



## Editor's Report

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# Organic Turf Management: Direct Route or Detour to Sustainability?

A recent court ruling in Suffolk County, NY could have substantial implications for golf development in the US. The State Supreme Court in Riverhead, NY ruled that the feasibility (financial practicality) of an “organic, pesticide-free” golf course must be explored before further development can proceed. This includes issues such as the use of composted organic waste as a soil amendment, exclusively using organic fertilizers and no chemical pesticides.

On the one hand, there are aspects of this decision that run counter to scientific principles, including practical water quality concerns relative to phosphorus loading and runoff. On the other hand, society has decided, as it often does with scientific illiteracy at an all-time high, to push the envelope and explore the possibilities. So, this could be a good thing **in spite** of the motivation.

Beyond this development issue, lies the broader question: Can we manage a golf course with only fertilizers derived from natural organic sources and without the use of synthetic pesticides? As my good friend Jim Moore, the Director of Construction Education Programs at the USGA, always tells me: It depends!

### Evolution of Expectations

The unaltered linksland of coastal Scotland provided a golfing habitat as early as 1414. The native sandy soils afforded exceptional drainage and an occasional hazard. The primary means of fertilization was organic waste from an animal or composted leaf mould. The vegetation was already adapted to the harsh conditions of the land, so that regular care for the purpose of turfgrass survival was not required.

The modern American golf course has evolved in both spirit and substance to become a judiciously managed landscape in an increasingly urbanized society. Player demand has been met with advances in technology from biological and chemical to mechanical, capable of being deployed to provide a unique recreational experience. Still, while much has changed about the golf course in the last 500 years, the constant is that the plants still need to be fertilized, however now the turf must provide so much more than the grasses of the linksland.

### Our Daily Nitrogen

Turfgrass fertilization has not been immune to the evolution of “golfer expectations.” Organic fertilization persisted as a primary means of feeding turf through the 1950’s. The advent of synthetically processed fertilizer that relied on energy to “trap” nitrogen became a common

means of supplying nutrients in a more “controlled” fashion. The golf course superintendent now had the ability to more precisely manage turfgrass growth.

The synthetic slow-release fertilizers of today are technological marvels in that they provide all the benefits of controlled nutrient release that is similar to, but more complete than the natural organics. They can be designed to release over a 4 to 16 week period, independent of microorganism activity. Comparatively, small amounts of liquid fertilizer applied on a frequent basis (spoon-feeding) to putting greens enables superintendents to more precisely manage growth, efficiently utilize resources and provide consistent playing quality. The concept of spoon-feeding has a parallel in human nutrition. Instead of eating one big meal each day, we eat a few smaller meals to make nutrients available to our body as we need them.

Continuing with this thought, exclusively organic fertilization might parallel vegetarianism. As a former vegetarian, I remember how much more I thought about my nutrition and occasionally had to supplement my diet with vitamins or other minerals. It took many months to learn what my body required and I had to eat very deliberately. As time passed, I realized I could still eat healthy, adding meat products to my diet in moderation. Herein lies the challenge: the *best* fertility management program on golf courses likely utilizes both organic and synthetic sources of nutrients.

### Do the Plants or the Microorganisms Care?

Turfgrass plants derive nutrition from a pool of resources in the soil. While we debate organic vs. synthetic nutrition, the plant simply absorbs the nutrients it needs for growth regardless of the source in which they are supplied. An exclusively organic program presents challenges in providing a balanced nutritional program. In addition, in northern climates where soils are cool for longer periods, microorganism activity that breaks down the organic sources to release the nutrients are not active. Subsequently, nutrients, and in particular nitrogen may not be available to the plant. Therefore, in the shoulders of the season (spring and fall) when soils are cool,



plants not supplemented with synthetic fertilizer will be weak and less able to withstand traffic or other stress.

Invariably, people who claim that exclusively organic approaches are beneficial to the soil microorganisms, imply that synthetic materials “sterilize” the soil. In fact, there is a significant amount of evidence that suggests the measurable microorganism population in the soil is unaffected or enhanced by synthetic fertilizers and pesticides (both are good carbon and nutrient sources). In addition, except in the most troubled soils, there is limited impact of synthetic materials on the physical properties of the soil.

Still, there are many benefits to using natural organic fertilizer sources. Clearly the addition of organic matter in these fertilizers benefits many soils both physically by enhancing soil structure and chemically by introducing a complex pool of nutrients that can become available to the plant over time. In addition, studies at Cornell University have demonstrated that some composted materials provide disease suppression. This suppression can be short term in a similar fashion to a fungicide, or longer term, by enhancing populations of microorganisms that antagonize and suppress turf diseases for many years. This type of work is encouraging and holds much promise, however, the study of microorganisms (the linchpin of the organic approach), is in its infancy and highly site specific.

### Trade-Offs

I have found that there are very few aspects of life in a modern society without trade-offs. When we want something, it seems that there is always something else that raises concern. Organic fertilization is more costly on a per unit nitrogen basis (5 to 10 times that of synthetic fertilizers). The amount of phosphorus applied can be 10 to 20 times that supplied with a commercially available synthetic source. This phosphorus, not only may not be needed for turf growth, continuous application may saturate the system resulting in an increased risk of off-site movement that can compromise surface water quality.

Synthetic fertilizers with a higher proportion of readily-available nitrogen are more likely to leach through coarse textured soils than slow release sources. There is considerable amounts of energy (fossil fuels) that go into producing synthetic fertilizers and move the industry further from sustainability. Of course, while this discussion has focused on fertilization, the use of synthetic chemical pesticides has well documented concerns regarding human and wildlife exposure as well as water quality issues.

Therefore, the answer to the initial question; Can we manage a golf course with only fertilizers derived from natural organic sources and without the use of synthetic pesticides? Yes, but not without trade-offs. Clearly, the more reasonable our expectations and the more rigorous and precise we are in the integration of all available resources, the more we maximize the benefits of each product and minimize any drawback.

### Parting Shot

Throughout my career, I have been actively involved with environmental advocacy groups. This has included coauthoring a grant to the Great Lakes Protection Fund to work towards elimination of pesticide use on lawns in the Great Lakes Basin. In addition, I have been outspoken at the national level regarding the means that golf course superintendents are “forced” to employ in an effort to meet the increasingly unreasonable aesthetic and functional performance expectations of the American golfer. Therefore, while I share the spirit of the “organic” movement confronting the golf industry, attempting to “ratchet down” expectations, I cannot in good conscience dismiss scientific principles.

Some might say I am hiding behind the “conservative ivory tower of science.” To them I say: provide the funding to address these concerns, so that we can put some science behind the “organic” process. To those in the golf industry who dismiss those “who think otherwise,” I challenge them to face the fact that energy intensive golf turf management is not sustainable and the first step is maintaining reasonable expectations. The golf course superintendent is one of the most service-oriented, environmentally responsible professionals I have ever known. When the tools are made available to maintain championship conditions that are more sustainable (organic or otherwise) they will be employed. In the meantime, I believe that the road to sustainability is cleared by an open and robust discussion of the issues based on scientific principles.

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