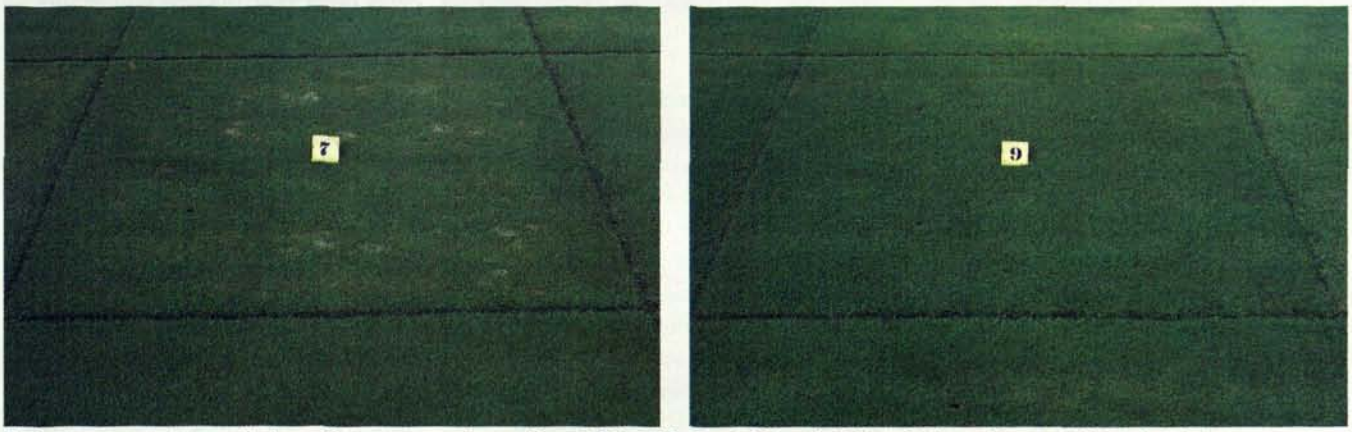
Ironing Out Your Fertilizer Program

Can micronutrients be used as macronutrients without consequences?

BY TOM COOK



Turfgrass vigor was impacted when sulfur rates were changed from 1.5 lbs. sulfur per 1,000 sq. ft. (left) to 3.5 lbs. sulfur per 1,000 sq. ft. (right) per year.

I can't remember how many times superintendents have told me that growing grass is the easy part; dealing with people is the hard part. I always took that as a compliment because it meant our students actually learned something about turf culture while they were in school. Unfortunately, recent events in the world of putting green fertility management make me wonder if some of our students may have been snoozing from time to time.

A recent craze here in the Northwest involves the use of high levels of micronutrients, while greatly reducing nitrogen. To be fair, most of the superintendents I have talked to have asked what I know about this program and whether I think it has any merit. This is a little frustrating because until recently I really didn't know what the program was about since it is "secret" and only available to clubs who pay a large fee and agree not to divulge any information about what they are doing. I confess, if I were a superintendent, I would be very skeptical about paying someone money for advice before I knew what I was getting. Furthermore, I would probably hang up the phone or escort the guy out when he got to the part about nondisclosure. I have been amazed at the number of otherwise good superintendents who seem to have fallen under the spell of this "magic" even before they have tried it. A scarier situation involves the clubs where the superintendent has been forced to adopt this program because it was sold to a board member or the green committee.

My purpose here is to offer my assessment of this fertilizer plan in the context of putting green turf culture as we know it in the Pacific Northwest. I believe my comments will have relevance nationwide, at least in the northern states, but I can really speak only from our limited experiences in the Pacific Northwest.

SOME HISTORY

Except for golf courses less than 20 years old, the vast majority of putting turf on Pacific Northwest golf courses ranges from 80% to 99.9% annual bluegrass. Because we have cultured annual bluegrass for so long, most courses have developed complex mixtures of perennial types that provide excellent putting surfaces and are relatively easy to maintain year 'round (Cook, 1987, 1996a, 1996b).

Fertility programs have evolved over the years, ranging from very high nitrogen levels in the 1950s and 1960s to the starvation diets of the 1990s and to the variable, course-specific levels of today. According to survey data we are currently summarizing, the average annual N-P_2O_5-K_2O rates in lbs. per 1,000 sq. ft. per year applied to mostly annual bluegrass putting greens in our area range from approximately 5-1.5-5 for areas west of the Cascade Mountains (10+-month growing season) to approximately 4-1.5-4 for areas in the snowy winter parts of the Pacific Northwest (6- to 8-month growing season). At the low end there are a few courses applying as little as 3 lbs. of N per 1,000 sq. ft. per year, but overall application rates are fairly consistent. These standard fertility programs have

generally produced healthy turf and high-quality putting surfaces throughout the region.

Some readers may remember the fertilizer research done many years ago by Dr. Roy Goss and his colleagues at Washington State University (WSU). What started out as a disease-suppression study evolved over time into a long-term study on the effects of different fertilizer rates, NPK balance, and sulfur on turf vigor, disease incidence, and the balance between bentgrass and annual bluegrass. Working with colonial bentgrass putting turf on a fine sandy loam soil, Goss found that long-term fertilization with 6+ lbs. N per 1,000 sq. ft. per year, 0 lbs. P_2O_5 per 1,000 sq. ft. per year, and 3.5 lbs. S per 1,000 sq. ft. per year resulted in pure bentgrass turf with no annual bluegrass. Potassium rates had no impact on stand composition. In the same trial, plots receiving variable levels of nitrogen, P at 4 lbs. P_2O_5 per 1,000 sq. ft. per year, and S at 1.5 lbs. S per 1,000 sq. ft. per year resulted in high levels of annual bluegrass (Goss et al., 1975). An added benefit of the high-sulfur fertilization program was a significant reduction in Fusarium patch disease on bentgrass. In the context of the times, this was a landmark study. It was clear that we could produce pure bentgrass turf on soil by using moderate nitrogen, minimal phosphorus, variable potassium, and high sulfur.

When I first saw these research plots, the transition had already occurred. One of the nagging questions left over from the study was just what happened to the annual bluegrass that was originally in the plots. The answer to that question became apparent once superintendents began to incorporate high sulfur rates into their turf management programs. People who went on low-phosphorus, high-sulfur fertility programs on annual bluegrass greens soon were struggling with severe Anthracnose problems in summer and winter, and severe Fusarium patch problems during the winter Fusarium season (Cook, 1987, 1996a).

Meanwhile, the bentgrass looked great! Perhaps this explained how the plots in Goss's trials converted to pure bentgrass. Superintendents who were expecting their annual bluegrass to simply disappear learned the hard way that it had to die first. Since club members would never stand for that, superintendents responded by using more fungicides to keep their annual bluegrass alive. This was a little like pouring gasoline on a fire while trying to put it out with water.

The lesson I learned from this experience is that you have to make sure you understand what grasses you are growing and how best to take care of them to produce the healthiest turf possible. In our region that means different fertility management for bentgrass and annual bluegrass. In other words, if you treat annual bluegrass like it was bentgrass, you will simply increase disease problems and jeopardize the quality of your putting greens and your job.

BACK TO THE PRESENT

Fast forward to 2004. Assume you are a superintendent and somebody wants you to change your fertility program to a plan that will give you the ultimate putting surfaces and reduce the need for fungicides. The catch, of course, is that you have to adopt the program without knowing what it is and have to take the seller's word for how your greens will handle it. Does it make sense to do this? Obviously, there is no way to know for sure. The prudent thing to do would be to study the ingredients, consider your greens, your grasses, and what you have to gain by buying into the program. You know changes in your fertility program will likely affect bentgrass and annual bluegrass differently. You really need to know what this program entails.

In a nutshell, what this program describes is very low nitrogen and very high sulfur. This is different from, but clearly reminiscent of, the program developed from the work of Dr. Goss at WSU. It is very clearly oriented towards growing bentgrass. The stated advantages of this program include reduced chemical, fertilizer, and water usage, leading to a more environmentally friendly golf course; reduced thatch buildup due to enhanced microbial activity; and reduced need for aerification, leading to a frequency of once every other year. Because you are no longer growing much grass, you will not have to mow as often, resulting in a 40% reduction in labor costs. Instead of mowing 7 days per week, you will only have to mow 4 days per week. The turf will be so dense that you can mow it at 0.08" with a triplex mower. Finally, the seller suggests that the program will produce quality putting surfaces reminiscent of the outstanding surfaces achieved in Australia and the British Isles. Other than the word of the seller, there is no supporting documentation for these claims.

When I first heard about this fertility program, all I knew was that it probably used less nitrogen and incorporated a soup of other ingredients. That wasn't much to go on, so it was hard to predict what might happen. I was pretty sure that the claims for reduced disease would not come true in western Oregon, at least on annual bluegrass, but I really didn't know.

In 2004 several golf courses in Oregon bought into this program for the first time. I predicted it could take two to three years to find out what the longer-term effects would be. I believe I was wrong in my assessment. At least two courses with annual bluegrass greens reported serious turf decline as summer progressed. The turf damage at these courses was blamed on everything from anthracnose to nematodes, and chemical use went up considerably in an attempt to control these problems. At least one course dropped the program shortly after experiencing problems. Courses with sand-based greens and predominantly bentgrass turf have reported few problems so far.

Assuming the sample program I received is typical of the basic program golf courses are being asked to commit to, I will modify my predictions as follows:

- Golf courses that are predominantly annual bluegrass will eventually see serious problems with anthracnose, Fusarium patch, nematodes, and any other diseases that affect annual bluegrass in our region. This may even happen during the first year of use and will become increasingly severe as time passes.
- Golf courses that are predominantly bentgrass on sand-based rootzones may be okay, at least until the nitrogen reserves in the rootzone are depleted to the point where growth is seriously impaired. At some point, dollar spot may become a serious issue, requiring increased use of fungicides. Turf in cold winter areas will go dormant earlier in fall and be late to green up in spring. Turf damage from wear on greens with limited hole locations will be slow to recover, resulting in very thin turf. I suspect there will be other problems, but I don't know yet what they will be.

Bentgrass in Corvallis, Oregon, growing slowly under low nitrogen fertility is more prone to dollar-spot disease than vigorous turf. Dollar-spot control requires regular fungicide applications.

CONCLUSIONS AND RECOMMENDATIONS

One truism I have always believed in is that when you make major changes in cultural practices or grasses, you simply trade one set of problems for another. The key is to decide which set of problems you can live with. For example, frequent sand topdressing has provided us with firm, smooth putting surfaces and surfaces that are playable even during wet weather, but it also has increased wear on mowing machinery, increased labor costs, made irrigation more difficult, and at times inconvenienced golfers who object to sand everywhere. For most superintendents, the advantages outweigh the disadvantages.

Based on information at hand, this fertilizer program is clearly a bentgrass program geared, in my mind, to sand-based greens that are relatively free of annual bluegrass. In the short run, at least, it is likely that users could see promising results. There is no way of knowing what to expect long term. It is even harder to know what results to expect long term on push-up soil-based greens or greens using salty water for irrigation. Annual bluegrass greens should not be fertilized with this program unless you can tolerate increased disease and potential loss of turf.

I encourage all to think long and hard before mortgaging the health of your putting greens on any program that promises to solve all of your problems. This is particularly true for people with predominantly annual bluegrass greens. In the end, you are the ones who have to live with the results of your choices. Usually, the one who takes the hit is the superintendent. Before you launch off on something radically different from your current tried-and-true program, test it out thoroughly on your nursery green. If you don't have a nursery green, wait until the local guinea pigs have either proved the program or lost their jobs. Finally, rely on common sense and research before you engage in faith-based turf culture.

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