Wondering about Mowing

By Dr. Frank S. Rossi
Department of Horticulture
University of Wisconsin-Madison

We want shaven carpets of grass here and there, but what nonsense it is to shave it as often as foolish men shave their faces! There are indeed places where they boast of mowing 40 acres!! William Robinson; The Wild Garden. 1894

Perspective

I wonder if in 1830 when Edwin Budding invented and patented the first mechanical push mowing machine for turf, he knew the impact of that act. As with all new technologies, mechanical mowing was slow to be adopted, with many courses relying on sheep to keep the grass mowed and *nurtured.* Piper and Oakley in the 1917 classic *Turf for Golf Courses,* wrote, "mowing machines are the most essential elements on every golf course." They even went so far as to recommend horse-drawn machines on clayey fairways even though "the use of horses may involve some unevenness of the turf due to the footprints of the animals."

Anyone with interest in the management of golf courses might say that the largest single influence on the industry over the last 25 years is not golfer expectations, environmental issues or labor concerns. Rather it is reduced mowing heights. Occasionally, I'll even get a group of superintendents to actually admit how low they mow. You'll hear cries of 140 thousandths, 130 thousandths, 125 thousandths and one or two who whisper, "sometimes I go down to 110 or 105. How much difference does 15 thousandths of an inch make on ball roll, wear tolerance and disease resistance? Does it matter how often you mow (mowing frequency)? Do you actually mow less when you use growth regulators? Is bench height of .110 on a triplex the same as .110 on walking mower? How much roll should an undulating green have before it is considered unfair?

Mowing 101

Underground. From a purely physiological perspective, mowing is a shock to the turfgrass plant. The influences of low mowing, such as decreased carbohydrate synthesis and storage, decreased leaf width (except with Penncross of course), and most significantly decreased root growth rate and total root production are well known. And while these are all significant influences, the impact on rooting worries me the most. Dr. Beard suggested in the classic, *Turfgrass Science and Culture,* that close cutting heights may stimulate root growth regulator production in the leaves. This may help explain the physiological reason why plants mowed under close cutting heights typically have less root mass. Is this where biostimulants that contain cytokinins might help rooting under close mowing?

During my travels this spring I observed a substantial mass of roots on putting greens (it always makes me wonder if some of the concepts I learned along the way still hold water). Upon closer inspection I noticed that there were very few if any root hairs. Root hairs, which are rarely active for more than a week, are vital for maximizing absorption surface area. Are long roots without hairs as functional as short roots with hairs? I've seen beautiful white slender roots growing down through deep-tine grooves without root hairs. Are these roots helpful to the plant?

Aboveground. Much of what is known about modern mowing practices is based on research conducted in the early 1960's by Dr. John Madison. Dr. Madison indicated that there are two distinct growth phases after mowing occurs. The first is the extension of the cut leaf (about a four day period) then followed by production of new leaves. Daily mowing, often times multiple daily mowing, must surely have a substantial impact on this physiological process.

Turfgrass leaves house the engine that produces the energy to power the system we call a plant. It follows that as you reduce the effective leaf area, less energy is available for growth and plant health begins to be compromised. Are we seeing more disease problems at lower heights? Are the plants predisposed to these problems because they are barely chugging along? Dr. Bruce Clarke at Rutgers University identified a clear relationship between incidence of summer patch of annual bluegrass and mowing height. Raising the height .025" increases the amount of leaf surface by 20% and resulted in a 20 to 40% reduction in disease incidence. They must be healthier plants.

(Continued on page 11)

(Continued from page 9)

Mowing Frequency

What about mowing frequency? In the classic mowing paper by Madison, it was suggested that a rest period every 7 to 8 days would benefit a turf mowed at 0.25" every day. If you accept that mowing is a physiological stress to the plant, then daily multiple mowing prohibits any potential recovery that might be realized during the day. While this practice might be useful from a functional standpoint, to maintain ball roll, is it a nightmare from a plant health standpoint?

It is widely thought that morning dew or moisture reduces the quality of cut. Back East it was common practice to pole the green in the morning with a flexible pole to remove dew, as well as stones and even golf spikes that could disrupt the mower. I don't know of many courses where this is practiced in Wisconsin. Depending on the day, would it be possible to syringe the green in the morning to knockdown the dew, allow them to dry and then sneak out to mow around 9 or 10 am? Again, this may sound crazy, but someone has to speak for the turf plant.

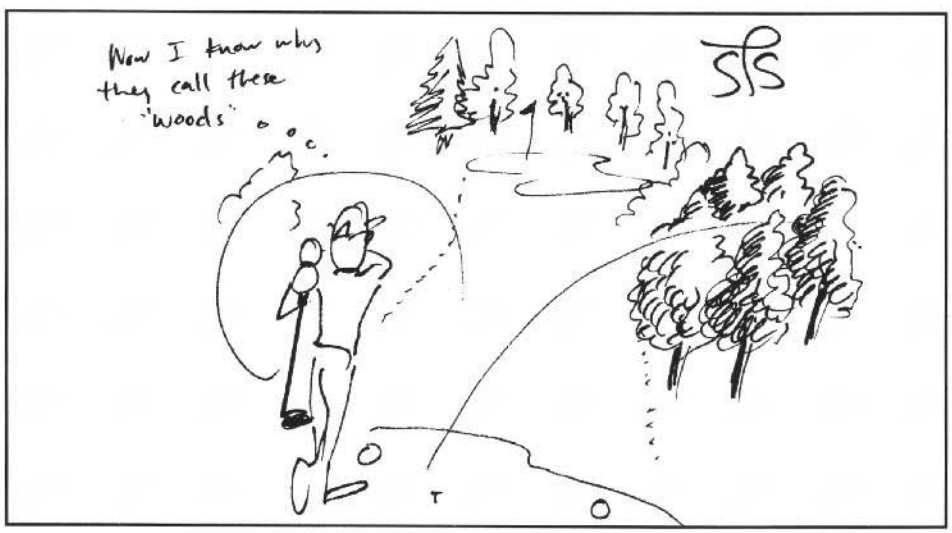
A Day of Rest. Following Madison's logic, one might consider resting the greens every 4 days. Now there's a radical approach! Could you maintain consistent conditions by not mowing every 4th or 6th day? Is the golfing season too short in Wisconsin to allow a green to grow from .125 to 156" or .110 to .124" over a two day period? What is the impact on plant health? Does this significantly reduce ball roll? I thought rolling might help us eliminate a mowing; I guess I was wrong. Now we're seeing multiple daily cuts plus rolling!

As I ask around, superintendents shudder at the thought of a day without mowing. One of the most highly regarded superintendents in the state indicated that if he rested the greens on Monday, it would take until Friday to get the speeds back to where they had to be. At some point we may have to consider either explaining the benefit of a day of rest to the golfers, or developing supplemental cultural practices such as rolling, topdressing or growth regulators to compensate for the day off. It is possible that more upright bentgrasses such as Putter, Crenshaw, Providence and Pennlinks may allow increased heights without lost speeds. In either case, it seems to me that something may have to give.

Ah Ha, Ball Roll

Every study that has investigated influences on ball roll (green speed) concluded that height of cut has the greatest influence. Reducing height on a Penncross/Penneagle green from .187" to .125 increased roll 2 feet, .156 to .125" about 8 inches and .125 to .09375" only 4 inches. Many of these studies as you might suspect were conducted under controlled conditions and on a surface different from yours.

Under actual maintenance and playing conditions, Mario Tiziani, under the supervision of Dr. Kussow, did a study at Cherokee Country Club that monitored the variation in ball roll over a one month period. They found that the "faster greens" had the greatest day to day variation. Daytime drying increased roll if greens weren't growing rapidly and grain and spike marks significantly reduced roll. The conclusion I liked was that superintendents should not be concerned when roll varies 9 inches or less; this is more likely a result of natural forces rather than cultural practices.



The Big Picture

A closer look at all this information suggests that some of the pressure for "high speed" is self inflicted. In reviewing the literature from a search of the Turfgrass Information File, I came across several articles such as *Speed Kills* and *No Speed Limit*. Our esteemed editor back in 1985 penned a piece on the the obsession with fast greens entitled "What's Goin on Here?". It was decried, enough is enough! Ten years later, here I am wondering if we can expand the biological boundaries further? Or, is it up to our communication skills to explain what's what to our golfing community.

I know we can provide the demanding high speed conditions that our better golfers demand—at a price. We will have to learn more about new technologies. Will the new bentgrasses allow us to increase heights and keep speed? If so, how do we introduce the new cultivars into our existing greens? Is it worth planting new bentgrasses if they will be infested with annual bluegrass within 5 years (I've seen new greens not even one year old with annual bluegrass in them!) Will plant growth regulators be developed that enable us to maintain health, quality and speed? Will battery operated greensmowers influence ball roll? Will a winter hardy annual bluegrass be developed that does not produce seedheads under putting green conditions?

The Future

I am concerned that continuing to force conditions on biological systems developed 30 to 50 years ago (Penncross/annual bluegrass greens) will only increase the demand for energy intensive inputs such as pesticides. I know we can and do produce almost unbelievably consistent and fast surfaces, yet it comes at a price.

Environmental research tells us, for the most part, our system does not threaten the environment (it enhances it). I'm still concerned with the casual manner with which we continue to use the same practices with only slightly different tools. I wonder if it's time, before we are forced into it, to investigate practices that focus on balancing consistent, high quality conditions with maintaining healthy plants. I wonder if mowing is the practice to start with....