Evaluation of Westar® and Krovar® to Control Marestail (*Conyza canadensis* (L.) Cronq.) in Bareground Situations

Introduction

Several herbaceous species can be problematic for vegetation managers involved in total vegetation management. Marestail, sometimes referred to as horseweed, can be problematic due to several of its physiological characteristics. Considered a winter or summer annual, germination characteristics of marestail can allow it to have the growth habit of a biennial. Germination of marestail seed can occur from fall through late summer. Seeds germinating in late summer may not be controlled by residual herbicide applications applied in the early spring if the available amount of active ingredient of herbicide has dissipated over the growing season. Seeds that germinate in late summer will overwinter in the rosette form and bolt early the following growing season and require a post application of herbicide to control.

Resistance of marestail to some herbicides can also lead to decreased control. Unfortunately, resistance to a specific mode of action is difficult to confirm. Glyphosate resistant biotypes are believed to occur in western and central Kentucky in production agriculture situations. It is also suspected that marestail may be developing resistance to ALS herbicides and certain biotypes are developing 'multiple resistance' to both glyphosate and ALS herbicides. The lack of control due to the germination characteristics described above may lead to a vegetation manager to assume resistance; however, this may not necessarily be the case.

In terms of total vegetation control scenarios, managers need to find treatments that include multiple modes of action, provide long lasting residual control to allow for one application per growing season, and consider rotating chemistries every few years to further prevent the development of resistance of marestail to glyphosate and ALS herbicides. A trial was initiated in May of 2005 to evaluate Westar (a.i. hexazinone and sulfometuron) and Krovar (a.i. bromacil and diuron) and their ability of provide total vegetation and marestail control.

Methods and Materials

The trial was located at the West Kentucky Research and Extension Center in Princeton, KY. The site had a history of traditional row crop research with appropriate soil characteristics. There is a suspicion that the area has ALS resistant biotypes of marestail present; however, this was never documented with laboratory tests. Dominant vegetation at initiation included marestail, yellow foxtail, and giant ragweed with marestail being the most dominant. The study was installed as a randomized complete block with three replications. Plots were 10' X 30', utilized a 2.5' running check between plots, and were treated with a CO_2 handheld sprayer at 20 GPA. All herbicide treatments included a nonionic surfactant at 0.25 % v/v. Eleven herbicide treatments and one untreated check (Table 1) were evaluated for total vegetation control and marestail control at 63 and 125 DAT. Control data was analyzed using ANOVA and treatment means were separated using Fisher's LSD at $p = 0.05$.

Results

The Payload alone treatment was significantly lower (63 %) than all other treatments tested for marestail control at 63 DAT (Table 1). Control values for this treatment increased at the 125 DAT interval and there were no significant differences across all treatments for marestail control at this evaluation interval. A rate effect was observed for the Westar alone treatments; as rate increased levels of bareground increased from 60 % to 95 % at 63 DAT. These control levels were not sustained; however, and control levels dropped below operationally acceptable levels for all Westar alone treatments at 125 DAT. The Krovar alone treatment provided satisfactory bareground levels at 63 DAT (92 %) and maintains effective levels of bareground through 125 DAT (90 %). The addition of Krovar to Westar did increase levels of bareground to operationally acceptable levels and above that of Krovar alone; however, there were no significant differences between any treatments that included Krovar at any evaluation interval. The Payload alone treatment never obtained operationally successful levels of total vegetation control and the Oust alone treatment, even though it provided satisfactory levels of bareground at 63 DAT (85 %), failed to maintain high levels of control at 125 DAT (43 %).

It is still unclear if the site was dominated by ALS resistant marestail. The site had been treated with FirstRate® (a.i. cloransulam methyl), an ALS herbicide, in the past and poor control levels were realized. Effective control levels were seen in this trial with Oust (a.i. sulfometuron), another type of ALS herbicide. This trial did show the effectiveness of another type of chemistry, the photosynthesis inhibitors bromacil and diuron (Krovar), to provide satisfactory levels of marestail control. This provides for an alternative chemistry for vegetation managers to prevent the establishment of marestail resistance while managing for total vegetation control.

Table 1: Treatment list and marestail and total vegetation control values

Treatment	Product(s)	Rate per acre	Percent Control Marestail		Total Vegetation Control	
			63 DAT	125 DAT	63 DAT	125 DAT
1	Westar	0.5 lb	97a	98a	60c	23ef
2	Westar	1 lb	98a	99a	78b	40de
3	Westar	1.5 lb	98a	99a	85ab	55cd
4	Westar	2 lb	98a	99a	95ab	72bc
5	Krovar I	6 lb	97a	99a	92ab	90ab
6	Westar + Krovar I	1 lb + 6 lb	98a	99a	93ab	96a
7	Westar + Krovar I	2 lb + 6 lb	98a	99a	98a	99a
8	Westar + Krovar I	1 lb + 8 lb	98a	99a	97a	99a
9	Westar + Krovar I	2 lb + 8 lb	100a	99a	95ab	99a
10	Payload	0.5 lb	63b	98a	30d	17f
11	Oust	0.125 lb	95a	96a	85ab	43de
12	Untreated		0	0	0	0
$LSD_{0.05}$			13.9	3.2	17.7	21.0

Note: Treatment means followed by the same letter are not statistically different using Fisher's LSD at p = 0.05. Untreated means were removed from analysis.