Selective Creeping Bentgrass Removal from Perennial Ryegrass with Mesotrione (Tenacity)

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Introduction

Contamination of turfgrass stands with creeping bentgrass (*Agrostis stolonifera* L.) can occur in many situations were turfgrass is grown, for example, homelawns, public parks, golf courses, etc. This can have an adverse effect on the management, playablity, and aesthetics of the turfgrass stand. This study focuses on developing an effective program for the selective removal of creeping bentgrass from a perennial ryegrass (*Lolium perenne* L.) stand using mesotrione ('Tenacity 4SC').

Materials and Methods

A 4-year study was conducted at the Washington State University Turfgrass and Agronomy Research Center, in Pullman, WA, to develop an effective program to remove creeping bentgrass (cv. 'T-1') from 'Gallery' perennial ryegrass with Tenacity. The perennial ryegrass stand was a green's surround growing in a Palouse silt loam soil with bentgrass contamination (approx. 70%). Following 2007 Tenacity applications and overseeding with 'Auburn Trilogy' perennial ryegrass, the plots were divided in half; one half left untreated and the other half received multiple Tenacity applications in 2008 and 2010 (Table 1). Treatments were applied with a bicycle-wheeled CO_2 pressurized sprayer with 11002 flat fan spray tips at 233 L ha^{-1}. The experimental design was a randomized-complete block with 4 replications and experimental units were 1.8 x 2.4 m. Percentages of bentgrass cover and perennial ryegrass phytotoxicity were rated beginning at 1 wk after initial treatment (WAIT) up to 14 WAIT each year. Perennial ryegrass phytotoxicity was rated using a scale of 0-10, with 10 = dead turf and values above 2 considered as unacceptable injury. No Tenacity treatments were applied in 2009.

Treatment	Tenacity Rate (g ai ha^{-1})	NIS (% v/v)	2007App. timing	2007 App. dates	2007 Overseed date	2008 App. timing	2008 App. dates	2010 App. timing	2010 App. dates
Mesotrione + NIS	140	0.25	2 wks prior to seeding	7/25					
Mesotrione + NIS	140	0.25	At seeding	8/8	8/8				
Mesotrione + NIS	140	0.25	3 wks after seeding	8/29					
Mesotrione + NIS	140	0.25	2 wks prior to seeding	7/25		0 WAT	5/27	0 WAT	6/8
Mesotrione + NIS	140	0.25	At seeding	8/8	8/8	2 WAT	6/12	2 WAT	6/23
Mesotrione + NIS	140	0.25	3 wks after seeding	8/29		5 WAT	7/8	4 WAT	7/8
Mesotrione + NIS	175	0.25	2 wks prior to seeding	7/25					
Mesotrione + NIS	175	0.25	At seeding	8/8	8/8				
Mesotrione + NIS	175	0.25	3 wks after seeding	8/29					
Mesotrione + NIS	175	0.25	2 wks prior to seeding	7/25		0 WAT	5/27	0 WAT	6/8
Mesotrione + NIS	175	0.25	At seeding	8/8	8/8	2 WAT	6/12	2 WAT	6/23
Mesotrione + NIS	175	0.25	3 wks after seeding	8/29		5 WAT	7/8	4 WAT	7/8
Mesotrione + NIS	140	0.25	2 wks prior to seeding	7/25					
Mesotrione + NIS	140	0.25	At seeding	8/8	8/8				
Mesotrione + NIS	140	0.25	3 wks after seeding	8/29					
Mesotrione + NIS	140	0.25	5 wks after seeding	9/12					
Mesotrione + NIS	140	0.25	2 wks prior to seeding	7/25		0 WAT	5/27	0 WAT	6/8
Mesotrione + NIS	140	0.25	At seeding	8/8	8/8	2 WAT	6/12	2 WAT	6/23
Mesotrione + NIS	140	0.25	3 wks after seeding	8/29		5 WAT	7/8	4 WAT	7/8
Mesotrione + NIS	140	0.25	5 wks after seeding	9/12		7 WAT	7/18	6 WAT	7/22
Overseed CHECK					8/8				
CHECK									

Table 1. Tenacity and perennial ryegrass overseeding treatments, 2007-2010 at Pullman, WA.

Results and Discussion

Tenacity applied 4 times at 140 g ai ha^{-1} in 2007 was more effective at reducing the amount of bentgrass than 3 applications at 140 or 175 g ai ha^{-1} (Fig. 1). However, not all of the bentgrass was eliminated in 2007.

At the beginning of 2008, those treatment regimens that received 3 applications of Tenacity, in 2007, had a higher percentage of bentgrass cover (14 to 28%) than the treatment that received 4 applications of Tenacity (6%) in 2007 (Fig. 1). Complete (100%) bentgrass control was achieved with Tenacity treatments applied 4 times at 140 g ai ha^{-1}, or 3 times at 175 g ai ha^{-1}. Fig. 2 shows bentgrass control following 4 applications of Tenacity in 2007 and 2008, versus 4 applications in 2007. Note: plots that were treated with Tenacity in 2007 only, the percentage of bentgrass in the stand continued to increase through the end of the study.

Bentgrass cover increased in all plots during 2009, prior to reapplication in 2010; however, bentgrass cover was lowest in plots treated 4 times at 140 g ai ha^{-1} in 2007 and 2008 (Fig. 1).

Prior to Tenacity applications in 2010, bentgrass cover had increased to 30% in plots that received 3 applications at 140 g ai ha^{-1} in 2007 and 2008, 15% in the 175 g ai ha^{-1} plots, and 4% in the plots that had 4 applications at 140 g ai ha^{-1} (Fig. 1). Following Tenacity applications in 2010 the 4 applications of 140 g ai ha^{-1} treatment resulted in complete bentgrass control by mid-July 2010 through the end of the study, mid-September 2010. Fig. 3 shows bentgrass control following 4 Tenacity treatments in each year, 2007, 2008, and 2010 versus 4 treatments in 2007 only. Even though 3 applications of 140 or 175 g ai ha^{-1} did not result in complete bentgrass control, bentgrass cover decreased from 30 or 15% to <5%.

Perennial ryegrass phytotoxicity following applications of Tenacity at 140 or 175 g ai ha^{-1} were at levels, for the most part, at or below the acceptable threshold (data not presented).

In this study, not all of the bentgrass in the overseeded perennial ryegrass stand was eliminated in the 1st yr (Fig. 1). Tenacity applied 4 times at 140 g ai ha^{-1} in 2007 were more effective at reducing the amount of bentgrass than 3 applications at 140 or 175 g ai ha^{-1} when measured at the start of the 2nd yr. Subsequent multiple applications of Tenacity the following year were required to remove the bentgrass from the turf stand. All Tenacity treatments in 2008 reduced bentgrass cover, with 100% bentgrass control being achieved with Tenacity applied 4 times each year at 140 g ai ha^{-1}, or Tenacity applied 3 times each year at 175 g ai ha^{-1}. Bentgrass cover increased in all plots prior to reapplication of Tenacity in 2010. However, the bentgrass cover was lowest in plots that were treated 4 times with 140 g ai ha^{-1} in 2007 and 2008. Following Tenacity applications in 2010, the 4 times, 140 g ai ha^{-1} treatment resulted in complete bentgrass control by mid-July. In general, levels of phytotoxicity on perennial ryegrass following Tenacity applications were low.

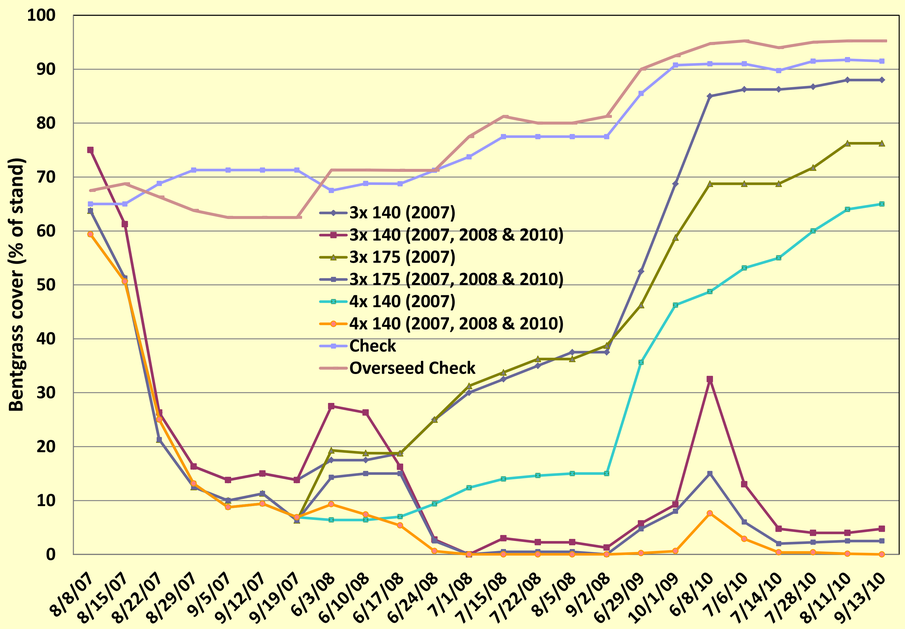

Fig. 1. Bentgrass cover, as percent of stand, following multiple applications of Tenacity in conjunction with overseeding in 2007, and with or without multiple applications of Tenacity in 2008 and 2010 at Pullman, WA.

Fig. 2. Bentgrass control following 4 Tenacity applications in 2007 and 2008 versus 2007 only.

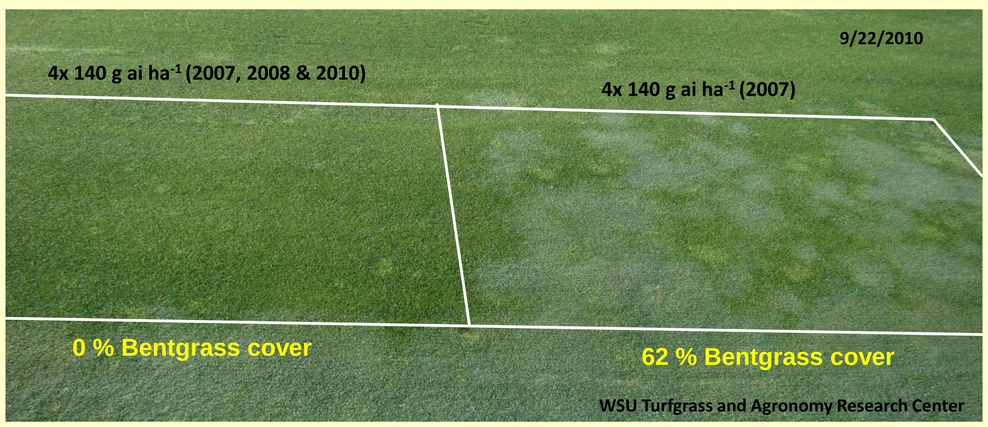

Fig. 3. Bentgrass control following 4Tenacity treatments in 2007, 2008, and 2010 versus 2007 only.

Conclusions

With the high amount of bentgrass in the turfgrass stand at the beginning of the study in 2007 (approx. 70%), a multiple year Tenacity control program with 4 applications at 140 g ai ha^{-1} in each of the first 2 yr, skipping a year and then applying Tenacity again, along with overseeding the 1st yr, would be necessary to achieve total bentgrass control. Subsequent Tenacity applications in following years may be needed to prevent bentgrass from reestablishing.

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