



Soil Sampling for Field Crops

Agronomic soil tests use a chemical extraction solution (such as the Morgan solution used by Cornell University) to measure extractable macronutrients such as phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg), and micronutrients generally including iron (Fe), manganese (Mn) and zinc (Zn). Most soil tests also measure soil organic matter and soil pH. When paired with data from crop research trials, the agronomic soil test results can be used to determine crop specific nutrient needs for profitable and environmentally sound applications of fertilizer, manure and lime. The guidelines are state-specific because field trials need to be conducted under local soil and weather conditions. Soil test results and management guidelines are only as accurate as the sample itself, so taking a representative sample of the field is essential. This fact sheet will help you collect and submit a quality soil sample to the Cornell Nutrient Analysis Laboratory (CNAL).

Obtain a soil test kit

Cornell Nutrient Analysis Laboratory soil sampling kits may be obtained from your local Cornell Cooperative Extension office or by contacting CNAL directly. Each kit contains a cloth mailing pouch with an attached envelope for sending in the sample, a plastic bag for the soil, an instruction sheet, and an information sheet to be submitted with the sample.

Establish a regular sampling time

For most crops, the soil should be sampled at least every 2 to 3 years. For high-value cash crops or where nutrient problems exist, the soil should be tested before planning each crop. Soil samples may be taken at any time of the year, but consistently sampling around the same month of the year will help reduce seasonal variations in your soil test records for a field.

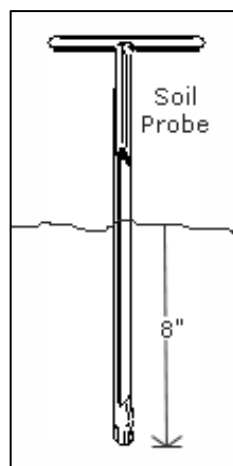
Use proper sampling tools

A soil probe or auger is the best tool for the job. Soil probes or augers work better than

shovels or trowels, because they collect soil in a continuous core from the surface through the entire sampling depth with minimal disturbance of the soil. Garden spades or shovels can be used if a probe or auger is not available. All sampling tools should be clean and free of rust. If using a spade, dig a hole to the desired depth, cut a ½ inch thick slice of soil from the face of the hole, and trim both vertical sides of the slice so as to obtain a strip of soil about 1 inch wide from top to bottom. Brass or galvanized tools or containers can contaminate the sample with copper and zinc, so stainless steel probes or augers are best. Collect the sample in a clean plastic bucket.

Sample the proper depth

For field crops, samples are normally taken from the surface to the tillage depth (usually 6-8 inches deep). This depth is important because lime and fertilizer are mixed within the tilled layer. For lime recommendations for no-till or minimum-till crops, take a sample from the 0-1 inch depth and another sample from 0-6 inches. The two samples should be placed in separate plastic bags labeled clearly with "0-1 inch" and "0-6 inch" and send them to the laboratory in the same outer cloth bag with one information sheet. Be sure to remove thatch and other visible plant or manure residue from the sample, regardless of the crop.



Obtain a representative sample

To adequately represent the field and minimize variation, each soil sample should be a composite of soil cores taken across a similar area. Limiting the sample to areas of 15 acres or less and taking a separate sample for areas with different crop histories, fertility management, crop growth, slope, etc. will help

in collecting a representative sample. Avoid sampling soon after fertilizer or manure applications. In addition, avoid unusual areas:

- dead or back furrows,
- areas near windbreaks or fence lines,
- old manure or lime pile areas,
- wet areas,
- areas near lime rock roads,
- boundaries between slopes and bottomland,
- fertilizer bands in fields where row crops have been grown,
- old building sites,
- severely eroded areas, and
- places where wood piles have been burned.

Once the area is defined, take 2-3 sub-samples per acre along a zig-zag pattern through the field and thoroughly mix the samples in a plastic bucket or plastic bag. Be sure to avoid extremely wet soil conditions unless absolutely necessary. In a wet sample, rapid biological transformations of the amounts and forms of soil nutrients can occur. Wet samples may also leak in the mail and delay analysis. As a guide: if the soil is too wet to plow, it is too wet to sample.

Prepare the sample for submission to the laboratory

Drying is an effective means of preserving the chemical characteristics of the soil sample. If a sample is moist, dry it first by spreading it in a thin layer on a clean sheet of waxed paper and allow the soil to dry at room temperature. Do not use heat to hasten drying, but a fan may be used. Once dried (or if sampled from a fairly dry field to begin with) remove large stones from the sample, break up any lumps or clods, and mix the sample thoroughly. Place about 2/3 to one pint of the mixed sample in a plastic bag, close it properly, and enclose the plastic bag in the cloth pouch supplied with the soil test kit for mailing to the laboratory.

Fill out the information sheet

A client/field history information sheet should be used for submitting standard field crop soil samples. A separate sheet is available for the pre-sidedress nitrogen test (PSNT) for corn. The information sheet should be sealed into the envelope attached to the cloth soil sample pouch for mailing. The information sheet is designed to collect information about the client, field area, soil, and crop rotation. The information and the soil test results are used

to generate nutrient guidelines for the upcoming crops. The guidelines will not be accurate if the information sheet is not filled out correctly. Also, no recommendations will be generated if the information is incomplete or the sample does not originate from agricultural land in New York State (soil fertility guidelines are state-specific).

Mail it in

Soil samples can be sent through standard mail services, either in the cloth pouch and attached envelope provided or boxed together. Send samples to:

Cornell Nutrient Analysis Laboratory
G01 Bradfield Hall
Cornell University, Ithaca, NY 14853

Interpreting results and keeping records

The soil analysis and guidelines for lime and nutrient applications will be mailed directly to you. If you have any questions about the recommendations or on how to interpret the results, contact your local Cornell Cooperative Extension office. The name, address, and phone number of your local Cornell Cooperative Extension educator is printed on the laboratory report. For questions regarding the status of your sample, contact the Cornell Nutrient Analysis Laboratory via the website: <http://www.css.cornell.edu/soiltest> or by calling the main office at (607) 255-4540.

Soil sampling will help make the most of manure, fertilizer, and lime applications, both for crop production and for protection of the environment. By maintaining records of your soil tests, you will be able to recognize changes in soil fertility over time and adjust your field management to meet crop demands and prevent over-application of nutrients.

For more information



Cornell University
Cooperative Extension

Nutrient Management Spear Program
<http://nmssp.css.cornell.edu>

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