

Efficacy of Methiozolin for Controlling Annual Bluegrass in a Creeping Bentgrass Golf Course Putting Green

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SUMMARY: Annual bluegrass (*Poa annua*) continues to be a problematic weed on golf course putting greens because of its poor disease and heat tolerance. Methiozolin is a new herbicide that selectively controls annual bluegrass in creeping bentgrass (*Agrostis stolonifera*) golf course putting greens. The objective of our research was to determine the effect of methiozolin application rate and timing on annual bluegrass coverage, bentgrass injury, and overall turf quality in a mixed creeping bentgrass/annual bluegrass putting green. Applications of methiozolin using the high 0.9 lb ai/A applied in March + April or March + April + May, or paclobutrazol applied in April + May at 0.25 lb ai/A were more effective at reducing annual bluegrass coverage. Bentgrass injury and turf quality were typically never below acceptable levels for either rate or timing of methiozolin. Although this herbicide is not currently registered for use in the United States, it is currently being evaluated by many researchers and golf course superintendents around the country through a US EPA experimental use permit.

Annual bluegrass (*Poa annua*) is one of the most problematic weeds on golf courses and athletic fields. It is particularly problematic on golf course putting greens, as it has poor disease and heat tolerance, provides an inconsistent playing surface, and is typically more expensive to maintain than creeping bentgrass (*Agrostis stolonifera*). Annual bluegrass is also problematic because it is a difficult to control weed on golf course putting greens as there are limited cultural and chemical control methods.

Methiozolin (PoaCure™) is a new herbicide currently involved in an Experimental Use Permit program in many states in the U.S. (Moghu Research Center, 2013). It has been reported to have good efficacy on annual bluegrass and good safety on many cool-season species including creeping bentgrass (Brosnan et al., 2013). Methiozolin is an isoxazoline herbicide that inhibits cell wall

biosynthesis. It is available in an EC formulation (2.1 lb/gal) and is reported to have both PRE and POST emergent activity and enters the plant primarily via root uptake (Flessner et al., 2012). Previous unpublished research performed by the same researchers as this experiment conducted another study on a golf course fairway in West Lafayette, IN comparing spring and fall application timings of methiozolin and concluded fall applications were more effective at controlling annual bluegrass. However, it is important to evaluate the efficacy of methiozolin on annual bluegrass control in golf course putting greens in the spring.

Therefore, the objective of our research was to determine the effect of methiozolin application rate and timing on annual bluegrass coverage, bentgrass injury, and overall turf quality in a mixed creeping bentgrass/annual bluegrass putting green.

ADDITIONAL INDEX WORDS:

ABG, MRC-01, PoaCure, *Poa annua*.

MATERIALS AND METHODS

This research was conducted on a putting green located at Ackerman Hills Golf Course in West Lafayette, IN. The putting green was a creeping bentgrass and annual bluegrass mixture with approximately 40% annual bluegrass. The putting green was a native soil putting green that is

approximately 60 years old and maintained under typical golf course putting green conditions.

Experimental design was a randomized complete block design with three replications. Plots were treated with single applications on the 15 March, 15 April, 15 May or sequential applications with March + April and March + April + May timings. Treatments included methiozolin (MRC-01) at 0.9 lb ai/A or 0.45 lb ai/A, as well as an untreated control. Paclobutrazol was included as a treated control and was treated on 15 April and 15 May at 0.25 lb ai/A. Herbicides were applied in 30 gal/A water with a CO₂ pressurized backpack sprayer at 30 psi. Plots were evaluated for creeping bentgrass injury (1-9, 9=no injury, 7=acceptable injury), turfgrass quality (1-9, 9=dense, healthy turf, 7=acceptable turf quality), and percent annual bluegrass coverage. All data were analyzed using SAS (SAS Institute, Inc.). Means were separated using Fisher's protected least significance difference test when F tests were significant at $\alpha=0.05$.

RESULTS AND DISCUSSION

Although there were statistical differences among treatments for bentgrass injury, there were no instances in which injury was rated below the acceptable level (acceptable injury ≥ 7) across all rating dates for all treatments (data not shown). Similarly, turf quality was typically not rated below the acceptable level (acceptable quality ≥ 7) for any treatments on the majority of rating dates (data not shown).

Rate and timing each influenced annual bluegrass coverage on multiple dates (Table 1). In general, spring sequential applications of methiozolin using the 0.9 lb ai/A applied in March + April or March + April + May were more effective at reducing annual bluegrass coverage on all rating dates. This trend in effectiveness of 0.9 lb ai/A methiozolin with early sequential timings is consistent with findings of a similar study performed in Tennessee (Brosnan et al., 2013; Trappe et al., 2012) and Pennsylvania (Han et al., 2012). Han et al., (2012) evaluated spring, summer, and fall application timings on a creeping bentgrass/annual bluegrass putting green in Pennsylvania using a similar treatment structure as this study and concluded fall applications reduced annual bluegrass populations more than spring, while there was no significant reduction of annual bluegrass populations compared to the untreated

control from summer applications. These reports indicate the effectiveness of methiozolin for gradual removal of annual bluegrass in a creeping bentgrass putting green.

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Table 1. The effect of methiozolin rate and timing on annual bluegrass coverage.

| Methiozolin application date | Rate | Annual bluegrass coverage | | | |
|------------------------------|---------|---------------------------|--------|--------|--------|
| | | 5/31 | 6/15 | 7/2 | 8/8 |
| | lb ai/A | -----%----- | | | |
| 15 March | 0.45 | 40 bcd ^a | 52 a | 42 bcd | 22 a-e |
| 15 March | 0.90 | 42 bc | 45 a | 27 e | 12 e |
| 15 April | 0.45 | 52 ab | 50 a | 47 abc | 18 cde |
| 15 April | 0.90 | 48 ab | 45 a | 52 ab | 30 abc |
| 15 May | 0.45 | 50 ab | 50 a | 42 bcd | 27 a-d |
| 15 May | 0.90 | 50 ab | 45 a | 50 ab | 32 abc |
| March + April | 0.45 | 48 ab | 50 a | 47 abc | 33 ab |
| March + April | 0.90 | 27 d | 28 cd | 33 de | 12 e |
| April + May | 0.45 | 43 ab | 45 a | 37 cde | 15 de |
| April + May | 0.90 | 45 ab | 40 abc | 40 bcd | 15 de |
| March + April + May | 0.45 | 40 bcd | 45 a | 43 a-d | 20 b-e |
| March + April + May | 0.90 | 28 cd | 23 d | 27 e | 12 e |
| Paclobutrazol | 0.25 | 28 cd | 32 bcd | 47 abc | 20 b-e |
| Untreated | - | 56 a | 42 ab | 55 a | 35 a |

^a Within columns, means followed by the same letter are not different (LSD, $\alpha=0.05$).

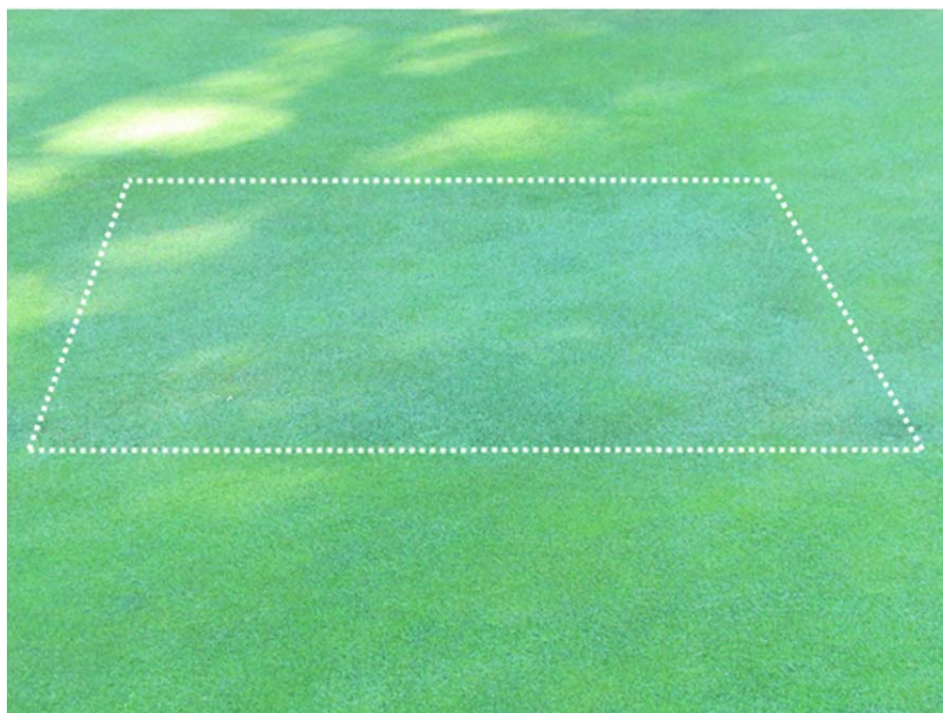


Fig. 1. The outlined area in the figure above indicates a plot that had approximately a 30% reduction in annual bluegrass coverage after receiving 0.9 lb ai/A of methiozolin on 15 March, 15 April, and 15 May 2012. Photo taken on 13 June 2012.