



QUESTIONS FROM THE FLOOR

By Dr. Wayne R. Kussow
Department of Soil Science
University of Wisconsin-Madison

Q: We're set to build a new USGA Green Section specification green next year. What fertilizer addition recommendations would you make for incorporation at final grading just prior to seeding and during establishment for the first year? Lacrosse County.

A: Apply and rake in 1.0 to 1.5 lb N/M as starter fertilizer prior to seeding. If your budget is tight, use agricultural grade monoammonium phosphate, a typical grade being 11-48-0. Do not use diammonium phosphate, particularly if your sand has a high pH. For insurance purposes, you might also incorporate a micronutrient package. If not, use a fertilizer with micronutrients later on. After the first or second mowing apply 1.0 lb N as a high K fertilizer such as 20-0-20 or 15-0-30. Within 2 to 3 weeks you'll want to begin a program in which you're applying 0.5 to 0.75 lb N every 2 to 3 weeks. My understanding is that the Green Section recommends use of soluble N. I prefer alternating soluble N (most likely urea) with a complete fertilizer whose N:P₂O₅:K₂O ratio is approximately 3:1:2 and that contains some SRN. Using just soluble N puts

you in a feast and famine situation. Having some SRN present tends to even out the bentgrass growth. Use of the complete grade of fertilizer will help keep P and K levels optimum. Continue this program until early fall. If your sand is calcareous, in early fall re-apply about 1.0 lb N as starter fertilizer and follow this up in 2 to 3 weeks with your high K fertilizer. A late fall N application would then complete fertilization for the first year. In total, you want to shoot for 6 to 8 lb N/M the establishment year. Back this off to about 5 lb N the second year and then settle into what you feel is a good maintenance fertilization program for your golf greens.

Q: Can you answer this question once and for all—does use of Milorganite increase the earthworm population of my fairways (and the attending mess) or not? Dane County

A: If your soil is a suitable habitat for earthworms (answer "yes" if they're already present) and you fertilize with nothing but Milorganite, the answer is a definite "yes". The same answer applies if you exclusively use any of

the natural organic fertilizers on your fairways. If you use Milorganite only once or twice a year, perhaps as a dormant application, then chances are that the impact on earthworm populations is negligible. Please understand that this is my educated guess as opposed to a WAG. I'm not aware of any research wherein the effects of one or two applications of Milorganite per year on earthworm populations versus its exclusive use has been studied. Questions such as these are what make us research types realize that we're not always researching the real world.

Q: I'm trying to find a source of ammonium sulfate that offers a smaller prill than the farm grade I've been using. Can you help me? (I am using the material as a part of a cultural control program for fairway summer patch). Rock County

A: I've had the same problem. Some of the agricultural ammonium sulfate has particles the size and color of poultry droppings! To find an answer to this question, I placed a call to Tom Vlack (class of '91) at the Pine Tree

LESCO
HAS IT!
(800) 321-5325

Your Growth Partner

**Everything you need for
professional turf management.**

- Fertilizers
- Control Products
- Seed
- Irrigation
- Equipment
- Replacement Parts
- Golf Course Accessories
- Safety Products
- Service Brochures
- Low Voltage Lighting

LESCO, Incorporated — (216) 333-9250
20005 Lake Road • Rocky River, Ohio 44116

Golf Course in Florida. As I suspected, he and his fellow superintendents in the south use a lot of soluble N. Tom informed me that Allied Chemical produces both regular and fine grades of ammonium sulfate for golf course use. Now all you have to do is find a fertilizer distributor that does or is willing to stock the Allied ammonium sulfate.

Q: I've heard colleagues talk about using "feed grade" urea. Not wanting to appear uninformed, I have been reluctant to ask. What is it anyway? Buffalo County

A: Feed grade urea, as the name implies, is manufactured as a feed additive. Animal researchers demonstrated years ago that adding the material to something like ensilage increases its nutritional value. To ensure uniform blending, the urea has to have a small particle size. It so happens that the feed grade urea particle size is very similar to that of a fine greens grade fertilizer. For example, a feed grade urea that I purchased locally has 85% of its particles in the size range of 0.5 to 1.0 mm, or the size of coarse sand particles. In contrast, a regular grade of urea purchased from a turf fertilizer vendor has nearly 75% of its particles larger than 2 mm. The obvious advantage of feed grade urea is that it produces no speckling in the closely mowed turf of greens and tees. If you do elect to apply granular feed grade urea, calibrate your spreader carefully. Because of its small particle size and the fact that it contains 45 or 46% N, I have to close my little drop spreader all the way down and still get an application rate of 0.8 lb N/M.

Q: How can I calculate from the pH of our very hard water how much acid to use to move the pH down in my spray tank? What should be the target pH for a spray tank? What kind of acid should I use? Where can I buy it? Waukesha County.

A: You can't calculate the amount of acid required based on the pH of the water. The water is hard because it contains high levels of dissolved calcium and magnesium carbonates. Carbon dioxide from air reacts with the water and carbonates to form bicarbonate in equilibrium with carbonic acid and carbonate ions. What this constitutes is a weak acid-weak base system in which the hydrogen ion concentration (measured as pH) represents only a small portion of the total amounts of acids and bases pre-

sent. The direct analogy is soil. The pH of soil represents only a miniscule portion of the acidity that must be neutralized in order to change its pH. If this were not the case and all we had to neutralize are the hydrogen ions actually in the soil solution, the amounts of liming material required would be in the range of pounds per acre rather than tons per acre. The other thing you have to be aware of is that the pH of hard water depends on the temperature of the water. The colder the water, the more CO₂ that dissolves in it. This shifts the equilibrium of the carbonic acid-bicarbonate system in favor of the carbonic acid. As the water warms up, CO₂ concentrations in the water decrease and the concentration of bicarbonate increases.

Therefore, cold water drawn directly from the well may have a pH of 7.5. Let that water stand until it reaches air temperature and the pH may be in the range of 8.5. If you don't believe this, take a bottle of your favorite brew from the refrigerator and measure its pH. Let the brew come to room temperature and measure the pH once again.

To determine how much acid you need to add to your water to drop the pH to the level that you want, you have to take a known volume of the water and determine how much acid of a known concentration is needed. Alternatively, you can send a water sample to a commercial lab and have it titrated for you. To save having to do some calculations yourself, be prepared to tell the lab what pH you want and the concentration (normality) of the acid you'll be using. I'd request a pH in the range of 6.0 to 7.0, which is what you want in your spray tank for the vast majority of the tank mixes you'll be preparing. As for the acid to use, I recommend what is known as technical or commercial grade sulfuric acid. This can be obtained from distributors of industrial chemicals.

Q: Do late season iron applications on turf have any effect on winter hardiness or survival? Green County

A: In responding to this question I'm assuming that you're referring to foliar application of Fe to the non-Fe deficient turf that we grow in Wisconsin. If iron were to influence winter hardiness and survival, the most likely mechanism would be increased production of so-called total non-structural carbohydrates (TNC). For this to happen as a result of iron application, the Fe would have to increase turfgrass chlorophyll content

and, in response, increase photosynthesis and carbohydrate production late in the season when shoot growth is slowed by low temperatures. The problem with this line of reasoning is that foliar Fe applications on non-deficient turf do not increase leaf chlorophyll content. Unless the turf is iron deficient, N supply, not Fe, is the controlling factor in chlorophyll production. What happens instead is that the foliar applied Fe forms a black coating the leaves, particularly on cut and damaged portions. This gives the appearance of a darker color. In a recent study of the effects of foliar iron on winter injury in bermudagrass, no greening response was noted, the leaves were observed to be "stained", and at rates above 1.5 oz Fe/M leaf levels of TNC actually declined. The authors surmised that the iron coatings may have actually blocked sunlight from reaching the leaf surface and reduced photosynthesis accordingly.

Q: Do you believe a fertility program can effectively or successfully move the bentgrass/Poa annua population ratios in a green or fairway one way or another? Ozaukee County

A: Let's start with the understanding that Poa is really a weak competitor with something like bentgrass. To move into bentgrass, it needs invasion gaps that greatly reduce or eliminate competition from the bentgrass. Thus, anything that creates invasion gaps is an invitation for Poa. On golf courses, these gaps are being created continuously in the form of ball marks, divots, patches of disease, traffic wear, aeration holes, earthworm casts, etc. This obviously limits what effect fertilization can have on Poa populations. Furthermore, any differences between bentgrass and Poa in terms of their nutrient requirements are slight to none. There is no truth to the idea that high P levels favor Poa over bentgrass. The two grasses do appear to differ in their tolerances to low soil pH. Applying sulfur to drop soil pH to around 5.5 has been found to adversely affect the Poa more than the bentgrass, but don't try this as a control measure unless you want to see some very sad looking bentgrass. All fertilization can accomplish is to impart to the bentgrass the capacity to recover quickly from any type of mechanical or disease injury that may occur. In most instances, this means keeping nitrogen levels up where the bentgrass has good color throughout the season and
(Continued on page 19)