MSPC FINAL REPORT (FY16)
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Herbicide-resistant horseweed (marestail) burndown options in no-till soybean

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MSPC Research Focus Area:

Goal: Manage biotic competition for resources

Priority: *Combat herbicide resistance issues*

Objectives:

1) Evaluate the effectiveness of fall and spring burndown herbicide programs on horseweed control.
2) Compare the length of residual activity of several soil-applied for horseweed control.
3) Provide this additional information on the management of herbicide-resistant horseweed to Michigan soybean producers.

Procedures:

Two field trials were conducted on growers' fields in Shiawassee and Ionia counties to examine various herbicide programs for control of herbicide-resistant horseweed. Horseweed at the Shiawassee county location is glyphosate-resistant and horseweed at the Ionia county location is ALS-resistant. Twenty different herbicide programs: fall followed by spring applications or spring only applications were examined. Plot sizes were 10 feet wide by 35 feet long in no-till fields. Each plot is replicated four times.

Nine different fall-herbicide treatments were applied on November 3 and 4 in Ionia and Shiawassee counties, respectively. These treatments were evaluated at the end of April/early May for horseweed control. Spring treatments were timed to be applied at least 7 days prior to planting. Horseweed control was then evaluated until control was poor. At the Shiawassee county location, control was poor by ~50 days after the spring application, so various POST ALS-inhibiting herbicides were applied on treatments where there was poor control. These plots were then evaluated.

Results and observations:

Shiawassee County:

- There was a high population of glyphosate-resistant horseweed at this location.
- Fall applications of Sharpen at 2 fl oz/A + MSO, 2,4-D ester at 1 pt + glyphosate, Sharpen at 1 fl oz + 2,4-D ester + MSO, and Clarity at 1 pt all provided good to excellent control of horseweed at the time of planting.
- Following each of these treatments with an effective spring burndown treatment, resulted in 99-100% control of horseweed within 21 d after the spring application.
- Spring only treatments provided greater than 90% control within 21 DAT.
- By 47 DAT, several of the herbicide treatments started to break and there were only 5 of 20 treatments that resulted in greater than 90% control. These treatments still provided greater than 80% horseweed control at 60 DAT. All but one of these had a fall burndown herbicide application.

- A subsection of treatments were examined to determine the residual activity of several PRE non-ALS herbicides (Table 1). Authority MTZ at the high rate of 18 oz/A provided 90% control 61 DAT. None of these treatments were above 90% by 96 DAT.
- By 96 DAT, only one treatment had enough residual activity to have 90% horseweed control. The residual control of this treatment combine three sites of action and one of these was the ALS-inhibitor chlorimuron, which probably helped with the longer activity since this population was not ALS-resistant.

Table 1. Residual control of glyphosate-resistant horseweed throughout the growing season with a subsection of residual herbicide treatments. All treatments contained with Roundup PowerMax at 22 fl oz/A + 2,4-D ester (1 pt/A) and were applied at least 7 days prior to planting.

Residual*	**May 18 (21 DAT)**	**June 13 (47 DAT)**	**June 27 (61 DAT)**	**Aug. 1 (96 DAT)**
Metribuzin (8 oz)	98 a	68 c	-	-
Valor (2 oz)	96 a	71 bc	-	-
+ metribuzin (6 oz)	98 a	86 ab	-	-
Spartan (8 fl oz)	97 a	81 b	-	-
Authority MTZ (18 fl oz)	100 a	95 a	90	64
Sharpen (1 oz)	99 a	45 d	-	-
+ metribuzin (6 oz)	100 a	66 c	-	-

- The POST ALS-treatments worked best with the spring treatments that had provided some good initial control, FirstRate at 0.45 oz and Classic at 0.67 oz worked the best.
- Due to the continued emergence of horseweed at this location (including later emergence), even with a good fall and spring treatment growers planting a soybean that would allow them to apply an effective POST would be beneficial for control (LibertyLink or Roundup Ready 2 Xtend). Issues will arise without a POST option.

Ionia County:

- Overall treatments worked well in this trial.
- All fall treatment with the exception of Sharpen 1 oz/A + MSO (81%) provided greater than 90% horseweed control at the spring application timing.
- At 80 d after the spring application, treatments that generally looked the best had a fall followed by spring treatment. Residual herbicide treatment selection was similar for most of the treatments.

Soybean Industry Benefits:

Information from this research has and will be presented at various meetings. This information has also provided us with some additional directions that we need to be looking at for herbicide-resistant horseweed control. It has also been used as background information for the newly updated fact-sheet on “Herbicide-resistant horseweed (marestail) in Michigan” in the

back of the 2017 MSU Weed Control Guide for Field Crops (E0434) and is posted on the MSUweeds.com website.