Creeping Bentgrass Seed Head Reduction

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Abstract

In 2003, glyphosate resistant creeping bentgrass (*Agrostis stolonifera* L.) accidentally escaped from production fields, and is now found growing along irrigation ditches in Jefferson County, Oregon. The objective of this study was to evaluate the use of diquat and propane burners applied at the boot and flowering stage for creeping bentgrass seed head reduction. Results suggest that these methods can indeed become effective tools in a mitigation control program. A significant reduction in the number of seed heads per plant was observed with all treatments 21 days after treatment, although results varied among treatments and with the time of application. The percent seed head reduction with diquat was greater when applied at flowering rather than at the boot stage. Diquat applied at flowering with the use of Class Act NG® as the non-ionic surfactant was 98 percent compared to 93 percent with Liberate®. Nevertheless, the most effective treatment in reducing seed production was the flaming of the bentgrass plants with a propane burner either at the boot or flowering stage.

Introduction

A mitigation program has been implemented to control and ultimately eradicate creeping bentgrass. Since plants are growing along irrigation ditches, herbicide options for control are limited to products with aquatic use labels. These alternatives are further restricted when water for irrigation runs through, increasing the risk of herbicide carryover and crop injury in non-targeted fields. It is during this period that killing the plants is very difficult; therefore, reducing seed head production is critical to minimizing seed dispersal. The objective of this study was to evaluate the use of diquat and propane burners applied at the boot and flowering stage for creeping bentgrass seed head reduction.

Materials and Methods

A field study was conducted at the Central Oregon Agriculture Research Station in Madras, Oregon, during 2012. The study design was a randomized complete block with four replications. Plot size was 10 feet wide by 5 feet long. In April 14, six creeping bentgrass plugs (3 inches by 2 inches) were planted per plot, fertilized and irrigated periodically. Herbicide treatments were applied with a hand sprayer at 7 fluid ounces per plant, and a propane vapor torch burner was used for the flame burning treatment. Application date, environmental conditions, creeping bentgrass growth stage are detailed in Table 1. Diquat was the herbicide tested with the addition of two different non-ionic surfactants. Class Act NG®, a non-ionic surfactant plus nitrogen source, and Liberate®, a non-ionic low foam penetrating surfactant. Application rates for each time of application and spray adjuvants are detailed in Table 2. The efficacy of diquat in creeping bentgrass seed head reduction was determined by counting the number of seed heads per plants 21 and 90 days after the last treatment (DAT).

Results and Discussion

A significant reduction in the number of seed heads per plants was observed with all treatments 21 DAT when compared to the untreated plants but differences existed between treatments and time of application (Table 2). For instance, the percent seed head reduction with diquat was greater when applied at flowering rather than at the boot stage. Also, at 21 DAT the percent seed head reduction with application of diquat at flowering with the use of Class Act NG® as the non-ionic surfactant was 98 percent compared to 93 percent with Liberate®. Nevertheless, the most effective treatment in reducing seed production was the flaming of the bentgrass plants with a propane burner either at the boot or flowering stage. Flaming also reduced the size of the treatment plants, and the effects were still visible at the end of the growing season. The level of seed head reduction observed 90 DAT were similar to the 21 DAT. The only change was that differences between time of application of diquat plus Liberate® were no longer significant. The bentgrass foliage at 90 DAT had totally recuperated from the burn down damage caused by the contact action of diquat. The lack of additional seed head production by the bentgrass plants also suggests that the stress cause by the herbicide application or the burning was severe enough to affect further seed head production. Results from this study suggest that the use of diquat or propane burners can be used for reducing creeping bentgrass seed head production and can become effective tools of a mitigation control program.

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Table 1. Applications dates, environmental conditions, and creeping bentgrass growth stage at time of application.

	A	B
Application Date	6/16/2012	7/1/2012
Time of Day	10 AM	11 AM
Air Temperature	69	69
Relative Humidity	45	53
Wind Speed	2	4
Wind Direction	SSE	NW
Crop Stage	Boot	Flowering
Bentgrass Diameter	----------23”----------	

Table 2. Percent seed heads reduction, 21 and 90 days after treatment.

	Treatment[12]		Rate	Time of application	21 DAT	90 DAT
1	Diquat	0.5	% v/v	Boot	78 b	77 b
	Class Act NG®	5	% v/v			
2	Diquat	0.5	% v/v	Flowering	98 d	95 c
	Class Act NG®	5	% v/v			
3	Diquat	0.5	% v/v	Boot	82 b	83 b
	Liberate®	0.5	% v/v			
4	Diquat	0.5	% v/v	Flowering	93 c	86 b
	Liberate®	0.5	% v/v			
5	Propane burner		20 sec/pl	Boot	100 e	100 d
6	Propane burner		20 sec/pl	Flowering	100 e	100 d
7	Untreated check				0 a	0 a

[1]Abbreviations: DAT, Days After Treatment; NIS, % v/v, percent volume of herbicide per volume of spray solution; sec/pl, seconds per plant

[2]Means followed by the same letter are not significantly different