Management of Herbicide-Resistant Giant Ragweed

Giant Ragweed Biology

- Giant ragweed is a competitive annual weed that has adapted to the fertile soil-crop-production acres of the Midwest and Soybean Belt.
- This weed typically emerges early in the growing season — as early as March — and some populations have adapted to extend emergence dates into midsummer. Emergence patterns will vary among fields and regions based on prior management practices and when an area was first infested.
- The seeds of giant ragweed are larger than most other weed species. The large seed size allows giant ragweed to emerge from several inches deep, with emergence often being promoted by tillage. Long-term no-tillage, along with proper herbicide management, can reduce giant ragweed populations.
- Seedling emergence from various depths also allows giant ragweed to escape many pre-emergence herbicides that remain in the upper soil layers.
- Giant ragweed quickly grows above crops to compete or sunlight and create a dense canopy with its 4- to 8-inch-wide leaves.
- The rapid growth habit and shading ability of giant ragweed lead to soybean yield losses, even at low densities.
- The prolific pollen production of giant ragweed largely contributes to the discomfort humans suffer from allergies.

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Herbicide Resistance in Giant Ragweed

- Giant ragweed resistance first occurred to Group 2 herbicides (ALS inhibitors) in Indiana, Illinois, Ohio and Iowa in the late 1990s and early 2000s.
- Resistance to Group 9 (glyphosate) herbicides was first confirmed in the eastern Soybean Belt and has now been confirmed in 12 states across the Midwest and southern U.S.
- Populations with resistance to both Group 2 (ALS inhibitors) and Group 9 (glyphosate) occur in Ohio, Minnesota, Missouri and Indiana.
- Resistance to other herbicide sites of action has not occurred, although the loss of Group 2 (ALS inhibitors) and Group 9 (glyphosate) is significant, as these were the most effective herbicide groups for control of giant ragweed.
- Resistance to multiple herbicides has not been widely documented, although caution should be taken to avoid creating multiple resistant populations by relying on Group 2 (ALS inhibitors) to control Group 9 (glyphosate)-resistant populations.

Management of Giant Ragweed

Giant ragweed populations vary in their emergence patterns and herbicide resistance depending on management history and region. Group 2 (ALS inhibitors) resistance is most likely to occur in fields with a history of non-GMO soybeans that depend heavily on Group 2 herbicides (ALS inhibitors) for control. Farmers should evaluate the performance of previous herbicide applications, scout and understand emergence patterns in order to determine the best management practices.

Farmers managing populations of weeds with Group 2 (ALS inhibitors) and Group 9 (glyphosate) resistance have limited options and will likely have to emphasize the use of Group 14 (PPO inhibitor), Group 10 (glufosinate) or Group 4 (2,4-D and dicamba) herbicides in the appropriate herbicide-resistant soybean. **Rotating to corn and taking advantage of effective corn herbicides may be the best option for dense infestations of Group 2 (ALS inhibitors)- and Group 9 (glyphosate)-resistant populations.**

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Follow the steps below for the best management of herbicide-resistant giant ragweed.

1. **Start weed-free at planting.** Control emerged weeds prior to planting with either thorough tillage or effective burndown herbicides.

   a. *The use of 2,4-D ester or dicamba (Group 4) in combination with glyphosate (Group 9) or paraquat (Group 22) is the most effective treatment on small giant ragweed plants less than 6 inches tall, regardless of the type of herbicide resistance. Be sure to observe 2,4-D and dicamba planting-restriction intervals if not planting Enlist E3, RR2Xtend or RR2XtendFlex soybean.*

   b. *Products containing saflufenacil (Group 14; Sharpen, Optill, Verdict, Optill PRO, and Zidua PRO) can be used instead of 2,4-D and dicamba (Group 4). These should also be combined with glyphosate (Group 9), Liberty (Group 10) or Liberty plus metribuzin (Group 5). The use of Liberty in a burndown program can restrict the use of post-emergence Liberty applications in glufosinate-tolerant soybeans because of the growing-season maximum.*

2. **Suppress late-emerging weeds.** The use of a residual herbicide either in combination with a burndown or at planting in a tilled seedbed will provide suppression of later-emerging giant ragweed plants, providing the soybean crop with a competitive advantage as well as relieving the selection pressure placed by postemergence herbicides.

   a. *Herbicide products containing chlorimuron, cloransulam or imazaquin (Table 1) applied before emergence at full rates are the most effective for reduction of giant ragweed emergence. Herbicides containing imazethapyr can provide more limited suppression. These herbicides will only be effective on Group 2 (ALS)-sensitive populations.*

   b. *Group 2 (ALS)-resistant populations can be suppressed by pre-emergence applications of products containing fomesafen (Group 14), such as Flexstar GT, Prefix, Intimidator, Reflex or Warrant Ultra. These products are more variable than the products listed above, and will be most effective in low populations and on soils low in organic matter. Their use will also restrict the use of postemergence products containing fomesafen (Group 14).*

Table 1. Pre-emergence herbicides containing chlorimuron or cloransulam that suppress ALS-susceptible giant ragweed. Rates are dependent on soil type, soil pH, application timing and region. Always refer to the label for appropriate rates.

Herbicide	Group #	Rates (oz./A.)	Equivalent Rates of Classic [chloriumuron] (oz./A.)	Equivalent Rates of FirstRate [cloransulam] (oz./A.)
Authority First/Sonic	14 & 2	4.5 - 8	--	0.43 - 0.74
Authority Maxx	14 & 2	5 - 9.6	0.78 - 1.5	--
Authority XL	14 & 2	4 - 9.6	1.25 - 3	--
Canopy EX/Cloak EX	2 & 2	1.1 - 3.3	1 - 3	--
Canopy/Cloak DF	5 & 2	2.25 - 7	1 - 3	--
Classic	2	1 - 3	1 - 3	--
Envive	2, 2 & 14	2.5 - 5.3	0.92 - 1.94	--
Fierce XLT	2, 14 & 15	3.75 - 5.25	1 - 1.4	--
FirstRate	2	0.6 - 0.75	--	0.6 - 0.75
Scepter	2	2.15 - 2.8	--	--
Surveil	14 & 2	3.5 - 4.2	--	0.5 - 0.6
Synchrony XP	2 & 2	1 - 3	0.85 - 2.56	--
Tendovo	2, 5 & 15	1.2 - 2.35 qt./A.	--	0.37 - 0.72
Trivence	14, 2 & 15	6 - 10	0.94 - 1.6	--
Valor XLT	14 & 2	2.5 - 5	1 - 2	--

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3. **Finish strong with multiple postemergence applications.** Multiple postemergence applications will likely be needed to control dense infestations of giant ragweed, especially in populations that exhibit extended emergence, even after an effective burndown and residual herbicide have been applied. Postemergence options can be limited, especially in ALS- and glyphosate-resistant populations. Use care in your postemergence product selection with attention toward using multiple sites of action and differing sites of action from the residual products to avoid selection of herbicide-resistant populations. Table 2 lists the available postemergence programs with their appropriate rates, soybean traits, application timings and effectiveness for each type of resistance.

   a. *In a planned, two-pass postemergence program, the first application should be made according to the size of weeds listed in Table 2. Make a second or "followed by" application three to four weeks after the first application to control later-emerging plants or plants that were not fully controlled by the first application.*

   b. *Postemergence applications of Group 14 (PPO inhibitor) herbicides can be variable in performance and should be used with caution because over-reliance could lead to PPO-resistant giant ragweed.*

4. **Consider LibertyLink, LLGT27, Enlist E3 or Roundup Ready 2 XtendFlex soybeans.** These trait systems allow the use of effective postemergence herbicides that will effectively control herbicide-resistant populations. An effective burndown/tillage program, along with a residual herbicide, should still be used in the system to minimize selection pressure and ensure optimal giant ragweed control.

Table 2. Postemergence herbicide options for control of susceptible and herbicide-resistant giant ragweed in soybeans.

Herbicide (Group #)	Rate	Weed Size (inches)	Soybean Traits*	Susceptible	Group 2 (ALS) Resistant Weeds	Group 9 (glyphosate) Resistant Weeds	Group 2 (ALS) + Group 9 (glyphosate) Resistant Weeds
FirstRate (2)	0.3 oz./A.	4 - 8	Non-GMO, RR, LL, RRX, RR2XF, E3 & LLGT	X**		X	
Flexstar (14)	1.3 - 1.6 pt./A.	4 - 8	Non-GMO, RR, LL, RRX, RR2XF, E3 & LLGT	X	X	X	X
FirstRate (2) + Flexstar (14)	0.3 oz./A. + 1 - 1.6 pt./A.	4 - 8	Non-GMO, RR, LL, RRX, RR2XF, E3 & LLGT	X	X***	X	X***
Enlist Duo (4 & 9)	4.75 pt./A.	4 - 8	E3	X	X	X	X
Enlist One (4) + Glyphosate (9)	2 pt./A. + 1.1 - 1.5 lb. ae/A.	4 - 8	E3	X	X	X	X
Enlist One (4) + Liberty (10)	2 pt./A. + 29 oz./A.	4 - 8	E3	X	X	X	X
Glyphosate (9) fb**** Glyphosate (9)	1.1 - 1.5 lb. ae/A. fb 0.75 lb. ae/A.	6 - 10	RR, RRX, RR2XF, E3 & LLGT	X	X		
Liberty (10) fb Liberty (10)	29 oz./A. fb 22 oz./A.	4 - 8	RR2XF, LL, E3 & LLGT	X	X	X	X

* Non-GMO: Non-genetically modified or conventional, RR: Roundup Ready, LL: LibertyLink., RRX: Roundup Ready 2 Xtend, RR2XF: Roundup Ready 2 XtendFlex, E3: Enlist E3, LLGT: LLGT27.
** X indicates control of giant ragweed within given susceptible or resistance category.
*** Control will be provided by the Flexstar element of the tank mix and will likely be less reliable as compared with the 1.3 pt./A. Flexstar alone or Flexstar fb Cobra programs.
**** fb: followed by.

For more information and links to additional resources, visit www.growiwm.org/Take-Action-Home.

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