

UTILIZING RESERVE AND CONCERT TO REDUCE THE SEVERITY OF BROWN PATCH IN VELOCITY-TREATED COLONIAL BENTGRASS, 2010

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INTRODUCTION

Bispyrac-sodium (Velocity) is a relatively new post emergent herbicide used to control annual bluegrass (*Poa annua*) in stands of creeping bentgrass (*Agrostis stolonifera*). Although not labeled for use on colonial bentgrass, the herbicide has been previously reported to increase the severity of brown patch in this species and in tall fescue (*Festuca arundinaceae*). Due to the high susceptibility of colonial bentgrass (*Agrostis tenuis*) to brown patch caused by *Rhizoctonia solani*, this species is the ideal candidate to evaluate the influence of Velocity on this foliar disease. The objectives of this study were to 1) elucidate the influence of Velocity on brown patch severity in colonial bentgrass and 2) determine if the use of effective brown patch fungicides would be able to reduce any negative effects of the herbicide on disease development.

MATERIALS & METHODS

A field study was conducted at the Valentine Turfgrass Research Facility located on the Penn State campus in University Park, PA. Turfgrass used for the fungicide evaluation was a mixed stand of colonial bentgrass and annual bluegrass (*Poa annua*). The area was maintained as a bentgrass fairway and mowed three times per week to a height of 0.5 in. All fungicide treatments were applied with a CO₂ pressurized (40 psi) sprayer equipped with an air-induction flat fan nozzle (AI9504E), and calibrated to deliver 1.0 gal water per 1000 ft². Treatments were applied on 15 Jun, 6 Jul, and 27 Jul. All treatments are listed in the data tables.

Plots measured 3 ft x 6 ft and were arranged in a randomized complete block with four replications. Brown patch severity, turfgrass quality and injury were rated periodically during the study. Percent plot area affected by brown patch was rated visually on a 0 to 100% scale where 0 = no disease symptoms were present and 100 = entire plot area displaying disease symptoms. Injury to the colonial bentgrass was visually rated on a 0 to 5 scale where 0 = no injury visible, < 3.0 = minimum acceptable injury for a golf course fairway and 5.0 = entire plot area brown or dead. Quality was rated on a 1 to 9 scale where 0 = entire plot area brown or dead, 7 = minimum acceptable quality for a golf course fairway; and 9 = optimum greenness and density.

RESULTS

Trace levels of brown patch were present in the study site when treatments were initiated on 15 Jun. Disease ratings were highly variable early in the study and

few differences among treatments and the untreated control plots were present (Table 1). Disease pressure, however, began to increase significantly approximately 2 to 3 weeks after the second application of each treatment. When plots were rated on 28 Jul, the untreated control plots had an average of 28 to 48% brown patch. Similarly, plots treated with either 4.0 or 6.0 oz of Velocity had 14 to 59% brown patch and were not different than the untreated control plots. Plots receiving fungicides alone or in combination with Velocity had significantly less disease and no differences among fungicides were observed. On the final rating date (13 Aug; ~2 weeks after the last application), plots treated with Reserve or Concert had between 0 and 9% brown patch. Excellent disease suppression ($\leq 1.0\%$) was observed within plots treated with Reserve (all rates and Velocity combinations) and Concert alone (5.5 fl oz). Although few statistical differences were observed among fungicide treatments, only plots treated three times with Concert + Velocity (6.0 oz) had brown patch percentages similar to the untreated control plots. With the exception of the low rate of Velocity evaluated in this study (4.0 oz), all plots treated with Velocity alone had significantly greater brown patch when compared to the untreated control plots.

Injury to the colonial bentgrass was sporadic and highly influenced by both the disease and applications of Velocity. The greatest level of injury was observed within plots treated only with Velocity and the injury appeared to last throughout the duration of the study (Table 2). Trace levels of injury were observed with other plots and appeared to be influenced by the presence or absence of Velocity. One exception was on the final rating date (28 Jul) when injury appeared to be highly influenced by disease severity and was observed within even the untreated control plots. Little to no injury was observed within plots receiving fungicides only (in the absence of Velocity).

DISCUSSION

Similar to previous reports, applications of Velocity to colonial bentgrass can increase the incidence and severity of brown patch. This is the first report that we are aware of, however, that fungicides effective against brown patch can help to reduce the negative impact of Velocity on this disease. In this study, both Reserve and Concert were effective at reducing brown patch even where Velocity was used. Future studies investigating the influence of single active ingredients previously reported to be effective against brown patch should be conducted to determine if a tank-mix of fungicides are necessary to provide disease control or if a single active ingredient would provide acceptable control. Additional studies should also seek to determine the influence of Velocity and potential fungicide mitigation in other turfgrass species such as tall fescue that are highly susceptible to brown patch.

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Table 1. Percent plot area affected by brown patch (*Rhizoctonia solani*) in a colonial bentgrass (*Agrostis tenuis*) fairway treated with Velocity alone or in combination with Concert of Reserve, 2010.

Treatment and rate per 1000 sq ft	Application Code ^y	Brown patch (%) ^z				
		18 Jun	2 Jul	14 Jul	28 Jul	13 Aug
1 Reserve 3.5 fl oz.....	ABC	2 d ^x	4 bc	0 c	5 d	1 ef
2 Reserve 4.5 fl oz.....	ABC	4 d	3 bc	0 c	3 d	0 f
3 Concert 5.5 fl oz.....	ABC	1 d	0 c	0 c	1 d	1 ef
4 Velocity 6.0 oz/A.....	AB	14 abc	9 a	28 a	59 a	27 ab
5 Velocity 6.0 oz/A.....	ABC	14 abc	5 ab	15 b	41 b	28 a
6 Velocity 4.0 oz/A.....	ABC	17 a	9 a	20 b	53 ab	19 bc
7 Reserve 4.5 fl oz	ABC					
Velocity 6.0 oz/A.....	AB	7 bcd	5 ab	3 c	2 d	0 f
8 Concert 5.5 fl oz	ABC					
Velocity 6.0 oz/A.....	AB	16 ab	2 bc	1 c	6 d	4 ef
9 Reserve 4.5 fl oz	ABC					
Velocity 6.0 oz/A.....	ABC	6 cde	4 bc	2 c	3 d	1 ef
10 Concert 5.5 fl oz	ABC					
Velocity 6.0 oz/A.....	ABC	17 a	3 bc	4 c	9 d	9 de
11 Reserve 4.5 fl oz	ABC					
Velocity 4.0 oz/A.....	ABC	2 d	1 bc	1 c	1 d	0 f
12 Concert 5.5 fl oz	ABC					
Velocity 4.0 oz/A.....	ABC	9 a-d	3 bc	0 c	7 d	4 ef
13 Untreated.....	-	8 a-d	5 ab	5 c	48 ab	13 cd
14 Untreated.....	-	3 d	5 ab	4 c	28 c	15 cd

^z Percent plot area affected by brown ring patch was rated visually on a 0 to 100% scale where 0 = no disease symptoms were present and 100 = entire plot area displaying disease symptoms.

^y Treatments were as follows: A = 15 Jun; B = 6 Jul; and C = 27 Jul.

^x Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ level according to the Fisher's protected least significant difference t-test.

Table 2. Colonial bentgrass injury in a research fairway following applications of Velocity alone or in combination with Concert of Reserve, 2010.

Treatment and rate per 1000 sq ft	Application Code ^y	Injury (0-5) ^z			
		18 Jun	2 Jul	14 Jul	28 Jul
1 Reserve 3.5 fl oz.....	ABC	0.3 b ^x	0.5 de	0.0 f	0.5 def
2 Reserve 4.5 fl oz.....	ABC	0.0 b	0.3 e	0.0 f	0.0 f
3 Concert 5.5 fl oz.....	ABC	0.0 b	0.0 e	0.0 f	1.0 def
4 Velocity 6.0 oz/A.....	AB	1.5 a	3.0 a	3.3 a	3.0 a
5 Velocity 6.0 oz/A.....	ABC	1.5 a	2.3 ab	2.3 b	2.3 abc
6 Velocity 4.0 oz/A.....	ABC	1.5 a	2.5 ab	3.0 a	2.5 ab
7 Reserve 4.5 fl oz	ABC				
Velocity 6.0 oz/A.....	AB	1.0 ab	2.3 ab	1.5 c	0.0 f
8 Concert 5.5 fl oz	ABC				
Velocity 6.0 oz/A.....	AB	1.8 a	1.5 bcd	0.8 de	1.3 cde
9 Reserve 4.5 fl oz	ABC				
Velocity 6.0 oz/A.....	ABC	0.0 b	1.5 bcd	1.0 cd	0.0 f
10 Concert 5.5 fl oz	ABC				
Velocity 6.0 oz/A.....	ABC	1.5 a	1.8 bc	1.0 cd	1.0 def
11 Reserve 4.5 fl oz	ABC				
Velocity 4.0 oz/A.....	ABC	0.8 ab	1.5 bcd	0.8 de	0.3 ef
12 Concert 5.5 fl oz	ABC				
Velocity 4.0 oz/A.....	ABC	1.8 a	0.8 cde	0.8 de	1.5 bcd
13 Untreated.....	-	1.5 a	0.3 e	0.5 def	2.3 abc
14 Untreated.....	-	1.0 ab	1.0 cde	0.3 ef	2.8 a

^z Colonial bentgrass injury from Velocity was rated on a 0 to 5 scale where 0 = no injury observed; 3 < maximum acceptable injury for a golf course fairway; and 5 = entire plot area brown or dead.

^y Treatments were as follows: A = 15 Jun; B = 6 Jul; and C = 27 Jul.

^x Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ level according to the Fisher's protected least significant difference t-test.

Table 3. Overall turfgrass quality of a colonial bentgrass research fairway following applications of Velocity alone or in combination with Concert of Reserve, 2010.

Treatment and rate per 1000 sq ft	Application	Quality (1-9) ^z				
	Code ^y	18 Jun	2 Jul	14 Jul	28 Jul	13 Aug
1 Reserve 3.5 fl oz.....	ABC	7.8 ab	7.5 ab	8.8 a	7.3 bc	7.5 a
2 Reserve 4.5 fl oz.....	ABC	8.0 a	8.3 a	9.0 a	8.3 a	8.0 a
3 Concert 5.5 fl oz.....	ABC	7.8 ab	8.3 a	9.0 a	7.3 bc	7.5 a
4 Velocity 6.0 oz/A.....	AB	6.0 e	5.0 e	5.0 e	5.0 d	5.5 cd
5 Velocity 6.0 oz/A.....	ABC	7.0 bcd	6.3 cd	5.8 d	5.3 d	5.8 bcd
6 Velocity 4.0 oz/A.....	ABC	6.5 cde	5.5 de	5.5 de	5.0 d	5.3 d
7 Reserve 4.5 fl oz	ABC					
Velocity 6.0 oz/A.....	AB	7.3 abc	6.3 cd	6.8 c	8.0 ab	7.8 a
8 Concert 5.5 fl oz	ABC					
Velocity 6.0 oz/A.....	AB	6.3 de	6.8 bc	7.3 c	7.3 bc	7.5 a
9 Reserve 4.5 fl oz	ABC					
Velocity 6.0 oz/A.....	ABC	7.8 ab	7.0 bc	7.0 c	8.5 a	7.5 a
10 Concert 5.5 fl oz	ABC					
Velocity 6.0 oz/A.....	ABC	6.0 e	6.5 c	7.0 c	6.8 c	6.3 bc
11 Reserve 4.5 fl oz	ABC					
Velocity 4.0 oz/A.....	ABC	7.3 abc	7.0 bc	7.0 c	7.8 ab	7.8 a
12 Concert 5.5 fl oz	ABC					
Velocity 4.0 oz/A.....	ABC	6.5 cde	8.0 a	7.0 c	6.8 c	6.5 b
13 Untreated.....	-	6.3 de	7.0 bc	8.0 b	5.5 d	5.3 d
14 Untreated.....	-	7.3 abc	6.8 bc	8.0 b	5.3 d	5.3 d

^z Overall turfgrass quality from Velocity was rated on a 1 to 9 scale where 0 = entire plot area brown or dead; 7 = minimum acceptable quality for a golf course fairway; and 9 = optimum greenness and density.

^y Treatments were as follows: A = 15 Jun; B = 6 Jul; and C = 27 Jul.

^x Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ level according to the Fisher's protected least significant difference t-test.