

## The Challenge of Collecting a Representative Soil Sample

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At first glance, soil sampling would seem to be a relatively easy task. However, when you consider the tremendous variability that likely exists within a field because of inherent soil formation factors and past production practices (such as banded fertilization), the collection of a representative soil sample becomes more of a challenge. Before heading to the field to take the sample, be sure to have your objective clearly in mind. If all you want to learn is the average fertility level of the field, then the sampling approach would be different than sampling for a variable rate fertilizer application program.

In some cases, sampling procedures are predetermined and simply must be followed. For example, soil test results may be required for compliance with a nutrient management plan or environmental regulations associated with confined animal feeding operations. Sampling procedures for regulatory compliance are set by the regulatory agency and their sampling instructions must be followed. Likewise, site-specific, variable-rate application programs have established a soil sampling system for their service, and their sampling plan should be followed.

Regardless of the sampling objectives or requirements, there are some sampling practices that should be followed:

- \* The soil sample should be a composite of many cores to minimize soil variability effects. A minimum of 8 to 10 cores should be taken from a relatively small area (two to four acres). A greater number of cores should be taken on larger fields than smaller fields, but not necessarily in direct proportion to the greater acreage. A single core is not an acceptable sample.
- \* A consistent sampling depth for all cores should be used because pH, organic matter, and nutrient levels often change with depth. Sampling depth should be matched to sampling objectives. For example, K-State recommendations call for a sampling depth of two feet for the mobile nutrients – nitrogen, sulfur, and chloride. A six-inch depth is suggested for routine tests for pH, phosphorus (P), potassium (K), zinc (Zn), iron (Fe), and boron (B).
- \* A zigzag pattern across the field is better than following planting/tillage pattern to minimize any past non-uniform fertilizer application/tillage effects. With GPS system available, georeferencing of core locations is possible. This allows future samples to be taken from the same locations in the field.
- \* Unusual spots obvious by plant growth or visual soil color/texture differences should be avoided. If information on these unusual areas is wanted, then a separate composite sample should be taken from these spots.

\* If banded fertilizer has been used on the previous crop and the old rows are still identifiable, the area where the band was applied should be avoided in taking cores. If old bands are not identifiable, then the number of cores taken should be increased to minimize the effect of an individual core on the composite sample results.

\* On ridge-till fields where ridges still exist, cores should be taken from the side of the ridge to represent the original soil elevation.

\* For permanent sod or long-term no-till fields where nitrogen fertilizer has been broadcast on the surface, a three- or four-inch sampling depth would be advisable to monitor surface soil pH. A two-increment sampling plan of 0-3 and 3-6 inches on the no-till fields also would allow for assessing stratification of P and K, as well as pH.

Soil test results for organic matter, pH, and non-mobile nutrients (P, K, Zn, and Fe)

change relatively slowly over time, making it possible to monitor changes if soil samples are collected from the same field following the same sampling procedures. There can be some seasonal variability and previous crop effects, however. Therefore, soil samples should be collected at the same time of year and after the same crop. For example, in a corn-soybean rotation, sampling after soybean harvest in the fall would be an excellent sampling system.

**Soil sampling has much to offer if done properly, but it all starts with the proper soil sample collection procedure – one that meets your objectives.**