

When soil testing, the trends can be more informative than the values
March 12, 2018

Last fall Dr. Travis Shaddox, Assistant Professor with the University of Florida, began a turf fertility presentation with a question about human blood pressure. It was an odd way to start a presentation about tissue testing in turf. I'll paraphrase his analogy:

You go to the doctor and they take your blood pressure. Then they say it's low, normal or high. Where do they get those numbers from? So Dr. Shaddox asked his wife, a medical doctor. She explained that medical researchers have compiled thousands of blood pressure records to see what is average or normal. It is a reference range. It doesn't mean a blood pressure of 125/75 shows you're sick because it's different than 120/80.

Dr. Shaddox spent the next fifteen minutes explaining how he used a similar approach for analyzing tissue samples in warm-season turf ([reference range paper](#)). PACE Turf and the Asian Turfgrass Center have taken a similar approach for soil test interpretation (MLSN). They analyzed the distribution of thousands of Mehlich-3 soil test results from turf deemed to have acceptable quality by the person submitting the sample. Then they calculated a soil test critical value at which 90% of the submissions had results greater than the critical value and 10% of the submissions had results less than that critical value. For example, 90% of the test results had soil test potassium greater than 37 ppm. From that, they essentially say a sample has below normal potassium if the result is less than 37 ppm. If it's greater than 37 ppm, then you're hanging with the crowd that says their turf performance is acceptable. It doesn't mean that 37 ppm K is necessarily the correct value for your facility. Maybe you think your quality is better when it's above 50 ppm. Other managers might want lower levels of potassium. Ultimately the exact amount required by the grass depends on factors such as species, growing environment, nitrogen fertilization, etc. Each site has its own ideal value. Another example, MLSN says the 90% cutoff for soil test phosphorus is 21 ppm (Mehlich-3). But, I built a research green in Madison, WI during my Master's degree, and we experimentally determined that the critical soil test phosphorus value was 7 ppm. It doesn't mean MLSN is wrong because that value was specific to that one green and growing environment.

Here's my point. We don't know the exact soil and tissue nutrients requirements (critical levels) for every possible growing environment. There is way too much diversity out there to know for every situation. Instead, find test results that you are comfortable with and strive to stay around those values. Consult documents like our [Simplifying Soil Testing for Professionals](#) NebGuide or the [PACE MLSN Reference](#) as a good and non-biased reference.

Instead of focusing on the exact soil or tissue test value, try to focus on how are those values moving over time. For that to work, you need to have consistency in your sampling techniques. Select samples from the same representative areas, carefully sample from the same depth (4"), use the same lab and extraction method. The Mehlich-3 is the preferred soil test method in turf. It works across a broad range of soil pH values and there is a lot of good data to reference (see above links). Look at those results over time. Are they steady, increasing or decreasing? Where are they relative to your personal comfort zone?

Extension is a Division of the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln cooperating with the Counties and the United States Department of Agriculture.

University of Nebraska-Lincoln Extension education programs abide with the nondiscrimination policies of the University of Nebraska-Lincoln and the United States Department of Agriculture.

Then adjust your fertilization program accordingly. If your goal soil test potassium value is 50 ppm and it's dropped from 100 to 60 ppm over the past three years, then you probably need to add more potassium fertilizer to your program next year. Remember that nitrogen fertilization rate is the biggest driver of nutrient uptake ([ideal fertilizer ratio](#)). Higher nitrogen fertilization will increase uptake of all other nutrients and lead to faster declines in soil test levels. Tissue nitrogen status will also influence the tissue test results for other nutrients.

Ultimately, view soil and test results like bank statements. The optimum amount of money in a bank account depends on the individual and their financial needs. If that bank account is too low, then add more money each month (or spend less). If it's getting too high, then stop adding to that account. The same is true for interpreting tissue and soil accounts. The key is establish goal ranges for your turf and make sure your sampling methods are consistent for accurate monitoring.

Bill Kreuser, Assistant Professor and Turfgrass Extension Specialist, wkreuser2@unl.edu