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

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INTRODUCTION

The majority of the focus on today's golf courses is directed towards the putting green. Due to the golfing publics' expectations, superintendents must maintain their putting greens at the highest level of playability and quality. Most golf courses, especially those that have undergone reconstruction, have more than one type of greens construction method represented on the course and therefore must be managed differently. In 1995, the United State Golf Association (USGA) funded this research investigating putting green construction techniques and typical management factors involved. The objective of our project is to evaluate the long-term 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

Through funding from the Michigan Turfgrass Foundation, the plots were constructed in the summer of 1992 and seeded in spring 1993. There are three putting green construction methods represented: an 80:20 (sand:peat) mixture built to USGA recommendations; an 80:10:10 (sand:soil:peat) mixture built with subsurface drainage; and a native unamended sandy clay loam textured (58%sand, 20.5% silt, 21.5% clay) "push-up" style putting green. These putting greens are arranged in a completely randomized block design, replicated three times, and have individual irrigation control. 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 trinexapac-ethyl (Primo) and flurprimidol (Cutless) which were split across each rolling factor. Each was applied at a rate of 0.05 oz. a.i./M at five-week intervals for both years of the study, 1996 and 1997. In the interest of representing a typical putting green, traffic was applied six times per week with a triplex unit fitted with metal golf shoe spike mounted rollers to simulate wear from 150 rounds of golf per day around the area of the cup. Sand topdressing was also included in the maintenance program on a light frequent basis to match the growth rate of the grass. Sand topdressing has taken place since the grow-in of the plots at a rate of 6-7 mm per year totaling 25 mm of total sand accumulation to date.

Data collection included stimpmeter readings taken three days per week on the same day that rolling was applied. Both turfgrass quality and color ratings were taken on a monthly basis (scale 1-9 for each). Turfgrass rooting weights were also recorded. The data were analyzed using ANOVA procedures. The least significant difference test was used to analyze differences between factors.

RESULTS

Ball roll distance readings representing data collected during both seasons are presented in Table 1. Construction methods did not produce significant differences in ball roll distance. As expected, rolled plots produced consistently higher ball roll distances than plots not receiving a rolling treatment. This is presumably due to the temporary hardening of the surface resulting from the rolling treatment. PGR's produced higher ball roll distance readings than check plots from 7 to 14 days after each application. In 1996, rolled plots that received a PGR application produced higher ball roll distance readings than rolled plots that did not receive PGR's (Table 2). This response was not seen in 1997. An interaction between construction method and rolling for ball roll distance was seen in 1997 but not in 1996 where both high sand content soils (USGA and 80:10:10) produced greater ball roll distance than the sandy clay loam plots when rolling was applied. This could potentially be a response to the continuous build-up of the topdressing layer.

Color ratings representing data collected for both seasons is also presented in Table 1. When color differences were seen between construction methods, 80:10:10 and sandy clay loam construction methods produced higher ratings than USGA plots. Trinexapac-ethyl and check plots produced higher color ratings than

flurprimidol from 7 to 21 days after each application.

An interaction between construction methods and rolling was observed for rooting weights from 0-15cm in October 1996 (Table 3). 80:10:10 plots produced significantly higher rooting weights than the USGA and sandy clay loam plots when rolling was applied. Also, sandy clay loam plots produced significantly greater rooting weights than both USGA and 80:10:10 plots.

The major focus of this study is the long-term effects of PGR's on putting green performance and will therefore continue through the year 2000, with PGR applications starting in May and concluding in September. Stimpmeter readings will be taken three times per week consistent with previous year's data collection. Long term trends will continue to be evaluated. We feel that the continuous build-up of a topdressing layer may have an effect on the response of the greens to the continued management practices. These responses will also continue to be monitored.

Table 1. Effects of construction method, rolling and PGR on ball roll distance and color ratings, East Lansing, MI, 8 Jun 1997.

Construction Method	Ball roll distance (cm)	Color
USGA	329	5.8
80:10:10	332	6.1
Sandy Clay Loam	326	6.4
$LSD_{(0.05)}$	ns	0.2
Rolling		
Rolled	337	6.1
Not Rolled	319	6.2
$LSD_{(0.05)}$	*	ns
PGR		
Trinexapac-ethyl	323	6.4
Flurprimidol	338	5.3
Check	323	6.7
$LSD_{(0.05)}$	7	0.2

Color Ratings: 1-9: 1= Poor (dead, brown), 9=dark green, and 6=acceptable.

Table 2. Effects of construction method and rolling on ball roll distance in feet on putting greens at the Hancock Turfgrass Research Center, 1996

	25-June		25-July		8-August	
	Rolled	Not Rolled	Rolled	Not Rolled	Rolled	Not Rolled
USGA	10.0	8.8	11.5	10.5	10.8	9.1
80:10:10	9.8	8.6	11.5	10.5	9.8	10.7
Native	9.7	9.0	11.3	11.2	10.7	9.1
$LSD_{(0.05)}$						
between rolling	0.3		0.6		0.5	
between construction methods	0.4		0.5		0.6	

Table 3. Effects of construction method and rolling on total root weights (0-15cm). East Lansing, MI, Oct 1996.

	Rolled	Not Rolled
Construction Method	———	(mg) ———
USGA	103	95
80:10:10	115	77
Sandy Clay Loam	174	189
$LSD_{(0.01)}$		
between rolling	29	
between construction methods	55	