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Nicholas Mitchell

Kansas State University, nmitch2@ksu.edu

Jared Hoyle

Kansas State University, jahoyle@ksu.edu

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Abstract

Windmillgrass (*Chloris verticillata* Nutt.) populations commonly infest turfgrass systems in the midwest, which result in aesthetically unacceptable turfgrass stands. Pylex (topramezone) and Acclaim Extra (fenoxaprop) have resulted in fair control of windmillgrass with single applications. For adequate control of windmillgrass, a sequential application of Tenacity (mesotrione), three weeks after the initial application, is recommended. Additionally, studies have shown the addition of triclopyr to HPPD inhibitor herbicides increases windmillgrass control in a controlled environment. Field experiments were initiated in 2018, at the Kansas State University Rocky Ford Turfgrass Research Center in Manhattan, KS, to determine the influence of herbicide combinations with the addition of triclopyr and sequential applications on windmillgrass control.

Keywords

windmillgrass, weed control, herbicide combination, sequential applications

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Influence of Herbicide Combinations and Sequential Applications on Windmillgrass (*Chloris verticillata*) Control

Nicholas Mitchell and Jared Hoyle

Summary

Windmillgrass (*Chloris verticillata* Nutt.) populations commonly infest turfgrass systems in the midwest, which result in aesthetically unacceptable turfgrass stands. Pylex (topramezone) and Acclaim Extra (fenoxaprop) have resulted in fair control of windmillgrass with single applications. For adequate control of windmillgrass, a sequential application of Tenacity (mesotrione), three weeks after the initial application, is recommended. Additionally, studies have shown the addition of triclopyr to HPPD inhibitor herbicides increases windmillgrass control in a controlled environment. Field experiments were initiated in 2018, at the Kansas State University Rocky Ford Turfgrass Research Center in Manhattan, KS, to determine the influence of herbicide combinations with the addition of triclopyr and sequential applications on windmillgrass control.

Rationale

Windmillgrass is a problematic perennial grassy weed commonly found in established turfgrass in the midwest. Currently, mesotrione and topramezone (4-hydroxyphenylpyruvate dioxygenase [HPPD] inhibitor) are the only available labeled post-emergent active ingredients available for windmillgrass control in turfgrass systems.

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Objective

The objective of this study was to determine the effect of sequential postemergent herbicide applications and the addition of triclopyr to HPPD inhibitor herbicides on windmillgrass control.

Study Description

Research trials were initiated in 2018 at Rocky Ford Turfgrass Research Center in Manhattan, KS. Windmillgrass (*Chloris verticillata* Nutt.) populations consisted of 65% cover in a low maintenance tall fescue (*Schedonorus arundinaceus*) system. Throughout the research, trial plots were maintained at 3 inches and no supplemental irrigation was applied. Treatments were arranged in a randomized complete block design with 4 replications. Seven herbicide combinations were applied as a single application or with a sequential application, and a non-treated control was included for comparison for a total of 15 individual treatments. All herbicide treatments were applied on August 16, 2018, and treatments that received a sequential application were applied on September 9, 2018. Herbicide treatments consisted of Pylex (topramezone) at 2 fl oz/a, Tenacity (mesotrione) at 8 fl oz/a, Acclaim (fenoxaprop) at 39 fl oz/a, Alligare Triclopyr 4 (triclopyr) at 32 fl oz/a, Pylex (topramezone) at 2 fl oz/a + Alligare Triclopyr 4 (triclopyr) at 32 fl oz/a, Tenacity (mesotrione) at 8 fl oz/a + Alligare Triclopyr 4 (triclopyr) at 32 fl oz/a, Acclaim (fenoxaprop) at 39 fl oz/a + Alligare Triclopyr 4 (triclopyr) at 32 fl oz/a, and a non-treated control. A surfactant was added to each herbicide treatment according to the manufacturer's directions. Herbicide treatments were applied using a CO₂ pressurized backpack boom sprayer calibrated to deliver 43.56 GPA at 37 psi. Data collected for research trials consisted of visual percent windmillgrass cover (0–100%) and were transformed to percent windmillgrass control for presentation purposes. Evaluations were conducted weekly for 8 weeks after the initial application. Analysis of variance (ANOVA) was performed in SAS 9.4 (SAS Institute Inc., Cary, NC) and means were separated according to Fisher's protected least significant difference (LSD) level at 0.05.

Results

Pylex (topramezone) applied at 2 fl oz/a on August 16, 2018, resulted in 87% windmillgrass control at 8 weeks after treatment (WAT). Single applications of Pylex (topramezone) at 2 fl oz/a + Alligare Triclopyr 4 (triclopyr) at 32 fl oz/a, and Tenacity (mesotrione) at 8 fl oz/a + Alligare Triclopyr 4 (triclopyr) at 32 fl oz/a resulted in 96% and 97% windmillgrass control 8 WAT, respectively. All treatments that received a sequential application on September 9, 2018, excluding the non-treated control and Acclaim (fenoxaprop) at 39 fl oz/a, provided 100% windmillgrass control at 8 WAT. Acclaim (fenoxaprop) at 39 fl oz/a applied on August 16, 2018, followed by an application at 39 fl oz/a on September 9, 2018, resulted in 88% windmillgrass control.

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Table 1. Windmillgrass (*Chloris verticillata* Nutt.) control 8 weeks after initial application from single and sequential applications at the Kansas State University Rocky Ford Turfgrass Research Center in Manhattan, KS, in 2018

Treatment	Herbicide	Rate	Application date	Control ^a —%—
1	Non-treated ^b	-	-	4 C ^c
2	Pylex + MSO ^d	2 fl oz/a + 1% v/v	Aug. 16, 2018	87 A
3	Tenacity + NIS ^d	8 fl oz/a + 0.25% v/v	Aug. 16, 2018	9 C
4	Acclaim Extra + NIS	39 fl oz/a + 32 fl oz/100 gal	Aug. 16, 2018	16 C
5	Triclopyr	32 fl oz/a	Aug. 16, 2018	64 B
6	Pylex + Triclopyr + MSO	2 fl oz/a + 32 fl oz/a + 1% v/v	Aug. 16, 2018	96 A
7	Tenacity + Triclopyr + NIS	8 fl oz/a + 32 fl oz/a + 0.25% v/v	Aug. 16, 2018	97 A
8	Acclaim Extra + Triclopyr + NIS	39 fl oz/a + 32 fl oz/a + 32 fl oz/100 gal	Aug. 16, 2018	63 B
9	Pylex + MSO	2 fl oz/a + 1% v/v	Aug. 16, 2018 fb ^e Sept. 9, 2018	100 A
10	Tenacity + NIS	8 fl oz/a + 0.25% v/v	Aug. 16, 2018 fb Sept. 9, 2018	100 A
11	Acclaim Extra + NIS	39 fl oz/a + 32 fl oz/100 gal	Aug. 16, 2018 fb Sept. 9, 2018	88 A
12	Triclopyr	32 fl oz/a	Aug. 16, 2018 fb Sept. 9, 2018	100 A
13	Pylex + Triclopyr + MSO	2 fl oz/a + 32 fl oz/a + 1% v/v	Aug. 16, 2018 fb Sept. 9, 2018	100 A
14	Tenacity + Triclopyr + NIS	8 fl oz/a + 32 fl oz/a + 0.25% v/v	Aug. 16, 2018 fb Sept. 9, 2018	100 A
15	Acclaim Extra + Triclopyr + NIS	39 fl oz/a + 32 fl oz/a + 32 fl oz/100 gal	Aug. 16, 2018 fb Sept. 9, 2018	100 A

^aRatings were conducted 8 weeks after initial application; October 11, 2018.

^bNon-treated control contained approximately 65% windmillgrass cover throughout the research trial. Only 4% control was observed on October 11, 2018, due to natural declining of windmillgrass populations because of environmental conditions.

^cTreatment means followed by a common capital letter are not significantly different according to Fisher's protected LSD ($\alpha=0.05$).

^dMethylated seed oil (MSO) and non-ionic surfactant (NIS) were added to treatments according to herbicide manufacture's recommendations.

^efb = followed by.

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