QUESTIONS FROM THE FLOOR

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Q: Dr. Kussow: I did some dabbling with a PGR this summer, trying to learn some of the practical aspects of them. The most obvious question I have is this: How does use of PGR affect one's normal fertility program? Does less tissue production translate into lower nutrient requirements? CALUMET COUNTY

A: Let me answer for a putting green since this seems to be where the greatest amount of interest is in the use of PGR's. To answer the question, we need to know how much clipping production has been reduced and the nutrient content of the clippings. Research shows that one can expect a clipping reduction of 0 to as much as 60%. The actual amount varies with the time of year and the amount of N being applied. Let's make as our first assumption that over the whole season, the clippings are reduced 30%. The second assumption is that without PGR the total clipping dry weight for a season is 80 lb/M. Thus, in the 24 pounds of clippings not produced, we would have had 0.96 lb N, 0.12 lb P (0.27 lb P2O5), and 0.48 lb K (0.56 lb K2O). This, then, is theoretically the amount by which you could reduce your annual fertilizer application. At best, it's a ballpark figure.

Q: Prof. Kussow: It seems that in recent years it has nearly become impossible to use granular fertilizer on my greens during the summer months. We have outings on Mondays, player complaints about fertilizer on greens and how it affects ball roll, a mess for rollers on mowers (and player shoes), the need to mow dry without baskets (never popular), particle pickup, and unknown nutrient removal when baskets are used, etc. *ad nauseam*. So we've been spraying fertilizer. The use of urea (and other immediately available products) led to a flush of growth and a lack of color in a week, so we moved to spray grades of slower release materials. Results seem good, although it is tough to time applications to coincide exactly with fungicide applications. Any comments or advice? MANITOWOC COUNTY

A: You've given several reasons why I think us of liquid fertilizer on putting greens is on the rise. Another reason is height of mowing. What granular product won't be extensively picked up at 0.109 inch or less? Second is the new, high-density bentgrass cultivars coming onto the market. Fertilizer really sits up on them. You've taken the right approach to your problem, and I cannot come up with a perfect solution, given that fungicide application intervals vary with the product and disease pressure. I do suggest that you try two different liquid fertilizers, one that is based on methylene urea and the other on triazone. The latter is slower release and probably won't do as well in cool weather. All I can suggest is that you try the two at different rates to see which gives the level and duration of response that best fits with your fungicide application schedule.

Q: We built a new green awhile back, nearly 10 years ago. It was built exactly to USGA Green Section specs, including the coarse sand layer. Bu something weird has happened over time. Despite passing all the material tests before construction, the perc rate of this green has declined every year, to the point where it is not significantly different from our native soil greens. What's going on here, Doc? LA CROSSE COUNTY

A: Putting green percolation rates naturally decline over time. We've seen our experimental greens go from about 12 inches/hour after construction to around 2 inches/hour in 5 years. This doesn't concern me, at least as far as our climate is concerned. It typically takes about 4 inches of rain before you achieve what we call the percolation rate and I haven't encountered 4 inches of rain per hour in my lifetime. If the perc rate of your USGA green has declined to that of your native soil greens, then I'd venture to say that you have some high-quality native soil greens. Besides the natural decline in perc rates, there are some management related causes that need to be explored. The first has to do with aeration, be it with hol-

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low or solid tines. Research has made it clear that repetitive aerations to the same depth create a compacted layer just beneath the depth of penetration. This can reduce percolation rates, but probably not to the extent you've described. Regardless, it is a good idea to take some cores from your green and look for this compacted layer. You should find the soil wetter above the layer than below. While taking the cores, look for other types of layering as well. If you've been the only superintendent and have been consistent in your management practices regarding cultivation intervals and quality of the topdressing sand, there shouldn't be a noticeable layering. Missing one or two annual aeration-topdressings can lead to buildup of enough thatch to create a layer that will impede water movement. Next, you have to ask yourself whether or not you've changed topdressing sand over time. Going to a fine sand is great for working it into the turf, but can create havoc with perc rates. At this moment, I'm looking at a situation where the superintendent chose to topdress with a sand containing nearly 35% very fine sand. After just 2 years, there is evidence that the very find sand and silt+clay have moved as much as 6 inches into the green and are clogging up the large pores. Finally, there is the issue of algae. If you have algae, it's because you've allowed sunlight to get to the soil surface and it is being kept moist. As I showed the attendees at the field day this past August, mowing at 0.109 inch is an invitation to algae while a height of 0.156 inch is not. Algae form a gelatinous mass in the top inch or so of the green that is very slow to transmit water. Surface compaction from traffic compounds the problem. As you can see, there are a number of reasons why the perc rate of your USGA green is so low. Systematically look for each one until you find the most likely cause. Having found it, you're halfway to finding an answer to the problem.

Q: River birch trees on our course are mature and beautiful, but some are suffering from severe iron chlorosis. We have tried foliar applications, but players frown on it and the results aren't very good. Any ideas? DANE COUNTY

A: As always, the solution lies in the cause or causes of the problem. First is the fact that in order for plant roots to absorb iron, the iron must be in its chemically reduced ferrous form. Plants vary in their capacity to reduce iron from the oxidized ferric form to the ferrous form at their rootsurfaces. River birch and other trees, such as pin oak, have low iron reduction capacity. They rely heavily on a sufficient amount of the iron in soil being in the reduced form. This is only the case when soil pH is low and/or the soil is poorly drained. From this brief discussion, you can see that solutions to the problem are two-fold. One is not to plant river birch in high pH, well-drained soils. The other is to foster reduction of soil and/or applied iron to the ferrous form. One drastic way that has been shown to work is to drill several holes in soil around the drip line and pour battery acid in them. I have a less dramatic approach that I think will work. With a cup cutter, bore some holes around the drip line, pour in a cup or so of an iron product that contains metal sulfides, and replace the turf plug. The mode of action would be microbiological oxidation of the sulfides, essentially producing sulfuric acid in the process. This will favor iron reduction to the ferrous form and hopefully keep the soil acid enough that sufficient ferrous iron is available to the tree for several years.

Q: I have some new tees we rebuilt to replace several that were simply too small. We used straight sand, thinking it made the most sense. But their performance has been lousy and they actually pale in comparison to the old, native soil tees. Am I doing something wrong? GREEN COUNTY

A: In answering, I'm assuming that you used the typical method of construction dig out the native soil and dump in sand. If so, you've created sand-filled bathtubs. You not only have a growth medium that won't hold water and nutrients, but something that fills up with water whenever you get an inch or more of rain. It's a lousy setup for establishing and maintaining turf. If you feel compelled to construct sand tees, I recommend construction similar to that of a California-type green. Cut trenches for tile drain lines, embed them in pea gravel, and cover with 12 inches or so of sand or an 80/20 mix. If straight sand, you have to on-site mix fertilizer and organic materials that will at least temporarily give you some moisture and nutrient retention capacity. My preference is native soil tees that are properly maintained. They need to be maintained much like a fairway and aerified and overseeded regularly. Overseeding and aerification are done together. Pull the cores, let them dry, drop seed down, shatter the cores, and keep the surface moist until the grass germinates. I've tried this at the Noer Facility and it works great for thickening up thin turf.

Q: What was your score at the Noer Facility tourney at Windy Acres? GREEN COUNTY

A: My score was the same as that of Jeff Gregos. We at the Noer Facility are indebted to Jim Krieger for hosting this stellar event. He went far beyond our expectations in making the day a most enjoyable one.