

Soybean Herbicide Management with Preemergence and Postemergence applications of Warrant at Rosemount, MN - 2011. Gunsolus, Jeffrey L. and Douglas W. Miller. The objective of this experiment was to evaluate crop safety and weed control with Warrant and several other herbicides applied preemergence and/or postemergence in a Roundup Ready weed control system. The experiment was conducted at Rosemount, MN on a Waukegon silt loam soil. Following corn, the experimental area was fall plowed. In the spring, the field was field cultivated on April 15 and April 25. Pioneer 91Y92 soybeans were planted on May 27 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, 30 psi pressure, and a spray volume of 20 gpa. Application dates, environmental conditions, and weed data are presented below. Weed control ratings are presented in the table below.

Treatment Date	May 27	June 24	July 13	July 26
Application	preemergence	early post	sequential to preemergence	sequential to early post
Application Time	2:00 - 2:45pm	12:45 - 1:00pm	3:40 – 4:00pm	2:00 pm
Actual Soybean Stage	--	VC-V1	(not recorded)	(not recorded)
Air Temperature (°F)	63	75	76	81
Relative humidity (%)	45	34	44	45
Dewpoint (°F)	42	47	53	58
Soil Moisture	dry	moist	moist at 0.25"	moist at 1"
Soil Temperature (°F)	61	74	81	87
Sky	cloudy	thin clouds	75 % clouds	5 % clouds
Wind (mph)	SSE 5-10	NNW 2-5	E 8	SE 3-8
Rainfall before Application				
Week 1 (inch)	2.18	2.46	1.46	0.26
Rainfall after Application				
Week 1 (inch)	0.97	0.02	2.74	1.20
Week 2 (inch)	0.12	0.19	0.57	0.05
<u>Weed Stages (height)</u>				
Common Lambsquarters - Colq	--	1-8"	3-15"	2-8"
Common Ragweed - Corw	--	emerging-6"	2-15"	2-10"
Eastern Black Nightshade – Ebns	--	(not recorded)	(not recorded)	1-6"
Pigweed species	--	emerging-4"	2-8"	2-12"
Pennsylvania Smartweed - Pesw	--	3-5"	5-10" (up to 15" diameter)	2-6"
Grass species	--	0.5-3"	(not recorded)	6-12"

<u>Weed Density (plants/ft²)</u>	June 24	July 26	
	Untreated Check	Roundup applied EPOST on June 24	Untreated Check
Common Lambsquarters - Colq	1.1	0.2	2.3
Common Ragweed - Corw	0.6 (emerging) & 0.6 (older)	0.1	0.6
Eastern Black Nightshade - Ebns	(not recorded)	0.4	0.3
Pennsylvania Smartweed – Pesw	0.2	0.1	1.6
Pigweed species	0.2 (emerging) & 0.4 (older)	0.4	1.4
- primarily Powell amaranth			
Grass species	0.1 (mixed species)	--	--
- Barnyardgrass	--	0.3	0.04
- Giant Foxtail	--	0.4	0.0
- Large & Smooth Crabgrass	--	0.2	0.3
- Woolly Cupgrass	--	0.1	0.4
- Yellow Foxtail	--	scattered	scattered

Heavy rainfall occurred on May 28 followed by a hot, dry period that resulted in severe soil crusting and poor soybean and weed emergence. The experimental area was rotary hoed at a speed of 1.2 mph on June 13 to break up the soil surface, but that did not result in a significant increase in soybean emergence. Soybean plants that emerged were chlorotic and had shredded leaves, therefore any possible preemergence herbicide injury symptoms could not be discerned. No injury symptoms were observed following any of the postemergence treatment applications.

Weed populations were recorded prior to the early postemergence treatment applications on June 24 and again on July 26. At the June 24 date, common lambsquarters, common ragweed and pigweed species were the most consistent of the weeds present. Pennsylvania smartweed and grass species populations were generally light and variable throughout the experimental area. A second flush of weed growth occurred in late June to early July. This was noted in the weed count data on July 26. The second flush also included eastern black nightshade and several grass species. The July 13 and July 26 sequential Roundup applications were applied later than would normally be recommended. As a result, some larger lambsquarters, ragweed, and smartweed were not totally controlled. Due to the poor soybean stand, no consistent canopy was formed and little competition from the soybeans resulted. This contributed to later season weed germination and increased weed sizes.

Weed Control with Preemergence + Postemergence Sequential Treatments

At the July 12 rating, Gangster resulted in the best overall preemergence weed control with good to excellent control of common lambsquarters and excellent control of ragweed, pigweed and smartweed. Authority First had fair to good control of lambsquarters, ragweed, and pigweed plus excellent control of smartweed. Valor SX and Fierce resulted in fair to poor control of lambsquarters, ragweed, and smartweed at the July 12 rating but both had excellent control of pigweed species. The Warrant treatment had little to no preemergence control of the four broadleaf species rated on July 12.

The July 26 rating was 13 days after the postemergence sequential application. Control rating differences on July 26 were a result of the range in weed sizes between treatments and also potential antagonism of Roundup by the inclusion of Warrant in the tank mix. All treatments controlled the grass species, nightshade, and pigweed species present at application. Where preemergence control of lambsquarters, ragweed, and smartweed was less effective, plant sizes at the sequential application date ranged to 15 inches tall. All treatments did a good to excellent job of controlling the common ragweed. However, Pennsylvania smartweed control was significantly lower in plots with the larger weeds (Warrant, Valor SX, and Fierce treated plots). Common lambsquarters control, regardless of size, was excellent with the Roundup only treatments. However, lambsquarters control (especially the larger weeds present) was lower with the Roundup plus Warrant tank mixes. These lower ratings were generally a slower rate of kill as most of those weeds were fully controlled by the August rating date.

With the exception of the preemergence Warrant treatment, all other treatments resulted in excellent broadleaf residual control. The Warrant treatment had some late emerging lambsquarters, nightshade, and pigweed. In addition, most treatments had some late emerging grasses, with the fewest emerging in the plots receiving the Warrant as a postemergence application. The differences were not significant however.

Weed Control with Early Postemergence Treatments with and without Sequential Applications

Weed control was excellent with both the early postemergence treatments applied on June 24 and the sequential postemergence applications applied on July 26. Warrant treated plots extended control of late emerging nightshade and pigweed that occurred following the Roundup applications.

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Table. Weed control ratings

Herbicide Treatment ¹	Rate (product/A)	Weed Control															
		Colq			Corw			pigweed species			Pesw			Ebns		grass species	
		7/12	7/26	8/24	7/12	7/26	8/24	7/12	7/26	8/24	7/12	7/26	8/24	7/26	8/24	7/26	8/24
		----- (%) -----															
<u>(Preemergence May 27) and (Postemergence July 13)</u>																	
(Warrant ²) + (Roundup ³ + AMS ⁴)	(8 oz) + (22 oz+ 8 pt)	8	99	58	8	93	89	8	100	40	8	51	55	100	94	100	95
(Valor SX ⁵) + (Roundup + AMS)	(2 oz) + (22 oz+ 8 pt)	63	100	99	41	98	93	100	100	97	58	54	81	100	100	100	95
(Valor SX) + (Roundup + AMS + Warrant)	(2 oz) + (22 oz+ 8 pt + 3pt)	55	51	90	36	94	94	98	100	100	80	51	58	100	100	100	97
(Gangster FR + Gangster V) ⁶ + (Roundup + AMS)	(0.4 oz + 2 oz) + (22 oz+ 8 pt)	94	100	97	100	100	100	99	100	96	100	100	100	100	100	100	91
(Gangster FR + Gangster V) + (Roundup + AMS + Warrant)	(0.4 oz + 2 oz) + (22 oz+ 8 pt + 3pt)	92	96	98	96	100	99	100	100	100	98	90	96	100	100	100	98
(Authority First ⁷) + (Roundup + AMS)	(3.2 oz) + (22 oz+ 8 pt)	80	100	100	80	98	97	89	100	95	98	100	99	100	98	100	93
(Authority First) + (Roundup + AMS + Warrant)	(3.2 oz) + (22 oz+ 8 pt + 3pt)	93	81	98	79	99	98	85	100	99	98	75	90	100	100	100	98
(Fierce ⁸) + (Roundup + AMS)	(3 oz) + (22 oz+ 8 pt)	66	100	99	73	98	97	100	100	99	73	49	71	100	100	100	97
(Fierce) + (Roundup + AMS + Warrant)	(3 oz) + (22 oz+ 8 pt + 3pt)	56	86	98	58	96	94	100	100	100	65	55	78	100	100	100	100
LSD (P=.05)		17	17	11	18	4	4	14	ns	8	21	19	26	ns	ns	ns	ns
<u>Early Postemergence June 24</u>																	
Roundup + AMS	22 oz + 8 pt	98	80	63	99	95	93	98	78	29	97	93	75	33	13	85	70
Roundup + AMS + Warrant	22 oz+ 8 pt + 3pt	98	90	70	99	99	95	98	90	76	99	99	96	100	96	91	79
<u>(Early Postemergence June 24) and (Postemergence July 26)</u>																	
(Roundup + AMS) + (Roundup + AMS)	(22 oz + 8 pt) + (22 oz + 8 pt)	98	94	94	98	97	98	96	75	96	98	95	97	33	97	83	98
(Roundup + AMS + Warrant) + (Roundup + AMS)	(22 oz + 8 pt + 3pt) + (22 oz + 8 pt)	99	93	98	99	99	98	100	94	98	98	98	97	100	100	95	100
(Roundup + AMS + Warrant) + (Roundup + AMS + Warrant)	(22 oz + 8 pt + 3pt) + (22 oz + 8 pt + 3pt)	99	93	96	99	98	99	100	95	99	98	98	97	100	100	97	100
LSD (P=.05)		ns	ns	11	ns	ns	3	ns	ns	21	ns	ns	15	38	6	10	15

¹ Treatments and rates in parenthesis represent a single application.

² Warrant 3CS = acetochlor.

³ Roundup PowerMax 4.5L = glyphosate.

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

⁵ Valor SX 51WDG = flumioxazin.

⁶ Gangster = multi-pack product of Gangster FR 84DF (chloransulam-methyl) and Gangster V 51DF (flumioxazin).

⁷ Authority First 70DF = 62% sulfentrazone & 8% chloransulam-methyl .

⁸ Fierce 76WDG = 33.5% flumioxazin & 42.5% pyroxasulfone.