

## Managing Kochia in Corn and Soybeans

Kochia (*Kochia scoparia*) is becoming a more common weed in cropland and can be difficult to manage. Kochia populations have developed resistance to many herbicide families including triazines, sulfonylureas, 2,4-D and dicamba. Glyphosate-resistant populations of kochia have also been recently confirmed. To manage kochia, it is important to start control measures early, use residual herbicides and rotate herbicide modes-of-action.

### Biology

Kochia is a summer annual broadleaf weed and a member of the same botanical family as common lambsquarters (*Chenopodiaceae*). Leaves are alternate and linear in shape with simple blades that are hairy or pubescent. Stems are erect, highly branched, and vary in color from green to red. They can grow erect up to 7 feet tall with competition, or can assume a more bushy habit reaching 3 to 4 feet without competition. Kochia has an imperfect flower that allows cross-pollination, which has important implications for the spread of herbicide resistance.

Kochia reproduces only by seed which are short-lived in the soil. Most seeds do not live more than one year with some that may live up to three years. Seeds mostly germinate at shallow soil depths, making no-till systems a good environment for kochia. Plants produce an abundance of seed that can spread long distances very rapidly. Seed is dispersed in the fall when kochia becomes similar to “tumbleweeds” dropping seeds as they blow around.

Kochia germinates very early in the spring and are quite tolerant to frost. One of the first summer annual weeds to emerge, kochia plants can be in advanced stages of growth when other broadleaf weeds are ready to spray in the spring. Plants grow rapidly through spring and summer sending taproots down deep in the soil. Additional flushes can germinate throughout the growing season making it difficult to control. Kochia plants are tolerant of drought and saline soils, and do well under growing conditions considered poor for most crops.

### Management

Since kochia germinates very early in the season, control measures should be started early. Tillage or a burndown herbicide application prior to corn or soybean planting can



**Kochia plant in early growth stage.**

sometimes eliminate most kochia for the remainder of the season. Burndown herbicide applications are most effective for the control of kochia when it is very small. A tank mixture of 22 oz/A Roundup PowerMAX® plus 8 oz/A Banvel® or Clarity® (dicamba) can be effective for the control of kochia up to 6 inches in height. Dicamba is generally more effective than 2,4-D for control of kochia.

The use of residual herbicides helps to control additional flushes of kochia and prevent seed production. Rotate herbicides to help reduce selection of resistant plants, and follow the recommendations provided to effectively manage kochia in corn and soybeans.

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### Roundup Ready® Corn 2\*

- ⇒ Start clean with a burndown herbicide or tillage. Spray early when kochia is small for best results.
- ⇒ Apply a preemergence residual herbicide containing atrazine such as Harness® Xtra or Degree Xtra®, or other residual herbicides at the recommended rate. Other preemergence herbicides that will help to control kochia include Integrity™, Hornet®, Balance® Flexx, and Radius®.
- ⇒ Or apply a preemergence residual herbicide at the recommended rate tank mixed with Roundup WeatherMAX® at a minimum of 22 oz/A in-crop.
- ⇒ Follow either program with a post-emergence in-crop application of Roundup WeatherMAX at a minimum rate of 22 oz/A.
- ⇒ Tank mix other herbicides such as Impact® or dicamba-based products to control emerged kochia if you suspect it is resistant to glyphosate.

\* Includes corn with Roundup Ready® 2 Technology

### Roundup Ready® and Genuity™ Roundup Ready 2 Yield® Soybeans

- ⇒ Start clean with a burndown herbicide or tillage. Tank mixing with dicamba or 2,4-D can help provide more effective burndown control.
- ⇒ An application of a residual herbicide such as Valor® SX, Authority® Assist, or Boundary® will help provide control of kochia preemergence and reduce the potential for resistance.
- ⇒ In-crop, apply Roundup WeatherMAX at a minimum of 22 oz/A, and follow with a second application of Roundup WeatherMAX if an additional flush of annual weeds occur.
- ⇒ Roundup WeatherMAX may be tank mixed with products such as Cobra® or Flexstar® if you suspect the kochia is resistant to glyphosate.

### Minimize the Risk of Weed Resistance

- ⇒ Start clean and control weeds early.
- ⇒ Use Roundup Ready® Technology as your foundation.
- ⇒ Add other herbicides and cultural practices where appropriate as part of the Roundup Ready System.
- ⇒ Use the right rate at the right time.
- ⇒ Control weeds throughout the season and reduce the weed seed bank.

**Recommendations for control of kochia in corn and soybeans. Always consult the product label for information on rates, additive recommendations, crop precautions, and appropriate tank mix partners.**

Scout fields and control weeds throughout the season. Proper application timing protects yields, uses the correct rate for weed size and considers the impact of environmental conditions on performance.

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**Individual results may vary**, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible.

**ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS.** Roundup Ready® crops contain genes that confer tolerance to glyphosate, the active ingredient in Roundup® brand agricultural herbicides. Roundup® brand agricultural herbicides will kill crops that are not tolerant to glyphosate. Degree Xtra® and Harness® are restricted use pesticides and are not registered in all states. The distribution, sale, or use of an unregistered pesticide is a violation of federal and/or state law and is strictly prohibited. Check with your local Monsanto dealer or representative for the product registration status in your state. **Tank mixtures:** The applicable labeling for each product must be in the possession of the user at the time of application. Follow applicable use instructions, including application rates, precautions and restrictions of each product used in the tank mixture. Monsanto has not tested all tank mix product formulations for compatibility or performance other than specifically listed by brand name. Always predetermine the compatibility of tank mixtures by mixing small proportional quantities in advance. Degree Xtra®, Genuity™, Harness®, Roundup®, Roundup PowerMAX®, Roundup Ready®, Roundup Ready 2 Yield®, Roundup WeatherMAX®, and Technology Development by Monsanto and Design(SM) are trademarks of Monsanto Technology LLC. Valor® is a registered trademark of Valent U.S.A. Corporation. All other trademarks are the property of their respective owners. ©2010 Monsanto Company.