Selective Removal of Creeping Bentgrass from Kentucky Bluegrass

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Introduction:

Creeping bentgrass often encroaches into collars, roughs, and other golf course sites where it is unwanted. Invasion frequently occurs during the seeding process, but can also result from improper mowing, affecting both new and established golf courses. This is becoming an increasing problem as the number of courses utilizing creeping bentgrass fairways continues to rise.

The goal of this study is to determine if any herbicides have the capability of selectively removing creeping bentgrass from Kentucky bluegrass. Our three objectives are to:

1. Determine the best time of application that provides for selective postemergence control of creeping bentgrass in Kentucky bluegrass,
2. Determine the rate of application for selective postemergence control of creeping bentgrass in Kentucky bluegrass, and
3. Observe any detrimental effects to the Kentucky bluegrass from the herbicide applications.

Research Progress

Field Research – A field trial was started during the fall of 2003. The research is being conducted at Coldwater Golf Links in Ames, IA on the Kentucky bluegrass/creeping bentgrass rough established on native soil. The research plots are maintained at a height of one inch and contain a mix of L-93 creeping bentgrass and Sure Shot Kentucky bluegrass. Sure Shot is a Kentucky bluegrass blend containing Nuglade, Bluemoon, Award, Rugby II, and Rambo cultivars. The field trial is examining the efficacy of MON 44951, a sulfonylurea produced by Monsanto containing the active ingredient sulfosulfuron. MON 44951 has been shown to effectively control rough bluegrass, yellow nutsedge, tall fescue and quackgrass. Additional field testing on other grassy weeds needs to be completed before the product will be released for commercial sales.

The randomized complete block trial was replicated three times and received weekly applications of MON 44951, applied with a surfactant, starting August 29, 2003, and concluding October 25, 2003 (Table 1). MON 44951 was applied at two rates: 0.25 oz/A and 0.50 oz/A. A list of the treatments can be found in Table 1 below. Weekly phytotoxicity data was recorded on a scale of 9-1 (9=Excellent, 6=Least Acceptable, 1=Worst). Grid counts were performed the second week in November to determine the percent cover of each turfgrass species and were also performed the following spring. The research is ongoing and the results will be available in future Iowa Turfgrass Research Reports.

Table 1. MON 44951 Fall 2003 treatments

Application Dates								
4th week Aug.	**1st week Sept.**	**2nd week Sept.**	**3rd week Sept.**	**4th week Sept.**	**1st week Oct.**	**2nd week Oct.**	**3rd week Oct.**	**4th week Oct.**

Treatments	
1	Control
2	MON 44951 75 DF at 0.25 oz/A plus MON 0818 at 0.25% v/v
3	MON 44951 75 DF at 0.50 oz/A plus MON 0818 at 0.25% v/v

Greenhouse Research – A second experiment was conducted the following winter (December 23, 2003 – March 1, 2004) in the greenhouse with mesotrione (Callisto) in addition to MON 44951. Mesotrione, a callistemone, is marketed by Syngenta and is used to control broadleaf and grass weeds in grain crops. Four-inch diameter plugs of L-93 creeping bentgrass and Sure Shot Kentucky bluegrass were grown in six-inch pots with native soil and were maintained at a height of one inch beneath high-pressure sodium lamps providing 16-hour photoperiods.

The experiment was a completely randomized design with 26 treatments and five replications (Table 2). Data was recorded for quality, stress, amount of regrowth, and herbicidal effects on rooting. Quality data was recorded weekly on a scale of 9-1 (9=Excellent, 6=Least Acceptable, 1=Worst). Stress data was also analyzed weekly by using a Walz Mini-Pam fluorometer. A fluorometer measures photosynthetic yield based upon the amount of light given off at longer wavelengths. Less fluorescence means more light is being utilized for photosynthesis equaling healthier plants. Regrowth was measured approximately every 10 days by cutting all samples to one inch and collecting the clippings. Clippings were dried at 68°C for 72 hours before being weighed. Rooting effects (Figure 1) were measured at the end of the experiment by washing and ashing the roots in a muffle furnace. Fisher's LSD ($\alpha=0.05$) was used to separate means.

Greenhouse Results:

MON 44951 applied at 1.0, 1.25, and1.5 oz/A effectively controlled creeping bentgrass. However, these rates were equally as harmful to Kentucky bluegrass (Table 2). Similarly, the same rates negatively affected the rooting of both creeping bentgrass and Kentucky bluegrass (Figure 1). Overall, mesotrione failed to provide adequate control of creeping bentgrass. Plans for future work include additional field studies in the fall of 2004 as well as further work in the greenhouse the following winter, 2004-2005.

Table 2. Visual quality of creeping bentgrass (Agrostis stolonifera L.) and Kentucky bluegrass (Poa pratensis L.) treated with 13 different rates of mesotrione and MON 44951 over time. Values are means of five treatments.

Chemical/Rate A.I./A) Species	Time(weeks) 2	3	4	5	6	7	8	9	10	Mean
Control										
Kentucky bluegrass	9.0	9.0	9.0	9.0	9.0	7.8	8.2	8.2	7.4	8.5
Creeping bentgrass	7.6	8.8	7.8	6	7.2	6.8	8	8	8	7.6
Mesotrione/0.125										
Kentucky bluegrass	9.0	9.0	9.0	9.0	8.8	6.8	8.4	8.4	8.0	8.5
Creeping bentgrass	6.8	8.2	7.8	4.6	5.4	5.6	7.2	7.6	7.6	6.8
Mesotrione/0.25										
Kentucky bluegrass	9.0	9.0	8.4	9.0	9.0	6.4	8.6	8.2	7.4	8.3
Creeping bentgrass	7.6	9.0	7.2	5.4	5.2	5.6	7.4	7.2	6.8	6.8
Mesotrione/0.37										
Kentucky bluegrass	9.0	9.0	9.0	8.8	8.8	7.8	8.8	9.0	8.6	8.8
Creeping bentgrass	8.6	8.4	7.0	6.4	7.0	7.2	8.6	8.2	7.8	7.7
Mesotrione/0.5										
Kentucky bluegrass	9.0	9.0	9.0	9.0	9.0	7.0	7.8	8.0	7.2	8.3
Creeping bentgrass	8.0	7.0	5.6	6.4	6.4	7.2	8.2	8.4	7.8	7.2
Mesotrione/0.625										
Kentucky bluegrass	9.0	9.0	9.0	8.8	9.0	7.0	8.4	8.4	8.2	8.5
Creeping bentgrass	8.0	8.2	4.8	5.0	6.4	6.2	7.8	7.6	7.4	6.8
Mesotrione/0.75										
Kentucky bluegrass	9.0	9.0	9.0	9.0	9.0	7.0	8.2	8.4	8.0	8.5
Creeping bentgrass	7.0	4.4	4.0	3.6	5.8	6.8	8.2	8.6	7.8	6.2
MON 44951/0.25										
Kentucky bluegrass	9.0	9.0	9.0	9.0	8.8	4.6	4.4	4.0	4.4	6.9
Creeping bentgrass	7.6	8.4	7.2	7.2	6.6	6.4	7.8	7.6	8.0	7.4
MON 44951/0.5										
Kentucky bluegrass	9.0	9.0	9.0	8.8	8.2	4.6	4.2	4.0	3.8	6.7
Creeping bentgrass	7.4	8.8	7.0	6.4	5.8	4.6	5.0	4.8	4.8	6.1
MON 44951/0.75										
Kentucky bluegrass	9.0	9.0	9.0	9.0	8.6	4.2	4.2	4.0	3.8	6.8
Creeping bentgrass	8.4	8.6	6.8	5.6	5.0	4.2	4.4	4.0	4.0	5.7
MON 44951/1.0										
Kentucky bluegrass	9.0	9.0	8.8	8.6	8.2	4.4	4.4	4.0	3.6	6.7
Creeping bentgrass	7.6	8.6	6.8	4.4	4.0	3.6	3.6	3.2	3.2	5.0
MON 44951/1.25										
Kentucky bluegrass	9.0	9.0	8.8	8.6	7.6	3.8	3.8	3.2	3.0	6.3
Creeping bentgrass	7.8	8.6	6.8	5.2	4.0	3.6	3.6	3.4	3.4	5.2
MON 44951/1.5										
Kentucky bluegrass	9.0	9.0	9.0	8.8	8.0	4.8	4.6	4.0	3.4	6.7
Creeping bentgrass	7.8	8.4	6.2	5.2	4.0	3.6	3.4	3.4	3.6	5.1
LSD 0.05	0.7	1.0	1.1	1.3	1.1	1.2	1.2	0.9	1.0	

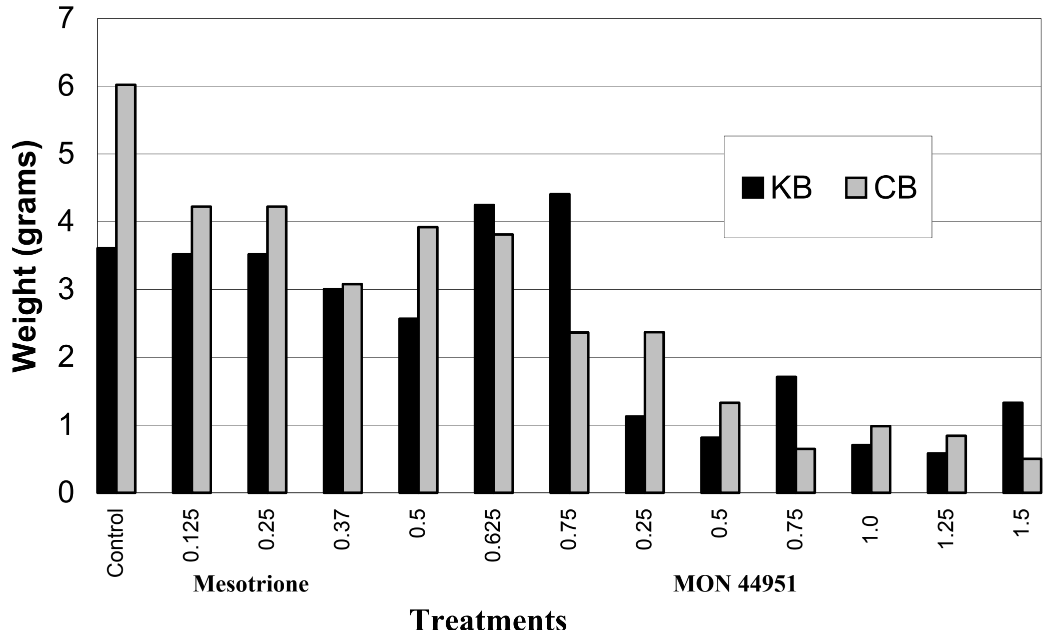

Figure 1. Root weights of Kentucky bluegrass and creeping bentgrass as determined by ashing after treatment effects.