

David Hallauer
District Extension Agent, Crops & Soils

Variability in Soil Sampling

While not the only factor affecting variable production levels across a field or hay meadow, soil fertility is certainly one we use management to try and overcome. We can't change the weather. We can do little for soil type. We can, however, affect fertility levels.

Doing so often starts with a soil test. Unfortunately, if done incorrectly, it can actually *add* to the variability we're trying to overcome. Whether pulling your own samples or working with a contractor, an understanding of how to reduce soil testing variability can make test results a lot more valuable.

Number of cores is a good place to start reducing the potential for error in a soil sample. A sample should be a composite of a minimum of 12-15 cores from a relatively small area (two to four acres - more is generally better). KSU Nutrient Management Specialist Dr. Dorivar Ruiz-Diaz often shares a Phosphorous confidence interval chart when discussing soil sampling procedures. It shows that for P, our degree of confidence in a sample consisting of just five cores is plus or minus five parts per million. In short, if your soil test result comes back at 12 ppm, the range of results might range from seven up to 17 ppm. That would change our KSU P fertilizer recommendation for 140 bushel corn from 40-45 pounds per acre all the way down to 15 pounds per acre. An accurate number of samples is key, and a single core is not an acceptable sample.

Sampling depth needs to be a consideration as well. Organic matter, pH, and other nutrient levels often change with depth. If stratification has occurred – and it's not uncommon in reduced tillage systems – keeping a consistent sampling depth can make a big difference in accuracy of results. For most nutrients, a six-inch sampling depth is suggested. Deeper sampling depths (24 inches) will be valuable to get accurate nitrogen and sulfur numbers. IF monitoring pH in long term no-till with surface applied N, shallower sampling should be considered.

Finally, try to sample at the same time each year, particularly if you are monitoring for changes over time. There may not be a lot of difference from samples pulled in fall vs. spring for some nutrients, but for others, trying to keep the sampling time consistent from year to year will reduce the variability seen in numbers compared across time.

There are other places, even in excellent soil testing programs, where variability can be introduced. Make sure you are keeping the process consistent to give you the best chance to reduce that soil fertility variable – and the yield variability that accompanies it.