

Recommendations for Management of Glyphosate-Resistant **Horseweed** (Marestail) in Illinois Soybean

The occurrence of glyphosate-resistant horseweed has been documented in Illinois for several years. These resistant biotypes can likely be found in the majority of fields in the southern one-third of the state. The shift to a glyphosate-resistant horseweed population in a field can occur quickly, perhaps within the span of a single growing season, as seed production and dissemination are very prolific. Weed scientists at Southern Illinois University and the University of Illinois have developed specific recommendations to help farmers better manage this problem in soybean. Herbicide programs used in soybean production may include applications in the fall, early spring, near planting, and after soybean emergence. The integration of both soil-residual and non-residual herbicides is warranted since the challenge is to control not only the horseweed that is present, but also to prevent subsequent horseweed emergence during the growing season. The steps described inside are specific to herbicides, but weed management practitioners should strongly consider utilizing other cultural practices that increase the competitive ability of the soybean crop.

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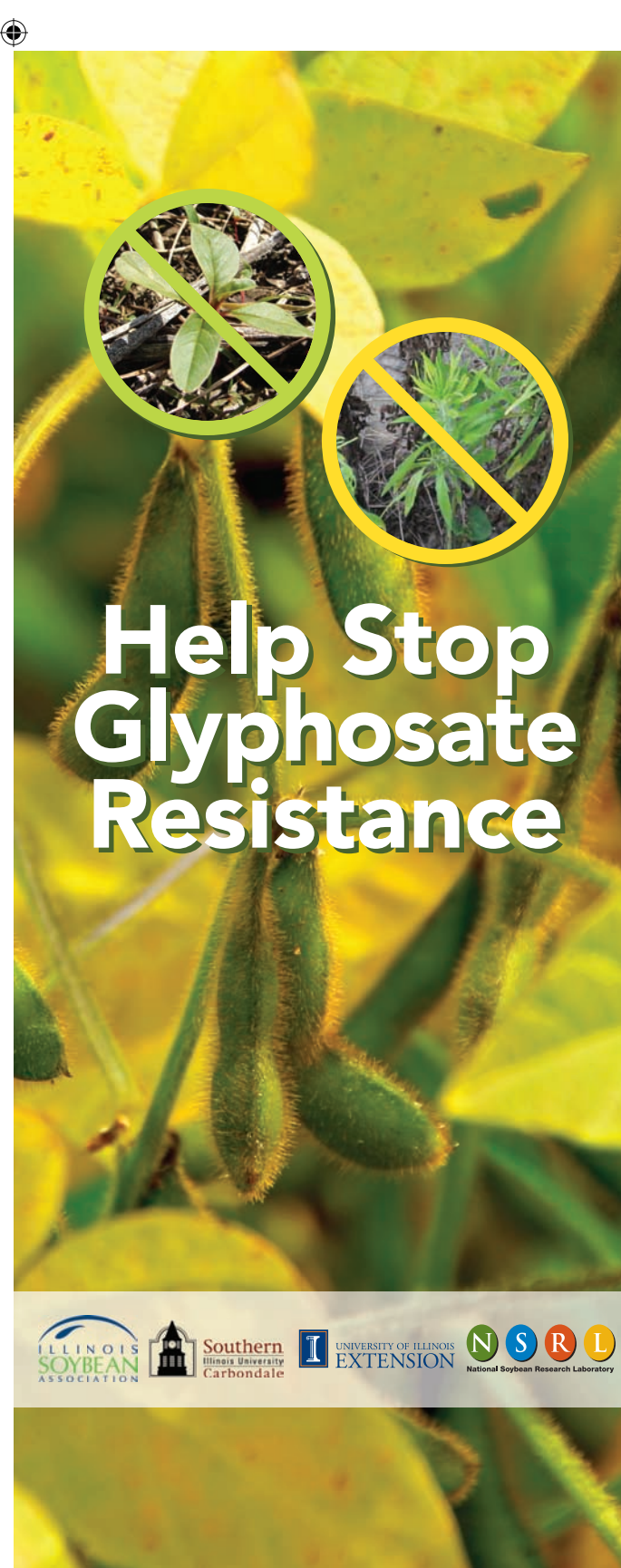
FOR MORE INFORMATION



Southern Illinois University Weed Science:
www.siu.edu/~weeds

Compendium of Herbicide Adjuvants, 9th Edition:
www.herbicide-adjuvants.com

University of Illinois at Urbana-Champaign Crop Sciences:
www.cropsci.illinois.edu



Help Stop Glyphosate Resistance

Recommendations for Management of Glyphosate-Resistant **Waterhemp** in Illinois Soybean

Illinois farmers have another adversary to consider in their annual battle against weeds. Glyphosate-resistant waterhemp is poised to bring new challenges to agronomic cropping systems in Illinois, and it might be especially troubling for soybean producers. Weed scientists at Southern Illinois University and the University of Illinois have developed specific recommendations to help farmers better manage this problem in soybean. The progressive four-step program described inside was developed using data describing waterhemp biology, ecology and control. The steps are specific to herbicides, but weed management practitioners should strongly consider utilizing other cultural practices that increase the competitive ability of the soybean crop. *Be sure to control any existing waterhemp plants before planting.*

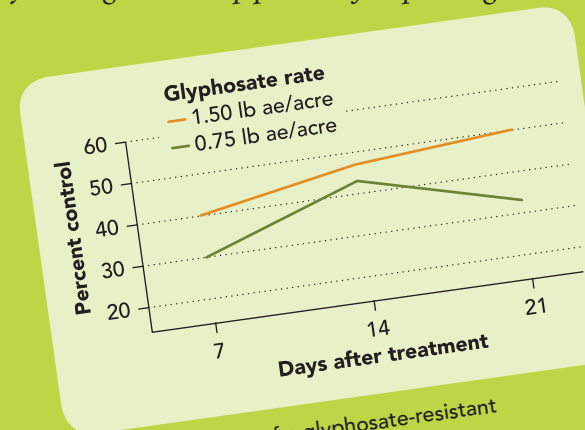


TABLE 1. Response of a glyphosate-resistant waterhemp population to labeled in-crop application rates of glyphosate (University of Illinois, 2007). Waterhemp size is 4 inches.



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STEP 1: Apply a full rate (according to label guidelines for soil type and organic matter content) of a soil-residual herbicide no sooner than 7 days before planting.

- Why invest in a soil-residual herbicide? Soil-residual herbicides may represent the only herbicide option for certain waterhemp populations. A waterhemp population resistant to both PPO inhibitors and glyphosate would not be controlled by any postemergence soybean herbicides. Waterhemp is competitive with soybean; previous research has shown that waterhemp can cause up to 40 percent soybean yield loss.
- Why use a full rate instead of a reduced (“set-up”) rate? Waterhemp germination and emergence extend late into the growing season. The later into the season that waterhemp emergence can be delayed, the greater the potential to maximize soybean yield.

STEP 2: The initial postemergence application of glyphosate (alone at 0.75 to 1.0 lb acid equivalent (ae)/ acre) must be made when waterhemp is 3 to 5 inches tall.

- Why use glyphosate alone instead of tank-mixing with a PPO inhibitor (such as lactofen, fomesafen, or acifluorfen)? Unless the herbicide sensitivity/resistance profile of the particular waterhemp population is known, the potential for significant antagonism with these tankmixes

Herbicide susceptible and resistant waterhemp following glyphosate application.



suggest glyphosate be applied alone. If the waterhemp population is confirmed to be:

- glyphosate-resistant: apply a PPO inhibitor followed 7 to 10 days later with glyphosate
 - PPO-resistant: apply glyphosate alone
- Increasing the glyphosate application rate from 0.75 to 1.5 lb ae/acre (the maximum rate allowed by label) did not consistently improve control of a confirmed glyphosate-resistant waterhemp population in field research trials (Table 1).
 - Susceptible waterhemp less than 5 inches tall is very sensitive to 0.75 lb ae/acre of glyphosate. Waterhemp plants that survive 0.75 or 1.0 lb ae/acre glyphosate when treated at 5 inches or less should be closely monitored.

STEP 3: Fields must be scouted 7 days after the initial glyphosate application to determine treatment effectiveness. If waterhemp control is inadequate and retreatment is necessary, consider applying a PPO-inhibiting herbicide (lactofen, fomesafen, or acifluorfen) at a full labeled rate (with recommended additives) as soon as possible.

- In field research trials, glyphosate-resistant waterhemp plants continued to grow at near-normal rates following treatment with glyphosate. If 7 to 10 days elapse before lack of control becomes obvious, glyphosate-resistant waterhemp plants might grow an additional 6 to 8 inches.
- PPO-inhibiting herbicides are the only remaining herbicide options for control of glyphosate-resistant waterhemp. Waterhemp control with PPO inhibitors is optimized when full rates are applied to small plants (5 inches or less).

STEP 4: Re-scout the treated field within 10 to 14 days. If any plants treated with a second herbicide application might survive, rogue these surviving plants from the field before they reach a reproductive growth stage.

Recommendations for Management of Glyphosate-Resistant **Horseweed (Marestail)** in Illinois Soybean

STEP 1: Implement control practices before horseweed plants exceed 6 inches tall.

- Herbicide effectiveness against horseweed rapidly diminishes after plants bolt and exceed 6 inches tall.
- Fall or early spring burndown herbicide applications can target smaller horseweed plants more consistently than applications made closer to soybean planting.
- Paraquat, dicamba and 2,4-D have provided effective control of glyphosate-resistant horseweed following either fall or early spring applications.
- Besides glyphosate, include at least two other herbicide modes of action in burndown applications.

STEP 2: Include soil-residual herbicides with burndown herbicide applications.

- Horseweed can emerge during fall or spring, so soil-residual herbicides are warranted to control horseweed that had not germinated or emerged when the burndown herbicide was applied.
- Soil-residual soybean herbicides that provide good to excellent residual control of horseweed include chlorimuron, cloransulam, and flumioxazin.
- Select application rates based on label recommendations for soil type and organic matter content.

STEP 3: Make timely applications of postemergence herbicides before spring-emerged horseweed exceed 2 to 3 inches.

- Limited herbicide options exist to control glyphosate-resistant horseweed after soybeans have emerged.
- Glyphosate at 1.13 lb acid equivalent (ae)/ acre tankmixed with either FirstRate or Synchrony XP can suppress or control small horseweed. Horseweed biotypes that are resistant to glyphosate and ALS inhibitors will not be effectively controlled by these tankmixes.

STEP 4: Continue to aggressively manage glyphosate-resistant horseweed during the growing season of the rotational crop.

- Horseweed seed is short-lived, so programs in rotational crops that reduce the amount of seed added back to the soil seedbank can potentially reduce the horseweed population when soybean is again grown.
- Encourage neighbors to control horseweed before it reaches the reproductive stage. Horseweed seed is easily moved by wind and seed produced in a neighboring field can easily reintroduce the species into surrounding fields.



Herbicide susceptible and resistant horseweed following glyphosate application.