

**Effect of planting date and preemergence herbicides on giant ragweed control in soybeans at Rosemount, MN - 2016.** Gunsolus, Jeffrey L, Douglas W. Miller, Bradley D. Kinkaid, Rafael Pedroso da Silva, and Maria Karis. The primary objective of this experiment was to evaluate the effect of soybean planting date on giant ragweed populations. A secondary objective was to evaluate giant ragweed control with several preemergence herbicides. In addition to giant ragweed, other weed species were also evaluated. The experiment was conducted at Rosemount, MN on a Waukegon silt loam soil with pH 6.0 and 3.9% organic matter. Soil test P and K were 16 and 174 lbs/A respectively. Following weedy fallow, the experimental area was chisel plowed in fall 2015. On April 11, 2016, the area was field cultivated, fertilized with 60 lbs/A P and 60 lbs/A K, and field cultivated a second time.

The experimental design was a split plot with four replications. Two planting dates comprised whole plots and six herbicide treatments plus a weedy check the sub plots. Sub plot size was 10 by 35 feet. The first planting date (PD1) occurred on May 5. The area was field cultivated and planted with Viking 1909R2N soybeans. The second planting date (PD2) occurred on June 2 with Viking 1776R2N soybeans. Due to the size of existing weeds at PD2, the area was flail mowed and field cultivated twice on June 1 to prepare the seed bed. At both planting dates, soybeans were seeded in 30 inch rows at a rate of 150,000 seeds/A. After each planting, preemergence herbicide treatments were applied with a tractor mounted, compressed air sprayer with an eight nozzle boom, 15 inch nozzle spacing, 110015VS XR Teejet flat-fan nozzles at 35 psi pressure producing a spray volume of 15 gpa.

Prior to tillage and planting on May 5, weed populations were determined from three random 0.25 m<sup>2</sup> areas in each replication of PD1 whole plots (data presented below). In addition, three 0.25 m<sup>2</sup> areas were established in each replication of PD2 whole plots. Giant ragweed populations were counted in these areas on May 5 and weekly up until June 1 when the area was prepared for PD2. All weed species present in the PD2 areas were counted on June 1 (data presented below).

One week after each planting date, two 0.25 m<sup>2</sup> areas were established in each subplot to monitor weed emergence. Emerged weeds were counted weekly for five weeks following each planting date. In addition the these counts, at the fifth week following planting, all giant ragweed plants between the two center rows of soybeans (2.5 ft x 35 feet) were counted to provide a more accurate estimate of total population. All treatments were also visually rated for overall weed control.

No postemergence broadleaf control treatments were applied. Due to high giant ragweed densities in PD1, no soybeans were harvested for yield. Preemergence application data are listed below. Data are presented in the figure and Tables.

<b>Treatment Date</b>	<b>May 5</b>	<b>June 2</b>
Application	Planting Date #1 (PD1)	Planting Date #2 (PD2)
Air Temperature (°F)	72	67
Relative humidity (%)	21	48
Dewpoint (°F)	31	47
Soil Moisture	dry to 1.0"	dry to 1.0"
Soil Temperature (°F)	68	66
Sky	clear	40% clouds
Wind (mph)	SW 6-8	WNW 2-6
Rainfall before Application		
Week 2 (inch)	0.51	0.46
Week 1 (inch)	0.59	1.03
Rainfall after Application		
Week 1 (inch)	1.12*	1.65**
Week 2 (inch)	0.20	1.45
	* 0.9" on May 9	0.25" on June 3 1.40" on June 8/9

**Weed species densities prior to tillage and planting (#/m<sup>2</sup>)**

Giant Ragweed (Girw)	77	135
Common Lambsquarters (Colq)	2	134
Common Ragweed (Corw)	5	46
Eastern Black Nightshade (Ebns)	2	6
Pennsylvania Smartweed (Pesw)	1	75
Amaranth species (Amass)	0	3
Woolly Cupgrass (Wocg)	4	13
Giant/Yellow Foxtail (Fxt)	2	4

## **Results**

Giant ragweed control was assessed by plant density counts and visual control ratings (which took into account density plus growth reduction and necrosis/chlorosis). Due to population variability, whole plot counts were a better indicator of giant ragweed densities than the counts from the smaller sample areas. Planting date was a significant factor influencing giant ragweed control. Average density of emerged giant ragweed at the time of tillage for PD1 (May 5) was 77/m<sup>2</sup>. This represented about 57% of the total amount emerged (135/m<sup>2</sup>) by PD2 (Figure 1). Emergence data are presented in Table 1 for the five weeks following each planting date. After PD1, significant numbers of giant ragweed continued to emerge totaling 28/m<sup>2</sup> 5 weeks after planting (WAP) based on whole plot counts in the weedy check. In contrast, only 1.1/m<sup>2</sup> had emerged at 5 WAP based on whole plot counts in the weedy check for PD2. Giant ragweed size on June 1 ranged up to 22 inches. As noted in the introduction, this resulted in the need to flail mow prior to tillage. Significant regrowth of giant ragweed occurred from axillary buds of the tilled plant residue. All regrowth was hand culled and were not included in the counts or control ratings in Table 1. Control of existing plants would be an issue if using planting date as a cultural control method for giant ragweed.

Significant rainfall (0.9 inch) following PD1 occurred 4 days after application. For PD2, 0.25 inch of rain occurred the day after application, the next significant rainfall (1.4 inches) did not occur until 6 day after application. Differences between preemergence herbicide treatments were most apparent in PD1 where giant ragweed densities and growth rates were affected. Treatment differences in PD2 were only noted in the visual control ratings where growth reduction and chlorosis were the main factors as very few giant ragweed emerged after planting. Overall control ranged from fair to poor 5 WAP compared to the weedy checks at both planting dates. Based on the whole plot counts and visual control ratings from PD1 (Table 1), Zidua Pro, Surveil, and Authority First (8 oz/A) provided the best control compared to the other treatments. These three treatments also provided the greatest growth reduction in the PD2 treatments. All preemergence treatments provided a degree of growth reduction compared to the weedy check. This would have provided for a longer application window for a sequential postemergence herbicide application to control emerged plants.

Common lambsquarters, common ragweed, Pennsylvania smartweed, Eastern black nightshade and amaranth species (Powell amaranth and tall waterhemp) were the other five broadleaf species present. Emergence data and visual weed control results for these species are presented in Tables 2 to 6. Common lambsquarters populations were highest of the broadleaf species and also the most uniform. Populations of common ragweed and Pennsylvania smartweed were present throughout the experimental area but densities were very high in a localized area that increased variability in the data. Eastern black nightshade and amaranth species populations were the most variable and included localized areas with very low to no populations.

Planting date had a significant effect on common lambsquarters control. Few lambsquarters (2/m<sup>2</sup>) were emerged at the time of tillage for PD1 on May 5. Average density in the PD1 weedy check was 371/m<sup>2</sup> at 5 WAP. Prior to tillage for PD2 on June 1, common lambsquarters density was 134/m<sup>2</sup>. Final common lambsquarters density at 5 WAP in the PD2 weedy check was 105/m<sup>2</sup>.

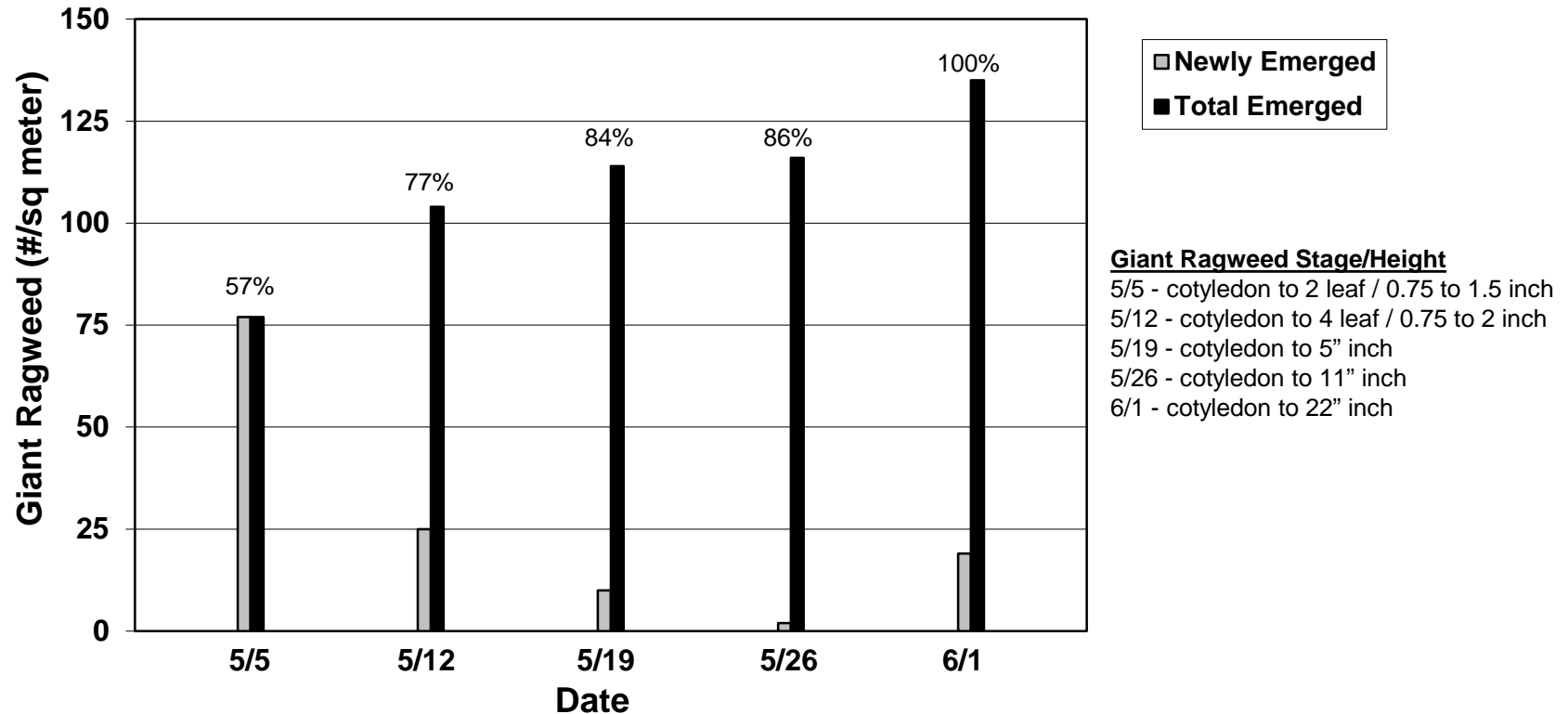
Prior to PD1 tillage on May 5, densities of emerged common ragweed and Pennsylvania smartweed were 5/m<sup>2</sup> and 1/m<sup>2</sup>, respectively. Prior to PD2 tillage on June 1, densities had increased to 46/m<sup>2</sup> for common ragweed and 75/m<sup>2</sup> for Pennsylvania smartweed. Average densities of these two species prior to PD2 tillage were skewed higher due to a few sample areas having much higher densities than most. Despite the high numbers of emerged common ragweed and Pennsylvania smartweed prior to tillage in the PD2 plots compared to the PD1 plots, planting date did not have a significant effect on total densities in the weedy checks of these species at 5 WAP. Eastern black nightshade and the amaranth species generally emerged later than the other species. However, due to the high population variability, final densities in the weedy checks at 5 WAP did not differ significantly between the two planting dates.

Preemergence herbicide treatments generally resulted in good to excellent control of these five broadleaf species and in most cases, did not differ significantly. Fierce showed lower common ragweed control than the other treatments at PD1 based on visual ratings (Table 3). Pennsylvania smartweed visual control ratings for Authority First (8 oz) at PD1 and PD2 and Fierce at PD2 were lower than the other herbicide treatments (Table 5), but in each case, one of the four replications had a very low rating compared to the other three replications, which skewed the results. This was also the case for nightshade control with Authority First (6.4 oz) at PD1 (Table 4).

Grass species were not of specific interest and several of the herbicide treatments did not target grass species. However, data are presented in Tables 7 and 8 to show emergence patterns. Species present included giant and yellow foxtail and woolly cupgrass. Grass populations were generally light over the experimental area except for an area the included replication 1 from PD1 and replication 2 of PD2, where populations were extremely heavy. Grass species were treated with clethodim in PD2 prior to the 5 WAP ratings to facilitate counts of the broadleaf species.

# Figure 1.

## Giant Ragweed Emergence Prior to Planting Date #2



Average Total Density on June 1 = 135/sq meter

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Table 1. Giant ragweed emergence and control.

Treatment	Rate	Planting Date #1 (May 5, 2016)							Planting Date #2 (June 2, 2016)						
		Counts from sample area <sup>1</sup>					Whole Plot Count <sup>2</sup>	Visual Control	Counts from sample area <sup>1</sup>					Whole Plot Count <sup>2</sup>	Visual Control
		1 WAP	2 WAP	3 WAP	4 WAP	5 WAP			1 WAP	2 WAP	3 WAP	4 WAP	5 WAP		
(product/A)	5/12	5/19	5/26	6/1	6/8	6/8	6/8	6/8	6/8	6/16	6/23	6/29	7/7	7/7	7/13
		----- (# emerged / m <sup>2</sup> ) -----							----- (# emerged / m <sup>2</sup> ) -----						
Authority First <sup>3</sup>	8 oz	2 a	14 a	23 a	25 a	21 bc	16 bcd	78 a	0 a	2.0 a	0.5 a	0.5 a	1.0 a	0.8 a	41 abc
Authority First	6.4 oz	6 a	20 a	31 a	27 a	21 bc	23 ab	74 ab	0 a	1.0 a	1.5 a	1.5 a	2.0 a	1.4 a	35 bc
Boundary <sup>4</sup>	3 pts	6 a	18 a	26 a	28 a	28 b	21 bc	61 bc	0 a	1.5 a	1.5 a	1.5 a	1.5 a	0.7 a	33 c
Surveil <sup>5</sup>	4.2 oz	4 a	12 a	18 a	16 a	11 c	15 cd	74 ab	0 a	0.0 a	0.5 a	0.0 a	0.5 a	0.4 a	65 a
Zidua Pro <sup>6</sup>	6 oz	10 a	14 a	22 a	26 a	27 b	13 d	81 a	0 a	0.5 a	0.5 a	1.5 a	0.5 a	0.4 a	60 ab
Fierce <sup>7</sup>	3.75 oz	6 a	21 a	46 a	44 a	46 a	30 a	50 c	0 a	0.0 a	0.0 a	0.0 a	0.0 a	1.0 a	38 bc
Weedy Check	--	10 a	23 a	28 a	31 a	32 b	28 a	0 d	0 a	1.5 a	1.5 a	2.0 a	2.5 a	1.1 a	0 d
LSD (0.05)		ns	ns	ns	ns	14	7	14	ns	ns	ns	ns	ns	ns	25

<sup>1</sup> Average of two 0.25 m<sup>2</sup> sample areas per plot.

<sup>2</sup> Counts between the two center rows of soybeans and the length of the plot (2.5 ft x 35 ft).

<sup>3</sup> Authority First 70DF = 7.9% chloransulam-methyl & 62.1% sulfentrazone.

<sup>4</sup> Boundary 6.5L = 5.25 lbs/gal s-metolachlor & 1.25 lbs/gal metribuzin.

<sup>5</sup> Surveil 48WG = 12% chloransulam-methyl & 36% flumioxazin.

<sup>6</sup> Zidua Pro 4.09SC = 2.28 lbs/gal pyroxasulfone & 1.33 lbs/gal imazethapyr & 0.48 lbs/gal saflufenacil.

<sup>7</sup> Fierce 76WDG = 33.5% flumioxazin & 42.5% pyroxasulfone.

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Table 2. Common lambsquarters emergence and control.

Treatment	Rate	Planting Date #1 (May 5, 2016)					Visual Control	Planting Date #2 (June 2, 2016)					Visual Control
		Counts from sample area <sup>1</sup>						Counts from sample area <sup>1</sup>					
		1 WAP	2 WAP	3 WAP	4 WAP	5 WAP		1 WAP	2 WAP	3 WAP	4 WAP	5 WAP	
		5/12	5/19	5/26	6/1	6/8	6/8	6/8	6/16	6/23	6/29	7/7	7/13
	(product/A)	----- (# emerged / m <sup>2</sup> ) -----					(%)	----- (# emerged / m <sup>2</sup> ) -----					(%)
Authority First <sup>2</sup>	8 oz	0 a	0.0 a	1.5 b	3.5 b	2.5 b	95 a	0 a	0.0 b	0.0 b	0.0 b	0.0 b	100 a
Authority First	6.4 oz	0 a	0.0 a	0.5 b	6.5 b	3.5 b	97 a	0 a	1.0 b	0.0 b	0.5 b	0.0 b	99 a
Boundary <sup>3</sup>	3 pts	0 a	0.0 a	0.5 b	0.5 b	0.0 b	97 a	0 a	0.0 b	0.0 b	0.5 b	0.5 b	99 a
Surveil <sup>4</sup>	4.2 oz	0 a	0.0 a	2.5 b	11.5 b	5.0 b	95 a	0 a	0.5 b	0.5 b	0.5 b	1.0 b	98 a
Zidua Pro <sup>5</sup>	6 oz	0 a	0.0 a	1.5 b	0.5 b	1.5 b	100 a	0 a	1.0 b	0.0 b	0.0 b	0.0 b	98 a
Fierce <sup>6</sup>	3.75 oz	0 a	0.5 a	21 b	24 b	6.5 b	96 a	0 a	0.5 b	0.5 b	0.5 b	0.5 b	94 b
Weedy Check	--	0 a	24 a	150 a	261 a	371 a	0 b	0 a	41 a	77 a	97 a	105 a	0 c
LSD (0.05)		ns	ns	61	69	88	5	ns	10	15	18	20	3

<sup>1</sup> Average of two 0.25 m<sup>2</sup> sample areas per plot.

<sup>2</sup> Authority First 70DF = 7.9% chloransulam-methyl & 62.1% sulfentrazone.

<sup>3</sup> Boundary 6.5L = 5.25 lbs/gal s-metolachlor & 1.25 lbs/gal metribuzin.

<sup>4</sup> Surveil 48WG = 12% chloransulam-methyl & 36% flumioxazin.

<sup>5</sup> Zidua Pro 4.09SC = 2.28 lbs/gal pyroxasulfone & 1.33 lbs/gal imazethapyr & 0.48 lbs/gal saflufenacil.

<sup>6</sup> Fierce 76WDG = 33.5% flumioxazin & 42.5% pyroxasulfone.

Table 3. Common ragweed emergence and control.

Treatment	Rate	Planting Date #1 (May 5, 2016)					Visual Control	Planting Date #2 (June 2, 2016)					Visual Control
		Counts from sample area <sup>1</sup>						Counts from sample area <sup>1</sup>					
		1 WAP	2 WAP	3 WAP	4 WAP	5 WAP		1 WAP	2 WAP	3 WAP	4 WAP	5 WAP	
		5/12	5/19	5/26	6/1	6/8	6/8	6/8	6/16	6/23	6/29	7/7	7/13
	(product/A)	----- (# emerged / m <sup>2</sup> ) -----					(%)	----- (# emerged / m <sup>2</sup> ) -----					(%)
Authority First <sup>2</sup>	8 oz	0 a	3.0 a	3.5 a	1.5 a	0.5 b	90 a	0 a	0.0 a	0.5 b	0.0 b	0.0 b	89 ab
Authority First	6.4 oz	0 a	0.5 a	1.0 a	1.5 a	0.0 b	81 ab	0 a	0.5 a	0.0 b	0.0 b	0.0 b	89 ab
Boundary <sup>3</sup>	3 pts	0 a	3.0 a	2.0 a	1.0 a	0.5 b	88 ab	0 a	1.0 a	0.5 b	0.5 b	0.0 b	89 ab
Surveil <sup>4</sup>	4.2 oz	0 a	0.5 a	1.0 a	0.0 a	0.0 b	95 a	0 a	0.5 a	0.0 b	0.0 b	0.0 b	100 a
Zidua Pro <sup>5</sup>	6 oz	0 a	1.0 a	3.5 a	2.5 a	1.5 b	91 a	0 a	0.0 a	0.0 b	0.0 b	0.0 b	82 b
Fierce <sup>6</sup>	3.75 oz	0 a	3.0 a	4.0 a	2.5 a	3.0 ab	68 b	0 a	1.0 a	0.0 b	0.0 b	0.0 b	91 ab
Weedy Check	--	0 a	3.5 a	6.5 a	6.5 a	6.0 a	0 c	0 a	0.5 a	4.0 a	5.0 a	5.0 a	0 c
LSD (0.05)		ns	ns	ns	ns	3.2	22	ns	ns	2.2	1.6	1.5	17

<sup>1</sup> Average of two 0.25 m<sup>2</sup> sample areas per plot.

<sup>2</sup> Authority First 70DF = 7.9% chloransulam-methyl & 62.1% sulfentrazone.

<sup>3</sup> Boundary 6.5L = 5.25 lbs/gal s-metolachlor & 1.25 lbs/gal metribuzin.

<sup>4</sup> Surveil 48WG = 12% chloransulam-methyl & 36% flumioxazin.

<sup>5</sup> Zidua Pro 4.09SC = 2.28 lbs/gal pyroxasulfone & 1.33 lbs/gal imazethapyr & 0.48 lbs/gal saflufenacil.

<sup>6</sup> Fierce 76WDG = 33.5% flumioxazin & 42.5% pyroxasulfone.

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Table 4. Eastern black nightshade emergence and control.

Treatment	Rate (product/A)	Planting Date #1 (May 5, 2016)					Visual Control 6/8 (%)	Planting Date #2 (June 2, 2016)					Visual Control 7/13 (%)
		Counts from sample area <sup>1</sup>						Counts from sample area <sup>1</sup>					
		1 WAP 5/12	2 WAP 5/19	3 WAP 5/26	4 WAP 6/1	5 WAP 6/8		1 WAP 6/8	2 WAP 6/16	3 WAP 6/23	4 WAP 6/29	5 WAP 7/7	
		----- (# emerged / m <sup>2</sup> ) -----						----- (# emerged / m <sup>2</sup> ) -----					
Authority First <sup>2</sup>	8 oz	0 a	0.0 a	1.0 b	0.5 b	0.5 b	90 ab	0 a	0.0 a	0.5 b	0.0 b	1.0 a	98 a
Authority First	6.4 oz	0 a	0.0 a	2.5 ab	2.5 b	4.0 ab	80 b	0 a	0.0 a	0.0 b	1.0 b	0.0 a	99 a
Boundary <sup>3</sup>	3 pts	0 a	0.0 a	0.0 b	0.0 b	0.0 b	99 a	0 a	0.5 a	0.0 b	0.0 b	0.0 a	100 a
Surveil <sup>4</sup>	4.2 oz	0 a	0.0 a	1.5 b	0.0 b	0.5 b	100 a	0 a	0.0 a	0.0 b	0.0 b	8.0 a	97 a
Zidua Pro <sup>5</sup>	6 oz	0 a	0.0 a	0.0 b	0.0 b	0.0 b	100 a	0 a	0.0 a	0.0 b	0.0 b	0.0 a	100 a
Fierce <sup>6</sup>	3.75 oz	0 a	0.0 a	0 b	0 b	0.5 b	100 a	0 a	0.0 a	0.0 b	0.0 b	0.0 a	100 a
Weedy Check	--	0 a	0 a	6 a	9 a	9 a	0 c	0 a	13 a	15 a	22 a	22 a	0 b
LSD (0.05)		ns	ns	3.5	5.0	4.8	14	ns	ns	10	14	ns	4

<sup>1</sup> Average of two 0.25 m<sup>2</sup> sample areas per plot.

<sup>2</sup> Authority First 70DF = 7.9% chloransulam-methyl & 62.1% sulfentrazone.

<sup>3</sup> Boundary 6.5L = 5.25 lbs/gal s-metolachlor & 1.25 lbs/gal metribuzin.

<sup>4</sup> Surveil 48WG = 12% chloransulam-methyl & 36% flumioxazin.

<sup>5</sup> Zidua Pro 4.09SC = 2.28 lbs/gal pyroxasulfone & 1.33 lbs/gal imazethapyr & 0.48 lbs/gal saflufenacil.

<sup>6</sup> Fierce 76WDG = 33.5% flumioxazin & 42.5% pyroxasulfone.

Table 5. Pennsylvania smartweed emergence and control.

Treatment	Rate (product/A)	Planting Date #1 (May 5, 2016)					Visual Control 6/8 (%)	Planting Date #2 (June 2, 2016)					Visual Control 7/13 (%)
		Counts from sample area <sup>1</sup>						Counts from sample area <sup>1</sup>					
		1 WAP 5/12	2 WAP 5/19	3 WAP 5/26	4 WAP 6/1	5 WAP 6/8		1 WAP 6/8	2 WAP 6/16	3 WAP 6/23	4 WAP 6/29	5 WAP 7/7	
		----- (# emerged / m <sup>2</sup> ) -----						----- (# emerged / m <sup>2</sup> ) -----					
Authority First <sup>2</sup>	8 oz	0 a	0.0 a	2.5 bc	2.0 bc	3.0 b	81 b	0 a	2.5 b	0.0 b	0.0 b	0.0 b	78 ab
Authority First	6.4 oz	0 a	0.0 a	1.5 bc	1.0 bc	1.5 b	95 a	0 a	1.0 b	2.0 b	0.0 b	0.5 b	94 ab
Boundary <sup>3</sup>	3 pts	0 a	0.0 a	0.5 c	0.0 c	0.5 b	95 a	0 a	0.0 b	0.0 b	0.0 b	0.0 b	100 a
Surveil <sup>4</sup>	4.2 oz	0 a	0.0 a	2.0 bc	1.5 bc	1.5 b	95 a	0 a	0.0 b	0.0 b	0.0 b	0.5 b	95 ab
Zidua Pro <sup>5</sup>	6 oz	0 a	0.5 a	0.5 c	0.5 bc	0.0 b	100 a	0 a	0.5 b	0.0 b	0.0 b	0.0 b	100 a
Fierce <sup>6</sup>	3.75 oz	0 a	0.0 a	3.5 b	4.0 b	1.0 b	95 a	0 a	1.5 b	0.0 b	0.0 b	0.0 b	75 b
Weedy Check	--	0 a	1.0 a	7.5 a	9.0 a	17.5 a	0 c	0 a	17.0 a	17.5 a	17.5 a	19.5 a	0 c
LSD (0.05)		ns	ns	2.8	5.6	4.7	12	ns	9	8.4	9.1	11	24

<sup>1</sup> Average of two 0.25 m<sup>2</sup> sample areas per plot.

<sup>2</sup> Authority First 70DF = 7.9% chloransulam-methyl & 62.1% sulfentrazone.

<sup>3</sup> Boundary 6.5L = 5.25 lbs/gal s-metolachlor & 1.25 lbs/gal metribuzin.

<sup>4</sup> Surveil 48WG = 12% chloransulam-methyl & 36% flumioxazin.

<sup>5</sup> Zidua Pro 4.09SC = 2.28 lbs/gal pyroxasulfone & 1.33 lbs/gal imazethapyr & 0.48 lbs/gal saflufenacil.

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Table 6. Amaranth species emergence and control.

Treatment	Rate (product/A)	Planting Date #1 (May 5, 2016)					Visual Control 6/8	Planting Date #2 (June 2, 2016)					Visual Control 7/13
		Counts from sample area <sup>1</sup>						Counts from sample area <sup>1</sup>					
		1 WAP 5/12	2 WAP 5/19	3 WAP 5/26	4 WAP 6/1	5 WAP 6/8		1 WAP 6/8	2 WAP 6/16	3 WAP 6/23	4 WAP 6/29	5 WAP 7/7	
		----- (# emerged / m <sup>2</sup> ) -----					(%)	----- (# emerged / m <sup>2</sup> ) -----					(%)
Authority First <sup>2</sup>	8 oz	0 a	0.0 a	0.5 a	0.0 a	0.5 b	93 a	0 a	0.0 a	0.0 a	0.5 b	0.0 a	96 b
Authority First	6.4 oz	0 a	0.0 a	0.5 a	1.5 a	0.5 b	96 a	0 a	0.0 a	0.0 a	0.0 b	0.0 a	98 ab
Boundary <sup>3</sup>	3 pts	0 a	0.0 a	1.0 a	0.0 a	0.5 b	100 a	0 a	0.0 a	0.0 a	0.0 b	0.0 a	100 a
Surveil <sup>4</sup>	4.2 oz	0 a	0.0 a	1.0 a	0.0 a	0.0 b	100 a	0 a	0.0 a	0.0 a	0.0 b	3.5 a	98 ab
Zidua Pro <sup>5</sup>	6 oz	0 a	0.0 a	0.0 a	0.0 a	2.0 b	98 a	0 a	0.0 a	0.0 a	0.0 b	0.0 a	100 a
Fierce <sup>6</sup>	3.75 oz	0 a	0.0 a	0 a	0 a	0.5 b	100 a	0 a	0.0 a	0.0 a	0.0 b	0.0 a	100 a
Weedy Check	--	0 a	0 a	2 a	5 a	15 a	0 b	0 a	1 a	13 a	11 a	11 a	0 c
LSD (0.05)		ns	ns	ns	ns	9	6	ns	ns	ns	5	ns	2

<sup>1</sup> Average of two 0.25 m<sup>2</sup> sample areas per plot.

<sup>2</sup> Authority First 70DF = 7.9% chloransulam-methyl & 62.1% sulfentrazone.

<sup>3</sup> Boundary 6.5L = 5.25 lbs/gal s-metolachlor & 1.25 lbs/gal metribuzin.

<sup>4</sup> Surveil 48WG = 12% chloransulam-methyl & 36% flumioxazin.

<sup>5</sup> Zidua Pro 4.09SC = 2.28 lbs/gal pyroxasulfone & 1.33 lbs/gal imazethapyr & 0.48 lbs/gal saflufenacil.

<sup>6</sup> Fierce 76WDG = 33.5% flumioxazin & 42.5% pyroxasulfone.

Effect of planting date and preemergence herbicides on giant ragweed control in soybeans at Rosemount, MN - 2016 (Gunsolus, Miller, Kinkaid, da Silva, and Karis).

Table 7. Foxtail species emergence and control.

Treatment	Rate (product/A)	Planting Date #1 (May 5, 2016)					Visual Control (%)	Planting Date #2 (June 2, 2016)				
		Counts from sample area <sup>1</sup>						Counts from sample area <sup>1</sup>				
		1 WAP 5/12	2 WAP 5/19	3 WAP 5/26	4 WAP 6/1	5 WAP 6/8		1 WAP 6/8	2 WAP 6/16	3 WAP 6/23	4 WAP 6/29	5 WAP 7/7
		----- (# emerged / m <sup>2</sup> ) -----						----- (# emerged / m <sup>2</sup> ) -----				
Authority First <sup>2</sup>	8 oz	0 a	1 a	8 abc	11 bc	11 bc	33 c	0 a	6 a	28 a	30 a	--
Authority First	6.4 oz	0 a	1 a	19 ab	26 ab	32 ab	30 c	0 a	10 a	30 a	36 a	--
Boundary <sup>3</sup>	3 pts	0 a	0 a	1 c	1 c	0 c	98 a	0 a	3 a	1 a	0 a	--
Surveil <sup>4</sup>	4.2 oz	0 a	0 a	19 ab	23 ab	22 abc	73 b	0 a	8 a	35 a	37 a	--
Zidua Pro <sup>5</sup>	6 oz	0 a	1 a	5 bc	8 bc	7 c	98 a	0 a	4 a	19 a	22 a	--
Fierce <sup>6</sup>	3.75 oz	0 a	2 a	6 bc	9 bc	8 c	98 a	0 a	0 a	14 a	14 a	--
Weedy Check	--	0 a	3 a	22 a	38 a	37 a	0 d	0 a	21 a	73 a	78 a	--
LSD (0.05)		ns	ns	15	21	23	24	ns	ns	ns	ns	

<sup>1</sup> Average of two 0.25 m<sup>2</sup> sample areas per plot.

<sup>2</sup> Authority First 70DF = 7.9% chloransulam-methyl & 62.1% sulfentrazone.

<sup>3</sup> Boundary 6.5L = 5.25 lbs/gal s-metolachlor & 1.25 lbs/gal metribuzin.

<sup>4</sup> Surveil 48WG = 12% chloransulam-methyl & 36% flumioxazin.

<sup>5</sup> Zidua Pro 4.09SC = 2.28 lbs/gal pyroxasulfone & 1.33 lbs/gal imazethapyr & 0.48 lbs/gal saflufenacil.

<sup>6</sup> Fierce 76WDG = 33.5% flumioxazin & 42.5% pyroxasulfone.

Table 8. Woolly cupgrass emergence and control.

Treatment	Rate (product/A)	Planting Date #1 (May 5, 2016)					Visual Control (%)	Planting Date #2 (June 2, 2016)				
		Counts from sample area <sup>1</sup>						Counts from sample area <sup>1</sup>				
		1 WAP 5/12	2 WAP 5/19	3 WAP 5/26	4 WAP 6/1	5 WAP 6/8		1 WAP 6/8	2 WAP 6/16	3 WAP 6/23	4 WAP 6/29	5 WAP 7/7
		----- (# emerged / m <sup>2</sup> ) -----						----- (# emerged / m <sup>2</sup> ) -----				
Authority First <sup>2</sup>	8 oz	0 a	1 a	3 a	3 a	4 a	33 b	0 a	5 a	49 a	55 a	--
Authority First	6.4 oz	0 a	0 a	5 a	6 a	8 a	30 b	0 a	5 a	37 a	43 a	--
Boundary <sup>3</sup>	3 pts	0 a	1 a	2 a	2 a	2 a	96 a	0 a	3 a	14 a	52 a	--
Surveil <sup>4</sup>	4.2 oz	0 a	1 a	6 a	6 a	8 a	75 a	0 a	5 a	29 a	33 a	--
Zidua Pro <sup>5</sup>	6 oz	0 a	1 a	7 a	7 a	7 a	97 a	0 a	8 a	34 a	37 a	--
Fierce <sup>6</sup>	3.75 oz	0 a	2 a	14 a	17 a	15 a	97 a	0 a	2 a	14 a	17 a	--
Weedy Check	--	0 a	4 a	9 a	11 a	13 a	0 c	0 a	4 a	33 a	41 a	--
LSD (0.05)		ns	ns	ns	ns	ns	24	ns	ns	ns	ns	

<sup>1</sup> Average of two 0.25 m<sup>2</sup> sample areas per plot.

<sup>2</sup> Authority First 70DF = 7.9% chloransulam-methyl & 62.1% sulfentrazone.

<sup>3</sup> Boundary 6.5L = 5.25 lbs/gal s-metolachlor & 1.25 lbs/gal metribuzin.

<sup>4</sup> Surveil 48WG = 12% chloransulam-methyl & 36% flumioxazin.

<sup>5</sup> Zidua Pro 4.09SC = 2.28 lbs/gal pyroxasulfone & 1.33 lbs/gal imazethapyr & 0.48 lbs/gal saflufenacil.

<sup>6</sup> Fierce 76WDG = 33.5% flumioxazin & 42.5% pyroxasulfone.