SRN. Slow-release N sources do not load up soil solution with nitrate such that extensive leaching can occur. For these reasons, turf is one of the most environmentally-sound crops that can be grown.

Q: Sometimes you feel like you cannot win. We have high pH conditions and have been using elemental sulfur to gradually lower (or at least stabilize) that 7.5+ number. Now, I read where a professor of agronomy at Ohio State is raising the flag on programs like mine. He says sands with high $CaCO_3$ content (and a subsequent high pH from 7.5 to 8.5) can create problems when sulfur is added to them. The sulfur dissolves the $CaCO_3$, allowing it to migrate down in the profile. The result is a caliche layer with a high pH. He says it's almost like cement. Should I quit using sulfur? Which is worse — a caliche layer or high root zone pH? (IOWA COUNTY)

A: Is your high pH the result of using a calcareous sand to begin with or the result of several years of irrigation with water high in calcium and magnesium? If the latter then you need not worry. You'll be long gone before the quantities of $CaCO_3$ required to form a caliche ($CaCO_3$) layer develops from irrigating with hard water. On the other hand, if the sand used during construction or for topdressing contains several percent of $CaCO_3$, the main prerequisite for caliche formation is in place. Whether or not or when formation of the layer will occur, I can't say. Literature does tell us though that caliche becomes hard and "almost like cement" only if allowed to dry. By definition, caliche is a soft, friable $CaCO_3$-dominated layer in soils of low rainfall regions. Indications are that soil must start out with a substantial $CaCO_3$ content and virtually no leaching must occur for many years before a caliche layer begins to develop.

I've not seen any evidence of formation of caliche layers in the putting greens I've examined. I have, however, found accumulations of iron oxides cementing sand grains together and starting to form physical barriers to turfgrass root development.

Q: I'm a dedicated Milorganite user and, quite frankly, have no intention of changing. But it seems more and more companies are "getting into" the organics. A colleague is quite happy with a product called "Sustane". Yet another used an organic (from poultry manure) and the material was disastrous — bad odor and even worse physical properties. Rumor has it that one of our major national plant food companies is developing a line of organics, too.

What do you think about all this? Is it just another bandwagon everybody is climbing aboard or is there merit to these kinds of products? Won't Milorganite always stand alone? (GREEN LAKE COUNTY)

A: Several forces are at work here. You have the public sector push toward use of "natural fertilizers" becoming the answer for some major disposal problems confronting the poultry industry and a few others with organic wastes. In the midst of this, considerable progress has been made the past few years in developing large-scale composting technology. Thus, all the ingredients

are present for a rapid influx of organic fertilizers.

Organic fertilizers, by their very nature, are low-analysis materials. Hence, unit nutrient costs are high — generally too high for extensive use by commercial agriculture. So where is the prime market? The turf industry. Where else could one sell nitrogen for as much as $2.00 or more per pound?

Each of the organics has its own unique characteristics. Sustane, for example, releases N to turfgrass faster than does Milorganite, but consequently has a shorter response time. All have their distinctive odors, some more tolerable than others. Some have excellent physical properties, while others do not. On the other hand, all the organics do have two things in common. Release of N from them requires microbial breakdown. For this reason, they are not good cold weather N sources. Second, one-half or more of the organic N present is very slow to be released. Consequently, turfgrass recovery of N from the organics generally lags behind materials such as urea, SCU, UF, IBDU, etc.

Call it a bandwagon if you will, but the organics are in the marketplace for very understandable reasons. Each has its own characteristics and none are miracle products. My guess is that fairly soon the market will approach saturation and some of these products will disappear. Those that remain are the ones with which turf managers have become familiar, know what to expect from a particular product, and have successfully integrated the product into their fertilization program.

Q: Probably the most radical piece of machinery introduced at the GCSAA show in Orlando last winter was Toro's Hydrojet aerifier. I was quite impressed by the machine, yet, something troubles me. We aerify turfed areas not only to relieve compaction, but to bring up soil that will mix with the thatch and provide biological control of that thatch. It seems to me that the Hydrojet is somewhat limited in its use because no soil is brought to the surface. What do you think, Dr. Kussow? (COLUMBIA COUNTY)

A: Reading a bit into your comments, I'll assume that your concern is about turfed areas that are aerified but not topdressed. Otherwise, I don't foresee a limitation.

The Hydrojet does lack the feature of bringing soil to the surface. Doing away with core removal was one of the guiding forces behind its development. Thus, in situations where mixing of soil with thatch is one of the desired outcomes of aeration, the Hydrojet is not the machine of choice.