
Enlite / Glyphosate + NIS + AMS	2.8 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	98	99	99	99	34.6 abc
Valor / Glyphosate + NIS + AMS	2.5 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	94	98	97	98	31.1 c-f
OpTill / Glyphosate + NIS + AMS	2 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	99	99	99	99	35.7 a
Sonic / Glyphosate + NIS + AMS	4.5 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	99	98	99	99	36.8 a
Prefix / Glyphosate + NIS + AMS	2 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	84	94	95	93	34.8 abc
Boundary / Glyphosate + NIS + AMS	1.8 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	99	99	99	99	33.9 a-d
Authority Assist / Glyphosate + NIS + AMS	12 fl oz/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	99	99	99	99	33.6 a-d
POST I						
Glyphosate + NIS + AMS	16 fl oz/a + 0.25% v/v + 2 lb/a	96	98	99	98	28.3 e-h
Flexstar + Glyphosate + NIS + AMS	12 fl oz/a +16 fl oz/a + 0.25% v/v + 2 lb/a	98	98	99	99	27.9 fgh
Cobra + Glyphosate + NIS + AMS	6 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	96	97	98	98	23.0 ij
Flexstar + Harmony SG + Glyphosate + NIS + AMS	12 fl oz/a + 0.125 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	98	99	99	99	23.3 ij
Cadet + Glyphosate + NIS + AMS	0.4 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	99	99	99	99	24.8 hi
FirstRate + Glyphosate + NIS + AMS	0.3 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	97	98	98	97	31.8 b-e
Synchrony XP + Glyphosate + NIS + AMS	0.375 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	98	99	99	99	20.2 j
Classic + Glyphosate + NIS + AMS	0.33 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	97	96	98	97	26.0 ghi
Harmony SG + Glyphosate + NIS + AMS	0.125 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	95	97	96	96	21.1 j
Pursuit + Glyphosate + NIS + AMS	4 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	97	98	99	99	28.7 efg
	LSD (P=0.10)	**5**	**2**	**2**	**3**	**3.7**

Table 7. Soybean injury resulting from herbicide systems and grain yield at 13% at Rochester, MN, in 2009.

Treatment	Rate	Injury		Yield
		6/29	7/6	
	(rate/A)	(%)		(bu/A)
PPI/POST I				
Prowl H_2O / Flexstar + Glyphosate + NIS + AMS	3 pt/a / 12 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	29	15	25.8 ghi
Prowl H_2O / Glyphosate + NIS + AMS	3 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	0	0	30.4 def
PRE/POST I				
Gangster V + Gangster FR / Glyphosate + NIS + AMS	2.5 oz wt/a + 0.5 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	0	5	35.4 ab
Enlite / Glyphosate + NIS + AMS	2.8 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	0	0	34.6 abc
Valor / Glyphosate + NIS + AMS	2.5 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	0	3	31.1 c-f
OpTill / Glyphosate + NIS + AMS	2 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	0	0	35.7 a
Sonic / Glyphosate + NIS + AMS	4.5 oz wt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	0	0	36.8 a
Prefix / Glyphosate + NIS + AMS	2 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	0	16	34.8 abc
Boundary / Glyphosate + NIS + AMS	1.8 pt/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	0	0	33.9 a-d
Authority Assist / Glyphosate + NIS + AMS	12 fl oz/a / 16 fl oz/a + 0.25% v/v + 2 lb/a	0	4	33.6 a-d
POST I				
Glyphosate + NIS + AMS	16 fl oz/a + 0.25% v/v + 2 lb/a	0	0	28.3 e-h
Flexstar + Glyphosate + NIS + AMS	12 fl oz/a +16 fl oz/a + 0.25% v/v + 2 lb/a	32	15	27.9 fgh
Cobra + Glyphosate + NIS + AMS	6 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	36	18	23.0 ij
Flexstar + Harmony SG + Glyphosate + NIS + AMS	12 fl oz/a + 0.125 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	54	21	23.3 ij
Cadet + Glyphosate + NIS + AMS	0.4 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	25	15	24.8 hi
FirstRate + Glyphosate + NIS + AMS	0.3 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	13	4	31.8 b-e
Synchrony XP + Glyphosate + NIS + AMS	0.375 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	46	21	20.2 j
Classic + Glyphosate + NIS + AMS	0.33 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	24	15	26.0 ghi
Harmony SG + Glyphosate + NIS + AMS	0.125 oz wt/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	40	20	21.1 j
Pursuit + Glyphosate + NIS + AMS	4 fl oz/a + 16 fl oz/a + 0.25% v/v + 2 lb/a	24	10	28.7 efg
	LSD (P=0.10)	**3**	**4**	**3.7**

1. Means followed by the same letter do not significantly differ (P=.10, LSD)

Table 8. Control of giant ragweed, common lambsquarters, and common waterhemp (07-09) and soybean injury and yield for 2009 sequential and tank mix programs at Rochester, MN

	Giant Ragweed			Common Lambsquarters			Common Waterhemp			INJURY	YIELD
	2007	2008	2009	2007	2008	2009	2007	2008	2009	6/26/09	2009
PRE/POST[1]	---------- % control ----------									%	Bu/A
Enlite / glyphosate	NR[2]	87	91	NR[2]	99	94	NR[2]	99	94	0	35
Gangster V + Gangster FR / glyphosate	93	96	85	99	99	84	99	99	92	0	35
OpTill / glyphosate	NR[2]	NR[2]	93	NR[2]	NR[2]	96	NR[2]	NR[2]	91	0	36
Sonic / glyphosate	88	83	92	99	99	95	94	97	95	0	37
Authority Assist / glyphosate	NR[2]	79	87	NR[2]	99	94	NR[2]	99	95	0	34
Authority MTZ / glyphosate	77	72	NR[2]	99	99	NR[2]	97	99	NR[2]	0	NR[2]
Valor / glyphosate	84	79	89	96	92	93	99	91	95	0	31
Prefix / glyphosate	97	95	96	92	93	75	99	95	95	0	35
Boundary / glyphosate	NR[2]	NR[2]	89	NR[2]	NR[2]	94	NR[2]	NR[2]	93	0	34
Prowl H_2O / glyphosate	NR[2]	65	82	NR[2]	66	90	NR[2]	65	86	0	30
POST[3]											
glyphosate[3] alone	78	71	74	60	76	71	73	65	67.5	0	28
Classic + glyphosate	80	69	75	68	86	86	69	63	75	24	26
FirstRate + glyphosate	90	80	86	70	73	91	78	56	76	13	32
Pursuit + glyphosate	86	68	87	96	84	93	60	58	70	24	29
Synchrony XP + glyphosate	78	64	76	71	75	88	71	65	73	46	20
Harmony GT + glyphosate	75	64	70	94	90	85	65	64	74	40	21
Flexstar + Harmony GT + glyphosate	NR[2]	NR[2]	76	NR[2]	NR	86	NR[2]	NR[2]	89	54	23
Flexstar + glyphosate	84	80	81	63	80	74	88	90	86	32	28
Cadet + glyphosate	NR[2]	56	68.8	NR[2]	79	80	NR[2]	56	71	25	25
Cobra + glyphosate	82	77	79	56	73	82	86	84	82	36	23
Resource + glyphosate	66	55	NR[2]	75	63	NR[2]	73	63	NR[2]	NR[2]	NR[2]
Prowl H_2O fb glyphosate + Flexstar	NR[2]	NR[2]	85	NR[2]	NR[2]	89	NR[2]	NR[2]	94	29	26
LSD α = 0.10	5	4	5	6	4	7	6	5	5	3	4

Table 9.

Rochester, MN Credit: F. Breitenbach, L. Behnken, R. Miller	Giant Ragweed			Common Lambsquarters			Common Waterhemp		
Sequential PRE/POST programs	2007	2008	2009	2007	2008	2009	2007	2008	2009
Glyphosate alone	78	71	74	60	76	71	73	65	68
Valor	+	+	+	++	++	++	++	++	++
Gangster V & FR	++	++	+	++	++	+	++	++	++
Prefix	++	++	++	++	++	=	++	++	++
Sonic	+	+	++	++	++	++	++	++	++
Enlite		+	++		++	++		++	++
Authority MTZ	=	=		++	++		++	++	
Authority Assist		+	+		++	++		++	++
Prowl H_2O		-	+		-	+		-	+
OpTill			++			++			++
Boundary			+			++			++

(++) is 90% or better control
(+) is significantly higher control than one-pass glyphosate, but less than 90%
(=) is the same control as one-pass glyphosate
(-) is significantly lower control than one-pass glyphosate

Table 10.

Rochester, MN Credit: F. Breitenbach, L. Behnken, R. Miller	Giant Ragweed			Common Lambsquarters			Common Waterhemp		
Postemergence Tank mix program	2007	2008	2009	2007	2008	2009	2007	2008	2009
Glyphosate alone	78	71	74	60	76	71	73	65	68
FirstRate	++	+	+	+	=	++	=	-	+
Classic	=	=	=	+	+	+	=	=	+
Synchrony XP	=	-	=	+	=	+	=	=	+
Flexstar	+	+	+	=	+	=	+	++	+
Pursuit	+	=	+	++	+	++	-	-	=
Cobra	=	+	=	=	=	+	+	+	+
Harmony GT	=	-	=	++	++	+	-	=	=
Resource	-	-		+	-		=	=	
Cadet		-	-		=	+		-	=

(++) is 90% or better control
(+) is significantly higher control than one-pass glyphosate, but less than 90%
(=) is the same control as one-pass glyphosate
(-) is significantly lower control than one-pass glyphosate

2009 Evaluation of Herbicide Systems in Soybean at Rochester, MN

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, Jeffrey L. Gunsolus, Thomas Hoverstad and Kyle Poss

The objective of this trial was to evaluate the performance of herbicide systems for weed control in soybeans in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.8 and soil test P and K levels of 95 ppm and 225 ppm, respectively. The field was spring disked and field cultivated once prior to planting. The soybean hybrid, Asgrow AG2108, was planted on May 19, 2009 at a depth of 1.5 inches in 30 inch rows at 150,000 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plot were taken on June 15 and 29, July 6, 13, 20 and 28 . Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on October 20, 2009. (University of Minnesota Extension Regional Office, Rochester)

Date	**5/21**	**6/16**	**6/22**	6/26	7/2	7/13
Treatment	PRE	POST I	POST II	POST III	POST IV	POST V
Temperature (F)						
Air	65	68	90	86	67	75
Soil	66.6	69.3	82	85.1	68.9	79.2
Relative Humidity (%)	52	54	48	37	69	43
Wind (mph)	13	14	12	0	13	6
Soil Moisture	Adequate	Adequate	Excessive	Inadequate	Inadequate	Inadequate
Soybean						
Stage		V1	V2	V3	V4-V5	V6-R1
Height (inch)		3.5	5.0	8.0	8.1	15.2
Giant Ragweed						
Weed density (ft^2)		5.6	5.6	5.6	5.6	5.6
Height (inch)		4.6	7.0	4.4	4.3	8.7
Common Lambsquarter						
Weed density (ft^2)		7	7	7	7	7
Height (inch)		1.8	2.5	2.9	1.8	5.0
Common Waterhemp						
Weed density (ft^2)		1.9	1.9	1.9	1.9	1.9
Height (inch)		1.5	3.0	1.6	3.5	4.1
Giant Foxtail						
Weed density (ft^2)		0.8	0.8	0.8	0.8	0.8
Height (inch)		3.6	4.5	2.9	7.0	5.9
Velvetleaf						
Weed density (ft^2)						
Height (inch)			1.9	2.4		3.0
Rainfall after each application						
Week 1	1.93	1.18	0.18	0.18	0.9	0
Week 2	0.82	0.17	0.27	0.99	0.15	1.80
Week 3	1.75	0.89	0.79	0.06	0.60	0.99

Table 1. Performance of herbicide systems for giant ragweed control in soybean and grain yield at 13% at Rochester, MN, in 2009

Treatment	Rate	Giant Ragweed Control						Yield	
		6/15	6/29	7/6	7/13	7/20	7/28		
	(rate/A)	(% Control)						(bu/A)	
Untreated		0	0	0	0	0	0	3.5	j
Weed Free		100	100	100	100	100	100	33.4	a-e
PRE/POST II									
Boundary / Flexstar + Fusion + Harmony SG + MSO + 28%N	1.5 pt/a / 16 oz/a + 8 oz/a + 0.125 oz/a + 1% v/v + 2.5% v/v	23	98	97	95	97	92	25.9	hi
Authority First / Raptor + Select + COC + 28%N	6.4 oz/a / 4 oz/a + 6 oz/a + 1% v/v + 2.5% v/v	90	93	88	88	92	87	28.2	ghi
Gangster V + Gangster FR / Raptor + Select + COC + 28%N	2.5 oz/a + 0.5 oz/a / 4 oz/a + 6 oz/a + 1% v/v + 2.5% v/v	90	93	87	87	92	84	25.4	I
PRE/POST IV									
Authority First / Roundup OriginalMax + N-Pa-K AMS	3.2 oz/a / 22 oz/a + 3 qt/a	89	91	92	97	98	97	35.7	a-d
Authority Assist / Roundup OriginalMax + N-Pa-K AMS	5 oz/a / 22 oz/a + 3 qt/a	63	98	97	96	98	94	34.9	a-d
IntRRo / Roundup WeatherMax + N-Pa-K AMS	2 qt/a / 22 oz/a + 3 qt/a	20	93	97	96	98	96	34.8	a-d
Gangster V + Gangster FR / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 0.4 oz/a / 22 oz/a + 3 qt/a	92	93	95	97	98	98	36.4	a-b
Prefix / Touchdown Total + N-Pa-K AMS	1 qt/a / 24 oz/a + 3 qt/a	79	83	98	98	99	99	34.6	a-d
Boundary / Touchdown Total + N-Pa-K AMS	1.5 pt/a / 24 oz/a + 3 qt/a	20	97	98	98	99	97	36.6	A
V-10233 / Roundup OriginalMax + N-Pa-K AMS	3 oz/a / 22 oz/a + 3 qt/a	20	84	96	97	98	96	35.9	abc
Valor SX + Python / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 0.5 oz/a / 22 oz/a + 3 qt/a	35	80	95	94	97	97	34.5	a-d
Valor SX + IntRRo / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 1 pt/a / 22 oz/a + 3 qt/a	30	97	96	98	98	97	35.6	a-d
Sonic / Durango DMA + N-Pa-K AMS	4.5 oz/a / 24 oz/a + 3 qt/a	92	92	95	97	98	99	34.5	a-d
Enlite / Roundup OriginalMax + N-Pa-K AMS	2.8 oz/a / 22 oz/a + 3 qt/a	65	97	97	97	98	97	34.3	a-d
Enlite / Roundup OriginalMax + Harmony SG + N-Pa-K AMS	2.8 oz/a / 22 oz/a + 0.125 oz/a + 3 qt/a	63	96	96	96	98	95	30.3	efg
POST I/POST V									
Roundup WeatherMax + N-Pa-K AMS / Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	92	90	82	92	93	32.2	def
Durango DMA + FirstRate + N-Pa-K AMS / Durango DMA + N-Pa-K AMS	24 oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a	0	97	96	96	98	98	32.4	c-f
Flexstar SG + N-Pa-K AMS / Touchdown Total + N-Pa-K AMS	3 pt/a + 3 qt/a / 24 oz/a + 3 qt/a	0	98	98	97	98	98	32.9	b-f
POST III									
Classic + Harmony SG + Roundup OriginalMax + N-Pa-K AMS	0.33 oz/a + 0.05 oz/a + 22 oz/a + 3 qt/a	0	94	96	96	97	95	27.5	ghi
Roundup OriginalMax + Resource + NIS + N-Pa-K AMS	22 oz/a + 3 oz/a + 0.25% v/v + 3 qt/a	0	82	87	87	95	90	29.8	efg
Roundup OriginalMax + Cadet + NIS + N-Pa-K AMS	22 oz/a + 0.6 oz/a + 0.25% v/v + 3 qt/a	0	80	87	87	95	93	29.3	fgh
Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a	0	97	96	95	97	95	32.7	b-f
	LSD (P=0.10)	5	5	2	2	1	3	3.6	

Table 2. Performance of herbicide systems for common lambsquarters control in soybean and grain yield at 13% at Rochester, MN, in 2009

Treatment	Rate	Common Lambsquarters Control						Yield	
		6/15	6/29	7/6	7/13	7/20	7/28		
	(rate/A)	(% Control)						(bu/A)	
Untreated		0	0	0	0	0	0	3.5	j
Weed Free		100	100	100	100	100	100	33.4	a-e
PRE/POST II									
Boundary / Flexstar + Fusion + Harmony SG + MSO + 28%N	1.5 pt/a / 16 oz/a + 8 oz/a + 0.125 oz/a + 1% v/v + 2.5% v/v	99	99	99	99	99	99	25.9	hi
Authority First / Raptor + Select + COC + 28%N	6.4 oz/a / 4 oz/a + 6 oz/a + 1% v/v + 2.5% v/v	99	99	99	99	99	99	28.2	ghi
Gangster V + Gangster FR / Raptor + Select + COC + 28%N	2.5 oz/a + 0.5 oz/a / 4 oz/a + 6 oz/a + 1% v/v + 2.5% v/v	99	94	99	99	99	99	25.4	I
PRE/POST IV									
Authority First / Roundup OriginalMax + N-Pa-K AMS	3.2 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	35.7	a-d
Authority Assist / Roundup OriginalMax + N-Pa-K AMS	5 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	34.9	a-d
IntRRo / Roundup WeatherMax + N-Pa-K AMS	2 qt/a / 22 oz/a + 3 qt/a	69	97	99	98	98	98	34.8	a-d
Gangster V + Gangster FR / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 0.4 oz/a / 22 oz/a + 3 qt/a	99	92	99	99	99	99	36.4	a-b
Prefix / Touchdown Total + N-Pa-K AMS	1 qt/a / 24 oz/a + 3 qt/a	90	93	99	99	99	99	34.6	a-d
Boundary / Touchdown Total + N-Pa-K AMS	1.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	98	36.6	A
V-10233 / Roundup OriginalMax + N-Pa-K AMS	3 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	35.9	abc
Valor SX + Python / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 0.5 oz/a / 22 oz/a + 3 qt/a	99	99	99	98	99	98	34.5	a-d
Valor SX + IntRRo / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 1 pt/a / 22 oz/a + 3 qt/a	92	99	99	99	99	99	35.6	a-d
Sonic / Durango DMA + N-Pa-K AMS	4.5 oz/a / 24 oz/a + 3 qt/a	99	99	99	99	99	99	34.5	a-d
Enlite / Roundup OriginalMax + N-Pa-K AMS	2.8 oz/a / 22 oz/a + 3 qt/a	97	99	99	99	99	99	34.3	a-d
Enlite / Roundup OriginalMax + Harmony SG + N-Pa-K AMS	2.8 oz/a / 22 oz/a + 0.125 oz/a + 3 qt/a	99	99	99	99	99	99	30.3	efg
POST I/POST V									
Roundup WeatherMax + N-Pa-K AMS / Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	89	91	84	89	97	32.2	def
Durango DMA + FirstRate + N-Pa-K AMS / Durango DMA + N-Pa-K AMS	24 oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a	0	81	85	79	87	95	32.4	c-f
Flexstar SG + N-Pa-K AMS / Touchdown Total + N-Pa-K AMS	3 pt/a + 3 qt/a / 24 oz/a + 3 qt/a	0	95	93	88	94	99	32.9	b-f
POST III									
Classic + Harmony SG + Roundup OriginalMax + N-Pa-K AMS	0.33 oz/a + 0.05 oz/a + 22 oz/a + 3 qt/a	0	91	95	89	90	93	27.5	ghi
Roundup OriginalMax + Resource + NIS + N-Pa-K AMS	22 oz/a + 3 oz/a + 0.25% v/v + 3 qt/a	0	91	92	91	90	94	29.8	efg
Roundup OriginalMax + Cadet + NIS + N-Pa-K AMS	22 oz/a + 0.6 oz/a + 0.25% v/v + 3 qt/a	0	94	95	89	90	93	29.3	fgh
Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a	0	95	96	92	94	94	32.7	b-f
	LSD (P=0.10)	3	4	2	2	3	2	3.6	

Table 3. Performance of herbicide systems for common waterhemp control in soybean and grain yield at 13% at Rochester, MN, in 2009

Treatment	Rate	Common Waterhemp Control						Yield	
		6/15	6/29	7/6	7/13	7/20	7/28		
	(rate/A)	(% Control)						(bu/A)	
Untreated		0	0	0	0	0	0	3.5	j
Weed Free		100	100	100	100	100	100	33.4	a-e
PRE/POST II									
Boundary / Flexstar + Fusion + Harmony SG + MSO + 28%N	1.5 pt/a / 16 oz/a + 8 oz/a + 0.125 oz/a + 1% v/v + 2.5% v/v	99	99	99	99	99	99	25.9	hi
Authority First / Raptor + Select + COC + 28%N	6.4 oz/a / 4 oz/a + 6 oz/a + 1% v/v + 2.5% v/v	99	99	99	99	99	99	28.2	ghi
Gangster V + Gangster FR / Raptor + Select + COC + 28%N	2.5 oz/a + 0.5 oz/a / 4 oz/a + 6 oz/a + 1% v/v + 2.5% v/v	99	96	99	99	99	98	25.4	I
PRE/POST IV									
Authority First / Roundup OriginalMax + N-Pa-K AMS	3.2 oz/a / 22 oz/a + 3 qt/a	99	97	99	99	99	99	35.7	a-d
Authority Assist / Roundup OriginalMax + N-Pa-K AMS	5 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	34.9	a-d
IntRRo / Roundup WeatherMax + N-Pa-K AMS	2 qt/a / 22 oz/a + 3 qt/a	92	99	99	98	97	97	34.8	a-d
Gangster V + Gangster FR / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 0.4 oz/a / 22 oz/a + 3 qt/a	99	91	99	99	99	99	36.4	a-b
Prefix / Touchdown Total + N-Pa-K AMS	1 qt/a / 24 oz/a + 3 qt/a	98	99	99	99	99	99	34.6	a-d
Boundary / Touchdown Total + N-Pa-K AMS	1.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	99	36.6	A
V-10233 / Roundup OriginalMax + N-Pa-K AMS	3 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	35.9	abc
Valor SX + Python / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 0.5 oz/a / 22 oz/a + 3 qt/a	99	99	99	98	99	99	34.5	a-d
Valor SX + IntRRo / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 1 pt/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	35.6	a-d
Sonic / Durango DMA + N-Pa-K AMS	4.5 oz/a / 24 oz/a + 3 qt/a	99	97	99	99	99	99	34.5	a-d
Enlite / Roundup OriginalMax + N-Pa-K AMS	2.8 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	34.3	a-d
Enlite / Roundup OriginalMax + Harmony SG + N-Pa-K AMS	2.8 oz/a / 22 oz/a + 0.125 oz/a + 3 qt/a	98	99	99	99	99	99	30.3	efg
POST I/POST V									
Roundup WeatherMax + N-Pa-K AMS / Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	89	88	83	97	99	32.2	def
Durango DMA + FirstRate + N-Pa-K AMS / Durango DMA + N-Pa-K AMS	24 oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a	0	95	93	88	98	99	32.4	c-f
Flexstar SG + N-Pa-K AMS / Touchdown Total + N-Pa-K AMS	3 pt/a + 3 qt/a / 24 oz/a + 3 qt/a	0	98	99	99	99	99	32.9	b-f
POST III									
Classic + Harmony SG + Roundup OriginalMax + N-Pa-K AMS	0.33 oz/a + 0.05 oz/a + 22 oz/a + 3 qt/a	0	98	98	97	97	97	27.5	ghi
Roundup OriginalMax + Resource + NIS + N-Pa-K AMS	22 oz/a + 3 oz/a + 0.25% v/v + 3 qt/a	0	95	97	93	94	93	29.8	efg
Roundup OriginalMax + Cadet + NIS + N-Pa-K AMS	22 oz/a + 0.6 oz/a + 0.25% v/v + 3 qt/a	0	97	97	90	94	92	29.3	fgh
Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a	0	98	97	93	96	93	32.7	b-f
	LSD (P=0.10)	3	3	1	2	1	2	3.6	

Table 4. Performance of herbicide systems for giant foxtail control in soybean and grain yield at 13% at Rochester, MN, in 2009

Treatment	Rate	Giant Foxtail Control						Yield	
		6/15	6/29	7/6	7/13	7/20	7/28		
	(rate/A)	(% Control)						(bu/A)	
Untreated		0	0	0	0	0	0	3.5	j
Weed Free		100	100	100	100	100	100	33.4	a-e
PRE/POST II									
Boundary / Flexstar + Fusion + Harmony SG + MSO + 28%N	1.5 pt/a / 16 oz/a + 8 oz/a + 0.125 oz/a + 1% v/v + 2.5% v/v	99	99	99	99	99	99	25.9	hi
Authority First / Raptor + Select + COC + 28%N	6.4 oz/a / 4 oz/a + 6 oz/a + 1% v/v + 2.5% v/v	90	87	90	94	97	99	28.2	ghi
Gangster V + Gangster FR / Raptor + Select + COC + 28%N	2.5 oz/a + 0.5 oz/a / 4 oz/a + 6 oz/a + 1% v/v + 2.5% v/v	90	88	90	93	95	95	25.4	I
PRE/POST IV									
Authority First / Roundup OriginalMax + N-Pa-K AMS	3.2 oz/a / 22 oz/a + 3 qt/a	75	80	95	99	99	99	35.7	a-d
Authority Assist / Roundup OriginalMax + N-Pa-K AMS	5 oz/a / 22 oz/a + 3 qt/a	81	99	99	98	98	98	34.9	a-d
IntRRo / Roundup WeatherMax + N-Pa-K AMS	2 qt/a / 22 oz/a + 3 qt/a	99	99	99	98	98	98	34.8	a-d
Gangster V + Gangster FR / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 0.4 oz/a / 22 oz/a + 3 qt/a	86	91	96	99	99	99	36.4	a-b
Prefix / Touchdown Total + N-Pa-K AMS	1 qt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	99	34.6	a-d
Boundary / Touchdown Total + N-Pa-K AMS	1.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	99	36.6	A
V-10233 / Roundup OriginalMax + N-Pa-K AMS	3 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	35.9	abc
Valor SX + Python / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 0.5 oz/a / 22 oz/a + 3 qt/a	86	94	99	99	99	99	34.5	a-d
Valor SX + IntRRo / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 1 pt/a / 22 oz/a + 3 qt/a	94	99	99	99	99	98	35.6	a-d
Sonic / Durango DMA + N-Pa-K AMS	4.5 oz/a / 24 oz/a + 3 qt/a	78	88	95	99	99	99	34.5	a-d
Enlite / Roundup OriginalMax + N-Pa-K AMS	2.8 oz/a / 22 oz/a + 3 qt/a	80	99	99	96	98	98	34.3	a-d
Enlite / Roundup OriginalMax + Harmony SG + N-Pa-K AMS	2.8 oz/a / 22 oz/a + 0.125 oz/a + 3 qt/a	86	99	99	98	99	99	30.3	efg
POST I/POST V									
Roundup WeatherMax + N-Pa-K AMS / Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	99	93	87	96	99	32.2	def
Durango DMA + FirstRate + N-Pa-K AMS / Durango DMA + N-Pa-K AMS	24 oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a	0	99	98	93	98	99	32.4	c-f
Flexstar SG + N-Pa-K AMS / Touchdown Total + N-Pa-K AMS	3 pt/a + 3 qt/a / 24 oz/a + 3 qt/a	0	99	99	98	99	99	32.9	b-f
POST III									
Classic + Harmony SG + Roundup OriginalMax + N-Pa-K AMS	0.33 oz/a + 0.05 oz/a + 22 oz/a + 3 qt/a	0	99	99	98	99	99	27.5	ghi
Roundup OriginalMax + Resource + NIS + N-Pa-K AMS	22 oz/a + 3 oz/a + 0.25% v/v + 3 qt/a	0	99	99	99	99	99	29.8	efg
Roundup OriginalMax + Cadet + NIS + N-Pa-K AMS	22 oz/a + 0.6 oz/a + 0.25% v/v + 3 qt/a	0	99	99	99	99	99	29.3	fgh
Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a	0	99	99	99	99	99	32.7	b-f
	LSD (P=0.10)	6	3	1	2	1	2	3.6	

Table 5. Performance of herbicide systems for velvetleaf control in soybean and grain yield at 13% at Rochester, MN, in 2009

Treatment	Rate	Velvetleaf Control					Yield	
		6/29	7/6	7/13	7/20	7/28		
	(rate/A)	(% Control)					(bu/A)	
Untreated		0	0	0	0	0	3.5	j
Weed Free		100	100	100	100	100	33.4	a-e
PRE/POST II								
Boundary / Flexstar + Fusion + Harmony SG + MSO + 28%N	1.5 pt/a / 16 oz/a + 8 oz/a + 0.125 oz/a + 1% v/v + 2.5% v/v	99	99	99	99	99	25.9	hi
Authority First / Raptor + Select + COC + 28%N	6.4 oz/a / 4 oz/a + 6 oz/a + 1% v/v + 2.5% v/v	99	99	99	99	99	28.2	ghi
Gangster V + Gangster FR / Raptor + Select + COC + 28%N	2.5 oz/a + 0.5 oz/a / 4 oz/a + 6 oz/a + 1% v/v + 2.5% v/v	96	99	99	99	99	25.4	I
PRE/POST IV								
Authority First / Roundup OriginalMax + N-Pa-K AMS	3.2 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	35.7	a-d
Authority Assist / Roundup OriginalMax + N-Pa-K AMS	5 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	34.9	a-d
IntRRo / Roundup WeatherMax + N-Pa-K AMS	2 qt/a / 22 oz/a + 3 qt/a	98	99	99	99	99	34.8	a-d
Gangster V + Gangster FR / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 0.4 oz/a / 22 oz/a + 3 qt/a	98	98	99	99	99	36.4	a-b
Prefix / Touchdown Total + N-Pa-K AMS	1 qt/a / 24 oz/a + 3 qt/a	97	96	97	98	98	34.6	a-d
Boundary / Touchdown Total + N-Pa-K AMS	1.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	36.6	A
V-10233 / Roundup OriginalMax + N-Pa-K AMS	3 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	35.9	abc
Valor SX + Python / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 0.5 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	34.5	a-d
Valor SX + IntRRo / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 1 pt/a / 22 oz/a + 3 qt/a	99	99	99	99	99	35.6	a-d
Sonic / Durango DMA + N-Pa-K AMS	4.5 oz/a / 24 oz/a + 3 qt/a	99	98	99	99	99	34.5	a-d
Enlite / Roundup OriginalMax + N-Pa-K AMS	2.8 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	34.3	a-d
Enlite / Roundup OriginalMax + Harmony SG + N-Pa-K AMS	2.8 oz/a / 22 oz/a + 0.125 oz/a + 3 qt/a	99	99	99	99	99	30.3	efg
POST I/POST V								
Roundup WeatherMax + N-Pa-K AMS / Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	98	98	92	98	99	32.2	def
Durango DMA + FirstRate + N-Pa-K AMS / Durango DMA + N-Pa-K AMS	24 oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	32.4	c-f
Flexstar SG + N-Pa-K AMS / Touchdown Total + N-Pa-K AMS	3 pt/a + 3 qt/a / 24 oz/a + 3 qt/a	99	99	95	99	99	32.9	b-f
POST III								
Classic + Harmony SG + Roundup OriginalMax + N-Pa-K AMS	0.33 oz/a + 0.05 oz/a + 22 oz/a + 3 qt/a	94	99	96	99	99	27.5	ghi
Roundup OriginalMax + Resource + NIS + N-Pa-K AMS	22 oz/a + 3 oz/a + 0.25% v/v + 3 qt/a	99	99	97	98	98	29.8	efg
Roundup OriginalMax + Cadet + NIS + N-Pa-K AMS	22 oz/a + 0.6 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	29.3	fgh
Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a	96	99	97	99	99	32.7	b-f
	LSD (P=0.10)	2	1	3	1	1	3.6	

Table 6. Soybean response to herbicide systems and grain yield at 13% at Rochester, MN, in 2009

Treatment	Rate	Injury 6/29	Injury 7/6	Yield	
	(rate/A)	(%)		(bu/A)	
Untreated		0	0	3.5	j
Weed Free		0	0	33.4	a-e
PRE/POST II					
Boundary / Flexstar + Fusion + Harmony SG + MSO + 28%N	1.5 pt/a / 16 oz/a + 8 oz/a + 0.125 oz/a + 1% v/v + 2.5% v/v	60	25	25.9	hi
Authority First / Raptor + Select + COC + 28%N	6.4 oz/a / 4 oz/a + 6 oz/a + 1% v/v + 2.5% v/v	1	25	28.2	ghi
Gangster V + Gangster FR / Raptor + Select + COC + 28%N	2.5 oz/a + 0.5 oz/a / 4 oz/a + 6 oz/a + 1% v/v + 2.5% v/v	6	26	25.4	I
PRE/POST IV					
Authority First / Roundup OriginalMax + N-Pa-K AMS	3.2 oz/a / 22 oz/a + 3 qt/a	0	3	35.7	a-d
Authority Assist / Roundup OriginalMax + N-Pa-K AMS	5 oz/a / 22 oz/a + 3 qt/a	3	0	34.9	a-d
IntRRo / Roundup WeatherMax + N-Pa-K AMS	2 qt/a / 22 oz/a + 3 qt/a	0	3	34.8	a-d
Gangster V + Gangster FR / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 0.4 oz/a / 22 oz/a + 3 qt/a	4	6	36.4	a-b
Prefix / Touchdown Total + N-Pa-K AMS	1 qt/a / 24 oz/a + 3 qt/a	9	0	34.6	a-d
Boundary / Touchdown Total + N-Pa-K AMS	1.5 pt/a / 24 oz/a + 3 qt/a	0	1	36.6	A
V-10233 / Roundup OriginalMax + N-Pa-K AMS	3 oz/a / 22 oz/a + 3 qt/a	4	0	35.9	abc
Valor SX + Python / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 0.5 oz/a / 22 oz/a + 3 qt/a	0	4	34.5	a-d
Valor SX + IntRRo / Roundup OriginalMax + N-Pa-K AMS	2 oz/a + 1 pt/a / 22 oz/a + 3 qt/a	6	3	35.6	a-d
Sonic / Durango DMA + N-Pa-K AMS	4.5 oz/a / 24 oz/a + 3 qt/a	0	1	34.5	a-d
Enlite / Roundup OriginalMax + N-Pa-K AMS	2.8 oz/a / 22 oz/a + 3 qt/a	4	4	34.3	a-d
Enlite / Roundup OriginalMax + Harmony SG + N-Pa-K AMS	2.8 oz/a / 22 oz/a + 0.125 oz/a + 3 qt/a	40	24	30.3	efg
POST I/POST V					
Roundup WeatherMax + N-Pa-K AMS / Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	3	0	32.2	def
Durango DMA + FirstRate + N-Pa-K AMS / Durango DMA + N-Pa-K AMS	24 oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a	9	0	32.4	c-f
Flexstar SG + N-Pa-K AMS / Touchdown Total + N-Pa-K AMS	3 pt/a + 3 qt/a / 24 oz/a + 3 qt/a	23	0	32.9	b-f
POST III					
Classic + Harmony SG + Roundup OriginalMax + N-Pa-K AMS	0.33 oz/a + 0.05 oz/a + 22 oz/a + 3 qt/a	39	25	27.5	ghi
Roundup OriginalMax + Resource + NIS + N-Pa-K AMS	22 oz/a + 3 oz/a + 0.25% v/v + 3 qt/a	30	10	29.8	efg
Roundup OriginalMax + Cadet + NIS + N-Pa-K AMS	22 oz/a + 0.6 oz/a + 0.25% v/v + 3 qt/a	33	10	29.3	fgh
Roundup WeatherMax + N-Pa-K AMS	22 oz/a + 3 qt/a	5	0	32.7	b-f
	LSD (P=0.10)	4	2	3.6	

1. Means followed by the same letter do not significantly differ (P=.10, LSD)

2009 Soybean Herbicide Evaluation - Lamberton

	Herbicide	Rate	Yellow foxtail	Common Lambsquarters	Tall waterhemp	Yield	Cost	Returns
		(Product/A)	----------(% control)----------			(bu/A)	----($/A)-----	
	Preemergence/ POST I (4-inch weeds)							
1	Boundary / Flexstar + Fusion + Harmony GT + MSO +	5 pt / 16 oz + 8 oz + 0.125 oz + 1% + 2.5	93	99	98	48.7	63.54	404
2	Authority First / Raptor + Select + COC + 28%N	6.4 oz / 4 oz + 6 oz + 1% 2.5%	76	98	92	47.0	80.30	371
3	Gangster / Raptor + Select + COC + 28%N	3 oz / 4 oz + 6 oz + 1% 2.5%	81	98	93	46.3	70.86	374
	Preemergence/ POST II (6-inch weeds)							
4	Authority First / Roundup Original Max + AMS	3.2 oz / 22 oz + 3 qt	88	99	99	47.4	48.55	406
5	Authority Asist / Roundup Original Max + AMS	5 oz / 22 oz + 3 qt	86	99	98	49.8	47.12	431
6	IntRRo / Roundup WeatherMax + AMS	4 pt / 22 oz + 3 qt	90	99	99	47.7	48.41	410
7	Gangster / Roundup Original Max + AMS	2.4 oz / 22 oz + 3 qt	89	99	99	49.2	49.08	423
8	Prefix / Touchdown Total + AMS	2 pt / 24 oz + 3 qt	94	99	98	47.6	47.47	410
9	Boundary / Touchdown Total + AMS	1.5 pt / 24 oz + 3 qt	94	99	99	50.0	44.84	435
10	V-10233 / Roundup Original Max + AMS	3 oz / 22 oz + 3 qt	88	99	98	49.1		
11	Valor SX + Python / Roundup Original Max + AMS	2 oz + 0.5 oz / 22 oz + 3 qt	85	99	96	48.5	51.56	414
12	Valor SX + IIntRRo / Roundup Original Max + AMS	2 oz + 1 pt / 22 oz + 3 qt	89	99	99	46.6	48.52	399
13	Sonic / Durango + AMS	4.5 oz / 24 oz + 3 qt	85	98	97	49.8	52.28	426
14	Enlite / Roundup Original Max + AMS	2.8 oz / 22 oz + 3 qt	86	99	99	48.6	47.93	418
15	Enlite / Roundup Original Max + Harmony + AMS	2.8 oz / 22 oz + 0.125 oz + 3 qt	87	99	99	47.9	51.89	408
	POST I (4-inch weeds)/POST III(Canopy)							
16	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	99	99	99	49.3	47.58	426
17	Durango DMA + First Rate + AMS / Durango DMA + AMS	24 oz + 0.3 oz + 3 qt / 24 oz + 3 qt	99	99	99	48.2	44.85	417
18	Flexstar GT + AMS / Touchdown Total + AMS	3 pt + 3 qt / 24 oz + 3 qt	99	99	99	47.4	59.45	395
	POST II (6-inch weeds)							
19	Classic + Harmony GT + Roundup Original Max + AMS	0.33 oz + 22 oz + 3 qt	81	98	97	50.5	31.70	453
20	Resource + Roundup Original Max + NIS + AMS	3 oz + 22 oz + 0.25% + 3 qt	78	96	76	45.6	34.20	404
21	Cadet + Roundup Original Max + NIS + AMS	0.6 oz + 22 oz + 0.25% + 3 qt	80	97	78	46.1	35.11	407
22	Roundup WeatherMax+AMS	22 oz + 3 qt	85	97	84	49.6	28.79	447
	Checks							
23	Weedy Check	-	0	0	0	3.9	0.00	38
24	Weed Free	-	100	100	100	46.4	0.00	445
		LSD(0.10)	**4**	**1**	**4**	**4.1**		**41**

2009 Soybean Herbicide Evaluation - Waseca

Common ragweed site

	Herbicide	Rate	Giant foxtail	Common ragweed	Common lambsquarters	Velvetleaf	Redroot pigweed	Wild Buckwheat	Yield	Cost	Returns
		(Product/A)	----------(% control)----------						(bu/A)	----($/A)-----	
	Preemergence/ POST I (4-inch weeds)										
1	Boundary / Flexstar + Fusion + Harmony GT + MSO +	5 pt / 16 oz + 8 oz + 0.125 oz + 1% + 2.5	78	98	87	99	92	89	38.6	63.54	307
2	Authority First / Raptor + Select + COC + 28%N	6.4 oz / 4 oz + 6 oz + 1% 2.5%	83	88	99	99	99	98	39.1	80.30	295
3	Gangster / Raptor + Select + COC + 28%N	3 oz / 4 oz + 6 oz + 1% 2.5%	78	93	96	99	87	99	40.1	70.86	314
	Preemergence/ POST II (6-inch weeds)										
4	Authority First / Roundup Original Max + AMS	3.2 oz / 22 oz + 3 qt	92	99	99	99	99	97	44.3	48.55	377
5	Authority Asist / Roundup Original Max + AMS	5 oz / 22 oz + 3 qt	93	99	99	99	99	99	42.6	47.12	362
6	IntRRo / Roundup WeatherMax + AMS	4 pt / 22 oz + 3 qt	88	99	99	99	97	99	42.4	48.41	359
7	Gangster / Roundup Original Max + AMS	2.4 oz / 22 oz + 3 qt	90	99	99	99	99	99	45.3	49.08	385
8	Prefix / Touchdown Total + AMS	2 pt / 24 oz + 3 qt	95	99	97	96	99	99	45.6	47.47	391
9	Boundary / Touchdown Total + AMS	1.5 pt / 24 oz + 3 qt	94	98	99	97	99	99	41.8	44.84	356
10	V-10233 / Roundup Original Max + AMS	3 oz / 22 oz + 3 qt	86	99	99	99	99	96	42.4		
11	Valor SX + Python / Roundup Original Max + AMS	2 oz + 0.5 oz / 22 oz + 3 qt	85	99	99	99	99	99	40.1	51.56	334
12	Valor SX + IIntRRo / Roundup Original Max + AMS	2 oz + 1 pt / 22 oz + 3 qt	84	99	99	99	99	99	37.2	48.52	308
13	Sonic / Durango + AMS	4.5 oz / 24 oz + 3 qt	90	99	99	99	99	99	39.2	52.28	324
14	Enlite / Roundup Original Max + AMS	2.8 oz / 22 oz + 3 qt	85	99	99	99	99	97	40.8	47.93	344
15	Enlite / Roundup Original Max + Harmony + AMS	2.8 oz / 22 oz + 0.125 oz + 3 qt	81	99	99	99	99	99	40.0	51.89	332
	POST I (4-inch weeds)/POST III(Canopy)										
16	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	96	99	99	99	99	96	38.3	47.58	320
17	Durango DMA + First Rate + AMS / Durango DMA + AMS	24 oz + 0.3 oz + 3 qt / 24 oz + 3 qt	98	99	99	99	99	99	38.2	44.85	322
18	Flexstar GT + AMS / Touchdown Total + AMS	3 pt + 3 qt / 24 oz + 3 qt	99	99	99	99	99	97	40.7	59.45	331
	POST II (6-inch weeds)										
19	Classic + Harmony GT + Roundup Original Max + AM	0.33 oz + 22 oz + 3 qt	88	96	99	99	99	96	40.4	31.70	356
20	Resource + Roundup Original Max + NIS + AMS	3 oz + 22 oz + 0.25% + 3 qt	87	97	93	99	99	99	42.3	34.20	372
21	Cadet + Roundup Original Max + NIS + AMS	0.6 oz + 22 oz + 0.25% + 3 qt	86	94	99	93	96	97	39.5	35.11	344
22	Roundup WeatherMax+AMS	22 oz + 3 qt	86	96	97	93	96	94	40.3	28.79	358
	Checks										
23	Weedy Check	-	0	0	0	0	0	0	5.9	0.00	57
24	Weed Free	-	100	100	100	100	100	100	40.1	0.00	385
		LSD(0.10)	**8**	**6**	**7**	**5**	**7**	**4**	**5.0**		**49**

2009 Soybean Herbicide Evaluation - Waseca

Giant ragweed site

	Herbicide	Rate	Giant foxtail	Giant ragweed	Common lambsquarters	Yield	Cost	Returns
		(Product/A)	----------(% control)----------			(bu/A)	----($/A)-----	
	Preemergence/ POST I (4-inch weeds)							
1	Boundary / Flexstar + Fusion + Harmony GT + MSO +	5 pt / 16 oz + 8 oz + 0.125 oz + 1% + 2.5	97	86	93	35.0	63.54	273
2	Authority First / Raptor + Select + COC + 28%N	6.4 oz / 4 oz + 6 oz + 1% 2.5%	99	88	99	41.7	80.30	320
3	Gangster / Raptor + Select + COC + 28%N	3 oz / 4 oz + 6 oz + 1% 2.5%	98	81	99	38.7	70.86	300
	Preemergence/ POST II (6-inch weeds)							
4	Authority First / Roundup Original Max + AMS	3.2 oz / 22 oz + 3 qt	96	93	89	39.9	48.55	335
5	Authority Asist / Roundup Original Max + AMS	5 oz / 22 oz + 3 qt	99	93	98	40.2	47.12	339
6	IntRRo / Roundup WeatherMax + AMS	4 pt / 22 oz + 3 qt	98	89	96	42.7	48.41	361
7	Gangster / Roundup Original Max + AMS	2.4 oz / 22 oz + 3 qt	99	89	99	43.7	49.08	371
8	Prefix / Touchdown Total + AMS	2 pt / 24 oz + 3 qt	98	87	97	42.2	47.47	357
9	Boundary / Touchdown Total + AMS	1.5 pt / 24 oz + 3 qt	97	86	99	41.5	44.84	353
10	V-10233 / Roundup Original Max + AMS	3 oz / 22 oz + 3 qt	98	92	98	45.7		
11	Valor SX + Python / Roundup Original Max + AMS	2 oz + 0.5 oz / 22 oz + 3 qt	97	94	96	41.9	51.56	351
12	Valor SX + IIntRRo / Roundup Original Max + AMS	2 oz + 1 pt / 22 oz + 3 qt	97	88	88	43.7	48.52	371
13	Sonic / Durango + AMS	4.5 oz / 24 oz + 3 qt	98	99	99	44.4	52.28	374
14	Enlite / Roundup Original Max + AMS	2.8 oz / 22 oz + 3 qt	98	92	77	41.7	47.93	352
15	Enlite / Roundup Original Max + Harmony + AMS	2.8 oz / 22 oz + 0.125 oz + 3 qt	97	97	99	43.0	51.89	361
	POST I (4-inch weeds)/POST III(Canopy)							
16	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	99	99	96	45.1	47.58	386
17	Durango DMA + First Rate + AMS / Durango DMA + AMS	24 oz + 0.3 oz + 3 qt / 24 oz + 3 qt	99	99	99	41.0	44.85	349
18	Flexstar GT + AMS / Touchdown Total + AMS	3 pt + 3 qt / 24 oz + 3 qt	99	99	99	42.5	59.45	348
	POST II (6-inch weeds)							
19	Classic + Harmony GT + Roundup Original Max + AMS	0.33 oz + 22 oz + 3 qt	96	92	99	39.8	31.70	351
20	Resource + Roundup Original Max + NIS + AMS	3 oz + 22 oz + 0.25% + 3 qt	97	91	98	42.3	34.20	372
21	Cadet + Roundup Original Max + NIS + AMS	0.6 oz + 22 oz + 0.25% + 3 qt	92	83	80	37.1	35.11	321
22	Roundup WeatherMax+AMS	22 oz + 3 qt	96	88	93	37.9	28.79	335
	Checks							
23	Weedy Check	-	0	0	0	11.1	0.00	106
24	Weed Free	-	100	100	100	41.5	0.00	398
		LSD(0.10)	**3**	**8**	**13**	**6.3**		**61**

2009 Soybean Herbicide Evaluation - Waseca

Common cocklebur site

	Herbicide	Rate	Giant foxtail	Common cocklebur	Common ragweed	Yield	Cost	Returns
		(Product/A)	----------(% control)----------			(bu/A)	----($/A)-----	
	Preemergence/ POST I (4-inch weeds)							
1	Boundary / Flexstar + Fusion + Harmony GT + MSO +	5 pt / 16 oz + 8 oz + 0.125 oz + 1% + 2.5	81	64	90	36.9	63.54	291
2	Authority First / Raptor + Select + COC + 28%N	6.4 oz / 4 oz + 6 oz + 1% 2.5%	73	43	65	34.3	80.30	249
3	Gangster / Raptor + Select + COC + 28%N	3 oz / 4 oz + 6 oz + 1% 2.5%	83	82	77	37.0	70.86	284
	Preemergence/ POST II (6-inch weeds)							
4	Authority First / Roundup Original Max + AMS	3.2 oz / 22 oz + 3 qt	94	97	99	38.7	48.55	323
5	Authority Asist / Roundup Original Max + AMS	5 oz / 22 oz + 3 qt	93	99	99	37.0	47.12	308
6	IntRRo / Roundup WeatherMax + AMS	4 pt / 22 oz + 3 qt	95	96	99	38.0	48.41	316
7	Gangster / Roundup Original Max + AMS	2.4 oz / 22 oz + 3 qt	93	99	96	42.7	49.08	361
8	Prefix / Touchdown Total + AMS	2 pt / 24 oz + 3 qt	97	99	99	40.0	47.47	336
9	Boundary / Touchdown Total + AMS	1.5 pt / 24 oz + 3 qt	96	99	99	38.1	44.84	321
10	V-10233 / Roundup Original Max + AMS	3 oz / 22 oz + 3 qt	96	97	99	38.8		
11	Valor SX + Python / Roundup Original Max + AMS	2 oz + 0.5 oz / 22 oz + 3 qt	94	99	99	35.9	51.56	293
12	Valor SX + IIntRRo / Roundup Original Max + AMS	2 oz + 1 pt / 22 oz + 3 qt	93	99	99	38.0	48.52	317
13	Sonic / Durango + AMS	4.5 oz / 24 oz + 3 qt	94	99	99	34.5	52.28	279
14	Enlite / Roundup Original Max + AMS	2.8 oz / 22 oz + 3 qt	94	99	99	37.2	47.93	310
15	Enlite / Roundup Original Max + Harmony + AMS	2.8 oz / 22 oz + 0.125 oz + 3 qt	91	97	99	37.1	51.89	304
	POST I (4-inch weeds)/POST III(Canopy)							
16	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	99	99	99	35.9	47.58	297
17	Durango DMA + First Rate + AMS / Durango DMA + AMS	24 oz + 0.3 oz + 3 qt / 24 oz + 3 qt	99	99	99	38.7	44.85	327
18	Flexstar GT + AMS / Touchdown Total + AMS	3 pt + 3 qt / 24 oz + 3 qt	99	99	99	37.8	59.45	303
	POST II (6-inch weeds)							
19	Classic + Harmony GT + Roundup Original Max + AMS	0.33 oz + 22 oz + 3 qt	94	97	99	35.4	31.70	308
20	Resource + Roundup Original Max + NIS + AMS	3 oz + 22 oz + 0.25% + 3 qt	90	93	90	37.5	34.20	326
21	Cadet + Roundup Original Max + NIS + AMS	0.6 oz + 22 oz + 0.25% + 3 qt	94	99	96	37.5	35.11	325
22	Roundup WeatherMax+AMS	22 oz + 3 qt	92	98	99	36.1	28.79	319
	Checks							
23	Weedy Check	-	0	0	0	6.7	0.00	64
24	Weed Free	-	100	100	100	37.6	0.00	361
		LSD(0.10)	**4**	**12**	**7**	**3.9**		**36**

2009 Soybean Herbicide Evaluation - Waseca

Tall waterhemp site

	Herbicide	Rate	Giant foxtail	Tall waterhemp	Yield	Cost	Returns
		(Product/A)	-------(% control)------		(bu/A)	----($/A)-----	
	Preemergence/ POST I (4-inch weeds)						
1	Boundary / Flexstar + Fusion + Harmony GT + MSO +	5 pt / 16 oz + 8 oz + 0.125 oz + 1% + 2.5	98	68	36.1	63.54	283
2	Authority First / Raptor + Select + COC + 28%N	6.4 oz / 4 oz + 6 oz + 1% 2.5%	98	84	43.5	80.30	338
3	Gangster / Raptor + Select + COC + 28%N	3 oz / 4 oz + 6 oz + 1% 2.5%	98	60	27.3	70.86	191
	Preemergence/ POST II (6-inch weeds)						
4	Authority First / Roundup Original Max + AMS	3.2 oz / 22 oz + 3 qt	99	99	50.5	48.55	436
5	Authority Asist / Roundup Original Max + AMS	5 oz / 22 oz + 3 qt	99	99	50.3	47.12	435
6	IntRRo / Roundup WeatherMax + AMS	4 pt / 22 oz + 3 qt	99	99	49.5	48.41	427
7	Gangster / Roundup Original Max + AMS	2.4 oz / 22 oz + 3 qt	99	99	47.7	49.08	409
8	Prefix / Touchdown Total + AMS	2 pt / 24 oz + 3 qt	99	98	44.0	47.47	375
9	Boundary / Touchdown Total + AMS	1.5 pt / 24 oz + 3 qt	99	97	44.9	44.84	386
10	V-10233 / Roundup Original Max + AMS	3 oz / 22 oz + 3 qt	99	98	48.9		
11	Valor SX + Python / Roundup Original Max + AMS	2 oz + 0.5 oz / 22 oz + 3 qt	99	93	47.4	51.56	403
12	Valor SX + IIntRRo / Roundup Original Max + AMS	2 oz + 1 pt / 22 oz + 3 qt	99	98	48.2	48.52	414
13	Sonic / Durango + AMS	4.5 oz / 24 oz + 3 qt	99	99	49.2	52.28	420
14	Enlite / Roundup Original Max + AMS	2.8 oz / 22 oz + 3 qt	99	99	46.5	47.93	399
15	Enlite / Roundup Original Max + Harmony + AMS	2.8 oz / 22 oz + 0.125 oz + 3 qt	99	99	51.2	51.89	440
	POST I (4-inch weeds)/POST III(Canopy)						
16	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	99	99	47.7	47.58	410
17	Durango DMA + First Rate + AMS / Durango DMA + AMS	24 oz + 0.3 oz + 3 qt / 24 oz + 3 qt	99	99	48.8	44.85	424
18	Flexstar GT + AMS / Touchdown Total + AMS	3 pt + 3 qt / 24 oz + 3 qt	99	97	50.5	59.45	425
	POST II (6-inch weeds)						
19	Classic + Harmony GT + Roundup Original Max + AMS	0.33 oz + 22 oz + 3 qt	99	81	35.5	31.70	310
20	Resource + Roundup Original Max + NIS + AMS	3 oz + 22 oz + 0.25% + 3 qt	99	86	34.7	34.20	299
21	Cadet + Roundup Original Max + NIS + AMS	0.6 oz + 22 oz + 0.25% + 3 qt	99	90	44.8	35.11	395
22	Roundup WeatherMax+AMS	22 oz + 3 qt	99	91	39.5	28.79	350
	Checks						
23	Weedy Check	-	0	0	6.9	0.00	67
24	Weed Free	-	99	100	51.1	0.00	490
		LSD(0.10)	**1**	**12**	**6.8**		**67**

2009 Soybean Herbicide Evaluation - Rochester

	Herbicide	Rate	grass weeds	Giant ragweed	Common lambsquarters	Velvetleaf	Tall waterhemp	Yield	Cost	Returns
		(Product/A)			----------(% control)----------			(bu/A)	----($/A)-----	
	Preemergence/ POST I (4-inch weeds)									
1	Boundary / Flexstar + Fusion + Harmony GT + MSO + 28%	1.5 pt / 16 oz + 8 oz + 0.125 oz + 1% + 2.5%	99	92	99	99	99	25.9	63.54	185
2	Authority First / Raptor + Select + COC + 28%N	6.4 oz / 4 oz + 6 oz + 1% 2.5%	99	87	99	99	99	28.2	80.30	190
3	Gangster / Raptor + Select + COC + 28%N	3 oz / 4 oz + 6 oz + 1% 2.5%	95	84	99	99	98	25.4	70.86	173
	Preemergence/ POST II (6-inch weeds)									
4	Authority First / Roundup Original Max + AMS	3.2 oz / 22 oz + 3 qt	99	97	99	99	99	35.7	48.55	294
5	Authority Asist / Roundup Original Max + AMS	5 oz / 22 oz + 3 qt	98	94	99	99	99	34.9	47.12	288
6	IntRRo / Roundup WeatherMax + AMS	4 pt / 22 oz + 3 qt	98	96	98	99	97	34.8	48.41	286
7	Gangster / Roundup Original Max + AMS	2.4 oz / 22 oz + 3 qt	99	98	99	99	99	36.4	49.08	300
8	Prefix / Touchdown Total + AMS	2 pt / 24 oz + 3 qt	99	99	99	98	99	34.6	47.47	284
9	Boundary / Touchdown Total + AMS	1.5 pt / 24 oz + 3 qt	99	97	98	99	99	36.7	44.84	307
10	V-10233 / Roundup Original Max + AMS	3 oz / 22 oz + 3 qt	99	96	99	99	99	35.9		
11	Valor SX + Python / Roundup Original Max + AMS	2 oz + 0.5 oz / 22 oz + 3 qt	99	97	98	99	99	34.6	51.56	280
12	Valor SX + IIntRRo / Roundup Original Max + AMS	2 oz + 1 pt / 22 oz + 3 qt	98	97	99	99	99	35.6	48.52	293
13	Sonic / Durango + AMS	4.5 oz / 24 oz + 3 qt	99	99	99	99	99	34.5	52.28	279
14	Enlite / Roundup Original Max + AMS	2.8 oz / 22 oz + 3 qt	98	97	99	99	99	34.3	47.93	281
15	Enlite / Roundup Original Max + Harmony + AMS	2.8 oz / 22 oz + 0.125 oz + 3 qt	99	95	99	99	99	30.3	51.89	239
	POST I (4-inch weeds)/POST III(Canopy)									
16	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	99	93	97	99	99	32.2	47.58	262
17	Durango DMA + First Rate + AMS / Durango DMA + AMS	24 oz + 0.3 oz + 3 qt / 24 oz + 3 qt	99	98	95	99	99	32.4	44.85	266
18	Flexstar GT + AMS / Touchdown Total + AMS	3 pt + 3 qt / 24 oz + 3 qt	99	98	99	99	99	32.9	59.45	256
	POST II (6-inch weeds)									
19	Classic + Harmony GT + Roundup Original Max + AMS	0.33 oz + 22 oz + 3 qt	99	95	93	99	97	27.5	31.70	232
20	Resource + Roundup Original Max + NIS + AMS	3 oz + 22 oz + 0.25% + 3 qt	99	90	94	98	93	29.8	34.20	252
21	Cadet + Roundup Original Max + NIS + AMS	0.6 oz + 22 oz + 0.25% + 3 qt	99	93	93	99	92	29.3	35.11	246
22	Roundup WeatherMax+AMS	22 oz + 3 qt	99	95	94	99	93	32.8	28.79	286
	Checks									
23	Weedy Check	-	0	0	0	0	0	3.5	0.00	33
24	Weed Free	-	100	100	100	100	100	33.4	0.00	320
		LSD(0.10)	**2**	**3**	**2**	**1**	**2**	**3.6**		**35**

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2009 Soybean Herbicide Evaluation

Average across all locations

	Herbicide	Rate	Giant foxtail	Yellow foxtail	Grass mix	Common lambsquarters	Tall waterhemp	Common ragweed	Velvetleaf	Giant ragweed	Common Cocklebur	Redroot pigweed	Wild Buckwheat	Yield	Cost	Returns	
			Number of Locations Evaluated														
			4	1	1	5	3	2	2	2	1	1	1	7		7	S.E.
		(Product/A)	----------(% control)----------											(bu/A)	----($/A)-----		
	Preemergence/ POST I (4-inch weeds)																
1	Boundary / Flexstar + Fusion + Harmony GT + MSO + 2	1.5 pt / 16 oz + 8 oz + 0.125 oz + 1% + 2.5%	88	93	99	96	88	94	99	89	64	92	89	37.4	63.54	296	15.9
2	Authority First / Raptor + Select + COC + 28%N	6.4 oz / 4 oz + 6 oz + 1% 2.5%	88	76	99	98	92	77	99	88	43	99	98	39.1	80.30	295	14.4
3	Gangster / Raptor + Select + COC + 28%N	3 oz / 4 oz + 6 oz + 1% 2.5%	89	81	95	98	84	85	99	82	82	87	99	36.1	70.86	276	16.9
	Preemergence/ POST II (6-inch weeds)																
4	Authority First / Roundup Original Max + AMS	3.2 oz / 22 oz + 3 qt	95	88	99	97	99	99	99	95	97	99	97	42.7	48.55	361	10.9
5	Authority Asist / Roundup Original Max + AMS	5 oz / 22 oz + 3 qt	96	86	98	99	99	99	99	93	99	99	99	41.8	47.12	355	13.5
6	IntRRo / Roundup WeatherMax + AMS	4 pt / 22 oz + 3 qt	95	90	98	98	98	99	99	93	96	97	99	42.5	48.41	360	10.2
7	Gangster / Roundup Original Max + AMS	2.4 oz / 22 oz + 3 qt	95	89	99	99	99	97	99	94	99	99	99	44.2	49.08	376	11.7
8	Prefix / Touchdown Total + AMS	2 pt / 24 oz + 3 qt	97	94	99	98	98	99	97	93	99	99	99	42.2	47.47	358	9.2
9	Boundary / Touchdown Total + AMS	1.5 pt / 24 oz + 3 qt	96	94	99	98	98	99	98	92	99	99	99	41.9	44.84	357	10.1
10	V-10233 / Roundup Original Max + AMS	3 oz / 22 oz + 3 qt	95	88	99	99	98	99	99	94	97	99	96	43.7			
11	Valor SX + Python / Roundup Original Max + AMS	2 oz + 0.5 oz / 22 oz + 3 qt	93	85	99	98	96	99	99	96	99	99	99	41.2	51.56	344	12.2
12	Valor SX + IIntRRo / Roundup Original Max + AMS	2 oz + 1 pt / 22 oz + 3 qt	93	89	98	97	99	99	99	92	99	99	99	41.9	48.52	353	11.4
13	Sonic / Durango + AMS	4.5 oz / 24 oz + 3 qt	95	85	99	99	98	99	99	99	99	99	99	42.9	52.28	359	12.5
14	Enlite / Roundup Original Max + AMS	2.8 oz / 22 oz + 3 qt	94	86	98	95	99	99	99	94	99	99	97	42.2	47.93	357	11.6
15	Enlite / Roundup Original Max + Harmony + AMS	2.8 oz / 22 oz + 0.125 oz + 3 qt	92	87	99	99	99	99	99	96	97	99	99	42.3	51.89	354	14.0
	POST I (4-inch weeds)/POST III(Canopy)																
16	Roundup WeatherMax + AMS / Roundup WeatherMax + AMS	22 oz + 3 qt / 22 oz + 3 qt	98	99	99	98	99	99	99	96	99	99	96	41.4	47.58	350	13.5
17	Durango DMA + First Rate + AMS / Durango DMA + AMS	24 oz + 0.3 oz + 3 qt / 24 oz + 3 qt	99	99	99	98	99	99	99	98	99	99	99	41.4	44.85	352	12.3
18	Flexstar GT + AMS / Touchdown Total + AMS	3 pt + 3 qt / 24 oz + 3 qt	99	99	99	99	98	99	99	99	99	99	97	42.4	59.45	348	11.6
	POST II (6-inch weeds)																
19	Classic + Harmony GT + Roundup Original Max + AMS	0.33 oz + 22 oz + 3 qt	94	81	99	97	91	97	99	94	97	99	96	38.4	31.70	337	14.2
20	Resource + Roundup Original Max + NIS + AMS	3 oz + 22 oz + 0.25% + 3 qt	93	78	99	96	85	93	99	90	93	99	99	37.8	34.20	329	13.2
21	Cadet + Roundup Original Max + NIS + AMS	0.6 oz + 22 oz + 0.25% + 3 qt	93	80	99	93	86	95	96	88	99	96	97	38.4	35.11	334	11.9
22	Roundup WeatherMax+AMS	22 oz + 3 qt	93	85	99	95	89	97	96	92	98	96	94	38.7	28.79	343	12.7
	Checks																
23	Weedy Check	-	0	0	0	0	0	0	0	0	0	0	0	6.9	0.00	67	6.8
24	Weed Free	-	100	100	100	100	100	100	100	100	100	100	100	41.5	0.00	398	12.6
		LSD(0.10)	**2**	**4**	**2**	**3**	**4**	**5**	**2**	**4**	**12**	**7**	**4**	**2.0**		**20**	

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SECTION F

SOYBEAN

PRODUCTION MANAGEMENT

Effect of Manganese Sulfate Fertilizer on Soybean at Rock Dell, Rochester and Chester, MN, 2007- 2009

Behnken, Lisa M., Fritz R. Breitenbach, Ryan P. Miller and John Lamb

The objective of this trial was to evaluate the effect of manganese sulfate fertilizer on soybean yield in southeastern Minnesota. There is evidence that suggests that glyphosate interferes with manganese (Mn) uptake and metabolism within the plant leading to Mn deficiency symptoms. In addition, there are reports of reduced weed control (antagonism) from tank mixes of Mn with glyphosate, reducing the effectiveness of the glyphosate. Applying Mn either broadcast before planting or more than eight days after the glyphosate application reduced the antagonism. If Mn is applied with the glyphosate, a chelated form should be used.

Recent research in several states suggests that glyphosate resistant soybeans may respond to the addition of Mn fertilizer compared to conventional soybeans. Results from Kansas, under high yielding conditions, reported increased yields of glyphosate tolerant soybean with the addition of Mn. Results from Nebraska in 2007 and 2008 indicated an inconsistent yield response with foliar applications of Mn, one trial increased grain yield, one trial decreased grain yield and two resulted in no differences in grain yield. Trials in Illinois in 2007 resulted in no soybean grain yield response with the addition of manganese fertilizer.

Trials have been conducted in Minnesota in 2007, 2008 and 2009. In 2007, research was conducted at Morris, Lamberton, and Rock Dell, MN. The Morris and Lamberton locations have calcareous subsoils, while the Rock Dell site has a near neutral pH. At the Morris and Lamberton locations, treatments included three variety/herbicide programs and Mn soil applied rates of 0, 2.5, 5, 7.5, and 10 pounds per acre before the final tillage operation. A 0.5 pound Mn per acre foliar treatment was applied at 6 to 8 days after the glyphosate herbicide was applied. The variety/herbicide program treatments were a conventional soybean variety (not glyphosate tolerant) with conventional herbicides, a glyphosate tolerant variety (similar to the conventional variety) with conventional herbicides (no glyphosate), and a glyphosate tolerant variety with glyphosate herbicide program. At the Rock Dell site, soil applied Mn treatments were applied at 0, 5, and 10 pounds per acre. A foliar treatment of 0.25 lb/A Mn was applied with the glyphosate application. Only one variety was used at Rock Dell, a glyphosate tolerant variety and a glyphosate herbicide program was implemented. At the Morris and Lamberton sites, soybean yields were not significantly affected by any of the treatments. There were significant periods of drought at both sites, which contributed to variability in the grain yields. The results at Rock Dell were a little different. The 5 pounds Mn/A broadcast before planting increased soybean grain yield over the untreated (Table 3) in 2007. The trial was repeated in 2008 at Rock Dell and at Rochester and Chester in 2009. However, there were no differences in soybean yield in 2008 or 2009 at any of the locations.

Field histories for SE sites are reported in Table 1. The trials were planted with a 4-row John Deere 7000 planter in 30-inch rows at a depth of 1.0 inch and a population of 150,000 seeds/A. A randomized complete block design was implemented and replicated eight times. Yield results for SE sites and years are reported in Table 3. Oil and protein results are reported in Table 4. (University of Minnesota Extension Regional Office, Rochester, MN)

Table 1. Field histories for Rock Dell, Rochester and Chester, MN in 2007, 2008 and 2009.

	2007	2008	2009	2009
Location	Rock Dell	Rock Dell	Rochester	Chester
Planting Date	June 5, 2007	May 21, 2008	May 15, 2009	May 18, 2009
Harvest Date	October 24, 2007	October 1, 2008	October 20, 2009	October 28, 2009
Variety	Producers 153RR	Producers 203 NRR	NK S19-A6	NK S19-A6
Soil Type	Kenyon Loam	Kenyon Loam	Lawler loam	Port Byron
Herbicide POST I/POST II	Sequence/ glyphosate + Select	Sequence / glyphosate + Select	Glyphosate	Glyphosate
Foliar Manganese applied	July 23, 2007, 0.23 lbs/A	July 21, 2008, 0.15 lbs/A	July 20, 2009, 0.15 lb/A	July 20, 2009, 0.15 lbs/A
Insecticide	Warrior	Warrior	Warrior II	Warrior II
Previous Crop	Soybean	Corn	Corn	Corn

Table 2. Manganese application description at Rochester and Chester, MN in 2009.

	Rochester	Chester		Rochester	Chester
Soil applied Mn	**5/15/09**	**5/15/09**			
Foliar applied Mn				**7/20/09**	**7/20/09**
Temperature (F)					
Air	57	59		75	75
Soil	62.4			71.2	69.8
Relative Humidity (%)	89	78		53	53
Wind (mph)	20	19		9	5
Soil moisture	Adequate	Adequate		Inadequate	Inadequate
Bean					
stage				R2	R2
height (inch)				20 in	17 in

Table 3. Soybean yield response to manganese sulfate fertilizer in 2007, 2008, and 2009 at Rock Dell, Rochester and Chester, MN.

	2007	2008	2009	2009
Treatment	**Rock Dell**	**Rock Dell**	**Rochester**	**Chester**
	Yield (bu/A)	**Yield (bu/A)**	**Yield (bu/A)**	**Yield (bu/A)**
Mn at 5 lb/A broadcast	**46.2**	**38.1**	**39.1**	**38.6**
Mn at 10 lb/A broadcast	**44.3**	**37.3**	**38.7**	**39.1**
Mn at 0.23 lb/A foliar	**42.5**			
Mn at 0.15 lb/A foliar		**37.1**	**37.8**	**38.6**
Untreated	**43.4**	**37.9**	**39.0**	**39.3**
LSD (P=0.10)	**2.1**	**NS**	**NS**	**NS**

Table 4. Soybean oil and protein content in 2007, 2008, and 2009 at Rock Dell, Rochester, and Chester, MN.

Rock Dell	**2007 - Rock Dell**		**2008 - Rock Dell**		**2009 - Rochester**		**2009 - Chester**	
Treatment	**% Oil**	**% Protein**	**% Oil**	**% Protein**	**% Oil**	**% Protein**	**% Oil**	**% Protein**
Mn at 5 lb/A broadcast	**16.9**	**35.9**	**20.9**	**30.9**	**17.6**	**32.4**	**16.9**	**32.4**
Mn at 10 lb/A broadcast	**17.2**	**35.6**	**20.9**	**30.7**	**17.5**	**32.6**	**16.9**	**32.6**
Mn at 0.23 lb/A foliar	**17.2**	**35.4**						
Mn at 0.15 lb/A foliar			**20.8**	**30.8**	**17.6**	**32.9**	**16.9**	**32.4**
Untreated	**17.1**	**35.9**	**20.8**	**31.1**	**17.9**	**32.7**	**16.8**	**32.2**
LSD (P=0.10)	**NS**	**NS**	**NS**	**NS**	**NS**	**0.2**	**NS**	**NS**

Evaluation of Insecticides for Control of Soybean Aphids at Rock Dell, MN, in 2009

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, Amanda Welter and Theresa Twohey.

The objective of this trial was to evaluate the effectiveness of insecticides for control of soybean aphids in soybean in southeastern Minnesota. The research site was a Kenyon loam soil with a pH of 7.2 soil test P of 30 ppm and a soil test K of 152 ppm. The previous crop was corn. The field was chisel plowed in the fall and field cultivated in the spring. The trial was planted with a 4-row John Deere 7000 planter. The soybean variety, Asgrow AG 1102, was planted on June 4, 2009 at a depth of 1.0 inches in eight, 30-in rows. Seeding rate was 150,000 seeds/A. A randomized complete block design with four replications was used. Pre-treatment soybean aphid populations were taken on July 5, 21, 27, 30, and August 5. On August 5, soybean aphid population reached the Economic Threshold, triggering application of insecticide treatments. Application and pretreatment soybean aphid numbers are listed in Table 1. After treatment, aphid counts were made at three, seven, thirteen, and nineteen days after treatment, Table 2. One insecticide treatment, Leverage, was made on July 23, when soybeans reached the R1 stage. Soybean aphid counts were taken four, seven, thirteen, twenty-six and thirty-two days after this treatment, Table 3. Soybean stage and nodes are reported in Tables 4 and 5, soybean height in Tables 6 and 7, and soybean yield and quality parameters in Table 8. The center four rows were harvested on November 2, 2009. (University of Minnesota Extension Regional Office, Rochester, MN).

Table 1. Environmental conditions, soybean stage and soybean aphid populations when insecticides applied.

Date	7/23/09	8/5/09
Temperature (F)		
Air	75	70
Soil		64
Relative Humidity (%)	59	54
Wind (mph)	3	5-10
Soil Moisture	Wet	Adequate
Soybean		
Stage	R1	R3
Height	8 inches	18 inches
Node	7	10
Soybean Aphid Population		
	20/plant	324/plant
Rainfall after application (inch)		
Week 1	1.66	2.14
Week 2	0.53	1.30
Week 3	2.26	0.40

Table 2. Soybean aphids per plant at pretreatment, three, seven, thirteen, and nineteen days after treatment at Rock Dell, MN, 2009. Sprayed at soybean aphid economic threshold and soybeans at R3 on 8/5/2009.

Treatment	Rate	Pretreatment count (8/5/09)		3 days post treatment (8/8/09)		7 days post treatment (8/12/09)		13 days post treatment (8/18/09)		19 days post treatment (8/24/09)	
		Winged	Total Aphids	Winged	Total Aphids	Winged	Total Aphids	Winged	Total Aphids	Winged	Total Aphids
Untreated		1	324	1	234	9	795	2	585	0	400
Baythroid XL	5 fl oz/a			1	68	1	45	0	37	0	24
Movento + COC	3 fl oz/a + 1 % v/v			0	83	0	12	0	16	0	11
Leverage + COC	3.8 fl oz/a +1 % v/v			0	13	0	8	0	24	0	28
Lorsban	16 fl oz/a			0	1	1	7	0	17	0	16
Warrior II	2.56 fl oz/a			0	36	1	6	0	31	0	12
Baythroid XL Lorsban	2 fl oz/a + 8 fl oz/a			0	1	0	3	0	19	0	19
Imidacloprid + Spirotretramat AMS	5 fl oz/a + 2 lb/a			1	169	1	134	0	73	0	71
Imidacloprid + Spirotretramat AMS	6 fl oz/a + 2 lb/a			1	174	1	47	0	35	0	31
Asana XL	9.6 fl oz/a			0	59	1	24	0	82	0	55
Asana XL Lorsban	6 fl oz/a + 6 fl oz/a			0	4	0	6	0	24	0	19
	LSD (P=0.10)			**1**	**46**	**1**	**75**	**1**	**32**	**0**	**67**

Table 3. Soybean aphids per plant on untreated and Leverage + COC sprayed at R1 on 7/23/2009 at Rock Dell, MN, 2009.

Treatment	Rate	7/15/09		7/21/09		7/27/09		7/30/09		8/5/09		8/8/09		8/12/09		8/18/09		8/24/09	
		Winged	Total	Winged	Total	Winged	Total	Winged	Total	Winged	Total	Winged	Total	Winged	Total	Winged	Total	Winged	Total
Untreated		0	4	0	23	0	48			1	324	0	234	9	795	2	585	0	400
Leverage + COC	3.8 fl oz/a + 1 % v/v	0	2	0	20	0	0	0	0	1	18					1	225	0	132

Table 4. Soybean stage and number of nodes at pretreatment, three, seven, fourteen, and twenty-one days after treatment at Rock Dell, MN, 2009. Sprayed at soybean aphid economic threshold, soybeans at R3 on 8/5/2009.

Treatment	Rate	Pretreatment Count (8/5/09)		3 days post treatment (8/8/09)		7 days post treatment (8/12/09)		14 days post treatment (8/18/09)		21 days post treatment (8/24/09)	
		Stage	Nodes	Stage	Nodes	Stage	Nodes	Stage	Nodes	Stage	Nodes
Untreated		R3	10	R4	10	R4	11	R5	12	R6	13
Baythroid XL	5 fl oz/a			R4	10	R5	11	R5	12	R6	12
Movento+ COC	3 fl oz/a + 1 % v/v			R4	11	R4	11	R5	12	R6	12
Leverage + COC	3.8 fl oz/a +1 % v/v			R4	10	R4	11	R5	12	R6	13
Lorsban	16 fl oz/a			R4	11	R4	11	R5	12	R6	13
Warrior II	2.56 fl oz/a			R4	10	R5	11	R5	12	R6	13
Baythroid XL Lorsban	2 fl oz/a + 8 fl oz/a			R4	11	R5	11	R5	12	R6	13
Imidacloprid + Spirotretramat AMS	5 fl oz/a + 2 lb/a			R4	10	R4	12	R5	12	R6	13
Imidacloprid + Spirotretramat AMS	6 fl oz/a + 2 lb/a			R4	11	R4	12	R5	12	R6	13
Asana XL	9.6 fl oz/a			R4	11	R4	11	R5	12	R6	13
Asana XL Lorsban	6 fl oz/a + 6 fl oz/a			R4	10	R4	10	R5	13	R5	13
LSD (P=0.10)					**1**		**1**		**1**		**1**

Table 5. Soybean stage and number of nodes of the soybeans in the untreated and Leverage + COC at Rock Dell, MN, 2009.

Treatment	Rate	7/15/09		7/21/09		7/27/09		7/30/09		8/5/09		8/8/09		8/12/09		8/18/09		8/24/09	
		stage	nodes	stage	nodes	stage	nodes	stage	nodes	stage	nodes	stage	nodes	stage	nodes	stage	nodes	stage	nodes
Untreated		V4	6	V3	7	R2	8			R3	10	R4	10	R4	11	R5	12	R6	13
Leverage + COC	3.8 fl oz/a + 1 % v/v	V4	6	V4	7	R2	8	R2	9	R3	10					R5	12	R6	13

Table 6. Soybean height in inches at pretreatment, three, seven, fourteen, and twenty-one days after treatment at Rock Dell, MN, 2009. Sprayed at soybean aphid economic threshold, soybeans at R3 on 8/5/2009.

Treatment	Rate	Pretreatment count (8/5/09)	3 days post treatment (8/8/09)	7 days post treatment (8/12/09)	14 days post treatment (8/18/09)	21 days post treatment (8/24/09)
Untreated		18	20	25	27	29
Baythroid XL	5 fl oz/a		19	23	28	28
Movento + COC	3 fl oz/a + 1 % v/v		20	24	27	30
Leverage + COC	3.8 fl oz/a +1 % v/v		20	24	26	29
Lorsban	16 fl oz/a		22	24	27	30
Warrior II	2.56 fl oz/a		21	24	27	29
Baythroid XL Lorsban	2 fl oz/a + 8 fl oz/a		21	24	28	29
Imidacloprid + Spirotretramat AMS	5 fl oz/a + 2 lb/a		20	25	26	28
Imidacloprid + Spirotretramat AMS	6 fl oz/a + 2 lb/a		20	23	25	27
Asana XL	9.6 fl oz/a		20	25	27	28
Asana XL Lorsban	6 fl oz/a + 6 fl oz/a		20	24	27	28
	LSD (P=0.10)		**1**	**2**	**2**	**2**

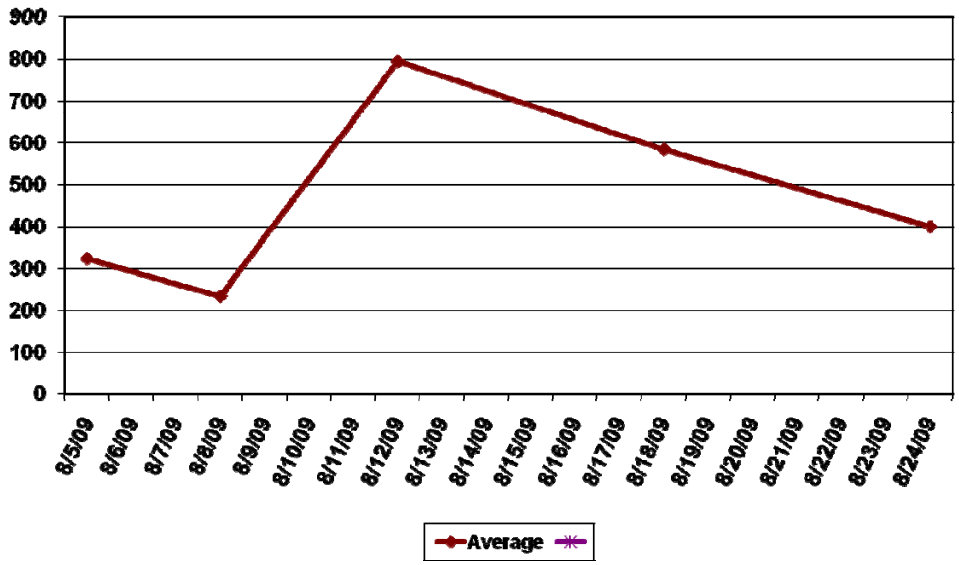
Table 7. The heights (in) of the soybeans in the untreated and Leverage + COC at Rock Dell, MN, 2009.

Treatment	Rate	7/21/09	7/27/09	7/30/09	8/5/09	8/8/09	8/12/09	8/18/09	8/24/09
Untreated		9	12		18	20	25	27	29
Leverage + COC	3.8 fl oz/a + 1 % v/v	8	12	15	18			27	30

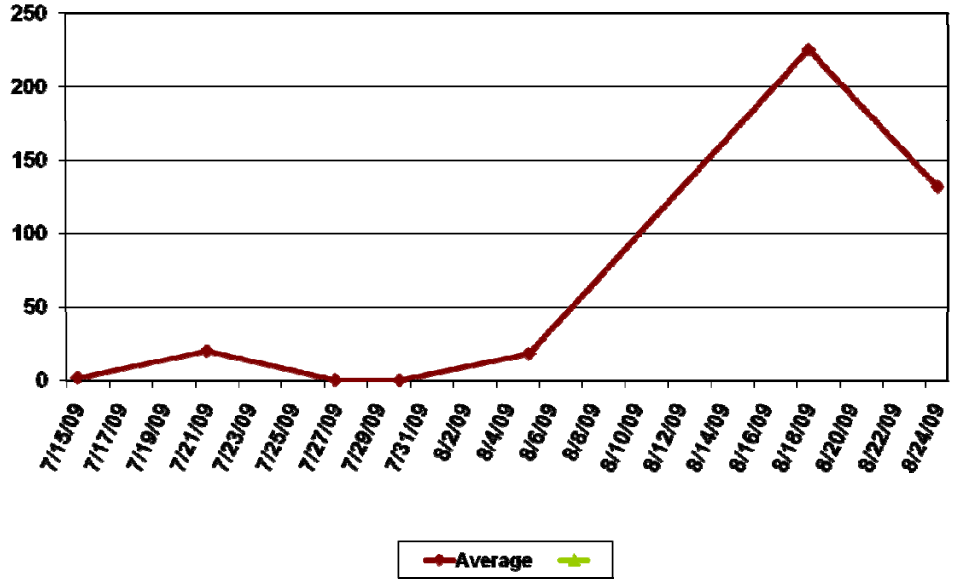
Table 8. Soybean grain yield and quality parameters at Rock Dell, MN in 2009.

Treatment	Rate	Soybean Moisture (%)	Soybean Yield (bu/A)	Oil Content (%)	Protein Content (%)
Untreated		16.6	41.6	17.5	32.8
Leverage + COC treated at R1	3.8 fl oz/a + 1 % v/v	17.1	47.9	17.4	32.4
Baythroid XL	5 fl oz/a	16.7	47.1	17.2	32.6
Movento+ COC	3 fl oz/a + 1 % v/v	16.8	48.4	17.6	32.3
Leverage + COC	3.8 fl oz/a +1 % v/v	17.1	49.0	17.5	32.6
Lorsban	16 fl oz/a	17.1	49.1	17.3	32.5
Warrior II	2.56 fl oz/a	17.1	50.1	17.4	32.7
Baythroid XL Lorsban	2 fl oz/a + 8 fl oz/a	16.9	48.5	17.4	32.6
Imidacloprid + Spirotretramat AMS	5 fl oz/a + 2 lb/a	17.1	48.1	17.4	32.7
Imidacloprid + Spirotretramat AMS	6 fl oz/a + 2 lb/a	16.9	48.4	17.3	32.4
Asana XL	9.6 fl oz/a	16.9	47.0	17.7	32.8
Asana XL Lorsban	6 fl oz/a + 6 fl oz/a	17.0	49.7	17.7	32.8
	LSD (P=0.10)	NS	NS	NS	NS

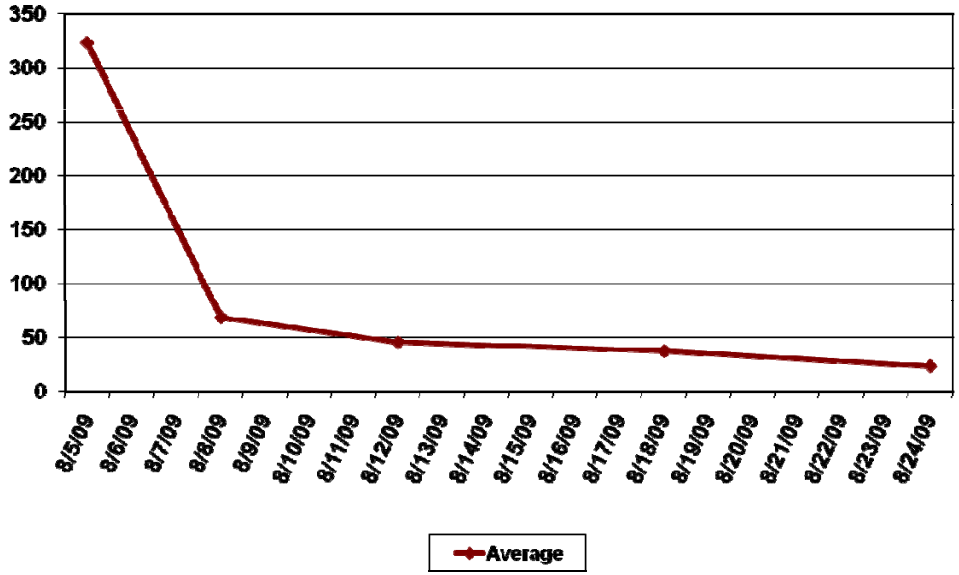
Total Soybean Aphids/Plant
Untreated Control



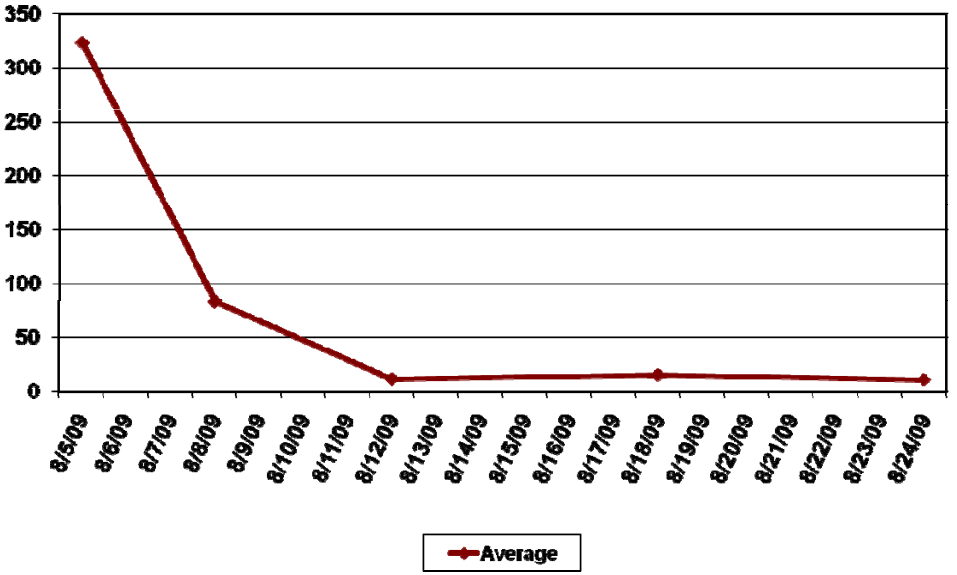
Total Soybean Aphids/Plant
Leverage + COC
3.8 fl oz/A
Applied at R1, 7/23/09



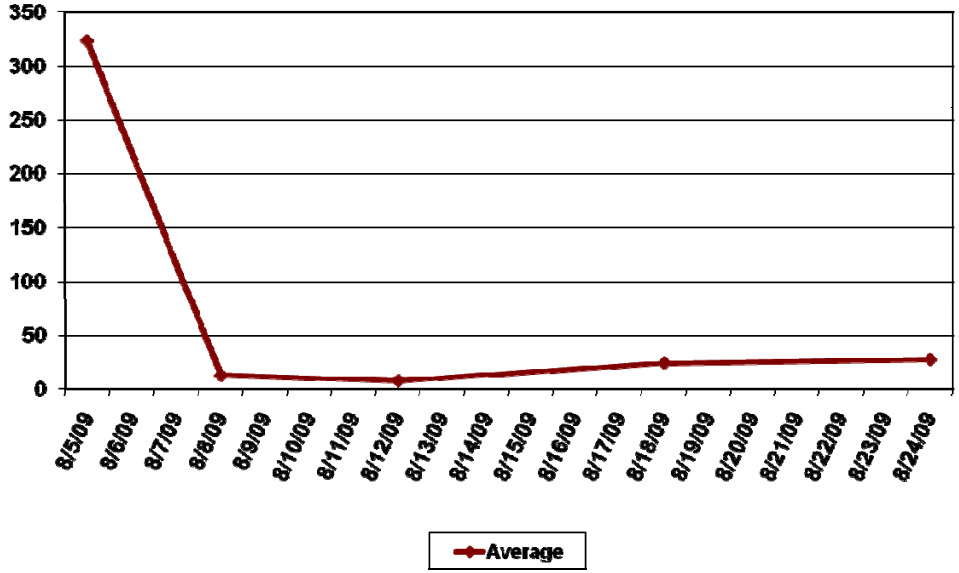
Total Soybean Aphids/Plant
Baythroid XL
5 fl oz/A
Applied at ET, 8/5/09



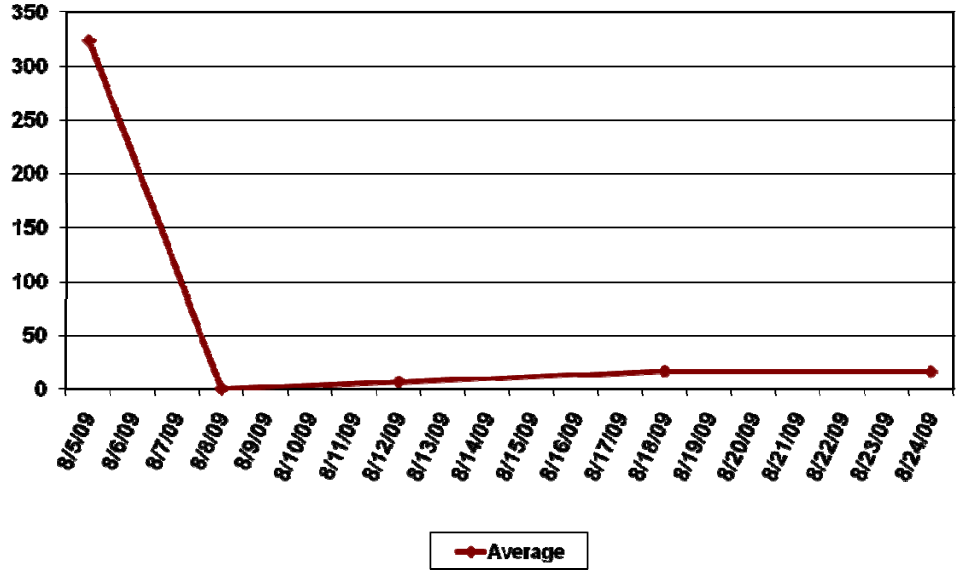
Total Soybean Aphids/Plant
Movento + NIS
3 fl oz/A
Applied at ET, 8/5/09



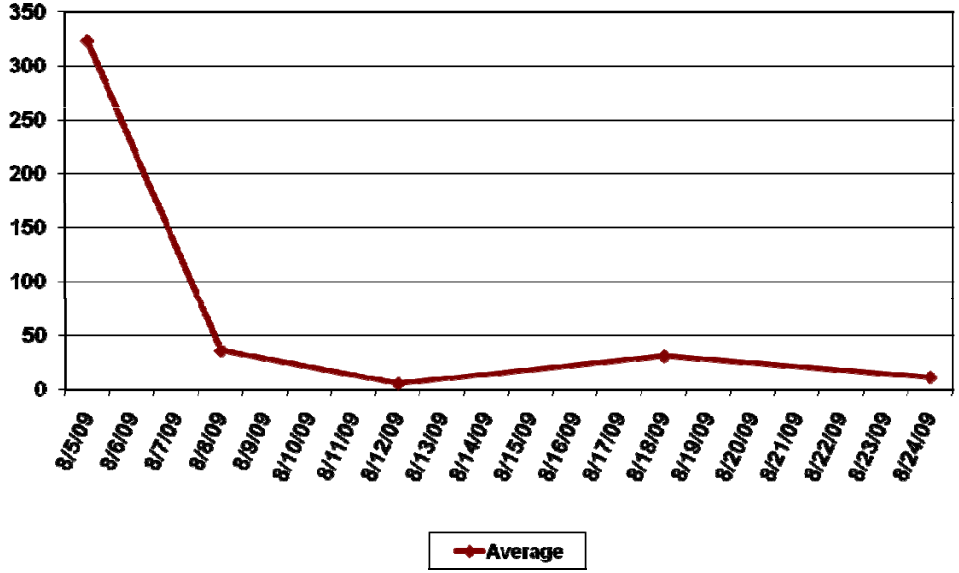
Total Soybean Aphids/Plant
Leverage + COC
3.8 fl oz/A
Applied at ET, 8/5/09



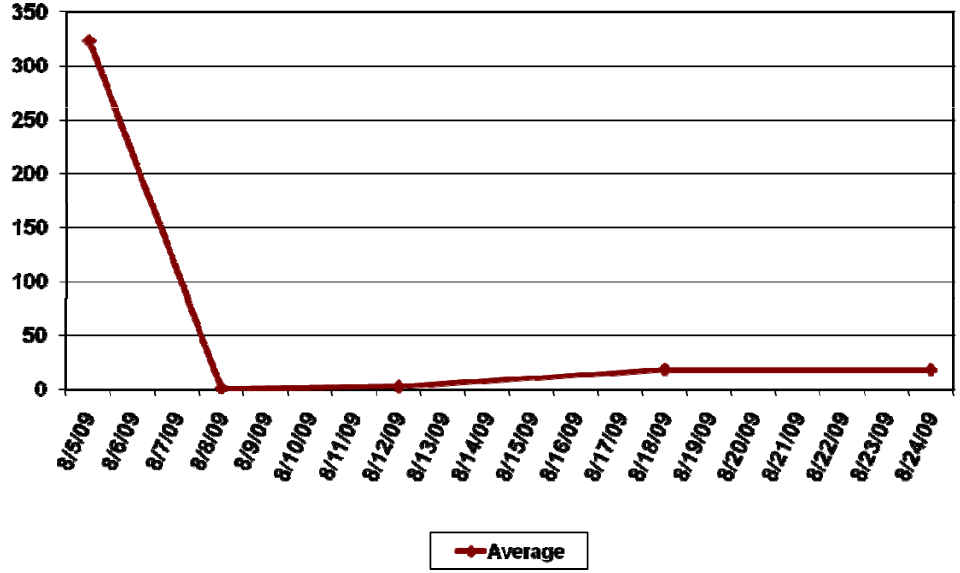
Total Soybean Aphids/Plant
Lorsban
16 fl oz/A
Applied at ET, 8/5/09



Total Soybean Aphids/Plant
Warrior II
2.56 fl oz/A
Applied at ET, 8/5/09



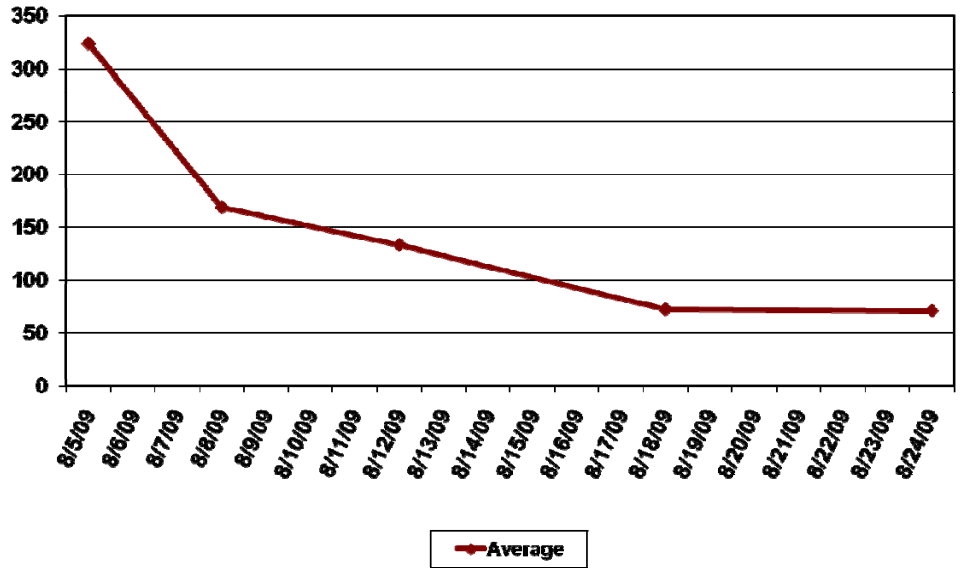
Total Soybean Aphids/Plant
Baythroid XL + Lorban
2 fl oz/A + 8 fl oz/A
Applied at ET, 8/5/09



Total Soybean Aphids/Plant (limidacloprid + Spirotetramat) + AMS

5 fl oz/A

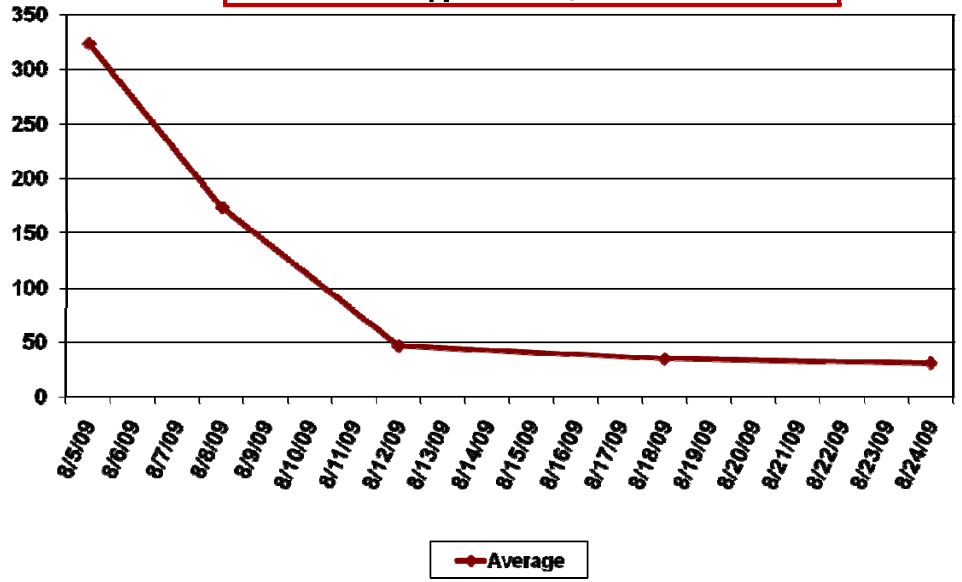
Applied at ET, 8/5/09



Total Soybean Aphids/Plant (limidacloprid + Spirotetramat) + AMS

6 fl oz/A

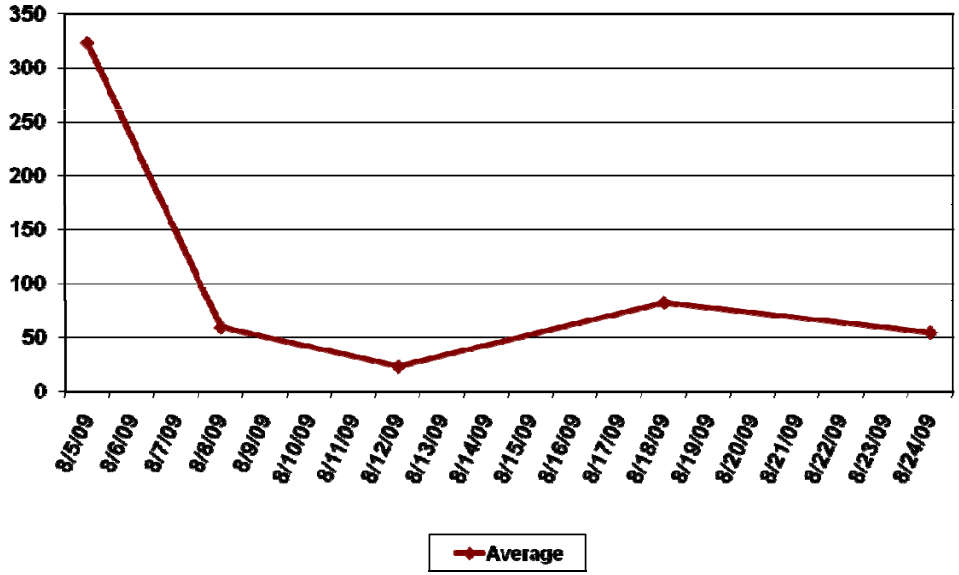
Applied at ET, 8/5/09



Total Soybean Aphids/Plant Asana XL

9.6 fl oz/A

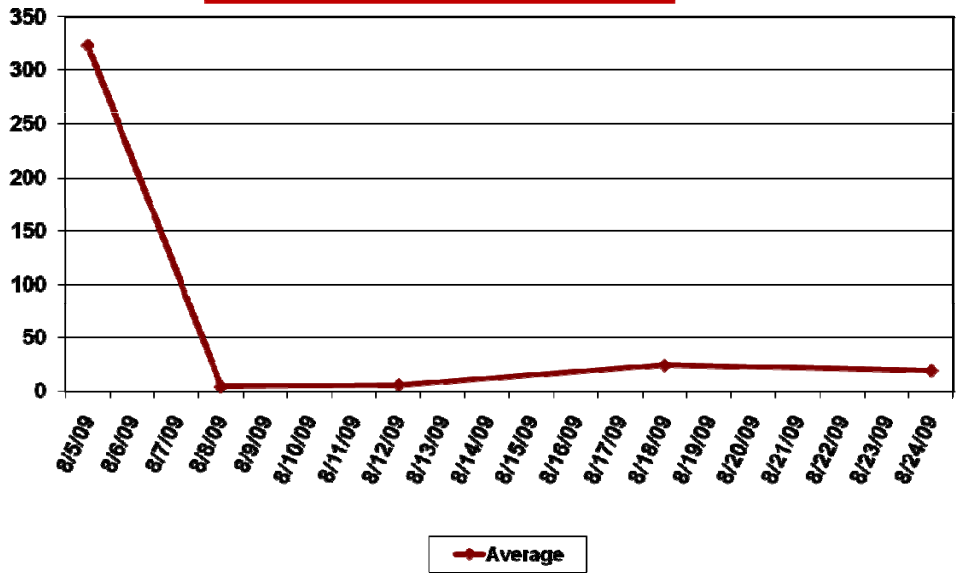
Applied at ET, 8/5/09



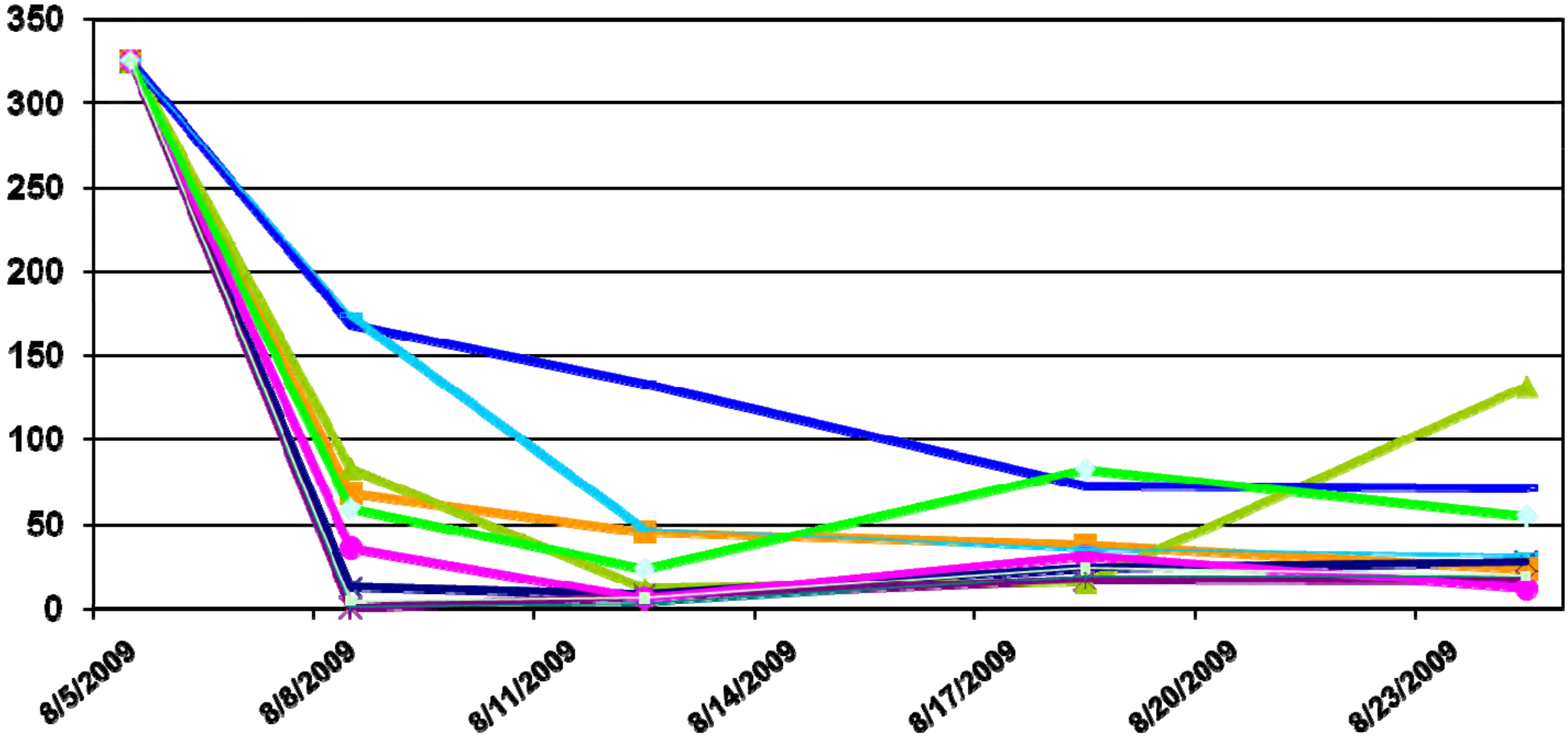
Total Soybean Aphids/Plant Asana XL + Lorban

6 fl oz/A + 6 fl oz/A

Applied at ET, 8/5/09



Total Soybean Aphids/Plant
Treatments Applied on 8/5/09



- Baythroid XL 6 oz
- Movento 5 oz
- Leverage 3.8 oz
- Lorsban 16 oz
- Warrior II 2.56
- Bathroid XL 2 oz + Lorsban 8 oz
- IMD + SPT 5 oz
- IMD + SPT 6 oz
- Asana XL 9.6 oz
- Asana XL 6 oz + Lorsban 6 oz

SECTION G

SMALL GRAINS

OAT

HERBICIDE TRIALS

Impact of Foliar Fungicide to Control Crown Rust in Oats in 2009

Behnken, Lisa M., Fritz R. Breitenbach, and Ryan P. Miller.

Oat is considered a multiple use crop, with primary uses being companion crop, livestock feed, grain and seed. There are approximately 300,000 acres of oat in Minnesota. Crown rust is the most widespread and damaging disease of oat. Moderate to severe epidemics can reduce yield by 10 to 40%, decrease test weight and cause severe lodging problems. Damage to leaves, particularly the flag leaf, reduces photosynthesis and interferes with grain development at fill, resulting in shriveled kernels and reduced feed value. Loss due to the disease can reach 100% if infection is early, if a susceptible cultivar is grown, and if weather conditions are favorable for disease development and spread.

Crown rust of oats, also know as leaf rust, is caused by the fungus *Puccinia coronata var. avenae*. Crown rust fungus is specific to cultivated oat, wild oat, and a few other grasses, but will not infect wheat, barley or rye. Symptoms include small oval-to-oblong, bright orange-yellow pustules developing on leaves. Pustules may also occur on leaf sheaths, stems and panicles. Each pustule contains thousands of spores that can spread to neighboring plants, producing new pustules in 7-10 days under ideal conditions. In Minnesota, oat crown rust overwinters on buckthorn. Crown rust usually appears on buckthorn about 3-4 weeks ahead of oats. The inoculum moves from the buckthorn to infect oats.

Most of the effort to manage the disease has been through the development of resistant cultivars. Developing crown rust resistant varieties is an ongoing job for cereal breeders, because new races of the disease continue to develop and overcome the resistant genes.

Fungicides could be a management tool when economics are favorable for application. Approved foliar fungicides are largely protective. The ideal time to apply a fungicide is at flag leaf emergence to protect the flag leaf. Rust can develop quickly, so one must be vigilant on proper timing of application to protect the leaves. Once spots develop on the flag leaf, it is too late to apply a fungicide.

In summary, to manage and control of crown rust on oat 1) Grow crown rust resistant varieties, 2) Plant oats as early as possible to reduce the risk of infection, 3) Eradicate buckthorn where feasible, and 4) Use a foliar fungicide when the risk of disease is present and economics are favorable.

2009 Field Trial

In 2009, we conducted a field trial to evaluate foliar fungicides to control crown rust on oat. Research plots were planted at Rochester on April 15, 2009. Kame oat was seeded at 3 bushels/acre and fertilized according to University of Minnesota guidelines. Kame oats was released in 2004. It's characteristics are: early maturity, below average yield, short, good lodging resistance, poor test weight and yellow seed. In 2005, Kame was rated as moderately tolerant to moderately susceptible to crown rust. In 2008, this rating changed to moderately susceptible to susceptible to crown rust. (University of Minnesota Varietal Trials, 2009)

The experimental design was a randomized complete block with four replications. Plot size was 10' X 30'. Foliar fungicides were applied on June 5, 2009, just after flag leaf emergence. Application date, environmental conditions, and crop stage at application are listed in Table 1. Crop injury and disease severity were visually rated on June 9 and July 1, respectively. Plots were machine harvested on July 28, 2009, and grain yields, test weight and moisture are reported in Table 2. Data was analyzed with an ANOVA at a p value of 0.10.

Summary

The use of foliar fungicides significantly reduced crown rust severity compared to the untreated check, Table 2. All fungicides used in this trial performed similarly, significantly increasing test weight (1.4 - 2.3 lbs/bu) and significantly increasing yield (13.7 - 17.1 bu/ac) compared to the untreated check, Table 2. (University of Minnesota Extension - Regional Office, Rochester, MN)

Table 1. Application date, environmental conditions, and crop stage at application.	
Date	**June 5, 2009**
Treatment	POST I
Temperature (F)	
Air	71.0
Soil	64.4
Relative Humidity (%)	42
Wind (mph)	14
Soil Moisture	Dry
Oat Stage	Flag leaf emerged
Rainfall after application	
Week 1	1.97
Week 2	1.03
Week 3	0.31

Table 2. Oat injury, crown rust disease severity, harvest moisture, test weight and grain yield of oats at Rochester, MN in 2009.

Treatment [1]	Rate	Injury	Disease Severity		Moisture		Test Weight		Yield	
		6/9	7/1		7/28		7/28		7/28	
	(rate/A)	1 =none[2]	1 = none[3]		(%)		(lbs/bu)		(bu/A)	
Untreated Check		1.8	3.4	a	14.5	c	28.3	b	63.5	b
POST I										
Headline + NIS	6 fl oz/a + 0.25% v/v	2.5	1.8	b	17.3	a	29.8	a	77.2	a
Twinline	7 fl oz/a	3.5	1.9	b	16.7	ab	30.6	a	77.4	a
Caramba	12 fl oz/a	3.0	2.0	b	16.8	ab	29.7	a	80.6	a
Stratego	7 fl oz/a	2.0	2.0	b	16.2	b	30.6	a	79.3	a
	LSD (P=0.10)	NS	0.5		1.0		1.3		8.0	

Means followed by the same letter do not significantly differ (P=0.10, LSD)

1. Treatments – all fungicides used in this trial are labeled for use on oat.
2. Rating scale, 1 – 5, with 1 = no visible injury, 5 = complete necrosis. Injury caused by fungicide was leaf speckling and necrotic spots.
3. Rating scale, 1 – 5, with 1 = no visible disease symptoms, 5 = flag leaf covered with rust lesions

Sources: *Oat Crown Rust, USDA-ARS, Minnesota, 2008; RPD No. 109 - Crown Rust of Oats, University of Illinois Extension, Integrated Pest Management, University of Illinois at Urbana – Champaign, 1989; Crown Rust of Oats – FAQs, Government of Saskatchewan, Agriculture, 2009; Oat Cultivar Selection and Fungicide Application for Control of Rust, Langdon, ND 2002, North Dakota State University.*

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SECTION H

INTEGRATED PEST MANAGEMENT ASSESSMENT

2009 Private Applicator Certification Program

IPM Assessment (Turning Point Data)

Pesticide Safety & Environmental Education Program

Fritz Breitenbach, IPM Specialist
Lisa Behnken, Ryan Miller, Liz Stahl, and Dave Nicolai, Regional Extension Educators
Jerry Tesmer, Fillmore/Houston Extension Educator
Tom Van Der Linden, Winona Extension Educator
Brad Carlson, Steel and Rice Extension Educator
Diane Stouffer, Le Sueur and Blue Earth Extension Educator

University of Minnesota Extension

Adapted from University of Wisconsin Pest Management Assessment for Field Corn (12-6-01-Univ. of Wis.-Madison, IPCM program)

How old are you? *(1530 responses)*

- 18% Over 65 years
- 12% 61 –65 years
- 16% 56-60 years
- 18% 51-55 years
- 15% 46-50 years
- 11% 41-45 years
- 6% 36-40 years
- 3% 31-35 years
- 3% 26-30 years
- 1% 18-25years

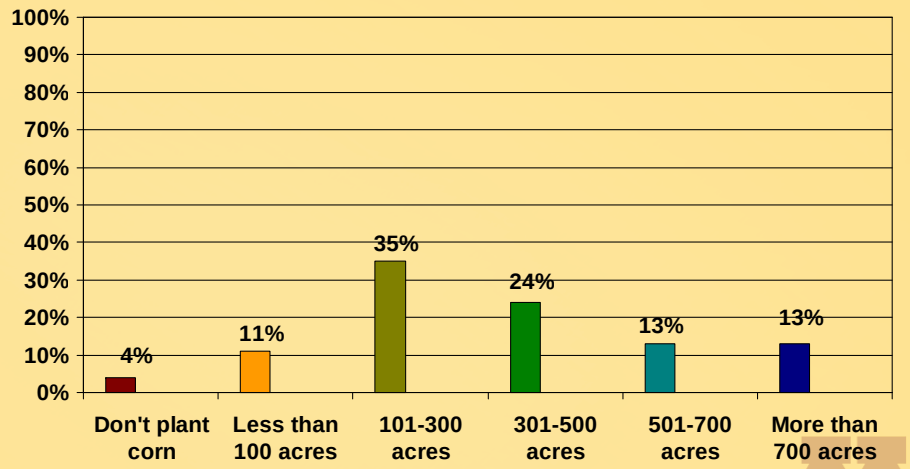
How many years have you been farming?

(1526 responses)

- 2% 1-5 years
- 5% 6-10 years
- 14% 11-20 years
- 28% 21-30 years
- 53% 31 or more years

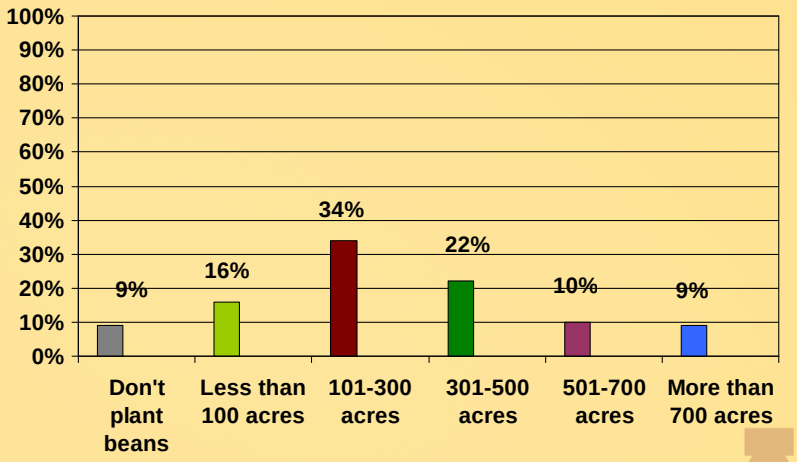
How many acres of Corn do you plant?

(1064 responses)



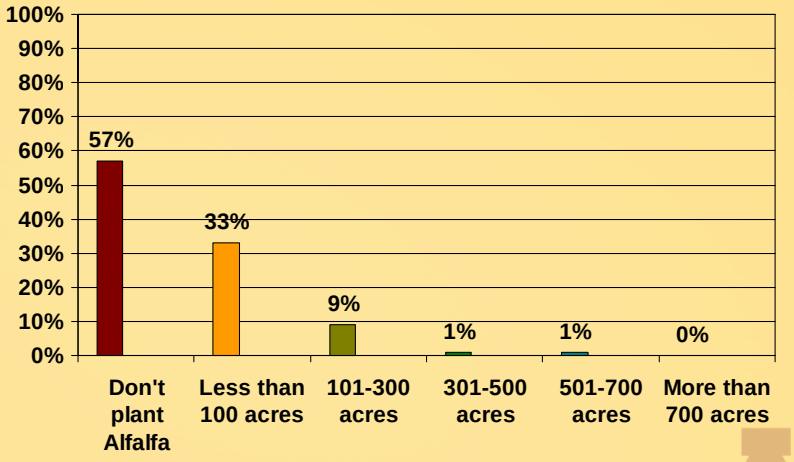
How many acres of Soybeans do you plant?

(1076 responses)



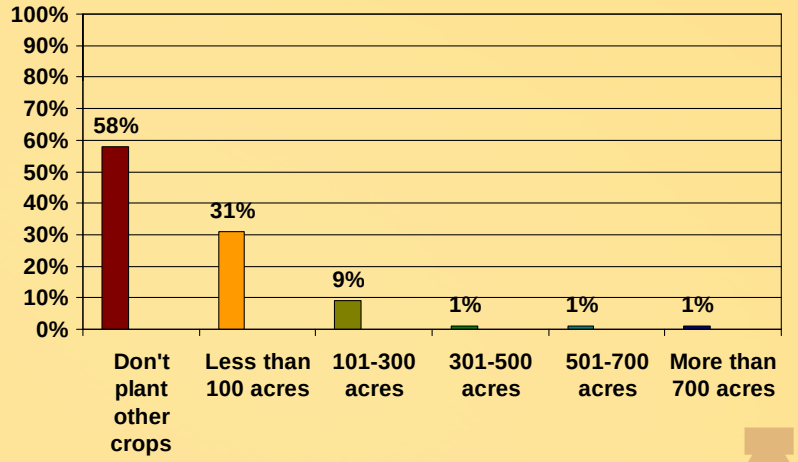
How many acres of Alfalfa do you plant?

(1065 responses)



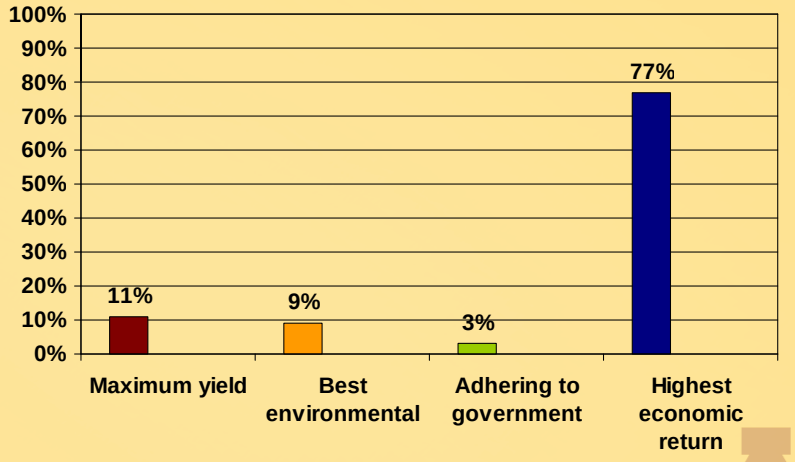
How many acres of other crops do you plant?

(1031 responses)

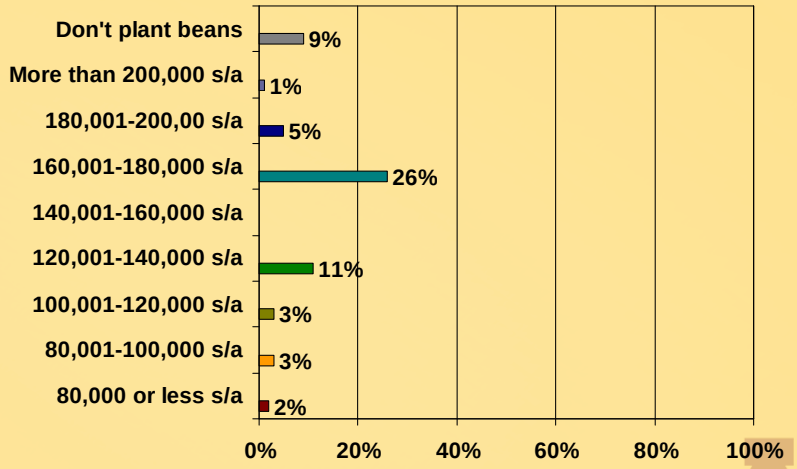


What is your crop production goal?

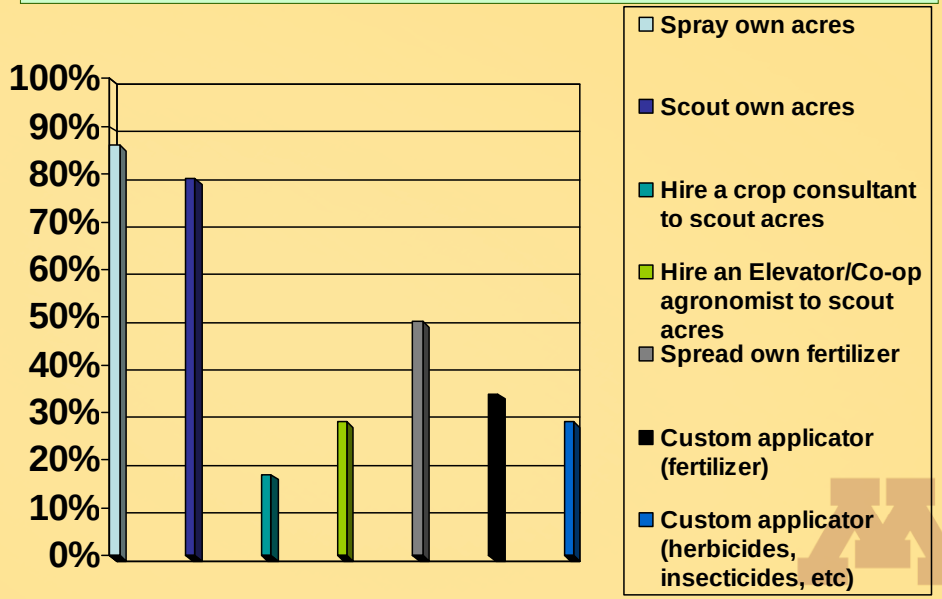
(374 responses)



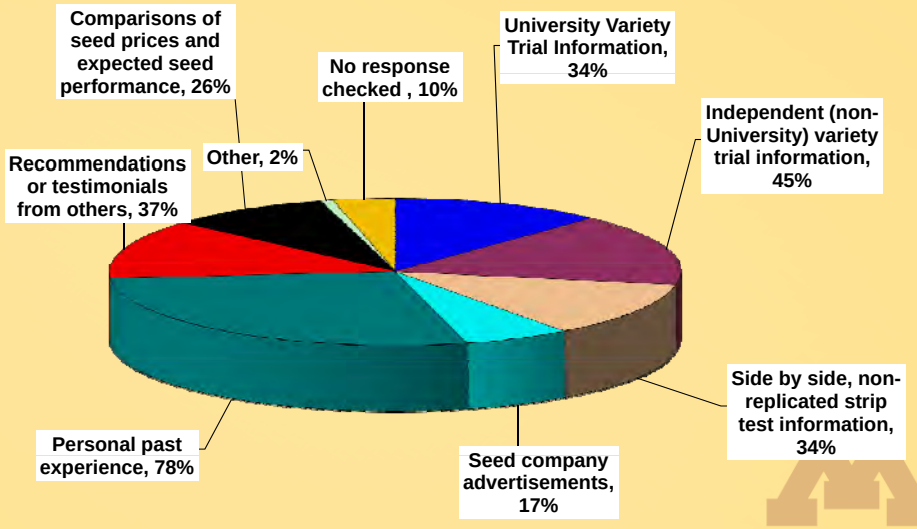
You generally plant soybeans at a seeding rate
(1039 responses)



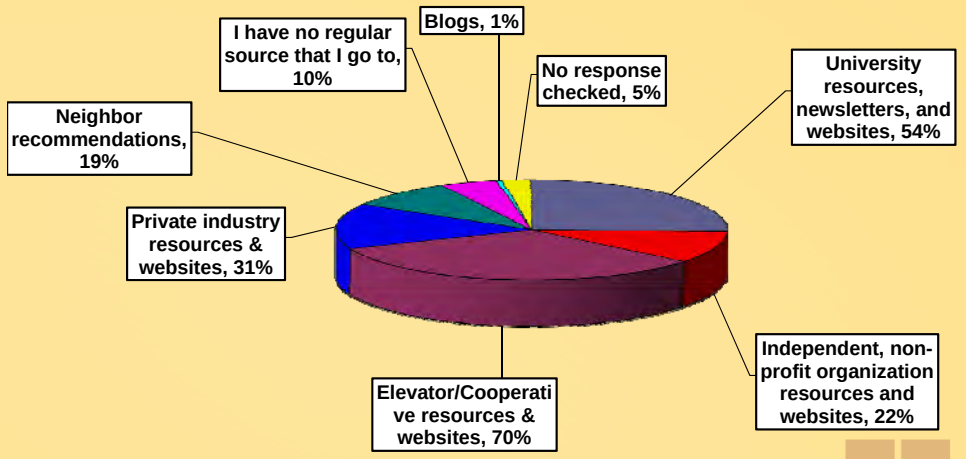
Which of the following practices do you utilize on your farm? (1523 Responses)



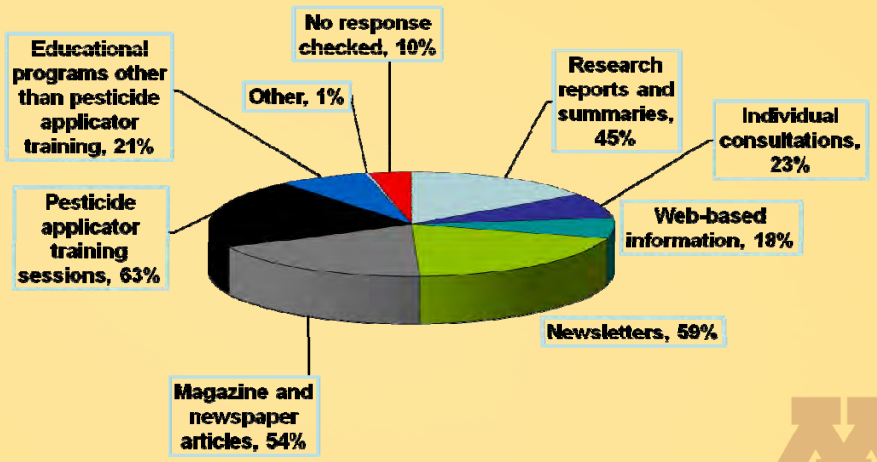
Which of the following kinds of information do you strongly consider when selecting seed varieties for your farm? (1396 responses)



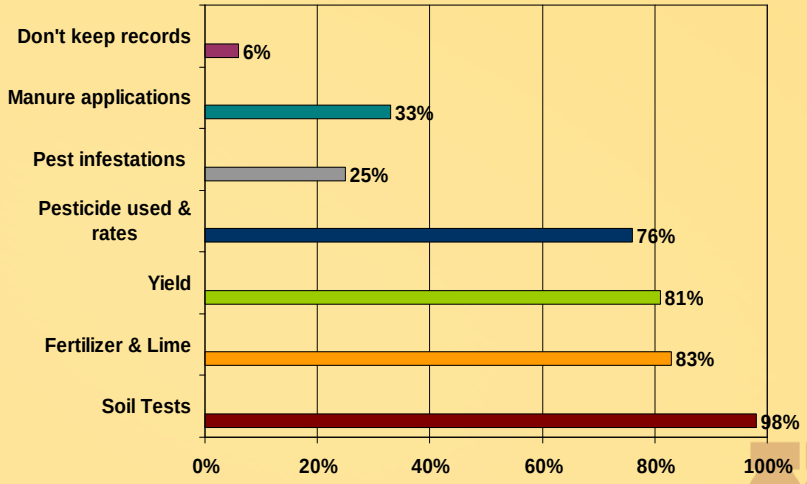
Which of the following sources do you rely on for crop and pest management information?
(1463 responses)



I rely on the following University of Minnesota resources to gain crop management and IPM related knowledge and practices: (1389 Responses)

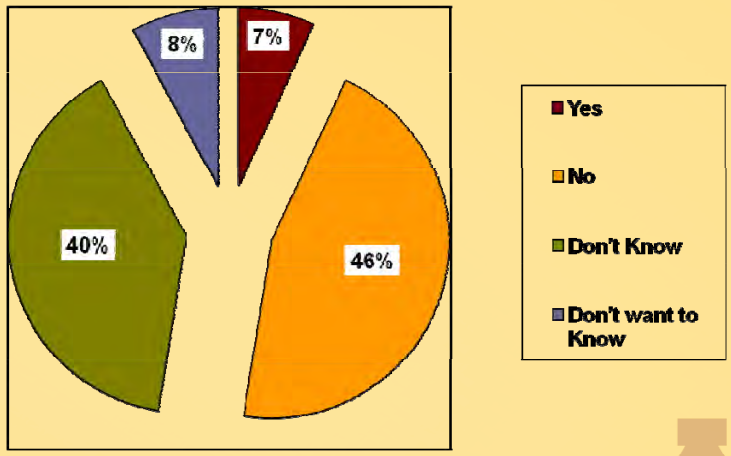


Do you regularly keep records for the following on your farm? (Select all that apply) (3207 responses)



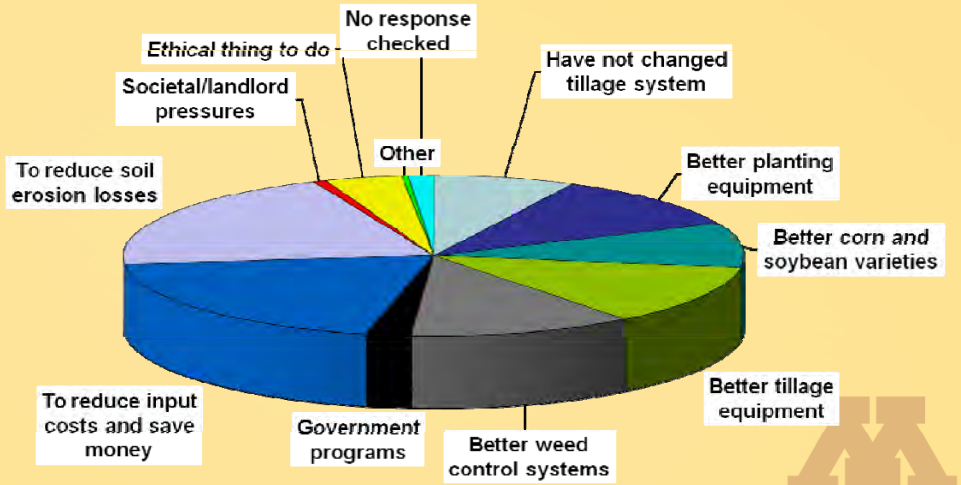
Do you have endangered species on your farm?

(601 responses)

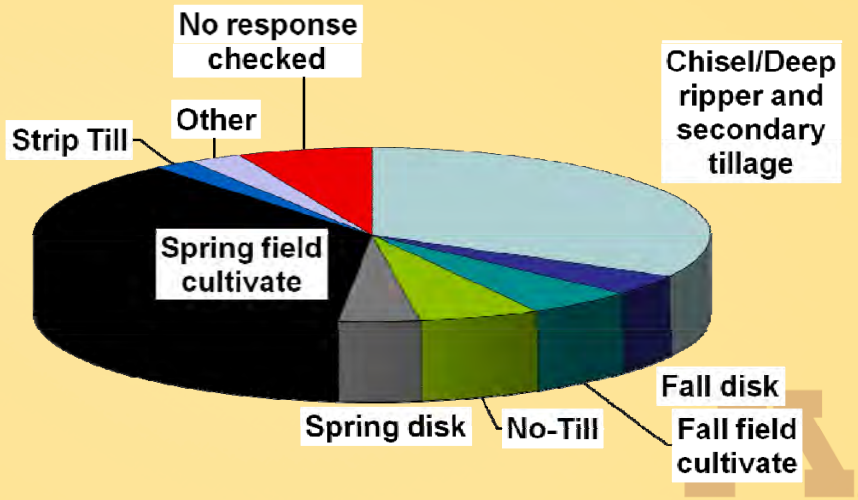


Reasons you've moved toward less aggressive tillage systems for corn and soybeans:

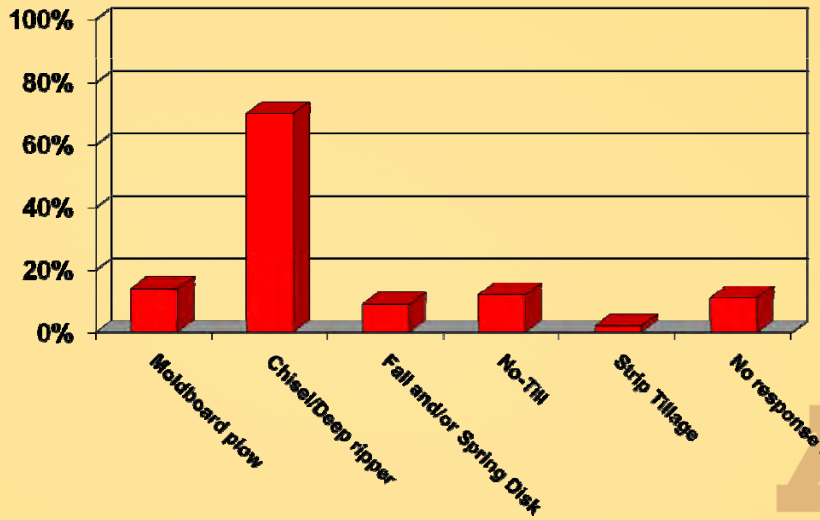
(1465 responses)



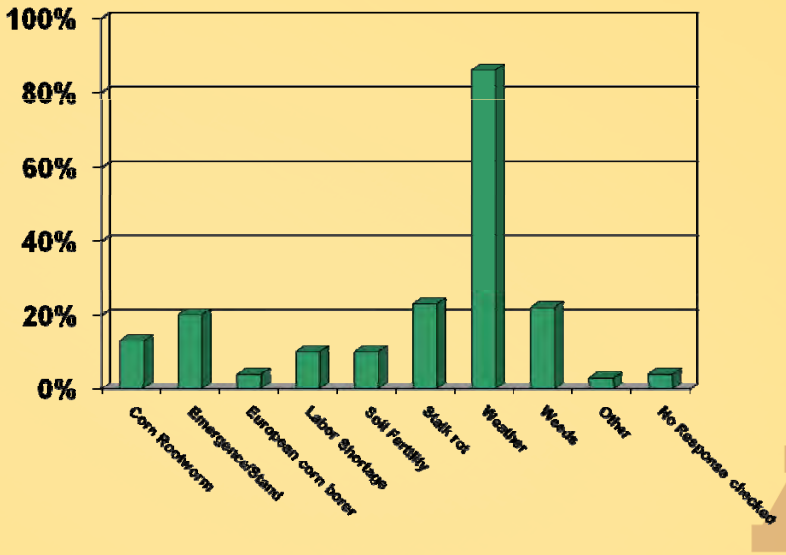
For corn after soybeans, what tillage systems are you typically using for most of you CORN acres?
(1388 responses)



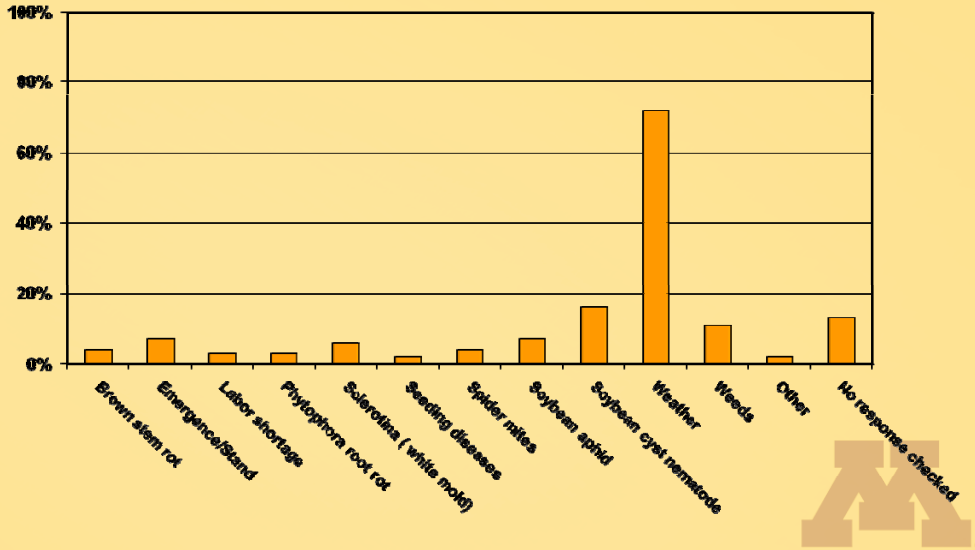
For soybeans after corn, what tillage systems are you typically using for most of your SOYBEAN acres?
(1374 responses)



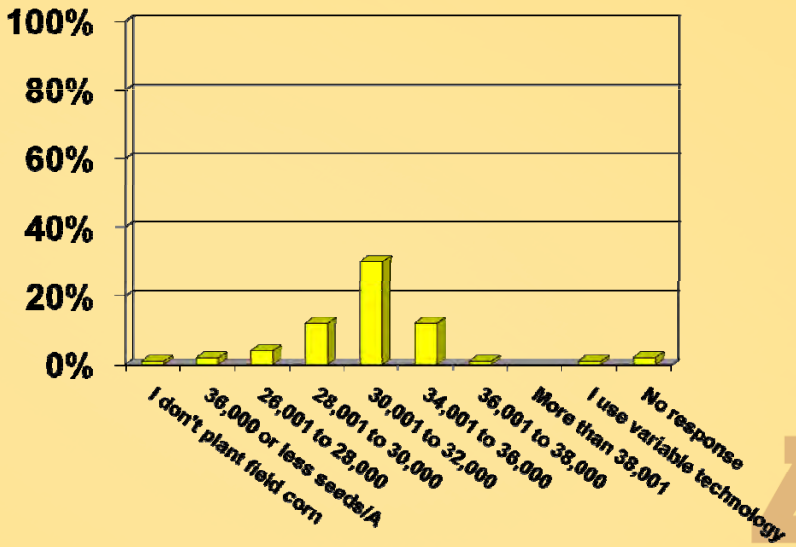
What were your top two crop production problems in CORN during the 2008 growing season? (1470 Responses)



What were your top two crop production problems in SOYBEAN during the 2008 growing season? *(1360 responses)*

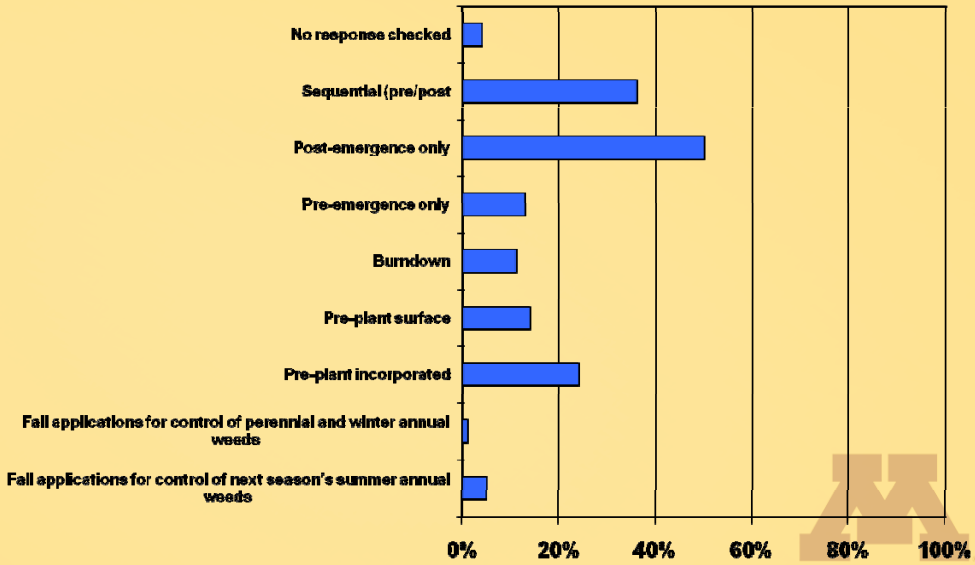


You generally plant FIELD CORN at a seeding rate of: *(1498 Responses.)*

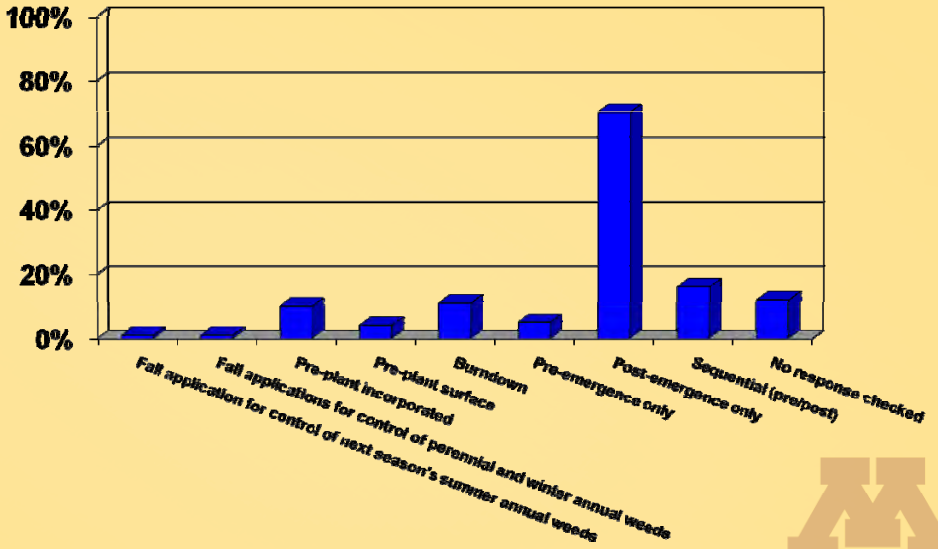


Which herbicide application timings do you usually use in CORN?

(1473 Responses.)

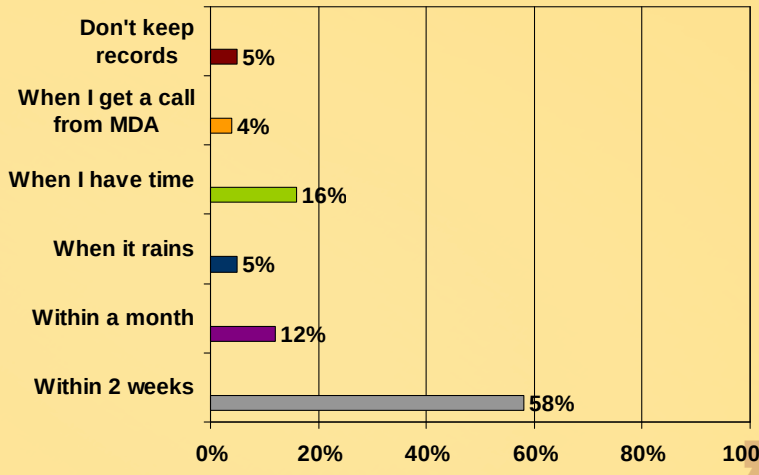


Which herbicide application timings do you usually use in SOYBEANS? *(503 Responses)*



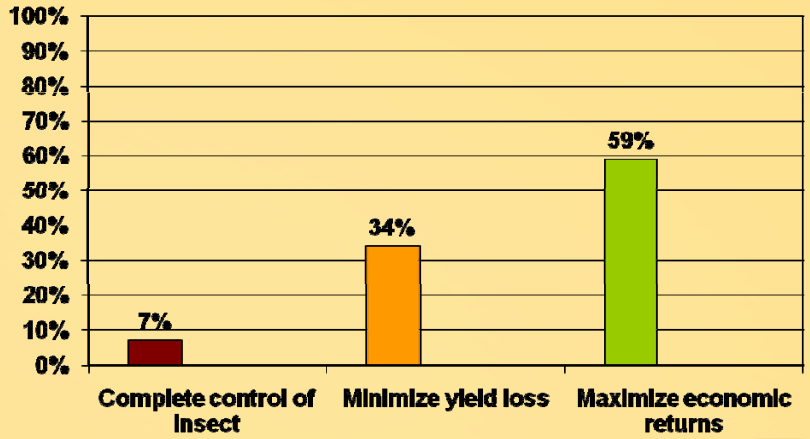
When do you make your records?

(986 responses)



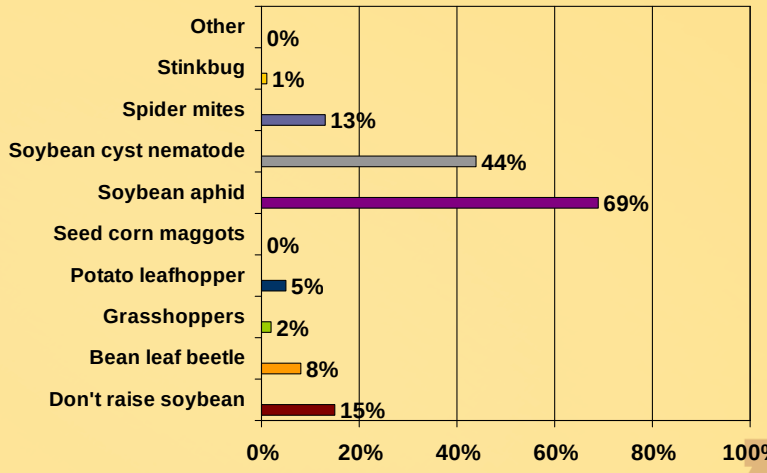
My Pest Management Strategy is:

(438 responses)



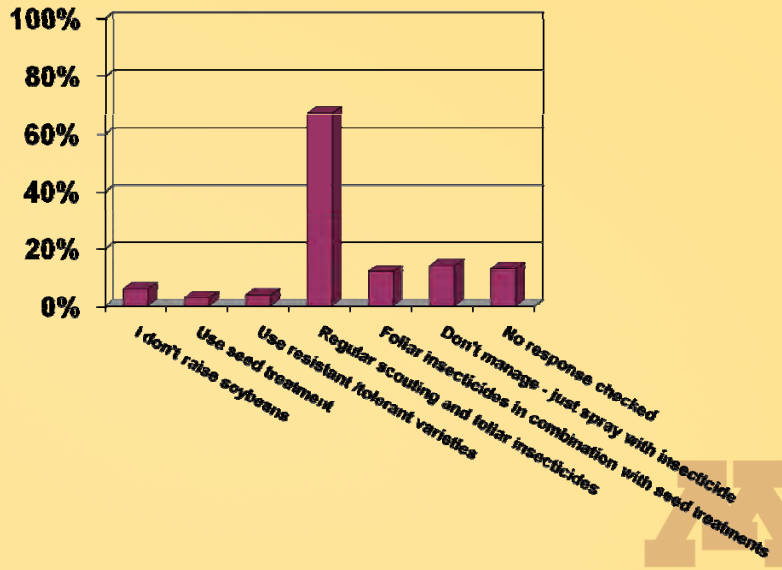
My most troublesome soybean insect pests are:

(710 responses)

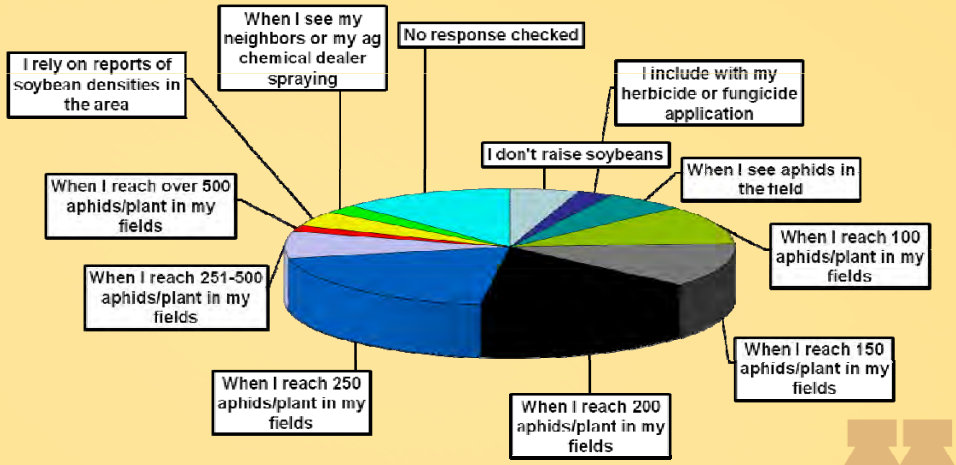


How do you manage soybean aphids?

(1355 Responses)

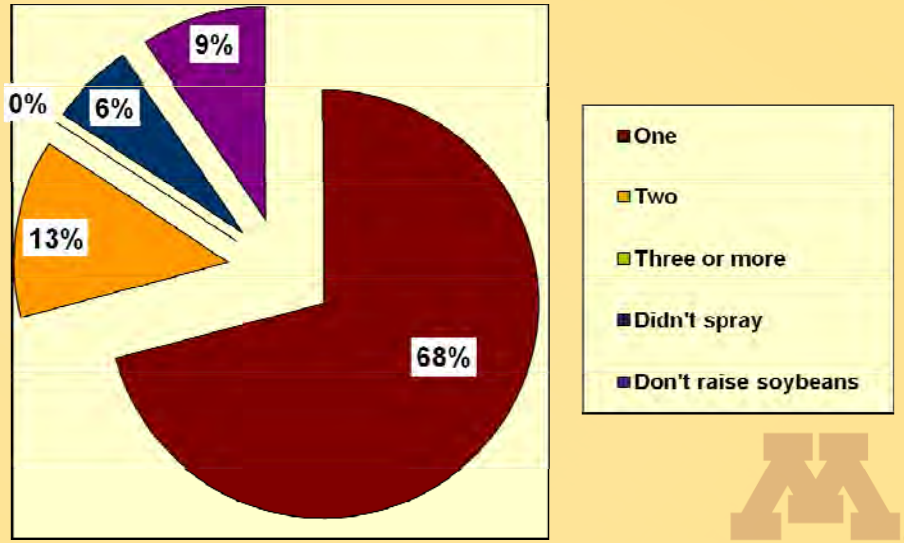


How do you decide when to apply a foliar insecticide to control soybean aphids? (1333 responses)



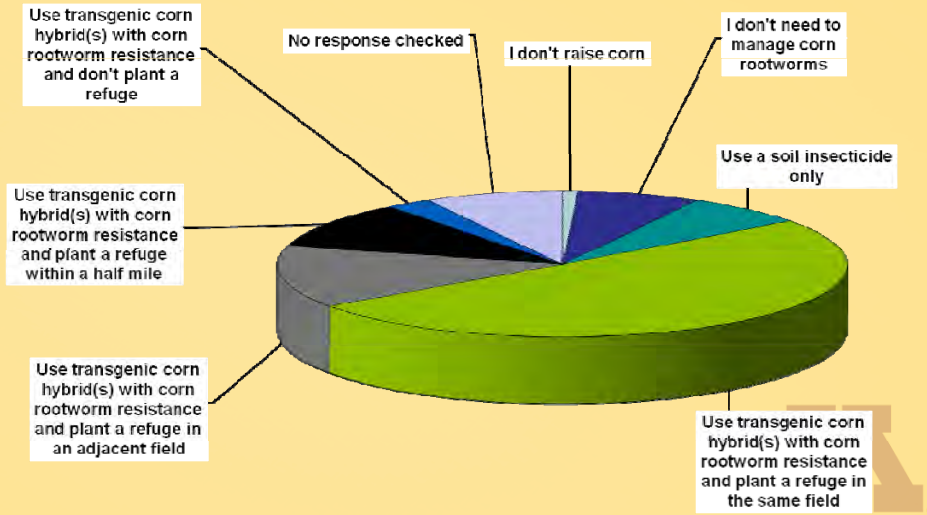
How many insecticide applications did you apply to control soybean aphids in 2008?

(Select only one) (878 responses)

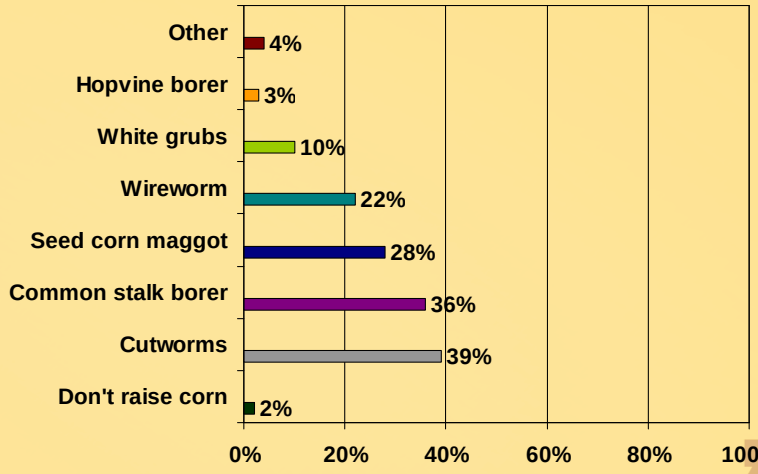


Which of the following best describes your corn rootworm management practices?

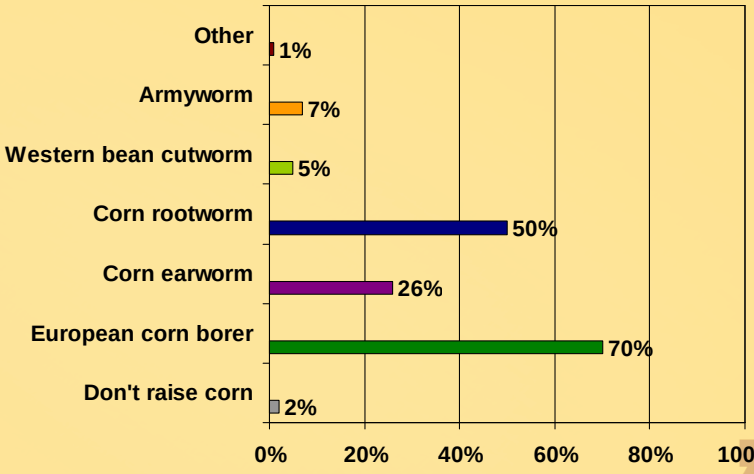
(1402 responses)



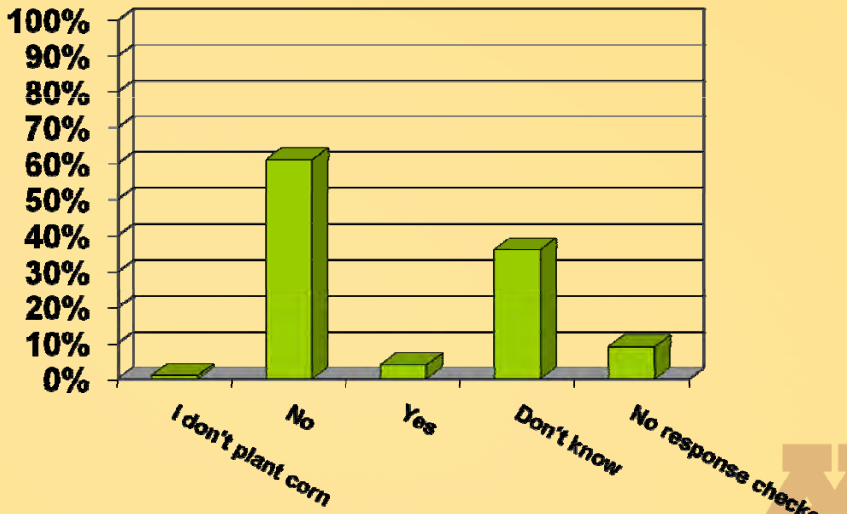
My two most troublesome Early season corn pests are: (650 responses)



My two most troublesome Late season corn pests are: (725 responses)

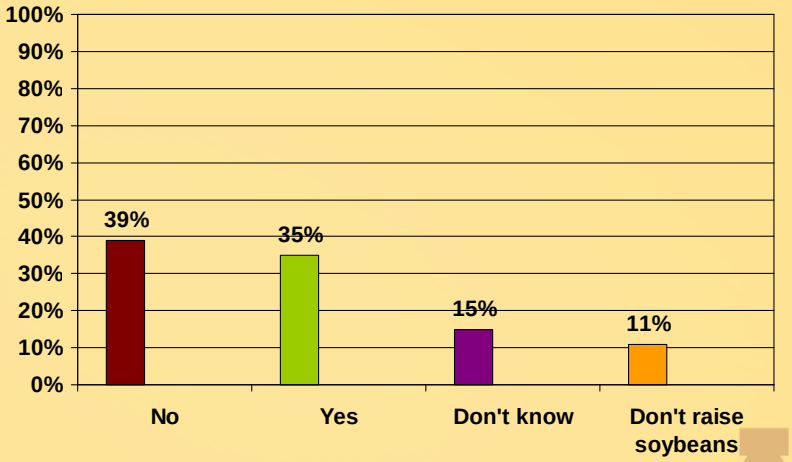


Do you have problems with CORN nematodes on your farm? (1405 responses)



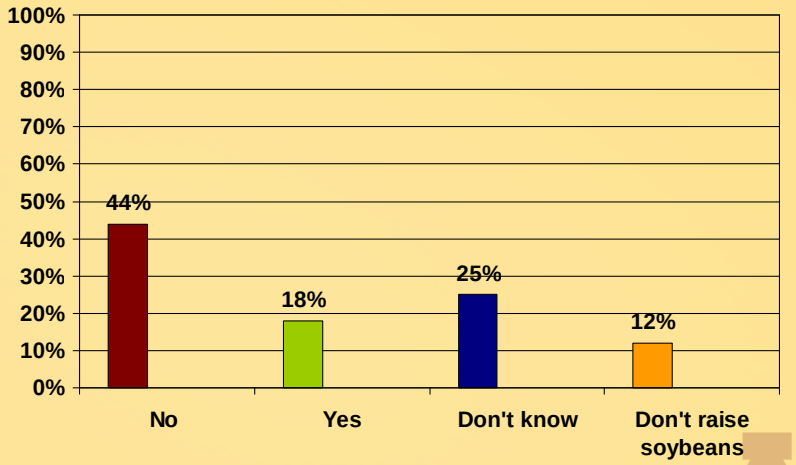
Do you have problems with northern corn rootworms in corn following soybeans?

(Select only one) (502 responses)

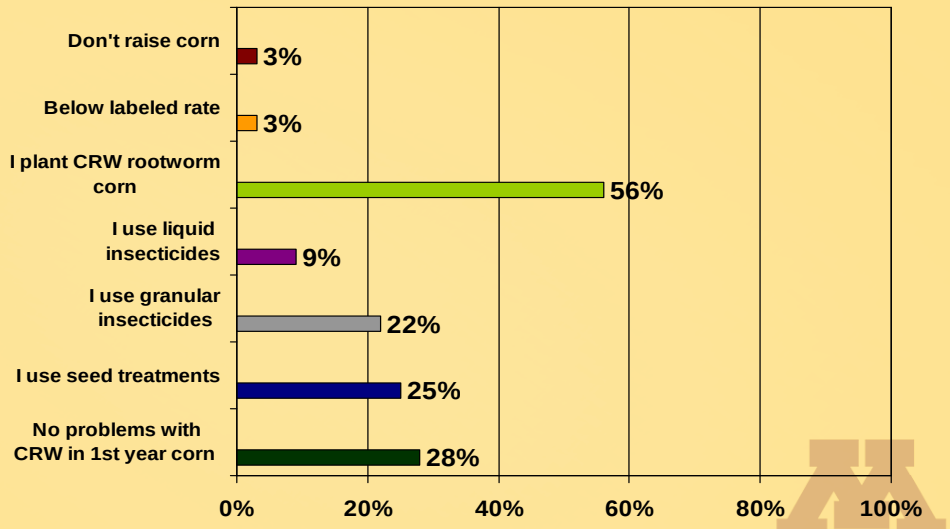


Do you have problems with western corn rootworms in corn following soybeans?

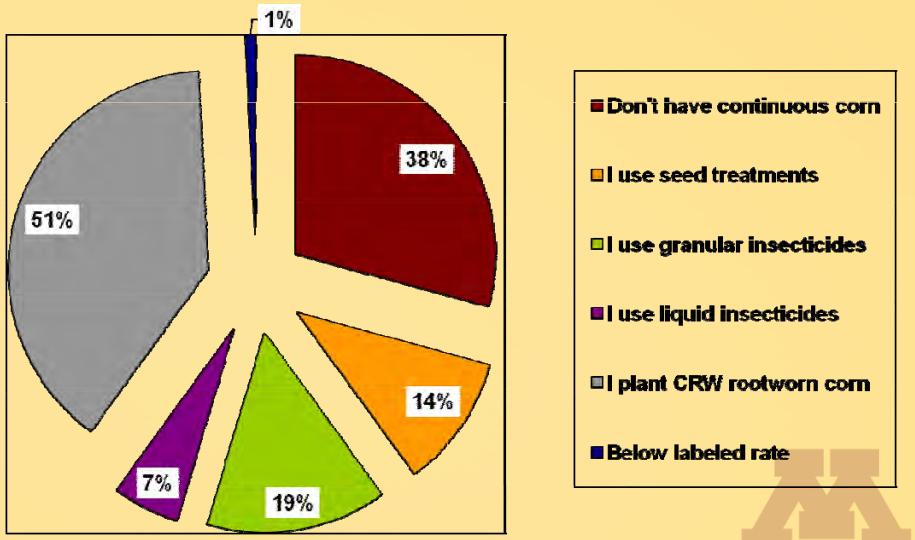
(Select only one) (476 responses)



How do you manage corn rootworms in FIRST YEAR CORN? (1514 responses)

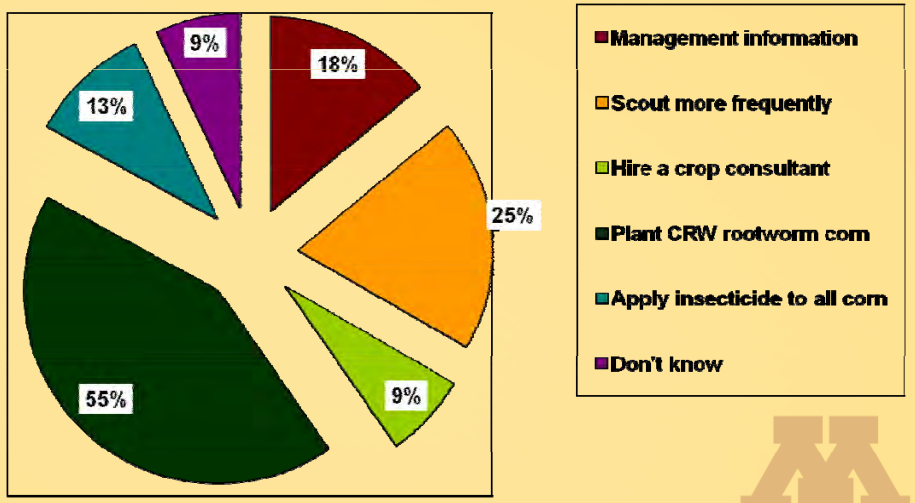


How do you manage corn rootworms in continuous corn? (1354 responses)



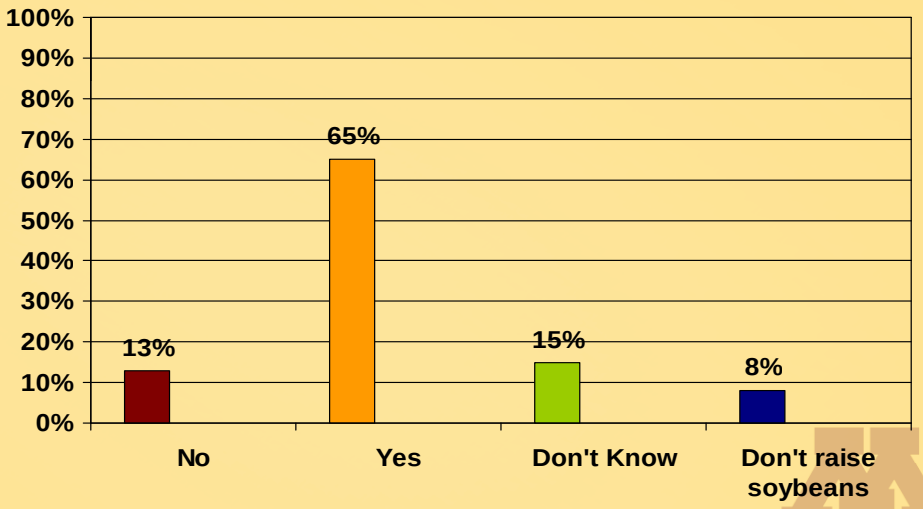
Because of the threat of northern corn rootworm extended diapause, I will:

(Select all that apply) (1291 responses)



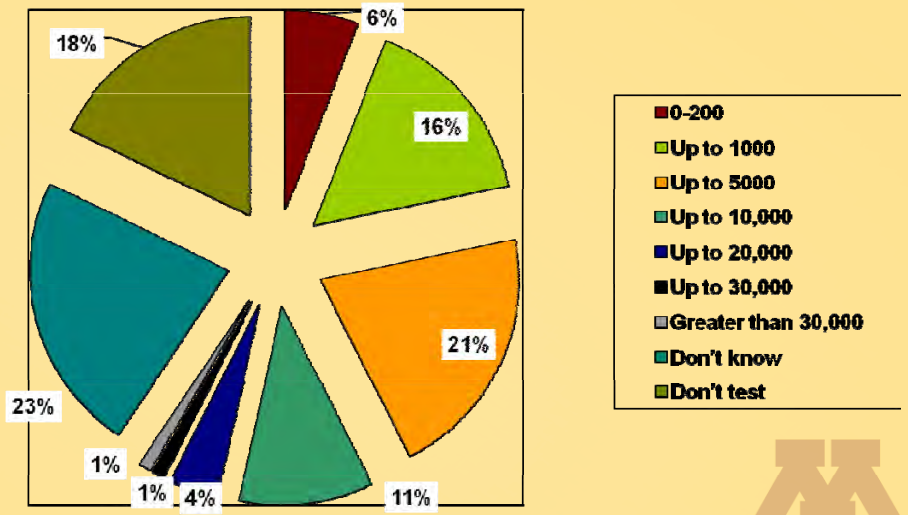
Do you have Soybean Cyst Nematode (SCN)?

(1083 responses)



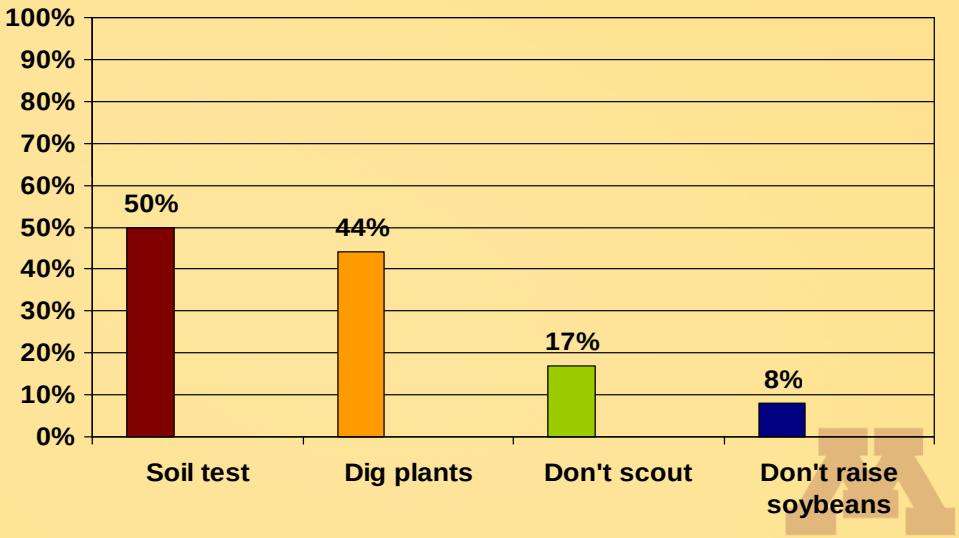
What are your SCN Soil test numbers?

(551 responses)



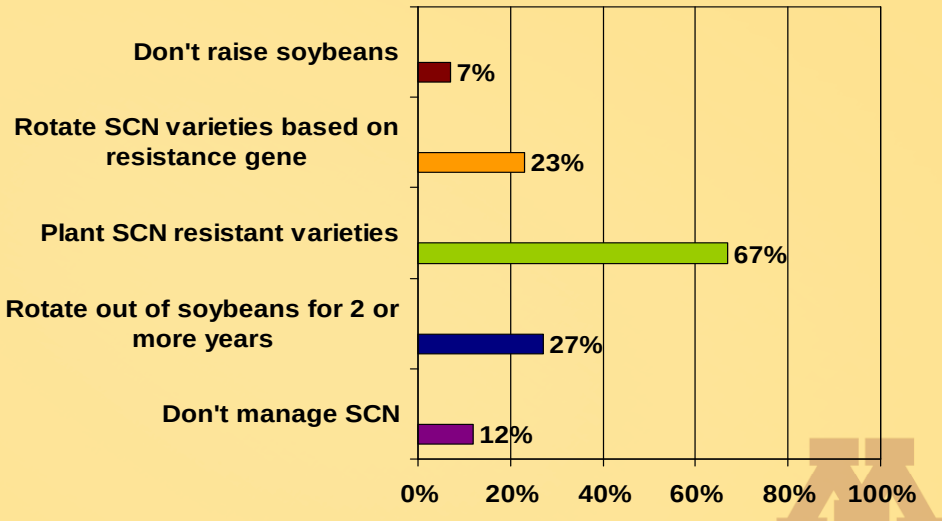
How do you scout for Soybean Cyst Nematode (SCN) on your farm?

(Select all that apply) (1288 responses)

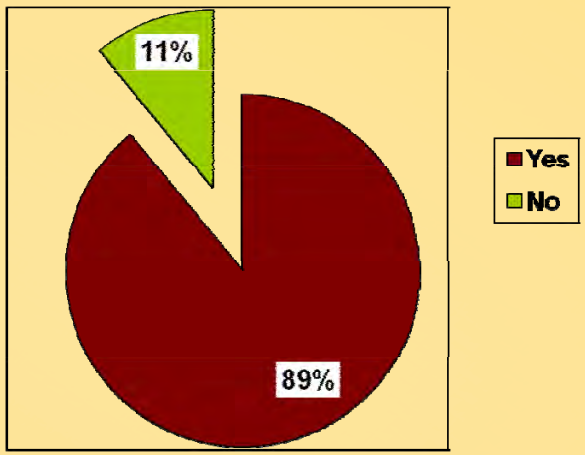


How do you manage SCN on your farm?

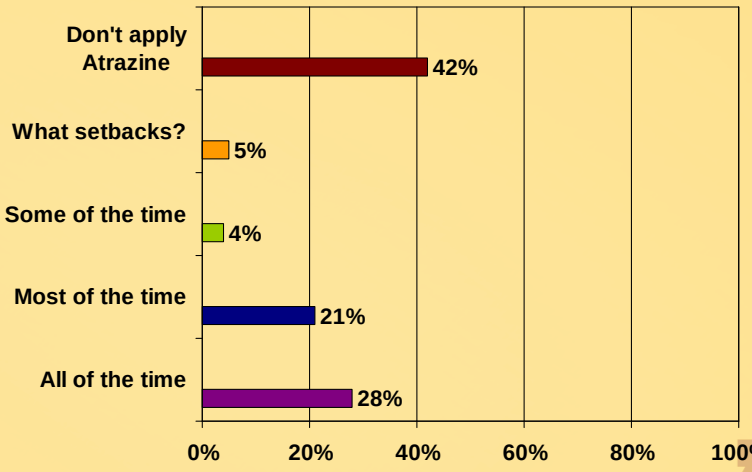
(Select all that apply)
(1477 responses)



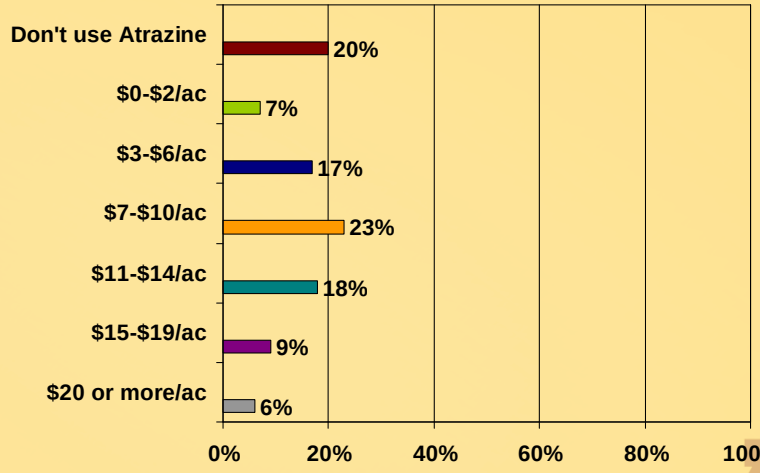
Do you consider environmental safety or risks when choosing pesticides? (578 responses)



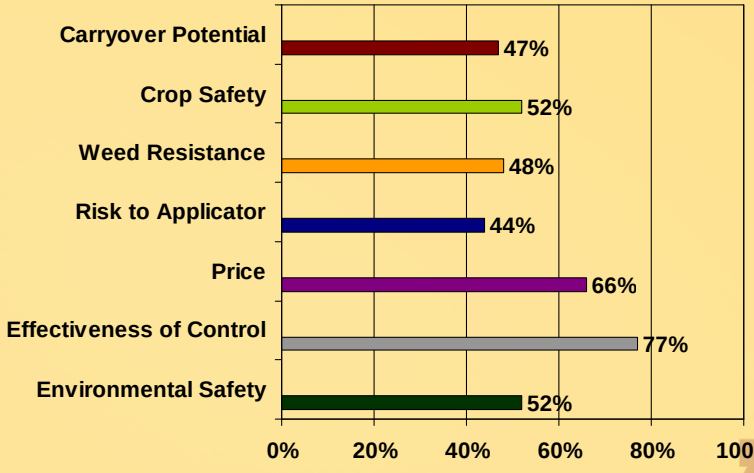
Do you follow the Atrazine setbacks? (1004 responses)



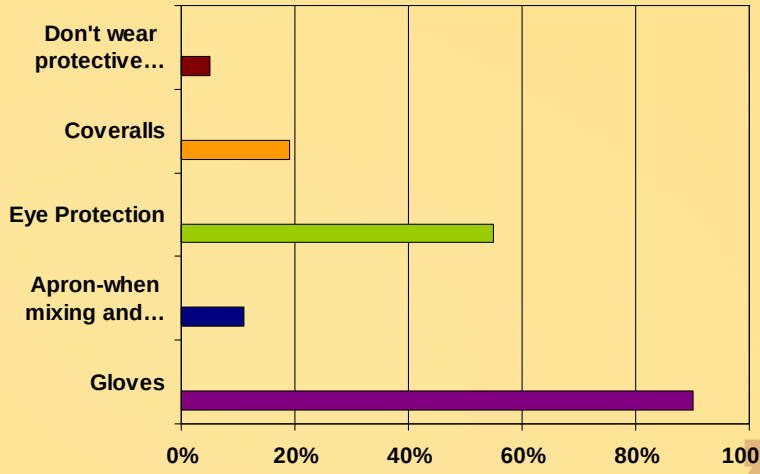
Banning Atrazine in Minnesota would increase my corn weed control costs by: (584 responses)



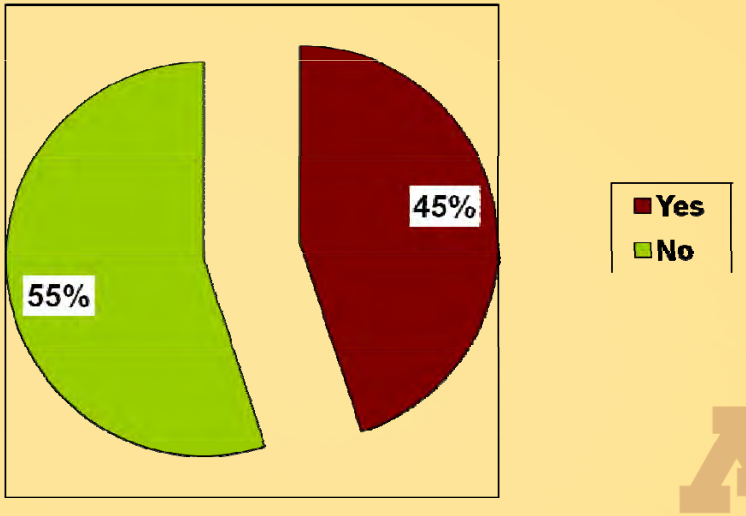
What do you consider when choosing pesticides? (3742 responses)



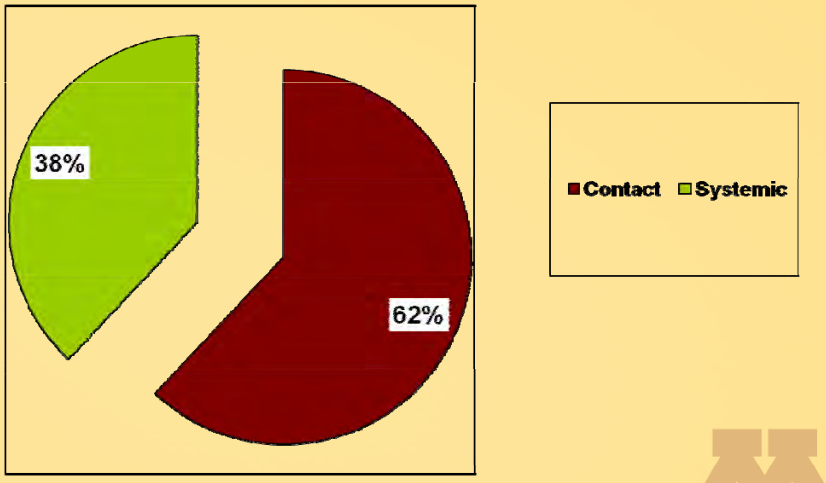
What do you usually wear when working with pesticides? (1050 responses)



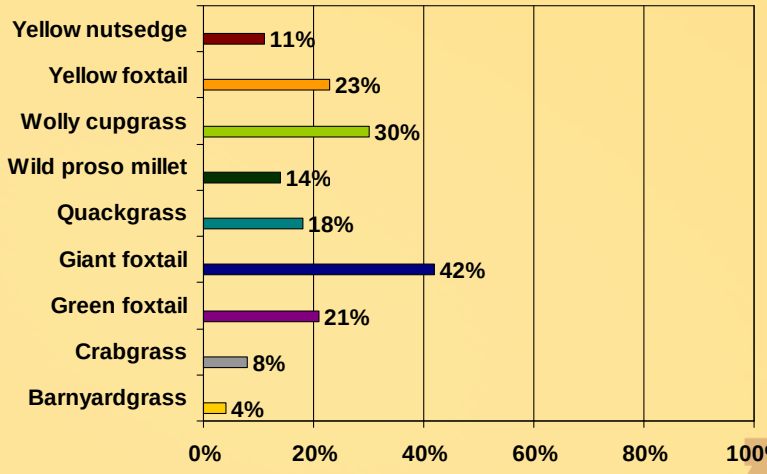
Does glyphosate (the active ingredient in Roundup) work as well today as it did when you first used it? (185 responses)



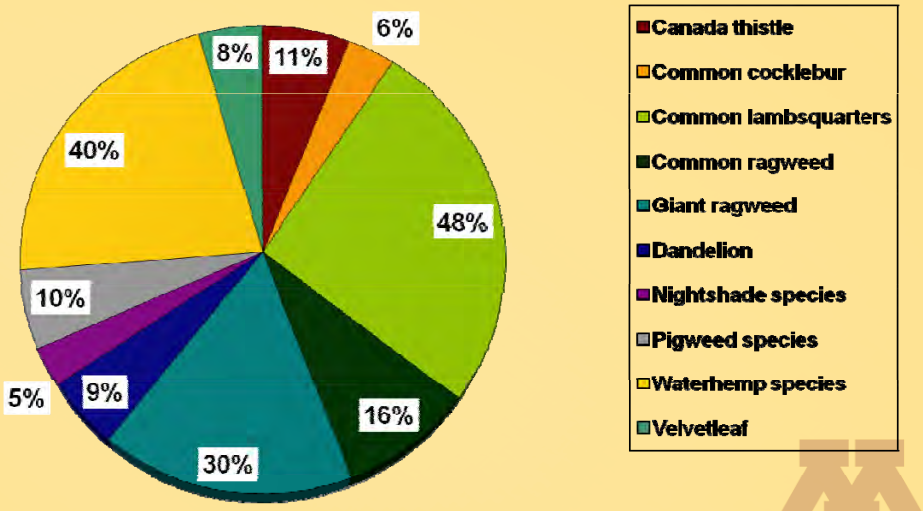
Is Glyphosate (the active ingredient in Roundup) a contact or systemic herbicide? (1005 responses)



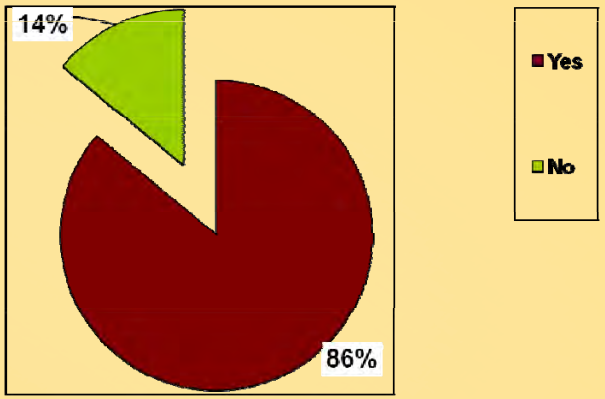
My TWO (2) most troublesome grass/sedge weeds in row crops are: (1462 responses)



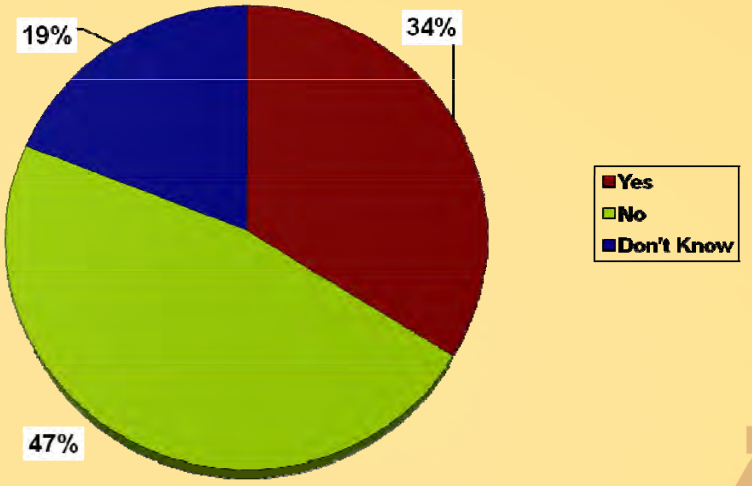
My TWO (2) most troublesome broadleaf weeds in row crops are: (1558 responses)



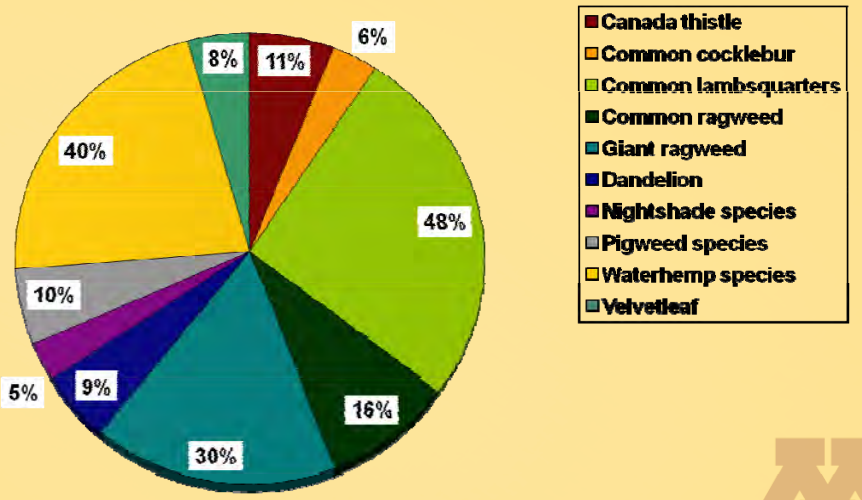
Are you concerned about weed resistance on your farm? (560 responses)



Do you think you have glyphosate resistant weeds on your farm? (552 responses)

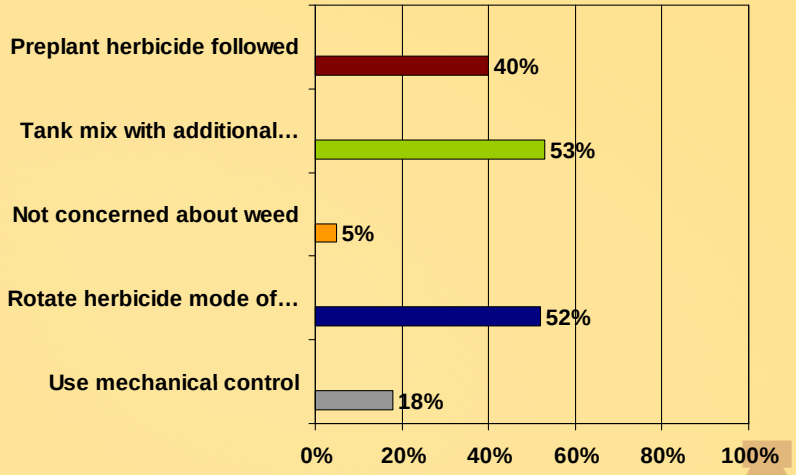


Which weed species do you suspect are resistant to glyphosate? (1558 responses)



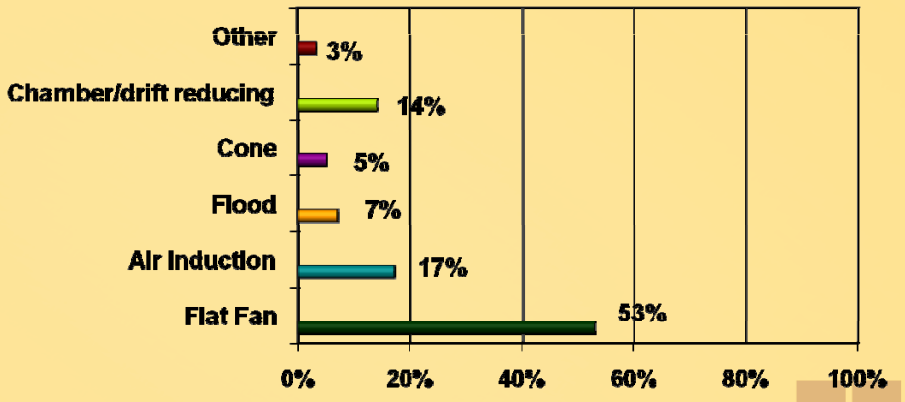
How do you manage weed resistance?

(1591 responses)

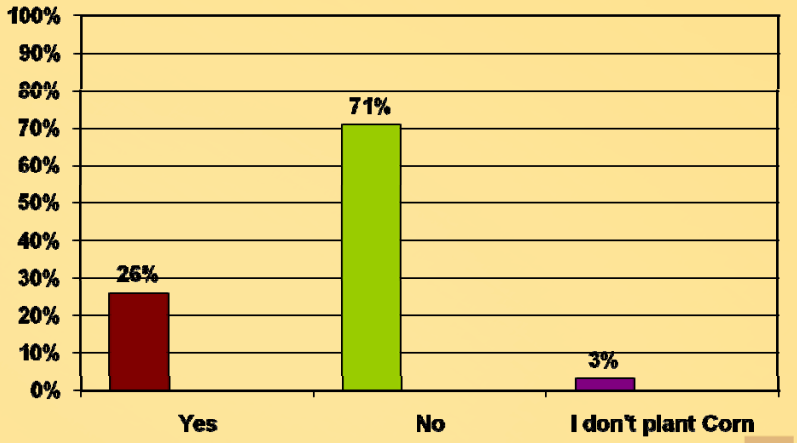


What type of nozzle do you usually use?

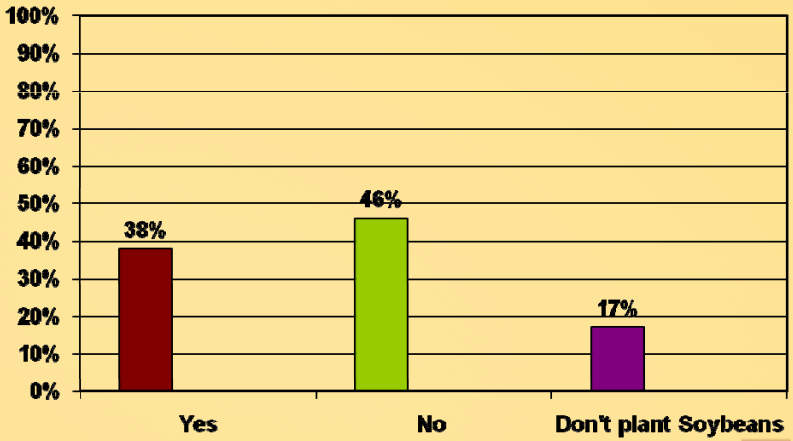
(462 responses)



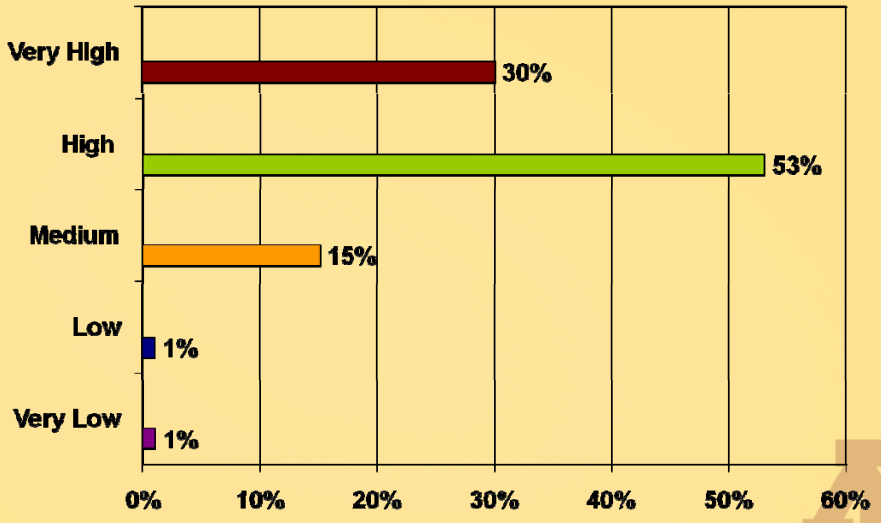
Do you plan on making a fungicide application for CORN plant health purposes (select only one)? (371 responses)



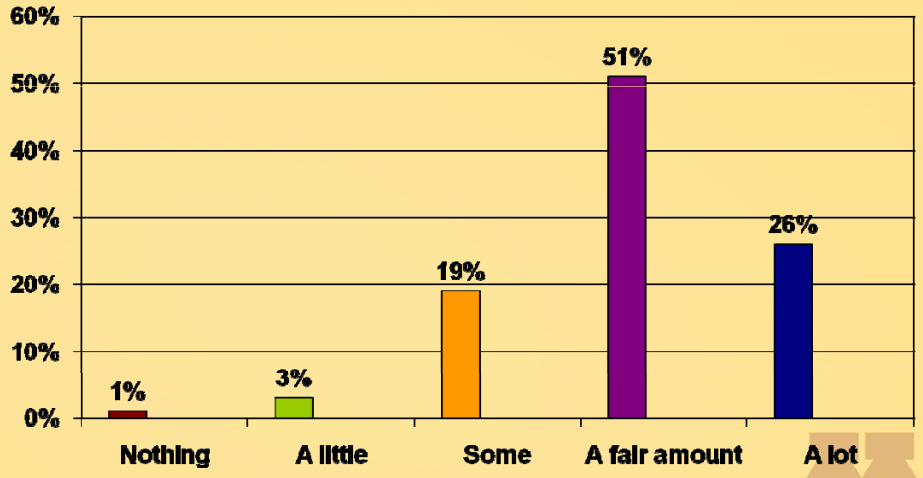
Do you plan on making a fungicide application for SOYBEAN plant health purposes? (315 responses)



How would you rate this workshop's overall value to you? (1142 responses)

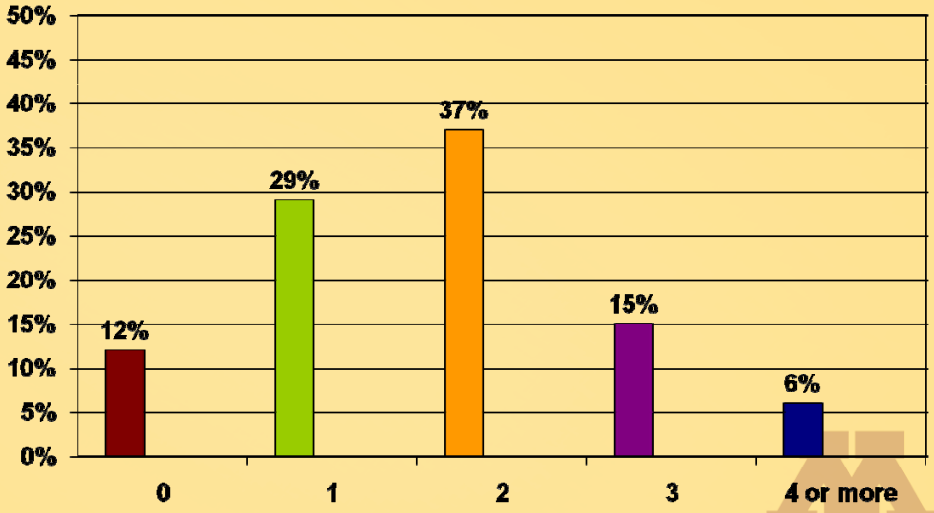


How much did you learn at this workshop? (1137 responses)

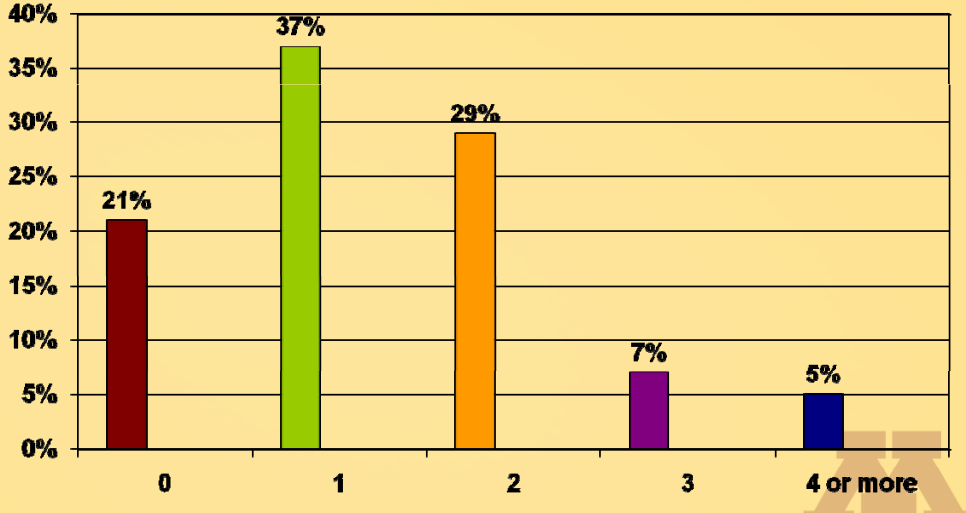


How many practices do you plan to change or adopt based on what you learned at this workshop?

(1142 responses)

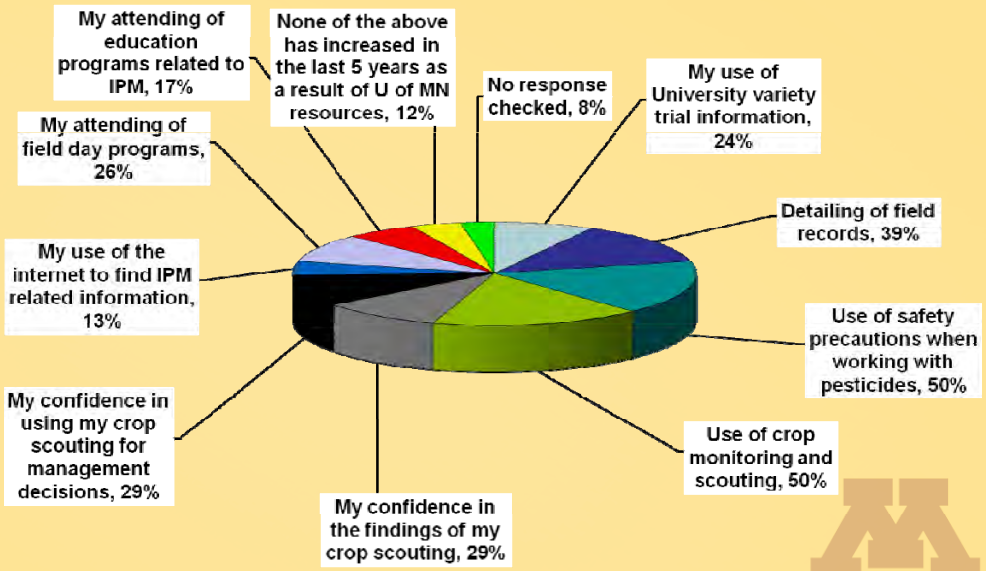


Since you last certified, how many practices did you change or adopt based on what you learned last time? (1107 responses)



I have significantly increased the following in the last five years as a result of University of Minnesota Extension Crop Management

(1417 responses)



What did you think of the interactive questions? (clickers?) (1088 responses)