EFFECTS OF PGR'S AND ROLLING ON THREE PUTTING GREEN CONSTRUCTION METHODS

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INTRODUCTION

The putting green is the focus of most golf courses in terms of playability. Therefore, interest regarding construction and maintenance have long been primary issues for discussion and research. In 1995, the United States Golf Association (USGA) funded research involving putting green construction techniques and the short and long term maintenance/management consequences involved. Our putting green project dealt with the long term effects of management practices compared across three construction methods. The objective of our project is to evaluate the effects of plant growth regulators (PGR's) on putting green speed and creeping bentgrass quality on three putting green construction methods with a rolling variable included.

MATERIALS AND METHODS

The study is being conducted on a 14,400ft^2 (120 x 120 ft) putting green constructed in the summer of 1992 and seeded in spring 1993. There are three root zone mixes: an 80:20 (sand:peat) mixture built to USGA recommendations; an 80:10:10 (sand:soil:peat) mixture built with subsurface tile drainage; and an unamended sandy clay loam textured (58% sand, 20.5% silt, 21.5% clay) "push-up" style green. These putting greens are 1600ft^2 (40 x 40 ft) and arranged in a randomized complete block design, replicated three times, and have individual irrigation control. They were built with the specific purpose of comparing among different soil types managed under similar management regimes. A rolling factor was split over each plot to compare its effects on three different soil types. Rolling was applied three times per week.

The PGR's used were foliar-absorbed trinexapac-ethyl (Primo) and root-absorbed flurprimidol (Cutless). Each were applied at a rate of 0.05 oz. a.i./M at five-week intervals starting June 14 1996, and ending with the last application on August 31, 1996. A check plot was also included in the PGR treatments.

Traffic was applied six times per week with a triplex unit fitted with golf shoe spike mounted rollers to simulate wear from 150 rounds of golf per day around the area of the cup on a typical golf green.

Data collected included stimpmeter readings, color and quality ratings, thatch accumulation, and rooting length. Stimpmeter readings were taken three times per week on the same day that rolling was applied. Both turfgrass quality and color ratings were taken on a monthly basis. Turfgrass rooting was recorded on August 7, 1996. Thatch accumulation data was collected in September.

RESULTS

Stimpmeter readings representing data collected during the season are presented in Table 1. There were no significant differences observed among soil types for stimpmeter readings until after the last PGR application. This application was made at the beginning of fall and the results could coincide with the onset of seasonal weather changes. After August 31, the USGA construction method plots produced higher stimpmeter readings. The rolling variable produced consistently higher green speeds than the not-rolled plots throughout the season. The interaction between rolling and construction type in green speeds produced inconsistencies with regard to 80:10:10 and sandy clay loam soils in rolled and not-rolled plots. On June 25, July 18, and August 8, rolled USGA plots showed consistently higher green speeds while not-rolled sandy clay loam plots showed consistently higher green speeds.

With respect to the PGR treatments, no differences were among Primo, Cutless, and the check plots. However, approximately two weeks after each application, there was a significant difference in the rolling x PGR interaction. At this point after each application, the greatest putting green speeds were achieved with a combination of PGR and rolling. These effects appeared to cease approximately 21 days after application.

Rolled plots resulted in lower color and quality ratings during July and September. The highest color and quality ratings were seen on the trinexapac-ethyl plots (Table 2). While rolled plots produced significantly higher green speeds, they also resulted in significantly shallower rooting depths (Table 3).

This study will be continued in 1997, with PGR treatments starting in May and concluding in September. Stimpmeter reading will be taken three times per week, consistent with 1996 readings. The long-term effects of PGR's will continue to be the main objective of this study, and comparisons to the 1996 data will be initiated.

Table 1. Effects of construction type, rolling, and plant growth regulator treatments on stimpmeter readings in feet on putting greens at the Hancock Turfgrass Research Center, 1996.

	6/25/96	7/18/96	7/25/96	8/8/96	9/10/96
Construction Type					
USGA	9.4	9.7	11.0	10.3	10.5
80:10:10	9.2	9.4	11.0	9.9	10.4
Sandy Clay Loam	9.3	9.7	11.2	9.9	10.3
LSD (0.05)	ns	ns	ns	0.4	ns
Rolling Variable					
rolled	9.8	9.8	11.4	10.7	10.8
not rolled	8.8	9.5	10.7	9.3	10.1
Significance[f]	*	*	*	*	*
Rolling x Construction Type					
USGA/rolled	10.0	9.7	11.5	10.8	11.0
USGA/not rolled	8.8	9.7	10.5	9.8	10.0
80:10:10/rolled	9.8	9.7	11.5	10.7	10.7
80:10:10/not rolled	8.6	9.1	10.5	9.1	10.2
sandy clay loam/rolled	9.7	9.9	11.3	10.7	10.6
sandy clay loam/ not rolled	9.0	9.6	11.2	9.1	10.1
LSD(0.05)	0.3	ns	0.6	0.5	ns
Plant Growth Regulator					
Trinexapac-ethyl	9.4	9.7	11.0	10.0	10.4
Flurprimidol	9.3	9.6	11.2	9.9	10.6
check	9.2	9.6	11.0	10.1	10.3
LSD (0.05)	ns	ns	ns	ns	ns
Rolling x PGR					
rolled/trinexapac-ethyl	10.1	9.9	11.6	10.7	10.9
rolled/flurprimidol	9.8	9.6	11.4	10.7	11.0
rolled/check	9.5	9.9	11.2	10.7	10.4
not rolled/trinexapac-ethyl	8.7	9.5	10.4	9.4	10.0
not rolled/flurprimidol	8.8	9.6	11.0	9.1	10.2
not rolled/check	8.8	9.4	10.8	9.5	10.2
LSD (0.05)	0.3	ns	ns	ns	0.4

f * indicates a significant difference at the 0.05 level.
ns = not significant.

Table 2. Effects of plant growth regulator treatments on color and quality ratings on putting greens at the Hancock Turfgrass Research Center, 1996.

	Quality Ratings			Color Ratings
	7/29/96	9/10/96	7/29/96	9/10/96
Construction Type				
USGA	6.7	6.6	6.7	7.0
80:10:10	7.0	7.0	6.9	7.1
Sandy Clay Loam	7.1	7.1	7.1	7.1
LSD (0.05)	ns	ns	ns	ns
Rolling Variable				
Rolled	6.8	6.9	6.6	7.0
Not Rolled	7.1	6.9	7.2	7.1
Significance[f]	*	ns	*	ns
Plant Growth Regulator				
Trinexapac-ethyl	7.1	7.3	7.2	7.7
Flurprimidol	6.6	6.6	6.2	6.5
check	7.4	6.8	7.3	7.0
LSD (0.05)	0.3	0.4	0.1	0.4

Color and quality ratings on scale 1 - 9; 1=brown, 9=best, 6=acceptable

f * indicates a significant difference at the 0.05 level

ns = not significant

Table 3. Effects of plant growth regulator treatments on rooting length (mm) on putting greens at the Hancock Turfgrass Research Center, August 7, 1996.

	Rooting Length
Construction Type	
USGA	195.7
80:10:10	151.5
Sandy Clay Loam	200.1
LSD (0.05)	ns
Rolling Variable	
rolled	170.3
not rolled	194.6
Significance	*
Plant Growth Regulator	
Trinexapac-ethyl	176.4
Flurprimidol	190.7
check	180.2
LSD (0.05)	ns