

Control of Marestalk in No-till Soybeans

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Marestalk Biology

- Marestalk (aka horseweed) has two primary periods of emergence - from late summer into fall, and from late March through June. Spring-emerging marestalk has been the most problematic to manage in the southern half of Ohio and Indiana, especially the plants that emerge in May and June.
- Marestalk plants overwinter in the rosette stage, and remain in this low-growing stage through late April, followed by stem elongation (bolting) and growth to an eventual height of 3 to 6 feet. Plants that emerge the previous fall will start stem elongation earlier than spring-emerging plants.
- Marestalk is most easily controlled when in the seedling or rosette stage, and burndown herbicides should be applied prior to stem elongation.
- Marestalk competes with the soybeans throughout the growing season, and reduces crop yield. Marestalk matures in late summer or early fall, and large mature plants can interfere with soybean harvest.
- Marestalk plants can produce up to 200,000 seed that are transported by wind, providing for effective spread of herbicide-resistant populations.



Soybean yield loss due to marestalk

- Herbicide programs must consist of: 1) fall and spring burndown treatments (or two spring treatments - early spring and at plant) to ensure that the field is free of marestalk at the time of soybean planting, and 2) spring-applied residual (PRE) herbicides to control marestalk for another 6 to 8 weeks after planting.
- Failure to follow these guidelines can result in poor control and reduced soybean yield. We observed the following soybean yields in a 2010 OSU marestalk study:

51 bu/A - the burndown treatment failed to control emerged plants

57 bu/A - the burndown treatment was effective, but there was no residual herbicide

65 bu/A - the burndown was effective and effective residual herbicides were used



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Herbicide resistance in marestail

- Most populations of marestail in Ohio and Indiana are resistant to glyphosate, and will not be controlled by burndown or postemergence applications of glyphosate alone.
- Many marestail populations are now multiple-resistant, to both glyphosate (group 9) and ALS-inhibiting herbicides (group 2 - e.g. Classic, FirstRate). Growers should therefore not expect to obtain effective POST control in soybeans with combinations of glyphosate plus Classic, Synchrony, or FirstRate. Postemergence PPO-inhibiting herbicides (group 14), such as Flexstar, Cobra, and Cadet, also do not control marestail.



Photos: multiple-resistant marestail surviving treatment with (from left to right): glyphosate alone, ALS inhibitor alone, and a combination of ALS inhibitor and glyphosate

Other Impacts of glyphosate + ALS multiple resistance

- Fall-applied Canopy or other chlorimuron- or cloransulam-containing herbicides will not provide residual control of ALS-resistant marestail into spring, and residual herbicides should largely be reserved for spring application (at least with regard to marestail - residual control of other weeds can occur).
- Spring-applied residuals should include active rates of non-ALS herbicides - metribuzin, flumioxazin (Valor), or sulfentrazone (Authority). Low rates of premix products (Canopy, Valor XLT, Sonic, Matador, etc) may not provide a high enough rate of the non-ALS herbicide.
- In burndown applications, there will be no added effectiveness on emerged marestail from products that contain chlorimuron or cloransulam, which makes the other herbicides in the mix more important.

LibertyLink soybeans - the most effective marestail control strategy

- LibertyLink soybeans are the most effective tool for management of herbicide-resistant marestail, especially in fields with high marestail populations.
- Use burndown and residual herbicides as outlined on the next two pages. Apply Liberty POST (29 oz/A) before marestail plants exceed 6 inches in height. Liberty can be applied POST at rates up to 36 oz/A for taller plants or plants that have survived previous herbicide treatments, but control may be variable. Follow with a second POST application of Liberty as necessary.
- Liberty is a contact herbicide and effective activity is dependent upon use of the appropriate spray volume (at least 15 gpa) and nozzles. See label for specific information.

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Steps for effective management of marestalk

1. Use fall herbicide treatments in fields with a history of problems or where marestalk seedlings are observed in fall. The primary goal of a fall treatment is control of emerged plants, and it is not a substitute for a preplant herbicide treatment the following spring. An application of burndown and residual herbicides is still required closer to the time of planting in fields that were treated in the fall. For fall applications, we suggest using 2,4-D as the base herbicide to control marestalk, and combining it with one of the following to ensure control of other winter weeds:

- glyphosate; dicamba (or premix - Brash, WeedMaster, Outlaw, Rifle); Basis; Express; a low rate of Canopy/Cloak EX or DF; or metribuzin
- can add Canopy/Cloak to other herbicide combinations to obtain residual control of weeds into spring. However, do not expect residual from fall-applied Canopy/Cloak to adequately control spring-emerging marestalk. We do not recommend the use of other residual herbicides in the fall due to cost and lack of residual control into spring.
- can add Basis, or low rate of metribuzin or Canopy/Cloak to early-fall applications to control weeds that emerge later in fall, but this should not be needed from mid-October on.
- Do not overspend on fall treatments. Keep the cost of herbicides in the \$6 to \$15 range.

2. Apply effective burndown herbicides in spring. Do not plant into existing stands of marestalk. Start weedfree at the time of planting by using one of the following preplant herbicide treatments, applied when marestalk plants are still in the rosette stage. Note - tillage close to time of planting also effectively removes marestalk, but must thoroughly mix the upper few inches of soil and uproot existing plants.

- 2,4-D ester plus glyphosate (1.5 lb ae/A)
- Saflufenacil product (Sharpen or Verdict) plus MSO (1% v/v) plus either glyphosate or Liberty
- 2,4-D ester plus glyphosate plus Sharpen or Verdict plus MSO (1% v/v)
- 2,4-D ester plus Gramoxone (3 to 4 pts/A) plus a metribuzin-containing herbicide
- Liberty (29 to 36 oz/A) or Liberty plus a metribuzin-containing herbicide
- The mixture of glyphosate and 2,4-D ester applied in the spring has become more variable for control of marestalk over time, especially in fields that were not treated the previous fall. Plants should be newly emerged and no larger than the rosette stage at the time of application for best results. In fields where this mixture has previously failed to provide effective control, add Sharpen or use one of the other burndown treatments listed above.
- Control can be improved by using the highest rate of a 2,4-D ester product that is allowed, based on the interval between application and soybean planting. For all 2,4-D ester products, rates up to 0.5 lb active ingredient/A must be applied at least 7 days before planting. Rates between 0.5 and 1.0 lb/A should be applied at least 30 days before planting, with the exception of several products (E-99, Salvo, and Weedone 650) that allow 1 lb/A to be applied 15 days before planting.
- Saflufenacil is a contact herbicide and effective activity is dependent upon use of the appropriate spray volume (at least 15 gpa) and nozzles, and the addition of MSO. Saflufenacil products cannot be applied in a mixture with other PPO-inhibiting (group 14) herbicides including: flumioxazin - Valor, Envive/Enlite, Gangster, Fierce; sulfentrazone - Authority products, Sonic; and fomesafen - Prefix, Vise, Torment. See label for most current information.
- In ALS-sensitive populations, the activity of any of the above can be improved with the addition of a herbicide that contains chlorimuron (Canopy/Cloak/Fallout, Valor XLT, Envive, Authority XL) or cloransulam (Gangster, Sonic, Authority First). The addition of metribuzin to any burndown treatment can also improve control of emerged marestalk.
- The addition of dicamba to early spring burndown treatments can improve control of emerged marestalk, especially plants that have overwintered. Dicamba can be more effective than 2,4-D on marestalk in the spring, but has more potential to injure soybeans if the recrop guidelines are not followed. Following dicamba application, soybeans can be planted 14 to 28 days after an inch of rain has occurred (in total). For example, the Clarity label states the following - "following application of Clarity and a minimum accumulation of one inch of rain, a waiting interval of 14 days is required for rates of 8 oz/A or less,

Steps for effective management of marestail

3. Include residual herbicides with the burndown treatment. Add one of the following herbicides or herbicide combinations to the burndown herbicides, for residual control of marestail until the soybean leaf canopy develops.

- Valor, Valor XLT, Envive, Enlite, Fierce, or Gangster
- Authority First, Sonic, Authority XL, Authority Broadleaf, Authority Assist, Authority Maxx, or Spartan
- Metribuzin - Metri DF, Tricor, etc (at least 8 oz/A, and preferably 10 to 12 oz/A), but do not exceed recommended rate for soil type per the label.
- Add metribuzin to other metribuzin-containing products to bring total metribuzin rate to 0.38 to 0.5 lbs ai/A. Products here include: Boundary/Ledger, Canopy/Cloak DF, Intimidator, Matador, Authority MTZ.
- Most consistent control of ALS-resistant populations will occur with rates of these products that maximize the amount of the non-ALS component - flumioxazin, sulfentrazone, or metribuzin.
- Consider adding 4 to 6 oz/A of metribuzin to products that contain flumioxazin or sulfentrazone to improve burndown and residual control. In OSU research, this has been a more consistent approach than relying on any one herbicide.
- Where early spring application is needed due to lack of a treatment the previous fall, increase herbicide rates and consider more complex mixtures (or consider split spring approach - see below). Adding metribuzin to other products can help. Sharpen can be added to early spring treatments of metribuzin to improve residual control, especially at the 1.5 to 2 oz/A rate. These rates must be applied 14 to 44 days before soybean planting, depending upon rate and soil type.

4. No fall treatment? - consider split-spring applications. Failing to treat fields in the fall can result in a population of overwintered marestail plants the following spring, which should be controlled early in spring to ensure effective burndown. Applying all of the burndown and residual herbicide early can result in poor control of plants that emerge mid-season. An alternative approach is to apply burndown herbicides with some of the residual herbicide in early spring, and then when soybeans are planted, apply the rest of the residual herbicide. The second application may require some additional burndown herbicide. Examples here include:

- early spring - glyphosate + 2,4-D + Sonic (2.5 oz/A); at plant - Sonic (2.5 oz) + Gramoxone
- early spring - glyphosate + 2,4-D + metribuzin (4 oz); at plant - Canopy DF (4 oz) + metribuzin (2 oz) + Sharpen (1 oz)
- early spring - glyphosate + 2,4-D + metribuzin (6 oz); 7 days preplant - Envive (4 oz) + 2,4-D ester

5. So this all seems really involved. Can't I just do it all with one spring preplant treatment?

Maybe - but this is not an approach that has consistently worked well (see photos below). This is difficult to accomplish unless the marestail population in the field has been well managed for several years and the population is generally low. Growers should use their own previous experiences here as guidance, and plan on increasing the complexity and rates of the herbicide program. Problems with skipping the fall treatment, and applying everything at once in spring include the following:

- applying early in spring when plants are small can result in poor control of plants that are emerging in mid-season if not enough of the residual herbicide remains
- applying closer to planting to maximize the length of residual often results in less effective control of larger, older marestail plants, especially those that have overwintered.



Left photo - spring application of glyphosate + 2,4-D + residual herbicides (no fall herbicide treatment)

Right photo - fall application of glyphosate + 2,4-D followed by spring application of glyphosate + 2,4-D + residual herbicides

Fall application = early November
Spring application = April 21 (7 days preplant)

