West Virginia University
Extension Service

Soil Fertility

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SAMPLING SOILS

Fertilizer and lime are most effective when used in the proper amounts. That is the reason for soil testing: to determine the amount of lime (if lime is needed) and the proper fertilizers for the crop or plants to be grown.

Many years of research have gone into developing soil testing equipment and methods which accurately correlate the fertility and acidity of any kind of soil with the crop to be grown and the expected yield. Modern soil testing methods are very accurate but this accuracy is of no vale if the small sample is of poor quality and not representative of the entire area. It is important to remember that this small sample may represent an area that is 10 to 20 million times larger than the sample. Thus the quality of the soil sample sets the limits on the reliability of the soil test and on the recommendations based on soil test results.

Like machinery and people, soils need checkups. With periodic soil tests combined with fertility management practices an economic return can be obtained from investments in fertilizer, lime and time. For the homeowner this return is satisfaction in healthier plants and lawns, and for the farmer or gardener it may be money in the bank and food on the table.

Each year the West Virginia University Soil Testing Service analyzes as many as 25,000 soil samples for available plant nutrients and soil acidity. Unfortunately, one out of every five of these samples is of poor quality. The most common reasons for this are:

1. Samples are taken from only one or two locations and are not representative of the entire area.
2. Samples are contaminated by using containers previously used for lime, fertilizers, detergents, etc.
3. Samples are taken at depths not reflecting lime and fertilizers previously applied.
4. Samples are taken and mailed to the laboratory while wet or frozen.
5. Wet soils were dried in the oven or in hot sun.
6 Samples are too small, less than 1/2 lb.
7. Plant debris was included in the sample.

Laboratory instruments do not distinguish between properly and improperly taken samples. Soil test results reflect the analysis of the soil submitted. If a soil sample does not represent the true fertility or acidity of the area, then the lime and fertilizer recommendations based on this sample will be inaccurate.

Where To Sample

Soils are as variable as people. For an accurate assessment of the average fertility that plant roots encounter in a soil, a minimum of 15 to 20 randomly selected soil borings or slices should be taken. These samples need to be combined and mixed well and a small sub sample taken and submitted to the laboratory. If the field is larger than 10 acres a minimum of 30 borings should be made. Divide larger fields into 10 acre areas, especially if portions may have been managed differently. (Figure 1). Generally, 10 to 15 borings will suffice for small areas such as lawns and gardens.

Consider Unusual Areas

Sample separately areas not characteristic of entire field, lawn or garden; for example: wet spots, eroded areas, bare spots, back furrows, and field edges. Do not combine samples from areas in a field that were limed and fertilized or otherwise treated differently.

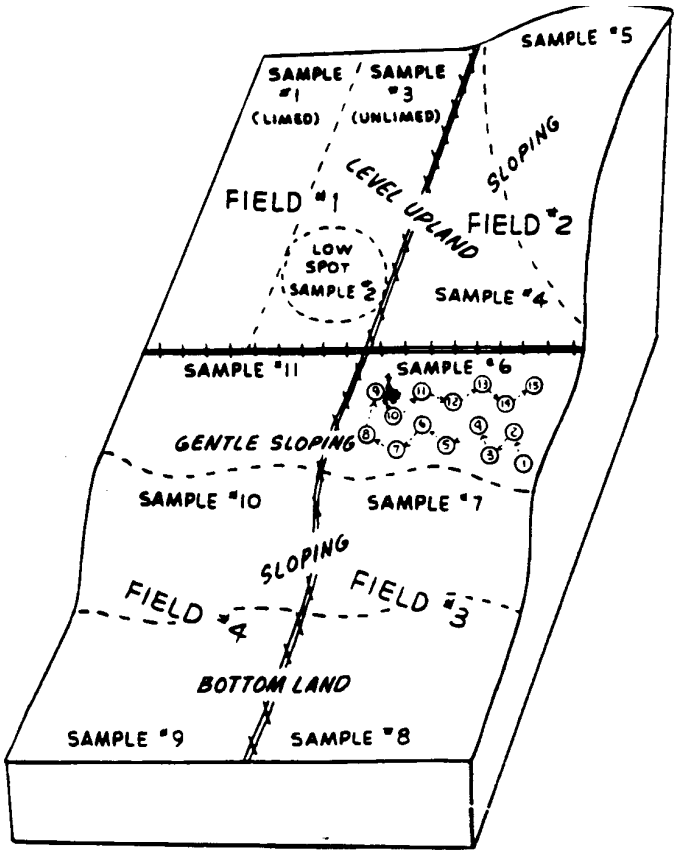


Figure 1. Field Sampling. Sketch your fields before sampling to reflect known differences in soils, history of liming, fertilizing, and cropping. Soil differences to consider are wet spots, slope, degree of erosion, texture (sandy, loamy, clayey), color, organic matter content. Traverse each field to take the samples as indicated for sample No. 6 in the figure.

Sampling Depth

Lime and fertilizer applied to the surface, require many years to move down into the soil, especially if the soil is primarily clay. The extent to which lime and fertilizer penetrate and react with the soil depends upon the amount applied, whether incorporated or applied to the surface, and the time that has elapsed since application. These are the reasons the sampling depths given in figure 2 should be strictly followed. However, sampling soils that were recently limed or fertilized usually result in misleading soil test results and incorrect recommendations.

Consider the Crop

Lawns - Remove organic debris, from the surface sample soil 6 inches in established lawns, and to 4 to 6 inches for new lawns.

Vegetable Gardens and Planting Beds - Sample soil to plow or spading depth, usually 6 inches.

Permanent Pastures - Remove organic debris from the surface, sample to 2 inches.
Meadows - Remove organic debris from the surface sample to 6 inches.

Cropland - Sample to plow depth, usually 6 inches.

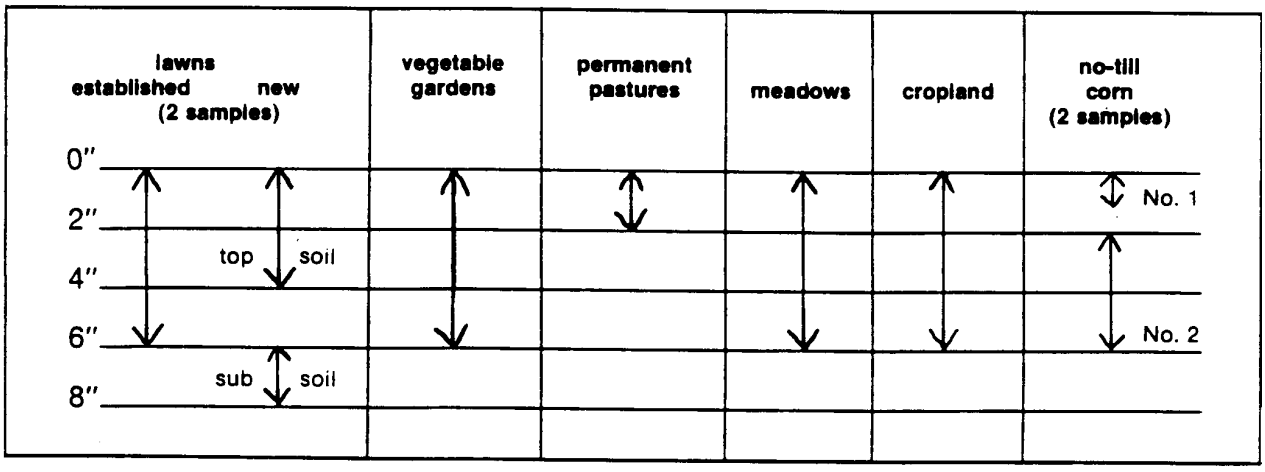
No-till corn - Take two samples, zero to 1 inch and a second between the 1 inch and 6 inch level.

Soil Sampling Tools

The best tool for soil sampling is a soil sampling tube or auger that can be punched into the soil to the proper depth to extract a small core of soil. Most West Virginia University County Extension Offices have these tools which may be borrowed or purchased. Other tools are available and are satisfactory but require more time and patience. When using a garden spade or trowel, cut a "V" out of the soil. Then make a 1 inch slide down one side to the desired depth.

Handling The Soil Sample

Collect the cores of soil in a clean container and gently crush and mix thoroughly. If the samples are wet, spread on a clean piece of paper long enough for it to



dry naturally in a shaded place, then crush and mix and place in the plastic sample bag. Never oven-dry soils as this will adversely affect the test results.

Soil Test Information Sheets

Fill out the information sheet as completely as possible, including your name and address written legibly. Include as much information as possible. Check each information block. Other additional information or questions may be included under Remarks By Landowner.

When to Sample

Soil samples should preferably be taken in late summer or early fall because they come closer to representing the true nutrient status of the soil that a growing crop encounters than those taken in late fall through early spring. Soil samples should not be taken when the soil is wet or frozen or shortly after applying lime or fertilizer. A pinch of fertilizer or lime in a soil sample will give a very high analysis resulting in incorrect recommendations. Soil samples should not be taken shortly after organic matter has been incorporated into the soil.

Mail Samples Early

Soil samples should be mailed well in advance of planting. Allow about 3 weeks for processing the samples. Samples sent to the laboratory between the middle of January and the middle of April may take longer to process. Copies of the results are sent to local West Virginia University County Extension Agents who will be pleased to discuss the results with you.

How Often To Sample

The frequency of sampling soils depends primarily on the crops to be grown, previous fertilization rates, when lime was applied, yields of previously harvested crops, the crop sequence, or other crops grown before. Land that has recently been converted into cropland or gardens will need to be tested every year until the proper fertility level has been reached. In general, however, the following schedule is recommended:

New lawns - after topsoil has been placed and final grading completed.

Established lawns - every 3 to 5 years.

Gardens - every 2 to 3 years.

Permanent pastures - every 3 to 5 years.

Continuous row crops and alfalfa - every 1 to 3 years.

Perennial crops - every 3 years or once each rotation. If these instructions have been carefully followed, an accurate soil analysis will result and effective recommendations can be made. Remember, soil tests results are no better than the soil sample submitted for analysis!

Soil testing is a chemical analysis only

Since soil testing is limited to chemical analysis, no recommendations are made to solve physical problems such as excessive wetness or droughtinous, soil hardpans or impervious layers, compaction from continuous corn production, previous herbicide use, stoniness, climatic problems. As for soil-related insects and diseases, these often disappear after soil physical or chemical problems are corrected, or they can be separately identified by the WVU Extension Plant Pathologist or Entomologist, 414 Brooks Hall, WVU. If problems persist, there is no substitute for an on-site visit by the County Extension Agent who can advise you on the interpretation of your soil test results for your specific conditions.

West Virginia Soil Testing Service

Soil testing is a cooperative program between the Cooperative Extension Service and Agricultural Experiment Station at West Virginia University. Since 1972, it has been supported by annual budget allocations by the West Virginia Legislature for the benefit of West Virginia residents.

Persons wishing to leave soil samples analyzed should:

* Secure a soil test packet from the local County Extension Office, the West Virginia Soil Testing Laboratory, any County USDA office, or the West Virginia State Department of Agriculture. A soil test packet will contain an information sheet to be completed, plastic bag in which to place soil sample, and a mailing container.
* Take samples according to instructions given in this brochure or on the back of the information sheet.
* Fill out the information sheet as completely as possible, use a separate soil test form for each sample submitted.
* Send soil samples and soil test information sheet forms to:

  Soil Testing Laboratory
  Agricultural Science Building
  West Virginia University
  Morgantown, WV 26506

The West Virginia University Cooperative Extension Service through the County Extension Agent will:

* Furnish soil sampling packets

* Advise on taking soil samples and filling out test forms
* Discuss the results and recommendations with the landowner

The Soil Testing Laboratory, at no cost to West Virginia residents, will:

* Test soil samples for pH (acidity), lime requirements, and available amounts of phosphorus, potassium, calcium and magnesium
* Upon request and for a small fee, test for other elements or properties. Contact the Soil Testing Laboratory or County Extension Agent for details
* Recommend fertilizer and lime rates based on the soil test results and on the site and crop information supplied on the soil test information sheet
* Repeat soil analysis if results are questioned (a second soil sample will be required)
* Discuss the results and recommendations by telephone (293-6258 or 293-2219) or by writing to the Soil Testing Laboratory (see address on Page 3).