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Research You Can Use

More Light on Lightweight Rolling

Research is shedding light on rolling as a season-long maintenance practice.

BY THOMAS A. NIKOLAI

In 1901 Walter Travis wrote, "From May until October each green should be rolled daily with a light roller, rather than once or twice a week with a heavy one."¹ For the next quarter century the debate over roller frequency and weight was waged in numerous publications. Before the issue was resolved, however, most turfgrass managers lost interest in rolling putting greens as the effects of soil compaction on turfgrass rooting became clearer.²

In the early 1990s, the practice of rolling greens was reinitiated due to the

demand for faster green speeds.⁴ With its resurrection came articles praising it for tournament preparation while warning of negative effects if overused for regular play. Golf course superintendents searched for advice about roller use, but found little research regarding rolling. Specifically, information was needed concerning the use of rollers in a season-long program.¹ Recognizing this need, a handful of turfgrass researchers initiated studies of lightweight green rolling.

Researchers at Michigan State University (MSU) rolled USGA and native soil bentgrass greens three times per week. However, those treatments resulted in no significant change in turf quality, soil compaction, or water infiltration from unrolled putting green plots.⁷ At North Carolina State University, bentgrass greens were rolled zero, one four, and seven times per week. Once again, plots rolled once per week resulted in no reduction in turfgrass quality.

and seven times per week were not immediate. The reduction in turfgrass quality at those frequencies took three to four weeks to become apparent.

GREEN SPEED AND GOLFER PERCEPTION

Most rolling studies have considered the immediate and residual effects that rolling has on green speed. All studies concluded that rolling noticeably increases green speed on the day rolling is applied. The amount of increase varied



FREQUENCY AND COMPACTION

Over the past decade three studies considered the impact of season-long green rolling on soil compaction. Penn State University researchers compared plots having both USGA-recommended sand or native soil rootzones. Plots were rolled once or twice per week, but no changes in turfgrass quality, soil bulk density, or water infiltration were found in rolled plots versus plots that were not rolled.³

One side observation was that rolling impacted dollar spot symptoms on the turf plots. The plot on the right was rolled three times per week and showed few dollar spot lesions, while the left plot was not rolled and was heavily impacted by the disease.

Rolling four and seven times per week decreased turfgrass quality on plots growing on both USGA-recommended sand rootzones and plots having native soil rootzones.⁴ Furthermore, compaction increased on the native soil greens rolled four and seven times per week during the first year of the study. It is noteworthy that the loss in quality attributed to lightweight rolling four

from day to day, but rolled plots were generally one foot faster than non-rolled plots on the day they were rolled.

The residual effect that rolling has on green speed is not as clear-cut. Several studies report a measurable residual effect up to 48 hours after rolling, while other studies report the increase lasts not more than one day. Some of the apparent discrepancy may be due to the

way the data are reported. Although studies reported a statistically significant increase in green speed up to 48 hours after rolling, the residual increases are usually three inches or less.⁹ Golfer surveys indicate that most golfers cannot detect differences in green speed of six inches or less.⁵ Thus, the three-inch difference is valid scientific reporting, but from a real-world aspect the greens would not be noticeably faster to the golfer two days after rolling.

The fact that most golfers cannot detect differences in green speed of six inches or less adds credence to the argument that posting green speeds may be more bother than it's worth. Often, golfers argue over half-foot differences in green speeds, while surveys show that even low handicappers cannot detect differences in green speeds that accurately.

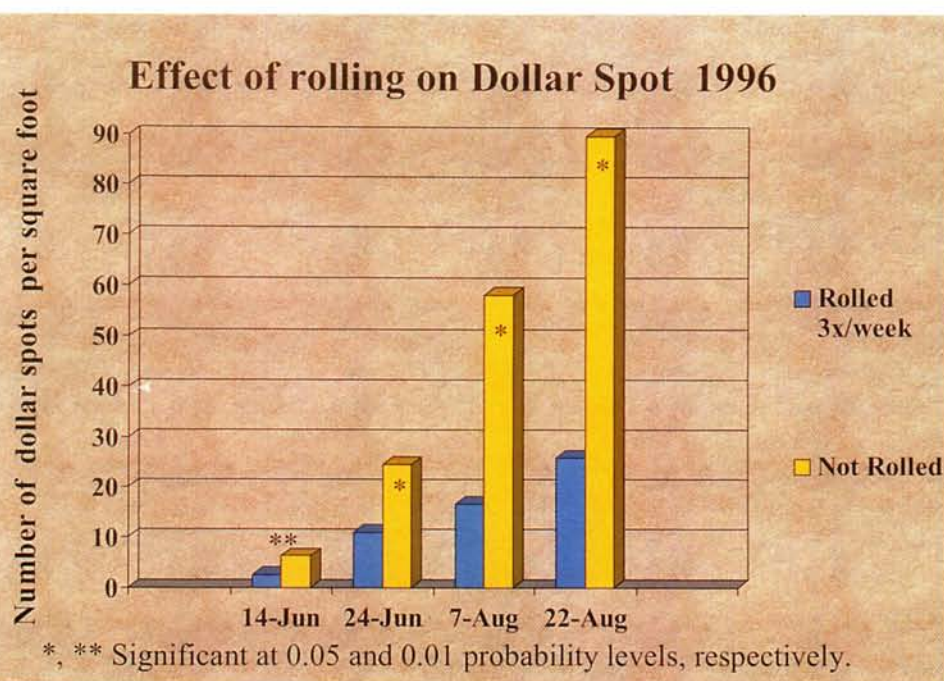
ROLLER WEIGHT AND TYPE

Roller weight and type appear to be linked together. It would seem logical that heavier rolling machines would result in greater increases in green speed for a longer period of time. However, results from a Michigan State University study indicate roller type must be considered in an evaluation of the effect of roller weight.

In the MSU study, a triplex attachment roller (single roller per attachment) weighing approximately 1,300 pounds and a sidewinder roller (three rollers traversing the same area) weighing about 950 pounds were included in the study. Both increased green speed approximately one foot on the day they were applied compared to non-rolled plots. The day after rolling, however, the triplex-rolled plots averaged three inches faster than the non-rolled check plot, while the sidewinder-rolled plots averaged six inches faster than the check.⁷

ROLLING VERSUS MOWING

Rolling frequency and duration (length of time using the same roller schedule) have an effect on residual green speed,



Research plots at Michigan State University were rolled over a five-year period to study the effects of this maintenance practice when used in a season-long program.

too. This is most apparent when comparing mowing height green speed studies performed at the University of Arizona and again at Michigan State University. Both universities investigated whether it may be possible to raise mowing height and still retain putting speeds by incorporating rolling as a routine maintenance practice.

The two studies differed slightly in that the roller frequencies differed, but the difference in mowing heights was identical (0.03 inch). The University of Arizona study rolled two times per week, while the MSU study rolled three times per week. In the University of Arizona study, rolling was not as effective in increasing green speed as lower mowing. In other words, the non-rolled, low-cut turf was still faster than the rolled, higher-cut bentgrass.⁶ In the Michigan State study, the non-rolled, low-cut turf plots also were initially faster than the rolled high-cut plots. However, after two weeks of rolling, the higher-cut plots retained the same green speed as the non-rolled, low-cut turf on the day the greens were rolled and the day after rolling treatments were applied.⁷

ROLLING AND PEST OUTBREAKS

Golf course superintendents have been justifiably concerned that rolling may lead to diseased turf. Dollar spot is a turfgrass disease that can be spread by maintenance equipment that carries fungal mycelium and infected plant tissue from green to green.¹⁰ Because of this, it may be reasonable to assume that rolling would increase the severity of this disease. However, dollar spot severity *decreased* on research greens at Michigan State University that were rolled three times per week for five straight years.

These positive results were obtained because of the timing of the mowing and rolling. Similarly to most golf courses, the research greens were mowed at dawn and rolled within an hour after mowing. This timing is believed to be important because early morning mowing may exacerbate the release of guttation droplets forming at the tips of the cut leaf blades. These guttation droplets are used as a nutrient supply by fungal pathogens. Rolling within an hour after an early morning mowing may disperse concentrated

guttation water, thus reducing the pathogen's ability to infect other plants.

Rolling also may affect the ability of turfgrass insects to infect and populate an area. In 1998, Dr. Dan Potter from the University of Kentucky reported that black cutworm moths lay nearly all their eggs on the tips of leaf blades and that many eggs survive passage through the mower blades and will later hatch.⁸ On a green rolling research site at MSU, bird activity highly coincided with numerous black cutworms being observed on the site. While no attempt was made to quantify the number of

weighing up to 960 pounds three times per week in a season-long program. Triplex attachment rollers can weigh more because there is less weight being applied on each roller. However, it is important that when a specific rolling program is adopted, the total number of rounds and other factors imparting stress on the greens be kept in mind.

Research also suggests that rolling three times per week increases green speed significantly, and the increase in speed is still apparent up to six days after rolling. This frequency may also allow the superintendent the

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cutworms on the site, significantly less bird activity was observed on greens that were rolled.⁷ Considering debris adheres to green rollers and is transported to the wash pad, it is conceivable that rolling could have decreased the amount of cutworms per green by removing eggs with the excess debris.

CONCLUSIONS

Although the effect of roller weight is dependent on the type of roller used, results indicate it is safe to operate a sidewinder roller (with three rollers)

flexibility of raising the cutting height up to 0.03 inch during the heat of summer and retain the same green speeds as the non-rolled shorter height of cut.

Although the MSU studies suggest that rolling after an early morning mowing decreases dollar spot severity and may pick up excess turfgrass leaf litter, resulting in fewer black cutworms, further research is needed. If additional research can corroborate these observations, rolling greens may prove to be more important than just being a means to increase green speed.

