

# Agricultural Soil Analysis Sampling Guide

Provided by: A&L Great Lakes Laboratories, Inc.  
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The intention of the following information is to aid you in properly taking soil samples under various conditions and for specific purposes. As it has been said many times, **"A soil test is only as accurate as the sample taken."**



## SAMPLING TOOLS

Tools that may be used to take a soil sample include a spade or shovel, soil sampling tube, or soil auger. Sample tubes or augers should either be stainless steel or chrome plated.

When sampling various soils at different times of the season it is important to use the proper equipment. A soil probe, either a hand tube or hydraulic probe, can be used under most conditions. A small wooden rod may be helpful in removing the soil core from the tube. The soil auger is especially useful when sampling frozen ground or heavily compacted soil that a soil tube can't penetrate. If a spade is used for sampling, dig a V-shaped hole to sample depth; then cut a thin slice of soil from one side of the hole.

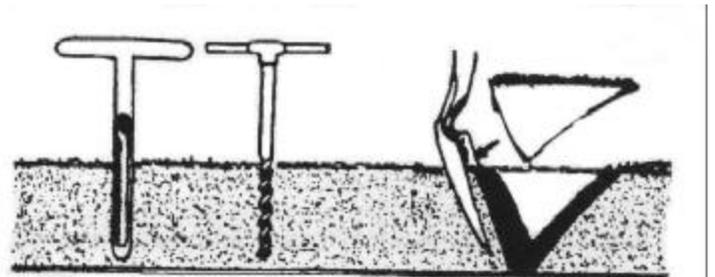
If using a pail to collect the soil, it should be plastic to avoid any contamination from trace metals. For instance, soil will pick up zinc from

a galvanized pail.

When sampling wet soils, vegetable oil or mineral oil may be used to lubricate the probe to minimize soil pushing ahead of the probe.

## SAMPLE PREPARATION

Mix cores or slices together in a clean plastic container and take enough subsample to fill the special soil sample bag provided by the laboratory. There is no need to process the sample further before shipment. At A & L Laboratories, the sample received is dried, ground, and sieved by experienced technicians. Send a separate bag if the Nematode Test or Residue Test is needed in addition to the Basic Tests.



## SAMPLE SIZE

A well-mixed composite from 10 to 20 random locations should be subsampled to give 1 to 1 1/2 cups of soil to be sent to the laboratory for analysis. Greater amounts may be needed when physical properties of the soil (such as textural classification, available moisture, nematodes or pesticide residues) are to be measured.

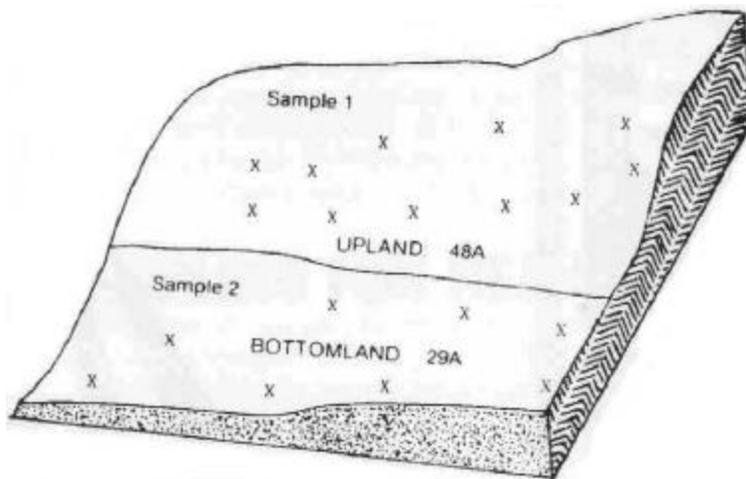
## SAMPLE AREA

Area to be included in a sample generally should be no more than forty acres. Small acreages may be sampled when soil is not uniform throughout a field. A soil map or crop response map can be of help in distinguishing areas.

Areas that differ in soil type, appearance, crop growth or in past treatment should be sampled separately, provided this area can be treated separately.

Avoid small areas that are different such as dead furrows, corners of fields, end rows, and poorly drained areas. Stay at least fifty feet from barns, roads, lanes, or fence rows.

The sample should be obtained from 10 to 20 locations within the areas as diagrammed below.



When sampling problem areas, collect separate samples from both the poor area and the good area to use as a comparison. It would be advisable to run a complete test on a surface sample and a sample from a lower depth to provide additional information. Include a description of the problem when samples are submitted so that A & L agronomists may assist you in finding a solution.

If sampling an area with extreme variations such as where land leveling has occurred or erosion and deposition are severe, the field should be sampled on a grid or incremental unit basis.

## SAMPLING DEPTH

When sampling, scrape away plant residue and sample to 6 inches; or if primary tillage is deeper, sample to tillage depth. This is the depth which can be altered with fertilizers or soil amendments. Eighty to ninety percent of the Nutrients taken up by the plant come from this tillage depth. Plants also obtain nutrients from a lower depth. Subsoil's can provide significant information regarding nitrate-nitrogen and sulfur.

When sampling for nitrate-nitrogen, the most appropriate time for sampling is in the spring or during the growing season. Since nitrate-nitrogen will move with the water front, it can be leached deeper with winter and spring precipitation, especially in sandy soils. Generally, when sampling for nitrate-nitrogen, A & L recommends sampling at 1 foot increments down to 3 feet. It is suggested that the depths be kept separate so that a more accurate assessment can be made regarding soil fertility and soil physical conditions.

## TIME TO SAMPLE?

Soil samples may be taken at any time during the year. However, it is generally recommended to be consistent from year to year. If a particular field is sampled in the spring, it should be sampled in the spring in following years. If this cannot be done, seasonal variations should be expected and taken into account.

In addition, pH can vary during the growing season due to presence of soluble salts, CO<sub>2</sub>, organic matter decomposition, nutrient uptake and exchange, and fertilizer applications.

Nitrate-nitrogen and sulfate-sulfur are leachable. Therefore seasonal variation may occur in levels of these nutrients, depending on soil types, weather patterns, and moisture levels.

Consistency in the time of year samples are taken can eliminate much of the question of whether a variation does occur in a particular soil. A field history should be established to help distinguish seasonal and sampling variation from real fertility changes.

The best time to take soil samples is probably whenever it best fits into your time schedule, However, there are several items to consider before sampling:

- Allow ample time to receive results from the laboratory.
- Sample when you will not be hurried - allow time for taking a representative sample.
- Sampling should be done in accordance with the grower's field observations.
- Taking both a soil sample and a plant sample during the growing season may help distinguish nutrient uptake patterns from chemical, physical, or disease factors.

It is recommended that you sample fields every other year or every third year. In the case of intensive cropping, manure or sludge applications, or sandy soils, annual sampling is recommended to monitor the available nutrients or potentially damaging salt accumulations.

## **SPECIALIZED SAMPLING**

### **SAMPLING REDUCED TILLAGE AND NO-TILL**

No till and reduced tillage has different meanings to various people. When referred to here we mean any tillage that doesn't incorporate soil much more than 3 inches. Remember most disks and chisel plows, if run 6 inches deep, are only incorporating to one-half that depth.

To get a representative soil sample under these conditions, it is best that soil samples be taken from two depths. Take one from the surface 2 inches and one from the 0-6 inch depth. The 0-6 inch depth should be used for general fertilizer recommendations. The 0-2 inch sample should be used to adjust the fertilizer program placement and to provide for accurate herbicide programs. Generally at the surface you will find higher fertility, higher organic matter content, and lower pH, all of which affect the fertility and herbicide programs.

Usually a basic test is adequate for the 0-2 inch depth. However, a more complete test should be run in some situations. Zinc deficiencies have been seen under reduced tillage, even though the 0-6 inch sample showed adequate levels. Shallow sampling revealed most zinc concentrated at the surface, positionally unavailable to plant roots under dry conditions. Soluble salts could also accumulate at the soil surface at higher concentrations than indicated by a 0-6 inch sample, causing stress to plants, particularly at early stages of growth.

## **SAMPLING RIDGE-TILL**

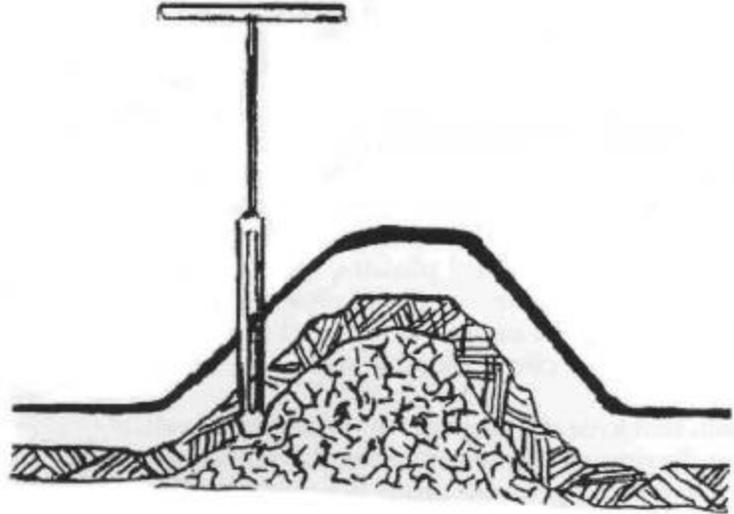
When using ridge-till or ridge-till up for flood irrigation, it is recommended that you sample half-way down the

ridge at a 45° angle to the edge as shown below.

## SAMPLING CENTER-PIVOT GROUND

Many who sample center-pivot ground include too large an area in their sample, creating an excessive variation in results from year to year. Here are several suggestions for best results:

- Split the circle into thirds. This would limit the sample to about 45 acres. Take about 15-20 cores from each of these thirds.
- If time or expense is a limitation, take one sample from the hillsides and another sample from the valleys.
- If the circle is on flat land, sample two areas containing no more than 40 acres each. These two areas could be selected from extreme variations in the field. (For instance, sandy versus clay loams or one area that you know hasn't yielded as well as another area). Then either average the lab results from the two areas or else treat these areas of the field separately.



Whichever of these methods you use, keep the sample areas the same each year. With these methods, inconsistencies in results from year to year will be minimized and you will have a better field history file.

## SAMPLING FIELDS WITH VARYING TERRAIN

If bottomland and hills both represent significant amounts of a field, take a sample from each type of terrain. If either bottomland or hills represent just a small area of the field, do not include these areas in your sample.

## POSITIVE PLACEMENT OF FERTILIZER

**Starters:** When row-placed bands are used, sample between the rows. An exception may be where the total fertilizer program is in a row-placed band. Here you should probe about one-sixth of your total number of probes in or near the row.

**Strip/Deep Placement:** Increase the number of cores per sample. Take two cores near each other at a distance equal to one-half the band widths. Sample in this manner at 12-15 locations to accumulate soil for a sample.