

Soil Sampling 101

By Janet Fallon, CCA

The United Nations projects that the world population will increase by more than 2 BILLION people in the next 40 years. This creates some rather obvious challenges when it comes to meeting the world's demand for safe and affordable food. Increased food production must be achieved by intensified crop production since our arable land base is not likely to expand

Soil testing will play a critical role to ensure efficient utilization of crop nutrients needed to boost food production in the future while minimizing negative impacts on the environment. That process begins by collecting a representative soil sample.

How to take a soil sample

A representative soil sample is needed to determine lime and fertilizer requirements and avoid costly over or under fertilization. It is perhaps the most important part of any soil testing program...whether it is for a commercial operation farming 1000 acres or for your home garden. Follow the guidelines below to help ensure the best results.

Order Your Soil Test Supplies

There are 3 ways to order soil sample boxes and sample information sheets:

- call 1-800-344-2697 ext. 2172.
- email supply@dairyone.com. Be sure to include your account number and/or name, street address and daytime phone number plus items and quantity needed. Specify the type of sample information sheet needed.
- Directly from our website: <http://www.dairyone.com/Forage/OrderSupplies/>

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. A soil auger may work better in wet or rocky soils. 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 an Agro-One sample box.

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 ¾ 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.

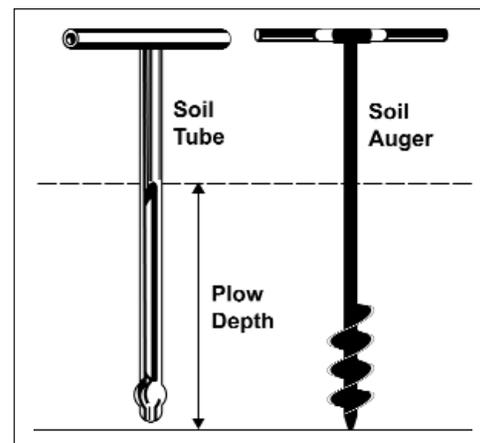


Figure 1. Use a stainless steel probe or auger for best results.

Identify the Sampling Area

Commercial 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.

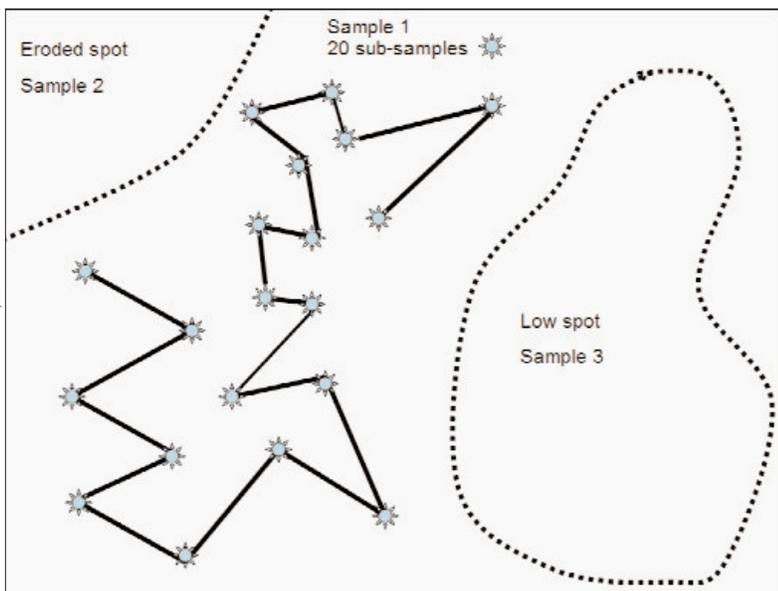


Figure 2. Suggested Sampling Pattern in a Commercial Field

Home Landscape Samples

- Each sample should represent only one area - for example, a lawn, vegetable garden or perennial landscaped area (Figure 3).
- For each unique area take at least 10 - 12 cores.
- Submit samples from healthy and unhealthy areas separately.
- Sample lawns to a depth of 4 inches.
- Sample shrubbery & perennial beds to a depth of 4 - 6 inches taking care to avoid zones where lime or fertilizer has been applied recently.
- Sample annual vegetable and flower beds to the depth that you plan to incorporate lime or fertilizer, usually about 4 - 6 inches.
- Place all cores for one unique area in a clean plastic bucket and mix well. Fill the soil sample box about 2/3rd full (about 2 cups).

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.

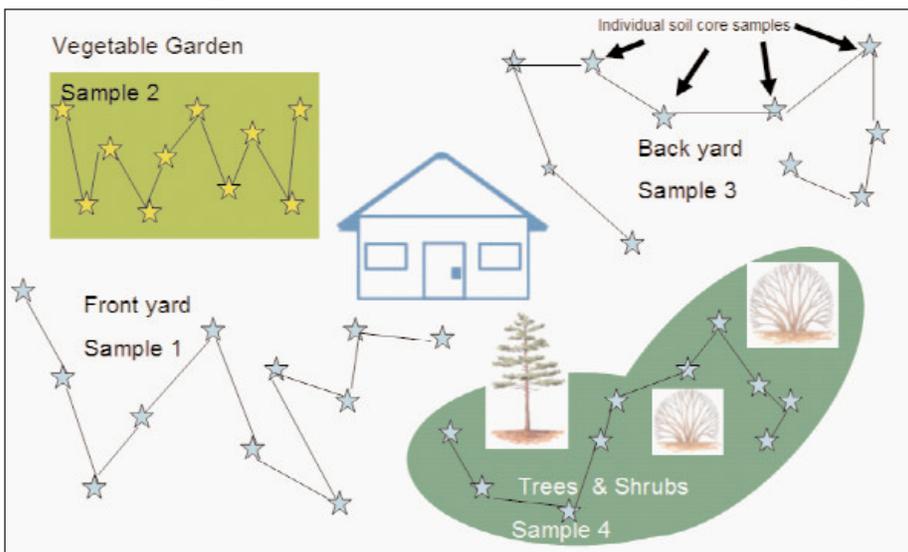


Figure 3. Sample Each Unique Area in a Home Landscape

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.
 - All Commercial NY samples must include a valid soil name if recommendations are desired.
 - All NY Home, Garden and Landscape samples must include soil texture and soil drainage if recommendations are to be reported.
 - All VT samples require soil drainage class if recommendations are to be reported
- Method of payment - Dairy One or Agro One account number, DHIA herd code, credit card information or a check. Results will not be released until payment or billing information has been received. Make checks payable to Dairy One.
- Sample information - sample identification, soil name (NY commercial samples), soil drainage & soil texture (NY Home, garden and landscape samples, soil drainage class (VT samples), 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. Dried ground samples will be stored at the lab for approximately 4 weeks to allow for additional test requests.
- 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.

Ship Your Samples to:

Dairy One
730 Warren Road
Ithaca NY 14850
Phone: 1-800-344-2697 ext. 2172

Samples can be shipped via U.S. Mail, UPS, Fed Ex, DHL, etc. Selecting these carriers will require additional packaging and will incur additional shipping and handling costs. If using the USPS, the flat rate boxes will be your most economical way to ship samples.

In some areas, samples can be left at milk pick-up points by prior arrangement. Where available, samples will be picked up three times a week and delivered to the Dairy One facility in Ithaca the following morning. There is no shipping or handling charge for this service. Complete information on pick-up point locations, procedures and schedules can be found at: http://98.159.209.20/Truck_Stops.html

Although the factors contributing to improved crop production are numerous, one thing is certain - the use of soil testing to determine crop nutrient requirements and enhance overall efficiency will be a key component of world food production and environmental protection in the future.