Natural Variation in Putting Green Speed

By Mario Tiziani

The most important part of the game of golf is putting. A good putter can contribute immensely to his game by having complete knowledge of the putting surfaces used in any round of golf. The speed the putting surface allows the ball to travel is the most important aspect of putting.

I begin my preparation for any round of golf by spending as much allowable time as I can on the practice putting green. My assumption is the putting green has the same texture as the golf course proper. I go so far as to ask the golf course superintendent if the practice putting green was constructed at the same time the golf course was constructed. My concern in knowing these facts is to help determine the speed of the various greens. The speed or pace of the green dictates the amount of break, or borrow, one must ultimately be aware of in making the putt.

Every putt is a straight putt; only the contour of the ground and the texture of the putting surface causes the ball to curve. As a golfer I must therefore dwell on not only the high spots on the green, but I must also consider factors such as cutting height and, most of all, grain.

Once you have command of the speed of the green, you can begin to have confidence in not only your putting, but also in club selection as you begin to approach the putting surface. Hence, knowledge of the speed of the greens is a determining factor in the success or failure of all golfers.

There are many cultural practices that affect green speed. These have been researched and reported on numerous occasions. The main factors are:

A. Fertilization

Reduction in the amount of nitrogen applied will cause a thinning of turf and, therefore, an increase in speed. The side effects of weed encroachment and disease make the practice less than desirable.

B. Topdressing

Applying a light layer of sand every 2-4 weeks will make for a smoother, truer, and faster putting surface. Actually, the sand reduces the amount of leaf that is exposed to the surface. The ball rolls on the tips of the plant offering little friction to the rolling ball.

C. Cutting Height

A generally accepted height for cutting in our area is $\frac{6}{32}$-inch. Cutting lower tends to increase speed, but with the heat and humidity that exist during our golf season, this can cause excessive loss of grass and damage to turf. Double cutting starting a week before the desired time of increased speed also increases the amount of time a golfer spends on the putting surface.

D. Aerification

Aerifying actually removes grass, stolons and thatch from the greens. This process alone reduces the amount of grass the ball rolls over and allows the ball to move faster over the putting surface. The most significant aspect of aerification is that the process really improves the root system of the grass and contributes to the overall health of the turf so that management practices such as fertilization, topdressing, and cutting height can be used more effectively to regulate speed.

One aspect of green speed that has not been well documented is variation resulting from factors that are beyond the control of the golf course superintendent. Weather and time of day are prime examples. An accomplished golfer is one who correctly anticipates time of day and day-to-day variations in green speed during tournament play. It is also important that club members come to understand that green speed is not a function of cultural practices alone.

To enhance my understanding of how green speed varies as a result of uncontrollable factors such as weather, I used a stimpmeter to measure speeds of four greens at the Cherokee Country Club over a 4-week period during which cultural practices did not change. The greens were single cut at a constant height, no fertilization occurred just prior to or during the measurement period and, as luck would have it, no disease problems arose that demanded treatment.

OBSERVATIONS

The more than 100 stimpmeter readings taken according to USGA Green Section procedures were first examined from the standpoint of day-to-day variation in green speed. To do this, a statistical analysis of variance was run using the speeds of the four greens as replicate determinations. I then examined differences in speeds of individual greens measures at 180° to each other. This particular aspect of green speed is being referred to here as directional speed. On two different occasions, the speeds of two greens were measured at approximately 9 a.m., noon, 3 p.m., and 6 p.m. to provide an indication of how green speed varies with time of day. The final green speed factors examined were direction of ball roll with respect to mowing direction and grain and speed around and away from the cup after a half-day of fairly intensive play.

Day-to-Day Speed

Statistical analysis was used to establish whether or not changes in green speed from one day to the next were systemic or just the result of random variation. What I discovered was that unless the speed change from one day to the next was greater than 9 inches, the change was purely random. In other words, it was a result of non-reproducible variation in green speed.

When averaged over the four greens, day-to-day variations in green speeds were not significant. However, speeds of individual greens did occasionally vary significantly from one day to the next. Whether or not this variation was significant seemed to depend on the average speed of the green and air temperature. The faster the green, the greater the number of successive days when speed changed significantly. This is illustrated in Figure 1. The speed of green #5, the fastest of the four greens examined, had significant day-to-day changes in speed for 5 of the 13 dates observed. In contrast, speed of the relatively slow green #17 never changed significantly from one day to the next.

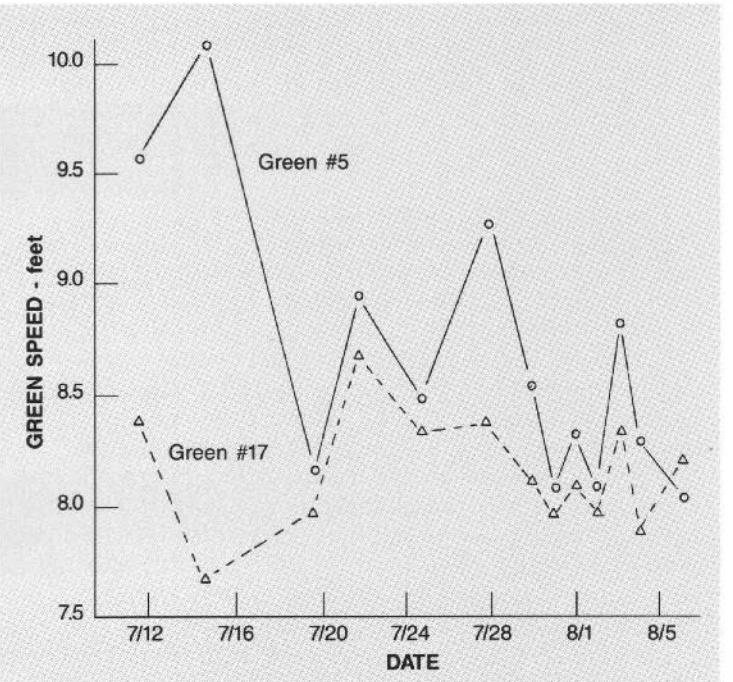

Figure 1. Naturally occurring day-to-day variations in green speed.

Significant day-to-day changes in green speed were confined to periods when maximum daily air temperatures were less than 80°F. Once air temperatures were consistently above this level, significant changes in green speed disappeared. In Figure 1, these conditions prevailed between July 30 and August 6.

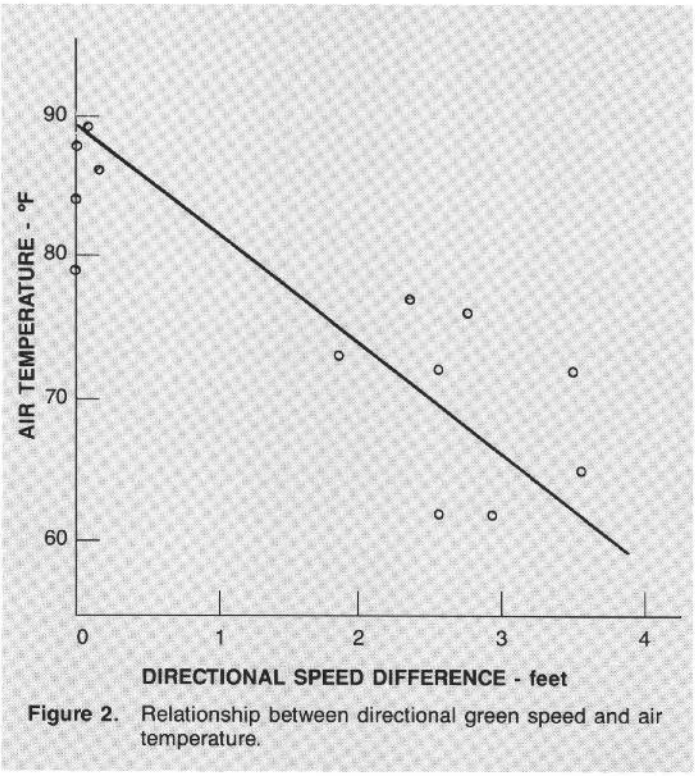

Figure 2. Relationship between directional green speed and air temperature.

I was unable to find any consistent relationship between day-to-day changes in green speed and rainfall, cloud cover, or humidity. The reason for this is the fact that each green tended to behave independently as far as weather was concerned. For example, between two successive days in August, the speeds of greens #5 and #12 decreased, #10 remained the same, and #17 increased in speed.

Directional Speed

Differences in speeds measured in opposing directions on the individual greens ranged from 0 to as much as 3 feet 7 inches. Just as in the case of day-to-day variation in green speed, variation in directional speed was greatest on the faster greens, but became insignificant on all greens when maximum daily air temperatures exceeded 80°F (Fig. 2).

Time of Day Speed

Change of speed with time of day was observed on two greens on different dates. Changes in speed were confined to the hours of 9 a.m. to 3 p.m. (Fig. 3). The type of change that occurred depended on weather conditions. Between 9 a.m. and noon, both greens underwent drying, a circumstance that would normally expect to increase speed. That did occur on green No. 12 on July 22, but not on green No. 10 on July 25. The reason for these conflicting influences of drying on green speed is believed to be weather. Turfgrass growing conditions were considerably more favorable on July 25 than on July 22. I believe that on green No. 10 a very rapid turfgrass growth rate offset the effects of drying on green speed. The noon to 3 p.m. reduction in the speed of green No. 12 (Fig. 3) coincides with the fact that a light drizzle began during this time and continued throughout the remainder of the day.

Grain and Mowing Direction vs. Speed

One of the faster greens was used to assess the impacts of grain and mowing direction on green speed. Grain was found to have a major impact. Ball roll against the grain was 21 to 28 inches less than roll with the grain. The average reduction in green speed attributable to grain was 20%.

Mowing direction had considerably less influence on green speed than did grain. The single measurements made against and with mowing direction yielded a difference of only 7 inches, or about a 6% reduction in ball speed when rolled against rather than with the mowing direction.

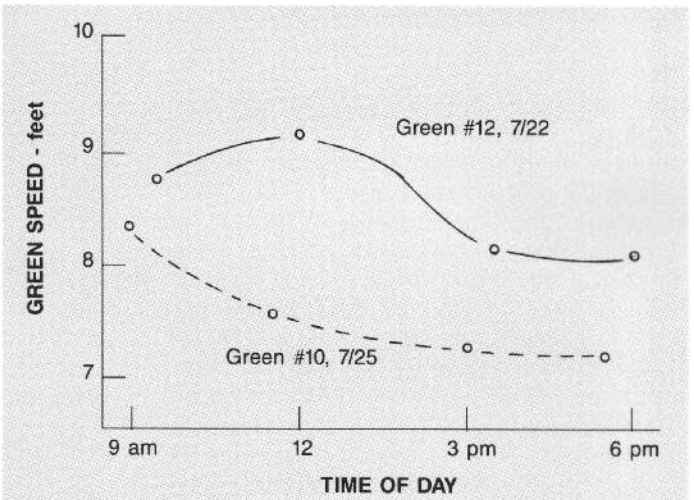

Figure 3. Time of day green speed.

Foot Traffic vs. Speed

On one date, stimpmeter readings were taken around the cup on one green and again some 20 feet from the cup. By noon of that day, green speed near the cup was 5.5 inches less than away from the cup. While not a major change in speed, this observation raises the question of what foot traffic does to green speed near the end of a day of intensive tournament play.

SUMMARY

This was a 1-month study of the variations over time that naturally occur in the speed of golf greens subjected to uniform, unchanging cultural practices. From my perspective as a serious golfer, correctly anticipating these variations is vital to my putting ability and to my ultimate success in the game itself. To the golf course superintendent, these speed variations signify the degree to which uniformity in green speed can be achieved with standard, uniformly imposed cultural practices.

The most important findings in this study were:

1. Uncontrollable, naturally occurring variations in the environments of golf greens and changing weather can induce substantial variations in golf green speeds even under uniform cultural practices. In this study, the maximum green-to-green variation in speed was 2.5 feet. Day-to-day speed variation on a given green ranged from 0 to a maximum of 1.25 feet.
2. The faster a green and the better the conditions for turfgrass growth, the greater the green-to-green and day-to-day speed variation that occurred. When air temperatures exceeded 80°F for several days in succession, these speed variations diminished to 9 inches or less and were then no longer statistically significant. In other words, uniformity in green speed was greatest during periods of heat stress and superintendents should not be concerned when green speeds vary by approximately 9 inches or less. Uncontrollable natural forces rather than cultural practices are responsible for this variability.
3. Slower green speed and elevated temperatures also reduce differences in the directional speed of golf greens.
4. Daytime drying increased green speed, but only if the bentgrass was not growing rapidly. Rapid growth during the day reduced green speed by approximately the same amount as did precipitation.
5. Grain had a much greater impact on green speed than did mowing direction. The implication here is that reduction of grain by way of verticutting, grooming, topdressing, etc. is an effective means for substantially reducing speed variability on a green.
6. Spike marks left by heavy foot traffic reduce green speed. I measured a 5.6% reduction in speed over one-half day of play.

EDITOR'S NOTE: *Mario Tiziani is a sophomore at the University of Wisconsin-Madison and a member of the UW golf team. He was named outstanding freshman golfer in the Big 10 for 1989 and won the Madison City Golf Tournament this past summer. This study was conducted under the direction of Dr. Wayne Kussow, UW-Madison, and Michael Semler, Superintendent, Cherokee Country Club.*