

SOIL SAMPLING



Economic fertilizer recommendations should be developed based on analysis of properly sampled soil. This fact sheet focuses on soil sampling and soil testing laboratories.

Soil Sampling Procedures

Soil test results are no better than the samples collected. Proper soil sampling techniques are critical to determine the average nutrient status in a field as well as the nutrient variability across a field. Fertilizer recommendations based on samples not representative of a field may result in over-application and/or under-application of nutrients. This can have a negative impact on both economics and the environment.

The Natural Resources Conservation Service (NRCS) requires producers to test their soil every 4 years. These analyses will include pH, organic matter, phosphorous and potassium. Producers are also encouraged to test for soil nitrate levels, when applicable.

The first step is to determine the number of samples needed per field. This is dependent upon the amount of variability within the field. Factors that should be considered include soil types and textures, slopes, cropping history, manure history, drainage, and erosion. Each sample is comprised of 15-20 cores. A core is an individual boring or coring at one spot in the field.

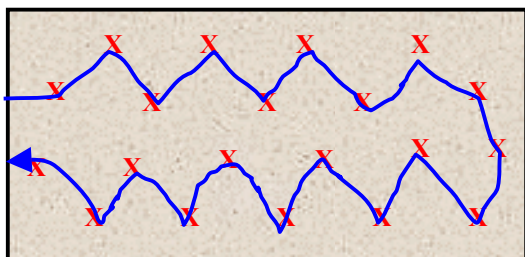
Ideally, large uniform fields should have 1 composite sample collected per 20 acres or less. Smaller fields, including contour strips, should have 1 composite sample collected per 5 acres, especially on hilly or rolling ground. Separate samples should be taken from unique areas such as low spots, eroded knolls, terraces, old fence rows, lime or fertilizer spill areas, headlands and saline areas.

Fewer samples can be taken provided there is little in-field variability; the number of cores representing an individual sample is increased; or fertility management of small individual areas is not practical. In these cases, samples from larger fields and uniform landscapes may be divided into areas that are no larger than 40 acres. Smaller fields and hilly or rolling ground should be divided into uniform areas that are no larger than 20 acres.

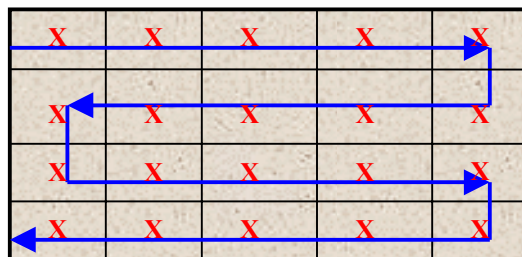
Once you have defined your sampling areas, mark them on a map before you begin. Label them with a unique name or number. You may also want to mark the corresponding sample containers before heading into the field.

The next step is to properly collect the samples. Most samples should be collected after harvest. Do not sample shortly after lime, fertilizer or manure applications. Using a soil probe, soil auger or spade, collect 15-20 cores at random or in a grid pattern, making sure that the sampling area is adequately represented. Be sure to scrape any crop residue and manure off of the soil surface.

Samples collected randomly



Samples collected in a grid pattern



The cores should be collected from between the rows of row crops, except for ridge-till plantings. In a conventional tillage system, samples should be collected from the surface layer to a depth of 6 inches for all nutrients except nitrogen.

Where ridge till is used, collect core 6 inches to the side of banded fertilizer applications. In reduced and no-tillage systems, the depth sampled has a much greater impact on the soil test results because of the stratification of non-mobile nutrients and pH. Surface samples (0-6 inch) may need to be separated into 0-2 and 2-6 inch depths.

Mix cores thoroughly in a clean plastic pail to obtain an individual composite sample. Fill sample boxes or bags provided by soil labs from the pail to the fill line. A 60 -acre field with 3 sampling areas would require 15-20 cores for each of 3 composite boxed or bagged samples. All samples should be kept cool until delivered to the soil-testing lab.

Obtain and complete a laboratory soil sample information sheet before submitting samples. Typically you will be asked for sample identification information, crops to be grown, yield goals, previous crops and the tests you want conducted. Make sure the completed information is consistent with your maps and sample bags or boxes and that sample depths are also noted.

Samples for nitrate-nitrogen should be collected to a depth of 24 inches. Nitrate-nitrogen samples can be collected in Western and Northwestern Minnesota in fall (preferably after Sept. 15) or in early spring. Collect nitrate-nitrogen samples in South-Central, Southeastern and East-Central Minnesota before planting, at planting, or immediately after planting corn. Nitrate-nitrogen samples should be kept cool and shipped immediately overnight to the lab or immediately frozen and sent via normal mail. In either case, ensure that the sample does not arrive at a lab on a Saturday or Sunday.

Soil Test Laboratories

For NRCS program participants, samples should only be submitted for analysis to a laboratory that participates in the Minnesota Department of Agriculture (MDA) Soil Testing Lab Certification program. A list of certified laboratories is available on-line at: <http://www.mda.state.mn.us/> by going to "MDA A to Z" and clicking on "S" and then "Soil Testing Laboratories".

Labs that participate in this program do so to ensure that their analytical methods have been collectively endorsed by midwestern universities. This significantly reduces variability from lab to lab. These labs also use the same reporting units as are used in University of Minnesota Fertilizer Recommendations such as parts per million of elemental Phosphorous (P). This reduces the risk of error that could result from developing fertilizer recommendations based on different reporting units or using different analytical procedures.

Some soil testing laboratories participating in MDA's certification program may provide crop nutrient need recommendations based on the soil test results. These recommendations may be different than the most current University of Minnesota Fertilizer Recommendations. It is important to recognize and understand these differences.