

Timing of Roundup® Application Critical when Converting Golf Course Greens and Fairways to Roundup® Ready Creeping Bentgrass

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Roundup Ready® creeping bentgrass (*Agrostis stolonifera* L.) (RRCB) may provide a management tool to prevent *Poa annua* infestation in putting greens and fairways. Unfortunately, the complete renovation to RRCB would be costly and render a golf course unplayable for a significant period of time. If it was possible to incorporate the interseeding of RRCB into regular maintenance processes such as verticutting and aerification, existing greens and fairways could slowly be converted to RRCB. The objective of this study was to observe the effects of Roundup® timing before and after interseeding to determine the impact of competition from conventional grasses on the establishment of RRCB.

Materials and Methods

Site

The study was conducted at Veenker Memorial Golf Course in Ames, Iowa on one green and three fairways built on modified native soil. The research putting green was 'Pennncross' creeping bentgrass, and the fairways were 'Trueline' creeping bentgrass, Double Eagle Kentucky bluegrass mix, and Scotts 100-81600 perennial ryegrass mix. The green was maintained at a height of 0.145 inches and the fairways were mown at 0.60 inches.

Procedure

Treatment 1 was the control in which a bare soil seedbed was prepared. Treatments 2-11 were core aerified in two directions using 5/8 inch tines. The aerification cores on the putting green study were removed and the area was topdressed to fill the aerification holes. The aerification cores on the fairway were broken up using a vertical mower and the area was dragged. RRCB seed was applied to both the green study and the fairway study and the plots were lightly verticut and spiked to ensure seed-to-soil contact. All areas were seeded on September 3, 2002, at a rate of 1.75 lb per 1000 square feet. The seed used contained 50% RRCB with the remaining 50% being conventional creeping bentgrass.

Roundup® was applied at a rate of 2 quarts per acre to treatments 1-10. For treatment 11, a rate of 0.5 quarts per acre was used for each application. Roundup® was applied at a rate of 2 quarts per acre to the entire area on May 7, 2003, to determine the actual population of RRCB.

Treatments

1. Apply Roundup® 14 days prior to seeding, remove sod and prepare seedbed, apply Roundup® 28 days after seeding to remove Roundup® susceptible seedlings.
2. Apply Roundup® 7 days prior to seeding and 28 days after seeding.
3. Apply Roundup® at time of seeding and 28 days after seeding.
4. Apply Roundup® 7 days after seeding.
5. Apply Roundup® 7 days after seeding and 28 days after seeding.
6. Apply Roundup® 14 days after seeding.
7. Apply Roundup® 14 days after seeding and 28 days after seeding.
8. Apply Roundup® 28 days after seeding.
9. Apply Roundup® at one-fourth of the recommended rate at seedling emergence; apply three repeated applications at one-fourth of the recommended rate at two-week intervals (to suppress and gradually remove the existing grass) .
10. Apply Roundup® at the end of the 2002 growing season.
11. No Roundup® application until the spring of 2003.

Results and Discussion

Competition from existing turfgrass significantly reduced the timeliness of establishment. Roundup applications made 7 days before seeding, at seeding, or 7 to 14 days after seeding were most effective at removing competition of existing conventional grasses and speeding complete RRCB establishment (Table 1).

The conversion of fairways to RRCB was very effective; however, the renovation of the creeping bentgrass putting green to RRCB using these methods proved to be less successful (Table 1). Consequently, more research is being done to improve the timeliness of conversion to RRCB on putting greens.

Table 1. Percentage cover on June 1, 2003, of Roundup Ready® creeping bentgrass on areas previously established to creeping bentgrass maintained at green height and creeping bentgrass, Kentucky bluegrass, and perennial ryegrass maintained at fairway height. Each area was intraseeded with Roundup Ready® creeping bentgrass on September 3, 2002. Values are means of observations from three replications.

Roundup® application timing	Percentage cover of Roundup Ready® creeping bentgrass			
	Green height		Fairway height	
	Creeping bentgrass	Creeping bentgrass	Kentucky bluegrass	Perennial ryegrass
Bare Soil ^z	84	96	97	100
7 days before seeding ^z	75*	99	100	99
At time of seeding ^z	60*	90	100	98
7 days after seeding	49*	87	95	95
7 days after seeding ^z	55*	85	98	90*
14 days after seeding	44*	70	85	94
14 days after seeding ^z	40*	84*	86	90*
28 days after seeding	32*	72*	77*	92
¼ rate in 4 applications	42*	84	98	97
End of growing season	20*	67*	67*	82*
Spring of 2003	4*	7*	6*	30*

^z These treatments also received an application of Roundup® 28 days after seeding.

^y Existing turf was removed and seed was sown into soil.

* Values within each column are significantly different from the control at $P \leq 0.05$ according to Dunnett's one-tailed t-test against the control.