

Waterhemp Management in Corn

Waterhemp management is an agricultural challenge because of these plants' ability to produce large numbers of seed and quickly respond to selection pressures from herbicide applications. Waterhemp has developed resistance to more site-of-action herbicide groups than any other Midwestern weed species.¹ Genetic diversity and herbicide resistance materialize as individual male and female plants cross pollinate. Each female waterhemp plant can produce from 250,000 to over a million seeds.^{1,2}

Complete waterhemp control in corn should be a goal. Control starts with plant identification to differentiate waterhemp from other pigweed species. The major pigweed species in the Midwest include common waterhemp (*Amaranthus rudis*, Figures 1 and 2), tall waterhemp (*A. tuberculatus*), redroot pigweed (*A. retroflexus*), smooth pigweed (*A. hybridus*), spiny amaranth (*A. spinosus*), prostrate pigweed (*A. blitoides*), and Palmer amaranth (*A. palmeri*). While these species may appear similar, they do have distinguishing differences.

To identify them, one must carefully look for smooth or hairy stems, petioles, or leaves, examine the shape and size of cotyledonary and mature leaves, and plant structure. When the plants set seeds, the seed of each species has distinguishing characteristics. A good resource for identifying each species is [Pigweed Identification, A Pictorial Guide to the Common Pigweeds of the Great Plains](#) from Kansas State University.³

Herbicide resistant waterhemp is a widespread problem that requires tillage, and once waterhemp is identified, one must assume the plants are resistant to several herbicide groups. Therefore, tillage, crop rotation, cover crops, and tank mixes of residual and systemic/contact PRE and POST emergent herbicides should be considered. Characteristically, waterhemp can germinate later in the growing season when tillage is not an option. Fields should be weed free during early crop growth (the Critical Weed Free Period) to help reduce competition for resources and protect yield potential.



Figure 1. Waterhemp seedlings.



Figure 2. Waterhemp seed head that can produce thousands of seed. Picture courtesy of Steven Gower

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Knowing potential herbicide resistance within a waterhemp population is useful to help determine which labeled herbicide tank mixes with different modes of action to utilize. To help improve herbicide effectiveness, POST herbicides should be applied at full labeled rates to waterhemp plants when they are less than three inches tall. Since waterhemp plants can grow up to one inch per day, it is imperative to scout for waterhemp appearance and apply herbicides when the plants are small.²

Bayer Crop Science herbicide recommendations to help maximize waterhemp control are listed below. Please read the respective product labels prior to application to check appropriate rates for your region and soil type.

Option 1: PRE application of TriVolt™ herbicide, a Restricted Use Pesticide (Groups 2, 15, and 27) (16 fl oz/acre) fb POST application of Harness® MAX Herbicide (Groups 15 and 27) (64 fl oz/acre) + DiFlexx® herbicide + (Group 4) (12 fl oz/acre) + VaporGrip® Xtra Technology/Buffering Agent*.

Option 2: PRE application of Harness® Xtra 5.6L Herbicide, a Restricted Use Pesticide (Groups 5 and 15) (4 qt/acre) + Balance® Flexx herbicide, a Restricted Use Pesticide (Group 27) (4 fl oz/acre) fb POST application of DiFlexx® DUO herbicide (Groups 4 and 27) (30 fl oz/acre) + VaporGrip® Xtra Technology/Buffering Agent*.

Option 3: PRE application of Degree Xtra® Herbicide, a Restricted Use Pesticide (Groups 5 and 15) (3 qt/acre) + Balance® Flexx herbicide, a Restricted Use Pesticide (4 fl oz/acre) fb POST application of Laudis® herbicide (Group 27) (3 fl oz/acre) + DiFlexx® herbicide (12 fl oz/acre) + VaporGrip® Xtra Technology/Buffering Agent*.

Option 4 (for Roundup Ready® Corn 2 Technology): PRE application of TriVolt™ herbicide, a Restricted Use Pesticide (16 fl oz/acre) + Harness® Xtra 5.6L herbicide, a Restricted Use Pesticide (4 qt/acre) fb DiFlexx® DUO herbicide (30 fl oz/acre) + Roundup PowerMAX® herbicide (Group 9) (30 fl oz/acre) + VaporGrip® Xtra Technology/Buffering Agent*.

*Refer to the Bayer DiFlexx® website for more information regarding recommended rates of VaporGrip® Xtra Technology/Buffering Agent.



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Brief Descriptions of Herbicides

Balance® Flexx herbicide, a Restricted Use Pesticide (Isoxaflutole + CSI Safener) can be applied to corn from burndown or preplant through the V2 growth stage, including sandy soils. Its Crop Safety Innovation (CSI) Safener enables corn plants to better withstand herbicidal activity, which can lead to increased root growth and plant health.

Degree Xtra® herbicide, a Restricted Use Pesticide (Acetochlor + Atrazine) delivers an immediate dose of atrazine through micro-encapsulation when soil temperatures rise with a slow release of acetochlor. The process allows for improved crop safety and longer-lasting residual control of key grass and broadleaf weeds. This product can be applied postemergence until corn reaches 11 inches in height.

DiFlexx® herbicide (Dicamba + CSI Safener) can be applied in corn from pre-emergence to postemergence through V10 stage of growth (10 leaf collar) or 36 inches tall, whichever occurs first. Inclusion of VaporGrip® Xtra Agent is strongly recommended when using this herbicide. This product offers extremely fast and highly effective control of tough-to-control broadleaf weeds.

DiFlexx® DUO herbicide (Tembotrione + Dicamba + CSI Safener) is a selective preemergence and postemergence herbicide with two effective sites of action that can manage tough-to-control weeds such as waterhemp and glyphosate-resistant Palmer amaranth. DiFlexx® DUO herbicide should be applied as a directed spray application when corn is from the V7 thru V10 growth stages (7 to 10 collars), up to 36 inches tall, or up to 15 days prior to tassel, whichever occurs first.

Harness® MAX herbicide (Acetochlor + Mesotrione) offers the residual benefits of Harness® herbicide with the added postemergence and residual activity of mesotrione for control of tough-to-control weeds in corn. This product can be applied POST in corn up to 11 inches in height.

Harness® Xtra 5.6L herbicide, a Restricted Use Pesticide (Acetochlor + Atrazine) provides broad spectrum control of more than 40 grasses and broadleaf weeds. This product may be applied postemergence until corn reaches 11 inches in height.

Laudis® herbicide (Tembotrione) provides postemergence control of grass and broadleaf weeds and is also effective on the toughest broadleaf weeds, including glyphosate-, PPO-, ALS-, and dicamba-resistant weeds. Broadcast applications of Laudis® herbicide must be made to field corn from emergence up to the V8 stage of growth.

Roundup PowerMAX® 3 herbicide (Glyphosate) is formulated for Roundup Ready® crops and is generally a non-selective herbicide that gives broad-spectrum control of many broadleaf weeds and grasses. It contains a surfactant with the highest concentration of glyphosate acid equivalent per gallon in the US market, as of December 2023. It may be applied alone or in a tank-mix over the top of field corn products with Roundup Ready® 2 Technology from emergence through V8 growth stage (8 leaves with collars), or until corn plant height reaches 30 inches (freestanding), whichever comes first.

TriVolt™ herbicide, a Restricted Use Pesticide (Thiencarbazone-methyl + Isoxaflutole + Flufenacet + CSI Safener) offers burndown of grass and broadleaf weeds and keeps field clean with residual control through crop canopy closure. This product can be applied early postemergence to corn in tank mixture with atrazine from spiking through the 2-leaf collar growth stage. Tank-mixtures with other herbicides or adjuvants are not advised for early postemergence.



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Sources

- ¹Hager, A. 2022. Waterhemp resistance to Group 15 herbicides. Take Action Herbicide-Resistance management. <https://iwilltakeaction.com/wp-content/legacy/uploads/files/61947-3-ta-group15-factsheet-final.pdf>
- ²Arana, J. and Meyers, S. 2020. Waterhemp. Purdue University, Vegetable Crops Hotline. Article 675. <https://vegcropshotline.org/article/waterhemp/>
- ³Peterson, D.E. (Ed.) 2019. (Horak, M.J., Peterson, D.E., Chessman, D.J., and Wax, L.M. 1994.) Pigweed identification. A pictorial guide to the common pigweeds of the Great Plains. K-State Research and Extension. Kansas State University. https://bookstore.ksre.ksu.edu/pubs/pigweed-identification-a-pictorial-guide-to-the-common-pigweeds-of-the-great-plains_S80.pdf

Legal Statements

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS.

Performance may vary, from location to location and from year to year, as local growing, soil and environmental conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on their growing environment.

The recommendations in this material are based upon trial observations and feedback received from a limited number of growers and growing environments. These recommendations should be considered as one reference point and should not be substituted for the professional opinion of agronomists, entomologists or other relevant experts evaluating specific conditions.

Balance® Flexx, Degree Xtra®, Harness® Xtra 5.6L Herbicide and TriVolt™ are restricted use pesticides. Not all products are registered for use in all states and may be subject to use restrictions. 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 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. Not all tank mix product formulations have been tested 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. Bayer, Bayer Cross, Degree Xtra®, DiFlexx®, Laudis®, Roundup PowerMAX®, TriVolt™ and VaporGrip® are trademarks of Bayer Group. All other trademarks are the property of their respective owners. For additional product information call toll-free 1-866-99-BAYER (1-866-992-2937) or visit our website at www.BayerCropScience.us. Bayer CropScience LP, 800 North Lindbergh Boulevard, St. Louis, MO 63167. ©2024 Bayer Group. All rights reserved. 1223_445554.

