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(turfgrass talk)

Avoiding nutrient deficiencies

When grass grows, it uses nutrients like nitrogen (N), phosphorus (P) and potassium (K). When grass is not growing, it won't be taking up any nutrients, so one can consider the nutrient demand to be zero. As the grass grows slowly, it uses a small amount of nutrients. When the grass grows quickly, it uses a larger quantity of nutrients. How can one be sure that the grass is always supplied with enough of the nutrients that it uses?

For N, one can expect that the grass has the ability to use the entire applied amount. In fact, turfgrass managers keep the grass in a perpetual state of N deprivation. The grass grows faster when more N is supplied, but golf turf is not the best when it is growing its fastest. Instead, the best surfaces are associated with turf that grows slowly. All that needs to be done with N is to supply the amount that produces the desired growth rate. If the grass is growing too quickly, reduce the N supply. If the grass isn't growing fast enough, add a little more N.

What about P and K, calcium (Ca) and magnesium (Mg)? When these elements are added, they almost never have an effect on the growth rate or any visual effect at

all. But we know that deficiencies of these elements can cause problems with turf performance.

One way to be sure that there won't be deficiencies of those elements is by soil testing, specifically by doing a soil nutrient analysis. Testing the soil to find out how much of each element can be extracted and then comparing the amount extracted with a guideline level is a reliable way to make sure the soil has enough of the elements to meet the grass requirement. For turfgrass, I recommend using the minimum levels for sustainable nutrition (MLSN) guidelines, which are based on the Mehlich 3 soil test extractant. The MLSN guidelines say that the soil should be kept above 37 ppm for K, above 21 ppm for P, above 331 ppm for Ca, and above 47 ppm for Mg. If the soil levels of those elements are above the minimum MLSN guidelines, then the grass won't be deficient in those elements. For more about MLSN, see http://files.asianturfgrass.com/golf_people_mlsn_cn.pdf.

A second way doesn't require soil testing. (I'd recommend soil testing, because in most soils, the correct interpretation of soil tests can reduce the quantity of fertilizer that is applied. But if one can't do a soil test, here's a method to estimate the amount of each element that the grass uses.) How does it work? One can estimate the use of each element based on N, because the growth rate is controlled by N, but N uptake is not 100 percent efficient. If 10 g of N are applied, the grass will use somewhat less than 10 g. Because of that, the quantity of N applied can be set as a maximum for the amount of N (and of the other elements) that the grass could possibly use.

Let's say that N was applied in a total amount of 10 g/m². For cool-season grasses, when the grass uses 10 g of N, that corresponds to a growth rate that uses about 1.3 g P, 5 g K, 1.3 g Ca, and 0.5 g Mg. If one applies the elements in proportion to the amount of N applied, one can be sure that the grass is supplied with all that it can use, thus avoiding any deficiencies.

For bermudagrass (*Cynodon* species) or zoysiagrass (*Zoysia* species), the ratios are slightly different because the leaves usually contain less N and more of the other elements. If 10 g N were used by bermudagrass, that corresponds to a growth rate that is using about 1.7 g P, 6.7 g K, 1.7 g Ca, and 0.7 g Mg. When 10 g of N are used on seashore paspalum, the growth rate corresponds to expected use of 1.7 g P, 10 g K, 1.7 g Ca, and 0.7 g Mg.

Whether by soil testing or by applying all of an element that the grass can use, one can guarantee there will be no nutrient deficiencies. What about micronutrients? Micronutrients like iron and manganese and copper and zinc are used in tiny quantities by the grass. They are unlikely to be deficient because the grass uses them in such small amounts. But if it makes you feel better, adding a little bit of micronutrients is a sure way to be sure the grass has enough. That's all there is to it.

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