Questions From The Floor

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Q. *A group of us got into a discussion over sand used for root zone mixes. Some claimed silica sand was the only way to go; others were fierce in their defense of calcareous sands. What do you think — are there significant differences between the two? WALWORTH COUNTY*

A. To begin, let's briefly review what the USGA Green Section has to say on the matter. "Silica sands are recommended, other sands acceptable in rare cases where silica sand is unavailable." USGA Green Section Record. May, 1973.

"Sand particles should preferably be smooth or round in shape. If round-shaped particles are not available, sharp sands are suitable and acceptable. Be sure to stay away from sands of soft origin, such as limestone or other calcareous materials. Only sands formed from silica, quartz or other hard rock materials are recommended." USGA Green Section Record. November, 1977.

Clearly, silica sands are strongly preferred by the Green Section staff. Why? Both physical and chemical concerns are involved. Some calcareous sands contain only carbonates, but these act as cementing agents for clay, silt and very fine sand particles. Other calcareous sands actually contain sand-sized limestone particles. In either case, the carbonates will eventually weather away, leaving behind fine sand, silt and clay particles that can clog larger pores. The net result can be significant reductions in water infiltration rates and inadequate drainage and aerations.

On the chemical side of this issue are concerns about nutrient deficiencies. Calcareous materials strongly absorb phosphate and render it unavailable to turfgrass. If the carbonate present is only calcium carbonate, you have the situation wherein magnesium deficiency has occurred in golf greens. When carbonates are present, the equilibrium pH of the root zone mix is 8.3. At this pH, iron deficiency is likely and problems with zinc and manganese may occur as well. At its worst, you can find yourself having to institute an unending foliar feeding program.

The position the Green Section staff has taken on calcareous sands is prudent. It is not saying that all of the above problems will arise if you use calcareous sand, but the potential exists for problems that are not associated with silica or quartz sands.

Q. *Iron applications to greens, tees and fairways as part of a spray program are fairly common in Wisconsin. Some superintendents are using ferrous sulfate while others are using chelated products. What difference does it make? DOOR COUNTY*

A. If you are layering in your greens or tees, I'd avoid ferrous sulphate when using iron on a regular basis. Layering disrupts drainage and sets up conditions for black layer formation. Under the unaerobic conditions that result, microrganisms reduce sulfate to hydrogen sulfide. Hydrogen sulfide is a gas that can accumulate to the point of becoming toxic to the turfgrass.

If you don't have conditions conducive to black layer formation or aren't worried about it, choice of iron source depends on whose research reports you read. Chelated iron seems to be more effective than ferrous iron when air temperatures are low, while the opposite may be true under high temperatures. In general, on an ounce-for-ounce basis, chelated iron gives a better response than ferrous iron. However, the differences in responses often do not justify the cost differential of the two products.

Q. *Can you get a "black layer" on older type soil greens? I thought it was only a problem on sandy root zones, but while at the Golf Turf Symposium I overheard someone say that O.J. Noer had seen such a layer 50 years ago. LA CROSSE COUNTY*

A. You need only two conditions to set the stage for black layer formation. One is obstruction of water movement at some point in the turfgrass rooting zone. The other is the presence of organic matter or an inorganic compound such as sulphate that serves as an energy source for microorganisms. I don't doubt that there were (are?) some old soil greens where these preconditions have arisen. I would, however, venture to guess that we're talking primarily about sandy loam or loamy sand soils overlying finer textured soil.

Q. *Fine grade Milorganite seems to be more available these days from MMSD distributors. What do you know about this material? RACINE COUNTY*

A. I've been applying the material to creeping bentgrass for the past three years. Its turfgrass response characteristics are similar to those of regular grade Milorganite. The only difference is that I've had to apply about 30% more N from the fine grade Milorganite as compared to the regular grade to get comparable intensities of turfgrass color. This may be due in part to the fact that the fine grade Milorganite has been applied bi-weekly and the regular grade Milorganite on a monthly basis. My experience is that increasing the frequency of application of a nitrogen fertilizer while keeping its annual rate constant reduces the intensity of turfgrass color.

The major difference between fine and regular grade Milorganite is in application. If you're going to use the fine grade material, you have to be willing to push a drop spreader and wait for a calm day .I believe Tom Harrison can describe what happens when fine grade Milorganite is applied with a rotary spreader.

Q. *I'm embroiled in an argument with a colleague over homogenous vs. blended fertilizers. I say that on fine turf you should use a homogenous product. He says it doesn't make a lick of difference and that I'm foolish to spend the extra money. How do you view the "cost/ benefit" factor in this golf course management issue? GREEN COUNTY*

A. The answer to this question is more complex than most people realize. To start with, let's say that both of you share the same concern — uniform application of all nutrients contained in the fertilizer. This objective can be achieved with blended fertilizers **provided** all the fertilizer particles are of similar size and shape and the opening in the spreader at the rate of application desired is slightly larger than the largest fertilizer particles. If the particles of the different nutrient sources are of different sizes, they will tend to segregate by size during handling and application of the fertilizer and you will not get uniform spreading. If some of the fertilizer particles are larger than your spreader opening, segregation during spreading becomes pronounced and your rate of application will not be constant. The lower the rate of fertilizer application, the smaller the opening(s) in the spreader hopper and the greater the decline in rate of application becomes as the spreader empties. One product I examined a couple of years ago contained three N sources. One N source had such large particles that the lowest "safe" rate of application (i.e. the lowest rate where uniform application of all three N sources was assured) was 1.5 lb. N/100 $ft.^2$.

Problems such as those mentioned above do not arise with homogenous fertilizers. This is true **providing** none of the particles are larger than the opening in the spreader. If this condition is not met, your rate of application declines as you empty the spreader. Thus, even homogenous products can be problematic when you're operating at low application rates. Consequently, your cost/benefit ratio for the fertilizer is high because the benefits of uniform turf color and quality are less than desired.

As you can see, the answer to your question depends on uniformity of particle size and shape in the blended fertilizer and the particle sizes of both the blended and homogenous fertilizers with respect to size of the spreader opening which, of course, is a function of the rate of fertilizer application. Uniform application of blended fertilizers at rates commonly employed on fine turf (e.g. golf greens and tees) requires small, uniform particles. "Farmer" fertilizers do not meet this requirement. Rather you're talking about fertilizers manufactured specifically for fine turf. My experience is that the cost of such fertilizers does not differ greatly from the cost of small-particle, homogenous products.

Q. *During a conversation about the natural freeze/thaw aerification that takes place on our golf courses over the winter months, this question came up: "Which expands the most when frozen — sand, silt, clay or water?" What is the correct answer? WAUSHARA COUNTY*

A. The correct answer is water, **but** how much of this natural aerification occurs during a given winter is very much dependent on how many freeze/thaw cycles occur. Water expands when it freezes and forces apart soil particles. During the thaw cycle water enters the new spaces created. Freezing then causes further expansion, and so the cycle goes.

Sandy soils, because of their inherently lower water contents, generally undergo less freeze/thaw action than do silt or clay soils. Sands are also the least subject to compaction. Hence, in the final analysis, the importance of natural freeze/thaw aerification does not differ greatly among the three soils.