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Soil Testing

How to take a soil sample

Taking a soil sample is needed to determine lime and fertilizer requirements and avoid costly over or under fertilization. Follow the guidelines below to help ensure the best results.

Order or Pick up your Soil Test Supplies from your local Cornell Cooperative Extension Office

Establish a Sampling Schedule

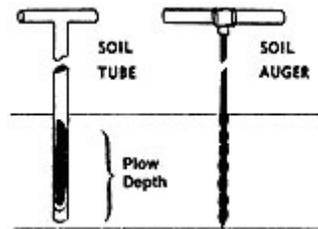
Most soils should be sampled every 2 - 3 years; more often for sandy soils, high value crops or problem areas. To avoid seasonal variation, try to sample at the same time every year for a given field or garden. Fall is generally considered to be the most reliable time to pull samples, especially when it comes to pH. Soil pH fluctuates and tends to be lower in the summer when temperatures are higher and soils are dryer. When soils dry out, salt concentrations increase allowing Ca^{++} , Mg^{++} , K^+ to replace H^+ and Al^{+++} on the soil surface. The extra H^+ and Al^{+++} in the soil solution will temporarily decrease soil pH hence pH determination is more reliable in the Fall when soil moisture is a bit higher.

Use the Right Tool

Use tools that are clean and free of rust. Avoid brass or galvanized tools or containers that can contaminate samples with zinc or copper. Stainless steel probes or augers are best because they collect a continuous core through the entire sampling depth with a minimum disturbance of the soil (see Figure 1.). Avoid shovels or trowels.

Collect samples in a clean plastic bucket or plastic bag. Avoid collecting or shipping wet samples in plain commercial paper bags or boxes that are often treated with a product containing boron. Wet samples can leach boron out of the paper and contaminate the sample. If possible, send air dried samples in and Agro-One sample box.

Figure 1. Use a stainless steel probe or auger for best results.



Sample at the Proper Depth Based on Tillage

- **Moldboard plow** - surface to tillage depth (usually 6-7 inches)
- **Chisel plow and offset disk** - sample before tillage to $\frac{3}{4}$ of the tillage depth.
- **Reduced tillage systems** - No Till, Ridge till, Zone Till etc.

Two Samples may be required. Sample between rows to avoid disturbed soil or fertilizer band.

- Sample to 6 inch depth for pH and nutrient content.
- Take a second sample to a 1 inch depth to determine if surface applied N has resulted in an acid layer that can reduce the effectiveness of triazine herbicides.

Identify the Sampling Area in a Commercial Agriculture Field

Historically, a single composite soil sample has been used to generate one fertilizer and lime recommendation for each field. This is adequate in many cases but may result in inefficient use of fertilizer inputs and increased potential for environmental degradation due to over or under fertilization within a field if the field is quite variable.

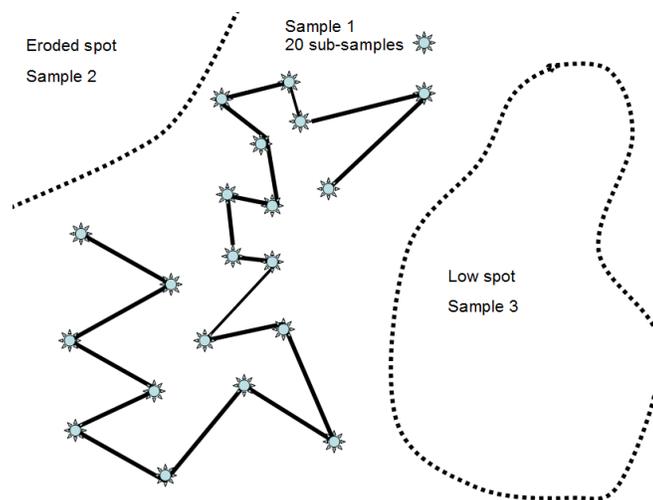
Technology such as digitized soil survey maps, electrical conductivity mapping, yield monitors and aerial photographs may help farms sample fields more precisely by dividing them into "management zones". Several cores can be taken

from each management zone and submitted separately to generate a nutrient application plan that is customized for each management zone within the field. Up front analytical costs may be higher per field since you may submit multiple samples for each field but it allows for improved fertilizer efficiency and environmental protection

Follow the guidelines shown below for taking a single composite soil sample per field. Contact your crop adviser if you plan to implement site specific or "precision" sampling on your farm.

- Take 15-20 plow depth core sub-samples using a zig-zag pattern in a management area representing < 20 acres (see Figure 2.).
- Avoid unusual areas such as dead furrows, old hedge rows, fence lines, old manure piles, lime piles or burn piles. Avoid wet areas or severely eroded areas.
- Take separate samples from areas within the field that vary widely from the rest of the field in color, slope, soil texture, drainage, productivity or crop history.
- Sample each contour strip separately if it is > 5 acres.
- Mix the 15-20 subsamples completely in a clean plastic bag or plastic bucket.
- Avoid sampling under extremely wet soil conditions. Wet samples usually leak in transit and some nutrients in very wet soils may undergo rapid biological transformations.

Figure 2. Suggested Sampling Pattern in a Commercial Field



Prepare Samples for Shipment

If possible, spread wet samples in a thin layer on a clean surface and dry at room temperature. Do not use heat but a fan is acceptable to assist in drying. Remove large stones or sticks and break up large lumps or clods before mixing the sample thoroughly.

Complete the required information on the sample box before assembling and make sure that it matches the information on the sample information sheet. Place about $\frac{3}{4}$ - 1 pint of the mixed sample in the sample box then close it securely.

Fill Out the Sample Information Sheet Completely.

A completed sheet must accompany each sample. Required information includes;

- Customer name, address and contact information.
- Consultant/Extension Educator name, address and contact information
- Method of reporting results - fax, email or US Mail.
- Type of report required - with or without recommendations.
- Method of payment
- Sample information - sample identification, soil name, soil drainage & soil texture, soil drainage class, and other required information should be filled in completely. Recommendations may not be generated if the information sheet is incomplete.
- **KEEP A RECORD OF ALL SAMPLES SHIPPED** including method and date of shipment.
- Maintain records of your soil test results to assist in monitoring changes in soil fertility over time. This may be useful to adjust soil management to meet crop demands without costly over or under application of nutrients.