Update of Trimmit 2SC for Suppression of Annual Bluegrass on Golf Course Fairways in Minnesota

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Annual bluegrass *(Poa annua var annua)* is prevalent on most golf course putting greens and fairways in Minnesota. During periods of moderate temperature and adequate moisture, it performs admirably. However, an annual life cycle, prolific seedhead production, susceptibility to diseases, high water use and vulnerability to extremes in temperature often creates problems in its management. In recent Minnesota winters, extremely cold temperatures and limited snow cover led to considerable annual bluegrass death. For golf courses with very little annual bluegrass, typically newer clubs or stands of turf, this acted as a beneficial control mechanism. Unfortunately, a large number of courses in the Twin Cities are dominated by annual bluegrass and superintendents were faced with large dead portions of their fairways and greens. The massive die-off of annual bluegrass increased the desire of many superintendents to lower the amount of annual bluegrass on their courses or to eliminate it completely.

In addition to the desire to get rid of annual bluegrass, some of our older clubs are planning considerable renovation projects to restore golf course playing conditions to the original design specifications. Three of these courses are North Oaks Golf Club, Minneapolis Golf Club and Golden Valley Country Club. These three astute golf course superintendents have approached the University of Minnesota requesting information on how to transition out their annual bluegrass without harming the bentgrass.

Table 1. Trimmit 2SC treatment number, rate, frequency and timing.

Trt #	Name	Product rate	Number of Applications	Timing
1	Trimmit 2SC	8 FL OZ/A	1	Fall
2	Trimmit 2SC	8 FL OZ/A	1	Spring
3	Trimmit 2SC	8 FL OZ/A	1	Summer
4	Trimmit 2SC	8 FL OZ/A	2	Fall, Spring
5	Trimmit 2SC	8 FL OZ/A	2	Fall, Summer
6	Trimmit 2SC	8 FL OZ/A	3	Fall, Spring, Summer
7	Trimmit 2SC	16 FL OZ/A	1	Fall
8	Trimmit 2SC	16 FL OZ/A	1	Spring
9	Trimmit 2SC	16 FL OZ/A	1	Summer
10	Trimmit 2SC	16 FL OZ/A	2	Fall, Spring
11	Trimmit 2SC	16 FL OZ/A	2	Fall, Summer
12	Trimmit 2SC	16 FL OZ/A	3	Fall, Spring, Summer
13	Trimmit 2SC	32 FL OZ/A	1	Fall
14	Trimmit 2SC	32 FL OZ/A	1	Spring
15	Trimmit 2SC	32 FL OZ/A	1	Summer
16	Trimmit 2SC	32 FL OZ/A	2	Fall, Spring
17	Trimmit 2SC	32 FL OZ/A	2	Fall, Summer
18	Trimmit 2SC	32 FL OZ/A	3	Fall, Spring, Summer
19	Trimmit 2SC	8 FL OZ/A	6	Every 4 wks
20	Trimmit 2SC	4 FL OZ/A	6	Every 4 wks
21	Glyphosate	64 FL OZ/A	1	Spring
22	Untreated			

The purpose of this research project is to develop an annual bluegrass removal/transition program that golf course superintendents can use in Minnesota. Previous research has been conducted using Trimmit® in North Carolina (Fred Yelverton) and Illinois (Bruce Branham). Unfortunately, our winters in Minnesota are unique and provide an opportunity for research that North Carolina and Illinois can not duplicate.

In order to determine the treatments that would be included in this study, the current label was consulted. The Trimmit® 2SC label recommends application rates of 16 to 32 fl oz of product/A for a single application with a maximum use of 128 fl oz of product/A for a single season when used on cool season grasses that are not putting greens. If the product is being used on turf areas with large populations of annual bluegrass, the rate should be cut in half in order to limit the discoloration of annual bluegrass. The label recommends that applications be spaced at least eight weeks apart with a maximum of three applications per season. With this information in hand we developed our treatments.

In order to address what rate of Trimmit® is needed, treatment rates of 4, 8, 16 and 32 fl oz/A were chosen for the study. These rates cover the full range of recommend rates for fairways with and without large populations of annual bluegrass.

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The issue of application timing is addressed by single applications in the spring (May), summer (July) or fall (September) for the 8, 16 and 32 fl oz/A rates. To address whether multiple applications are needed, treatments were included for the 8, 16 and 32 fl oz/A rate that contained either two or three applications based on the seasonal timing with an 8-week reapplication interval. To further examine the effect of multiple applications, two treatments using the 4 and 8 fl oz/A rates were included at 4-week intervals from April through September. The goal of these two treatments is to evaluate whether low rates at closer intervals can effectively suppress annual bluegrass with a limited decrease on turf quality. For comparison purposes, a control treatment and a glyphosate treatment are included. The glyphosate treatment will only be carried out in the 2006 growing season. Table 1 lists all 22 treatments with their respective rate, timing and frequency.

Besides chemical control of annual bluegrass, many superintendents have implemented slit-seeding programs in an attempt to increase creeping bentgrass populations on golf course fairways. The invention of the Turfco® TriWaveTM slit seeder, which creates minimal surface disruption while effectively cutting slits and placing seed into these slits, has allowed this practice to occur at almost any time of the year without interruption to play. When done in bare or thin areas, the creeping bentgrass seedlings have a good chance of becoming established. In areas dominated by annual bluegrass, the likelihood of seedling success is questionable. In these areas the competitive advantage favors the established turfgrass. If the annual bluegrass can be suppressed before slit-seeding, an opportunity might arise for the creeping bentgrass seedlings to become established.

Since the goal of this trial is find an effective means of increasing creeping bentgrass on fairways, slit-seeding was incorporated into select treatments to see if it is advantageous. The treatments that received slit-seeding were those plots receiving a single application of Trimmit® or glyphosate during the growing season. Seeding was done four weeks after chemical application. This duration was based on recommendations from other researchers in order to prevent the Trimmit® from having a detrimental effect on the seedlings. Table 2 lists the exact dates of slit seeding and treatment applications.

This study is being conducted at North Oaks Golf Club, Minneapolis Golf Club, and Golden Valley Country Club. Due to an application error by the study directors, the study at Golden Valley Country Club was discontinued and data will not be discussed. In April of 2006 the sites were visited and locations with high populations of annual bluegrass were chosen. All treatments were applied by a five foot wide CO2 powered backpack sprayer equipped with four TeeJet XR 8010 nozzles using 77 gal H2O/A. Treatments were irrigated with 0.25 inches of water during the evening following application. Plots were evaluated monthly for turf quality with ratings being heavily dependent on the amount of phytotoxicity. Annual bluegrass reduction was calculated as percent reduction from the difference between the October and April ratings for annual bluegrass. Slit seeding was carried out in two directions using a Turfco® TriWaveTM slit-seeder applying 0.5 lbs creeping bentgrass seed per pass. Preliminary data analysis was done on treatment mean turf quality for each rating date and on annual bluegrass reduction using the program Agricultural

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Research Manager.

Annual bluegrass ranged from 55 to 81% at Minneapolis Golf Club and 70 to 96% at North Oaks Golf Club before treatments began. The 2006 data displayed a 20 to 70% reduction of annual bluegrass at Minneapolis Golf Club and a 5 to 60% reduction at North Oaks Golf Club. Both locations also displayed a trend of increasing reduction with increasing rates of Trimmit®. Since the study was initiated in 2006, the effectiveness of timing cannot be evaluated with only one year of data. The specific differences in timing and number of applications will be fully evaluated after the 2007 data is collected.

Although higher rates of Trimmit® appear to cause a greater reduction in annual bluegrass, there is also an inverse relationship with turf quality. Figures 1 and 2 display the turf quality for Minneapolis and North Oaks Golf Club respectively. Each figure is comprised of four separate graphs so that turf quality can be easily compared between the same application rates. The LSD value at 5% is given for comparisons within or across graphs at the specific rating date.

Figure 1 shows a decline in June turf quality at Minneapolis Golf Club for plots receiving spring applications. The difference between spring treated and untreated plots is greater as the rate is increased from 8 to 32 fl oz/A. The summer applications only showed a turf quality decline at the 32 fl oz/A rate. October turf quality ratings displayed a similar pattern to the June ratings, with an increasing difference between plots which did and did not receive a fall application.

Figure 2 illustrates the differences in turf quality at North Oaks Golf Club. All treatments for October ratings which received Trimmit® applications in the fall had significantly lower turf quality ratings than those that did not receive fall applications The August rating did not clearly show this difference for treatments receiving summer applications versus those that did not. The June rating clearly displayed a significant difference between plots with and without a spring application at the 32 fl oz/A rate, but rating differences were not as apparent for the lower rates.

Table 2. Trimmit 2SC dates of treatments and slit seeding applications for North Oaks and Minneapolis Golf Club for the 2006 season.

	Minneapolis Golf Club		North Oaks Golf Club	
Timing	Trimmit	Slit-seeding	Trimmit	Slit-seeding
Spring	16-May	13-Jun	17-May	14-Jun
Summer	11-Jul	8-Aug	12-Jul	8-Aug
Fall	7-Sep	10-Oct	6-Sep	10-Oct
Every 4 Weeks	18-Apr, 16-May 13-Jun, 11-Jul 10-Aug, 7-Sep		17-Apr, 17-May 14-Jun, 12-Jul 8-Aug, 6-Sep	

At both courses a similar trend was seen with the 4 and 8 fl oz/A treatments applied every 4 weeks. During May and June the 8 fl oz/A treatment had lower turf quality ratings but eventually the plots recovered to the level of the 4 fl oz/A treatments. Another similarity between the trials at these two courses was the rate of recovery of the glyphosate treated plots. At each course it took

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course it took roughly 4 months before the plots had recovered.

Although there were similarities between the ratings on these two courses, it is hard not to notice the differences in annual bluegrass populations, reduction percentages and turf qualities. When taking soil samples from these two sites a major difference was found that might explain these differences. At North Oaks Golf Club the soil depth is only inches deep before rock is encountered. This very shallow root zone has led to management practices that prevent moisture stress and have allowed the annual bluegrass to flourish. This increase in irrigation might explain why the differences in turf quality seen at lower rates of Trimmit® were not as pronounced as they were at the higher rates. Further observations revealed that areas of the test fairways that tended to dry out sooner exacerbated the effect of Trimmit®. For superintendents planning on using Trimmit®, increased irrigation might help prevent a decrease in turf quality; however it also might also limit the increase bentgrass percentages. This project will continue through 2007 and future results will pinpoint which treatments provide effective annual bluegrass reduction with limited turf quality decline.

This research would not be possible without the support of the Minnesota Golf Course Superintendents Association and Syngenta Professional Products. We are also extremely thankful to the superintendents and golf courses that have so willingly accommodated this research: Jack MacKenzie at North Oaks Golf Club, Dale Caldwell at Minneapolis Golf Club and Jeff Ische at Golden Valley Country Club.

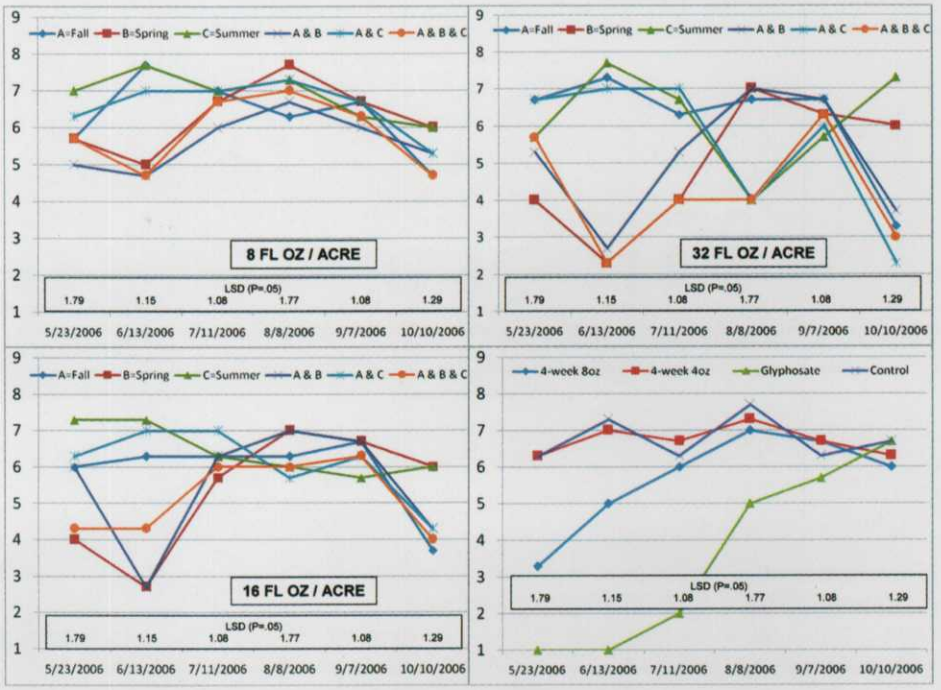

Figure 1. Turf quality ratings (1-9, 9 = Ideal) for Minneapolis Golf Club over the 2006 season.

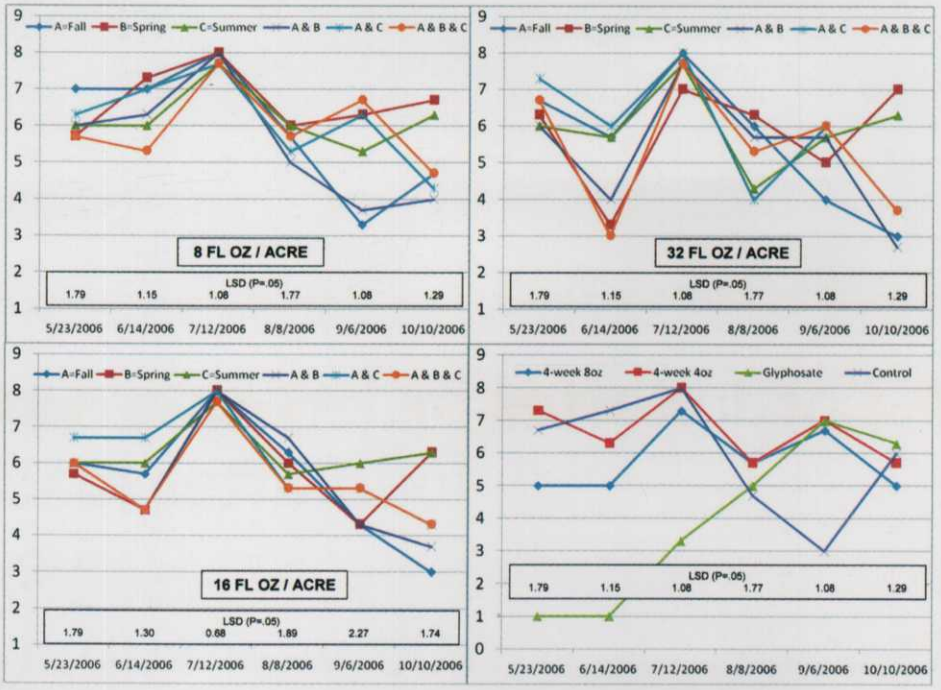

Figure 2. Turf quality ratings (1-9, 9 = Ideal) for North Oaks Golf Club over the 2006 season.

Turfco Germination *(Germination of bentgrass seedlings in a glyphosate treated plot seeded with a Turfco TriWave slit seeder at Minneapolis Golf Club).*

Round up regrowth *(Creeping bentgrass growth one month after slit seeding at Minneapolis Golf Club)*

Spring applications *(Phytotoxicity of Trimmit and glyphosate one-month after spring applications)*