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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.