SOYBEAN (*Glycine max* Dyna-Gro 'S44LS76')
Common ragweed (*Ambrosia artemisiifolia*)
numerous soybean herbicides

M. J. VanGessel, Q.R. Johnson, and B.A. Scott
University of Delaware, Research and Education Center
16483 County Seat Hwy, Georgetown, DE 19947

Management of herbicide-resistant common ragweed in soybeans

Three experiments were conducted on a private farm in Dorchester County, MD in 2016. The field has common ragweed biotypes confirmed resistant to glyphosate, ALS-, and PPO-inhibiting herbicides (Groups 9, 2, and 14, respectively). All trials were no-till and the site was not irrigated. Plots were 10 ft. wide (5 rows, 15-inches apart) and 25 ft. long. Liberty Link soybeans were planted June 6. All herbicide treatments were made with 20 g/A spray volume, at 3 mph, and 11002 spray nozzles, applied with CO_2 backpack sprayer using 30 psi. All data was collected as visual crop response and weed control made based on appropriate check plots on a scale of 0 to 100.

Objectives:

- Burndown control of herbicide-resistant common ragweed
- Preemergence control of herbicide-resistant common ragweed
- Postemergence control of herbicide-resistant common ragweed

Objective 1. Burndown control of herbicide-resistant common ragweed. The first trial was designed to evaluate common ragweed control with burndown herbicides (Table 1). Labeled rates were used for the soil type and were applied 2 weeks before planting and no other burndown applications were made. Common ragweed was ~3 inches tall at time of application. The study was a randomized complete block design with three replications. Dual plus Prowl was applied on June 10 and Liberty was applied July 7.

Both treatments with Gramoxone, and Roundup plus 2,4-D provided the best burndown control of common ragweed. Gramoxone treatments and Spartan provided the best control of field pansy (Johnny-jump-up).

Table 1. Comparison of various burndown herbicides to control emerged common ragweed at time of application, applied two weeks before planting.

		3 WAT				4 WAT	
Herbicides and adjuvants	Rate / A	Common ragweed		Field pansy		Common ragweed	
		---------- % control ----------					
Untreated Check		0		0		0	
RU PowerMax	1 qt	77	b	80	c	47	g
2,4-D ester	1 pt	77	b	53	d	87	bc
RU + 2,4-D	1 qt + 1 pt	83	b	77	c	95	ab
Tricor + COC + UAN	5 oz wt + 1 qt + 1.6 qt	40	d	40	e	67	ef
Tricor + Valor + COC + UAN	5 oz wt + 3 oz wt + 1 qt + 1.6 qt	84	b	89	b	77	cd
Gramoxone + COC	3 pt + 1 qt	100	a	100	a	95	ab
Tricor + Gramoxone + COC	5 oz wt + 3 pt + 1 qt	100	a	100	a	99	a
Valor + COC + UAN	3 oz wt + 1 qt + 1.6 qt	80	b	90	b	70	de
Spartan + COC + UAN	8 fl oz + 1 qt + 1.6 qt	53	c	99	a	57	fg
P values[x]		0.0001		0.0001		0.0001	

[y]Means within a column followed by the same letter are not significantly different (p=0.05) according to Fisher's protected LSD test.
[x]P values ≤0.05 indicate significant differences exist among treatments.
COC= crop oil concentrate; UAN= liquid nitrogen; WAT= weeks after treatment

Objective 2. Preemergence control of herbicide-resistant common ragweed. The second trial examined herbicides for preemergence applications (Table 2). The Roundup PowerMax plus 2,4-D was applied pre-plant, but only the treatments and Gramoxone (to control emerged seedlings) were applied at planting. The study was a randomized complete block design with three replications.

Preemergence control of common ragweed was better with herbicide combinations than with individual herbicides (Table 2). Valor in combination with Tricor, Linex, or Command, and Tricor plus Linex, provided the best common ragweed control. Tricor alone resulted in only 4% stunting, but when used in combination with Valor, Spartan, Linex, or Command, injury was ≥14%.

Table 2. Comparison of various preemergence herbicides to control common ragweed

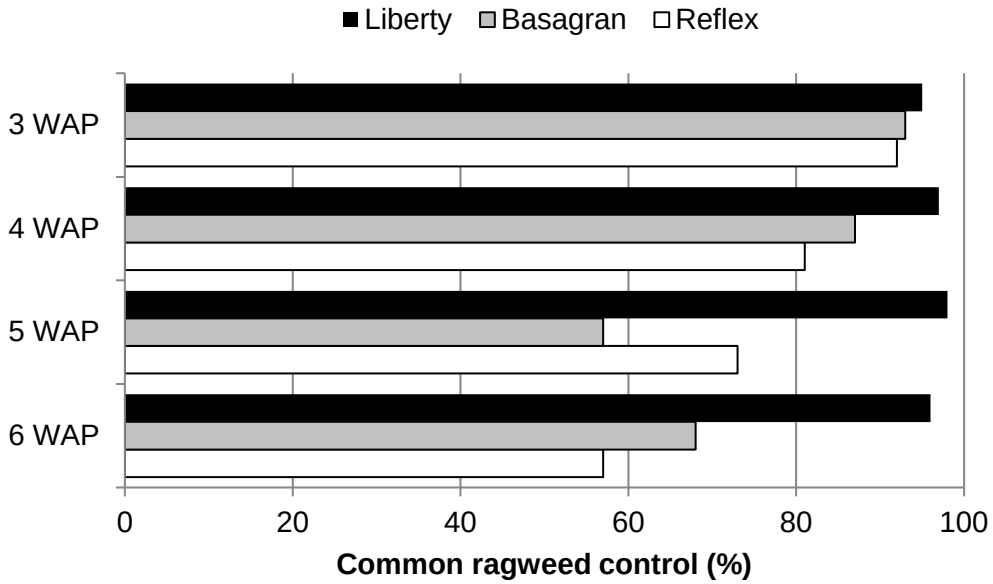
		3 WAT				5 WAT	
Herbicide	Rate / A	Soybean stunting		Common ragweed		Common ragweed	
		---------- % control ----------					
Untreated Check		0		0		0	
Valor	3 oz wt	4	bc	92	abc	79	cde
Spartan	8 fl oz	4	bc	40	g	-	
Tricor	3 oz wt	4	bc	80	ef	62	g
Tricor	5 oz wt	8	bc	88	bcd	70	efg
Linex	1.75 pt	6	bc	95	ab	81	cd
Command	1.25 pt	0	c	85	c-f	82	cd
Valor + Tricor	3 oz wt + 5 oz wt	20	a	99	a	98	a
Valor + Linex	3 oz wt + 1.75 pt	9	bc	99	a	93	ab
Valor + Command	3 oz wt + 1.25 pt	0	c	98	a	98	a
Spartan + Tricor	8 fl oz + 5 oz wt	14	ab	87	cde	62	g
Spartan + Linex	8 fl oz + 1.75 pt	0	c	96	ab	82	cd
Spartan + Command	8 fl oz + 1.25 pt	6	bc	82	def	66	fg
Tricor + Linex	5 oz wt + 1.75 pt	20	a	99	a	89	abc
Tricor + Command	5 oz wt + 1.25 pt	20	a	97	a	85	bcd
Linex + Command	1.75 pt + 1.25 pt	0	c	78	f	75	def
P values[x]		0.0014		0.0001		0.0001	

[y]Means within a column followed by the same letter are not significantly different (p=0.05) according to Fisher's protected LSD test.
[x]P values ≤0.05 indicate significant differences exist among treatments.
WAT= weeks after treatment

Objective 3. Postemergence control of herbicide-resistant common ragweed. The third trial examined Reflex (1.25 pt + non-ionic surfactant), Basagran (1 qt + crop oil concentrate), and Liberty (1 qt + AMS) applied at 3, 4, 5 or 6 weeks after planting (WAP) (Figure 1). The study was a factorial arrangement of herbicide and application timing, with three replications. The field was treated with Roundup PowerMax (1 qt/A) plus 2,4-D (1 pt) May 4 followed by Gramoxone (3 pts) plus Dual (1.25 pt) plus Prowl (1.75 pt) on June 7.

Timing of POST applications for Liberty was not as critical for control of common ragweed as Basagran or Reflex. Common ragweed control with Liberty was >95% regardless of application timing. Only Basagran applications at 3 WAP provided over 90% control. Control with Reflex was greater than expected given the common ragweed is resistant to Group 14 herbicides. However, in greenhouse trials, these common ragweed biotypes treated with Group 14 herbicides showed typical injury from these herbicides, but the plants quickly outgrew the injury. In the field, the dense soybean canopy was able to close quickly and outcompete the injured common ragweed plants.

Figure 1. Common ragweed control with Liberty, Basagran or Reflex applied from 3 to 6 weeks after planting.



LSD= 9
WAP= weeks after application

Summary:
Additional research is need to confirm these results and help identify consistent treatments, but it appears these herbicide-resistant biotypes of common ragweed can be effectively controlled in soybeans. Based on one trial, use of Gramoxone or 2,4-D at planting effectively controlled emerged common ragweed plants. Preemergence treatments of Valor plus Linex or Valor plus Command provided the highest level of residual control without causing too much soybean injury. A postemergence application of Liberty before the soybean canopy interferes with spray deposition is the best approach for emerged common ragweed plants.