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# 2015 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.

*University of Minnesota is an equal opportunity educator and employer.*

**CROPS WEBSITE:**

<http://www.extension.umn.edu/agriculture/crops/>

## ***Extension and Research Team Members***

### **Extension Specialists**

Lisa Behnken	Extension Educator, Crops, Rochester
Fritz Breitenbach	Extension Integrated Pest Management Specialist, Southeast
Brad Carlson	Extension Educator, Crops, Mankato
Jeff Coulter	Extension Agronomist, Crops, St. Paul
Jeff Gunsolus	Extension Agronomist, Weed Scientist, St. Paul
Doug Holen	Extension Educator, Crops, Fergus Falls
Dan Kaiser	Extension Nutrient Management Specialist, St. Paul
Brad Kinkaid	Extension Weed Management Scientist, St. Paul
Ian MacRae	Research Entomologist, Crookston
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### **County Extension Educators**

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Dan Martens	Benton, Morrison and Stearns Counties
Mike Boersma	Pipestone County
Nathan Winter	McLeod County

### **SROC (Southern Research & Outreach Center – Waseca)**

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Wayne Gottschalk	Senior Research Plot Technician
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*Contact Fritz, Lisa, Ryan, or Mary Jane if interested in receiving the "Crops Connection" Newsletter sent via e-mail*

NEW CROPS WEBSITE:

[www.extension.umn.edu/agriculture/crops/](http://www.extension.umn.edu/agriculture/crops/)

## 2015 Southern Minnesota Regional Research and Demonstration Summary

We 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.

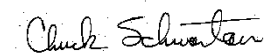
The many student interns involved in this important research are our workforce of the future! Their summer academic experience provides opportunities to accelerate their own professional careers and give them hands-on experiences working with Minnesota agriculture. We are actively promoting future projects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



Chuck Schwartau  
Regional Director – Southeast



Dr. LuAnn Hiniker  
Regional Director - Southeast

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## CORN

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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>

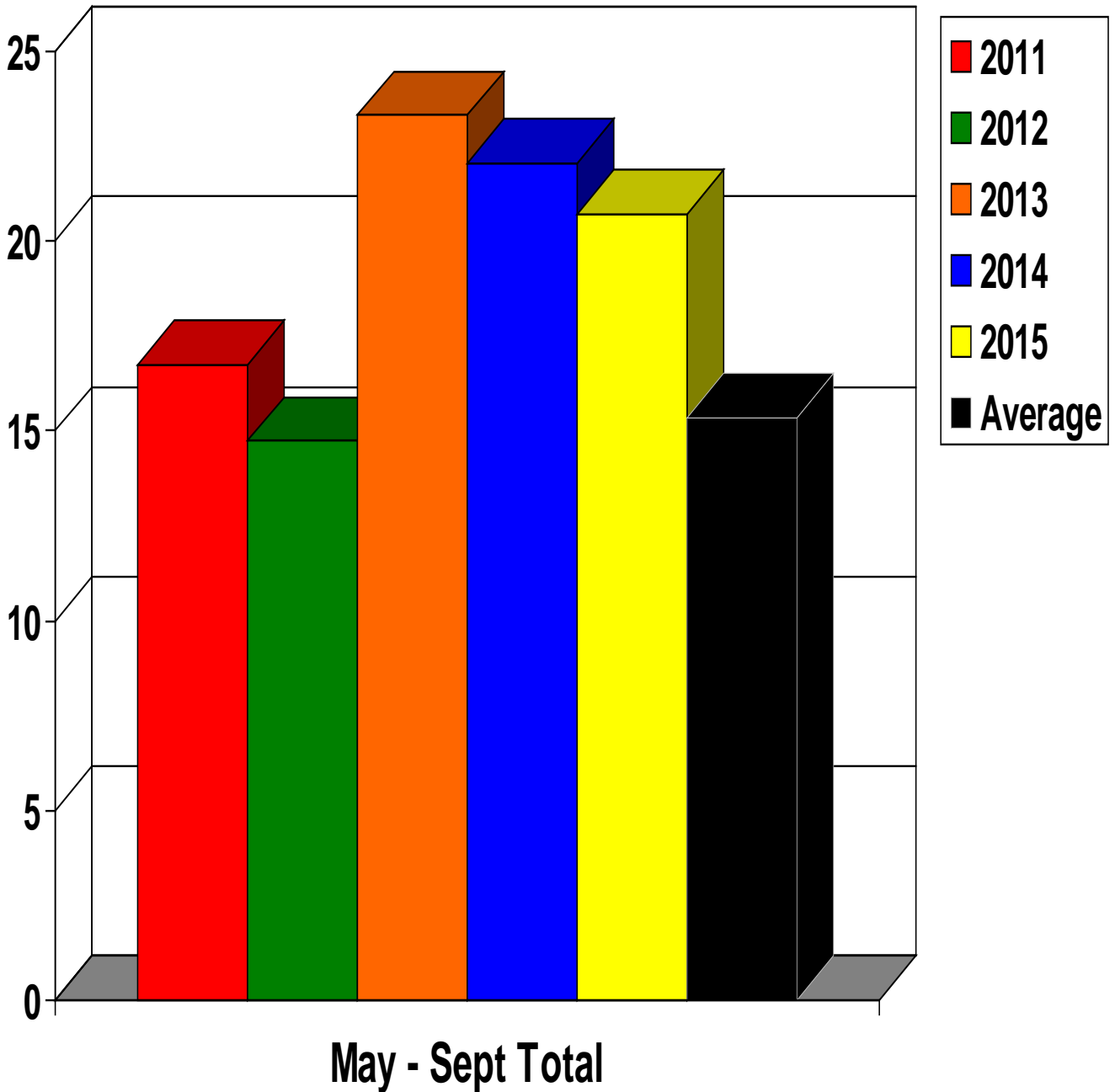
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# Monthly Rainfall

At Rochester, MN  
Season Totals (inches)  
2011 - 2015



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

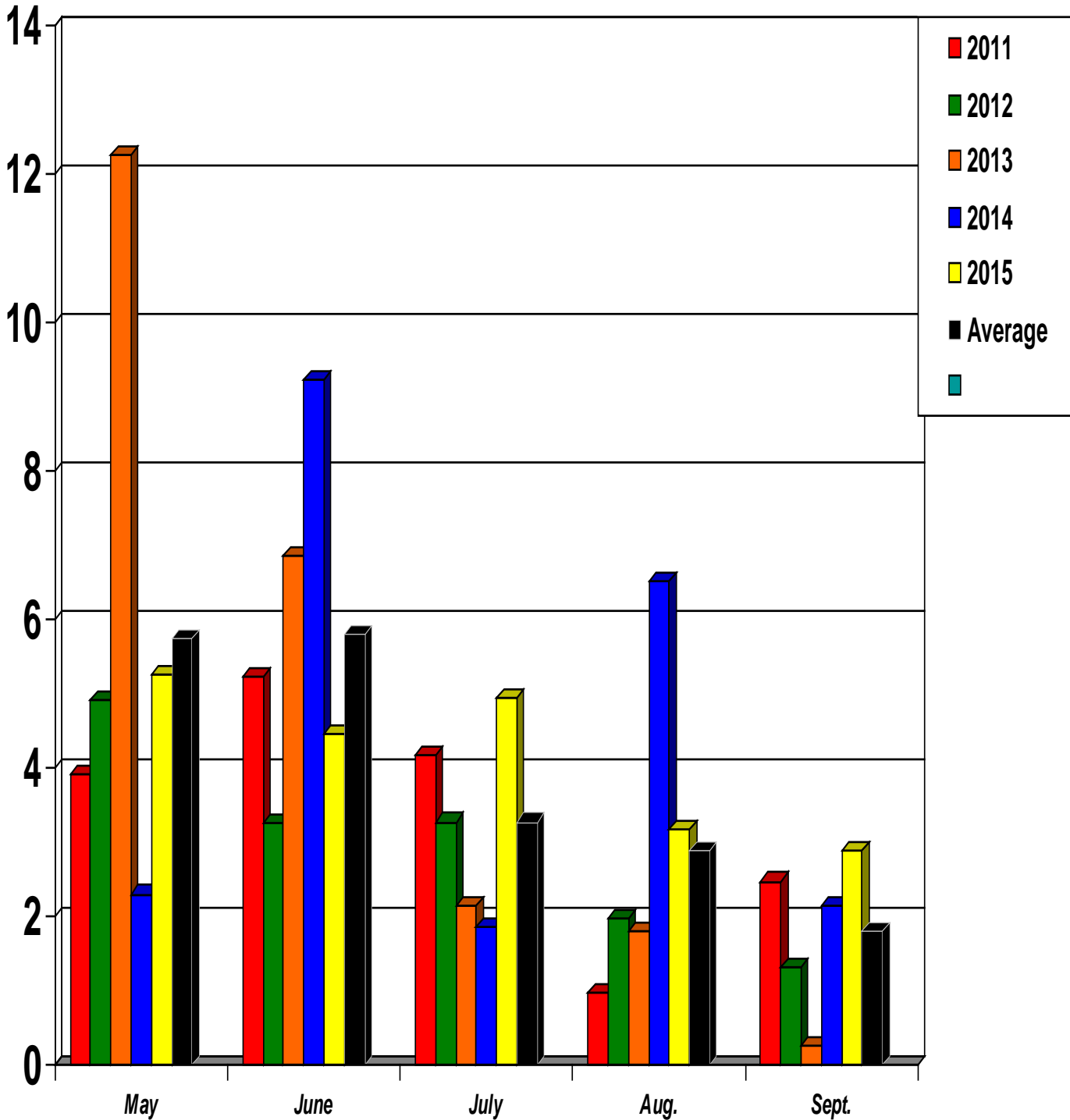
# Monthly Rainfall Totals

At Rochester, MN

(inches)

Comparison by Month

2011 - 2015

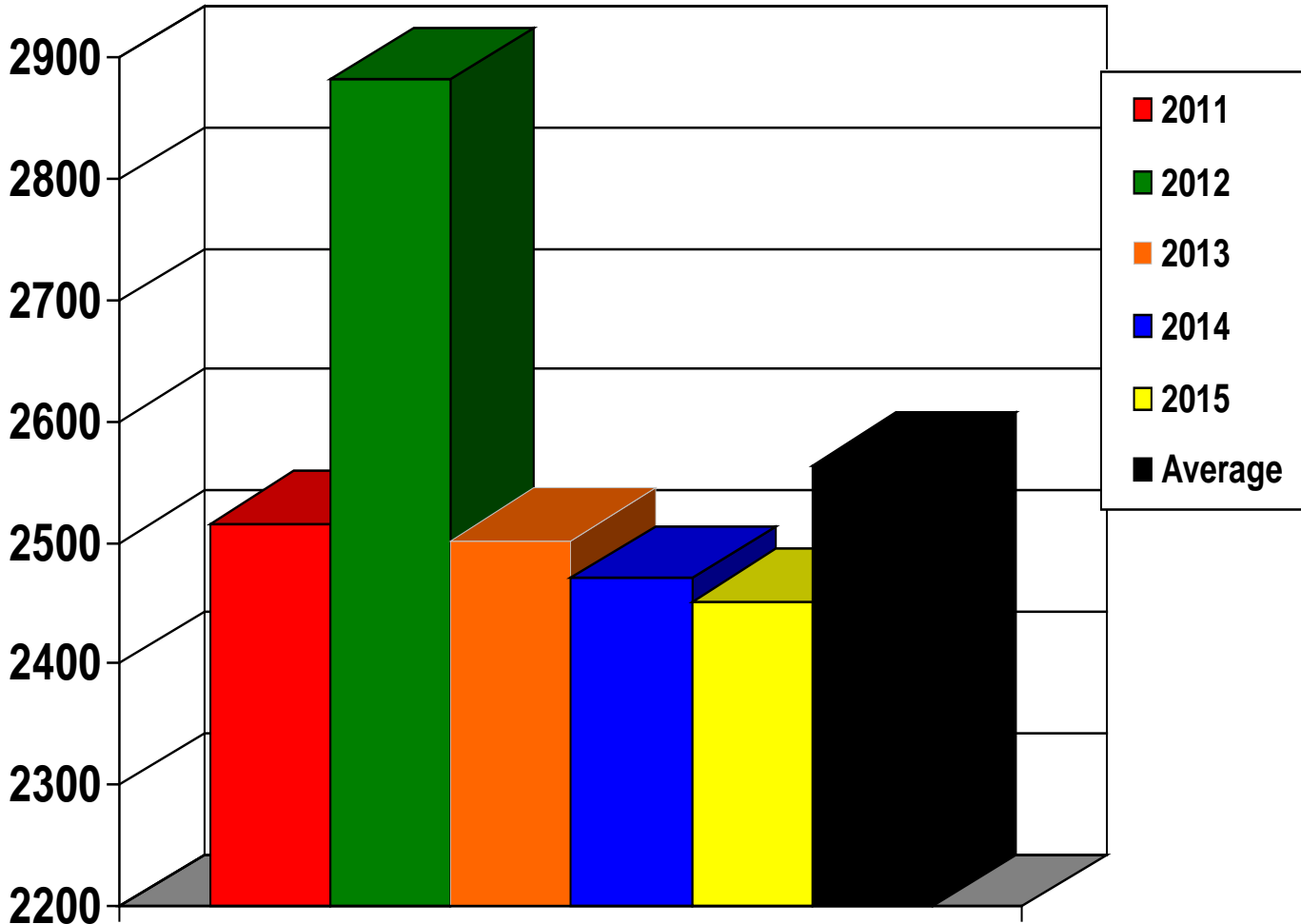


# Growing Degree Days

At Rochester, MN

Season Totals

2011 - 2015



## 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.

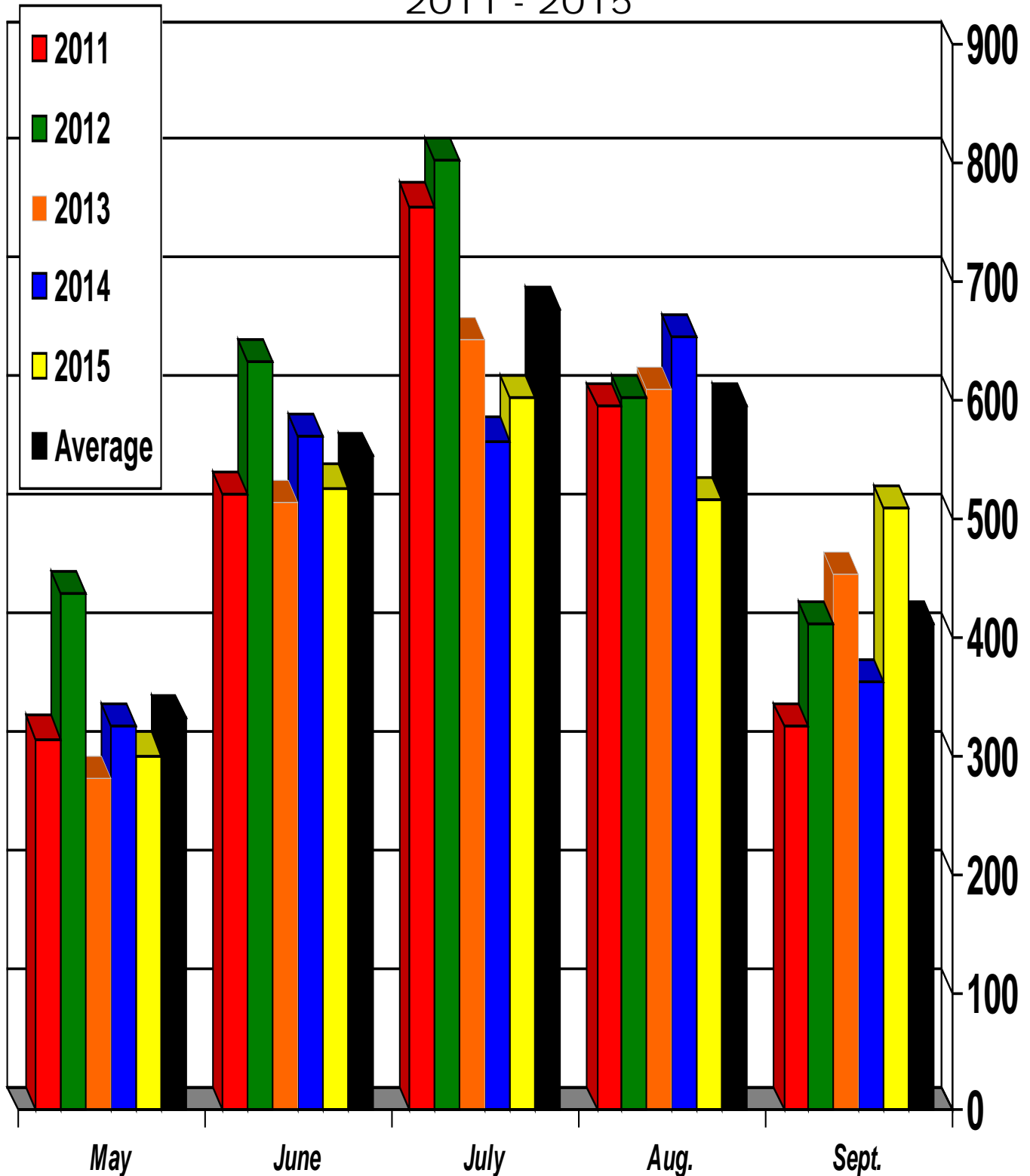
$$\text{GDD} = ((\text{Maximum temp} + \text{Minimum temp}) / 2) - 50$$





# Growing Degree Days

At Rochester, MN  
Comparison by Month  
2011 - 2015





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***SECTION***

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**A**

**CORN HYBRIDS**

# 2015 Minnesota Hybrid Corn Silage Performance Trials

Prepared by the corn silage hybrid testing consortium: C.C. Sheaffer, M.S. Wells, 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. Sites within regions were as follows:

### **Southeast Dairy Region**

LaCrescent (Houston County)  
Rochester (Olmsted County)

### **Central Dairy Region**

Hutchinson (McLeod County)  
Melrose (Stearns County)

## **TEST PROCEDURES**

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

Site	Planting Date	Harvest Date
LaCrescent	May 16	September 29
Rochester	May 16	September 30
Hutchinson	May 30	September 23
Melrose	May 30	September 22

Planting at all locations was delayed by the cool and wet spring weather.

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

**Harvesting:** Plots were harvested and whole-plant herbage sampled for determination of dry matter content and forage quality at each site. Moisture content, whole-plant dry matter (DM) yield, and silage yield at harvest moisture are listed. Test sites are normally harvested when the average whole-plant moisture across entries is estimated to be 65.

## **RESULTS PROVIDED**

Tables 1-4 summarize hybrid yield and forage quality results from LaCrescent, Rochester, Hutchinson, and Melrose, respectively. Moisture content, whole-plant dry matter (DM) yield and silage yield at harvest moisture 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 was 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). A difference less than the LSD value probably is due to environmental factors.

### **PARTICIPATING COMPANIES**

AgriGold Hybrids	<a href="http://www.agrigold.com">www.agrigold.com</a>
Albert Lea Seed House (Viking)	<a href="http://www.alseed.com">www.alseed.com</a>
Channel	<a href="http://www.channel.com">www.channel.com</a>
Dahlman Seed	<a href="http://www.dahlmanseed.com">www.dahlmanseed.com</a>
Dairyland Seed Co, Inc.	<a href="http://www.dairylandseed.com">www.dairylandseed.com</a>
Dekalb	<a href="http://www.dekalb.com">www.dekalb.com</a>
Golden Harvest	<a href="http://www.syngenta-us.com/golden-harvest.com">www.syngenta-us.com/golden-harvest.com</a>
Legacy Seeds, Inc.	<a href="http://www.legacyseeds.com">www.legacyseeds.com</a>
Masters Choice	<a href="http://www.seedcorn.com">www.seedcorn.com</a>
Nu Tech Seed LLC	<a href="http://www.yieldleader.com">www.yieldleader.com</a>
Producers Hybrids	<a href="http://www.producershybrids.com">www.producershybrids.com</a>
REA Hybrids	<a href="http://www.rea-hybrids.com">www.rea-hybrids.com</a>
Renk Seeds	<a href="http://www.renk.com">www.renk.com</a>
TracySeeds	<a href="http://www.traceyseeds.com">www.traceyseeds.com</a>
Wensman Seed Company	<a href="http://www.wensmanseed.com">www.wensmanseed.com</a>

## Companies Participating in 2015 Hybrid Corn Silage Performance Trials

AgriGold Hybrids	<a href="http://www.agrigold.com">www.agrigold.com</a>
Channel	<a href="http://www.channel.com">www.channel.com</a>
Dahlman	<a href="http://www.dahlmanseed.com/">http://www.dahlmanseed.com/</a>
Dairyland Seed	<a href="http://www.dairylandseed.com">www.dairylandseed.com</a>
Dekalb	<a href="http://www.dekalb.com">www.dekalb.com</a>
Golden Harvest	<a href="http://www.syngenta-us.com/corn/golden-harvest">www.syngenta-us.com/corn/golden-harvest</a>
Legacy Seeds, Inc.	<a href="http://www.legacyseeds.com">www.legacyseeds.com</a>
Masters Choice	<a href="http://www.seedcorn.com">www.seedcorn.com</a>
NuTech Seed LLC	<a href="http://www.nutechseed.com">www.nutechseed.com</a>
Producers Hybrids	<a href="http://www.producershybrids.com">www.producershybrids.com</a>
Rea Hybrids	<a href="http://www.rea-hybrids.com">www.rea-hybrids.com</a>
Renk	<a href="http://www.renkseed.com">www.renkseed.com</a>
Tracy Seeds	<a href="http://www.tracyseeds.com">www.tracyseeds.com</a>
Viking Seed	<a href="http://www.alseed.com">www.alseed.com</a>
Wensman Seed Company	<a href="http://www.wensmanseed.com">www.wensmanseed.com</a>

**Table 1.** Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield, and quality traits for corn hybrids planted at LaCrescent, MN (Houston County) in 2015.

Entry	Company	Entry	Traits <sup>1</sup>	RM	Yield <sup>2</sup>			Quality (concentration) <sup>3</sup>				Milk Yield <sup>4</sup>		
					Moist	DM	silage	CP	NDF	NDFC	Starch	Ton	Acre	
					%	- ton/ acre -			%				lb/ ton	lb/ acre
8	AgriGold	A6462STXRIB	GLY,Bt,LL,CRW	110	63	13.3	35.8	6.2	39	40	47	2,900	39,000	
40	Producers Hybrids	7088STXRIB	STX-GLY,LL,BT,CRW	110	61	13.5	34.6	6.7	42	39	42	2,600	35,500	
35	Nutech/G2 Genetics	5Z-308	Gly,Bt,LL,CRW	108	62	13.2	34.5	6.3	42	38	44	2,700	35,200	
13	Channel	209-53STXRIB Bran	GLY,Bt,LL,CRW	109	61	13.1	32.8	6.2	40	40	45	2,700	34,900	
15	Dairyland Seed	HIDF-3605-9	GLY,Bt,LL,CRW,BMR	105	57	14.3	33.2	6.3	43	41	41	2,400	34,800	
34	Nutech/G2 Genetics	5Z-906	Gly,Bt,LL,CRW	106	59	13.3	32.8	6.5	40	39	45	2,600	34,500	
32	Nutech/G2 Genetics	5H-806	Gly,Bt,LL	106	60	13.6	34.2	6.5	43	40	41	2,500	34,400	
43	RENK	RK858VT3P	GLY,Bt,CRW	112	59	13.2	32.1	6.0	41	40	45	2,500	34,100	
37	Nutech/G2 Genetics	5F-510	Gly,Bt,LL	110	62	12.5	34.0	6.4	41	39	44	2,700	34,100	
18	Dairyland Seed	HIDF-3510SSX	GLY,Bt,LL,CRW,BMR	110	62	13	34.0	5.6	43	39	43	2,600	34,000	
6	AgriGold	A6442STXRIB	GLY,Bt,LL,CRW	109	58	13.5	32.1	6.5	42	40	43	2,500	33,900	
45	Golden Harvest	G12J11-3111A	Gly, Bt, Viptera	112	60	13.5	33.8	5.6	44	39	42	2,500	33,600	
25	Masters Choice	MCT 6153	GT	111	59	13.3	32.5	5.8	42	40	44	2,500	33,400	
39	Nutech/G2 Genetics	5F-713	Gly,Bt,LL	113	63	12	32.4	5.3	44	40	41	2,700	32,100	
33	NuTech	5N-406	Gly,Bt,LL,CRW	106	56	13.2	30.2	5.7	41	41	44	2,400	32,000	
17	Dairyland Seed	HIDF-3808SSX	GLY,Bt,LL,CRW,BMR	108	59	12.7	31.2	5.7	44	39	42	2,500	31,500	
12	Channel	209-46STXRIB Bran	GLY,Bt,LL,CRW	109	61	12.4	31.8	5.8	44	39	41	2,500	31,400	
38	Nutech/G2 Genetics	5F-811	Gly,Bt,LL	111	61	12.3	30.9	5.5	45	40	41	2,500	31,400	
27	DeKalb	DKC58-06RIB	RR2,BT, CRW, LL	108	58	12.1	28.7	5.8	42	40	43	2,500	30,100	
42	RENK	RK776SSTX	GLY,Bt,LL,CRW	107	60	12.3	31.0	5.9	48	40	38	2,400	29,500	
24	Masters Choice	MC 535	Conventional	107	58	11.6	27.0	5.6	41	42	46	2,500	29,300	
7	AgriGold	A6441STX	GLY,Bt,LL,CRW	109	59	11.5	28.2	5.4	42	39	45	2,500	28,600	
5	AgriGold	A6416STXRIB	GLY,Bt,LL,CRW	107	60	11.4	28.3	6.2	44	40	40	2,500	28,600	
29	DeKalb	DKC62-97RIB	RR2,BT, CRW, LL	112	59	11.9	28.9	5.5	45	40	39	2,400	28,300	
16	Dairyland Seed	HIDF-3108RA	GLY,Bt,LL,CRW,BMR	108	62	11.7	30.2	5.2	49	40	36	2,400	28,100	
49	Wensman	W7473VT3PRIB	GLY, Bt, CRW	109	60	10.9	27.4	6.6	41	39	45	2,600	28,100	
20	Legacy Seeds	L-7253 3000GT	GLY, Bt, LL, CRW	112	57	11.8	27.6	5.2	43	39	44	2,400	28,000	
14	Dairyland Seed	HIDF-3702-9	GLY,Bt,LL,CRW,BMR	102	57	11.7	27.1	5.7	43	40	43	2,400	28,000	
41	Producers Hybrids	7014VT3PRIB	T3PRIB- GLY,BT,CRV	110	60	11	27.5	6.4	42	38	43	2,600	28,000	
23	Masters Choice	MCT 5661	GT	106	57	11.2	26.0	5.3	41	41	45	2,500	27,500	
31	Nutech/G2 Genetics	5Z-504	Gly,Bt,LL,CRW	104	57	11.4	26.3	6.3	39	40	47	2,400	27,400	
3	AgriGold	A6358VT3PRIB	GLY,Bt,CRW	105	50	12.4	24.9	5.5	46	40	40	2,200	27,300	
30	NuTech	5N-803	Gly,Bt,LL,CRW	103	47	12.5	23.4	5.4	45	40	41	2,200	27,200	
19	Legacy Seeds	L-5350 3122 EZR	GLY, Bt, LL, CRW	104	56	11.3	25.7	5.9	43	40	43	2,400	26,900	
36	Nutech/G2 Genetics	5F-709	Gly,Bt,LL	109	62	10.3	26.8	6.1	44	39	41	2,600	26,700	
44	Golden Harvest	G09E98-3000GT Br	Gly, Bt, CRW	109	56	11.1	25.2	5.0	41	40	46	2,400	26,600	
28	DeKalb	DKC58-87RIB	RR2,BT, CRW, LL	108	58	11.8	28.1	6.5	46	38	39	2,200	26,200	
21	Masters Choice	MCT 5371	GT	103	55	11.1	25.0	5.9	43	40	42	2,300	25,900	
11	Viking	Y54-05R	GLY,Bt,LL,CRW,BMR	105	58	10.6	24.9	5.7	45	42	40	2,500	25,900	
22	Masters Choice	MCT 527GT	GT	105	49	11.1	22.2	5.5	42	40	45	2,300	25,800	
48	Wensman	W91073STXRIB	GLY, Bt, LL, CRW	107	58	10	24.3	6.4	41	40	45	2,500	25,400	
46	Tracy Seeds	T104-14 3122E-Z RE	RR,Bt,LL,BL,CRW	104	59	10.6	25.8	5.6	49	41	35	2,300	24,400	
9	AgriGold	A6458VT3PRIB	GLY,Bt,CRW	110	59	9.5	23.2	6.3	43	40	44	2,500	23,600	
4	AgriGold	A6408VT3PRIB	GLY,Bt,CRW	107	53	10.7	22.9	5.3	45	39	42	2,200	23,300	
2	AgriGold	A6355STX	GLY,Bt,LL,CRW	105	54	10.5	22.7	4.8	45	40	41	2,200	23,300	
47	Wensman	W9325STXRIB	GLY, Bt, LL, CRW	102	62	8.2	21.6	6.1	49	46	30	2,600	21,300	
26	DeKalb	DKC54-38RIB	RR2,BT, CRW, LL	104	62	8.6	22.2	6.4	51	45	28	2,400	21,200	
10	Viking	10-05ND	None	105	52	9.2	19.2	6.7	44	42	42	2,300	21,000	
1	AgriGold	A6267STXRIB	GLY,Bt,LL,CRW	102	57	8.9	20.5	5.4	47	43	37	2,400	21,000	
Mean					58	11.7	28.4	5.9	43	40	42	2,500	29,000	
LSD(0.10)					5	2.5	7.1	0.9	6	2	7	200	7,400	
C.V.					7	18	21	13	11	5	14	8	22	

<sup>1</sup> Bt, CRW, GLY, LL, and Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, Liberty (glufosinate-ammonium) herbicide tolerance and leafy trait, respectively.

<sup>2</sup> DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

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

<sup>4</sup> 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 2015.

Entry	Company	Entry	Traits <sup>1</sup>	RM	Moist	Yield <sup>2</sup>		Quality (concentration) <sup>3</sup>			Milk Yield <sup>4</sup>			
						DM	silage	CP	NDF	NDFD	Starch	Ton	Acres	
					%	- ton/ acre -		%			lb/ ton	lb/ acre		
7	AgriGold	A6441STX	GLY,Bt,LL,CRW	109	67	13.6	41.1	6.3	39	38	49	3,100	42,800	
39	Nutech/G2 Genetics	5F-713	Gly,Bt,LL	113	71	13.3	43.5	7.5	44	40	42	2,900	40,300	
23	Masters Choice	MCT 5661	GT	106	66	13.2	38.9	6.2	42	42	46	3,000	40,200	
35	Nutech/G2 Genetics	5Z-308	Gly,Bt,LL,CRW	108	67	13.2	41.0	7.2	43	40	44	3,000	39,600	
34	Nutech/G2 Genetics	5Z-906	Gly,Bt,LL,CRW	106	67	12.7	38.2	7.2	42	41	46	3,000	38,800	
37	Nutech/G2 Genetics	5F-510	Gly,Bt,LL	110	68	12.5	42.7	7.4	40	40	47	3,100	38,700	
19	Legacy Seeds	L-5350 3122 EZR	GLY, BT, LL, CRW	104	65	13.9	37.3	6.1	44	39	39	2,600	38,000	
8	AgriGold	A6462STXRIB	GLY,Bt,LL,CRW	110	66	12.5	37.2	6.0	43	41	44	3,000	37,600	
38	Nutech/G2 Genetics	5F-811	Gly,Bt,LL	111	69	12.9	41.3	6.3	44	39	42	2,900	37,500	
27	DeKalb	DKC58-06RIB	RR2,BT, CRW, LL	108	63	12.1	32.5	6.4	37	41	51	3,000	36,800	
44	Golden Harvest	G09E98-3000GT Brand	Gly, Bt, CRW	109	67	12.7	37.8	6.2	43	40	44	3,000	36,700	
12	Channel	209-465TXRIB Brand Blend	GLY,Bt,LL,CRW	109	66	12.2	35.9	6.8	42	42	45	3,000	36,700	
15	Dairyland Seed	HIDF-3605-9	GLY,Bt,LL,CRW,BMR	105	64	12.0	34.1	7.2	43	42	44	2,900	35,400	
18	Dairyland Seed	HIDF-3510SSX	GLY,Bt,LL,CRW,BMR	110	70	11.8	41.5	6.3	44	40	43	3,000	35,200	
13	Channel	209-535TXRIB Brand Blend	GLY,Bt,LL,CRW	109	67	11.8	36.0	6.4	43	40	44	3,000	35,000	
43	RENK	RK858VT3P	GLY,Bt,CRW	112	64	12.8	36.0	6.2	46	41	40	2,700	34,900	
33	NuTech	5N-406	Gly,Bt,LL,CRW	106	67	12.6	38.1	6.1	47	40	41	2,700	34,100	
40	Producers Hybrids	70885TXRIB	STX-GLY,LL,BT,CRW	110	66	11.4	33.2	7.3	41	39	46	3,000	33,900	
21	Masters Choice	MCT 5371	GT	103	62	12.5	32.9	6.0	42	40	46	2,700	33,700	
36	Nutech/G2 Genetics	5F-709	Gly,Bt,LL	109	67	11.9	36.0	6.4	45	40	42	2,800	33,700	
32	Nutech/G2 Genetics	5H-806	Gly,Bt,LL	106	67	11.4	37.5	6.6	42	39	45	2,900	33,100	
48	Wensman	W910735TXRIB	GLY, Bt, LL, CRW	107	65	11.0	31.3	6.7	40	40	49	3,000	33,100	
6	AgriGold	A64425TXRIB	GLY,Bt,LL,CRW	109	67	11.7	35.4	7.1	45	39	41	2,800	32,700	
31	Nutech/G2 Genetics	5Z-504	Gly,Bt,LL,CRW	104	63	11.2	30.8	6.6	39	40	48	2,900	32,700	
45	Golden Harvest	G12J11-3111A	Gly, Bt, Viptera	112	67	11.4	34.0	6.1	45	39	42	2,900	32,600	
29	DeKalb	DKC62-97RIB	RR2,BT, CRW, LL	112	65	11.4	32.5	6.6	42	38	46	2,800	32,400	
22	Masters Choice	MCT 527GT	GT	105	60	12.1	31.0	6.2	43	42	44	2,600	32,000	
46	Tracy Seeds	T104-14 3122E-Z REFUGE	RR,Bt,LL,BL,CRW	104	62	12.0	31.9	5.8	45	41	43	2,700	31,800	
5	AgriGold	A64165TXRIB	GLY,Bt,LL,CRW	107	66	11.2	32.6	6.8	40	40	45	2,800	31,800	
25	Masters Choice	MCT 6153	GT	111	65	11.8	36.2	5.8	44	39	43	2,800	31,700	
24	Masters Choice	MC 535	Conventional	107	67	10.7	32.5	5.6	43	39	44	2,900	31,500	
47	Wensman	W93255TXRIB	GLY, Bt, LL, CRW	102	59	11.9	29.6	6.2	40	40	49	2,600	31,300	
20	Legacy Seeds	L-7253 3000GT	GLY, Bt, LL, CRW	112	65	11.4	32.9	5.7	46	40	41	2,700	30,900	
17	Dairyland Seed	HIDF-3808SSX	GLY,Bt,LL,CRW,BMR	108	67	11.5	35.3	6.5	47	38	39	2,700	30,800	
28	DeKalb	DKC58-87RIB	RR2,BT, CRW, LL	108	64	11.2	31.6	7.3	44	40	44	2,800	30,800	
42	RENK	RK7765STX	GLY,Bt,LL,CRW	107	63	11.6	32.0	6.4	44	38	44	2,600	30,600	
4	AgriGold	A6408VT3PRIB	GLY,Bt,CRW	107	63	11.6	32.0	5.8	45	39	42	2,600	30,500	
16	Dairyland Seed	HIDF-3108RA	GLY,Bt,LL,CRW,BMR	108	69	11.1	35.8	6.8	48	40	37	2,700	30,500	
1	AgriGold	A62675TXRIB	GLY,Bt,LL,CRW	102	59	10.9	27.0	6.2	38	41	50	2,700	30,000	
11	Viking	Y54-05R	GLY,Bt,LL,CRW,BMR	105	64	11.0	30.5	5.8	45	42	42	2,700	29,900	
14	Dairyland Seed	HIDF-3702-9	GLY,Bt,LL,CRW,BMR	102	60	11.5	28.3	6.4	43	41	45	2,500	29,000	
30	NuTech	5N-803	Gly,Bt,LL,CRW	103	54	11.9	26.8	6.2	43	40	46	2,300	28,500	
3	AgriGold	A6358VT3PRIB	GLY,Bt,CRW	105	55	11.7	26.3	6.2	40	40	48	2,300	28,500	
9	AgriGold	A6458VT3PRIB	GLY,Bt,CRW	110	70	10.1	33.2	6.6	46	38	40	2,800	28,500	
41	Producers Hybrids	7014VT3PRIB	VT3PRIB- GLY,BT,CRW	110	66	9.6	28.7	7.1	43	41	44	2,900	27,600	
10	Viking	10-05ND	None	105	60	10.7	26.5	6.8	43	42	43	2,600	27,400	
26	DeKalb	DKC54-38RIB	RR2,BT, CRW, LL	104	63	10.5	27.1	5.4	43	40	44	2,800	27,300	
2	AgriGold	A6355STX	GLY,Bt,LL,CRW	105	59	10.9	26.4	5.4	43	40	45	2,500	26,800	
49	Wensman	W7473VT3PRIB	GLY, Bt, CRW	109	70	8.5	28.2	7.3	46	39	40	2,800	24,100	
Mean						65	11.7	33.7	6.4	43	40	44	2,800	32,900
LSD(0.10)						5	1.6	6.3	0.8	4	2	5	300	6,300
C.V.						7	12	16	10	9	4	11	9	16

<sup>1</sup> Bt, CRW, GLY, LL, and Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, Liberty (glufosinate-ammonium) herbicide tolerance and leafy trait, respectively.

<sup>2</sup> DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

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

<sup>4</sup> 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 2015.

Entry	Company	Entry	Traits <sup>1</sup>	RM	Yield <sup>2</sup>			Quality (concentration) <sup>3</sup>			Milk Yield <sup>4</sup>		
					Moist	DM	silage	CP	NDF	NDFD	Starch	Ton	Acre
					%	- ton/ acre -		%			lb/ ton	lb/ acre	
11	Dairyland Seed	HIDF-3700SSX	GLY,Bt,LL,CRW,BMF	100	62	12.2	32.3	5.9	43	43	40	2,800	33,800
25	DeKalb	DKC54-38RIB	RR2,BT,CRW,LL	104	61	11.1	28.3	5.4	41	42	43	2,700	33,300
12	Dairyland Seed	HIDF-3702-9	GLY,Bt,LL,CRW,BMF	102	64	11.4	31.4	6.1	42	40	42	2,800	32,300
54	Wensman	W910735TXRIB	GLY, Bt, LL, CRW	107	63	11.2	30.4	6.3	42	39	44	2,800	31,400
6	Channel	205-195TXRIB Brand Blend	GLY,Bt,LL,CRW	105	63	11.5	31.5	5.6	44	40	40	2,700	31,200
3	Viking	GT5781	GLY	105	60	12.3	30.6	5.0	44	41	39	2,500	31,000
47	RENK	RK629VT3P	GLY,BtCRW	101	65	11.3	32.6	5.8	47	41	36	2,700	31,000
10	Dairyland Seed	HIDF-3099-9	GLY,Bt,LL,CRW,BMF	99	64	11.1	31.2	6.3	43	40	40	2,800	31,000
43	Rea Hybrids	6V633-RHDS	GLY,Bt,CRW	106	63	11.7	31.8	6.1	47	41	37	2,600	30,300
15	Dairyland Seed	HIDF-3808SSX	GLY,Bt,LL,CRW,BMF	108	67	11.1	34.4	6.3	48	40	36	2,700	30,300
53	Wensman	W93255TXRIB	GLY, Bt, LL, CRW	102	60	10.2	28.8	5.7	43	42	41	2,600	30,300
22	Masters Choice	MCT 5371	GT	103	61	11.0	28.6	5.7	41	42	43	2,700	30,200
14	Dairyland Seed	HIDF-3108RA	GLY,Bt,LL,CRW,BMF	108	66	11.1	33.1	5.3	49	44	30	2,700	29,900
7	Channel	207-275TXRIB Brand Blend	GLY,Bt,LL,CRW	107	63	10.5	28.3	6.0	44	41	43	2,800	29,000
49	Golden Harvest	G01P52-3011A Brand	Gly, BT, CRW	101	60	11.3	28.8	5.9	44	40	41	2,500	28,800
17	Legacy Seeds	L-5350 3122 EZR	GLY, BT, LL, CRW	104	64	10.5	29.1	5.8	45	39	41	2,700	28,300
2	Viking	T51-01R	GLY	101	59	11.1	27.2	6.4	41	40	44	2,500	28,200
51	Wensman	W92885TXRIB	GLY, Bt, LL, CRW	98	59	11.3	27.0	6.0	43	40	45	2,500	28,100
39	Rea Hybrids	4V301-RHDS	GLY,Bt,CRW	93	63	11.0	29.7	5.9	47	41	35	2,500	28,000
20	Masters Choice	MCT4881	GT	98	58	11.3	27.2	5.8	45	43	39	2,500	27,900
40	Rea Hybrids	4V970-RHDS	GLY,Bt,CRW	96	64	10.4	29.2	5.2	46	40	37	2,700	27,800
13	Dairyland Seed	HIDF-3605-9	GLY,Bt,LL,CRW,BMF	105	65	9.7	27.7	6.4	45	41	39	2,800	27,300
16	Legacy Seeds	L-4433 3011A	GLY, BT, LL, CRW	101	59	10.6	26.0	6.7	42	42	43	2,600	27,000
46	RENK	RK565GTCBLLRW	GLY,Bt,LL,CRW	99	58	10.4	25.1	6.0	43	40	46	2,500	26,900
38	Producers Hybrids	63185TXRIB	STX-GLY,LL,BT,CRW	103	62	10.4	27.1	6.2	45	41	39	2,600	26,900
37	Producers Hybrids	61085TXRIB	STX-GLY,LL,BT,CRW	101	64	9.8	27.6	5.7	46	41	38	2,700	26,900
32	NuTech	5N-0108	Gly,BT,LL,CRW	101	59	10.1	24.6	6.5	38	40	45	2,700	26,700
35	NuTech	5N-803	Gly,Bt,LL,CRW	103	63	9.6	25.9	5.6	44	41	43	2,700	26,200
23	DeKalb	DKC46-79RIB	RR2,BT,CRW,LL	95	58	10.6	25.2	6.4	43	41	44	2,500	26,000
44	RENK	RK302GTCBLLRWBL	GLY,Bt,LL,CRW	89	69	9.7	29.1	5.4	47	40	33	2,600	25,400
21	Masters Choice	MC 5250	Conventional	102	64	9.4	25.8	5.9	44	41	40	2,700	25,400
19	Masters Choice	MC 4630	Conventional	96	61	9.3	23.6	6.7	38	42	45	2,700	25,400
24	DeKalb	DKC49-72RIB	RR2,BT,CRW,LL	99	60	9.7	24.4	6.1	42	42	42	2,600	25,200
42	Rea Hybrids	5V781-RHDS	GLY,Bt,CRW	102	64	9.7	27.3	5.7	48	41	34	2,600	25,200
33	Nutech/G2 Genetics	5F-701	Gly,BT,LL	101	60	10.2	24.4	5.6	48	41	38	2,400	24,900
45	RENK	RK544VT2P	GLY,Bt	95	59	9.9	24.5	6.3	45	42	41	2,400	24,900
41	Rea Hybrids	5A981-RIB	GLY,Bt,CRW	98	61	9.6	24.7	6.6	44	40	42	2,600	24,800
9	Dairyland Seed	HIDF-3197-7	GLY,Bt,LL,CRW,BMF	97	58	11.8	24.5	5.1	45	41	38	2,400	24,500
52	Wensman	W909945TX	GLY, Bt, LL, CRW	99	65	9.7	30.1	6.8	49	41	34	2,700	24,300
50	Tracy Seeds	T098-11 3000GT	RR,Bt,LL,CRW	98	59	9.7	23.6	4.6	45	43	41	2,500	24,200
36	Nutech/G2 Genetics	5Z-504	Gly,BT,LL,CRW	104	63	8.8	23.7	5.8	43	40	41	2,700	23,900
31	Nutech/G2 Genetics	5F-198	Gly,BT,LL	98	57	9.9	23.3	6.4	42	39	43	2,500	23,700
18	Masters Choice	MCT 4211	GT	92	40	9.9	17.5	5.7	44	45	40	2,400	23,600
1	Viking	42-92N	None	92	57	9.7	21.7	5.3	42	41	43	2,400	23,600
29	NuTech	5N-195	Gly,BT,LL,CRW	95	56	9.7	22.1	5.9	44	44	42	2,500	23,600
48	Golden Harvest	G95D32-3110 Brand	Gly, Bt, Viptera	95	56	9.7	21.9	5.4	43	42	43	2,400	23,100
4	Channel	197-66VT2PRIB Brand Blend	GLY,Bt	97	63	8.5	23.1	6.1	43	40	41	2,700	23,100
28	Nutech/G2 Genetics	5X-894	Gly,BT,LL,CRW	94	53	9.8	20.9	5.4	43	42	41	2,400	22,900
8	Dahlman	R50-306SSRIB	GLY,Bt,LL,CRW	101	62	8.8	22.9	5.9	41	41	40	2,800	22,800
27	NuTech	5N-290	Gly,BT,LL,CRW	90	65	8.3	23.7	6.0	45	40	36	2,500	22,200
30	Nutech/G2 Genetics	5F-196	Gly,BT,LL	96	57	9.1	21.5	5.7	42	40	44	2,400	21,900
5	Channel	202-525TXRIB Brand Blend	GLY,Bt,LL,CRW	102	64	8.1	22.5	6.9	47	40	41	2,700	21,800
34	Nutech/G2 Genetics	5H-502	Gly,BT,LL	102	62	8.8	23.4	5.9	49	41	36	2,500	21,600
26	Nutech/G2 Genetics	5Z-488	Gly,BT,LL,CRW	88	59	8.2	19.8	5.8	48	40	35	2,200	18,800
		Mean			61	10.2	26.5	5.9	44	41	40	2,600	26,600
		LSD(0.10)			5	1.8	5.7	0.9	4	2	6	200	5,500
		C.V.			7	15	18	13	8	5	13	7	18

<sup>1</sup> Bt, CRW, GLY, LL, and Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, Liberty (glufosinate-ammonium) herbicide tolerance and leafy trait, respectively.

<sup>2</sup> DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

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

<sup>4</sup> 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 2015.

Entry	Company	Entry	Traits <sup>1</sup>	RM	Yield <sup>2</sup>			Quality (concentration) <sup>3</sup>				Milk Yield <sup>4</sup>	
					Moist	DM	silage	CP	NDF	NDFD	Starch	Ton	Acres
					%	- ton/ acre -			%				
4	Channel	197-66VT2PRIB Brand Blend	GLY,Bt	97	61	10.0	25.9	6.7	43	40	42	2,600	25,900
5	Channel	202-52STXRIB Brand Blend	GLY,Bt,LL,CRW	102	58	11.9	26.4	6.3	42	41	44	2,500	27,400
6	Channel	205-19STXRIB Brand Blend	GLY,Bt,LL,CRW	105	60	10.7	27.6	6.9	40	39	44	2,700	29,100
7	Channel	207-27STXRIB Brand Blend	GLY,Bt,LL,CRW	107	62	11.7	30.9	6.9	37	40	48	2,900	34,200
1	Viking	42-92N	None	92	59	11.6	29.6	6.7	40	40	45	2,800	32,500
39	Rea Hybrids	4V301-RHDS	GLY,Bt,CRW	93	56	11.0	25.9	6.3	41	40	45	2,500	28,300
40	Rea Hybrids	4V970-RHDS	GLY,Bt,CRW	96	61	11.3	29.0	6.5	42	40	43	2,600	29,900
41	Rea Hybrids	5A981-RIB	GLY,Bt,CRW	98	64	10.8	30.4	6.6	45	40	40	2,600	28,300
30	Nutech/G2 Genetics	5F-196	Gly,Bt,LL	96	64	11.1	31.6	6.8	41	40	43	2,800	31,700
31	Nutech/G2 Genetics	5F-198	Gly,Bt,LL	98	58	11.8	28.1	6.5	40	41	45	2,500	30,000
33	Nutech/G2 Genetics	5F-701	Gly,Bt,LL	101	59	12.0	30.9	6.5	42	41	44	2,600	31,700
34	Nutech/G2 Genetics	5H-502	Gly,Bt,LL	102	57	12.7	30.8	6.9	38	40	48	2,700	34,600
32	NuTech	5N-0108	Gly,Bt,LL,CRW	101	61	9.8	23.2	6.2	37	39	48	2,700	26,700
29	NuTech	5N-195	Gly,Bt,LL,CRW	95	61	11.5	30.9	6.6	42	40	42	2,700	31,200
27	NuTech	5N-290	Gly,Bt,LL,CRW	90	61	10.0	26.4	6.4	40	39	46	2,700	26,800
35	NuTech	5N-803	Gly,Bt,LL,CRW	103	56	11.8	27.2	6.4	38	40	46	2,500	29,700
42	Rea Hybrids	5V781-RHDS	GLY,Bt,CRW	102	59	10.7	27.4	6.5	39	40	45	2,800	29,600
28	Nutech/G2 Genetics	5X-894	Gly,Bt,LL,CRW	94	55	12.2	27.6	5.8	38	39	48	2,500	30,700
26	Nutech/G2 Genetics	5Z-488	Gly,Bt,LL,CRW	88	56	11.2	25.9	6.5	36	40	45	2,400	27,700
36	Nutech/G2 Genetics	5Z-504	Gly,Bt,LL,CRW	104	59	11.5	29.4	6.3	40	40	44	2,700	30,800
37	Producers Hybrids	6108STXRIB	STX-GLY,LL,BT,CRW	101	62	10.2	27.2	6.4	42	40	44	2,700	27,000
38	Producers Hybrids	6318STXRIB	STX-GLY,LL,BT,CRW	103	65	11.6	33.4	6.5	41	40	44	2,900	33,400
43	Rea Hybrids	6V633-RHDS	GLY,Bt,CRW	106	61	11.6	29.6	6.4	40	40	45	2,700	31,800
23	DeKalb	DKC46-79RIB	RR2,BT, CRW, LL	95	57	11.5	28.0	6.6	36	40	49	2,800	32,900
24	DeKalb	DKC49-72RIB	RR2,BT, CRW, LL	99	54	11.8	23.5	5.7	39	40	48	2,400	26,000
25	DeKalb	DKC54-38RIB	RR2,BT, CRW, LL	104	62	10.8	29.4	6.6	43	40	43	2,600	28,400
49	Golden Harvest	G01P52-3011A Brand	Gly, Bt, CRW	101	58	11.5	27.1	6.7	40	40	47	2,500	28,300
48	Golden Harvest	G95D32-3110 Brand	Gly, Bt, Viptera	95	60	11.7	31.9	6.6	37	40	45	2,700	34,700
3	Viking	GT5781	GLY	105	59	11.9	30.4	6.2	42	40	43	2,600	31,700
10	Dairyland Seed	HIDF-3099-9	GLY,Bt,LL,CRW,BMF	99	59	11.4	27.9	6.5	41	40	46	2,600	29,700
14	Dairyland Seed	HIDF-3108RA	GLY,Bt,LL,CRW,BMF	108	61	11.0	28.5	6.5	42	41	41	2,700	25,000
9	Dairyland Seed	HIDF-3197-9	GLY,Bt,LL,CRW,BMF	97	59	11.8	29.1	6.3	37	39	48	2,700	32,300
13	Dairyland Seed	HIDF-3605-9	GLY,Bt,LL,CRW,BMF	105	61	12.9	33.4	5.9	41	41	44	2,700	34,900
11	Dairyland Seed	HIDF-3700SX	GLY,Bt,LL,CRW,BMF	100	60	11.1	28.4	6.3	40	40	44	2,700	30,200
12	Dairyland Seed	HIDF-3702-9	GLY,Bt,LL,CRW,BMF	102	60	11.5	30.3	6.5	39	39	46	2,700	31,300
15	Dairyland Seed	HIDF-3808SX	GLY,Bt,LL,CRW,BMF	108	60	10.9	27.3	6.4	41	40	46	2,600	28,500
16	Legacy Seeds	L-4433 3011A	GLY, Bt, LL, CRW	101	62	12.2	32.9	6.5	43	40	41	2,700	32,400
17	Legacy Seeds	L-5350 3122 EZR	GLY, Bt, LL, CRW	104	61	10.7	27.8	6.5	39	40	46	2,800	29,700
19	Masters Choice	MC 4630	Conventional	96	57	10.2	23.9	7.1	40	40	45	2,500	25,300
21	Masters Choice	MC 5250	Conventional	102	59	10.6	26.6	6.3	40	39	47	2,600	28,000
18	Masters Choice	MCT 4211	GT	92	58	10.9	26.8	6.4	41	40	44	2,600	28,100
22	Masters Choice	MCT 5371	GT	103	60	11.8	30.0	6.5	39	39	47	2,700	31,800
20	Masters Choice	MCT4881	GT	98	63	10.9	29.8	6.4	38	40	47	2,900	32,200
8	Dahlman	R50-306SSRIB	GLY,Bt,LL,CRW	101	57	11.7	27.7	6.6	38	40	47	2,600	30,400
44	RENK	RK302GTCBLLRWBL	GLY,Bt,LL,CRW	89	58	11.6	27.9	6.5	37	40	48	2,700	31,000
45	RENK	RK544VT2P	GLY,Bt	95	59	11.8	29.0	6.4	40	40	44	2,600	30,600
46	RENK	RK565GTCBLLRW	GLY,Bt,LL,CRW	99	55	11.1	25.1	6.6	38	39	46	2,500	27,600
47	RENK	RK629VT3P	GLY,BtCRW	101	57	10.7	25.2	6.2	37	40	49	2,700	28,900
50	Tracy Seeds	T098-11 3000GT	RR,Bt,LL,CRW	98	58	11.1	25.6	6.7	41	41	45	2,600	29,100
2	Viking	T51-01R	GLY	101	57	10.9	25.7	6.3	39	40	48	2,600	27,800
52	Wensman	W90994STX	GLY, Bt, LL, CRW	99	60	10.8	24.5	6.6	40	41	44	2,600	27,600
54	Wensman	W91073STXRIB	GLY, Bt, LL, CRW	107	59	10.5	26.2	6.6	39	40	46	2,600	27,800
51	Wensman	W9288STXRIB	GLY, Bt, LL, CRW	98	57	12.2	28.8	6.4	41	40	45	2,500	30,600
53	Wensman	W9325STXRIB	GLY, Bt, LL, CRW	102	59	10.8	26.3	6.3	37	40	48	2,700	28,900
Mean					59	11.3	28.2	6.5	40	40	45	2,700	29,900
LSD(0.10)					6	1.6	6.5	0.6	4	1	5	300	6,100
C.V.					9	12	20	7	8	3	9	10	17

<sup>1</sup> Bt, CRW, GLY, LL, and Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, Liberty (glufosinate-ammonium) herbicide tolerance and leafy trait, respectively.

<sup>2</sup> DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

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

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



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## **Corn Grain: Tom Hoverstad, Wade Ihlenfeld, Jeff Coulter, Curt Reese, Steve Quiring and Mark Hanson**

The Minnesota Corn Evaluation 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: Crookston, Rothsay and Staples

### ***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 2015. Reported yields are adjusted to 15.5% grain moisture. Entries are ranked within a maturity group by moisture content averaged across locations for 2015.

### ***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 yield potential. We show LSD values with a 0.2 alpha level, which means that when two entries differ in yield 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 is less than the LSD, the two entries probably do not differ significantly in yield potential.

## **Companies participating in the 2015 corn grain trials**

AgriGold Hybrids: Rt.1 Box 203 St Francisville, IL 62460: [www.agrigold.com](http://www.agrigold.com)  
Albert Lea Seed House (Viking Hybrids): Box 127, 1414 W. Main, Albert Lea, MN 56007: [www.alseed.com](http://www.alseed.com)  
Anderson Seeds: 37825 Co. Road 63, St. Peter, MN 56082  
Blue River Hybrids: 27087 Timber Road, Kelley IA 50134: [www.blueriverorgseed.com](http://www.blueriverorgseed.com)  
Dalhman Seed Co.: 73504 200th Street, Dassel, Minnesota 55325: [www.dahlmanseed.com](http://www.dahlmanseed.com)  
Dairyland Seed Co., Inc.: Box 958, West Bend, WI 53095: [www.dairylandseed.com](http://www.dairylandseed.com)  
Dekalb (Monsanto Co.): 102 W. Carol Ave., Courtland, IL 60112: [www.dekalb.com](http://www.dekalb.com)  
Legacy Seeds Inc.: 1937 Spindt Dr. Waupaca, WI 54981: [www.legacyseeds.com](http://www.legacyseeds.com)  
Mycogen Seeds: 1413 Jenson Road, Eau Claire, WI 54701: [www.mycogen.com](http://www.mycogen.com)  
NuTech Seed: 415 South Duff, Suite C, Ames, IA 50010: [www.nutechseed.com](http://www.nutechseed.com)  
Peterson Farms Seed: 3104 164<sup>th</sup> Ave S.E. Harwood, ND 58092: [www.petersonfarmsseed.com](http://www.petersonfarmsseed.com)  
REA Hybrids: 8108 100th Ave SE, Fullerton, ND 58441: [www.rea-hybrids.com](http://www.rea-hybrids.com)  
Proseed: 705 E Brewster, Harvey, ND 58341: [www.proseed.net](http://www.proseed.net)  
Renk Seed Co.: 6809 Wilburn Rd., Sun Prairie, WI 53590: [www.renkseed.com](http://www.renkseed.com)  
NK Brand (Syngenta): 22979 401 Ave, Arlington, MN 55307: [www.syngenta.com](http://www.syngenta.com)  
Titan Pro: 1301 S. 24th St, Clear Lake, IA 50428: [www.titanprosci.com](http://www.titanprosci.com)  
Tracy Seeds: 1805 South St Rd 140, Janesville, WI 53546: [www.tracyseeds.com](http://www.tracyseeds.com)

**Table 2. Individual Trial Information - 2015**

Location	Cooperators	Previous Crop	Planting Date	Harvest Date
Lamberton	Steve Quiring	Soybean	27-Apr	25-Oct
Rochester	Fritz Brietenbach	Soybean	30-Apr	20-Oct
Waseca	Tom Hoverstad	Soybean	23-Apr	21-Oct
Hutchinson	Nathan Winter Paul Wright	Soybean	1-May	19-Oct
Morris	Curt Reese	Soybean	4-May	15-Oct
Rosemount	Jerry Holz	Soybean	29-Apr	30-Oct
Crookston	Mark Hanson	Soybean	5-May	22-Oct
Rothsay	Troy Larson	Soybean	5-May	21-Oct
Staples	Ron Nelson	Soybean	5-May	26-Oct

### Early maturity entries, southern locations, 2015

Source	Entry	Traits	Relative Maturity	Yield, Bushels/A at:			Average Across Locations	
				Lamberton	Rochester	Waseca	Bu/Acre	% Moisture
97 and earlier RM entries								
Anderson Seeds	7995		95	212	223	202	212	14.6
AgriGold	A6199STX	Gly, Bt, LL, CRW	95	219	202	214	212	14.7
AgriGold	A6217STXRIB	Gly, Bt, LL, CRW	97	219	209	205	211	15.1
Anderson Seeds	689VT3P	Gly, Bt, CRW	95	224	201	213	213	15.2
Anderson Seeds	795R	Gly	95	219	218	214	217	15.4
97 and earlier RM Averages:				219	211	210	213	15.0
98 to 101 RM entries								
Nutech/G2 Genetics	5F-198	Gly, Bt, LL	98	219	234	220	224	14.7
Dairyland Seed	DS-9198	Gly, Bt, LL, CRW	98	201	219	208	209	14.9
Dekalb	DKC49-72RIB	Gly, Bt, CRW	99	239	213	205	219	15.1
Anderson Seeds	537R	Gly	101	216	226	206	216	15.3
Anderson Seeds	588VT3P	Gly, Bt, CRW	101	206	198	195	200	15.5
Dekalb	DKC50-82RIB	Gly, Bt, CRW	100	222	210	200	211	15.5
AgriGold	A6257STXRIB	Gly, Bt, LL, CRW	100	244	213	203	220	15.6
Dairyland Seed	DS-9701	Gly, Bt, LL, CRW	101	232	226	200	219	15.8
Viking	D71-00RL	Gly, Bt, LL, CRW	100	231	199	211	214	15.8
Viking	57-01N		101	220	212	197	210	15.8
Anderson Seeds	615VT3P	Gly, Bt, CRW	98	218	198	183	199	15.9
Tracy Seeds	T100-25 3000GT	Gly, Bt, LL, CRW	100	217	214	201	211	15.9
Legacy Seeds	L4424 GENSS	Gly, Bt, LL, CRW	100	237	228	206	224	16.0
Titan Pro	TP 31-01 3011A	Gly, Bt, LL, CRW	101	238	202	210	217	16.1
Renk	RK680SSTX	Gly, Bt, LL, CRW	101	217	190	216	208	16.1
Anderson Seeds	6073		101	230	224	210	222	16.1
Anderson Seeds	684R	Gly	98	229	205	231	222	16.1
Viking	T51-01R	Gly	101	219	227	224	223	16.1
NuTech	5N-0108	Gly, Bt, LL, CRW	101	227	228	221	225	16.1
Tracy Seeds	T102-14 3011A	Gly, Bt, LL, CRW	101	222	206	199	209	16.2
Nutech/G2 Genetics	5F-002	Gly, Bt, LL	100	231	237	224	231	16.3
Anderson Seeds	6284		98	232	210	229	224	16.4
Renk	RK629VT3P	Gly, Bt, CRW	101	237	207	217	220	16.4
Dairyland Seed	DS-9599	Gly, Bt, LL, CRW	99	246	219	213	226	16.6
Viking	35-01N		101	216	197	212	208	18.2
98 to 101 RM Averages:				226	214	210	216	15.9
102 to 103 RM entries								
Dekalb	DKC52-84RIB	Gly, Bt, CRW	102	228	213	227	222	15.7
AgriGold	A6300STXRIB	Gly, Bt, LL, CRW	103	233	201	217	217	16.1
Renk	RK666SSTX	Gly, Bt, LL, CRW	102	239	205	218	221	16.1
Viking	D83-03RL	Gly, Bt, LL, CRW	103	231	179	216	209	16.1
Legacy Seeds	L4714 GENSS RIB	Gly, Bt, LL, CRW	103	237	196	220	218	16.3
Nutech/G2 Genetics	5Z-0305	Gly, Bt, LL	103	232	266	258	252	16.5
Nutech/G2 Genetics	5H-502	Gly, Bt, LL	102	226	236	235	232	16.6
Nutech/G2 Genetics	5K-0208	Gly, Bt, LL	102	247	249	239	245	16.7
Titan Pro	TP 39-02 SS	Gly, Bt, LL, CRW	102	226	213	177	205	16.8
Titan Pro	TP 53-03 2P	Gly, Bt, LL	103	247	233	226	235	17.0
Titan Pro	TP 40-03		103	243	229	230	234	17.6
AgriGold	A6267STXRIB	Gly, Bt, LL, CRW	102	243	249	215	236	17.6
Dairyland Seed	DS-9905	Gly, Bt, LL, CRW	103	240	214	203	219	18.2
Dairyland Seed	DS-9203	Gly, Bt, LL, CRW	103	232	218	243	231	18.3
102 to 103 RM averages:				236	222	223	227	16.8
Southern locations, early maturity averages:				228	216	214	219	16.1
LSD (0.20)				16	19	14	9	0.4

### Late maturity entries, southern locations, 2015.

Source	Entry	Traits	Relative Maturity	Yield, Bushels/A at:			Average Across Locations	
				Lamberton	Rochester	Waseca	Bu/Acre	% Moisture
104 RM and later entries								
Viking	72-04N		104	242	229	218	230	16.6
Tracy Seeds	T104-13 3000GT	Gly, Bt, LL, CRW	104	239	205	205	216	17.0
Viking	C78-05R	Gly, Bt, LL, CRW	105	216	222	234	224	17.3
AgriGold	A6355STX	Gly, Bt, LL, CRW	105	214	224	219	219	17.5
Nutech/G2 Genetics	5X-905	Gly, Bt, LL, CRW	105	228	199	242	223	17.5
Dekalb	DKC54-38RIB	Gly, Bt, CRW	104	227	229	234	230	17.6
Nutech/G2 Genetics	5Z-504	Gly, Bt, LL	104	239	243	263	248	18.0
Nutech/G2 Genetics	5H-806	Gly, Bt, LL	106	236	236	252	241	18.1
Renk	RK712SSTX	Gly, Bt, LL, CRW	106	249	200	219	223	18.1
Legacy Seeds	L-6025 GENSS	Gly, Bt, LL, CRW	107	240	245	238	241	18.4
Dairyland Seed	DS-9805	Gly, Bt, LL, CRW	105	236	181	214	211	18.5
Anderson Seeds	5674		105	232	213	208	218	18.6
AgriGold	A6416STXRIB	Gly, Bt, LL, CRW	107	228	227	226	227	18.8
Viking	63-05N		105	256	209	252	239	19.0
Tracy Seeds	T108-26 Viptera 3111	Gly, Bt, LL, CRW	108	260	225	240	242	19.2
Titan Pro	TP 56-06 3110	Gly, Bt, LL	106	226	246	222	231	19.2
Dekalb	DKC57-75RIB	Gly, Bt, CRW	107	225	217	207	216	19.4
Viking	A81-07R	Gly	107	240	261	226	243	19.4
Nutech/G2 Genetics	5Z-906	Gly, Bt, LL	106	256	233	238	242	19.4
Nutech/G2 Genetics	5Z-308	Gly, Bt, LL	108	249	245	241	245	19.6
Renk	RK752SSTX	Gly, Bt, LL, CRW	107	248	232	250	243	19.7
Renk	RK699SSTX	Gly, Bt, LL, CRW	105	204	178	175	185	19.7
Viking	D91-06RL	Gly, Bt, LL, CRW	106	247	222	249	239	19.8
Dekalb	DKC58-06RIB	Gly, Bt, CRW	108	266	251	260	259	19.9
NuTech	5N-607	Gly, Bt, LL, CRW	107	217	229	235	227	20.4
Tracy Seeds	T107-25 3000GT	Gly, Bt, LL, CRW	107	225	226	238	230	20.7
Southern Locations, Late Maturity Averages:				236	224	231	230	18.8
LSD (0.20)				22	19	17	11	0.6



**Early maturity entries, central locations, 2015.**

Source	Entry	Traits	Relative Maturity	Yield, Bushels/A at:			Average Across Locations	
				Hutchinson	Morris	Rosemount	Bu/Acre	% Moisture
93 and earlier RM entries								
Anderson Seeds	747R		92	179	176	223	193	16.5
Tracy Seeds	T091-25 3000GT	Gly, Bt, LL, CRW	90	166	209	245	207	16.9
Dairyland Seed	DS-9593	Gly, Bt, LL, CRW	93	144	192	212	183	16.9
Viking	E88-90R	Gly, Bt	90	168	238	251	219	17.0
Proseed	1492 VT2P	Gly, Bt	92	206	206	208	207	17.1
Renk	RK415VT2P	Gly, Bt	92	203	224	235	221	17.2
Viking	42-92N		92	195	214	206	205	17.4
Dairyland Seed	DS-9791RA	Gly, Bt, LL, CRW	91	188	179	215	194	17.6
Anderson Seeds	7422		92	200	221	231	217	17.6
Tracy Seeds	T093-26 3110 Artesian	Gly, Bt, LL	93	155	203	227	195	17.8
Dairyland Seed	DS-9693	Gly, Bt, LL, CRW	93	163	212	218	198	20.4
Proseed	1392 VT2P <sup>1</sup>	Gly, Bt	92	203	233	-	218 <sup>1</sup>	17.8 <sup>1</sup>
Proseed	1393 VT2P <sup>1</sup>	Gly, Bt	93	173	150	-	161 <sup>1</sup>	16.9 <sup>1</sup>
93 RM and earlier averages:				180	204	225	203	17.5
94 to 96 RM entries								
Legacy Seeds	L-3423 GENSS RIB	Gly, Bt, LL, CRW	95	170	204	237	204	17.1
Renk	RK544SSTX	Gly, Bt, LL, CRW	95	210	218	220	216	17.3
Viking	51-95N		95	167	190	209	189	17.3
Anderson Seeds	7995		95	187	182	225	198	17.4
Viking	D34-95RL	Gly, Bt, LL, CRW	95	181	232	248	220	17.4
Nutech/G2 Genetics	5X-894	Gly, Bt, LL, CRW	94	210	221	214	215	17.5
NuTech	5N-195	Gly, Bt, LL, CRW	95	184	192	256	211	17.6
Renk	RK522SSTX	Gly, Bt, LL, CRW	94	191	223	216	210	17.7
Anderson Seeds	689VT3P	Gly, Bt, CRW	95	193	187	230	203	17.8
Dahlman	R48-301SSRIB	Gly, Bt, LL, CRW	95	176	210	228	205	17.8
Anderson Seeds	795R	Gly	95	201	225	236	221	17.9
Dekalb	DKC46-36RIB	Gly, Bt, CRW	96	217	211	229	219	18.0
Titan Pro	TP 30-96		96	183	215	243	214	18.0
Dekalb	DKC44-13RIB	Gly, Bt, CRW	94	189	226	246	220	18.1
Titan Pro	2M95-2P	Gly, Bt, LL	95	196	214	231	213	18.1
Titan Pro	TP 50-94 A		94	150	227	224	200	18.2
Dekalb	DKC45-65RIB	Gly, Bt, CRW	95	240	175	207	207	18.2
Nutech/G2 Genetics	5F-196	Gly, Bt, LL	96	196	210	251	219	18.3
Legacy Seeds	L-3845 GENSS	Gly, Bt, LL, CRW	96	193	237	246	225	18.3
Viking	E52-95R	Gly, Bt	95	179	183	170	177	18.5
Titan Pro	TP-58-95 SS	Gly, Bt, LL, CRW	95	180	212	225	206	18.6
94 to 96 RM averages:				190	209	228	209	17.9
Central locations, early maturity averages:				187	209	227	207	17.7
LSD (0.20)				25	27	15	13	0.5

<sup>1</sup> Morris and Hutchinson only

### Late maturity entries, central locations, 2015.

Source	Entry	Traits	Relative Maturity	Yield, Bushels/A at:			Average Across Locations	
				Hutchinson	Morris	Rosemount	Bu/Acre	% Moisture
99 RM and Earlier entries								
Dairyland Seed	DS-9198	Gly, Bt, LL, CRW	98	200	177	239	206	17.2
Dekalb	DKC49-72RIB	Gly, Bt, CRW	99	197	198	250	215	17.6
Nutech/G2 Genetics	5F-198	Gly, Bt, LL	98	201	235	232	223	17.8
Tracy Seeds	T098-11 3000GT	Gly, Bt, LL, CRW	98	175	222	232	209	18.0
Titan Pro	TP 50-99 A		99	168	206	206	193	18.0
Dahlman	R49-315SSRIB	Gly, Bt, LL, CRW	99	201	208	225	211	18.1
Dairyland Seed	DS-9599	Gly, Bt, LL, CRW	99	166	215	219	200	18.2
Viking	89-99N	Gly, Bt, LL, CRW	99	126	210	235	190	18.3
Viking	D37-98RL	Gly, Bt, LL, CRW	98	184	218	227	210	18.6
Dekalb	DKC48-56RIB	Gly, Bt, CRW	98	199	212	242	218	18.6
Anderson Seeds	684R	Gly	98	216	228	241	229	18.6
Viking	58-98N		98	213	210	223	215	18.8
Anderson Seeds	6284		98	199	203	220	207	18.9
Titan Pro	TP 39-98 SS	Gly, Bt, LL, CRW	98	190	217	231	213	19.1
Renk	RK596SSTX	Gly, Bt, LL, CRW	98	198	187	221	202	19.3
Anderson Seeds	615VT3P	Gly, Bt, CRW	98	173	173	227	191	19.5
99 RM and earlier averages:				188	207	229	208	18.4
Later than 99 RM entries								
Anderson Seeds	537R	Gly	101	179	213	221	205	17.6
Viking	T51-01R	Gly	101	194	230	267	230	17.8
Dairyland Seed	DS-9701	Gly, Bt, LL, CRW	101	196	198	234	209	18.5
Tracy Seeds	T100-25 3000GT	Gly, Bt, LL, CRW	100	163	219	231	204	18.5
Renk	RK680SSTX	Gly, Bt, LL, CRW	101	230	195	223	216	18.8
Titan Pro	TP 39-00 SS	Gly, Bt, LL, CRW	100	181	210	232	208	18.8
Nutech/G2 Genetics	5Z-0305	Gly, Bt, LL	103	225	269	277	257	19.1
Nutech/G2 Genetics	5F-002	Gly, Bt, LL	100	202	238	269	237	19.1
Titan Pro	TP 58-01 2P	Gly, Bt, LL	101	229	206	242	226	19.1
Dahlman	R50-306SSRIB	Gly, Bt, LL, CRW	101	181	216	215	204	19.2
Anderson Seeds	588VT3P	Gly, Bt, CRW	101	182	212	234	209	19.3
Tracy Seeds	T102-14 3011A	Gly, Bt, LL, CRW	101	208	194	228	210	19.3
NuTech	5N-0108	Gly, Bt, LL, CRW	101	202	204	250	219	19.5
Anderson Seeds	6073		101	221	209	237	222	19.5
Legacy Seeds	L4424 GENSS	Gly, Bt, LL, CRW	100	187	217	228	211	19.5
Dekalb	DKC52-84RIB	Gly, Bt, CRW	102	205	197	247	216	19.7
Renk	RK612SSTX	Gly, Bt, LL, CRW	100	183	199	224	202	19.8
Titan Pro	TP 40-00		100	175	197	233	202	19.8
Dahlman	R52-328SSRIB	Gly, Bt, LL, CRW	103	194	223	245	221	19.9
Dairyland Seed	DS-9900RA	Gly, Bt, LL, CRW	103	200	222	232	218	20.0
DEKALB	DKC54-38RIB	Gly, Bt, CRW	104	195	199	261	218	20.2
Nutech/G2 Genetics	5H-502	Gly, Bt, LL	102	240	226	272	246	20.5
Dairyland Seed	DS-9203	Gly, Bt, LL, CRW	103	172	227	246	215	20.7
Nutech/G2 Genetics	5K-0208	Gly, Bt, LL	102	229	220	263	237	20.9
Nutech/G2 Genetics	5Z-504	Gly, Bt, LL	104	211	217	270	233	21.1
Anderson Seeds	5674		105	171	227	239	212	22.4
Later than 99 RM averages:				198	215	243	219	19.6
Central locations, late maturity averages:				194	212	238	215	19.1
LSD(0.20)				26	26	19	14	0.7

## Northern locations, 2015

Source	Entry	Traits	Relative Maturity	Yield, Bushels/acre at:			Average Across Locations	
				Crookston	Rothsay	Staples	Bu/Acre	% Moisture
82 and earlier RM entries								
Blue River	14A91		82	134	193	174	167	14.7
Rea Hybrids	1B820-RIB	Gly, Bt	82	156	214	206	192	15.3
Renk	RK240VT2P	Gly, Bt	82	143	189	184	172	15.6
Renk	RK212GT	Gly	81	153	212	195	187	15.7
82 and earlier RM entry averages:				147	202	190	179	15.3
83 to 87 RM entries								
Legacy Seeds	L-2314 VT2PRO RIB	Gly, Bt	83	167	188	174	177	14.7
Proseed	1483 VT2P	Gly, Bt	83	145	193	194	178	14.9
Nutech/G2 Genetics	5Z-783	Gly, Bt, LL	83	155	215	201	190	14.9
Dairyland Seed	DS-9186RA	Gly, Bt, LL, CRW	86	152	210	187	183	15.0
PFS	71D83	Gly, Bt	83	127	183	164	158	15.2
Rea Hybrids	2B840-RIB	Gly, Bt	84	156	213	212	194	15.2
Proseed	1286 VT2P	Gly, Bt	86	146	190	185	174	15.3
Proseed	PX85 VT2P	Gly, Bt	85	138	165	153	152	15.3
Proseed	1283 VT2P	Gly, Bt	83	139	192	166	166	15.4
Proseed	1384 VT2P	Gly, Bt	84	135	169	160	154	15.4
Proseed	1083 GT3000	Gly, Bt, LL, CRW	83	144	197	182	174	15.4
Renk	RK266VT3P	Gly, Bt, CRW	85	148	203	191	181	15.5
Proseed	1385 VT2P	Gly, Bt	85	156	180	178	172	15.5
Rea Hybrids	2A860-RIB	Gly, Bt, CRW	86	176	203	190	189	15.5
Blue River	23A71		87	133	198	185	172	15.6
Tracy Seeds	T086-13 Viptera 3110	Gly, Bt, LL, CRW	85	153	217	150	173	15.8
NuTech	5N-183	Gly, Bt, LL, CRW	83	165	195	202	188	15.8
Dairyland Seed	DS-9487RA	Gly, Bt, LL, CRW	87	165	218	206	196	16.0
PFS	75K85	Gly, Bt	85	164	202	237	201	16.1
Tracy Seeds	T086-26 Viptera 3110	Gly, Bt, LL, CRW	86	154	201	213	189	16.2
Rea Hybrids	2A871-RIB	Gly, Bt, CRW	87	157	187	210	185	16.5
83 to 87 RM entry averages:				151	196	188	178	15.5
88 to 92 RM entries								
NuTech	5N-290	Gly, Bt, LL, CRW	90	163	218	201	194	15.8
Renk	RK415VT2P	Gly, Bt	92	155	220	203	193	15.9
Rea Hybrids	3B330-RIB	Gly, Bt	90	186	222	206	204	16.0
Tracy Seeds	T091-25 3000GT	Gly, Bt, LL, CRW	90	148	207	192	182	16.0
Titan Pro	2M91-2P	Gly, Bt, LL	91	154	237	212	201	16.1
Legacy Seeds	L-2924 VT2PRO	Gly, Bt	89	157	213	179	183	16.1
PFS	74K89	Gly, Bt	89	164	223	240	209	16.3
Rea Hybrids	3B890-RIB	Gly, Bt	89	138	218	214	190	16.4
Legacy Seeds	L-3115 VT2PRO	Gly, Bt	91	182	224	221	209	16.6
Dairyland Seed	DS-9791RA	Gly, Bt, LL, CRW	91	150	207	196	184	16.6
Dekalb	DKC39-27RIB	Gly, Bt, CRW	89	174	215	214	201	16.6
Viking	42-92N		92	167	223	232	207	16.7
Rea Hybrids	3A922-RIB	Gly, Bt, CRW	92	127	233	196	186	16.8
Blue River	27B16		88	184	199	198	194	17.0
Nutech/G2 Genetics	5Z-488	Gly, Bt, LL	88	151	199	191	181	18.1
88 to 92 RM entry averages:				160	217	206	194	16.5
93 and later RM entries								
Dekalb	DKC36-28RIB	Gly, Bt, CRW	96	168	218	205	197	15.3
Dairyland Seed	DS-9593	Gly, Bt, LL, CRW	93	149	202	184	178	16.1
Nutech/G2 Genetics	5X-894	Gly, Bt, LL, CRW	94	154	211	205	190	16.3
Blue River	35M70		94	147	225	209	193	16.7
Rea Hybrids	4B953-RIB	Gly, Bt	95	181	225	194	200	16.8
Dekalb	DKC44-13RIB	Gly, Bt, CRW	94	143	225	213	194	17.0
Rea Hybrids	4A942-RIB	Gly, Bt, CRW	93	144	226	205	192	17.1
Rea Hybrids	4A930-RIB	Gly, Bt, CRW	93	141	187	199	176	17.1
Renk	RK522SSTX	Gly, Bt, LL, CRW	94	129	204	199	177	17.3
Titan Pro	TP-58-95 SS	Gly, Bt, LL, CRW	95	161	238	162	187	17.6
Titan Pro	TP 50-94 A		94	179	207	205	197	17.7
Titan Pro	2M95-2P	Gly, Bt, LL	95	129	205	213	183	17.9
NuTech	5N-195	Gly, Bt, LL, CRW	95	165	211	211	195	18.0
Dairyland Seed	DS-9693	Gly, Bt, LL, CRW	93	124	215	186	175	19.0
93 and Later RM entry averages:				151	214	199	188	17.1
Northern locations averages:				153	207	196	185	16.2
LSD(0.20)				23	15	20	11	0.7



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## ***B***

### **CORN HERBICIDE EVALUATION**

## **2015 Evaluation of the Weed Spectrum and Duration of Control Achieved with Preemergence Applications of Acuron and Acuron Flexi in Field Corn at Rochester, MN.**

*Breitenbach, Fritz R., Lisa M. Behnken, Ellen Sheehan, and Dillon Welter*

The objective of this trial was to evaluate the duration and spectrum of weed control achieved with preemergence applications of Acuron and Acuron Flexi compared to other standard preemergence programs in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.1, O.M. of 2.5%, and soil test P and K levels of 38 ppm and 203 ppm, respectively. Spring fertilizer was broadcast on April 13, 2015 ahead of planting at a rate of 120–23–90–24 (N-P-K-S). In the spring the field was disked and field cultivated once prior to planting. The previous crop was soybean. The corn hybrid, NK Brand NK45P-3011A, was planted on May 1, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 32,000 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) treatments were applied with a tractor-mounted sprayer delivering 15 gpa at 40 psi using TTI 11015 spray tips. Evaluations of the plot were taken on May 15, May 27, June 3, June 18, and August 12. The center two rows of each plot were machine harvested on October 30th, 2015. Application dates, environmental conditions, and weed stages can be found in Table 1. Performance ratings for giant ragweed, common lambsquarter, common waterhemp, and grass control can be found in Tables 2 through 5, respectively. No crop injury was observed.

### **SUMMARY**

Acuron and Acuron Flexi performed very well in these trials. Over 90% control of giant ragweed, common lambsquarters, common waterhemp and grass was achieved through mid-August (last rating) with both herbicides. This is consistent with weed control evaluations of these herbicides in 2013 and 2014. University of Minnesota Extension Regional Office, Rochester.

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

<b>Date</b>	<b>5/1</b>	<b>5/28</b>
<b>Treatment</b>	PRE (A)	POST I (B)
<b>Temperature (F)</b>		
Air	61	71
Soil	54.5	63.1
<b>Relative Humidity (%)</b>	35	68
<b>Wind (mph)</b>	16	12
<b>Soil Moisture</b>	Normal	Wet
<b>Corn</b>		
Stage		V2
Height (inch)		5.0
<b>Giant Ragweed</b>		
Weed density (ft <sup>2</sup> )		13
Height (inch)		2.9
<b>Common Lambsquarter</b>		
Weed density (ft <sup>2</sup> )		20
Height (inch)		0.9
<b>Common Waterhemp</b>		
Weed density (ft <sup>2</sup> )		22
Height (inch)		0.5
<b>Grass</b>		
Weed density (ft <sup>2</sup> )		23
Height (inch)		0.5
<b>Rainfall after each application (inch)</b>		
Week 1	1.17	1.32
Week 2	0.83	1.41
Week 3	1.07	1.69

**Table 2. Giant ragweed control with preemergence only herbicide applications in field corn in Rochester, MN, 2015**

Pest Code Pest Name Rating Date				AMBTR					YIELD			
				Giant ragweed								
				May-15	May-27	June-3	June-18	Aug-12				
Trt	Treatment	Rate	Appl	Percent (%) control					Bu/A			
<b>PRE 5/1/15</b>												
1	UNTREATED CHECK			0	f	0	d	0	e	0	e	
2	SOA 15,27 ACURON FLEXI	2.25 qt/a	A	70	c	79	b	87	b	94	a	144 a
3	SOA 5,15, 27 ACURON	3 qt/a	A	74	b	87	a	91	a	95	a	157 a
4	SOA 2,4,15 SURESTART II	2 pt/a	A	76	b	68	c	74	d	64	d	32 d
5	SOA 2,27 CORVUS	5.6 fl oz/a	A	63	d	77	b	83	c	85	b	138 a
6	SOA 2,27 INSTIGATE	6 oz/a	A	24	e	70	c	75	d	75	c	65 c
7	SOA 14,15 VERDICT	14 fl oz/a	A	90	a	91	a	82	c	75	c	39 cd
<b>POST 5/28/15</b>												
8	SOA 9 GLYPHOSATE CHECK ROUNDUP POWERMAX	32 fl oz/a	B	0	f	0	d	89	ab	77	c	97 b
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				3.5		3.6		4.0		4.5		27

Means followed by same letter do not significantly differ.

**Table 3. Common lambsquarters control with preemergence only herbicide applications in field corn in Rochester, MN, 2015**

Pest Code Pest Name Rating Date				CHEAL				YIELD				
				Common lambsquarters								
				May-27	June-3	June-18	Aug-12					
Trt	Treatment	Rate	Appl	Percent (%) control				Bu/A				
<b>PRE 5/1/15</b>												
1	UNTREATED CHECK			0	b	0	c	0	d	0	d	0 e
2	SOA 15,27 ACURON FLEXI	2.25 qt/a	A	99	a	99	a	99	a	99	a	144 a
3	SOA 5,15, 27 ACURON	3 qt/a	A	99	a	99	a	99	a	99	a	157 a
4	SOA 2,4,15 SURESTART II	2 pt/a	A	99	a	99	a	99	a	99	a	32 d
5	SOA 2,27 CORVUS	5.6 fl oz/a	A	99	a	99	a	99	a	98	ab	138 a
6	SOA 2,27 INSTIGATE	6 oz/a	A	99	a	99	a	98	b	99	a	65 c
7	SOA 14,15 VERDICT	14 fl oz/a	A	99	a	99	a	99	ab	97	b	39 cd
<b>POST 5/28/15</b>												
8	SOA 9 GLYPHOSATE CHECK ROUNDUP POWERMAX	32 fl oz/a	B	0	b	91	b	80	c	78	c	97 b
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>						2.0		0.7		1.4		27

Means followed by same letter do not significantly differ.

**Table 4. Common waterhemp control with preemergence only herbicide applications in field corn in Rochester, MN, 2015**

Pest Code	Pest Name	Rating Date	AMATA							YIELD		
			Common waterhemp									
			May-27		June-3		Jun-18		Aug-12			
Trt	Treatment	Rate	Appl	Percent (%) control							Bu/A	
<b>PRE 5/1/15</b>												
1	UNTREATED CHECK			0	b	0	c	0	d	0	e	0 e
2	SOA 15,27 ACURON FLEXI	2.25 qt/a	A	99	a	99	a	99	a	97	a	144 a
3	SOA 5,15, 27 ACURON	3 qt/a	A	99	a	99	a	99	a	98	a	157 a
4	SOA 2,4,15 SURESTART II	2 pt/a	A	99	a	99	a	99	a	99	a	32 d
5	SOA 2,27 CORVUS	5.6 fl oz/a	A	99	a	99	a	79	b	77	c	138 a
6	SOA 2,27 INSTIGATE	6 oz/a	A	99	a	99	a	98	a	95	b	65 c
7	SOA 14,15 VERDICT	14 fl oz/a	A	99	a	99	a	99	a	98	a	39 cd
<b>POST 5/28/15</b>												
8	SOA 9 GLYPHOSATE CHECK ROUNDUP POWERMAX	32 fl oz/a	B	0	b	95	b	60	c	59	d	97 b
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				.		0.2		1.6		1.7		27

Means followed by same letter do not significantly differ.

**Table 5. Grass control with preemergence only herbicide applications in field corn in Rochester, MN, 2015**

Pest Code	Pest Name	Rating Date	GRASS							YIELD		
			<i>Grangea sp.</i>									
			May-27		June-3		June-18		Aug-12			
Trt	Treatment	Rate	Appl	Percent (%) control							Bu/A	
<b>PRE 5/1/15</b>												
1	UNTREATED CHECK			0	b	0	c	0	d	0	d	0 e
2	SOA 15,27 ACURON FLEXI	2.25 qt/a	A	99	a	99	a	99	a	98	a	144 a
3	SOA 5,15, 27 ACURON	3 qt/a	A	99	a	99	a	99	a	99	a	157 a
4	SOA 2,4,15 SURESTART II	2 pt/a	A	99	a	99	a	99	a	98	a	32 d
5	SOA 2,27 CORVUS	5.6 fl oz/a	A	99	a	99	a	98	ab	96	ab	138 a
6	SOA 2,27 INSTIGATE	6 oz/a	A	99	a	99	a	97	b	95	b	65 c
7	SOA 14,15 VERDICT	14 fl oz/a	A	99	a	99	a	99	a	99	a	39 cd
<b>POST 5/28/15</b>												
8	SOA 9 GLYPHOSATE CHECK ROUNDUP POWERMAX	32 fl oz/a	B	0	b	98	b	91	c	89	c	97 b
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				.		0.4		3.8		3.0		27

Means followed by same letter do not significantly differ.





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## **Evaluation of DiFlexx and Laudis Flexx Herbicide Formulations for Weed Control and Crop Response in Field Corn at Rochester, Minnesota in 2015**

Breitenbach, Fritz R., Lisa M. Behnken, Brent Breitenbach, and Ellen Sheehan

The objective of this trial was to evaluate DiFlexx and Laudis Flexx Herbicide Formulations for weed control and crop response in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.1, O.M. 2.5%, and soil test P and K levels of 38 ppm and 203 ppm, respectively. Spring fertilizer was broadcast on April 13, 2015 ahead of planting at a rate of 120–23–90–24 (N-P-K-S). In the spring the field was disked and field cultivated once prior to planting. The previous crop was soybean. The corn hybrid, NK Brand 45P-3011A, was planted May 1, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 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 15 gpa at 40 psi using TTI 110015 spray tips. Evaluations of the plots were taken May 15, May 27, June 3, June 18, and August 12. The center two rows of each plot were machine harvested on October 30, 2015. Application dates, environmental conditions and weed stages can be found in Table 1. Performance ratings for giant ragweed, common lambsquarter, common waterhemp and grass control can be found in Tables 2 through 5, respectively. No significant crop response was observed (data not shown). (University of Minnesota Extension Regional Office, Rochester.)

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

<b>Date</b>	<b>5/1</b>	<b>5/28</b>	<b>6/8</b>
<b>Treatment</b>	PRE (A)	POST I (B)	POST II (C)
<b>Temperature (F)</b>			
Air	62	74	77
Soil	54.5	63.9	78.1
<b>Relative Humidity (%)</b>	35	61	51
<b>Wind (mph)</b>	16	12	15
<b>Soil Moisture</b>	Normal	Wet	Normal
<b>Corn</b>			
Stage		V2	V5
Height (inch)	0.0	5	10
<b>Giant Ragweed</b>			
Weed Density (ft <sup>2</sup> )		19	25
Height (inch)	0.0	4.9	2
<b>Common Waterhemp</b>			
Weed Density (ft <sup>2</sup> )		40	50
Height (inch)	0.0	0.7	0.7
<b>Common Lambsquarter</b>			
Weed Density (ft <sup>2</sup> )		9	37
Height (inch)	0.0	1.3	1.0
<b>Grass</b>			
Weed Density (ft <sup>2</sup> )		4	28
Height (inch)	0.0	0.7	0.7
<b>Rainfall after each application (inch)</b>			
Week 1	1.17	1.32	1.64
Week 2	0.83	1.41	0.05
Week 3	1.07	1.46	1.95

**Table 2. Evaluation of DiFlexx and LaudisFlexx Herbicide Formulations for giant ragweed control in Field Corn in Rochester, MN, 2015.**

Pest Name				AMBTR						YIELD					
				Giant ragweed											
Rating Date				May-15	May-27	June-3	June-18	Aug-12	Oct-30						
Trt	Treatment	Rate	Appl	Percent control (%)						Bu/A					
3	UNTREATED CHECK			0	c	0	b	0	e	0	c	0	d	0	c
<b>PRE / POST II 5/1/15 / 6/8/15</b>															
1	SOA 2,5,9,27			59	b	77	a	81	d	95	a	93	ab	171	a
	CORVUS	3.5 fl oz/a	A												
	Atrazine	0.75 qt/a	A												
	ROUNDUP POWERMAX	32 fl oz/a	C												
	AMS	17 lb/100 gal	C												
2	SOA 2,4,5,9,27			63	a	78	a	83	d	97	a	96	a	172	a
	CORVUS	3.5 fl oz/a	A												
	Atrazine	0.75 qt/a	A												
	DIFLEXX	6 fl oz/a	C												
	ROUNDUP POWERMAX	32 fl oz/a	C												
	COC	1 % v/v	C												
	AMS	17 lb/100 gal	C												
<b>POST I 5/28/15</b>															
4	SOA 9,15,27			0	c	0	b	92	c	95	a	93	ab	170	a
	LAUDIS	3 fl oz/a	B												
	OUTLOOK	12 fl oz/a	B												
	ROUNDUP POWERMAX	32 fl oz/a	B												
	COC	1 % v/v	B												
	AMS	17 lb/100 gal	B												
5	SOA 4,9,15,27			0	c	0	b	97	ab	94	a	93	ab	165	a
	LAUDIS	3 fl oz/a	B												
	DIFLEXX	6 fl oz/a	B												
	OUTLOOK	12 fl oz/a	B												
	ROUNDUP POWERMAX	32 fl oz/a	B												
	COC	1 % v/v	B												
	AMS	17 lb/100 gal	B												
6	SOA 4,9,15,27			0	c	0	b	94	bc	95	a	92	b	162	a
	LAUDIS FLEXX	24 fl oz/a	B												
	OUTLOOK	12 fl oz/a	B												
	ROUNDUP POWERMAX	32 fl oz/a	B												
	MSO	1 % v/v	B												
	AMS	17 lb/100 gal	B												
7	SOA 4,9,15,27			0	c	0	b	99	a	96	a	94	ab	163	a
	LAUDIS FLEXX	32 fl oz/a	B												
	OUTLOOK	12 fl oz/a	B												
	ROUNDUP POWERMAX	32 fl oz/a	B												
	MSO	1 % v/v	B												
	AMS	17 lb/100 gal	B												
8	SOA 9,15			0	c	0	b	94	bc	75	b	68	c	127	b
	TREATED CHECK														
	OUTLOOK	12 fl oz/a	B												
	ROUNDUP POWERMAX	32 fl oz/a	B												
	COC	1 % v/v	B												
	AMS	17 lb/100 gal	B												
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				<b>1.7</b>		<b>1.4</b>		<b>3.8</b>		<b>2.8</b>		<b>4.3</b>		<b>12</b>	

Means followed by same letter do not significantly differ.

**Table 3. Evaluation of DiFlexx and LaudisFlexx Herbicide Formulations for common lambsquarters control in Field Corn in Rochester, MN, 2015.**

Pest Name			CHEAL				YIELD Oct-30 Bu/A	
			Common lambsquarters					
Rating Date			May-27	June-3	June-18	Aug-12		
Trt	Treatment	Rate	Appl	Percent control (%)				
3	UNTREATED CHECK			0 b	0 c	0 d	0 d	0 c
<b>PRE / POST II 5/1/15 / 6/8/15</b>								
1	SOA 2,5,9,27			99 a	99 a	98 a	98 a	171 a
	CORVUS	3.5 fl oz/a	A					
	Atrazine	0.75 qt/a	A					
	ROUNDUP POWERMAX	32 fl oz/a	C					
	AMS	17 lb/100 gal	C					
2	SOA 2,4,5,9,27			99 a	98 b	99 a	98 a	172 a
	CORVUS	3.5 fl oz/a	A					
	Atrazine	0.75 qt/a	A					
	DIFLEXX	6 fl oz/a	C					
	ROUNDUP POWERMAX	32 fl oz/a	C					
	COC	1 % v/v	C					
	AMS	17 lb/100 gal	C					
<b>POST I 5/28/15</b>								
4	SOA 9,15,27			0 b	99 a	93 b	93 b	170 a
	LAUDIS	3 fl oz/a	B					
	OUTLOOK	12 fl oz/a	B					
	ROUNDUP POWERMAX	32 fl oz/a	B					
	COC	1 % v/v	B					
	AMS	17 lb/100 gal	B					
5	SOA 4,9,15,27			0 b	99 a	97 a	97 a	165 a
	LAUDIS	3 fl oz/a	B					
	DIFLEXX	6 fl oz/a	B					
	OUTLOOK	12 fl oz/a	B					
	ROUNDUP POWERMAX	32 fl oz/a	B					
	COC	1 % v/v	B					
	AMS	17 lb/100 gal	B					
6	SOA 4,9,15,27			0 b	99 a	98 a	97 a	162 a
	LAUDIS FLEXX	24 fl oz/a	B					
	OUTLOOK	12 fl oz/a	B					
	ROUNDUP POWERMAX	32 fl oz/a	B					
	MSO	1 % v/v	B					
	AMS	17 lb/100 gal	B					
7	SOA 4,9,15,27			0 b	99 a	99 a	98 a	163 a
	LAUDIS FLEXX	32 fl oz/a	B					
	OUTLOOK	12 fl oz/a	B					
	ROUNDUP POWERMAX	32 fl oz/a	B					
	MSO	1 % v/v	B					
	AMS	17 lb/100 gal	B					
8	SOA 9,15			0 b	99 a	89 c	88 c	127 b
	TREATED CHECK							
	OUTLOOK	12 fl oz/a	B					
	ROUNDUP POWERMAX	32 fl oz/a	B					
	COC	1 % v/v	B					
	AMS	17 lb/100 gal	B					
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				.	1	3	3	12

Means followed by same letter do not significantly differ.

**Table 4. Evaluation of DiFlexx and LaudisFlexx Herbicide Formulations for common waterhemp control in Field Corn in Rochester, Minnesota, 2015.**

Pest Name				AMATA				YIELD Oct 30						
				Common waterhemp										
Rating Date				May 27	June 3	June 18	Aug 12	Bu/A						
Trt	Treatment	Rate	Appl	Percent control (%)										
3	UNTREATED CHECK			0	b	0	c	0	e	0	c	0	c	
<b>PRE / POST II 5/1/15 / 6/8/15</b>														
1	SOA 2,5,9,27			99	a	99	a	98	ab	90	a		171	a
	CORVUS	3.5 fl oz/a	A											
	Atrazine	0.75 qt/a	A											
	ROUNDUP POWERMAX 32	fl oz/a	C											
	AMS	17 lb/100 gal	C											
2	SOA 2,4,5,9,27			99	a	98	b	98	a	91	a		172	a
	CORVUS	3.5 fl oz/a	A											
	Atrazine	0.75 qt/a	A											
	DIFLEXX	6 fl oz/a	C											
	ROUNDUP POWERMAX 32	fl oz/a	C											
	COC	1 % v/v	C											
	AMS	17 lb/100 gal	C											
<b>POST I 5/28/15</b>														
4	SOA 9,15,27			0	b	99	a	90	d	91	a		170	a
	LAUDIS	3 fl oz/a	B											
	OUTLOOK	12 fl oz/a	B											
	ROUNDUP POWERMAX 32	fl oz/a	B											
	COC	1 % v/v	B											
	AMS	17 lb/100 gal	B											
5	SOA 4,9,15,27			0	b	99	a	93	bcd	91	a		165	a
	LAUDIS	3 fl oz/a	B											
	DIFLEXX	6 fl oz/a	B											
	OUTLOOK	12 fl oz/a	B											
	ROUNDUP POWERMAX 32	fl oz/a	B											
	COC	1 % v/v	B											
	AMS	17 lb/100 gal	B											
6	SOA 4,9,15,27			0	b	99	a	92	cd	90	a		162	a
	LAUDIS FLEXX	24 fl oz/a	B											
	OUTLOOK	12 fl oz/a	B											
	ROUNDUP POWERMAX 32	fl oz/a	B											
	MSO	1 % v/v	B											
	AMS	17 lb/100 gal	B											
7	SOA 4,9,15,27			0	b	99	a	96	abc	95	a		163	a
	LAUDIS FLEXX	32 fl oz/a	B											
	OUTLOOK	12 fl oz/a	B											
	ROUNDUP POWERMAX 32	fl oz/a	B											
	MSO	1 % v/v	B											
	AMS	17 lb/100 gal	B											
8	SOA 9,15			0	b	99	a	77	e	76	b		127	b
	TREATED CHECK													
	OUTLOOK	12 fl oz/a	B											
	ROUNDUP POWERMAX 32	fl oz/a	B											
	COC	1 % v/v	B											
	AMS	17 lb/100 gal	B											
<b>LSD P = .10 for weed ratings, LSD P = .20 for yields</b>				.		0.9		4.9		5.3			12	

Means followed by same letter do not significantly differ.

**Table 5. Evaluation of DiFlexx and LaudisFlexx Herbicide Formulations for grass control in Field Corn in Rochester, Minnesota, 2015.**

Pest Name				GRASS ( <i>Grangea sp.</i> )				YIELD Oct-30
Rating Date				May-27	Jun-3	Jun-18	Aug-12	
Trt	Treatment	Rate	App l					
3	UNTREATED CHECK			0 b	0 c	0 b	0 c	0 c
<b>PRE / POST II 5/1/15 / 6/8/15</b>								
1	SOA 2,5,9,27			99 a	99 a	98 a	92 ab	171 a
	CORVUS	3.5 fl oz/a	A					
	Atrazine	0.75 qt/a	A					
	ROUNDUP POWERMAX	32 fl oz/a	C					
	AMS	17 lb/100 gal	C					
2	SOA 2,4,5,9,27			99 a	98 b	98 a	95 ab	172 a
	CORVUS	3.5 fl oz/a	A					
	Atrazine	0.75 qt/a	A					
	DIFLEXX	6 fl oz/a	C					
	ROUNDUP POWERMAX	32 fl oz/a	C					
	COC	1 % v/v	C					
	AMS	17 lb/100 gal	C					
<b>POST I 5/28/15</b>								
4	SOA 9,15,27			0 b	99 a	96 a	93 ab	170 a
	LAUDIS	3 fl oz/a	B					
	OUTLOOK	12 fl oz/a	B					
	ROUNDUP POWERMAX	32 fl oz/a	B					
	COC	1 % v/v	B					
	AMS	17 lb/100 gal	B					
5	SOA 4,9,15,27			0 b	99 a	97 a	92 ab	165 a
	LAUDIS	3 fl oz/a	B					
	DIFLEXX	6 fl oz/a	B					
	OUTLOOK	12 fl oz/a	B					
	ROUNDUP POWERMAX	32 fl oz/a	B					
	COC	1 % v/v	B					
	AMS	17 lb/100 gal	B					
6	SOA 4,9,15,27			0 b	99 a	97 a	91 b	162 a
	LAUDIS FLEXX	24 fl oz/a	B					
	OUTLOOK	12 fl oz/a	B					
	ROUNDUP POWERMAX	32 fl oz/a	B					
	MSO	1 % v/v	B					
	AMS	17 lb/100 gal	B					
7	SOA 4,9,15,27			0 b	99 a	96 a	94 ab	163 a
	LAUDIS FLEXX	32 fl oz/a	B					
	OUTLOOK	12 fl oz/a	B					
	ROUNDUP POWERMAX	32 fl oz/a	B					
	MSO	1 % v/v	B					
	AMS	17 lb/100 gal	B					
8	SOA 9,15			0 b	99 ab	98 a	97 a	127 b
	TREATED CHECK							
	OUTLOOK	12 fl oz/a	B					
	ROUNDUP POWERMAX	32 fl oz/a	B					
	COC	1 % v/v	B					
	AMS	17 lb/100 gal	B					
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>					0.9	2.9	5.1	12

Means followed by same letter do not significantly differ.



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## Comparisons of PRE/POST Weed Control Programs in Field Corn at Rochester, MN in 2015

Behnken, Lisa M., Fritz R. Breitenbach, Dillon Welter and Brent Breitenbach

The objective of this trial was to evaluate PRE/POST programs for weed control and crop response in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.1, O.M. of 2.5%, and soil test P and K levels of 38 ppm and 203 ppm, respectively. Spring fertilizer was broadcast ahead of planting on April 13, 2015 at a rate of 120-23-90-24 (N-P-K-S). The field was spring disked and field cultivated once prior to planting. The previous crop was soybean. The corn hybrid, NK Brand 45P-3011A, was planted May 1, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 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 15 gpa at 40 psi using TTI 110015 spray tips. Evaluations of the plots were taken May 15, May 27, June 3, June 18, and August 13. The center two rows of each plot were machine harvested on October 30, 2015. Application dates, environmental conditions and weed stages can be found in Table 1. Performance ratings for giant ragweed, common lambsquarter, common waterhemp, and grass control, plus crop response ratings are found in Tables 2 through 6, respectively. (University of Minnesota Extension Regional Office, Rochester.)

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

<b>Date</b>	<b>5/1</b>	<b>5/22</b>	<b>5/28</b>	<b>6/8</b>
<b>Treatment</b>	PRE (A)	POST I (B)	POST II (C)	POST III (D)
<b>Temperature (F)</b>				
Air	62	64	74	77
Soil	54.5	65.7	64.6	78.8
<b>Relative Humidity (%)</b>	35	37	64	51
<b>Wind (mph)</b>	16	4	12	15
<b>Soil Moisture</b>	Normal	Normal	Normal	Normal
<b>Corn</b>				
Stage		1-collar	V2	V5
Height (inch)		2.5	5.0	10.0
<b>Giant Ragweed</b>				
Weed Density (ft <sup>2</sup> )			14	28
Height (inch)		1.5	4.0	2.6
<b>Common Waterhemp</b>				
Weed Density (ft <sup>2</sup> )			16	48.0
Height (inch)		0.4	0.8	1.6
<b>Common Lambsquarter</b>				
Weed Density (ft <sup>2</sup> )			18	45
Height (inch)		0.3	1.0	1.1
<b>Grass</b>				
Weed Density (ft <sup>2</sup> )			3	38
Height (inch)		0.3	0.5	1.9
<b>Rainfall after each application (inch)</b>				
Week 1	1.17	1.45	1.32	1.64
Week 2	0.83	1.32	1.41	0.83
Week 3	1.07	2.82	1.69	2.06



**Table 2. Comparisons of Pre/Post Programs for Control of Giant Ragweed in Field Corn at Rochester Minnesota, 2015.**

Pest Code	Pest Name	Rating	Date	AMBTR					YIELD Oct-30
				Giant ragweed					
Trt	Treatment	Rate	Appl	May-15	May-27	Jun-3	Jun-18	Aug-13	
				Percent Control (%)					
7	UNTREATED CHECK			0 e	0 f	0 g	0 f	0 f	1 f
<b>PRE / POST II 5-1-15 / 5-28-15</b>									
2	SOA 9,14,15			16 d	24 e	93 abc	85 c	76 d	101 c
	ANTHEM	10 fl oz/a	A						
	ROUNDUP POWERMAX32	32 fl oz/a	C						
	Ammonium Sulfate	3.3 lb/100 gal	C						
3	SOA 5,9,14,15			42 c	76 c	94 ab	83 cd	74 d	78 d
	ANTHEM	10 fl oz/a	A						
	AATREX	32 fl oz/a	A						
	ROUNDUP POWERMAX32	32 fl oz/a	C						
	Ammonium Sulfate	3.3 lb/100 gal	C						
6	SOA 9,14,15,27			19 d	23 e	93 abc	95 a	93 a	143 ab
	ANTHEM	8 fl oz/a	A						
	SOLSTICE	3 fl oz/a	C						
	ROUNDUP POWERMAX32	32 fl oz/a	C						
	Ammonium Sulfate	3.3 lb/100 gal	C						
<b>PRE / POST III 5-1-15 / 6-8-15</b>									
1	SOA 2,4,9,14,15,			92 a	93 a	91 cd	97 a	95 a	149 ab
	ANTHEM	10 fl oz/a	A						
	STANZA	5 oz/a	A						
	ROUNDUP POWERMAX32	32 fl oz/a	D						
	Ammonium Sulfate	3.3 lb/100 gal	D						
4	SOA 2,4,9,15			82 b	84 b	83 f	97 a	94 a	145 ab
	SURESTART II	2 pt/a	A						
	ROUNDUP POWERMAX32	32 fl oz/a	D						
	Ammonium Sulfate	3.3 lb/100 gal	D						
5	SOA 2,4,9,14,15			95 a	92 a	90 d	97 a	96 a	155 a
	STANZA	5 oz/a	A						
	SHARPEN	2 fl oz/a	A						
	ANTHEM	8 fl oz/a	D						
	ROUNDUP POWERMAX32	32 fl oz/a	D						
	Ammonium Sulfate	3.3 lb/100 gal	D						
<b>POST I 5-22-15</b>									
8	SOA 5,9,14,15			0 e	84 b	92 bcd	84 cd	78 cd	114 c
	ANTHEM ATZ	32 fl oz/a	B						
	ROUNDUP POWERMAX32	32 fl oz/a	B						
	Ammonium Sulfate	3.3 lb/100 gal	B						
	NIS	0.25 % v/v	B						
9	SOA 9,15,27			0 e	68 d	92 bcd	91 b	88 b	143 ab
	HALEX GT	3.6 pt/a	B						
	Ammonium Sulfate	3.3 lb/100 gal	B						
	NIS	0.25 % v/v	B						
10	SOA 5,9,14,15,27			0 e	88 b	95 a	96 a	94 a	138 b
	ANTHEM	4.25 fl oz/a	B						
	SOLSTICE	2.5 fl oz/a	B						
	AATREX	16 fl oz/a	B						
	ROUNDUP POWERMAX32	32 fl oz/a	B						
	Ammonium Sulfate	3.3 lb/100 gal	B						
11	SOA 9			0 e	73 c	88 e	60 e	60 e	35 e
	ROUNDUP POWERMAX32	32 fl oz/a	B						
	Ammonium Sulfate	3.3 lb/100 gal	B						
<b>POST II 5-28-15</b>									
12	SOA 9			0 e	0 f	94 ab	81 d	81 c	76 d
	ROUNDUP POWERMAX32	32 fl oz/a	C						
	Ammonium Sulfate	3.3 lb/100 gal	C						
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				<b>3.8</b>	<b>4.4</b>	<b>2.4</b>	<b>3.3</b>	<b>4.7</b>	<b>17</b>

Means followed by same letter do not significantly differ.

**Table 3. Comparisons of Pre/Post Programs for Control of Common Lambsquarters in Field Corn at Rochester, MN 2015.**

Pest Code	Pest Name	Rating Date	CHEAL				YIELD Oct-30					
			Common lambsquarters									
			May-27	Jun-3	Jun-18	Aug-13						
Trt Treatment	Rate	Appl	Percent Control (%)									
7	UNTREATED CHECKI		0	d	0	d	0	d	0	f	1	f
<b>PRE / POST II 5-1-15 / 5-28-15</b>												
2	SOA 9,14,15		98	a	99	a	99	a	95	bc	101	c
	ANTHEM	10 fl oz/a										
	ROUNDUP POWERMAX	32 fl oz/a										
	Ammonium Sulfate	3.3 lb/100 gal										
3	SOA 5,9,14,15		99	a	99	a	98	a	95	c	78	d
	ANTHEM	10 fl oz/a										
	AATREX	32 fl oz/a										
	ROUNDUP POWERMAX	32 fl oz/a										
	Ammonium Sulfate	3.3 lb/100 gal										
6	SOA 9,14,15,27		98	a	99	a	99	a	98	a	143	ab
	ANTHEM	8 fl oz/a										
	SOLSTICE	3 fl oz/a										
	ROUNDUP POWERMAX	32 fl oz/a										
	Ammonium Sulfate	3.3 lb/100 gal										
<b>PRE / POST III 5-1-15 / 6-8-15</b>												
1	SOA 2,4,9,14,15,		99	a	99	a	99	a	97	abc	149	ab
	ANTHEM	10 fl oz/a										
	STANZA	5 oz/a										
	ROUNDUP POWERMAX	32 fl oz/a										
	Ammonium Sulfate	3.3 lb/100 gal										
4	SOA 2,4,9,15		99	a	99	a	99	a	97	abc	145	ab
	SURESTART II	2 pt/a										
	ROUNDUP POWERMAX	32 fl oz/a										
	Ammonium Sulfate	3.3 lb/100 gal										
5	SOA 2,4,9,14,15		99	a	99	a	99	a	99	a	155	a
	STANZA	5 oz/a										
	SHARPEN	2 fl oz/a										
	ANTHEM	8 fl oz/a										
	ROUNDUP POWERMAX	32 fl oz/a										
	Ammonium Sulfate	3.3 lb/100 gal										
<b>POST I 5-22-15</b>												
8	SOA 5,9,14,15		88	b	99	a	99	a	98	abc	114	c
	ANTHEM ATZ	32 fl oz/a										
	ROUNDUP POWERMAX	32 fl oz/a										
	Ammonium Sulfate	3.3 lb/100 gal										
	NIS	0.25 % v/v										
9	SOA 9,15,27		70	c	99	a	99	a	98	ab	143	ab
	HALEX GT	3.6 pt/a										
	Ammonium Sulfate	3.3 lb/100 gal										
	NIS	0.25 % v/v										
10	SOA 5,9,14,15,27		91	b	99	a	99	a	99	a	138	b
	ANTHEM	4.25 fl oz/a										
	SOLSTICE	2.5 fl oz/a										
	AATREX	16 fl oz/a										
	ROUNDUP POWERMAX	32 fl oz/a										
	Ammonium Sulfate	3.3 lb/100 gal										
11	SOA 9		73	c	95	c	79	c	79	e	35	e
	ROUNDUP POWERMAX	32 fl oz/a										
	Ammonium Sulfate	3.3 lb/100 gal										
<b>POST II 5-28-15</b>												
12	SOA 9		0	d	97	b	86	b	86	d	76	d
	ROUNDUP POWERMAX	32 fl oz/a										
	Ammonium Sulfate	3.3 lb/100 gal										
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>			<b>4.1</b>		<b>1.3</b>		<b>2.4</b>		<b>2.6</b>		<b>17</b>	

Means followed by same letter do not significantly differ.

**Table 4. Comparisons of Pre/Post Programs for Control of Common Waterhemp in Field Corn at Rochester, MN 2015.**

Pest Code		AMATA							YIELD Oct-30 Bu/A				
Pest Name		Common waterhemp											
Rating Date		May-27	Jun-3	Jun-18	Aug-13								
Trt	Treatment	Rate	Appl	Percent Control (%)									
7	UNTREATED CHECKI			0	e	0	d	0	d	0	e	1	f
<b>PRE / POST II 5-1-15 / 5-28-15</b>													
2	SOA 9,14,15			99	a	99	a	99	a	98	a	101	c
	ANTHEM	10	fl oz/a										
	ROUNDUP POWERMAX	32	fl oz/a										
	Ammonium Sulfate	3.3	lb/100 gal										
3	SOA 5,9,14,15			99	a	99	a	99	a	99	a	78	d
	ANTHEM	10	fl oz/a										
	AAtrex	32	fl oz/a										
	ROUNDUP POWERMAX	32	fl oz/a										
	Ammonium Sulfate	3.3	lb/100 gal										
6	SOA 9,14,15,27			98	a	99	a	99	a	98	a	143	ab
	ANTHEM	8	fl oz/a										
	SOLSTICE	3	fl oz/a										
	ROUNDUP POWERMAX	32	fl oz/a										
	Ammonium Sulfate	3.3	lb/100 gal										
<b>PRE / POST III 5-1-15 / 6-8-15</b>													
1	SOA 2,4,9,14,15,			99	a	99	a	99	a	97	a	149	ab
	ANTHEM	10	fl oz/a										
	STANZA	5	oz/a										
	ROUNDUP POWERMAX	32	fl oz/a										
	Ammonium Sulfate	3.3	lb/100 gal										
4	SOA 2,4,9,15			99	a	99	a	99	a	95	b	145	ab
	SURESTART II	2	pt/a										
	ROUNDUP POWERMAX	32	fl oz/a										
	Ammonium Sulfate	3.3	lb/100 gal										
5	SOA 2,4,9,14,15			99	a	99	a	99	a	99	a	155	a
	STANZA	5	oz/a										
	SHARPEN	2	fl oz/a										
	ANTHEM	8	fl oz/a										
	ROUNDUP POWERMAX	32	fl oz/a										
	Ammonium Sulfate	3.3	lb/100 gal										
<b>POST I 5-22-15</b>													
8	SOA 5,9,14,15			87	c	99	a	99	a	99	a	114	c
	ANTHEM ATZ	32	fl oz/a										
	ROUNDUP POWERMAX	32	fl oz/a										
	Ammonium Sulfate	3.3	lb/100 gal										
	NIS	0.25	% v/v										
9	SOA 9,15,27			71	d	99	a	99	a	97	a	143	ab
	HALEX GT	3.6	pt/a										
	Ammonium Sulfate	3.3	lb/100 gal										
	NIS	0.25	% v/v										
10	SOA 5,9,14,15,27			91	b	99	a	99	a	98	a	138	b
	ANTHEM	4.25	fl oz/a										
	SOLSTICE	2.5	fl oz/a										
	AAtrex	16	fl oz/a										
	ROUNDUP POWERMAX	32	fl oz/a										
	Ammonium Sulfate	3.3	lb/100 gal										
11	SOA 9			73	d	90	c	59	c	59	d	35	e
	ROUNDUP POWERMAX	32	fl oz/a										
	Ammonium Sulfate	3.3	lb/100 gal										
<b>POST II 5-28-15</b>													
12	SOA 9			0	e	96	b	73	b	73	c	76	d
	ROUNDUP POWERMAX	32	fl oz/a										
	Ammonium Sulfate	3.3	lb/100 gal										
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				<b>3.9</b>		<b>1.3</b>		<b>2.1</b>		<b>2.3</b>		<b>17</b>	

Means followed by same letter do not significantly differ.

<b>Table 5. Comparisons of Pre/Post Programs for Control of Grass species in Field Corn at Rochester, MN in 2015.</b>																	
Pest Code	Pest Name	Rating	Date	Trt	Treatment	Rate	Appl	GRASS				YIELD Oct-30					
								<i>Grangea sp.</i>									
								May-27	Jun-3	Jun-18	Aug-13						
Percent Control (%)																	
7	UNTREATED CHECK							0	e	0	d	0	d	0	e	1	f
<b>PRE / POST II 5-1-15 / 5-28-15</b>																	
2	SOA 9,14,15							99	a	99	a	99	a	96	a	101	c
	ANTHEM	10	fl oz/a		A												
	ROUNDUP POWERMAX	32	fl oz/a		C												
	Ammonium Sulfate	3.3	lb/100 gal		C												
3	SOA 5,9,14,15							99	a	99	a	99	a	97	a	78	d
	ANTHEM	10	fl oz/a		A												
	AATREX	32	fl oz/a		A												
	ROUNDUP POWERMAX	32	fl oz/a		C												
	Ammonium Sulfate	3.3	lb/100 gal		C												
6	SOA 9,14,15,27							99	a	99	a	99	a	96	a	143	ab
	ANTHEM	8	fl oz/a		A												
	SOLSTICE	3	fl oz/a		C												
	ROUNDUP POWERMAX	32	fl oz/a		C												
	Ammonium Sulfate	3.3	lb/100 gal		C												
<b>PRE / POST III 5-1-15 / 6-8-15</b>																	
1	SOA 2,4,9,14,15,							99	a	99	a	99	a	98	a	149	ab
	ANTHEM	10	fl oz/a		A												
	STANZA	5	oz/a		A												
	ROUNDUP POWERMAX	32	fl oz/a		D												
	Ammonium Sulfate	3.3	lb/100 gal		D												
4	SOA 2,4,9,15							99	a	99	a	99	a	95	a	145	ab
	SURESTART II	2	pt/a		A												
	ROUNDUP POWERMAX	32	fl oz/a		D												
	Ammonium Sulfate	3.3	lb/100 gal		D												
5	SOA 2,4,9,14,15							90	b	92	b	99	a	98	a	155	a
	STANZA	5	oz/a		A												
	SHARPEN	2	fl oz/a		A												
	ANTHEM	8	fl oz/a		D												
	ROUNDUP POWERMAX	32	fl oz/a		D												
	Ammonium Sulfate	3.3	lb/100 gal		D												
<b>POST I 5-22-15</b>																	
8	SOA 5,9,14,15							84	c	99	a	99	a	97	a	114	c
	ANTHEM ATZ	32	fl oz/a		B												
	ROUNDUP POWERMAX	32	fl oz/a		B												
	Ammonium Sulfate	3.3	lb/100 gal		B												
	NIS	0.25	% v/v		B												
9	SOA 9,15,27							70	d	99	a	99	a	97	a	143	ab
	HALEX GT	3.6	pt/a		B												
	Ammonium Sulfate	3.3	lb/100 gal		B												
	NIS	0.25	% v/v		B												
10	SOA 5,9,14,15,27							84	c	98	a	96	a	94	a	138	b
	ANTHEM	4.25	fl oz/a		B												
	SOLSTICE	2.5	fl oz/a		B												
	AATREX	16	fl oz/a		B												
	ROUNDUP POWERMAX	32	fl oz/a		B												
	Ammonium Sulfate	3.3	lb/100 gal		B												
11	SOA 9							68	d	88	c	53	c	53	c	35	e
	ROUNDUP POWERMAX	32	fl oz/a		B												
	Ammonium Sulfate	3.3	lb/100 gal		B												
<b>POST II 5-28-15</b>																	
12	SOA 9							0	e	97	a	75	b	75	b	76	d
	ROUNDUP POWERMAX	32	fl oz/a		C												
	Ammonium Sulfate	3.3	lb/100 gal		C												
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>								<b>5.3</b>		<b>3.1</b>		<b>3.8</b>		<b>3.9</b>		<b>17</b>	

Means followed by same letter do not significantly differ.

**Table 6. Crop response to Pre/Post Weed Control Programs in Field Corn at Rochester, MN, 2015.**

Date				CROP RESPONSE						YIELD	
				May-27		Jun-3		Jun-18			
Trt	Treatment	Rate	Appl	Percent Injury (%)						Bu/A	
7	UNTREATED CHECKI			0	d	0	d	0	c	1	f
<b>PRE / POST II 5-1-15 / 5-28-15</b>											
2	SOA 9,14,15			0	d	0	d	0	c	101	c
	ANTHEM	10 fl oz/a	A								
	ROUNDUP POWERMAX	32 fl oz/a	C								
	Ammonium Sulfate	3.3 lb/100 gal	C								
3	SOA 5,9,14,15			0	d	0	d	0	c	78	d
	ANTHEM	10 fl oz/a	A								
	AATREX	32 fl oz/a	A								
	ROUNDUP POWERMAX	32 fl oz/a	C								
	Ammonium Sulfate	3.3 lb/100 gal	C								
6	SOA 9,14,15,27			0	d	10	a	5	b	143	ab
	ANTHEM	8 fl oz/a	A								
	SOLSTICE	3 fl oz/a	C								
	ROUNDUP POWERMAX	32 fl oz/a	C								
	Ammonium Sulfate	3.3 lb/100 gal	C								
<b>PRE / POST III 5-1-15 / 6-8-15</b>											
1	SOA 2,4,9,14,15,			0	d	0	d	0	c	149	ab
	ANTHEM	10 fl oz/a	A								
	STANZA	5 oz/a	A								
	ROUNDUP POWERMAX	32 fl oz/a	D								
	Ammonium Sulfate	3.3 lb/100 gal	D								
4	SOA 2,4,9,15			0	d	0	d	0	c	145	ab
	SURESTART II	2 pt/a	A								
	ROUNDUP POWERMAX	32 fl oz/a	D								
	Ammonium Sulfate	3.3 lb/100 gal	D								
5	SOA 2,4,9,14,15			0	d	0	d	15	a	155	a
	STANZA	5 oz/a	A								
	SHARPEN	2 fl oz/a	A								
	ANTHEM	8 fl oz/a	D								
	ROUNDUP POWERMAX	32 fl oz/a	D								
	Ammonium Sulfate	3.3 lb/100 gal	D								
<b>POST I 5-22-15</b>											
8	SOA 5,9,14,15			16	b	6	b	0	c	114	c
	ANTHEM ATZ	32 fl oz/a	B								
	ROUNDUP POWERMAX	32 fl oz/a	B								
	Ammonium Sulfate	3.3 lb/100 gal	B								
	NIS	0.25 % v/v	B								
9	SOA 9,15,27			9	c	4	c	0	c	143	ab
	HALEX GT	3.6 pt/a	B								
	Ammonium Sulfate	3.3 lb/100 gal	B								
	NIS	0.25 % v/v	B								
10	SOA 5,9,14,15,27			19	a	9	a	0	c	138	b
	ANTHEM	4.25 fl oz/a	B								
	SOLSTICE	2.5 fl oz/a	B								
	AATREX	16 fl oz/a	B								
	ROUNDUP POWERMAX	32 fl oz/a	B								
	Ammonium Sulfate	3.3 lb/100 gal	B								
11	SOA 9			0	d	0	d	0	c	35	e
	ROUNDUP POWERMAX	32 fl oz/a	B								
	Ammonium Sulfate	3.3 lb/100 gal	B								
<b>POST II 5-28-15</b>											
12	SOA 9			0	d	0	d	0	c	76	d
	ROUNDUP POWERMAX	32 fl oz/a	C								
	Ammonium Sulfate	3.3 lb/100 gal	C								
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				<b>2.0</b>		<b>1.5</b>		<b>1.1</b>		<b>17</b>	

Means followed by same letter do not significantly differ.

## Comparisons of Herbicide Systems for Weed Control in Field Corn at Rochester, MN in 2015

Behnken, Lisa M., Fritz R. Breitenbach, Jeffery Gunsolus, and Thomas Hoverstad

The objective of this trial was to evaluate herbicide systems in field corn 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 14 ppm and 116 ppm, respectively. Spring fertilizer was broadcast ahead of a planting on April 13, 2015 at a rate of 120-23-90-24 (N-P-K-S). The field was disked and field cultivated once prior to planting. The previous crop was soybean. The corn hybrid, DEKALB DKC49-72RIB, was planted April 28, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 32,000 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) treatments were applied with a tractor-mounted sprayer delivering 15 gpa at 40 psi using TTI 11015 spray tips. Evaluations of the plots were taken May 15, May 27, June 3, June 10, and August 11. The center two rows of each plot were machine harvested on October 30, 2015. Application dates, environmental conditions and weed stages can be found in Table 1. Performance ratings for giant ragweed control, common lambsquarters control, common waterhemp control and grass control can be found in Tables 2 through 5 respectively. Minor crop injury was only observed in three postemergence treatments, 18, 20 and 25, and only on the rating date immediately after the application. (University of Minnesota Extension Regional Office, Rochester.)

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

Date	4/28	5/22	5/28	6/2	6/8	6/10
<b>Treatment</b>	PRE	POST I	POST II	POST III	POST IV	POST V
<b>Temperature (F)</b>						
Air	60	66	71	73	76	76
Soil	59.2	65.5	62.9	72	76.6	83.3
<b>Relative Humidity (%)</b>	33	35	68	49	51	49
<b>Wind (mph)</b>	13	6	12	16	12	8
<b>Soil Moisture</b>	Adequate	Adequate	Excessive	Adequate	Adequate	Adequate
<b>Corn</b>						
Stage			V2-V3	4-collar	5-collar	6-collar
Height (in)		2.5	5.0	7.0	13.0	12.5
<b>Giant Ragweed</b>						
Weed Density (ft <sup>2</sup> )					18	
Height (in)	0.0	2.8	4.5	4.2	4.6	2.8
<b>Common Waterhemp</b>						
Weed Density (ft <sup>2</sup> )					6	
Height (in)	0.0	0.3	0.5	0.0	2.3	1.4
<b>Common Lambsquarter</b>						
Weed Density (ft <sup>2</sup> )					38	
Height (in)	0.0	0.4	0.9	1.3	1.3	1.6
<b>Grass</b>						
Weed Density (ft <sup>2</sup> )					19	
Height (in)	0.0	0.6	0.6	1.5	1.8	1.5
<b>Rainfall after each application (inch)</b>						
Week 1	0.42	1.47	1.32	1.64	1.64	1.69
Week 2	1.53	1.32	1.41	1.69	0.05	0.78
Week 3	1.12	2.82	1.69	0.78	1.95	1.63

**Table 2. Giant ragweed control in herbicide systems for field corn at Rochester MN in 2015.**

Weed Code				Giant Ragweed										YIELD		
Rating Date				May-15-15		May-27-15		Jun-3-15		Jun-10-15		Aug-11-15		Oct-20-15		
No.	Name	Rate Unit	Stg	Code	Percent control (%)										Bu/A	
23	Weedy				0	j	0	k	0	l	0	k	0	j	5.8	l
<b>PRE 4-28-15</b>																
1	SOA 5, 15, 27 Acuron	3pt/a	Pre	A	78	cd	93	bc	94	d-g	91	efg	92	g	185.6	b-g
<b>PRE / POST II 4-28-15 / 5-28-15</b>																
2	SOA 15 / 4, 9 Harness Diflexx Roundup Power Max Destiny HC N-Pa-K AMS	1.25pt/a 10oz/a 28oz/a 0.5% v/v 2qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C	6	ij	24	i	97	a-d	95	b-e	92	fg	197.0	bcd
4	SOA 15 / 4, 9, 27 Harness Laudis Flexx Roundup Power Max Destiny HC N-Pa-K AMS	1.25pt/a 32oz/a 28oz/a 0.5% v/v 2qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C	13	hi	29	h	98	abc	97	abc	97	a-e	201.2	bc
5	SOA 15 / 2, 9, 27 BreakFree Realm Q 4 oz/A - rimsulfuron - mesotrione - Isoxadifen-ethyl Abundit Extra NIS N-Pa-K AMS	2pt/a 1.2oz/a 2.5oz/a 0.3oz/a 32oz/a 0.25% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C C C	34	g	39	g	96	b-f	96	abc	96	b-f	197.1	bcd
9	SOA 15 / 2, 4, 9, 15, 27 Dual II Magnum Halex GT NorthStar NIS N-Pa-K AMS	2pt/a 3.6pt/a 3oz/a 0.25% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C	0	j	18	j	96	b-f	98	abc	98	abc	201.9	b
16	SOA 14, 15 / 14, 27, 9 Anthem Solstice Roundup Power Max N-Pa-K AMS	8oz/a 3oz/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds 4" weeds	A C C C	20	h	18	j	92	ghi	97	abc	97	a-e	182.0	d-h
<b>PRE / POST III 4-28-15 / 6-2-15</b>																
7	SOA 15 / 4, 9, 19 Harness Roundup Power Max Status N-Pa-K AMS	2.25pt/a 32oz/a 5oz/a 3qt/a	Pre 4" weeds 4" weeds 4" weeds	A D D D	54	e	48	f	80	k	97	abc	95	c-g	185.8	b-g
17	SOA 15 / 9, 27 Harness Impact Roundup Power Max Destiny HC N-Pa-K AMS	2.25pt/a 0.75oz/a 32oz/a 0.5% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A D D D D	45	f	41	g	81	k	97	abc	94	d-g	188.6	b-f
<b>PRE / POST IV 4-28-15 / 6-8-15</b>																
8	SOA 2, 4, 15 / 9, 27 TripleFlex II Impact Roundup Power Max Destiny HC N-Pa-K AMS	2pt/a 0.75oz/a 32oz/a 0.5% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A E E E E	73	d	90	c	88	j	81	i	95	c-g	220.4	a
12	SOA 2, 4, 15 / 9 Surestart II Durango DMA N-Pa-K AMS	2pt/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds	A E E	71	d	90	c	88	j	80	i	94	d-g	198.0	bcd
<b>PRE / POST V 4-28-15 / 6-10-15</b>																
3	SOA 2, 27 / 5, 10 Corvus Liberty atrazine N-Pa-K AMS	5.6oz/a 22oz/a 16oz/a 2qt/a	Pre 4" weeds 4" weeds 4" weeds	A F F F	76	d	93	bc	93	fgh	90	fgh	98	abc	200.7	bc
6	SOA 5, 15 / 2, 9, 27 Breakfree NXT Lite Instigate 6 oz/A - rimsulfuron - mesotrione Abundit Extra N-Pa-K AMS	1.75qt/a 1oz/a 5oz/a 32oz/a 3qt/a	Pre A A A 4" weeds 4" weeds	A A A F F	86	bc	95	ab	97	b-e	95	b-e	98	abc	197.6	bcd
10	SOA 4, 15, 27 / 9 Resicore Durango DMA N-Pa-K AMS	2.75qt/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds	A F F	96	a	97	ab	97	b-e	97	abc	99	ab	187.0	b-g
11	SOA 4,15, 27 / 4, 15, 27, 9 Resicore Resicore Durango DMA N-Pa-K AMS	1.5qt/a 1.25qt/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds 4" weeds	A F F F	87	b	93	bc	93	fgh	91	d-g	99	ab	182.9	d-g
13	SOA 2,4,15 / 9 Surestart II Durango DMA N-Pa-K AMS	2.5pt/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds	A F F	86	b	94	bc	92	ghi	87	h	92	g	160.4	j

**Table 2. (continued) Giant ragweed control in herbicide systems for field corn at Rochester MN in 2015.**

Weed Code				Giant Ragweed					YIELD						
Rating Date				May-15-15	May-27-15	Jun-3-15	Jun-10-15	Aug-11-15	Oct-20-15						
No.	Name	Rate Unit	Stg Code	Percent control (%)					Bu/A						
14	SOA 14, 15 / 9, 15, 27			97	a	97	ab	95	c-g	91	e-h	98	abc	172.5	f-j
	Verdict	18oz/a	Pre												
	Armezon	0.5oz/a	4" weeds												
	Outlook	12oz/a	4" weeds												
	Roundup Power Max	22oz/a	4" weeds												
	NIS	0.25% v/v	4" weeds												
	N-Pa-K AMS	3qt/a	4" weeds												
15	SOA 14, 15 / 4, 9, 19			96	a	95	ab	94	efg	88	gh	98	abc	166.1	hij
	Verdict	16oz/a	Pre												
	Roundup Power Max	32oz/a	4" weeds												
	Status	5oz/a	4" weeds												
	NIS	0.25% v/v	4" weeds												
	N-Pa-K AMS	3qt/a	4" weeds												
27	SOA 14, 15 / 4, 9, 19			94	ab	96	ab	96	b-f	90	fgh	98	abc	180.6	e-h
	Verdict	16oz/a	Pre												
	Roundup Power Max	32oz/a	3-4" weeds												
	Status	5oz/a	3-4" weeds												
	NIS	0.25% v/v	3-4" weeds												
	N-Pa-K AMS	3qt/a	3-4" weeds												
<b>POST I / POST V 5-22-15 / 6-10-15</b>															
18	SOA 2, 5, 27 / 10			0	j	50	f	96	b-f	96	bcd	98	abc	178.0	e-1
	Capreno	3oz/a	1" weeds												
	atrazine	16oz/a	1" weeds												
	Superb HC	0.5% v/v	1" weeds												
	N-Pa-K AMS	2qt/a	1" weeds												
	Liberty	22oz/a	4" weeds												
	N-Pa-K AMS	2qt/a	4" weeds												
<b>POST I 5-22-15</b>															
25	SOA 4, 9, 15, 27			0	j	80	d	98	abc	94	c-f	95	c-g	192.7	b-e
	Roundup WeatherMax	32oz/a	1-2" Weeds												
	Dual II Magnum	1.33pt/a	1-2" Weeds												
	Laudis	3oz/a	1-2" Weeds												
	Clarity	8oz/a	1-2" Weeds												
	Destiny HC	0.5% v/v	1-2" Weeds												
	N-Pa-K AMS	2qt/a	1-2" Weeds												
26	SOA 9			0	j	70	e	89	ij	74	j	74	i	96.0	k
	Roundup WeatherMax	32oz/a	1-2" Weeds												
	N-Pa-K AMS	2qt/a	1-2" Weeds												
<b>POST II 5-28-15</b>															
19	SOA 5, 9, 15, 27			0	j	0	k	90	hij	99	ab	99	ab	185.4	c-g
	Acuron	3pt/a	2" weeds												
	Touchdown Total	30oz/a	2" weeds												
	N-Pa-K AMS	3qt/a	2" weeds												
20	SOA 9, 14, 15, 27			0	j	0	k	94	d-g	97	abc	98	a-d	172.1	g-j
	Solstice	2.5oz/a	2" weeds												
	Anthem	4.25oz/a	2" weeds												
	Roundup Power Max	32oz/a	2" weeds												
	NIS	0.25% v/v	2" weeds												
	N-Pa-K AMS	3qt/a	2" weeds												
	SOA 2, 4, 9, 15														
21	SureStart II	2pt/a	2" weeds	0	j	0	k	99	ab	97	abc	94	efg	190.2	b-e
	Durango DMA	32oz/a	2" weeds												
	N-Pa-K AMS	3qt/a	2" weeds												
22	SOA 2, 9, 15, 27			0	j	0	k	93	fgh	95	b-e	95	b-g	177.9	e-i
	Realm Q 4 oz/A		2" weeds												
	- rimsulfuron	1.2oz/a	2" weeds												
	- mesotrione	2.5oz/a	2" weeds												
	- isoxadifen-ethyl	0.3oz/a	2" weeds												
	Abundit Extra	32oz/a	2" weeds												
	NIS	0.25% v/v	2" weeds												
	N-Pa-K AMS	3qt/a	2" weeds												
28	SOA 9			0	j	0	k	95	c-g	87	gh	86	h	163.7	ij
	Roundup WeatherMax	32oz/a	3-4" weeds												
	N-Pa-K AMS	2qt/a	3-4" weeds												
24	Weed - Free		E	100	a	100	a	100	a	100	a	100	a	194.2	b-e
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				<b>8</b>		<b>5</b>		<b>3</b>		<b>5</b>		<b>4</b>		<b>16</b>	



**Table 3. Common lambsquarters control with different herbicide systems in corn at Rochester, MN in 2015.**

Weed Code				CHEAL								Yield		
				Common lambsquarters										
Rating Date				May-27-15		Jun-3-15		Jun-10-15		Aug-11-15		Oct-20-15		
Trt	Treatment	Rate	Grow	Appl	Percent Control (%)								BU/A	
23	Weedy				0	h	0	e	0	f	0	i	5.8	l
<b>PRE 4-28-15</b>														
1	SOA 5, 15, 27 Acuron	3pt/a	Pre	A	99	b	99	b	99	ab	99	ab	185.6	b-g
<b>PRE / POST II 4-28-15 / 5-28-15</b>														
2	SOA 15 / 4, 9 Harness Diflexx Roundup Power Max Destiny HC N-Pa-K AMS	1.25pt/a 10oz/a 28oz/a 0.5% v/v 2qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C	99	b	99	b	99	ab	94	g	197.0	bcd
4	SOA 15 / 4, 9, 27 Harness Laudis Flexx Roundup Power Max Destiny HC N-Pa-K AMS	1.25pt/a 32oz/a 28oz/a 0.5% v/v 2qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C	98	c	99	b	99	ab	98	cd	201.2	bc
5	SOA 15 / 2, 9, 27 BreakFree Realm Q 4 oz/A - rimsulfuron - mesotrione - Isoxadifen-ethyl Abundit Extra NIS N-Pa-K AMS	2pt/a 1.2oz/a 2.5oz/a 0.3oz/a 32oz/a 0.25% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C C C	99	b	99	b	99	ab	99	ab	197.1	bcd
9	SOA 15 / 2, 4, 9, 15, 27 Dual II Magnum Halex GT NorthStar NIS N-Pa-K AMS	2pt/a 3.6pt/a 3oz/a 0.25% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C	96	d	99	b	99	ab	99	ab	201.9	b
16	SOA 14, 15 / 14, 27, 9 Anthem Solstice Roundup Power Max N-Pa-K AMS	8oz/a 3oz/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds 4" weeds	A C C C	98	c	99	b	99	ab	99	ab	182.0	d-h
<b>PRE / POST III 4-28-15 / 6-2-15</b>														
7	SOA 15 / 4, 9, 19 Harness Roundup Power Max Status N-Pa-K AMS	2.25pt/a 32oz/a 5oz/a 3qt/a	Pre 4" weeds 4" weeds 4" weeds	A D D D	99	b	99	b	99	ab	96	ef	185.8	b-g
17	SOA 15 / 9, 27 Harness Impact Roundup Power Max Destiny HC N-Pa-K AMS	2.25pt/a 0.75oz/a 32oz/a 0.5% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A D D D D	99	b	99	b	99	ab	99	bc	188.6	b-f
<b>PRE / POST IV 4-28-15 / 6-8-15</b>														
8	SOA 2, 4, 15 / 9, 27 TripleFlex II Impact Roundup Power Max Destiny HC N-Pa-K AMS	2pt/a 0.75oz/a 32oz/a 0.5% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A E E E E	99	b	99	b	99	ab	98	bcd	220.4	a
12	SOA 2, 4, 15 / 9 Surestart II Durango DMA N-Pa-K AMS	2pt/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds	A E E	99	b	99	b	99	ab	98	bcd	198.0	bcd
<b>PRE / POST V 4-28-15 / 6-10-15</b>														
3	SOA 2, 27 / 5, 10 Corvus Liberty atrazine N-Pa-K AMS	5.6oz/a 22oz/a 16oz/a 2qt/a	Pre 4" weeds 4" weeds 4" weeds	A F F F	99	b	99	b	99	ab	99	ab	200.7	bc
6	SOA 5, 15 / 2, 9, 27 Breakfree NXT Lite Instigate 6 oz/A - rimsulfuron - mesotrione Abundit Extra N-Pa-K AMS	1.75qt/a 1oz/a 5oz/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A A A A F F	99	b	99	b	99	ab	99	ab	197.6	bcd
10	SOA 4, 15, 27 / 9 Resicore Durango DMA N-Pa-K AMS	2.75qt/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds	A F F	99	b	99	b	99	ab	99	bc	187.0	b-g
11	SOA 4,15, 27 / 4, 15, 27, 9 Resicore Resicore Durango DMA N-Pa-K AMS	1.5qt/a 1.25qt/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds 4" weeds	A F F F	99	b	99	b	99	ab	99	ab	182.9	d-g

**Table 3 (cOntinued) Common lambsquarters control with different herbicide systems in corn at Rochester, MN in 2015.**

Weed Code				CHEAL				Yield	
				Common lambsquarters					
Rating Date				May-27-15	Jun-3-15	Jun-10-15	Aug-11-15	Oct-20-15	
Trt	Treatment	Rate	Grow	Percent Control (%)				BU/A	
13	SOA 2,4,15 / 9 Surestart II Durango DMA N-Pa-K AMS	2.5pt/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds	A F F	99 b	99 b	99 ab	99 bc	160.4 j
14	SOA 14, 15 / 9, 15, 27 Verdict Armezon Outlook Roundup Power Max NIS N-Pa-K AMS	18oz/a 0.5oz/a 12oz/a 22oz/a 0.25% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds 4" weeds	A F F F F F	99 b	99 b	99 ab	99 bc	172.5 f-j
15	SOA 14, 15 / 4, 9, 19 Verdict Roundup Power Max Status NIS N-Pa-K AMS	16oz/a 32oz/a 5oz/a 0.25% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A F F F F	99 b	99 b	99 ab	97 de	166.1 hij
27	SOA 14, 15 / 4, 9, 19 Verdict Roundup Power Max Status NIS N-Pa-K AMS	16oz/a 32oz/a 5oz/a 0.25% v/v 3qt/a	Pre 3-4" WEEDS 3-4" WEEDS 3-4" WEEDS 3-4" WEEDS	A F F F F	99 b	99 b	99 ab	97 de	180.6 e-h
<b>POST I / POST V 5-22-15 / 6-10-15</b>									
18	SOA 2, 5, 27 / 10 Capreno atrazine Superb HC N-Pa-K AMS Liberty N-Pa-K AMS	3oz/a 16oz/a 0.5% v/v 2qt/a 22oz/a 2qt/a	1" weeds 1" weeds 1" weeds 1" weeds 4" weeds 4" weeds	B B B B F F	50 g	99 b	99 ab	99 ab	178.0 e-i
<b>POST I 5-22-15</b>									
25	SOA 4, 9, 15, 27 Roundup WeatherMax Dual II Magnum Laudis Clarity Destiny HC N-Pa-K AMS	32oz/a 1.33pt/a 3oz/a 8oz/a 0.5% v/v 2qt/a	1-2" WEEDS 1-2" WEEDS 1-2" WEEDS 1-2" WEEDS 1-2" WEEDS 1-2" WEEDS	B B B B B B	80 e	99 b	99 ab	98 cd	192.7 b-e
26	SOA 9 Roundup WeatherMax N-Pa-K AMS	32oz/a 2qt/a	1-2" WEEDS 1-2" WEEDS	B B	70 f	95 d	91 e	91 h	96.0 k
<b>POST II 5-28-15</b>									
19	SOA 5, 9,15, 27 Acuron Touchdown Total N-Pa-K AMS	3pt/a 30oz/a 3qt/a	2" weeds 2" weeds 2" weeds	C C C	0 h	99 b	99 ab	99 ab	185.4 c-g
20	SOA 9, 14, 15, 27 Solstice Anthem Roundup Power Max NIS N-Pa-K AMS SOA 2, 4, 9, 15	2.5oz/a 4.25oz/a 32oz/a 0.25% v/v 3qt/a	2" weeds 2" weeds 2" weeds 2" weeds 2" weeds	C C C C C	0 h	99 b	99 ab	99 bc	172.1 g-j
21	SureStart II Durango DMA N-Pa-K AMS	2pt/a 32oz/a 3qt/a	2" weeds 2" weeds 2" weeds	C C C	0 h	99 c	97 c	98 cd	190.2 b-e
22	SOA 2, 9, 15, 27 Realm Q 4 oz/A - rimsulfuron - mesotrione - isoxadifen-ethyl Abundit Extra NIS N-Pa-K AMS	1.2oz/a 2.5oz/a 0.3oz/a 32oz/a 0.25% v/v 3qt/a	2" weeds 2" weeds 2" weeds 2" weeds 2" weeds 2" weeds	C C C C C C	0 h	99 b	98 b	99 bc	177.9 e-i
28	SOA 9 Roundup WeatherMax N-Pa-K AMS	32oz/a 2qt/a	3-4" WEEDS 3-4" WEEDS	C C	0 h	99 b	96 d	96 f	163.7 ij
24	Weed - Free			E	100 a	100 a	100 a	100 a	194.2 b-e
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>					1	0.1	1	1	16

**Table 4. Common waterhemp control with different herbicide systems in corn at Rochester, MN in 2015.**

AMATA														
Weed Code				Common waterhemp								Yield		
Rating Date				May-27-15		Jun-3-15		Jun-10-15		Aug-11-15		Oct-20-15		
No.	Treatment	Rate	Stage	Code	Percent Control (%)								BU/A	
23	Weedy				0	f	0	d	0	f	0	e	5.8	l
<b>PRE 4-28-15</b>														
1	SOA 5, 15, 27 Acuron	3pt/a	Pre	A	99	b	99	b	99	b	99	b	185.6	b-g
<b>PRE / POST II 4-28-15 / 5-28-15</b>														
2	SOA 15 / 4, 9 Harness Diflexx Roundup Power Max Destiny HC N-Pa-K AMS	1.25pt/a 10oz/a 28oz/a 0.5% v/v 2qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C	99	b	99	b	99	b	99	b	197.0	bcd
4	SOA 15 / 4, 9, 27 Harness Laudis Flexx Roundup Power Max Destiny HC N-Pa-K AMS	1.25pt/a 32oz/a 28oz/a 0.5% v/v 2qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C	99	b	99	b	99	b	99	b	201.2	bc
5	SOA 15 / 2, 9, 27 BreakFree Realm Q 4 oz/A - rimsulfuron - mesotrione - Isoxadifen-ethyl Abundit Extra NIS N-Pa-K AMS	2pt/a 1.2oz/a 2.5oz/a 0.3oz/a 32oz/a 0.25% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C C C	99	b	99	b	99	b	99	b	197.1	bcd
9	SOA 15 / 2, 4, 9, 15, 27 Dual II Magnum Halex GT NorthStar NIS N-Pa-K AMS	2pt/a 3.6pt/a 3oz/a 0.25% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C	99	b	99	b	99	b	99	b	201.9	b
16	SOA 14, 15 / 14, 27, 9 Anthem Solstice Roundup Power Max N-Pa-K AMS	8oz/a 3oz/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds 4" weeds	A C C C	99	b	99	b	99	b	99	b	182.0	d-h
<b>PRE / POST III 4-28-15 / 6-2-15</b>														
7	SOA 15 / 4, 9, 19 Harness Roundup Power Max Status N-Pa-K AMS	2.25pt/a 32oz/a 5oz/a 3qt/a	Pre 4" weeds 4" weeds 4" weeds	A D D D	99	b	99	b	99	b	99	b	185.8	b-g
17	SOA 15 / 9, 27 Harness Impact Roundup Power Max Destiny HC N-Pa-K AMS	2.25pt/a 0.75oz/a 32oz/a 0.5% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A D D D D	99	b	99	b	99	b	99	b	188.6	b-f
<b>PRE / POST IV 4-28-15 / 6-8-15</b>														
8	SOA 2, 4, 15 / 9, 27 TripleFlex II Impact Roundup Power Max Destiny HC N-Pa-K AMS	2pt/a 0.75oz/a 32oz/a 0.5% v/v 3qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A E E E E	99	b	99	b	99	b	99	b	220.4	a
12	SOA 2, 4, 15 / 9 Surestart II Durango DMA N-Pa-K AMS SOA 2, 4, 15 / 9	2pt/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds	A E E	99	b	99	b	99	b	99	b	198.0	bcd
<b>PRE / POST V 4-28-15 / 6-10-15</b>														
3	SOA 2, 27 / 5, 10 Corvus Liberty atrazine N-Pa-K AMS	5.6oz/a 22oz/a 16oz/a 2qt/a	Pre 4" weeds 4" weeds 4" weeds	A F F F	99	b	99	b	99	b	99	b	200.7	bc
6	SOA 5, 15 / 2, 9, 27 Breakfree NXT Lite Instigate 6 oz/A - rimsulfuron - mesotrione Abundit Extra N-Pa-K AMS	1.75qt/a 1oz/a 5oz/a 32oz/a 3qt/a	Pre Pre Pre 4" weeds 4" weeds	A A A F F	99	b	99	b	99	b	99	b	197.6	bcd
10	SOA 4, 15, 27 / 9 Resicore Durango DMA N-Pa-K AMS	2.75qt/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds	A F F	99	b	99	b	99	b	99	b	187.0	b-g
11	SOA 4, 15, 27 / 4, 15, 27, 9 Resicore Resicore Durango DMA N-Pa-K AMS	1.5qt/a 1.25qt/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds 4" weeds	A F F F	99	b	99	b	99	b	99	b	182.9	d-g
13	SOA 2, 4, 15 / 9 Surestart II Durango DMA N-Pa-K AMS	2.5pt/a 32oz/a 3qt/a	Pre 4" weeds 4" weeds	A F F	99	b	99	b	99	b	99	b	160.4	j

**Table 4. (continued) Common waterhemp control with different herbicide systems in corn at Rochester, MN in 2015.**

				Common waterhemp								Yield		
Rating Date				May-27-15		Jun-3-15		Jun-10-15		Aug-11-15		Oct-20-15		
No.	Treatment	Rate	Stage	Code	Percent Control (%)								Bu/A	
14	SOA 14, 15 / 9, 15, 27				99	b	99	b	99	b	99	b	172.5	f-j
	Verdict	18oz/a	Pre	A										
	Armezon	0.5oz/a	4" weeds	F										
	Outlook	12oz/a	4" weeds	F										
	Roundup Power Max	22oz/a	4" weeds	F										
	NIS	0.25% v/v	4" weeds	F										
	N-Pa-K AMS	3qt/a	4" weeds	F										
15	SOA 14, 15 / 4, 9, 19				99	b	99	b	99	b	99	b	166.1	hij
	Verdict	16oz/a	Pre	A										
	Roundup Power Max	32oz/a	4" weeds	F										
	Status	5oz/a	4" weeds	F										
	NIS	0.25% v/v	4" weeds	F										
	N-Pa-K AMS	3qt/a	4" weeds	F										
27	SOA 14, 15 / 4, 9, 19				99	b	99	b	99	b	99	b	180.6	e-h
	Verdict	16oz/a	Pre	A										
	Roundup Power Max	32oz/a	3-4" weeds	F										
	Status	5oz/a	3-4" weeds	F										
	NIS	0.25% v/v	3-4" weeds	F										
	N-Pa-K AMS	3qt/a	3-4" weeds	F										
<b>POST I / POST V 5-22-15 / 6-10-15</b>														
18	SOA 2, 5, 27 / 10				50	e	99	b	99	b	99	b	178.0	e-i
	Capreno	3oz/a	1" weeds	B										
	atrazine	16oz/a	1" weeds	B										
	Superb HC	0.5% v/v	1" weeds	B										
	N-Pa-K AMS	2qt/a	1" weeds	B										
	Liberty	22oz/a	4" weeds	F										
	N-Pa-K AMS	2qt/a	4" weeds	F										
<b>POST I 5-22-15</b>														
25	SOA 4, 9, 15, 27				80	c	99	b	99	b	99	b	192.7	b-e
	Roundup WeatherMax	32oz/a	1-2"weeds	B										
	Dual II Magnum	1.33pt/a	1-2"weeds	B										
	Laudis	3oz/a	1-2"weeds	B										
	Clarity	8oz/a	1-2"weeds	B										
	Destiny HC	0.5% v/v	1-2"weeds	B										
	N-Pa-K AMS	2qt/a	1-2"weeds	B										
26	SOA 9				70	d	95	c	91	e	91	d	96.0	k
	Roundup WeatherMax	32oz/a	1-2"weeds	B										
	N-Pa-K AMS	2qt/a	1-2"weeds	B										
<b>POST II 5-28-15</b>														
19	SOA 5, 9,15, 27				0	f	99	b	99	b	99	b	185.4	c-g
	Acuron	3pt/a	2" weeds	C										
	Touchdown Total	30oz/a	2" weeds	C										
	N-Pa-K AMS	3qt/a	2" weeds	C										
20	SOA 9, 14, 15, 27				0	f	99	b	99	b	99	b	172.1	g-j
	Solstice	2.5oz/a	2" weeds	C										
	Anthem	4.25oz/a	2" weeds	C										
	Roundup Power Max	32oz/a	2" weeds	C										
	NIS	0.25% v/v	2" weeds	C										
	N-Pa-K AMS	3qt/a	2" weeds	C										
	SOA 2, 4, 9, 15													
21	SureStart II	2pt/a	2" weeds	C	0	f	99	b	98	c	99	b	190.2	b-e
	Durango DMA	32oz/a	2" weeds	C										
	N-Pa-K AMS	3qt/a	2" weeds	C										
22	SOA 2, 9, 15, 27				0	f	99	b	99	bc	99	b	177.9	e-i
	Realm Q 4 oz/A		2" weeds	C										
	- rimsulfuron	1.2oz/a	2" weeds	C										
	- mesotrione	2.5oz/a	2" weeds	C										
	- isoxadifen-ethyl	0.3oz/a	2" weeds	C										
	Abundit Extra	32oz/a	2" weeds	C										
	NIS	0.25% v/v	2" weeds	C										
	N-Pa-K AMS	3qt/a	2" weeds	C										
28	SOA 9				0	f	99	b	96	d	96	c	163.7	ij
	Roundup WeatherMax	32oz/a	3-4"weeds	C										
	N-Pa-K AMS	2qt/a	3-4"weeds	C										
24	Weed - Free			E	100	a	100	a	100	a	100	a	194.2	b-e
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>									1		1		16	

**Table 5. Grass control with different herbicide systems in corn at Rochester, MN in 2015.**

Weed Code											GRASS					YIELD				
Rating Date											May-27-15		Jun-3-15		Jun-10-15		Aug-11-15		Oct-20-15	
No.	Name	Rate	Unit	Stg	Code	Percent control (%)					Bu/A									
23 Weedy						0	g	0	d	0	h	0	j	5.8	j					
<b>PRE 4-28-15</b>																				
1	SOA 5, 15, 27 Acuron	3	pt/a	Pre	A	99	b	99	a	99	ab	97	a-e	185.6	b-g					
<b>PRE / POST II 4-28-15 / 5-28-15</b>																				
2	SOA 15 / 4, 9 Harness Diflexx Roundup Power Max Destiny HC N-Pa-K AMS	1.25 10 28 0.5 2	pt/a oz/a oz/a % v/v qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C	99	b	99	a	97	abc	93	ef	197.0	bcd					
4	SOA 15 / 4, 9, 27 Harness Laudis Flexx Roundup Power Max Destiny HC N-Pa-K AMS	1.25 32 28 0.5 2	pt/a oz/a oz/a % v/v qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C	99	b	99	a	98	abc	95	b-e	201.2	bc					
5	SOA 15 / 2, 9, 27 BreakFree Realm Q 4 oz/A - rimsulfuron - mesotrione - Isoxadifen-ethyl Abundit Extra NIS N-Pa-K AMS	2 1.2 2.5 0.3 32 0.25 3	pt/a oz/a oz/a oz/a oz/a % v/v qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C C C	99	b	99	a	99	ab	95	b-e	197.1	bcd					
9	SOA 15 / 2, 4, 9, 15, 27 Dual II Magnum Halex GT NorthStar NIS N-Pa-K AMS	2 3.6 3 0.25 3	pt/a pt/a oz/a % v/v qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A C C C C	99	b	99	a	99	a	99	abc	201.9	b					
16	SOA 14, 15 / 14, 27, 9 Anthem Solstice Roundup Power Max N-Pa-K AMS	8 3 32 3	oz/a oz/a oz/a qt/a	Pre 4" weeds 4" weeds 4" weeds	A C C C	98	c	99	a	99	a	97	a-e	182.0	d-h					
<b>PRE / POST III 4-28-15 / 6-2-15</b>																				
7	SOA 15 / 4, 9, 19 Harness Roundup Power Max Status N-Pa-K AMS	2.25 32 5 3	pt/a oz/a oz/a qt/a	Pre 4" weeds 4" weeds 4" weeds	A D D D	99	b	99	a	99	a	96	a-e	185.8	b-g					
17	SOA 15 / 9, 27 Harness Impact Roundup Power Max Destiny HC N-Pa-K AMS	2.25 0.75 32 0.5 3	pt/a oz/a oz/a % v/v qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A D D D D	99	b	99	a	99	a	97	a-e	188.6	b-f					
<b>PRE / POST IV 4-28-15 / 6-8-15</b>																				
8	SOA 2, 4, 15 / 9, 27 TripleFlex II Impact Roundup Power Max Destiny HC N-Pa-K AMS	2 0.75 32 0.5 3	pt/a oz/a oz/a % v/v qt/a	Pre 4" weeds 4" weeds 4" weeds 4" weeds	A E E E E	99	b	99	a	99	a	96	a-e	220.4	a					
12	SOA 2, 4, 15 / 9 Surestart II Durango DMA N-Pa-K AMS SOA 2, 4, 15 / 9	2 32 3	pt/a oz/a qt/a	Pre 4" weeds 4" weeds	A E E	99	b	99	a	99	a	93	ef	198.0	bcd					
<b>PRE / POST V 4-28-15 / 6-10-15</b>																				
3	SOA 2, 27 / 5, 10 Corvus Liberty atrazine N-Pa-K AMS	5.6 22 16 2	oz/a oz/a oz/a qt/a	Pre 4" weeds 4" weeds 4" weeds	A F F F	99	b	99	a	95	a-d	94	cde	200.7	bc					
6	SOA 5, 15 / 2, 9, 27 Breakfree NXT Lite Instigate 6 oz/A - rimsulfuron - mesotrione Abundit Extra N-Pa-K AMS	1.75 1 5 32 3	qt/a oz/a oz/a oz/a qt/a	Pre Pre Pre 4" weeds 4" weeds	A A A F F	99	b	99	a	97	a-d	97	a-e	197.6	bcd					
10	SOA 4, 15, 27 / 9 GF-3471 Durango DMA N-Pa-K AMS	2.75 32 3	qt/a oz/a qt/a	Pre 4" weeds 4" weeds	A F F	99	b	99	a	99	a	97	a-d	187.0	b-g					
11	SOA 4, 15, 27 / 4, 15, 27, 9 GF-3471 GF-3471 Durango DMA N-Pa-K AMS	1.5 1.25 32 3	qt/a qt/a oz/a qt/a	Pre 4" weeds 4" weeds 4" weeds	A F F F	99	b	99	a	91	d	99	ab	182.9	d-g					
13	SOA 2, 4, 15 / 9 Surestart II Durango DMA N-Pa-K AMS	2.5 32 3	pt/a oz/a qt/a	Pre 4" weeds 4" weeds	A F F	99	b	99	a	96	a-d	94	def	160.4	j					

**Table 5. (continued) Grass control with different herbicide systems in corn at Rochester, MN in 2015.**

Weed Code					GRASS				YIELD					
Rating Date					May-27-15	Jun-3-15	Jun-10-15	Aug-11-15	Oct-20-15					
No.	Name	Rate	Unit	Stg	Percent control (%)				Bu/A					
14	SOA 14, 15 / 9, 15, 27				99	b	99	a	97	a-d	99	ab	172.5	f-j
	Verdict	18	oz/a	Pre										
	Armezon	0.5	oz/a	4" weeds										
	Outlook	12	oz/a	4" weeds										
	Roundup Power Max	22	oz/a	4" weeds										
	NIS	0.25	% v/v	4" weeds										
	N-Pa-K AMS	3	qt/a	4" weeds										
15	SOA 14, 15 / 4, 9, 19				99	b	99	a	99	a	95	b-e	166.1	hij
	Verdict	16	oz/a	Pre										
	Roundup Power Max	32	oz/a	4" weeds										
	Status	5	oz/a	4" weeds										
	NIS	0.25	% v/v	4" weeds										
	N-Pa-K AMS	3	qt/a	4" weeds										
27	SOA 14, 15 / 4, 9, 19				99	b	99	a	98	abc	97	a-e	180.6	e-h
	Verdict	16	oz/a	Pre										
	Roundup Power Max	32	oz/a	MIPOWE										
	Status	5	oz/a	MIPOWE										
	NIS	0.25	% v/v	MIPOWE										
	N-Pa-K AMS	3	qt/a	MIPOWE										
<b>POST I / POST V 5-22-15 / 6-10-15</b>														
18	SOA 2, 5, 27 / 10				50	f	95	c	75	f	88	gh	178.0	e-i
	Capreno	3	oz/a	1" weeds										
	atrazine	16	oz/a	1" weeds										
	Superb HC	0.5	% v/v	1" weeds										
	N-Pa-K AMS	2	qt/a	1" weeds										
	Liberty	22	oz/a	4" weeds										
	N-Pa-K AMS	2	qt/a	4" weeds										
<b>POST I 5-22-15</b>														
25	SOA 4, 9, 15, 27				80	d	99	a	98	abc	97	a-d	192.7	b-e
	Roundup WeatherMax	32	oz/a	EAPOWE										
	Dual II Magnum	1.33	pt/a	EAPOWE										
	Laudis	3	oz/a	EAPOWE										
	Clarity	8	oz/a	EAPOWE										
	Destiny HC	0.5	% v/v	EAPOWE										
	N-Pa-K AMS	2	qt/a	EAPOWE										
26	SOA 9				70	e	93	c	69	g	69	i	96.0	k
	Roundup WeatherMax	32	oz/a	EAPOWE										
	N-Pa-K AMS	2	qt/a	EAPOWE										
<b>POST II 5-28-15</b>														
19	SOA 5, 9, 15, 27				0	g	98	ab	93	bcd	96	a-e	185.4	c-g
	Acuron	3	pt/a	2" weeds										
	Touchdown Total	30	oz/a	2" weeds										
	N-Pa-K AMS	3	qt/a	2" weeds										
20	SOA 9, 14, 15, 27				0	g	97	b	95	a-d	95	cde	172.1	g-j
	Solstice	2.5	oz/a	2" weeds										
	Anthem	4.25	oz/a	2" weeds										
	Roundup Power Max	32	oz/a	2" weeds										
	NIS	0.25	% v/v	2" weeds										
	N-Pa-K AMS	3	qt/a	2" weeds										
	SOA 2, 4, 9, 15													
21	SureStart II	2	pt/a	2" weeds	0	g	99	a	92	cd	90	fg	190.2	b-e
	Durango DMA	32	oz/a	2" weeds										
	N-Pa-K AMS	3	qt/a	2" weeds										
22	SOA 2, 9, 15, 27				0	g	95	c	83	e	84	h	177.9	e-i
	Realm Q 4 oz/A			2" weeds										
	- rimsulfuron	1.2	oz/a	2" weeds										
	- mesotrione	2.5	oz/a	2" weeds										
	- isoxadifen-ethyl	0.3	oz/a	2" weeds										
	Abundit Extra	32	oz/a	2" weeds										
	NIS	0.25	% v/v	2" weeds										
	N-Pa-K AMS	3	qt/a	2" weeds										
28	SOA 9				0	g	98	ab	73	fg	73	i	163.7	ij
	Roundup WeatherMax	32	oz/a	MIPOWE										
	N-Pa-K AMS	2	qt/a	MIPOWE										
24	Weed - Free			E	100	a	100	a	100	a	100	a	194.2	b-e
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>					<b>0.4</b>		<b>2</b>		<b>6</b>		<b>5</b>		<b>16</b>	



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**2015 Corn Herbicide Evaluation  
Lamberton**

Herbicide	Rate (product/A)	Pre			Final			H2O %	Yield Bu/A
		Yeft	Tahw	Colq	Yeft	Tahw	Colq		
<b>Preemergence</b>		<b>% Control</b>							
1 Acuron	3 pt	81	99	96	18	99	99	229	
<b>Preemergence/POST III (4" weeds)</b>									
2 Harness / Diflexx + Roundup PowerMax + Destiny HC + AMS	1.25 pt / 10 oz + 28 oz + 0.5% + 2 qt	90	97	92	81	99	99	225	
3 Corvus / Liberty + atrazine + AMS	5.6 oz / 22 oz + 16 oz + 2 qt	78	99	99	96	99	99	220	
4 Harness / Diflexx + Roundup PowerMax + Destiny HC + AMS	1.25 pt / 32 oz + 28 oz + 0.5% + 2 qt	91	98	88	88	99	99	225	
5 Breakfree / Realm Q + Abundit Extra+ NIS + AMS	2 pt / 4 oz + 32 oz + 0.25%+ 3qt	91	99	93	88	99	99	232	
6 Breakfree NXT Lite / Instigate + Abundit Extra+ NIS + AMS	1.75 qt / 6 oz + 32 oz + 3qt	95	99	99	76	99	99	230	
7 Harness / Roundup PowerMax + Status + AMS	2.25 pt / 32 oz + 5 oz + 3 qt	94	99	84	86	99	99	228	
8 TripleFlex II / Impact + Roundup PowerMax + Destiny HC + AMS	2 pt / 0.75 oz + 32 oz + 0.5 % + 3 qt	93	99	96	80	99	99	232	
9 Dual II Magnum / Halex GT + Northstar + NIS + AMS	2 pt / 3.6 pt + 3 oz + 0.25% + 3 qt	88	99	75	96	99	99	236	
10 Resicore / Durango + AMS	3 qt / 32 oz + 3 qt	95	99	99	83	99	99	226	
11 Resicore / Resicore + Durango + AMS	1.5 qt / 1.25 qt + 32 oz + 3 qt	92	99	99	97	99	99	228	
12 SureStart II / Durango + AMS	2 pt / 32 oz + 3 qt	91	99	96	83	99	99	239	
13 SureStart II / Durango + AMS	2.5 pt / 32 oz + 3 qt	94	99	99	80	99	98	234	
14 Verdict / Armezon + Outlook + Roundup PowerMax + NIS + AMS	18 oz / 0.5 oz + 12 oz + 22 oz + 0.25% + 3 qt	89	99	97	98	99	99	235	
15 Verdict / Roundup PowerMax + Status + NIS + AMS	16 oz / 32 oz + 5 oz + 0.25% + 3 qt	88	99	98	85	99	99	234	
16 Anthem / Roundup PowerMax + Solstice + AMS	8 oz / 32 oz + 3 oz + 3 qt	83	99	92	91	99	99	235	
17 Harness / Impact + Roundup PowerMax + Destiny HC + AMS	2.25 pt / 0.75 oz + 32 oz + 0.5% + 3 qt	93	99	88	86	99	99	243	
<b>POST I (1" weeds) / POST III (4" weeds)</b>									
18 Capreno + atrazine + Superb HC + AMS / Liberty + AMS	3 oz + 16 oz +0.5% + 2 qt / 22 oz + 2 qt	0	0	0	97	99	98	234	
<b>POST II (2" weeds)</b>									
19 Acuron + Touchdown Total + AMS	3 pt + 30 oz + 3 qt	0	0	0	73	99	99	226	
20 Solstice + Anthem + Roundup PowerMax + NIS + AMS	2.5 oz + 4.25 oz + 32 oz + 0.25% + 3 qt	0	0	0	71	99	99	236	
21 SureStart + Durango + AMS	2 pt + 32 oz + 3 qt	0	0	0	73	99	99	228	
22 Realm Q + Abundit Extra + NIS + AMS	4 oz + 32 oz + 0.25% + 3 qt	0	0	0	39	99	99	217	
<b>Checks</b>									
23 Weedy Check	-	0	0	0	0	0	0	128	
24 Weed-Free Check	-	100	100	100	100	100	100	229	
<b>LSD (0.10)</b>		<b>5</b>	<b>1</b>	<b>8</b>	<b>12</b>	<b>1</b>	<b>1</b>	<b>14</b>	



**2015 Corn Herbicide Evaluation  
Rochester**

Herbicide	Rate (product/A)	Pre				Final				H2O	Yield
		Grs	Girw	Colq	Tawh	Grs	Girw	Colq	Tawh		
<b>Preemergence</b>											
1 Acuron	3 pt	99	93	99	99	97	92	99	99	14.5	174
<b>Preemergence/POST III (4" weeds)</b>											
2 Harness / Diflexx + Roundup PowerMax + Destiny HC + AMS	1.25 pt / 10 oz + 28 oz + 0.5% + 2 qt	99	24	99	99	93	92	94	99	14.8	191
3 Corvus / Liberty + atrazine + AMS	5.6 oz / 22 oz + 16 oz + 2 qt	99	93	99	99	94	98	99	99	14.6	193
4 Harness / Diflexx + Roundup PowerMax + Destiny HC + AMS	1.25 pt / 32 oz + 28 oz + 0.5% + 2 qt	99	29	98	99	95	97	98	99	14.8	194
5 Breakfree / Realm Q + Abundit Extra+ NIS + AMS	2 pt / 4 oz + 32 oz + 0.25%+ 3qt	99	39	99	99	95	96	99	99	14.7	190
6 Breakfree NXT Lite / Instigate + Abundit Extra+ NIS + AMS	1.75 qt / 6 oz + 32 oz + 3qt	99	95	99	99	97	98	99	99	14.6	190
7 Harness / Roundup PowerMax + Status + AMS	2.25 pt / 32 oz + 5 oz + 3 qt	99	48	99	99	96	95	96	99	14.7	179
8 TripleFlex II / Impact + Roundup PowerMax + Destiny HC + AMS	2 pt / 0.75 oz + 32 oz + 0.5 % + 3 qt	99	90	99	99	96	95	98	99	14.7	208
9 Dual II Magnum / Halex GT + Northstar + NIS + AMS	2 pt / 3.6 pt + 3 oz + 0.25% + 3 qt	99	18	96	99	99	98	99	99	14.7	194
10 Resicore / Durango + AMS	3 qt / 32 oz + 3 qt	99	97	99	99	97	99	99	99	14.5	180
11 Resicore / Resicore + Durango + AMS	1.5 qt / 1.25 qt + 32 oz + 3 qt	99	93	99	99	99	99	99	99	14.4	175
12 SureStart II / Durango + AMS	2 pt / 32 oz + 3 qt	99	90	99	99	93	94	98	99	14.6	191
13 SureStart II / Durango + AMS	2.5 pt / 32 oz + 3 qt	99	94	99	99	94	92	99	99	14.4	153
14 Verdict / Armezon + Outlook + Roundup PowerMax + NIS + AMS	18 oz / 0.5 oz + 12 oz + 22 oz + 0.25% + 3 qt	99	97	99	99	99	98	99	99	14.5	166
15 Verdict / Roundup PowerMax + Status + NIS + AMS	16 oz / 32 oz + 5 oz + 0.25% + 3 qt	99	95	99	99	95	98	97	99	14.4	159
16 Anthem / Roundup PowerMax + Solstice + AMS	8 oz / 32 oz + 3 oz + 3 qt	98	18	98	99	97	97	99	99	14.4	174
17 Harness / Impact + Roundup PowerMax + Destiny HC + AMS	2.25 pt / 0.75 oz + 32 oz + 0.5% + 3 qt	99	41	99	99	97	94	99	99	14.5	181
<b>POST I (1" weeds) / POST III (4" weeds)</b>											
18 Capreno + atrazine + Superb HC + AMS / Liberty + AMS	3 oz + 16 oz +0.5% + 2 qt / 22 oz + 2 qt	50	50	50	50	88	98	99	99	14.4	170
<b>POST II (2" weeds)</b>											
19 Acuron + Touchdown Total + AMS	3 pt + 30 oz + 3 qt	0	0	0	0	96	99	99	99	14.6	179
20 Solstice + Anthem + Roundup PowerMax + NIS + AMS	2.5 oz + 4.25 oz + 32 oz + 0.25% + 3 qt	0	0	0	0	95	98	99	99	14.3	164
21 SureStart + Durango + AMS	2 pt + 32 oz + 3 qt	0	0	0	0	90	94	98	99	14.4	182
22 Realm Q + Abundit Extra + NIS + AMS	4 oz + 32 oz + 0.25% + 3 qt	0	0	0	0	84	95	99	99	14.7	172
<b>Checks</b>											
23 Weedy Check	-	0	0	0	0	0	0	0	0	14.5	6
24 Weed-Free Check	-	100	100	100	100	100	100	100	100	14.6	187
<b>LSD (0.10)</b>		<b>1</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>ns</b>	<b>19</b>

**2015 Corn Herbicide Evaluation  
Common Ragweed Site**

Herbicide	Rate (product/A)	Pre					Final					H2O	Yield
		Gift	Corw	Colq	Vele	Rrpw	Gift	Corw	Colq	Vele	Rrpw		
<b>Preemergence</b>		<b>% Control</b>										<b>%</b>	<b>Bu/A</b>
1 Acuron	3 pt	89	94	95	92	95	83	99	99	99	99	16.7	145
<b>Preemergence/POST III (4" weeds)</b>													
2 Harness / Diflexx + Roundup PowerMax + Destiny HC + AMS	1.25 pt / 10 oz + 28 oz + 0.5% + 2 qt	94	71	95	68	95	98	99	99	99	99	16.7	146
3 Corvus / Liberty + atrazine + AMS	5.6 oz / 22 oz + 16 oz + 2 qt	95	95	95	95	95	99	99	99	99	99	16.6	158
4 Harness / Diflexx + Roundup PowerMax + Destiny HC + AMS	1.25 pt / 32 oz + 28 oz + 0.5% + 2 qt	95	80	91	76	95	99	99	99	99	99	16.6	144
5 Breakfree / Realm Q + Abundit Extra+ NIS + AMS	2 pt / 4 oz + 32 oz + 0.25%+ 3qt	95	86	95	69	95	99	96	99	99	99	16.7	170
6 Breakfree NXT Lite / Instigate + Abundit Extra+ NIS + AMS	1.75 qt / 6 oz + 32 oz + 3qt	92	93	95	91	95	98	99	99	99	99	16.6	159
7 Harness / Roundup PowerMax + Status + AMS	2.25 pt / 32 oz + 5 oz + 3 qt	95	94	95	90	95	99	99	99	98	99	16.7	174
8 TripleFlex II / Impact + Roundup PowerMax + Destiny HC + AMS	2 pt / 0.75 oz + 32 oz + 0.5 % + 3 qt	94	95	95	86	95	99	99	99	99	99	16.6	172
9 Dual II Magnum / Halex GT + Northstar + NIS + AMS	2 pt / 3.6 pt + 3 oz + 0.25% + 3 qt	94	79	85	76	95	99	99	99	99	99	16.7	166
10 Resicore / Durango + AMS	3 qt / 32 oz + 3 qt	95	95	95	95	95	99	99	99	99	99	16.6	171
11 Resicore / Resicore + Durango + AMS	1.5 qt / 1.25 qt + 32 oz + 3 qt	93	95	95	93	95	99	99	99	99	99	16.6	155
12 SureStart II / Durango + AMS	2 pt / 32 oz + 3 qt	92	94	94	94	95	99	98	99	99	99	16.7	143
13 SureStart II / Durango + AMS	2.5 pt / 32 oz + 3 qt	94	95	95	89	95	99	99	99	99	99	16.6	158
14 Verdict / Armezon + Outlook + Roundup PowerMax + NIS + AMS	18 oz / 0.5 oz + 12 oz + 22 oz + 0.25% + 3 qt	95	95	95	95	95	99	99	99	99	99	16.5	169
15 Verdict / Roundup PowerMax + Status + NIS + AMS	16 oz / 32 oz + 5 oz + 0.25% + 3 qt	94	95	95	95	95	99	99	99	99	99	16.6	163
16 Anthem / Roundup PowerMax + Solstice + AMS	8 oz / 32 oz + 3 oz + 3 qt	95	80	91	90	95	99	99	99	99	99	16.6	163
17 Harness / Impact + Roundup PowerMax + Destiny HC + AMS	2.25 pt / 0.75 oz + 32 oz + 0.5% + 3 qt	95	90	95	75	95	99	99	99	99	99	16.9	173
<b>POST I (1" weeds) / POST III (4" weeds)</b>													
18 Capreno + atrazine + Superb HC + AMS / Liberty + AMS	3 oz + 16 oz +0.5% + 2 qt / 22 oz + 2 qt	93	94	95	91	95	98	99	99	99	99	16.6	163
<b>POST II (2" weeds)</b>													
19 Acuron + Touchdown Total + AMS	3 pt + 30 oz + 3 qt	93	95	95	91	95	98	99	99	99	99	16.6	176
20 Solstice + Anthem + Roundup PowerMax + NIS + AMS	2.5 oz + 4.25 oz + 32 oz + 0.25% + 3 qt	95	94	95	95	95	98	97	99	99	99	16.6	163
21 SureStart + Durango + AMS	2 pt + 32 oz + 3 qt	95	94	95	95	95	99	99	99	99	99	16.6	174
22 Realm Q + Abundit Extra + NIS + AMS	4 oz + 32 oz + 0.25% + 3 qt	94	89	95	93	95	93	95	99	99	99	16.7	183
<b>Checks</b>													
23 Weedy Check	-	0	0	0	0	0	0	0	0	0	0	16.1	104
24 Weed-Free Check	-	100	100	100	100	100	100	100	100	100	100	16.5	173
<b>LSD (0.10)</b>		<b>2</b>	<b>7</b>	<b>4</b>	<b>9</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>ns</b>	<b>28</b>

**2015 Corn Herbicide Evaluation**  
Average across locations

Herbicide	Rate	Pre					Final					H2O	Yield	
		Grass	Corw	Girw	Amar sp	Colq	Grass	Corw	Girw	Amar sp	Colq			
		3	1	1	3	3	3	1	1	3	3	3	3	3
<b>Preemergence</b>	(product/A)	% Control												
1 Acuron	3 pt	90	94	93	98	97	66	99	92	99	99	15.6	Bu/A	183
<b>Preemergence/POST III (4" weeds)</b>														
2 Harness / Diflexx + Roundup PowerMax + Destiny HC + AMS	1.25 pt / 10 oz + 28 oz + 0.5% + 2 qt	94	71	24	97	95	91	99	92	99	97	15.7	187	
3 Corvus / Liberty + atrazine + AMS	5.6 oz / 22 oz + 16 oz + 2 qt	91	95	93	98	98	96	99	98	99	99	15.6	190	
4 Harness / Diflexx + Roundup PowerMax + Destiny HC + AMS	1.25 pt / 32 oz + 28 oz + 0.5% + 2 qt	95	80	29	97	93	94	99	97	99	99	15.6	188	
5 Breakfree / Realm Q + Abundit Extra+ NIS + AMS	2 pt / 4 oz + 32 oz + 0.25%+ 3qt	95	86	39	98	96	94	96	96	99	99	15.6	197	
6 Breakfree NXT Lite / Instigate + Abundit Extra+ NIS + AMS	1.75 qt / 6 oz + 32 oz + 3qt	95	93	95	98	98	90	99	98	99	99	15.6	193	
7 Harness / Roundup PowerMax + Status + AMS	2.25 pt / 32 oz + 5 oz + 3 qt	96	94	48	98	93	94	99	95	99	98	15.6	194	
8 TripleFlex II / Impact + Roundup PowerMax + Destiny HC + AMS	2 pt / 0.75 oz + 32 oz + 0.5 % + 3 qt	96	95	90	98	97	92	99	95	99	99	15.6	204	
9 Dual II Magnum / Halex GT + Northstar + NIS + AMS	2 pt / 3.6 pt + 3 oz + 0.25% + 3 qt	94	79	18	98	85	98	99	98	99	99	15.6	199	
10 Resicore / Durango + AMS	3 qt / 32 oz + 3 qt	96	95	97	98	98	93	99	99	99	99	15.5	192	
11 Resicore / Resicore + Durango + AMS	1.5 qt / 1.25 qt + 32 oz + 3 qt	95	95	93	98	98	98	99	99	99	99	15.5	186	
12 SureStart II / Durango + AMS	2 pt / 32 oz + 3 qt	94	94	90	98	96	91	98	94	99	99	15.6	191	
13 SureStart II / Durango + AMS	2.5 pt / 32 oz + 3 qt	96	95	94	98	98	91	99	92	99	99	15.5	182	
14 Verdict / Armezon + Outlook + Roundup PowerMax + NIS + AMS	18 oz / 0.5 oz + 12 oz + 22 oz + 0.25% + 3 qt	94	95	97	98	97	99	99	98	99	99	15.5	190	
15 Verdict / Roundup PowerMax + Status + NIS + AMS	16 oz / 32 oz + 5 oz + 0.25% + 3 qt	94	95	95	98	97	93	99	98	99	98	15.5	185	
16 Anthem / Roundup PowerMax + Solstice + AMS	8 oz / 32 oz + 3 oz + 3 qt	92	80	18	98	94	95	99	97	99	99	15.5	191	
17 Harness / Impact + Roundup PowerMax + Destiny HC + AMS	2.25 pt / 0.75 oz + 32 oz + 0.5% + 3 qt	96	90	41	98	94	94	99	94	99	99	15.6	199	
<b>POST I (1" weeds) / POST III (4" weeds)</b>														
18 Capreno + atrazine + Superb HC + AMS / Liberty + AMS	3 oz + 16 oz +0.5% + 2 qt / 22 oz + 2 qt	48	94	50	48	48	94	99	98	99	99	15.5	189	
<b>POST II (2" weeds)</b>														
19 Acuron + Touchdown Total + AMS	3 pt + 30 oz + 3 qt	31	95	0	32	32	89	99	99	99	99	15.6	193	
20 Solstice + Anthem + Roundup PowerMax + NIS + AMS	2.5 oz + 4.25 oz + 32 oz + 0.25% + 3 qt	32	94	0	32	32	88	97	98	99	99	15.5	188	
21 SureStart + Durango + AMS	2 pt + 32 oz + 3 qt	32	94	0	32	32	87	99	94	99	99	15.5	194	
22 Realm Q + Abundit Extra + NIS + AMS	4 oz + 32 oz + 0.25% + 3 qt	31	89	0	32	32	72	95	95	99	99	15.6	190	
<b>Checks</b>														
23 Weedy Check	-	0	0	0	0	0	0	0	0	0	0	15.4	79	
24 Weed-Free Check	-	100	100	100	100	100	100	100	100	100	100	15.5	197	
<b>LSD (0.10)</b>		<b>2</b>	<b>7</b>	<b>5</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>ns</b>	<b>12</b>	

# Corn Herbicide Evaluation

## SWROC at Lamberton and SROC at Waseca

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### Research Reports

These reports are a summary of weed control research conducted by personnel in the Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul. They have been prepared for the benefit of cooperators and other workers involved in weed control research. They are not intended for publication or reproduction. We have intended to make these reports as accurate as possible. If you have questions, please contact the specific authors for clarification or correction.

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***SECTION***

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**C**

**SOYBEAN**

**VARIETY**

**2015 SE Minnesota Regional Performance of Early Maturity Glyphosate Tolerant (GT) Roundup Ready® (RR) Soybean Varieties (1.3 to 1.8 maturities) at Rochester, MN.**

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

The objective of this study was to compare the performance of early maturity GT/RR® soybean (1.3 to 1.8 maturities) in southeastern Minnesota. The trial was located at Rochester, MN (Lawler site). Field history is reported in Table 1. The trial was planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 150,000 seeds per acre with seed planted at a depth of 1.5 inches in 30 inch rows. Plots were four rows wide by 22 feet in length. A randomized complete block design was implemented and replicated four times. The center two rows of each plot were machine harvested on October 9, 2015. Table 2 provides the yield at 13% moisture. Table 3 lists soybean variety traits. Table 4 lists the 2014 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 (Lawler site), MN in 2015.**

	Rochester (Lawler site)
Planting Date	May 22, 2015
Harvest Date	October 9, 2015
Soil Type	Port Byron Silt Loam
Tillage	Conventional
Previous Crop	Corn

**Table 2. Yield (at 13%) of early maturity soybeans (1.3 – 1.8) at Rochester, MN in 2015.**

Entry Name	Description	Rochester (Lawler site)	
1.3 to 1.8 maturity	Maturity	Yield (13%) (Bu/A)	
ASGROW AG1431	1.4	61.0	a-h
ASGROW AG1733	1.7	62.4	abc
CROPLAN R2C1400	1.4	59.0	e-i
CROPLAN R2C1625	1.6	60.1	c-h
DAHLMAN 5215NRR2Y	1.5	58.9	f-i
DAIRYLAND DSR-1340	1.3	53.8	k
DAIRYLAND DSR-1721	1.7	59.2	e-i
DUPONT PIONEER P15T46R2	1.5	60.4	b-h
DYNAGRO S18RY25	1.8	58.9	e-i
GOLD COUNTRY 1715	1.7	54.6	jk
GOLD COUNTRY 1814	1.8	63.3	ab
LEGACY LS1335N RR2	1.3	60.0	c-h
LEGACY LS1735 RR2	1.7	59.9	c-h
LG SEEDS C1530R2	1.5	61.6	a-f
LG SEEDS C1899R2	1.8	59.2	d-i
MYCOGEN SEEDS 5N157 R2	1.5	57.0	ij
MYCOGEN SEEDS 5N180R2	1.8	60.6	b-h
MYCOGEN SEEDS 5N182R2	1.8	63.7	a
NK BRAND S15-P1	1.5	60.5	b-h
NK BRAND S17-B3	1.7	61.5	a-g
PRAIRIE BRAND 1466	1.4	58.6	ghi
PRAIRIE BRAND 1822	1.8	62.1	a-d
PRODUCERS 1503NR2	1.5	60.1	c-h
PRODUCERS 1804NR2	1.8	58.4	hi
RENK RS153 NR2	1.5	61.8	a-e
RENK RS175 NR2	1.7	60.1	c-h
STINE 14RF62	1.4	62.3	abc
STINE 17RF26	1.7	58.6	ghi
<b>LSD (P=0.20)</b>		<b>2.9</b>	
<b>Plot Average</b>		<b>59.9 bu/A</b>	

**Table 3. Traits of early maturity GT/RR® soybean varieties in 2015.**

Entry	Maturity Rating	SCN Resistant Source	Hilum Color	Flower Color	Pubescence Color	Pod Color
ASGROW AG1431	1.4		Black	Purple	Light Tawny	Brown
ASGROW AG1733	1.7		Imperfect Black	Purple	Gray	Brown
CROPLAN R2C1400	1.4		Black	Purple	Light Tawny	Brown
CROPLAN R2C1625	1.6					
DAHLMAN 5215NRR2Y	1.5		Black	Purple	Light Tawny	Brown
DAIRYLAND DSR-1340	1.3		Black	Purple	Light Tawny	Brown
DAIRYLAND DSR-1721	1.7		Imperfect Black	Purple	Gray	Tan
DUPONT PIONEER P15T46R2	1.5					
DYNAGRO S18RY25	1.8		Imperfect Black	Purple	Gray	Tan
GOLD COUNTRY 1715	1.7		Imperfect Black	Purple	Gray	Brown
GOLD COUNTRY 1814	1.8		Black	Purple	Light Tawny	Brown
LEGACY LS1335N RR2	1.3		Black	Purple	Light Tawny	Brown
LEGACY LS1735 RR2	1.7		Brown	Purple	Light Tawny	Tan
LG SEEDS C1530R2	1.5		Black	Purple	Light Tawny	Brown
LG SEEDS C1899R2	1.8		Imperfect Black	Purple	Gray	Tan
MYCOGEN SEEDS 5N157 R2	1.5					
MYCOGEN SEEDS 5N180R2	1.8		Imperfect Black	Purple	Gray	Brown
MYCOGEN SEEDS 5N182R2	1.8		Imperfect Black	Purple	Gray	Tan
NK BRAND S15-P1	1.5	PI88788	Black	Purple	Light Tawny	Tan
NK BRAND S17-B3	1.7	PI88788	Black	Purple	Light Tawny	Tan
PRAIRIE BRAND 1466	1.4	PI88788	Black	Purple	Light Tawny	Brown
PRAIRIE BRAND 1822	1.8	PI88788	Imperfect Black	Purple	Gray	Tan
PRODUCERS 1503NR2	1.5		Black	Purple	Light Tawny	Brown
PRODUCERS 1804NR2	1.8		Imperfect Black	Purple	Gray	Tan
RENK RS153 NR2	1.5		Black	Purple	Light Tawny	Brown
RENK RS175 NR2	1.7		Imperfect Black	Purple	Gray	Tan
STINE 14RF62	1.4		Imperfect Black	Purple	Gray	
STINE 17RF26	1.7		Black	Purple	Gray	

**Table 4. Yield (at 13%) of early maturity soybeans (0.7 – 1.8) at Rochester (Lawler site) and Waseca, MN in 2014.**

Entry Name	Description	Rochester (Lawler site)		Waseca	
		Yield (bu/A)		Yield (bu/A)	
<b>0.7 to 1.8 maturity</b> <b>** Denotes committee selected</b>	<b>Maturity</b>				
ASGROW AG0934	0.9	55.7	ijk	25.5	l
ASGROW AG1431	1.4	56.1	g-k	28.0	jkl
ASGROW AG1733	1.7	58.1	c-j	29.9	h-k
ASGROW AG1832	1.8	56.1	g-k	34.0	d-g
CROPLAN R2C1750	1.7	56.7	d-k	30.6	f-k
CROPLAN R2C1873	1.8	55.0	k	38.4	ab
DAHLMAN 5215NRR2Y	1.5	56.0	h-k	30.2	g-k
DAIRYLAND SEED DSR-1340R2Y	1.3	55.6	ijk	34.3	c-f
DAIRYLAND SEED DSR-1808R2Y	1.8	59.5	b-e	36.3	a-d
DUPONT PIONEER P15T83R	1.5	55.9	h-k	31.3	e-j
DUPONT PIONEER P16T04R	1.6	55.6	ijk	38.3	abc
DYNAGRO 34RY17	1.7	56.6	e-k	35.7	a-d
GOLD COUNTRY 1514	1.5	59.4	b-f	34.8	b-e
GOLD COUNTRY 1814	1.8	59.0	b-h	38.7	ab
LEGACY SEEDS LS-1533RR2	1.5	63.6	a	27.9	jkl
LEGACY SEEDS LS-1710RR2	1.7	61.2	abc	32.5	d-i
LG SEEDS C1530R2	1.5	58.6	b-i	33.9	d-h
LG SEEDS C1899R2	1.8	56.6	e-k	35.9	a-d
MYCOGEN SEEDS 5N156R2	1.5	56.1	g-k	38.9	a
MYCOGEN SEEDS 5N180R2	1.8	60.6	abc	33.8	d-h
NK BRAND S12-H2	1.2	59.4	b-e	27.2	kl
PRAIRIE BRAND PB1566 R2	1.5	61.3	ab	27.9	jkl
PRAIRIE BRAND PB1822 R2	1.8	59.6	b-e	38.8	ab
PRODUCERS HYBRIDS 1601 NR2	1.6	56.3	f-k	29.9	h-k
PRODUCERS HYBRIDS 1803 NRS	1.8	55.3	jk	36.3	a-d
RENK SEED RK153NR2	1.5	59.2	b-g	31.4	e-j
RENK SEED RK183NRS	1.8	54.6	k	33.9	d-h
STINE 13RF62**	1.3	55.6	ijk	29.0	i-l
STINE 14RD62	1.5	59.8	bcd	35.9	a-d
VIKING 1522R2N	1.5	58.5	b-i	29.2	i-l
VIKING 1707R2N	1.7	58.9	b-h	31.1	e-k
<b>LSD (P=0.20)</b>		<b>3.1</b>		<b>4.1</b>	





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## **2015 SE Minnesota Regional Performance of Late Maturity Glyphosate Tolerant (GT) Roundup Ready® (RR) Soybean Varieties (1.9 to 2.5 maturities) at Rochester, MN.**

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

The objective of this study was to compare the performance of late maturity GT/RR® soybean (1.9 to 2.5 maturities) in southeastern Minnesota. The trial was located at Rochester, MN (Lawler site). Field history is reported in Table 1. The trial was planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 150,000 seeds per acre with seed planted at a depth of 1.5 inches in 30 inch rows. Plots were four rows wide by 22 feet in length in Rock Dell and Rochester. A randomized complete block design was implemented and replicated four times. The center two rows of each plot were machine harvested on October 12, 2015. Table 2 provides yield at 13% moisture. Table 3 lists soybean variety traits. Table 4 lists the 2014 late 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 (Lawler site), MN in 2015**

	Rochester (Lawler site)
<b>Planting Date</b>	May 22, 2015
<b>Harvest Date</b>	October 12, 2015
<b>Soil Type</b>	Port Byron Silt Loam
<b>Tillage</b>	Conventional
<b>Previous Crop</b>	Corn

**Table 2. Yield (at 13%) of late maturity soybeans (1.9 to 2.6) at Rochester, MN in 2015.**

Entry Name	Description	Rochester (Lawler site)
1.9 to 2.5 maturity	Maturity	Yield @13% (bu/A)
ASGROW AG1935	1.9	59.5
ASGROW AG2035	2.0	61.4
CROPLAN R2C2025	2.0	62.0
CROPLAN R2C2075	2.0	62.2
DAHLMAN 5420 NRR2Y	2.0	56.7
DAHLMAN 5321 NRR2Y	2.1	59.8
DAIRYLAND DSR-1990	1.9	57.8
DAIRYLAND DSR-2110	2.1	62.1
DUPONT PIONEER P19T78R	1.9	58.9
DUPONT PIONEER P22T73R	2.2	61.1
DUPONT PIONEER P25T51R	2.5	62.1
DYNAGRO S20RY45	2.0	62.0
GOLD COUNTRY 2015	2.0	62.8
GOLD COUNTRY 2114	2.1	63.6
LEGACY LS1934 NRR2	1.9	63.4
LEGACY LS2135 N RR2	2.1	62.3
LEGACY LS2414 N RR2	2.4	58.7
LG SEEDS C2020 R2	2.0	61.9
LG SEEDS C2441 R2	2.4	62.3
MYCOGEN SEEDS 5N206 R2	2.0	63.8
NK BRAND S19-B2	1.9	60.9
NK BRAND S20-T6	2.0	59.4
PRAIRIE BRAND 1956	1.9	62.7
PRAIRIE BRAND 2024	2.0	61.2
PRODUCERS 2004 NR2	2.0	60.4
PRODUCERS 2204 NR2	2.2	59.3
RENK RS195 NR2	1.9	61.9
RENK RS213 NR2	2.1	60.9
STINE 19RF32	1.9	60.6
STINE 20RD20	2.0	63.2
<b>LSD (P=0.20)</b>		<b>NS</b>
<b>Plot Ave</b>		<b>61.2 bu/a</b>

**Table 3. Traits of late maturity GT/RR<sup>®</sup> soybean varieties in 2015.**

Entry Name <i>**Denotes committee selected varieties</i>	Maturity Rating	SCN Resistant Source	Hilum Color	Flower Color	Pubescence Color	Pod Color
ASGROW AG1935	1.9					
ASGROW AG2035	2.0					
CROPLAN R2C2025	2.0					
CROPLAN R2C2075	2.0					
DAHLMAN 5420NRR2Y	2.0		Black	Purple	Tawny	Brown
DAHLMAN 5321NRR2Y	2.1		Black	Purple	Light Tawny	Brown
DAIRYLAND DSR-1990	1.9		Black	Purple	Tawny	Brown
DAIRYLAND DSR-2110	2.1		Black	Purple	Light Tawny	Tan
DUPONT PIONEER P19T78R	1.9					
DUPONT PIONEER P22T73R	2.2					
DUPONT PIONEER P25T51R	2.5		Black	Purple	Light Tawny	Brown
DYNAGRO S20RY45	2.0		Imperfect Black	Purple	Gray	Brown
GOLD COUNTRY 2015	2.0		Black	Purple	Light Tawny	Brown
GOLD COUNTRY 2114	2.1		Imperfect Black	Purple	Gray	Tan
LEGACY LS1934N RR2	1.9		Imperfect Black	Purple	Gray	Brown
LEGACY LS2135N RR2	2.1		Black	Purple	Light Tawny	Brown
LG SEEDS C2020R2	2.0		Black	Purple	Tawny	Brown
LG SEEDS C2441R2	2.4		Black	Purple	Light Tawny	Brown
MYCOGEN SEEDS 5N206R2	2.0		Black	Purple	Light Tawny	Brown
NK BRAND S19-B2	1.9		Black Black	Purple	Light Tawny	Tan
NK BRAND S20-T6	2.0		Black	White	Light Tawny	Brown
PRAIRIE BRAND 1956	1.9		Black	Purple	Light Tawny	Brown
PRAIRIE BRAND 2024	2.0		Black	Purple	Light Tawny	Brown
PRODUCERS 2004NR2	2.0		Black	Purple	Light Tawny	Brown
PRODUCERS 2204NR2	2.2		Black	Purple	Light Tawny	Brown
RENK RS195 NR2	1.9		Imperfect Black	Purple	Gray	Tan
RENK RS213 NR2	2.1		Black	Purple	Light Tawny	Brown
STINE 19RF32	1.9		Black	Purple	Gray	
STINE 20RD20	2.0		Black	Purple	Brown	
LS2414NRR2	2.4		Black	Purple	Light Tawny	Brown

**Table 4. Yield (at 13%) of late maturity soybeans (1.9 to 2.6) at Rochester (Lawler site) and Waseca, MN, and the 2-site average, in 2014.**

Entry Name	Description	Rochester (Lawler)		Waseca		2-Site Average
1.9 to 2.6 maturity ** Denotes committee selected	Maturity	Yield (bu/A)		Yield (bu/A)		Yield at 13% (bu/A)
ASGROW AG2031	2.0	59.3	a	45.6	a-e	52.4
ASGROW AG2134	2.1	51.8	i-p	38.2	k-q	45.0
ASGROW AG2232	2.2	54.8	b-i	44.1	b-g	49.4
ASGROW AG2433	2.4	55.5	b-g	41.1	f-m	48.3
CHANNEL 2105R2	2.1	53.7	d-l	41.1	f-m	47.4
CROPLAN R2C2200	2.2	56.8	a-d	40.0	g-n	48.4
CROPLAN R2C2120	2.1	54.0	d-l	39.9	g-n	46.9
DAHLMAN 5321NRR2Y	2.1	50.4	n-r	37.8	l-q	44.1
DAHLMAN 5420NRR2Y	2.0	50.6	m-r	38.2	k-q	44.4
DAIRYLAND SEED DSR-19902Y	1.9	51.7	i-p	36.6	n-q	44.1
DAIRYLAND SEED DSR-2105R2Y	2.1	51.2	k-r	39.3	h-p	45.3
DAIRYLAND SEED DSR-2411R2Y	2.4	53.6	e-m	47.5	abc	50.5
DUPONT PIONEER P22T69R	2.2	55.0	b-h	38.6	i-p	46.8
DUPONT PIONEER P25T51R	2.5	57.2	abc	47.9	ab	52.6
DUPONT PIONEER 92Y51	2.5	53.0	f-n	38.6	i-p	45.8
DYNAGRO 24RY73	2.4	53.2	e-n	35.5	o-r	44.3
GOLD COUNTRY 2114	2.1	54.1	c-k	42.9	d-i	48.5
GOLD COUNTRY 2040	2.0	55.6	b-g	40.0	g-n	47.8
LEGACY SEEDS LS-2034NRR2	2.0	49.0	o-r	38.5	i-p	43.7
LEGACY SEEDS LS-2313NRR2	2.3	48.7	pqr	42.4	d-k	45.5
LG SEEDS C2020R2	2.0	52.0	h-o	48.6	a	50.3
LG SEEDS C2222R2	2.2	50.8	l-r	42.1	d-l	46.4
MYCOGEN SEEDS 5N206R2	2.0	54.6	b-j	45.1	a-f	49.9
MYCOGEN SEEDS 5N223R2	2.2	52.0	h-o	37.6	m-q	44.8
NK BRAND S20-T6	2.0	57.2	ab	38.2	k-q	47.7
NK BRAND S22-F8**	2.2	52.0	h-o	31.2	r	41.6
NK BRAND S22-S1**	2.2	56.3	a-e	40.7	g-n	48.5
PRAIRIE BRAND PB2024R2	2.0	54.8	b-i	46.2	a-d	50.5
PRAIRIE BRAND PB2230R2	2.2	48.2	r	38.1	k-q	43.2
PRODUCERS HYBRIDS 1900 NR2	1.9	55.1	b-g	42.8	d-j	48.9
PRODUCERS HYBRIDS 2101 NR2	2.1	51.4	k-q	39.7	g-o	45.6
RENK SEEDS RS213NR2	2.1	54.9	b-i	43.2	c-h	49.0
RENK SEEDS RS224NR2	2.2	52.5	g-n	41.5	e-m	47.0
STINE 20RD20	2.0	56.0	b-f	43.3	c-h	49.6
STINE 22RD00	2.2	51.9	h-o	43.6	b-h	47.8
STINE 22RC62	2.2	53.4	e-n	35.2	pqr	44.3
VIKING 2000R2N	2.0	51.5	i-q	33.9	qr	42.7
VIKING 2144R2N	2.1	48.4	qr	39.5	h-p	44.0
<b>Site Average</b>		<b>53.2</b>		<b>40.6</b>		
<b>LSD (P=0.10)</b>		<b>3.1</b>		<b>4.8</b>		

# ***SECTION***

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## **D**

### **SOYBEAN HERBICIDE EVALUATION**

# ***Sequential Preemergence/Postemergence Herbicide Systems in Soybean for the Control of Giant Ragweed in Southeastern Minnesota in 2015.***

Breitenbach, Fritz R., Lisa M. Behnken, Ellen Sheehan, and Brent Breitenbach

The objective of this trial was to evaluate preemergence (PRE) followed by postemergence (POST) herbicide systems for control of giant ragweed and other broadleaf weeds in soybean in southeastern, Minnesota. The research site was a Lawler loam series with pH of 6.2, O.M. 2.4% and soil test P and K levels of 36 ppm and 194 ppm, respectively. In the spring the field was disked and field cultivated once prior to planting. The previous crop was corn. The soybean variety was NK Brand S20-T6 and was planted May 20, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 150,000 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) treatments were applied with a tractor-mounted sprayer delivering 15 gpa at 30 psi using TTI 11002 spray tips. POST applications for systemic herbicides were made using TTI 11002 spray tips and for contact herbicides using TTI J60 spray tips. Evaluations of this plot were taken June 10, June 19, June 26, June 30, July 8, July 15, and September 22. The center two rows of each plot were machine harvested on October 14, 2015. Application dates, environmental conditions, and weed stages can be found in Table 1. Performance ratings for giant ragweed, common lambsquarters, common waterhemp and grass control, and crop response can be found in Tables 2 through 6, respectively. (University of Minnesota Extension Regional Office, Rochester.)

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

Date	5/20	6/16	6/25
<b>Treatment</b>	PRE (A)	POST I (B)	POST II (C)
<b>Temperature (F)</b>			
Air	52	72	80
Soil	56.7	72.5	78.3
<b>Relative Humidity (%)</b>	52	56	52
<b>Wind (mph)</b>	W	VARI	NE
<b>Soil Moisture</b>	SL Wet	Normal	Normal
<b>Soybean</b>			
Stage		V2	V4
Height (inch)		6	10
<b>Giant Ragweed</b>			
Weed Density (ft <sup>2</sup> )		11	
Height (inch)		3.8	4.2
<b>Common Lambsquarter</b>			
Weed Density (ft <sup>2</sup> )		39	
Height (inch)		1.1	2.11
<b>Common Waterhemp</b>			
Weed Density (ft <sup>2</sup> )		5	
Height (inch)		1.4	2.9
<b>Grass</b>			
Weed Density (ft <sup>2</sup> )		18	
Height (inch)		1.3	2.8
<b>Rainfall after each application (inch)</b>			
Week 1	1.47	0.78	1.63
Week 2	1.09	1.17	0.69
Week 3	1.64	1.15	0.30

<b>Table 2. PRE/POST herbicide systems in soybean for the control of giant ragweed in SE Minnesota, 2015.</b>										
Pest Code				Giant Ragweed						YIELD
Rating Date				Jun-10	Jun-19	Jun-26	Jun-30	Jul-15	Sep-22	Oct-10-15
Trt	Treatment	Rate	Appl	Percent Control (%)						Bu/A
8	UNTREATED CHECK			0 j	0 i	0 i	0 i	0 f	0 e	4.3 g
<b>PRE / POST I 5-20 / 6-16</b>										
1	SOA 2, 14 / 14, 9			72 gh	94 cd	96 b-e	92 ef	90 e	89 d	38.2 cde
	AUTHORITY ASSIST	9 fl oz/a	A							
	MARVEL	7.25 fl oz/a	B							
	ROUNDUP POWERMAX	32 fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
2	SOA 2,14 / 14, 9			80 ef	96 abc	97 a-d	94 de	93 d	93 c	34.6 f
	AUTHORITY ASSIST	12 fl oz/a	A							
	MARVEL	7.25 fl oz/a	B							
	ROUNDUP POWERMAX	32 fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
3	SOA 2,14 / 14, 9			86 bcd	95 abc	96 cde	95 cd	94 cd	93 c	38.3 cde
	AUTHORITY FIRST	4 oz/a	A							
	MARVEL	7.25 fl oz/a	B							
	ROUNDUP POWERMAX	32 fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
6	SOA 14,15 / 9			75 fg	89 e	96 de	94 de	90 e	90 d	40.2 abc
	VERDICT	5 fl oz/a	A							
	ROUNDUP POWERMAX	32 fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
9	SOA 2,14 / 14, 15, 9			84 cde	98 a	98 ab	97 a	97 ab	97 ab	36.3 ef
	LATIR	4.25 oz/a	A							
	WISE	2 pt/a	B							
	ROUNDUP POWERMAX	32 fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
10	SOA 2,14 / 14, 9			84 cde	97 ab	98 abc	97 ab	98 ab	98 ab	41.5 abc
	LATIR	4.25 oz/a	A							
	RUMBLE	1 pt/a	B							
	ROUNDUP POWERMAX	32 fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
11	SOA 5,14 / 2,15, 9			82 de	93 d	97 a-d	97 ab	97 ab	97 ab	40.6 abc
	RANSOM	9 oz/a	A							
	PUMMEL	2 pt/a	B							
	ROUNDUP POWERMAX	32 fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
12	SOA 5,14 / 2, 14, 9			82 de	95 bcd	99 a	97 abc	97 ab	97 ab	40.2 abc
	RANSOM	9 oz/a	A							
	TORMENT	1 pt/a	B							
	ROUNDUP POWERMAX	32 fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
13	SOA 5,15 / 2,14,9			69 h	93 d	97 a-d	96 abc	97 ab	97 ab	36.5 def
	TAILWIND	2.5 pt/a	A							
	TORMENT	1 pt/a	B							
	ROUNDUP POWERMAX	32 fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
14	SOA 5, 15 / 14, 9			70 h	97 ab	98 a-d	96 abc	97 ab	97 ab	38.8 b-e
	TAILWIND	2.5 pt/a	A							
	RUMBLE	1 pt/a	B							
	ROUNDUP POWERMAX	32 fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
15	SOA 5,14 / 2,15, 9			57 i	85 f	96 b-e	95 bcd	96 bc	95 bc	36.6 def
	AUTHORITY MTZ	11 oz/a	A							
	PUMMEL	2 pt/a	B							
	ROUNDUP POWERMAX	32 fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							

**Table 2 (continued). PRE/POST herbicide systems in soybean for the control of giant ragweed in SE Minnesota, 2015.**

Pest Code				Giant Ragweed						YIELD	
Rating Date				Jun-10	Jun-19	Jun-26	Jun-30	Jul-15	Sep-22	Oct-14-2015	
Trt	Treatment	Rate	Appl	Percent Control (%)						Bu/A	
<b>PRE / POST II 5-20 / 6-25</b>											
4	SOA 2,14 / 14, 9			<b>90</b>	<b>87</b>	<b>83</b>	<b>89</b>	<b>96</b>	<b>97</b>	<b>41.7</b>	<b>ab</b>
	AUTHORITY FIRST	6.4 oz/a	A								
	MARVEL	7.25 fl oz/a	C								
	ROUNDUP POWERMAX32	fl oz/a	C								
	Ammonium Sulfate	3.3 lb/100 gal	C								
5	SOA 2, 14,15 / 9			<b>89</b>	<b>80</b>	<b>72</b>	<b>85</b>	<b>98</b>	<b>98</b>	<b>42.3</b>	<b>a</b>
	OPTILL PRO										
	OPTILL	2 oz/a	A								
	OUTLOOK	10 fl oz/a	A								
	ROUNDUP POWERMAX32	fl oz/a	C								
	Ammonium Sulfate	3.3 lb/100 gal	C								
7	SOA 14,15 / 9			<b>97</b>	<b>96</b>	<b>92</b>	<b>96</b>	<b>99</b>	<b>99</b>	<b>39.7</b>	<b>a-d</b>
	PREFIX	2 pt/a	A								
	ROUNDUP POWERMAX32	fl oz/a	C								
	Ammonium Sulfate	3.3 lb/100 gal	C								
<b>POST I 6-16</b>											
16	SOA 9			<b>0</b>	<b>69</b>	<b>94</b>	<b>91</b>	<b>91</b>	<b>90</b>	<b>41.4</b>	<b>abc</b>
	GLYPHOSATE CHECK										
	ROUNDUP POWERMAX32	fl oz/a	B								
	Ammonium Sulfate	3.3 lb/100 gal	B								
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				<b>5.2</b>	<b>2.4</b>	<b>2.2</b>	<b>1.9</b>	<b>2.3</b>	<b>2.4</b>	<b>3.4</b>	

Means followed by same letter do not significantly differ





**Table 3 (continued). PRE/POST herbicide systems in soybean for the control of common lambsquarters in SE, Minnesota in 2015.**

Pest Code			Common Lambsquarters						YIELD							
Rating Date			Jun-10	Jun-19	Jun-26	Jun-30	Jul-15	Sep-22	Oct-14-2015							
Trt	Treatment	Rate	Percent Control (%)						BU/A							
<b>PRE / POST II 5-20 / 6-25</b>																
4	SOA 2,14 / 14, 9		<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>	<b>41.7</b>	<b>ab</b>				
	AUTHORITY FIRST	6.4 oz/a														
	MARVEL	7.25 fl oz/a														
	ROUNDUP POWERMAX32	fl oz/a														
	Ammonium Sulfate	3.3 lb/100 gal														
5	SOA 2, 14,15 / 9		<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>	<b>99</b>	<b>ab</b>	<b>99</b>	<b>a</b>	<b>98</b>	<b>a</b>	<b>42.3</b>	<b>a</b>		
	OPTILL PRO															
	OPTILL	2 oz/a														
	OUTLOOK	10 fl oz/a														
	ROUNDUP POWERMAX32	fl oz/a														
	Ammonium Sulfate	3.3 lb/100 gal														
7	SOA 14,15 / 9		<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>	<b>98</b>	<b>b</b>	<b>99</b>	<b>a</b>	<b>98</b>	<b>a</b>	<b>99</b>	<b>a</b>	<b>39.7</b>	<b>a-d</b>
	PREFIX	2 pt/a														
	ROUNDUP POWERMAX32	fl oz/a														
	Ammonium Sulfate	3.3 lb/100 gal														
<b>POST I 6-16</b>																
16	SOA 9		<b>0</b>	<b>b</b>	<b>81</b>	<b>b</b>	<b>90</b>	<b>d</b>	<b>86</b>	<b>c</b>	<b>77</b>	<b>c</b>	<b>77</b>	<b>c</b>	<b>41.4</b>	<b>abc</b>
	GLYPHOSATE CHECK															
	ROUNDUP POWERMAX32	fl oz/a														
	Ammonium Sulfate	3.3 lb/100 gal														
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>					<b>0.8</b>		<b>0.8</b>		<b>1.4</b>		<b>1.9</b>		<b>1.9</b>		<b>3.4</b>	

Means followed by same letter do not significantly differ

<b>Table 4. PRE/POST herbicide systems in soybean for the control of common waterhemp in SE Minnesota in 2015.</b>										
Pest Code				Common Waterhemp						YIELD
Rating Date				Jun-10	Jun-19	Jun-26	Jun-30	Jul-15	Sep-22	Oct-14-2015
Trt	Treatment	Rate	Appl	Percent Control (%)						BU/A
8	UNTREATED CHECK			0 c	0 c	0 d	0 d	0 d	0 d	4.3 g
<b>PRE / POST I 5-22 / 6-16</b>										
1	SOA 2, 14 / 14, 9			99 b	99 a	99 a	99 a	99 a	99 a	38.2 cde
	AUTHORITY ASSIST	9 fl oz/a	A							
	MARVEL	7.25 fl oz/a	B							
	ROUNDUP POWERMAX32	fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
2	SOA 2,14 / 14, 9			99 a	99 a	99 a	99 a	99 a	99 a	34.6 f
	AUTHORITY ASSIST	12 fl oz/a	A							
	MARVEL	7.25 fl oz/a	B							
	ROUNDUP POWERMAX32	fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
3	SOA 2,14 / 14, 9			99 a	99 a	99 a	99 a	98 a	98 a	38.3 cde
	AUTHORITY FIRST	4 oz/a	A							
	MARVEL	7.25 fl oz/a	B							
	ROUNDUP POWERMAX32	fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
6	SOA 14,15 / 9			99 a	99 a	97 b	95 b	91 b	90 b	40.2 abc
	VERDICT	5 fl oz/a	A							
	ROUNDUP POWERMAX32	fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
9	SOA 2,14 / 14, 15, 9			99 a	99 a	99 a	99 a	99 a	99 a	36.3 ef
	LATIR	4.25 oz/a	A							
	WISE	2 pt/a	B							
	ROUNDUP POWERMAX32	fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
10	SOA 2,14 / 14, 9			99 a	99 a	99 a	99 a	99 a	99 a	41.5 abc
	LATIR	4.25 oz/a	A							
	RUMBLE	1 pt/a	B							
	ROUNDUP POWERMAX32	fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
11	SOA 5,14 / 2,15, 9			99 a	99 a	99 a	99 a	99 a	99 a	40.6 abc
	RANSOM	9 oz/a	A							
	PUMMEL	2 pt/a	B							
	ROUNDUP POWERMAX32	fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
12	SOA 5,14 / 2, 14, 9			99 a	99 a	99 a	99 a	99 a	99 a	40.2 abc
	RANSOM	9 oz/a	A							
	TORMENT	1 pt/a	B							
	ROUNDUP POWERMAX32	fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
13	SOA 5,15 / 2,14,9			99 a	99 a	99 a	99 a	99 a	99 a	36.5 def
	TAILWIND	2.5 pt/a	A							
	TORMENT	1 pt/a	B							
	ROUNDUP POWERMAX32	fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
14	SOA 5, 15 / 14, 9			99 a	99 a	99 a	99 a	99 a	99 a	38.8 b-e
	TAILWIND	2.5 pt/a	A							
	RUMBLE	1 pt/a	B							
	ROUNDUP POWERMAX32	fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
15	SOA 5,14 / 2,15, 9			99 a	99 a	99 a	99 a	99 a	99 a	36.6 def
	AUTHORITY MTZ	11 oz/a	A							
	PUMMEL	2 pt/a	B							
	ROUNDUP POWERMAX32	fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							

**Table 4 (continued). PRE/POST herbicide systems in soybean for the control of common waterhemp in SE Minnesota in 2015.**

Pest Code	Rating Date	Common Waterhemp								YIELD		
		Jun-10	Jun-19	Jun-26	Jun-30	Jul-15	Sep-22	Oct-14-2015				
Trt	Treatment	Rate	Appl	Percent Control (%)								BU/A
<b>PRE / POST II 5-22 / 6-25</b>												
4	SOA 2,14 / 14, 9			99 a	99 a	99 a	99 a	99 a	99 a	99 a	41.7	ab
	AUTHORITY FIRST	6.4 oz/a	A									
	MARVEL	7.25 fl oz/a	C									
	ROUNDUP POWERMAX32	fl oz/a	C									
	Ammonium Sulfate	3.3 lb/100 gal	C									
5	SOA 2, 14,15 / 9			99 a	99 a	99 a	99 a	97 a	97 a	97 a	42.3	a
	OPTILL PRO											
	OPTILL	2 oz/a	A									
	OUTLOOK	10 fl oz/a	A									
	ROUNDUP POWERMAX32	fl oz/a	C									
	Ammonium Sulfate	3.3 lb/100 gal	C									
7	SOA 14,15 / 9			99 a	99 a	99 a	99 a	99 a	99 a	99 a	39.7	a-d
	PREFIX	2 pt/a	A									
	ROUNDUP POWERMAX32	fl oz/a	C									
	Ammonium Sulfate	3.3 lb/100 gal	C									
<b>POST I 6-16</b>												
16	SOA 9			0 c	90 b	88 c	87 c	77 c	77 c	77 c	41.4	abc
	GLYPHOSATE CHECK											
	ROUNDUP POWERMAX32	fl oz/a	B									
	Ammonium Sulfate	3.3 lb/100 gal	B									
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				<b>0.2</b>	<b>.</b>	<b>1.1</b>	<b>1.2</b>	<b>3.2</b>	<b>3.1</b>	<b>3.4</b>		

Means followed by same letter do not significantly differ



**Table 5 (continued). PRE/POST herbicide systems in soybean for grass control in SE Minnesota in 2015**

Pest Code			GRASS						YIELD	
Rating Date			June 10	June 19	June 26	June 30	July 15	Sept 22	Oct-14-2015	
Trt	Treatment	Rate	Percent Control (%)						Bu/A	
<b>PRE / POST II 5-22 / 6-25</b>										
4	SOA 2,14 / 14, 9		99 a	99 a	99 a	99 a	99 a	99 a	99 a	41.7 ab
	AUTHORITY FIRST	6.4 oz/a								
	MARVEL	7.25 fl oz/a								
	ROUNDUP POWERMAX32	fl oz/a								
	Ammonium Sulfate	3.3 lb/100 gal								
5	SOA 2, 14,15 / 9		99 a	99 a	99 a	99 a	98 a	98 a	98 a	42.3 a
	OPTILL PRO									
	OPTILL	2 oz/a								
	OUTLOOK	10 fl oz/a								
	ROUNDUP POWERMAX32	fl oz/a								
	Ammonium Sulfate	3.3 lb/100 gal								
7	SOA 14,15 / 9		99 a	99 a	99 a	99 a	99 a	99 a	99 a	39.7 a-d
	PREFIX	2 pt/a								
	ROUNDUP POWERMAX32	fl oz/a								
	Ammonium Sulfate	3.3 lb/100 gal								
<b>POST I 6-16</b>										
16	SOA 9		0 b	90 b	94 c	89 c	86 c	85 c	85 c	41.4 abc
	GLYPHOSATE CHECK									
	ROUNDUP POWERMAX32	fl oz/a								
	Ammonium Sulfate	3.3 lb/100 gal								
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				<b>0.8</b>	<b>0.8</b>	<b>1.4</b>	<b>1.9</b>	<b>1.9</b>	<b>1.9</b>	<b>3.4</b>

Means followed by same letter do not significantly differ



**Table 6 (continued). Crop response to PRE/POST herbicide systems in soybean in SE Minnesota in 2015.**

Pest Code				INJURY						YIELD
Rating Date				June 10	June 19	June 26	June 30	July 8	July 15	
Trt	Treatment	Rate	Appl	Percent Injury (%)						BU/A
<b>PRE / POST II 5-22 / 6-25</b>										
4	SOA 2,14 / 14, 9			0 d	0 f	28 f	35 a	24 a	0	41.7 ab
	AUTHORITY FIRST	6.4 oz/a	A							
	MARVEL	7.25 fl oz/a	C							
	ROUNDUP POWERMAX32	fl oz/a	C							
	Ammonium Sulfate	3.3 lb/100 gal	C							
5	SOA 2, 14,15 / 9			0 d	3 ef	0 g	0 h	0 e	0	42.3 a
	OPTILL PRO									
	OPTILL	2 oz/a	A							
	OUTLOOK	10 fl oz/a	A							
	ROUNDUP POWERMAX32	fl oz/a	C							
	Ammonium Sulfate	3.3 lb/100 gal	C							
7	SOA 14,15 / 9			0 d	6 de	0 g	0 h	0 e	0	39.7 a-d
	PREFIX	2 pt/a	A							
	ROUNDUP POWERMAX32	fl oz/a	C							
	Ammonium Sulfate	3.3 lb/100 gal	C							
<b>POST I 6-16</b>										
16	SOA 9			0 d	5 de	0 g	0 h	0 e	0	41.4 abc
	GLYPHOSATE CHECK									
	ROUNDUP POWERMAX32	fl oz/a	B							
	Ammonium Sulfate	3.3 lb/100 gal	B							
<b>LSD P=.10 for weed ratings, LSD P = .20 for yields</b>				<b>1.4</b>	<b>4.5</b>	<b>4.5</b>	<b>2.6</b>	<b>1.9</b>	<b>.</b>	<b>3.4</b>

Means followed by same letter do not significantly differ





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## ***Demonstration of the Advantages of a Full Spectrum Residual Herbicide Program in Soybean at Rochester, Minnesota in 2015.***

Behnken, Lisa M., Fritz R. Breitenbach, Dillon Welter and Ellen Sheehan.

The objective of this trial was to evaluate the advantages of using full spectrum residual herbicide programs for weed control in soybeans in southeastern Minnesota in 2015. The research site was a Lawler loam series with pH of 6.2, O.M. 2.4% and soil test P and K levels of 36 ppm and 194 ppm, respectively. In the spring the field was disked and field cultivated once prior to planting. The previous crop was corn. The soybean variety was NK Brand S20-T6 and was planted May 20, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 150,000 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) treatments were applied with a tractor-mounted sprayer delivering 15 gpa at 30 psi using TTI 11002 spray tips. POST applications for systemic herbicides were made using TTI 11002 spray tips and for contact herbicides using TTI J60 spray tips. Evaluations of this plot were taken June 10, June 18, June 26, June 30, July 8, July 15, and September 22. The center two rows of each plot were machine harvested on October 14, 2015. Application dates, environmental conditions, and weed stages can be found in Table 1. Performance ratings for giant ragweed, common lambsquarters, common waterhemp, grass control, and crop response can be found in Tables 2 through 6 respectively. (University of Minnesota Extension Regional Office, Rochester.)

**Table 1. Application timing, plant stages, environmental conditions.**

Date	5/20	6/16	6/25
Treatment	PRE (A)	POST I (B)	POST II (C)
<b>Temperature (F)</b>			
Air	54	64	80
Soil	54.7	68.9	78.3
<b>Relative Humidity (%)</b>	46	68	52
<b>Wind (mph)</b>	5	7	12
<b>Soil Moisture</b>	SL Wet	Normal	Normal
<b>Soybean</b>			
Stage		V2	V4
Height (inch)		6	10
<b>Giant Ragweed</b>			
Weed Density (ft <sup>2</sup> )		10.3	
Height (inch)		4.3	3.8
<b>Common Lambsquarter</b>			
Weed Density (ft <sup>2</sup> )		50.0	
Height (inch)		1.5	1.6
<b>Common Waterhemp</b>			
Weed Density (ft <sup>2</sup> )		14	
Height (inch)		1.6	2.3
<b>Grass</b>			
Weed Density (ft <sup>2</sup> )		22.7	
Height (inch)		2	
<b>Rainfall after each application (inch)</b>			
Week 1	1.47	0.78	1.63
Week 2	1.09	1.17	0.69
Week 3	1.64	1.15	0.30

**Table 2. Giant ragweed control with residual herbicide programs in soybean at Rochester, MN in 2015**

Pest Code			Giant Ragweed								YIELD	
Rating Date			June 10	June 18	June 26	July 8	July 15	Sept. 22	Oct-14-2015			
Trt	Treatment	Rate	Appl	Percent Control (%)								BU/A
1	UNTREATED			0 g	0 h	0 e	0 c	0 c	0 d	0 d	6.1 d	
<b>PRE / POST I 5-20 / 6-16</b>												
2	SOA 14, 15 / 14, 9											
	BROADAXE	25 fl oz/a	A	46 f	99 a	99 a	98 a	99 a	99 a	99 a	44.9 ab	
	FLEXSTAR GT 3.5	3.5 pt/a	B									
	N-PAK AMS	2.5 % v/v	B									
	MSO	1 % v/v	B									
3	SOA 5, 15 / 14, 9			46 f	99 a	99 ab	98 a	98 a	97 ab	97 ab	43.0 abc	
	BOUNDARY	1.8 pt/a	A									
	FLEXSTAR GT 3.5	3.5 pt/a	B									
	N-PAK AMS	2.5 % v/v	B									
	MSO	1 % v/v	B									
4	SOA 14,15 / 9											
	BROADAXE	25 fl oz/a	A	46 f	63 f	97 c	94 b	94 b	93 c	93 c	43.2 abc	
	TOUCHDOWN TOTAL	32 fl oz/a	B									
	N-PAK AMS	2.5 % v/v	B									
5	SOA 5, 15 / 9			50 e	66 f	97 bc	95 b	94 b	94 c	94 c	43.2 abc	
	BOUNDARY	1.8 pt/a	A									
	TOUCHDOWN TOTAL	32 fl oz/a	B									
	N-PAK AMS	2.5 % v/v	B									
7	SOA 14, 15 / 9			77 c	82 e	96 c	92 b	91 b	90 c	90 c	39.9 c	
	FIERCE	3 oz/a	A									
	ROUNDUP POWERMAX	29 fl oz/a	B									
	N-PAK AMS	2.5 % v/v	B									
8	SOA 2, 14 / 9			85 b	89 d	97 c	94 b	94 b	93 c	93 c	44.8 ab	
	SONIC	5 oz/a	A									
	ROUNDUP POWERMAX	29 fl oz/a	B									
	N-PAK AMS	2.5 % v/v	B									
10	SOA 2, 14, 15 / 9			86 b	89 cd	96 c	93 b	93 b	92 c	92 c	45.2 ab	
	OPTILL	2 oz/a	A									
	ZIDUA	2 oz/a	A									
	ROUNDUP POWERMAX	29 fl oz/a	B									
	N-PAK AMS	2.5 % v/v	B									
11	SOA 14, 15 / 9			74 d	79 e	97 bc	94 b	93 b	94 bc	94 bc	44.3 ab	
	VERDICT	5 fl oz/a	A									
	ROUNDUP POWERMAX	29 fl oz/a	B									
	N-PAK AMS	2.5 % v/v	B									
<b>PRE / POST II 5-20 / 6-25</b>												
6	SOA 14, 15 / 9			94 a	95 ab	92 d	99 a	99 a	99 a	99 a	42.1 bc	
	PREFIX	2 pt/a	A									
	TOUCHDOWN TOTAL	32 fl oz/a	C									
	N-PAK AMS	2.5 % v/v	C									
9	SOA 2, 14 / 9			91 a	94 bc	91 d	99 a	98 a	99 a	99 a	46.1 a	
	SURVEIL											
	FLUMIOXACIN	2.5 oz/a	A									
	CLORANSULAM-METHYL	0.5 oz/a	A									
	ROUNDUP POWERMAX	29 fl oz/a	C									
	N-PAK AMS	2.5 % v/v	C									
<b>POST II 6-25</b>												
12	SOA 9			0 g	43 g	96 c	93 b	93 b	92 c	92 c	46.5 a	
	ROUNDUP POWERMAX	29 fl oz/a	B									
	N-PAK AMS	2.5 % v/v	B									
<b>LSD P=.10 for weed ratings, LSD P = .20 for yield</b>				<b>3.0</b>	<b>4.7</b>	<b>1.6</b>	<b>3.1</b>	<b>3.5</b>	<b>3.5</b>	<b>3.5</b>	<b>4.25</b>	

Means followed by same letter do not significantly differ

**Table 3. Common lambsquarters control with residual herbicide programs in soybean at Rochester, MN in 2015.**

Pest Code			Common lambsquarters								YIELD					
Rating Date			June 10	June 18	June 26	July 8	July 15	Sept 22								
Trt	Treatment	Rate	Appl		Percent Control (%)						Bu/A					
1	UNTREATED		0	c	0	d	0	e	0	f	0	e	0	d	6.1	d
<b>PRE / POST I 5-20 / 6-16</b>																
2	SOA 14, 15 / 14, 9		99	a	99	a	99	a	99	a	99	a	99	a	44.9	ab
	BROADAXE	25 fl oz/a		A												
	FLEXSTAR GT 3.5	3.5 pt/a		B												
	N-PAK AMS	2.5 % v/v		B												
	MSO	1 % v/v		B												
3	SOA 5, 15 / 14, 9		96	b	99	a	99	a	99	a	98	ab	98	a	43.0	abc
	BOUNDARY	1.8 pt/a		A												
	FLEXSTAR GT 3.5	3.5 pt/a		B												
	N-PAK AMS	2.5 % v/v		B												
	MSO	1 % v/v		B												
4	SOA 14,15 / 9		99	a	99	a	99	a	99	a	99	a	99	a	43.2	abc
	BROADAXE	25 fl oz/a		A												
	TOUCHDOWN TOTAL	32 fl oz/a		B												
	N-PAK AMS	2.5 % v/v		B												
5	SOA 5, 15 / 9		99	a	99	a	98	b	94	c	91	c	92	b	43.2	abc
	BOUNDARY	1.8 pt/a		A												
	TOUCHDOWN TOTAL	32 fl oz/a		B												
	N-PAK AMS	2.5 % v/v		B												
7	SOA 14, 15 / 9		99	a	99	a	99	a	98	b	95	b	98	a	39.9	c
	FIERCE	3 oz/a		A												
	ROUNDUP POWERMAX	29 fl oz/a		B												
	N-PAK AMS	2.5 % v/v		B												
8	SOA 2, 14 / 9		99	a	99	a	99	ab	99	ab	98	a	99	a	44.8	ab
	SONIC	5 oz/a		A												
	ROUNDUP POWERMAX	29 fl oz/a		B												
	N-PAK AMS	2.5 % v/v		B												
10	SOA 2, 14, 15 / 9		99	a	99	a	99	a	99	ab	98	ab	99	a	45.2	ab
	OPTILL	2 oz/a		A												
	ZIDUA	2 oz/a		A												
	ROUNDUP POWERMAX	29 fl oz/a		B												
	N-PAK AMS	2.5 % v/v		B												
11	SOA 14, 15 / 9		97	b	95	b	95	c	88	d	89	c	90	b	44.3	ab
	VERDICT	5 fl oz/a		A												
	ROUNDUP POWERMAX	29 fl oz/a		B												
	N-PAK AMS	2.5 % v/v		B												
<b>PRE / POST II 5-20 / 6-25</b>																
6	SOA 14, 15 / 9		99	a	98	a	95	c	99	ab	98	a	98	a	42.1	bc
	PREFIX	2 pt/a		A												
	TOUCHDOWN TOTAL	32 fl oz/a		C												
	N-PAK AMS	2.5 % v/v		C												
9	SOA 2, 14 / 9		99	a	99	a	99	ab	99	a	99	a	99	a	46.1	a
	SURVEIL															
	FLUMIOXACIN	2.5 oz/a		A												
	CLORANSULAM-METHYL	0.5 oz/a		A												
	ROUNDUP POWERMAX	29 fl oz/a		C												
	N-PAK AMS	2.5 % v/v		C												
<b>POST I 6-16</b>																
12	SOA 9		0	c	43	c	89	d	77	e	76	d	77	c	46.5	a
	ROUNDUP POWERMAX	29 fl oz/a		B												
	N-PAK AMS	2.5 % v/v		B												
<b>LSD P=.10 for weed ratings, LSD P = .20 for yield</b>			<b>2.4</b>		<b>2.4</b>		<b>1.3</b>		<b>1.3</b>		<b>2.5</b>		<b>2.1</b>		<b>4.25</b>	

Means followed by same letter do not significantly differ

**Table 4. Common waterhemp control with residual herbicide programs in soybean at Rochester, MN in 2015.**

Pest Code	Rating	Date	Common Waterhemp								YIELD						
			June 10	June 18	June 26	July 8	July 15	Sept 22	Bu/A								
Trt	Treatment	Rate	Appl	Percent Control (%)								Bu/A					
1	UNTREATED			0	c	0	c	0	d	0	e	0	e	0	e	6.1	d
<b>PRE / POST I 5-20 / 6-16</b>																	
2	SOA 14, 15 / 14, 9			99	a	99	a	99	a	99	a	99	a	99	a	44.9	ab
	BROADAXE	25 fl oz/a	A														
	FLEXSTAR GT 3.5	3.5 pt/a	B														
	N-PAK AMS	2.5 % v/v	B														
	MSO	1 % v/v	B														
3	SOA 5, 15 / 14, 9			99	b	99	a	99	a	99	a	99	a	99	a	43.0	abc
	BOUNDARY	1.8 pt/a	A														
	FLEXSTAR GT 3.5	3.5 pt/a	B														
	N-PAK AMS	2.5 % v/v	B														
	MSO	1 % v/v	B														
4	SOA 14,15 / 9			99	a	99	a	99	a	99	a	98	a	99	a	43.2	abc
	BROADAXE	25 fl oz/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
5	SOA 5, 15 / 9			99	a	99	a	99	a	96	b	93	b	97	b	43.2	abc
	BOUNDARY	1.8 pt/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
7	SOA 14, 15 / 9			99	a	99	a	99	a	98	a	98	a	99	a	39.9	c
	FIERCE	3 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
8	SOA 2, 14 / 9			99	a	99	a	99	a	99	a	98	a	99	a	44.8	ab
	SONIC	5 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
10	SOA 2, 14, 15 / 9			99	a	99	a	99	a	99	a	98	a	99	a	45.2	ab
	OPTILL	2 oz/a	A														
	ZIDUA	2 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
11	SOA 14, 15 / 9			99	a	99	a	96	b	91	c	89	c	92	c	44.3	ab
	VERDICT	5 fl oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
6	SOA 14, 15 / 9			99	a	99	a	99	a	99	a	98	a	99	a	42.1	bc
	PREFIX	2 pt/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	C														
	N-PAK AMS	2.5 % v/v	C														
<b>PRE / POST II 5-20 / 6-25</b>																	
9	SOA 2, 14 / 9			99	a	99	a	99	a	99	a	99	a	99	a	46.1	a
	SURVEIL																
	FLUMIOXACIN	2.5 oz/a	A														
	CLORANSULAM-METHYL	0.5 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	C														
	N-PAK AMS	2.5 % v/v	C														
<b>POST I 6-16</b>																	
12	SOA 9			0	c	43	b	89	c	78	d	74	d	75	d	46.5	a
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
<b>LSD P=.10 for weed ratings, LSD P = .20 for yield</b>				<b>0.3</b>		<b>1.7</b>		<b>0.4</b>		<b>1.7</b>		<b>2.3</b>		<b>1.8</b>		<b>4.25</b>	

Means followed by same letter do not significantly differ

**Table 5. Grass control with residual herbicide programs in soybean at Rochester, MN in 2015.**

Pest Code				Grass						YIELD							
Rating Date				June 10	June 18	June 26	July 8	July 15	Sept 22	Bu/A							
Trt	Treatment	Rate	Appl	Percent Control (%)													
1	UNTREATED			0	c	0	c	0	c	0	d	0	c	6.1	d		
<b>PRE / POST I 5-20 / 6-16</b>																	
2	SOA 14, 15 / 14, 9			99	a	99	a	99	a	99	a	99	a	99	a	44.9	ab
	BROADAXE	25 fl oz/a	A														
	FLEXSTAR GT 3.5	3.5 pt/a	B														
	N-PAK AMS	2.5 % v/v	B														
	MSO	1 % v/v	B														
3	SOA 5, 15 / 14, 9			99	a	99	a	99	a	99	a	99	a	99	a	43.0	abc
	BOUNDARY	1.8 pt/a	A														
	FLEXSTAR GT 3.5	3.5 pt/a	B														
	N-PAK AMS	2.5 % v/v	B														
	MSO	1 % v/v	B														
4	SOA 14,15 / 9			99	a	99	a	99	a	99	a	99	a	99	a	43.2	abc
	BROADAXE	25 fl oz/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
5	SOA 5, 15 / 9			99	a	99	a	99	a	99	a	99	a	99	a	43.2	abc
	BOUNDARY	1.8 pt/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
7	SOA 14, 15 / 9			99	a	99	a	99	a	99	ab	98	a	98	a	39.9	c
	FIERCE	3 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
8	SOA 2, 14 / 9			99	b	99	a	99	a	98	ab	98	a	99	a	44.8	ab
	SONIC	5 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
10	SOA 2, 14, 15 / 9			99	a	99	a	99	a	99	a	99	a	99	a	45.2	ab
	OPTILL	2 oz/a	A														
	ZIDUA	2 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
11	SOA 14, 15 / 9			99	a	99	a	99	a	96	b	94	b	97	a	44.3	ab
	VERDICT	5 fl oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
<b>PRE / POST II 5-20 / 6-25</b>																	
6	SOA 14, 15 / 9			99	a	99	a	99	a	99	a	99	a	99	a	42.1	bc
	PREFIX	2 pt/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	C														
	N-PAK AMS	2.5 % v/v	C														
9	SOA 2, 14 / 9			99	a	99	a	99	a	99	a	99	a	99	a	46.1	a
	SURVEIL																
	FLUMIOXACIN	2.5 oz/a	A														
	CLOANSULAM-METHYL	0.5 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	C														
	N-PAK AMS	2.5 % v/v	C														
<b>POST I 6-16</b>																	
12	SOA 9			0	c	43	b	96	b	86	c	88	c	89	b	46.5	a
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
<b>LSD P=.10 for weed ratings, LSD P = .20 for yield</b>				<b>0.2</b>		<b>1.7</b>		<b>1.8</b>		<b>2.7</b>		<b>3.2</b>		<b>3.6</b>		<b>4.25</b>	

Means followed by same letter do not significantly differ

**Table 6. Crop response to residual herbicide programs in soybean at Rochester, MN in 2015.**

Pest Code				Crop Response					YIELD						
Rating Date				June 10	June 18	June 26	June 30	July 8	Bu/A						
Trt	Treatment	Rate	Appl	Percent Crop Response (%)					Bu/A						
1	UNTREATED			0	c	0	e	0	d	0	b	0	b	6.1	d
<b>PRE / POST I 5-20 / 6-16</b>															
2	SOA 14, 15 / 14, 9			0	c	64	a	56	a	10	a	6	a	44.9	ab
	BROADAXE	25 fl oz/a	A												
	FLEXSTAR GT 3.5	3.5 pt/a	B												
	N-PAK AMS	2.5 % v/v	B												
	MSO	1 % v/v	B												
3	SOA 5, 15 / 14, 9			0	c	65	a	55	b	10	a	8	a	43.0	abc
	BOUNDARY	1.8 pt/a	A												
	FLEXSTAR GT 3.5	3.5 pt/a	B												
	N-PAK AMS	2.5 % v/v	B												
	MSO	1 % v/v	B												
4	SOA 14,15 / 9			0	c	1	e	0	d	0	b	0	b	43.2	abc
	BROADAXE	25 fl oz/a	A												
	TOUCHDOWN TOTAL	32 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
5	SOA 5, 15 / 9			0	c	1	e	0	d	0	b	0	b	43.2	abc
	BOUNDARY	1.8 pt/a	A												
	TOUCHDOWN TOTAL	32 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
7	SOA 14, 15 / 9			39	a	25	b	10	c	0	b	0	b	39.9	c
	FIERCE	3 oz/a	A												
	ROUNDUP POWERMAX	29 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
8	SOA 2, 14 / 9			0	c	11	c	0	d	0	b	0	b	44.8	ab
	SONIC	5 oz/a	A												
	ROUNDUP POWERMAX	29 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
10	SOA 2, 14, 15 / 9			3	c	11	c	0	d	0	b	0	b	45.2	ab
	OPTILL	2 oz/a	A												
	ZIDUA	2 oz/a	A												
	ROUNDUP POWERMAX	29 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
11	SOA 14, 15 / 9			0	c	8	cd	0	d	0	b	0	b	44.3	ab
	VERDICT	5 fl oz/a	A												
	ROUNDUP POWERMAX	29 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
<b>PRE / POST II 5-20 / 6-25</b>															
6	SOA 14, 15 / 9			0	c	6	d	0	d	0	b	0	b	42.1	bc
	PREFIX	2 pt/a	A												
	TOUCHDOWN TOTAL	32 fl oz/a	C												
	N-PAK AMS	2.5 % v/v	C												
9	SOA 2, 14 / 9			24	b	21	b	0	d	0	b	0	b	46.1	a
	SURVEIL														
	FLUMIOXACIN	2.5 oz/a	A												
	CLORANSULAM-METHYL	0.5 oz/a	A												
	ROUNDUP POWERMAX	29 fl oz/a	C												
	N-PAK AMS	2.5 % v/v	C												
<b>POST I 6-16</b>															
12	SOA 9			0	c	0	e	0	d	0	b	0	b	46.5	a
	ROUNDUP POWERMAX	29 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
<b>LSD P=.10 for weed ratings, LSD P = .20 for yield</b>				<b>3.7</b>		<b>4.0</b>		<b>0.9</b>			<b>1.6</b>		<b>4.25</b>		

Means followed by same letter do not significantly differ

## Evaluation of Difficult to Control Broadleaf Weeds with an HPPD Herbicide Based Program in Soybean in SE Minnesota in 2015.

Behnken, Lisa M., Fritz R. Breitenbach, Ellen Sheehan and Dillon Welter

The objective of this trial was to evaluate HPPD tolerant soybean weed control systems and crop response in southeastern Minnesota. The research site was a Lawler loam series with pH of 5.6, O.M. 2.1% and soil test P and K levels of 32 ppm and 309 ppm, respectively. In the spring the field was disked and field cultivated once prior to planting. The previous crop was soybeans. The soybean variety was unknown and was planted May 20, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 135,000 seeds per acre. A randomized complete block design was used with three replications. Preemergence (PRE) treatments were applied with a tractor mounted sprayer delivering 15 gpa at 40 psi using TTI 110015 spray tips. Postemergence (Post I) treatments were applied with a tractor mounted sprayer delivering 15 gpa at 40 psi using TTJ60 11002 spray tips. Evaluations of the plots were taken on June 3, June 10, June 23, July 1, and July 8. Application dates, environmental conditions, and weed stages can be found in Table 1. Performance ratings for giant ragweed control, common lambsquarters control, common waterhemp control, and crop injury response can be found in Tables 2 through 5, respectively. Grass control was excellent in all plots (99 percent control). Crop was destroyed on July 8 to comply with protocol requirements. (University of Minnesota Extension Regional Office, Rochester.)

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

Date	5/20	6/10
<b>Treatment</b>	PRE	POST I
<b>Temperature (F)</b>		
Air	50	77
Soil	50.9	78.6
<b>Relative Humidity (%)</b>	54	48
<b>Wind (mph)</b>		
<b>Soil Moisture</b>	SLIWet	Normal
<b>Soybean</b>		
Stage		V1
Height (inch)		3.5
<b>Giant Ragweed</b>		
Weed Density (ft <sup>2</sup> )		13
Height (inch)		2.5
<b>Common Lambsquarter</b>		
Weed Density (ft <sup>2</sup> )		32
Height (inch)		0.25
<b>Common Waterhemp</b>		
Weed Density (ft <sup>2</sup> )		28
Height (inch)		0.75
<b>Grass</b>		
Weed Density (ft <sup>2</sup> )		1
Height (inch)		1
<b>Rainfall after each application (inch)</b>		
Week 1	1.47	1.46
Week 2	1.09	0.78
Week 3	1.64	1.63



**Table 2. Giant ragweed control with HPPD herbicide systems in HPPD tolerant soybeans at Rochester, MN in 2015.**

Pest Name	Rating Date	Giant ragweed											
		6/3/2015		6/10/2015		6/23/2015		7/1/2015		7/8/2015			
Trt	Treatment	Rate	Appl	Percent Control (%)									
1	UNTREATED CHECK			0	e	0	e	0	d	0	d	0	d
<i>PREEMERGENCE APPLIED 05/20/2015</i>													
2	SOA 27,15,14 / 1			98	a	98	a	98	a	98	a	97	a
	CALLISTO	5fl oz/a	A										
	DUAL MAGNUM	26.7fl oz/a	A										
	FLEXSTAR	17fl oz/a	A										
3	SOA 27,15, 5 / 14,1			90	a	97	a	98	ab	97	ab	97	ab
	CALLISTO	5fl oz/a	A										
	DUAL MAGNUM	26.7fl oz/a	A										
	TRICOR	5.33oz/a	A										
<i>PREEMERGENCE (A) APPLIED 05/20/2015 / POST I (B) APPLIED 06/10/2015</i>													
4	SOA 5,15 / 14,1			35	d	38	d	98	a	98	a	97	ab
	BOUNDARY	24fl oz/a	A										
	FLEXSTAR	17fl oz/a	B										
	FUSION	12fl oz/a	B										
	MSO	1% v/v	B										
5	SOA 14,15 / 14, 1			58	c	37	d	97	ab	97	ab	96	ab
	BROADAXE	25fl oz/a	A										
	FLEXSTAR	17fl oz/a	B										
	FUSION	12fl oz/a	B										
	MSO	1% v/v	B										
6	SOA 2,14 / 14, 1			80	b	85	b	97	b	95	b	95	ab
	AUTHORITY FIRST	5oz/a	A										
	FLEXSTAR	17fl oz/a	B										
	FUSION	12fl oz/a	B										
	MSO	1% v/v	B										
7	SOA 14,15 / 14, 1			77	b	71	c	91	c	86	c	86	c
	VERDICT	5fl oz/a	A										
	COBRA	10fl oz/a	B										
	SELECT MAX	15fl oz/a	B										
	COC	1.5pt/a	B										
	AMS	17lb/100 gal	B										
<i>POST I (B) APPLIED 06/10/2015</i>													
8	SOA 14, 1			0	e	0	e	97	b	97	ab	94	b
	POST ONLY CHECK												
	FLEXSTAR	17fl oz/a	B										
	FUSION	12fl oz/a	B										
	MSO	1% v/v	B										
<b>LSD P=.10</b>				<b>8</b>		<b>8</b>		<b>2</b>		<b>3</b>		<b>3</b>	

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

**Table 3. Common lambsquarters control with HPPD herbicide systems in HPPD tolerant soybeans at Rochester, MN in 2015.**

Pest Name	Common lambsquarters												
	Rating Date		6/3/2015		6/10/2015		6/23/2015		7/1/2015		7/8/2015		
Trt	Treatment	Rate	Appl	Percent control (%)									
1	UNTREATED CHECK			0	b	0	c	0	c	0	d	0	c
<i>PREEMERGENCE APPLIED 05/20/2015</i>													
2	SOA 27,15,14 / 1			99	a	99	a	99	a	99	a	99	a
	CALLISTO	5fl oz/a	A										
	DUAL MAGNUM	26.7fl oz/a	A										
	FLEXSTAR	17fl oz/a	A										
3	SOA 27,15, 5 / 14,1			99	a	99	a	99	a	99	a	99	a
	CALLISTO	5fl oz/a	A										
	DUAL MAGNUM	26.7fl oz/a	A										
	TRICOR	5.33oz/a	A										
<i>PREEMERGENCE (A) APPLIED 05/20/2015 / POST I (B) APPLIED 06/10/2015</i>													
4	SOA 5,15 / 14,1			99	a	99	a	99	a	99	a	99	a
	BOUNDARY	24fl oz/a	A										
	FLEXSTAR	17fl oz/a	B										
	FUSION	12fl oz/a	B										
	MSO	1% v/v	B										
5	SOA 14,15 / 14, 1			99	a	99	a	99	a	99	a	99	a
	BROADAXE	25fl oz/a	A										
	FLEXSTAR	17fl oz/a	B										
	FUSION	12fl oz/a	B										
	MSO	1% v/v	B										
6	SOA 2,14 / 14, 1			99	a	99	a	99	a	99	a	99	a
	AUTHORITY FIRST	5oz/a	A										
	FLEXSTAR	17fl oz/a	B										
	FUSION	12fl oz/a	B										
	MSO	1% v/v	B										
7	SOA 14,15 / 14, 1			99	a	97	b	96	a	90	b	88	b
	VERDICT	5fl oz/a	A										
	COBRA	10fl oz/a	B										
	SELECT MAX	15fl oz/a	B										
	COC	1.5pt/a	B										
	AMS	17lb/100 gal	B										
<i>POST I (B) APPLIED 06/10/2015</i>													
8	SOA 14, 1			0	b	0	c	76	b	79	c	88	b
	POST ONLY CHECK												
	FLEXSTAR	17fl oz/a	B										
	FUSION	12fl oz/a	B										
	MSO	1% v/v	B										
<b>LSD P=.10</b>						1		3		2		3	

**Table 4. Common waterhemp control with HPPD herbicide systems in HPPD tolerant soybeans at Rochester, MN in 2015.**

Pest Name	Common waterhemp												
	Rating Date		6/3/2015		6/10/2015		6/23/2015		7/1/2015		7/8/2015		
Trt	Treatment	Rate	Appl	Percent Control (%)									
1	UNTREATED CHECK			0	b	0	b	0	c	0	c	0	c
<i>PREEMERGENCE APPLIED 05/20/2015</i>													
2	SOA 27,15,14 / 1			99	a	99	a	99	a	99	a	99	a
	CALLISTO	5fl oz/a	A										
	DUAL MAGNUM	26.7fl oz/a	A										
	FLEXSTAR	17fl oz/a	A										
3	SOA 27,15, 5 / 14,1			99	a	99	a	99	a	99	a	99	a
	CALLISTO	5fl oz/a	A										
	DUAL MAGNUM	26.7fl oz/a	A										
	TRICOR	5.33oz/a	A										
<i>PREEMERGENCE (A) APPLIED 05/20/2015 /POST I (B) APPLIED 06/10/2015</i>													
4	SOA 5,15 / 14,1			99	a	99	a	99	a	99	a	99	a
	BOUNDARY	24fl oz/a	A										
	FLEXSTAR	17fl oz/a	B										
	FUSION	12fl oz/a	B										
	MSO	1% v/v	B										
5	SOA 14,15 / 14, 1			99	a	99	a	99	a	99	a	99	a
	BROADAXE	25fl oz/a	A										
	FLEXSTAR	17fl oz/a	B										
	FUSION	12fl oz/a	B										
	MSO	1% v/v	B										
6	SOA 2,14 / 14, 1			99	a	99	a	99	a	99	a	99	a
	AUTHORITY FIRST	5oz/a	A										
	FLEXSTAR	17fl oz/a	B										
	FUSION	12fl oz/a	B										
	MSO	1% v/v	B										
7	SOA 14,15 / 14, 1			99	a	99	a	98	a	96	ab	96	b
	VERDICT	5fl oz/a	A										
	COBRA	10fl oz/a	B										
	SELECT MAX	15fl oz/a	B										
	COC	1.5pt/a	B										
	AMS	17lb/100 gal	B										
<i>POST I (B) APPLIED 06/10/2015</i>													
8	SOA 14, 1			0	b	0	b	92	b	92	b	97	b
	POST ONLY CHECK												
	FLEXSTAR	17fl oz/a	B										
	FUSION	12fl oz/a	B										
	MSO	1% v/v	B										
LSD P=.10								1		4		1	

**Table 5. Crop response to HPPD herbicide systems at Rochester, MN in 2015.**

Pest Name Rating Date			Crop Response				
			6/3/2015	6/10/2015	6/23/2015	7/1/2015	7/8/2015
Trt	Treatment	Rate Appl	Percent crop response (%)				
1	UNTREATED CHECK		0 a	0 c	0 c	0 b	0 b
<i>PREEMERGENCE APPLIED 05/20/2015</i>							
2	SOA 27,15,14 / 1		0 a	13 b	0 c	0 b	0 b
	CALLISTO	5fl oz/a A					
	DUAL MAGNUM	26.7fl oz/a A					
	FLEXSTAR	17fl oz/a A					
3	SOA 27,15, 5 / 14,1		0 a	20 a	0 c	0 b	0 b
	CALLISTO	5fl oz/a A					
	DUAL MAGNUM	26.7fl oz/a A					
	TRICOR	5.33oz/a A					
<i>PREEMERGENCE (A) APPLIED 05/20/2015 / POST I (B) APPLIED 06/10/2015</i>							
4	SOA 5,15 / 14,1		0 a	0 c	30 b	0 b	0 b
	BOUNDARY	24fl oz/a A					
	FLEXSTAR	17fl oz/a B					
	FUSION	12fl oz/a B					
	MSO	1% v/v B					
5	SOA 14,15 / 14, 1		0 a	0 c	30 b	0 b	0 b
	BROADAXE	25fl oz/a A					
	FLEXSTAR	17fl oz/a B					
	FUSION	12fl oz/a B					
	MSO	1% v/v B					
6	SOA 2,14 / 14, 1		0 a	0 c	30 b	0 b	0 b
	AUTHORITY FIRST	5oz/a A					
	FLEXSTAR	17fl oz/a B					
	FUSION	12fl oz/a B					
	MSO	1% v/v B					
7	SOA 14,15 / 14, 1		0 a	0 c	40 a	10 a	10 a
	VERDICT	5fl oz/a A					
	COBRA	10fl oz/a B					
	SELECT MAX	15fl oz/a B					
	COC	1.5pt/a B					
	AMS	17lb/100 gal B					
<i>POST I (B) APPLIED 06/10/2015</i>							
8	SOA 14, 1		0 a	0 c	30 b	0 b	0 b
	POST ONLY CHECK						
	FLEXSTAR	17fl oz/a B					
	FUSION	12fl oz/a B					
	MSO	1% v/v B					

## Impact of nozzle type and spray volume on weed control using Liberty 280 herbicide in soybeans in southeast Minnesota in 2015.

Breitenbach, Fritz R., Lisa M. Behnken, David R. Nicolai, and Brent Breitenbach.

The objective was to evaluate nozzle type and spray volume impacts on weed control with Liberty 280 herbicide (contact) in soybean in southeastern Minnesota. The research site is a Lawler loam series with pH of 6.6, O.M 2.1% and soil test P and K levels of 49 ppm and 137 ppm, respectively. In the spring the field was disked and field cultivated once prior to planting. The previous crop was fallow. The soybean variety was Stine 19LF62 LibertyLink and was planted June 2, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 135,000 seeds per acre. A randomized complete block design was used with four replications. Postemergence treatments (POST) were applied with a tractor-mounted sprayer delivering 7.5 gpa at 36 psi and 15 gpa at 36 psi using 4 different spray tips from TeeJet. The four spray tips included a Turbo Teejet (medium droplets), a Turbo Teejet Induction (ultra-course droplets), a Turbo TwinJet (course droplets), and Turbo TwinJet Induction (course droplets) nozzles. All nozzles were in the 11002 size category with the same ounces per minute flow rate. Applications were made to large weeds in order to accentuate control differences between the nozzle types and application volumes. Application dates, environmental conditions, and weed stages can be found in Table 1. Evaluations of the plots were taken July 21. Performance ratings for weed control can be found in Tables 2. A 1-5 rating scale was utilized to assess weed control. A score of 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, and 5 = Excellent control. (University of Minnesota Extension Regional Office, Rochester.)

### Conclusions:

Spray volume was the single most important factor for improved weed control. At 15 gallons per acre all nozzles performed equally. Only one nozzle the Turbo TeeJet performed equally well at both the 7.5 and 15 gallon per acre volume. This nozzle is the only nozzle tested in the medium sized droplet category. Split pattern nozzles did not improve weed control at either spray volume in this trial.

**Table 1. Application date, environmental conditions, and weed stages**

Date	7/2
Treatment	POST I
Temperature (F)	
Air	68
Relative Humidity (%)	56
Wind (mph)	6
Soil Moisture	Normal
Soybean	
Stage	V4
Height (inch)	8
Giant Ragweed	
Height (inch)	15
Common Waterhemp	
Height (inch)	5
Rainfall after each application (inch)	
Week 1	0.69
Week 2	0.30
Week 3	1.64

**Table 2. Weed control of nozzles at 7.5 and 15 GPA in soybeans at Rochester, MN in 2015.**

Pest Code	Rating Date	Rating Type	Weed Control Scale 1= Poor, 5 = Excellent	ALL SPP Jul-21-2015 CONTROL 1-5
No	Name	Rate	Unit	
1	TT 11002 @ 7.5 GPA LIBERTY 280 Ammonium Sulfate	32 3	fl oz/a lb/a	3.4 a
2	TT 11002 @ 15 GPA LIBERTY 280 Ammonium Sulfate	32 3	fl oz/a lb/a	3.3 a
3	TTI 11002 @ 7.5 GPA LIBERTY 280 Ammonium Sulfate	32 3	fl oz/a lb/a	2.9 bc
4	TTI 11002 @ 15 GPA LIBERTY 280 Ammonium Sulfate	32 3	fl oz/a lb/a	3.3 a
5	TTJ60 11002 @ 7.5 GPA LIBERTY 280 Ammonium Sulfate	32 3	fl oz/a lb/a	2.6 cd
6	TTJ60 11002 @ 15 GPA LIBERTY 280 Ammonium Sulfate	32 3	fl oz/a lb/a	3.1 ab
7	AITTJ60 11002 @ 7.5 GPA LIBERTY 280 Ammonium Sulfate	32 3	fl oz/a lb/a	2.4 d
8	AITTJ60 11002 @ 15 GPA LIBERTY 280 Ammonium Sulfate	32 3	fl oz/a lb/a	3.5 a
<b>LSD P=.20</b>				<b>0.45</b>

## Glufosinate (LibertyLink) and Glyphosate (Roundup Ready/GT) Weed Control Programs for SOA 2- & SOA 9- Resistant Giant Ragweed in Soybean.

Behnken, Lisa M., Fritz R. Breitenbach, Jeffrey L. Gunsolus, and Dillon L. Welter.

The objective of this trial was to evaluate and compare glufosinate (LibertyLink) and glyphosate (Roundup Ready/GT) programs for control of SOA 2- & SOA 9 herbicide resistant giant ragweed in soybeans in southeastern Minnesota. Preemergence (PRE) / Postemergence (POST) and total POST systems were compared for weed control and crop response. The research site was positioned on a Port Byron silt loam soil with a pH of 7.0, O.M 4.1% and soil test P and K levels of 44 and 175 ppm, respectively. The field was fall chisel plowed and spring disked. Fertilizer was broadcast applied on April 23, 2015 at a rate of 38-70-155-12 (N-P-K-S). The field was field cultivated ahead of planting. The previous crop was a weedy fallow. Soybean varieties planted were Stine 19LF62 (LibertyLink), Stine 22LD23 (LibertyLink), Stine 19RF32 (Roundup Ready), and Stine 22RF22 (Roundup Ready). The trial was planted on May 22, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 140,000 seeds per acre. A randomized complete block design was used with four replications. PRE treatments and POST systemic herbicide treatments were applied with TTI11002 spray tips. POST contact herbicide treatments were applied with TTIJ60-11002 spray tips. All applications were applied with a tractor-mounted sprayer delivering 15 gpa at 30 psi. Evaluations of the plots were taken in June on the 8, 17, 25, and 30, in July on the 8, 15, 20, and 27 and on September 28, 2015. The two center rows of each plot were machine harvested on October 19, 2015. Application dates, environmental conditions, and weed stages are in Table 1. Performance ratings for control of giant ragweed, crop response control of common lambsquarters and redroot pigweed are in Tables 2 through 5, respectively. Varieties performed similarly in each system, noting soybean recovery and canopy closure was similar after herbicide applications. (University of Minnesota Extension Regional Office, Rochester. Trial partially funded by the Minnesota Soybean Research & Promotion Council).

### SUMMARY

There are challenges associated with achieving acceptable weed control of SOA 2- (ALS inhibitors) and SOA 9- (EPSP synthase inhibitors - glyphosate) resistant giant ragweed in soybean. Previous work has shown that three-pass systems are the most effective and that giant ragweed control levels of greater than 95 percent are achievable. The keys to successful weed control of SOA 2- and SOA 9-resistant giant ragweed are 1) selecting an effective PRE herbicide; and 2) following it with a timely POST application of SOA 10 (glufosinate – Liberty) and/or SOA 14 (PPO-Flexstar, Cobra, etc.) herbicide(s).

Planting a glufosinate (LibertyLink) variety is necessary for utilizing the SOA 10 herbicide system. Glufosinate by itself or in a tank mix has provided good resistant giant ragweed control. If planting a glyphosate (Roundup/GT) variety the inclusion of a SOA 14 herbicide is essential for good resistant ragweed control.

**Regardless of which herbicide system you choose, weeds need to be treated at the correct stage (2 inches) and proper application practices need to be adhered to when using contact herbicides!**

Crop injury will occur when using SOA 14 herbicides and must be accepted by farmers as a condition for satisfactory weed control. However, overuse of SOA 10 and SOA 14 herbicides without a diversified integrated weed management plan will likely result in giant ragweed becoming resistant to both of these SOA's. Waterhemp populations in Minnesota are already becoming resistant to SOA 14 herbicides because of repeated overuse.

In the 2015 study, PRE followed by timely POST systems provided the most durable weed control. This was especially true in SOA 10 systems (LibertyLink) where weed species in addition to giant ragweed needed to be targeted. Relying on total POST systems greatly increases the risk for weed control failures or poor performance. However, weather often limits the application window for PRE herbicides, resulting in the use of a total POST system. Total POST systems that included Prefix (SOA 14) in combination with either glyphosate (Roundup) or glufosinate (Liberty) followed by an additional POST herbicide application, one that is effective on giant ragweed, provided better results than two POST applications of either glufosinate or glyphosate only systems. It is evident that herbicide only management systems to control resistant weed populations are going to be increasingly challenged and non-chemical strategies will need to be implemented.

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

Date	5/23	6/9	6/24	6/25	7/3	7/10
<b>Treatment</b>	PRE (A)	POST I (B)	POST II (C)	POST III (D)	POST IV (E)	POST V (F)
<b>Temperature (F)</b>						
Air	62	69	69	66	57	77
Soil	57.2	65.3	65.3	68.7		
<b>Relative Humidity (%)</b>	51	65	73	88	88	64
<b>Wind (mph)</b>	0	8	6	8	4	9
<b>Soil Moisture</b>	Normal	Normal	Normal	Normal	Normal	Normal
<b>Soybean</b>						
Stage		VC	V3	V4	V5	R1 Flower
Height (inch)		2.5	7	8	9	19
<b>Giant Ragweed</b>						
Weed Density (ft <sup>2</sup> )		15.3				5.8
Height (inch)		2.3	4.4	2.8	4.6	
<b>Common Lambsquarter</b>						
Weed Density (ft <sup>2</sup> )		34.3				
Height (inch)		1.1	1.8	2.5		
<b>Common Waterhemp</b>						
Weed Density (ft <sup>2</sup> )		14				
Height (inch)		0.9	2.1	1.9		
<b>Grass</b>						
Weed Density (ft <sup>2</sup> )		43				
Height (inch)		1.6	3.4	2.6		
<b>Rainfall after each application (inch)</b>						
Week 1	1.47	1.69	1.63	1.63	0.69	0.30
Week 2	1.32	0.78	0.69	0.69	0.30	1.64
Week 3	2.82	1.63	0.30	0.30	1.64	1.61

**Table 2A. SOA-2 and SOA-9 resistant giant ragweed control in glufosinate and glyphosate systems in soybean at Rochester, MN in 2015.**

Pest Code					Giant ragweed											
Rating Date					Jun-8-15	Jun-17-15	Jun-30-15	Jul-15-15	Jul-27-15	Sep-28-15						
Trt	Treatment	Rate	Growth	Appl	Percent control (%)											
<b>Glufosinate systems</b>																
1	STINE 19LF62				90	a	85	bc	98	a	98	ab	99	a	99	a
	VERDICT	5	fl oz/a	PREPRE	A											
	ZIDUA	2	oz/a	PREPRE	A											
	LIBERTY 280	29	fl oz/a	MIDPOWE	C											
	N-PAK AMS	2.5	% v/v	MIDPOWE	C											
	LIBERTY 280	29	fl oz/a	LAPOWE	F											
	N-PAK AMS	2.5	% v/v	LAPOWE	F											
2	STINE 22LD23				90	a	84	c	98	a	98	ab	99	a	99	ab
	VERDICT	5	fl oz/a	PREPRE	A											
	ZIDUA	2	oz/a	PREPRE	A											
	LIBERTY 280	29	fl oz/a	MIDPOWE	C											
	N-PAK AMS	2.5	% v/v	MIDPOWE	C											
	LIBERTY 280	29	fl oz/a	LAPOWE	F											
	N-PAK AMS	2.5	% v/v	LAPOWE	F											
3	STINE 19LF62				0	c	97	a	99	a	98	ab	96	ab	96	abc
	PREFIX	2	pt/a	EAPOWE	B											
	LIBERTY 280	29	fl oz/a	EAPOWE	B											
	N-PAK AMS	2.5	% v/v	EAPOWE	B											
	LIBERTY 280	29	fl oz/a	LAPOWE	D											
	N-PAK AMS	2.5	% v/v	LAPOWE	D											
4	STINE 22LD23				0	c	94	a	99	a	97	ab	95	ab	95	abc
	PREFIX	2	pt/a	EAPOWE	B											
	LIBERTY 280	29	fl oz/a	EAPOWE	B											
	N-PAK AMS	2.5	% v/v	EAPOWE	B											
	LIBERTY 280	29	fl oz/a	LAPOWE	D											
	N-PAK AMS	2.5	% v/v	LAPOWE	D											
5	STINE 22LD23				0	c	97	a	99	a	97	ab	95	ab	95	bc
	LIBERTY 280	29	fl oz/a	EAPOWE	B											
	N-PAK AMS	2.5	% v/v	EAPOWE	B											
	LIBERTY 280	29	fl oz/a	LAPOWE	D											
	N-PAK AMS	2.5	% v/v	LAPOWE	D											
<b>Glyphosate systems</b>																
6	STINE 19RF32				89	ab	88	b	95	b	94	b	92	b	92	c
	VERDICT	5	fl oz/a	PREPRE	A											
	ZIDUA	2	oz/a	PREPRE	A											
	COBRA	12	fl oz/a	MIDPOWE	C											
	ROUNDUP POWERMAX	32	fl oz/a	MIDPOWE	C											
	COC	1	pt/a	MIDPOWE	C											
	N-PAK AMS	2.5	% v/v	MIDPOWE	C											
7	STINE 20RD00				88	b	84	c	96	b	88	c	86	c	86	d
	VERDICT	5	fl oz/a	PREPRE	A											
	ZIDUA	2	oz/a	PREPRE	A											
	COBRA	12	fl oz/a	MIDPOWE	C											
	ROUNDUP POWERMAX	32	fl oz/a	MIDPOWE	C											
	COC	1	pt/a	MIDPOWE	C											
	N-PAK AMS	2.5	% v/v	MIDPOWE	C											
8	STINE 19RF32				0	c	96	a	87	c	98	a	97	a	97	ab
	PREFIX	2	pt/a	EAPOWE	B											
	ROUNDUP POWERMAX	32	fl oz/a	EAPOWE	B											
	NIS	0.25	% v/v	EAPOWE	B											
	N-PAK AMS	2.5	% v/v	EAPOWE	B											
	COBRA	12	fl oz/a	LAPOWE	E											
	ROUNDUP POWERMAX	32	fl oz/a	LAPOWE	E											
	COC	1	pt/a	LAPOWE	E											
	N-PAK AMS	2.5	% v/v	LAPOWE	E											
9	STINE 20RD00				0	c	96	a	83	d	99	a	98	a	98	ab
	PREFIX	2	pt/a	EAPOWE	B											
	ROUNDUP POWERMAX	32	fl oz/a	EAPOWE	B											
	NIS	0.25	% v/v	EAPOWE	B											
	N-PAK AMS	2.5	% v/v	EAPOWE	B											
	COBRA	12	fl oz/a	LAPOWE	E											
	ROUNDUP POWERMAX	32	fl oz/a	LAPOWE	E											
	COC	1	pt/a	LAPOWE	E											
	N-PAK AMS	2.5	% v/v	LAPOWE	E											
10	STINE 20RD00				0	c	55	d	58	e	36	d	34	d		
	ROUNDUP POWERMAX	32	fl oz/a	EAPOWE	B											
	N-PAK AMS	2.5	% v/v	EAPOWE	B											
	ROUNDUP POWERMAX	32	fl oz/a	LAPOWE	D											
	N-PAK AMS	2.5	% v/v	LAPOWE	D											
<b>LSD P=-.10</b>					<b>1.3</b>		<b>2.8</b>		<b>1.9</b>		<b>4.4</b>		<b>4.1</b>		<b>3.8</b>	



**Table 3. Soybean response to herbicides used to control SOA-2 & SOA-9 resistant giant ragweed in soybean at Rochester, MN in 2015.**

Rating Date				Jun-8-15	Jun-17-15	Jun-25-15	Jun-30-15	Jul-8-15	Jul-15-15						
Part Rated				Crop Response - Injury											
No.	Name	Rate Unit	Stage	Code											
				Percent (%)											
<b>Glufosinate systems</b>															
1	STINE 19LF62			5	a	0	c	14	e	16	cd	10	c	10	b
	VERDICT	5	fl oz/a	PREPRE	A										
	ZIDUA	2	oz/a	PREPRE	A										
	LIBERTY 280	29	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
	LIBERTY 280	29	fl oz/a	LAPOWE	F										
	N-PAK AMS	2.5	% v/v	LAPOWE	F										
2	STINE 22LD23			5	a	0	c	15	e	19	c	0	d	5	c
	VERDICT	5	fl oz/a	PREPRE	A										
	ZIDUA	2	oz/a	PREPRE	A										
	LIBERTY 280	29	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
	LIBERTY 280	29	fl oz/a	LAPOWE	F										
	N-PAK AMS	2.5	% v/v	LAPOWE	F										
3	STINE 19LF62			0	b	60	a	33	c	20	c	10	c	0	d
	PREFIX	2	pt/a	EAPOWE	B										
	LIBERTY 280	29	fl oz/a	EAPOWE	B										
	N-PAK AMS	2.5	% v/v	EAPOWE	B										
	LIBERTY 280	29	fl oz/a	LAPOWE	D										
	N-PAK AMS	2.5	% v/v	LAPOWE	D										
4	STINE 22LD23			0	b	59	a	26	d	29	b	10	c	0	d
	PREFIX	2	pt/a	EAPOWE	B										
	LIBERTY 280	29	fl oz/a	EAPOWE	B										
	N-PAK AMS	2.5	% v/v	EAPOWE	B										
	LIBERTY 280	29	fl oz/a	LAPOWE	D										
	N-PAK AMS	2.5	% v/v	LAPOWE	D										
5	STINE 22LD23			0	b	13	b	0	f	18	c	0	d	0	d
	LIBERTY 280	29	fl oz/a	EAPOWE	B										
	N-PAK AMS	2.5	% v/v	EAPOWE	B										
	LIBERTY 280	29	fl oz/a	LAPOWE	D										
	N-PAK AMS	2.5	% v/v	LAPOWE	D										
<b>Glyphosate systems</b>															
6	STINE 19RF32			5	a	0	c	65	a	63	a	43	b	5	c
	VERDICT	5	fl oz/a	PREPRE	A										
	ZIDUA	2	oz/a	PREPRE	A										
	Cobra	12	fl oz/a	MIDPOWE	C										
	ROUNDUP POWERMAX	32	fl oz/a	MIDPOWE	C										
	COC	1	pt/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
7	STINE 20RD00			5	a	0	c	65	a	65	a	46	b	13	b
	VERDICT	5	fl oz/a	PREPRE	A										
	ZIDUA	2	oz/a	PREPRE	A										
	Cobra	12	fl oz/a	MIDPOWE	C										
	ROUNDUP POWERMAX	32	fl oz/a	MIDPOWE	C										
	COC	1	pt/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
8	STINE 19RF32			0	b	60	a	38	c	11	d	85	a	36	a
	PREFIX	2	pt/a	EAPOWE	B										
	ROUNDUP POWERMAX	32	fl oz/a	EAPOWE	B										
	NIS	0.25	% v/v	EAPOWE	B										
	N-PAK AMS	2.5	% v/v	EAPOWE	B										
	Cobra	12	fl oz/a	LAPOWE	E										
	ROUNDUP POWERMAX	32	fl oz/a	LAPOWE	E										
	COC	1	pt/a	LAPOWE	E										
	N-PAK AMS	2.5	% v/v	LAPOWE	E										
9	STINE 20RD00			0	b	59	a	45	b	18	c	85	a	39	a
	PREFIX	2	pt/a	EAPOWE	B										
	ROUNDUP POWERMAX	32	fl oz/a	EAPOWE	B										
	NIS	0.25	% v/v	EAPOWE	B										
	N-PAK AMS	2.5	% v/v	EAPOWE	B										
	Cobra	12	fl oz/a	LAPOWE	E										
	ROUNDUP POWERMAX	32	fl oz/a	LAPOWE	E										
	COC	1	pt/a	LAPOWE	E										
	N-PAK AMS	2.5	% v/v	LAPOWE	E										
10	STINE 20RD00			0	b	11	b	0	f	11	d	0	d	0	d
	ROUNDUP POWERMAX	32	fl oz/a	EAPOWE	B										
	N-PAK AMS	2.5	% v/v	EAPOWE	B										
	ROUNDUP POWERMAX	32	fl oz/a	LAPOWE	D										
	N-PAK AMS	2.5	% v/v	LAPOWE	D										
<b>LSD P=.10</b>				.		3.7		5.1		5.7		5.0		4.7	

**Table 4. Common lambsquarters control in a SOA-2 & SOA-9 resistant giant ragweed soybean site in Rochester, MN in 2015.**

Pest Code					Common lambsquarters							
Rating Date					Jun-8-2015	Jun-17-2015	Jun-30-2015	Sep-28-2015				
No. Name	Rate	Unit	Stage	Code	Percent control (%)							
<b>Glufosinate Sysyems</b>												
1 STINE 19LF62					99	a	99	ab	99	a	98	ab
VERDICT	5	fl oz/a	PREPRE	A								
ZIDUA	2	oz/a	PREPRE	A								
LIBERTY 280	29	fl oz/a	MIDPOWE	C								
N-PAK AMS	2.5	% v/v	MIDPOWE	C								
LIBERTY 280	29	fl oz/a	LAPOWE	F								
N-PAK AMS	2.5	% v/v	LAPOWE	F								
2 STINE 22LD23					99	a	99	a	99	a	99	a
VERDICT	5	fl oz/a	PREPRE	A								
ZIDUA	2	oz/a	PREPRE	A								
LIBERTY 280	29	fl oz/a	MIDPOWE	C								
N-PAK AMS	2.5	% v/v	MIDPOWE	C								
LIBERTY 280	29	fl oz/a	LAPOWE	F								
N-PAK AMS	2.5	% v/v	LAPOWE	F								
3 STINE 19LF62					0	b	95	bc	99	a	93	ef
PREFIX	2	pt/a	EAPOWE	B								
LIBERTY 280	29	fl oz/a	EAPOWE	B								
N-PAK AMS	2.5	% v/v	EAPOWE	B								
LIBERTY 280	29	fl oz/a	LAPOWE	D								
N-PAK AMS	2.5	% v/v	LAPOWE	D								
4 STINE 22LD23					0	b	89	d	99	a	93	def
PREFIX	2	pt/a	EAPOWE	B								
LIBERTY 280	29	fl oz/a	EAPOWE	B								
N-PAK AMS	2.5	% v/v	EAPOWE	B								
LIBERTY 280	29	fl oz/a	LAPOWE	D								
N-PAK AMS	2.5	% v/v	LAPOWE	D								
5 STINE 22LD23					0	b	43	e	95	b	91	f
LIBERTY 280	29	fl oz/a	EAPOWE	B								
N-PAK AMS	2.5	% v/v	EAPOWE	B								
LIBERTY 280	29	fl oz/a	LAPOWE	D								
N-PAK AMS	2.5	% v/v	LAPOWE	D								
<b>Glyphosate systems</b>												
6 STINE 19RF32					99	a	99	a	99	a	96	bc
VERDICT	5	fl oz/a	PREPRE	A								
ZIDUA	2	oz/a	PREPRE	A								
Cobra	12	fl oz/a	MIDPOWE	C								
ROUNDUP POWERMAX	32	fl oz/a	MIDPOWE	C								
COC	1	pt/a	MIDPOWE	C								
N-PAK AMS	2.5	% v/v	MIDPOWE	C								
7 STINE 20RD00					99	a	99	ab	99	a	95	cde
VERDICT	5	fl oz/a	PREPRE	A								
ZIDUA	2	oz/a	PREPRE	A								
Cobra	12	fl oz/a	MIDPOWE	C								
ROUNDUP POWERMAX	32	fl oz/a	MIDPOWE	C								
COC	1	pt/a	MIDPOWE	C								
N-PAK AMS	2.5	% v/v	MIDPOWE	C								
8 STINE 19RF32					0	b	99	ab	87	c	95	cd
PREFIX	2	pt/a	EAPOWE	B								
ROUNDUP POWERMAX	32	fl oz/a	EAPOWE	B								
NIS	0.25	% v/v	EAPOWE	B								
N-PAK AMS	2.5	% v/v	EAPOWE	B								
Cobra	12	fl oz/a	LAPOWE	E								
ROUNDUP POWERMAX	32	fl oz/a	LAPOWE	E								
COC	1	pt/a	LAPOWE	E								
N-PAK AMS	2.5	% v/v	LAPOWE	E								
9 STINE 20RD00					0	b	99	ab	89	c	96	abc
PREFIX	2	pt/a	EAPOWE	B								
ROUNDUP POWERMAX	32	fl oz/a	EAPOWE	B								
NIS	0.25	% v/v	EAPOWE	B								
N-PAK AMS	2.5	% v/v	EAPOWE	B								
Cobra	12	fl oz/a	LAPOWE	E								
ROUNDUP POWERMAX	32	fl oz/a	LAPOWE	E								
COC	1	pt/a	LAPOWE	E								
N-PAK AMS	2.5	% v/v	LAPOWE	E								
10 STINE 20RD00					0	b	92	cd	95	b		
ROUNDUP POWERMAX	32	fl oz/a	EAPOWE	B								
N-PAK AMS	2.5	% v/v	EAPOWE	B								
ROUNDUP POWERMAX	32	fl oz/a	LAPOWE	D								
N-PAK AMS	2.5	% v/v	LAPOWE	D								
<b>LSD P=.10</b>					.		4.0		3.6		2.7	

**Table 5. Redroot pigweed control in a SOA-2 & SOA-9 resistant giant ragweed soybean site in Rochester, MN in 2015.**

Pest Code					Common waterhemp					
Rating Date					Jun-8-15	Jun-17-15	Jun-30-15	Sep-28-15		
No.	Name	Rate	Unit	Stage	Code					
					Percent control (%)					
<b>Glufosinate systems</b>										
1	STINE 19LF62				<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>
	VERDICT	5	fl oz/a	PREPRE	A					
	ZIDUA	2	oz/a	PREPRE	A					
	LIBERTY 280	29	fl oz/a	MIDPOWE	C					
	N-PAK AMS	2.5	% v/v	MIDPOWE	C					
	LIBERTY 280	29	fl oz/a	LAPOWE	F					
	N-PAK AMS	2.5	% v/v	LAPOWE	F					
2	STINE 22LD23				<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>
	VERDICT	5	fl oz/a	PREPRE	A					
	ZIDUA	2	oz/a	PREPRE	A					
	LIBERTY 280	29	fl oz/a	MIDPOWE	C					
	N-PAK AMS	2.5	% v/v	MIDPOWE	C					
	LIBERTY 280	29	fl oz/a	LAPOWE	F					
	N-PAK AMS	2.5	% v/v	LAPOWE	F					
3	STINE 19LF62				<b>0</b>	<b>b</b>	<b>96</b>	<b>ab</b>	<b>99</b>	<b>a</b>
	PREFIX	2	pt/a	EAPOWE	B					
	LIBERTY 280	29	fl oz/a	EAPOWE	B					
	N-PAK AMS	2.5	% v/v	EAPOWE	B					
	LIBERTY 280	29	fl oz/a	LAPOWE	D					
	N-PAK AMS	2.5	% v/v	LAPOWE	D					
4	STINE 22LD23				<b>0</b>	<b>b</b>	<b>90</b>	<b>c</b>	<b>99</b>	<b>a</b>
	PREFIX	2	pt/a	EAPOWE	B					
	LIBERTY 280	29	fl oz/a	EAPOWE	B					
	N-PAK AMS	2.5	% v/v	EAPOWE	B					
	LIBERTY 280	29	fl oz/a	LAPOWE	D					
	N-PAK AMS	2.5	% v/v	LAPOWE	D					
5	STINE 22LD23				<b>0</b>	<b>b</b>	<b>43</b>	<b>d</b>	<b>97</b>	<b>ab</b>
	LIBERTY 280	29	fl oz/a	EAPOWE	B					
	N-PAK AMS	2.5	% v/v	EAPOWE	B					
	LIBERTY 280	29	fl oz/a	LAPOWE	D					
	N-PAK AMS	2.5	% v/v	LAPOWE	D					
<b>Glyphosate systems</b>										
6	STINE 19RF32				<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>
	VERDICT	5	fl oz/a	PREPRE	A					
	ZIDUA	2	oz/a	PREPRE	A					
	Cobra	12	fl oz/a	MIDPOWE	C					
	ROUNDUP POWERMAX	32	fl oz/a	MIDPOWE	C					
	COC	1	pt/a	MIDPOWE	C					
	N-PAK AMS	2.5	% v/v	MIDPOWE	C					
7	STINE 20RD00				<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>	<b>99</b>	<b>a</b>
	VERDICT	5	fl oz/a	PREPRE	A					
	ZIDUA	2	oz/a	PREPRE	A					
	Cobra	12	fl oz/a	MIDPOWE	C					
	ROUNDUP POWERMAX	32	fl oz/a	MIDPOWE	C					
	COC	1	pt/a	MIDPOWE	C					
	N-PAK AMS	2.5	% v/v	MIDPOWE	C					
8	STINE 19RF32				<b>0</b>	<b>b</b>	<b>99</b>	<b>a</b>	<b>91</b>	<b>c</b>
	PREFIX	2	pt/a	EAPOWE	B					
	ROUNDUP POWERMAX	32	fl oz/a	EAPOWE	B					
	NIS	0.25	% v/v	EAPOWE	B					
	N-PAK AMS	2.5	% v/v	EAPOWE	B					
	Cobra	12	fl oz/a	LAPOWE	E					
	ROUNDUP POWERMAX	32	fl oz/a	LAPOWE	E					
	COC	1	pt/a	LAPOWE	E					
	N-PAK AMS	2.5	% v/v	LAPOWE	E					
9	STINE 20RD00				<b>0</b>	<b>b</b>	<b>99</b>	<b>a</b>	<b>90</b>	<b>c</b>
	PREFIX	2	pt/a	EAPOWE	B					
	ROUNDUP POWERMAX	32	fl oz/a	EAPOWE	B					
	NIS	0.25	% v/v	EAPOWE	B					
	N-PAK AMS	2.5	% v/v	EAPOWE	B					
	Cobra	12	fl oz/a	LAPOWE	E					
	ROUNDUP POWERMAX	32	fl oz/a	LAPOWE	E					
	COC	1	pt/a	LAPOWE	E					
	N-PAK AMS	2.5	% v/v	LAPOWE	E					
10	STINE 20RD00				<b>0</b>	<b>b</b>	<b>92</b>	<b>bc</b>	<b>96</b>	<b>b</b>
	ROUNDUP POWERMAX	32	fl oz/a	EAPOWE	B					
	N-PAK AMS	2.5	% v/v	EAPOWE	B					
	ROUNDUP POWERMAX	32	fl oz/a	LAPOWE	D					
	N-PAK AMS	2.5	% v/v	LAPOWE	D					
<b>LSD P=.10</b>					.		<b>4</b>	<b>2</b>	<b>2</b>	

## Introduction

With the increase in herbicide resistant weed biotypes and no new herbicide chemistries on the horizon, fewer options remain for good weed control. Achieving acceptable control is particularly challenging in parts of Minnesota where *Ambrosia trifida* (giant ragweed) is resistant to both SOA 2- (ALS inhibitors) and SOA 9- (EPSP synthase inhibitors) herbicides. Research conducted in Rochester, Minnesota in 2015 suggests that glufosinate (SOA 10) herbicide can be a viable control option when herbicide resistant giant ragweed is present. The objective of this trial was to evaluate and compare glufosinate and glyphosate systems for control of SOA 2- and SOA 9- resistant giant ragweed. Funding was provided by the Minnesota Soybean Research and Promotion Council.

## Materials and Methods

Three systems using either glufosinate or glyphosate were evaluated for control of herbicide resistant giant ragweed in soybean in southeast Minnesota. Systems included: 1) Preemergence herbicides (PRE) followed by postemergence (POST) application(s) of glufosinate or glyphosate. In the glufosinate system, two POST applications of glufosinate were made; 2) Two-pass POST applications of glufosinate or glyphosate with effective tank mix partners; and 3) Two-pass POST applications of glufosinate or glyphosate alone as controls. The research site was a Port Byron silt loam soil with a pH of 7.0, O.M 4.1% and soil test P and K levels of 44 and 175 ppm, respectively. The field was fall chisel plowed, spring disked and field cultivated ahead of planting. The previous crop was a weedy fallow. Four Stine soybean varieties, LibertyLink 19LF62 and 22LD23 and Roundup Ready 19RF32 and 22RF22 were cone planted on May 22, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 140,000 seeds per acre. A randomized complete block design with four replications was used. PRE treatments and POST systemic herbicide treatments (e.g. glyphosate) were applied with TTI11002 spray tips. POST contact herbicide treatments (e.g. glufosinate) were applied with TTIJ60-11002 spray tips. All applications were applied with a tractor-mounted sprayer delivering 15 gpa at 30 psi. Evaluations were taken from June through September (Table 1). The plots were machine harvested on October 19, 2015.

Glufosinate Systems		Percent Control					Injury	
Herbicide <sup>1</sup>	Rate/A	Time <sup>2</sup>	(%)					(%)
			6/8	6/17	6/30	7/27	9/28	7/8
Verdict + Zidua / Liberty 280 + N-PAK AMS / Liberty 280 + N-PAK AMS	5 fl oz + 2 oz / 29 fl oz + 2.5% v/v / 29 fl oz + 2.5% v/v	A						
		C	90	85	98	99	99	5
		F						
Prefix +Liberty 280 + N-PAK AMS / Liberty 280 + N-PAK AMS	2 pt + 29 fl oz + 2.5% v/v / 29 fl oz + 2.5% v/v	B	0	95	99	95	95	10
		D						
Glyphosate Systems								
Verdict + Zidua / Cobra + Roundup PowerMAX + COC + N-PAK AMS	5 fl oz + 2 oz / 12 fl oz + 32 fl oz + 1 pt + 2.5% v/v	A	89	86	95	89	89	44
		C						
Prefix + Roundup PowerMAX +NIS + N-PAK AMS / Cobra + Roundup PowerMAX + COC + N-PAK AMS	2 pt + 32 fl oz + 0.25% v/v + 2.5% v/v / 12 fl oz + 32 fl oz + 1 pt + 2.5% v/v	B	0	96	85	97	97	85
		E						
LSD P = .10			2	2	1	3	3	6

1. Verdict = saflufenacil + dimethenamid-P, Zidua = pyroxasulfone, Liberty 280 = glufosinate, Prefix = s-metolachlor + fomesafen, Cobra = lacotofen, Roundup PowerMAX = glyphosate  
2. A = PRE on 5/23, B = POST I on 6/9, C = POST II on 6/24, D = POST III on 6/25, E = POST IV on 7/3, F = POST V on 7/10



Figure 1. Three-pass system using a PRE application of Verdict + Zidua followed by two POST applications of Liberty 280 on 6/24 and 7/10. Photo taken 7/27/15.



Figure 2. Two-pass POST system using Prefix + Liberty 280 applied on 6/9 followed by a second POST application of Liberty 280 on 6/25. Photo taken 7/27/15.

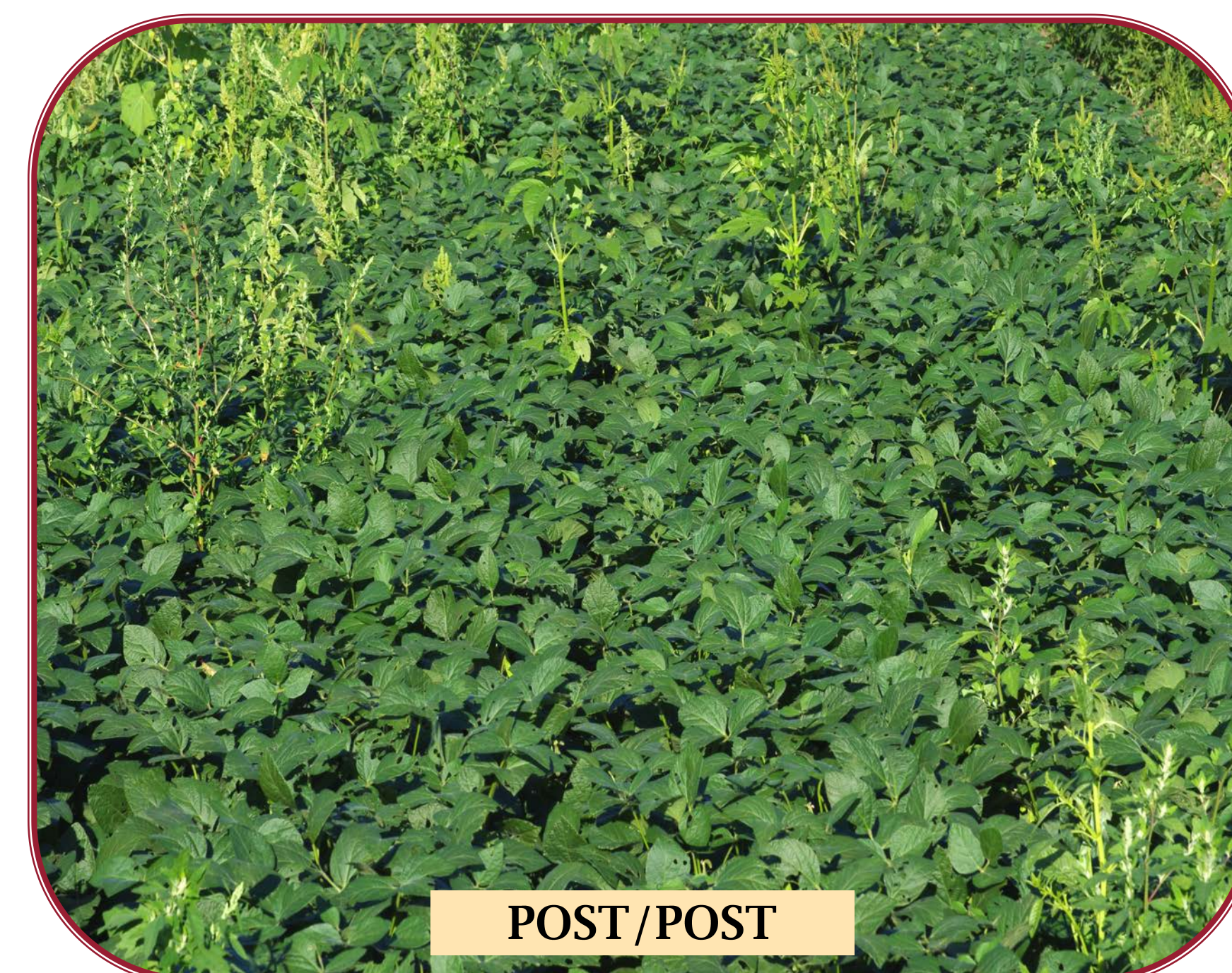


Figure 3. Control = Two-pass POST applications of Liberty 280 on 6/9 and 6/25. Photo taken 8/25/15. Note weed escapes.



Figure 4. Two-pass system using a PRE application of Verdict + Zidua followed by one POST applications of Cobra + Roundup PowerMAX on 6/24. Photo taken 7/27/15.



Figure 5. Two-pass POST system using Prefix + Roundup PowerMAX followed by Cobra + Roundup PowerMAX on 6/9 and 7/3. Photo taken 7/27/15.



Figure 6. Control = Two-pass POST applications of Roundup PowerMAX on 6/9 and 6/25. Photo taken 7/27/15.

## Results and Discussion

● The most durable weed control was the glufosinate system that used a PRE herbicide (effective on giant ragweed) followed by two timely (2-inch) POST applications of glufosinate. This system also had among the lowest herbicide injury ratings throughout the season, 5-18%. In the glyphosate systems, the inclusion of a SOA 14 (Cobra or Prefix) herbicide was essential for giant ragweed control. However, crop injury up to 85% occurred after the Cobra applications (Table 1) and canopy closure was delayed (Figures 4 and 5).

● Relying on total POST systems increases the risk for weed control failures. However, weather often limits the application window for PRE herbicides, resulting in the dependence on total POST systems. Systems including Prefix in combination with either glufosinate or glyphosate followed by an additional POST herbicide effective on giant ragweed (Figures 2 and 5) provided better results than the two POST applications of either glufosinate or glyphosate alone (Figures 3 and 6). But, overuse of SOA 10 and SOA 14 herbicides is a concern and could result in giant ragweed becoming resistant to both of these SOAs.

● Keys to successful control of SOA 2- and SOA 9- giant ragweed include:

1. Use of a preemergence herbicide that is effective on giant ragweed.
2. Follow with timely (2-inch) POST application(s) of glufosinate or PPO herbicides.
3. Use proper practices for contact herbicides.
4. Include and implement non-chemical strategies such as delayed planting, diversified crop rotations and removing weed escapes. Also, don't forget to manage weeds in fencerows before viable seed is set.



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## **Rapid Agricultural Response Fund FY14 and FY15 FINAL REPORT**

**Title: Crop Rotation Strategies for Management of Herbicide-Resistant Giant Ragweed (*Ambrosia trifida*) - an Integration of Research and Extension Education**

**Project Leader:**

Jeffrey L. Gunsolus

**Project Team Members:**

Lisa Behnken and Fritz Breitenbach, Regional Educator and IPM Specialist, Southeast Minnesota; Jeff Coulter, Craig Sheaffer, Roger Becker, and Jared Goplen Department of Agronomy and Plant Genetics; Gregg Johnson, Department of Agronomy and Plant Genetics and SROC, Waseca.

**Rationale for the Research:**

Weeds are undoubtedly the most important chronic crop pests in commodity crop production resulting, in the USA, in approximately \$33 billion in lost crop production plus another \$5 billion in herbicide costs, annually. Glyphosate is the most widely-used herbicide in Minnesota, due primarily to the development of glyphosate-resistant corn and soybean. However, the repeated use of glyphosate has led to glyphosate-resistant weed biotypes (32 weed species worldwide). Since 2005, in Minnesota, biotypes of glyphosate-resistant giant ragweed have been identified and the acreage they impact is rapidly growing. It is estimated that in 2014, of the 15.6 million corn and soybean acres grown in Minnesota, 4 million acres contain glyphosate-resistant giant ragweed, of which 1.5 million acres are heavily infested. Herbicide-resistant weeds are an economic and ecological concern. With the advance of glyphosate-resistant Palmer amaranth in the southern USA, the percentage of farmers who indicated they had total weed control costs greater than \$50 per acre nearly doubled after the emergence of herbicide-resistant weeds. Rotating herbicide chemistries is one way of dealing with the issues of glyphosate-resistant weed species. However, many of the weeds resistant to glyphosate are also resistant to other herbicide chemistries. Weeds with multiple resistances reduce the efficacy of existing and developing herbicide-resistant crop technologies, limit options for weed control, and decrease profitability. With such large economic consequences and the increasing prevalence of herbicide resistant weeds, new and integrated strategies are needed to improve the timeliness of weed control.

**Part I: Seed-Bank depletion of giant ragweed in various crop rotations**

The objective of this research was to determine how six different three-year crop rotations containing corn (C), soybean (S), alfalfa (A), and wheat (W) (CCC, SCC, CSC, SWC, SAC, AAC) affect giant ragweed seed-bank depletion, and ultimately determine the most appropriate combination of crops to manage glyphosate- and ALS- resistant giant ragweed. Results thus far indicate that there is high potential for the giant ragweed seed bank depletion. Across all crop rotation treatments, there were no differences in seed bank depletion, with an average of 97% of giant ragweed seeds in the seed bank being depleted in two years.

**Part II: Emergence patterns of Giant Ragweed in various Crops and Crop Rotations**

The objective of this research was to determine how these six different crop rotations affect giant ragweed emergence patterns. Giant ragweed emerged early across all treatments, with 90% emergence occurring by June 4<sup>th</sup>. In comparison to corn or soybean, total emergence was reduced when wheat or alfalfa were planted, indicating that seedling recruitment is affected by crop rotation. When combined with the seed bank depletion work, these results indicate that various crop rotations are more conducive to giant ragweed emergence than others, and that long term giant ragweed management can be accomplished by implementing a zero weed threshold to deplete the weed seed bank.

### **Part III: Giant Ragweed Seed Production and Retention in Soybean and Field Margins**

The objective of this research was to determine the quantity of seed produced during the growing season and the level of seed retention at crop harvest in Midwestern soybean and field margins. Giant ragweed plants produced an average of over 1800 seeds per plant with 66% being potentially viable. Seed began shattering on September 12 and continued through October at 0.75% of seeds per day, indicating that 80% of seeds are retained on giant ragweed on the average Minnesota soybean harvest date of October 8. These results suggest that there is ample time to remove escaped giant ragweed from production fields and margins before the seed shatters, and that the majority of giant ragweed seed is likely passing through the combine at soybean harvest.

#### **Extension/communication plan describing how the research results were transferred to the public:**

Extension educators were members of the research team and directly involved with the planning of this research and results are being used in their educational programs. Results have been transferred by the extension educators through various venues including: field days, winter workshops (~60 Private Applicator Training Workshops/year) and YouTube videos have been posted on-line at: <https://www.youtube.com/user/UMNCrops>. This research has also been integrated into Extension programming sessions developed for the Institute for Ag Professionals (IAP), which conveys research and recommendations to professionals who advise many of Minnesota's farmers. To illustrate, ~725 people attended the 2014 Crop Pest Management (CPM) Short Course and 401 attended the 2015 Ag Professional Research Update series. The majority of the audience consisted of: seed company agronomists (20%), crop producers (15%), independent crop consultants (14%) and fertilizer/crop protection dealers (13%). A survey of the attendees of the Ag Professional Update series indicated their potential to influence ~5 million acres across the state and surrounding region. This research integrates into the existing Extension educational framework that is encouraging and enabling growers to take control of herbicide resistant-weeds in a proactive manner in order to preserve their valuable herbicide-resistant traits in corn and soybean.

#### **Impacts:**

This research has already reached a wide audience. The research was presented in December 2013 and 2014 at the North Central Weed Science Society meetings. Posters have also been presented at both the Production Agriculture and Plant Breeding Symposiums at the University of Minnesota in Saint Paul, MN as well as the 2014 American Society of Agronomy meetings. Results will be presented at the 2015 ASA and NCWSS meetings and one manuscript has been submitted to Weed Technology. The research has also been used in numerous extension programs where the research and recommendations are conveyed directly to professionals who advise many of Minnesota's farmers. This research was also highlighted in an August 2, 2014 StarTribune article at: <http://www.startribune.com/aug-2-herbicide-resistant-superweeds-emerge-to-challenge-farmers/269632941/>

Research addressing the giant ragweed seedbank dynamic has led to more durable solutions to preventing and managing herbicide-resistant giant ragweed through the strategic use of diversified cropping sequences and tactics to deplete the weed seed bank via limiting weed seed inputs. The success of these strategies depended upon an understanding of the optimal integration of multiple control tactics based on a sound understanding of giant ragweed biology and ecology. This research improves our ability to determine the appropriate tactics, sequence and combination of crops for managing herbicide-resistant giant ragweed populations and seed banks.

## ***Demonstration of Cultural and Herbicide Strategies to Manage Giant Ragweed in Soybeans: Impact of A) Row Spacing – 10", 20" and 30" rows; B) Time of Weed Removal and, C) Delayed Soybean Planting at Waseca, MN in 2015***

Hoverstad, Thomas R and Jeffrey L. Gunsolus

The vast majority of soybean growers, over 75% (according to the 2015 IPM Assessment for southern MN) are convinced they have glyphosate resistant weeds on their farms. The objective of these trials was to demonstrate to farmers how diversified weed management strategies, cultural combined with herbicides, could impact the controlling giant ragweed in soybean at Waseca, MN in 2015. Three types of strategies were implemented, A) Soybean Row Spacing – 10", 20" and 30" inch rows, B) Time of Weed Removal (giant ragweed at 2", 4", 6" and 8") with and without a preemergence herbicide and C) Delayed Soybean Planting (May 5 compared to May 30) on giant ragweed density and control. Evaluations of the plots were taken June 18 and September 28, 2015.

- A. **Row Spacing** –Several combinations of strategies were compared and demonstrated
  - 1) Three different row spacing's, 10", 20" and 30" rows,
  - 2) Each row spacing planted with and without the preemergence herbicide, Survey
  - 3) Removal of giant ragweed at either 2 inches or 8 inches.The demonstration was planted in early May with Surveil herbicide applied after planting. Glyphosate herbicide was applied to remove the 2 inch weeds when soybeans were at VC stage and applied to remove 8 inch weeds when the soybeans were at V3 growth stage. Environmental conditions at application are reported in Table 1.
- B. **Time of Weed Removal** – This combination of strategies demonstrated what impact removing giant ragweed at 2-inches, 4-inches, 6-inches or 8-inches had on overall weed control and soybean growth and development. This was demonstrated with and without the preemergence herbicide, Surveil. Environmental conditions at application are reported in Table 2
- C. **Delayed Planting of Soybeans** – This combination of strategies demonstrated what impact planting date (early May compared to early June) had on giant ragweed density and control with the use of different preemergence herbicides. Herbicides compared were Sonic, Surveil, Optill Pro, Fierce, and Boundary. Environmental conditions at application are reported in Table 3. (See Photos at end for visual comparisons)

### **Results & Summary of Educational Efforts:**

Advanced Weed Science Summer Field Days were held at Rochester and Waseca (attendance across locations totaled 170). The programs were devoted to in-depth education using in-field research and demonstration field trials to assist farmers and those who influence farmers (retail dealers and the agricultural press) in making weed management decisions based on weed biology, ecology and agronomics. Educational programs during the winter reached over 300 people. Extra efforts were made to conduct radio interviews, newspaper and magazine articles. A very comprehensive news article describes the Waseca event:

Gunsolus, J.L., T. Hoverstad, F. Breitenbach, and L. Behnken. 2015. Cover story: Taking control through weed science. *The Land Online*, July 16, 2015 article by Marie Wood.  
[http://www.thelandonline.com/news/cover-story-taking-control-through-weed-science/article\\_faafb626-2bf7-11e5-a113-3f92fe192e40.html](http://www.thelandonline.com/news/cover-story-taking-control-through-weed-science/article_faafb626-2bf7-11e5-a113-3f92fe192e40.html)

**Examples of comments from Winter Crops Day evaluation:** "Great job relating to a farmer's perspective making the information applicable to on-farm situations", "Appreciate that the U of M is not agenda driven". "Need more on herbicide selection and modes of action – continue your efforts"



**Table 1. Row Spacing - Application timing, plant stages, environmental conditions.**

Date	5/4	5/22	6/8
<b>Treatment</b>	PRE (A)	POST I (B)	POST II (C)
<b>Temperature (F)</b>			
Air	60	68	76
Soil	59	66	72
<b>Relative Humidity (%)</b>	75	25	45
<b>Wind (mph)</b>	12	6	8
<b>Soil Moisture</b>	Moist	Moist	Moist
<b>Soybean</b>			
Stage		VC	V3
Height (inch)		1	7
<b>Giant Ragweed</b>			
Weed Density (ft <sup>2</sup> )		4	4
Height (inch)		2	8
<b>Rainfall after each application (inch)</b>			
Week 1	0.45	1.34	1.52
Week 2	1.81	1.01	3.20
Week 3	0.82	3.30	0.84

**Table 2. Time of Weed Removal Application timing, plant stages, environmental conditions.**

Date	5/4	5/22	5/28	6/3	6/8
<b>Treatment</b>	PRE (A)	POST I (B)	POST II (C)	POST III (D)	POST IV (E)
<b>Temperature (F)</b>					
Air	60	68	77	65	76
Soil	59	66	68	65	72
<b>Relative Humidity (%)</b>	75	25	50	80	45
<b>Wind (mph)</b>	12	6	12	10	8
<b>Soil Moisture</b>	Moist	Moist	Moist	Moist	Moist
<b>Soybean</b>					
Stage		VC	V1	V2	V3
Height (inch)		1	3	5	7
<b>Giant Ragweed</b>					
Weed Density (ft <sup>2</sup> )		4	4	7	4
Height (inch)		2	4	6	8
<b>Rainfall after each application (inch)</b>					
Week 1	0.45	1.34	1.02	2.21	1.52
Week 2	1.81	1.01	2.18	1.52	3.20
Week 3	0.82	3.30	2.02	3.12	0.84

**Table 3. Delayed Planting - Application timing, plant stages, and environmental conditions.**

Date	5/4	6/3
<b>Treatment</b>	PRE (A)	PRE (B)
<b>Temperature (F)</b>		
Air	60	65
Soil	59	65
<b>Relative Humidity (%)</b>	75	80
<b>Wind (mph)</b>	12	10
<b>Soil Moisture</b>	Moist	Moist
<b>Rainfall after each application (inch)</b>		
Week 1	0.45	2.21
Week 2	1.81	1.52
Week 3	0.82	3.12

Delayed Planting Demonstration with Different PRE Herbicides





## **Managing Waterhemp in Soybean with Layered Residual Herbicides – A Strategy for Controlling Glyphosate Resistant Waterhemp in Minnesota in 2015.**

Breitenbach, Fritz R., Lisa M., Behnken, Jeffrey L. Gunsolus, and Ellen Sheehan.

The objective of this trial was to demonstrate and evaluate the effectiveness of layering soil residual herbicides for control of waterhemp in soybeans in southeastern Minnesota. Waterhemp seedlings emerge over an extended period of time, frequently outlasting the residual control achieved by herbicides applied before planting or crop emergence. Several residual herbicides may also be applied post-emergence to the crop alone or in combination with other post emergent herbicides. When activated by rainfall, these post-applied residual herbicides extend the duration of seedling waterhemp control. Three herbicides were evaluated in this study, 1) Dual II Magnum (s-metolachlor), 2) Outlook (dimethenamid-P), and 3) Warrant (acetochlor). These were selected because of their known effectiveness for controlling waterhemp and their flexibility of application timing. Pursuit (imazethapyr) does not control this population of waterhemp (ALS resistant); however, it was applied in tank mixes with the pre-emergent treatments to eliminate other non-target broadleaf weeds.

### **Materials and Methods:**

The research site was a Lawler loam series with a pH of 6.7, O.M. 2.8% and soil test P and K levels of 34 ppm and 175 ppm respectively. The field was fall chisel plowed and spring disked and field cultivated once prior to planting. The previous crop was soybean. The soybean variety was Stine 22LD23 (LibertyLink) and was planted May 5, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 135,000 seeds per acre. A randomized complete block design was used with three replications. Preemergence (PRE) treatments were applied with a tractor-mounted sprayer delivering 15 gpa at 40 psi using TTI 110015 spray tips. Layered soil residual products were applied post emergence (POST I) with a tractor-mounted sprayer delivering 15 gpa at 30 psi using TTIJ60 nozzles (11002's). Evaluations of the plots were taken May 27, June 10, June 26, July 8 and September 29, 2015. The center two rows of each plot were machine harvested on October 13, 2015. Application dates, environmental conditions, and weed stages can be found in Table 1. Performance ratings for common waterhemp and common lambsquarters are in Tables 2 and 3. Grass control was satisfactory in all plots.

### **Summary:**

1. Layered or sequential applications of Dual II Magnum, Outlook, or Warrant herbicide provided significantly better, season-long control of waterhemp compared to their PRE only treatments.
2. Control of common waterhemp by PRE only applications began to diminish by late June, about 45-60 days after planting (Table 2). Also, an open soybean canopy well into July allowed waterhemp to continue to emerge and compete with the crop (Figure 1).
3. Layered or PRE/POST applications of these herbicides provided significantly better, season-long control of waterhemp (90-95%) compared to their PRE only treatments, (62-81%), (9/29 rating, Table 2). Soybean yield was also higher in the layered treatments by 6-14 Bu/A compared to their PRE only counterpart. (Table 2).
4. Valor (flumioxazin) herbicide provided very good waterhemp control; significantly better than the Dual II Magnum, Outlook or Warrant PRE only treatments. However, late season observations indicated that waterhemp control does break when compared to the layered Dual II Magnum and Outlook treatments. However, with populations of waterhemp having confirmed SOA 14 resistance in Minnesota, relying solely on an SOA 14 herbicide may not be a sustainable. Layering an effective residual SOA 15 herbicide would make this a more durable system. This strategy will be evaluated in 2016.
5. This trial demonstrates that layering of effective residual herbicides is a strategy that could provide season long control of common waterhemp in Minnesota.

(University of Minnesota Extension Regional Office, Rochester. Funding provided by the Minnesota Soybean Research and Promotion Council)

**Table 1. Application timing, plant stages, environmental conditions.**

<b>Date</b>	<b>5/5</b>	<b>6/8</b>
<b>Treatment</b>	PRE	POST I
<b>Temperature (F)</b>		
Air	55	76
Soil	57.0	75.9
<b>Relative Humidity (%)</b>	83	51
<b>Wind (mph)</b>	20	12
<b>Soil Moisture</b>	Normal	Normal
<b>Soybean</b>		
Stage		V2
Height (inch)		6
<b>Common Waterhemp</b>		
Weed Density (ft <sup>2</sup> )		51
Height (inch)		0
<b>Rainfall after each application</b>		
Week 1	1.53	1.64
Week 2	1.11	0.05
Week 3	1.15	1.95

**Table 2. Common waterhemp control with preemergence compared to preemergence followed by postemergence herbicides in soybeans in SE MN in 2015.**

Treatment	Rate Unit	Applied	Percent (%) Common waterhemp control					Yield **
			5/27/15	6/10/15	6/26/15	7/8/15	9/29/15	Bu/A
SOA 2, 15			99	96 b	91 b	85 b	81 b	43 cd
DUAL II	1.5 pt/a	PRE						
MAGNUM								
Pursuit	4 fl oz/a	PRE						
SOA 2, 15 / 15			99	98 a	96 a	97 a	95 a	49 ab
DUAL II	1.5 pt/a	PRE						
MAGNUM								
Pursuit	4 fl oz/a	PRE						
DUAL II	1.0 pt/a	POST I						
MAGNUM								
SOA 2, 15			99	96 b	85 c	73 c	71 c	40 d
OUTLOOK	18 fl oz/a	PRE						
Pursuit	4 fl oz/a	PRE						
SOA 2, 15 / 15			99	98 a	97 a	97 a	94 a	51 a
OUTLOOK	14 fl oz/a	PRE						
Pursuit	4 fl oz/a	PRE						
OUTLOOK	10 fl oz/a	POST I						
SOA 2, 15			99	91 c	82 c	69 c	62 d	32 e
WARRANT	1.6 qt/a	PRE						
Pursuit	4 fl oz/a	PRE						
SOA 2, 15 / 15			98	95 b	95 ab	94 a	90 a	46 bc
WARRANT	1.6 qt/a	PRE						
Pursuit	4 fl oz/a	PRE						
WARRANT	1.6 qt/a	POST I						
SOA 2, 14			99	97 a	96 a	94 a	89 a	51 a
VALOR SX	3 oz/a	PRE						
Pursuit	4 fl oz/a	PRE						
LSD P=0.10 for weed control and P=0.20 for yield			NS	1.5	4.4	6.2	6.3	4.1

Means followed by same letter do not significantly differ

\*PRE – Applied immediately after planting, POST I - Applied on June 8, 2015

\*\* Pursuit weedy check yielded 14 bu/a.

**Table 3. Common lambsquarters control with preemergence compared to preemergence followed by postemergence herbicides in soybeans in SE MN in 2015.**

Treatment	Rate Unit	Applied *	Percent (%) Common lambsquarters control					Yield Bu/A
			5/27/15	6/10/15	6/26/15	7/8/15	9/29/15	
1 SOA 2, 15 DUAL II MAGNUM Pursuit	1.5 pt/a 4 fl oz/a	PRE PRE	99 ab	99	96 c	92 c	92 c	43 cd
2 SOA 2, 15 / 15 DUAL II MAGNUM Pursuit DUAL II MAGNUM	1.5 pt/a 4 fl oz/a 1.0 pt/a	PRE PRE POST I	98 bc	99	98 ab	97 ab	97 ab	ab
3 SOA 2, 15 OUTLOOK Pursuit	18 fl oz/a 4 fl oz/a	PRE PRE	99 ab	99	98 b	98 ab	98 ab	40 d
4 SOA 2, 15 / 15 OUTLOOK Pursuit OUTLOOK	14 fl oz/a 4 fl oz/a 10 fl oz/a	PRE PRE POST I	98 ab	99	99 a	98 ab	98 ab	51 a
5 SOA 2, 15 WARRANT Pursuit	1.6 qt/a 4 fl oz/a	PRE PRE	97 c	99	98 ab	97 b	97 b	32 e
6 SOA 2, 15 / 15 WARRANT Pursuit WARRANT	1.6 qt/a 4 fl oz/a 1.6 qt/a	PRE PRE POST I	98 ab	99	99 a	99 a	99 a	46 bc
7 SOA 2, 14 VALOR SX Pursuit	3 oz/a 4 fl oz/a	PRE PRE	99 a	99	96 a	98 ab	98 ab	51 a
LSD P=0.10 for weed control and P=0.20 for yield			1.2	ns	1.3	2.2	2.2	4.1

Means followed by same letter do not significantly differ

\*PRE – Applied immediately after planting, POST I - Applied on June 8, 2015

\*\* Pursuit weedy check yielded 14 bu/a.



Figure 1. Comparison of weed control in soybean with a single preemergence, May 5, application of Outlook (left) and layered applications of Outlook on May 5 and June 8 (right). Top photos taken on July 14, 2015. Bottom photos taken three weeks later on August 6, 2015.





### Introduction

Common waterhemp (*Amaranthus rudis*) is becoming more widespread throughout Minnesota. In addition, waterhemp populations resistant to glyphosate (SOA-9) are increasing and most populations are already resistant to ALS inhibitors (SOA-2). When glyphosate is no longer effective, different strategies to control waterhemp are needed. One strategy for dealing with glyphosate resistant waterhemp is to layer soil residual herbicides, preemergence (PRE) followed by additional residual herbicide at early postemergence (POST). Waterhemp seedlings emerge over an extended period of time, frequently outlasting the residual control achieved by herbicides applied before planting or crop emergence. Several residual herbicides may be applied post-emergence to the crop alone or in combination with other post emergent herbicides. When activated by rainfall, these post-applied residual herbicides can extend the duration of waterhemp seedling control. The objective of this trial was to evaluate and demonstrate the effectiveness of layering soil residual herbicides for control of common waterhemp in soybeans in southeastern Minnesota. This work was funded by the Minnesota Soybean Research and Promotion Council.



Figure 1. Comparison of weed control in soybean with a single preemergence, May 5, application of Outlook (left) and layered applications of Outlook on May 5 and June 8 (right). Top photos taken on July 14, 2015. Bottom photos taken three weeks later on August 6, 2015.



### Materials and Methods

Three herbicides were evaluated in this study, 1) Dual II Magnum (s-metolachlor) at 1.5 pts/A PRE only or 1.5 pt/A PRE followed by 1.0 pt/A POST, 2) Outlook (dimethenamid-P) at 18 fl oz/A PRE only or 14 fl oz/A PRE followed by 10 fl oz/A POST, and 3) Warrant (acetochlor) at 1.6 qt/A PRE only or 1.6 qt/A PRE followed by 1.6 qt/A POST. These were selected because of their known effectiveness for controlling common waterhemp and their flexibility of application timing. Rates used were based on soil type and seasonal limits. Pursuit (imazethapyr) did not control this population of waterhemp (ALS resistant); however, it was applied with the PRE herbicides to eliminate other broadleaf weeds. The research site was a Lawler loam series with a pH of 6.7, O.M. 2.8% and soil test P and K levels of 34 ppm and 175 ppm, respectively. The field was fall chisel plowed, spring disked and field cultivated prior to planting. Stine 22LD23 (LibertyLink) soybean was planted May 5, 2015 in 30 inch rows at 135,000 seeds per acre. A randomized complete block design was used with three replications. PRE treatments were applied with a tractor-mounted sprayer delivering 15 gpa at 40 psi using TTI 110015 spray tips immediately after planting. Layered soil residual herbicides were applied POST at 15 gpa and 30 psi using TTIJ60 11002 nozzles on June 8. Common waterhemp density on June 8 averaged 51 plants per square foot. Evaluations were taken from May through September. The center two rows of each plot were machine harvested on October 13, 2015.

### Discussion

➡ Control of common waterhemp by PRE only Dual II Magnum, Outlook, or Warrant began to diminish by late June, about 60 days after planting (Table 1). In addition, an open soybean canopy well into July allowed waterhemp to continue to emerge and compete with the crop (Figure 1).

➡ Layered or PRE/POST applications of these herbicides provided significantly better, season-long control of waterhemp (90-95%) compared to their PRE only treatments, (62-81%), (September 29, rating, Table 1). Soybean yield was also higher in the layered treatments by 6-14 bu/A compared to their PRE only counterpart. (Table 1).

➡ This trial demonstrates that layering of effective residual herbicides is a strategy that could provide season long control of common waterhemp.

Table 1. Common waterhemp control and soybean yield with residual herbicides applied either PRE only or layered PRE/POST at Rochester, MN in 2015.

Treatment <sup>1</sup>	Rate	Appl. <sup>2</sup>	5/27/15	6/10/15	6/26/15	7/8/15	9/29/15	YIELD
Herbicide	Per acre	Time	(% Control) <sup>3</sup>					(Bu/A) <sup>4</sup>
Dual II Magnum	1.5 pt	A	99	96	91	85	81	43
Dual II Magnum / Dual II Magnum	1.5 pt / 1.0 pt	A / B	99	98	96	97	95	49
Outlook	18 fl oz	A	99	96	85	73	71	40
Outlook / Outlook	14 fl oz / 10 fl oz	A / B	99	98	97	97	94	51
Warrant	1.6 qt	A	99	91	82	69	62	32
Warrant / Warrant	1.6 qt / 1.6 qt	A / B	98	95	95	94	90	46
LSD P = 0.10			1	1	5	7	7	4

1. All PRE treatments included 4 fl oz Pursuit  
 2. Application date: A = PRE: 5/5/15, B = POST: 6/8/15  
 3. Waterhemp density on June 8 was 51/sq ft in Pursuit check  
 4. Pursuit weedy check yield = 14 Bu/A

**Managing Glyphosate Resistant Common Waterhemp with Different Systems and Herbicide Rates in LibertyLink Soybean in SE Minnesota in 2015.**

Breitenbach, Fritz R., Lisa M. Behnken, Jeffrey L. Gunsolus, and Dillon Welter

The objective of this trial was to evaluate systems for controlling glyphosate resistant waterhemp in southeastern Minnesota. The research site was a Lawler loam series with pH of 6.7, O.M. 2.8 % and soil test P and K levels of 34 ppm and 175 ppm, respectively. In the spring the field was disked and field cultivated once prior to planting. The previous crop was alfalfa/fallow/soybean. The soybean variety was Stine 22LD23 (LibertyLink) and was planted on May 5, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 135,000 seeds per acre. A randomized complete block design was used with three replications. Preemergence (PRE) treatments were applied with a tractor mounted sprayer delivering 15 gpa at 40 psi using TTI 110015 spray tips. POST applications for contact herbicides were made using TTI J60 spray tips delivering 15 gpa at 30 psi. Evaluations were taken May 27, June 10, June 19, June 23, June 30, July 8 and September 28. The center two rows of each plot were machine harvested on October 13, 2015. Application dates, environmental conditions, and weed stages can be found in Table 1. Performance ratings for common waterhemp, common lambsquarters, and grass control and crop injury can be found in Tables 2 through 5, respectively. (University of Minnesota Extension Regional Office, Rochester.)

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

Date	5/5	6/5	6/16	6/23	6/24	7/2	7/4
<b>Treatment</b>	PRE	POST I	POST II	POST III	Cultivation	POST IV	Cultivation
<b>Temperature (F)</b>							
Air	55	68	72	74		71	
Soil	57	65.3	71.8	71.2		70.0	
<b>Relative Humidity (%)</b>	83	78	53	49		50	
<b>Wind (mph)</b>	20	12	0	9		6	
<b>Soil Moisture</b>	Normal	Normal	Normal	Normal		SLIWet	
<b>Soybean</b>							
Stage		V2	V4	V6		V8	
Height (inch)		5.0	11.0	14.5		19.0	
<b>Common Lambsquarter</b>							
Weed Density (ft <sup>2</sup> )							
Height (inch)		3.6				2.6	
<b>Common Waterhemp</b>							
Weed Density (ft <sup>2</sup> )							
Height (inch)		2.0	1.5	1.9		3.0	
<b>Grass</b>							
Weed Density (ft <sup>2</sup> )							
Height (inch)		1.8	4.3	4.3		3.9	
<b>Rainfall after each application (inch)</b>							
Week 1	1.53	2.82	0.78	1.17		0.69	0.69
Week 2	1.06	0.28	1.17	1.15		0.30	1.25
Week 3	1.48	0.78	1.15	0.99		1.64	0.69











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## University of Minnesota 2015 Statewide Soybean Weed Management at Rochester, MN

Breitenbach, Fritz R., Lisa M. Behnken, Jeffrey L. Gunsolus and Thomas R. Hoversted

The objective of this trial was to evaluate Soybean Weed Management programs for weed control and crop response in soybeans in southeastern Minnesota. The research site was a Lawler loam series with pH of 6.1, O.M. 2.3% and soil test P and K levels of 33 ppm and 212 ppm, respectively. The field was fall chisel plowed and spring disked and field cultivated once prior to planting. The previous crop was corn. The soybean variety was ASGROW AG2035 and was planted on May 13, 2015 at a depth of 1.5 inches in 30 inch rows at a rate of 150,000 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) treatments were applied with a tractor-mounted sprayer delivering 15 gpa at 40 psi with a ground speed of 4 mph using TTI 110015. Post-emergent treatments were applied with two different nozzle types. Both were applied at 30 psi and ground speed of 4.5 MPH. When contact materials were applied as part of the treatment AITTJ60-11002 nozzles were used. Systemic materials were applied with TTI11002 nozzles. Evaluations of the plots were taken June 5, June 10, June 19, June 26, July 8, and September 24. The center two rows of each plot were machine harvested on October 1. Application dates, environmental conditions, and weed stages can be found in Table 1. Performance rating for giant ragweed control, common lambsquarters control, common waterhemp control, grass control, and crop injury can be found in Tables 2 through 6, respectively. (University of Minnesota Extension Regional Office, Rochester.)

**Table 1. Application timing, plant stages, environmental conditions.**

Date	5/13	6/5	6/8	6/10	6/16	6/25	7/2
<b>Treatment</b>	PRE A	POST I B	POST II C	POST III D	POST IV E	POST V F	POST VI'G
<b>Temperature (F)</b>							
Air	64	68	76	77	63	79	72
Soil	55.9	65.5	77.4	86.2	67.8	79.7	70
<b>Relative Humidity (%)</b>	64	78	51	48	68	56	64
<b>Wind (mph)</b>	15	12	12	12	7	8	6
<b>Soil Moisture</b>	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate
<b>Soybean</b>							
Stage		DESC	DESC	DESC	DESC	DESC	DESC
Height (in)	0	3	4.5	4.5	5.5	10.0	12
<b>Giant Ragweed</b>							
Weed Density (ft <sup>2</sup> )					7.8		
Height (in)		2.3	2.5	3.8	4.3	6.4	4.3
<b>Common Lambsquarter</b>							
Weed Density (ft <sup>2</sup> )					5.5		
Height (in)		0.8		1.0	1.9	1.8	2.5
<b>Common Waterhemp</b>							
Weed Density (ft <sup>2</sup> )					8.8		
Height (in)		0.6		1.0	1.6	2.18	0.68
<b>Grass</b>							
Weed Density (ft <sup>2</sup> )					3.8		
Height (in)	0	0	1.0	1.0	1.9	2.0	2.5
<b>Rainfall after each application (in)</b>							
Week 1	0.56	2.82	1.64	1.69	0.78	1.63	0.69
Week 2	1.47	0.28	0.05	0.78	1.63	0.69	0.30
Week 3	1.32	0.78	1.95	1.63	1.15	0.30	1.64





**Table 2. (continued) Giant ragweed control with soybean herbicide systems at Rochester, MN in 2015.**

Weed Code					Giant ragweed							YIELD	
Rating Date					Jun-5-2015	Jun-10-2015	Jun-19-2015	Jun-26-2015	Jul-8-2015	Sep-24-2015	Oct-14-2015		
No.	Name	Rate	Unit	Stg	Code	Percent control (%)							Bu/A
15	SOA 2, 14 / 9, 15 Enlite 2.8 oz/A - chlorimuron - thifensulfuron - flumioxazin Abundit Extra Cinch N-Pa-K AMS	0.33 0.5 2 32 1 3	oz/a oz/a oz/a oz/a pt/a qt/a	Pre Pre Pre 4" Weeds 4" Weeds 4" Weeds	A A A E E E	79 bc	72 d	91 de	98 bcd	98 abc	97 bcd	39.6	ef
16	SOA 14 / 9, 14, 15 Rowel Roundup WeatherMax Warrant Cobra COC N-Pa-K AMS	3 32 2 12.5 1 3	oz/a oz/a pt/a oz/a pt/a qt/a	Pre 4" Weeds 4" Weeds 4" Weeds 4" Weeds 4" Weeds	A E E E E E	73 cde	72 d	99 a	98 abc	98 abc	98 abc	36.5	f
23	SOA 14 / 9 SPARTAN Roundup Power Max N-Pa-K AMS	9 32 3	fl oz/a oz/a qt/a	PRE Late Post Late Post	A E E	40 g	21 h	71 j	97 cde	95 fgh	96 cde	44.7	ab
24	SOA 14, 7 / 9 SPARTAN Lorox FL Roundup Power Max N-Pa-K AMS	9 32 32 3	fl oz/a fl oz/a oz/a qt/a	PRE PRE Late Post Late Post	A A E E	59 f	41 f	78 i	98 b-e	96 d-g	96 b-e	46.3	a
25	SOA 14, 5 / 9 SPARTAN TRICOR Roundup Power Max N-Pa-K AMS	9 14 32 3	fl oz/a oz/a oz/a qt/a	PRE PRE Late Post Late Post	A A E E	66 ef	56 e	85 gh	98 bcd	97 b-e	97 bcd	43.6	abc
<b>PRE / POST V 5-13 / 6-25</b>													
1	SOA 2, 14 / 9 Authority First Roundup Power Max N-Pa-K AMS	6.4 32 3	oz/a oz/a qt/a	Pre 4" Weeds 4" Weeds	A F F	85 b	88 b	83 h	85 h	99 ab	99 abc	43.2	a-d
<b>POST I / POST VI 5-13 / 7-2</b>													
20	SOA 9, 14 / 9 Roundup Power Max Cobra COC N-Pa-K AMS Roundup Power Max N-Pa-K AMS	32 12.5 1 3 32 3	oz/a oz/a pt/a qt/a oz/a qt/a	2" Weeds 2" Weeds 2" Weeds 2" Weeds 2" regrowth 2" regrowth	B B B B G G	0 i	99 a	97 abc	90 g	99 ab	99 ab	37.1	f
<b>POST II 6/8</b>													
27	SOA 9 Roundup Power Max N-Pa-K AMS	32 3	oz/a qt/a	4" Weeds 4" Weeds	C C	0 i	28 g	96 abc	90 g	88 j	83 g	36.7	f
<b>POST III 6/16</b>													
28	SOA 9 Roundup Power Max N-Pa-K AMS	32 3	oz/a qt/a	6" Weeds 6" Weeds	E E	0 i	0 i	70 j	97 b-e	96 c-f	94 e	43.8	abc
22	Weed-Free			multiple		100 a	100 a	99 a	100 a	100 a	100 a	42.6	b-e
<b>LSD P=.10 for weed control ratings, LSD P=.20 for Yields</b>						7.5	4.9	3.7	1.8	2.3	2.6	3.4	



**Table 3. (continued) Common lambsquarters control with soybean herbicide systems at Rochester, MN in 2015.**

Weed Code					Common lambsquarters						YIELD								
Rating Date					Jun-5-2015	Jun-10-2015	Jun-19-2015	Jun-26-2015	Jul-8-2015	Sep-24-2015	Oct-14-2015								
No.	Name	Rate	Unit	Stg	Code	Percent control (%)						Bu/A							
15	SOA 2, 14 / 9, 15 Enlite 2.8 oz/A - chlorimuron - thifensulfuron - flumioxazin Abundit Extra Cinch N-Pa-K AMS	0.33 0.5 2 32 1 3	oz/a oz/a oz/a oz/a pt/a qt/a	Pre Pre Pre 4" Weeds 4" Weeds 4" Weeds	A A A E E E	99	b	99	b	99	a	99	ab	99	ab	99	ab	39.6	ef
16	SOA 14 / 9, 14, 15 Rowel Roundup WeatherMax Warrant Cobra COC N-Pa-K AMS	3 32 2 12.5 1 3	oz/a oz/a pt/a oz/a pt/a qt/a	Pre 4" Weeds 4" Weeds 4" Weeds 4" Weeds 4" Weeds	A E E E E E	99	b	99	b	99	a	99	ab	99	a	99	ab	36.5	f
23	SOA 14 / 9 SPARTAN Roundup Power Max N-Pa-K AMS	9 32 3	fl oz/a oz/a qt/a	PRE Late Post Late Post	A E E	99	b	99	b	99	a	99	ab	99	a	99	abc	44.7	ab
24	SOA 14, 7 / 9 SPARTAN Lorox FL Roundup Power Max N-Pa-K AMS	9 32 32 3	fl oz/a fl oz/a oz/a qt/a	PRE PRE Late Post Late Post	A A E E	99	b	99	b	99	a	99	ab	99	a	99	ab	46.3	a
25	SOA 14, 5 / 9 SPARTAN TRICOR Roundup Power Max N-Pa-K AMS	9 14 32 3	fl oz/a oz/a oz/a qt/a	PRE PRE Late Post Late Post	A A E E	99	b	99	b	99	a	99	ab	99	a	99	ab	43.6	abc
<b>PRE / POST V 5-13 / 6/25</b>																			
1	SOA 2, 14 / 9 Authority First Roundup Power Max N-Pa-K AMS	6.4 32 3	oz/a oz/a qt/a	Pre 4" Weeds 4" Weeds	A F F	99	b	99	b	99	a	99	ab	99	a	99	ab	43.2	a-d
<b>POST I / POST VI 5-13 / 7-2</b>																			
20	SOA 9, 14 / 9 Roundup Power Max Cobra COC N-Pa-K AMS Roundup Power Max N-Pa-K AMS	32 12.5 1 3 32 3	oz/a oz/a pt/a qt/a oz/a qt/a	2" Weeds 2" Weeds 2" Weeds 2" Weeds Late Post Late Post	B B B B G G	0	c	99	b	99	a	95	c	99	ab	98	abc	37.1	f
<b>POST II 6-8</b>																			
27	SOA 9 Roundup Power Max N-Pa-K AMS	32 3	oz/a qt/a	4" Weeds 4" Weeds	C C	0	c	28	c	99	a	93	d	88	d	86	f	36.7	f
<b>POST IIV 6-16</b>																			
28	SOA 9 Roundup Power Max N-Pa-K AMS	32 3	oz/a qt/a	6" Weeds 6" Weeds	E E	0	c	0	d	88	b	98	b	95	c	93	e	43.8	abc
22	Weed-Free		multiple			100	a	100	a	99	a	100	a	100	a	100	a	42.6	b-e
<b>LSD P=.10 for weed control ratings, LSD P=.20 for Yields</b>								1		1		1		2		2		3.4	



**Table 4. (continued) Common waterhemp control with soybean herbicide systems at Rochester, MN in 2015.**

Weed Code					Common waterhemp						YIELD								
Rating Date					Jun-5-2015	Jun-10-2015	Jun-19-2015	Jun-26-2015	Jul-8-2015	Sep-24-2015	Oct-14-2015								
No.	Name	Rate	Unit	Stg	Code	Percent control (%)						Bu/A							
15	SOA 2, 14 / 9, 15 Enlite 2.8 oz/A - chlorimuron - thifensulfuron - flumioxazin Abundit Extra Cinch N-Pa-K AMS	0.33 0.5 2 32 1 3	oz/a oz/a oz/a oz/a pt/a qt/a	Pre Pre Pre 4" Weeds 4" Weeds 4" Weeds	A A A E E E	99	b	99	b	99	a	99	ab	99	a	99	ab	39.6	ef
16	SOA 14 / 9, 14, 15 Rowel Roundup WeatherMax Warrant Cobra COC N-Pa-K AMS	3 32 2 12.5 1 3	oz/a oz/a pt/a oz/a pt/a qt/a	Pre 4" Weeds 4" Weeds 4" Weeds 4" Weeds 4" Weeds	A E E E E E	99	b	99	b	99	a	99	ab	99	a	99	ab	36.5	f
23	SOA 14 / 9 SPARTAN Roundup Power Max N-Pa-K AMS	9 32 3	fl oz/a oz/a qt/a	PRE Late Post Late Post	A E E	99	b	99	b	99	a	99	ab	99	a	99	ab	44.7	ab
24	SOA 14, 7 / 9 SPARTAN Lorox FL Roundup Power Max N-Pa-K AMS	9 32 32 3	fl oz/a fl oz/a oz/a qt/a	PRE PRE Late Post Late Post	A A E E	99	b	99	b	99	a	99	ab	99	a	99	b	46.3	a
25	SOA 14, 5 / 9 SPARTAN TRICOR Roundup Power Max N-Pa-K AMS	9 14 32 3	fl oz/a oz/a oz/a qt/a	PRE PRE Late Post Late Post	A A E E	99	b	99	b	99	a	99	ab	99	a	99	ab	43.6	abc
<b>PRE / POST V 5-13 / 6-25</b>																			
1	SOA 2, 14 / 9 Authority First Roundup Power Max N-Pa-K AMS	6.4 32 3	oz/a oz/a qt/a	Pre 4" Weeds 4" Weeds	A F F	99	b	99	b	99	a	99	ab	99	a	99	ab	43.2	a-d
<b>POST I / POST VI 6-5 / 7-2</b>																			
20	SOA 9, 14 / 9 Roundup Power Max Cobra COC N-Pa-K AMS Roundup Power Max N-Pa-K AMS	32 12.5 1 3 32 3	oz/a oz/a pt/a qt/a oz/a qt/a	2" Weeds 2" Weeds 2" Weeds 2" Weeds Late Post Late Post	B B B B G G	0	c	99	b	99	a	98	b	99	a	98	bc	37.1	f
<b>POST II 6-8</b>																			
27	SOA 9 Roundup Power Max N-Pa-K AMS	32 3	oz/a qt/a	4" Weeds 4" Weeds	C C	0	c	28	c	99	a	91	d	87	d	83	f	36.7	f
<b>POST IV 6-16</b>																			
28	SOA 9 Roundup Power Max N-Pa-K AMS	32 3	oz/a qt/a	6" Weeds 6" Weeds	E E	0	c	0	d	89	b	96	c	93	c	89	e	43.8	abc
22	Weed-Free		Multiple			100	a	100	a	99	a	100	a	100	a	100	a	42.6	b-e
<b>LSD P=.10 for weed rations, LSD P= .20 for yields</b>								1		2		2		2		1		3.4	



**Table 5. (continued) Grass control with soybean herbicide systems at Rochester, MN in 2015.**

Weed Code					Grass						YIELD								
Rating Date					Jun-5-2015	Jun-10-2015	Jun-19-2015	Jun-26-2015	Jul-8-2015	Sep-24-2015	Oct-14-2015								
No.	Name	Rate	Unit	Stg	Code	Percent control (%)						Bu/A							
15	SOA 2, 14 / 9, 15 Enlite 2.8 oz/A - chlorimuron - thifensulfuron - flumioxazin Abundit Extra Cinch N-Pa-K AMS	0.33 0.5 2 32 1 3	oz/a oz/a oz/a oz/a pt/a qt/a	Pre Pre Pre 4" Weeds 4" Weeds 4" Weeds	A A A E E E	99	b	99	b	99	a	99	ab	99	ab	99	ab	39.6	ef
16	SOA 14 / 9, 14, 15 Rowel Roundup WeatherMax Warrant Cobra COC N-Pa-K AMS	3 32 2 12.5 1 3	oz/a oz/a pt/a oz/a pt/a qt/a	Pre 4" Weeds 4" Weeds 4" Weeds 4" Weeds 4" Weeds	A E E E E E	99	b	99	b	99	a	99	ab	99	ab	99	ab	36.5	f
23	SOA 14 / 9 SPARTAN Roundup Power Max N-Pa-K AMS	9 32 3	fl oz/a oz/a qt/a	PRE Late Post Late Post	A E E	99	b	99	b	99	a	99	ab	97	ab	98	ab	44.7	ab
24	SOA 14, 7 / 9 SPARTAN Lorox FL Roundup Power Max N-Pa-K AMS	9 32 32 3	fl oz/a fl oz/a oz/a qt/a	PRE PRE Late Post Late Post	A A E E	99	b	99	b	99	a	99	ab	98	ab	98	ab	46.3	a
25	SOA 14, 5 / 9 SPARTAN TRICOR Roundup Power Max N-Pa-K AMS	9 14 32 3	fl oz/a oz/a oz/a qt/a	PRE PRE Late Post Late Post	A A E E	99	b	99	b	99	a	99	ab	98	ab	97	ab	43.6	abc
<b>PRE / POST V 5-13 / 6-25</b>																			
1	SOA 2, 14 / 9 Authority First Roundup Power Max N-Pa-K AMS	6.4 32 3	oz/a oz/a qt/a	Pre 4" Weeds 4" Weeds	A F F	99	b	99	b	97	b	92	c	99	ab	99	ab	43.2	a-d
<b>PRE / POST VI 5-13 / 7-2</b>																			
20	SOA 9, 14 / 9 Roundup Power Max Cobra COC N-Pa-K AMS Roundup Power Max N-Pa-K AMS	32 12.5 1 3 32 3	oz/a oz/a pt/a qt/a oz/a qt/a	2" Weeds 2" Weeds 2" Weeds 2" Weeds Late Post Late Post	B B B B G G	0	c	99	b	99	a	97	ab	99	ab	99	ab	37.1	f
<b>POST II 6-8</b>																			
27	SOA 9 Roundup Power Max N-Pa-K AMS	32 3	oz/a qt/a	4" Weeds 4" Weeds	C C	0	c	28	c	98	b	87	d	79	d	82	d	36.7	f
<b>POST IV 6-16</b>																			
28	SOA 9 Roundup Power Max N-Pa-K AMS	32 3	oz/a qt/a	6" Weeds 6" Weeds	E E	0	c	0	d	90	c	97	b	93	c	90	c	43.8	abc
22	Weed-Free		Multiple			100	a	100	a	99	a	100	a	100	a	100	a	42.6	b-e
<b>LSD P=.10 for weed rations, LSD P= .20 for yields</b>						.		1		1		3		4		4		3.4	





**Table 6. (continued) Crop response to herbicide systems at Rochester, MN in 2015.**

Weed Code					Crop Response							YIELD					
Rating Date					Jun-5-2015	Jun-10-2015	Jun-19-2015	Jun-26-2015	Jul-8-2015	Oct-14-2015							
No.	Name	Rate	Unit	Stg	Percent Injury (%)							Bu/A					
15	SOA 2, 14 / 9, 15 Enlite 2.8 oz/A - chlorimuron - thifensulfuron - flumioxazin Abundit Extra Cinch N-Pa-K AMS	0.33 0.5 2 32 1 3	oz/a oz/a oz/a oz/a pt/a qt/a	Pre Pre Pre 4" Weeds 4" Weeds 4" Weeds	A A A E E E	25	ab	24	h	38	d	11	c	0	d	39.6	ef
16	SOA 14 / 9, 14, 15 Rowel Roundup WeatherMax Warrant Cobra COC N-Pa-K AMS	3 32 2 12.5 1 3	oz/a oz/a pt/a oz/a pt/a qt/a	Pre 4" Weeds 4" Weeds 4" Weeds 4" Weeds 4" Weeds	A E E E E E	26	a	35	e	89	a	46	a	18	a	36.5	f
23	SOA 14 / 9 SPARTAN Roundup Power Max N-Pa-K AMS	9 32 3	fl oz/a oz/a qt/a	PRE Late Post Late Post	A E E	0	d	0	i	19	e-h	0	f	0	d	44.7	ab
24	SOA 14, 7 / 9 SPARTAN Lorox FL Roundup Power Max N-Pa-K AMS	9 32 32 3	fl oz/a fl oz/a oz/a qt/a	PRE PRE Late Post Late Post	A A E E	0	d	0	i	14	h-k	0	f	0	d	46.3	a
25	SOA 14, 5 / 9 SPARTAN TRICOR Roundup Power Max N-Pa-K AMS	9 14 32 3	fl oz/a oz/a oz/a qt/a	PRE PRE Late Post Late Post	A A E E	0	d	0	i	13	i-l	0	f	0	d	43.6	abc
<b>PRE / POST V 5-13 / 6-25</b>																	
1	SOA 2, 14 / 9 Authority First Roundup Power Max N-Pa-K AMS	6.4 32 3	oz/a oz/a qt/a	Pre 4" Weeds 4" Weeds	A F F	0	d	0	i	0	m	0	f	0	d	43.2	a-d
<b>POST I / POST VI 5-13 / 7-2</b>																	
20	SOA 9, 14 / 9 Roundup Power Max Cobra COC N-Pa-K AMS Roundup Power Max N-Pa-K AMS	32 12.5 1 3 32 3	oz/a oz/a pt/a qt/a oz/a qt/a	2" Weeds 2" Weeds 2" Weeds 2" Weeds Late Post Late Post	B B B B G G	0	d	85	b	46	c	5	d	3	c	37.1	f
<b>POST II 6-8</b>																	
27	SOA 9 Roundup Power Max N-Pa-K AMS	32 3	oz/a qt/a	4" Weeds 4" Weeds	C C	0	d	0	i	24	e	0	f	0	d	36.7	f
<b>POST IV 6-16</b>																	
28	SOA 9 Roundup Power Max N-Pa-K AMS	32 3	oz/a qt/a	6" Weeds 6" Weeds	E E	0	d	0	i	9	kl	0	f	0	d	43.8	abc
22	Weed-Free			Multiple		0	d	100	a	8	l	0	f	0	d	42.6	b-e
<b>LSD P=.10 for weed rations, LSD P= .20 for yields</b>					2.4		3.0		5.3		2.8		2.3		3.4		



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## 2015 Soybean Herbicide Evaluation Lamberton

Herbicide	Rate (Product/A)	Pre			Final			Yield bu/A
		Yeft	Tawh	Colq	Yeft	Tawh	Colq	
<b>Preemergence/ POST II (4-inch weeds)</b>		<b>% control</b>						
1	Authority First / Roundup PowerMax + AMS	86	99	99	91	99	99	61.9
2	Authority First / Anthem + Roundup PowerMax + AMS	88	99	99	97	99	99	60.8
3	Authority Assist / Roundup PowerMax + AMS	93	99	99	94	98	99	63.4
4	Boundary / Flexstar GT 3.5 + MSO + AMS	91	99	99	95	99	99	60.0
5	BroadAxe XC / Flexstar GT 3.5 + MSO + AMS	97	99	99	97	99	99	56.9
6	Fierce + FirstRate / Roundup PowerMax + AMS	90	99	99	96	99	99	65.1
7	Fierce + Sencor / Roundup PowerMax + AMS	88	99	99	94	99	99	61.0
8	Zidua PRO / Roundup PowerMax + NIS + AMS	89	99	99	92	99	99	59.5
9	Verdict + Outlook / Roundup PowerMax + NIS + AMS	97	99	99	90	99	99	58.5
10	Zidua + Verdict / Roundup PowerMax + NIS + AMS	93	99	99	94	99	99	59.2
11	Sonic / Durango DMA + AMS	84	94	99	91	99	99	66.1
12	Sonic / Durango DMA + AMS	89	99	99	92	99	99	61.5
13	Surveil / Durango DMA + AMS	93	99	99	92	99	99	63.6
14	Enlite / Abundit Extra + AMS	83	99	99	93	99	99	65.0
15	Enlite / Abundit Extra + Cinch + AMS	85	99	99	97	99	99	63.8
16	Rowel / Roundup WeatherMax + Warrant + Cobra + COC + AMS	86	99	99	91	99	99	51.4
<b>Preemergence/ POST I (2-inch weeds)</b>								
17	Rowel / Roundup WeatherMax + Warrant + AMS	86	99	99	91	99	99	63.9
18	Authority First / Roundup WeatherMax + Warrant + AMS	88	99	98	79	99	99	60.5
19	Boundary / Flexstar GT 3.5 + Dual II Magnum + NIS + AMS	95	99	99	97	99	99	59.3
<b>POST I (2-inch weeds) / POST III (Late Post)</b>								
20	Roundup PowerMax + Cobra + COC + AMS / Roundup PowerMax + AMS	0	0	0	97	99	99	54.1
<b>Checks</b>								
21	Weedy Check	0	0	0	0	0	0	27.0
22	Weed Free	99	99	99	99	99	99	61.5
<b>LSD(0.10)</b>		<b>6</b>	<b>2</b>	<b>1</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>4.2</b>

## 2015 Soybean Herbicide Evaluation Rochester

Herbicide	Rate (Product/A)	Pre				Final				Yield bu/A
		Grs	Girw	Colq	Tawh	Grs	Girw	Colq	Tawh	
<b>Preemergence/ POST II (4-inch weeds)</b>		<b>% control</b>								
1	Authority First / Roundup PowerMax + AMS	99	85	99	99	99	99	99	99	43.2
2	Authority First / Anthem + Roundup PowerMax + AMS	99	86	99	99	99	99	99	99	44.3
3	Authority Assist / Roundup PowerMax + AMS	99	75	99	99	98	98	99	99	41.0
4	Boundary / Flexstar GT 3.5 + MSO + AMS	99	20	99	99	99	99	98	99	39.4
5	BroadAxe XC / Flexstar GT 3.5 + MSO + AMS	99	23	99	99	99	99	99	99	40.6
6	Fierce + FirstRate / Roundup PowerMax + AMS	99	86	99	99	99	96	99	99	40.8
7	Fierce + Sencor / Roundup PowerMax + AMS	99	71	99	99	98	96	98	99	41.3
8	Zidua PRO / Roundup PowerMax + NIS + AMS	99	77	99	99	97	98	99	97	42.0
9	Verdict + Outlook / Roundup PowerMax + NIS + AMS	99	70	99	99	96	96	96	95	40.7
10	Zidua + Verdict / Roundup PowerMax + NIS + AMS	99	73	99	99	98	96	97	99	41.2
11	Sonic / Durango DMA + AMS	99	79	99	99	99	98	99	99	41.3
12	Sonic / Durango DMA + AMS	99	86	99	99	99	97	99	99	41.9
13	Surveil / Durango DMA + AMS	99	88	99	99	99	99	99	99	40.3
14	Enlite / Abundit Extra + AMS	99	76	99	99	98	97	99	99	39.9
15	Enlite / Abundit Extra + Cinch + AMS	99	79	99	99	99	97	99	99	39.6
16	Rowel / Roundup WeatherMax + Warrant + Cobra + COC + AMS	99	73	99	99	99	98	99	99	36.5
<b>Preemergence/ POST I (2-inch weeds)</b>										
17	Rowel / Roundup WeatherMax + Warrant + AMS	99	72	99	99	99	91	99	99	41.1
18	Authority First / Roundup WeatherMax + Warrant + AMS	99	86	99	99	99	89	99	99	43.2
19	Boundary / Flexstar GT 3.5 + Dual II Magnum + NIS + AMS	99	20	99	99	99	95	98	99	41.8
<b>POST I (2-inch weeds) / POST III (Late Post)</b>										
20	Roundup PowerMax + Cobra + COC + AMS / Roundup PowerMax + AMS	0	0	0	0	99	99	98	98	37.1
<b>Checks</b>										
21	Weedy Check	-	0	0	0	0	0	0	0	5.8
22	Weed Free	100	100	100	100	100	100	100	100	42.6
<b>LSD(0.10)</b>		<b>1</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>4.7</b>



**2015 Soybean Herbicide Evaluation  
Average Across Locations**

Herbicide	Rate (Product/A)	Pre						Final						Yield bu/A	
		Gift	Corw	Girw	Colq	Vele	Rrpw	Gift	Corw	Girw	colq	Vele	Rrpw		
<b>% control</b>															
1	Authority First / Roundup PowerMax + AMS	84	95	85	98	95	98	96	99	99	99	99	99	99	51.7
2	Authority First / Anthem + Roundup PowerMax + AMS	81	95	86	98	95	98	98	99	99	99	99	99	99	54.0
3	Authority Assist / Roundup PowerMax + AMS	89	48	75	98	95	98	97	99	98	99	99	99	99	53.9
4	Boundary / Flexstar GT 3.5 + MSO + AMS	85	73	20	96	90	96	98	99	99	99	99	99	99	52.2
5	BroadAxe XC / Flexstar GT 3.5 + MSO + AMS	94	49	23	98	95	96	98	99	99	99	99	99	99	49.5
6	Fierce + FirstRate / Roundup PowerMax + AMS	89	95	86	98	95	98	98	99	96	99	99	99	99	53.2
7	Fierce + Sencor / Roundup PowerMax + AMS	86	70	71	98	95	98	97	99	96	99	99	99	99	53.3
8	Zidua PRO / Roundup PowerMax + NIS + AMS	94	88	77	98	95	98	96	99	98	99	99	99	98	51.8
9	Verdict + Outlook / Roundup PowerMax + NIS + AMS	92	78	70	97	95	98	95	99	96	98	99	98	98	51.5
10	Zidua + Verdict / Roundup PowerMax + NIS + AMS	89	73	73	96	91	98	97	99	96	98	99	99	99	50.2
11	Sonic / Durango DMA + AMS	87	78	79	98	95	94	96	99	98	99	99	99	99	51.9
12	Sonic / Durango DMA + AMS	87	80	86	98	95	95	96	99	97	99	99	99	99	53.6
13	Surveil / Durango DMA + AMS	87	93	88	98	95	92	96	99	99	99	99	99	99	52.8
14	Enlite / Abundit Extra + AMS	74	60	76	98	78	92	97	99	97	99	99	99	99	51.4
15	Enlite / Abundit Extra + Cinch + AMS	76	59	79	98	95	98	98	99	97	99	98	99	99	51.6
16	Rowel / Roundup WeatherMax + Warrant + Cobra + COC + AMS	80	50	73	98	88	98	96	99	98	99	99	99	99	46.4
<b>Preemergence/ POST I (2-inch weeds)</b>															
17	Rowel / Roundup WeatherMax + Warrant + AMS	93	95	72	98	95	98	95	99	91	99	99	99	99	53.0
18	Authority First / Roundup WeatherMax + Warrant + AMS	93	95	86	97	95	98	91	99	89	99	99	99	99	54.1
19	Boundary / Flexstar GT 3.5 + Dual II Magnum + NIS + AMS	96	95	20	98	95	98	98	99	95	99	99	99	99	54.9
<b>POST I (2-inch weeds) / POST III (Late Post)</b>															
20	Roundup PowerMax + Cobra + COC + AMS / Roundup PowerMax + AMS	30	94	0	31	95	32	98	99	99	99	99	99	99	48.2
<b>Checks</b>															
21	Weedy Check	-	0	0	0	0	0	0	0	0	0	0	0	0	22.3
22	Weed Free	-	96	84	100	98	96	98	99	99	100	99	99	99	53.7
<b>LSD(0.10)</b>		<b>7</b>	<b>25</b>	<b>8</b>	<b>1</b>	<b>10</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3.4</b>

# Soybean Herbicide Evaluation

## SWROC at Lamberton and SROC at Waseca

LINK: <http://appliedweeds.cfans.umn.edu/research-reports>



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These reports are a summary of weed control research conducted by personnel in the Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul. They have been prepared for the benefit of cooperators and other workers involved in weed control research. They are not intended for publication or reproduction. We have intended to make these reports as accurate as possible. If you have questions, please contact the specific authors for clarification or correction.

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### Reports

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- [2010 Reports](#)
- [2009 Reports](#)



***SECTION***

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***E***

**SOYBEAN**

**AGRONOMY**

## Improving the Profitability of Soybean Production – Addressing Barriers

### Tillage Trial and Field Day

Liz Stahl, Extension Educator, Crops - Worthington, MN

#### **INTRODUCTION: Tillage and Soil Health**

Reduced tillage systems have been reported to improve measures of soil health, including increased soil microbial activity, improved soil structure and increased water infiltration. Although previous research on strip-tillage in southern Minnesota has shown this system is competitive in yields and returns with more aggressive tillage systems in a corn/soybean rotation (see [www.extension.umn.edu/tillage](http://www.extension.umn.edu/tillage)), adoption has been limited by farmers across southern Minnesota. Previous research, however, has not focused on the long-term benefits of reduced tillage such as enhancements in soil health. A long-term tillage trial at the Southwest Research and Outreach Center in Lamberton, MN, that has been in moldboard plow, v-rip and strip tillage systems since the fall of 2007 provides a unique opportunity to measure differences in soil health due to the tillage system used. This site also provides a unique opportunity for an educational, hands-on, “see for yourself” field day for farmers and ag professionals. Our goal is to hold an educational field day and explain the impacts of long-term tillage systems on soil health indicators while showing them the impacts these tillage systems had on soil health.

#### **OBJECTIVE: Implement an educational field day on the impacts long-term tillage systems has on soil health indicators**

**Goal 1.** Compare soil health indicators such as water infiltration rates, soil structure, and soil microbial activity across three tillage systems in a replicated trial

**Goal 2.** Hold an educational, hands-on field day to educate farmers, ag professionals, agency personnel, non-profit personnel, Extension, and other about the impacts long-term tillage systems has on soil health indicators.

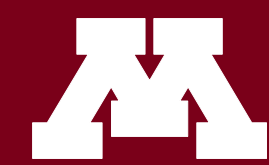
**Goal 3.** Disseminate results through newsletters, a UM extension factsheet, UM Extension Crops website, field days, meetings, and a MN Crop News article.

#### **RESULTS: Tillage Trial and Field Day – Liz**

- Soil samples from replicated long-term tillage plots (since 2007) at the SWROC in Lamberton were collected at 3 sampling dates (6/1, 7/14, and 10/14/15). Tillage systems evaluated included moldboard plow, strip-tillage, and a disk/rip system. Soil was analyzed with the Haney Test (a soil test commonly used to measure soil health) at all 3 dates, and with standard testing procedures at the first and last sampling dates.
- Other measurements collected included PLFA (phospholipid fatty acid) soil health evaluations, percent residue cover, infiltration rates, and soil aggregation.
- **We learned:**
  - Little differences in soil health measures were detected among the tillage systems
  - At the spring sampling date, recommended nitrogen application rates **were much greater** with the Haney test compared to the standard soil testing procedures and U of MN soil fertility guidelines. Recommended application rates for P and K **also varied** between the two testing methods.
  - It is recommended that farmers use soil testing methods and Land Grant University soil fertility guidelines that have been correlated and calibrated in their state
- **Research results were presented at:**
  - ***"What Impact is My Tillage System Having on Soil Health"*** Field Day, held at the SWROC in Lamberton, 7/1/15. 104 participants attended (farmers, ag professionals and agency personnel). Presentations are available online at: [http://www.extension.umn.edu/agriculture/tillage/presentations/.](http://www.extension.umn.edu/agriculture/tillage/presentations/)
  - The CCA Update in Paynesville, 9/29/15. 53 attendees (primarily ag professionals)
  - Radio spots on three stations in SW MN

- CCA Update in NE, and shared with Servi-Tech soil testing laboratories
- Poster presentation at the MN Ag Expo in Mankato, 1/27-28/2016.
- Results will be presented in a poster at the National Association of County Ag Agents National meeting in Little Rock, AR in July of 2016 and a MN Crop News article is planned. Further publication options are being explored.
- This project helped lead to additional research through an AFREC grant where we will further evaluate the utility and applicability of the Haney Test in MN.
- I received numerous comments from ag professionals who appreciated the information, as farmers have been using the Haney Test but very little information exists on how one **should use** the results (plus the test is significantly more expensive than standard soil tests).
- A brief summary of evaluation results from the field day: On a 1-5 scale (1=Very Dissatisfied, 5 = Very Satisfied), attendees rated the program overall at 4.3 (33 respondents). Also, 97% of respondents indicated a learning gain (38 responses), 95% indicated they had situations where they could use what they learned (38 responses) and 83% indicated they planned to change at least one of their practices based on what they learned from the program (35 responses). Comments included "Thank you for an informative event – it was well planned", "Great presentations – lots of useful information", and "Great program – thank you".

# The Impact of Long-term Tillage Systems on Measures of Soil Health



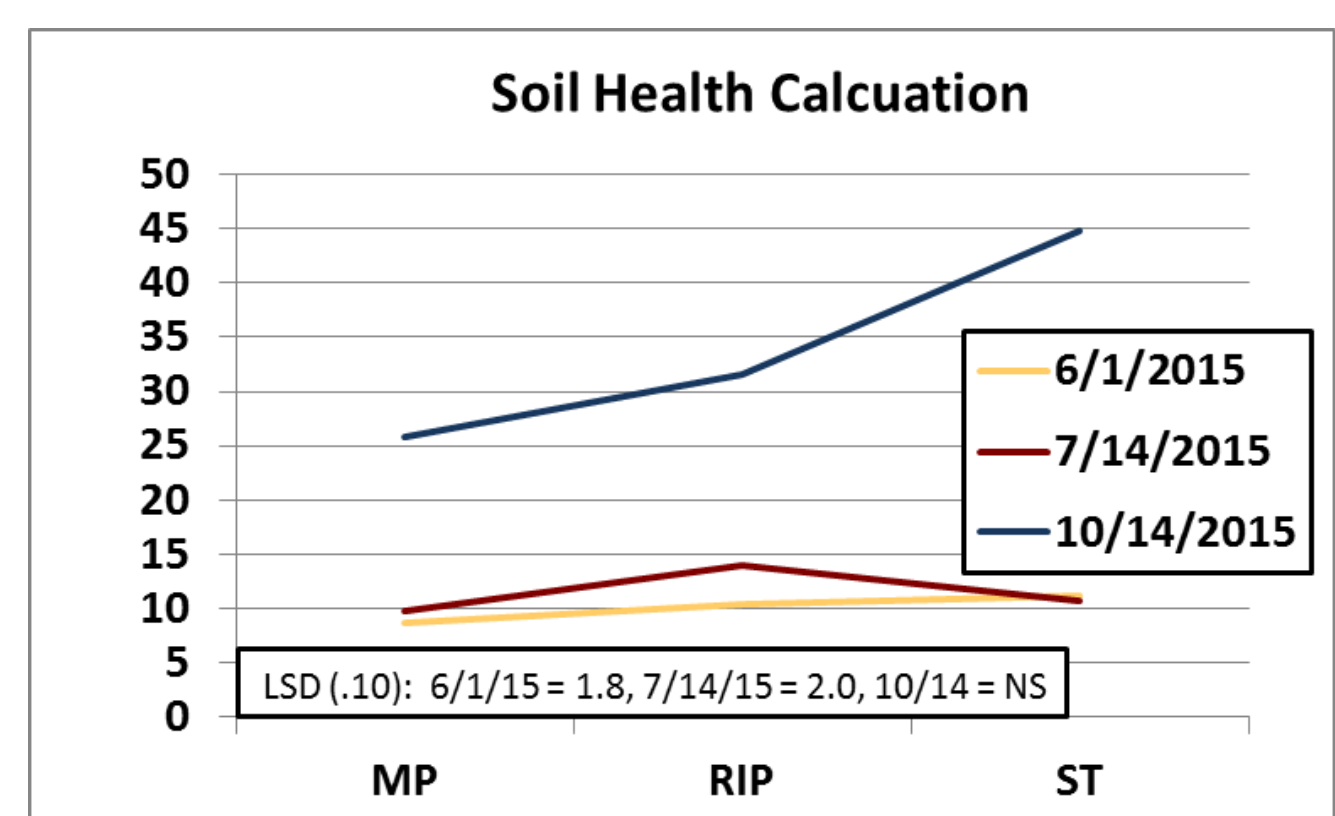
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**What impact does my tillage system have on soil health?** Reduced tillage systems can result in many benefits including reduced soil erosion, decreased input costs, increased soil organic matter, and increased water infiltration. Soil health (often referred to as soil quality) can be defined by the interactions of a soil's chemical, physical, and biological characteristics. This project evaluated what differences in soil health could be measured among long-term tillage systems when using the Haney Test, a tool being used across the nation as a measure of soil health. N fertilizer recommendations were also compared to U of MN guidelines when using standard soil testing procedures.

## Background and Results:

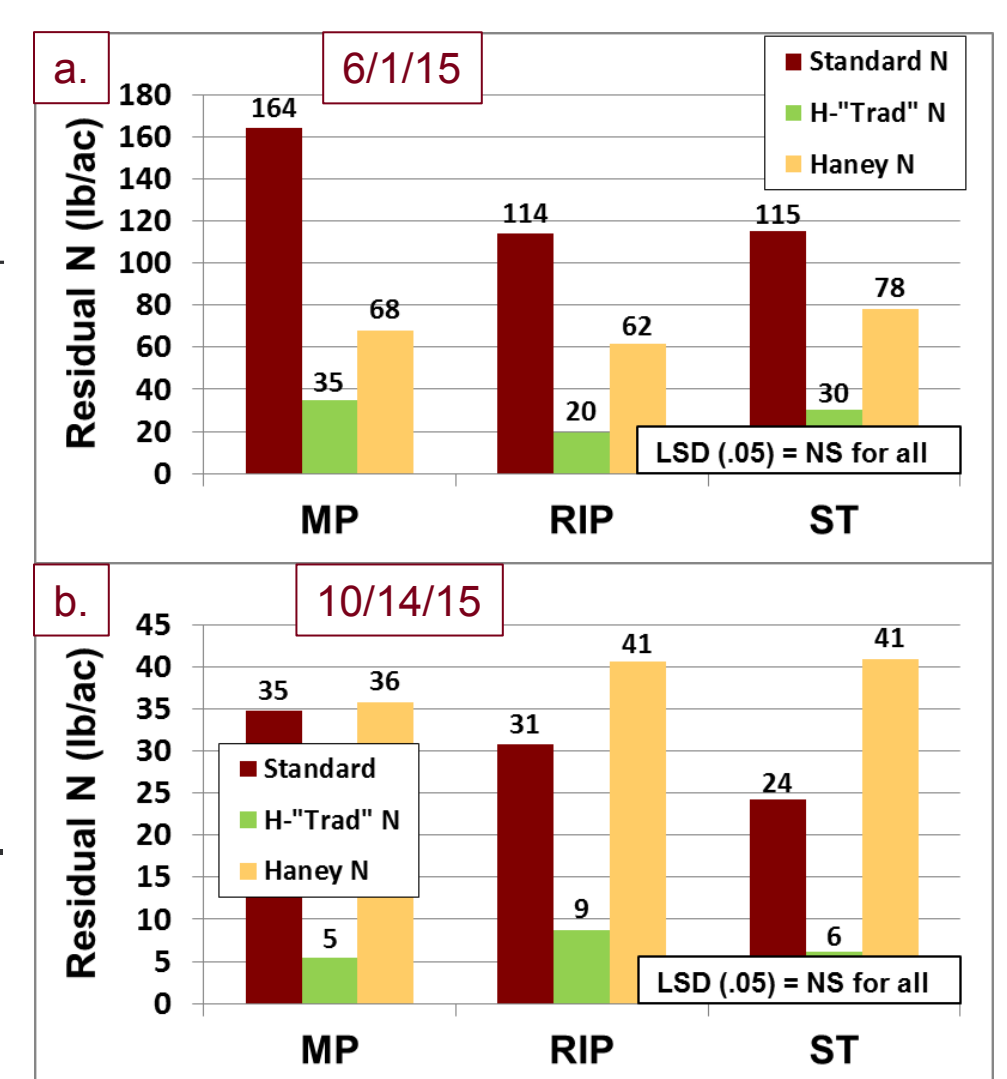
- The trial was conducted in 2015 at the SWROC in Lamberton in tillage plots that had been in place since the fall of 2007. Corn was grown until 2015 when soybeans were grown (planting date = 5/9).
- Tillage systems included:
  - MP (Moldboard Plow)
  - RIP (Disk Rip/V-Rip)
  - ST (Strip-tillage)
- Soil samples were collected in the spring (6/1), summer (7/14) and fall (10/14).
  - 15 cores/plot, 4 reps of each tillage
  - Sample depth: 0-6" inches as per Haney Test guidelines; 0-6" and 6-24" inches as per Standard Soil Testing Procedures for NO<sub>3</sub>-N.
  - Samples were sent to MVTL labs in New Ulm for analysis. Spring and fall samples were split and analyzed by the Haney Test and Standard Soil Testing Procedures. Summer samples were analyzed by the Haney Test only.
- Fertilizer recommendations were generated from Haney Soil Test reports and U of MN nitrogen-rate guidelines (available at): [www.extension.umn.edu/nutrient-management](http://www.extension.umn.edu/nutrient-management).

## Haney Test Soil Health Score/Calculation by Tillage System (Lamberton, 2015)\*

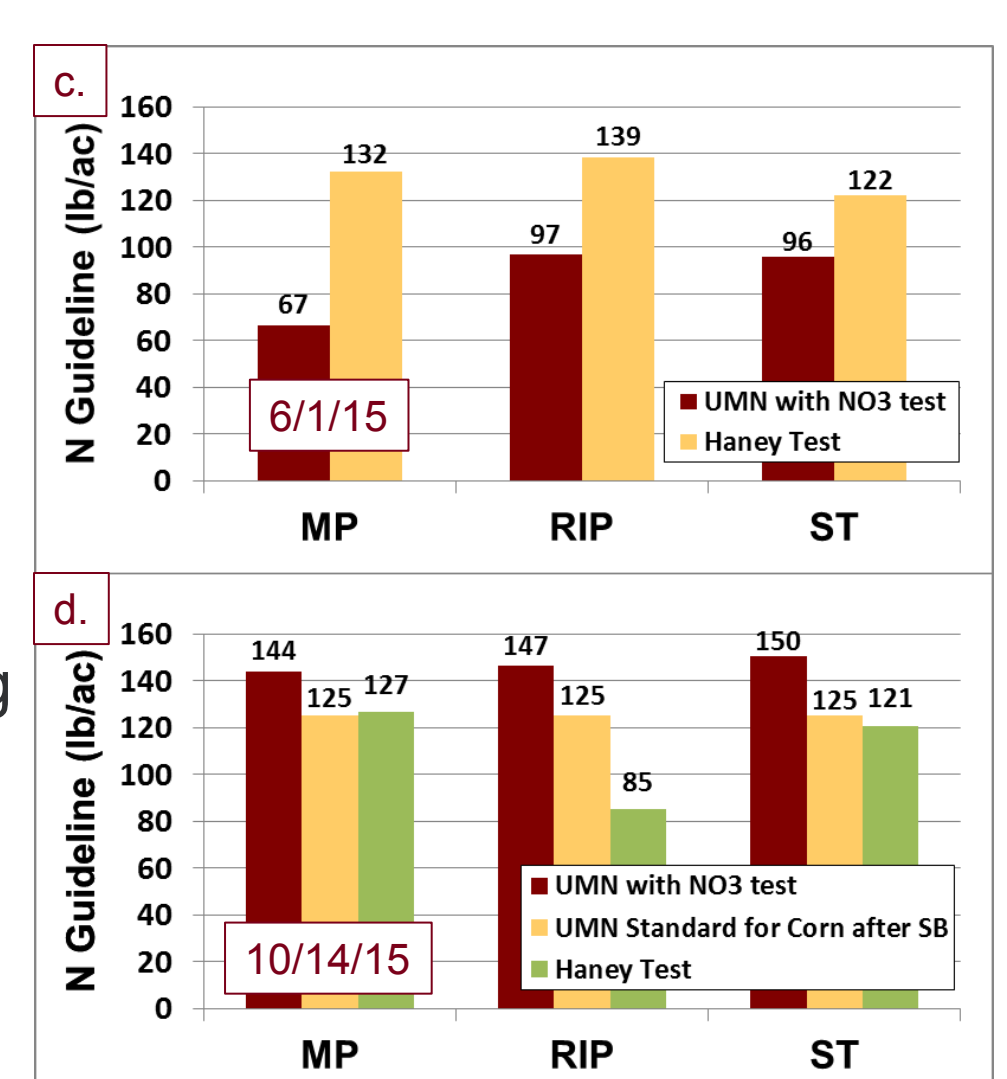


\*Soil Health Score = (Solvita 1-day CO<sub>2</sub>C / C:N ratio + (Organic C/100) + (Organic N/10). According to Ward Laboratories Inc. (Kearney, NE), a value > 7 is preferred.

Amount of residual nitrogen in the spring (a.) and fall (b.) as determined by the Haney Test and Standard Soil Testing Procedures. The Haney Test report also includes values for a "Traditional" test (H-"Trad" N). Spring Standard Test results were likely high due to ongoing dry conditions at Lamberton.



Amount of nitrogen recommended for 200 bu/ac corn based on spring (c.) and fall (d.) results from Standard Testing Procedures and the Haney Test. Note more N was recommended when using the Haney Test in the spring, while similar or lower rates were recommended by the Haney Test in the fall.



## Summary:

- Although the Haney Test detected little difference in soil health measures among long-term tillage systems at Lamberton in 2015 (not all data shown), reduced tillage systems can result in significant long-term benefits.
- It is unknown if increased crop diversity would have altered Haney Test results.
- Farmers should utilize fertilizer guidelines based on soil test results that have been correlated and calibrated in their state.

Author: Lizabeth Stahl

Find out more at:

[www.extension.umn.edu/tillage](http://www.extension.umn.edu/tillage)

Thanks to the Minnesota Soybean Research and Promotion Council and NCR-SARE for their support of this project.

## Improving the Profitability of Soybean Production – Addressing Barriers

### Cover Crops Learning Tour

Liz Stahl, Extension Educator, Crops - Worthington, MN

#### **INTRODUCTION: Cover Crops Learning Tour**

Agronomic, environmental, and economic benefits have driven an increase in use of cover crops. However, use in Minnesota has been very limited in part due to establishment challenges in a corn/soybean rotation. A partnership of farmers, agricultural professionals and researchers will develop hands-on educational demonstration plots to complement on-going cover crop research. An interactive educational field day (mini-field school format) will allow farmers to see cover crops in production and discuss how to implement them on their farms. The demonstration plots will be adjacent to a University of Minnesota (UM) replicated research trial near Lamberton, MN. The research trial is evaluating the impacts of planting date, cover crop type and their interactions on corn and subsequent soybean yield. Data collected from these plots and the field day will help address future research needs. Educational materials will also be developed. The research trial is supported through Minnesota Department of Agriculture Clean Water Funds and complements more expansive, small-plot research trials being conducted on UMN Research and Outreach Centers. A request for funding the field day demonstration site and event, a needs assessment survey on cover crops, and additional demonstration sites and field day(s) in 2016 was submitted to North Central Region Sustainable Agriculture Research and Education (total requested over two years = \$29,999).

#### **OBJECTIVE: Implement hands-on, interactive field day on cover crops for farmers and ag professionals**

**Goal 1.** Support educational plots and host an interactive educational field day that highlights UM research evaluating the impact of planting date, cover crop species and their impacts on cash crop yield. The target audiences are farmers, ag professionals, agency personnel, non-profit personnel, Extension, and other educators. The field day will be held adjacent to the UM replicated research trial near Lamberton, MN.

**Goal 2.** Results from the field day and research trials will be disseminated through newsletters, the UM Extension Crops website, factsheets, one peer-reviewed paper, field days, videos, and local, regional, and national meetings.

#### **RESULTS: Cover Crop Learning Tour**

- Research and demonstration plots were established at an on-farm location in southwestern MN. Factors evaluated included date of seeding, seeding rate, and species.
- The Cover Crop Learning Tour was held on September 15, 2015. There were 125 attendees including growers, consultants/ag professionals, agency personnel, non-profits, Extension/University, and students. Speakers, plot tours and demos were followed by equipment demos.
- The project was discussed on numerous radio spots, and a number of articles from have been published in the ag media about the program.
- Video footage was collected by U of MN Extension and the MN Corn Growers, and future videos are planned.
- Research conducted at the site (not funded through this project), will be published in a journal article in the future. Results have also been presented at numerous programs throughout the winter meeting season.
- The demonstration plot is currently being analyzed and summarized by the summer intern for a school science project. This information may be presented in a future UM Extension Fact Sheet and/or MN Crop News article.
- Feedback from the program was overwhelmingly positive. A brief summary of evaluations: On a 1-5 scale (1=Very Dissatisfied, 5 = Very Satisfied), attendees rated the program overall 4.6 (35 respondents). 100% of respondents indicated a learning gain (37 responses), that they had situations where they could use what they learned (37 responses) and that they planned to change at least one of their practices based on what they learned from the program (29 responses). Comments included "Best field day yet!", "Well-planned event, kept on schedule", "Well done", "Great job!", "Very good program", and "Very enlightening and informative".
- We continue to build on programming in the soil health arena, and future efforts will continue to build and develop on a sound research base.

# Soybean Herbicide Management Videos

LINK: <https://www.youtube.com/user/UMNCrops>



## Herbicide Spray Drift Demonstration

by University of Minnesota Extension Crops



## Herbicide Resistance Management Series:

by University of Minnesota Extension Crops



## Herbicide Resistance Management: Herbicide Mode...

by University of Minnesota Extension Crops



## Herbicide Resistance Management Series:

by University of Minnesota Extension Crops

***SECTION***

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***F***

**INTEGRATED**

**PEST**

**MANAGEMENT**

**ASSESSMENT**

# 2015 IPM Assessment

1312 ~ responses

## Pesticide Safety & Environmental Education Program



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Liz Stahl, Regional Extension Educator  
Lisa M. Behnken, Regional Extension Educator  
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Ryan Miller, Regional Extension Educator  
Dave Nicolai, Regional Extension Educator

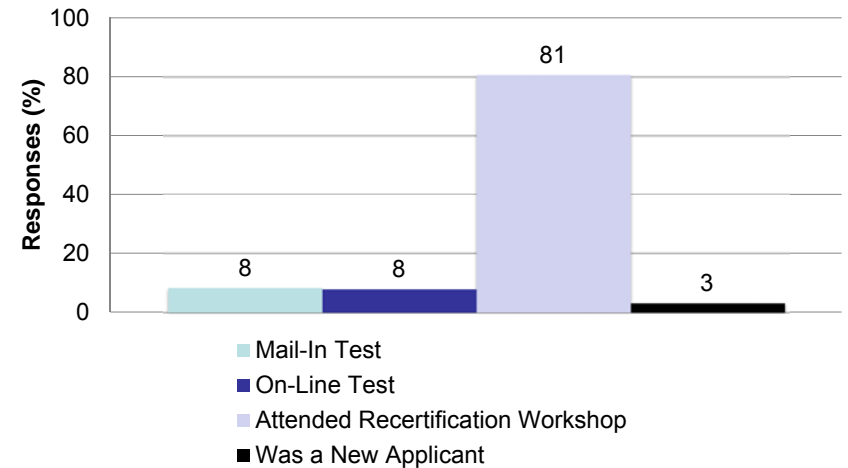
## Section 1 Baseline/General Information



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## How did you last recertify?

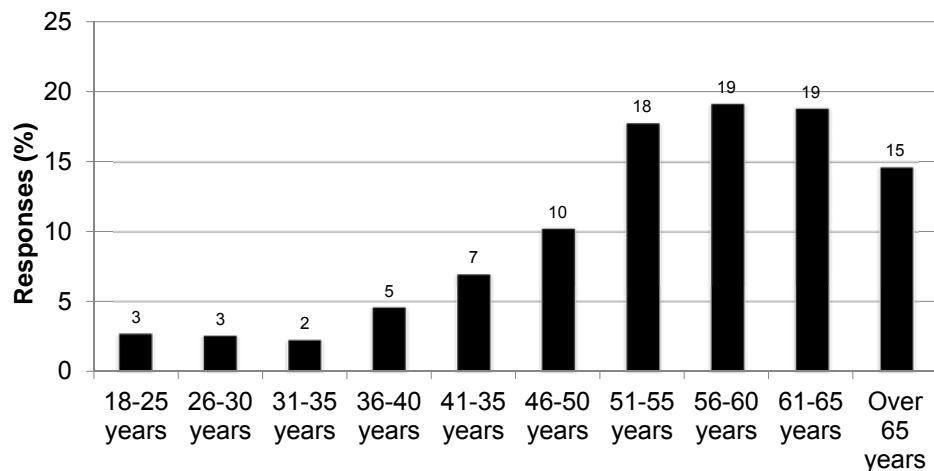
(445 responses SE)





## What is your age?

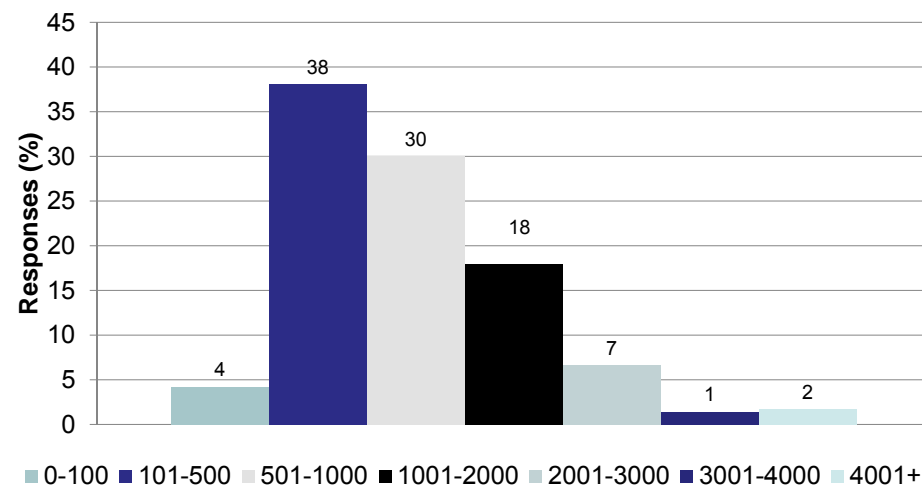
(955 responses SW and SE)



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## How many acres do you farm?

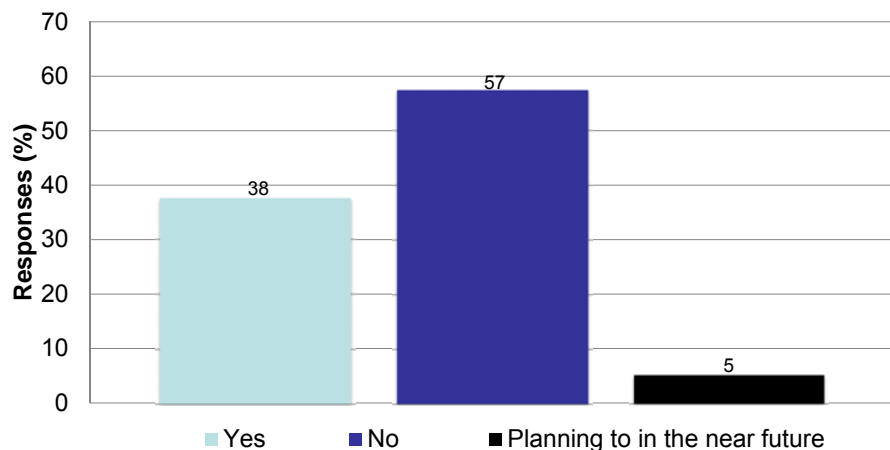
(1000 responses SW, C, and SE)



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## Do you use a Smart Phone/Tablet/Mobile Device to access the internet while in the field?

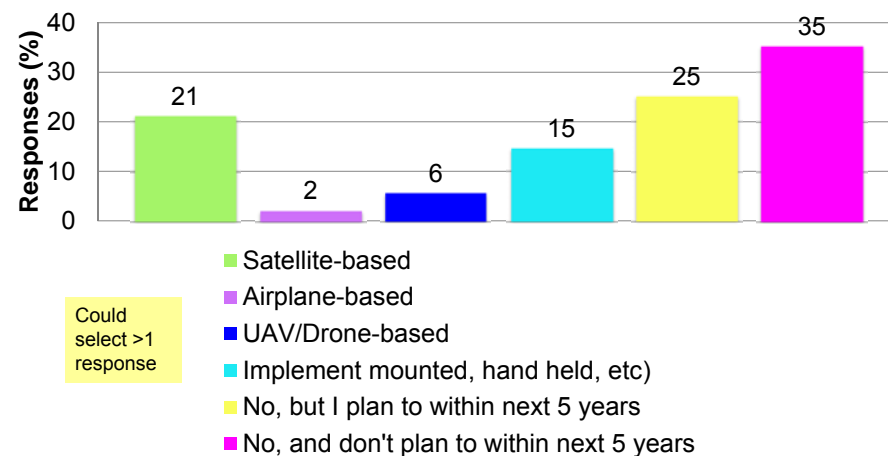
(1228 responses SW, C, and SE)



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## In 2014, did you use remotely-sensed data collected by the following means for crop management?

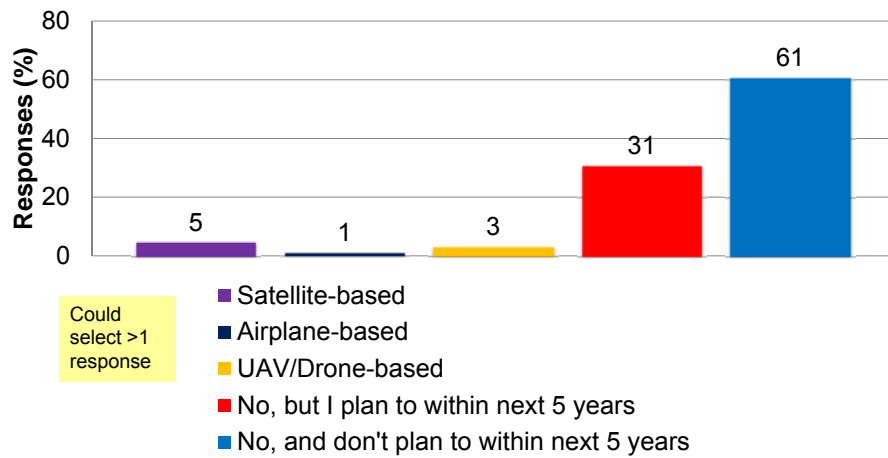
(199 responses C)



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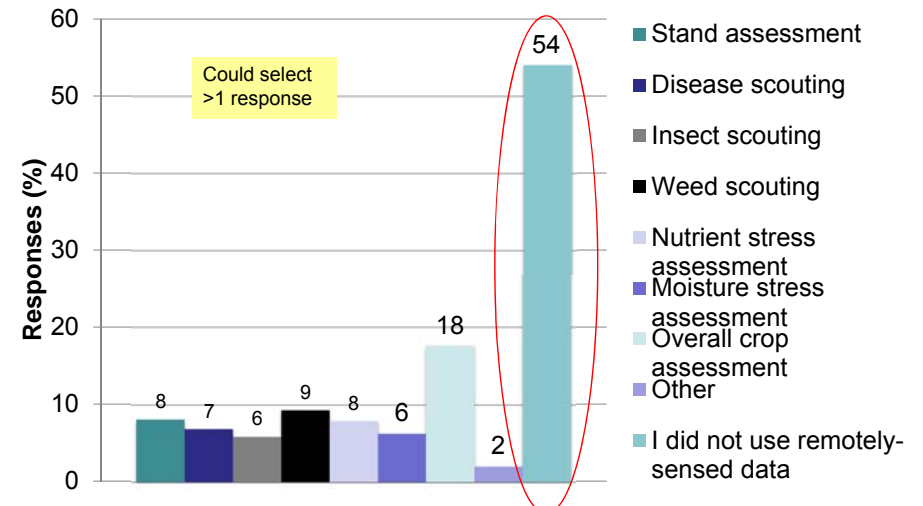
## In 2014, did you use remotely-sensed data collected by the following means for crop management?

(394 responses SE)



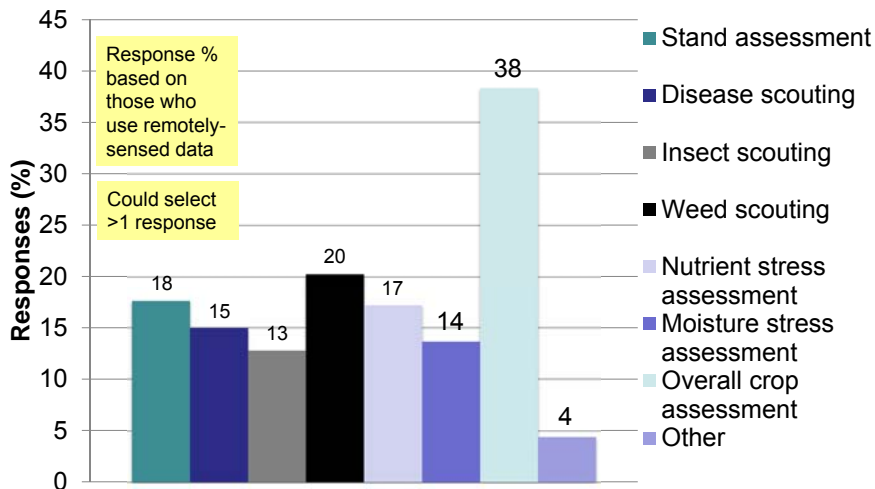
## If you used remotely sensed data in 2014, how did you use the data?

(494 responses C and SE)



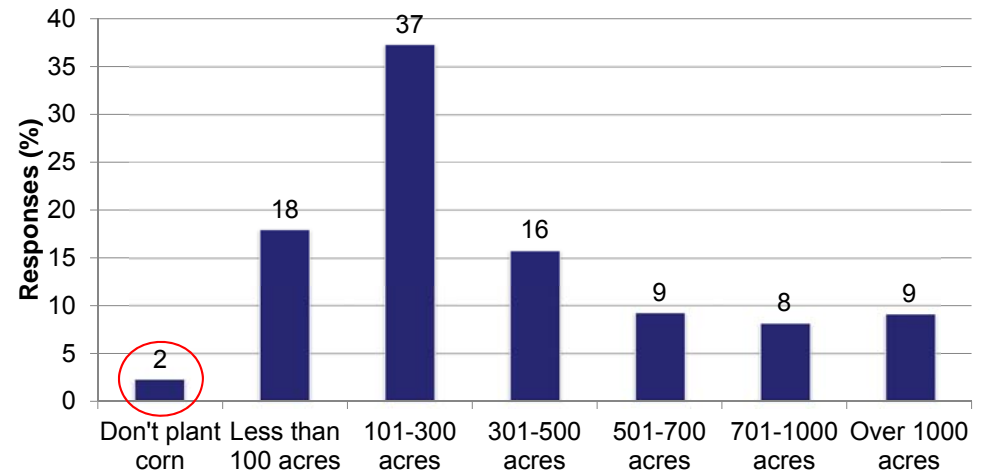
## If you used remotely sensed data in 2014, how did you use the data?

(227 responses C and SE)



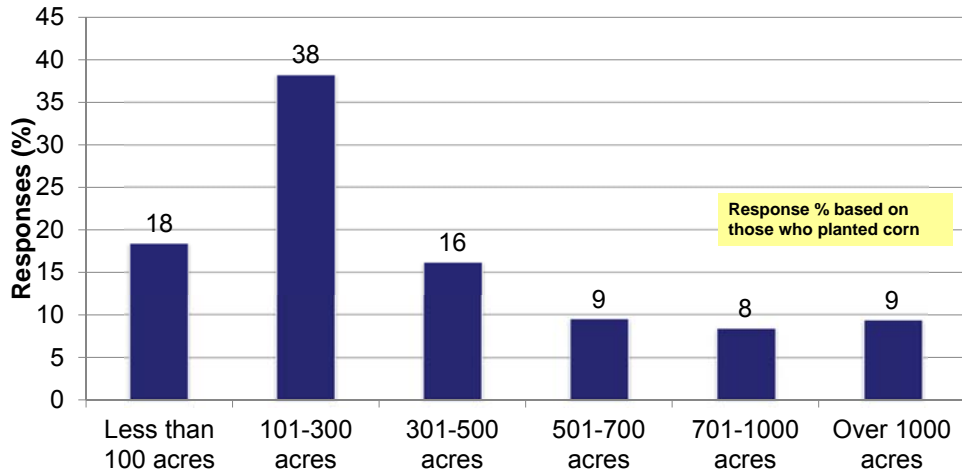
## How many acres of Corn do you raise?

(734 responses C and SE)



## How many acres of Corn do you raise?

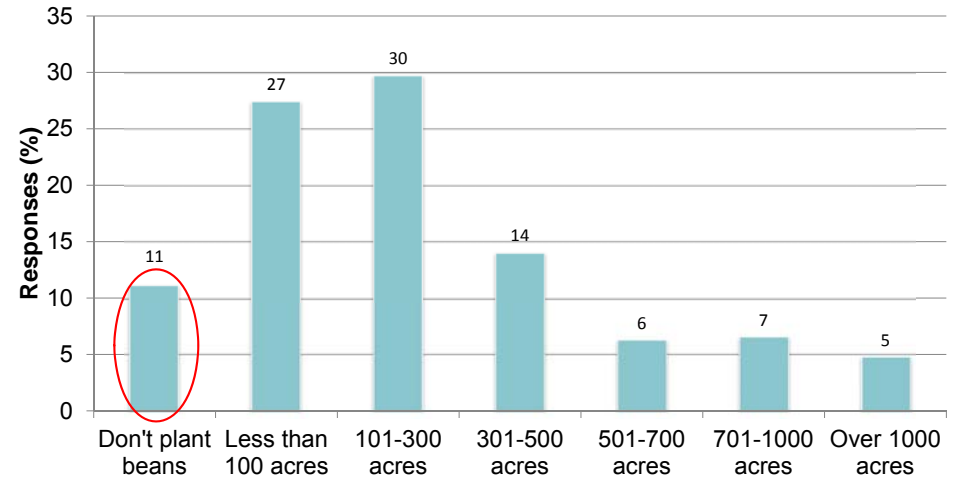
(717 responses C and SE)



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## How many acres of Soybeans do you raise?

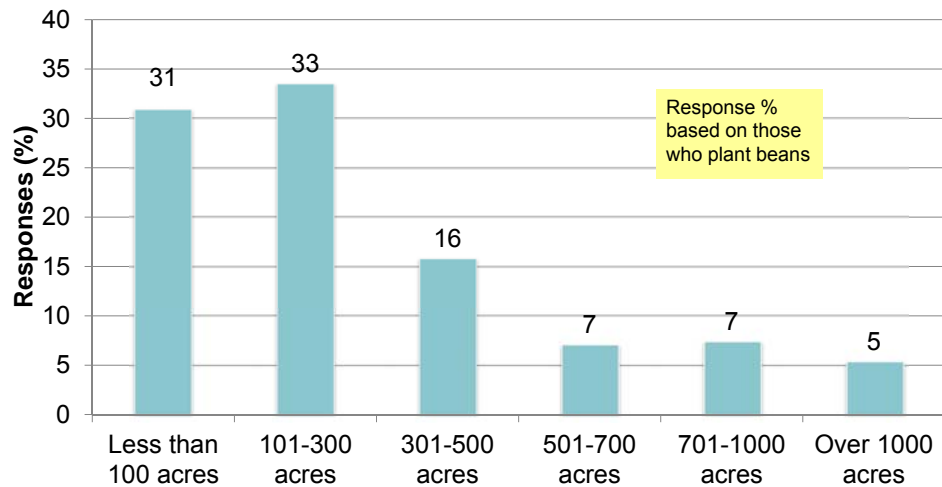
(733 responses C and SE)



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## How many acres of Soybeans do you raise?

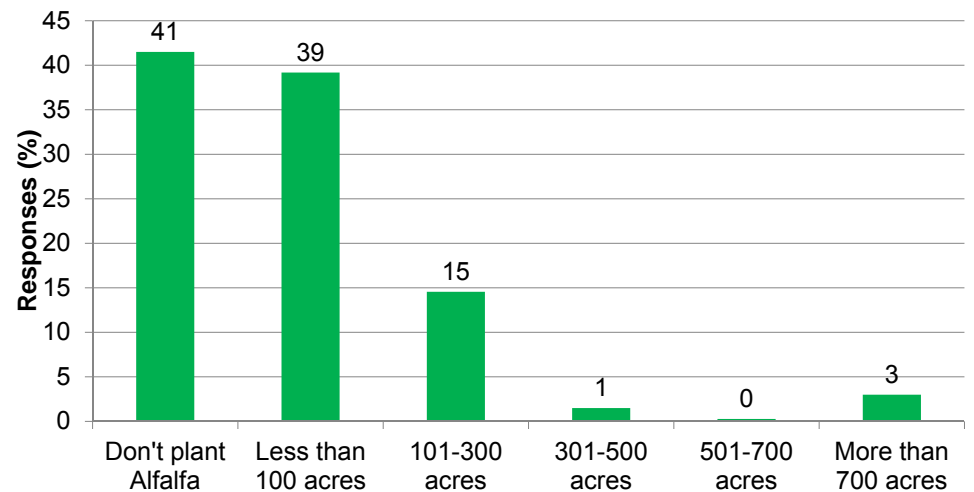
(651 responses C and SE)



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## How many acres of Alfalfa do you raise?

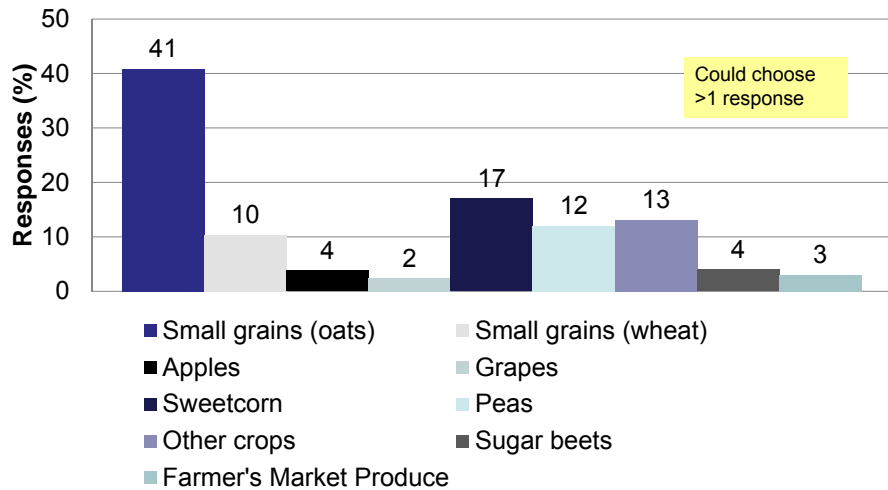
(735 responses C and SE)



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## What other crops do you raise? Select all that apply

(627 responses C and SE)



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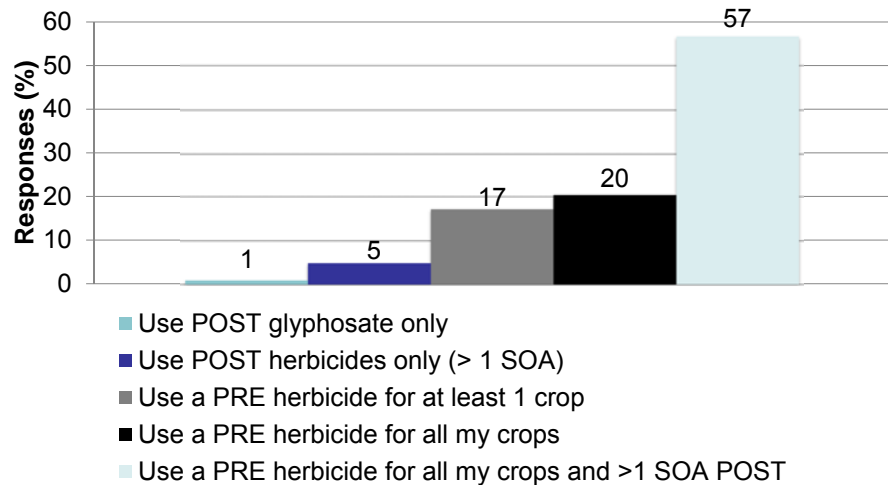
## Section 2 Weed Management



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## For Weed Control I Primarily:

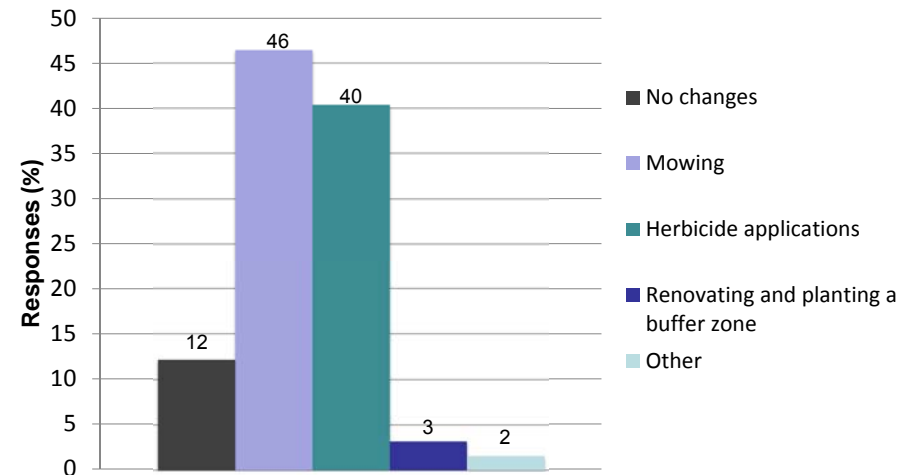
(679 responses SW, C, and SE)



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## In 2014, I made a conscious effort to control weeds in my fence rows/ waterways, by: (select all that apply)

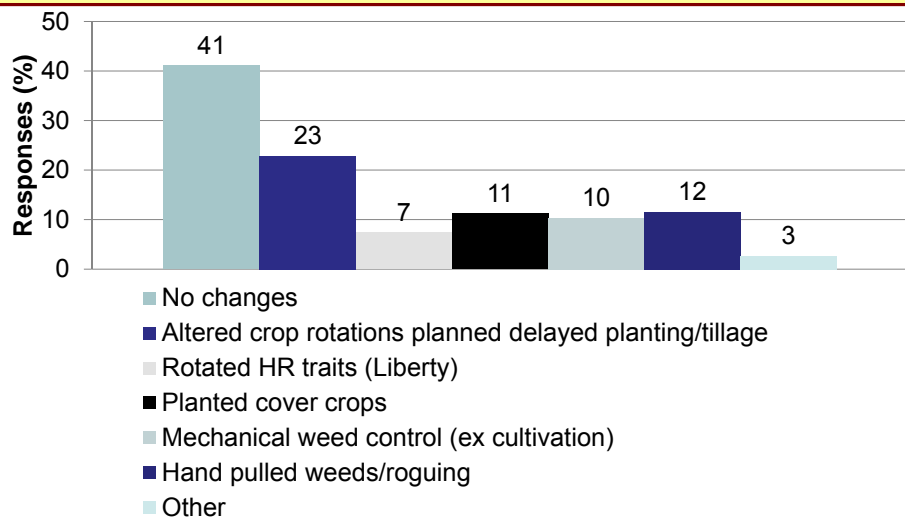
(379 responses SE)



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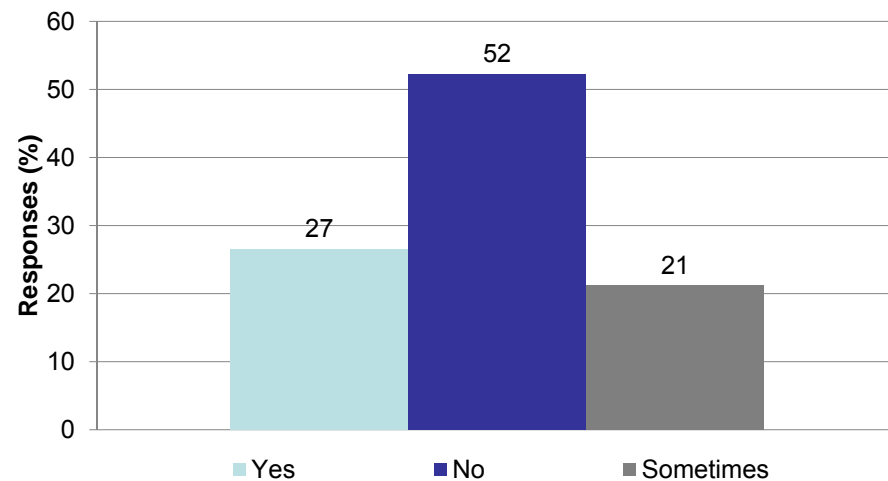
### In 2014, I used the following weed management practice(s) on land I farm (select all that apply)

(416 responses SE)



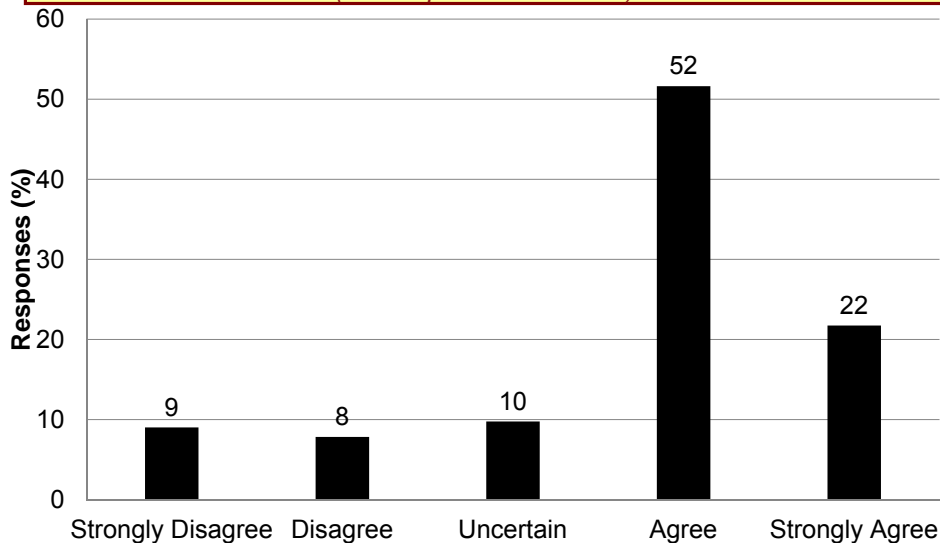
### Do you map weedy spots and/or infestations in your field?

(995 SW, C & SE responses)



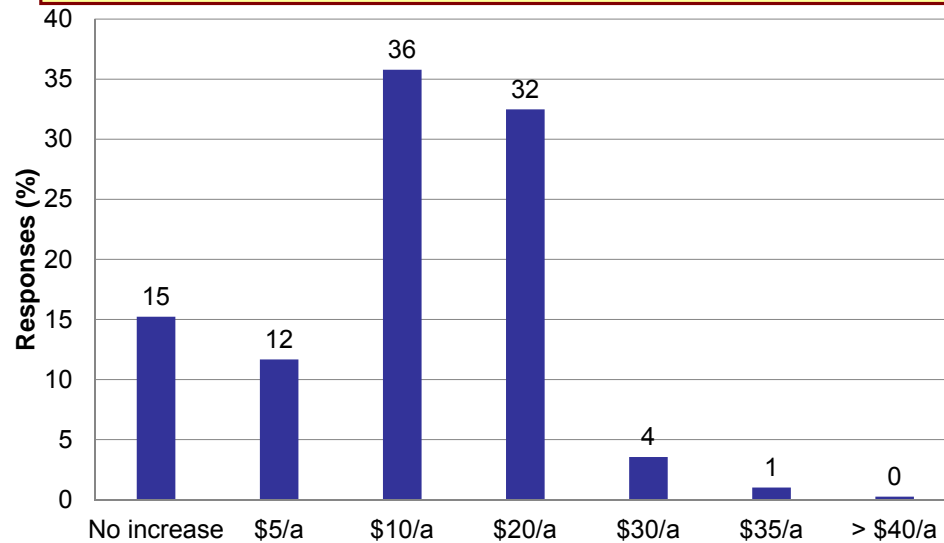
### Glyphosate is still an extremely important herbicide component in my farming operation

(676 responses C and SE)



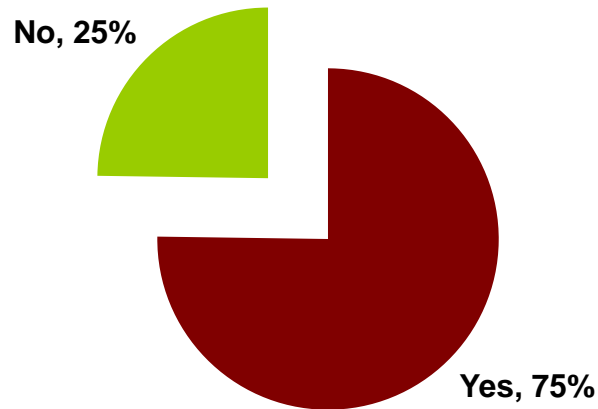
### How much has reduced effectiveness of glyphosate increased the cost of your weed control programs?

(394 responses SE)



## Do you think you have glyphosate resistant weeds on your farm?

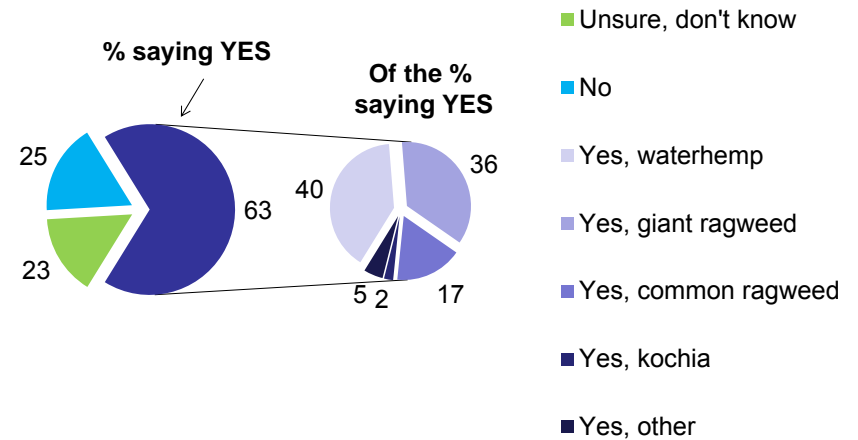
(1312 responses SW, C, and SE)



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## In 2014, did you have weeds that were resistant to multiple SOA's? (select all that apply)

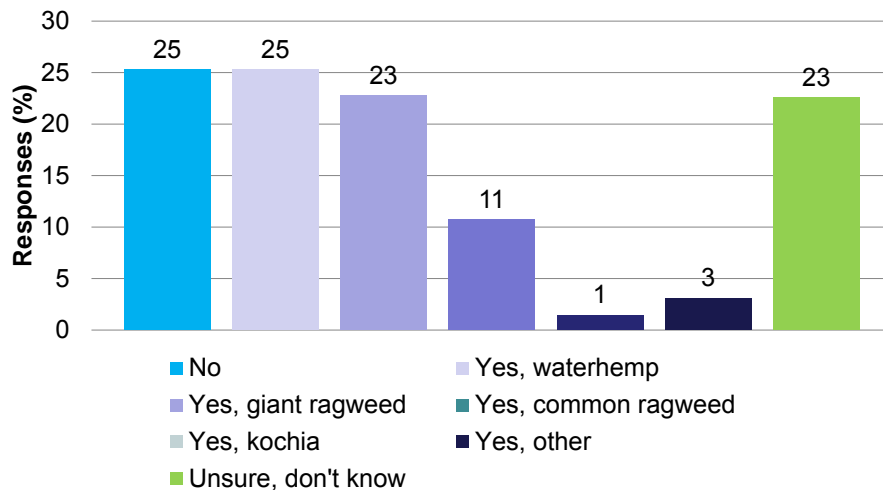
(549 responses C and SE)



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## In 2014, did you have weeds that were resistant to multiple SOA's? (select all that apply)

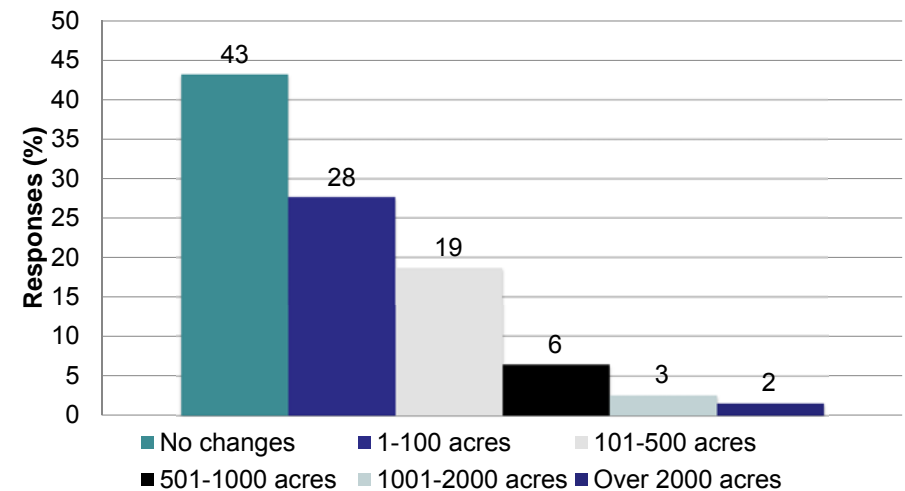
(549 responses C and SE)



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## In 2014, on how many acres did you change your herbicide program to manage for resistant weeds?

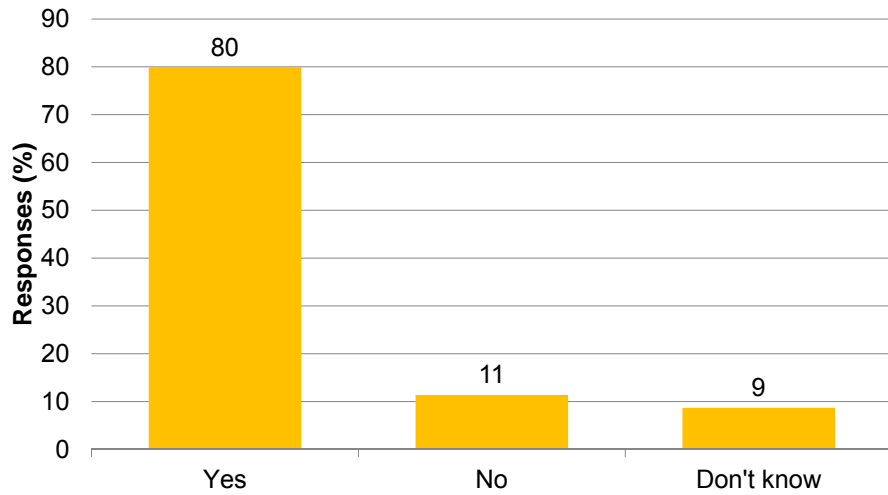
(391 responses SE)



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## When planning weed management programs, do you purposefully utilize different SOA's?

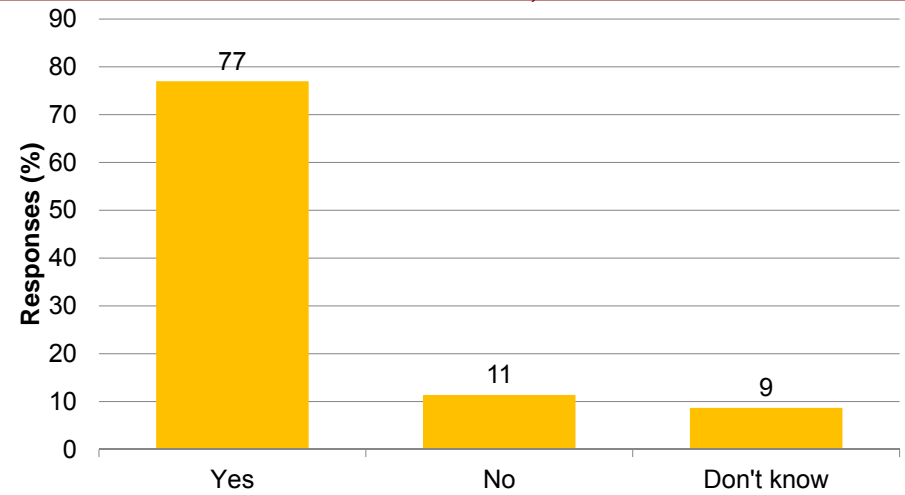
(518 responses C and SE)



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## When planning weed management programs, do you purposefully utilize different SOAs?

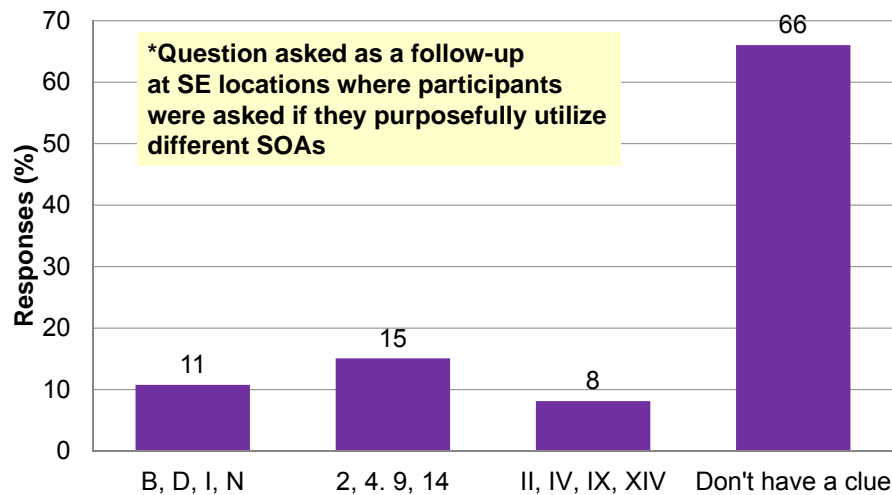
(434 responses in SE where follow-up question was asked about SOA classification)



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## How are Herbicide SOAs classified?\*

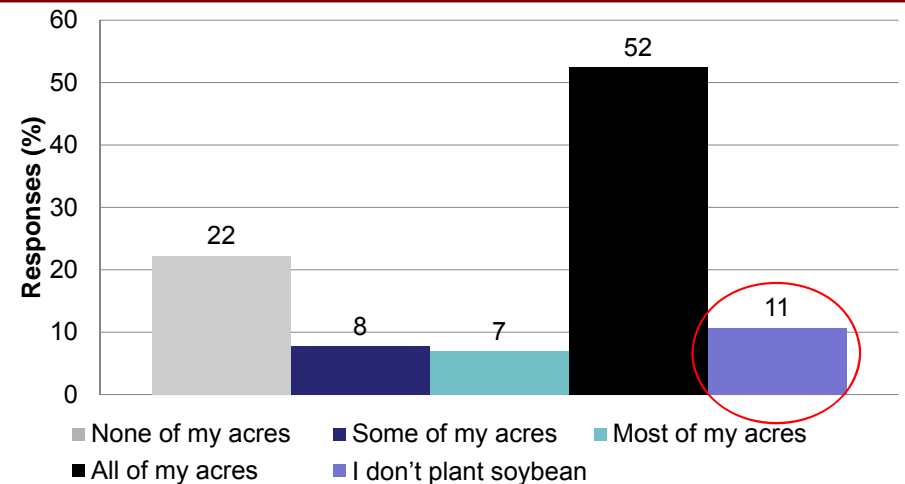
(418 responses SE)



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## Last year, I used pre-emergence or preplant residual herbicide in Soybean on...

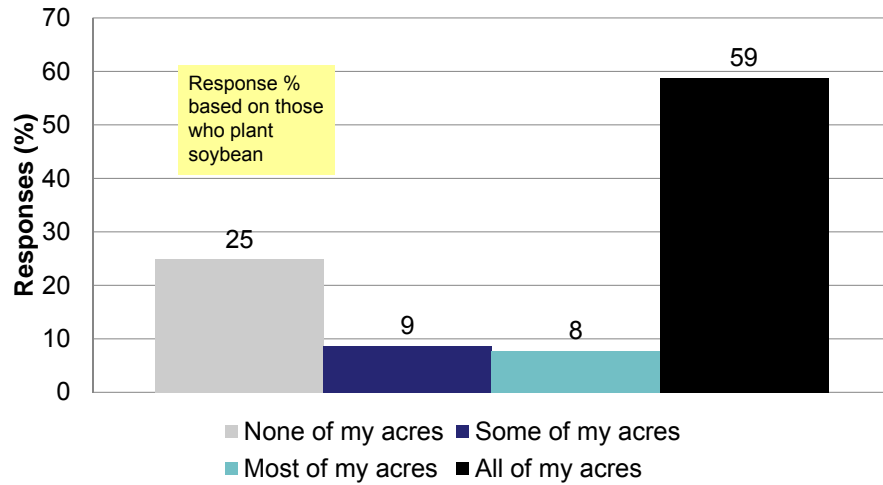
(972 responses SW and SE)



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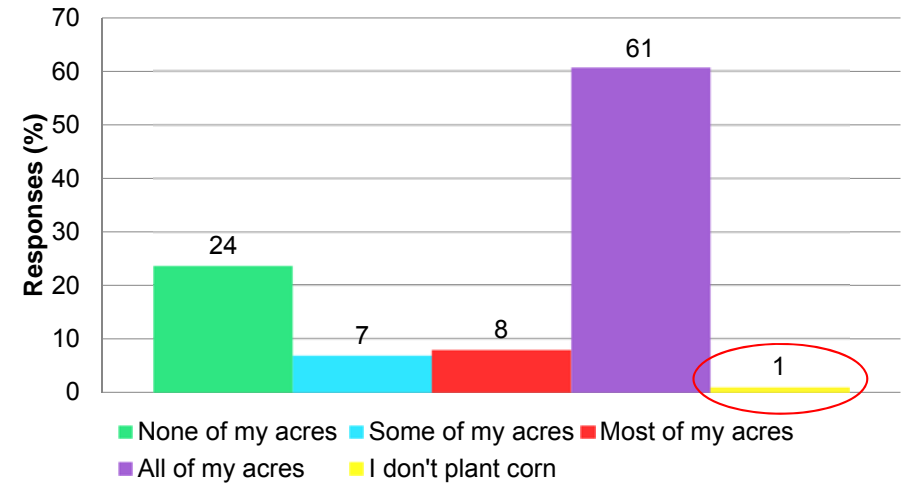
## Last year, I used pre-emergence or preplant residual herbicide in Soybean on...

(868 responses SW and SE)



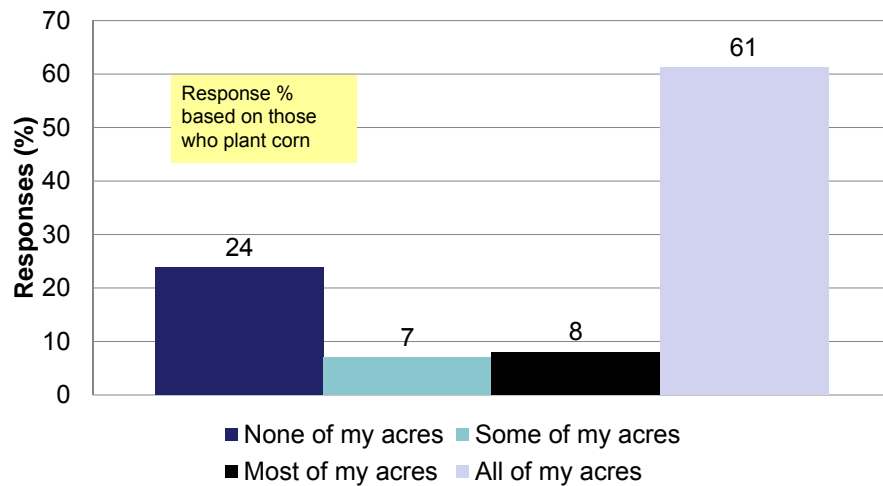
## Last year, I used pre-emergence or preplant residual herbicide in Corn on...

(931 responses SW, C, and SE)



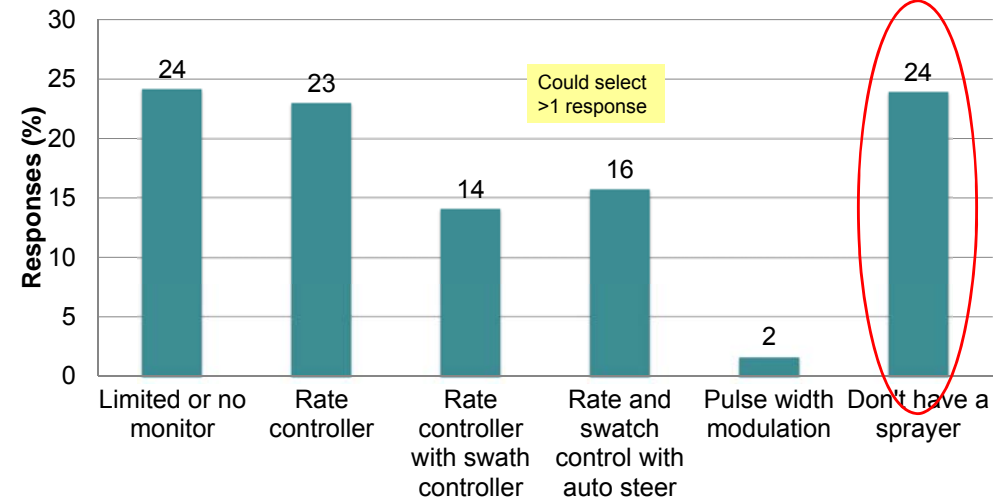
## Last year, I used pre-emergence or preplant residual herbicide in Corn on...

(931 responses SW, C, and SE)



## My sprayer uses...

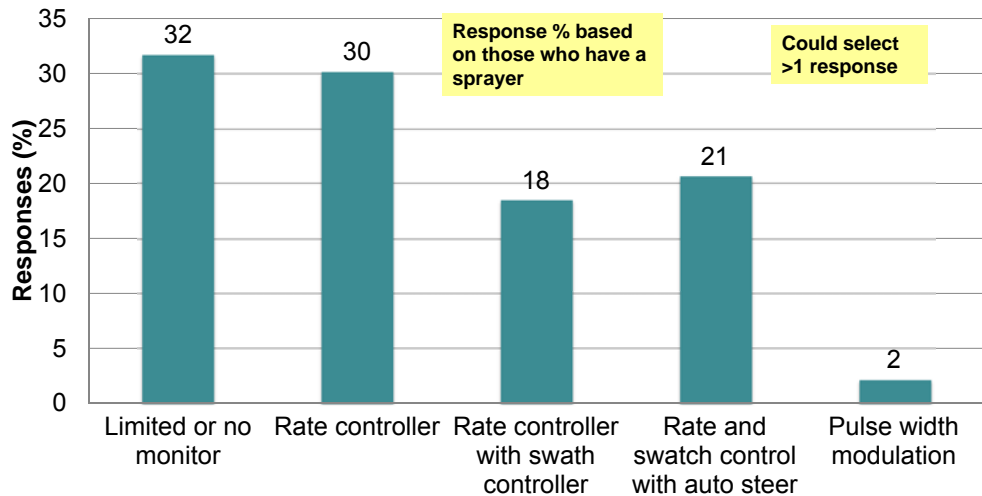
(427 responses SE)





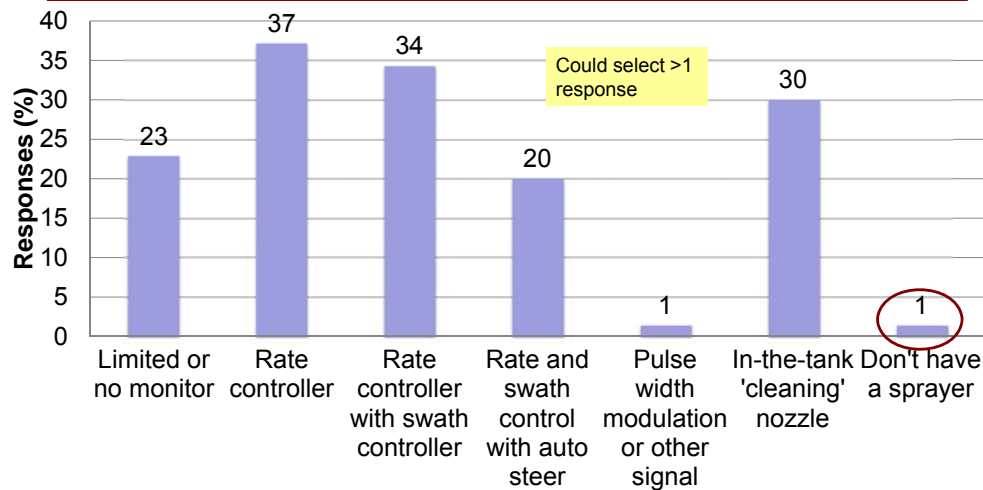
## My sprayer uses...

(325 responses SE)



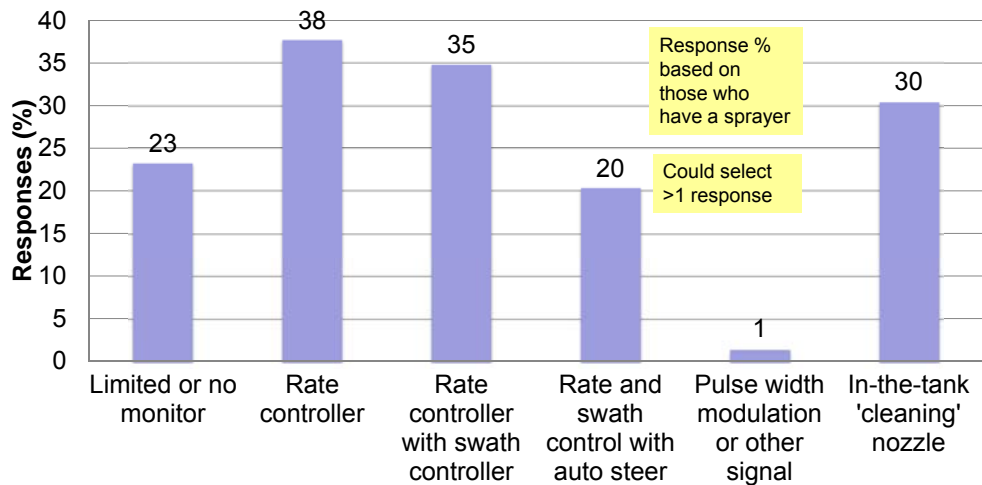
## My sprayer uses...

(70 responses C)



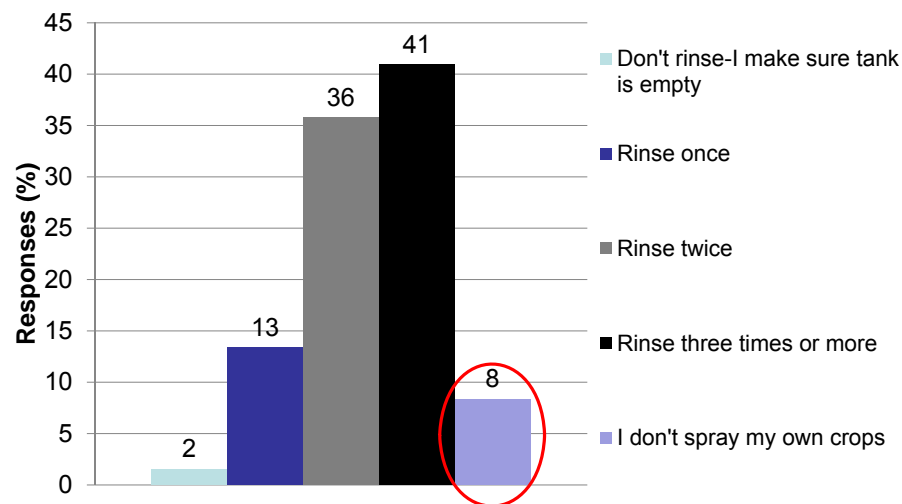
## My sprayer uses...

(69 responses C)



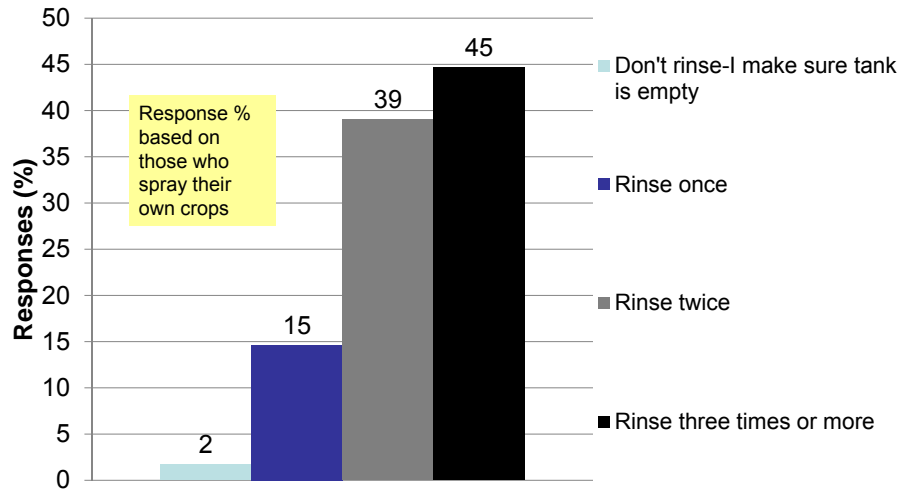
## When rinsing out the tank between susceptible crops, I usually...

(1158 responses SW, C, and SE)



## When rinsing out the tank between susceptible crops, I usually...

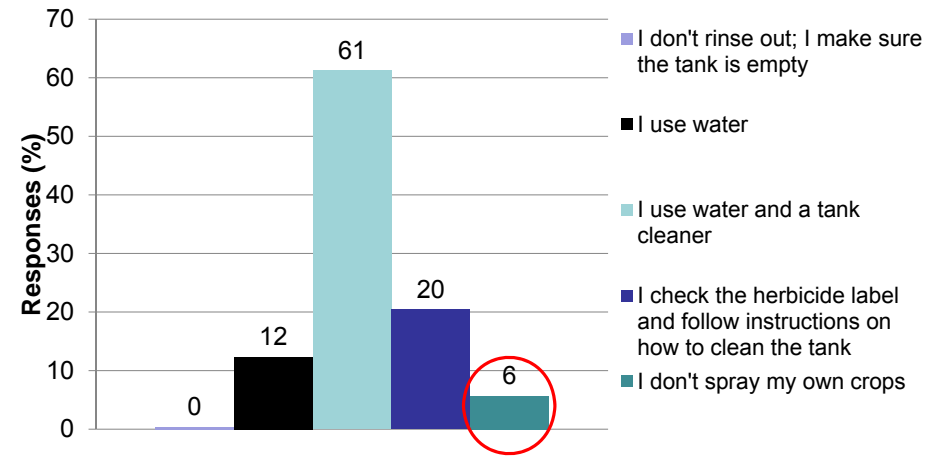
(1061 responses SW, C, and SE)



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## When changing from one crop to a susceptible crop, which method best describes how you clean the spray tank?

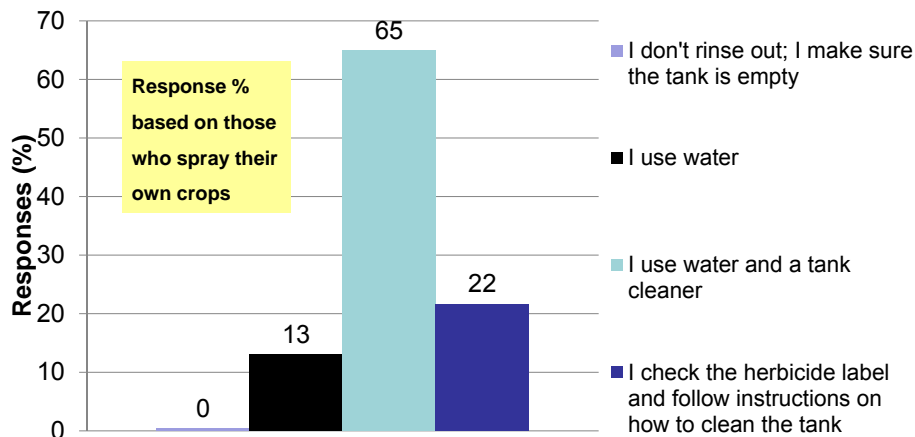
(794 responses SW, C, and SE)



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## When changing from one crop to a susceptible crop, which method best describes how you clean the spray tank?

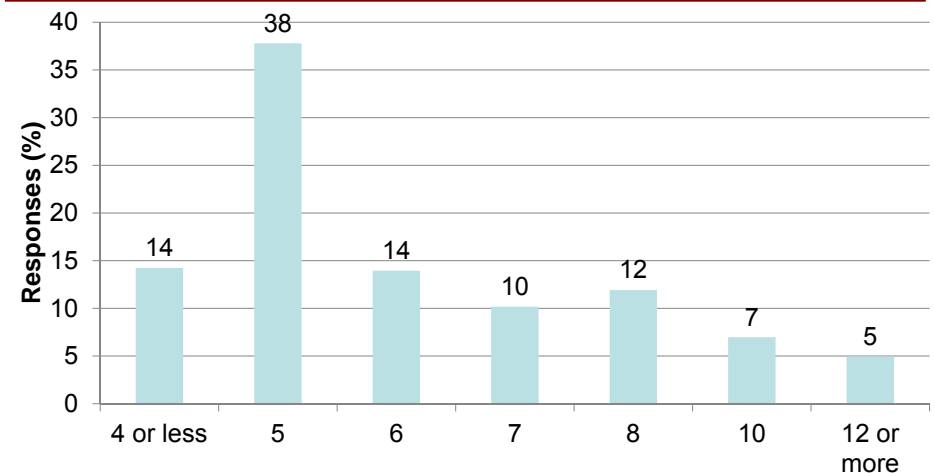
(749 SW, C, and SE responses)



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## MPH for your spraying?

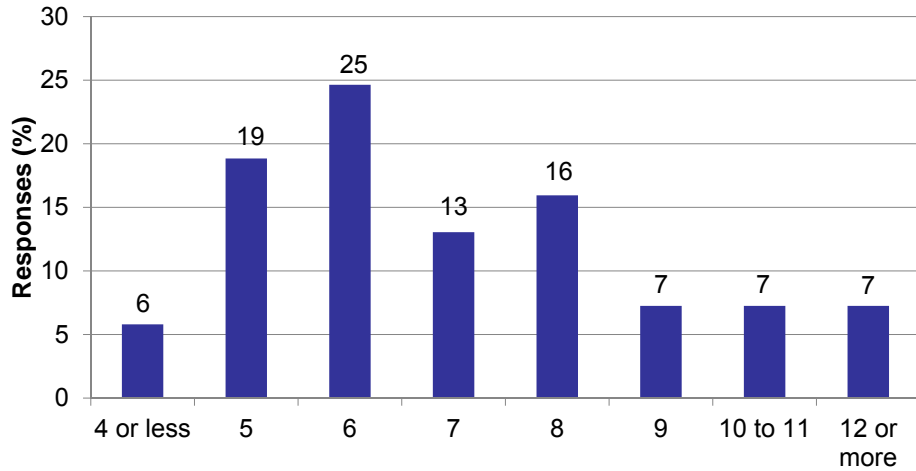
(344 responses SE)



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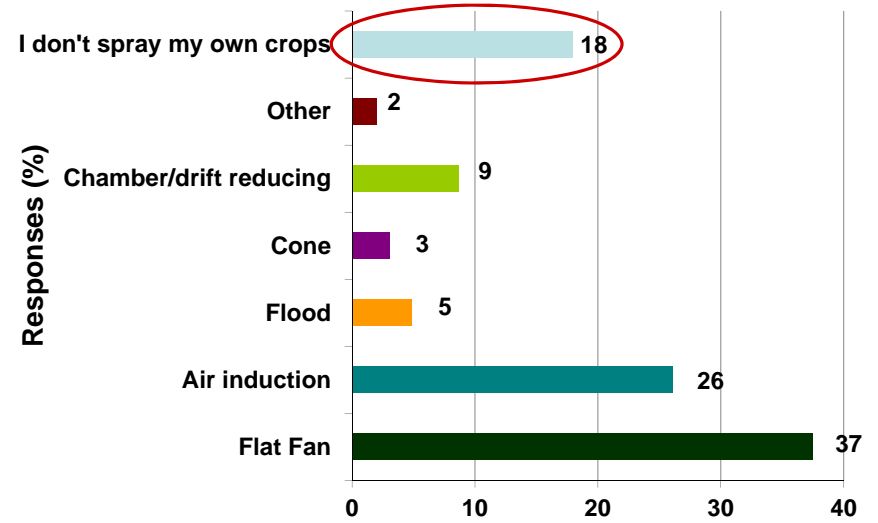
# MPH for your spraying?

(69 responses C)



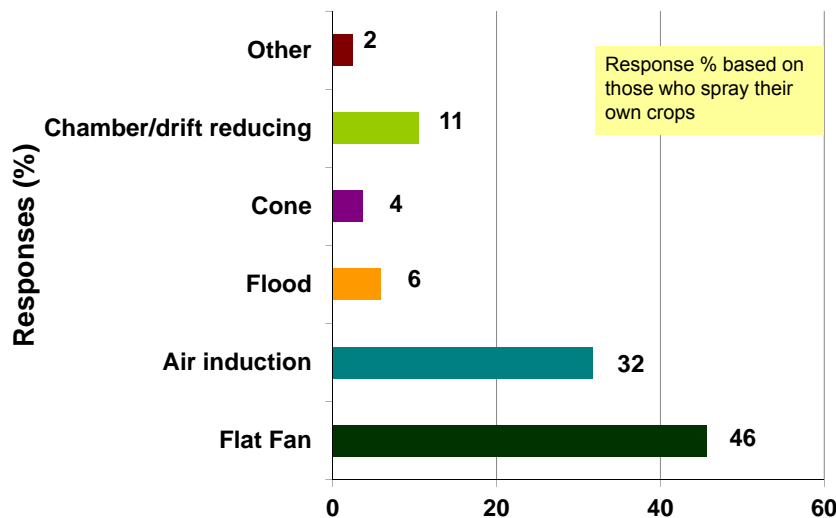
# What type of nozzle do you usually use?

(659 responses C and SE)



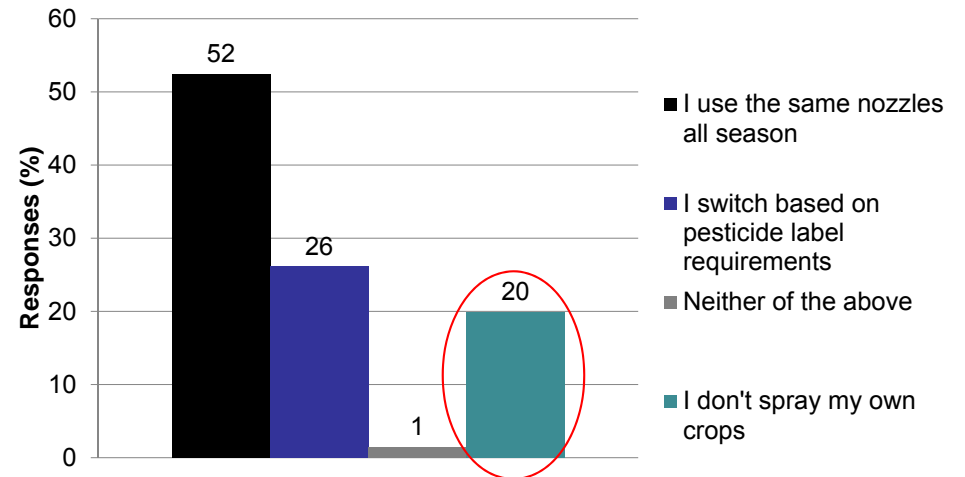
# What type of nozzle do you usually use?

(541 responses C and SE)



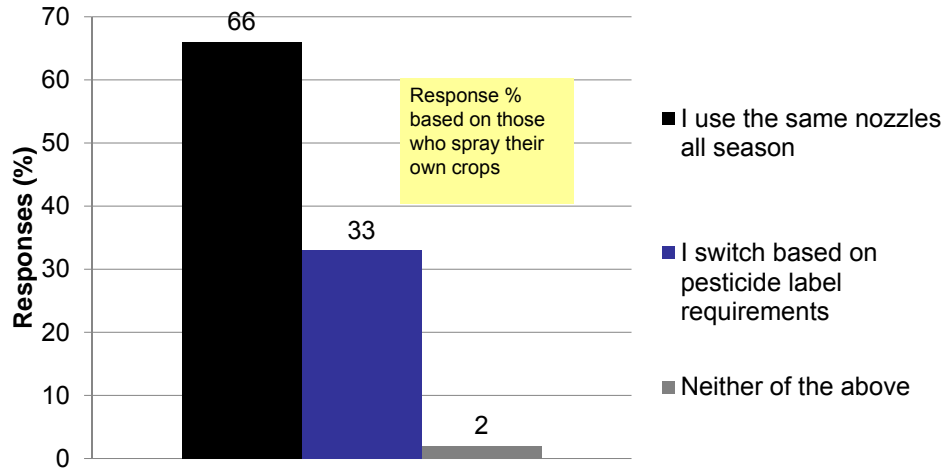
# How many different types of nozzles do you use in a season?

(692 responses C and SE)



## How many different types of nozzles do you use in a season?

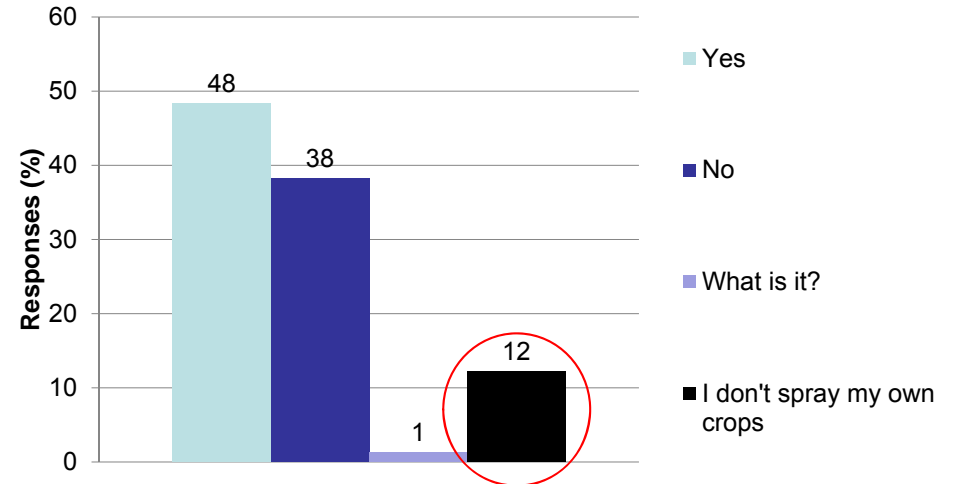
(554 responses C and SE)



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## Do you have/ use an in-the-tank rinsing nozzle in your spray tank for cleaning purposes?

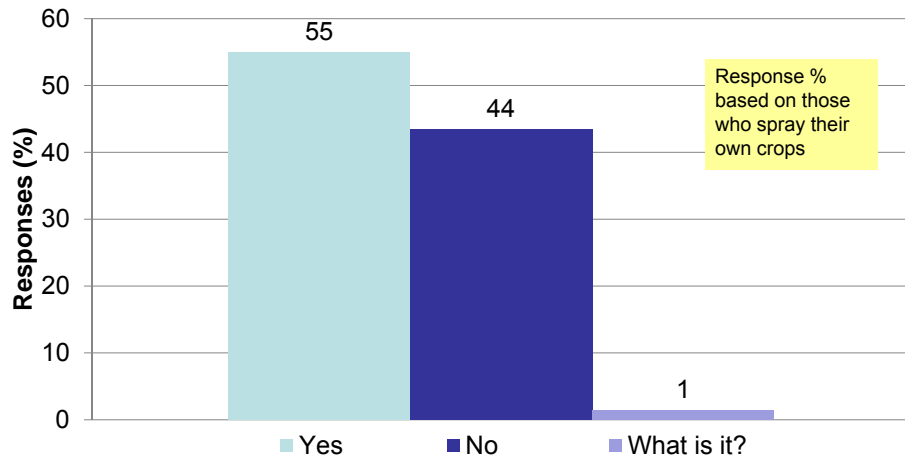
(623 responses C and SE)



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## Do you have/ use an in-the-tank rinsing nozzle in your spray tank for cleaning purposes?

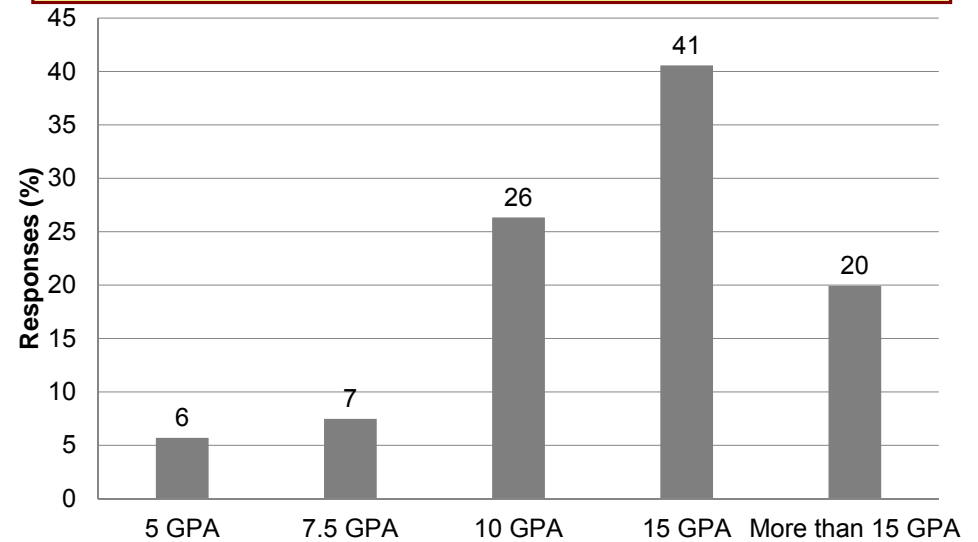
(547 responses C and SE)



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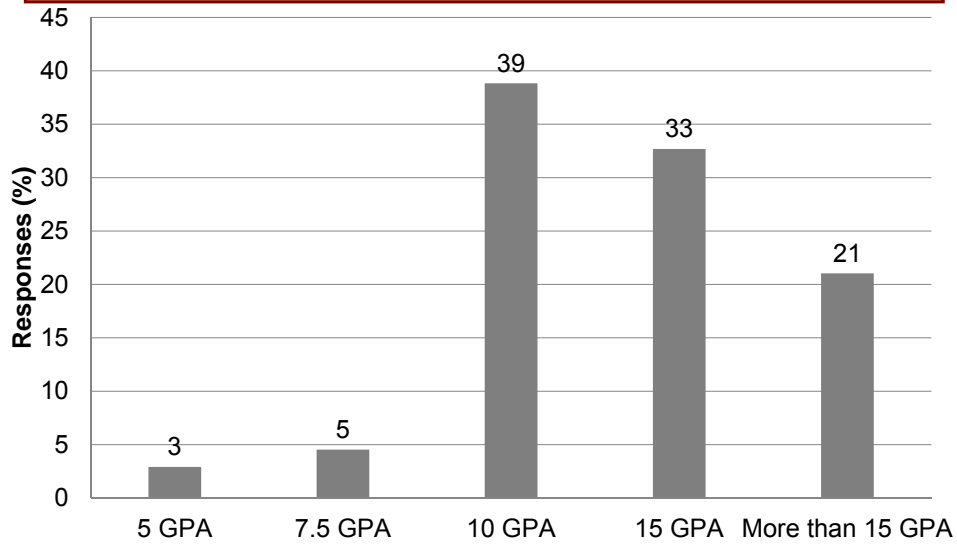
## I generally apply contact pesticides like Liberty and Cobra at:

(281 responses SE)



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**I generally apply systemic pesticides like glyphosate and 2, 4-D at:**  
(309 responses SE)

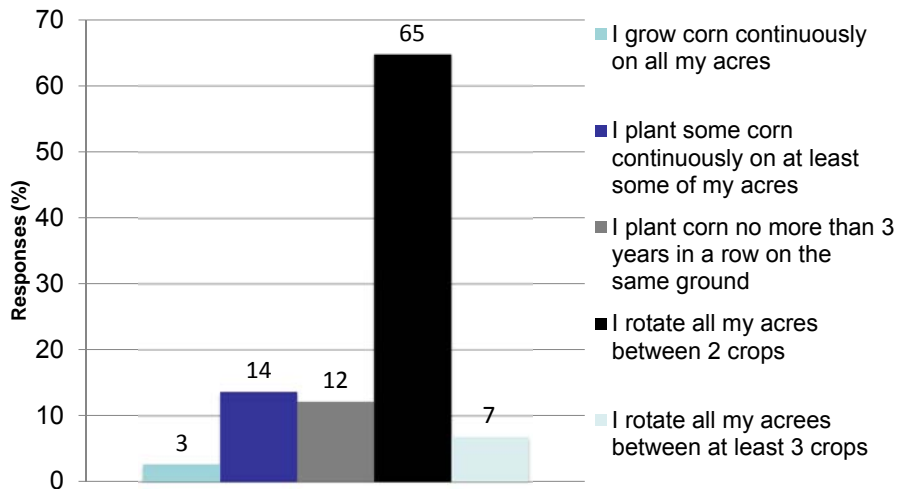


**Section 3  
Insect Management**

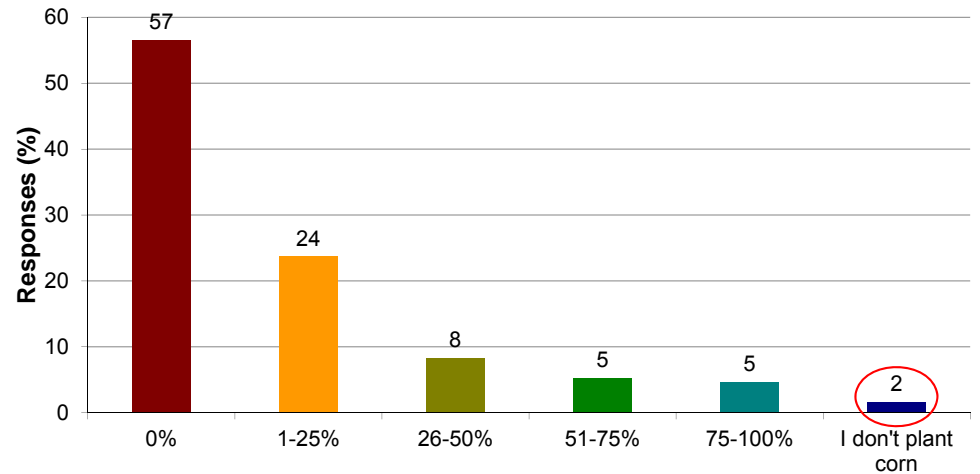


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**My Crop Rotation Consists of:**  
(528 responses SW and SE)

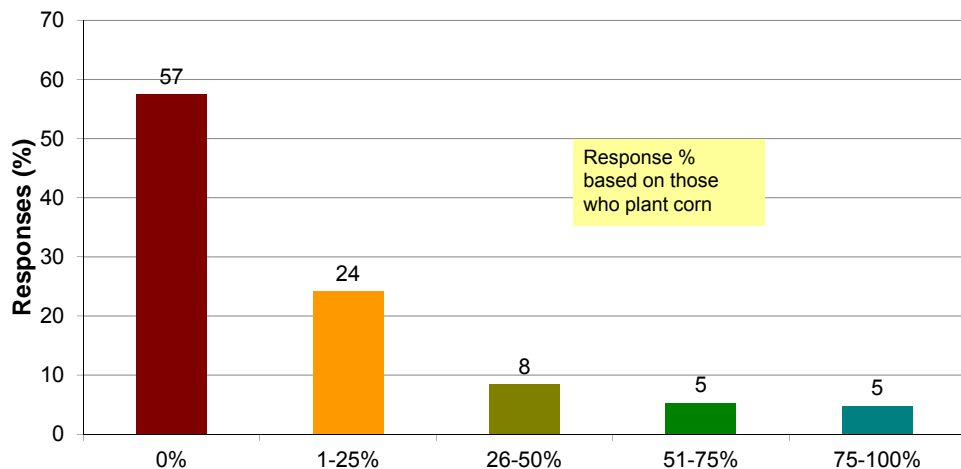


**What percentage of your acres are 3 or more years of corn on corn?**  
(1021 responses SW, C, and SE)



## What percentage of your acres are 3 or more years of corn on corn?

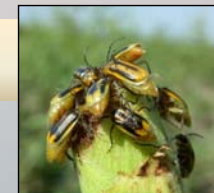
(1004 responses SW, C, and SE)



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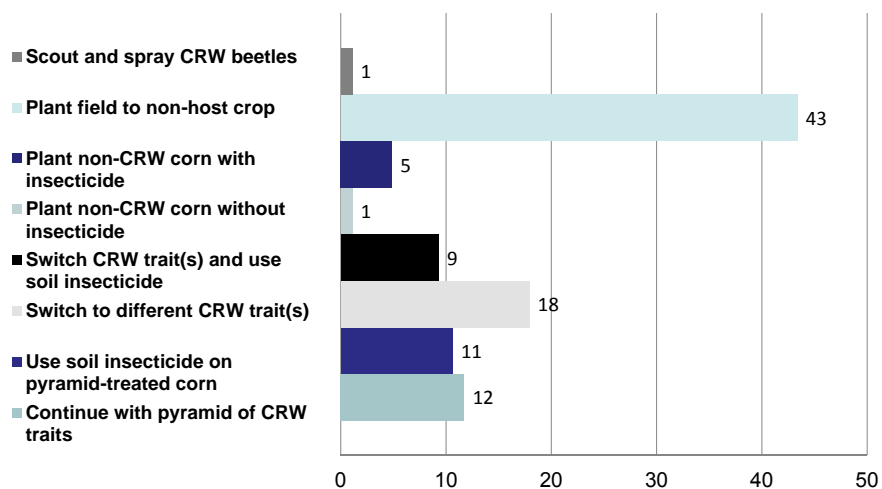
## Corn Rootworm Case Study 1– 2015



- This field was corn-on-corn for the past 5 years.
- Planted the same CRW trait, VT Triple (Cry1Ab + Cry3Bb1) for three years, then switched to SmartStax (Cry3Bb1 + Cry34/35) for 2 years.
- Lodging in VT Triple was observed 3 years ago after thunderstorm. Rootworm feeding confirmed.
- No scouting for beetles done in 2014; no lodging observed last summer.
- If you were this grower, what would you do?

## What would you do (Case Study 1)?

(452 responses C and SE)



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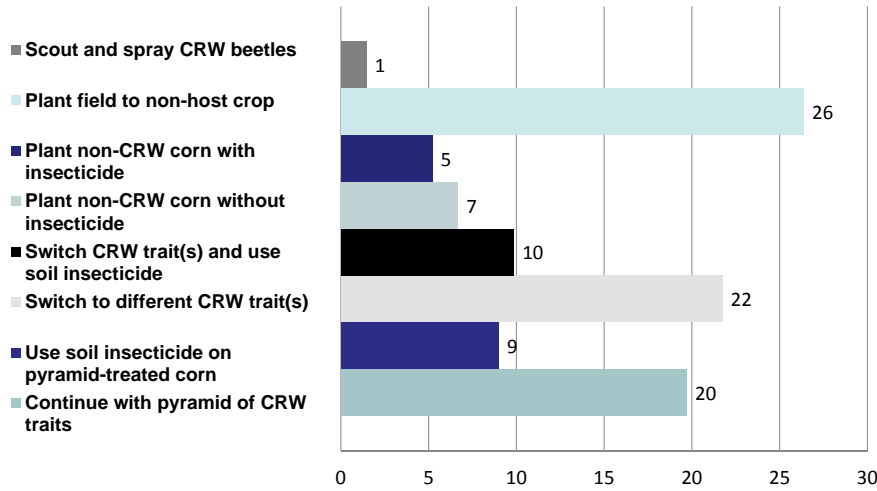
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## Corn Rootworm Case Study 2 - 2015

- This field has been in a C/SB rotation the past 20 years.
- Planted the same CRW trait for 3 crops, then switched to a pyramid-traited CRW hybrid last corn crop
- Extended diapause problems observed on farm 10 years ago.
- No scouting for beetles done in 2013; no lodging observed.
- If you were this grower, what would you do?

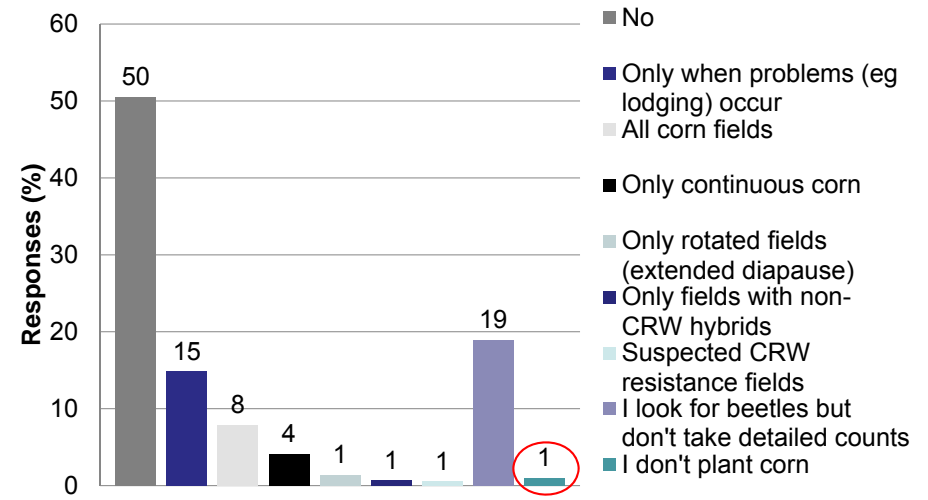
## What would you do (Case Study 2)?

(345 responses C and SE)



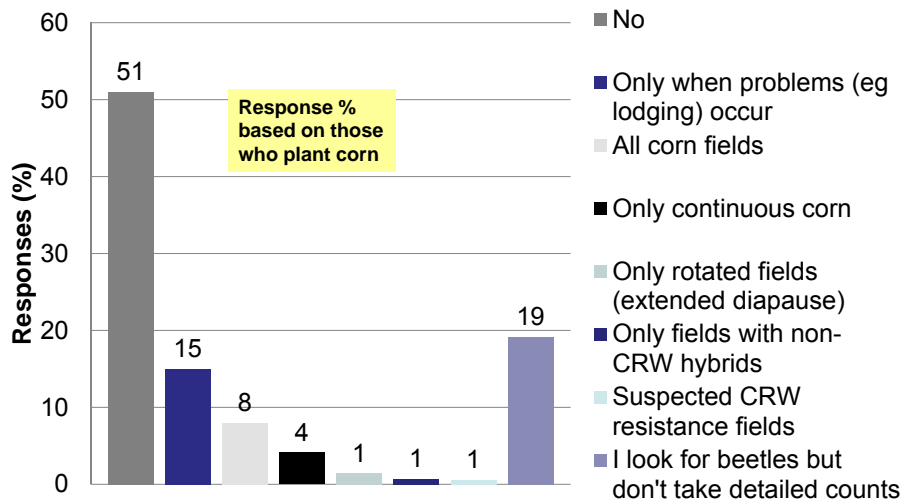
## Do you take CRW beetle counts, whole plant, or sticky trap in your corn fields?

(707 responses SW and SE)



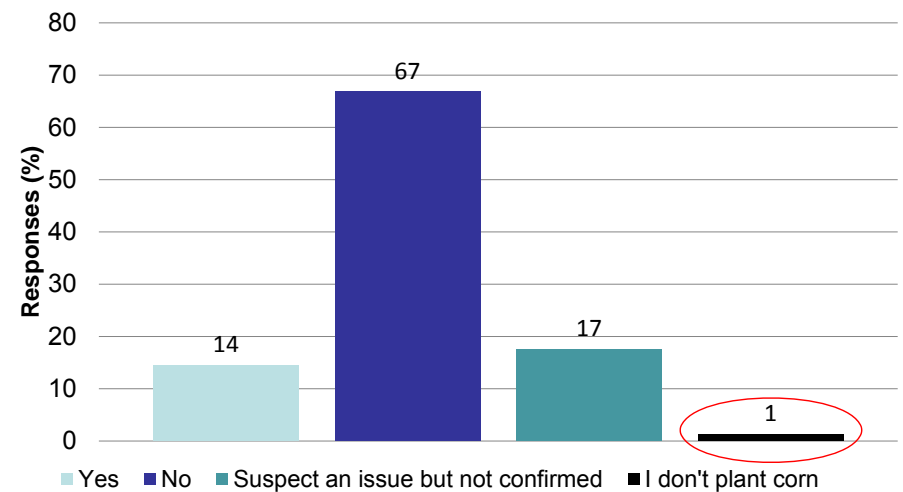
## Do you take CRW beetle counts, whole plant, or sticky trap in your corn fields?

(700 responses SW and SE)



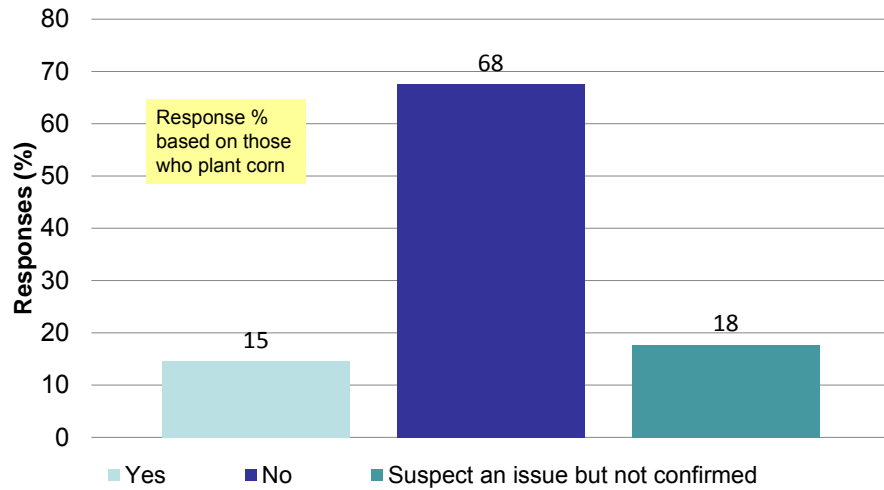
## Has a CRW performance issue been confirmed on your farm?

(1183 responses SW, C, and SE)



## Has a CRW performance issue been confirmed on your farm?

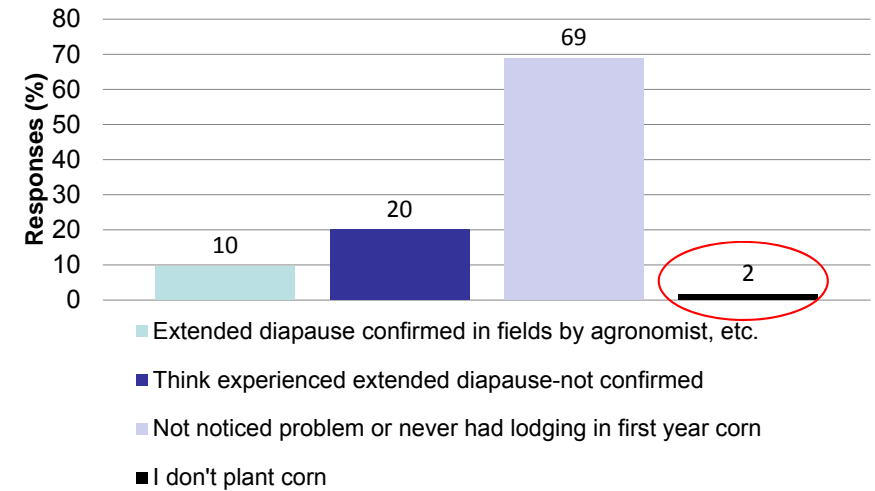
(1168 responses SW, C, and SE)



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## Regarding extended diapause of northern CRW

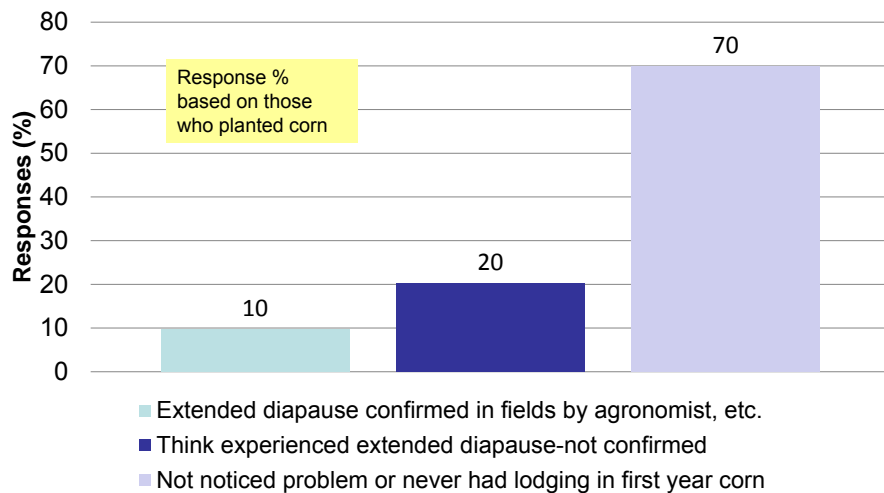
(490 responses SW, C, and SE)



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## Regarding extended diapause of northern CRW

(482 responses SW, C, and SE)



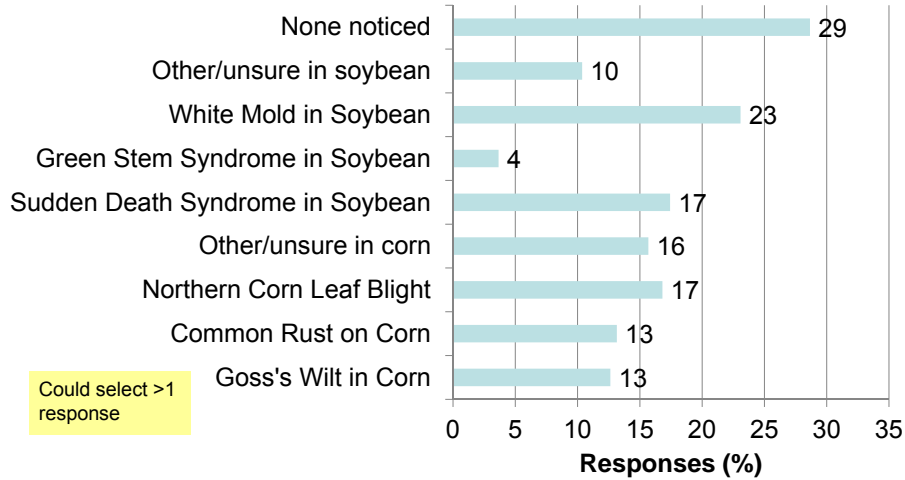
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## Section 4 Disease Management



## Which diseases did you see in your fields this year?

(1624 responses SW, C, and SE)



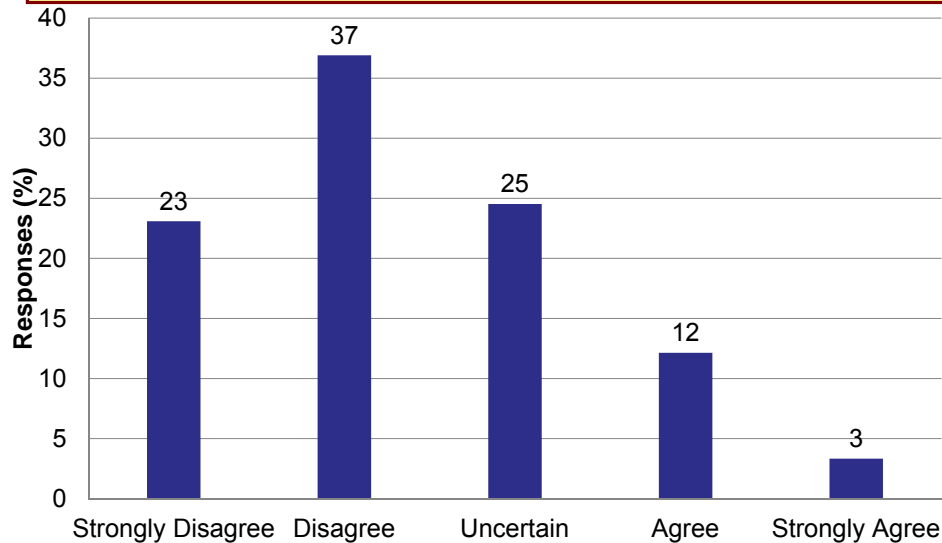
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## Section 5 Other Topics & General IPM



## Pest resistance is not a major concern because new technologies will be developed to manage them.

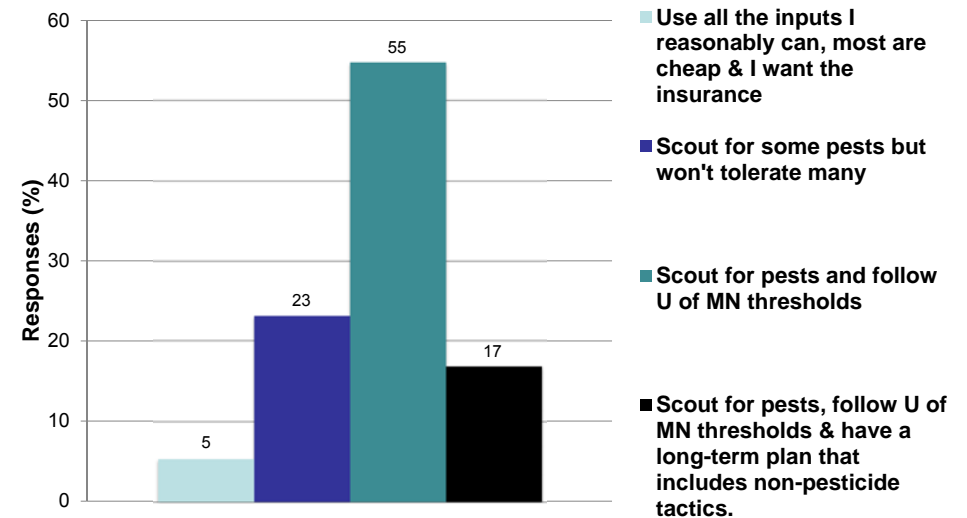
(420 responses SE)



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## For Pest Management I...

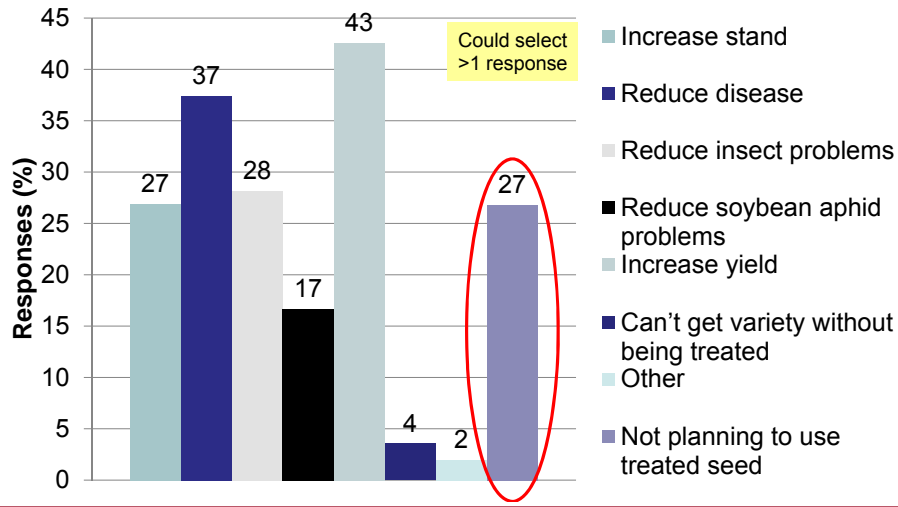
(489 responses SW, C, and SE)



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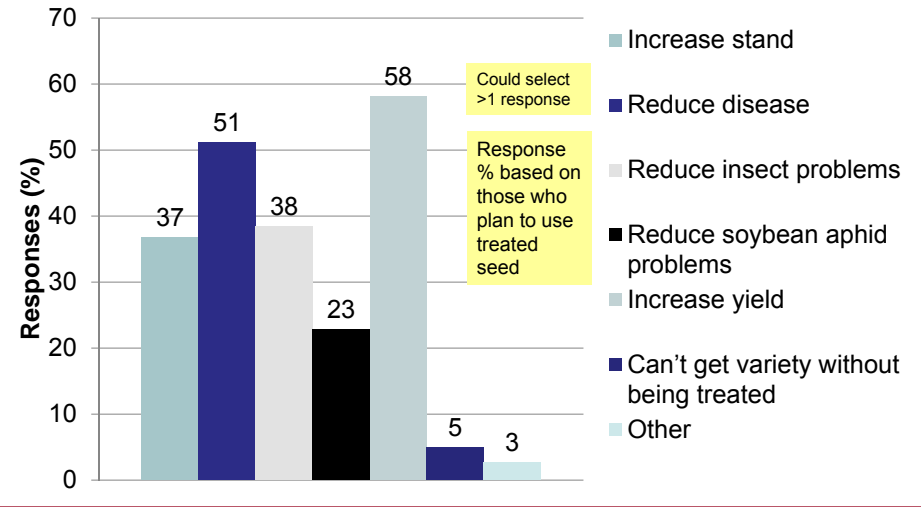
## If you plan to use seed treatments on soybeans this year, why do you plan to do so?

(1283 responses SW, C, and SE)



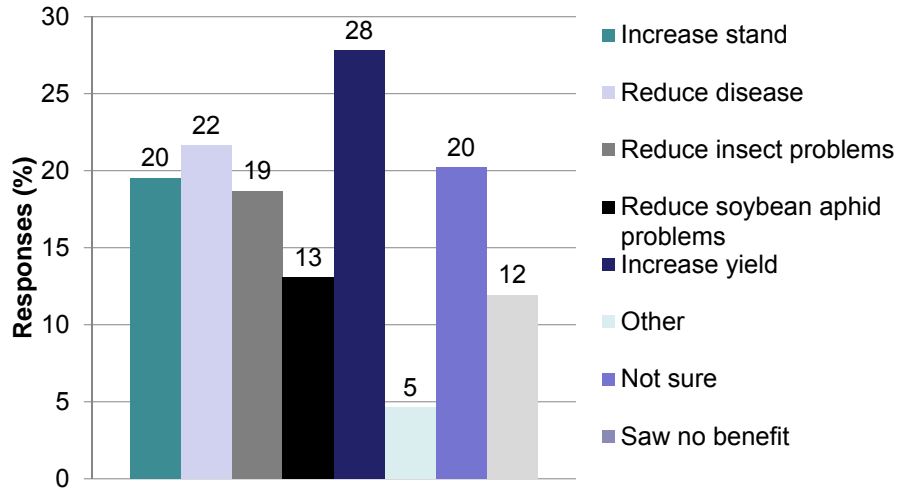
## If you plan to use seed treatments on soybeans this year, why do you plan to do so?

(939 responses SW, C, and SE)



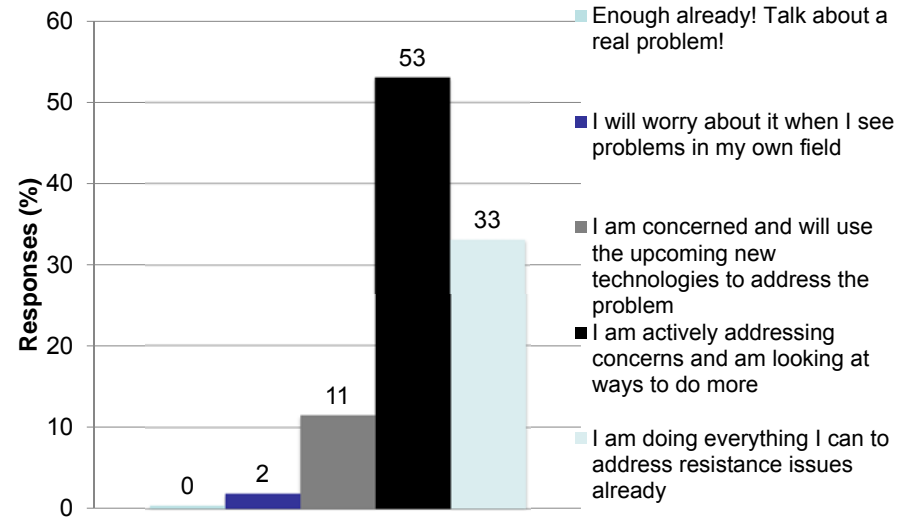
## If you used seed treatments on soybeans last year, what benefits did they provide?

(712 responses C and SE)



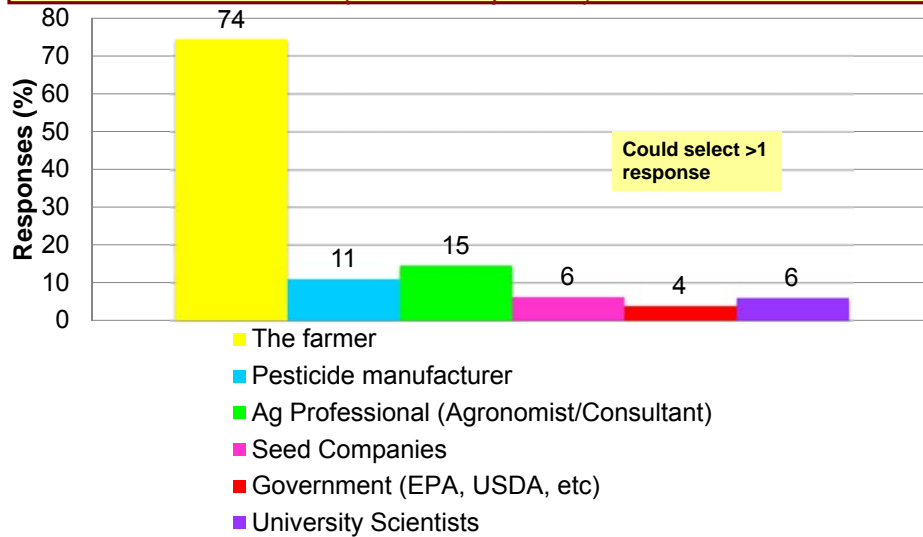
## Regarding "Resistance" ...

(531 responses SW and SE)



## Whose responsibility is it to prevent/ mitigate pest resistance? (select all that apply)

(418 SE responses)



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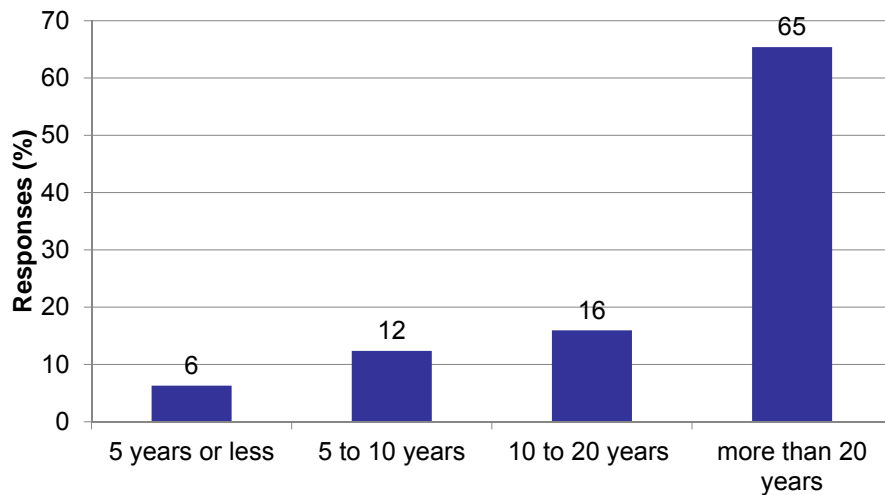
## Section 6 Pesticide Safety



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## How many years have you been applying pesticides?

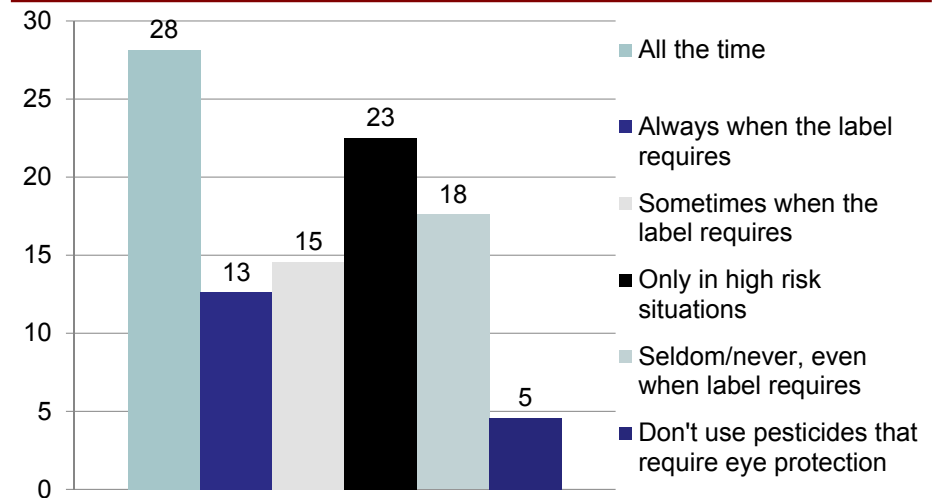
(445 responses C and SE)



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## How often do you wear eye protection when using or handling pesticides?

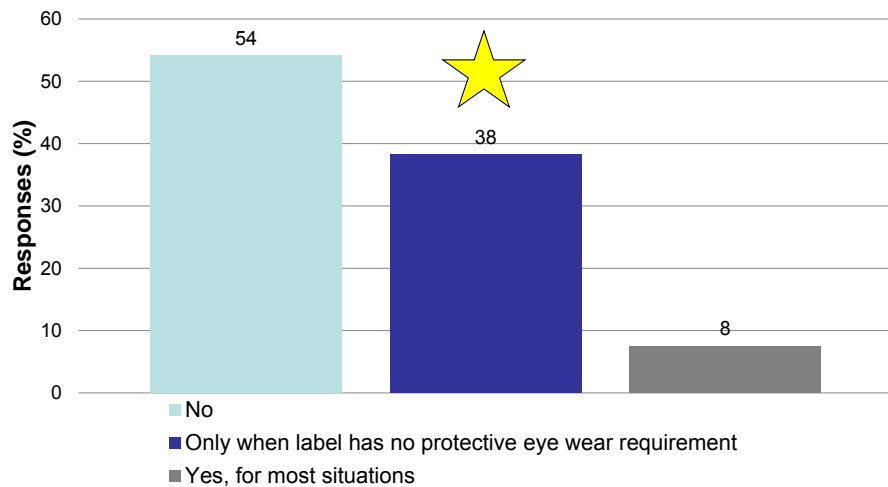
(1244 responses SW, C and SE)



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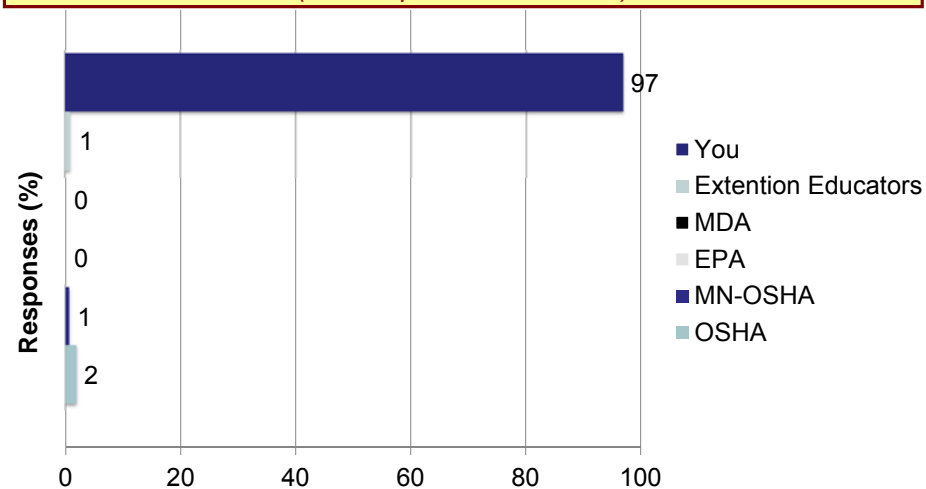
## Are regular glasses ever acceptable eye protection when handling pesticides?

(345 responses C and SE)



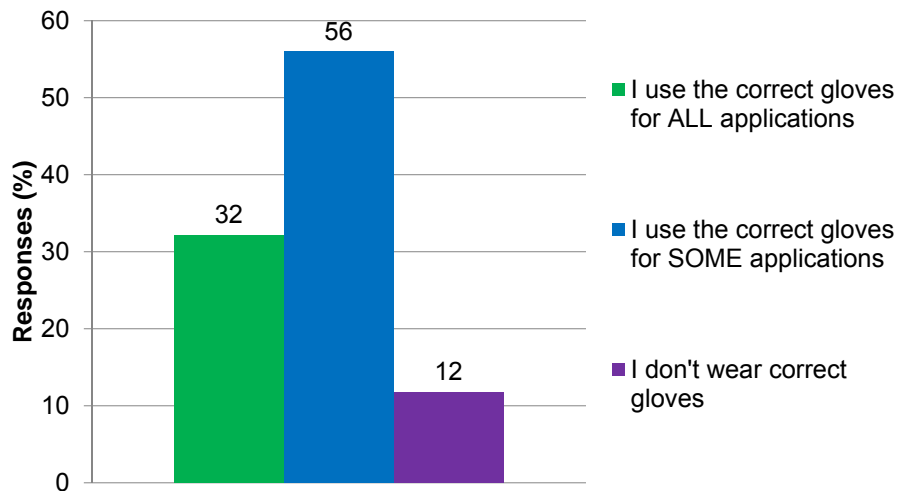
## Who should care most about your eyes?

(344 responses C and SE)



## Do you wear the correct safety gloves when making pesticide applications?

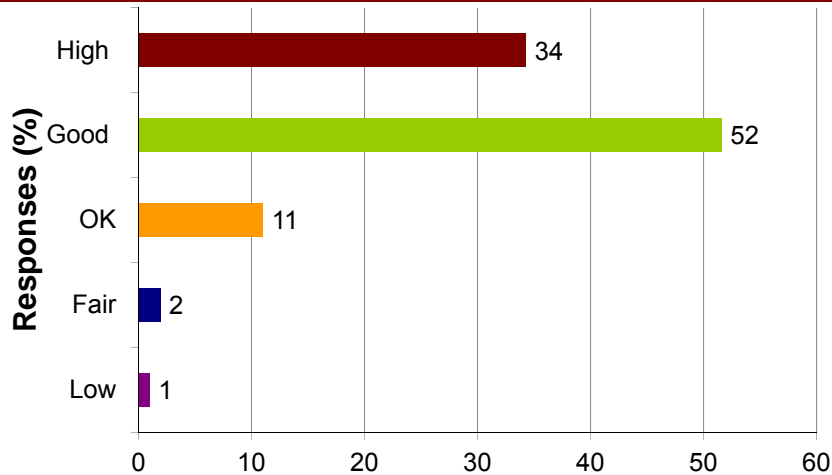
(407 responses SE)



## Section 7 Evaluation

## How would you rate the overall value of this workshop for the work that you do?

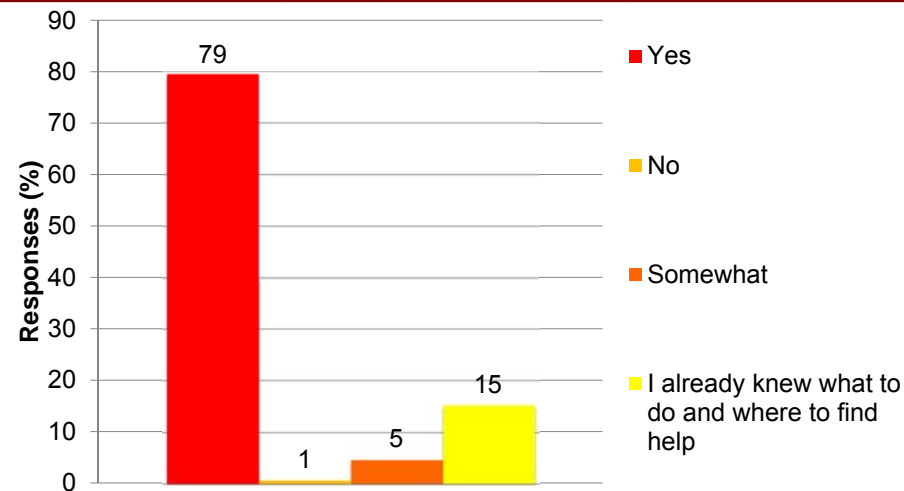
(1375 responses in SE, C, and SE)



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## As a result of today's workshop, I know the steps I need to take and resources available if I should have a pesticide spill:

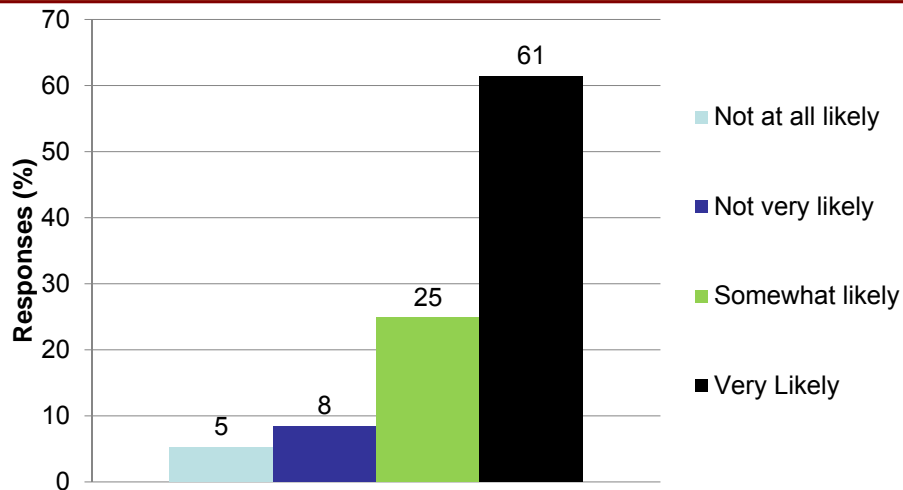
(884 responses SW, C and SE)



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## As a result of today's workshop, I am likely to continue or increase use of crop rotation for corn rootworm management.

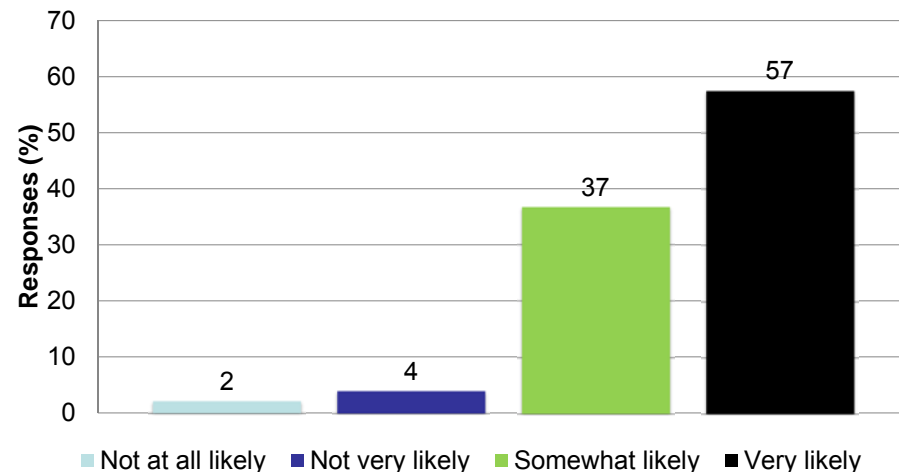
(876 responses SW, C, and SE)



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## As a result of today's workshop, I am likely to monitor pests and base treatment on threshold levels:

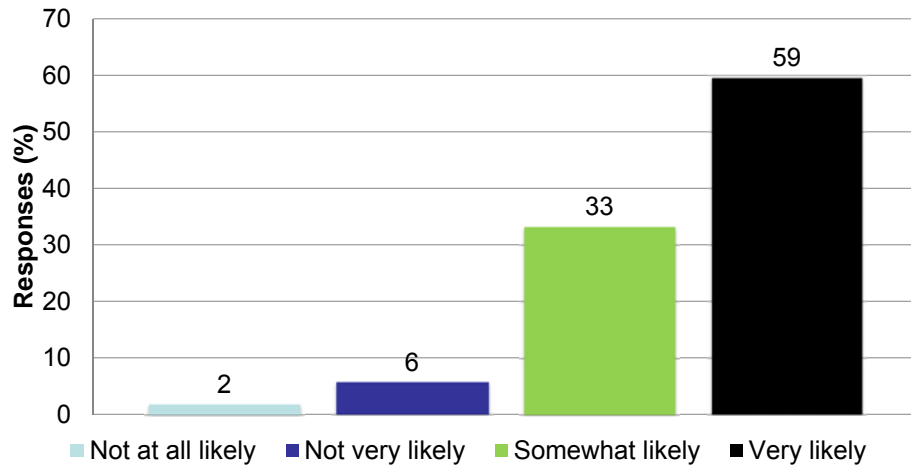
(884 responses SW, C, and SE)



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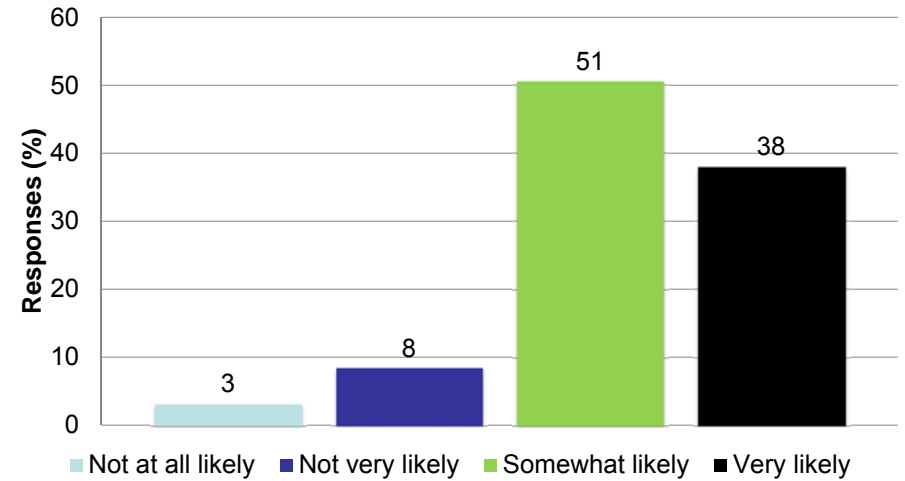
**As a result of today's workshop, I am likely to wear chemical resistant gloves when handling treated seed:**

*(874 responses SW, C, and SE)*



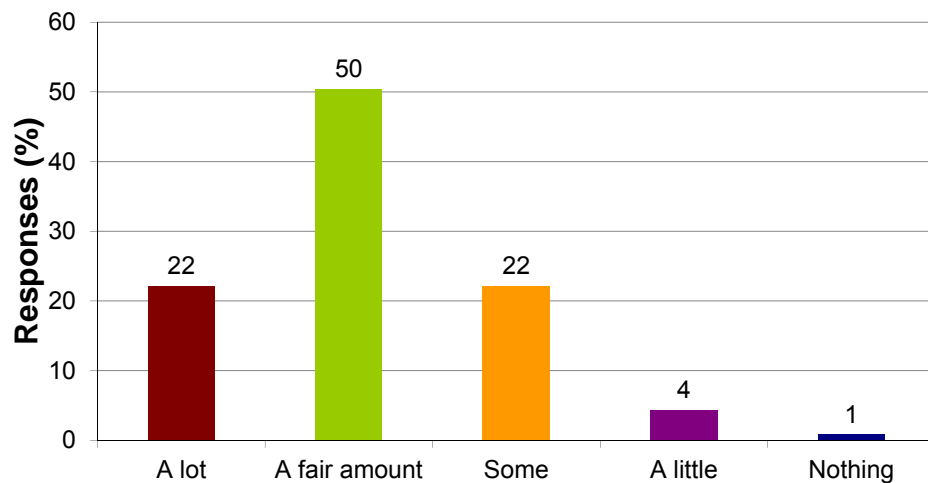
**As a result of today's workshop, I am more likely to utilize U of M research-based information in pest management decisions:**

*(896 responses SW, C, and SE)*



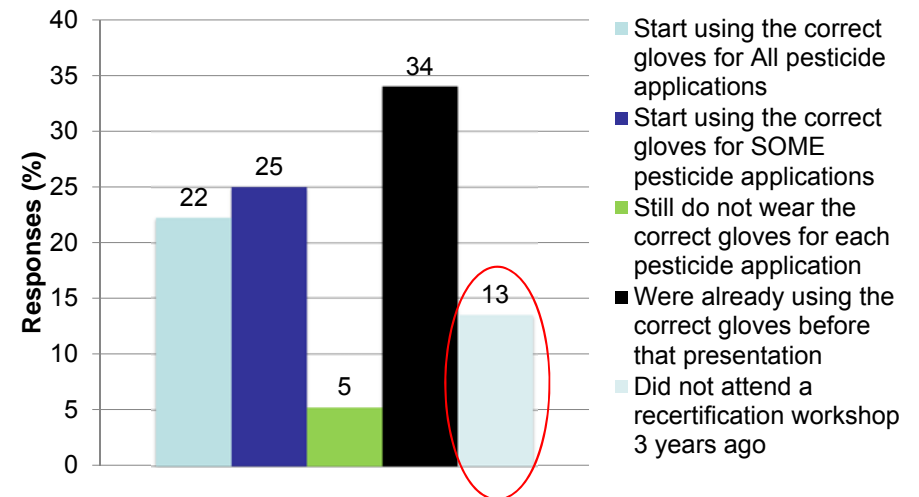
**How much did you learn at this workshop?**

*(460 responses SE)*



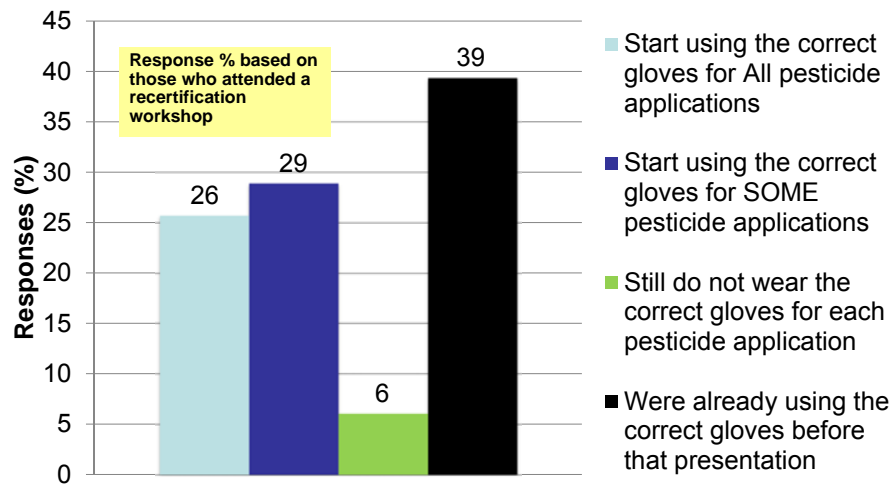
**Based on information in the Personal Protective Equipment (PPDE) presentation on Gloves that was given at the Private Pesticides Applicator recertification workshops three years ago did you...?**

*(764 responses SW and C)*



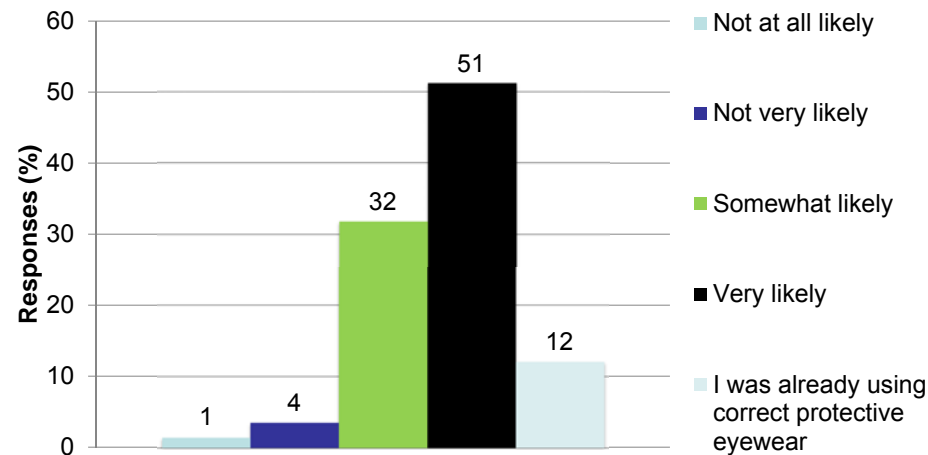
**Based on information in the Personal Protective Equipment (PPDE) presentation on Gloves that was given at the Private Pesticides Applicator recertification workshops three years ago did you...?**

(661 responses SW and C)



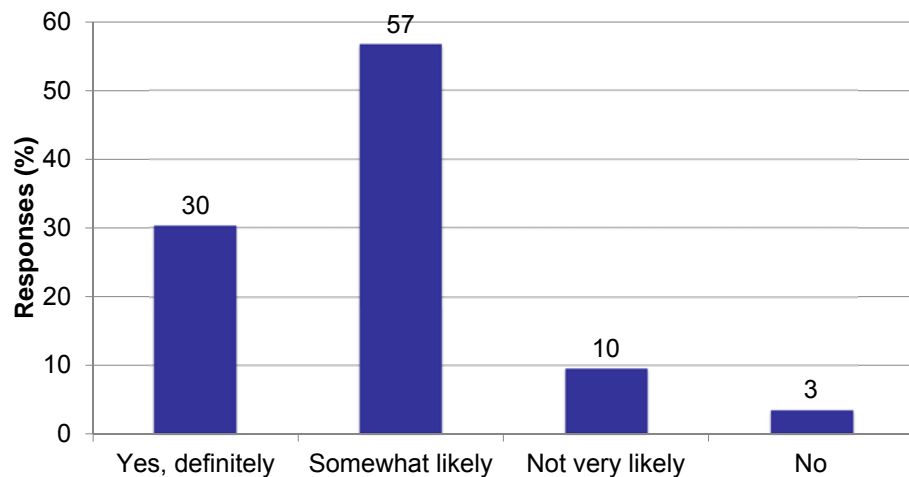
**As a result of today's workshop, how likely are you to MAKE CHANGES in the use of correct protective eyewear when handling pesticides?**

(1252 responses SW, C and SE)



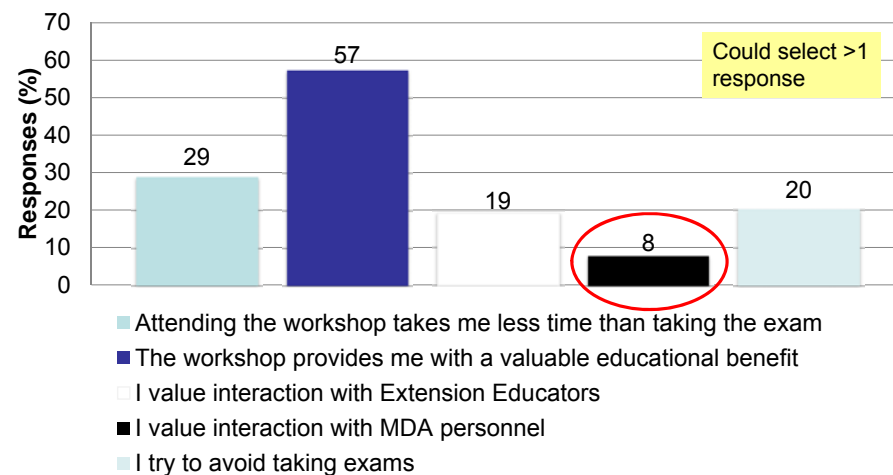
**As a result of today's workshop, will you MAKE CHANGES to your farming operation?**

(462 responses SE)



**Which of the following possible reasons were important in YOUR decision to attend today?**

(979 responses SW, C, and SE)



## Which of the following possible reasons were important in YOUR decision to attend today?

(417 responses SE)

