

Soybean Herbicide Management with MON 63410 at Rosemount, MN - 2010. Gunsolus, Jeffrey L. and Douglas W. Miller. The objective of this experiment was to evaluate crop safety and residual weed control with MON 63410 applied postemergence in one and two pass Roundup weed control systems that include preemergence products. The experiment was conducted at Rosemount, MN on a Waukegon silt loam soil with 5.4% organic matter, pH 6.1, and soil test P and K levels of 110 and 502 lb/A, respectively. Following oats, the experimental area was fall chisel plowed. In the spring, the field was disked once on May 17. On May 20, the area was field cultivated. Asgrow AG1506 soybeans were planted on May 20 at a rate of 160,000 seeds/acre with 30 inch row spacing. The experimental design was a randomized complete block with four replications and plot size was 15 by 25 ft. All herbicide treatments were applied to a center 10 ft strip with a CO₂ powered backpack sprayer utilizing a six nozzle boom with 20 inch nozzle spacing, 11002VS XR Teejet flat-fan nozzles, 35 psi pressure, and a spray volume of 20 gpa. Application dates, environmental conditions, and weed data are presented below. Weed control ratings, crop injury and yield data are presented in Tables 1 and 2.

Treatment Date	May 21	June 16	July 6
Target Stage	preemergence	V3	V9-R1
Application Time	11:30am – 12:00pm	11:30am – 12:30pm	afternoon
Actual Soybean Stage	--	V3	R5
Air Temperature (°F)	63	71	81
Relative humidity (%)	70	68	62
Dewpoint (°F)	--	60	67
Soil Moisture	dry	moist	moist
Soil Temperature (°F)	61	73	81
Sky	cloudy	70 % clouds	--
Wind	E 3-7	NNE 0-4	WNW 0-1
Rainfall before Application			
Week 1 (inch)	0.00	1.28	1.39
Rainfall after Application			
Week 1 (inch)	0.55	0.62	0.78
Week 2 (inch)	1.26	2.63	0.96
<u>Weed Density and Height</u>			
Grass species (148 /ft ²)	--	0.5–6 inches	24-28 inches
- 70-80% Giant Foxtail			
- 2-7% Woolly Cupgrass			
- 15-20% Yellow Foxtail			
Common Lambsquarters - Colq (18 /ft ²)	--	0.5-3 inches	12-26 inches
Pigweed species (18 /ft ²)	--	0.5-4 inches	17 inches
- primarily Powell amaranth			
Wild Buckwheat – Wibu (2 /ft ²)	--	1-4 inches	12-15 inches
Wild Mustard – Wimu (1.5 /ft ²)	--	2-4 inches	25-37 inches

Preemergence Weed Control

Rainfall amounts of 0.3 and 0.35 inches were received on May 22 and May 25, respectively. Soybeans and grass species emerged on May 28. The preemergence herbicide treatment Optill prevented a small percentage of grasses from emerging (compared to other treatments) and had begun to kill the majority of the emerged grasses by 14 DAT (data not shown). The Optill treatment eventually killed most of the grasses initially present and this is reflected in the early control ratings. The Valor treatment did not inhibit emergence of grassy weed species or result in a high kill rate of grassy weeds, but provided early grass suppression as observed on the June 16 rating date. At the July 2 rating, grass suppression by Valor was greatly reduced. Optill provided excellent preemergence control of broadleaf weeds throughout the period leading up to the late application of glyphosate on July 6. Valor initially controlled all broadleaf weeds but some common lambsquarters were present by the July 2 rating date.

Postemergence Glyphosate Weed Control

Control of all weed species by all June 16 glyphosate treatments (early) was near 100% as observed on July 2. However, control of weed species by the July 6 glyphosate treatments (late) varied as observed on the July 16

rating date. Weed control by the late glyphosate application in the preemergence sequential treatments was excellent. Few weeds were present during the late sequential glyphosate application where an earlier glyphosate application occurred, and again, control was excellent. For the late glyphosate treatment that had not previously been treated, weeds were very tall at application and wild mustard plants had nearly matured. While grass and pigweed species were controlled by the July 16 rating date, common lambsquarters and wild buckwheat still had green tissue present. The wild buckwheat eventually died, however a few common lambsquarters had still survived at the August 24 rating. Wild mustard was not rated on July 16 or August 24 as the plants has senesced.

Residual Weed Control

Generally, there were few weeds that emerged after the June 16 glyphosate treatment applications, making it difficult to assess the effectiveness of MON 63410 and the other products for residual control. There appeared to be a few more later emerging grasses in the treatments that received only a postemergence application on June 16, but the differences were minimal and any weeds remaining by the August 24 rating were small and effectively canopied by the soybeans.

Soybean Injury

The preemergence treatments did not cause any visible soybean injury or stand reduction when observed on June 4. Injury symptoms observed on June 23, seven days after the first postemergence herbicide applications, included chlorosis, growth reduction, leaf crinkling, and necrotic spots. These symptoms varied by treatment and are presented separately in Table 2. The chlorosis observed was only noted in the plots not treated with a preemergence herbicide and were most likely caused by weed competition. The same is probably true for the growth reduction observed with the exception that the postemergence application of Extreme resulted in significantly greater growth reduction compared to the other treatments. Extreme also caused a notable leaf crinkling effect on the newest expanded trifoliolate leaves of the treated soybeans. The postemergence application of Dual II Magnum caused contact necrotic spots on the soybean leaves present at the time of application. Slight growth reduction was noted on July 2 in all treatments that included a residual product with glyphosate at application. Extreme caused the greatest growth reduction observed with these treatments. The growth reduction observed in the untreated check was due to weed competition.

Soybean Yields

Yield differences were observed and could be attributed to weed competition and herbicide treatment. Comparing the preemergence treatments Optill and Valor plus early sequential glyphosate with MON 63410 or late glyphosate-only sequential, Valor with a late glyphosate sequential resulted in significantly higher yields than the other treatments. No significant difference in yield was observed between the early Optill/glyphosate + MON 63410 sequential and the late Optill/glyphosate sequential. The Valor/glyphosate sequential also yielded significantly higher than any of the total postemergence treatments applied on June 16. This yield difference might be due to tank mix/package mix partners included in those treatments (MON 63410, imazethapyr, or Dual II Magnum) and/or that the Valor treatment provided some initial grass suppression and broadleaf weed control. The early/late glyphosate sequential treatment applied on June 16/July 6 yielded less than the Valor/glyphosate sequential and more than the three glyphosate tank mix treatments noted above but these differences were not statistically significant. Comparing the early/late glyphosate sequential with the single late glyphosate application, the early/late sequential yielded better than the late-only application which most likely was due to extended weed competition for the late-only treatment.

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Table 1. Visual weed control ratings

Herbicide Treatment ¹	Rate (product/A)	Weed Control																	
		grass species				Colq				pigweed species				Wibu				Wimu	
		6/16	7/2	7/16	8/24	6/16	7/2	7/16	8/24	6/16	7/2	7/16	8/24	6/16	7/2	7/16	8/24	6/16	7/2
		----- (%) -----																	
<u>(Preemergence May 21) and (Postemergence June 16)</u>																			
(Optill X ²) + (Roundup PowerMax ³ + MON 63410 ⁴ + AMS ⁵)	(2 oz) + (1.33 pt + 3 pt + 8 pt)	92	100	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
(Valor SX ⁶) + (Roundup PowerMax + MON 63410 + AMS)	(1.96 oz) + (1.33 pt + 3 pt + 8 pt)	88	100	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100
<u>(Preemergence May 21) and (Postemergence July 6)</u>																			
(Optill X) + (Roundup PowerMax + AMS)	(2 oz) + (1.33 pt + 8 pt)	90	91	100	100	100	100	100	100	100	100	100	100	98	100	100	100	100	100
(Valor SX) + (Roundup PowerMax + AMS)	(1.96 oz) + (1.33 pt + 8 pt)	84	56	99	100	99	96	100	100	100	100	100	100	99	100	100	100	99	100
<u>Postemergence June 16</u>																			
Roundup PowerMax + MON 63410 + AMS	1.33 pt + 3 pt + 8 pt	--	100	98	99	--	100	98	99	--	100	100	100	--	100	97	100	--	100
Extreme ⁷ + AMS	3 pt + 8 pt	--	100	97	98	--	100	100	100	--	100	100	100	--	100	99	100	--	100
Roundup PowerMax + Dual II Magnum ⁸ + AMS	1.33 pt + 1.18 pt + 8 pt	--	100	98	98	--	100	99	99	--	100	98	99	--	100	98	100	--	100
<u>(Postemergence June 16) and (Postemergence July 6)</u>																			
(Roundup PowerMax + AMS) + (Roundup PowerMax + AMS)	(1.33 pt + 8 pt) + (1.33 pt + 8 pt)	--	99	99	100	--	100	100	100	--	100	100	100	--	99	99	100	--	100
<u>Postemergence July 6</u>																			
Roundup PowerMax + AMS	1.33 pt + 8 pt	--	--	100	100	--	--	93	96	--	--	100	99	--	--	91	100	--	--
LSD (P=.05)		ns	7.9	1.0	1.1	0.6	2.2	1.6	1.2	ns	ns	ns	ns	ns	ns	1.7	ns	ns	ns

¹ Treatments and rates in parenthesis represent a single application.

² Optill X 68WG = 17.8% saflufenacil & 50.2% imazethapyr.

³ Roundup PowerMax 4.5L = glyphosate.

⁴ MON 63410 3CS = acetochlor.

⁵ AMS = N-Pak ammonium sulfate solution (3.4 lbs/gal).

⁶ Valor SX 51WDG = flumioxazin.

⁷ Extreme 2.17L = 0.17 lb ae/gal imazethapyr & 2 lb ai/gal glyphosate salt.

⁸ Dual II Magnum 7.64E = s-metolachlor.

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Table 2. Visual soybean injury ratings and yields

Herbicide Treatment ¹	Rate (product/A)	Soybean Injury							Soybean Yield (bu/A)
		June 4		June 23				July 2	
		Injury	Stand Reduction	Chlorosis	Growth Reduction	Crinkling	Necrosis	Growth Reduction	
		----- (%) -----							
<u>(Preemergence May 21) and (Postemergence June 16)</u>									
(Optill X ²) + (Roundup PowerMax ³ + MON 63410 ⁴ + AMS ⁵)	(2 oz) + (1.33 pt + 3 pt + 8 pt)	0	0	0	0	0	0	1	59
(Valor SX ⁶) + (Roundup PowerMax + MON 63410 + AMS)	(1.96 oz) + (1.33 pt + 3 pt + 8 pt)	0	0	0	0	0	0	3	60
<u>(Preemergence May 21) and (Postemergence July 6)</u>									
(Optill X) + (Roundup PowerMax + AMS)	(2 oz) + (1.33 pt + 8 pt)	0	0	0	0	0	0	0	61
(Valor SX) + (Roundup PowerMax + AMS)	(1.96 oz) + (1.33 pt + 8 pt)	0	0	0	0	0	0	0	65
<u>Postemergence June 16</u>									
Roundup PowerMax + MON 63410 + AMS	1.33 pt + 3 pt + 8 pt	--	--	10	9	0	0	3	59
Extreme ⁷ + AMS	3 pt + 8 pt	--	--	13	23	16	0	5	60
Roundup PowerMax + Dual II Magnum ⁸ + AMS	1.33 pt + 1.18 pt + 8 pt	--	--	9	8	0	11	3	59
<u>(Postemergence June 16) and (Postemergence July 6)</u>									
(Roundup PowerMax + AMS) + (Roundup PowerMax + AMS)	(1.33 pt + 8 pt) + (1.33 pt + 8 pt)	--	--	10	9	0	0	0	62
<u>Postemergence July 6</u>									
Roundup PowerMax + AMS	1.33 pt + 8 pt	--	--	5	0	0	0	0	57
Untreated	--	--	--	5	0	0	0	2	13
LSD (P=.05)		ns	ns	1.8	2.6	1.2	1.2	3.6	3.2

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