High Frequency Rolling on a Sand-based Putting Green

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Additional index words: creeping bentgrass, *Agrostis stolonifera*, green speed, ball roll distance, quality, water infiltration.

Richards, J., D. Karcher, M. Richardson, A. Patton, and J. Summerford. 2010. High frequency rolling on a sand-based putting green. Arkansas Turfgrass Report 2009, Ark. Ag. Exp. Stn. Res. Ser. 579:77-81.

Photo by Jay Richards

Putting green turf quality declined significantly following six weeks of rolling the plots eight times per day.

Summary. Rolling putting greens is a cultural practice that many golf course superintendents use to increase putting green speed (ball roll distance). At times, circumstances are such that require golf course superintendents to quickly increase green speed, which may be detrimental to turf quality. Little is known about the effects of high-frequency rolling (more than once daily) with a commonly-used greens roller. The objective of this study was to determine the effects of intense rolling frequencies on ball roll distance and putting green quality. Five rolling frequencies were evaluated: no rolling and rolled either one, two, four or eight times per day. At rolling frequencies greater than once per day, ball roll distance increased with increasing rolling frequency. In addition, turf rolled twice per day remained above minimum acceptable quality throughout the study, unlike plots rolled four and eight times per day. Turf quality and water infiltration decreased as rolling frequency increased. Temporary high-frequency rolling may provide a method for rapidly increasing putting green speed without a significant decline in putting green quality.

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Although it is known from previous research that specialized putting green rollers increase green speed (as measured by ball roll distance), it is unclear how high-frequency rolling affects green speed and turf quality. For many years, a standard recommendation for putting green rolling frequency has been no more than three times per week (Nikolai, 2004; Hartwiger et al., 2001; Hamilton et al., 1994), based on research on native soil greens and with older model, heavier rollers. However, it may be possible to roll putting greens with greater frequency without sacrificing turf quality when rolling on sand-based putting greens, especially when using the relatively lighter rollers that are currently commercially available. In a recently completed two-year study, daily rolling provided superior green speeds at a 0.156 inch mowing height compared to unrolled turf at an equivalent height and at a lower height of 0.125 inch (Richards et al., 2009). There may be occasions when a significant increase in putting green speed is needed in a relatively short period of time, such as prior to tournament play. Rolling more than once daily may help in such situations, but little is known about the effects of high-frequency rolling on putting green quality. The objective of this study was to determine the effects of high-frequency rolling on ball roll distance, visual quality, and water infiltration rate on a sand-based putting green.

Materials and Methods

Experimental area. This research was conducted at the University of Arkansas Agriculture Research and Extension Center in Fayetteville, Ark. on a 'Penn-G2' creeping bentgrass putting green that was constructed according to United States Golf Association specifications (USGA, 1993). Mowing, fertilization, growth regulator and pesticide applications, aerification, irrigation, and topdressing were uniform across the experimental area throughout the study and were consistent with typical golf course putting green management practices in the region. Plots were mowed 6 days per week at a height of 0.125 inch. Nitrogen, phosphorous, and potassium were applied with 0.5, 0.05, and 0.5 lb per 1000 ft^2 per month of active growth, respectively. Trinexapac-ethyl (TE) (PrimoMaxx 1 EC, Syngenta Group Comp., Wilmington, Del.) growth regulator was applied monthly throughout the growing season at the label rate. Plots were sand-topdressed lightly, twice monthly, with sand that matched that of the existing rootzone and brushed into the canopy following application. Irrigation was applied as needed to maintain optimum conditions.

Treatments. This experiment was conducted during a six week period from 15 May through 26 June in 2009. The study consisted of five rolling treatments: zero, one, two, four, and eight times per day. Treatments were applied six times per week and replicated three times in a total of 15 plots (5 by 24 ft each). Rolling treatments were applied using a Tru Turf greens roller (RS48-11C Golf Roll 'n' Spike, Tru-Turf Rollers, Ernest Junction, Queensland, Australia).

Evaluations. Green speed was evaluated weekly by measuring ball roll distance with a Pelzmeter (Pelz, 2002). On each plot, three golf balls were rolled in one direction, and then rolled back in the opposite direction. The six resultant ball roll distances were then averaged to determine a single ball roll distance for each plot. Each plot was also evaluated weekly for turf quality on a visual scale from 1 to 9, with 1 being poor, 6 being minimum acceptable quality, and 9 being exceptional. Water infiltration measurements were conducted at the conclusion of the study to estimate the compaction of the surface layer of the plots. Infiltration was measured using a double-ring infiltrometer with an inside diameter of 6 inches (Turf-Tec Double-Ring Infiltrometer, Turf-Tec International, Tallahassee, Fla.) and a mariotte siphon (Gregory et al., 2005).

Results and Discussion

Ball roll distance. As rolling frequency increased, ball roll distance also significantly increased (Fig. 1). Three days after initial treatments were applied, plots rolled four and eight times per day produced significantly faster green speeds than plots rolled zero and one time per day. Eleven days after initial treatments were applied, all plots that were rolled were significantly faster

than plots that were not rolled. At 36 days after initial treatment application, all plots rolled eight times per day had the fastest green speeds; however, these speeds were not achieved until visual quality was unacceptable. With the exception of 36 days after initial treatments, rolling two times per day produced comparable ball roll distances to rolling four and eight times per day. Increases in green speed could have occurred more as a result of the thinning of the turf that occurred towards the end of the study on plots rolled eight times per day than a smoother putting surface. Thinner turf would offer less resistance to the ball than a healthy stand of turf. Therefore, a rolling frequency of two times per day maximized the benefit in ball roll distance.

According to this study, high-frequency rolling is a reliable cultural practice to increase putting green speeds in a short amount of time. Rolling four and eight times per day produced the fastest greens in the shortest amount of time. However, at eleven days after initial treatment, plots that were rolled two times per day were producing similar green speeds compared to plots rolled four and eight times per day. According to this study, in as little as three days, golf course superintendents can significantly improve their putting green speeds by implementing a high-frequency rolling program when preparing for events that require faster putting greens.

Visual quality. Plots rolled zero and one time per day did not differ in turfgrass quality on any evaluation date (Fig. 2). However, when averaged over all evaluation dates, plots rolled zero and one time per day had better visual quality than all other treatments, and turf quality decreased with increasing rolling frequency for plots rolled two, four, and eight times per day. All treatments remained above acceptable quality until 11 days after initial treatments were applied. At that point, plots rolled eight times per day had unacceptable quality. At 30 days after initial treatments, plots rolled four times per day declined to below acceptable quality. All other rolling treatments remained above acceptable quality throughout the study. Plots rolled once per day did not experience a decline in quality. Based on these results, golf course superintendents who are willing to sacrifice some turfgrass quality for improved green speed can roll as often as twice per day and see improvements in green speed compared to just once per day, and produce turf quality that remains above acceptable.

Water infiltration. There was a significant decrease in water infiltration as rolling frequency increased. Plots that were not rolled had a mean water infiltration rate of 22 inch/h compared to 8 inch/h for plots rolled eight times per day (Fig. 3). Though there were significant decreases in water infiltration rates as rolling frequency increased, infiltration rates for plots rolled eight times per day remained acceptable, and above USGA recommended saturated hydraulic conductivity rates (>6 inch/h) for a putting green constructed according to USGA specifications (USGA, 1993) and would likely drain adequately during heavy rain events.

These results indicate that a high-frequency rolling program can be used to significantly increase putting green speed in a short period of time. In addition, high-frequency rolling can be done for several days without producing unacceptable quality or infiltration rates that are detrimentally low. Therefore, golf course superintendents can implement higher-frequency rolling programs (2 times per day) for up to five weeks to maximize increases in green speed without decreasing turf quality or water infiltration below acceptable levels. This may be an important management practice when rapid increases in green speed are desired, such as prior to tournament play.

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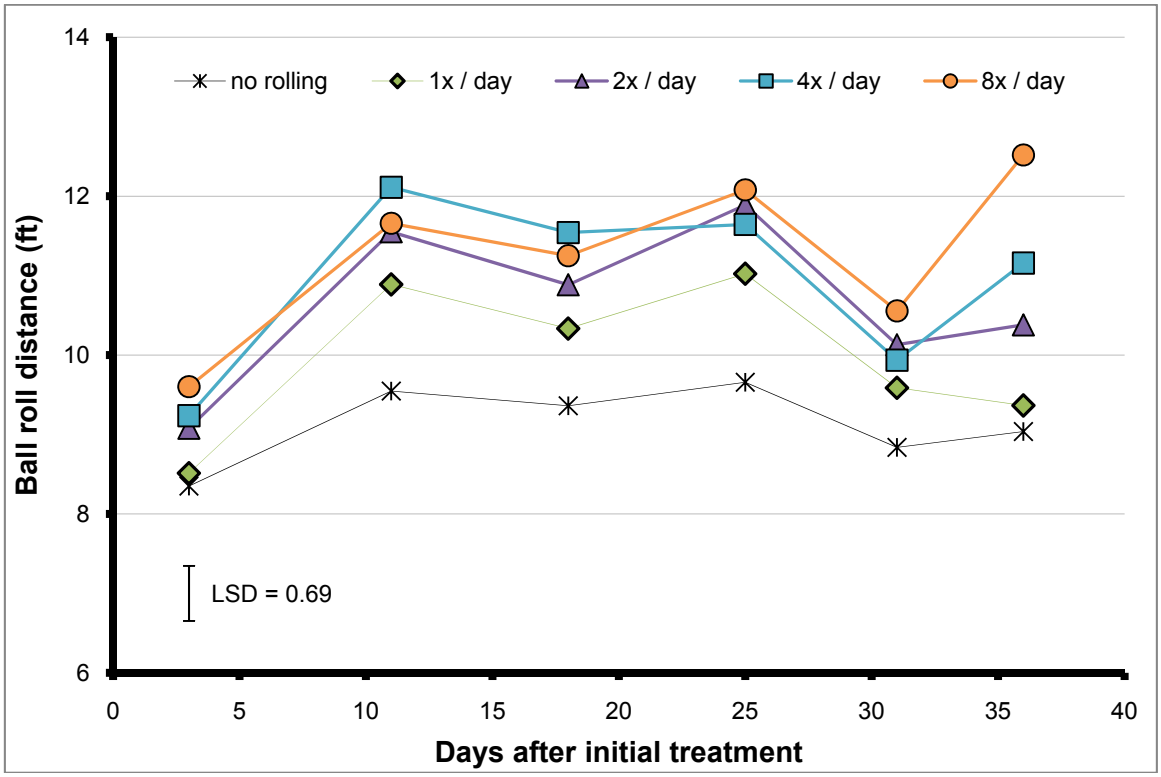

Fig. 1. Ball roll distance as affected by rolling frequency. Error bar represents Fisher's LSD (α = 0.05).

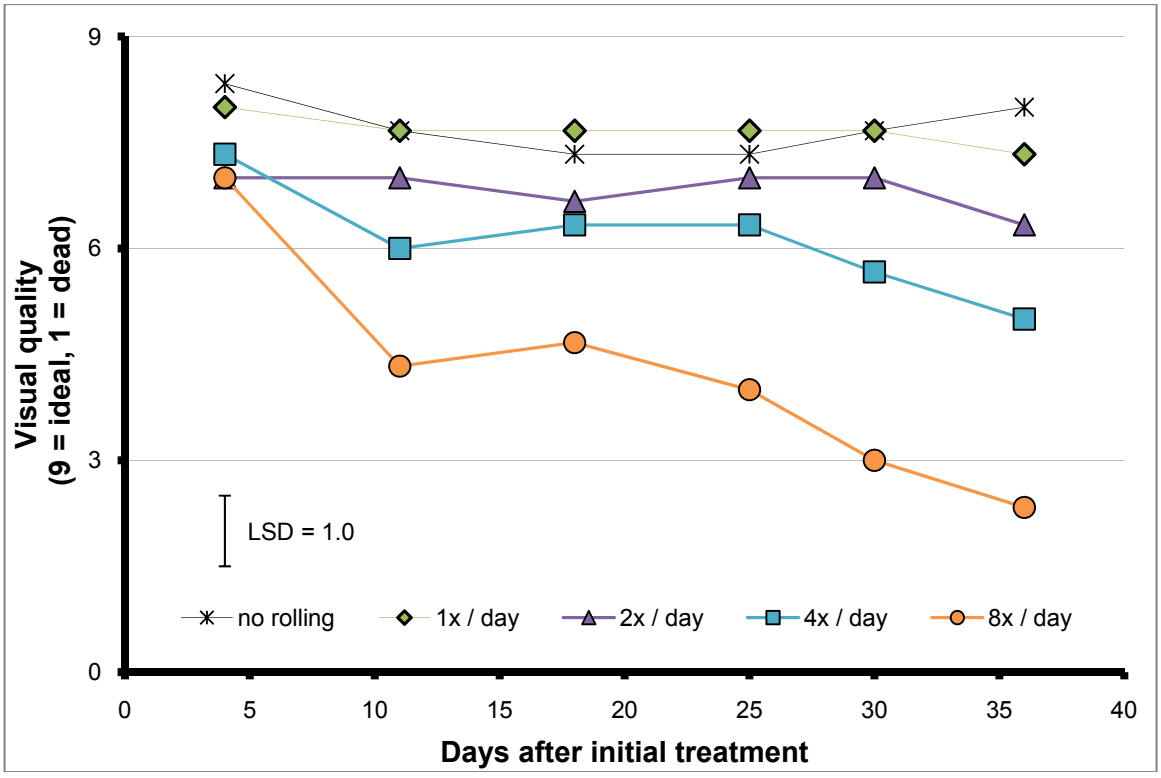

Fig. 2. Visual turf quality as affected by rolling frequency. Error bar represents Fisher's LSD (α = 0.05).

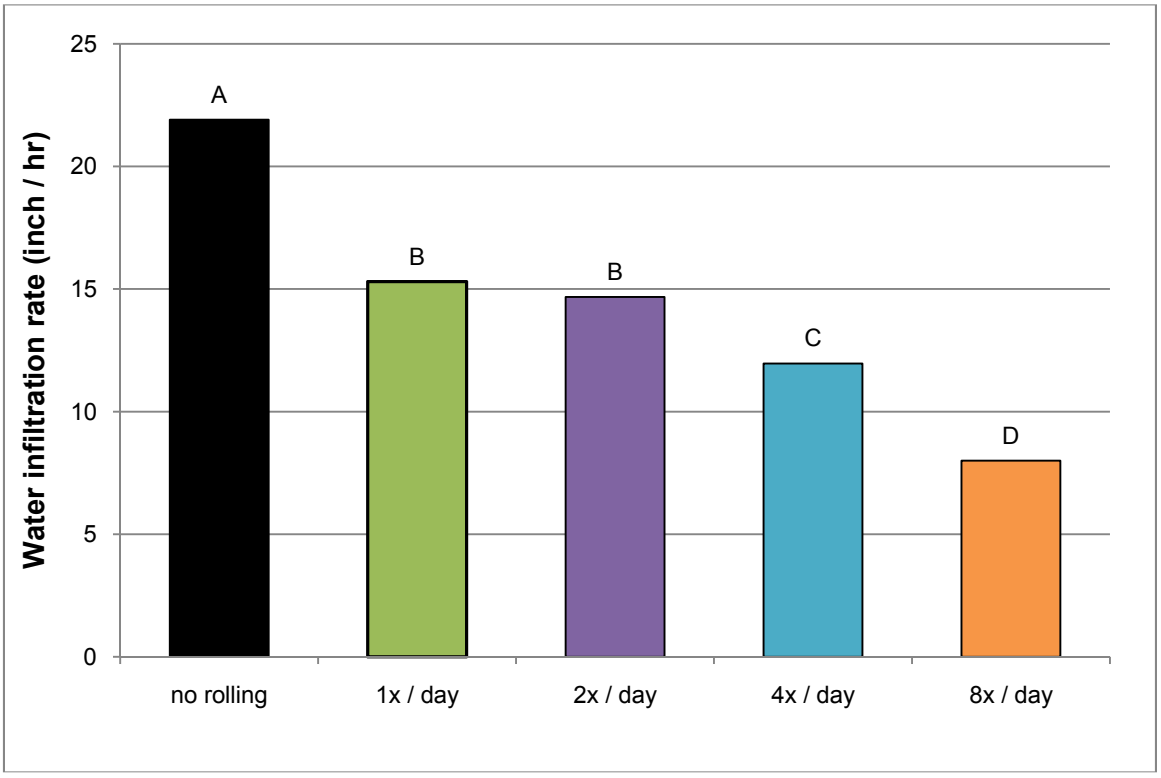

Fig. 3. Water infiltration rate as affected by rolling treatment. Measurements were taken six weeks after initial rolling treatments. Bars sharing a letter are not significantly different (α = 0.05).