2011
SOUTHERN MINNESOTA
REGIONAL
RESEARCH & DEMONSTRATION
SUMMARY

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 – 2011

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

WASECA (SROC)

Corn Hybrid
92-95 RM (Early Season)
96-100 RM (Mid-Season)
101 – 107 RM (Late Season)
Conventional/Waxy

Soybean Variety
Soybean Cyst Nematode
Early Maturity GT/Roundup Ready® (1.2-1.8)
Late Maturity GT/Roundup Ready® (1.9-2.5)
Food Grade & Special Use
Liberty Link
Evaluation of Micronutrients on Soybeans
Evaluation of Cropping Systems on SCN –
Full Season Soybean, Peas fb Short Season Soybean & Peas fb Fallow

Alfalfa
Headline Fungicide

LAMBERTON (SWROC)

Liberty Link compared to Roundup Ready Soybeans
Evaluation of Micronutrients on Soybeans

ROCK DELL

Corn Hybrid
92-95 RM (Early Season)
96-100 RM (Mid-Season)
101 – 107 RM (Late Season)
Conventional/Waxy
Corn Silage

Soybean Variety
Liberty Link
Evaluations of Soybean Aphid Control Strategies
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ROSEMOUNT

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LAWLER'S

- Early Maturity GT/Roundup Ready® Soybean (1.2-1.8)
- Late Maturity GT/Roundup Ready® Soybean (1.9-2.5)
- Soybean Cyst Nematode
- 92-95 RM (Early Season) Corn Hybrid
- 96-100 RM (Mid-Season) Corn Hybrid
- 101 – 107 RM (Late Season) Corn Hybrid
- Conventional/Waxy Corn Hybrids

OLMSTED COUNTY

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LeCRESCENT

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WILMONT & WELCOME

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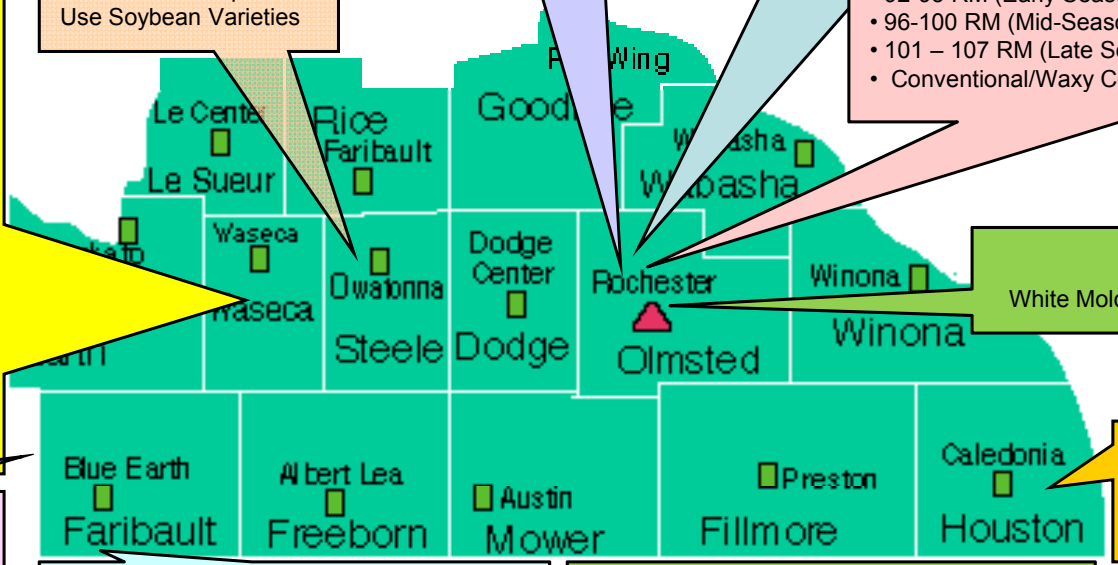

2011 Southern Minnesota Regional Research and Demonstration Summary

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 Research and Outreach Centers at Waseca, Lamberton and Rosemount, 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 at 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
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

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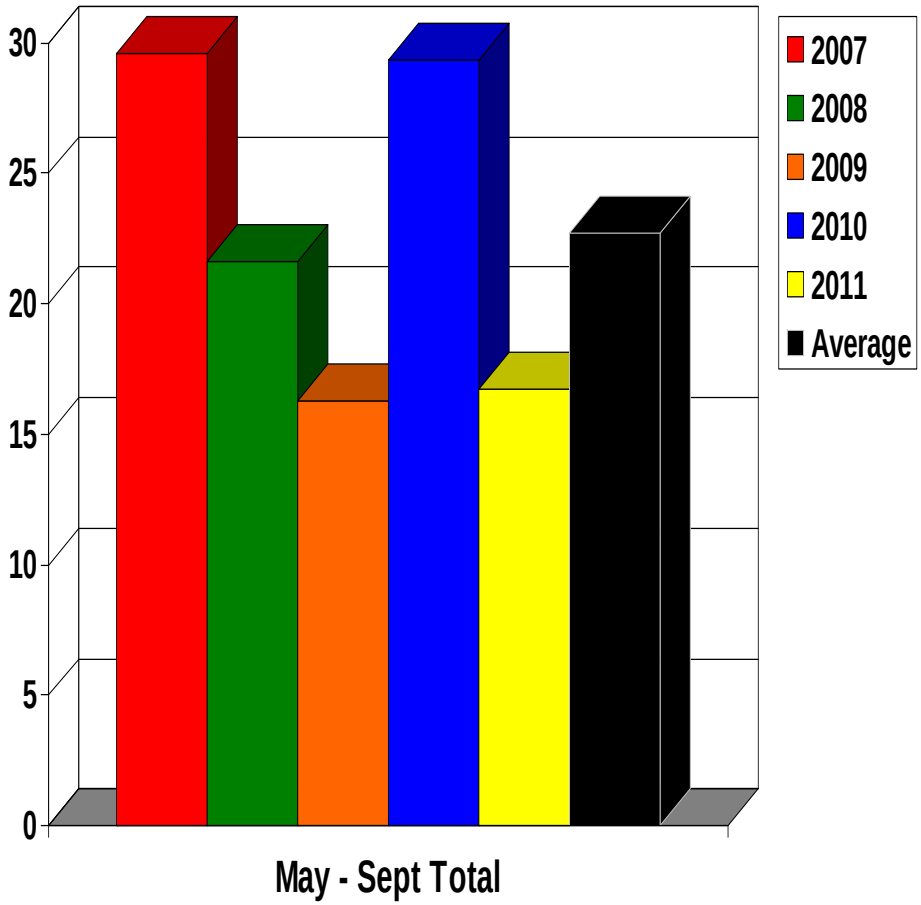
Contact Fritz, Lisa, Ryan, or Mary Jane if interested in receiving the "Crops Connection" Newsletter sent via e-mail.

Monthly Rainfall

(inches)
Season Totals
2007 – 2011



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

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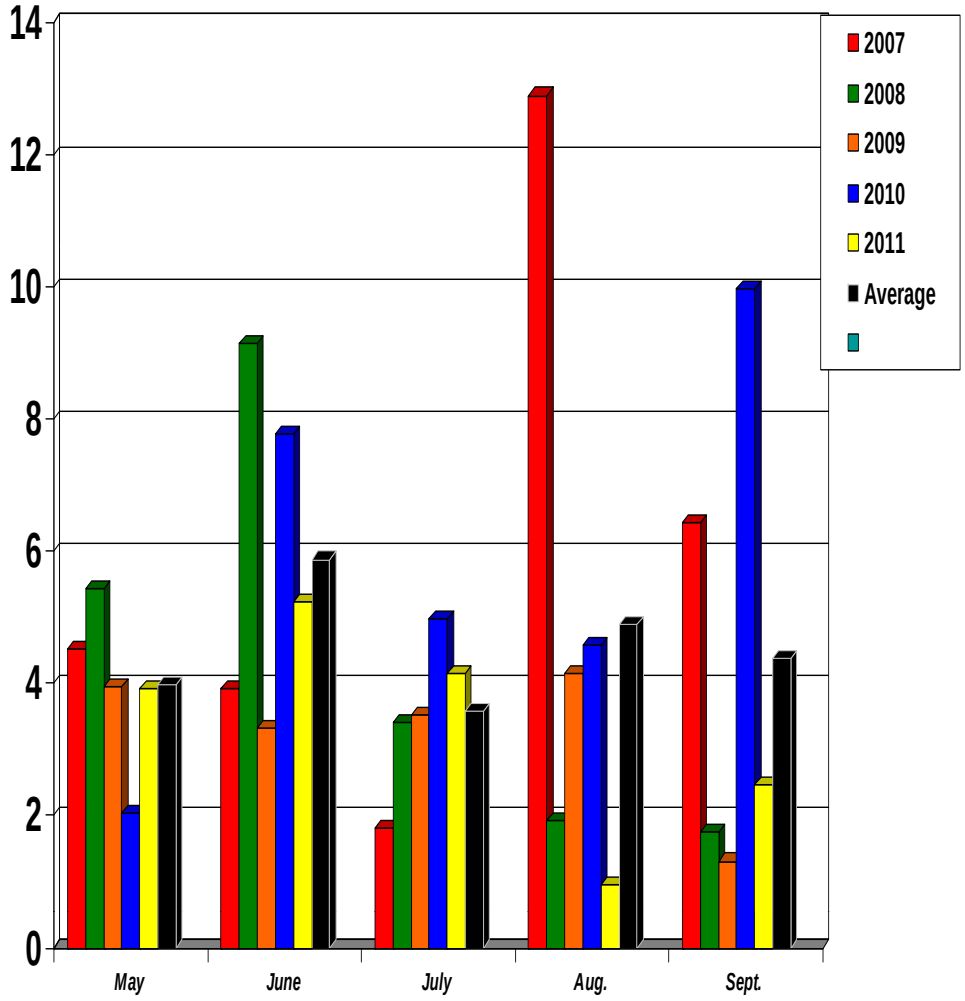
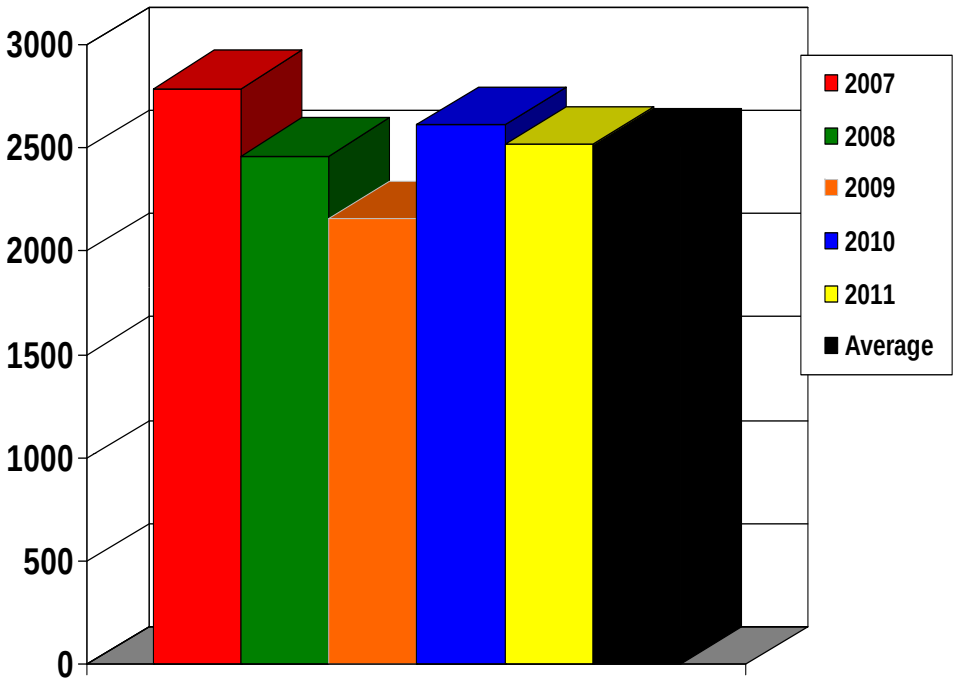
Monthly Rainfall Totals

(inches)
Comparison by Month
2007 - 2011



Growing Degree Days

Season Totals
2007 - 2011



May - September Total

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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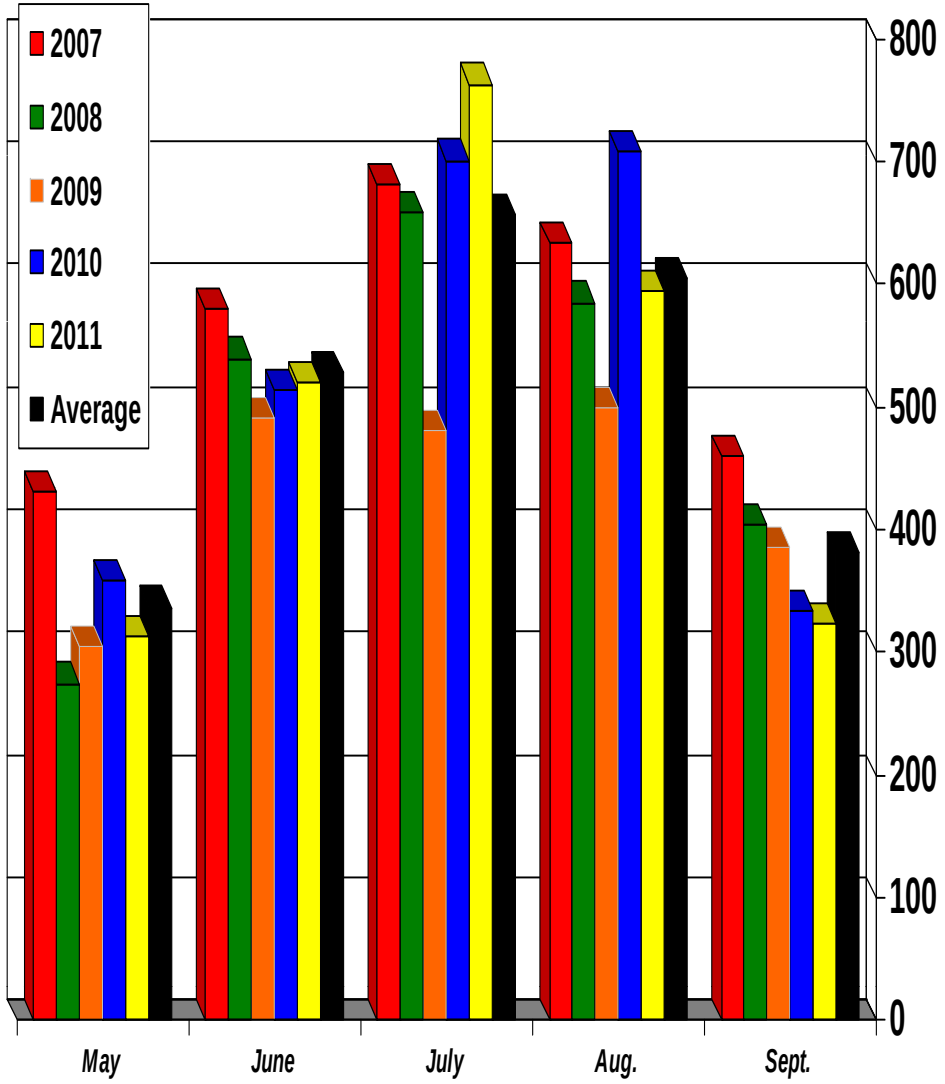
Growing Degree Days

Comparison by Month
2007 - 2011



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SECTION A

ALFALFA

FUNGICIDE EVALUATION

Effects of Fungicide Application on Established Alfalfa at Waseca, MN in 2011.

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

The objective of this trial was to evaluate the performance of Headline fungicide to control leaf diseases in alfalfa and the impact on yield and forage quality at Waseca, MN. The research site was a LeSueur clay loam. The trial was conducted on an alfalfa stand established in the spring of 2010 and consisting of a blend of Pioneer 55V48 and 55V12. A randomized complete block design was used with four replications. Postemergence (POST) fungicide and insecticide treatments were applied when alfalfa was 8-10 inches tall or approximately 14 days after cutting. Applications were made with a tractor-mounted sprayer delivering 24.75 gpa at 49 psi using TurboTee 11002 nozzles. Application dates, environmental conditions, and crop stage are listed in Table 1. Forage was harvested with a Carter Harvester on June 9, July 19 and August 16, 2011.

There are a number of leaf diseases that affect alfalfa throughout the growing season. The primary ones in southern Minnesota are Common Leaf Spot, Lepto Leaf Spot, Spring Black Stem, and Summer Black Stem. The fungicide Headline, recently received registration (fall 2010) for application on alfalfa to control leaf diseases. Limited research data is available on the use of fungicides in alfalfa, and its impact on controlling diseases, forage yield and quality. The objective of this trial was to evaluate the use of Headline fungicide on alfalfa to control leaf diseases and the impact on total yield and forage quality.

DISEASES

Common Leaf Spot occurs primarily in the first and second cuttings and in the fall regrowth of alfalfa. Symptoms appear as small brown to black lesions, 1-3 mm in diameter which typically remain as separate lesions. On the upper leaf surface, the lesions may have a raised disc in the center. The disease starts in the lower canopy, resulting in leaf drop, mild to severe defoliation and reduced forage quality. Yield losses of up to 40% can occur. The pathogen, *Pseudopeziza medicaginis,* is a fungus that survives on dead leaves between crops where it produces spores that spread to new growth. This disease can occur all season long and is favored by prolonged periods of cool, wet weather.

Lepto Leaf Spot attacks young leaves/regrowth of alfalfa in the spring and early summer and again in the fall. Disease development is very noticeable following cool, raining periods. Lesions begin as small black/brown spots that enlarge to 1-3 mm spots with a light brown or tan center, dark brown margin, and are often surrounded by a yellow halo. Lesions enlarge and often coalesce to kill patches on the leaves. Leaflets may be killed and eventually drop off, reducing yield and quality. The pathogen, *Leptosphaerulina briosiana,* overwinters on leaf and stem debris on the soil surface.

Spring Black Stem and Leaf Spot occurs during the early spring reducing forage yield and quality. Leaves, stems, and crowns can be affected. Many small, dark brown to black spots develop on lower leaves and stems, usually with fairly even color to the border of the lesion. Leaves turn yellow and tend to wilt before dropping. Lesions on the stems enlarge and often coalesce to form larger blackened areas near the base of the plant. Severe infestations girdle and kill the stem. The plant dies when the infection spreads to the crown and roots. The fungal pathogen, *Phoma medicagnis,* survives between crops on infested crop debris and on stems and crowns. It is most common in the spring and fall, and is especially common in first cuttings. The disease is usually most severe in the lower canopy when weather is cool and wet and when there is a dense alfalfa canopy.

Summer Black Stem and Leaf Spot occurs during hot, humid weather, reducing forage yield and quality. The disease first attacks the base of the plant and progresses up the stem, causing leaves to drop. New leaf spots on leaves and stems are usually chocolate to reddish brown, with irregular margins, and often are fairly large (2-6 mm in diameter) with a diffuse yellow margin or halo around them. Oval lesions form on the stems and merge together to discolor most of it. A few lesions can cause leaflets to drop. The fungal pathogen, *Cercospora medicaginis*, overwinters in infected stems and occurs on or after the second cutting.

SOURCE: Alfalfa Management Guide published by the American Society of Agronomy, Crop Science Society of America and Soil Science Society of America and Purdue Extension Field Crop Diseases, Crop Sciences, University of Illinois College of Agriculture, Consumer and Environmental Sciences.

Table 1. Application timing, plant stage, environmental conditions.

Date	5/10	6/28	7/29
Treatment	POST I	POST II	POST III
Temperature (F)			
Air	79.0	64	79
Soil	55.4	67.1	
Relative Humidity (%)	78	64	61
Wind (mph)	18	8	0
Soil Moisture	Adequate	Adequate	Excessive
Alfalfa			
Stage	Veg	Veg	Veg
Height (inch)	7.2	11.3	10.0
Rainfall after each application (inch)			
Week 1	0.51	0.31	0.04
Week 2	1.78	0.45	0.10
Week 3	0.66	2.79	0.01

SUMMARY & DISCUSSION

The intended use of forage from this field was for dairy heifers. It is important to note the harvest dates for this trial. Wetter than normal weather conditions lengthened the duration of time before first cutting and between subsequent cuttings. The impacts of later and longer growth periods are likely to impact the results of fungicide application. Additional research is needed to verify the impacts on alfalfa hay grown for high quality dairy forage under shorter harvest intervals.

In this trial alfalfa treated with Headline, and Headline + Warrior increased forage yield by about 20 percent when compared to the untreated check and Warrior insecticide treatments. The yield increases were evident in all three cuttings. The most dramatic impact was observed in the first cutting. We did note reduced incidence of leaf spot disease in every cutting in the plots treated with Headline fungicide. The greatest reduction occurred in the first cutting where leaf spot diseases had infected and defoliated approximately 64 percent of the lower canopy; compared to a reduction of about 28-33 percent where Headline fungicide was used. The impact of foliar diseases in second and third crop still adversely impacted the lower canopy with roughly 45-49 percent of the lower canopy severely infected; compared to a reduction of 13-21 percent where Headline fungicide was used.

Insect pressure did not appear to be a significant factor throughout the duration of the trial with the possible exception of RFQ values in the first cutting. There was some early season insect damage from alfalfa weevils noted by terminal feeding in the first cutting, however, no yield differences were detected with insecticide treated and untreated treatments.

Season total yield and milk/A were greatest in the treatments that included Headline fungicide. However, economics may not be favorable for third cutting, due to lower tonnage associated with third crop alfalfa and generally drier conditions in July and August. There is also a case for resistance management, where repeated applications in a growing season nay lead to disease resistance to the fungicide. First cutting may be the best overall investment, disease response, greatest potential yield, etc. There were no differences in quality in this trial. We have evaluated our sampling technique and will change this in 2012.

Additional research is needed to evaluate the impact and economics of fungicide use in alfalfa. We are in discussions with the University of Wisconsin to plan and conduct trials with similar protocols in 2012. (University of Minnesota Extension Regional Office, Rochester)

Table 2. Forage quality and yield results of first cutting on June 9, 2011 at Waseca, MN.

Treatment	Rate	First Cutting									
		Leaf Spot	Plant Height	Yield	Protein	ADF	aNDF	RFQ	RFV	LB MILK/T	LB MILK/A
	(rate/A)	(%)	(in)	(T/A)	(%)	(%)	(%)				
Untreated Check		64 a	21.0 bc	2.0 b	19.3	40.0	48.2	111	118	2370	4690 c
Headline	6 fl oz/a	28 b	22.1 a	2.4 a	19.1	35.8	47.1	111	121	2363	5634 b
Headline + Warrior II	6 fl oz/a + 1.2 fl oz/a	33 b	21.6 a	2.4 a	19.8	33.8	44.4	132	131	2595	6269 a
Warrior	1.2 fl oz/a	64 a	20.5 c	2.0 b	19.0	35.6	46.1	122	124	2477	4940 c
	LSD (P=0.10)	6.4	0.9	0.1	NS	NS	NS	15	NS	NS	506

Table 3. Forage quality and yield results of second cutting on July 19, 2011 at Waseca, MN.

Treatment	Rate	Second Cutting									
		Leaf Spot	Plant Height	Yield	Protein	ADF	aNDF	RFQ	RFV	LB MILK/T	LB MILK/A
	(rate/A)	(%)	(in)	(T/A)	(%)	(%)	(%)				
Untreated check		45 a	30.2	1.8 b	17.8 a	41.0	52.0	92	103	2011	3562 b
Headline	6 fl oz/a	13 b	29.5	2.1 a	17.4 a	39.6	50.6	98	107	2039	4284 a
Headline + Warrior II	6 fl oz/a + 1.2 fl oz/a	15 b	30.1	2.1 a	16.7 b	41.8	52.6	92	100	1956	4071 a
Warrior II	1.2 fl oz/a	49 a	30.3	1.8 b	16.9 b	42.4	53.2	90	98	1878	3395 b
	LSD (P=0.10)	6	NS	0.1	0.8	1.7	NS	NS	NS	NS	345

Table 4. Forage quality and yield results of third cutting on August 16, 2011 at Waseca, MN.

Treatment	Rate	Third Cutting									
		Leaf Spot	Plant Height	Yield	Protein	ADF	aNDF	RFQ	RFV	LB MILK/T	LB MILK/A
	(rate/A)	(%)	(in)	(T/A)	(%)	(%)	(%)				
Untreated Check		46 a	24.2 b	1.4 b	20.1	35.8	48.6	98	117	2125	2965
Headline	6 fl oz/a	21 b	25.2 a	1.6 a	19.6	35.7	48.2	100	118	2180	3472
Headline + Warrior II	6 fl oz/a + 1.2 fl oz/a	16 b	25.7 a	1.6 a	19.9	36.9	49.4	92	113	2007	3172
Warrior II	1.2 fl oz/a	45 a	25.7 a	1.4 b	19.0	38.2	51.0	93	109	1997	2809
	LSD (P=0.10)	8	0.7	0.1	NS	NS	NS	NS	NS	NS	NS

Table 5. Forage value per acre for first, second, third cuttings and total season tons per acre and pounds milk per acre in 2011 at Waseca, MN.

Treatment	Rate	First Cutting		Second Cutting		Third Cutting		TOTAL	
		$ Value Yield/A	$ Value Lbs Milk/A	$ Value Yield/A	$ Value Lbs Milk/A	$ Value Yield/A	$ Value Lbs Milk/A	$ Value Yield/A	$ Value Lbs Milk/A
	(rate/A)	$125/T	$20/CWT	$125/T	$20/CWT	$125/T	$20/CWT	$125/T	$20/CWT
Untreated Check		247 b	938 c	223 b	712 b	174 b	593 a	644 b	2243 b
Headline	6 fl oz/a	298 a	1127 b	262 a	857 a	199 a	694 a	759 a	2678 a
Headline + Warrior II	6 fl oz/a + 1.2 fl oz/a	302 a	1254 a	260 a	814 a	197 a	634 a	760 a	2702 a
Warrior II	1.2 fl oz/a	249 b	988 c	226 b	679 b	176 b	562 a	652 b	2229 b
	LSD (P=0.10)	16	101	14	69	18	NS	26	198

Table 6. Dollar value return per acre over untreated for all cuttings in 2011 at Waseca, MN.

Treatment	Rate	First Cutting		Second Cutting		Third Cutting		TOTAL	
		$ Value Yield/A	$ Value Lbs Milk/A	$ Value Yield/A	$ Value Lbs Milk/A	$ Value Yield/A	$ Value Lbs Milk/A	$ Value Yield/A	$ Value Lbs Milk/A
	(rate/A)	$125/T	$20/CWT	$125/T	$20/CWT	$125/T	$20/CWT	$125/T	$20/CWT
Untreated Check		0 b	0 c	0 b	0 b	0 b	0 a	0 b	0 b
Headline	6 fl oz/a	51 a	189 b	39 a	145 a	25 a	101 a	115 a	435 a
Headline + Warrior II	6 fl oz/a + 1.2 fl oz/a	55 a	316 a	37 a	102 a	24 a	41 a	116 a	459 a
Warrior II	1.2 fl oz/a	2 b	50 c	3 b	-33 b	2 b	-31 a	8 b	-14 b
	LSD (P=0.10)	16	101	14	69	18	NS	26	198

Table 7. Season total dollar value return per acre over untreated for alfalfa in 2011 at Waseca, MN.

Treatment	Rate	TOTAL	TOTAL	DOLLAR RETURN/ACRE	
	(rate/A)	TONS/ACRE	LBS MILK/ACRE	($20/CWT)	Return over untreated
Untreated Check		5.2 b	11,217 b	2243 b	0
Headline	6 fl oz/a	6.1 a	13,391 a	2678 a	+435
Headline + Warrior II	6 fl oz/a + 1.2 fl oz/a	6.1 a	13,511 a	2702 a	+459
Warrior II	1.2 fl oz/a	5.2 b	11,145 b	2229 b	-14
	LSD (P=0.10)	0.2	991	198	

Table 8. Disease level, insect damage and insect numbers for each alfalfa cutting in 2011 at Waseca, MN.

Treatment	Rate	First Cutting		Second Cutting			Third Cutting		
		Disease	Terminal Feeding	Disease	PLH	Plant Bugs	Disease	PLH	Plant Bugs
	(rate/A)	%		%	Per 10 sweeps		%	Per 10 Sweeps	
Untreated Check		64	18	45	9	11	46	2	9
Headline	6 fl oz/a	38	17	13	6	7	21	1	15
Headline + Warrior II	6 fl oz/a + 1.2 fl oz/a	33	1	15	3	7	16	1	8
Warrior II	1.2 fl oz/a	64	1	49	4	8	45	0	8
	LSD (P=0.10)	**6**	**3.5**	**6**	**NS**	**NS**	**8**	**NS**	**3**

SECTION B

CORN HYBRIDS

2011 MINNESOTA CORN PERFORMANCE TRIALS

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University of Minnesota Agricultural Experiment Station

Results of the Minnesota Corn Evaluation Program are presented in this bulletin. The program was conducted by the University of Minnesota Agricultural Experiment Station to provide unbiased information for use by corn growers when they choose which brand of corn to buy and grow. The program was financed in part by entry fees from private seed companies that chose to place their entries for testing.

TEST LOCATIONS

Test zones, locations and maturities are as follows:

Southern Zone: Lamberton, Rochester, and Waseca
Early Maturity Trial – 103 Relative Maturity (RM) and earlier entries
Late Maturity Trial – 104 RM and later entries

Central Zone: Hutchinson, Morris, and Rosemount
Early Maturity Trial = 96 RM and earlier entries
Late Maturity Trial – 97 RM and later entries

Northern Zone: Glyphosate Tolerant Entries at Crookston, Rothsay & Staples
Entries without glyphosate tolerance at Crookston, Staples, & Underwood

TESTING PROCEDURE

Entries: Seed corn companies choose their entries for each zone. Entries in each trial were based on the relative maturity (RM) provided by the company. The University of Minnesota Corn Testing Committee could also choose entries in each test. All locations tested three replications for each entry.

PRESENTATION OF DATA

Yields are given for individual locations along with yields and harvest moisture contents averaged across locations for 2011. Reported yields are adjusted to 15.5% grain moisture. Entries are ranked within a maturity group by moisture content averaged across locations for 2011.

IDENTIFICATION OF TRAITS

Genetic modifications of entries will be identified using generic terms to describe the trait without identifying the specific event for genetic modification.

For example, Bt will identify genetic modification for corn borer resistance but will not differentiate between the Bt 11 event, the YieldGuard corn borer event or the Herculex corn borer event.

Identifiers will be:
Bt = European corn borer resistance
CRW = Corn rootworm resistance
GLY = glyphosate herbicide resistance
LL = Liberty herbicide resistance

LEAST SIGNIFICANT DIFFERENCE

The LSD (Least Significant Difference) figures at the bottom of the yield columns in the tables are statistical measures of variability in the trials. These values may be used to determine whether the difference between any two entries is likely to be a real difference or just natural variation.

If the yield difference between two entries is equal to or greater than the LSD, then one can be confident that the two entries probably differ in the yield potential. We show LSD values with a 0.2 alpha level which means that when two entries differ in yiled by the LSD value or more, one can be 80% confident that the two entries differ in yield potential. The higher yielding one is the better entry from the yield standpoint. If the yield difference between two entries lis less than the LSD, the two entries probably do not differ significantly in yield potential.

Table 1a. Participating Companies

Names and mailing addresses of companies participating in the 2011 trials:

	Internet Link
AgriGold Hybrids: Rt.1 Box 203 St Francisville, IL 62460	www.agrigold.com
Albert Lea Seed House (Viking Hybrids): Box 127, 1414 W. Main, Albert Lea, MN 56007	www.alseed.com
Anderson Seeds: 37825 Co. Road 63, St. Peter, MN 56082	
Croplan Genetics: 13749 Nevada Circle, Savage, MN 55378	www.croplangenetics.com
Dahlman Seed Co.: 73504 200th St., Dassel, MN 55325	www.dahlmanseed.com
Dairyland Seed Co., Inc.: Box 958, West Bend, WI 53095	www.dairylandseed.com
Dekalb (Monsanto Co.): 102 W. Carol Ave., Courtland, IL 60112	www.dekalb.com or www.asgrow.com
Dyna-Gro / CPS: 708 West Spruce St. Fergus Falls, MN 56537	www.dynagroseed.com/dynagro
Epley Bros. Hybrids Inc.: P.O. Box 310, Shell Rock IA 50670	
G2 Genetics: 415 South Duff, Suite C, Ames, IA 50010	www.yieldleader.com
Hyland Seeds: 2 Hyland Drive, Blenheim, Ontario, Canada NOP 1A0	www.hylandseeds.com
Johnson Seeds: 72700 185th St. Dassel, MN 55325	www.legendseeds.net
Legacy Seeds Inc.: 1937 Spindt Dr. Waupaca, WI 54981	www.legacyseeds.com
NuTech Seed: 415 South Duff, Suite C, Ames, IA 50010	www.nutechseed.com
Peterson Farms Seed: 3104 164th Ave S.E. Harwood, ND 58092	www.petersonfarmsseed.com
Pioneer Hi-Bred Int'l., Inc.: 151 Saint Andrews Ct., Mankato, MN 56001	www.pioneer.com/usa/
Proseed: 705 E Brewster, Harvey, ND 58341	www.proseed.net
Renk Seed Co.: 6809 Wilburn Rd., Sun Prairie, WI 53590	www.renkseed.com
Seeds 2000: Box 200 115 N 3rd St., Breckenridge, MN 56520	www.seeds2000.net
Titan Pro: 1301 S. 24th St, Clear Lake, IA 50428	www.titanprosci.com
Wensman Seed Co.: P.O. Box 190, Wadena, MN 56492	www.wensmanseed.com

Table 2. Individual Trial Information - 2011

Location	*Cooperators*	*Previous Crop*	*Planting Date*	*Harvest Date*
Lamberton	Steve Quiring	Soybean	10-May	11-Oct
Rochester	Fritz Brietenbach	Soybean	18-May	24-Oct
Waseca	Tom Hoverstad	Soybean	4-May	17-Oct
Hutchinson	Nathan Winter Paul Wright	Corn	4-Jun	19-Oct
Morris	George Nelson	Soybean	18-May	13-Oct
Rosemount	Jerry Holz	Soybean	16-May	25-Oct
Rothsay	George Nelson Troy Larson	Wheat	10-May	26-Oct
Crookston	Mark Hanson	Soybean	13-May	18-Oct
Staples	Bob Schafer	Soybean	10-May	18-Oct
Underwood	Matt Bickell	Corn	6-May	18-Oct

Early Maturity entries, Southern Locations, 2011

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Lamberton	Rochester	Waseca	Average Across Locations Bu/Acre	% Moisture
97 and earlier RM entries								
DAIRYLAND SEED	ST-9395SSX	Bt,CRW,GLY,LL	95	174	184	222	193	12.9
DeKalb	DKC45-51	Bt,CRW,GLY,LL	95	187	195	192	191	13.2
Renk	RK585VT3P	Bt,CRW,GLY	96	189	155	188	177	13.4
Anderson Seeds	812VT3	Bt,CRW,GLY	93	171	160	196	176	13.4
Dahlman	R48-30 VT3PRO	Bt,CRW,GLY	95	189	190	203	194	13.4
Renk	RK580VT3	Bt,CRW,GLY	97	184	192	204	193	13.5
Anderson Seeds	628R	GLY	95	195	192	202	196	13.5
Anderson Seeds	811R	GLY	92	173	168	181	174	13.5
Anderson Seeds	628VT3	Bt,CRW,GLY	96	168	190	219	192	13.7
AgriGold	A6203VT3	Bt,CRW,GLY	96	211	168	219	199	13.8
97 and earlier RM Averages:				**184**	**179**	**203**	**189**	**13.4**

Early Maturity entries, Southern Locations, 2011, continued

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Lamberton	Rochester	Waseca	Average Across Locations Bu/Acre	% Moisture
98 to 101 RM entries								
AgriGold	A6225VT3	Bt,CRW,GLY	98	204	190	197	197	13.0
DeKalb	DKC49-94	Bt,CRW,GLY,LL	99	187	180	206	191	13.1
Pioneer	P9910XR	Bt,CRW,GLY,LL	99	214	205	236	218	13.1
Anderson Seeds	617R	GLY	98	183	190	197	190	13.2
Titan Pro	80A00GL	Bt,CRW,GLY,LL	100	183	203	198	195	13.4
Wensman	W 7273VT3	Bt,CRW,GLY	98	181	183	202	188	13.4
DeKalb	DKC48-12	Bt,CRW,GLY,LL	98	192	202	206	200	13.6
AgriGold	A6220VT3Pro	Bt,CRW,GLY	98	199	186	190	191	13.7
Epley Brothers	E1238GT3000	Bt,CRW,GLY,LL	101	180	172	201	184	13.9
AgriGold	A6256STX	Bt,CRW,GLY,LL	100	193	185	212	197	14.0
Anderson Seeds	626R	GLY	100	182	172	209	188	14.1
Legacy Seeds	L-4010 VT3Pro	Bt,CRW,GLY	100	185	188	195	189	14.3
Wensman	W 7290VT3PRO	Bt,CRW,GLY	99	216	198	229	214	14.3
Viking	C94-00R		100	185	174	192	184	14.4
Croplan Genetics	4338VT3	Bt,CRW,GLY	100	187	198	205	197	14.4
G2 Genetics	5H-501	Bt,GLY,LL	101	192	204	210	202	14.4
Anderson Seeds	605VT3	Bt,CRW,GLY	100	178	172	196	182	14.5
G2 Genetics	5H-0101	Bt,GLY,LL	101	185	209	230	208	14.5
Dahlman	R50-30		100	174	191	180	182	14.5
NuTech	5N-001	Bt,CRW,GLY,LL	100	183	186	217	195	14.5
Anderson Seeds	6073		101	204	205	224	211	14.7
Pioneer	P0115XR	Bt,CRW,GLY,LL	101	196	230	223	216	14.7
Titan Pro	89A98GL	Bt,CRW,GLY,LL	98	193	195	209	199	14.8
DAIRYLAND SEED	ST-9501SSX	Bt,CRW,GLY,LL	101	188	192	220	200	14.9
DAIRYLAND SEED	ST-9399	Bt,CRW,GLY,LL	99	206	212	221	213	14.9
G2 Genetics	5X-500	Bt,CRW,GLY,LL	100	179	200	217	199	15.1
AgriGold	A6276VT3	Bt,CRW,GLY	101	198	208	209	205	15.2
Wensman	W 7320VT3PRO	Bt,CRW,GLY	101	184	193	197	191	15.3
Titan Pro	1018		101	179	202	233	205	15.5
Viking	60-01N		101	193	208	219	206	15.6
Titan Pro	80A01GLV	Bt,CRW,GLY,LL	101	188	207	220	205	16.2
98 to 101 RM Averages:				**190**	**195**	**210**	**198**	**14.4**

Early Maturity entries, Southern Locations, 2011, continued

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Lamberton	Rochester	Waseca	Average Across Locations: Bu/Acre	% Moisture
102 to 103 RM entries								
Anderson Seeds	103R	GLY	102	188	185	201	191	14.6
G2 Genetics	5H-902	Bt,GLY,LL	102	202	221	227	217	14.0
NuTech	5N-102	Bt,CRW,GLY,LL	102	195	188	227	203	14.4
DAIRYLAND SEED	ST-9303SSX	Bt,CRW,GLY,LL	103	205	210	218	211	14.5
Wensman	W 7360VT3	Bt,CRW,GLY	103	197	214	213	208	14.7
AgriGold	A6319VT3Pro	Bt,CRW,GLY	103	193	163	210	189	14.9
DeKalb	DKC53-78	Bt,CRW,GLY,LL	103	198	183	218	200	15.1
Renk	RK698VT3	Bt,CRW,GLY	103	188	206	213	202	15.2
NuTech	5B-0205	Bt,CRW,GLY,LL	102	176	211	228	205	15.3
G2 Genetics	5H-903	Bt,GLY,LL	103	182	207	199	196	15.4
Renk	RK694GTCBLLRWBL	Bt,CRW,GLY,LL	103	201	220	210	210	15.6
G2 Genetics	5H-502	Bt,GLY,LL	102	195	219	204	206	15.7
Anderson Seeds	103VT3	Bt,CRW,GLY	103	168	199	205	191	15.9
NuTech	5N-803	Bt,CRW,GLY,LL	103	186	195	224	202	16.1
AgriGold	A6323GT3	Bt,CRW,GLY,LL	103	210	197	215	207	17.5
102 to 103 RM averages:				**192**	**201**	**214**	**202**	**15.3**
Southern Locations, Early Maturity Averages:				**190**	**194**	**210**	**198**	**14.4**
LSD(0.20)				**19**	**19**	**18**	**11**	**0.5**

Late Maturity entries, Southern Locations, 2011

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Lamberton	Rochester	Waseca	Average Across Locations Bu/Acre	% Moisture
104 RM and later entries								
G2 Genetics	5H-905	Bt,GLY,LL	105	201	180	222	201	15.1
Renk	RK708VT3P	Bt,CRW,GLY	105	186	185	204	192	15.2
Wensman	W6443 RR	GLY	106	191	176	248	205	15.3
Titan Pro	1041		104	177	189	197	188	15.4
NuTech	5N-705	Bt,CRW,GLY,LL	105	184	164	223	190	15.4
Renk	RK741VT3P	Bt,CRW,GLY	108	189	169	222	193	15.5
Titan Pro	80A05GL	Bt,CRW,GLY,LL	105	182	179	211	190	16.0
DeKalb	DKC55-09	Bt,CRW,GLY,LL	105	193	197	223	204	16.1
Renk	RK744VT3P	Bt,CRW,GLY	107	188	187	211	195	16.3
G2 Genetics	5H-0701	Bt,GLY,LL	107	175	206	226	202	16.3
DeKalb	DKC57-50	Bt,CRW,GLY	107	170	181	194	182	16.5
Pioneer	P0448XR	Bt,CRW,GLY,LL	104	204	189	230	207	16.6
Croplan Genetics	5438SS	Bt,CRW,GLY,LL	104	192	190	230	204	16.7
Wensman	W 7473VT3	Bt,CRW,GLY	109	192	186	240	206	16.8
Viking	D44-05RL	Bt,CRW,GLY	105	172	186	221	193	16.9
Pioneer	P0533XR	Bt,CRW,GLY,LL	105	191	175	214	193	17.1
Viking	50-04N		104	204	208	204	206	17.2
DAIRYLAND SEED	ST-9206SSX	Bt,CRW,GLY,LL	106	189	185	209	194	17.3
Legacy Seeds	L-5350 3000GT	Bt,CRW,GLY,LL	104	195	213	216	208	17.4
Epley Brothers	E1418GT3000	Bt,CRW,GLY,LL	104	182	194	228	201	17.6
NuTech	5B-1003	Bt,GLY,LL	110	170	181	217	189	17.7
G2 Genetics	5H-0601	Bt,GLY,LL	106	192	173	229	198	17.8
Titan Pro	X81A04	GLY	104	191	164	205	187	17.9
Wensman	W 7392GT3	Bt,CRW,GLY,LL	104	213	181	206	200	18.1
DAIRYLAND SEED	ST-9308SSX	Bt,CRW,GLY,LL	108	175	170	197	181	18.5
NuTech	5N-1004	Bt,CRW,GLY,LL	110	172	185	209	189	18.7
G2 Genetics	5H-1001	Bt,GLY,LL	110	188	173	199	187	18.8
Epley Brothers	E1602SS	Bt,CRW,GLY,LL	106	168	188	226	194	18.8
Wensman	W 7566VT3PRO	Bt,CRW,GLY	111	190	188	241	206	19.1
DeKalb	DKC59-35	Bt,CRW,GLY	109	195	213	224	211	19.3
G2 Genetics	5X-909	Bt,CRW,GLY,LL	109	189	194	206	196	19.5
G2 Genetics	5X-908	Bt,CRW,GLY,LL	108	185	189	222	199	19.7
DAIRYLAND SEED	ST-9210SSX	Bt,CRW,GLY,LL	110	170	185	236	197	20.1
Southern Locations, Late Maturity Averages:				**187**	**186**	**218**	**197**	**17.3**
LSD(0.20)				**18**	**17**	**15**	**10**	**0.9**

Early Maturity entries, Central Locations, 2011

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Hutchinson	Morris	Rosemount	Average Across Locations Bu/Acre	% Moisture
93 and earlier RM entries								
NuTech	5N-290	Bt,CRW,GLY,LL	90	232	184	206	207	15.1
Proseed	990 3000GT	Bt,CRW,GLY,LL	90	209	180	197	195	15.2
Titan Pro	80A93GL	Bt,CRW,GLY,LL	93	220	163	200	194	15.2
Renk	RK302GTCBLLRW	Bt,CRW,GLY,LL	90	226	196	200	207	15.5
Proseed	1192 VT3Pro	Bt,CRW,GLY	92	196	164	160	174	15.5
G2 Genetics	5H-492	Bt,GLY,LL	92	189	189	178	185	15.9
Proseed	1091 3000GT	Bt,CRW,GLY,LL	91	208	163	192	188	15.9
PFS	98L90	Bt,GLY,LL	90	245	220	217	227	16.4
NuTech	5B-290	Bt,GLY,LL	90	205	205	199	203	16.5
Renk	RK434VT3P	Bt,CRW,GLY	92	225	193	199	206	16.5
PFS	76R92	Bt,GLY	92	208	192	203	201	16.6
DeKalb	DKC42-72	Bt,CRW,GLY	92	220	181	186	196	16.7
G2 Genetics	5X-9101	Bt,CRW,GLY,LL	91	199	192	193	195	16.8
Dahlman	R45-46 RR	GLY	90	209	185	195	196	17.0
Dahlman	R45-48 VT3PRO	Bt,CRW,GLY	90	211	169	192	191	17.1
DAIRYLAND SEED	ST-9992	Bt,GLY,LL	92	239	211	215	222	17.7
Dahlman	R45-34 VT3PRO	Bt,CRW,GLY	90	221	187	181	196	17.8
Wensman	W 7140VT3PRO	Bt,CRW,GLY	93	226	180	189	198	18.2
NuTech	5N-9001	Bt,CRW,GLY,LL	90	205	171	178	185	18.3
Dahlman	R46-30 VT3PRO	Bt,CRW,GLY	92	226	165	183	191	18.4
93 RM and earlier averages:				**216**	**184**	**193**	**198**	**16.6**

Early Maturity entries, Central Locations, 2011

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Hutchinson	Morris	Rosemount	Average Across Locations: Bu/Acre	% Moisture
94 to 96 RM entries								
DAIRYLAND SEED	ST-6494	Bt,CRW,GLY,LL	94	203	194	195	198	15.6
Hyland Seeds	8377	Bt,CRW,GLY,LL	94	195	169	193	186	16.5
SEEDS 2000	9602 G3	Bt,CRW,GLY,LL	96	217	204	203	208	16.9
Proseed	794 3000GT	Bt,CRW,GLY,LL	94	204	182	207	198	17.3
G2 Genetics	5X-795	Bt,CRW,GLY,LL	95	211	194	190	198	17.4
Dahlman	R48-30 VT3PRO	Bt,CRW,GLY	95	215	179	205	200	17.7
Viking	E52-94R		94	201	187	184	191	17.8
Renk	RK585VT3P	Bt,CRW,GLY	96	201	196	197	198	17.9
DAIRYLAND SEED	ST-9395SSX	Bt,CRW,GLY,LL	95	218	197	209	208	18.0
Legacy Seeds	L-3610 VT3Pro	Bt,CRW,GLY	96	223	195	196	205	18.1
Pioneer	P9630XR	Bt,CRW,GLY,LL	96	225	163	190	193	18.2
Legacy Seeds	L-3110 VT3Pro	Bt,CRW,GLY	94	233	170	196	199	18.3
Renk	RK530VT3P	Bt,CRW,GLY	94	215	191	188	198	18.3
G2 Genetics	5X-895	Bt,CRW,GLY,LL	95	205	188	183	192	18.5
PFS	87V95	Bt,CRW,GLY,LL	95	192	147	208	182	18.6
Wensman	W 7268VT3	Bt,CRW,GLY	96	217	204	215	212	18.7
Viking	C33-94R	GLY	94	198	179	192	189	18.9
G2 Genetics	5H-696	Bt,GLY,LL	96	225	44	203	157	19.0
DeKalb	DKC45-51	Bt,CRW,GLY,LL	95	218	172	191	194	19.9
94 to 96 RM averages:				**211**	**176**	**197**	**195**	**18.0**
Central Locations, Early Maturity Averages:				**214**	**181**	**195**	**196**	**17.3**
LSD(0.20)				**15**	**20**	**12**	**9**	**0.5**

Late Maturity entries, Central Locations, 2011

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Hutchinson	Morris	Rosemount	Average Across Locations Bu/Acre	% Moisture
97 to 99 RM entries								
NuTech	5N-9901	Bt,CRW,GLY,LL	99	176	192	203	190	16.6
G2 Genetics	5H-797	Bt,GLY,LL	97	220	192	200	204	18.0
Wensman	W 7273VT3	Bt,CRW,GLY	98	214	208	211	211	18.1
Wensman	W 7270VT3PRO	Bt,CRW,GLY	97	211	174	196	194	18.1
Viking	U41-99L	Bt, LL	99	192	174	213	193	18.3
Titan Pro	X81A97	Bt,GLY,LL	97	221	145	175	180	18.5
Pioneer	P9917XR	Bt,CRW,GLY,LL	99	198	194	209	200	18.9
Pioneer	P9910XR	Bt,CRW,GLY,LL	99	198	188	201	196	18.9
PFS	53B97	Bt,CRW,GLY	97	190	177	215	194	19.0
Renk	RK676		99	205	171	187	188	19.0
Renk	RK580VT3	Bt,CRW,GLY	97	237	157	199	198	19.1
NuTech	5N-197	Bt,CRW,GLY,LL	97	186	205	212	201	19.2
DeKalb	DKC48-12	Bt,CRW,GLY,LL	98	228	205	206	213	19.2
Wensman	W 7290VT3PRO	Bt,CRW,GLY	99	206	175	225	202	19.5
DeKalb	DKC49-94	Bt,CRW,GLY,LL	99	215	206	196	206	19.5
Viking	Y91-99RL	Bt,CRW,GLY,LL	99	207	208	196	204	20.1
Titan Pro	89A98GL	Bt,CRW,GLY,LL	98	238	211	209	219	20.2
SEEDS 2000	9902 G3	Bt,CRW,GLY,LL	99	214	228	215	219	20.3
DAIRYLAND SEED	ST-9399	Bt,CRW,GLY,LL	99	204	222	204	210	20.6
Hyland Seeds	HL 4424	Bt,CRW,GLY,LL	98	192	195	198	195	20.9
99 RM and earlier averages:				**208**	**191**	**203**	**201**	**19.1**

Late Maturity entries, Central Locations, 2011

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Hutchinson	Morris	Rosemount	Average Across Locations Bu/Acre	% Moisture
Later than 99 RM entries								
DeKalb	DKC50-66	Bt,CRW,GLY	100	227	186	195	203	18.7
Titan Pro	80A00GL	Bt,CRW,GLY,LL	100	206	186	208	200	19.0
Dahlman	R50-30		100	194	171	189	185	19.0
DAIRYLAND SEED	ST-9501SSX	Bt,CRW,GLY,LL	101	183	182	208	191	19.2
G2 Genetics	5X-500	Bt,CRW,GLY,LL	100	156	177	207	180	19.2
Hyland Seeds	HL 4490	Bt,CRW,GLY,LL	100	190	149	193	178	19.5
Titan Pro	1018		101	208	217	204	210	19.9
Legacy Seeds	L-4010 VT3Pro	Bt,CRW,GLY	100	206	228	189	208	20.1
G2 Genetics	5H-902	Bt,GLY,LL	102	216	196	209	207	20.2
NuTech	5B-0205	Bt,CRW,GLY,LL	102	195	138	209	180	20.3
G2 Genetics	5H-0101	Bt,GLY,LL	101	227	210	205	214	20.3
NuTech	5N-001	Bt,CRW,GLY,LL	100	176	202	208	195	20.5
NuTech	5N-102	Bt,CRW,GLY,LL	102	213	226	213	217	20.6
Renk	RK698VT3	Bt,CRW,GLY	103	206	193	213	204	20.8
Wensman	W 7320VT3PRO	Bt,CRW,GLY	101	221	205	201	209	21.2
G2 Genetics	5H-501	Bt,GLY,LL	101	224	211	207	214	21.3
DeKalb	DKC53-78	Bt,CRW,GLY,LL	103	190	153	217	187	21.3
Titan Pro	80A01GLV	Bt,CRW,GLY,LL	101	178	199	209	195	21.5
G2 Genetics	5H-502	Bt,GLY,LL	102	203	188	215	202	21.5
DAIRYLAND SEED	ST-9303SSX	Bt,CRW,GLY,LL	103	209	134	224	189	22.1
DAIRYLAND SEED	ST-9206SSX	Bt,CRW,GLY,LL	106	199	161	210	190	22.5
DeKalb	DKC55-09	Bt,CRW,GLY,LL	105	230	175	203	202	22.6
Pioneer	P0448XR	Bt,CRW,GLY,LL	104	222	200	212	211	22.8
Later than 99 RM averages:				**203**	**186**	**206**	**199**	**20.6**
Central Locations, Late Maturity Averages:				**205**	**189**	**205**	**200**	**19.9**
LSD(0.20)				**23**	**30**	**11**	**13**	**0.7**

Glyphosate Tolerant entries, Northern Locations, 2011

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Crookston	Rothsay	Staples	Average Across Locations Bu/Acre	% Moisture
82 and earlier RM glyphosate tolerant entries								
Wensman Brand	W 8107VT2PRO	Bt,GLY	80	93	162	197	151	14.9
PFS	76F82	Bt,GLY	82	117	172	179	156	15.0
Wensman Brand	W 7080VT3	Bt,CRW,GLY	80	151	150	185	162	15.0
Renk	RK212GT	GLY	81	133	160	198	164	15.2
Wensman Brand	W 8074VT2PRO	Bt,GLY	81	127	146	198	157	15.3
82 and earlier RM glyphosate tolerant entry averages:				**124**	**158**	**192**	**158**	**15.1**

Glyphosate Tolerant entries, Northern Locations, 2011

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Crookston	Rothsay	Staples	Average Across Locations Bu/Acre	% Moisture
83 to 87 RM glyphosate tolerant entries								
G2 Genetics	5H-080	Bt,GLY,LL	83	138	136	207	160	14.4
Hyland Seeds	8234	Bt,CRW,GLY,LL	86	138	155	176	156	14.5
DAIRYLAND SEED	ST-9286SSX	Bt,CRW,GLY,LL	86	158	158	187	168	14.8
PFS	56J86	Bt,CRW,GLY	86	180	164	201	182	14.8
DeKalb	DKC33-53	Bt,CRW,GLY,LL	83	119	132	185	145	14.8
Proseed	884 VT3	Bt,CRW,GLY	84	120	157	181	153	14.9
DeKalb	DKC35-43	Bt,CRW,GLY	85	118	148	175	147	14.9
Wensman Brand	W 8089VT2PRO	Bt,GLY	86	129	146	204	160	14.9
Dyna-Gro Seed	D27GC19	Bt,GLY,LL	87	140	158	188	162	14.9
Dahlman	R43-30 VT3PRO	Bt,CRW,GLY	85	156	161	208	175	14.9
DAIRYLAND SEED	ST-7085	Bt,GLY,LL	85	138	136	200	158	15.0
Pioneer Brand	39V07	Bt,CRW,GLY	85	164	158	198	174	15.0
Renk	RK295GTCBLLRW	Bt,CRW,GLY,LL	85	115	169	182	155	15.0
NuTech	5N-183	Bt,CRW,GLY,LL	83	110	138	184	144	15.0
Wensman Brand	W 8085VT2PRO	Bt,GLY	84	120	168	202	163	15.1
NuTech	5N-186	Bt,CRW,GLY,LL	86	116	144	204	154	15.1
Pioneer Brand	P8581R	GLY	85	107	128	191	142	15.2
Proseed	1086 3000GT	Bt,CRW,GLY,LL	86	149	168	192	170	15.2
Proseed	1183 GTCBLL	Bt,GLY,LL	83	139	159	184	161	15.3
Proseed	781 RRBt	Bt,GLY	83	128	158	181	156	15.5
SEEDS 2000	2852 GTCBLL	Bt,GLY,LL	85	114	176	213	168	15.7
Hyland Seeds	HL R230	GLY	86	125	158	172	151	20.0
Proseed	1185 VT2	Bt,GLY	85	136	154	176	155	20.3
83 to 87 RM glyphosate tolerant entry averages:				**133**	**153**	**191**	**159**	**15.4**

Glyphosate Tolerant entries, Northern Locations, 2011, continued

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Crookston	Rothsay	Staples	Average Across Locations Bu/Acre	% Moisture
88 to 92 RM glyphosate tolerant entries								
DeKalb	DKC39-07	Bt,GLY	89	149	182	217	183	14.4
Renk	RK302GTCBLLRW	Bt,CRW,GLY,LL	90	101	177	213	164	14.5
Proseed	990 3000GT	Bt,CRW,GLY,LL	90	90	151	203	148	14.5
Legacy Seeds	L-2999 3000GT	Bt,CRW,GLY,LL	91	130	179	208	172	14.7
Dahlman	R44-66 RR	GLY	88	184	207	198	196	14.7
NuTech	5N-290	Bt,CRW,GLY,LL	90	120	170	198	163	14.9
Hyland Seeds	HL R238	GLY	92	150	186	205	180	14.9
Pioneer Brand	P8906HR	Bt,CRW,GLY	89	90	174	226	163	15.0
Titan Pro	X81A88GLV	GLY	88	119	161	165	148	15.1
Dyna-Gro Seed	CX11191	Bt,CRW,GLY	91	174	163	202	179	15.1
PFS	98L90	Bt,GLY,LL	90	161	176	205	181	15.1
G2 Genetics	5X-8901	Bt,CRW,GLY,LL	89	71	150	178	133	15.1
Hyland Seeds	8300	Bt,CRW,GLY,LL	90	171	175	182	176	15.2
Proseed	1091 3000GT	Bt,CRW,GLY,LL	91	176	150	194	173	15.2
G2 Genetics	5X-9101	Bt,CRW,GLY,LL	91	112	173	198	161	15.2
Dyna-Gro Seed	D32VP29	Bt,CRW,GLY	92	171	175	208	185	15.2
Dahlman	R45-48 VT3PRO	Bt,CRW,GLY	90	182	195	205	194	15.3
NuTech	5B-290	Bt,GLY,LL	90	136	135	200	157	15.3
SEEDS 2000	2903 GTCBLL	Bt,GLY,LL	90	134	150	211	165	15.4
Renk	RK434VT3P	Bt,CRW,GLY	92	163	153	197	171	15.4
Wensman Brand	W 8120VT2PRO	Bt,GLY	92	158	163	201	174	15.4
G2 Genetics	5H-492	Bt,GLY,LL	92	130	177	186	164	15.4
Dahlman	R45-34 VT3PRO	Bt,CRW,GLY	90	169	160	190	173	15.4
PFS	76R92	Bt,GLY	92	174	152	220	182	15.4
Dahlman	R46-30 VT3PRO	Bt,CRW,GLY	92	150	147	188	161	15.5
Hyland Seeds	8386	Bt,CRW,GLY,LL	92	144	176	202	174	15.6
Wensman Brand	W 7107VT3	Bt,CRW,GLY	90	113	174	206	164	15.6
DAIRYLAND SEED	ST-9992	Bt,GLY,LL	92	162	127	197	162	15.6
Legacy Seeds	L-2811 VT3Pro	Bt,CRW,GLY	88	189	149	204	181	15.7
Dahlman	R45-46 RR	GLY	90	177	169	216	187	15.8
G2 Genetics	5H-8902	Bt,GLY,LL	89	137	159	197	164	15.8
NuTech	5N-9001	Bt,CRW,GLY,LL	90	153	197	200	183	16.5
88 to 92 RM glyphosate tolerant entry averages:				**145**	**166**	**201**	**171**	**15.2**

Glyphosate Tolerant entries, Northern Locations, 2011, continued

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Crookston	Rothsay	Staples	Average Across Locations Bu/Acre	% Moisture
93 and later RM glyphosate tolerant entries								
DAIRYLAND SEED	ST-9395SSX	Bt,CRW,GLY,LL	95	143	154	191	163	14.5
Hyland Seeds	8454	Bt,CRW,GLY,LL	93	120	164	189	157	14.6
DAIRYLAND SEED	ST-6494	Bt,CRW,GLY,LL	94	87	187	198	157	14.6
Hyland Seeds	8395	Bt,CRW,GLY,LL	95	92	165	192	149	14.7
Dyna-Gro Seed	D35RR40	GLY	95	155	187	218	187	14.9
SEEDS 2000	9202 VT2P	Bt,GLY	95	177	192	197	189	15.2
DeKalb	DKC45-51	Bt,CRW,GLY,LL	95	164	172	176	171	15.3
Wensman Brand	W 7140VT3PRO	Bt,CRW,GLY	93	169	170	203	181	15.8
Wensman Brand	7143VT3	Bt,CRW,GLY	93	105	165	200	157	15.8
G2 Genetics	5X-795	Bt,CRW,GLY,LL	95	49	168	200	139	15.9
SEEDS 2000	9503 VT3P	Bt,CRW,GLY	95	185	185	201	190	15.9
Pioneer Brand	P9630XR	Bt,CRW,GLY,LL	96	107	150	192	150	16.0
93 and Later RM glyphosate tolerant entry averages:				**129**	**172**	**196**	**166**	**15.3**
Glyphosate tolerant northern locations averages:				**137**	**163**	**196**	**165**	**15.3**
LSD(0.20)				**23**	**27**	**13**	**12**	**0.3**

Entries Without Glyphosate Tolerance, Northern Locations, 2011

Company	Entry	Traits	Relative Maturity	Yield, Bushels/acre at: Crookston	Staples	Underwood	Average Across Locations Bu/Acre	% Moisture
Foundation Direct	8925		85	103	182	150	145	14.9
Dahlman	R40-10		80	116	154	92	120	14.9
Foundation Direct	ORG8080		80	79	151	114	115	15.1
Foundation Direct	ORG8900		88	156	177	162	165	15.3
Viking	20-90N		90	135	197	201	177	15.9
Foundation Direct	8830		89	132	194	184	170	16.2
Foundation Direct	8984		84	53	214	177	148	16.8
Northern Zone non glyphosate entry average:				**110**	**181**	**154**	**149**	**15.6**
LSD(0.20)				**24**	**12**	**16**	**10**	**0.3**

2011 Minnesota Hybrid Corn Silage Performance Trials

Prepared by the corn silage hybrid testing consortium: C.C. Sheaffer, J. A. Coulter, D.R. Swanson, T.R. Hoverstad, M.D. Bickell, L.M. Behnken, F.R. Breitenbach, and D.L. Holen; 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
Hutchinson, MN (McLeod County)
Melrose, MN (Stearns County)

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

TEST PROCEDURES

Design: Plots were established at LaCrescent, Rochester, Hutchinson, Melrose, Underwood and Ottertail in randomized complete block designs with 4 replications. Planting and harvesting dates at the test sites follow:

Site	Planting Date	Harvest Date
LaCrescent	May 18	September 19
Rochester	May 18	September 20
Hutchinson	June 4	September 13
Melrose	May 26	September 13
Underwood & Ottertail	May 6	September 14

Hybrid entries were planted at 35,000 seed per acre with 30-inch row spacing. Plant nutrients as manure or inorganic fertilizer were applied according to University of Minnesota recommendation. Herbicides were applied to control weeds following University of Minnesota recommendations.

Harvesting: Plots were harvested and whole-plant herbage sampled for dry matter and forage quality analysis at each site. Test sites was harvested when the average whole-plant moisture across entries was estimated to be 65%. Replications were reduced to three at the Underwood site due to crop damage caused by wildlife feeding. Low harvest moisture at Rochester was due to an early frost which damaged the upper part of plants.

RESULTS PROVIDED

Tables 1-6 summarize hybrid yield and forage quality results from LaCrescent, Rochester, Hutchinson, Melrose, Underwood, 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 potential 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. Milk production (lb milk/ton and lb milk/acre) values can be used as a quick reference for relative comparison of hybrids within test locations.

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
Albert Lea Seed House (Viking)	www.alseed.com
Anderson Seeds, 37825 County Road 63, St. Peter, MN 56082	
Dairyland Seed Co, Inc.	www.dairylandseed.com
Dyna-Gro Seeds	www.dynagroseed.com
Gold Country Seed	www.goldcountryseed.com
Hyland Seeds	www.hylandseeds.com
Legacy Seeds, Inc	www.legacyseeds.com
Legend Seeds	www.legendseeds.net
Masters Choice	www.seedcorn.com
Monsanto (DeKalb)	www.asgrowanddekalb.com
Mycogen Seed	www.dowagro.com/mycogen
Nu Tech Seed LLC	www.yieldleader.com
Pioneer Hi-Bred, Int'l	www.pioneer.com
Producers Hybrids	www.producershybrids.com
REA Hybrids	www.rea-hybrids.com
Renk Seed Co.	www.renkseed.com
Seeds 2000	www.seeds2000.net
Stine Seed Co.	www.stineseed.com
Syngenta Seeds	www.syngenta.com
Trelay Seeds	www.trelay.com
Wensman Seed Company	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 planted at LaCrescent, MN (Houston County) in 2011.*

No.	Company/ 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
1	Dairyland Seed/ HiD.F.-3110-Q	Bt,CRW,GLY	108	62.6	16.4	44.0	7.7	40	79	50	37	3,690	60,700
2	DEKALB/ DKC55-09	Bt,CRW,GLY,LL	105	57.5	15.9	37.5	8.1	34	84	53	45	3,740	59,500
3	NuTech/ 5N-1004	Bt,CRW,GLY,LL	110	55.7	16.3	36.9	7.4	38	81	52	41	3,600	58,800
4	Pioneer Brand/ 34A89	Bt,CRW,GLY,LL	109	61.3	15.9	41.0	7.5	39	79	54	39	3,690	58,600
5	Pioneer Brand/ P0891XR	Bt,CRW,GLY,LL	108	61.4	15.9	41.3	7.5	40	79	50	37	3,650	58,200
6	Pioneer Brand/ 33F88	Bt,CRW,GLY,LL	114	61.5	15.4	39.9	7.4	37	81	51	40	3,730	57,300
7	Mycogen/ TMF2L533	Bt,CRW,GLY,LL	101	56.8	15.6	36.1	6.9	38	81	52	41	3,660	57,100
8	Renk/ RK733VT3 NDS	Bt,CRW,GLY	107	61.9	15.3	40.2	7.6	39	80	51	39	3,720	56,900
9	Legacy Seeds/ L-5810 3000GT	Bt,CRW,GLY,LL	106	59.2	15.2	37.2	7.0	35	81	52	43	3,740	56,700
10	AgriGold/ A6439VT3	Bt,CRW,GLY	109	60.3	15.2	38.3	8.0	38	81	52	40	3,720	56,600
11	G2 Genetics/ 5H-511TM	Bt,GLY,LL	111	62.7	15.2	40.8	7.4	39	80	52	38	3,720	56,600
12	DEKALB/ DKC59-35	Bt,CRW,GLY	109	60.1	15.3	38.3	7.5	38	81	50	40	3,690	56,500
13	DEKALB/ DKC61-35	Bt,CRW,GLY	111	61.8	15.1	39.4	7.2	40	79	52	38	3,710	55,800
14	Wensman Seed/ W 7360VT3	Bt,CRW,GLY	103	59.7	14.9	36.9	7.4	34	83	52	46	3,740	55,700
15	Gold Country Seed/110-35 VT3	Bt,CRW,GLY	110	59.0	14.8	36.0	7.8	35	81	50	43	3,740	55,300
16	Masters Choice/ MC-5250		102	58.1	14.7	35.0	7.2	36	82	52	44	3,740	54,800
17	DEKALB/ DKC61-88	Bt,CRW,GLY	111	62.6	14.7	39.2	7.5	39	79	53	39	3,710	54,400
18	Mycogen/ TMF2W727	Bt,CRW,GLY,LL	113	64.7	15.0	42.4	7.1	42	78	51	35	3,610	54,000
19	Wensman Seed/ W 7392GT3	Bt,CRW,GLY,LL	104	58.9	14.5	35.2	7.2	36	81	52	42	3,730	54,000
20	AgriGold/ A6323GT3	Bt,CRW,GLY,LL	103	57.4	14.5	34.0	7.2	37	81	51	42	3,680	53,300
21	Garst/ 85V88-3000GT	Bt,CRW,GLY,LL	107	59.8	14.2	35.4	7.4	36	81	51	43	3,740	53,300
22	Garst/ 88E98-3000GT	Bt,CRW,GLY,LL	109	61.2	14.3	36.7	7.5	36	81	52	42	3,730	53,200
23	Legacy Seeds/ L-5350 3000GT	Bt,CRW,GLY,LL	104	59.4	14.4	35.4	7.4	39	80	54	39	3,670	52,800
24	G2 Genetics/ 5X-909TM	Bt,CRW,GLY,LL	109	62.7	14.1	37.9	8.5	40	80	52	37	3,710	52,500
25	G2 Genetics/ 5X-007TM	Bt,CRW,GLY,LL	107	62.0	14.1	37.1	7.2	39	80	51	39	3,710	52,400
26	Trelay/ 6VP982	Bt,CRW,GLY	107	61.1	14.1	36.2	7.8	38	81	52	40	3,720	52,300
27	Masters Choice/ MC-535		107	62.5	14.2	37.8	7.4	39	81	52	39	3,670	52,200
28	AgriGold/ A6384VT3Pro	Bt,CRW,GLY	106	61.0	14.3	36.6	7.0	40	79	51	39	3,650	52,100
29	NuTech/ 5N-406	Bt,CRW,GLY,LL	106	58.1	14.1	33.6	7.0	36	81	51	43	3,700	52,100
30	Producers Hybrids/ 6364GT3	Bt,CRW,GLY,LL	103	58.2	14.0	33.4	6.9	37	81	51	42	3,710	51,800
31	Gold Country Seed/103-09 VT3P	Bt,CRW,GLY	103	61.4	14.0	36.2	7.0	40	80	54	38	3,680	51,400
32	Golden Harvest/ H-8211 3000GT	Bt,CRW,GLY,LL	105	61.0	14.0	35.9	7.2	39	80	52	39	3,670	51,300
33	AgriGold/ A6389VT3Pro	Bt,CRW,GLY	106	62.6	13.8	36.7	7.7	38	80	52	40	3,710	51,100

Table 1. *Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield, and quality traits for corn hybrids planted at planted at LaCrescent, MN (Houston County) in 2011.*

No.	Company/ 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
38	Legend Seeds/ 9207-3000GT	Bt,CRW,GLY,LL	107	61.4	13.8	35.6	7.3	40	79	52	39	3,660	50,300
39	Trelay/ 6ST620	Bt,CRW,GLY,LL	106	60.8	13.5	34.4	7.2	39	80	52	38	3,710	50,000
40	G2 Genetics/ 5X-905TM	Bt,CRW,GLY,LL	105	61.3	13.3	34.3	7.4	38	80	50	40	3,720	49,500
41	NK/ N49J-3000GT	Bt,CRW,GLY,LL	103	60.5	13.4	33.9	7.2	41	79	53	38	3,670	49,100
42	Gold Country Seed/107-17 VT3P	Bt,CRW,GLY	107	59.4	13.5	33.2	7.7	39	80	53	39	3,640	49,000
43	Anderson Seeds/ 6073		101	55.7	13.2	29.7	7.0	35	82	51	44	3,710	48,900
44	Producers Hybrids/ 7394VT3	Bt,CRW,GLY	113	64.0	13.2	36.7	7.4	40	79	50	38	3,700	48,800
45	Anderson Seeds/ 628VT3	Bt,CRW,GLY	96	55.5	13.5	30.3	7.0	41	79	53	38	3,610	48,600
46	Stine/ 9729VT3PRO	Bt,CRW,GLY	108	63.4	12.8	35.0	7.6	34	82	51	45	3,750	48,000
47	Trelay/ 6VT823	Bt,CRW,GLY	107	59.9	12.7	31.6	7.2	37	81	53	41	3,720	47,100
48	Legend Seeds/ 47J104-3000GT	Bt,CRW,GLY,LL	104	56.8	12.6	29.1	7.1	34	82	52	46	3,720	46,800
49	Stine/ 9731VT3PRO	Bt,CRW,GLY	109	63.8	12.5	34.6	7.5	36	81	52	42	3,740	46,700
50	Anderson Seeds/ 103VT3	Bt,CRW,GLY	103	59.6	12.7	31.4	7.4	37	81	52	42	3,670	46,500
51	Anderson Seeds/ 103R	GLY	102	58.8	12.4	30.2	7.8	36	82	52	43	3,730	46,400
52	Trelay/ 7VP745	Bt,CRW,GLY	111	63.2	12.7	34.6	7.9	43	79	52	34	3,630	46,200
53	DEKALB/ DKC53-78	Bt,CRW,GLY,LL	103	58.4	12.5	30.2	8.0	38	80	53	40	3,680	46,100
54	Masters Choice/ MC-527		105	56.4	12.3	28.1	6.7	35	81	53	45	3,700	45,300
55	Gold Country Seed/101-99 GENSS	Bt,CRW,GLY,LL	101	61.8	12.1	31.7	7.6	40	80	52	38	3,700	44,900
56	Anderson Seeds/ 626R	GLY	100	61.1	11.9	30.7	7.4	39	80	53	39	3,700	44,300
57	Anderson Seeds/ 617R	GLY	98	61.3	11.1	28.6	7.0	43	79	53	36	3,630	40,200
58	Anderson Seeds/ 605VT3	Bt,CRW,GLY	100	58.6	10.5	25.4	7.3	37	81	52	43	3,710	39,000
	mean			**60.3**	**14.0**	**35.3**	**7.4**	**38**	**80**	**52**	**40**	**3,700**	**51,600**
	LSD(0.10)			**3.2**	**2.0**	**3.6**	**0.5**	**4**	**2**	**2**	**5**	**80**	**7600**
	CV			**4.6**	**12.3**	**8.9**	**6.2**	**9.7**	**2.2**	**3.0**	**10.5**	**1.8**	**12.7**

[1] Bt, CRW, GLY, and LL traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, and Liberty (glufosinate-ammonium) herbicide tolerance, 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 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 2011.*

No.	Company/ 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
1	DEKALB/ DKC59-35	Bt,CRW,GLY	109	55.4	13.1	29.4	7.2	43	79	54	34	3,550	46,600
2	Dairyland Seed/ HiD.F.-3110-Q	Bt,CRW,GLY	108	60.6	12.9	32.7	6.7	45	77	51	31	3,540	45,600
3	DEKALB/ DKC61-88	Bt,CRW,GLY	111	55.4	12.4	27.8	6.3	38	80	53	40	3,670	45,400
4	G2 Genetics/ 5H-511TM	Bt,GLY,LL	111	60.4	12.3	31.0	6.3	41	79	53	37	3,660	45,000
5	AgriGold/ A6323GT3	Bt,CRW,GLY,LL	103	51.7	12.6	26.1	6.4	41	79	53	38	3,550	44,900
6	AgriGold/ A6439VT3	Bt,CRW,GLY	109	55.8	12.4	28.0	7.2	41	79	55	36	3,610	44,700
7	Wensman Seed/ W 7360VT3	Bt,CRW,GLY	103	53.2	12.6	26.8	6.5	40	79	52	39	3,530	44,300
8	G2 Genetics/ 5X-909TM	Bt,CRW,GLY,LL	109	59.7	12.0	29.8	6.9	39	80	53	38	3,670	44,000
9	G2 Genetics/ 5X-007TM	Bt,CRW,GLY,LL	107	57.4	12.1	28.5	6.9	41	79	53	37	3,570	43,300
10	Pioneer Brand/ 34A89	Bt,CRW,GLY,LL	109	55.9	12.2	27.7	6.7	44	78	54	34	3,540	43,300
11	Wensman Seed/ W 7392GT3	Bt,CRW,GLY,LL	104	55.9	11.8	26.8	6.4	38	80	53	40	3,660	43,200
12	Masters Choice/ MC-527		105	53.9	11.8	25.5	6.6	36	81	53	43	3,660	43,000
13	AgriGold/ A6436VT3Pro	Bt,CRW,GLY	109	57.3	11.8	27.7	6.3	41	80	54	37	3,630	42,900
14	Pioneer Brand/ 33F88	Bt,CRW,GLY,LL	114	58.5	11.8	28.5	6.8	41	79	53	36	3,610	42,600
15	Legacy Seeds/ L-5810 3000GT	Bt,CRW,GLY,LL	106	58.0	11.6	27.7	6.2	38	80	51	40	3,650	42,500
16	Mycogen/ TMF2L533	Bt,CRW,GLY,LL	101	54.9	11.9	26.4	6.2	43	78	53	35	3,550	42,400
17	Gold Country Seed/110-35 VT3	Bt,CRW,GLY	110	57.2	11.6	27.2	6.6	42	79	54	36	3,610	42,000
18	Pioneer Brand/ P0891XR	Bt,CRW,GLY,LL	108	57.5	11.7	27.5	6.6	42	78	52	36	3,580	41,900
19	AgriGold/ A6384VT3Pro	Bt,CRW,GLY	106	56.0	11.8	26.8	6.5	42	78	51	35	3,500	41,200
20	Stine/ 9729VT3PRO	Bt,CRW,GLY	108	54.7	11.3	24.9	6.5	39	80	53	38	3,620	40,900
21	Mycogen/ TMF2W727	Bt,CRW,GLY,LL	113	62.4	11.8	31.3	6.7	48	76	52	28	3,470	40,800
22	Trelay/ 6VP982	Bt,CRW,GLY	107	54.8	11.3	24.9	6.7	38	80	53	41	3,620	40,800
23	Garst/ 88E98-3000GT	Bt,CRW,GLY,LL	109	58.4	11.2	26.9	6.7	39	81	53	38	3,620	40,600
24	Masters Choice/ MC-535		107	58.6	11.0	26.6	6.2	40	79	52	38	3,680	40,500
25	Stine/ 9731VT3PRO	Bt,CRW,GLY	109	57.3	11.2	26.2	6.6	41	80	52	38	3,620	40,500
26	DEKALB/ DKC61-35	Bt,CRW,GLY	111	56.9	11.2	26.1	6.6	43	79	54	35	3,570	40,100
27	Mycogen/ TMF2Q717	Bt,CRW,GLY,LL	109	60.0	11.4	28.4	6.7	47	76	54	30	3,530	40,100
28	Renk/ RK733VT3 NDS	Bt,CRW,GLY	107	57.6	11.2	26.5	7.3	43	78	53	36	3,570	40,100
29	Gold Country Seed/107-17 VT3P	Bt,CRW,GLY	107	59.5	10.7	26.4	6.8	39	80	51	40	3,650	39,100
30	NK/ N49J-3000GT	Bt,CRW,GLY,LL	103	54.1	11.0	24.0	6.2	40	79	52	38	3,540	39,000
31	Producers Hybrids/ 6364GT3	Bt,CRW,GLY,LL	103	53.6	10.9	23.4	6.5	40	80	53	38	3,580	39,000
32	AgriGold/ A6389VT3Pro	Bt,CRW,GLY	106	57.3	10.6	24.8	6.9	38	80	52	41	3,660	38,800
33	Golden Harvest/ H-8211 3000GT	Bt,CRW,GLY,LL	105	56.6	10.8	25.0	6.6	40	80	53	37	3,580	38,800

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 2011.*

No.	Company/ 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
38	Legacy Seeds/ L-5350 3000GT	Bt,CRW,GLY,LL	104	57.4	10.5	24.7	6.1	42	78	51	37	3,580	37,700
39	Legend Seeds/ 47J104-3000GT	Bt,CRW,GLY,LL	104	55.0	10.3	22.8	6.7	39	81	54	39	3,620	37,200
40	Anderson Seeds/ 103VT3	Bt,CRW,GLY	103	55.6	10.4	23.4	7.0	39	80	51	40	3,570	37,100
41	Producers Hybrids/ 7394VT3	Bt,CRW,GLY	113	60.1	10.5	26.3	6.4	44	77	51	34	3,530	37,100
42	DEKALB/ DKC55-09	Bt,CRW,GLY,LL	105	56.3	10.3	23.6	7.6	39	81	53	39	3,590	37,000
43	Trelay/ 7VP745	Bt,CRW,GLY	111	59.0	10.6	25.9	6.9	47	76	53	29	3,470	36,900
44	Anderson Seeds/ 103R	GLY	102	52.4	10.3	21.7	6.8	39	79	55	39	3,570	36,800
45	DEKALB/ DKC57-50	Bt,CRW,GLY	107	53.9	10.3	22.4	6.3	41	79	53	37	3,560	36,800
46	Gold Country Seed/103-09 VT3P	Bt,CRW,GLY	103	58.8	10.1	24.4	6.6	41	80	53	38	3,660	36,800
47	Garst/ 85V88-3000GT	Bt,CRW,GLY,LL	107	58.3	10.2	24.5	6.1	41	79	51	38	3,590	36,700
48	Trelay/ 6ST620	Bt,CRW,GLY,LL	106	54.9	10.0	22.2	6.3	38	80	53	40	3,630	36,400
49	Trelay/ 6ST576	Bt,CRW,GLY,LL	104	52.7	10.2	21.7	6.8	41	79	54	38	3,510	35,900
50	Anderson Seeds/ 6073		101	50.9	10.5	21.4	6.1	42	78	51	36	3,400	35,800
51	Gold Country Seed/101-99 GENSS	Bt,CRW,GLY,LL	101	56.7	10.1	23.4	6.2	45	77	53	34	3,510	35,500
52	DEKALB/ DKC53-78	Bt,CRW,GLY,LL	103	50.6	10.1	20.5	6.6	39	79	51	41	3,500	35,400
53	Trelay/ 6VT823	Bt,CRW,GLY	107	55.2	9.9	22.2	7.2	43	79	55	35	3,550	35,300
54	Legend Seeds/ 9207-3000GT	Bt,CRW,GLY,LL	107	53.8	10.1	21.8	6.8	40	79	51	39	3,460	34,900
55	Anderson Seeds/ 626R	GLY	100	52.6	10.0	21.1	6.8	42	79	53	36	3,480	34,700
56	G2 Genetics/ 5X-905TM	Bt,CRW,GLY,LL	105	58.6	9.5	22.9	7.0	42	78	51	36	3,550	33,700
57	Anderson Seeds/ 628VT3	Bt,CRW,GLY	96	48.7	9.3	18.2	6.6	40	80	51	40	3,460	32,300
58	Anderson Seeds/ 605VT3	Bt,CRW,GLY	100	54.7	8.8	19.4	6.6	42	79	54	37	3,550	31,200
	mean			**56.1**	**11.1**	**25.3**	**6.6**	**41**	**79**	**52**	**37**	**3,570**	**39,500**
	LSD(0.10)			**3.5**	**1.4**	**2.5**	**0.5**	**4**	**2**	**2**	**5**	**110**	**5600**
	CV			**5.4**	**11.3**	**8.5**	**6.8**	**6.0**	**2.3**	**3.1**	**11.4**	**2.7**	**12.1**

[1] Bt, CRW, GLY, and LL traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, and Liberty (glufosinate-ammonium) herbicide tolerance, 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 Hutchinson, MN (McLeod County) in 2011.*

No.	Company/ 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
1	Trelay/ 5VP688	Bt,CRW,GLY	101	60.5	10.8	27.3	6.0	39	81	52	39	3,650	39,400
2	NK/ N49J-3000GT	Bt,CRW,GLY,LL	103	61.9	10.9	28.5	6.4	42	80	51	35	3,580	38,900
3	Producers Hybrids/ 6464VT3	Bt,CRW,GLY	104	61.5	11.0	28.7	5.9	45	77	53	31	3,520	38,900
4	Gold Country Seed/107-17 VT3P	Bt,CRW,GLY	107	63.3	10.8	29.5	6.5	43	80	51	34	3,550	38,400
5	NuTech/ 5N-197	Bt,CRW,GLY,LL	97	60.3	10.8	27.1	6.3	41	80	50	37	3,530	38,000
6	Pioneer Brand/ P0448XR	Bt,CRW,GLY,LL	104	60.9	10.6	27.1	6.2	41	79	50	35	3,550	37,600
7	Dairyland Seed/ HiD.F.-3110-Q	Bt,CRW,GLY	108	67.2	11.2	34.1	6.8	49	79	53	26	3,350	37,400
8	NuTech/ 5N-102	Bt,CRW,GLY,LL	102	61.2	10.3	26.6	6.8	41	80	51	37	3,590	37,100
9	Renk/ RK698VT3	Bt,CRW,GLY	103	58.2	10.2	24.4	6.1	38	81	51	40	3,610	37,000
10	Dyna-Gro Seed/ D32VP29	Bt,CRW,GLY	92	59.9	10.2	25.5	6.3	41	79	51	36	3,520	36,000
11	Trelay/ 6VP982	Bt,CRW,GLY	107	63.6	10.2	27.9	6.9	44	80	53	33	3,540	36,000
12	Dyna-Gro Seed/ D35RR40	GLY	95	61.1	9.8	25.1	6.1	40	80	52	38	3,650	35,600
13	Producers Hybrids/ 6364GT3	Bt,CRW,GLY,LL	103	59.7	10.1	25.0	5.1	44	78	53	33	3,530	35,500
14	Hyland Seeds/ HL 4424	Bt,CRW,GLY,LL	98	60.3	10.2	25.6	5.4	43	79	51	34	3,480	35,400
15	Golden Harvest/ H-8211 3000GT	Bt,CRW,GLY,LL	105	60.7	10.0	25.6	6.1	43	79	52	34	3,510	35,300
16	Dairyland Seed/ HiD.F.-3702-9	Bt,CRW,GLY,LL	102	63.0	9.7	26.2	6.3	42	80	51	35	3,600	35,000
17	Hyland Seeds/ HL 4420	Bt,CRW,GLY,LL	97	59.0	9.7	23.6	5.9	42	80	53	36	3,590	34,700
18	Gold Country Seed/101-99 GENSS	Bt,CRW,GLY,LL	101	62.0	9.6	25.2	6.6	42	80	52	35	3,610	34,500
19	Gold Country Seed/103-09 VT3P	Bt,CRW,GLY	103	63.6	9.6	26.5	6.1	44	79	52	33	3,580	34,500
20	DEKALB/ DKC53-78	Bt,CRW,GLY,LL	103	62.9	9.5	25.5	6.5	40	81	51	36	3,640	34,400
21	Mycogen/ TMF2L533	Bt,CRW,GLY,LL	101	63.2	9.9	26.9	6.3	48	80	55	27	3,470	34,400
22	NuTech/ 5N-001	Bt,CRW,GLY,LL	100	57.5	9.6	22.6	6.4	39	81	52	38	3,580	34,400
23	Renk/ RK694GTCBLLRWBL	Bt,CRW,GLY,LL	103	63.2	9.9	26.9	6.0	45	79	50	32	3,470	34,400
24	G2 Genetics/ 5H-797TM	Bt,GLY,LL	97	56.8	9.9	23.0	6.6	39	80	49	38	3,460	34,300
25	G2 Genetics/ 5X-0001TM	Bt,CRW,GLY,LL	100	58.6	9.9	23.8	6.1	40	80	49	38	3,470	34,300
26	DEKALB/ DKC55-09	Bt,CRW,GLY,LL	105	62.4	9.3	24.8	6.3	40	82	54	38	3,670	34,200
27	Pioneer Brand/ P0115XR	Bt,CRW,GLY,LL	101	60.4	9.7	24.4	6.5	42	80	50	36	3,470	33,700
28	DEKALB/ DKC57-50	Bt,CRW,GLY	107	62.7	9.5	25.6	6.2	45	78	53	30	3,530	33,600
29	DEKALB/ DKC59-35	Bt,CRW,GLY	109	64.5	9.4	26.5	6.6	43	80	53	32	3,590	33,600
30	Renk/ RK623VT3 NDS	Bt,CRW,GLY	103	65.0	9.5	27.0	6.6	43	79	50	34	3,550	33,500
31	Legacy Seeds/ L-4310 3111	Bt,CRW,GLY,LL	103	62.8	9.1	24.5	6.0	43	80	52	33	3,600	32,800
32	Trelay/ 6VT154	Bt,CRW,GLY	103	62.8	9.5	25.7	5.9	46	78	51	31	3,440	32,800
33	Trelay/ 6ST576	Bt,CRW,GLY,LL	104	62.5	9.3	24.8	6.0	44	79	50	33	3,520	32,700

Table 3. *Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield, and quality traits for corn hybrids planted at Hutchinson, MN (McLeod County) in 2011.*

No.	Company/ 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
38	Dairyland Seed/ HiD.F.-3297-9	Bt,CRW,GLY,LL	97	62.8	9.0	24.2	5.9	43	79	49	35	3,530	31,800
39	Gold Country Seed/100-07 VT3	Bt,CRW,GLY	100	61.6	8.6	22.4	7.0	41	80	53	37	3,620	31,200
40	Mycogen/ TMF2R522	Bt,CRW,GLY,LL	98	62.8	8.9	23.9	6.5	45	79	53	30	3,500	31,100
41	G2 Genetics/ 5X-501TM	Bt,CRW,GLY,LL	101	60.5	8.9	22.5	6.6	43	80	51	34	3,490	31,000
42	Gold Country Seed/110-35 VT3	Bt,CRW,GLY	110	64.3	8.5	23.9	6.5	44	81	53	32	3,570	30,500
43	Viking/ Lfy22-00N		100	62.0	8.9	23.4	5.9	47	78	52	29	3,430	30,500
44	Gold Country Seed/96-20 VT3P	Bt,CRW,GLY	96	61.0	8.4	21.5	6.8	38	83	52	40	3,600	30,200
45	DEKALB/ DKC45-51	Bt,CRW,GLY,LL	95	65.5	8.4	24.4	6.9	43	80	51	34	3,560	30,000
46	SEEDS 2000/ 3141 GT	GLY	104	61.1	8.3	21.4	5.6	42	80	52	35	3,590	29,800
47	Masters Choice/ MC-4280		92	52.7	8.5	18.0	5.9	37	82	50	42	3,470	29,500
48	NuTech/ 5N-803	Bt,CRW,GLY,LL	103	61.6	8.3	21.7	5.8	43	81	54	33	3,540	29,500
49	Wensman Seed/ W 7392GT3	Bt,CRW,GLY,LL	104	62.6	8.1	21.8	5.9	43	80	50	34	3,530	28,700
50	Wensman Seed/ W 7360VT3	Bt,CRW,GLY	103	61.3	7.9	20.4	5.8	44	80	52	33	3,510	27,700
	mean			**61.7**	**9.5**	**24.9**	**6.2**	**42**	**80**	**52**	**34**	**3,540**	**33,800**
	LSD(0.10)			**2.9**	**ns**	**4.6**	**0.7**	**3**	**2**	**ns**	**3**	**120**	**ns**
	CV			**4.0**	**16.1**	**16.0**	**10.9**	**6.3**	**2.4**	**5.6**	**9.6**	**3.1**	**18.4**

[1] Bt, CRW, GLY, and LL traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, and Liberty (glufosinate-ammonium) herbicide tolerance, 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 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 2011.*

					Yield [2]		Quality (concentration) [3]					Milk Yield [4]		een
No.	Company/ Entry	Traits [1]	RM	Moist	DM	silage	CP	NDF	IVD	NDFD	Starch	Ton	Acre	nap
				%	- ton/ acre -				%			lb/ ton	lb/ acre	%
1	Pioneer Brand/ P0448XR	Bt,CRW,GLY,LL	104	63.3	11.1	30.1	7.1	41	79	51	33	3,680	40,700	5
2	Trelay/ 6ST576	Bt,CRW,GLY,LL	104	62.2	10.7	28.3	6.5	41	79	51	34	3,650	39,000	4
3	Gold Country Seed/101-99 GENSS	Bt,CRW,GLY,LL	101	62.0	10.6	27.9	6.6	42	79	52	32	3,660	38,800	1
4	G2 Genetics/ 5X-501TM	Bt,CRW,GLY,LL	101	59.4	10.2	25.2	7.2	36	81	50	38	3,690	37,700	3
5	Golden Harvest/ H-8211 3000GT	Bt,CRW,GLY,LL	105	59.6	10.4	25.8	6.5	40	79	50	35	3,630	37,700	9
6	NuTech/ 5N-197	Bt,CRW,GLY,LL	97	59.8	10.1	25.1	7.2	41	79	50	34	3,640	36,700	4
7	Wensman Seed/ W 7392GT3	Bt,CRW,GLY,LL	104	60.8	9.8	25.0	6.6	39	80	50	36	3,680	36,100	3
8	Viking/ Lfy22-00N		100	61.8	9.6	25.2	6.9	42	79	52	32	3,630	35,000	3
9	Trelay/ 5VP688	Bt,CRW,GLY	101	60.3	9.4	23.6	6.9	37	81	50	38	3,690	34,600	#
10	NK/ N49J-3000GT	Bt,CRW,GLY,LL	103	64.1	9.3	25.9	6.6	41	80	51	34	3,690	34,300	#
11	Producers Hybrids/ 6364GT3	Bt,CRW,GLY,LL	103	62.3	9.4	24.9	6.0	40	79	50	35	3,650	34,300	5
12	Legacy Seeds/ L-5350 3000GT	Bt,CRW,GLY,LL	104	62.9	9.3	25.2	6.0	42	78	52	32	3,650	34,100	1
13	Dairyland Seed/ HiD.F.-3702-9	Bt,CRW,GLY,LL	102	61.2	9.3	24.1	5.7	41	78	51	34	3,640	34,000	1
14	DEKALB/ DKC55-09	Bt,CRW,GLY,LL	105	61.7	9.1	23.6	6.8	39	81	51	36	3,700	33,500	4
15	Mycogen/ TMF2L533	Bt,CRW,GLY,LL	101	62.6	9.4	25.1	6.7	46	77	53	28	3,570	33,500	1
16	Renk/ RK698VT3	Bt,CRW,GLY	103	63.0	9.2	24.8	6.2	42	78	52	33	3,640	33,400	1
17	SEEDS 2000/ 3141 GT	GLY	104	59.5	9.0	22.1	6.2	38	80	51	37	3,700	33,200	9
18	Renk/ RK523GTCBLLRW	Bt,CRW,GLY,LL	100	60.5	9.3	23.4	7.7	42	79	51	33	3,580	33,100	3
19	Gold Country Seed/110-35 VT3	Bt,CRW,GLY	110	65.8	9.0	26.3	6.6	42	79	51	32	3,670	33,000	5
20	Renk/ RK623VT3 NDS	Bt,CRW,GLY	103	64.6	8.9	25.1	7.4	40	81	51	35	3,690	32,700	8
21	Hyland Seeds/ HL 4424	Bt,CRW,GLY,LL	98	60.9	8.9	22.7	6.6	40	80	52	35	3,660	32,500	6
22	DEKALB/ DKC57-50	Bt,CRW,GLY	107	59.8	9.0	22.5	6.3	43	78	51	31	3,570	32,300	3
23	Producers Hybrids/ 6464VT3	Bt,CRW,GLY	104	62.8	8.8	23.7	6.9	41	79	50	34	3,630	32,100	#
24	Hyland Seeds/ HL 4420	Bt,CRW,GLY,LL	97	61.9	8.7	22.9	6.7	41	80	53	33	3,660	31,900	#
25	Dyna-Gro Seed/ D40SS09	Bt,CRW,GLY,LL	100	65.2	8.6	24.6	6.9	40	80	51	35	3,700	31,700	#
26	DEKALB/ DKC59-35	Bt,CRW,GLY	109	65.5	8.7	25.1	6.8	43	78	51	31	3,630	31,500	4
27	Dyna-Gro Seed/ D32VP29	Bt,CRW,GLY	92	59.3	8.7	21.5	6.3	39	79	49	37	3,580	31,300	4
28	Gold Country Seed/103-09 VT3P	Bt,CRW,GLY	103	66.0	8.4	24.9	6.6	42	80	51	34	3,680	31,100	#
29	Dairyland Seed/ HiD.F.-3110-Q	Bt,CRW,GLY	108	67.7	8.7	26.8	7.0	46	78	52	27	3,560	30,900	#
30	NuTech/ 5N-803	Bt,CRW,GLY,LL	103	62.8	8.4	22.5	6.4	41	79	51	33	3,680	30,800	8
31	DEKALB/ DKC45-51	Bt,CRW,GLY,LL	95	66.2	8.1	24.1	7.1	41	80	51	35	3,690	30,000	9
32	Renk/ RK694GTCBLLRWBL	Bt,CRW,GLY,LL	103	64.9	8.1	23.1	7.7	39	81	52	34	3,690	29,900	#
33	Wensman Seed/ W 7360VT3	Bt,CRW,GLY	103	63.4	8.1	22.2	6.8	40	80	50	36	3,670	29,800	8

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 2011.*

					Yield [2]		Quality (concentration) [3]					Milk Yield [4]		een
No.	**Company/ Entry**	**Traits [1]**	**RM**	**Moist**	**DM**	**silage**	**CP**	**NDF**	**IVD**	**NDFD**	**Starch**	**Ton**	**Acre**	**nap**
				%	- ton/ acre -				%			lb/ ton	lb/ acre	%
38	Trelay/ 6VT154	Bt,CRW,GLY	103	64.5	7.7	21.6	6.7	43	79	53	33	3,660	28,100	#
39	Mycogen/ TMF2R522	Bt,CRW,GLY,LL	98	63.8	7.6	21.2	6.8	40	80	51	34	3,660	28,000	9
40	Trelay/ 6VP982	Bt,CRW,GLY	107	63.3	7.5	20.5	7.2	39	80	51	34	3,690	27,800	#
41	Pioneer Brand/ P0115XR	Bt,CRW,GLY,LL	101	63.5	7.2	19.6	6.9	39	80	50	36	3,690	26,400	#
42	Gold Country Seed/100-07 VT3	Bt,CRW,GLY	100	62.8	7.0	18.7	7.3	37	81	50	39	3,720	25,900	#
43	G2 Genetics/ 5X-0001TM	Bt,CRW,GLY,LL	100	60.1	6.8	17.1	6.9	36	81	50	39	3,730	25,500	#
44	Gold Country Seed/96-20 VT3P	Bt,CRW,GLY	96	61.9	6.3	16.5	7.0	38	82	49	38	3,680	23,100	#
45	Masters Choice/ MC-4280		92	54.3	6.1	13.3	7.1	37	81	51	39	3,620	21,900	#
46	Dyna-Gro Seed/ D35RR40	GLY	95	60.1	5.8	14.6	7.3	35	82	51	41	3,720	21,700	#
47	G2 Genetics/ 5H-797TM	Bt,GLY,LL	97	57.4	5.8	13.7	7.0	37	81	50	39	3,680	21,400	#
48	DEKALB/ DKC53-78	Bt,CRW,GLY,LL	103	63.4	5.7	15.4	7.2	38	81	50	37	3,700	21,000	#
49	Trelay/ 4VP726	Bt,CRW,GLY	97	64.9	5.5	15.6	6.9	39	81	52	36	3,680	20,200	#
50	Dairyland Seed/ HiD.F.-3297-9	Bt,CRW,GLY,LL	97	63.0	5.5	14.8	6.7	42	79	50	32	3,630	19,900	#
	mean			**62.2**	**8.4**	**22.4**	**6.8**	**40**	**80**	**51**	**35**	**3,660**	**30,800**	**#**
	LSD(0.10)			**3.7**	**1.3**	**3.7**	**0.6**	**2**	**2**	**1**	**3**	**80**	**5,100**	**#**
	CV			**5.1**	**14.1**	**14.4**	**7.5**	**6.1**	**1.9**	**2.6**	**8.4**	**1.8**	**14.2**	**#**

[1] Bt, CRW, GLY, and LL traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, and Liberty (glufosinate-ammonium) herbicide tolerance, 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.

[5] Due to a windstorm, greensnap damage occurred on July 10 at this site.

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 2011.*

					Yield [2]		Quality (concentration) [3]					Milk Yield [4]	
No.	**Company/ Entry**	**Traits [1]**	**RM**	**Moist**	**DM**	**silage**	**CP**	**NDF**	**IVD**	**NDFD**	**Starch**	**Ton**	**Acre**
				%	- ton/ acre -				%			lb/ ton	lb/ acre
1	Gold Country Seed/107-17 VT3P	Bt,CRW,GLY	107	63.4	12.4	33.7	7.3	36	82	52	38	3,690	45,600
2	Gold Country Seed/110-35 VT3	Bt,CRW,GLY	110	67.7	12.2	37.7	8.0	41	80	52	33	3,660	44,600
3	Gold Country Seed/103-09 VT3P	Bt,CRW,GLY	103	67.4	12.1	37.1	6.8	38	80	53	38	3,680	44,500
4	Pioneer Brand/ P0448XR	Bt,CRW,GLY,LL	104	67.2	11.9	36.1	7.2	39	80	51	35	3,680	43,700
5	Renk/ RK698VT3	Bt,CRW,GLY	103	64.8	11.8	33.6	6.5	37	80	53	38	3,680	43,600
6	Gold Country Seed/101-99 GENSS	Bt,CRW,GLY,LL	101	66.6	11.9	35.6	6.0	43	77	55	32	3,630	43,100
7	Dyna-Gro Seed/ D35RR40	GLY	95	61.7	11.6	30.3	7.1	36	82	53	39	3,690	42,800
8	SEEDS 2000/ 2904 GT	GLY	90	59.8	11.3	28.2	6.6	35	82	51	42	3,710	42,100
9	REA Hybrids/ 5R780-HDS	Bt,CRW,GLY	100	69.2	11.5	37.5	6.7	44	77	54	29	3,610	41,700
10	Pioneer Brand/ P0115XR	Bt,CRW,GLY,LL	101	66.0	11.2	33.1	7.1	39	80	51	36	3,690	41,400
11	Hyland Seeds/ HL4424	Bt,CRW,GLY,LL	98	66.7	11.1	33.2	7.2	40	80	53	36	3,650	40,400
12	Dyna-Gro Seed/ D32VP29	Bt,CRW,GLY	92	64.3	10.6	29.7	6.7	39	80	53	36	3,670	38,900
13	Gold Country Seed/96-20 VT3P	Bt,CRW,GLY	96	63.9	10.5	29.2	7.3	38	81	51	37	3,690	38,800
14	Dyna-Gro Seed/ CX11191	Bt,CRW,GLY	91	62.0	10.5	27.6	6.7	37	81	52	38	3,690	38,600
15	REA Hybrids/ 4V301-HDS	Bt,CRW,GLY	94	67.7	10.3	31.9	7.1	41	79	53	34	3,640	37,600
16	Gold Country Seed/93-39 VT3P	Bt,CRW,GLY	93	62.2	10.2	26.9	7.4	38	81	53	37	3,670	37,300
17	Hyland Seeds/ HL4420	Bt,CRW,GLY,LL	97	67.1	10.3	31.2	7.3	46	79	52	32	3,600	37,000
18	Dairyland Seed/ Hi.F.-3702-9	Bt,CRW,GLY,LL	102	69.7	10.1	33.2	7.0	40	79	53	34	3,660	36,900
19	Gold Country Seed/100-07 VT3	Bt,CRW,GLY	100	62.5	9.4	25.0	7.0	37	81	51	40	3,700	34,700
	mean			**65.2**	**11.1**	**32.2**	**7.0**	**39**	**80**	**52**	**36**	**3,670**	**40,700**
	LSD(0.10)			**2.7**	**1.3**	**3.3**	**0.5**	**3**	**2**	**2**	**3**	**30**	**5,200**
	CV			**3.5**	**10.5**	**8.6**	**6.2**	**7.4**	**1.9**	**3.6**	**8.3**	**0.9**	**10.8**

[1] Bt, CRW, GLY, and LL traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, and Liberty (glufosinate-ammonium) herbicide tolerance, 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 6. *Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield, and quality traits for corn hybrids planted at Underwood, MN (Otter Tail County) in 2011.*

No.	Company/ 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
1	Gold Country Seed/107-17 VT3P	Bt,CRW,GLY	107	59.7	11.1	27.5	5.9	38	81	50	40	3,600	39,800
2	Gold Country Seed/110-35 VT3	Bt,CRW,GLY	110	58.5	10.7	25.9	6.1	41	81	55	36	3,610	38,800
3	Pioneer Brand/ P0115XR	Bt,CRW,GLY,LL	101	57.4	10.8	25.4	6.4	41	79	52	36	3,510	38,000
4	Pioneer Brand/ P0448XR	Bt,CRW,GLY,LL	104	56.2	10.6	24.2	6.2	40	79	52	38	3,480	36,900
5	Gold Country Seed/103-09 VT3P	Bt,CRW,GLY	103	61.1	10.1	26.1	6.1	41	80	51	36	3,560	36,100
6	Gold Country Seed/101-99 GENSS	Bt,CRW,GLY,LL	101	59.3	10.4	25.4	6.4	41	80	50	36	3,460	35,800
7	Hyland Seeds/ HL4420	Bt,CRW,GLY,LL	97	58.9	10.0	24.4	6.8	42	80	52	35	3,530	35,400
8	Hyland Seeds/ HL4424	Bt,CRW,GLY,LL	98	57.2	9.9	23.2	5.8	40	80	52	38	3,550	35,200
9	SEEDS 2000/ 2904 GT	GLY	90	47.4	10.0	19.0	6.2	38	81	50	40	3,430	34,300
10	REA Hybrids/ 4V301-HDS	Bt,CRW,GLY	94	59.4	10.1	24.7	6.3	44	78	51	32	3,400	34,100
11	Dyna-Gro Seed/ D32VP29	Bt,CRW,GLY	92	50.7	9.7	19.8	5.8	37	80	51	41	3,410	33,200
12	Renk/ RK698VT3	Bt,CRW,GLY	103	58.7	9.6	23.2	6.1	46	78	51	33	3,310	31,800
13	Dairyland Seed/ Hi.F.-3702-9	Bt,CRW,GLY,LL	102	59.1	9.5	23.1	5.4	47	76	52	30	3,350	31,700
14	Gold Country Seed/96-20 VT3P	Bt,CRW,GLY	96	57.0	8.5	19.8	6.6	42	81	56	34	3,550	30,200
15	Gold Country Seed/100-07 VT3	Bt,CRW,GLY	100	52.5	8.5	17.9	6.6	34	82	50	45	3,550	30,100
16	REA Hybrids/ 5R780-HDS	Bt,CRW,GLY	100	59.0	9.4	23.0	5.0	50	74	51	26	3,200	30,100
17	Dyna-Gro Seed/ CX11191	Bt,CRW,GLY	91	56.6	8.5	19.5	6.5	41	80	53	35	3,450	29,300
18	Dyna-Gro Seed/ D35RR40	GLY	95	53.9	7.9	17.1	6.5	42	80	52	35	3,390	26,700
19	Gold Country Seed/93-39 VT3P	Bt,CRW,GLY	93	57.1	7.4	17.1	6.6	43	80	52	34	3,360	24,700
	mean			**56.8**	**9.6**	**22.4**	**6.2**	**41**	**79**	**52**	**36**	**3,460**	**33,300**
	LSD(0.10)			**3.5**	**1.7**	**3.6**	**0.7**	**5**	**3**	**ns**	**6**	**ns**	**6,300**
	CV			**4.5**	**13.3**	**11.8**	**9.0**	**8.6**	**2.6**	**4.9**	**12.7**	**3.1**	**13.9**

[1] Bt, CRW, GLY, and LL traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, and Liberty (glufosinate-ammonium) herbicide tolerance, 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.

2011 SE Minnesota Regional Early Maturity (90-95 Day Relative Maturity) Corn Hybrids at Rochester, Rock Dell and Waseca, MN

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

The objective of this trial was to compare the performance of early season maturity (90-95 day relative maturity) corn hybrids in southern Minnesota. The trials were located at Rochester, 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 in 30 inch rows at a depth of 1.5 inches. The plots were four rows wide at Waseca and Rock Dell and two rows wide at the Rochester site. A randomized complete block design was implemented with four replications at Rochester and Waseca and six replications at Rock Dell. The two center rows of each plot at Waseca and Rock Dell and both rows at Rochester site were machine harvested with moisture and grain weight recorded at all sites. Table 2 provides moisture and grain yield at all sites, and the 3-site average 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 2011.

	Rochester	Rock Dell	Waseca
Planting Date	May 4, 2011	May 17, 2011	May 4, 2011
Harvest Date	October 13, 2011	October 24, 2011	October 22, 2011
Soil Type	Port Byron Silt Loam	Kenyon Loam	Webster Clay Loam
Fertilizer			140 LB N/A as AA
Herbicide (Pre/Post)			2 pt Surestart / 1 oz Accent Q + COC + 28%
Tillage	Conventional	Conventional	Conventional
Previous Crop	Soybean	Soybean	Soybean

Table 2. Early maturity (90-95 day relative maturity) hybrid moisture content and grain yield (15.5%) at Rochester, Rock Dell and Waseca, MN, and the average of all sites in 2011.

Entry Name	Description	Maturity	Rochester		Rock Dell			Waseca		3-Site Average	
	Traits & Seed Treatment	Day	Moisture (%)	Yield (bu/A)	Lodging (%)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)
Agrigold A6170VT3Pro	VT3 + Acceleron + VOTiVO 500	93	16.4	240	23	14.2	231	13.9	199	14.8	223
Agventure 4342	GL/HBW	92	17.1	260	28	13.8	223	13.9	208	14.9	230
Croplan 3424SS		94	18.5	260	12	14.9	227	14.0	221	15.8	236
Dahlman R48-30 VT3	GENVT3P + Acceleron 250	95	17.0	234	58	13.7	206	14.3	206	15.0	215
Dahlman R-48-49	GENSS	95	17.0	257	43	13.9	217	14.0	204	15.0	226
Dairyland ST-5494SSX	SmartStax + Cruiser 250	94	15.1	232	46	13.1	202	13.9	216	14.0	217
DeKalb DKC45-51 Brand	GENSS	95	18.1	253	31	13.2	223	13.7	208	15.0	228
LG Seeds 2411VT3	VT3 + Poncho/VOTiVO 500	90	17.7	250	52	13.8	204	14.3	225	15.3	226
Merschman M-1294	Genuity VT3Pro + Acceleron/P250	94	17.1	255	56	13.9	219	14.0	204	15.0	226
Mycogen 2J337	VT3 + Avicta Complete 250	92	17.4	240	38	13.9	216	14.2	205	15.2	220
Renk RK434VT3P	VT3 + Poncho 250	92	15.5	244	18	13.0	226	13.7	217	14.1	229
Pioneer Brand 38H08	HX1/LL/RR2 + Cruiser Xtreme 250	92	15.6	243	38	12.8	211	13.7	207	14.0	220
Producers 5223VT2PRO	VT2Pro + Poncho/VOTiVO 250	92	15.7	263	17	13.2	218	13.7	211	14.2	231
Stine 9207GTCBLL	Agrisure GT/CB/LL	90	16.4	258	40	13.8	231	14.3	221	14.9	237
Viking C33-94R	VT3 PRO + Acceleron 250	94	18.4	246	25	14.2	233	14.4	221	15.7	233
Viking R7291	Roundup	95	16.9	227	58	13.6	196	13.6	200	14.7	208
Site Average Yield			**16.9**	**248**	**36**	**0.3**	**218**	**14.0**	**211**		
LSD (P=0.10)			**0.7**	**19**	**13**	**13.7**	**16.6**	**0.5**	**14**	**0.3**	**10**

2011 SE Minnesota Regional Mid Maturity (95-100 Day Relative Maturity) Corn Hybrids at Rochester, Rock Dell and Waseca, MN

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

The objective of this trial was to compare the performance of mid maturity (95-100 day relative maturity) corn hybrids in southern Minnesota. The trials were located at Rochester, 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 in 30 inch rows at a depth of 1.5 inches. The plots were four rows wide at Waseca and Rock Dell and two rows wide at the Rochester site. A randomized complete block design was implemented with four replications at Rochester and Waseca and six replications at Rock Dell. The two center rows of each plot at Waseca and Rock Dell and both rows at Rochester site were machine harvested with moisture and grain weight recorded at all sites. Table 2 provides moisture and grain yield at all sites, and the 3-site average 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 maturity (95-100 day relative maturity) corn hybrids in 2011.

	Rochester	Rock Dell	Waseca
Planting Date	May 4, 2011	May 17, 2011	May 4, 2011
Harvest Date	October 13, 2011	October 24, 2011	October 22, 2011
Soil Type	Port Byron Silt Loam	Kenyon Loam	Webster Clay Loam
Fertilizer			140 LB N/A as AA
Herbicide (Pre/Post)			2 pt Surestart / 1 oz Accent Q + COC + 28%
Tillage	Conventional	Conventional	Conventional
Previous Crop	Soybean	Soybean	Soybean

Table 2. Mid maturity (95-100 day relative maturity) hybrid moisture content and grain yield (15.5%) at Rochester, Rock Dell and Waseca, MN, and the average of all sites in 2011.

Entry Name	Description	Maturity	Rochester		Rock Dell			Waseca		3-site Average	
	Traits & Seed Treatment	Day	Moisture (%)	Yield (bu/A)	Lodging (%)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Moisture %	Yield (bu/A)
Agrigold A6203VT3	VT3 + Acceleron + VOTiVO 500	96	18.0	238	54	12.4	165	14.7	215	15.0	206
Agventure 5628	RL/HBW	99	18.8	237	37	12.6	163	14.2	213	15.2	205
Croplan 4338VT3	VT3	100	19.2	239	48	13.1	163	14.6	209	15.7	204
Dairyland ST-9399	3000GT + Cruiser 250	99	18.9	258	68	13.8	170	14.4	218	15.7	215
DeKalb DKC48-12 Brand	GENSS	98	18.0	256	17	12.7	201	13.9	209	14.9	222
DeKalb DKC 49-94 Brand	GENSS	99	19.3	241	25	12.2	161	13.7	206	15.1	203
DeKalb DKC50-35 Brand		100	17.8	246	23	12.4	179	14.4	217	14.8	214
Gold Country 95-11	RR	95	17.1	236	22	12.7	189	14.0	202	14.6	209
Gold Country 96-20	GENVT3	96	16.9	236	43	12.8	162	13.7	199	14.5	199
Gold Country 98-10 VT3	VT3	98	18.7	256	37	11.1	154	13.8	205	14.5	205
Legend LR9098SMTX	Genuity SmartStax + Acceleron	98	19.4	223	24	12.8	172	13.9	204	15.4	200
LG Seeds 2478VT3PRO	VT3PRO + Poncho/VOTiVO 500	97	16.9	242	49	12.9	167	14.0	201	14.6	203
Merschman M-1299	Genuity SmartStax + Acceleron/P250	99	20.3	241	25	13.4	185	14.6	218	16.1	215
Mycogen 2P 486	Smart Stax	97	17.3	240	38	12.4	163	13.2	205	14.3	203
Mycogen 2G500	GT3000 + Avicta Complete 250	100	19.4	252	68	13.5	170	15.1	226	16.0	216
Pioneer Brand 37Y11	RR	97	18.9	232	24	13.3	171	14.1	181	15.4	195
Pioneer Brand P9910AM1	Optimum AcreMax1 + Cruiser Xtreme	99	18.1	255	33	11.0	174	13.5	212	14.2	214

Table 2. Mid maturity (95-100 day relative maturity) hybrid moisture content and grain yield (15.5%) at Rochester, Rock Dell and Waseca, MN, and the average of all sites in 2011.

Entry Name	Description	Maturity	Rochester		Rock Dell			Waseca		3-site Average	
	Traits & Seed Treatment	Day	Moisture (%)	Yield (bu/A)	Lodging (%)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Moisture %	Yield (bu/A)
Producers 5784 VT3	VT3	97	18.5	249	52	13.2	190	14.4	218	15.4	219
Producers 6044VT3	VT3 + Acceleron 250	100	20.6	266	52	14.5	174	14.7	221	16.6	220
Renk 501 VT3	VT3	95	18.3	250	36	12.4	168	13.8	203	14.8	207
Renk RK559VT3P	VT3P + Poncho 250	96	18.0	228	49	13.0	186	14.1	204	15.0	206
Stine 9417VT3	VT3	98	18.8	250	37	12.5	158	13.7	214	15.0	207
Viking C94-00R	VT3PRO + Acceleron 250	100	17.8	225	33	13.6	166	14.8	209	15.4	200
Viking Y84-00RL	Agrisure 3000GT	100	19.5	250	40	14.3	166	14.0	229	15.9	215
	Site Average Yield		**18.5**	**244**	**39**	**12.9**	**172**	**14.1**	**210**		
	LSD (P=0.10)		**0.6**	**16**	**12**	**1.2**	**NS**	**0.5**	**15.9**	**0.6**	**13**

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2011 Performance of Late Maturity (101-106 Day Relative Maturity) Corn Hybrids at Rochester, Rock Dell and Waseca, MN

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

The objective of this trial was to compare the performance of early maturity (101-106 day relative maturity) corn hybrids in southern Minnesota. The trials were located at Rochester, 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 in 30 inch rows at a depth of 1.5 inches. The plots were four rows wide at Waseca and Rock Dell and two rows wide at the Rochester site. A randomized complete block design was implemented with four replications at Rochester and Waseca and six replications at Rock Dell. The two center rows of each plot at Waseca and Rock Dell and both rows at Rochester site were machine harvested with moisture and grain weight recorded at all sites. Table 2 provides moisture and grain yield at all sites, and the 3-site average 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 (101-106 day relative maturity) corn hybrids in 2011.

	Rochester	Rock Dell	Waseca
Planting Date	May 4, 2011	May 17, 2011	May 4, 2011
Harvest Date	October 13, 2011	October 24, 2011	October 22, 2011
Soil Type	Port Byron Silt Loam	Kenyon Loam	Webster Clay Loam
Fertilizer			140 LB N/A as AA
Herbicide (Pre/Post)			2 pt Surestart / 1 oz Accent Q + COC + 28%
Tillage	Conventional	Conventional	Conventional
Previous Crop	Soybean	Soybean	Soybean

Table 2. Late maturity (101-106 day relative maturity) hybrid moisture content and grain yield (15.5%) at Rochester, Rock Dell and Waseca, MN, and the average of all sites in 2011.

Entry Name	Description	Maturity	Rochester		Rock Dell			Waseca		3-site Average	
	Traits & Seed Treatment	Day	Moisture (%)	Yield (bu/A)	Lodging (%)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)
Agrigold A6276VT3	VT3 + Acceleron + VOTiVO 500	101	20.7	257	16	16.1	225	14.5	227	17.1	236
Agventure 6157	RL/HBW	101	19.3	213	8	15.1	221	13.8	190	16.1	208
Croplan 5438SS		104	20.6	250	5	16.8	224	14.6	229	17.3	234
Croplan 5338 VT3	VT3	103	20.0	257	35	14.8	204	14.0	206	16.3	222
Dairyland ST-9303SSX	SmartStax + Cruiser 250	103	19.8	234	23	14.5	214	13.8	202	16.0	217
DeKalb DKC52-59 Brand	VT3	102	19.6	243	42	14.3	217	13.5	185	15.8	215
DeKalb DKC55-09 Brand	GENSS	105	22.2	253	33	17.5	220	14.7	214	18.1	229
Legend LR 9201 GENSS	SmartStax + Acceleron	101	20.8	243	6	14.7	210	14.3	212	16.6	221
LG Seeds 2510STX	STX + Poncho/ VOTiVO 500	103	20.7	248	33	16.3	209	13.8	202	16.9	220
Mycogen 2A551	HXXTRA + Avicta Complete 250	103	21.3	229	9	17.7	221	14.1	199	17.7	216
Pioneer Brand 36V53	HX1/LL/RR2	102	20.2	260	8	15.7	245	14.2	230	16.7	245
Pioneer Brand P0488XR	HX1/LL/RR2 + Cruiser Xtreme 250	104	21.7	249	17	17.8	230	15.1	225	18.2	235
Producers 6694VT3PRO	VT3PRO + Acceleron	106	23.0	279	20	16.1	219	14.4	226	17.8	241
Renk RK698VT3	VT3 + Poncho 250	102	20.7	249	20	16.0	229	14.5	219	17.0	232
Stine 9417VT3	YieldGard VT3 + Acceleron/P500	101	18.8	235	20	14.1	220	13.7	198	15.5	218
Stine 9523VT3	VT3	103	20.8	257	40	15.3	201	14.0	206	16.7	221
Viking Y54-04RL	GT3000+ Acceleron 250	104	20.8	271	12	16.4	246	14.7	222	17.3	246
Viking B53-03R	YieldGard VT Triple RR2	103	20.7	264	28	14.6	204	13.9	200	16.4	223
	Site Average Yield		**20.6**	**250**	**21**	**15.8**	**220**	**14.2**	**211**		
	LSD (P=0.10)		**0.7**	**17**	**8**	**0.6**	**16**	**0.6**	**16**	**0.4**	**9**

2011 SE Minnesota Regional Performance of Conventional and Waxy (92-106 Day Relative Maturity) Corn Hybrids at Rochester, Rock Dell and Waseca, MN

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

The objective of this trial was to compare the performance of conventional and waxy corn hybrids in southern Minnesota. The trials were located at Rochester, 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 in 30 inch rows at a depth of 1.5 inches. The plots were four rows wide at Waseca and Rock Dell and two rows wide at the Rochester site. A randomized complete block design was implemented with four replications at Rochester and Waseca and six replications at Rock Dell. The two center rows of each plot at Waseca and Rock Dell and both rows at Rochester site were machine harvested with moisture and grain weight recorded at all sites. Table 2 provides moisture and grain yield at all sites, and the 3-site average 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 and waxy corn hybrid trials in 2011.

	Rochester	Rock Dell	Waseca
Planting Date	May 4, 2011	May 17, 2011	May 4, 2011
Harvest Date	October 13, 2011	October 24, 2011	October 22, 2011
Soil Type	Port Byron Silt Loam	Kenyon Loam	Webster Clay Loam
Fertilizer			140 LB N/A as AA
Herbicide (PRE/POST)			2 pt Surestart / 1 oz Accent Q + COC + 28%
Tillage	Conventional	Conventional	Conventional
Previous Crop	Soybean	Soybean	Soybean

Table 2. Conventional and waxy corn hybrid moisture content and grain yield (15.5%) at Rochester, Rock Dell and Waseca, MN, and the average of all sites in 2011.

Entry Name	Seed Treatment	Maturity	Rochester		Rock Dell			Waseca		3-site Average	
		Day	Moisture (%)	Yield (bu/A)	Lodging (%)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)
Agrigold A6149	Poncho 250	92	18.1	239	48	13.2	190	13.5	206	14.9	211
AgVenture 101		101	20.3	253	29	15.1	221	14.3	209	16.6	228
Dairyland ST-1803	Cruiser 250	103	18.8	249	25	13.8	207	12.9	207	15.2	221
Dahlman R50-30	Acceleron 250	100	19.3	232	33	15.1	206	14.4	209	16.3	216
LG Seeds 2414	Poncho/ VOTiVO 250	94	17.6	237	26	13.4	215	14.1	211	15.0	221
Pioneer Brand 36V52	Cruiser Extreme 250	102	19.4	248	28	14.3	214	13.9	216	15.9	226
Renk RK565GTCBLLRW	Trilex	100	19.5	240	61	15.2	191	14.8	223	16.5	218
Stine 9420		100	21.2	249	47	15.0	184	13.7	203	16.6	212
Viking 60-01N	Acceleron 250	101	20.6	254	36	15.2	221	14.9	234	16.9	236
Agrigold A6326WX	Poncho 500	104	21.4	238	25	19.2	198	15.4	213	18.7	216
Cappel 3130WX		96	18.7	205	43	14.8	185	14.4	205	16.0	198
Pioneer Brand 35F36	Cruiser Extreme 250	105	21.8	232	16	17.3	217	15.1	211	18.1	220
Cappel Seed 2660		106	25.0	215	32	16.2	196	15.0	171	18.7	194
Site Average Yield			**20.1**	**238**	**34**	**15.2**	**203**	**14.3**	**209**		
LSD (P=0.10)			**0.9**	**16**	**10**	**0.5**	**14**	**0.6**	**13.6**	**0.1**	**8**

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SECTION C

CORN

HERBICIDE EVALUATION

New Corn Herbicides for 2012 found in the 2011 Reports

1. ***Anthem*** **= pyroxasulfone + fluthiocet (Cadet) [FMC]**

Evaluation of Laudis and Capreno in One-Pass Weed Control Systems in Field Corn in 2011.

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, Bo Beyer and Steve Reiter

The objective of this trial was to evaluate the performance of Laudis and Capreno in one-pass weed control systems in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.4, O.M. of 2.3%, and soil test P and K levels of 38 ppm and 97 ppm, respectively. Fall fertilizer was broadcast applied on November 11, 2010 at a rate of 6-26-150 (N-P-K). Spring fertilizer was broadcast ahead of planting on April 5, 2011 at a rate of 120-0-0-24 (N-P-K-S). The area was side dressed with an additional 33 lb/A of N on June 13. The field was spring disked and field cultivated once prior to planting. The corn hybrid, Pioneer P9910AM1 (99 day), was planted on May 2, 2011 at a depth of 1.5 inches in 30 inch rows at 32,000 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 4 (crop injury only), 7, 16, 24, and August 22. Application date, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on October 13, 2011.

SUMMARY

The one-pass herbicide systems in this trial performed similarly for giant ragweed (92-97%), common lambsquarters (96–99%), and common waterhemp (97-99%) control. Control of grass species was more variable, 67 to 90% control. However, reduced grass control does not appear to be explain the differences in corn yield. (University of Minnesota Extension Regional Office, Rochester)

Date	6/1
Treatment	POST
Temperature (F)	
Air	63
Soil	64.2
Relative Humidity (%)	44
Wind (mph)	16
Soil Moisture	Adequate
Corn	
Stage	3-Collar
Height (inch)	6.0
Giant Ragweed	
Weed density (ft^2)	5.0
Height (inch)	5.0
Common Lambsquarters	
Weed density (ft^2)	3.0
Height (inch)	2.0
Common Waterhemp	
Weed density (ft^2)	3.3
Height (inch)	1.0
Giant Foxtail	
Weed density (ft^2)	47.5
Height (inch)	2.0
Rainfall after each application (inch)	
Week 1	0.04
Week 2	2.26
Week 3	2.83

Table 1. Evaluation of Laudis and Capreno in one-pass systems for giant ragweed control in field corn on June 7, 16, 24, and August 22 at Rochester, MN, in 2011.

Treatment	Rate	Giant Ragweed Control				Yield
		6/7	6/16	6/24	8/22	
	(rate/A)	(%)				(bu/A)
Untreated Check		0	0	0	0	34
POST (2-6 inch weeds)						
Laudis + Buctril + Destiny HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	98	96	95	95	170
Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	95	97	96	97	175
Laudis + Roundup PowerMax + Buctril + Destiny HC + AMS	3 fl oz/a + 22 fl ox/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	98	97	94	96	172
Dual II Magnum + Laudis + Roundup PowerMax +Destiny HC + AMS	1 pt/a + 3 fl oz/a + 22 fl oz/a +0.5% v/v + 8.5 lb/ 100 gal	95	96	94	96	165
Capreno + COC + AMS	3 fl oz/a + 1.0% v/v + 8.5 lb/ 100 gal	90	97	96	94	167
Capreno + Roundup PowerMax + Superb HC + AMS	3 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	96	96	92	93	178
Capreno + Buctril + Superb HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	98	94	93	94	163
Capreno + Roundup Powermax + Buctril + Superb HC + AMS	3 fl oz/a + 22 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	97	96	91	92	167
Dual II Magnum + Capreno + Roundup PowerMax + NIS + AMS	1 pt/a + 3 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	96	96	93	95	167
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	96	97	96	96	180
SureStart + Roundup PowerMax + AMS	2 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal	96	98	95	97	170
	LSD (P=0.10)	**2**	**2**	**5**	**4**	**12**

Table 2. Evaluation of Laudis and Capreno in one-pass systems for common lambsquarters control in field corn on June 7, 16, 24, and August 22 at Rochester, MN, in 2011.

Treatment	Rate	Common Lambsquarters Control				Yield
		6/7	6/16	6/24	8/22	
	(rate/A)	(%)				(bu/A)
Untreated Check		0	0	0	0	34
POST (2-6 inch weeds)						
Laudis + Buctril + Destiny HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	98	97	94	98	170
Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	99	98	99	98	175
Laudis + Roundup PowerMax + Buctril + Destiny HC + AMS	3 fl oz/a + 22 fl ox/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	98	97	97	96	172
Dual II Magnum + Laudis + Roundup PowerMax +Destiny HC + AMS	1 pt/a + 3 fl oz/a + 22 fl oz/a +0.5% v/v + 8.5 lb/ 100 gal	98	99	98	98	165
Capreno + COC + AMS	3 fl oz/a + 1.0% v/v + 8.5 lb/ 100 gal	90	99	99	99	167
Capreno + Roundup PowerMax + Superb HC + AMS	3 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	98	98	98	98	178
Capreno + Buctril + Superb HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	99	94	97	98	163
Capreno + Roundup Powermax + Buctril + Superb HC + AMS	3 fl oz/a + 22 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	99	99	99	98	167
Dual II Magnum + Capreno + Roundup PowerMax + NIS + AMS	1 pt/a + 3 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	99	99	99	98	167
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	99	99	99	99	180
SureStart + Roundup PowerMax + AMS	2 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal	96	98	99	98	170
	LSD (P=0.10)	**1**	**2**	**2**	**1**	**12**

Table 3. Evaluation of Laudis and Capreno in one-pass systems for common waterhemp control in field corn on June 7, 16, 24, and August 22 at Rochester, MN, in 2011.

Treatment	Rate	Common Waterhemp Control				Yield
		6/7	6/16	6/24	8/22	
	(rate/A)	(%)				(bu/A)
Untreated Check		0	0	0	0	34
POST (2-6 inch weeds)						
Laudis + Buctril + Destiny HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	99	99	98	99	170
Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	99	99	98	98	175
Laudis + Roundup PowerMax + Buctril + Destiny HC + AMS	3 fl oz/a + 22 fl ox/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	99	98	97	98	172
Dual II Magnum + Laudis + Roundup PowerMax +Destiny HC + AMS	1 pt/a + 3 fl oz/a + 22 fl oz/a +0.5% v/v + 8.5 lb/ 100 gal	99	99	98	99	165
Capreno + COC + AMS	3 fl oz/a + 1.0% v/v + 8.5 lb/ 100 gal	90	92	98	98	167
Capreno + Roundup PowerMax + Superb HC + AMS	3 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	99	99	98	97	178
Capreno + Buctril + Superb HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	99	99	99	99	163
Capreno + Roundup Powermax + Buctril + Superb HC + AMS	3 fl oz/a + 22 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	99	99	99	99	167
Dual II Magnum + Capreno + Roundup PowerMax + NIS + AMS	1 pt/a + 3 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	99	99	99	98	167
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	99	99	99	98	180
SureStart + Roundup PowerMax + AMS	2 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	98	170
	LSD (P=0.10)	**0.4**	**2**	**1**	**1**	**12**

Table 4. Evaluation of Laudis and Capreno in one-pass systems for giant foxtail control in field corn on June 7, 16, 24, and August 22 at Rochester, MN, in 2011.

Treatment	Rate	Giant Foxtail Control				Yield
		6/7	6/16	6/24	8/22	
	(rate/A)	(%)				(bu/A)
Untreated Check		0	0	0	0	34
POST (2-6 inch weeds)						
Laudis + Buctril + Destiny HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	94	79	70	69	170
Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	97	96	85	77	175
Laudis + Roundup PowerMax + Buctril + Destiny HC + AMS	3 fl oz/a + 22 fl ox/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	98	96	83	78	172
Dual II Magnum + Laudis + Roundup PowerMax +Destiny HC + AMS	1 pt/a + 3 fl oz/a + 22 fl oz/a +0.5% v/v + 8.5 lb/ 100 gal	97	97	95	93	165
Capreno + COC + AMS	3 fl oz/a + 1.0% v/v + 8.5 lb/ 100 gal	90	73	61	66	167
Capreno + Roundup PowerMax + Superb HC + AMS	3 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	98	96	92	83	178
Capreno + Buctril + Superb HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	91	70	61	67	163
Capreno + Roundup Powermax + Buctril + Superb HC + AMS	3 fl oz/a + 22 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	95	97	91	86	167
Dual II Magnum + Capreno + Roundup PowerMax + NIS + AMS	1 pt/a + 3 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	98	97	94	90	167
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	99	96	93	88	180
SureStart + Roundup PowerMax + AMS	2 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal	99	97	94	89	170
	LSD (P=0.10)	**2**	**3**	**4**	**5**	**12**

Table 4. Crop response to Laudis and Capreno one-pass systems in field corn on June 7 and 16 at Rochester, MN, in 2011.

Treatment	Rate	Crop Injury 6/7	Crop Injury 6/16	Yield
	(rate/A)	(%)		(bu/A)
Untreated Check		0	0	34
POST (2-6 inch weeds)				
Laudis + Buctril + Destiny HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	5	0	170
Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	2	0	175
Laudis + Roundup PowerMax + Buctril + Destiny HC + AMS	3 fl oz/a + 22 fl ox/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	6	0	172
Dual II Magnum + Laudis + Roundup PowerMax +Destiny HC + AMS	1 pt/a + 3 fl oz/a + 22 fl oz/a +0.5% v/v + 8.5 lb/ 100 gal	4	0	165
Capreno + COC + AMS	3 fl oz/a + 1.0% v/v + 8.5 lb/ 100 gal	6	0	167
Capreno + Roundup PowerMax + Superb HC + AMS	3 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	4	0	178
Capreno + Buctril + Superb HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	9	0	163
Capreno + Roundup Powermax + Buctril + Superb HC + AMS	3 fl oz/a + 22 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	10	0	167
Dual II Magnum + Capreno + Roundup PowerMax + NIS + AMS	1 pt/a + 3 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	4	0	167
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	4	0	180
SureStart + Roundup PowerMax + AMS	2 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal	3	0	170
	LSD (P=0.10)	**3**	**0**	**12**

Evaluation of Two-Pass Herbicide Programs for Weed Control in Field Corn in 2011.

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

The objective of this trial was to evaluate the performance of two-pass herbicide programs for weed control in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.6, O.M. of 2.1%, and soil test P and K levels of 49 ppm and 137 ppm, respectively. Fall fertilizer was broadcast applied on November 11, 2010 at a rate of 6-26-150 (N-P-K). Spring fertilizer was broadcast ahead of planting on April 5, 2011 at a rate of 120-0-0-24 (N-P-K-S). The area was side dressed with an additional 33 lb/A of N on June 13. The field was spring disked and field cultivated once prior to planting. The corn hybrid, Pioneer P9910AM1 (99 day), was planted on May 2, 2011 at a depth of 1.5 inches in 30 inch rows at 32,000 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 23, 31, June 8, 16, 24, and August 22. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on October 13, 2011.

SUMMARY

Giant ragweed and giant foxtail control provided the most separation among the soil applied pre-emergence herbicides. For giant ragweed the lowest soil applied control was achieved with Harness at 18% control (6/8 rating date). The three soil applied Capreno treatments averaged 47% control (6/8 rating date). SureStart, Lumax, Verdict, and Zemax all provided 77% control or better (6/8 rating date). By the last rating (8/22). only the Harness followed by Roundup PowerMax treatment provided significantly lower final giant ragweed control, 84% versus 94% or better for all other treatments (8/22).

Soil applied giant foxtail control with Capreno herbicide averaged 82%(6/8 rating date). All other soil applied herbicides provided 95% control or better (6/8 rating date). Final giant foxtail control in the PRE/POST systems was closely tied to the application date of the Post emergence herbicides. PRE/POST systems with POST applications at POST III & IV provided better giant foxtail control when compared to sequential POST II applications.

Common lambsquaters and common waterhemp control was very good to excellent for all treatments. Final common waterhemp control with the soil applied Capreno treatments was about 10% lower when compared to the best common waterhemp control treatments, (8/22 rating).

All crop response was associated with post emergence herbicide applications. Treatments with Buctril or Lumax provided the highest level of injury however; there was no impact on corn growth and development or grain yield. (University of Minnesota Extension Regional Office, Rochester).

Date	**5/3**	**5/26**	**6/6**	**6/8**	**6/13**
Treatment	PRE	POST I	POST II	POST III	POST IV
Temperature (F)					
Air	54	60	89	85	64
Soil	50.7	62.2	83.8	84.9	60.1
Relative Humidity (%)	36	43	53	34	64
Wind (mph)	10	18	3	14	8
Soil Moisture	Adequate	Adequate	Adequate	Dry	Dry
Corn					
Stage		2 Collar	4-5 Collar	5 Collar	5-6 Collar
Height (inch)		2.6	10.5	13.5	16.3
Giant Ragweed					
Weed density (ft^2)		17.1			
Height (inch)		2.0	6.3	5.3	3.8
Common Lambsquarters					
Weed density (ft^2)		7.1			
Height (inch)		0.8	4.5		
Common Waterhemp					
Weed density (ft^2)		20.0			
Height (inch)		0.4	1.0		
Giant Foxtail					
Weed density (ft^2)		16.0			
Height (inch)		0.6	2.5		6.0
Rainfall after each application (inch)					
Week 1	0.97	0.14	0.48	2.26	3.41
Week 2	0.51	0.48	3.41	2.83	1.29
Week 3	1.78	1.82	1.29	0.19	0.31

Table 1. Evaluation of two-pass herbicide systems for giant ragweed control in field corn on May 23, 31, June 8, 16, 24, and August 22 at Rochester, MN, in 2011.

Treatment	Rate	Giant Ragweed Control						Yield
		5/23	5/31	6/8	6/16	6/24	8/22	
	(rate/A)	(%)						(bu/A)
Untreated Check		0	0	0	0	0	0	0
PRE/POST II (4-6 inch weeds)								
Capreno / Laudis + Buctril + Destiny HC + AMS	3 fl oz/a / 3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	61	48	46	94	93	99	171
Capreno / Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a / 2 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	61	44	46	84	94	98	172
Capreno / Ignite 280 + Laudis + AMS	3 fl oz/a / 22 fl oz/a + 2 fl oz/a + 8.5 lb/ 100 gal	59	59	50	46	93	98	177
Harness / Roundup PowerMax + AMS	1.33 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	29	20	18	73	91	84	168
PRE/POST III (2-4 inch regrowth)								
SureStart / SureStart + Durango DMA + AMS	1.5 pt/a / 1.5 pt/a + 24 fl oz/a + 8.5 lb/ 100 gal	82	74	77	97	96	97	168
SureStart / Durango DMA + AMS	1.75 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	85	77	85	94	96	95	179
PRE / POST IV (4-6 inch regrowth)								
Lumax / Touchdown Total + AMS	1.5 qt/a / 24 fl oz/a + 8.5 lb/ 100 gal	83	84	89	83	96	98	192
Lumax / Halex GT + NIS + AMS	1.5 qt/a / 3.6 pt/a + 0.25 % v/v + 8.5 lb/ 100 gal	79	80	87	82	97	99	181
Verdict/ Status + Roundup PowerMax + AMS	13 fl oz/a / 2.5 oz/a + 22 fl oz/a + 8.5 lb/ 100 gal	90	88	89	90	91	94	202
Zemax / Touchdown Total + AMS	2.4 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	76	75	84	75	91	95	203
Zemax / Touchdown Total + AMS	3.2 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	81	80	92	89	95	98	188
POST I (1-2 inch weeds) / POST IV (4-6 inch regrowth)								
Capreno + Buctril + Superb HC + AMS / Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal / 2 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	0	87	87	78	97	99	191
Capreno + Buctril + Superb HC + AMS / Ignite 280 + Laudis + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal / 22 fl oz/a + 2 fl oz/a + 8.5 lb/ 100 gal	0	88	86	80	97	99	183
Lumax + Superb HC / Touchdown Total + AMS	1.5 qt/a + 0.5% v/v / 24 fl oz/a + 8.5 lb/ 100 gal	0	81	92	86	97	99	179
Lumax + Superb HC / Halex GT + NIS + AMS	1.5 qt/a + 0.5% v/v / 3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	0	80	92	88	97	99	189
	LSD (P=0.10)	**3.5**	**5.0**	**4.8**	**5.5**	**3.1**	**3.0**	**21**

Table 2. Evaluation of two-pass herbicide systems for common lambsquarters control in field corn on May 23, 31, June 8, 16, 24, and August 22 at Rochester, MN, in 2011.

Treatment	Rate	Common Lambsquarters Control						Yield
		5/23	5/31	6/8	6/16	6/24	8/22	
	(rate/A)	(%)						(bu/A)
Untreated Check		0	0	0	0	0	0	0
PRE/POST II (4-6 inch weeds)								
Capreno / Laudis + Buctril + Destiny HC + AMS	3 fl oz/a / 3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	96	96	97	99	99	99	171
Capreno / Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a / 2 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	97	95	96	97	99	98	172
Capreno / Ignite 280 + Laudis + AMS	3 fl oz/a / 22 fl oz/a + 2 fl oz/a + 8.5 lb/ 100 gal	97	96	97	99	96	98	177
Harness / Roundup PowerMax + AMS	1.33 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	98	96	96	95	97	99	168
PRE/POST III (2-4 inch regrowth)								
SureStart / SureStart + Durango DMA + AMS	1.5 pt/a / 1.5 pt/a + 24 fl oz/a + 8.5 lb/ 100 gal	99	99	97	99	99	99	168
SureStart / Durango DMA + AMS	1.75 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	99	99	98	99	99	99	179
PRE / POST IV (4-6 inch regrowth)								
Lumax / Touchdown Total + AMS	1.5 qt/a / 24 fl oz/a + 8.5 lb/ 100 gal	98	99	99	99	99	99	192
Lumax / Halex GT + NIS + AMS	1.5 qt/a / 3.6 pt/a + 0.25 % v/v + 8.5 lb/ 100 gal	99	99	99	99	99	99	181
Verdict/ Status + Roundup PowerMax + AMS	13 fl oz/a / 2.5 oz/a + 22 fl oz/a + 8.5 lb/ 100 gal	99	99	97	98	99	98	202
Zemax / Touchdown Total + AMS	2.4 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	203
Zemax / Touchdown Total + AMS	3.2 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	188
POST I (1-2 inch weeds) / POST IV (4-6 inch regrowth)								
Capreno + Buctril + Superb HC + AMS / Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal / 2 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	0	99	98	99	99	99	191
Capreno + Buctril + Superb HC + AMS / Ignite 280 + Laudis + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal / 22 fl oz/a + 2 fl oz/a + 8.5 lb/ 100 gal	0	99	99	99	99	99	183
Lumax + Superb HC / Touchdown Total + AMS	1.5 qt/a + 0.5% v/v / 24 fl oz/a + 8.5 lb/ 100 gal	0	99	99	99	99	99	179
Lumax + Superb HC / Halex GT + NIS + AMS	1.5 qt/a + 0.5% v/v / 3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	0	98	99	99	99	99	189
	LSD (P=0.10)	**0.5**	**2.1**	**1.6**	**1.3**	**1.4**	**0.7**	**21**

Table 3. Evaluation of two-pass herbicide systems for common waterhemp control in field corn on May 23, 31, June 8, 16, 24, and August 22 at Rochester, MN, in 2011.

Treatment	Rate	Common Waterhemp Control						Yield
		5/23	5/31	6/8	6/16	6/24	8/22	
	(rate/A)	(%)						(bu/A)
Untreated Check		0	0	0	0	0	0	0
PRE/POST II (4-6 inch weeds)								
Capreno / Laudis + Buctril + Destiny HC + AMS	3 fl oz/a / 3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	96	95	97	98	98	89	171
Capreno / Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a / 2 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	98	97	99	99	98	89	172
Capreno / Ignite 280 + Laudis + AMS	3 fl oz/a / 22 fl oz/a + 2 fl oz/a + 8.5 lb/ 100 gal	97	96	98	99	96	90	177
Harness / Roundup PowerMax + AMS	1.33 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	95	168
PRE/POST III (2-4 inch regrowth)								
SureStart / SureStart + Durango DMA + AMS	1.5 pt/a / 1.5 pt/a + 24 fl oz/a + 8.5 lb/ 100 gal	99	99	98	99	99	98	168
SureStart / Durango DMA + AMS	1.75 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	97	179
PRE / POST IV (4-6 inch regrowth)								
Lumax / Touchdown Total + AMS	1.5 qt/a / 24 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	98	192
Lumax / Halex GT + NIS + AMS	1.5 qt/a / 3.6 pt/a + 0.25 % v/v + 8.5 lb/ 100 gal	99	99	99	99	99	99	181
Verdict/ Status + Roundup PowerMax + AMS	13 fl oz/a / 2.5 oz/a + 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	98	96	202
Zemax / Touchdown Total + AMS	2.4 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	98	96	203
Zemax / Touchdown Total + AMS	3.2 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	98	98	188
POST I (1-2 inch weeds) / POST IV (4-6 inch regrowth)								
Capreno + Buctril + Superb HC + AMS / Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal / 2 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	0	99	98	98	99	98	191
Capreno + Buctril + Superb HC + AMS / Ignite 280 + Laudis + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal / 22 fl oz/a + 2 fl oz/a + 8.5 lb/ 100 gal	0	98	97	99	99	98	183
Lumax + Superb HC / Touchdown Total + AMS	1.5 qt/a + 0.5% v/v / 24 fl oz/a + 8.5 lb/ 100 gal	0	99	99	99	98	99	179
Lumax + Superb HC / Halex GT + NIS + AMS	1.5 qt/a + 0.5% v/v / 3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	0	98	99	99	99	99	189
	LSD (P=0.10)	**0.9**	**1.5**	**1.1**	**0.5**	**1.6**	**4.5**	**21**

Table 4. Evaluation of two-pass herbicide systems for giant foxtail control in field corn on May 23, 31, June 8, 16, 24, and August 22 at Rochester, MN, in 2011.

Treatment	Rate	Giant Foxtail Control						Yield
		5/23	5/31	6/8	6/16	6/24	8/22	
	(rate/A)	(%)						(bu/A)
Untreated Check		0	0	0	0	0	0	0
PRE/POST II (4-6 inch weeds)								
Capreno / Laudis + Buctril + Destiny HC + AMS	3 fl oz/a / 3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	95	81	80	85	82	71	171
Capreno / Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a / 2 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	95	84	81	97	92	73	172
Capreno / Ignite 280 + Laudis + AMS	3 fl oz/a / 22 fl oz/a + 2 fl oz/a + 8.5 lb/ 100 gal	95	80	85	95	89	74	177
Harness / Roundup PowerMax + AMS	1.33 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	97	78	168
PRE/POST III (2-4 inch regrowth)								
SureStart / SureStart + Durango DMA + AMS	1.5 pt/a / 1.5 pt/a + 24 fl oz/a + 8.5 lb/ 100 gal	99	99	98	99	99	98	168
SureStart / Durango DMA + AMS	1.75 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	89	179
PRE / POST IV (4-6 inch regrowth)								
Lumax / Touchdown Total + AMS	1.5 qt/a / 24 fl oz/a + 8.5 lb/ 100 gal	99	99	95	95	99	94	192
Lumax / Halex GT + NIS + AMS	1.5 qt/a / 3.6 pt/a + 0.25 % v/v + 8.5 lb/ 100 gal	99	99	96	94	99	98	181
Verdict/ Status + Roundup PowerMax + AMS	13 fl oz/a / 2.5 oz/a + 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	98	99	93	202
Zemax / Touchdown Total + AMS	2.4 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	99	99	97	89	90	88	203
Zemax / Touchdown Total + AMS	3.2 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	99	99	99	97	99	95	188
POST I (1-2 inch weeds) / POST IV (4-6 inch regrowth)								
Capreno + Buctril + Superb HC + AMS / Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal / 2 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	0	78	72	71	94	83	191
Capreno + Buctril + Superb HC + AMS / Ignite 280 + Laudis + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal / 22 fl oz/a + 2 fl oz/a + 8.5 lb/ 100 gal	0	80	73	75	78	78	183
Lumax + Superb HC / Touchdown Total + AMS	1.5 qt/a + 0.5% v/v / 24 fl oz/a + 8.5 lb/ 100 gal	0	78	80	56	99	97	179
Lumax + Superb HC / Halex GT + NIS + AMS	1.5 qt/a + 0.5% v/v / 3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	0	79	80	58	99	99	189
	LSD (P=0.10)	**1.5**	**4.5**	**4.8**	**4.2**	**3.7**	**4.5**	**21**

Table 5. Crop response to two-pass herbicide systems in field corn on May 23, 31, June 8, 16, and 24 at Rochester, MN, in 2011.

Treatment	Rate	Crop Injury					Yield
		5/23	5/31	6/8	6/16	6/24	
	(rate/A)	(%)					(bu/A)
Untreated Check		0	0	0	0	0	0
PRE/POST II (4-6 inch weeds)							
Capreno / Laudis + Buctril + Destiny HC + AMS	3 fl oz/a / 3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	0	0	8	0	0	171
Capreno / Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a / 2 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	0	0	4	0	0	172
Capreno / Ignite 280 + Laudis + AMS	3 fl oz/a / 22 fl oz/a + 2 fl oz/a + 8.5 lb/ 100 gal	0	0	5	0	0	177
Harness / Roundup PowerMax + AMS	1.33 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	1	0	0	168
PRE/POST III (2-4 inch regrowth)							
SureStart / SureStart + Durango DMA + AMS	1.5 pt/a / 1.5 pt/a + 24 fl oz/a + 8.5 lb/ 100 gal	0	0	0	0	0	168
SureStart / Durango DMA + AMS	1.75 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	0	0	0	0	0	179
PRE / POST IV (4-6 inch regrowth)							
Lumax / Touchdown Total + AMS	1.5 qt/a / 24 fl oz/a + 8.5 lb/ 100 gal	0	0	0	0	0	192
Lumax / Halex GT + NIS + AMS	1.5 qt/a / 3.6 pt/a + 0.25 % v/v + 8.5 lb/ 100 gal	0	0	1	0	0	181
Verdict/ Status + Roundup PowerMax + AMS	13 fl oz/a / 2.5 oz/a + 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	0	0	202
Zemax / Touchdown Total + AMS	2.4 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	0	0	0	0	0	203
Zemax / Touchdown Total + AMS	3.2 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal	0	0	0	0	0	188
POST I (1-2 inch weeds) / POST IV (4-6 inch regrowth)							
Capreno + Buctril + Superb HC + AMS / Laudis + Roundup PowerMax + Destiny HC + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal / 2 fl oz/a + 22 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	0	16	6	0	0	191
Capreno + Buctril + Superb HC + AMS / Ignite 280 + Laudis + AMS	3 fl oz/a + 6 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal / 22 fl oz/a + 2 fl oz/a + 8.5 lb/ 100 gal	0	16	6	0	0	183
Lumax + Superb HC / Touchdown Total + AMS	1.5 qt/a + 0.5% v/v / 24 fl oz/a + 8.5 lb/ 100 gal	0	12	4	0	0	179
Lumax + Superb HC / Halex GT + NIS + AMS	1.5 qt/a + 0.5% v/v / 3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	0	7	4	0	0	189
	LSD (P=0.10)	**0**	**2.5**	**2.2**	**0**	**0**	**21**

Evaluation of the Performance of Pyroxasulfone Herbicide Programs for Weed Control in Field Corn in 2011.

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

The objective of this trial was to evaluate the performance of pyroxasulfone + fluthiocet (Anthem) herbicide programs for weed control in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.4, O.M. of 2.3%, and soil test P and K levels of 38 ppm and 97 ppm, respectively. Fall fertilizer was broadcast applied on November 11, 2010 at a rate of 6-26-150 (N-P-K). Spring fertilizer was broadcast ahead of planting on April 5, 2011 at a rate of 120-0-0-24 (N-P-K-S). The area was side dressed with an additional 33 lb/A of N on June 13. The field was spring disked and field cultivated once prior to planting. The corn hybrid, Pioneer P9910AM1 (99 day), was planted on May 3, 2011 at a depth of 1.5 inches in 30 inch rows at 32,000 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 24, 31, June 8, 15, 24 and August 31. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on October 13, 2011.

SUMMARY

Giant Ragweed: The addition of Aatrex to Anthem improved control from 40 to 50% in both PRE and POST programs, (6/8 rating. Anthem applied PRE gave giant ragweed control similar to Harness. Anthem + atrazine applied PRE provided control of giant ragweed similar to Harness Xtra. The best early season control was achieved with Verdict (90%) or Lumax (92%) applied PRE (6/8 rating). The best giant ragweed control with POST programs was achieved with Anthem + Aatrex + Roundup PowerMax (85%) and Halex GT (81%). Herbicide programs with PRE Anthem or Anthem + Aatrex fb POST Roundup PowerMax provided superior giant ragweed control compared to POST only Anthem + Roundup PowerMax programs and similar control as POST only program Anthem + Aatrex fb Roundup PowerMax.

Common Lambsquarters: For POST programs, the addition of Aatrex to Anthem provided a slight advantage in common lambsquarters control over Anthem alone.

Common Waterhemp: Control was excellent for all programs except Roundup PowerMax alone, over 90% compared to 59%.

Grasses: Control was acceptable for all programs except Roundup PowerMax alone. (University of Minnesota Extension Regional Office, Rochester)

Date	5/4	5/26	6/8
Treatment	PRE	POST I	POST II
Temperature (F)			
Air	55	61	84
Soil	49.6	62.2	86.2
Relative Humidity (%)	34	45	34
Wind (mph)	15	15	16
Soil Moisture	Adequate	Adequate	Dry
Corn			
Stage		2-Collar	4-Collar
Height (inch)		3.3	13.4
Giant Ragweed			
Weed density (ft^2)		5.0	
Height (inch)		1.3	4.1
Common Lambsquarters			
Weed density (ft^2)		6.0	
Height (inch)		0.7	0.9
Common Waterhemp			
Weed density (ft^2)		3.3	
Height (inch)		0.3	1.5
Giant Foxtail			
Weed density (ft^2)		47.5	
Height (inch)		0.7	2.5
Rainfall after each application (inch)			
Week 1	1.07	0.14	2.26
Week 2	0.41	0.48	2.83
Week 3	2.30	1.82	0.19

Table 1. Evaluation of pyroxasulfone herbicide systems for giant ragweed control in field corn on May 24, 31, June 8, 15, 24, and August 31 at Rochester, MN, in 2011.

Treatment	Rate	Giant Ragweed Control						Yield
		5/24	5/31	6/8	6/15	6/24	8/31	
	(rate/A)	(%)						(bu/A)
Untreated Check		0	0	0	0	0	0	27
PRE								
Anthem	10 fl oz/a	28	30	20	10	11	14	43
Anthem + Aatrex	10 fl oz/a + 1.25 qt/a	60	69	68	48	50	46	99
PRE / POST II (2-4 inch weeds)								
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	24	29	20	86	93	89	183
Anthem / Roundup PowerMax + AMS	10 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	29	34	33	88	94	95	163
Anthem + Aatrex / Roundup PowerMax + AMS	8 fl oz/a + 1 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	54	59	60	94	92	89	176
Anthem + Aatrex / Roundup PowerMax + AMS	10 fl oz/a + 1 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	68	71	76	98	98	93	167
Verdict / Roundup PowerMax + AMS	13 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	78	88	90	99	96	96	169
Harness / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	39	39	38	86	97	92	179
Harness Xtra / Roundup PowerMax + AMS	2 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	58	79	68	98	97	97	183
Lumax / Roundup PowerMax + AMS	2 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	63	83	92	99	97	97	166
POST I (1-3 inch weeds)								
Anthem + Roundup PowerMax + NIS + AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	0	95	87	75	76	73	155
Anthem + Roundup PowerMax + NIS + AMS	9 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	0	84	81	69	65	64	147
Anthem + Aatrex + Roundup PowerMax + NIS + AMS	7 fl oz/a + 0.875 qt/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	0	93	91	89	86	85	167
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	0	86	90	80	81	81	181
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal	0	74	79	64	60	59	135
	LSD (P=0.10)	**7**	**10**	**11**	**8**	**9**	**10**	**32**

Table 2. Evaluation of pyroxasulfone herbicide systems for common lambsquarters control in field corn on May 24, 31, June 8, 15, 24, and August 31 at Rochester, MN, in 2011.

Treatment	Rate	Common Lambsquarters Control						Yield
		5/24	5/31	6/8	6/15	6/24	8/31	
	(rate/A)	(%)						(bu/A)
Untreated Check		0	0	0	0	0	0	27
PRE								
Anthem	10 fl oz/a	99	98	98	96	94	93	43
Anthem + Aatrex	10 fl oz/a + 1.25 qt/a	99	99	99	99	99	97	99
PRE / POST II (2-4 inch weeds)								
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	98	96	99	98	93	183
Anthem / Roundup PowerMax + AMS	10 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	97	97	99	99	94	163
Anthem + Aatrex / Roundup PowerMax + AMS	8 fl oz/a + 1 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	96	176
Anthem + Aatrex / Roundup PowerMax + AMS	10 fl oz/a + 1 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	97	167
Verdict / Roundup PowerMax + AMS	13 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	97	98	99	99	93	169
Harness / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	97	95	99	99	97	179
Harness Xtra / Roundup PowerMax + AMS	2 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	97	183
Lumax / Roundup PowerMax + AMS	2 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	166
POST I (1-3 inch weeds)								
Anthem + Roundup PowerMax + NIS + AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	0	99	98	91	96	91	155
Anthem + Roundup PowerMax + NIS + AMS	9 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	0	98	98	91	92	92	147
Anthem + Aatrex + Roundup PowerMax + NIS + AMS	7 fl oz/a + 0.875 qt/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	0	99	99	99	99	99	167
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	0	95	99	99	99	99	181
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal	0	98	97	68	76	74	135
	LSD (P=0.10)	**0.3**	**1**	**2**	**5**	**4**	**5**	**32**

Table 3. Evaluation of pyroxasulfone herbicide systems for common waterhemp control in field corn on May 24, 31, June 8, 15, 24, and August 31 at Rochester, MN, in 2011.

Treatment	Rate	Common Waterhemp Control						Yield
		5/24	5/31	6/8	6/15	6/24	8/31	
	(rate/A)	(%)						(bu/A)
Untreated Check		0	0	0	0	0	0	27
PRE								
Anthem	10 fl oz/a	99	99	99	99	99	99	43
Anthem + Aatrex	10 fl oz/a + 1.25 qt/a	99	99	99	99	99	97	99
PRE / POST II (2-4 inch weeds)								
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	183
Anthem / Roundup PowerMax + AMS	10 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	163
Anthem + Aatrex / Roundup PowerMax + AMS	8 fl oz/a + 1 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	98	99	176
Anthem + Aatrex / Roundup PowerMax + AMS	10 fl oz/a + 1 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	167
Verdict / Roundup PowerMax + AMS	13 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	97	169
Harness / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	98	99	179
Harness Xtra / Roundup PowerMax + AMS	2 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	183
Lumax / Roundup PowerMax + AMS	2 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	166
POST I (1-3 inch weeds)								
Anthem + Roundup PowerMax + NIS + AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	0	99	98	96	98	99	155
Anthem + Roundup PowerMax + NIS + AMS	9 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	0	99	98	92	95	99	147
Anthem + Aatrex + Roundup PowerMax + NIS + AMS	7 fl oz/a + 0.875 qt/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	0	99	99	99	98	99	167
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	0	98	99	99	99	99	181
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal	0	99	94	74	85	83	135
	LSD (P=0.10)	**0.1**	**1**	**1**	**4**	**3**	**5**	**32**

Table 4. Evaluation of pyroxasulfone herbicide systems for giant foxtail control in field corn on May 24, 31, June 8, 15, 24, and August 31 at Rochester, MN, in 2011.

Treatment	Rate	Giant Foxtail Control						Yield
		5/24	5/31	6/8	6/15	6/24	8/31	
	(rate/A)	(%)						(bu/A)
Untreated Check		0	0	0	0	0	0	27
PRE								
Anthem	10 fl oz/a	96	97	96	92	81	84	43
Anthem + Aatrex	10 fl oz/a + 1.25 qt/a	96	97	93	93	88	89	99
PRE / POST II (2-4 inch weeds)								
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	95	98	92	99	97	97	183
Anthem / Roundup PowerMax + AMS	10 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	96	97	95	99	97	98	163
Anthem + Aatrex / Roundup PowerMax + AMS	8 fl oz/a + 1 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	96	97	96	98	98	97	176
Anthem + Aatrex / Roundup PowerMax + AMS	10 fl oz/a + 1 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	97	98	96	99	98	98	167
Verdict / Roundup PowerMax + AMS	13 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	96	98	91	96	96	91	169
Harness / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	97	98	99	99	96	90	179
Harness Xtra / Roundup PowerMax + AMS	2 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	98	99	97	96	96	94	183
Lumax / Roundup PowerMax + AMS	2 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	96	97	89	98	97	96	166
POST I (1-3 inch weeds)								
Anthem + Roundup PowerMax + NIS + AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	0	96	85	77	78	78	155
Anthem + Roundup PowerMax + NIS + AMS	9 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	0	96	82	80	82	82	147
Anthem + Aatrex + Roundup PowerMax + NIS + AMS	7 fl oz/a + 0.875 qt/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	0	88	86	79	83	79	167
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	0	85	92	86	86	83	181
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal	0	90	75	66	60	60	135
	LSD (P=0.10)	**1**	**5**	**5**	**6**	**4**	**6**	**32**

Table 5. Crop response to pyroxasulfone herbicide systems in field corn on May 31, June 8 and 15, at Rochester, MN, in 2011.

Treatment	Rate	Crop Injury			Yield
		5/31	6/8	6/15	
	(rate/A)		(%)		(bu/A)
Untreated Check		0	0	0	27
PRE					
Anthem	10 fl oz/a	0	0	0	43
Anthem + Aatrex	10 fl oz/a + 1.25 qt/a	0	0	0	99
PRE / POST II (2-4 inch weeds)					
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	183
Anthem / Roundup PowerMax + AMS	10 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	163
Anthem + Aatrex / Roundup PowerMax + AMS	8 fl oz/a + 1 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	176
Anthem + Aatrex / Roundup PowerMax + AMS	10 fl oz/a + 1 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	167
Verdict / Roundup PowerMax + AMS	13 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	169
Harness / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	179
Harness Xtra / Roundup PowerMax + AMS	2 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	183
Lumax / Roundup PowerMax + AMS	2 qt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	1	0	166
POST I (1-3 inch weeds)					
Anthem + Roundup PowerMax + NIS + AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	30	11	5	155
Anthem + Roundup PowerMax + NIS + AMS	9 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	31	13	5	147
Anthem + Aatrex + Roundup PowerMax + NIS + AMS	7 fl oz/a + 0.875 qt/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/ 100 gal	31	10	5	167
Halex GT + NIS + AMS	3.6 pt/a + 0.25% v/v + 8.5 lb/ 100 gal	0	0	0	181
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	135
	LSD (P=0.10)	**2**	**1**	**1**	**32**

2011 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 6.7, O.M. of 2.5%, and soil test P and K levels of 69 ppm and 180 ppm, respectively. Fall fertilizer was broadcast applied on November 11, 2010 at a rate of 6-26-150 (N-P-K). Spring fertilizer was broadcast ahead of planting on April 5, 2011 at a rate of 120-0-0-24 (N-P-K-S). The area was side dressed with an additional 33 lb/A of N on June 13. The field was spring chisel plowed, disked and field cultivated once prior to planting. The corn hybrid, Pioneer P9910AM1, was planted on May 2, 2011 at a depth of 1.5 inches in 30 inch rows at 32,000 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 23, 31, June 8, 16, 24, and September 6, 2011. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on October 13, 2011. (University of Minnesota Extension Regional Office, Rochester)

SUMMARY

Giant ragweed control drives corn grain yield at the Rochester field trials. The majority of the time sequential weed control programs are necessary to adequately control giant ragweed and maximize yield. This was clearly the case during the 2011 growing season. All of the single pass total post treatments were statistically lower than the sequential PRE/POST systems, and sequential POST systems. The average grain yield for the single pass POST treatments sprayed at POST II averaged just 162 bu/a (average of 7 treatments). The average grain yield for the PRE/POST systems averaged 207 bu/a (average of 17 treatments). Sequential POST treatments also yielded well with an average grain yield of 210 bu/a (average of 2 treatments). In the PRE/POST systems where the soil applied herbicide does not sufficiently address broadleaf weed control (Anthem, BreakFree, Dual, and Harness); broadleaf weed control was enhanced when a herbicide with broadleaf activity was tank mixed with either glyphosate or glufosinate in the POST treatment. Where the soil applied herbicide provided significant broadleaf control (SureStart, SYN-A17227A, and Verdict) POST applications of glyphosate alone provided adequate broadleaf weed control. The Dual II Magnum/Halex GT treatment is an exception to the above statement in regard to giant ragweed control (90% control 9/6 rating date). A possible explanation for this is the early POST II timing of the Halex GT with limited 2 week rainfall following application. A couple of areas to note; sequential application of only Roundup WeatherMax did not maximize final weed control, with the exception of giant ragweed. Season long common waterhemp control proved to be challenging for a number of treatments especially where lower PRE setup rates and sulfonylurea chemistry were employed. (University of Minnesota Extension Regional Office, Rochester)

Date	**5/3**	**5/24**	**5/26**	**6/1**	**6/6**	**6/13**
Treatment	PRE	POST I	POST II	POST III	POST IV	POST V
Temperature (F)						
Air	54	66	61	66	89	59
Soil	49.1	62.8	62.8	64	83.8	59.5
Relative Humidity (%)	36	57	45	38	53	72
Wind (mph)	10	10	15	17	3	8
Soil Moisture	Adequate	Adequate	Adequate	Adequate	Dry	Dry
Corn						
Stage		V2	V2	V3	V4	V6
Height (inch)		3.0	4.0	6.0	10.8	16.3
Giant Ragweed						
Weed density (ft^2)		20.1				
Height (inch)		1.9	1.5	6.0	4.0	3.8
Common Lambsquarters						
Weed density (ft^2)		2.4				
Height (inch)		0.6	0.5	2.0	1.5	
Common Waterhemp						
Weed density (ft^2)		41.5				
Height (inch)		0.3	0.5	1.25	1.0	
Giant Foxtail						
Weed density (ft^2)		4.5				
Height (inch)		0.7	0.5	3.0	1.0	6.0
Rainfall after each application (inch)						
Week 1	0.97	0.66	0.14	0.04	0.48	3.41
Week 2	0.51	0.04	0.48	2.26	3.41	1.29
Week 3	1.78	1.92	1.82	2.83	1.29	0.31

Table 1. Performance of herbicide systems for giant ragweed control in field corn on May 23, 31, June 8, 16, 24, and September 6, at Rochester, MN, in 2011.

Treatment	Rate	Giant Ragweed Control						Yield
		5/23	5/31	6/8	6/16	6/24		
	(rate/A)	(%)						(bu/A)
Untreated Check		0	0	0	0	0	0	0
Weed Free		100	100	100	100	100	100	212
PRE/POST II (2-4 inch weeds- 5/26)								
Dual II Magnum / Halex GT + NIS + N-Pak AMS	1 pt/a / 3.6 pt/a + 0.25% v/v + 3 qt/a	14	86	87	88	85	90	190
PRE/POST III (V3-V4 corn - 6/1)								
Harness / Laudis + Destiny HC + N-Pak AMS	1.75 pt/a / 3 oz/a + 0.5% v/v + 2 qt/a	20	34	86	94	93	94	206
Capreno / Laudis + Roundup PowerMax + Destiny HC + N-Pak AMS	3 oz/a / 3 oz/a + 22 oz/a + 0.5% v/v + 2 qt/a	53	58	96	96	94	95	205
Harness / Ignite + Atrazine + N-Pak AMS	1.75 pt/a / 22 oz/a + 16 oz/a + 3 qt/a	21	31	97	95	92	94	202
BreakFree / Realm Q + Abundit S + N-Pak AMS	2 pt/a / 4 oz/a + 32 oz/a + 3 qt/a	20	30	96	92	90	95	208
BreakFree / Realm Q + Atrazine + COC + N-Pak AMS	2 pt/a / 4 oz/a + 16 oz/a + 1% v/v + 3 qt/a	21	37	95	94	94	96	210
BreakFree ATZ Lite / Realm Q + Abundit S + N-Pak AMS	4 pt/a / 4 oz/a + 32 oz/a + 3 qt/a	53	60	95	92	90	95	211
Harness / Roundup WeatherMax + N-Pak AMS	1.25 pt/a / 22 oz/a + 3 qt/a	19	29	88	89	87	87	200
Anthem / Roundup WeatherMax + N-Pak AMS	10 oz/a / 22 oz/a + 3 qt/a	20	21	93	93	93	91	202
Harness / Impact + Atrazine + MSO + N-Pak AMS	1.75 pt/a / 0.75 oz/a + 16 oz/a + 1% v/v + 3 qt/a	25	31	97	94	91	92	203
BreakFree / Abundit S + N-Pak AMS	1 pt/a / 32 oz/a + 3 qt/a	18	24	89	88	88	89	206
PRE/POST IV (4 in regrowth – 6/6)								
SYN-A17227A / Touchdown Total + N-Pak AMS	3 pt/a / 24 oz/a + 3 qt/a	73	76	83	97	95	97	219
Surestart / Durango + N-Pak AMS	1.75 pt/a / 24 oz/a + 3 qt/a	74	75	75	97	94	96	202
Surestart/ Durango + N-Pak AMS	2.5 pt/a / 24 oz/a + 3 qt/a	79	79	84	96	95	96	220
Surestart + Atrazine / Durango + N-Pak AMs	1.75 pt/a + 1.5 pt/a / 24 oz/a + 3 qt/a	78	79	85	97	96	96	216
PRE/POST V (4 inch regrowth – 6/13)								
Verdict / Roundup PowerMax + NIS + N-Pak AMS	18 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	90	87	92	99	97	97	211
Verdict / Roundup PowerMax + Status + NIS + N-Pak AMS	16 oz/a / 22 oz/a + 2.5 oz/a + 0.25% v/v + 3 qt/a	93	94	95	99	98	98	215
POST I (1 inch weeds) / POST V (4 inch weed regrowth)								
Roundup WeatherMax + N-Pak AMS / Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	88	77	90	97	96	214
POST II (2-4 inch weeds) / POST V (4 inch weed regrowth)								
Capreno + Roundup PowerMax + N-Pak AMS / Laudis + Destiny HC + N-Pak AMS	3 oz/a + 18 oz/a + 2 qt/a / 3 oz/a + 0.55 v/v + 2 qt/a	0	86	76	85	93	97	206
POST II (2-4 inch weeds – 5/26)								
Anthem + Roundup PowerMax + NIS + N-Pak AMS	8 oz/a + 22 oz/a + 0.25% v/v + 3 qt/a	0	91	76	78	75	75	109
Halex GT + Atrazine + NIS + N-Pak AMS	3.6 pt/a + 16 oz/a + 0.25% v/v + 3 qt/a	0	88	88	85	85	85	194
SureStart + Durango + N-Pak AMS	1.75 pt/a + 24 oz/a + 3 qt/a	0	91	79	82	81	85	172
Realm Q + Abundit S + N-Pak AMs	4 oz/a + 32 oz/a + 3 pt/a	0	87	81	83	82	83	176
Realm Q + Ignite + N-Pak AMS	4 oz/a + 22 oz/a + 3 qt/a	0	92	80	79	79	78	145
BreakFree + Realm Q + Abundit S + N-Pak AMS	1 pt/a + 4 oz/a + 32 oz/a + 3 qt/a	0	89	84	87	86	87	169
Realm Q + Abundit S + Atrazine + N-Pak AMS	4 oz/a + 32 oz/a + 16 oz/a + 3 qt/a	0	86	83	83	84	85	170
	LSD (P=0.10)	**6**	**4**	**7**	**3**	**4**	**4**	**20**

Table 2. Performance of herbicide systems for common lambsquarters control in field corn on May 23, 31, June 8, 16, 24, and September 6, at Rochester, MN, in 2011.

Treatment	Rate	Common Lambsquarters Control						Yield
		5/23	5/31	6/8	6/16	6/24		
	(rate/A)	(%)						(bu/A)
Untreated Check		0	0	0	0	0	0	0
Weed Free		100	100	100	100	100	100	212
PRE/POST II (2-4 inch weeds- 5/26)								
Dual II Magnum / Halex GT + NIS + N-Pak AMS	1 pt/a / 3.6 pt/a + 0.25% v/v + 3 qt/a	78	99	99	99	99	99	190
PRE/POST III (V3-V4 corn - 6/1)								
Harness / Laudis + Destiny HC + N-Pak AMS	1.75 pt/a / 3 oz/a + 0.5% v/v + 2 qt/a	99	99	99	99	99	98	206
Capreno / Laudis + Roundup PowerMax + Destiny HC + N-Pak AMS	3 oz/a / 3 oz/a + 22 oz/a + 0.5% v/v + 2 qt/a	93	98	99	99	99	99	205
Harness / Ignite + Atrazine + N-Pak AMS	1.75 pt/a / 22 oz/a + 16 oz/a + 3 qt/a	99	99	99	99	99	99	202
BreakFree / Realm Q + Abundit S + N-Pak AMS	2 pt/a / 4 oz/a + 32 oz/a + 3 qt/a	94	95	99	99	99	99	208
BreakFree / Realm Q + Atrazine + COC + N-Pak AMS	2 pt/a / 4 oz/a + 16 oz/a + 1% v/v + 3 qt/a	99	97	99	99	99	99	210
BreakFree ATZ Lite / Realm Q + Abundit S + N-Pak AMS	4 pt/a / 4 oz/a + 32 oz/a + 3 qt/a	99	99	99	99	99	99	211
Harness / Roundup WeatherMax + N-Pak AMS	1.25 pt/a / 22 oz/a + 3 qt/a	96	96	99	99	99	98	200
Anthem / Roundup WeatherMax + N-Pak AMS	10 oz/a / 22 oz/a + 3 qt/a	98	98	99	99	99	98	202
Harness / Impact + Atrazine + MSO + N-Pak AMS	1.75 pt/a / 0.75 oz/a + 16 oz/a + 1% v/v + 3 qt/a	99	99	99	99	99	99	203
BreakFree / Abundit S + N-Pak AMS	1 pt/a / 32 oz/a + 3 qt/a	98	97	99	99	99	98	206
PRE/POST IV (4 in regrowth – 6/6)								
SYN-A17227A / Touchdown Total + N-Pak AMS	3 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	99	219
Surestart / Durango + N-Pak AMS	1.75 pt/a / 24 oz/a + 3 qt/a	99	99	98	99	99	98	202
Surestart/ Durango + N-Pak AMS	2.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	99	220
Surestart + Atrazine / Durango + N-Pak AMs	1.75 pt/a + 1.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	99	216
PRE/POST V (4 inch regrowth – 6/13)								
Verdict / Roundup PowerMax + NIS + N-Pak AMS	18 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	99	211
Verdict / Roundup PowerMax + Status + NIS + N-Pak AMS	16 oz/a / 22 oz/a + 2.5 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	99	215
POST I (1 inch weeds) / POST V (4 inch weed regrowth)								
Roundup WeatherMax + N-Pak AMS / Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	99	90	90	99	95	214
POST II (2-4 inch weeds) / POST V (4 inch weed regrowth)								
Capreno + Roundup PowerMax + N-Pak AMS / Laudis + Destiny HC + N-Pak AMS	3 oz/a + 18 oz/a + 2 qt/a / 3 oz/a + 0.55 v/v + 2 qt/a	0	99	99	99	99	99	206
POST II (2-4 inch weeds – 5/26)								
Anthem + Roundup PowerMax + NIS + N-Pak AMS	8 oz/a + 22 oz/a + 0.25% v/v + 3 qt/a	0	99	99	98	98	98	109
Halex GT + Atrazine + NIS + N-Pak AMS	3.6 pt/a + 16 oz/a + 0.25% v/v + 3 qt/a	0	99	99	99	99	99	194
SureStart + Durango + N-Pak AMS	1.75 pt/a + 24 oz/a + 3 qt/a	0	99	99	99	99	99	172
Realm Q + Abundit S + N-Pak AMs	4 oz/a + 32 oz/a + 3 pt/a	0	99	99	99	99	99	176
Realm Q + Ignite + N-Pak AMS	4 oz/a + 22 oz/a + 3 qt/a	0	99	99	99	99	99	145
BreakFree + Realm Q + Abundit S + N-Pak AMS	1 pt/a + 4 oz/a + 32 oz/a + 3 qt/a	0	99	99	99	99	99	169
Realm Q + Abundit S + Atrazine + N-Pak AMS	4 oz/a + 32 oz/a + 16 oz/a + 3 qt/a	0	99	99	99	99	99	170
	LSD (P=0.10)	**3**	**1**	**2**	**1**	**1**	**1**	**20**

Table 3. Performance of herbicide systems for common waterhemp control in field corn on May 23, 31, June 8, 16, 24, and September 6, at Rochester, MN, in 2011.

Treatment	Rate	Common Waterhemp Control						Yield
		5/23	5/31	6/8	6/16	6/24		
	(rate/A)	(%)						(bu/A)
Untreated Check		0	0	0	0	0	0	0
Weed Free		100	100	100	100	100	100	212
PRE/POST II (2-4 inch weeds- 5/26)								
Dual II Magnum / Halex GT + NIS + N-Pak AMS	1 pt/a / 3.6 pt/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	99	190
PRE/POST III (V3-V4 corn - 6/1)								
Harness / Laudis + Destiny HC + N-Pak AMS	1.75 pt/a / 3 oz/a + 0.5% v/v + 2 qt/a	99	99	99	99	99	97	206
Capreno / Laudis + Roundup PowerMax + Destiny HC + N-Pak AMS	3 oz/a / 3 oz/a + 22 oz/a + 0.5% v/v + 2 qt/a	92	87	99	98	95	93	205
Harness / Ignite + Atrazine + N-Pak AMS	1.75 pt/a / 22 oz/a + 16 oz/a + 3 qt/a	99	99	99	99	99	97	202
BreakFree / Realm Q + Abundit S + N-Pak AMS	2 pt/a / 4 oz/a + 32 oz/a + 3 qt/a	99	99	99	99	99	97	208
BreakFree / Realm Q + Atrazine + COC + N-Pak AMS	2 pt/a / 4 oz/a + 16 oz/a + 1% v/v + 3 qt/a	99	99	99	99	99	98	210
BreakFree ATZ Lite / Realm Q + Abundit S + N-Pak AMS	4 pt/a / 4 oz/a + 32 oz/a + 3 qt/a	99	99	99	99	99	98	211
Harness / Roundup WeatherMax + N-Pak AMS	1.25 pt/a / 22 oz/a + 3 qt/a	99	98	99	99	98	89	200
Anthem / Roundup WeatherMax + N-Pak AMS	10 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	98	202
Harness / Impact + Atrazine + MSO + N-Pak AMS	1.75 pt/a / 0.75 oz/a + 16 oz/a + 1% v/v + 3 qt/a	99	99	99	99	99	95	203
BreakFree / Abundit S + N-Pak AMS	1 pt/a / 32 oz/a + 3 qt/a	99	99	99	98	95	92	206
PRE/POST IV (4 in regrowth – 6/6)								
SYN-A17227A / Touchdown Total + N-Pak AMS	3 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	95	219
Surestart / Durango + N-Pak AMS	1.75 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	90	202
Surestart/ Durango + N-Pak AMS	2.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	96	220
Surestart + Atrazine / Durango + N-Pak AMs	1.75 pt/a + 1.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	93	216
PRE/POST V (4 inch regrowth – 6/13)								
Verdict / Roundup PowerMax + NIS + N-Pak AMS	18 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	92	211
Verdict / Roundup PowerMax + Status + NIS + N-Pak AMS	16 oz/a / 22 oz/a + 2.5 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	97	215
POST I (1 inch weeds) / POST V (4 inch weed regrowth)								
Roundup WeatherMax + N-Pak AMS / Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	98	79	90	98	85	214
POST II (2-4 inch weeds) / POST V (4 inch weed regrowth)								
Capreno + Roundup PowerMax + N-Pak AMS / Laudis + Destiny HC + N-Pak AMS	3 oz/a + 18 oz/a + 2 qt/a / 3 oz/a + 0.55 v/v + 2 qt/a	0	98	95	90	99	97	206
POST II (2-4 inch weeds – 5/26)								
Anthem + Roundup PowerMax + NIS + N-Pak AMS	8 oz/a + 22 oz/a + 0.25% v/v + 3 qt/a	0	99	92	94	97	97	109
Halex GT + Atrazine + NIS + N-Pak AMS	3.6 pt/a + 16 oz/a + 0.25% v/v + 3 qt/a	0	99	99	99	98	98	194
SureStart + Durango + N-Pak AMS	1.75 pt/a + 24 oz/a + 3 qt/a	0	99	99	94	98	96	172
Realm Q + Abundit S + N-Pak AMs	4 oz/a + 32 oz/a + 3 pt/a	0	99	98	87	91	91	176
Realm Q + Ignite + N-Pak AMS	4 oz/a + 22 oz/a + 3 qt/a	0	99	98	92	92	93	145
BreakFree + Realm Q + Abundit S + N-Pak AMS	1 pt/a + 4 oz/a + 32 oz/a + 3 qt/a	0	99	99	99	99	99	169
Realm Q + Abundit S + Atrazine + N-Pak AMS	4 oz/a + 32 oz/a + 16 oz/a + 3 qt/a	0	99	99	91	91	92	170
	LSD (P=0.10)	**2**	**3**	**2**	**2**	**2**	**3**	**20**

Table 4. Performance of herbicide systems for giant foxtail control in field corn on May 23, 31, June 8, 16, 24, and September 6, at Rochester, MN, in 2011.

Treatment	Rate	Giant Foxtail Control						Yield
		5/23	5/31	6/8	6/16	6/24		
	(rate/A)	(%)						(bu/A)
Untreated Check		0	0	0	0	0	0	0
Weed Free		100	100	100	100	100	100	212
PRE/POST II (2-4 inch weeds- 5/26)								
Dual II Magnum / Halex GT + NIS + N-Pak AMS	1 pt/a / 3.6 pt/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	99	190
PRE/POST III (V3-V4 corn - 6/1)								
Harness / Laudis + Destiny HC + N-Pak AMS	1.75 pt/a / 3 oz/a + 0.5% v/v + 2 qt/a	99	99	99	98	99	94	206
Capreno / Laudis + Roundup PowerMax + Destiny HC + N-Pak AMS	3 oz/a / 3 oz/a + 22 oz/a + 0.5% v/v + 2 qt/a	76	81	99	98	90	85	205
Harness / Ignite + Atrazine + N-Pak AMS	1.75 pt/a / 22 oz/a + 16 oz/a + 3 qt/a	99	99	99	99	99	98	202
BreakFree / Realm Q + Abundit S + N-Pak AMS	2 pt/a / 4 oz/a + 32 oz/a + 3 qt/a	99	99	99	99	99	97	208
BreakFree / Realm Q + Atrazine + COC + N-Pak AMS	2 pt/a / 4 oz/a + 16 oz/a + 1% v/v + 3 qt/a	99	99	99	99	99	98	210
BreakFree ATZ Lite / Realm Q + Abundit S + N-Pak AMS	4 pt/a / 4 oz/a + 32 oz/a + 3 qt/a	99	99	99	99	99	98	211
Harness / Roundup WeatherMax + N-Pak AMS	1.25 pt/a / 22 oz/a + 3 qt/a	99	99	99	99	99	95	200
Anthem / Roundup WeatherMax + N-Pak AMS	10 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	98	202
Harness / Impact + Atrazine + MSO + N-Pak AMS	1.75 pt/a / 0.75 oz/a + 16 oz/a + 1% v/v + 3 qt/a	99	99	99	99	99	98	203
BreakFree / Abundit S + N-Pak AMS	1 pt/a / 32 oz/a + 3 qt/a	99	99	99	98	95	96	206
PRE/POST IV (4 in regrowth – 6/6)								
SYN-A17227A / Touchdown Total + N-Pak AMS	3 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	96	219
Surestart / Durango + N-Pak AMS	1.75 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	96	202
Surestart/ Durango + N-Pak AMS	2.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	97	220
Surestart + Atrazine / Durango + N-Pak AMs	1.75 pt/a + 1.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	97	216
PRE/POST V (4 inch regrowth – 6/13)								
Verdict / Roundup PowerMax + NIS + N-Pak AMS	18 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	97	211
Verdict / Roundup PowerMax + Status + NIS + N-Pak AMS	16 oz/a / 22 oz/a + 2.5 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	98	215
POST I (1 inch weeds) / POST V (4 inch weed regrowth)								
Roundup WeatherMax + N-Pak AMS / Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	97	78	90	94	87	214
POST II (2-4 inch weeds) / POST V (4 inch weed regrowth)								
Capreno + Roundup PowerMax + N-Pak AMS / Laudis + Destiny HC + N-Pak AMS	3 oz/a + 18 oz/a + 2 qt/a / 3 oz/a + 0.55 v/v + 2 qt/a	0	98	96	89	98	93	206
POST II (2-4 inch weeds – 5/26)								
Anthem + Roundup PowerMax + NIS + N-Pak AMS	8 oz/a + 22 oz/a + 0.25% v/v + 3 qt/a	0	99	94	94	99	99	109
Halex GT + Atrazine + NIS + N-Pak AMS	3.6 pt/a + 16 oz/a + 0.25% v/v + 3 qt/a	0	99	99	97	98	98	194
SureStart + Durango + N-Pak AMS	1.75 pt/a + 24 oz/a + 3 qt/a	0	99	98	97	96	94	172
Realm Q + Abundit S + N-Pak AMs	4 oz/a + 32 oz/a + 3 pt/a	0	99	94	89	92	91	176
Realm Q + Ignite + N-Pak AMS	4 oz/a + 22 oz/a + 3 qt/a	0	99	98	96	95	95	145
BreakFree + Realm Q + Abundit S + N-Pak AMS	1 pt/a + 4 oz/a + 32 oz/a + 3 qt/a	0	98	98	97	98	97	169
Realm Q + Abundit S + Atrazine + N-Pak AMS	4 oz/a + 32 oz/a + 16 oz/a + 3 qt/a	0	97	97	92	93	96	170
	LSD (P=0.10)	**1**	**1**	**2**	**2**	**3**	**4**	**20**

Table 5. Crop response to herbicide systems in field corn on May 23, 31, June 8, 16, and 24 at Rochester, MN, in 2011.

Treatment	Rate	Crop Injury					Yield
		5/23	5/31	6/8	6/16	6/24	
	(rate/A)	(%)					(bu/A)
Untreated Check		0	0	0	0	0	0
Weed Free		100	100	100	100	100	212
PRE/POST II (2-4 inch weeds- 5/26)							
Dual II Magnum / Halex GT + NIS + N-Pak AMS	1 pt/a / 3.6 pt/a + 0.25% v/v + 3 qt/a	0	5	0	0	0	190
PRE/POST III (V3-V4 corn - 6/1)							
Harness / Laudis + Destiny HC + N-Pak AMS	1.75 pt/a / 3 oz/a + 0.5% v/v + 2 qt/a	0	0	0	0	0	206
Capreno / Laudis + Roundup PowerMax + Destiny HC + N-Pak AMS	3 oz/a / 3 oz/a + 22 oz/a + 0.5% v/v + 2 qt/a	0	0	0	0	0	205
Harness / Ignite + Atrazine + N-Pak AMS	1.75 pt/a / 22 oz/a + 16 oz/a + 3 qt/a	0	0	1	0	0	202
BreakFree / Realm Q + Abundit S + N-Pak AMS	2 pt/a / 4 oz/a + 32 oz/a + 3 qt/a	0	0	0	0	0	208
BreakFree / Realm Q + Atrazine + COC + N-Pak AMS	2 pt/a / 4 oz/a + 16 oz/a + 1% v/v + 3 qt/a	0	0	0	0	0	210
BreakFree ATZ Lite / Realm Q + Abundit S + N-Pak AMS	4 pt/a / 4 oz/a + 32 oz/a + 3 qt/a	0	0	0	0	0	211
Harness / Roundup WeatherMax + N-Pak AMS	1.25 pt/a / 22 oz/a + 3 qt/a	0	0	0	0	0	200
Anthem / Roundup WeatherMax + N-Pak AMS	10 oz/a / 22 oz/a + 3 qt/a	0	0	0	0	0	202
Harness / Impact + Atrazine + MSO + N-Pak AMS	1.75 pt/a / 0.75 oz/a + 16 oz/a + 1% v/v + 3 qt/a	0	0	3	0	0	203
BreakFree / Abundit S + N-Pak AMS	1 pt/a / 32 oz/a + 3 qt/a	0	0	1	0	0	206
PRE/POST IV (4 in regrowth – 6/6)							
SYN-A17227A / Touchdown Total + N-Pak AMS	3 pt/a / 24 oz/a + 3 qt/a	0	0	0	0	0	219
Surestart / Durango + N-Pak AMS	1.75 pt/a / 24 oz/a + 3 qt/a	0	0	0	0	0	202
Surestart/ Durango + N-Pak AMS	2.5 pt/a / 24 oz/a + 3 qt/a	0	0	0	0	0	220
Surestart + Atrazine / Durango + N-Pak AMs	1.75 pt/a + 1.5 pt/a / 24 oz/a + 3 qt/a	0	0	0	0	0	216
PRE/POST V (4 inch regrowth – 6/13)							
Verdict / Roundup PowerMax + NIS + N-Pak AMS	18 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	0	0	0	0	0	211
Verdict / Roundup PowerMax + Status + NIS + N-Pak AMS	16 oz/a / 22 oz/a + 2.5 oz/a + 0.25% v/v + 3 qt/a	0	0	0	9	0	215
POST I (1 inch weeds) / POST V (4 inch weed regrowth)							
Roundup WeatherMax + N-Pak AMS / Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a	0	1	0	0	0	214
POST II (2-4 inch weeds) / POST V (4 inch weed regrowth)							
Capreno + Roundup PowerMax + N-Pak AMS / Laudis + Destiny HC + N-Pak AMS	3 oz/a + 18 oz/a + 2 qt/a / 3 oz/a + 0.55 v/v + 2 qt/a	0	10	0	0	0	206
POST II (2-4 inch weeds – 5/26)							
Anthem + Roundup PowerMax + NIS + N-Pak AMS	8 oz/a + 22 oz/a + 0.25% v/v + 3 qt/a	0	20	2	0	0	109
Halex GT + Atrazine + NIS + N-Pak AMS	3.6 pt/a + 16 oz/a + 0.25% v/v + 3 qt/a	0	7	0	0	0	194
SureStart + Durango + N-Pak AMS	1.75 pt/a + 24 oz/a + 3 qt/a	0	7	3	0	0	172
Realm Q + Abundit S + N-Pak AMs	4 oz/a + 32 oz/a + 3 pt/a	0	5	0	0	0	176
Realm Q + Ignite + N-Pak AMS	4 oz/a + 22 oz/a + 3 qt/a	0	15	1	0	0	145
BreakFree + Realm Q + Abundit S + N-Pak AMS	1 pt/a + 4 oz/a + 32 oz/a + 3 qt/a	0	6	0	0	0	169
Realm Q + Abundit S + Atrazine + N-Pak AMS	4 oz/a + 32 oz/a + 16 oz/a + 3 qt/a	0	4	5	0	0	170
	LSD (P=0.10)	**0**	**2**	**3**	**1**	**0**	**20**

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On-Farm Evaluation of Twin-Row Corn in Southern Minnesota in 2010 and 2011

Stahl, Lizabeth A.B. and Jeffrey A. Coulter

INTRODUCTION AND OBJECTIVES

Growers are continually striving to increase corn yield and profits. Planting corn in narrow rows is one potential way to do this. University of Minnesota research in southern and central Minnesota has indicated that corn yields can be increased 7 to 9% by planting in 20-inch rows compared to 30 inch rows, but these increases have not been consistently observed (1). It is also hypothesized that populations that optimize yields are greater in narrow rows than in 30-inch rows. Results from University of Minnesota trials conducted in northwestern MN from 2009-2011 indicate that yields were optimized at higher populations in narrow rows than in 30-inch rows (2).

In a twin-row corn system, which is a variation of narrow-row corn, corn is planted in row pairs six to eight inches apart and 30 inches separates the center of row pairs. A major advantage of planting corn in twin row rows compared to 15- or 22-inch rows is that beyond modifications to the planter, no additional major equipment modifications are needed. For example, a standard combine head will work to harvest the crop and narrow row tires, which can be very costly, compared to standard tires, are not essential. Plant arrangement, however, is different in twin rows than in 30-inch rows and plant populations that optimize yield may differ between these row spacings.

Trials conducted in more southern states indicate a potential to increase yields by planting corn in twin rows compared to 30-inch rows, although results have been inconsistent (3). Anecdotal reports from growers in southern Minnesota who are currently planting corn in twin rows indicate a potential for increased yields in twin rows compared to 30-inch rows This study was initiated in 2010 at two on-farm locations in southern Minnesota to determine 1) If row width (30-inch vs. 22-/8-inch twin rows) influences corn grain yield, harvest moisture, stalk lodging, and economic return and 2) If corn planted in twin-rows has a greater response to an increased seeding rate than corn planted in 30-inch rows.

MATERIALS AND METHODS

On-farm trials were initiated the spring of 2010 in southern Minnesota with two farmer cooperators by Welcome and Wilmont who have been planting corn in twin rows for a number of years. Fertilizer was applied according to soil test recommendations and herbicides were applied to control weeds at each site. Both sites have a long-term history of manure use. Further details regarding field histories for each site are listed in Tables 1. The planter used at Wilmont was designed by a manufacturer for twin-row corn production, while the planter used at the Welcome location was modified by the farmer to plant twin rows.

Treatments were arranged in a 2 x 3 factorial experiment in a randomized complete block design with four replications. Two row widths (30-inch vs. 22-/8-inch twin rows) at three target plant populations (33,000, 38,000, and 43,000 plants per acre (ppa)) were evaluated, for a total of six treatments. Plot length was 400 feet and individual plot width was 30 feet (Welcome) or 40 feet (Wilmont). The same planter was used for all treatments within a site. Each planter had dual toolbars and planting units were turned off on one tool bar for the 30-inch rows. Planter seeding rates were adjusted according to planter manual guidelines for each population by row spacing combination. At the Welcome site, the seeding rate was slightly higher for planter units on one tool bar than the other to help prevent seeds from being planted next to each other in the twin-rows. At the Wilmont site, planting rates were first tested in the field using planter monitor readings in order to try and match target populations as closely as possible.

When corn was V4 to V8 in 2010 and @ V3 in 2011, stand counts were taken by counting the number of plants in 100 feet of each harvest row.

Stalk lodging was determined prior to harvest by counting the number of stalk-lodged plants in 100 foot of row at two locations within each plot. Grain yield, moisture, and test weight was determined by harvesting the center 6 (Welcome) or 8 rows (Wilmont) of each plot. A weigh wagon was used at each site to determine plot weight. Grain moisture was adjusted to 15% moisture in yield calculations. ANOVA was used for statistical analysis and means compared using Fisher's Protected LSD at the 0.05 significance level. Data are presented across years and locations as well as for each site year.

RESULTS AND DISCUSSION

Table 1 shows the field background for each site in 2010 and 2011. Sites were planted in a timely manner both years: In 2010 planting occurred on 4/28 and 4/29 (Wilmont and Welcome, respectively) and in 2011 on 5/6 at both locations. The hybrid DKC 48-37, which has resistance to European corn borer, corn rootworm and glyphosate, was planted at each location both years. Figures 1 & 2 show the planters used at each site. When setting planting populations, care was taken to reach target populations as closely as possible but settings were also selected so that populations could be matched as closely as possible between row spacings.

Both sites had hail in 2011 (Welcome on 7/5/11 and Wilmont on 7/10/11). At the Wilmont site, damage appeared uniform across the plot and according to hail damage estimates should have had minimal impact on yield and minimal damage was observed at the Welcome as well.

Population:

Populations achieved in the field were close to target populations, differing by only 390 to 820 plants/ac from target populations when averaged across row spacings, sites and years (Table 2), and no difference was detected in population between row spacings when averaged across sites and years. Looking at individual site years, stands were slightly lower in twin rows compared to 30-inch rows when averaged across populations at Welcome in 2010 and Wilmont in 2011 (Table 3). Table 4 shows the plant stands for each row spacing by target population combination each year. There was no interaction between row spacing and target population at Welcome, but there was at Wilmont. At Wilmont, stands were similar between row spacings at the lowest target population both years, and the highest target population in 2010. Stands were greater in 30-inch rows at the mid-target population both years, however, and in twin rows at the highest population in 2011. Equipment limitations influenced how closely target populations could be reached, and the highest setting possible for 30-inch rows was used at Wilmont both years for the highest population. Overall, plant stands were closer to target populations in 2011 across sites.

Figures 3 through 8 are pictures of the three planting populations in each row spacing at Wilmont during 2010.

Stalk Lodging:

Averaged across sites and years, row spacing and population had no effect on stalk lodging (Table 2) and there was no row spacing by population interaction. However, differences were found when looking at individual site years. In 2010, stalk lodging was slightly greater in twin rows than 30-inch rows at Welcome (Table 3). Population also had an effect on stalk lodging, with stalk lodging being greater at the highest population than the lowest all sites years except for Welcome in 2010 where no difference was found due to population (Table 5). There was no interaction between row spacing and population in the amount of stalk lodging observed. Drought stress likely contributed to the increased amount of stalk lodging observed at both locations in 2011 compared to 2010.

Grain Moisture, Test Weight, and Yield:

Averaged across sites and years, row spacing, population, and the row spacing by population interaction had no effect on grain moisture at harvest (Table 2). In 2010 at Welcome, grain moisture was slightly higher (0.2%) at the highest population (Table 5). Grain was very dry by harvest each year, averaging less than 14.6 percent across all treatments, sites, and years.

Grain test weight was not affected by row spacing or population and there was no interaction between row spacing and population (Tables 2, 3, and 5).

Averaged across site years, row spacing and population had no effect on yield (Table 2), but there was a significant row spacing by population interaction (Table 6). In twin rows, yields were optimized at the highest population compared to the lower populations. Looking at individual site years, yield was not affected by row spacing at Welcome, but in 2010 the lowest population resulted in lower yields than the higher populations (Tables 3 and 5). At Wilmont in 2010 there was a significant interaction between population and row spacing (Table 7). Yields were greatest at the highest population in twin rows compared to all the other treatments. In comparison, yields in the 30-inch rows were lower at the highest population than the other populations.

CONCLUSIONS:

- A range of populations (low, medium and high) were achieved at each site both years, similar to target populations.
- Although stalk lodging was slightly greater in twin rows at Welcome in 2010, population had the greatest effect on stalk lodging, with the highest population (43,000 ppa) resulting in more stalk lodging that the lowest population (33,000 ppa) 3 of 4 site years.
- Although slight differences were seen at Welcome in 2010, row spacing, population, and the row spacing x population interaction had little effect on grain moisture at harvest. Grain moisture was low at harvest, averaging less than 14.6%, at both locations both years.
- Test weight was not affected by population, row spacing, or the row spacing x population interaction.
- Averaged across sites and years, yields were greater in twin rows at the highest population compared to the lower populations. This indicates that corn was able to take advantage of higher planting populations better in twin rows than in 30-inch rows. The likelihood of a yield response, however, would need to be considered along with the increased cost involved with planting at such high populations.

ACKNOWLEDGEMENTS

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Figure 1: Twin-row planter used at the Wilmont, MN site in 2010.

Figure 2: Twin-row planter used at the Welcome, MN site in 2010.

Figure 3: Twin-row corn at Wilmont, 33,000 ppa target population, 2010.

Figure 4: 30-inch corn at Wilmont, 33,000 ppa target population, 2010.

Figure 5: Twin-row corn at Wilmont, 38,000 ppa target population, 2010.

Figure 6: 30-inch row corn at Wilmont, 38,000 ppa target population, 2010.

Figure 7: Twin-row corn at Wilmont, 43,000 ppa target population, 2010.

Figure 8: 30-inch row corn at Wilmont, 43,000 ppa target population, 2010.

Table 1. Background information for twin-row corn sites in 2010 and 2011.

	2010	
	Welcome	**Wilmont**
Previous Crop	Soybean	Soybean
Tillage	Conventional	Conventional
Planter	White planter with dual toolbars	Kinzie Twin Row Planter, with auto guidance
Hybrid	DKC 48-37	DKC 48-37
Planting Date	4/29/10	4/28/10
Stand Counts	6/17 & 6/18/10 @ V8 corn	6/9/10 @ V4 corn
Lodging Ratings	10/12/10	10/14/10
Harvest Date	10/12/10	10/20/10
	2011	
	Welcome	**Wilmont**
Previous Crop	Soybean	Soybean
Tillage	Conventional	Conventional
Planter	White planter with dual toolbars	Kinzie Twin Row Planter, with auto guidance
Hybrid	DKC 48-37	DKC 48-37
Planting Date	5/6/11	5/6/11
Stand Counts	6/2/11 @ V3 corn	6/1/11 @ V3 corn
Lodging Ratings	10/6/11	10/12/11
Harvest Date	10/7/11	10/12/11

Table 2. Effect of row spacing (averaged across populations) and population (averaged across row spacings) on plant stand, stalk lodging, grain moisture, test weight, and yield averaged across locations (Welcome and Wilmont) and years (2010 and 2011).

	Averaged Across Locations (Welcome & Wilmont) and Years (2010-2011)				
Row Spacing	**Plant Stand**	**Stalk Lodging**	**Grain Moisture**	**Test Weight**	**Yield**
(plants/ac)	(plants/ac)	--- Stalk lodging (%) ----	----- Moisture (%) -----	---- Test weight (lb/bu) -----	----- Yield (bu/ac) -----
30" Rows	37680	2.3	14.6	59.2	207.4
Twin Rows	37190	2.2	14.5	59.5	207.6
LSD (.05)	**NS**	**NS**	**NS**	**NS**	**NS**
	Averaged Across Locations (Welcome & Wilmont) and Years (2010-2011)				
Target Population	**Plant Stand**	**Stalk Lodging**	**Grain Moisture**	**Test Weight**	**Yield**
(plants/ac)	---- (plants/ac) ----	--- Stalk lodging (%) ----	----- Moisture (%) -----	---- Test weight (lb/bu) -----	----- Yield (bu/ac) -----
33,000	32610	0.9	14.5	59.4	205.4
38,000	37510	2.1	14.6	59.4	207.8
43,000	42180	3.8	14.6	59.3	209.2
LSD (.05)	**1600**	**NS**	**NS**	**NS**	**NS**

Table 3. Effect of row spacing averaged across target populations on plant stand, stalk lodging, grain moisture, test weight, and yield at Welcome and Wilmont in 2010 and 2011.

	2010									
	Plant Stand		Stalk Lodging		Grain Moisture		Test Weight		Yield	
Target Population	Welcome	Wilmont	Welcome	Wilmont	Welcome	Wilmont	Welcome	Wilmont	Welcome	Wilmont
	--- (plants/ac) ---		--- Stalk lodging (%) ----		----- Moisture (%) -----		---- Test weight (lb/bu) -----		----- Yield (bu/ac) -----	
30" Rows	38040	35520	0.0	0.4	14.7	14.6	59.0	58.2	225.5	212.3
Twin Rows	36880	35330	0.3	0.9	14.6	14.4	59.3	59.7	224.6	218.6
LSD (.05)	440	NS	0.2	NS	NS	NS	NS	NS	NS	2.5
	2011									
	Plant Stand		Stalk Lodging		Grain Moisture		Test Weight		Yield	
Row Spacing	Welcome	Wilmont	Welcome	Wilmont	Welcome	Wilmont	Welcome	Wilmont	Welcome	Wilmont
	----- (plants/ac) -----		--- Stalk lodging (%) ----		----- Moisture (%) -----		---- Test weight (lb/bu) -----		----- Yield (bu/ac) -----	
30" Rows	38670	38590	2.8	6.4	14.5	14.6	59.9	59.2	183.5	208.4
Twin Rows	38290	38260	2.3	5.4	14.6	14.5	59.8	59.2	182.7	204.4
LSD (.05)	NS	320	NS	NS	NS	NS	NS	NS	NS	NS

Table 4. Evaluation of interaction between row spacing and target population on stand at Welcome and Wilmont in 2010 and 2011.

	2010				2011			
	Welcome		Wilmont		Welcome		Wilmont	
Target Population	30" Rows	Twin Rows	30" Rows	Twin Rows	30" Rows	Twin Rows	30" Rows	Twin Rows
(plants per acre)	---------- population (plants per acre) ----------				---------- population (plants per acre) ----------			
33,000	33730	32550	30070	30610	33960	33610	33430	32940
38,000	37910	36770	35950	34370	38750	38420	39800	38120
43,000	42490	41340	40530	41020	43300	42830	42530	43730
Interaction LSD (.05) within location and year	NS		850		NS		580	

Table 5. Effect of target population averaged across row spacing on plant stand, stalk lodging, grain moisture, test weight, and yield at Welcome and Wilmont in 2010 and 2011.

	2010									
	Plant Stand		Stalk Lodging		Grain Moisture		Test Weight		Yield	
Target Population	Welcome	Wilmont	Welcome	Wilmont	Welcome	Wilmont	Welcome	Wilmont	Welcome	Wilmont
(plants per acre)	Population (plants/ac)		--- Stalk lodging (%) ----		----- Moisture (%) -----		---- Test weight (lb/bu) -----		----- Yield (bu/ac) -----	
33,000	33140	30340	0.0	0.0	14.6	14.4	58.9	59.0	222.1	213.7
38,000	37340	35160	0.3	0.8	14.6	14.4	59.4	59.5	226.8	216.3
43,000	41910	40780	0.1	1.3	14.8	14.7	59.4	58.5	226.2	216.3
LSD (.05)	**540**	**600**	**NS**	**0.6**	**0.2**	**NS**	**NS**	**NS**	**2.9**	**NS**
	2011									
	Plant Stand		Stalk Lodging		Grain Moisture		Test Weight		Yield	
Target Population	Welcome	Wilmont	Welcome	Wilmont	Welcome	Wilmont	Welcome	Wilmont	Welcome	Wilmont
(plants per acre)	---- (plants/ac)		--- Stalk lodging (%) ----		----- Moisture (%) -----		---- Test weight (lb/bu) -----		----- Yield (bu/ac) -----	
33,000	33780	33180	1.2	2.4	14.5	14.4	59.9	59.2	180.5	205.4
38,000	38590	38960	2.2	5.4	14.8	14,7	59.9	59.1	184.7	203.5
43,000	43070	43130	4.3	10.0	14.5	14,5	59.9	59.3	184.1	210.4
LSD (.05)	**500**	**390**	**2.5**	**5.7**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

Table 6. Evaluation of interaction between row spacing and target population on stand and yield averaged across sites (Welcome and Wilmont) and years (2010 and 2011).

	Average 2010-2011			
	Population		Yield	
Target Population	30" Rows	Twin Rows	30" Rows	Twin Rows
(plants per acre)	---------- (plants/ac) ----------		---------- (bu/ac) ----------	
33,000	32800	32430	206.6	204.3
38,000	38100	36920	210.2	205.5
43,000	42140	42230	205.4	213.0
LSD (.05)	**NS**		**7.8**	

Table 7. Evaluation of interaction between row spacing and population on yield at Welcome and Wilmont in 2010 and 2011.

	2010				2011			
	Welcome		Wilmont		Welcome		Wilmont	
Target Population	30" Rows	Twin Rows	30" Rows	Twin Rows	30" Rows	Twin Rows	30" Rows	Twin Rows
(plants per acre)	---------- yield (bu/ac) ----------				---------- yield (bu/ac) ----------			
33,000	222.9	221.4	211.8	215.7	180.8	180.2	210.7	200.0
38,000	227.1	226.5	215.6	217.1	190.7	178.7	207.4	199.6
43,000	226.6	225.8	209.4	223.1	178.9	189.4	207.2	213.6
Interaction LSD (.05) within a location and year		NS		4.3		NS		NS

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Evaluation of StrategoYLD Fungicide and Herbicide Tank Mix Programs on Field Corn at Rochester, MN in 2011.

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

The objective of this trial was to evaluate the performance of Stratego YLD fungicide when tank mixed with herbicide products for crop safety and disease control in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.9, O.M. of 2.6%, and soil test P and K levels of 32 ppm and 136 ppm, respectively. The field was fall moldboard plowed, and spring disked and field cultivated once prior to planting. The previous crop was field corn. Spring fertilizer was broadcast ahead of planting on April 5, 2011 at a rate of 152-0-0-30 (N-P-K-S). The area was side dressed with an additional 33 lb/A of N on June 13. Lumax herbicide was broadcast applied pre-emergence at a rate of 3 pints per acre to the entire plot area following planting. The plots were also hand rouged to keep the plots area weed free. The corn hybrid, Pioneer P9910AM1 (99 day), was planted on May 3, 2011 at a depth of 1.5 inches in 30 inch rows at 32,000 seeds per acre. A randomized complete block design was used with eight replications. Postemergence (POST) treatments were applied on June 7 with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Application dates, environmental conditions, and crop stages are listed below. Visual observations were made for crop injury at 3 and 7 days following application. A push test was conducted to evaluate the presence of stalk rot. The center two rows of each plot were machine harvested on October 13, 2011.

SUMMARY

No significant crop response differences were observed when comparing tank mixes with and without StrategoYLD and its herbicide partner. No differences in corn stalk quality were observed between the various treatments. In addition no significant grain yield differences were measured with the addition of StrategoYLD fungicide and its herbicide partner. (University of Minnesota Extension Regional Office, Rochester)

Date	**6/7**
Treatment	POST
Temperature (F)	
Air	79
Soil	77.5
Relative Humidity (%)	62
Wind (mph)	13
Soil Moisture	Adequate
Corn	
Stage	V5
Height (inch)	9.9
Rainfall after application (inch)	
Week 1	1.92
Week 2	2.80
Week 3	0.46

Table 1. Evaluation of StrategoYLD fungicide when tank mixed with herbicide products at Rochester, MN, in 2011.

Treatment	Rate	Push Test				Yield
		Phyto 6/10	Phyto 6/14	Lodged Plants 9/13	Grain Moist 10/13	
	(rate/A)	(%)				(bu/A)
Untreated Check		0	0	1.5	15.1	223.8
Stratego YLD + NIS	4 fl oz/a + 0.125% v/v	0	0	1.0	15.7	223.4
Laudis + Destiny HC + AMS	3 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	0	1	1.0	15.2	226.6
Stratego YLD + Laudis + Destiny HC + AMS	4 fl oz/a + 3 fl oz/a + 0.5% v/v + 8.5 lb/ 100 gal	0	0	3.5	15.5	237.0
Callisto + COC + AMS	3 fl oz/a + 1% v/v + 8.5 lb/ 100 gal	0	0	2.5	15.1	220.2
Stratego YLD + Callisto + COC + AMS	4 fl oz/a + 3 fl oz/a + 1% v/v + 8.5 lb/ 100 gal	0	0	1.5	15.4	224.7
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal	0	0	0.5	15.3	240.1
Stratego YLD + Roundup PowerMax + AMS	4 fl oz/a + 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0.5	15.7	237.4
LSD (P=0.05)		**NS**	**NS**	**NS**	**NS**	**12.4**

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Corn Response to Micronutrients Across Minnesota

Fertilizer: Treatments
1) Control (Chk) - no fertilizer
2) Without Zinc (-Zn)
3) Without Manganese (-Mn)
4) Without Copper (-Cu)
5) Without Boron (-B)
6)All - 10 lb/ac Zn + 10 lb/ac Mn + 10 lb/ac Cu + 5 lb/ac B
Nitrogen, Phosphorus, and Potassium kept at non-limiting levels
Fertilizer was broadcast and incorporated before planting

Weed Management: Glyphosate

Experimental Design: Randomized complete block design with 4 replications

Objective:

The purpose of this study was to determine if there is a potential yield response in corn to selected micro-nutrients applied broadcast before planting.

Results:

This study used a simple drop out design to study the effects of micronutrients by comparing plots with 4 micronutrients with plots where one of the particular nutrients are not applied. To test treatment effects, an analysis of variance procedure was used to determine whether any of the treatments were significantly different. When the analysis indicated significance, all treatments with a particular nutrient were averaged and compared to averages of treatments without. Initial soil test results are given in Table 1. Soil samples were taken at 0-6" soil depth from all locations. However, at the time of this report the samples from three of the locations are still being analyzed. Soil types varied by location. The soil at Oklee was a Northwood muck, Rochester was a Marshan silt loam, Staples was a Verndale sandy loam, and Westport was a Estherville loam. The Oklee site was selected because of the high amounts of organic matter (data not shown). This was to better evaluate response to copper since these types of soils typically are more responsive to copper (Cu) in small grains. Corn is somewhat sensitive to Cu deficiency according to many reports. However, most mineral soils contain plenty of copper to satisfy the needs of most crops. Current guidelines do not list an adequate soil test for copper. Therefore data provided will not be helpful in determine if a response may occur. Typically zinc (Zn) is the most deficient micronutrient reported in corn.

Table 1. Initial soil test data for 0-6" samples collected before treatment application for corn micronutrient studies.

		Soil Test							
Location	County	P	K	Zn	Mn	Cu	B	OM	pH
		----------ppm----------						--%--	
Oklee	Red Lake	37	74	3.7	4.1	0.2	1.3	18.7	6.3
Rochester	Olmsted	66	185	1.9	53.7	1.2	0.4	3.2	6.1
Staples	Wadena	40	105	2.5	23.9	0.7	0.2	2.1	7.1
Westport	Pope	40	135	2.2	32.6	0.6	0.4	5.1	6.5

P, Bray-P1 phosphorus; K, ammonium acetate potassium; Zn, DTPA zinc; Mn, DTPA manganese; Cu, DTPA copper; B, hot water extracted boron; OM, organic matter loss on ignition; pH, 1:1 soil:water ;na, data not available.

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Project Funding Provided by:
Agrium

Corn Response to Micronutrients Across Minnesota
(continued)

Reports of lowered micronutrient uptake in glyphosate tolerant crops have spurred interest in Manganese (Mn), especially in soybean. However, no documented cases of Mn deficiency in corn have been reported outside of areas of the country that have soils historically low in Mn. The final micronutrient, Boron (B) was included since soil tests ran on sandy soils typically will show lower boron levels. However, corn is not as sensitive to B deficiency as crops such as alfalfa. Therefore, the current fertilizer suggestions for corn do not include any B applications to corn. Two of the locations included sandy soils or soils that have high leaching potentials (Staples and Westport). Borate is the form of B in the soil and is highly leachable. Typically soils low in B are sandy soils low in organic matter. Another major issue with B application is B toxicity which can be a significant problem in crops due to the over application of the nutrient.

Yield data is given in Table 2 (reported yields are adjusted to 15.5% moisture). Grain yields were high at all locations except for the peat/muck soil site at Oklee. This site was wet early in the year and had a hard frost before the corn reached physiological maturity. Consequently yield potentials were limited at this site and calculated grain moistures were very high (Table 3). There were no significant yield increases at Oklee, Rochester, or Westport. The only site that soil test data were available was the Rochester location which tested high in Zn and Mn was adequate according to data from states which have Mn guidelines for crops (from the Tri State fertilizer recommendations MI, OH, IN). Soils typically responsive to Mn in those areas are high in organic matter and also have high pH. The Oklee site would fit this description, but still yields were not affected. The only site where there was a significant yield increase was Staples. At this location plots receiving Zn and Cu both appeared to have yields 7 bu/ac higher than those without. Even though we cannot tell whether both did have an effect, it is likely that Zn increased yields due to the soil type at this location and the fact that Zn is the micro-nutrient most likely to be deficient. Soil tests did show that zinc levels were higher than where we would expect a response (Table 1) at 2.5 ppm.

Grain moisture data is given in Table 3. Nutrient deficiencies can delay maturity thereby significantly influencing grain moisture levels at harvest. In this study there was no significant increase or decrease in grain moisture at harvest for any of the micronutrient treatments. At Oklee the grain harvest moistures were extremely high. This may have been due to extreme shrinkage of the kernel following the hard freeze and the plot not being fully mature. Harvest moistures were much lower at all other locations.

Year 1 Summary

- Corn is not known to respond to any micronutrient other than zinc in Minnesota
- Grain Yield was increased by one or more micronutrients at one location
- At Staples, either Zn or Cu increased yields. Soil test data to confirm initial levels of either was not available at the time of this summary to indicate if either or both was deficient.
- Corn grain harvest moisture was not affected by micronutrient application at any location

Table 2. Corn yield (@ 15.5%) summary by treatment for each location.

	Treatment						
Site	Chk	-Zn	-Mn	-Cu	-B	All	*P>F* †
	bu/ac						
Oklee	105	117	109	116	113	109	0.26
Rochester	243	238	241	227	237	233	0.30
Staples	189c	191bc	197ab	191bc	202a	199ab	0.03
Westport	196	193	194	199	194	189	0.69

† Treatments are significantly different when $P \leq 0.05$.

Table 3. Corn grain moisture summary by treatment for each location.

	Treatment						
Site	Chk	-Zn	-Mn	-Cu	-B	All	*P>F* †
	%						
Oklee	41.6	38.5	40.2	38.9	40.0	41.7	0.14
Rochester	15.7	15.6	16.2	15.7	15.6	15.6	0.71
Staples	13.3	13.1	13.1	13.0	13.0	13.1	0.46
Westport	14.2	14.6	15.1	15.0	14.6	15.4	0.14

† Treatments are significantly different when $P \leq 0.05$.

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2011 Corn Silage Foliar Fungicide Research Trial

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

Project Description: There has been a significant increase in questions regarding the economical use of foliar fungicide in Midwest corn silage production. Little university research has been conducted to verify its effect on yield, quality and ultimately economics. As a result, the Universities of Wisconsin and Minnesota implemented a cooperative research trial starting in 2009 near La Crescent, MN using three commonly used fungicides on two high yielding corn silage hybrids. Results of the 2011 trials are discussed here.

Materials and methods: The trial included two corn silage hybrids; NK N53W-3000GT and De Kalb DKC 57-50, which were selected based on their performance in the 2010 Minnesota and Wisconsin corn silage hybrid trials. In 2011 V5 and R1 treatment timings were evaluated. Foliar fungicides were applied at the following timings; V5 applications were Headline (6.0 fl. oz/a), Quadris (6.0 fl. oz/a), and Stratego YLD (2.5 fl. oz/a), R1 applications were Headline AMP (10.0 fl. oz/a), Quilt Xcel (10.5 fl. oz/a) and Stratego YLD (5.0 fl. oz/a). The trial was set up in a randomized complete block design, with four replications. Each plot was four 30-inch rows, twenty feet long. Fungicides were applied with a back-pack sprayer using a high-clearance, telescoping boom (R&D Sprayers, Opelousas, LA) equipped with 11003XR flat fan nozzles at 40 psi delivering a total volume of 18.3 gallons per acre at V5 and 20.6 gallons per acre at R1. Volume differences are due to sprayer configuration differences between the application timings.

The plot was rated for foliar disease intensity based on percentage of leaf area infected at the time of fungicide applications and at harvest (i.e., severity). Fungicide treatments were applied on 16 June 2011 (V5) and 24 July 2011 (R1). The plot was harvested 19 September 2011. 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 one of the center two rows of each treatment replication was harvested, measured for yield, and sampled for quality.

Results and Discussion: Similar to 2009 and 2010, results indicated no evidence of a statistical or economic advantage for using a foliar fungicide for yield or quality. Hybrid selection, similar to other years, was found to be a more important component of production compared to the use of a foliar fungicide.

Results of 2011 Small Plot Research, LaCrescent, MN

Trt #	Treatment	Application timing	% DM [a]	DM Yield (T/A) [a]	CP (% DM) [a]	NDF (% DM) [a]	NDFd (% DM) [a]	Fat (% DM) [a]	Milk/T [a]
1	NK N53W-3000GT Untreated Check	-	35.3 ab	12.3 a	8.17 abcde	36.89 a	18.67 abc	2.19 bc	3733 ab
2	NK N53W-3000GT Stratego YLD (2.5 fl. oz/a)	V5-V6	35.7 ab	11.79 ab	8.41abc	34.92 a	17.33 c	3.07 ab	3766 ab
3	NK N53W-3000GT Stratego YLD (5.0 fl. oz/a)	VT-R1	34.6 ab	12.0 a	8.35 abc	36.21 a	18.17 bc	2.89 ab	3791 a
4	NK N53W-3000GT Headline (6.0 fl. oz/a)	V5-V6	34.8 ab	11.8 ab	8.49 ab	35.71 a	17.97 bc	2.91 abc	3746 ab
5	NK N53W-3000GT Headline AMP (10.0 fl. oz/a)	VT-R1	31.8 c	10.4 b	8.37 abc	35.03 a	20.66 a	2.10 c	3623 b
6	NK N53W-3000GT Quadris (6.0 fl. oz/a)	V5-V6	34.7 ab	11.8 ab	8.52 a	36.07	17.85 bc	2.87 abc	3706 ab
7	NK N53W-3000GT Quilt XL (10.5 fl. oz/a)	VT-R1	36.1 ab	11.9 ab	8.53 a	35.31 a	17.38 c	2.92 abc	3780 a
8	Dekalb DKC 57-50 Untreated Check	-	36.4 a	12.1 a	8.07 cde	34.35 a	17.24 c	3.11 a	3783 a
9	Dekalb DKC 57-50 Stratego YLD (2.5 fl. oz/a)	V5-V6	34.3 abc	11.4 ab	7.83 e	36.96 a	19.08 abc	2.21 bc	3658 ab
10	Dekalb DKC 57-50 Stratego YLD (5.0 fl. oz/a)	VT-R1	35.6 ab	11.7 ab	8.36 abc	35.5 a	18.02 bc	2.52 abc	3740 ab
11	Dekalb DKC 57-50 Headline (6.0 fl. oz/a)	V5-V6	35.9 ab	12.6 a	8.19 abcd	35.01 a	17.32 c	3.11 a	3769 ab
12	Dekalb DKC 57-50 Headline AMP (10.0 fl. oz/a)	VT-R1	33.5 bc	12.2 a	8.12 bcde	38.68 a	20.25 ab	2.87 abc	3617 b
13	Dekalb DKC 57-50 Quadris (6.0 fl. oz/a)	V5-V6	36.3 ab	12.5 a	7.96 de	33.85 a	16.86 c	3.12 a	3728 ab
14	Dekalb DKC 57-50 Quilt XL (10.5 fl. oz/a)	VT-R1	34.4 abc	12.3 a	8.18 abcde	36.52 a	18.40 abc	2.94 abc	3741 ab

[a] means with a column followed by the same letter are not significantly different (P=0.10, Duncan's New Multiple Range Test)

Effect of Long-Term Tillage Practices on Corn and Soybean at Heron Lake, MN in 2011.

Stahl, Lizabeth A.B.

This trial was established the fall of 2005 to evaluate the effect of long-term tillage practices on percent residue, population, yield, and economics in corn and soybean. Long-term cooperators with this project include University of Minnesota Extension, the Heron Lake Watershed District, Pietz Farms, Vernon Uit de Flesch, Fairland Management Company, Alba Grain, Inc, and the North Heron Lake Game Producers Association. In 2011, this project was supported with funding from an Environmental Protection Agency 319 grant administered by the Minnesota Pollution Control Agency.

Treatments were established in a Randomized Complete Block Design with three replications in an on-farm trial, using field-scale equipment for all tillage and planting operations. Both a soybean and corn plot was established the fall of 2005. Plots were rotated in subsequent years in a corn/soybean rotation so that tillage treatments were practiced in each tillage strip continuously.

The six tillage treatments included: Strip tillage (ST, targeted for the fall although circumstances required strip tillage to be conducted in the spring for the 2010 and 2009 growing seasons), no tillage (NT), ridge-tillage (RT, ridges were built during the corn year by cultivation but no cultivation was conducted the soybean year), chisel plow (CP, fall chisel plow followed by a field cultivation in the spring), chisel plow with an alternative nitrogen application (CPA, fall chisel plow followed by a field cultivation in the spring, with approximately 25% more nitrogen applied), and one-pass (OP, field cultivation in the spring only).

Field Histories for 2011 are reported in Table 1. Primary tillage was conducted the fall of 2010. Field cultivation was conducted for the corresponding tillage treatments prior to planting in the spring. A 16-row John Deere 1790 planter, equipped with residue managers, was used to plant both the corn and soybean trials in 30-inch rows on May 18th and June 5th, respectively. Individual plots were 16 rows wide and 380 feet long. The center eight rows of each individual plot were harvested, and grain moisture, test weight (for corn), and weight using a weigh wagon was recorded.

Precipitation was above normal at this site the beginning of the year and planting was delayed due to wet conditions. Corn appeared stunted and yellowed prior to N application, particularly in reduced tillage plots. From the end of July through harvest, however, precipitation was below normal.

Table 2 lists results for the corn trial in 2011, and Table 3 lists results for the soybean trial in 2011. The economic analysis and multi-year analysis had not yet been conducted at the time of publication.

Conclusions for 2011:

- Tillage did not have an effect on population in both corn and soybean
- Test weight and moisture at harvest were not affected by tillage system in corn.
- Yields under long-term NT in corn were significantly lower than in all the other tillage systems evaluated
- Although yields in the CPA treatment in soybean were lower than the other tillage treatments, this has not been observed in previous years of the study and could be due in part to variability across the plot. Otherwise, there was no difference in yield across tillage systems in soybean yield.
- NT resulted in the highest percent residue cover in both the corn and soybean. Residue levels in the RT and ST treatments were similar and significantly higher than in the CP and CPA treatments

Acknowledgements: A special thanks to Mark Pietz and Pietz Farms, Vernon Uit de Flesch, David Christopher, Steven Christopher, Orthman Manufacturing Inc., and DAWN Equipment Company for their assistance with this plot.

Table 1. Field history for long-term tillage trial at Heron Lake in corn and soybean in 2011.

	Corn	Soybean
Planting Date	May 18, 2011	June 5, 2011
Population	36,000 seeds/ac	170,000 seeds/acre
Hybrid/Variety	DKC 5066	Channel 1901
Fertilizer program	36-92-30 applied fall of 2010, 10-34-0 @ 4.5 gpa @ planting, 28% UAN sidedressed @ 140 # N/a on 6/30/11 (CPA received 180# N/a)	(if needed, P & K applied with corn needs previous year during trial)
Stand counts	June 27, 2011 @ V6	July 6, 2011 @ V3
Tillage notes	Primary tillage conducted fall of 2010	Primary tillage conducted fall of 2010
Harvest Date	October 25, 2011	October 6, 2011
Herbicide Program	Halex GT POST @ 3.6 pt/a on 6/7/11	Touchdown @ 2.1 pt/a + Fusion @ 2 oz/a June 20,2011 f/b Touchdown @ 2.1 pt/a July 14, 2011
Insecticide	Capture @ 5oz/a @ planting (May 18, 2011)	Warrior 8/5/11 @ 3.2 oz/a for soybean aphid
Soil Type	Clarion Loam, Nicollet Clay Loam	Clarion Loam, Nicollet Clay Loam
Previous Crop	Soybean	Corn

Table 2. Effect of long-term tillage treatments in corn on percent residue cover, population, test weight, grain moisture, and yield at Heron Lake, in 2011.

Tillage	Residue (%)		Population (ppa)		Test Weight (#/bu)		Moisture (%)		Yield (bu/ac)	
CP	7.5	C	34080		58.3		12.4		182.2	A
CPA	8.3	C	35000		57.9		12.3		194.5	A
NT	68.3	A	33250		57.1		12.4		155.7	B
OP*										
RT	55.5	B	33420		57.0		12.8		182.2	A
ST	46.0	B	32670		58.4		11.8		177.0	A
p value	**0.000**		**0.6910**		**0.8319**		**0.4366**		**0.0236**	
C.V. (%)	18.47		5.23		2.83		4.26		6.39	
LSD (.05)	**10.8**		**NS**		**NS**		**NS**		**21.0**	

*Note OP plots were accidently plowed the fall of 2010, so this treatment was dropped from the trial in 2011.

Table 3. Effect of long-term tillage treatments in soybean on percent residue cover, population, and yield at Heron Lake, in 2011.

Tillage	Residue (%)		Population (ppa)		Yield (bu/ac)	
CP	13.6	C	168800		47.5	A
CPA	14.3	C	167950		44.3	B
NT	56.6	A	160080		47.0	A
OP*						
RT	45.8	B	160200		47.7	A
ST	49.3	AB	168070		46.5	A
p value	**0.000**		**0.7453**		**.0124**	
C.V. (%)	**8.04**		**5.96**		**1.5**	
LSD (.05)	**7.4**		**NS**		**1.8**	

*Note OP plots were accidently plowed the fall of 2010, so this treatment was dropped from the trial in 2011.

SECTION E

SOYBEAN VARIETY

2011 SE Minnesota Regional Performance of Early Maturity Glyphosate Tolerant (GT) Roundup Ready® (RR) Soybean Varieties (1.3 to 1.8 maturity) at Rochester and Waseca, MN.

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

The objective of this study was to compare the performance of early maturity GT/RR® soybean (1.3 to 1.8 maturities) in southern Minnesota. The trials were located at Rochester and Waseca, MN. Field histories are reported in Table 1. The trials 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 in Rochester and Waseca. A randomized complete block design was implemented and replicated four times. The center two rows 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 lists soybean variety traits. Table 4 lists the 2010 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 Rochester and Waseca, MN in 2011.

	Rochester	Waseca
Planting Date	May 16, 2011	June 1, 2011
Harvest Date	October 6, 2011	October 10, 2011
Soil Type	Port Byron Silt loam	Nicollet/Webster clay loam
Tillage	Conventional	Conventional
Herbicide		1.5 pt Treflan + 2 oz Optill Cultivated 7/19/11
Previous Crop	Corn	Corn

Table 2. Yield (at 13%) and moisture of early maturity soybeans (1.3 – 1.8) at Rochester and Waseca, MN, and the 2-site average, in 2011.

Entry Name	Description	Rochester		Waseca		2-Site Average
1.3 to 1.8 maturity	Maturity	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Yield @ 13% (bu/A)
AgVenture 18G8	1.8	8.7	75.3	8.3	52.3	63.8
AgVenture 19C9	1.8	9.3	64.0	8.6	49.0	56.5
Asgrow AG1431 Brand	1.4	8.4	73.8	8.7	56.2	65.0
Asgrow AG1631	1.6	8.4	72.3	8.7	49.3	60.8
Asgrow AG1832	1.8	9.6	71.3	8.3	48.4	59.9
Asgrow AG1831	1.8	8.8	64.2	8.3	42.3	53.3
Croplan R2C1770	1.7	9.4	70.3	9.0	43.5	56.9
Croplan R2C1669	1.6	9.6	71.4	8.5	49.9	60.7
Dahlman 5115NRR2Y	1.5	8.9	69.8	8.7	55.4	62.6
Dahlman 5117NRR2Y	1.7	9.3	68.4	8.7	50.5	59.5
Dairyland DSR-1710R2Y	1.7	9.0	70.4	8.4	53.9	62.2
Dairyland DSR-1808R2Y	1.8	9.4	69.9	8.4	53.7	61.8
LG Seeds C1390R2	1.3	8.4	70.0	8.6	49.4	59.7
LG Seeds C1665R2	1.6	9.1	70.7	8.7	49.9	60.3
Merschman Venus 1214RR2Y	1.4	8.9	68.8	8.4	49.9	59.4
Mycogen 5N160R2	1.6	9.2	70.0	8.7	52.0	61.0
Mycogen 5N180R2	1.8	9.2	70.5	8.5	56.2	63.4
NK Brand S17-F3 Brand	1.7	10.3	68.4	8.4	54.0	61.2
NK Brand S17-G8 Brand	1.7	8.5	67.0	8.4	48.2	57.6
NuTech 1808 R	1.8	9.1	63.5	8.6	45.4	54.5
NuTech-G2 7164	1.6	9.3	68.2	8.4	53.9	61.1
NuTech-G2 7170	1.7	9.5	64.8	8.6	49.4	57.1
Pioneer Brand 91Y61	1.6	9.0	66.7	8.8	39.5	53.1
Pioneer Brand 91Y72	1.7	9.3	60.3	9.0	45.9	53.1
Renk RS140NR2	1.4	8.4	70.3	8.3	51.3	60.8
Renk RS172NR2	1.7	9.4	71.1	8.0	47.1	59.1
Stine 13RA08	1.3	8.5	69.2	8.2	45.6	57.4
Stine 16RA02	1.8	9.2	71.8	8.5	49.2	60.5
Viking 1440R2	1.4	8.9	69.2	8.4	46.8	58.0
Viking 1707R2N	1.7	9.0	66.5	8.5	52.6	59.6
LSD (P=0.10)		0.4	4.9	0.5	6.7	

Table 3. Traits of early maturity GT/RR® soybean varieties in 2011.

Company	Entry	Maturity Rating	SCN Resistant Source	Hilum Color	Flower Color	Pubescence Color	Pod Color
AgVenture	**18G8**	1.8	PI88788				
AgVenture	**19C9**	1.8	PI88788	Black	Purple	Light Tawny	Brown
Asgrow	**AG1431 Brand**	1.4	PI88788	Black	Purple	Light Tawny	Brown
Asgrow	**AG1631**	1.6	PI88788	Imperfect Black	Purple	Gray	Brown
Asgrow	**AG1832**	1.8	PI88788				
Asgrow	**AG1831**	1.8	PI88788	Black	Purple	Tawny	Tan
Croplan	**R2C1770**	1.7	PI88788	Imperfect Black	Purple	Gray	Tan
Croplan	**R2C1669**	1.6	R3/MR14	Imperfect Black	Purple	Gray	Tan
Dahlman	**5115NRR2Y**	1.5	PI88788	Black	Purple	Gray	Brown
Dahlman	**5117NRR2Y**	1.7	PI88788	Black	Purple	Gray	Tan
Dairyland	**DSR-1710R2Y**	1.7	Susceptible	Imperfect Black	Purple	Gray	Brown
Dairyland	**DSR-1808R2Y**	1.8	PI88788				
LG Seeds	**C1390R2**	1.3	Peking	Imperfect Black	Purple	Gray	Brown
LG Seeds	**C1665R2**	1.6	PI88788	Imperfect Black	Purple	Gray	Tan
Merschman	**Venus 1214RR2Y**	1.4	Susceptible	Black	Purple	Tawny	Tan
Mycogen	**5N160R2**	1.6	PI88788	Imperfect Black	Purple	Gray	Brown
Mycogen	**5N180R2**	1.8	PI88788	Imperfect Black	Purple	Gray	Brown
NK Brand	**S17-F3 Brand**	1.7	PI88788	Brown	Purple	Light Tawny	Brown
NK Brand	**S17-G8 Brand**	1.7	PI88788	Imperfect Black	Purple	Gray	Brown
NuTech	**1808 R**	1.8					
NuTech-G2	**7164**	1.6	PI88788	Black	Purple	Light Tawny	
NuTech-G2	**7170**	1.7	PI88788	Black	Purple	Light Tawny	
Pioneer Brand	**91Y61**	1.6	Susceptible	Brown	Purple	Tawny	Brown
Pioneer Brand	**91Y72**	1.7	PI88788	Black	Purple	Light Tawny	Tan
Renk	**RS140NR2**	1.4	PI88788	Imperfect Black	Purple	Gray	Brown
Renk	**RS172NR2**	1.7	PI88788				
Stine	**13RA08**	1.3	Susceptible	Black	Purple	Tawny	
Stine	**16RA02**	1.8	PI88788	Imperfect Black	Purple	Gray	
Viking	**1440R2**	1.4	Susceptible	Black	Purple	Tawny	Tan
Viking	**1707R2N**	1.7	PI88788	Imperfect Black	Purple	Gray	Brown

Table 4. Yield (at 13%) and moisture of early maturity soybeans (1.3 – 1.8) at Rochester and Waseca, MN, and the 2-site average, in 2010.

Entry Name	Description	Rochester		Waseca		2-Site Average
1.3 to 1.8 maturity	Maturity	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Yield @ 13% (bu/A)
AgVenture 20A1	1.8	10.1	50.4	9.6	59.4	54.9
AgVenture 20A2	1.8	10.3	51.3	9.8	67.3	59.3
Asgrow AG 1506	1.5	10.1	55.8	9.5	65.6	60.7
Asgrow AG 1831 RR2Y	1.8	10.9	55.8	10.1	69.9	62.8
Croplan Genetics R2C1669	1.6	10.3	56.1	10.0	68.5	62.3
Croplan Genetics RC1820	1.8	10.2	54.9	9.7	66.9	60.9
LG Seeds C1375R2	1.3	10.0	49.4	9.8	67.3	58.3
LG Seeds C1665R2	1.6	10.4	55.8	10.1	70.4	63.1
NK Brand S17-B5 Brand	1.7	10.3	54.7	9.7	70.2	62.4
NK Brand S17-G8 Brand	1.7	10.0	54.4	9.8	67.7	61.0
Northstar Genetics NS1726NR2	1.7	10.1	56.3	9.9	71.9	64.1
Northstar Genetics NS1826NR2	1.8	10.5	59.1	9.8	66.4	62.7
NuTech 6153 G2	1.5	10.2	50.1	10.0	59.6	54.8
NuTech 7180 G2	1.8	10.3	47.8	10.0	62.9	55.3
Pioneer Brand 91Y40	1.4	10.1	49.6	9.5	61.5	55.5
Pioneer Brand 91Y80	1.8	10.3	46.6	9.8	64.5	55.5
Renk RS140NR2	1.4	10.1	54.6	10.0	62.2	58.4
Renk RS160NR2	1.6	10.3	55.8	10.0	63.3	59.6
Stine 16RA02	1.6	10.3	57.6	9.8	68.7	63.2
Stine 14RA02	1.4	10.2	56.1	10.2	62.8	59.4
Viking 1712R2N	1.7	10.2	55.2	10.0	65.4	60.3
Viking 1929NRR	1.8	10.1	48.4	9.8	64.3	56.3
Dairyland DSR 1601	1.6	10.2	51.0	10.0	64.8	57.9
NuTech 1808RN	1.8	10.2	50.3	9.8	58.5	54.4
	Site Average	**10.2**	**53.2**	**9.9**	**65.4**	**59.3**
	LSD (P=0.10)	**0.2**	**2.8**	**0.4**	**6.8**	**3.6**

2011 SE Minnesota Regional Performance of Late Maturity Glyphosate Tolerant (GT) Roundup Ready® (RR) Soybean Varieties (1.9 to 2.5 maturity) at Rochester and Waseca, MN

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

The objective of this study was to compare the performance of late maturity GT/RR® soybean (1.9 to 2.5 maturities) in southern Minnesota. The trials were located at Rochester and Waseca, MN. Field histories are reported in Table 1. The trials 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 in Rochester and Waseca. A randomized complete block design was implemented and replicated four times. The center two rows 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 lists soybean variety traits. Table 4 lists the 2010 early maturity GT/RR® trial result. (University of Minnesota Extension Regional Office, Rochester, and Southern Research and Outreach Center, Waseca, MN).

Table 1. Field history at Rochester and Waseca, MN in 2011.

	Rochester	Waseca
Planting Date	May 16, 2011	June 1, 2011
Harvest Date	October 6, 2011	October 10, 2011
Soil Type	Port Byron Silt loam	Nicollet/Webster clay loam
Tillage	Conventional	Conventional
Herbicide		1.5 pt Treflan + 2 oz Optill Cultivated 7/19/11
Previous Crop	Corn	Corn

Table 2. Yield (at 13%) and moisture of late maturity soybeans (1.9 – 2.5) at Rochester and Waseca, MN, and the 2-site average, in 2011.

Entry Name	Description	Rochester		Waseca		2-Site Average
1.9 to 2.5 maturity	Maturity	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Yield @ 13% (bu/A)
AgVenture 20A3	2.0	9.0	63.3	8.4	42.8	53.1
AgVenture 22C4	2.2	10.0	65.2	8.4	48.0	56.6
Asgrow AG1931 Brand	1.9	8.3	68.0	8.6	46.3	57.2
Asgrow AG2031 Brand	2.0	9.0	73.0	8.4	55.8	64.4
Asgrow AG2430 Brand	2.4	9.8	62.2	8.4	49.1	55.7
Croplan R2C2070	2.0	9.0	70.7	8.4	51.8	61.3
Croplan R2C2120	2.1	10.0	65.1	8.3	43.2	54.2
Dahlman 5120NRR2Y	2.0	9.9	68.5	8.2	49.8	59.2
Dahlman 5220NRR2Y	2.0	9.4	67.3	8.3	46.1	56.7
Dairyland DSR-2105R2Y	2.1	10.0	68.2	8.4	55.2	61.7
Dairyland DSR-2560R2Y	2.5	12.5	61.5	8.8	51.0	56.3
Legend 20R20N	2.0	8.8	68.9	8.4	51.6	60.3
Legend 21R29N	2.1	9.4	69.1	8.1	49.7	59.4
LG Seeds C1917R2	1.9	9.2	70.0	8.4	52.2	61.1
LG Seeds C2175R2	2.1	9.6	67.5	8.4	49.1	58.3
Merschman Apache 1124RR2Y	2.4	10.5	68.7	8.4	48.5	58.6
Mycogen 5N210R2	2.1	9.8	65.0	8.4	53.0	59.0
NK Brand S20-Y2	2.0	8.7	71.4	8.6	54.9	63.2
NK Brand 21-N6	2.1	10.5	68.1	8.2	52.6	60.4
NK Brand S21-E4 *(aphid resistant)*	2.1	10.0	62.6	8.3	52.2	57.4
NK Brand S25-R3	2.5	10.7	64.6	8.7	50.3	57.5
NuTech – G2 7208	2.0	8.7	68.1	8.4	45.3	56.7
NuTech – G2 7250	2.5	10.1	70.6	9.0	48.0	59.3
Pioneer Brand 92Y12	2.1	9.8	66.3	8.8	43.4	54.9
Pioneer Brand 92Y51	2.5	10.4	64.8	8.8	44.9	54.9
Renk RS210NR2	2.1	9.7	66.0	8.2	48.9	57.5
Renk RS241R2	2.4	10.4	66.3	8.3	42.5	54.4
Stine 2420-4	2.3	9.5	66.0	8.3	47.7	56.9
Viking 2000R2N	2.0	9.2	71.4	8.3	52.4	61.9
Viking 2044R2N	2.0	9.5	67.5	8.3	45.9	56.7
Site Average		9.7	67.2	8.4	49.6	58.4
LSD (P=0.10)		0.4	4.0	0.3	7.4	4.1

Table 3. Traits of late maturity GT/RR® soybean varieties in 2011.

Company	Entry	Maturity Rating	SCN Resistant Source	Hilum Color	Flower Color	Pubescence Color	Pod Color
AgVenture	**20A3**	2.0	PI88788	Black	Mix	Tawny	Brown
AgVenture	**22C4**	2.2		Black	White	Light Tawny	Brown
Asgrow	**AG1931 Brand**	1.9	PI88788	Imperfect Black	Purple	Gray	Brown
Asgrow	**AG2031 Brand**	2.0	PI88788	Black	Purple	Light Tawny	Brown
Asgrow	**AG2430 Brand**	2.4	PI88788	Imperfect Black	Purple	Gray	Tan
Croplan	**R2C2070**	2.0	PI88788	Imperfect Black	Purple	Light Tawny	Brown
Croplan	**R2C2120**	2.1	PI88788	Imperfect Black	Purple	Gray	Tan
Dahlman	**5120NRR2Y**	2.0	PI88788	Black	Purple	Gray	Tan
Dahlman	**5220NRR2Y**	2.0	PI88788	Black	Purple	Tawny	Brown
Dairyland	**DSR-2105R2Y**	2.1	PI88788				
Dairyland	**DSR-2560R2Y**	2.5	Susceptible				
Legend	**20R20N**	2.0	PI88788	Black			
Legend	**21R29N**	2.1	PI88788	Black			
LG Seeds	**C1917R2**	1.9	PI88788	Black	Purple	Light Tawny	Brown
LG Seeds	**C2175R2**	2.1	PI88788	Imperfect Black	Purple	Gray	Tan
Merschman	**Apache 1124RR2Y**	2.4	Susceptible	Buff	Purple	Gray	Brown
Mycogen	**5N210R2**	2.1	PI88788	Imperfect Black	Purple	Gray	Tan
NK Brand	**S20-Y2**	2.0	PI88788	Black	Purple	Light Tawny	Brown
NK Brand	**S21-N6**	2.1	Susceptible	Brown	Purple	Light Tawny	Brown
NK Brand	**S21-E4** *(aphid resistant)*	2.1	Susceptible	Black	White	Light Tawny	Tan
NK Brand	**S25-R3**	2.5	Susceptible	Brown	White	Light Tawny	Brown
NuTech – G2	**7208**	2.0	PI88788	Black	Purple	Tawny	
NuTech – G2	**7250**	2.5	Peking	Buff	Purple	Gray	
Pioneer Brand	**91Y12**	2.1	PI88788	Black	Purple	Light Tawny	Tan
Pioneer Brand	**92Y51**	2.5	PI88788	Black	Purple	Light Tawny	Tan
Renk	**RS210NR2**	2.1	PI88788	Imperfect Black	Purple	Gray	Tan
Renk	**RS241R2**	2.4	Susceptible	Black	Purple	Gray	Brown
Stine	**2420-4**	2.3	PI88788	Black	White	Light Tawny	
Viking	**2000R2N**	2.0	PI88788	Black	Purple	Tawny	Tan
Viking	**2044R2N**	2.0	PI88788	Imperfect Black	Purple	Gray	Brown

Table 4. Yield and moisture of late maturity soybeans (1.9 – 2.5) at Rochester and Waseca, MN, and the 2-site average, in 2010.

Entry Name	Description	Rochester		Waseca		2-Site Average
1.9 to 2.5 maturities	Maturity	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Yield (bu/A)
AgVenture 20A3	1.9	10.0	51.7	11.1	64.0	57.8
AgVenture 22C4	2.0	9.8	49.9	11.1	65.9	57.9
Asgrow DKB22-52 Brand	2.2	10.6	52.3	11.2	68.1	60.2
Asgrow AG2430	2.4	10.5	54.6	11.1	72.8	63.7
Croplan Genetics RT2092	2.0	10.4	51.3	11.2	68.6	59.9
Croplan Genetics RC2257	2.2	10.5	55.4	11.3	70.3	62.9
Dahlman 3920NRR	2.0	10.1	55.0	11.3	68.9	61.9
LG Seeds C2175R2	2.1	10.2	56.6	11.1	77.0	66.8
NK Brand S19-A6 Brand	1.9	10.3	52.8	11.1	73.8	63.3
NK Brand S21-B1 Brand	2.1	10.3	51.1	11.2	68.5	59.8
Northstar Genetics NS2026NR2	2.0	9.9	53.2	11.2	72.3	62.8
Northstar Genetics NS2226NR2	2.2	15.4	54.5	11.3	72.2	63.4
NuTech 7208	2.0	9.8	50.8	11.2	58.8	54.8
NuTech 7230	2.3	10.3	52.0	11.3	70.4	61.2
Pioneer Brand 91Y92	1.9	9.8	48.4	11.1	66.3	57.4
Pioneer Brand 92Y51	2.5	10.4	54.8	11.2	76.0	65.4
Renk RS210NR2	2.0	10.4	57.8	11.2	72.2	65.0
Renk RS223RR	2.2	10.4	53.1	11.2	67.6	60.4
Stine 2062-4	2.0	10.3	54.8	11.3	67.1	61.0
Stine 19RA02	2.1	10.1	52.4	11.0	67.8	60.1
Viking 2000R2N	2.0	9.6	52.5	11.1	70.0	61.3
Viking 2201R2N	2.2	11.5	52.8	11.4	67.5	60.2
Dairyland DSR 2132	2.1	10.3	52.4	11.2	65.8	59.1
Stine 1932-4	1.9	10.0	47.5	11.1	63.1	55.3
LSD (P=0.10)		0.5	2.2	0.2	7.1	3.7

2011 SE Minnesota Regional Performance of Food Grade and Special Use Soybean at Hope and Waseca, MN.

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 2011. The trials were planted with a 4-row John Deere 7000 planter equipped with cone units and the seeding rate was 150,000 seeds per acre planted in 30 inch rows at a depth of 1.5 inches. The plots were four rows wide by 22 feet in length at Hope and Waseca. A randomized complete block design was implemented and replicated four times at both sites. The center two rows of each plot were machine harvested with grain weight and moisture recorded at all sites. Field histories are reported in Table 1. 2011 soybean yield and moisture for Hope and Waseca are reported individually and averaged across locations in Table 2. NIRS was used to determine protein and oil content for grain samples from Hope in Table 2. Table 3 lists the results from the 2010 trial. (University of Minnesota Extension Regional Office, Rochester, Southern Research and Outreach Center, Waseca, and Minnesota Crop Improvement Association).

Table 1. Field histories at Hope and Waseca for 2011.

	Hope	Waseca
Planting Date	May 19, 2011	June 1, 2011
Harvest Date	October 10, 2011	October 10, 2011
Soil Type	Biscay Loam	Nicollet/Webster clay loam
Herbicide	Cultivated 6/14/11 and 6/29/11 7/6/11 1 pt Flexstar and 8 oz Clethodim	1.5 pt Treflan + 2 oz Optill Cultivated 7/19/2011
Tillage	Conventional	Conventional
Previous Crop	Corn	Corn

Table 2. Soybean protein, oil, harvest moisture and yield at Hope and harvest moisture and yield at Waseca and the 2-site average yield in southern Minnesota in 2011.

Entry	Hope				Waseca		Average
	Protein (%)	Oil (%)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Yield (Bu/A)
Dairyland DSR-2400	35.3	17.7	9.1	46.9	9.0	34.3	40.6
NK 21-N6	32.0	18.8	8.9	53.8	8.2	52.5	53.1
MN 1607SP	36.2	17.8	8.5	47.4	7.9	35.6	41.5
Viking 0.2022	32.8	19.2	8.7	56.6	7.8	37.9	47.3
Viking 0.2265	33.3	18.6	8.6	56.4	8.2	53.8	55.1
M02-359041	36.2	18.7	8.7	45.2	8.0	42.4	43.8
MN02-359073	36.4	18.3	9.0	41.8	8.4	37.3	39.6
M02-385091	34.2	18.6	8.6	55.9	7.9	46.1	51
M03-914047	32.6	19.7	8.8	54.8	8.6	41.4	48.1
MN0804SP	37.6	17.3	8.9	50.4	7.9	43.4	46.9
MN1410	34.4	18.8	8.6	58.7	8.4	49.7	54.2
MN1505SP	37.1	18.3	8.7	48.2	7.9	42.8	45.5
MN1610CN	33.5	18.5	8.4	55.1	8.4	46.1	50.6
SR-08LF	33.0	18.0	8.7	54.9	7.9	45.7	50.3
SR-11	34.6	18.5	8.8	47.5	8.1	39.7	43.6
SR-20	35.0	18.4	8.6	48.0	8.6	44.8	46.4
SR-255	35.6	17.6	9.0	46.3	8.2	37.1	41.7
SR-327RA1	36.4	16.0	9.7	44.1	10.2	41.1	42.6
SR-53	37.2	16.6	9.0	42.3	9.2	42	42.2
SR-53LF	37.0	16.6	8.8	42.2	9.0	46.5	44.4
SR-67	37.2	17.1	8.8	45.3	8.7	39.4	42.4
SRN-14	35.3	18.7	8.8	54.3	8.7	39.4	46.9
KIN	32.7	18.3	8.8	54.3	8.1	44.8	49.6
LARIET	33.9	19.2	8.7	54.9	8.1	42.2	48.6
Site Average Yield	**35.0**	**18.1**	**8.8**	**50.2**	**8.4**	**42.8**	**46.5**
LSD (P=0.10)	**0.4**	**0.3**	**0.1**	**3.6**	**0.57**	**NS**	**5.1**

Table 3. Soybean protein, oil, moisture and yield at Hope and moisture and yield at Waseca and the 2-site average in Minnesota in 2010.

Entry	Hope				Waseca		Average
	Protein (%)	Oil (%)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Yield (Bu/A)
Dairyland DSR-2400	35.0	16.8	10.0	46.1	11.3	58.7	52.4
MN1410	33.9	17.7	9.5	46.2	10.7	66.6	56.4
MN1413CN	32.6	18.2	9.8	47.6	11.1	69.1	58.3
MN1505SP	37.3	17.4	9.7	42.5	10.9	57.6	50.1
MN1607SP	36.5	16.9	9.6	41.0	10.6	57.3	49.2
MN1701CN	32.3	18.0	9.6	48.6	10.8	63.8	56.2
MN1806SP	38.0	16.2	9.7	37.5	10.7	59.6	48.6
M02-359041	37.7	17.2	9.7	42.9	10.7	57.3	50.1
Northland HI-PRO 15	37.2	17.3	9.7	40.5	10.7	56.3	48.4
Northland NorthPro 7	37.1	16.0	10.0	37.8	10.8	57.2	47.5
Northland Surepro	37.8	16.3	9.7	40.7	11.0	56.6	48.7
Pioneer Brand 92Y21	33.1	17.9	9.7	52.4	11.5	69.7	61.0
eMerge 209F.HPC	38.9	15.0	9.5	43.2	10.8	53.5	48.3
eMerge 240F.Y	36.1	15.9	10.1	39.8	11.5	65.1	52.4
eMerge Y2310	36.5	15.9	9.7	47.5	10.9	64.6	56.1
Viking 0.2022	32.5	18.4	9.5	44.7	10.8	57.3	51.0
Viking 0.2265	32.9	17.6	9.6	51.9	10.8	66.5	59.2
EXP 255	35.0	16.9	10.2	45.1	11.4	56.8	51.0
SR-327	36.5	15.6	9.9	44.5	11.6	61.8	53.2
SR-20	34.5	17.7	9.5	39.6	10.8	66.1	52.8
SR-53	36.4	16.4	9.4	37.6	11.2	65.8	51.7
SR-53LF	36.5	16.0	9.5	39.9	11.0	63.6	51.7
SR-67	36.7	17.1	9.6	43.2	10.9	64.1	53.7
Lariet	34.3	18.6	9.3	46.1	10.8	61.9	54.0
SR-08LF	33.0	17.4	9.4	46.3	10.8	55.8	51.1
KIN	32.8	17.2	9.4	46.4	10.5	62.1	54.3
SR-08BC	33.0	17.6	9.6	50.7	10.7	65.7	58.2
SR-11	35.4	17.4	9.7	40.0	10.8	63.8	51.9
SRN-14	35.7	17.9	9.4	38.9	10.8	51.6	45.3
Stine 1932-4	32.6	17.9	9.3	52.6	10.6	61.5	57.1
LSD (P=0.10)	**0.6**	**0.4**	**0.2**	**3.2**	**0.5**	**7.3**	**3.9**

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2011 Southern Minnesota Performance of Liberty Link Soybean Varieties Compared to Four GT/RR Soybean Standards at Rock Dell, Waseca, and Lamberton, MN.

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. 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 1.0 inches. Plots were four 30-inch rows wide by 22 feet in length at Rock Dell and Waseca and 30 feet long at Lamberton. A randomized complete block design was implemented and replicated four times. Four RR/GT soybean varieties, Asgrow AG1831, NK S21-N6, Pioneer 92Y51 and Stine 19RA02, were used as standards in the trial for comparison purposes. The center two rows of each plot were machine harvested with grain weight and moisture recorded at all sites. Table 2 provides moisture and yield at Rock Dell, Waseca, Lamberton, and the 3-site average yield. Table 3 provides the soybean characteristics. Table 4 provides the trial results from the 2010 Liberty Link variety trials. (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 2011.

	Rock Dell	Waseca	Lamberton
Planting Date	May 17, 2011	June 1, 2011	
Harvest Date	October 6, 2011	October 10, 2011	October 7, 2011
Soil Type	Kenyon Loam	Nicollet Webster Clay Loam	Webster Clay Loam
Tillage	Conventional	Conventional	Conventional
Herbicide	Conventional	1.5 pt Treflan + 2 oz Optill Cultivated July 19, 2011	Conventional
Previous Crop	Corn	Corn	Corn

Table 2. Grain yield and moisture of Liberty Link soybean varieties at Rock Dell, Waseca, and Lamberton, MN and the 3 site average in 2011.

Entry Name	Description	Rock Dell		Waseca		Lamberton		3 Site Average
	Maturity	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Yield (bu/A)
Croplan LC2060	2.0	8.0	37.1	8.3	42.8	7.2	42.3	40.7
Hefty H1712L	1.7	8.0	37.8	8.0	47.6	7.3	43.5	43.0
Hefty H2010L	2.0	8.1	38.4	7.9	40.9	7.3	42.2	40.5
Latham L1773L	1.7	8.0	35.1	8.0	40.7	7.4	43.2	39.7
Latham L2058L	2.0	8.1	38.9	8.2	45.0	7.3	42.8	42.2
Legend Seeds 2210LLN	2.2	8.2	39.9	8.2	48.5	7.2	42.7	43.7
Merschman Munsee 1220LL	2.0	8.0	36.6	8.0	42.3	7.3	43.1	40.7
Merschman Comanche 1024LL	2.4	8.1	35.2	8.3	48.2	7.4	44.0	42.5
Renk RS230NLL	2.3	8.1	31.1	8.4	46.4	7.4	40.8	39.4
Stine 18LC08	1.8	8.0	35.9	7.7	41.8	7.4	43.2	40.3
Stine 25LA02	2.5	8.4	33.9	8.5	41.1	7.7	46.5	40.5
Stine 25LA20	2.5	8.2	30.8	8.2	40.6	7.6	42.6	38.0
Viking L199	1.9	7.8	33.9	7.9	39.2	7.2	41.1	38.1
Viking L200N	2.0	8.1	39.2	8.1	45.8	7.1	41.7	42.2
Asgrow AG1831 RR (Standard)	1.8	7.9	40.2	7.9	42.8	7.4	45.6	42.9
NK Brand S21-N6 RR (Standard)	2.1	8.1	38.5	8.0	52.9	7.5	46.5	46.0
Pioneer Brand 92Y51 RR (Standard)	2.5	8.1	40.0	8.3	43.2	7.6	45.3	42.8
Stine 19RA02 (Standard)	1.9	7.9	41.3	8.0	43.2	7.4	47.6	44.0
Site Average Yield			36.9		44.1		43.6	
LSD (P=0.10)		0.1	3.2	0.5	5.9	0.2	2.4	

Table 3. Traits of Liberty Link soybean varieties.

Brand Name	Variety	Maturity Rating	Hilum Color	Flower Color	Pubescence Color	Pod Color
Croplan	**LC2060**	2.0	Imperfect Black	Purple	Gray	Brown
Hefty	**H1712L**	1.7	Buff	Purple	Gray	Tan
Hefty	**H2010L**	2.0	Imperfect Black	Purple	Gray	Brown
Latham	**L1773L**	1.7	Buff	Purple	Gray	Tan
Latham	**L2058**	2.0	Imperfect black	Purple	Gray	Brown
Legend Seeds	**2210LLN**	2.2				
Merschman	**Munsee 1220LL**	2.0	Buff	Purple	Gray	Tan
Merschman	**Comanche 1024LL**	2.4	Black	Purple	Tawny	Brown
Renk	**RS230NLL**	2.3	Imperfect Black	Purple	Gray	Brown
Stine	**18LC08**	1.8				
Stine	**25LA02**	2.5	Imperfect Black	Purple	Gray	
Stine	**25LA20**	2.5	Black	Purple	Light Tawny	
Viking	**L199**	1.9	Black	Purple	Tawny	Tan
Viking	**L200N**	2.0	Black	Purple	Gray	Brown
Asgrow	**AG1831 RR**	1.8 Standard	Black	Purple	Tawny	Tan
NK Brand	**S21-N6 RR**	2.1 Standard	Brown	Purple	Light Tawny	Brown
Pioneer Brand	**92Y51 RR**	2.5 Standard	Black	Purple	Light Tawny	
Stine	**19RA02**	1.9 Standard	Imperfect Black	Purple	Gray	

Table 4. Grain yield and moisture of Liberty Link soybean varieties at Rock Dell, Waseca, and Lamberton, MN and the 3 site average in 2010.

Entry Name	Description	Rock Dell		Waseca		Lamberton		3 Site Average
	Maturity	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Moisture (%)	Yield (bu/A)	Yield (bu/A)
Croplan Genetics LT1519	1.5	8.8	49.4	11.0	69.6	7.8	55.4	58.1
Croplan Genetics LT1829	1.8	8.4	43.4	11.2	62.6	8.4	50.7	52.2
Dahlman 4916LL	1.5	8.7	51.1	11.0	68.2	8.0	52.5	57.3
LG Seeds C1829LL	1.8	8.3	47.5	11.1	64.0	8.3	45.8	52.4
Renk RS170LL	1.9	8.3	46.9	11.1	65.4	8.6	51.7	54.7
Renk RS230NLL	2.3	8.5	49.7	11.1	71.2	9.3	53.5	58.1
Stine 23LA08	2.3	8.5	49.8	10.9	65.5	8.5	56.2	57.2
Stine 23LA03	2.3	8.5	49.8	11.1	67.7	8.5	52.8	56.7
Stine 25LA02	2.5	9.2	49.1	12.3	75.9	9.5	55.6	60.2
Stine 19LA06	1.9	8.5	47.4	11.0	70.1	8.6	52.3	56.6
Viking L199	1.9	8.4	45.7	11.9	59.6	8.4	51.6	52.3
Viking L200N	2.0	8.5	49.8	11.2	62.5	8.1	50.4	54.2
Asgrow 2108 RR	2.1 Standard	8.4	50.7	11.2	73.2	8.5	51.1	58.3
NK Brand S21-N6 RR	2.1 Standard	8.3	49.7	10.9	71.1	8.3	65.4	62.1
Pioneer Brand 92Y30-RR	2.3 Standard	8.3	49.7	11.0	68.7	8.4	54.7	57.7
Stine 2062-4-RR	2.0 Standard	8.4	50.5	11.1	65.3	8.5	53.6	56.5
	LSD (P=0.10)	**0.2**	**3.3**	**0.5**	**6.5**	**0.6**	**5.4**	**4.0**

Evaluation of Soybean Cyst Nematode (SCN) Resistant Varieties - Performance and Impact on SCN Egg Counts at Rosemount, Rochester, and Waseca, MN, in 2011.

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

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 all sites 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. 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 creating a composite sample for each block. The initial egg count is reported as an average of the four replications at each site. The initial SCN egg counts for Waseca Non-infested, Waseca Infested, Rochester (Lawler's), and Rosemount were 38, 3,925, 0, and 1,825 eggs/ 100 cc of soil, respectively (Table 1). Waseca non-infested and Rochester were considered non-infested sites. Waseca infested and Rosemount were considered infested sites. Final SCN soil samples for egg counts were collected at Waseca infested after the soybeans had reached the R6 stage, fall samples were not taken at Rosemount because plots were mistakenly chisel plowed. Infested site samples were collected from each plot and were bulked by variety across replications. The reproductive index (RI) was calculated by dividing the final egg counts for each variety by the initial (at planting) average egg count (Table 2). 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). Traits for the varieties and/or brands in the 2011 trial are listed in table 5. Yield results for the 2010 SCN variety trials are presented in Tables 6 and 7, and the 2010 varieties were ranked by yield and RI in figures 2 and 3. In 2010 High Forest and Waseca Infested sites were HG typed. High Forest was determined to be a 2.5.7 HG type with a relatively high Female Index on Line 2, indicating that this population of nematodes has the ability to reproduce on soybeans with PI 88788 resistance (Figure 4). Waseca Infested was HG type 2.7 (Figure 5). We have not received the HG test results for the 2011 trials. (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 2011.

	Rosemount	Rochester (Lawler's)	Waseca Non-infested	Waseca Infested
Planting Date	May 19, 2011	May 16, 2011	June 1, 2011	June 1, 2011
Harvest Date	October 6, 2011	October 6, 2011	October 10, 2011	October 10, 2011
Soil Type	Waukegan Silt Loam	Port Byron Silt Loam	Nicollet/Webster Clay Loam	Nicollet/Webster Clay Loam
Herbicide	2 pt prowl + 1.5 oz Optill fb Roundup	Glyphosate	1.5 pt Treflan + 2oz Optill fb cultivation	1.5 pt Treflan + 2 oz Optill fb Roundup
Tillage	Conventional	Conventional	Conventional	Conventional
Previous Crop	Corn	Corn	Corn	Corn
Preplant SCN Egg Count (Eggs/100 cc soil)	1,825 eggs/ 100 cc of soil	0 eggs/ 100 cc of soil	38 eggs/ 100 cc of soil	3,925 eggs/ 100 cc of soil

Table 2. Resistance source/type and reproductive and index for soybean cyst nematode (SCN) resistant soybean varieties in southern Minnesota in 2011.

Variety	Resistance Source/Type	Reproductive Index at Waseca Infested
AgVenture 19C9	88788	1.13
AgVenture 20A3	88788	1.23
AgVenture 22C4		0.57
Asgrow AG2031	88788	0.78
Asgrow AG2108	88788	1.17
Asgrow AG2130	Susceptible	5.16
Asgrow AG2430	88788	0.64
Asgrow AG2431	Susceptible	3.54
Dairyland DSR-2105R2Y		1.35
Latham L1985 R2	88788	1.62
Latham E1900R2X	PUSCN-14	4.76
Latham L2084R2	88788	0.98
Latham E2100R2X	PUSCN-14	3.39
Latham L2438R2	88788	1.13
Merschman Navaho 1220RR2Y	88788	0.88
Merschman Mohegan 1222RRS7	88788	1.06
Mycogen 5N180R2	88788	1.22
Mycogen 5N210R2	88788	1.43
NK Brand S17-F3 Brand	Peking	2.01
NK Brand S17-G8 Brand	88788	0.99
NK Brand S20-Y2 Brand	88788	0.68
NK Brand S21-N6 Brand	Susceptible	4.42
NuTech – G2 7192	88788	0.88
NuTech – G2 7208	88788	1.55
NuTech – G2 7226	Peking	1.01
NuTech – G2 7250	Peking	0.27
Pioneer Brand 91Y72	88788	0.88
Pioneer Brand 91Y90	Susceptible	4.14
Pioneer Brand 91Y92	88788	0.83
Pioneer Brand 92Y31	Susceptible	3.18
Pioneer Brand 92Y53	Peking	0.61
Pioneer Brand 92Y51	88788	0.87
Stine 19RA02	Resistant	1.10
Viking 1908CNRR	88788	1.29
Viking 2000R2N	88788	0.94
Viking 2174NRR	88788	4.60

Table 3. SCN Soybean Variety Trial Moisture (%) and Yield (bu/A @13% moisture) at Rosemount, Rochester, and Waseca in 2011.

Variety	Description		Rosemount -- Infested		Rochester – Non Infested		Waseca – Infested		Waseca -- Non Infested	
	Maturity	Resistance Source	Soybean Moisture (%)	Soybean Yield (bu/A)	Soybean Moisture (%)	Soybean Yield (bu/A)	Soybean Moisture (%)	Soybean Yield (bu/A)	Soybean Moisture (%)	Soybean Yield (bu/A)
AgVenture 19C9	1.9	88788	8.2	47.0	9.2	60.3	10.7	44.4	8.3	47.1
AgVenture 20A3	2.0	88788	8.2	47.9	8.5	61.3	12.3	39.9	8.3	43.1
AgVenture 22C4	2.2		8.4	49.1	9.9	61.9	11.9	44.0	8.3	51.3
Asgrow AG2031	2.0	88788	8.1	57.9	8.3	71.2	11.2	42.8	8.1	45.1
Asgrow AG2108	2.1	88788	8.5	44.9	9.6	65.4	13.6	37.5	8.1	48.3
Asgrow AG2130	2.1	Susceptible	8.3	44.6	9.9	62.6	12.0	38.9	8.4	45.5
Asgrow AG2430	2.4	88788	8.7	46.7	9.7	62.3	13.6	39.8	8.3	43.4
Asgrow AG2431	2.4	Susceptible	8.3	41.3	10.5	65.1	12.6	38.5	8.0	40.3
Dairyland DSR-2105R2Y	2.1		8.2	50.6	9.7	66.2	12.9	48.1	8.0	48.0
Latham L1985 R2	1.9	88788	8.1	54.5	8.9	71.2	11.7	48.9	8.1	43.7
Latham E1900R2X	1.9	PUSCN-14	8.2	40.4	9.8	60.2	12.0	35.7	8.4	43.2
Latham L2084R2	2.0	88788	8.2	54.0	8.3	70.4	11.8	54.9	8.0	43.2
Latham E2100R2X	2.1	PUSCN-14	8.4	38.6	9.9	64.3	12.8	50.2	8.5	50.2
Latham L2438R2	2.4	88788	8.3	43.2	10.1	63.9	12.8	38.4	8.6	45.0
Merschman Navaho 1220RR2Y	2.0	88788	8.2	58.0	8.7	68.2	11.8	51.0	8.2	52.7
Merschman Mohegan 1222RRS7	2.2	88788	8.2	49.4	9.9	64.1	12.9	43.1	8.2	51.4
Mycogen 5N180R2	1.8	88788	8.3	55.3	9.6	65.3	12.1	45.5	8.1	52.1
Mycogen 5N210R2	2.1	88788	8.2	48.3	9.8	68.6	13.2	41.6	8.1	54.4
NK Brand S17-F3 Brand	1.7	Peking	8.5	51.1	9.6	63.1	12.4	45.4	8.0	53.3
NK Brand S17-G8 Brand	1.7	88788	8.6	55.1	7.6	71.5	12.6	45.2	8.1	54.7
NK Brand S20-Y2 Brand	2.0	88788	8.1	51.7	8.6	68.9	12.0	50.1	8.3	51.9
NK Brand S21-N6 Brand	2.1	Susceptible	8.6	40.9	10.3	62.6	12.0	41.4	8.0	52.0
NuTech – G2 7192	1.9	88788	8.5	47.6	9.5	64.4	12.2	40.2	8.2	48.3
NuTech – G2 7208	2.0	88788	8.3	49.9	8.4	64.5	12.7	37.7	8.4	46.7
NuTech – G2 7226	2.2	Peking	8.4	48.2	9.3	61.3	13.0	40.4	8.1	50.0
NuTech – G2 7250	2.5	Peking	8.5	51.0	9.9	66.4	12.4	39.4	8.6	50.9
Pioneer Brand 91Y72	1.7	88788	8.2	49.5	8.7	60.9	11.8	43.7	8.4	45.1
Pioneer Brand 91Y90	1.9	Susceptible	8.3	48.6	7.9	70.6	12.0	39.3	8.3	46.9
Pioneer Brand 91Y92	1.9	88788	8.5	47.9	7.8	67.5	13.2	51.1	8.2	42.2
Pioneer Brand 92Y31	2.3	Susceptible	8.2	42.5	9.6	63.9	11.1	36.3	8.2	52.5
Pioneer Brand 92Y53	2.5	Peking	8.7	43.9	12.5	62.6	13.5	39.8	8.8	42.5
Pioneer Brand 92Y51	2.5	88788	8.6	46.3	10.2	65.2	12.8	40.4	8.7	48.4
Stine 19RA02	1.9	Resistant	8.0	57.8	9.1	71.1	12.0	42.4	8.0	45.1
Viking 1908CNRR	1.9	88788	8.4	51.4	8.7	68.0	13.4	34.0	8.2	41.8
Viking 2000R2N	2.0	88788	8.0	52.4	8.6	72.4	12.0	48.2	7.9	46.9
Viking 2174NRR	2.1	88788	8.3	44.0	9.9	65.6	11.6	37.8	8.2	51.1
		LSD (P=0.10)	**0.16**	**4.7**	**0.55**	**3.96**	**0.97**	**7.8**	**0.24**	**7.5**

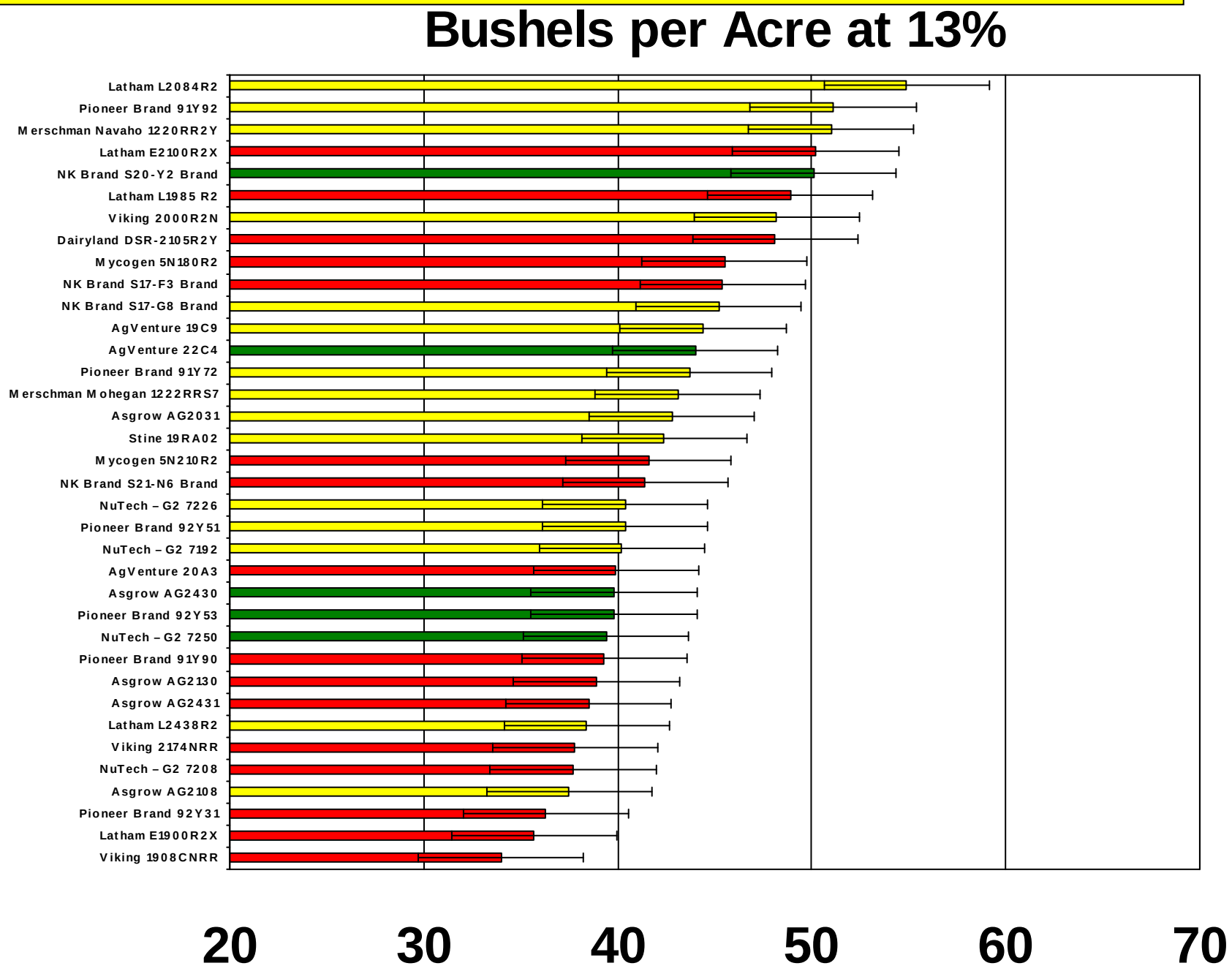
Table 4. Combined Yield Results for Infested and Non-infested Sites in 2011.

Variety	Resistance Source/Type	Infested			Non infested		
		Rosemount (bu/A)	Waseca Infested (bu/A)	Average (bu/A)	Rochester (bu/A)	Waseca Non-Infested (bu/A)	Average (bu/A)
AgVenture 19C9	88788	47.0	44.4	45.1	60.3	47.1	50.4
AgVenture 20A3	88788	47.9	39.9	41.9	61.3	43.1	47.7
AgVenture 22C4		49.1	44.0	45.3	61.9	51.3	54.0
Asgrow AG2031	88788	57.9	42.8	46.6	71.2	45.1	51.6
Asgrow AG2108	88788	44.9	37.5	39.4	65.4	48.3	52.6
Asgrow AG2130	Susceptible	44.6	38.9	40.3	62.6	45.5	49.8
Asgrow AG2430	88788	46.7	39.8	41.5	62.3	43.4	48.1
Asgrow AG2431	Susceptible	41.3	38.5	39.2	65.1	40.3	46.5
Dairyland DSR-2105R2Y		50.6	48.1	48.7	66.2	48.0	52.6
Latham L1985 R2	88788	54.5	48.9	50.3	71.2	43.7	50.6
Latham E1900R2X	PUSCN-14	40.4	35.7	36.9	60.2	43.2	47.5
Latham L2084R2	88788	54.0	54.9	54.7	70.4	43.2	50.0
Latham E2100R2X	PUSCN-14	38.6	50.2	47.3	64.3	50.2	53.7
Latham L2438R2	88788	43.2	38.4	39.6	63.9	45.0	49.7
Merschman Navaho 1220RR2Y	88788	58.0	51.0	52.8	68.2	52.7	56.6
Merschman Mohegan 1222RRS7	88788	49.4	43.1	44.7	64.1	51.4	54.6
Mycogen 5N180R2	R3/M14	55.3	45.5	48.0	65.3	52.1	55.4
Mycogen 5N210R2	R3/M14	48.3	41.6	43.3	68.6	54.4	58.0
NK Brand S17-F3 Brand	Peking	51.1	45.4	46.8	63.1	53.3	55.8
NK Brand S17-G8 Brand	88788	55.1	45.2	47.7	71.5	54.7	58.9
NK Brand S20-Y2 Brand	88788	51.7	50.1	50.5	68.9	51.9	56.2
NK Brand S21-N6 Brand	Susceptible	40.9	41.4	41.3	62.6	52.0	54.7
NuTech – G2 7192	88788	47.6	40.2	42.1	64.4	48.3	52.3
NuTech – G2 7208	88788	49.9	37.7	40.8	64.5	46.7	51.2
NuTech – G2 7226	Peking	48.2	40.4	42.4	61.3	50.0	52.8
NuTech – G2 7250	Peking	51.0	39.4	42.3	66.4	50.9	54.8
Pioneer Brand 91Y72	88788	49.5	43.7	45.2	60.9	45.1	49.1
Pioneer Brand 91Y90	Susceptible	48.6	39.3	41.6	70.6	46.9	52.8
Pioneer Brand 91Y92	88788	47.9	51.1	50.3	67.5	42.2	48.5
Pioneer Brand 92Y31	Susceptible	42.5	36.3	37.9	63.9	52.5	55.4
Pioneer Brand 92Y53	Peking	43.9	39.8	40.8	62.6	42.5	47.5
Pioneer Brand 92Y51	88788	46.3	40.4	41.9	65.2	48.4	52.6
Stine 19RA02	Resistant	57.8	42.4	46.3	71.1	45.1	51.6
Viking 1908CNRR	88788	51.4	34.0	38.4	68.0	41.8	48.4
Viking 2000R2N	88788	52.4	48.2	49.3	72.4	46.9	53.3
Viking 2174NRR	88788	44.0	37.8	39.4	65.6	51.1	54.7
	LSD (P=0.10)	**4.7**	**7.8**		**3.96**	**7.5**	

Table 5. Traits of SCN soybean varieties and/or brands in 2011.

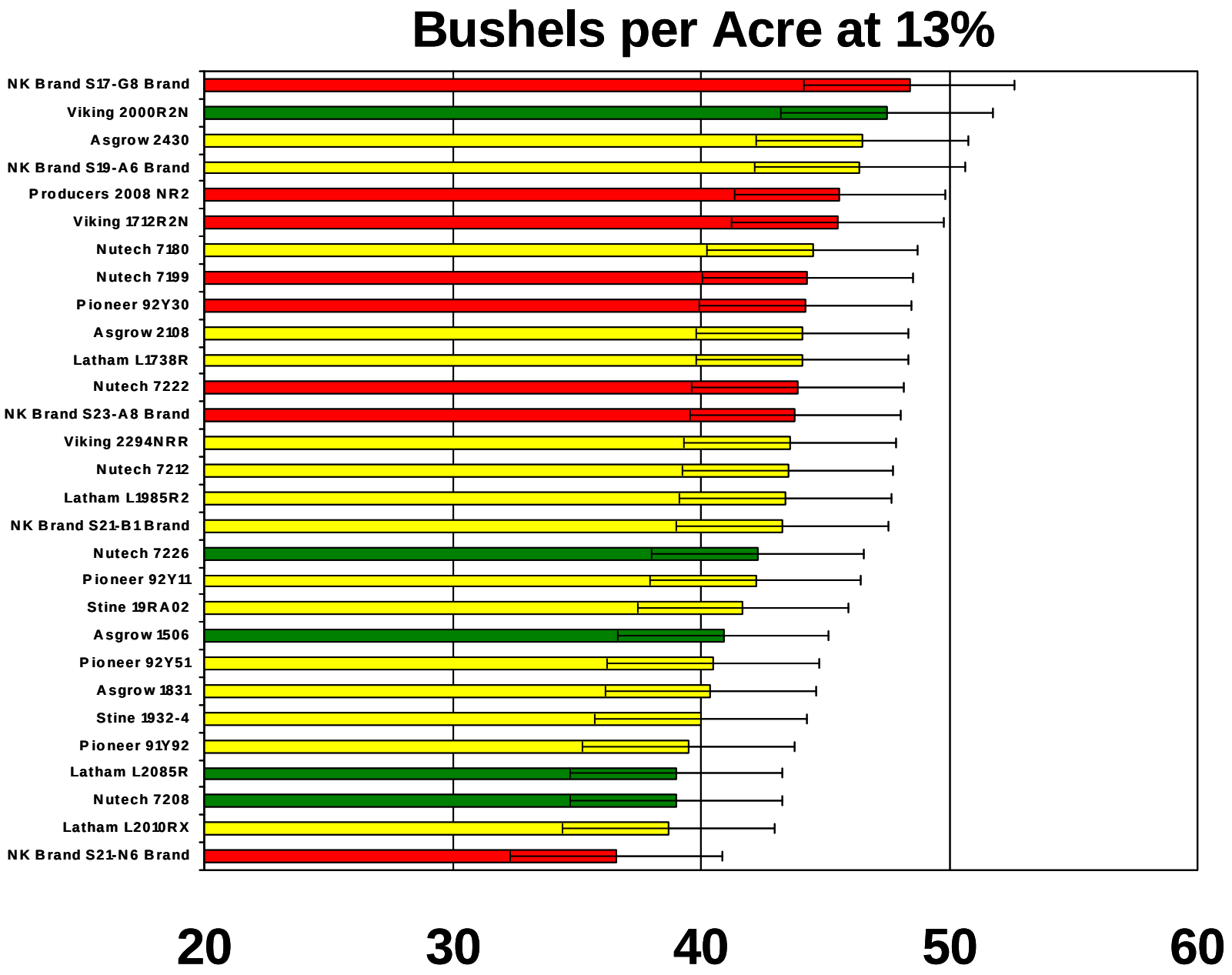
Company	Entry	Maturity Rating	SCN Resistant Source	Hilum Color	Flower Color	Pubescence Color	Pod Color
AgVenture	**19C9**	1.9	88788	Black	Purple	Light Tawny	Brown
AgVenture	**20A3**	2.0	88788	Black	Mix	Tawny	Brown
AgVenture	**22C4**	2.2	?	Black	White	Light Tawny	Brown
Asgrow	**AG2031**	2.0	88788	Black	Purple	Light Tawny	Brown
Asgrow	**AG2108**	2.1	88788	Imperfect Black	Purple	Gray	Tan
Asgrow	**AG2130**	2.1	Susceptible	Black	Purple	Light Tawny	Tan
Asgrow	**AG2430**	2.4	88788	Imperfect Black	Purple	Gray	Tan
Asgrow	**AG2431**	2.4	Susceptible	Buff	Purple	Gray	Brown
Dairyland	**DSR-2105R2Y**	2.1		Imperfect Black	Purple	Gray	Tan
Latham	**L1985R2**	1.9	88788	Imperfect Black	Purple	Gray	Brown/Tan
Latham	**E1900R2X**	1.9	PUSCN-14	Mixed	Purple	Tawny	Brown
Latham	**L2084R2**	2.0	88788	Black	Purple	Light Tawny	Brown
Latham	**E2100R2X**	2.1	PUSCN-14	Imperfect Black	White	Light Tawny	Tan
Latham	**L2438R2**	2.4	88788	Imperfect Black	Purple	Gray	Tan
Merschman	**Navaho 1220RR2Y**	2.0	88788	Black	Purple	Light Tawny	Brown
Merschman	**Mohegan 1222RRS7**	2.2	88788	Imperfect Black	Purple	Gray	Tan
Mycogen	**5N180R2**	1.8	R3/M14	Imperfect Black	Purple	Gray	Brown
Mycogen	**5N210R2**	2.1	R3/M14	Imperfect Black	Purple	Gray	Tan
NK Brand	**S17-F3 Brand**	1.7	Peking	Brown	Purple	Light Tawny	Brown
NK Brand	**S17-G8 Brand**	1.7	88788	Imperfect Black	Purple	Gray	Brown
NK Brand	**S20-Y2**	2.0	88788	Black	Purple	Light Tawny	Brown
NK Brand	**S21-N6**	2.1	Susceptible	Brown	Purple	Light Tawny	Brown
NuTech – G2	**7192**	1.9	88788	Brown	Purple	Light Tawny	
NuTech – G2	**7208**	2.0	88788	Black	Purple	Tawny	
NuTech – G2	**7226**	2.2	Peking	Black	Purple	Tawny	
NuTech – G2	**7250**	2.5	Peking	Buff	Purple	Gray	
Pioneer Brand 91Y72	**91Y72**	1.7	88788	Black	Purple	Brown	Tan
Pioneer Brand 91Y90	**91Y90**	1.9	Susceptible	Brown	White	Light Tawny	
Pioneer Brand 91Y92	**91Y92**	1.9	88788	Brown	Purple	Tawny	Brown
Pioneer Brand 92Y31	**92Y31**	2.3		Gray	Purple	Light Tawny	
Pioneer Brand 92Y53	**92Y53**	2.5	Peking	Brown	Purple	Tawny	Brown
Pioneer Brand 92Y51	**92Y51**	2.5	88788	Black	Purple	Light Tawny	Tan
Stine 19RA02	**19RA02**	1.9	Resistant	Imperfect Black	Purple	Gray	
Viking 1908CNRR	**1908CNRR**	1.9	88788	Imperfect Black	Purple	Gray	Tan
Viking 2000R2N	**2000R2N**	2.0	88788	Black	Purple	Gray	Brown
Viking 2174NRR	**2174NRR**	2.1	88788	Black	White	Light Tawny	Brown

Figure 1. Average Yield Ranking and Reproductive Index for Waseca Infested in 2011.



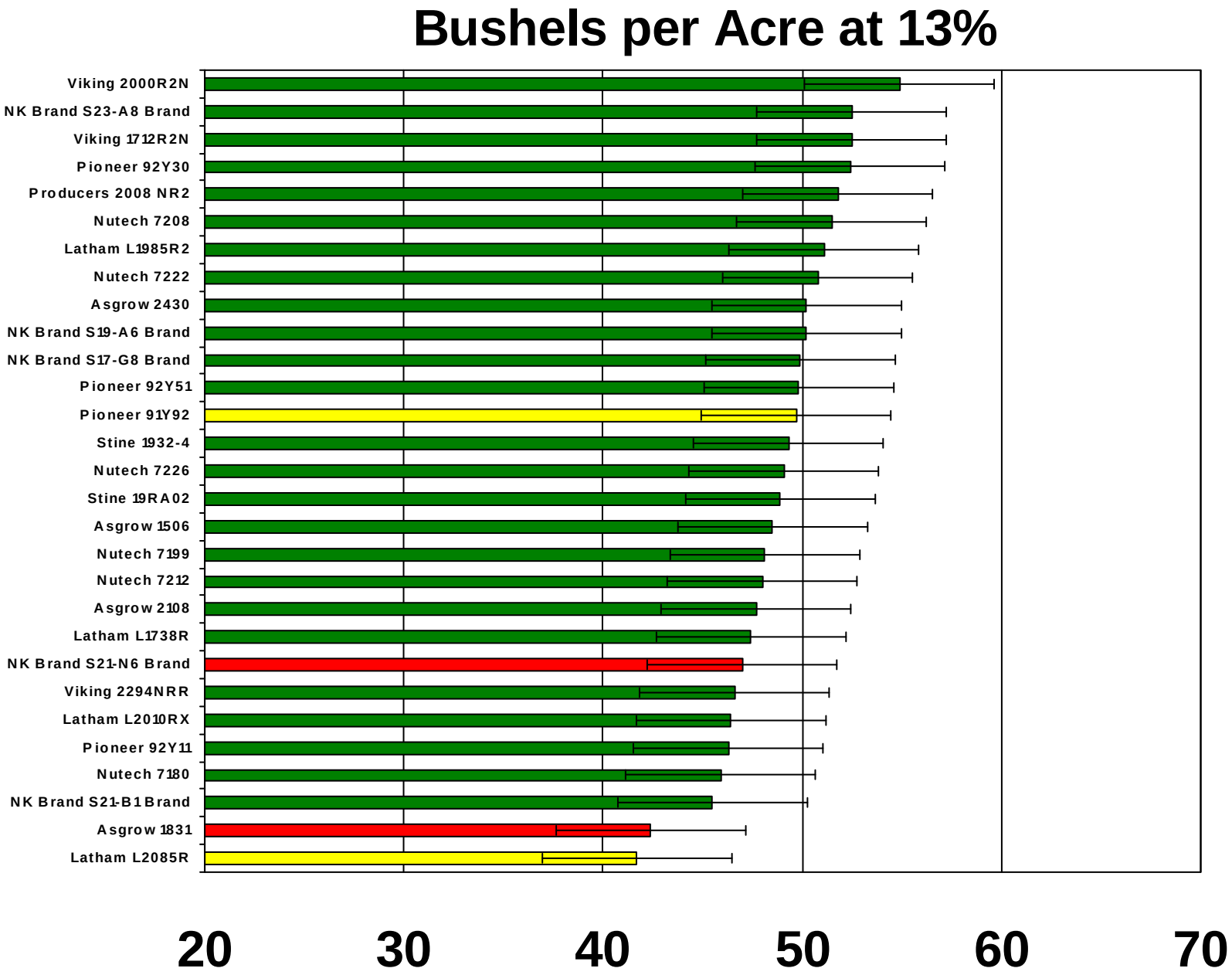
1. ***Green** indicates egg counts decreased over the season (Reproductive Index = 0.0 to 0.7)*
2. ***Yellow** indicates egg counts remained the same over the season (Reproductive Index = 0.71 to 1.2)*
3. ***Red** indicates egg counts increased over the season (Reproductive Index =1.2 and greater)*

Figure 2. Average Yield Ranking and Reproductive Index for High Forest in 2010.



4. *Green indicates egg counts decreased over the season (Reproductive Index = 0.0 to 0.7)*
5. *Yellow indicates egg counts remained the same over the season (Reproductive Index = 0.71 to 1.2)*
6. *Red indicates egg counts increased over the season (Reproductive Index =1.2 and greater)*

Figure 3. Average Yield Ranking and Reproductive Index for Waseca Infested in 2010.



7. *Green indicates egg counts decreased over the season (Reproductive Index = 0.0 to 0.7)*
8. *Yellow indicates egg counts remained the same over the season (Reproductive Index = 0.71 to 1.2)*
9. *Red indicates egg counts increased over the season (Reproductive Index =1.2 and greater)*

Figure 4. HG type High Forest 2010.

Line #	Ind. Line Name	# plants	# cysts	Female/plant	FI (%)	HG Type
1	PI 548402 (PEKING)	5	26	5.2	1.1	
2	PI88788	5	448	89.6	19.3	2
3	PI90763	5	2	0.4	0.1	
4	PI437654	5	1	0.2	0.0	
5	PI209332	5	365	73	15.7	5
6	PI89772	4	3	0.75	0.2	
7	PI548316 (CLOUD)	5	773	154.6	33.3	7
8	LEE	5	2320	464		

Figure 5. HG type Waseca Infested 2010.

Line #	Ind. Line Name	# plants	# cysts	Female/plant	FI (%)	HG Type
1	PI 548402 (PEKING)				2	
2	PI88788				13	2
3	PI90763				0	
4	PI437654				0	
5	PI209332				7	
6	PI89772				0	
7	PI548316 (CLOUD)				31	7
8	LEE					

SECTION F

SOYBEAN
HERBICIDE EVALUATION

New Soybean Herbicides for 2012 found in the 2011 Reports

1. ***Anthem*** **= pyroxasulfone + fluthiocet (Cadet) [FMC]**
2. **Zidua = pyroxasulfone [BASF]**
3. **Fierce = pyroxasulfone + flumioxazin (Valor) [VALENT]**

Comparison of PRE/POST and POST only Weed Control Systems in Liberty Link Soybeans at Rochester, MN, in 2011.

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, Adam Hazel and Bo Beyer

The objective of this trial was to evaluate the performance of PRE/POST and POST only herbicide programs for weed control in Liberty Link soybeans in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.8, O.M of 2.5%, and soil test P and K levels of 95 ppm and 225 ppm, respectively. The field was fall moldboard plowed, and disked and field cultivated once prior to planting. The soybean variety, Stine 25LA20 LL, was planted on May 16, 2011, 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 plots were taken on June 8, 13, 29, July 8, 20, and September 21, 2011. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on October 10, 2011.

Date	**5/17**	**6/13**	**7/5**
Treatment	PRE	POST I	POST II
Temperature			
Air	64	67	79
Soil	62.4	61.9	74.7
Relative Humidity (%)	28	48	64
Wind (mph)	7	12	14
Soil Moisture	Adequate	Dry	Adequate
Soybean			
Stage		V2	R1
Height (inches)		5.5	12.0
Giant Ragweed			
Weed density (ft^2)		3.9	
Height (inches)		4.6	11.8
Common Lambsquarters			
Weed density (ft^2)		4.4	
Height (inches)		2.3	2.8
Common Waterhemp			
Weed density (ft^2)		6.3	
Height (inches)		2.0	2.8
Giant foxtail			
Weed density (ft^2)		0.5	
Height (inches)		2.5	2.0
Rainfall after each application			
Week 1	1.78	3.41	0.45
Week 2	0.66	1.29	2.79
Week 3	0.04	0.31	0.17

SUMMARY

Extremely limited rainfall in August and September coupled with an early September frost severely impacted soybean grain yields at the Rochester location. Overall weed control with the Liberty Link system was consistently very good to excellent depending on the treatment.

Giant ragweed control was excellent in all of the PRE/POST treatments with final weed control for all plots above 97 percent (9/21 rating date). POST only systems were not as consistent. The Ignite + Prefix, and the split Ignite treatments provided excellent control of giant ragweed, above 97 percent control (9/21 rating date). However, the Ignite + Dual II, and the Ignite + Anthem treatments provided somewhat diminished giant ragweed control; 87 and 88 percent control respectively, 9/21 rating date.

Common lambsquarters control was excellent in all PRE/POST treatments (all 99 percent control 9/21 rating date). Total POST treatments were not as consistent as the PRE/POST treatments. The Ignite + Prefix, and the split Ignite treatments provided excellent control of common lambsquarters control, 96 and 99 percent control respectively (9/21 rating date). However, the Ignite + Dual II, and the Ignite + Anthem treatments provided somewhat diminished common lambsquaters control; 87 and 92 percent control respectively, 9/21 rating date.

Common waterhemp control was excellent in all PRE/POST treatments, 99 percent control on 9/21 rating date. POST only treatments were not as consistent as the PRE/POST treatments. The Ignite + Prefix, and the split Ignite treatments provided excellent control of common waterhemp control, 97 and 99 percent control respectively (9/21 rating date). However, the Ignite + Dual II, and the Ignite + Anthem treatments provided somewhat reduced common waterhemp control; 83 and 90 percent control respectively, 9/21 rating date.

Giant foxtail was effectively control with all PRE/POST and total POST treatments, 99 percent control (9/21 rating date).

There were some issues with crop response to both the PRE/POST and total POST treatments. The Prefix, and the Boundary + Sharpen treatments exhibited minor crop injury in response to the soil applied component. In the total POST programs, Ignite tank mixed with any of the herbicides increased injury. The Ignite + Prefix, and the Ignite + Anthem treatments exhibited the most injury at 31 and 24 percent respectively (6/29 rating date). Ignite when applied alone resulted in about 15 injury (7/8 rating date). (University of Minnesota Extension Regional Office, Rochester).

Table 1. Evaluation of PRE/POST and POST only herbicide systems for giant ragweed control in Liberty Link soybeans on June 8, 13, 29, July 8, 20 and September 21 at Rochester, MN, in 2011.

Treatment	Rate	Giant Ragweed Control						Yield
		6/8	6/13	6/29	7/8	7/20	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	7.2
PRE/POST II (R1 soybean)								
Prefix / Ignite 280 + AMS	2.5 pt/a / 29 fl oz/a + 8.5 lb/ 100 gal	94	97	91	98	98	97	20.9
Authority First / Ignite 280 + AMS	6 oz/a / 29 fl oz/a + 8.5 lb/100 gal	92	93	89	97	98	98	23.5
Boundary + Sharpen / Ignite 280 + AMS	2.1 pt/a + 1 fl oz/a / 29 fl oz/a + 8.5 lb/ 100 gal	92	95	88	97	96	98	22.0
POST I (2-4 inch weeds)								
Ignite 280 + Prefix + AMS	29 fl oz/a + 2.5 pt/a + 8.5 lb/ 100 gal	0	0	98	99	99	98	24.3
Ignite 280 + Dual II Magnum + AMS	29 fl oz/a + 1.33 pt/a + 8.5 lb/ 100 gal	0	0	95	96	94	87	26.4
Ignite 280 + Anthem + AMS	29 fl oz/a + 8 fl oz/a + 8.5 lb/ 100 gal	0	0	96	96	95	88	24.1
POST I (2-4 inch weeds) / POST II (R1 soybean)								
Ignite 280 + AMS / Ignite 280 + AMS	29 fl oz/a + 8.5 lb/ 100 gal / 29 fl oz/a + 8.5 lb/ 100 gal	0	0	92	97	99	99	26.5
	LSD (P=0.10)	**3**	**2**	**3**	**1**	**2**	**4**	**4.5**

Table 2. Evaluation of PRE/POST and POST only herbicide systems for common lambsquarters control in Liberty Link soybeans on June 8, 13, 29, July 8, 20, and September 21 at Rochester, MN, in 2011.

Treatment	Rate	Common Lambsquarters Control						Yield
		6/8	6/13	6/29	7/8	7/20	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	7.2
PRE/POST II (R1 soybean)								
Prefix / Ignite 280 + AMS	2.5 pt/a / 29 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	20.9
Authority First / Ignite 280 + AMS	6 oz/a / 29 fl oz/a + 8.5 lb/100 gal	99	99	99	99	99	99	23.5
Boundary + Sharpen / Ignite 280 + AMS	2.1 pt/a + 1 fl oz/a / 29 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	22.0
POST I (2-4 inch weeds)								
Ignite 280 + Prefix + AMS	29 fl oz/a + 2.5 pt/a + 8.5 lb/ 100 gal	0	0	98	96	96	96	24.3
Ignite 280 + Dual II Magnum + AMS	29 fl oz/a + 1.33 pt/a + 8.5 lb/ 100 gal	0	0	93	91	93	87	26.4
Ignite 280 + Anthem + AMS	29 fl oz/a + 8 fl oz/a + 8.5 lb/ 100 gal	0	0	96	95	95	92	24.1
POST I (2-4 inch weeds) / POST II (R1 soybean)								
Ignite 280 + AMS / Ignite 280 + AMS	29 fl oz/a + 8.5 lb/ 100 gal / 29 fl oz/a + 8.5 lb/ 100 gal	0	0	95	97	99	99	26.5
	LSD (P=0.10)	**1**	**0**	**3**	**3**	**2**	**3**	**4.5**

Table 3. Evaluation of PRE/POST and POST only herbicide systems for common waterhemp control in Liberty Link soybeans on June 8, 13, 29, July 8, 20, and September 21 at Rochester, MN, in 2011.

Treatment	Rate	Common Waterhemp Control						Yield
		6/8	6/13	6/29	7/8	7/20	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	7.2
PRE/POST II (R1 soybean)								
Prefix / Ignite 280 + AMS	2.5 pt/a / 29 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	20.9
Authority First / Ignite 280 + AMS	6 oz/a / 29 fl oz/a + 8.5 lb/100 gal	99	99	99	99	99	99	23.5
Boundary + Sharpen / Ignite 280 + AMS	2.1 pt/a + 1 fl oz/a / 29 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	22.0
POST I (2-4 inch weeds)								
Ignite 280 + Prefix + AMS	29 fl oz/a + 2.5 pt/a + 8.5 lb/ 100 gal	0	0	98	98	99	97	24.3
Ignite 280 + Dual II Magnum + AMS	29 fl oz/a + 1.33 pt/a + 8.5 lb/ 100 gal	0	0	92	91	91	83	26.4
Ignite 280 + Anthem + AMS	29 fl oz/a + 8 fl oz/a + 8.5 lb/ 100 gal	0	0	95	95	95	90	24.1
POST I (2-4 inch weeds) / POST II (R1 soybean)								
Ignite 280 + AMS / Ignite 280 + AMS	29 fl oz/a + 8.5 lb/ 100 gal / 29 fl oz/a + 8.5 lb/ 100 gal	0	0	85	97	99	99	26.5
	LSD (P=0.10)	**0**	**0**	**3**	**2**	**1**	**3**	**4.5**

4.5

Table 4. Evaluation of PRE/POST and POST only herbicide systems for giant foxtail control in Liberty Link soybeans on June 8, 13, 29, July 8, 20, and September 21 at Rochester, MN, in 2011.

Treatment	Rate	Giant Foxtail Control						Yield
		6/8	6/13	6/29	7/8	7/20	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	7.2
PRE/POST II (R1 soybean)								
Prefix / Ignite 280 + AMS	2.5 pt/a / 29 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	20.9
Authority First / Ignite 280 + AMS	6 oz/a / 29 fl oz/a + 8.5 lb/100 gal	98	98	92	99	99	99	23.5
Boundary + Sharpen / Ignite 280 + AMS	2.1 pt/a + 1 fl oz/a / 29 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	22.0
POST I (2-4 inch weeds)								
Ignite 280 + Prefix + AMS	29 fl oz/a + 2.5 pt/a + 8.5 lb/ 100 gal	0	0	98	99	97	99	24.3
Ignite 280 + Dual II Magnum + AMS	29 fl oz/a + 1.33 pt/a + 8.5 lb/ 100 gal	0	0	99	99	98	99	26.4
Ignite 280 + Anthem + AMS	29 fl oz/a + 8 fl oz/a + 8.5 lb/ 100 gal	0	0	99	99	98	99	24.1
POST I (2-4 inch weeds) / POST II (R1 soybean)								
Ignite 280 + AMS / Ignite 280 + AMS	29 fl oz/a + 8.5 lb/ 100 gal / 29 fl oz/a + 8.5 lb/ 100 gal	0	0	98	97	99	99	26.5
	LSD (P=0.10)	**1**	**1**	**3**	**1**	**1**	**1**	**4.5**

4.5

Table 5. Crop response to herbicide systems in Liberty Link soybeans on June 8, 13, 29, and July 8 at Rochester, MN, in 2011.

Treatment	Rate	Injury				Yield
		6/8	6/13	6/29	7/8	
	(rate/A)	(%)				(bu/A)
Untreated		0	0	0	0	7.2
PRE/POST II (R1 soybean)						
Prefix / Ignite 280 + AMS	2.5 pt/a / 29 fl oz/a + 8.5 lb/ 100 gal	0	4	0	14	20.9
Authority First / Ignite 280 + AMS	6 oz/a / 29 fl oz/a + 8.5 lb/100 gal	0	0	0	15	23.5
Boundary + Sharpen / Ignite 280 + AMS	2.1 pt/a + 1 fl oz/a / 29 fl oz/a + 8.5 lb/ 100 gal	1	5	4	15	22.0
POST I (2-4 inch weeds)						
Ignite 280 + Prefix + AMS	29 fl oz/a + 2.5 pt/a + 8.5 lb/ 100 gal	0	0	31	6	24.3
Ignite 280 + Dual II Magnum + AMS	29 fl oz/a + 1.33 pt/a + 8.5 lb/ 100 gal	0	0	20	7	26.4
Ignite 280 + Anthem + AMS	29 fl oz/a + 8 fl oz/a + 8.5 lb/ 100 gal	0	0	24	9	24.1
POST I (2-4 inch weeds) / POST II (R1 soybean)						
Ignite 280 + AMS / Ignite 280 + AMS	29 fl oz/a + 8.5 lb/ 100 gal / 29 fl oz/a + 8.5 lb/ 100 gal	0	0	6	15	26.5
	LSD (P=0.10)	**1**	**4**	**2**	**2**	**4.5**

Performance of Pyroxasulfone Herbicide Programs for Weed Control in Soybean at Rochester, MN, in 2011.

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The objective of this trial was to evaluate the performance of pyroxasulfone herbicide programs for weed control in soybeans in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.8, O.M of 2.5%, and soil test P and K levels of 95 ppm and 225 ppm, respectively. The field was moldboard plowed in the fall, disked in the spring and field cultivated once prior to planting. The soybean variety, Pioneer 91Y90, was planted on May 16, 2011, 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 plots were taken on June 8, 13, 27, July 8, 18, and September 21, 2011. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on October 3, 2011. (University of Minnesota Extension Regional Office, Rochester).

SUMMARY

Two groups of pre-emergent herbicides were readily apparent in their ability or inability to control giant ragweed. Single product pre-emergent herbicide programs did not provide adequate control of giant ragweed, average 21percent control. The same can be said for the Authority MTZ package mixture, 35 percent control on 6/13.

Pre-emergent package mixtures and tank mixes clearly offered an advantage in controlling giant ragweed. Final soil applied control from this group ranged from a low of 65 percent to a high of 92 percent. In the case of tank mixes, the addition of Classic to Fierce increased final soil applied giant ragweed control from 25 percent (6/13 rating; glyphosate applied 6/16) to 65 percent (6/27 rating; glyphosate applied 6/29). The addition of Authority First to Anthem increased final soil applied giant ragweed control from 19 percent (6/13 rating; glyphosate applied 6/16) to 77 percent (6/27 rating; glyphosate applied 6/29). Furthermore, the addition of Sharpen to Zidua increased final soil applied giant ragweed control from 20 percent (6/13 rating; glyphosate applied 6/16) to 92 percent (6/27 rating; glyphosate applied 6/29). The package mixtures; Authority First, Gangster, and Prefix provided final soil applied giant ragweed control of 84, 80, and 86 percent, respectively (6/27 rating). Post emergent only control of giant ragweed was only slightly enhanced by the addition of Zidua (94%), and Zidua plus Extreme (97%) with Roundup PowerMax when compared to Roundup PowerMax alone (91%), 7/18 rating. Lower giant ragweed control was observed with the tank mix of Anthem and Roundup PowerMax (87%), 7/18 rating.

Common lambsquaters control was exceptional with all pre-emergent herbicides. Post emergent control of common lambsquaters was only slightly enhanced by the addition of Zidua (96%), and Zidua plus Extreme (98%) with Roundup PowerMax when compared to Roundup PowerMax alone (93%), 7/18 rating. Lower common lambsquaters control was observed with the tank mix of Warrant and Roundup PowerMax (81%), 7/18 rating.

Common waterhemp control like lambsquaters was exceptional with all pre-emergent herbicides. Post emergent control of common waterhemp was only slightly enhanced by the addition of Zidua (98%), Zidua plus Extreme (98%), and Warrant (97%) with Roundup PowerMax when compared to Roundup PowerMax alone (93%), 7/18 rating. Giant foxtail control was exceptional with all treatment pre and post.

Significant crop response was detected with two herbicide treatments; the Boundary and Sharpen tank mix applied PRE, and the Anthem and Roundup PowerMax tank mix applied POST. The injury exhibited was not visibly apparent on later rating dates.

Of significant note is the Flexstar GT treatment. We have chosen to include rating data for this treatment, however, have elected to not include the information in the narratives due to the improper exclusion of additives with this treatment. Our expectation is that with the correct additive package control numbers would be higher in most if not all cases Extremely limited rainfall in August and September coupled with an early September frost severely impacted soybean grain yields at the Rochester location. Yield variability across plots was higher than expected. (University of Minnesota Extension Regional Office, Rochester)

Date	5/17	6/13	6/16	6/29	7/1
Treatment	PRE	POST I	POST II	POST III	POST IV
Temperature					
Air	63	67	66	74	82
Soil	63.7	61.9	66.2	69.1	81.1
Relative Humidity (%)	27	48	90	57	69
Wind (mph)	8	12	8	13	16
Soil Moisture	Adequate	Dry	Excessive	Adequate	Adequate
Soybean					
Stage		V2	V3	V5	R1
Height (inches)		5.5	6.8	9.2	10.8
Giant Ragweed					
Weed density (ft^2)		5.0			
Height (inches)		3.5	7.5	5.5	5.9
Common Lambsquarters					
Weed density (ft^2)		2.9			
Height (inches)		1.5	2.5		1.2
Common Waterhemp					
Weed density (ft^2)		3.5			
Height (inches)		1.3	2.5		2.4
Giant foxtail					
Weed density (ft^2)		0.6			
Height (inches)		2.0	4.5	5.3	
Rainfall after each application					
Week 1	1.78	3.41	2.89	0.31	0.00
Week 2	0.66	1.29	0.03	0.45	3.24
Week 3	0.04	0.31	0.31	2.79	0.01

Table 1. Evaluation of pyroxasulfone herbicide systems for giant ragweed control in soybeans on June 8, 13, 27 July 8, 18, and September 21 at Rochester, MN, in 2011.

Treatment	Rate	Giant Ragweed Control						Yield
		6/8	6/13	6/27	7/8	7/18	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	7.4
PRE/POST II (3-4 inch weeds)								
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz.a + 8.5 lb/ 100 gal	18	19	87	81	90	80	30.4
Authority MTZ / Roundup PowerMax + AMS	16 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	40	35	95	91	93	88	37.3
Zidua / Roundup PowerMax + AMS	2.5 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	21	20	89	84	90	84	41.0
Fierce / Roundup PowerMax + AMS	3 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	28	25	94	89	93	91	36.8
PRE / POST III (3-4 inch weeds)								
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	92	90	84	88	95	95	41.4
Anthem + Authority First / Roundup PowerMax + AMS	7 fl oz/a + 3.2 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	88	81	77	83	94	95	38.0
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	96	93	86	93	96	97	32.9
Gangster FR + Gangster V / Roundup PowerMax + AMS	0.4 oz wt/a + 2 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	90	88	80	86	94	95	41.4
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz wt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	97	95	92	97	97	98	39.1
Fierce + Classic / Roundup PowerMax + AMS	3 oz wt/a + 0.33 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	64	46	65	76	90	91	36.8
Boundary + Sharpen / Roundup PowerMax + AMS	1.5 pt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	97	95	92	97	98	99	31.2
POST I (3-4 inch weeds)								
Anthem + Roundup PowerMax + AMS	8 fl oz/a + 22 fl oz/a + 8.5 lb/ 100 gal			78	75	87	70	28.4
Zidua + Roundup PowerMax + AMS	2.5 oz wt/a + 22 fl oz + 8.5 lb/ 100 gal			96	93	94	90	32.9
Zidua + Extreme + NIS + AMS	2 oz wt/a + 3 pt/a + 0.125% v/v + 8.5 lb/ 100 gal			96	96	97	95	29.5
Warrant + Roundup PowerMax + AMS	3 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal			96	87	93	86	34.2
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal			94	87	91	81	31.6
POST I (3-4 inch weeds) / POST IV (3-4 inch weeds)								
Flexstar GT / Touchdown Total + AMS	3 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal			70	85	92	95	29.7
LSD (P=0.10)		**4**	**6**	**5**	**5**	**2**	**4**	**8.7**

Table 2. Evaluation of pyroxasulfone herbicide systems for common lambsquarters control on June 8, 13, 27, July 8, 18, and September 21 in soybeans at Rochester, MN, in 2011.

Treatment	Rate	Common Lambsquarters Control						Yield
		9/8	6/13	6/27	7/8	7/18	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	7.4
PRE/POST II (3-4 inch weeds)								
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz.a + 8.5 lb/ 100 gal	99	99	99	99	98	99	30.4
Authority MTZ / Roundup PowerMax + AMS	16 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	37.3
Zidua / Roundup PowerMax + AMS	2.5 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	98	98	98	41.0
Fierce / Roundup PowerMax + AMS	3 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	36.8
PRE / POST III (3-4 inch weeds)								
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	41.4
Anthem + Authority First / Roundup PowerMax + AMS	7 fl oz/a + 3.2 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	38.0
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	32.9
Gangster FR + Gangster V / Roundup PowerMax + AMS	0.4 oz wt/a + 2 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	98	99	99	41.4
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz wt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	39.1
Fierce + Classic / Roundup PowerMax + AMS	3 oz wt/a + 0.33 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	36.8
Boundary + Sharpen / Roundup PowerMax + AMS	1.5 pt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	31.2
POST I (3-4 inch weeds)								
Anthem + Roundup PowerMax + AMS	8 fl oz/a + 22 fl oz/a + 8.5 lb/ 100 gal			98	92	92	89	28.4
Zidua + Roundup PowerMax + AMS	2.5 oz wt/a + 22 fl oz + 8.5 lb/ 100 gal			99	97	96	97	32.9
Zidua + Extreme + NIS + AMS	2 oz wt/a + 3 pt/a + 0.125% v/v + 8.5 lb/ 100 gal			98	98	98	99	29.5
Warrant + Roundup PowerMax + AMS	3 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal			74	76	81	75	34.2
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal			97	91	93	83	31.6
POST I (3-4 inch weeds) / POST IV (3-4 inch weeds)								
Flexstar GT / Touchdown Total + AMS	3 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal			90	95	97	96	29.7
	LSD (P=0.10)	**1**	**1**	**2**	**2**	**2**	**3**	**8.7**

Table 3. Evaluation of pyroxasulfone herbicide systems for common waterhemp control in soybeans on June 8, 13, 27, July 8, 18, and September 21 at Rochester, MN, in 2011.

Treatment	Rate	Common Waterhemp Control						Yield
		6/8	6/13	6/27	7/8	7/18	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	7.4
PRE/POST II (3-4 inch weeds)								
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz.a + 8.5 lb/ 100 gal	99	99	99	99	99	99	30.4
Authority MTZ / Roundup PowerMax + AMS	16 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	37.3
Zidua / Roundup PowerMax + AMS	2.5 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	41.0
Fierce / Roundup PowerMax + AMS	3 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	36.8
PRE / POST III (3-4 inch weeds)								
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	41.4
Anthem + Authority First / Roundup PowerMax + AMS	7 fl oz/a + 3.2 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	38.0
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	32.9
Gangster FR + Gangster V / Roundup PowerMax + AMS	0.4 oz wt/a + 2 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	41.4
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz wt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	39.1
Fierce + Classic / Roundup PowerMax + AMS	3 oz wt/a + 0.33 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	36.8
Boundary + Sharpen / Roundup PowerMax + AMS	1.5 pt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	31.2
POST I (3-4 inch weeds)								
Anthem + Roundup PowerMax + AMS	8 fl oz/a + 22 fl oz/a + 8.5 lb/ 100 gal			91	84	93	87	28.4
Zidua + Roundup PowerMax + AMS	2.5 oz wt/a + 22 fl oz + 8.5 lb/ 100 gal			99	99	98	98	32.9
Zidua + Extreme + NIS + AMS	2 oz wt/a + 3 pt/a + 0.125% v/v + 8.5 lb/ 100 gal			99	97	98	97	29.5
Warrant + Roundup PowerMax + AMS	3 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal			98	90	95	87	34.2
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal			98	85	88	82	31.6
POST I (3-4 inch weeds) / POST IV (3-4 inch weeds)								
Flexstar GT / Touchdown Total + AMS	3 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal			73	99	99	99	29.7
	LSD (P=0.10)	**1**	**0**	**2**	**3**	**1**	**3**	**8.7**

Table 4. Evaluation of pyroxasulfone herbicide systems for giant foxtail control in soybeans on June 8, 13, 27, July 8, 18, and September 21 at Rochester, MN, in 2011.

Treatment	Rate	Giant Foxtail Control						Yield
		6/8	6/13	6/27	7/8	7/18	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	7.4
PRE/POST II (3-4 inch weeds)								
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz.a + 8.5 lb/ 100 gal	99	99	99	99	99	99	30.4
Authority MTZ / Roundup PowerMax + AMS	16 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	98	97	99	99	99	99	37.3
Zidua / Roundup PowerMax + AMS	2.5 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	41.0
Fierce / Roundup PowerMax + AMS	3 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	36.8
PRE / POST III (3-4 inch weeds)								
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	96	92	86	99	99	99	41.4
Anthem + Authority First / Roundup PowerMax + AMS	7 fl oz/a + 3.2 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	98	97	99	99	99	38.0
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	32.9
Gangster FR + Gangster V / Roundup PowerMax + AMS	0.4 oz wt/a + 2 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	92	91	85	98	99	99	41.4
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz wt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	98	99	99	99	39.1
Fierce + Classic / Roundup PowerMax + AMS	3 oz wt/a + 0.33 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	98	99	98	99	99	99	36.8
Boundary + Sharpen / Roundup PowerMax + AMS	1.5 pt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	98	99	99	99	31.2
POST I (3-4 inch weeds)								
Anthem + Roundup PowerMax + AMS	8 fl oz/a + 22 fl oz/a + 8.5 lb/ 100 gal			97	99	99	99	28.4
Zidua + Roundup PowerMax + AMS	2.5 oz wt/a + 22 fl oz + 8.5 lb/ 100 gal			99	99	98	99	32.9
Zidua + Extreme + NIS + AMS	2 oz wt/a + 3 pt/a + 0.125% v/v + 8.5 lb/ 100 gal			99	98	98	99	29.5
Warrant + Roundup PowerMax + AMS	3 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal			95	99	99	99	34.2
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal			96	91	84	85	31.6
POST I (3-4 inch weeds) / POST IV (3-4 inch weeds)								
Flexstar GT / Touchdown Total + AMS	3 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal			95	99	99	99	29.7
	LSD (P=0.10)	**2**	**2**	**3**	**1**	**2**	**1**	**8.7**

Table 5. Percent crop injury from pyroxasulfone herbicide systems in soybeans on June 8, 13, 27, and July 18 at Rochester, MN, in 2011.

Treatment	Rate	Injury			Yield
		6/8	6/13	6/27	
	(rate/A)		(%)		(bu/A)
Untreated		0	0	0	7.4
PRE/POST II (3-4 inch weeds)					
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz.a + 8.5 lb/ 100 gal	0	0	0	30.4
Authority MTZ / Roundup PowerMax + AMS	16 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	37.3
Zidua / Roundup PowerMax + AMS	2.5 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	1	41.0
Fierce / Roundup PowerMax + AMS	3 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	36.8
PRE / POST III (3-4 inch weeds)					
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	41.4
Anthem + Authority First / Roundup PowerMax + AMS	7 fl oz/a + 3.2 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	38.0
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	32.9
Gangster FR + Gangster V / Roundup PowerMax + AMS	0.4 oz wt/a + 2 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	41.4
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz wt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	5	8	6	39.1
Fierce + Classic / Roundup PowerMax + AMS	3 oz wt/a + 0.33 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	36.8
Boundary + Sharpen / Roundup PowerMax + AMS	1.5 pt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	23	26	12	31.2
POST I (3-4 inch weeds)					
Anthem + Roundup PowerMax + AMS	8 fl oz/a + 22 fl oz/a + 8.5 lb/ 100 gal			24	28.4
Zidua + Roundup PowerMax + AMS	2.5 oz wt/a + 22 fl oz + 8.5 lb/ 100 gal			6	32.9
Zidua + Extreme + NIS + AMS	2 oz wt/a + 3 pt/a + 0.125% v/v + 8.5 lb/ 100 gal			5	29.5
Warrant + Roundup PowerMax + AMS	3 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal			5	34.2
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal			0	31.6
POST I (3-4 inch weeds) / POST IV (3-4 inch weeds)					
Flexstar GT / Touchdown Total + AMS	3 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal			0	29.7
	LSD (P=0.10)	**2**	**3**	**4**	**8.7**

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Performance of Warrant Herbicide for Weed Control in Early and Normal Planted Soybeans at Rochester, MN, in 2011.

Breitenbach, Fritz R., Lisa M. Behnken, Ryan P. Miller, Jolene Kuisle and Adam Hazel

The objective of this trial was to evaluate the crop response of Warrant herbicide in early and normal planted soybeans in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.2, O.M of 2.4%, and soil test P and K levels of 99 ppm and 164 ppm, respectively. The field was fall mold board plowed, disked and field cultivated once prior to planting. The soybean variety, Asgrow 1832, was planted on April 18 and May 10, 2011, 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. Stand count and population estimates of the plots were taken on May 17, 24, and June 1. Plant heights and canopy closure were measured on June 30 and July 11, 2011. Application dates, environmental conditions, and crop stages are listed below. The center two rows of each plot were machine harvested on October 3, 2011.

SUMMARY

Challenging spring planting conditions were the norm for SE Minnesota in 2011. In a typical year, soybean planting will start in the last week of April and is generally finished by the third week of May. In 2011 very few soybeans had been planted even after the second week of May. Cool and wet conditions hampered both corn and soybean planting.

In this trial, soybeans were planted on April 18th and May 10th. April 18th planted soybean stands were reduced by approximately 50 percent regardless of whether a pre-emergence herbicide was used or not. In addition, early post emergent herbicide applications of Warrant did not impact soybean stand counts in the April 18th planted soybeans.

Soybean emergence was also impacted by weather for the May 10th planted soybeans. Stands were reduced by 33 percent regardless of whether a pre-emergent or early post emergent herbicide was used.

Soybean vigor and crop response to herbicide application was measured by evaluating plant height and canopy closure. For the April 18th planted soybeans, plots treated with Valor and the low rate of Warrant pre-emergence were significantly taller (7/11 rating date) than V2 treated applications of Warrant and the untreated check. Canopy closure was also reduced with the high rate of Warrant applied at V2 when compared to the Valor pre-emergence treatment.

For the May 10th planted soybeans, plots treated with Valor pre-emergence were significantly taller than plants in the untreated check (7/11 rating date). In addition, the Valor treated plots had significantly faster canopy closure than all of the Warrant treated plots (regardless of application timing) and of the untreated check.

Soybean yields were significantly different by planting date only. The earlier planted soybeans had higher yields than the later planted soybeans. Herbicide treatment, rate, and timing had no impacts on final grain yield. (University of Minnesota Extension Regional Office, Rochester).

Date	4/18 - Early	6/3 – Early	5/10 - Normal	6/7 – Normal
Treatment	PRE	POST	PRE	POST
Temperature				
Air	51.6	75.0	86.0	85.0
Soil	51.6	68.5	72.5	84.9
Relative Humidity (%)	40	78	60	34
Wind (mph)	3	17	20	14
Soil Moisture	Adequate	Adequate	Adequate	Dry
Soybean				
Stage		V2		V3
Height inches)		3.7		2.8
Rainfall after each application				
Week 1	1.63	0.51	0.51	2.26
Week 2	0.45	1.78	1.78	2.89
Week 3	0.97	2.89	0.66	0.19

Table 1. Plant stand and population before POST Warrant herbicide applications in early and normal planted soybeans at Rochester, MN in 2011.

Treatment	Rate	Plant Stand & Population						Yield
		5/17		5/24		6/1		
	(rate/A)	Per 8 ft	Plants/a	Per 8 ft	Plants/a	Per 8 ft	Plants/a	(bu/A)
Early Planting – April 18, 2011								
Untreated		32	68,880	31	68,340	-	-	48.5
PRE								
Warrant	3.33 pt/a	35	77,050	34	74,600	-	-	53.2
Warrant	6 pt/a	32	69,150	34	73,240	-	-	51.1
Valor	1.96 oz/a	36	77,590	38	83,580	-	-	51.3
POST (V2 Soybean, 6/3/11)								
Warrant	3.33 pt/a	33	72,420	30	66,160	-	-	51.1
Warrant	6 pt/a	32	71,060	34	72,960	-	-	48.9
Normal Planting – May 10, 2011								
Untreated		-	-	49	107,540	43	93,110	41.3
PRE								
Warrant	3.33 pt/a	-	-	47	102,370	44	96,380	40.3
Warrant	6 pt/a	-	-	45	98,830	42	90,660	42.5
Valor	1.96 pt/a	-	-	47	102,370	41	88,210	40.0
POST (V2 Soybean, 6/7/11)								
Warrant	3.33 pt/a	-	-	51	110,530	49	106,450	40.0
Warrant	6 pt/a	-	-	49	106,450	45	96,920	38.3
LSD (P=0.10)		**NS**	**NS**	**6.7**	**14,490**	**NS**	**NS**	**6.3**

Table 2. Plant height and canopy closure after POST Warrant herbicide applications in early and normal planted soybeans at Rochester, MN in 2011.

Treatment	Rate	Plant Height		Canopy Closure	Yield
		6/30	7/11	7/11	
	(rate/A)	(Inches)	(Inches)	(Inches between row)	(bu/A)
Early Planting – April 18, 2011					
Untreated		11.4 ab	17.0 bc	9.6 abc	48.5
PRE					
Warrant	3.33 pt/a	12.1 a	19.4 a	7.8 abc	53.2
Warrant	6 pt/a	12.1 a	18.4 ab	8.0 abc	51.1
Valor	1.96 oz/a	12.6 a	19.1 a	7.0 c	51.3
POST (V2 Soybean, 6/3/11)					
Warrant	3.33 pt/a	10.5 bc	16.6 bc	10.2 ab	51.1
Warrant	6 pt/a	10.8 bc	16.8 bc	10.4 a	48.9
Normal Planting – May 10, 2011					
Untreated		9.4 c	15.5 c	9.1 abc	41.3
PRE					
Warrant	3.33 pt/a	9.9 c	16.4 bc	9.5 abc	40.3
Warrant	6 pt/a	10.1 c	16.8 bc	9.8 ab	42.5
Valor	1.96 pt/a	9.9 c	17.8 abc	7.4 bc	40.0
POST (V2 Soybean, 6/7/11)					
Warrant	3.33 pt/a	9.9 c	16.3 bc	10.0 ab	40.0
Warrant	6 pt/a	9.7 c	16.8 bc	9.3 abc	38.3
	LSD (P=0.10)	**0.9**	**1.3**	**1.6**	**6.3**

Table 3. Plant stand and population before POST Warrant herbicide applications in early planted soybeans at Rochester, MN in 2011.

Treatment	Rate	Plant Stand & Population				Yield
		5/17		5/24		
	(rate/A)	Per 8 ft	Plants/a	Per 8 ft	Plants/a	(bu/A)
Early Planting – April 18, 2011						
Untreated		32	68,880	31	68,340	48.5
PRE						
Warrant	3.33 pt/a	35	77,050	34	74,600	53.2
Warrant	6 pt/a	32	69,150	34	73,240	51.1
Valor	1.96 oz/a	36	77,590	38	83,580	51.3
POST (V2 Soybean, 6/3/11)						
Warrant	3.33 pt/a	33	72,420	30	66,160	51.1
Warrant	6 pt/a	32	71,060	34	72,960	48.9
LSD (P=0.10)		**NS**	**NS**	**NS**	**NS**	**NS**

Table 4. Plant height and canopy closure after POST Warrant herbicide applications in early planted soybeans at Rochester, MN in 2011.

Treatment	Rate	Plant Height		Canopy Closure	Yield
		6/30	7/11	7/11	
	(rate/A)	(Inches)	(Inches)	(Inches between row)	(bu/A)
Early Planting – April 18, 2011					
Untreated		11.4 ab	17.0 b	9.6 ab	41.3
PRE					
Warrant	3.33 pt/a	12.1 ab	19.4 a	7.8 b	40.3
Warrant	6 pt/a	12.1 ab	18.4 ab	8.0 ab	42.5
Valor	1.96 oz/a	12.6 a	19.1 a	7.0 b	40.0
POST (V2 Soybean, 6/3/11)					
Warrant	3.33 pt/a	10.5 b	16.6 b	10.2 ab	40.0
Warrant	6 pt/a	10.8 ab	16.8 b	10.4 a	38.3
LSD (P=0.10)		**1.2**	**1.6**	**2.1**	**NS**

Table 5. Plant stand and population before POST Warrant herbicide applications in normal planted soybeans at Rochester, MN in 2011.

Treatment	Rate	Plant Stand & Population				Yield
		5/24		6/1		
	(rate/A)	Per 8 ft	Plants/a	Per 8 ft	Plants/a	(bu/A)
Normal Planting – May 10, 2011						
Untreated		49	107,540	43	93,110	41.3
PRE						
Warrant	3.33 pt/a	47	102,370	44	96,380	40.3
Warrant	6 pt/a	45	98,830	42	90,660	42.5
Valor	1.96 pt/a	47	102,370	41	88,210	40.0
POST (V2 Soybean, 6/7/11)						
Warrant	3.33 pt/a	51	110,530	49	106,450	40.0
Warrant	6 pt/a	49	106,450	45	96,920	38.3
	LSD (P=0.10)	**NS**	**NS**	**NS**	**NS**	**NS**

Table 6. Plant height and canopy closure after POST Warrant herbicide applications in normal planted soybeans at Rochester, MN in 2011.

Treatment	Rate	Plant Height		Canopy Closure	Yield
		6/30	7/11	7/11	
	(rate/A)	(Inches)	(Inches)	(Inches between row)	(bu/A)
Normal Planting – May 10, 2011					
Untreated		9.4	15.5 b	9.1 a	48.5
PRE					
Warrant	3.33 pt/a	9.9	16.4 ab	9.5 a	53.2
Warrant	6 pt/a	10.1	16.8 ab	9.8 a	51.1
Valor	1.96 pt/a	9.9	17.8 a	7.4 b	51.3
POST (V2 Soybean, 6/7/11)					
Warrant	3.33 pt/a	9.9	16.3 ab	10.0 a	51.1
Warrant	6 pt/a	9.7	16.8 ab	9.3 a	48.9
	LSD (P=0.10)	**NS**	**0.9**	**1.0**	**NS**

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2011 Evaluation of Herbicide Systems in Soybean at Rochester, MN

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

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 6.6, O.M. of 2.6%, and soil test P and K levels of 62 ppm and 188 ppm, respectively. The field was fall moldboard plowed, and disked and field cultivated once prior to planting in the spring. The soybean variety, Pioneer 91Y90, was planted on May 16, 2011 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 8, 13, 24, 30, July 8, 18, and September 21, 2011. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on October 3, 2011.

SUMMARY: Extremely limited rainfall in August and September coupled with an early September frost severely impacted soybean grain yields at the Rochester location. Overall weed control was consistently very good to excellent depending on the treatment.

Five pre-emergent herbicide treatments provided superior giant ragweed control 86% or better (6/13 rating). These treatments were Optill, Authority First, Prefix, Verdict + Outlook, and Zidua + Verdict. These five treatments followed by glyphosate also resulted in superior final giant ragweed control, 97-99% (9/21 rating). Other treatments that resulted in superior giant ragweed control were the conventional herbicide program Boundary (PRE) followed by Flexstar + Fusion + Harmony SG, and all sequential POST I + POST V treatments.

Common lambsquarters control was exceptional for nearly all of the treatments. Only three treatments provided significantly lower control of common lambsquarters. These treatments were all total post treatments, POST II Roundup WeatherMax, (87%), POST I Anthem + Roundup WeatherMax, (83%), and POST I Warrant + Roundup WeatherMax, (75%). There appeared to be some antagonism with the Warrant + Roundup WeatherMax treatment.

Common waterhemp control was exceptional for nearly all of the treatments. Only three treatments provided significantly lower control of common waterhemp. These treatments were all total post treatments, POST II Roundup WeatherMax, (83%), POST I Anthem + Roundup WeatherMax, (79%), and POST I Warrant + Roundup WeatherMax, (93%).

Giant foxtail control was excellent in all treatments (97% control or higher). The only significant reduction in foxtail control occurred in the single pass, POST II Roundup WeatherMax treatment with final weed control of 88% (9/21 rating).

Crop response to soil applied herbicide is noteworthy; three herbicide treatments (all containing saflufenacil) exhibited a crop injury response. These treatments were Optill 16%, Verdict + Outlook 7%, and Zidua +Verdict 14% (6/13 rating date). The crop injury response did not appear to negatively impact grain yields. (University of Minnesota Extension Regional Office, Rochester)

Date	**5/17**	**6/13**	**6/16**	**6/25**	**6/29**	**7/5**
Treatment	PRE	POST I	POST II	POST III	POST IV	POST V
Temperature (F)						
Air	63	64	66	67	74	79
Soil	62.4	62.2	66.6	66.2	69.6	77.6
Relative Humidity (%)	29	64	90	70	57	64
Wind (mph)	12	8	8	6	13	14
Soil Moisture	Adequate	Dry	Excessive	Excessive	Adequate	Adequate
Soybean						
Stage		V2	V3	V4	V5	R1
Height (inch)		5.5	5.5	9.8	8.4	11.5
Giant Ragweed						
Weed density (ft^2)	4.4					
Height (inch)	3.5	6.5	5.1	10.5	4.1	3.6
Common Lambsquarters						
Weed density (ft^2)	2.0					
Height (inch)	1.1	1.5	1.5			1.9
Common Waterhemp						
Weed density (ft^2)	3.8					
Height (inch)	1.3	2.4	1.5			3.0
Giant Foxtail						
Weed density (ft^2)	0.6					
Height (inch)	2.3	3.5	3.4	4.8	3.3	3.0
Rainfall after each application (inch)						
Week 1	1.78	3.41	2.89	0.31	0.31	0.45
Week 2	0.66	1.29	0.03	0.04	0.45	2.79
Week 3	0.04	0.31	0.31	3.20	2.79	0.17

Table 1. Performance of herbicide systems for giant ragweed control in soybean and grain yield at 13% at Rochester, MN, in 2011.

Treatment	Rate	Giant Ragweed Control						Yield
		6/8	6/13	6/24	7/8	7/18	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	4.5
Weed Free		100	100	100	100	100	100	35.9
PRE/POST I (4 inch weeds)								
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	34	15	99	98	97	97	24.7
PRE/POST II (6 inch weeds)								
Anthem / Roundup PowerMax + N-Pak AMS	10 oz/a / 22 oz/a + 3 qt/a	31	16	94	90	91	88	23.9
Boundary / Touchdown Total + N-Pak AMS	1.5 pt/a / 24 oz/a + 3 qt/a	31	15	92	89	89	87	28.1
Valor SX / Roundup PowerMax + N-Pak AMS	2 oz/a / 22 oz/a + 3 qt/a	55	30	96	94	93	91	30.7
PRE / POST III (6 inch weeds)								
Fierce / Roundup PowerMax + N-Pak AMS	3 oz/a / 22 oz/a + 3 qt/a	62	49	53	87	88	88	24.8
Fierce + Classic / Roundup PowerMax + N-Pak AMS	3 oz/a + 0.33 oz a / 22 oz/a + 3 qt/a	63	51	57	87	89	87	31.4
Optill / Roundup PowerMax + NIS + N-Pak AMS	2 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	90	86	90	96	94	99	26.3
Sonic / Durango DMA + N-Pak AMS	3 oz/a / 24 oz/a + 3 qt/a	83	74	70	93	94	93	31.4
Enlite / Abundit S + N-Pak AMS	2.8 oz/a / 32 oz/a + 3 qt/a	75	61	50	88	90	90	25.5
Enlite / Abundit S + Harmony SG + N-Pak AMS	2.8 oz/a / 32 oz/a + 0.125 oz/a + 3 qt/a	71	57	49	84	87	86	28.2
PRE / POST IV (4 inch weeds)								
Authority First / Roundup PowerMax + N-Pak AMS	6.4 oz/a / 22 oz/a + 3 qt/a	91	88	88	95	95	97	30.3
Prefix / Touchdown Total + N-Pak AMS	1 qt/a / 24 oz/a + 3 qt/a	93	90	86	94	95	99	26.0
Verdict + Outlook / Roundup PowerMax + NIS + N-Pak AMS	5 oz/a + 10 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	93	90	84	94	94	97	31.2
Zidua + Verdict / Roundup PowerMax + NIS + N-Pak AMS	2 oz/a + 5 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	97	94	93	97	96	98	28.4
POST I (4 inch weeds)								
Anthem + Roundup PowerMax + NIS + N-Pak AMS	8 oz/a + 22 oz/a + 0.25% v/v + 3 qt/a			93	91	90	84	23.5
Warrant + Roundup WeatherMax + N-Pak AMS	3 pt/a + 22 oz/a + 3 qt/a			97	94	92	87	28.0
POST I (4 inch weeds)/POST V (4 inch regrowth)								
Roundup WeatherMax + N-Pak AMS / Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a			97	97	99	99	32.2
Durango DMA + FirstRate + N-Pak AMS / Durango DMA + N-Pak AMS	24 oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a			97	98	98	99	29.8
Flexstar GT + N-Pak AMS / Touchdown Total + N-Pak AMS	3.5 pt/a + 3 qt/a / 24 oz/a + 3 qt/a			92	96	96	99	30.2
Sychrony + Abundit S + N-Pak AMS / Abundit S + N-Pak AMS	0.375 oz/a + 32 oz/a + 3 qt/a / 32 oz/a + 3 qt/a			98	97	98	99	23.6
Roundup PowerMax + Resource + N-Pak AMS / Roundup PowerMax + N-Pak AMS	22 oz/a + 2 oz/a + 3 qt/a / 22 oz/a + 3 qt/a			87	95	94	97	25.0
POST II (6 inch weeds)								
Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a			90	89	90	83	31.4
	LSD (P=0.10)	**3.4**	**4.1**	**4.1**	**2.5**	**2.4**	**3.5**	**5.7**

Table 2. Performance of herbicide systems for common lambsquarters control in soybean and grain yield at 13% at Rochester, MN, in 2011.

Treatment	Rate	Common Lambsquarters Control						Yield
		6/8	6/13	6/24	7/8	7/18	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	4.5
Weed Free		100	100	100	100	100	100	35.9
PRE/POST I (4 inch weeds)								
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	98	24.7
PRE/POST II (6 inch weeds)								
Anthem / Roundup PowerMax + N-Pak AMS	10 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	98	97	23.9
Boundary / Touchdown Total + N-Pak AMS	1.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	98	96	95	28.1
Valor SX / Roundup PowerMax + N-Pak AMS	2 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	30.7
PRE / POST III (6 inch weeds)								
Fierce / Roundup PowerMax + N-Pak AMS	3 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	24.8
Fierce + Classic / Roundup PowerMax + N-Pak AMS	3 oz/a + 0.33 oz a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	31.4
Optill / Roundup PowerMax + NIS + N-Pak AMS	2 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	99	26.3
Sonic / Durango DMA + N-Pak AMS	3 oz/a / 24 oz/a + 3 qt/a	99	99	99	99	99	99	31.4
Enlite / Abundit S + N-Pak AMS	2.8 oz/a / 32 oz/a + 3 qt/a	99	99	99	99	99	99	25.5
Enlite / Abundit S + Harmony SG + N-Pak AMS	2.8 oz/a / 32 oz/a + 0.125 oz/a + 3 qt/a	99	99	99	99	99	99	28.2
PRE / POST IV (4 inch weeds)								
Authority First / Roundup PowerMax + N-Pak AMS	6.4 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	30.3
Prefix / Touchdown Total + N-Pak AMS	1 qt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	99	26.0
Verdict + Outlook / Roundup PowerMax + NIS + N-Pak AMS	5 oz/a + 10 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	99	31.2
Zidua + Verdict / Roundup PowerMax + NIS + N-Pak AMS	2 oz/a + 5 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	99	28.4
POST I (4 inch weeds)								
Anthem + Roundup PowerMax + NIS + N-Pak AMS	8 oz/a + 22 oz/a + 0.25% v/v + 3 qt/a			99	95	93	83	23.5
Warrant + Roundup WeatherMax + N-Pak AMS	3 pt/a + 22 oz/a + 3 qt/a			88	89	84	75	28.0
POST I (4 inch weeds)/POST V (4 inch regrowth)								
Roundup WeatherMax + N-Pak AMS / Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a			98	99	99	99	32.2
Durango DMA + FirstRate + N-Pak AMS / Durango DMA + N-Pak AMS	24 oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a			98	99	99	99	29.8
Flexstar GT + N-Pak AMS / Touchdown Total + N-Pak AMS	3.5 pt/a + 3 qt/a / 24 oz/a + 3 qt/a			99	98	98	99	30.2
Sychrony + Abundit S + N-Pak AMS / Abundit S + N-Pak AMS	0.375 oz/a + 32 oz/a + 3 qt/a / 32 oz/a + 3 qt/a			98	98	99	99	23.6
Roundup PowerMax + Resource + N-Pak AMS / Roundup PowerMax + N-Pak AMS	22 oz/a + 2 oz/a + 3 qt/a / 22 oz/a + 3 qt/a			99	98	99	99	25.0
POST II (6 inch weeds)								
Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a			99	96	94	87	31.4
	LSD (P=0.10)	**0**	**0.3**	**1.4**	**1.5**	**1.5**	**2.2**	**5.7**

Table 3. Performance of herbicide systems for common waterhemp control in soybean and grain yield at 13% at Rochester, MN, in 2011.

Treatment	Rate	Common Waterhemp Control						Yield
		6/8	6/13	6/24	7/8	7/18	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	4.5
Weed Free		100	100	100	100	100	100	35.9
PRE/POST I (4 inch weeds)								
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	24.7
PRE/POST II (6 inch weeds)								
Anthem / Roundup PowerMax + N-Pak AMS	10 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	23.9
Boundary / Touchdown Total + N-Pak AMS	1.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	97	98	28.1
Valor SX / Roundup PowerMax + N-Pak AMS	2 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	30.7
PRE / POST III (6 inch weeds)								
Fierce / Roundup PowerMax + N-Pak AMS	3 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	24.8
Fierce + Classic / Roundup PowerMax + N-Pak AMS	3 oz/a + 0.33 oz a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	31.4
Optill / Roundup PowerMax + NIS + N-Pak AMS	2 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	99	99	98	99	97	98	26.3
Sonic / Durango DMA + N-Pak AMS	3 oz/a / 24 oz/a + 3 qt/a	99	99	99	99	99	98	31.4
Enlite / Abundit S + N-Pak AMS	2.8 oz/a / 32 oz/a + 3 qt/a	99	99	99	99	99	99	25.5
Enlite / Abundit S + Harmony SG + N-Pak AMS	2.8 oz/a / 32 oz/a + 0.125 oz/a + 3 qt/a	99	99	99	99	99	99	28.2
PRE / POST IV (4 inch weeds)								
Authority First / Roundup PowerMax + N-Pak AMS	6.4 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	99	99	30.3
Prefix / Touchdown Total + N-Pak AMS	1 qt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	99	26.0
Verdict + Outlook / Roundup PowerMax + NIS + N-Pak AMS	5 oz/a + 10 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	99	31.2
Zidua + Verdict / Roundup PowerMax + NIS + N-Pak AMS	2 oz/a + 5 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	99	28.4
POST I (4 inch weeds)								
Anthem + Roundup PowerMax + NIS + N-Pak AMS	8 oz/a + 22 oz/a + 0.25% v/v + 3 qt/a			98	92	90	79	23.5
Warrant + Roundup WeatherMax + N-Pak AMS	3 pt/a + 22 oz/a + 3 qt/a			99	99	96	93	28.0
POST I (4 inch weeds)/POST V (4 inch regrowth)								
Roundup WeatherMax + N-Pak AMS / Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a			99	99	99	99	32.2
Durango DMA + FirstRate + N-Pak AMS / Durango DMA + N-Pak AMS	24 oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a			99	99	99	99	29.8
Flexstar GT + N-Pak AMS / Touchdown Total + N-Pak AMS	3.5 pt/a + 3 qt/a / 24 oz/a + 3 qt/a			98	98	99	99	30.2
Sychrony + Abundit S + N-Pak AMS / Abundit S + N-Pak AMS	0.375 oz/a + 32 oz/a + 3 qt/a / 32 oz/a + 3 qt/a			99	99	99	99	23.6
Roundup PowerMax + Resource + N-Pak AMS / Roundup PowerMax + N-Pak AMS	22 oz/a + 2 oz/a + 3 qt/a / 22 oz/a + 3 qt/a			98	98	99	99	25.0
POST II (6 inch weeds)								
Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a			99	93	92	83	31.4
	LSD (P=0.10)	**0.1**	**0.2**	**0.5**	**1.5**	**2.0**	**3.0**	**5.7**

Table 4. Performance of herbicide systems for giant foxtail control in soybean and grain yield at 13% at Rochester, MN, in 2011.

Treatment	Rate	Giant Foxtail Control						Yield
		6/8	6/13	6/24	7/8	7/18	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	4.5
Weed Free		100	100	100	100	100	100	35.9
PRE/POST I (4 inch weeds)								
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	98	99	24.7
PRE/POST II (6 inch weeds)								
Anthem / Roundup PowerMax + N-Pak AMS	10 oz/a / 22 oz/a + 3 qt/a	99	99	99	99	98	99	23.9
Boundary / Touchdown Total + N-Pak AMS	1.5 pt/a / 24 oz/a + 3 qt/a	99	99	99	99	97	99	28.1
Valor SX / Roundup PowerMax + N-Pak AMS	2 oz/a / 22 oz/a + 3 qt/a	94	75	99	99	97	99	30.7
PRE / POST III (6 inch weeds)								
Fierce / Roundup PowerMax + N-Pak AMS	3 oz/a / 22 oz/a + 3 qt/a	99	96	96	99	99	99	24.8
Fierce + Classic / Roundup PowerMax + N-Pak AMS	3 oz/a + 0.33 oz a / 22 oz/a + 3 qt/a	99	97	99	99	99	99	31.4
Optill / Roundup PowerMax + NIS + N-Pak AMS	2 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	91	68	68	99	97	99	26.3
Sonic / Durango DMA + N-Pak AMS	3 oz/a / 24 oz/a + 3 qt/a	95	79	81	99	98	99	31.4
Enlite / Abundit S + N-Pak AMS	2.8 oz/a / 32 oz/a + 3 qt/a	95	78	79	98	97	99	25.5
Enlite / Abundit S + Harmony SG + N-Pak AMS	2.8 oz/a / 32 oz/a + 0.125 oz/a + 3 qt/a	96	73	80	97	96	98	28.2
PRE / POST IV (4 inch weeds)								
Authority First / Roundup PowerMax + N-Pak AMS	6.4 oz/a / 22 oz/a + 3 qt/a	97	88	86	99	99	99	30.3
Prefix / Touchdown Total + N-Pak AMS	1 qt/a / 24 oz/a + 3 qt/a	99	99	99	99	99	99	26.0
Verdict + Outlook / Roundup PowerMax + NIS + N-Pak AMS	5 oz/a + 10 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	99	99	98	99	99	99	31.2
Zidua + Verdict / Roundup PowerMax + NIS + N-Pak AMS	2 oz/a + 5 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	99	28.4
POST I (4 inch weeds)								
Anthem + Roundup PowerMax + NIS + N-Pak AMS	8 oz/a + 22 oz/a + 0.25% v/v + 3 qt/a			99	98	96	97	23.5
Warrant + Roundup WeatherMax + N-Pak AMS	3 pt/a + 22 oz/a + 3 qt/a			99	99	98	99	28.0
POST I (4 inch weeds)/POST V (4 inch regrowth)								
Roundup WeatherMax + N-Pak AMS / Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a			99	98	99	99	32.2
Durango DMA + FirstRate + N-Pak AMS / Durango DMA + N-Pak AMS	24 oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a			99	99	99	99	29.8
Flexstar GT + N-Pak AMS / Touchdown Total + N-Pak AMS	3.5 pt/a + 3 qt/a / 24 oz/a + 3 qt/a			99	99	99	99	30.2
Sychrony + Abundit S + N-Pak AMS / Abundit S + N-Pak AMS	0.375 oz/a + 32 oz/a + 3 qt/a / 32 oz/a + 3 qt/a			99	99	99	99	23.6
Roundup PowerMax + Resource + N-Pak AMS / Roundup PowerMax + N-Pak AMS	22 oz/a + 2 oz/a + 3 qt/a / 22 oz/a + 3 qt/a			99	98	99	99	25.0
POST II (6 inch weeds)								
Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a			99	94	86	88	31.4
	LSD (P=0.10)	**1.5**	**4.3**	**2.9**	**1.3**	**2.8**	**1.3**	**5.7**

Table 5. Soybean response to herbicide systems and grain yield at 13% at Rochester, MN, in 2011.

Treatment	Rate	Injury 6/13	Injury 6/24	Injury 6/30 Plant Vigor	Yield
	(rate/A)		(%)		(bu/A)
Untreated		0	0	7	4.5
Weed Free		0	0	6.5	35.9
PRE/POST I (4 inch weeds)					
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	0	25	5.3	24.7
PRE/POST II (6 inch weeds)					
Anthem / Roundup PowerMax + N-Pak AMS	10 oz/a / 22 oz/a + 3 qt/a	0	6	6.4	23.9
Boundary / Touchdown Total + N-Pak AMS	1.5 pt/a / 24 oz/a + 3 qt/a	0	0	6.6	28.1
Valor SX / Roundup PowerMax + N-Pak AMS	2 oz/a / 22 oz/a + 3 qt/a	0	3	6.8	30.7
PRE / POST III (6 inch weeds)					
Fierce / Roundup PowerMax + N-Pak AMS	3 oz/a / 22 oz/a + 3 qt/a	0	0	6.4	24.8
Fierce + Classic / Roundup PowerMax + N-Pak AMS	3 oz/a + 0.33 oz a / 22 oz/a + 3 qt/a	0	0	6.6	31.4
Optill / Roundup PowerMax + NIS + N-Pak AMS	2 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	16	5	7	26.3
Sonic / Durango DMA + N-Pak AMS	3 oz/a / 24 oz/a + 3 qt/a	0	0	7.5	31.4
Enlite / Abundit S + N-Pak AMS	2.8 oz/a / 32 oz/a + 3 qt/a	0	0	6.8	25.5
Enlite / Abundit S + Harmony SG + N-Pak AMS	2.8 oz/a / 32 oz/a + 0.125 oz/a + 3 qt/a	0	0	6.6	28.2
PRE / POST IV (4 inch weeds)					
Authority First / Roundup PowerMax + N-Pak AMS	6.4 oz/a / 22 oz/a + 3 qt/a	0	0	7.4	30.3
Prefix / Touchdown Total + N-Pak AMS	1 qt/a / 24 oz/a + 3 qt/a	0	0	7.8	26.0
Verdict + Outlook / Roundup PowerMax + NIS + N-Pak AMS	5 oz/a + 10 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	7	4	6.8	31.2
Zidua + Verdict / Roundup PowerMax + NIS + N-Pak AMS	2 oz/a + 5 oz/a / 22 oz/a + 0.25% v/v + 3 qt/a	14	4	6	28.4
POST I (4 inch weeds)					
Anthem + Roundup PowerMax + NIS + N-Pak AMS	8 oz/a + 22 oz/a + 0.25% v/v + 3 qt/a		10	6	23.5
Warrant + Roundup WeatherMax + N-Pak AMS	3 pt/a + 22 oz/a + 3 qt/a		0	6.5	28.0
POST I (4 inch weeds)/POST V (4 inch regrowth)					
Roundup WeatherMax + N-Pak AMS / Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a / 22 oz/a + 3 qt/a		0	6.8	32.2
Durango DMA + FirstRate + N-Pak AMS / Durango DMA + N-Pak AMS	24 oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a		0	6.4	29.8
Flexstar GT + N-Pak AMS / Touchdown Total + N-Pak AMS	3.5 pt/a + 3 qt/a / 24 oz/a + 3 qt/a		15	6	30.2
Sychrony + Abundit S + N-Pak AMS / Abundit S + N-Pak AMS	0.375 oz/a + 32 oz/a + 3 qt/a / 32 oz/a + 3 qt/a		14	5.6	23.6
Roundup PowerMax + Resource + N-Pak AMS / Roundup PowerMax + N-Pak AMS	22 oz/a + 2 oz/a + 3 qt/a / 22 oz/a + 3 qt/a		5	6	25.0
POST II (6 inch weeds)					
Roundup WeatherMax + N-Pak AMS	22 oz/a + 3 qt/a		0	6.3	31.4
	LSD (P=0.10)	**4.7**	**4.7**	**0.6**	**5.7**

SECTION G

SOYBEAN AGRONOMY

Soybean Response to Micronutrients Across Minnesota

Fertilizer: Treatments
1) Control (Chk) - no fertilizer
2) Without Zinc (-Zn)
3) Without Manganese (-Mn)
4) Without Molybdenum (-Mo)
5) Without Boron (-B)
6)All - 10 lb/ac Zn + 10 lb/ac Mn + 0.5 lb/ac Mo + 5 lb/ac B
Phosphorus and Potassium kept at non-limiting levels
Fertilizer was broadcast and incorporated before planting except for Delavan which was managed with no-tillage.

Weed Management: Glyphosate

Experimental Design: Randomized complete block design with 4 replications

Objective:

The purpose of this study was to determine if there is a potential yield response in soybean to selected micro-nutrients applied broadcast before planting.

Results:

This study used a simple drop out design to study the effects of micronutrients by comparing plots with 4 micronutrients with plots where one of the particular nutrients are not applied. To test treatment effects, an analysis of variance procedure was used to determine whether any of the treatments were significantly different. When the analysis indicated significance, all treatments with a particular nutrient were averaged and compared to averages of treatments without. Initial soil test results are given in Table 1. Soil P levels were High to Very High at all locations, K ranged from Medium to Very High, and in general Zinc (Zn) was higher than levels in which deficiencies are likely to occur. Soil tests were also run for manganese (Mn) and boron (B). There currently are no critical values for soybeans grown in Minnesota for either nutrient since neither has been shown to be deficient. Soybeans are responsive to Mn, however, yield responses are typically seen in areas of the country with soils that have been historically deficient in Mn. Research in Michigan has shown soybean yield increases due to Mn and recommendations exist in that state when soil test levels are less than 24 ppm. The only location with a soil test near that level was the Rock Dell location. Other locations that can exhibit lowered Mn availability are those with high soil pH, but in this case there was no relationship between pH and Mn.

Table 1. Initial soil test data for 0-6" samples collected before treatment application for soybean micronutrient studies.

		Soil Test						
Location	County	P	K	Zn	Mn	B	OM	pH
		----------ppm----------					--%--	
Delavan	Faribault	23	150	12.0	46.6	1.1	5.2	6.1
Fosston	Polk	25	196	1.1	35.5	1.0	7.1	7.5
Hallock	Kittson	30	610	0.8	28.0	1.1	8.8	7.0
Montgomery	Rice	121	234	4.6	56.8	0.5	3.7	6.2
Rochester	Olmsted	66	185	1.9	53.7	0.4	3.2	6.1
Rock Dell	Olmsted	51	130	3.9	24.3	0.8	3.2	6.8

P, Bray-P1 phosphorus; K, ammonium acetate potassium; Zn, DTPA zinc; Mn, DTPA manganese; B, hot water extracted boron; OM, organic matter loss on ignition; pH, 1:1 soil:water ;na, data not available.

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Soybean Response to Micronutrients Across Minnesota (continued)

The upper most, fully developed trifoliate was sampled at R2 (full bloom) to assess plant nutrient status at selected sties (Fosston, Hallock, and Rochester were sampled, however, the data from Rochester is not currently available). Twenty samples were collected and composited from each plot and analyzed for zinc, manganese, and boron. Leaf molybdenum concentration was not determined.

Zinc was the only nutrient where the concentration differed between treatments at any site (Table 3). At Fosston leaf zinc content differed between treatments. Table 3 lists the least significant differences between treatments, however, comparisons between treatments with and without specific nutrients indicated that leaf zinc content was greater with the application of molybdenum. However, most concentrations were at or near the sufficient range of 20 to 50 ppm.

Table 4 compares the average tissue concentration for zinc, manganese, and boron across treatments at each location (sufficient ranges: Mn, 21 to 100 ppm; B, 21 to 55 ppm). At both the Hallock and Fosston sites the average tissue concentration fell in the sufficient range for all nutrients. This indicates that it was unlikely that a deficiency was present and yield would be limited. The yield data (reported at 13% moisture) in Table 5 confirms this result.

There was no significant effect of the micronutrients studied on yield at any of the locations. Glyphosate application at many of the southern locations was during periods of high temps which did induce some glyphosate flash symptoms in many fields in 2011. In the fields studied there was no advantage to Mn which has been reported to be limiting when glyphosate flash occurs. Yields in the southern sites were lower which may limit potential response to micronutrients. While there may have been some variability between treatment yields it was likely due to within plot variability.

Year 1 Summary

- There was no yield advantage for applying Zn, Mn, Mo, or B to soybeans at these locations.
- The potential effect of the climatic conditions at individual locations may have limited potential for determining treatment differences.
- Soil tests did not aid in the determination of where micronutrient deficiencies may occur.
- Plant tissue tests at selected sites agreed with yield data that micronutrients levels were sufficient enough to maintain soybean yields.

Table 3. Soybean trifoliate zinc concentration from samples taken at R2 (full bloom).

	Treatment						
Site	Chk	-Zn	-Mn	-Mo	-B	All	P>F†
	ppm						
Fosston	21abc	20abc	19c	19c	23a	22ab	0.04
Hallock	27	26	29	27	28	26	0.51

† Treatments are significantly different when $P \leq 0.05$.

Table 4. Soybean trifoliate nutrient concentration from samples taken at R2 (full bloom) averaged across treatments

	Nutrient and Sufficiency Level					
Site	Zn	SL†	Mn	SL†	B	SL†
	ppm					
Fosston	21	S	92	S	50	S
Hallock	27	S	51	S	49	S

† SL, sufficiency level: L, Low; S, Sufficient; H, High.

Table 5. Soybean yield summary by treatment for each location.

	Treatment						
Site	Chk	-Zn	-Mn	-Mo	-B	All	P>F†
	bu/ac						
Delavan	41	40	42	41	43	42	0.86
Fosston	64	62	66	62	66	65	0.50
Hallock	57	55	56	59	59	59	0.36
Montgomery	39	39	39	39	40	36	0.65
Rochester	38	37	37	37	38	38	0.54
RockDell	35	33	34	32	31	29	0.25

† Treatments are significantly different when $P \leq 0.05$.

MicroEssentials-SZ® as a Fertilizer Source for Soybean

Fertilizer: Treatments
1) Control (Chk) - no fertilizer
2) Nitrogen Only (N)
3) N and Phosphorus (N+P)
4) N, P, and Sulfur (N+P+S)
5) MicroEssentials-SZ applied at 200 lbs product per acre (MEZ)
Potassium kept at non-limiting levels
Fertilizer was broadcast and incorporated before planting
All nutrients were balanced to apply similar rates
Sulfur in treatment 4 was applied as 50% AMS and 50% Tiger 90

Weed Management: Glyphosate

Experimental Design: Randomized complete block design with 4 replications

Objective:

The purpose of this study was to determine the efficacy of using MicroEssentials-SZ, a multi nutrient fertilizer manufactured by Mosaic, on the yield of soybean and to determine which nutrient or nutrients may be responsible for increased yield.

Results:

This research studied the effect of MicroEssentials-SZ on the yield of soybeans. Treatments were designed to compare the impact of individual nutrients applied with the fertilizer. The product is a multi-nutrient blend of nitrogen (N), phosphorus (P), sulfur (S), and zinc (Zn) that has an analysis of 12-40-0-10-1 (% N-P_2O_5-K_2O-S-Zn). The material is manufactured using dry mono-ammonium phosphate (MAP), ammonium sulfate, elemental sulfur, and zinc oxide. In this study we compared treatments using N only as ammonium nitrate, N and P as MAP, and N , P and S as MAP, ammonium sulfate, and elemental sulfur. All treatments were intended to supply the nutrients in the same amount as the MEZ which was applied at 200 lb. of product per acre (24 lb N, 80 lb P_2O_5, 20 lb S, and 2 lb Zn per acre). Treatment differences were assessed using analysis of variance procedures. When the analysis indicated one or more treatments significantly differed treatment means were compared for response to N, P, K, S, and Zn by averaging treatments with and treatments without each individual nutrient and comparing their means'.

Initial soil test results are given in Table 1. Soil P levels were High to Very High at all locations, K ranged from Medium to Very High, and in general Zinc was higher than levels in which deficiencies are likely to occur in other crops. The only locations where a deficiency of an element was likely was K at the Warroad site which was in the medium classification for soybeans. The Very High levels of soil test P indicate that a response to P from the MEZ product is highly unlikely. There is no established critical value for Zn on soybeans in the state of Minnesota.

Table 1. Initial soil test data for 0-6" samples collected before treatment application for soybean MicroEssentials-SZ studies.

		Soil Test				
Location	County	P	K	Zn	OM	pH
		----------ppm----------			--%--	
Hallock	Kittson	30	610	0.8	8.8	7.0
Lamberton	Redwood	24	172	0.8	5.0	5.2
Rock Dell	Olmsted	51	130	3.9	3.2	6.8
Warroad	Lake of the Woods	29	96	1.0	2.8	7.6
Waseca	Waseca	27	172	0.9	7.1	6.5

P, Bray-P1 phosphorus; K ammonium acetate potassium; Zn, DTPA zinc; OM, organic matter loss on ignition; pH, 1:1 soil:water.

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Minnesota Soybean Research and Promotion Council

MicroEssentials-SZ® as a Fertilizer Source for Soybean (continued)

Results from soybean trifoliate samples collected at full bloom are given in Table 2 and 3 for the Hallock and Warroad locations (samples were collected from all sites but data are not available). Table 2 summarizes trifoliate P levels by treatment. Application of P at Warroad increased trifoliate P concentration. For the cases of S and Zn there was no difference in treatment so the data were averaged across treatments for both locations (Table 3).

All treatments tested sufficient for P and Zn (P, 0.26 to 0.50%; S, no critical level available; Zn, 20 to 50 ppm). Soybean yields (adjusted to 13% moisture) were significantly affected by one or more treatments at the Warroad location (Table 4). Treatment means comparisons indicate that N increased yield by an average of 6 bu/ac at the Warroad site. A comparison could not be made between the trifoliate N concentration and yield response since the data has not been run at this time. However, the effect of P on trifoliate concentration was not translated into higher yield.

In no cases did the MEZ treatment increase yields further than any other treatment other than the control (chk). The only other site that showed a small increasing yield trend was at Waseca where yields were slightly higher with P. However this increase, if significant, would be only 1 bu/ac which would not be economical based on the rates applied.

The lack of yield response to the MEZ treatment alone is not surprising since the only difference between that and any other treatment applied is the inclusion of zinc. Soybeans are not know to be highly responsive to zinc as compared to other crops such as corn or edible beans. In addition the sulfur in MEZ did not increase yields. Similar to Zn, soybeans are not known to be highly responsive to sulfur. When applying fertilizer sources such as MEZ or MAP for soybeans, the main consideration should be price per lb. P_2O_5 or N since these nutrients may significantly affect yields. While soybeans may not respond to S or Zn there could be a benefit from the carry over of these nutrients to following years' crops.

Year 1 Summary

- The sites had adequate P and Zn levels in the soil
- Soybean trifoliate S and Zn concentration were not influenced by treatments. Trifoliate P concentration was affected by P application at the Warroad location
- Soybean trifoliate P, S, and Zn concentration did not fully relate to yield differences
- Application of MEZ fertilizer did not increase yields more than N, N+P, or N+P+S fertilizer treatments
- Yields were increased by N application at one location.

Table 2. Soybean trifoliate phosphorus concentration from samples taken at R2 (full bloom).

	Treatment					
Site	Chk	N	N+P	N+P+S	MEZ	P>F†
	----------	----------	%----------	----------	----------	
Hallock	0.42	0.41	0.44	0.41	0.41	0.35
Warroad	0.34c	0.35bc	0.38ab	0.39a	0.37abc	0.04

† Treatments are significantly different when $P \leq 0.05$.

Table 3. Soybean trifoliate nutrient concentration from samples taken at R2 (full bloom) averaged across treatments in the MEZ study.

	Nutrient and Sufficiency Level					
Site	P	SL†	S	SL†	Zn	SL†
	----------	----------	ppm----------	----------	----------	
Hallock	0.42	S	0.27	--	26	S
Lamberton	na		na		na	
Rock Dell	na		na		na	
Warroad	0.37	S	0.28	--	22	S
Waseca	na		na		na	

† SL, sufficiency level: L, Low; S, Sufficient; H, High.

Table 4. Soybean MEZ yield summary by treatment for each location.

	Treatment					
Site	Chk	N	N+P	N+P+S	MEZ	P>F†
	----------	----------	bu/ac----------	----------	----------	
Hallock	57	60	60	58	58	0.50
Lamberton	52	52	50	54	51	0.42
Rock Dell	35	33	35	32	33	0.84
Warroad	41c	49a	47ab	51a	44bc	0.02
Waseca	51	50	52	53	52	0.38

† Treatments are significantly different when $P \leq 0.05$.

Performance of Fungicide Products for Disease Control in Soybean at Rochester, MN, in 2011.

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

The objective of this trial was to evaluate the performance of fungicide products for disease control in soybeans in southeastern Minnesota, 2011. The research site was a Lawler Loam series with a pH of 6.2, O.M. of 2.5%, and soil test P and K levels of 68 ppm and 177 ppm, respectively. The field was spring disked and field cultivated once prior to planting. The soybean variety, Pioneer 92Y51, was planted on May 24, 2011, 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. Postemergence (POST) treatments were applied at R3 with a tractor-mounted sprayer delivering 24.75 gpa at 49 psi using Turbo Tee 11002 nozzles. Application dates, environmental conditions are listed below. The center two rows of each plot were machine harvested on October 10, 2011.

SUMMARY

Extremely limited rainfall in August and September coupled with an early September frost severely impacted soybean grain yields at the Rochester location. Septoria brown spot was partially controlled by all fungicide treatments in this trial. No adverse crop response was observed following fungicide application for any of the treatments. No statistically differences were observed for either grain moisture or yield in this trial.
(University of Minnesota Extension Regional Office, Rochester).

Date	**7/25**
Treatment	POST
Field Conditions	
Temperature	
Air	77
Soil	75.7
Relative Humidity (%)	53
Wind (mph)	9
Soil Moisture	Excessive
Soybean	
Stage	R3
Height (inches)	33.2
Rainfall after each application	
Week 1	0.50
Week 2	0.03
Week 3	0.19

Treatment	**Rate**	**Crop Injury**	**Septoria Brown Spot**	**Moisture**	**Yield**
	(rate/A)	**(% Injury)**	**1-5 Rating Scale ***	**(%)**	**(bu/A)**
Stratego YLD + NIS	4 fl oz/a + 0.125% v/v	0	2.50	8.7	39.8
Headline	6 fl oz/a	0	2.31	8.7	42.5
Quilt	10.5 fl oz/a	0	2.56	8.8	42.5
Quilt Xcel	10.5 fl oz/a	0	2.63	8.7	42.3
Evito + NIS	3 fl oz/a + 0.125% v/v	0	2.88	8.7	42.8
Untreated Check		0	3.75	8.75	40.1
	LSD (P=0.10)	**NS**	**0.31**	**NS**	**NS**

RATING SCALE *1 = 20 percent severity, 5 = 100 percent severity

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Evaluation of Insecticides for Control of Soybean Aphids at Rock Dell, MN, in 2011.

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

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 7.0, O.M of 4.1%, soil test P and K levels of 31 ppm and 139 ppm, respectively. 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, Pioneer 91Y51, was planted on May 27, 2011 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. Baseline soybean aphid populations were taken on August 1 ranging from 6 to 415 aphids/plant and an average of 61 aphids/plant. Pre-treatment populations were taken on August 4 with a range of 24 to 153 aphids/plant and an average population of 63 aphids/plant. Soybean aphid populations reached the economic threshold in the untreated check on August 18th (13 days post treatment). Application and pretreatment soybean aphid population numbers are listed in Table 1. Insecticide treatments were made on August 5, when soybeans reached the R5 stage. Soybean aphid counts were taken three, six, thirteen, and twenty days after treatment, Tables 2 & 3. Soybean stage and nodes are reported in Tables 4, soybean height in Table 5. Soybean yield and grain moisture are presented at the end of end of each table. The center four rows of each plot were harvested on October 4, 2011.

All treatments significantly reduced soybean aphid population when compared to the untreated check through the duration of the trial. The only insecticide treatment which did not significantly out yield the untreated check was the reduced (0.375X rate) of Lorsban Advanced. When insecticide treatments were analyzed without the untreated check separation occurred in both soybean aphid count and in yield. Seperation of insecticide applications started to occur by 13 days after treatment; with the reduced rate insecticide treatments of Warrior II (0.375X rate) and Lorsban Advanced (0.375X rate) showing an increase in the number of soybean aphids per plant. Yields were enhanced with the addition of a pyrethroid insecticide component (either Warrior II, or Baythroid). Number of nodes, bean height, and soybean development stage were not impacted with by any of the insecticide treatments. (University of Minnesota Extension Regional Office, Rochester, MN).

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

Date	**8/5**
Temperature (F)	
Air	76
Soil	--
Relative Humidity (%)	79
Wind (mph)	5
Soil Moisture	Dry
Soybean	
Stage	R5
Height	32.1
Node	15
Soybean Aphid Population	
Average per plant	63
Rainfall after application (inch)	
Week 1	0.18
Week 2	0.01
Week 3	0.50

Table 2. Soybean aphids per plant at three, six, thirteen, and twenty-days after treatment at Rock Dell, MN, 2011. Sprayed on soybeans at R5 on 8/5/2011.

Treatment	Rate	3 days post treatment 8/8/11	6 days post treatment 8/11/11	13 days post treatment 8/18/11	20 days post treatment 8/25/11	Moisture	Yield
		Total Aphids	Total Aphids	Total Aphids	Total Aphids	(%)	(bu/A)
Untreated		42.7	22.1	252.3	363.5	8.7	47.1
POST (R5)							
Lorsban Advanced	6 fl oz/a	1.3	0.8	22.5	149.9	8.8	49.8
Warrior II	0.48 fl oz/a	17.4	9.1	46.7	66.2	8.9	53.8
Lorsban Advanced + Warrior II	6 fl oz/a + 0.48 fl oz/a	1.8	0.1	1.2	9.4	8.8	53.8
Warrior II	1.28 fl oz/a	6.1	3.4	9.7	7.6	8.9	54.7
Lorsban Advanced	16 fl oz/a	0.7	0.1	3.4	30.4	8.8	50.9
Leverage + COC	2.8 fl oz/a + 0.43 gal /a	1.6	0.2	8.2	24.3	8.7	50.4
Baythroid XL + Lorsban Advanced	2.0 fl oz/a + 8 fl oz/a	0.1	0.1	1.9	11.6	8.9	53.7
LSD (P=0.10)		**14.5**	**7.0**	**62.6**	**157**	**NS**	**3.1**

Table 3. Analysis without untreated check of soybean aphids per plant at three, six, thirteen, and twenty-days after treatment at Rock Dell, MN, 2011. Sprayed on soybeans at R5 on 8/5/2011.

Treatment	Rate	3 days post treatment 8/8/11	6 days post treatment 8/11/11	13 days post treatment 8/18/11	20 days post treatment 8/25/11	Moisture	Yield
		Total Aphids	Total Aphids	Total Aphids	Total Aphids	(%)	(bu/A)
POST (R5)							
Lorsban Advanced	6 fl oz/a	1.3	0.8	22.5	149.9	8.8	49.8
Warrior II	0.48 fl oz/a	17.4	9.1	46.7	66.2	8.9	53.8
Lorsban Advanced + Warrior II	6 fl oz/a + 0.48 fl oz/a	1.8	0.1	1.2	9.4	8.8	53.8
Warrior II	1.28 fl oz/a	6.1	3.4	9.7	7.6	8.9	54.7
Lorsban Advanced	16 fl oz/a	0.7	0.1	3.4	30.4	8.8	50.9
Leverage + COC	2.8 fl oz/a + 0.43 gal /a	1.6	0.2	8.2	24.3	8.7	50.4
Baythroid XL + Lorsban Advanced	2.0 fl oz/a + 8 fl oz/a	0.1	0.1	1.9	11.6	8.9	53.7
LSD (P=0.10)		**10.7**	**6.4**	**22.0**	**104.4**	**NS**	**3.1**

Table 4. Soybean stage and number of nodes three, six, thirteen, and twenty-days after treatment at Rock Dell, MN, 2011. Sprayed on soybeans at R5 on 8/5/2011.

Treatment	Rate	3 days post treatment 8/8/11		6 days post treatment 8/11/11		13 days post treatment 8/18/11		20 days post treatment 8/25/11	Moisture	Yield
		Nodes	Stage	Nodes	Stage	Nodes	Stage	Stage	(%)	(bu/A)
Untreated		14	5	16	5	16	5	6	8.7	47.1
POST (R5)			5							
Lorsban Advanced	6 fl oz/a	15	5	16	5	16	5	6	8.8	49.8
Warrior II	0.48 fl oz/a	14	5	15	5	16	5	6	8.9	53.8
Lorsban Advanced + Warrior II	6 fl oz/a + 0.48 fl oz/a	16	5	16	5	16	5	6	8.8	53.8
Warrior II	1.28 fl oz/a	15	5	16	5	15	6		8.9	54.7
Lorsban Advanced	16 fl oz/a	14	5	16	5	17	5	6	8.8	50.9
Leverage + COC	2.8 fl oz/a + 0.43 gal /a	16	5	16	5	16	5	6	8.7	50.4
Baythroid XL + Lorsban Advanced	2.0 fl oz/a +8 fl oz/a	14	5	14	5	17	6	6	8.9	53.7
LSD (P=0.10)		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**3.1**

Table 5. Soybean height in inches at three, six, and thirteen, after treatment at Rock Dell, MN, 2011. Sprayed on soybeans at R5 on 8/5/2011.

Treatment	Rate	3 days post treatment 8/8/11	6 days post treatment 8/11/11	13 days post treatment 8/18/11		Moisture (%)	Yield (bu/A)
Untreated		36	36	39		8.7	47.1
POST (R5)							
Lorsban Advanced	6 fl oz/a	36	37	40		8.8	49.8
Warrior II	0.48 fl oz/a	37	38	42		8.9	53.8
Lorsban Advanced + Warrior II	6 fl oz/a + 0.48 fl oz/a	36	37	40		8.8	53.8
Warrior II	1.28 fl oz/a	38	39	40		8.9	54.7
Lorsban Advanced	16 fl oz/a	36	36	38		8.8	50.9
Leverage + COC	2.8 fl oz/a + 0.43 gal /a	38	38	39		8.7	50.4
Baythroid XL + Lorsban Advanced	2.0 fl oz/a +8 fl oz/a	39	37	40		8.9	53.7
LSD (P=0.10)		**NS**	**NS**	**NS**		**NS**	**3.1**

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Evaluation of Late Season Soybean Aphids Control at Rochester, MN, in 2011.

Behnken, Lisa M., Fritz R. Breitenbach, Ryan P. Miller, Steve Reiter and Jolene Kuisle

The objective of this trial was to evaluate the effectiveness of late season insecticide application for control of soybean aphids in soybean in southeastern Minnesota. The fields were located on a Kasson silt loam (Field I), and Waucona loam (Field II). Soil characteristics are as follows: Field I = pH of 6.5, O.M of 3.5%, soil test P and K levels of 24 ppm and 117 ppm. Field II = pH of 6.7, O.M of 2.9%, soil test P and K levels of 10 ppm and 85 ppm, respectively.respectively. The previous crop was corn. The fields were chisel plowed in the fall and field cultivated in the spring. The fields were planted with a 6-row John Deere 7200 planter. The soybean variety Renk RS210NR2 (Field I), and NuTech 1808 (Field II) were both planted on May 19, 2011 at a depth of 1.0 inches in 30-in rows. Seeding rate was 150,000 seeds/A. A randomized complete block design with four replications was used. Pre-treatment aphid populations were taken on August 15 with an average population of 141 aphids/plant (Field I), and 469 aphids/plant (Field II). Application and environmental conditions are listed in Table 1. Insecticide treatments were made on August 15, when soybeans were in the R5 maturity stage. Soybean aphid counts were taken twelve, and twenty six days after treatment, Tables 2 & 3. Soybean stage and nodes are reported in Tables 4. Soybean yield and grain moisture are presented at the end of end of each table. The center two rows of each plot were harvested on October 6, 2011.

Insecticide treatments significantly reduced soybean aphid population in both Field I and Field II when compared to the untreated check throughout the duration of the trial. Aphid numbers in Field I reached 289 aphids per plant on August 27 before declining to 104 aphids per plant on September 6. Final grain yield and moisture were not significantly impacted with this late season aphid infestation in Field I Table 2.

Aphid numbers in Field II reached 522 aphids per plant on August 27 before declining to 129 aphids per plant on September 6. Final grain yield was significantly impacted with the Warrior II treated soybeans out-yielding the untreated plots by over 4 bushel per acre Table 3. Grain moisture was not impacted. (University of Minnesota Extension Regional Office, Rochester, MN).

Table 1. Environmental conditions, when insecticide applied.

Date	**8/15**
Temperature (F)	
Air	68
Soil	--
Relative Humidity (%)	78
Wind (mph)	9
Soil Moisture	Dry
Rainfall after application (inch)	
Week 1	0.5
Week 2	0.03
Week 3	1.41

Table 2. Soybean aphid populations and grain yield (Field I)

Treatment	Rate	Pre-treatment 8/15/11	12 days post treatment 8/27/11	26 days post treatment 9/6/11	Moisture	Yield
		Total Aphids	Total Aphids	Total Aphids	(%)	(bu/A)
Untreated		141	289	104	8.3	49.3
POST (R5)						
Warrior II	1.28 fl oz/a	141	0	0	8.3	51.0
LSD (P=0.10)					**NS**	**NS**

Table 3. Soybean aphid populations and grain yield (Field II)

Treatment	Rate	Pre-treatment 8/15/11	12 days post treatment 8/27/11	26 days post treatment 9/6/11	Moisture	Yield
		Total Aphids	Total Aphids	Total Aphids	(%)	(bu/A)
Untreated		469	522	129	7.8	44.1
POST (R5)						
Warrior II	1.28 fl oz/a	469	0	0	7.7	48.5
LSD (P=0.10)					**NS**	**1.8**

Table 4. Soybean growth stages and grain yields for Field I & Field II

Treatment	Rate	PRE treatment 8/15/11		12 days post treatment 8/27/11	26 days post treatment 9/6/11	Moisture	Yield
		Nodes	Stage	Stage	Stage	(%)	(bu/A)
FIELD I							
Untreated		16	R5	R6	R6	8.31	49.3
Warrior II	1.28 fl oz/a	16	R5	R6	R6	8.34	51.0
FIELD II							
Untreated		15	R5	R6	R6	7.8	44.1
Warrior II	1.28 fl oz/a	15	R5	R6	R6	7.7	48.5
LSD (P=0.10)						**NS**	**1.8**

SECTION H

SMALL GRAINS

OAT

FUNGICIDE

EVALUATION

Impact of Foliar Fungicide to Control Crown Rust in Oats in 2009, 2010, and 2011.

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

Oat is considered a multiple use crop, with primary uses being companion crop, livestock feed, grain and seed. There are approximately 250,000 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 disease 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.

Table 1. Application date, environmental conditions, and crop stage at application.

Date	**June 5, 2009**	**June 3, 2010**	**June 6, 2011**
Treatment	POST I	POST I	POST I
Temperature (F)			
Air	71	68	88
Soil	64.4	61.7	70.3
Relative Humidity (%)	42	56	53
Wind (mph)	14	0	5
Soil Moisture	Dry	Excessive	Dry
Oat Stage	Flag leaf emerged	Flag leaf emerged	Flag leaf emerged
Rainfall after application			
Week 1	1.97	0.85	0.48
Week 2	1.03	2.52	3.41
Week 3	0.31	1.94	1.29

2009 Field Trial

In 2009, we conducted a field trial to evaluate the effectiveness of 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. Kames' 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, the disease 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 information is 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 2009

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, increasing test weight (1.4 - 2.3 lbs/bu) and increasing yield (13.7 - 17.1 bu/ac) compared to the untreated check, Table 2.

2010 Field Trial

In 2010, we repeated the trial using two oat varieties and one foliar fungicide. Research plots were planted at Rochester on April 8, 2010. The oat varieties, Souris and Kame were seeded at 3 bushels/acre and fertilized according to University of Minnesota guidelines. Souris was released from NDSU, Fargo, ND in 2006. Souris' characteristics are: medium to late maturity, medium to high yield, good test weight, shorter, very good lodging resistance, resistance to crown rust, smut and susceptible to red leaf.

The experimental design was a randomized complete block with four replications. Plot size was 10' X 30'. The fungicide, Stratego, was applied on June 3, 2010, just after flag leaf emergence. Application information is listed in Table 1. Crop injury and disease severity were visually rated on June 7 and 24, respectively. Plots were machine harvested on July 19, 2010, and grain yields, test weight and moisture are reported in Table 3. Data was analyzed with an ANOVA at a p value of 0.10.

Summary 2010

The use of Stratego foliar fungicide significantly reduced crown rust severity compared to the untreated check of each variety, Table 3. Use of a fungicide to control crown rust on the variety Kame, increased test weight by 3.2 lbs/bu and yield by 19 bu/A compared to the untreated check. However, for the resistant variety Souris, there was no difference in test weight or yield when comparing treated with a fungicide and the untreated check.

2011 Field Trial

In 2011, we repeated the trial using two oat varieties and one foliar fungicide. Research plots were planted at Rochester on April 6, 2011. The oat varieties, Souris and Spurs were seeded at 3 bushels/acre and fertilized according to University of Minnesota guidelines. Spurs was released by Illinois AES in 2005. Spurs characteristics are: early to medium maturity, good yield, short with good lodging resistance, good test weight. It is susceptible to crown rust, smut and red leaf.

The experimental design was a randomized complete block with four replications. Plot size was 10' X 30'. The fungicide, Headline, was applied on June 6, 2011, just after flag leaf emergence. Application information is listed in Table 1. Crown rust disease severity and crop lodging were visually rated on June 30 and August 2, respectively. Plots were machine harvested on August 3, 2011, and grain yields, test weight and moisture are reported in Table 4. Data was analyzed with an ANOVA at a p value of 0.10.

Summary 2011 Field Trial

The use of Headline fungicide significantly reduced crown rust severity in both varieties. However, the disease was not as severe in the untreated Souris. Yield was increased by 14 bushels/acre with the use of Headline on Spurs, 88 compared to 102 bushels/acre; however there was no increase in test weight. Neither yield nor test weight was increased with the use of the fungicide, Headline, on the resistant variety, Souris.

In conclusion, fungicides used in this trial reduced crown rust for Kame, Souris and Spurs oat varieties. For the susceptible variety Kame, this resulted in an increase in test weight and yield in 2009 and 2010. For the susceptible variety Spurs, this resulted in an increase in yield in 2011. However, fungicides did not increase test weight or yield for the resistant variety Souris. Thus, the disease resistance in the variety Souris is still providing protection from the losses that can occur from crown rust. (University of Minnesota Extension Regional Office, Rochester, MN)

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		7/28/09	
	(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
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	

Table 3. Oat injury, crown rust disease severity, harvest moisture, test weight and grain yield of oats at Rochester, MN in 2010.

Treatment [1]	Rate	Injury	Disease Infection		Moisture		Test Weight		Yield	
		6/7	6/24		7/19		7/19		7/19/10	
	(rate/A)	1 =none[2]	(%)		(%)		(lbs/bu)		(bu/A)	
Kame - Untreated Check		2.0	66	a	13.4	d	25.3	c	112	b
Kame - Treated with Stratego	7 fl oz/a	5.0	29	b	17.3	c	28.5	b	131	a
Souris - Untreated Check		0.0	39	c	14.5	b	31.1	a	130	a
Souris - Treated with Stratego	7 fl oz/a	5.0	18	d	17.6	a	31.5	a	138	a
	LSD (P=0.10)	4.0	9		0.1		1.2		12	

Table 4. Crown rust disease severity, crop lodging, harvest moisture, test weight and grain yield of oats at Rochester, MN in 2011.

Treatment [1]	Rate	Disease Infection		Lodging		Moisture		Test Weight		Yield	
		6/30		8/2		8/3		8/3		8/3	
	(rate/A)	(%)		(%)		(%)		(lbs/bu)		(bu/A)	
Spurs - Untreated Check		34	a	6	b	12.3	a	29.4	a	88	c
Spurs - Treated with Headline	9 fl oz/a	5	c	5	b	12.2	a	28.8	a	105	b
Souris – Untreated Check		14	b	14	b	12.2	a	29.6	a	132	a
Souris - Treated with Headline	9 fl oz/a	5	c	34	a	12.0	a	30.1	a	134	a
	LSD (P=0.10)	5.0		19.2		0.2		1.3		13.0	

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.*

SECTION I

INTEGRATED PEST MANAGEMENT ASSESSMENT

University of Minnesota EXTENSION
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2011 IPM Assessment

~1248 responses

Pesticide Safety & Environmental Education Program

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Brad Carlson, Steel and Rice Extension Educator

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

How old are you? *(1248 responses)*

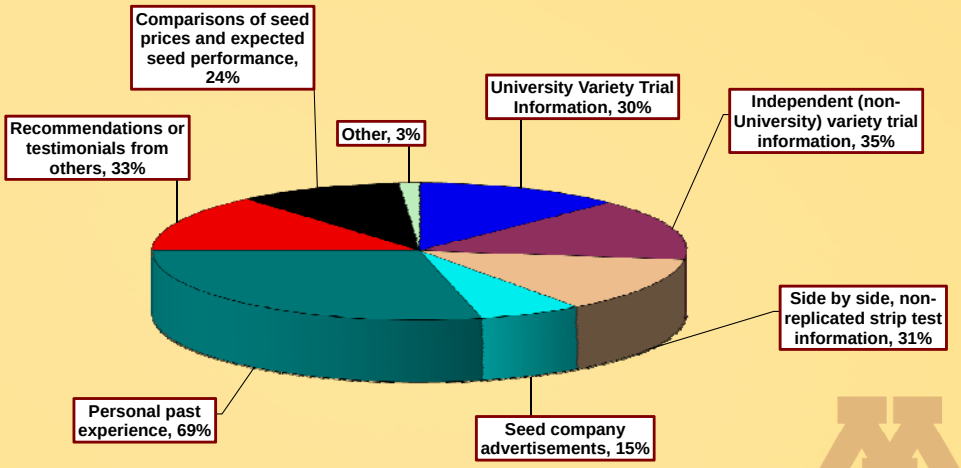
- 15% Over 65 years
- 14% 61 –65 years
- 18% 56-60 years
- 19% 51-55 years
- 13% 46-50 years
- 8% 41-45 years
- 5% 36-40 years
- 5% 31-35 years
- 3% 26-30 years
- 1% 18-25years

How many years have you been farming?

(1248 responses)

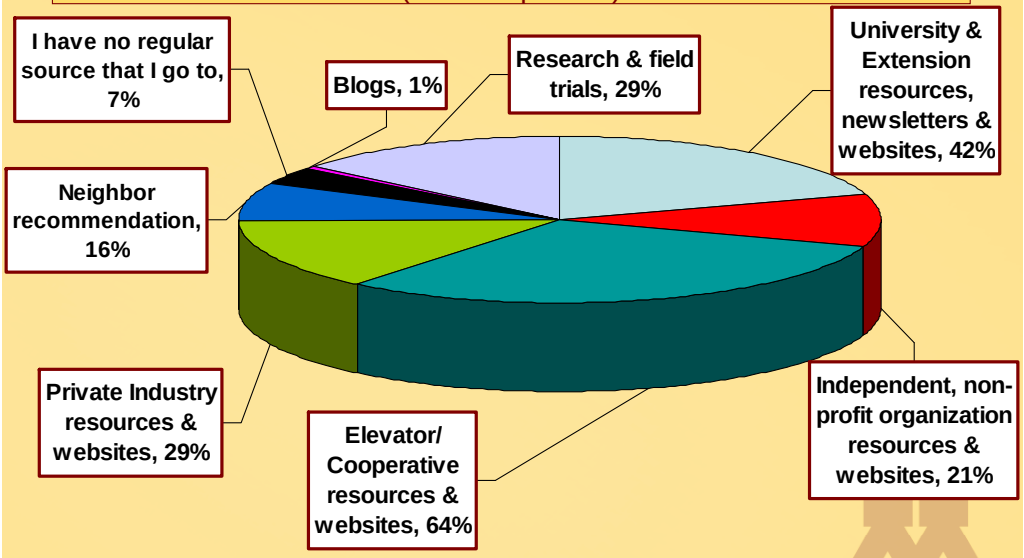
- 4% 1-5 years
- 6% 6-10 years
- 15% 11-20 years
- 26% 21-30 years
- 49% 31 or more years

Which of the following kinds of information do you strongly consider when selecting seed varieties for your farm? (1207 responses)



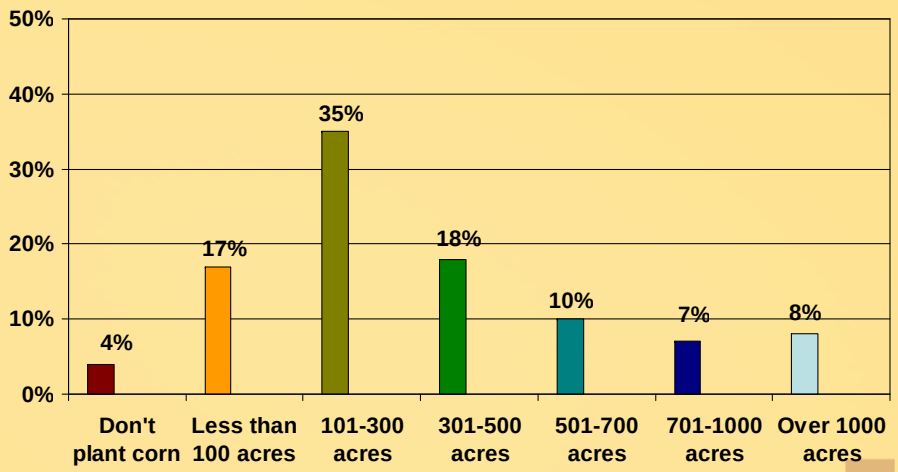
Which of the following sources do you rely on for crop and pest management information?

(1226 responses)

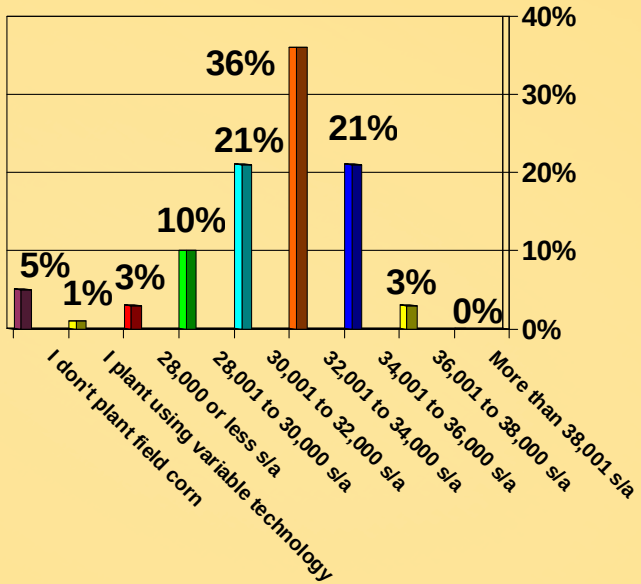


How many acres of Corn do you plant?

(1239 responses)

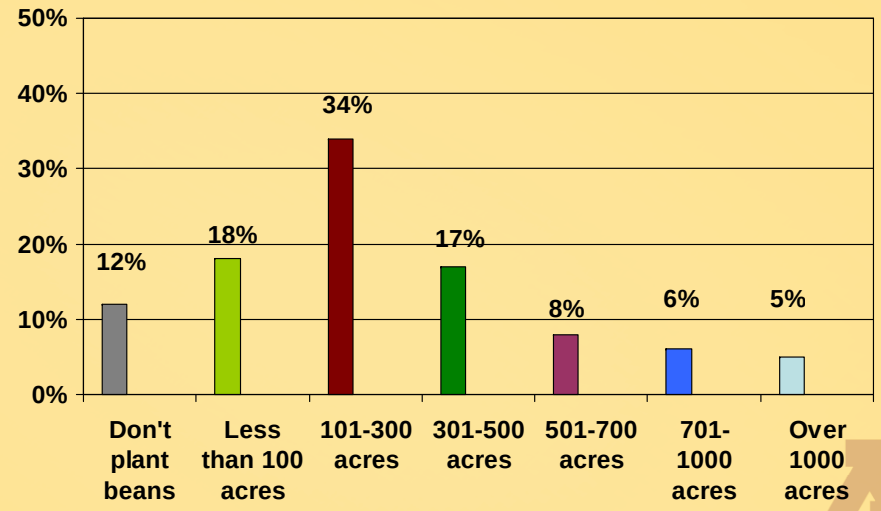


You generally plant FIELD CORN at a seeding rate of: *(1239 Responses.)*



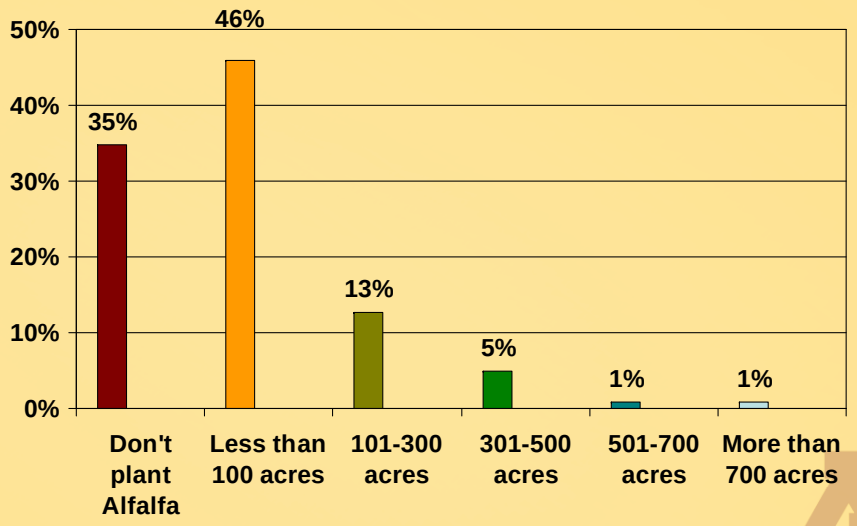
How many acres of Soybeans do you plant?

(1234 responses)



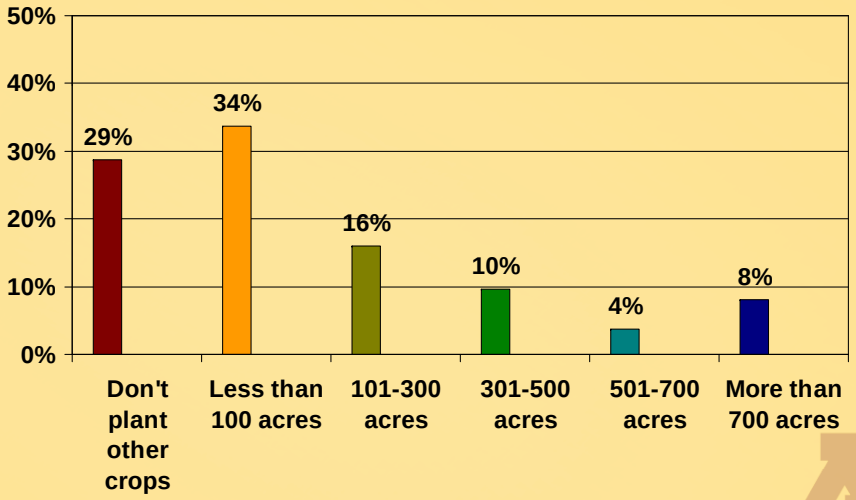
How many acres of Alfalfa do you plant?

(244 responses)



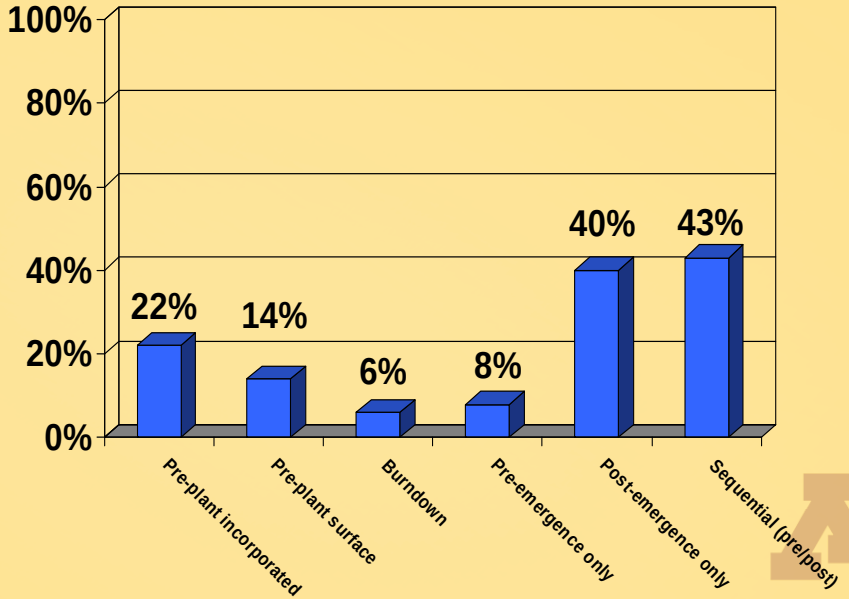
How many acres of other crops do you plant?

(237 responses)

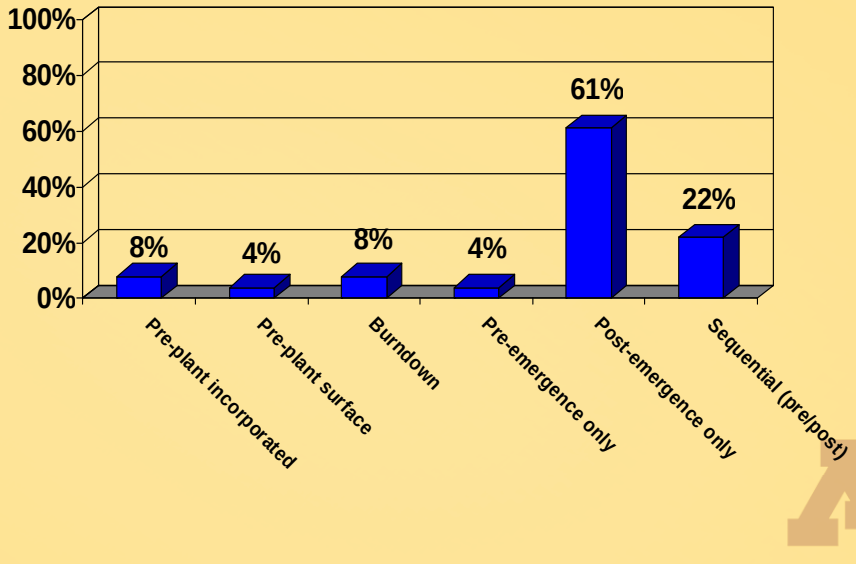


Which herbicide application timings do you usually use in CORN?

(1188 Responses.)

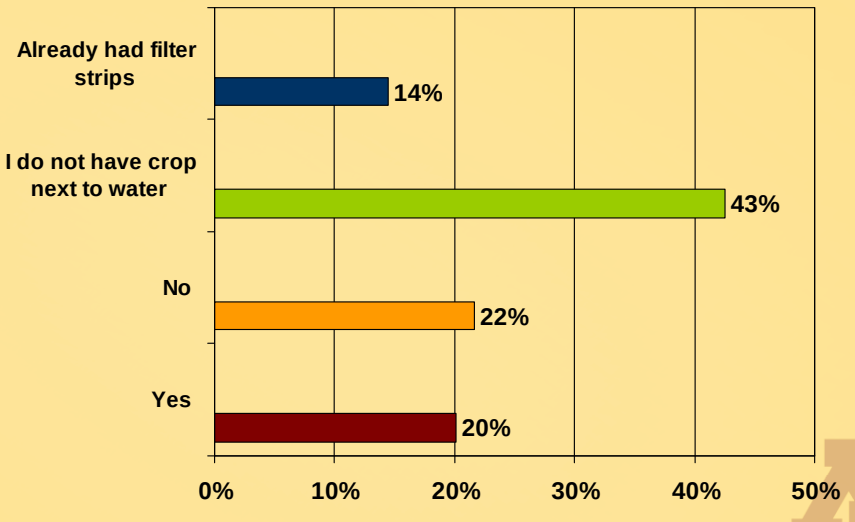


Which herbicide application timings do you usually use in SOYBEANS? *(1108 Responses)*



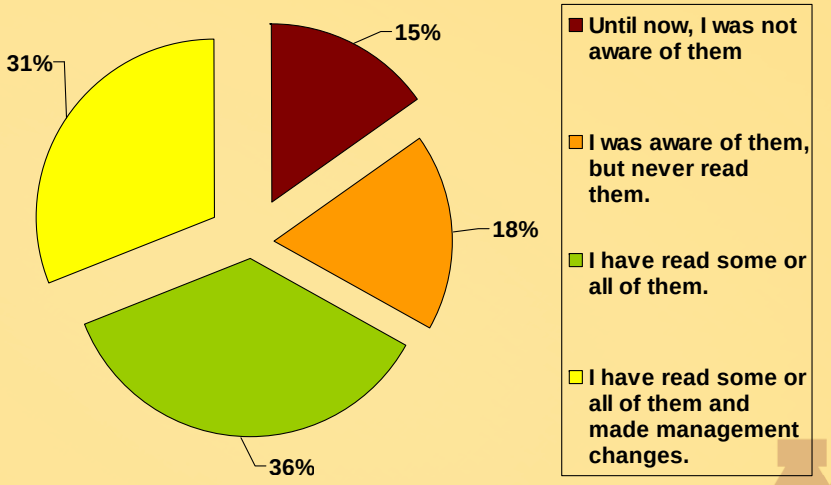
In the past three years, have you established a grass filter strip between cropland and water?

(249 responses)



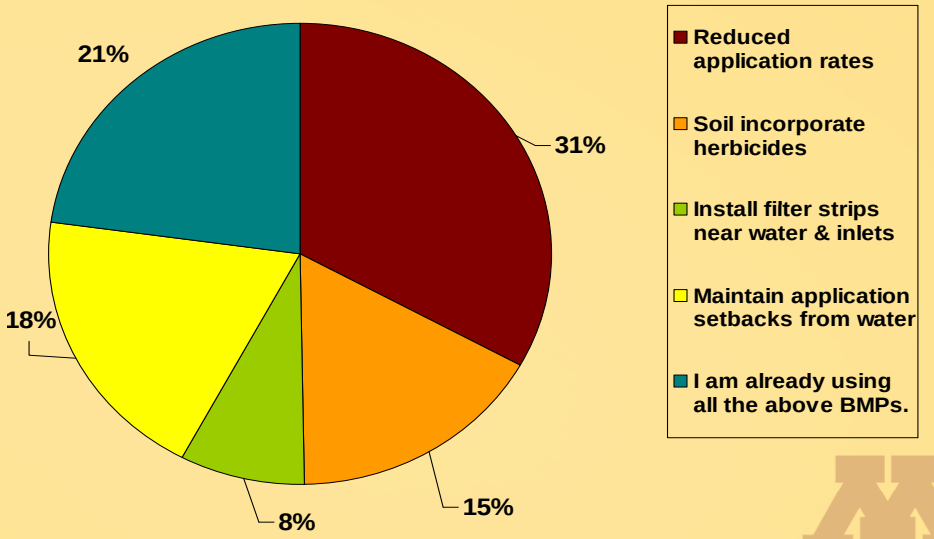
What is your experience with MDA Best Management Practices?

(235 responses)

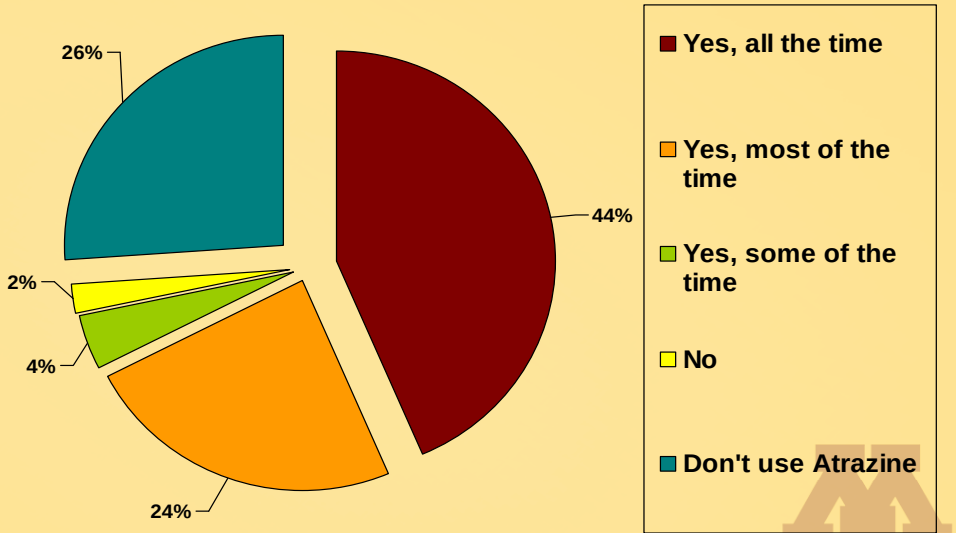


Which BMP that you are not using would you be most likely to try?

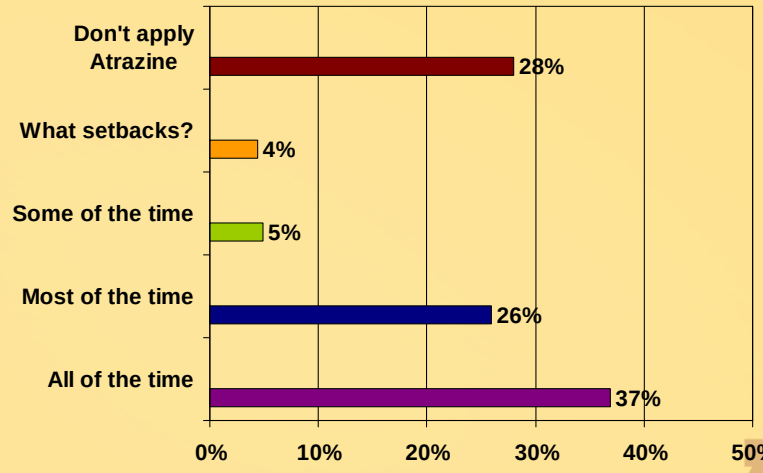
(39 responses)



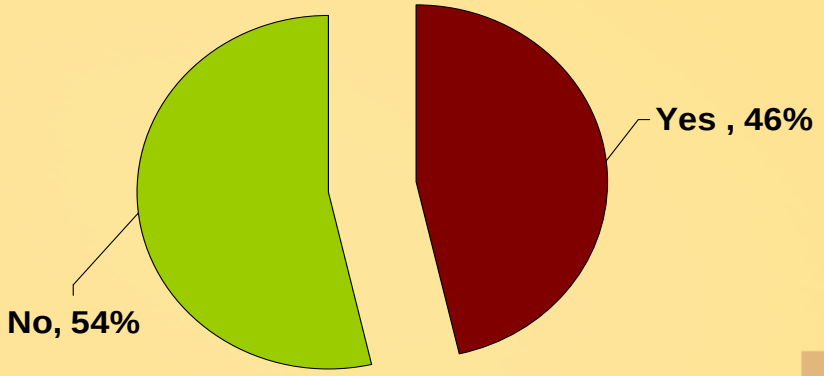
Do you follow the Atrazine Best Management Practices on your farm? (250 responses)



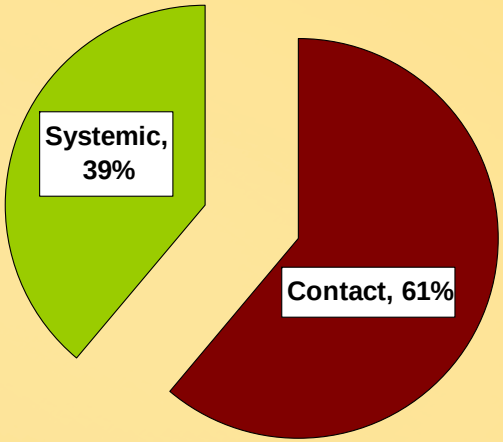
Do you follow the Atrazine setbacks? (247 responses)



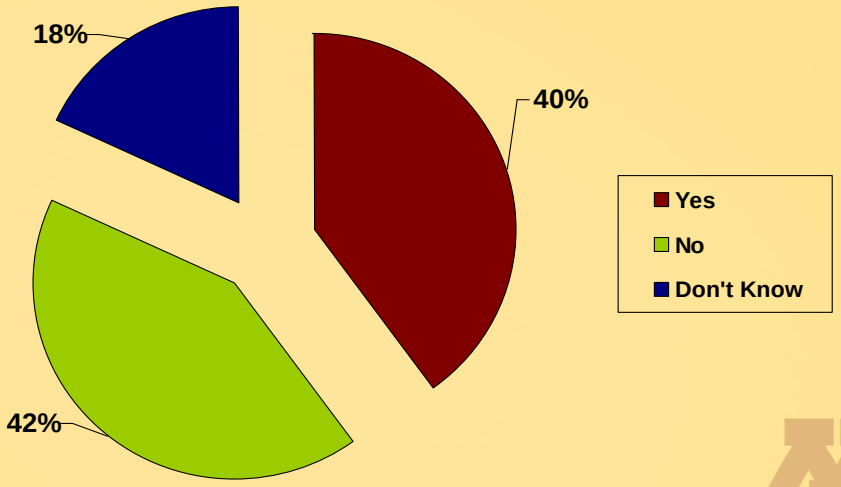
Does glyphosate (the active ingredient in Roundup) work as well today as it did when you first used it? (214 responses)



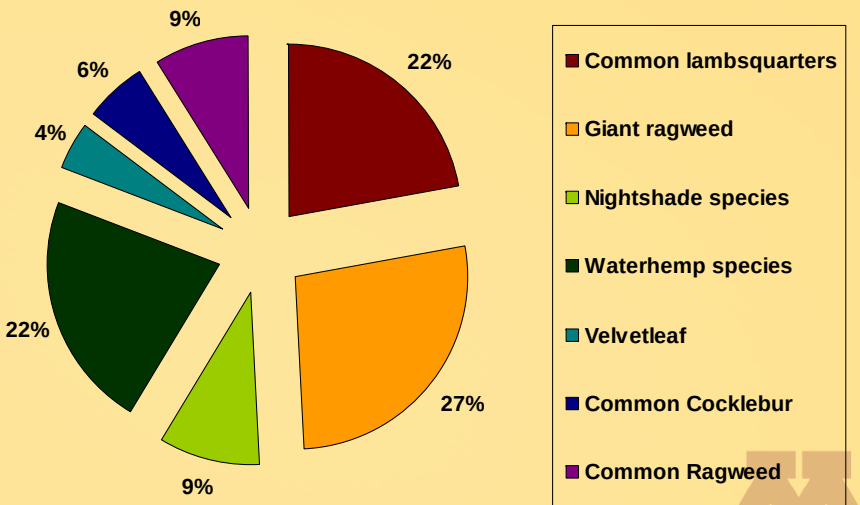
Is Glyphosate (the active ingredient in Roundup) a contact or systemic herbicide? (213 responses)



Do you think you have glyphosate resistant weeds on your farm? (221 responses)

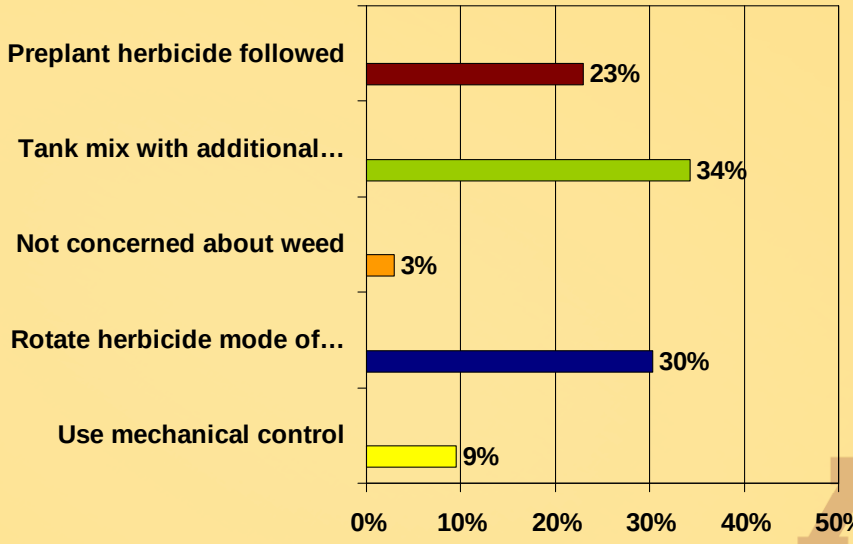


Which weed species do you suspect are resistant to glyphosate? (246 responses)



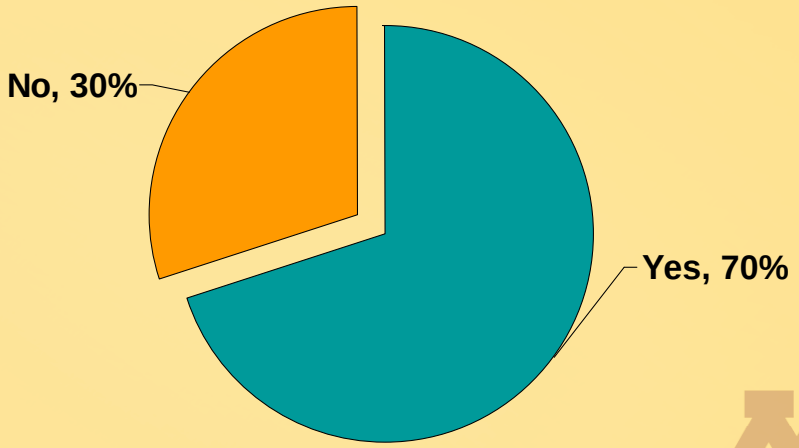
How do you manage weed resistance?

(274 responses)



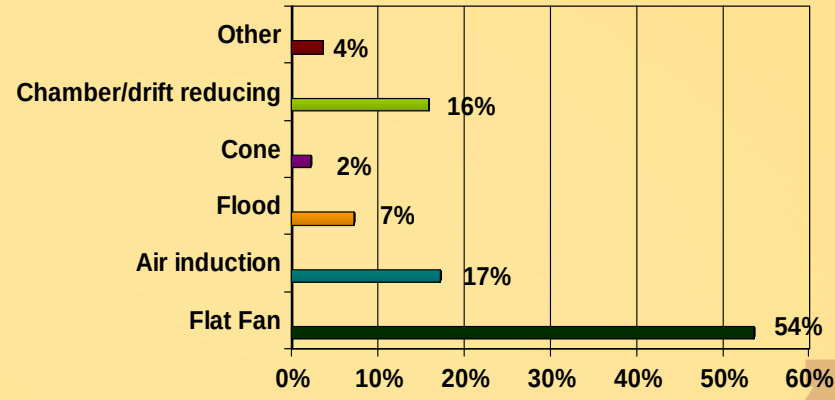
Does your sprayer have an enclosed cab?

(247 responses)

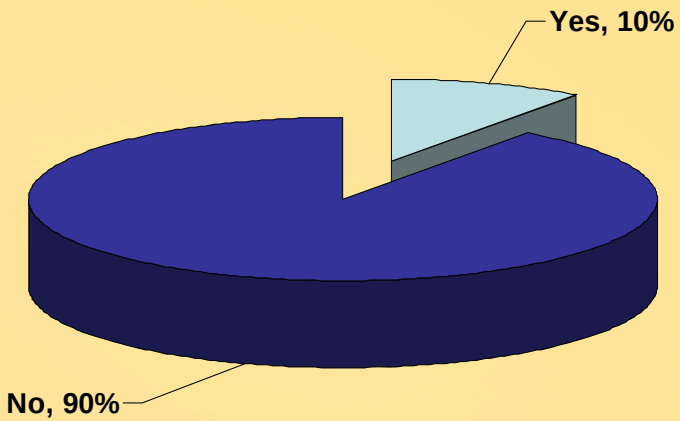


What type of nozzle do you usually use?

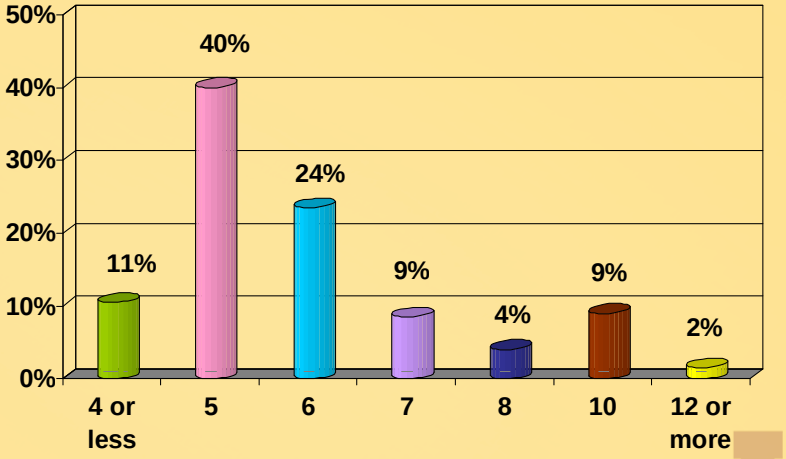
(220 responses)



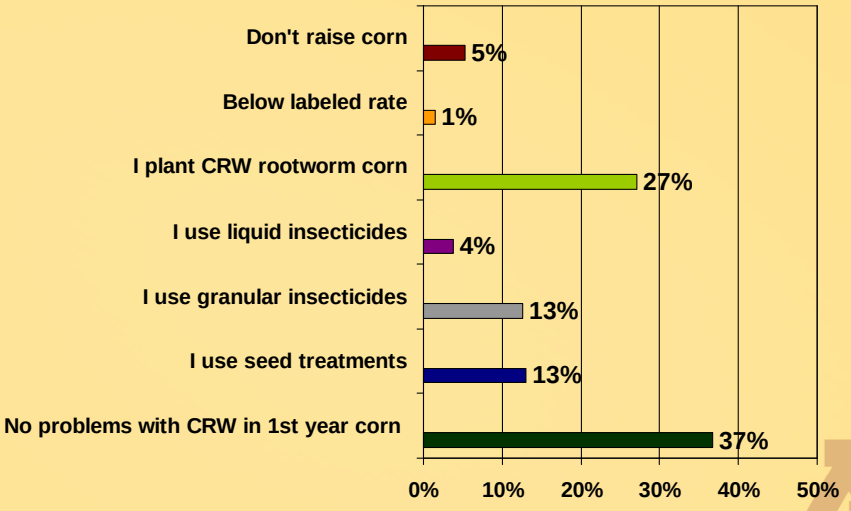
Do you have a hand held GPS unit on your farm? (109 responses)



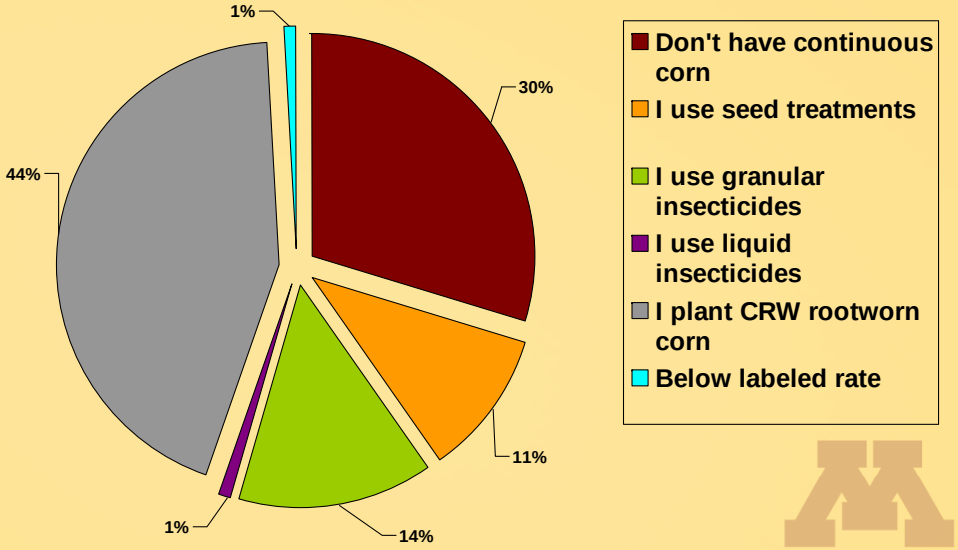
MPH for your spraying?
(200 responses)



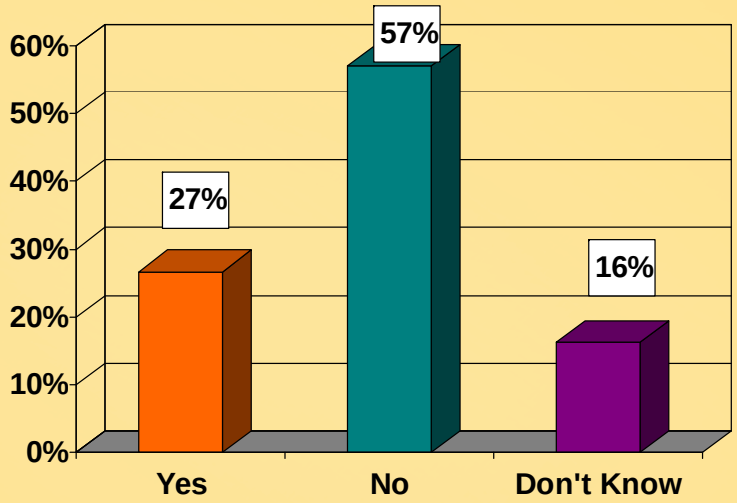
How do you manage corn rootworms in FIRST YEAR CORN? (207 responses)



How do you manage corn rootworms in continuous corn? (219 responses)



Have you experienced lodging or root damage in your CRW corn? (135 responses)

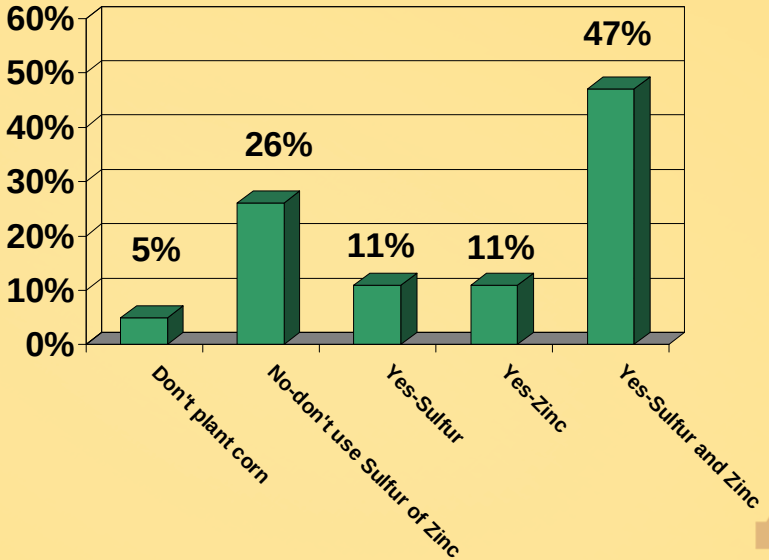


My most troublesome corn diseases are:

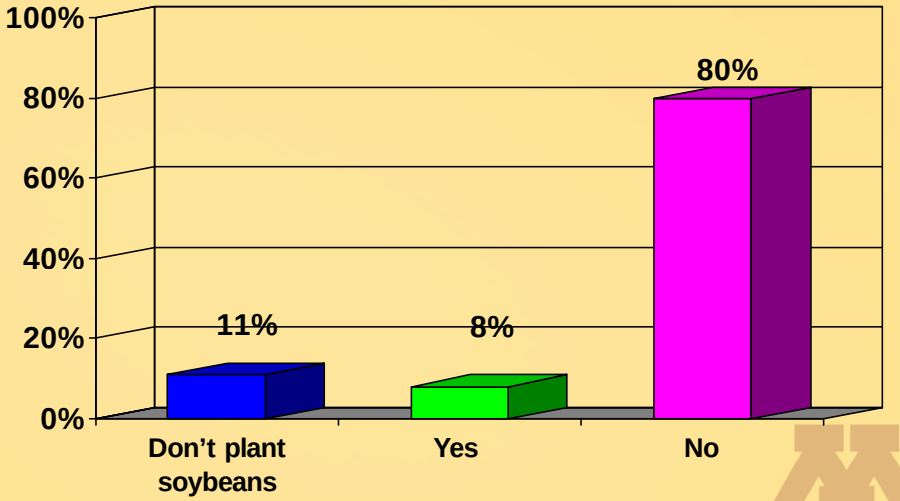
(1185 responses)

- 35% I don't have troublesome corn diseases
- 5% Other
- 2% Goss's wilt
- 2% Ear rots
- 1% Rust
- 7% Anthracnose
- 5% Northern corn leaf blight
- 3% Eyespots
- 32% Stalk rot
- 5% I don't plant corn

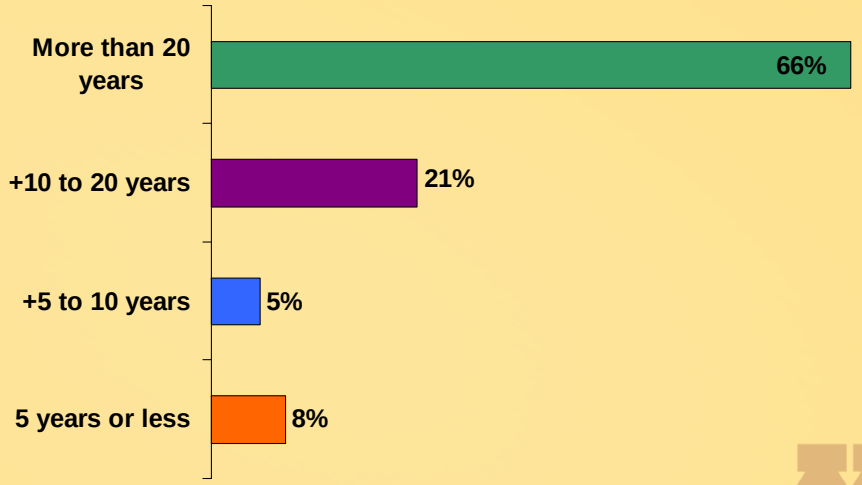
Do you apply sulfur or zinc for corn production? (1239 Responses)



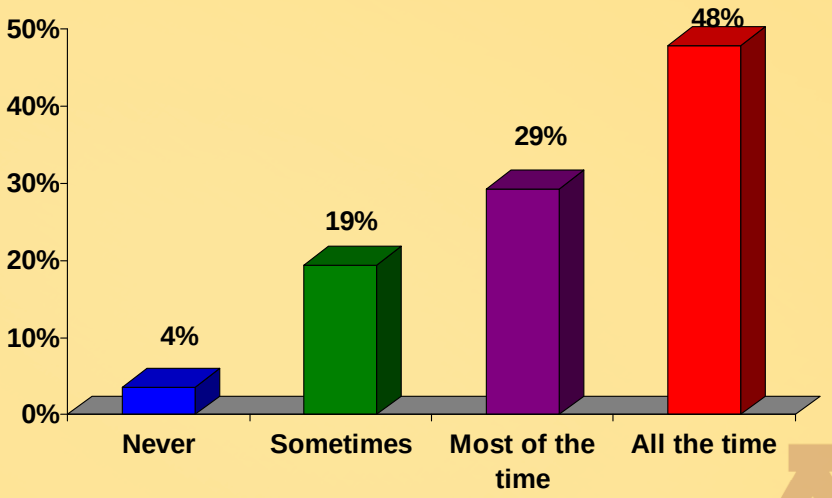
Do you use sulfur on soybeans? *(1224 responses)*



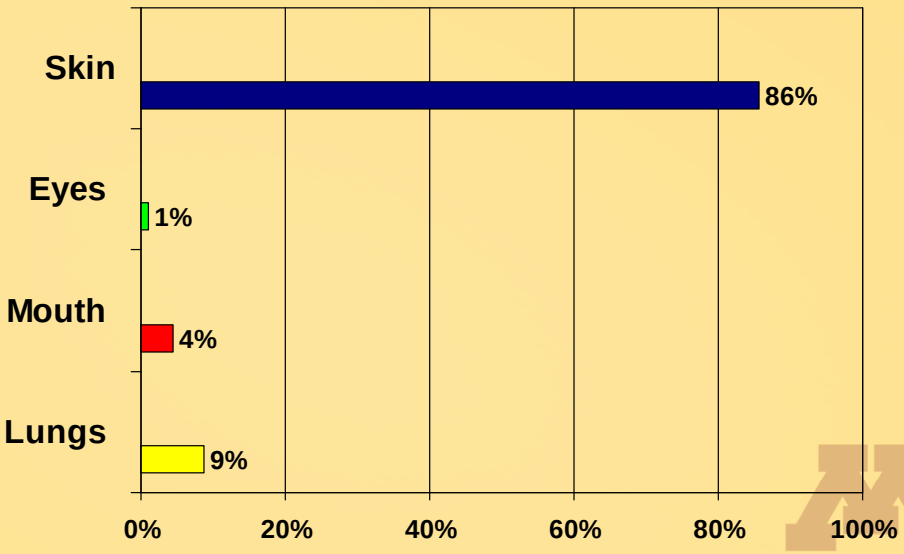
How many years have you been applying pesticides?
(259 responses)



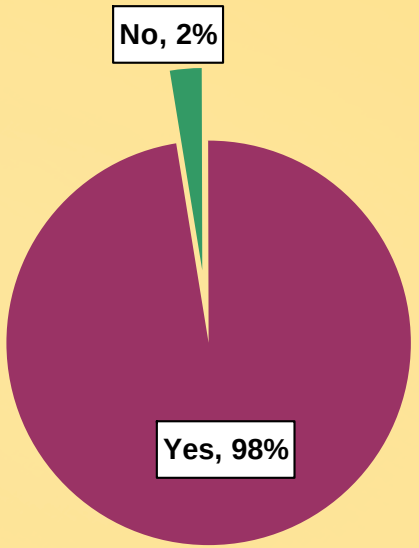
Do you use gloves when mixing pesticide?
(253 responses)



What is the most common route of exposure for pesticide applicators? (182 responses)

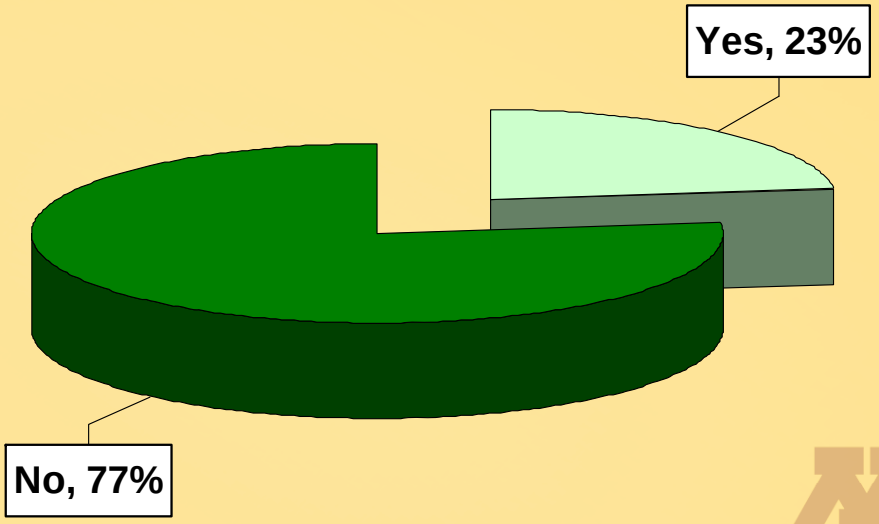


Have you had pesticide come in contact with your skin? (41 responses)



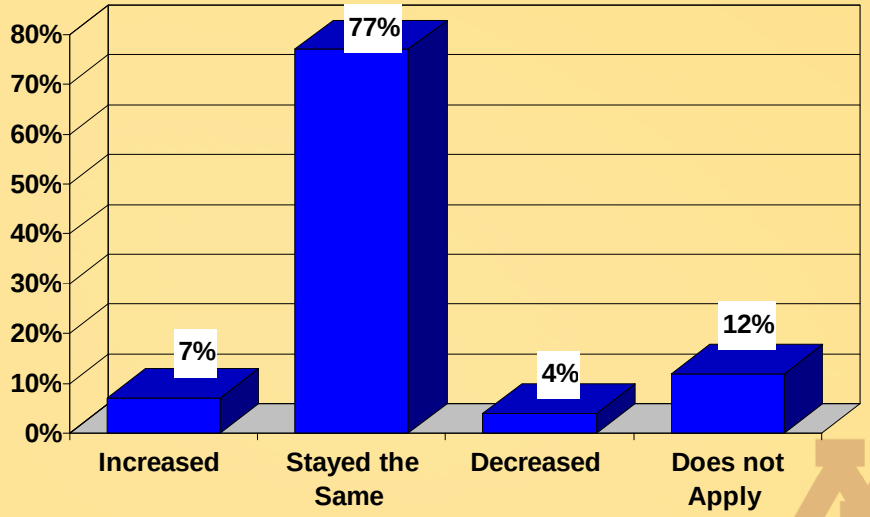
Do you own a mini-bulk container?

(239 responses)



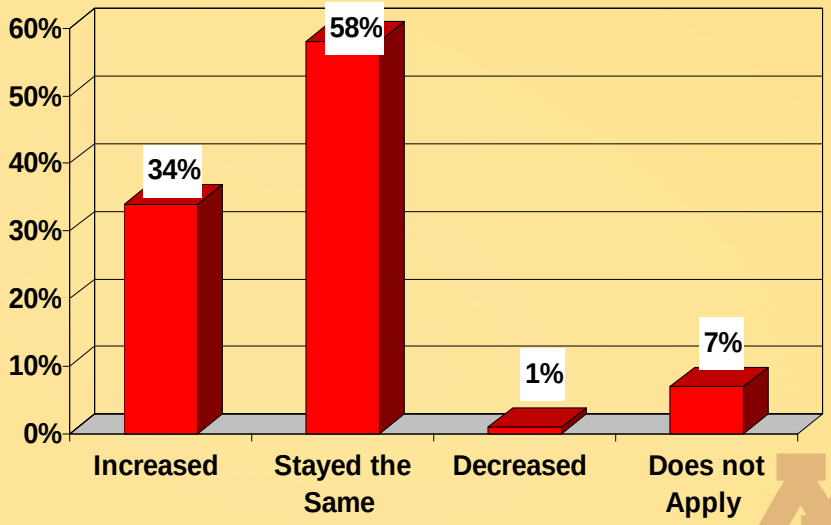
In the last three years, I have (increased, stayed the same, decreased, does not apply) the use of the following as a *result* of University of Minnesota Extension Crop Management programs and related information:

My Use of variety trial information (1183 responses)



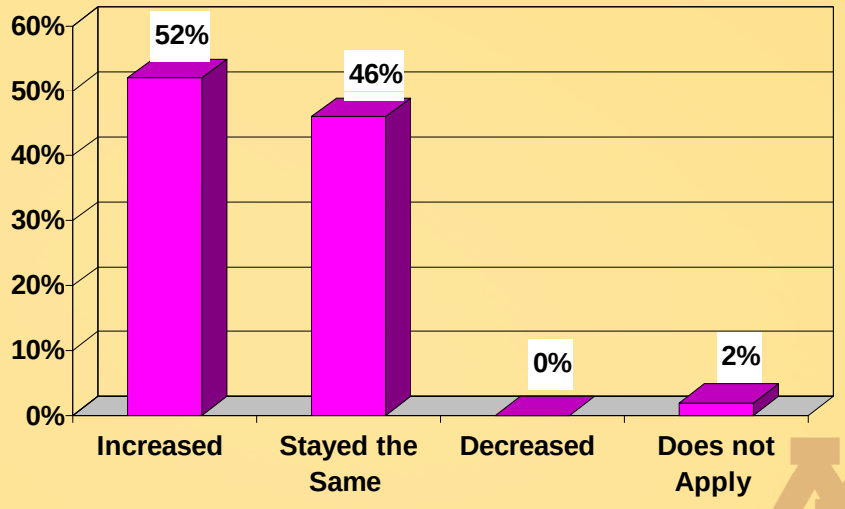
In the last three years, I have (increased, stayed the same, decreased, does not apply) the use of the following as a *result* of University of Minnesota Extension Crop Management programs and related information:

Detailing of field records (1138 responses)

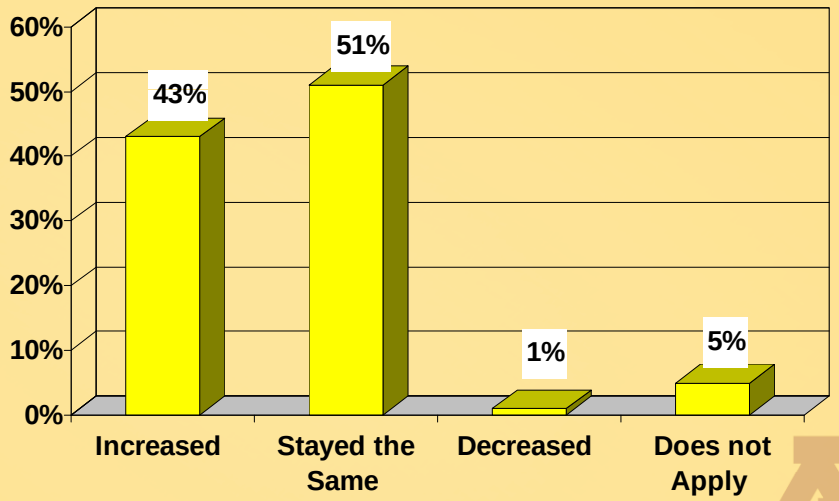


In the last three years, I have (increased, stayed the same, decreased, does not apply) the use of the following as a *result* of University of Minnesota Extension Crop Management programs and related information:

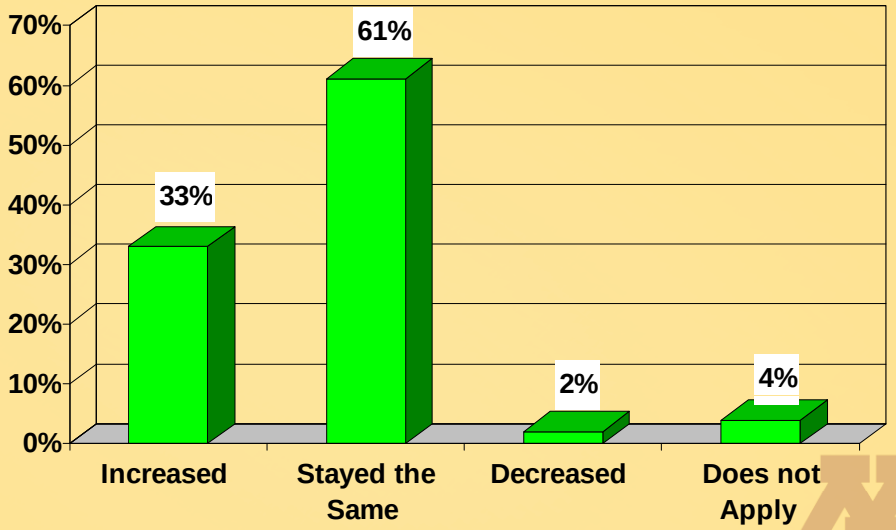
Use of safety precautions when working with pesticides (1186 responses)



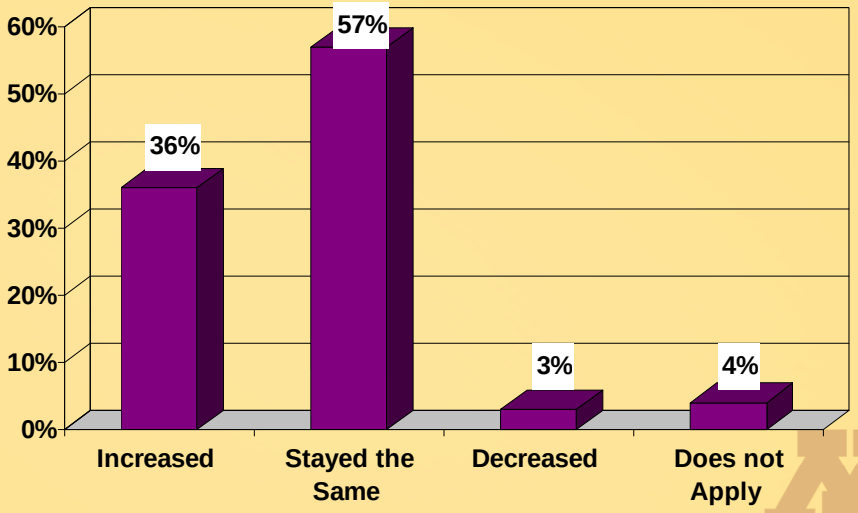
In the last three years, I have (increased, stayed the same, decreased, does not apply) the use of the following as a *result* of University of Minnesota Extension Crop Management programs and related information:
Use of crop monitoring and scouting (1175 responses)



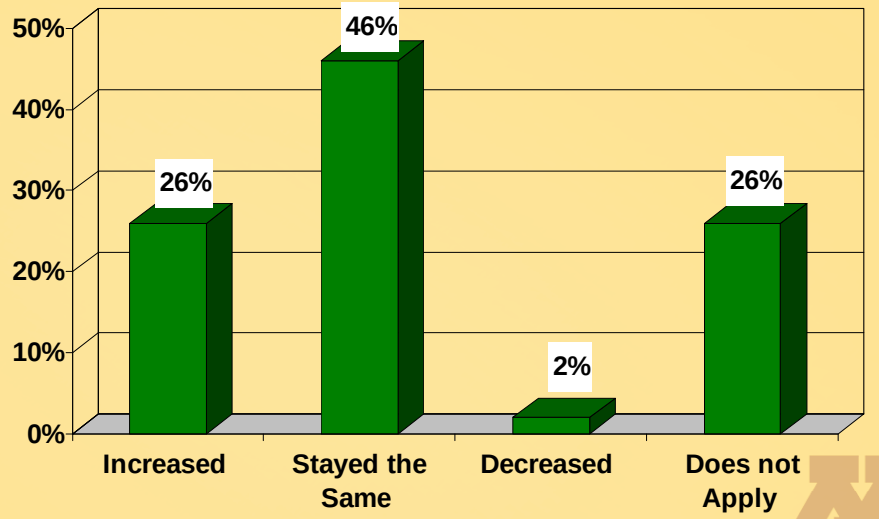
In the last three years, I have (increased, stayed the same, decreased, does not apply) the use of the following as a *result* of University of Minnesota Extension Crop Management programs and related information:
My confidence in the findings of my crop scouting (1174 responses)



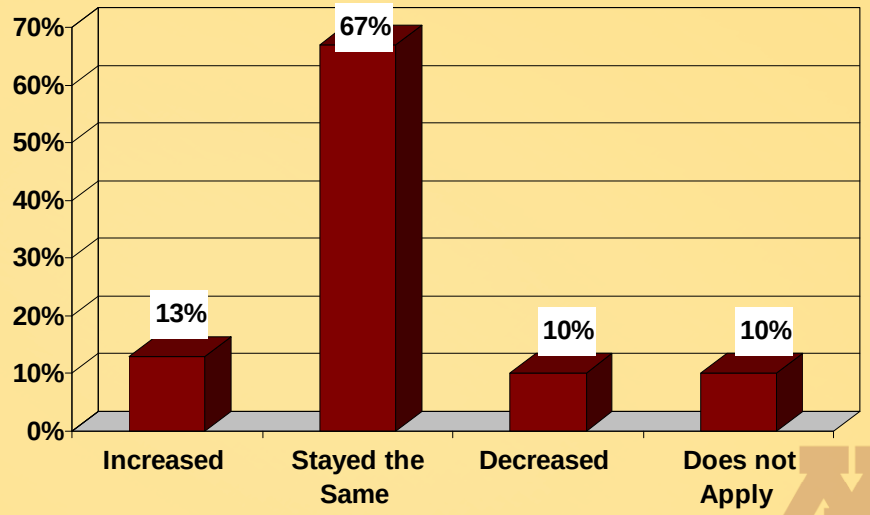
In the last three years, I have (increased, stayed the same, decreased, does not apply) the use of the following as a *result* of University of Minnesota Extension Crop Management programs and related information:
My confidence in using my crop scouting for management decisions
(1172 responses)



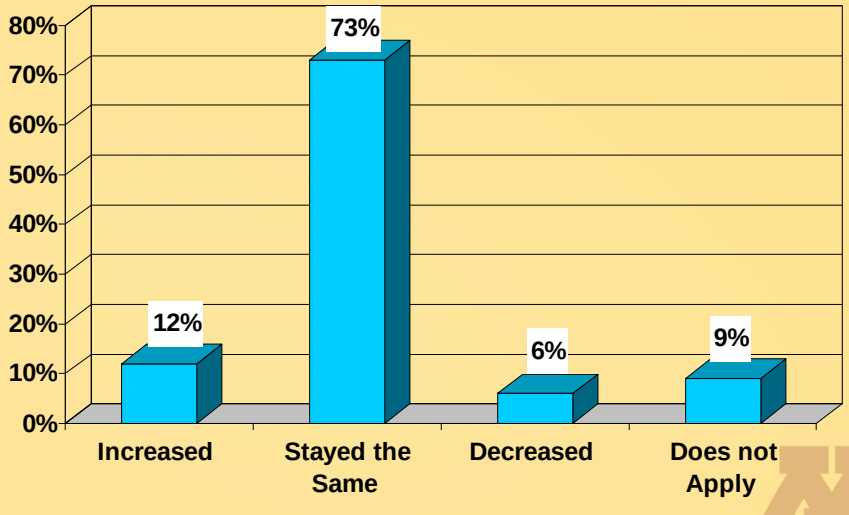
In the last three years, I have (increased, stayed the same, decreased, does not apply) the use of the following as a *result* of University of Minnesota Extension Crop Management programs and related information:
My use of the internet to find IPM related information (1175 responses)



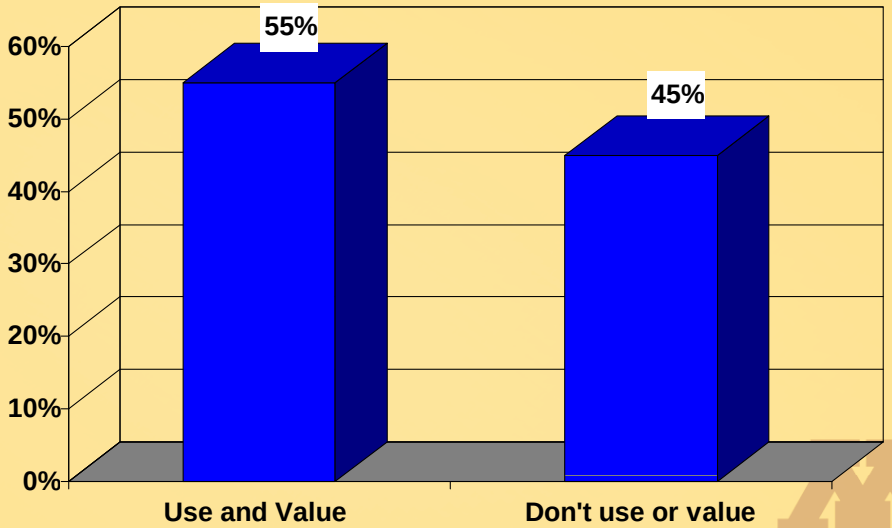
In the last three years, I have (increased, stayed the same, decreased, does not apply) the use of the following as a *result* of University of Minnesota Extension Crop Management programs and related information:
My attending of field day programs (1179 responses)



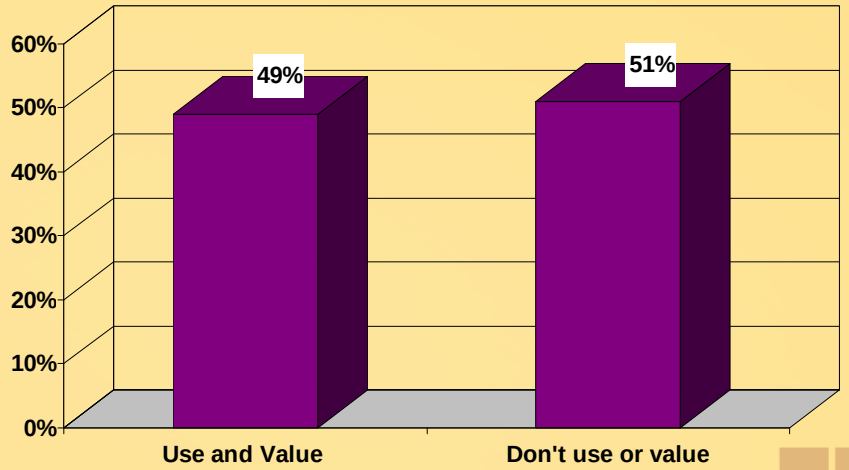
In the last three years, I have (increased, stayed the same, decreased, does not apply) the use of the following as a *result* of University of Minnesota Extension Crop Management programs and related information:
My attending of educational programs related to IPM (1179 responses)



Indicate if you use and value (or not) the following University of Minnesota resources to gain crop management and IPM related knowledge and practices:
Individual consultations (906 responses)

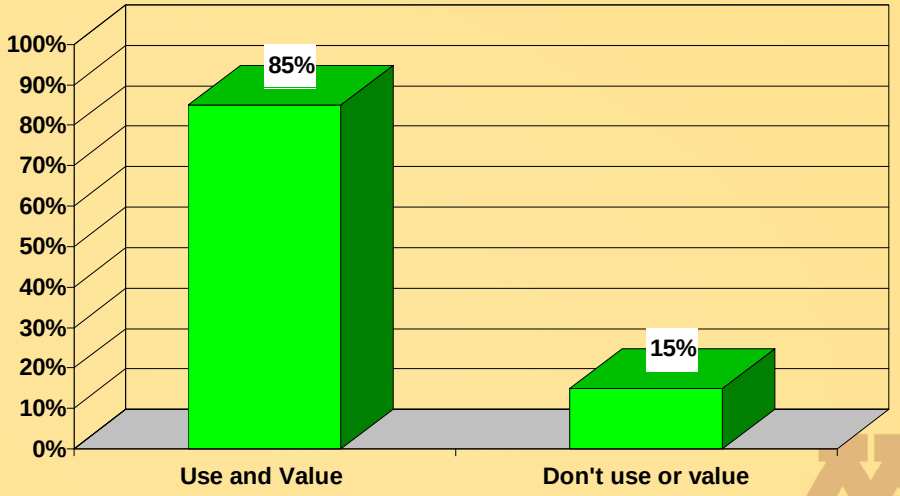


Indicate if you use and value (or not) the following University of Minnesota resources to gain crop management and IPM related knowledge and practices:
Web-based information (839 responses)



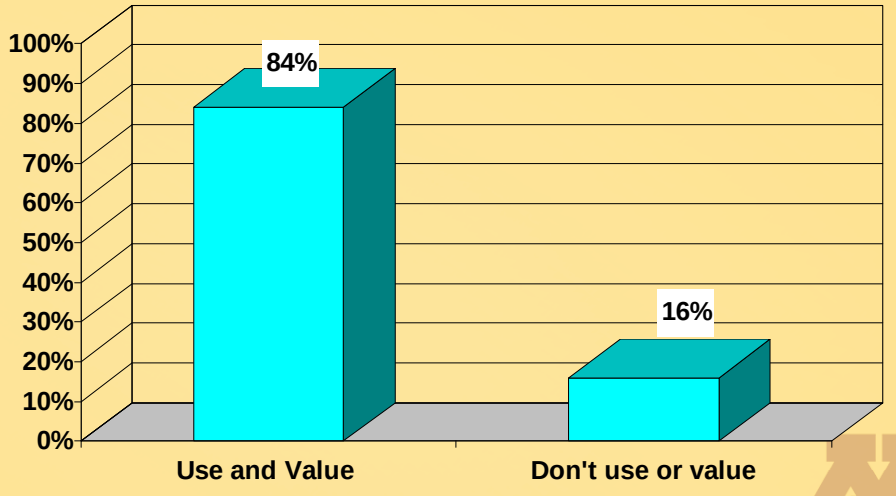
Indicate if you use and value (or not) the following University of Minnesota resources to gain crop management and IPM related knowledge and practices:

Newsletters (1012 responses)



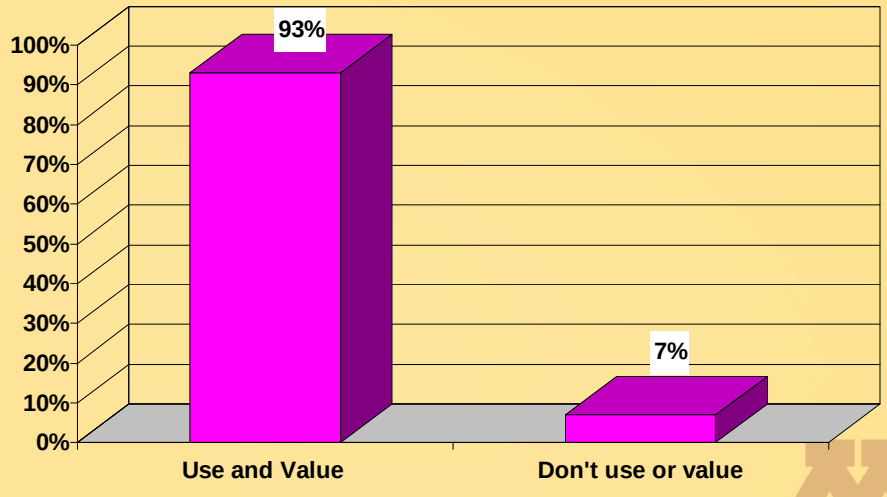
Indicate if you use and value (or not) the following University of Minnesota resources to gain crop management and IPM related knowledge and practices:

Magazine and Newspaper Articles (983 responses)



Indicate if you use and value (or not) the following University of Minnesota resources to gain crop management and IPM related knowledge and practices:

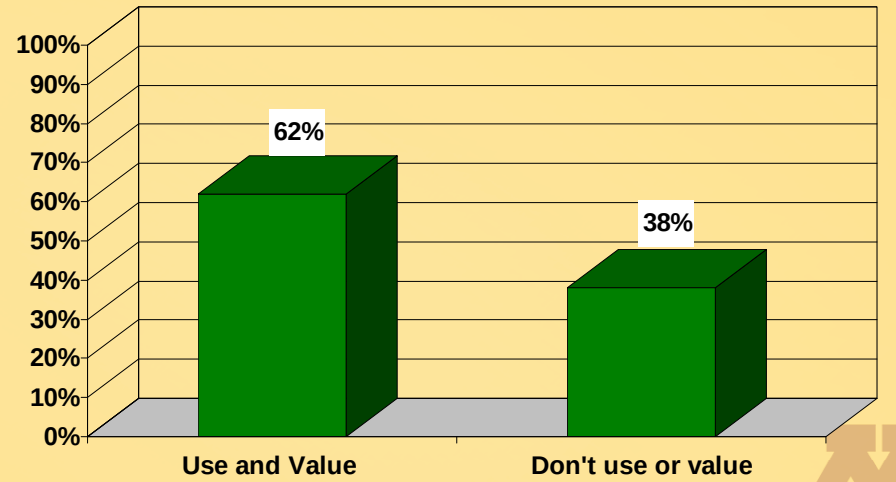
Pesticide applicator training sessions (1048 responses)



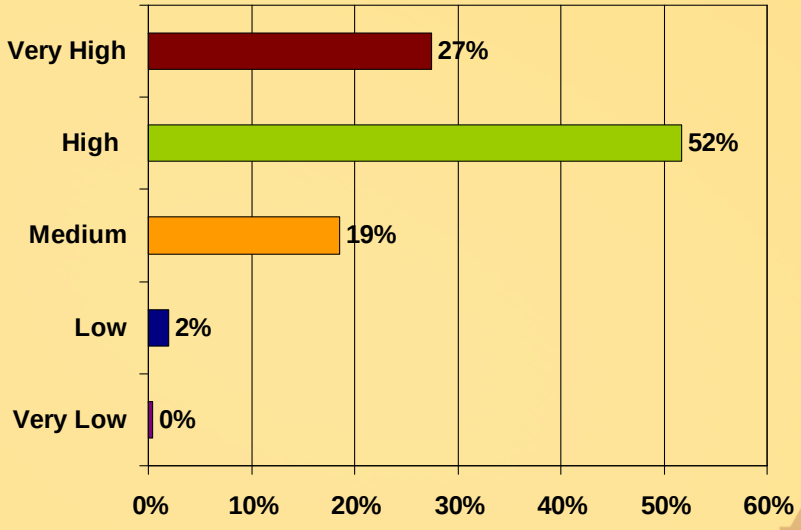
Indicate if you use and value (or not) the following University of Minnesota resources to gain crop management and IPM related knowledge and practices:

Educational programs other than pesticide applicator training

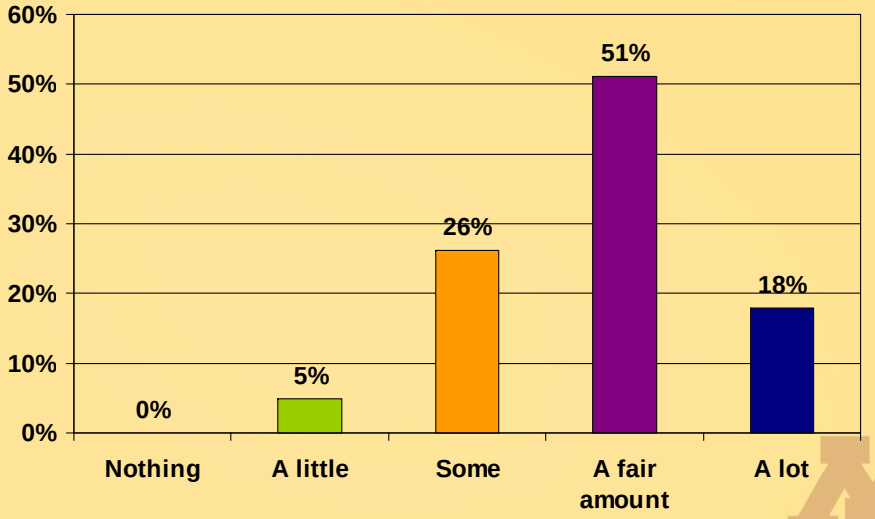
(862 responses)



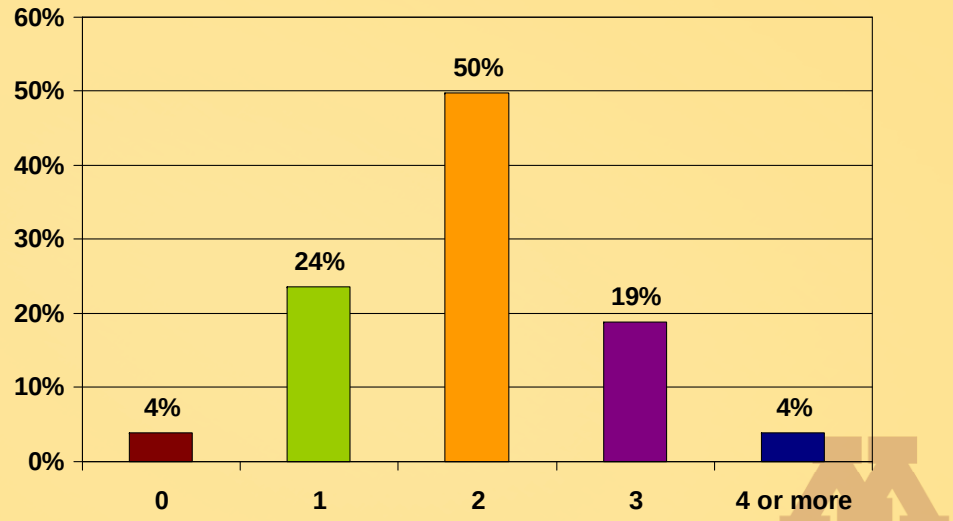
How would you rate this workshop's overall value to you? (259 responses)



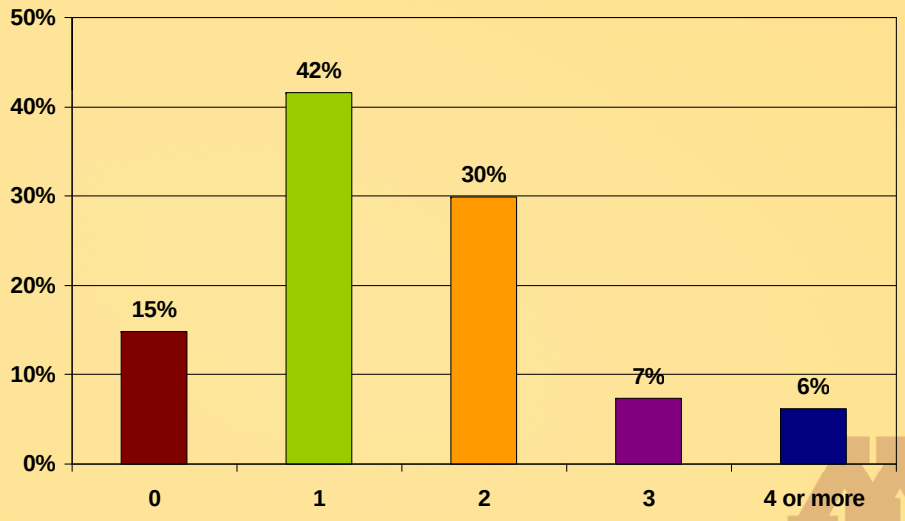
How much did you learn at this workshop?
(268 responses)



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

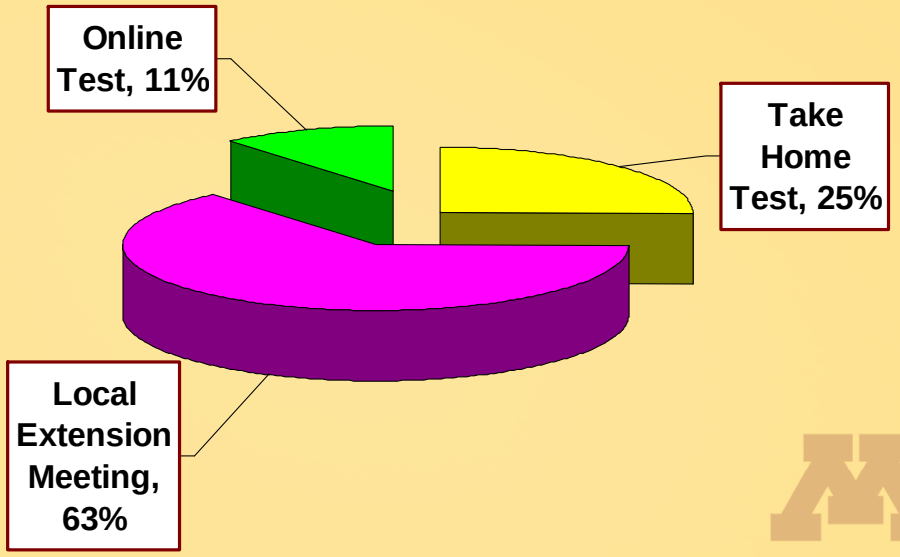


Since you last certified, how many practices did you change or adopt based on what you learned last time? (257 responses)



How did you last recertify in 2008?

(1237 responses - survey)



How did you last recertify in 2008?

(249 responses - workshop)