

MANAGING HERBICIDE-RESISTANT MARESTAIL (HORSEWEED)

Marestail or horseweed is a winter annual weed that germinates in both the fall and spring and completes its life cycle in late spring/early summer. It is especially adapted to a no-till crop production system.

Fall-germinated marestail overwinters in the rosette stage and bolts (starts stem elongation) in the spring. Marestail is most susceptible to herbicide control when it is still in the rosette stage of development, or before bolting. Once the weed starts to bolt (4-6 in. tall), it becomes difficult to kill with most herbicides.

Because of its capacity to germinate during the fall through late spring/early summer, a single herbicide application will not be sufficient for season-long control of marestail, particularly in no-till systems where its control is totally dependent on herbicides. Thus, a comprehensive management program using diverse herbicides in both the fall and spring is required for its control throughout the year.

Many populations of marestail are now resistant to glyphosate (Group 9) and ALS-inhibiting (Group 2) herbicides. Any weed management program for either continuous soybeans or for crops that are grown in rotation with soybeans should include aggressive measures to control herbicide-resistant (HR) marestail so that the amount of seed production is drastically reduced.

Burndown herbicide applications made in the fall or early spring for marestail control will be enhanced by mixing with residual herbicides. This will also delay the development of glyphosate-resistant (GR) weeds. If applying glyphosate in a burndown mix, include herbicides with at least two other MOA's in the mix.

A fall burndown plus residual herbicide treatment is used to control fall-emerged plants. It is not a substitute for a spring application of burndown and preemergent (PRE) residual herbicides because fall-applied residual herbicides will not control marestail that emerges in May and June. The majority of the residual herbicide should be applied in the spring.

The following is a compilation of the best management practices for control of HR marestail from the indicated sources.

[Control of marestail in no-till soybeans](#), by Dr. Mark Loux, Ohio State Univ., and Dr. Bill Johnson, Purdue Univ.

- Marestail is most easily controlled when in the seedling or rosette stage.
- Herbicide programs should consist of 1) both fall and spring burndown treatments to ensure no marestail plants at soybean planting, and 2) PRE herbicides applied before or at planting to control marestail for 6-8 weeks after planting. PRE herbicides applied in the fall will not persist into the spring.
- Glyphosate (Group 9) alone is not a sufficient burndown herbicide treatment since most marestail is GR.
- Fall-applied herbicide treatments should include 2,4-D or dicamba (Group 4) as the base herbicide in combination with glyphosate and/or other efficacious herbicides to control other weeds.
- Spring-applied residuals should include products that contain non-ALS herbicides such as metribuzin (Group 5), Valor (Group 14), and Authority (Group 14). It is imperative that soybean planting be made into a seedbed with no marestail.
- Spring-applied burndown treatment should include 2,4-D (Group 4) in combination with glyphosate (Group 9), Sharpen/Verdict (Group 14), gramoxone (Group 22), metribuzin (Group 5), or glufosinate (Group 10).
- Dicamba (Group 4) vs. 2,4-D (Group 4) may improve control of marestail, but has more stringent time restrictions for a following crop.
- If a fall burndown treatment was not applied, a split-spring treatment is advised, with the first application being early enough to control overwintered marestail.
- Liberty (Group 10) herbicide applied POST to LibertyLink soybean varieties is the most effective tool for management of HR marestail following an

effective burndown and PRE herbicide regimen.

[Update on Herbicide Options for Horseweed Control in Burndown Applications](#), by Dr. Larry Steckel, Univ. of Tenn., 2018.

- Xtend soybean varieties allow dicamba (Group 4) herbicides to be applied as a burndown closer to planting than non-Xtend varieties.
- As of 2018, Elevore (Group 4) herbicide became available, and is very effective at controlling horseweed that is up to 8 in. tall.
- Tank mixes of dicamba (Group 4) + Sharpen/Verdict (Group 14), Sharpen (Group 14) + Elevore (Group 4), or Elevore (Group 4) + FirstRate/Surveil (Group 2) have provided greater than 95% control of 8-in.-tall horseweed.
- As the above points indicate, premixes or tank mixes that contain herbicides from more than one group or family are recommended to accomplish resistance management goals.
- It is also recommended that these tank mixes also include herbicides such as glyphosate (Group 9) or Select (Group 1) that have activity against grasses that are likely to be present when burndown applications are made.

[Management of Herbicide-Resistant Horseweed \(Marestail\) in No-Till Soybeans](#), technical editing by Drs. Loux and Johnson, USB TakeAction, 2020.

This resource is likely the most authoritative and up-to-date, and covers the entire gamut of guidelines for control of marestail in soybean. Its content includes specific herbicides that are recommended based on the time of year of their application and the herbicide trait technology (LibertyLink and LL-GT27, RR2X, and Enlist E3) of the soybean variety that will be grown on the site of application.

[2020 Summary of Herbicide Evaluations for Marestail \(Horseweed\) Control in Soybean](#), by Dr. Prashant Jha, Iowa State Univ., 2021.

- Engenia (dicamba), Enlist One (2,4-D choline), and Liberty herbicides all provided greater control

of marestail when they were applied at the rosette vs. the bolting stage of marestail.

- In an Xtend soybean trial, fall-applied herbicides that contained a mix of dicamba and 2,4-D provided complete control of marestail until early spring (Apr. 15 in Iowa). However, due to lack of residual control, new marestail plants emerged in the spring and their control was reduced at time of planting (May 15).
- A residual herbicide included in a 2,4-D-based fall burndown program resulted in >98% control of marestail at soybean planting.
- It is recommended that residual herbicides be included in spring burndown applications to control late-emerging marestail and other early-emerging broadleaf weeds.
- Glufosinate (Liberty) herbicide should be added in spring burndown programs that use either 2,4-D choline or dicamba in Enlist E3 (tolerance to glyphosate, 2,4-D choline, and glufosinate) or XtendFlex (tolerance to glyphosate, dicamba, and glufosinate) soybean varieties, respectively.
- Research being conducted at Iowa State Univ. indicates that a fall-planted cereal rye cover crop would be an effective complement to herbicides for managing marestail.

OVERALL CONCLUSIONS

Since GR marestail cannot be visually detected prior to the application of control measures, the best management approach is to tank-mix glyphosate with herbicide(s) that have a second mode of action. The second mode of action will control GR marestail if present; if GR marestail is not present, the selection pressure for GR marestail will be lowered.

All herbicides that are applied in the fall and early spring should be applied to actively growing marestail during periods of mild temperatures.

Use 2,4-D as the base herbicide in fall applications. Glyphosate can be added to the fall mix to control grasses and other broadleaf weeds. However, if a winter vegetation cover is desired, this may not be preferable.

If a fall treatment is not applied, spring herbicide treatments for marestail control should start when the weed is in the rosette stage, which will occur early. If dicamba or 2,4-D treatments are applied in the spring, the preplant interval must be observed to avoid soybean injury. This of course is not a factor for Xtend and XtendFlex (dicamba-tolerant) and Enlist (2,4-D-tolerant) soybean varieties.

If burndown has been delayed until near planting and marestail has bolted, tank mixes of glyphosate with FirstRate, Classic, Gramoxone, Sharpen, Optill, or 2,4-D should be considered.

Liberty herbicide can also be used to control larger marestail. Liberty can be used PRE on any soybean variety.

The integration of both residual and non-residual herbicides in a marestail management program is necessary to control both the GR-marestail that is present and to prevent subsequent emergence of marestail during the growing season. Ensuring a weed-free start at planting is more important than having 100% control of later-emerging marestail.

To maximize control of marestail that will emerge in May and June, the majority of any residual herbicide should be applied in the spring close to planting time. Herbicide mixes such as Envive, Valor XLT, Gangster, Sonic, and Canopy contain two MOAs, and this will ensure effectiveness on ALS-resistant marestail.

As mentioned above, there are two approaches to marestail control in the spring. They are:

- Application of burndown plus residual herbicides in early spring followed by additional burndown and residual herbicides to control small marestail that are present at planting or prior to soybean emergence.
- Application of burndown plus residual herbicides close to planting time. This option may be enhanced by a fall control program that provides effective control through winter and early spring up to soybean planting.

Tradeoffs to these two approaches are:

- Applying the combination burndown + residual herbicides early in the spring (weeks ahead of planting) gives more consistent control of emerged plants, but can result in less persistence of the residual herbicide into the growing season when marestail is still emerging.
- Applying later in the spring (near planting time) will result in the opposite effect—i.e., increased risk of ineffective burndown of emerged plants that may be past the size for optimum control, but lengthened residual effectiveness.

With widespread resistance of marestail to glyphosate and ALS-inhibitor herbicides, growing Liberty Link soybeans in conjunction with applications of burndown and residual herbicides followed by application of POST Liberty herbicide is the most effective system for controlling and/or managing GR marestail. In fact, Liberty herbicide applied to Liberty Link soybeans is the only consistently effective POST herbicide for marestail control. Maximum effectiveness will only be achieved when Liberty is applied to marestail that is < 6 in. tall. With the availability of XtendFlex soybean varieties in 2021, this option is a valuable addition to the marestail control arsenal. However, this option should be rotated with non-Liberty herbicides to reduce selection pressure for resistance to glufosinate.

All herbicides listed in the above narrative plus others not listed are rated to control weeds other than marestail. Therefore, they should be selected to manage other broadleaf and grass weed species that will be present in a particular field and that are listed as controlled by the chosen herbicide or mix. Click [here](#) for Weed Control Guides for the Midsouthern States to find ratings for each herbicide's control of individual weed species in addition to marestail.

CAUTIONS

When using metribuzin or a herbicide mix that contains metribuzin, check [selected varieties to ensure](#)



[tolerance to this herbicide.](#)

Glyphosate + ALS-inhibiting herbicides such as Classic, FirstRate, and Synchrony should not be used where both GR- and ALS-resistant marestail are present.

POST Glyphosate should only be applied to RR soybeans.

POST Liberty should only be applied to Liberty Link soybean varieties.

POST dicamba herbicides should only be applied to Xtend and XtendFlex soybean varieties.

POST 2,4-D herbicides should only be applied to Enlist soybean varieties.

Click [here](#) to access labels for all herbicides mentioned in this article.

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