

**Weed control with preemergence herbicides in Roundup Ready soybeans at Rosemount, MN - 2014.**

Gunsolus, Jeffrey L., Douglas W. Miller, and Bradley Kinkaid. The objective of this experiment was to evaluate weed control and crop response with preemergence herbicides in a Roundup Ready soybean system. The experiment was conducted at Rosemount, MN on a Waukegon silt loam soil with pH 6.5 and 4.1% organic matter. Soil test P and K were 16 and 198 lbs/A respectively. Following weedy fallow, the experimental area was fall chisel plowed. In the spring, 60 lbs/A P and 60 lbs/A K were applied and the area was field cultivated on May 5. The area was field cultivated again on May 22 and planted with Asgrow AG 1733 (RR) soybeans at a rate of 150,000 seeds/A with 30 inch row spacing. The experimental design was a randomized complete block with four replications and plot size was 10 by 30 ft. Herbicide treatments were applied with either a tractor mounted, compressed air sprayer with an eight nozzle boom and 15 inch nozzle spacing or a CO<sub>2</sub> powered backpack sprayer with a six nozzle boom and 20 inch nozzle spacing. Both sprayers utilized 110015VS XR Teejet flat-fan nozzles at 35 psi pressure producing a spray volume of 15 gpa. Broadcast applications of Select Max were applied on June 13 (14 oz/A) and July 17 (16 oz/A) to control grass species. Plots were visually rated throughout the growing season. On October 7, giant ragweed plants with seed were counted in each plot (center 7.5 feet x 30 feet length). Soybean yields were determined by harvesting the two center rows of each plot. Application dates, environmental conditions, and weed data are presented below. Weed control data are presented in Tables 1 and 2. Soybean injury and yield data are presented in Table 2.

<b>Treatment Date</b>	<b>May 23</b>	<b>June 17</b>	<b>June 23</b>	<b>July 10</b>
Application Target	Preemergence	EPost 2 inch weeds	3-4" weeds following Preemergence	2-4" weeds following EPost Roundup Sequential
Sprayer type	Tractor	Backpack	Tractor	Tractor
Air Temperature (°F)	68	72	82	79
Relative humidity (%)	45	70	42	53
Dewpoint (°F)	45	61	57	61
Soil Moisture	dry to 1.0"	moist	dry to 0.25"	not recorded
Soil Temperature (°F)	69	73	83	not recorded
Sky	clear	10% clouds	cloudy	10% clouds
Wind (mph)	W 0-3	S 0-4	W 5-8	SE 10
Rainfall before Application				
Week 1 (inch)	1.61	2.90	3.68	0.65
Rainfall after Application				
Week 1 (inch)	0.54	3.23	0.78	1.58
Week 2 (inch)	2.44	0.85	0.20	0.02
Soybean				
Stage	--	V2 (20-25%) –V3 (75-80%)	V4 (5%)-V5 (95%)	R1
Height (inch)	--	5-6	9-11	20-22

**Average weed density (plants/ft<sup>2</sup>) in untreated check**

Common Lambsquarters – Colq	--	0.6	--	--
Common Ragweed - Corw	--	2.2	--	--
Giant Ragweed - Girw	--	0.6	--	--
Nightshade - Ebns	--	1.2	--	--
Pennsylvania Smartweed - Pesw	--	0.3	--	--
Amaranth species	--	0.4	--	--
Grass species	--	50-600	--	--

**Weed height (inches)**

Common Lambsquarters - Colq	--	0.5-1.25	0.5-2" (most 1")	0.25-1" (new)
Common Ragweed - Corw	--	1-2.5"	1-8" (most 3-5")	1-4" (old and new)
Giant Ragweed - Girw	--	3-5"	up to 10" (most 5-8")	cot-5" (new) 4-6" (old)
Nightshade - Ebns	--	0.25-1"	0.5-2" (most 1-1.25")	0.5" (new)
Pennsylvania Smartweed - Pesw	--	1-2.5"	1.5-6" (most 3-4")	none present
Amaranth species	--	0.5-2.5"	0.5-8" (most 3-5")	0.5-1.25" (new)

## Results

### General observations

With the exception of common ragweed, broadleaf weed densities were low. Pennsylvania smartweed density was the lowest and most variable. Eastern black nightshade populations were somewhat variable. Common lambsquarters populations were more evenly distributed. Amaranth species included mainly redroot pigweed and Powell amaranth with variable populations of tall waterhemp. Amaranth species were also more evenly distributed. Lambsquarters, nightshade and amaranths (in particular waterhemp) all had some mid-season germination flushes. Smartweed germinated early with no later season flushes. Common ragweed was the most evenly distributed broadleaf species. Giant ragweed was present throughout the experimental area but densities were somewhat variable. Ragweed species generally germinated early, however a few late germinators were noted at the July rating dates (mainly common ragweed). Grass species densities were very high and heavy growth flushes occurred into late July. Early populations consisted of giant and yellow foxtail and woolly cupgrass. Late germinating flushes consisted mainly of wild proso millet.

Rainfall (0.54 inches) occurred 5 days after planting to activate the preemergence treatments. Total rainfall accumulation for the month of June was 10.57 inches. Spray drift of Status herbicide from an adjacent corn production field occurred on June 26. This resulted in soybean injury to the entire experiment. Leaf cupping occurred on the upper 3 to 4 trifoliolate leaves with greatest injury on the youngest leaves. Subsequent leaf growth was normal and the crop appeared to have recovered well.

### Weed Control

Early preemergence control of lambsquarters, nightshade, smartweed, and amaranth species was excellent for all treatments with the exception of nightshade control with the 11 ounce rate of Authority MTZ on June 23 (Table 1). Residual control of these species was also excellent. Some mid-season emerging lambsquarters was present in most treatments at the July rating dates, in particular with the Valor treatments. The two pass Roundup treatment controlled all of these broadleaf species. Additional lambsquarters, nightshade and amaranths emerged after the first application but were controlled by the second application and no further emergence was observed.

Control of common ragweed was good to excellent for all preemergence treatments with the exception of the Authority MTZ treatments (Table 2) which showed poor to fair control. At the June 23 rating, common ragweed control remained high for most treatments. Control with the Valor treatment had declined to 92% by June 23. The Roundup sequential controlled the existing common ragweed, as did the Roundup in the two pass Roundup treatment. Common Ragweed present at the July 9 rating was primarily newly emerged plants. They did not provide any competition however due to soybean canopy closure.

Preemergence control of giant ragweed was good to excellent with treatments that included Gangster premix or Gangster FR. The higher rate of Fierce + Gangster FR had the best control. Giant ragweed control was poor for the Valor treatment but improved when tank mixed with Sencor. When Warrant was tank mixed with Valor, initial giant ragweed control was 80% at the June 17 rating and improved to 93% on June 23. Control with Fierce alone or Fierce + Sencor was fair. The Authority MTZ, Authority First, and Enlite treatments had poor control of giant ragweed. Roundup applied as a sequential to the preemergence treatments or in the two pass treatment did not result in complete control of all giant ragweed. Giant ragweed size in the sequential application ranged from 5 to 10 inches depending on the level of control/suppression provided by the preemergence treatment. In addition, the giant ragweed population was suspected as having some level of glyphosate resistance. While there was some treatment differences in the number of giant ragweed plants producing seed between treatments, the only significant difference was between the herbicide treated and the untreated check.

Preemergence grass control was good to excellent for all treatments except for the lower rates of Authority MTZ and Authority First. Grass was controlled by two applications of Select as the primary focus of the study was broadleaf weeds. Grasses present at the October rating had germinated after the second Select application on July 17.

### Soybean Injury and Yields

The high rate of Fierce + Gangster FR caused the greatest injury closely followed by the Valor + Warrant treatment. The other three treatments that included Fierce resulted in moderate injury. The Authority MTZ, Authority First, and two pass Roundup treatments did not result in any injury. Yields did not differ significantly between any of the herbicide treated plots but they all were higher than the untreated check.

**Weed control with preemergence herbicides in Roundup Ready soybeans at Rosemount, MN - 2014 (Gunsolus, Miller, and Kinkaid).**

**Table 1. Weed control (part 1).**

Treatment <sup>1</sup>	Rate <sup>1</sup> (product/A)	Broadleaf Weed Control																			
		Colq					Ebns					Pesw					Amaranth species				
		6/12	6/23	7/9	7/23	10/7	6/12	6/23	7/9	7/23	10/7	6/12	6/23	7/9	7/23	10/7	6/12	6/23	7/9	7/23	10/7
		----- (%) -----																			
<b><u>(Preemergence May 23) / (Postemergence June 23)</u></b>																					
(Authority MTZ <sup>2</sup> ) / (Roundup <sup>3</sup> + AMS <sup>4</sup> )	(11 oz) / (32 oz + 3 qt)	100	100	100	100	100	100	92	100	100	99	100	100	100	100	100	97	99	97	98	99
(Authority MTZ) / (Roundup + AMS)	(16 oz) / (32 oz + 3 qt)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	99	100
(Authority First <sup>5</sup> ) / (Roundup + AMS)	(3.2 oz) / (32 oz + 3 qt)	100	100	100	100	100	100	100	100	100	100	100	99	100	100	100	100	99	100	99	100
(Authority First) / (Roundup + AMS)	(6.45 oz) / (32 oz + 3 qt)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
(Valor SX <sup>6</sup> ) / (Roundup + AMS)	(2 oz) / (32 oz + 3 qt)	100	100	99	97	100	100	100	99	99	100	100	100	100	100	100	100	100	99	99	99
(Valor SX + Sencor <sup>7</sup> ) / (Roundup + AMS)	(2 oz + 4 oz) / (32 oz + 3 qt)	100	100	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	99	99	98
(Valor SX + Sencor) / (Roundup + AMS)	(3 oz + 4 oz) / (32 oz + 3 qt)	100	99	98	96	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	99
(Valor SX + Warrant <sup>8</sup> ) / (Roundup + AMS)	(2 oz + 1.25 qt) / (32 oz + 3 qt)	99	100	99	96	99	100	100	100	100	100	99	100	100	100	100	99	100	100	100	100
(Fierce <sup>9</sup> ) / (Roundup + AMS)	(3 oz) / (32 oz + 3 qt)	100	100	100	98	99	100	100	99	99	99	100	100	100	100	100	100	100	100	100	99
(Fierce + Sencor) / (Roundup + AMS)	(3 oz + 4 oz) / (32 oz + 3 qt)	100	100	100	98	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99
(Gangster V <sup>10</sup> + Gangster FR <sup>11</sup> ) / (Roundup + AMS)	(2 oz + 0.4 oz) / (32 oz + 3 qt)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	99	100
(Gangster V + Gangster FR + Sencor) / (Roundup + AMS)	(2 oz + 0.4 oz + 4 oz) / (32 oz + 3 qt)	100	100	100	99	100	100	100	100	100	100	100	100	100	100	100	100	100	99	99	99
(Fierce + Gangster FR) / (Roundup + AMS)	(3 oz + 0.3 oz) / (32 oz + 3 qt)	100	100	100	98	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	100
(Fierce + Gangster FR) / (Roundup + AMS)	(4.5 oz + 0.45 oz) / (32 oz + 3 qt)	100	100	100	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
(Enlite <sup>12</sup> ) / (Roundup + AMS)	(2.8 oz) / (32 oz + 3 qt)	100	100	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	99	99	99
<b><u>(Postemergence June 17) / (Postemergence July 10)</u></b>																					
(Roundup + AMS) / (Roundup + AMS)	(32 oz + 3 qt) / (32 oz + 3 qt)	--	100	95	100	100	--	100	97	100	100	--	100	100	100	100	--	100	89	100	100
LSD (0.05)		ns	ns	2	2	ns	ns	3	1	ns	ns	ns	ns	ns	ns	ns	ns	ns	4	ns	ns

<sup>1</sup> Treatments and rates in parenthesis represent a separate application timing.

<sup>2</sup> Authority MTZ 45WG = 18% sulfentrazone & 27% metribuzin .

<sup>3</sup> Roundup PowerMax 4.5L = glyphosate.

<sup>4</sup> AMS = N-Pak ammonium sulfate solution (3.4 lbs/gal).

<sup>5</sup> Authority First 70DF = 62% sulfentrazone & 8% chloransulam-methyl .

<sup>6</sup> Valor SX 51WDG = flumioxazin.

<sup>7</sup> Sencor 75DF = metribuzin.

<sup>8</sup> Warrant 3CS = acetochlor.

<sup>9</sup> Fierce 76WDG = 33.5% flumioxazin & 42.5% pyroxasulfone.

<sup>10</sup> Gangster V 51DF = flumioxazin (part of Gangster Co-Pack product).

<sup>11</sup> Gangster FR 84DF = chloransulam-methyl (also part of Gangster Co-Pack product).

<sup>12</sup> Enlite 47.86DG = 2.85% chlorimuron ethyl & 36.21% flumioxazin & 8.8% thifensulfuron methyl.

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**Table 2. Weed control (part 2), soybean injury, and soybean yields.**

Treatment <sup>2</sup>	Rate <sup>2</sup> (product/A)	Broadleaf Weed Control										Girw	Grass		Soybean		Soybean
		Corw					Girw					Counts <sup>1</sup>	Weed Control		Injury		Yield
		6/12	6/23	7/9	7/23	10/7	6/12	6/23	7/9	7/23	10/7	10/7	6/12	7/9	6/16	6/23	Yield
(%)										(plants/A)	(%)				(bu/A)		
<b><u>(Preemergence May 23) / (Postemergence June 23)</u></b>																	
(Authority MTZ <sup>3</sup> ) / (Roundup <sup>4</sup> + AMS <sup>5</sup> )	(11 oz) / (32 oz + 3 qt)	63	60	95	98	98	10	9	89	95	81	1607	73	89	0	1	66
(Authority MTZ) / (Roundup + AMS)	(16 oz) / (32 oz + 3 qt)	83	84	96	98	100	10	15	90	94	83	1065	96	93	0	0	69
(Authority First <sup>6</sup> ) / (Roundup + AMS)	(3.2 oz) / (32 oz + 3 qt)	99	97	100	99	100	18	39	91	92	83	1413	50	94	0	0	69
(Authority First) / (Roundup + AMS)	(6.45 oz) / (32 oz + 3 qt)	100	99	100	99	99	38	45	93	97	94	542	94	95	0	0	65
(Valor SX7) / (Roundup + AMS)	(2 oz) / (32 oz + 3 qt)	96	92	99	99	99	16	30	94	97	83	1162	91	94	5	3	65
(Valor SX + Sencor <sup>8</sup> ) / (Roundup + AMS)	(2 oz + 4 oz) / (32 oz + 3 qt)	99	95	100	99	99	57	53	93	96	84	1065	97	92	8	5	68
(Valor SX + Sencor) / (Roundup + AMS)	(3 oz + 4 oz) / (32 oz + 3 qt)	99	97	99	99	100	59	71	92	96	81	832	98	92	14	4	67
(Valor SX + Warrant <sup>9</sup> ) / (Roundup + AMS)	(2 oz + 1.25 qt) / (32 oz + 3 qt)	99	96	99	99	100	80	93	98	99	91	290	99	95	29	9	67
(Fierce <sup>10</sup> ) / (Roundup + AMS)	(3 oz) / (32 oz + 3 qt)	99	97	100	99	99	73	81	96	98	97	484	99	96	13	4	62
(Fierce + Sencor) / (Roundup + AMS)	(3 oz + 4 oz) / (32 oz + 3 qt)	99	99	100	99	99	61	75	96	97	89	445	99	94	14	4	63
(Gangster V <sup>11</sup> + Gangster FR <sup>12</sup> ) / (Roundup + AMS)	(2 oz + 0.4 oz) / (32 oz + 3 qt)	100	99	100	100	100	92	96	98	99	97	348	98	94	5	4	61
(Gangster V + Gangster FR + Sencor) / (Roundup + AMS)	(2 oz + 0.4 oz + 4 oz) / (32 oz + 3 qt)	100	100	100	99	100	92	94	97	99	99	194	98	93	6	5	61
(Fierce + Gangster FR) / (Roundup + AMS)	(3 oz + 0.3 oz) / (32 oz + 3 qt)	99	99	99	99	99	92	96	98	99	97	194	99	94	16	7	70
(Fierce + Gangster FR) / (Roundup + AMS)	(4.5 oz + 0.45 oz) / (32 oz + 3 qt)	100	100	100	100	100	99	99	99	99	98	290	98	97	36	10	64
(Enlite <sup>13</sup> ) / (Roundup + AMS)	(2.8 oz) / (32 oz + 3 qt)	99	96	99	99	99	28	35	91	95	86	1065	96	92	6	4	63
<b><u>(Postemergence June 17) / (Postemergence July 10)</u></b>																	
(Roundup + AMS) / (Roundup + AMS)	(32 oz + 3 qt) / (32 oz + 3 qt)	--	97	91	100	100	--	60	92	96	96	484	--	55	0	3	66
Untreated Check		--	--	--	--	--	--	--	--	--	--	6679	--	--	0	0	42
LSD (0.05)		12	13	4	ns	ns	27	26	5	ns	ns	1872	12	4	6	3	9

<sup>1</sup> Giant ragweed plants with seed.

<sup>2</sup> Treatments and rates in parenthesis represent a separate application timing.

<sup>3</sup> Authority MTZ 45WG = 18% sulfentrazone & 27% metribuzin .

<sup>4</sup> Roundup PowerMax 4.5L = glyphosate.

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