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**Project Title: Fairway Conversion to Low-Mow Kentucky Bluegrass Using Annual Bluegrass Herbicides Combined With Turf Seeding Time and Rate**

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**Introduction:**

Fairways make up the largest high quality turf area on the golf course. The Superintendent and General Manager need proven strategies and reasonable expectations for success before they are willing to take the risk of converting to improved grasses. Low-mow Kentucky bluegrass varieties have already proven themselves in many trials related to stress performance and playability; their performance as a mature stand of grass is not in question. Instead, the uncertainty involves the ability to make a successful conversion without having the fairway overrun with annual bluegrass. Our research evaluates seeding dates, seeding rates, and herbicide treatments that are aimed at eliminating annual bluegrass invasion so that Kentucky bluegrass can be successfully established in golf course fairways.

**Objectives:**

1. To determine specific herbicide and seeding strategies that can be used to successfully convert existing cool season grass fairways to improved low-mow Kentucky bluegrass varieties with minimal annual bluegrass infestation.
2. To determine the most cost effective strategy for converting existing cool season fairways to the new generation of improved low-mow Kentucky bluegrass varieties.

**Results:**

**Progress and results since the May 1, 2008 report**

All treatments were applied during the summer and fall of 2008 as outlined in the proposal. Table 1 shows that Tenacity applied in the fall to an establishing stand of Kentucky bluegrass and annual bluegrass (seeded in August or September) will result in greater than 95% Kentucky bluegrass and less than 4% annual bluegrass cover. Fall applications of Tenacity in 2008 have only been recently applied, however, they once again appear to provide the characteristic decline of annual bluegrass, i.e. annual bluegrass plants turn yellow after the first October application, then turn white after the second application, and then begin to turn brown and shriveled after the third October application. Here are some of the additional observations after the first year of data collection.

- The September and August seeding date resulted in better Kentucky bluegrass establishment than the June seeding date.
- Increasing the seeding rate from 2.5 to 5.0 lbs/1000 sq.ft. had no impact on Kentucky bluegrass establishment.
- No turf phytotoxicity was observed with Tenacity.
- Annual bluegrass cover was reduced from 90% cover in the non-treated control plots to 50% annual bluegrass cover in the Pendulum treated plots.
- Other researchers have found poor control of annual bluegrass using Tenacity. Our success may be related to the annual bluegrass age at the time of Tenacity application. In our study Round-up was applied one week before seeding, therefore, the age of the annual bluegrass and the Kentucky bluegrass at the time of Tenacity treatment would have been approximately 30 and 60 days old for the August and September seeding dates, respectively. We have been able to effectively kill annual

bluegrass when Tenacity is repeatedly applied to annual bluegrass plants that are 30 to 60 days old and were established after Round-up application. The reason other researchers have shown poor control of annual bluegrass with Tenacity may be the result of their application to a more mature stand of annual bluegrass.

- As an outgrowth of this GCSAA trial we have been evaluating the seeding date relative to Round-up application date. It appears that you can apply Round-up at least 2 days before or after seeding Kentucky bluegrass without any adverse impact to emerging Kentucky bluegrass plants. This should help speed turf establishment and reduce the amount of time that the fairway remains brown after Round-up application.
- We have also started trials on repeat fall applications of Tenacity to existing fairways containing “mature” stands of annual bluegrass that have not been treated with Round-up. Early observations in this trial indicate that the “mature annual bluegrass” still turns yellow and then white, but to a lesser degree than the post Round-up annual bluegrass that is treated with Tenacity. The amount of annual bluegrass that ultimately survives will be determined in the spring of 2009.

#### **Research initiated since May 1 2008 and its status**

- The entire study initiated in 2007 was again initiated on a separate area of the fairway in 2008.
- Seeding occurred in June, August, and September while herbicide applications occurred in October 2008.
- The 2007 trial was retreated with annual bluegrass herbicide treatments in October 2008.

#### **Research to be implemented between November 1 2008 and May 1, 2009.**

- The plots established in 2007 were treated again in October 2008 and will be rated through spring 2009.
- The plots established in 2008 will be evaluated in 2009, retreated in October 2009, and then evaluated through the spring of 2010.

**Describe any challenges that you have encountered since November 1 that may necessitate major changes in this research. If major changes are required, describe the revised research plan in detail.**

- From April through August 2008 Traer Country Club was flooded four separate times and the research plots were covered with debris, silt, and sand that ranged from two inches to four feet thick. We abandoned the research project at Traer and have concentrated our effort on the remaining golf course study locations in Cedar Rapids and Ames, IA. We were wise to have two additional locations to fall back on in case of a disaster; and this year we had tornado's and floods that destroyed parts of several golf courses in Iowa. The 2007 study location at Homewood Golf Course in Ames, IA has been very successful, however we moved 20 miles away to Jewell Golf and Country Club for the 2008 treatments because Homewood did not have another fairway with an adequate stand of annual bluegrass. Brian Abels is our Host Golf Course Superintendent at Jewell Golf and Country Club in Jewell, IA. The two remaining golf courses are not in a flood plain and the loss of the Traer study location should have no impact on the deliverable outcomes of this project.

Table 1. Percent ground cover of Kentucky bluegrass, annual bluegrass, and bare ground in 2007 and 2008 when seeded in 2007 and treated with Tenacity or Pendulum in October 2007. Data were combined over two Iowa test locations, Twin Pines Golf Course in Cedar Rapids and Homewood Golf Course in Ames.

Seeding Month	Treatments applied in Oct 2007	Nov, 2007			May, 2008			July, 2008		
		Kentucky bluegrass	Annual bluegrass	Bare ground	Kentucky bluegrass	Annual bluegrass	Bare ground	Kentucky bluegrass	Annual bluegrass	Bare ground
% Ground Cover										
June 07	Tenacity	41.7	58.3	0	82.5	12.5	5	85.8	14.2	0
	Pendulum	22.5	77.5	0	18.3	79.2	2.5	39.2	60.8	0
	Control no herbicide	21.2	78.8	0	5.8	94.2	0	15.8	84.2	0
	<b>LSD<sub>0.05</sub></b>	<b>12</b>	<b>13.3</b>	<b>NS</b>	<b>21.8</b>	<b>22.6</b>	<b>5.2</b>	<b>13.3</b>	<b>13.3</b>	<b>NS</b>
August 07	Tenacity	39.2	60.8	0	74.2	20.8	5	96.3	3.7	0
	Pendulum	20	80	0	17.5	82.5	0	50	50	0
	Control no herbicide	20	80	0	20	80	0	12.7	87.3	0
	<b>LSD<sub>0.05</sub></b>	<b>12</b>	<b>13.3</b>	<b>NS</b>	<b>21.8</b>	<b>22.6</b>	<b>5.2</b>	<b>13.3</b>	<b>13.3</b>	<b>NS</b>
Sept 07	Tenacity	54.1	26.7	19.2	85	3.2	11.8	97.2	2.8	0
	Pendulum	34.2	54.2	11.6	27.8	70	2.2	48.3	51.7	0
	Control no herbicide	30.8	65	4.2	8.3	91.7	0	9.2	90.8	0
	<b>LSD<sub>0.05</sub></b>	<b>12</b>	<b>13.3</b>	<b>4.7</b>	<b>21.8</b>	<b>22.6</b>	<b>5.2</b>	<b>13.3</b>	<b>13.3</b>	<b>NS</b>

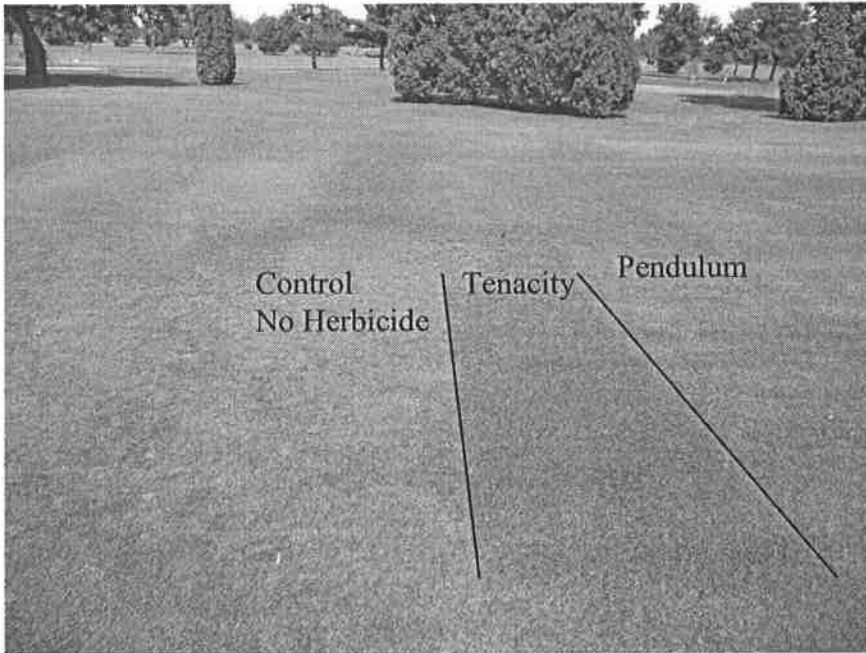


Figure 1. Twin Pines Golf Course Cedar Rapids, IA. Round-up applied and plot seeded in September 2007 followed by herbicide treatments in October 2007. Picture taken 26 August 2008, nearly one year after seeding. Right, Pendulum showing 50% Kentucky bluegrass and 50% annual bluegrass cover. Middle, Tenacity showing 95% Kentucky bluegrass cover and 5% annual bluegrass cover. Left, no-herbicide-control showing greater than 90% annual bluegrass cover.



Figure 1. Twin Pines Golf Course Cedar Rapids, IA. Round-up applied and plot seeded in September 2008 followed by herbicide treatments in October 2008. Picture taken 18 Oct 2008. Center, yellow appearance of annual bluegrass after 1 application of Tenacity with Kentucky bluegrass establishing in verticut rows.

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