

Soil Fertility Testing

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A. Soil tests are used by landscape managers like blood tests are used by physicians. Both types of tests disclose vital information that is mostly hidden from view.

Why not just use a "Do-it-yourself" Soil Tests versus the Soil Testing Labs:

- Soil testing kits and equipment can be purchased; however, their overall quality and dependability is strongly associated with, "you get what you pay for." A good example is that a one degree difference in pH is an exponential amount. Given the expenses that can be incurred by making fertilizer application errors (e.g. too much or not enough), the expense of using a reputable soil testing lab is usually justified.

What a Soil Test Can Do:

- Provides information important to understanding the chemical and physical qualities of the soil.
 - Allows us to learn the soil's pH. This is a component of soil chemistry which may interfere with the way nutrients are made available to plants.
 - Discloses information about the nutrient content of the soil including phosphorus, potassium, calcium, and magnesium.
 - The Cation Exchange Capacity (CEC) listed on soil test results provides a snapshot of the ability for the soil to hold onto and exchange positively charged nutrients (cations). Soils with a high CEC will remain fertile over a longer period of time, requiring fewer fertilizer applications, compared to a soil with a low CEC.
 - Sand, silt, and clay are known as the "mineral components" of the soil, and the relative percentages of these particles in the soil is known as the "soil texture." Soil tests can allow us to learn the texture of the soil.
 - Soil testing labs can also provide information on the organic content of the soil.
- Provides recommendations for correcting problems with soil nutrients.
 - Problems with soil pH are addressed by lime recommendations to raise the pH, or sulfur (or other soil acidifiers) recommendations to lower soil pH. Jon Dahl, Director of Michigan State University Soil Testing Lab does not recommend any amendment on pH unless it is below 5.5 or above 7.5.
 - Problems with nutrient deficiencies are addressed by fertilizer recommendations.
 - Conversely, a soil test will prevent over-application of nutrients, which can be just as detrimental to the health of plants as nutrient deficiencies.

What a Soil Test Cannot Do:

- Standard soil testing labs do not provide information on general soil chemical contamination. While most soil testing labs can perform special tests (for an additional fee) to determine the concentrations of certain elements, such as "heavy metals" (e.g. lead, arsenic, etc.), the labs typically do not offer tests for pesticide contamination.
- Soil testing labs can provide information on soil texture (percentage of sand, silt, and clay); however, they normally do not provide recommendations aimed at changing soil texture.
- Standard soil testing labs do not provide information on nitrogen in soils. This element is subject to rapid movement into the soil, and rapid uptake by plants. Nitrogen concentrations change too rapidly for soil tests to provide accurate results for this element.

B. Soil Testing Tips:

Equipment Needed:

- A shovel or hand trowel, or a soil testing probe. Soil probes are comparable in price to a good quality shovel; however, they make it easier to take multiple soil samples.
- A clean, plastic bucket. The bucket will be used to collect soil samples. Metal buckets can introduce contaminants into soil samples.

When Do You Soil Test?

- A soil test should be performed in enough time prior to planting to allow time to make corrections based on soil test recommendations. Fall or early spring are both fine.
- Soil testing should be repeated every 3-5 years for most mineral soils.
- Soil tests can also be performed "as needed" as an aid to diagnosing problems.

How Many Soil Tests?

■ Different Plants = Different Tests:

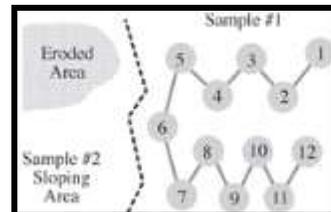
- The recommendations from soil test results are based on the type of plants being cultivated.
- A lawn, a flower bed, and a vegetable garden would require three separate soil tests.

■ Different Areas = Different Tests:

- Individual soil tests should focus on areas in the landscape that have the same soils.
 - The top of a slope may vary from the bottom of a slope. Also, if any amendments were added in the past to one area and not to another, separate tests should be run.
- The same consideration applies to large lawns covering more than 5 acre.

How Many Samples Per Soil Test?

- There will be some variability in soils, even within small areas. A single sample taken from a spot visited by a neighbor's dog will produce a highly inaccurate test result!
- You should take several soil samples in the area that is covered by a single soil test. A general rule is to take 8 - 12 samples.



How to Take Soil Samples?

- Depth: 4 - 6" for turf grass soil tests (6 - 8" for gardens and other plantings).
- Remove the upper 1/4" of the sample to remove organic matter and debris.
- With the slice of soil on the blade of the shovel, remove the sides of the slice with a trowel, knife or your hands to create a ribbon of soil 2 inches wide.
- Mix these samples in a clean plastic bucket (do not use a metal bucket!).
- Dump the contents onto a newspaper and allow soil to dry.
- Pulverize (stomping works!) soils clods and return contents to the bucket.
- Mix again and remove a single "composite" sample from the bucket (about 1/2 cup) to be used for the test.
- Place the soil sample (about 1/2 cup) in the zip lock bag provided.
- Fill out the required information sheet.
- Place bagged soil and completed form in the box addressed to Michigan State University Soil Testing Lab.



C. Fertilization

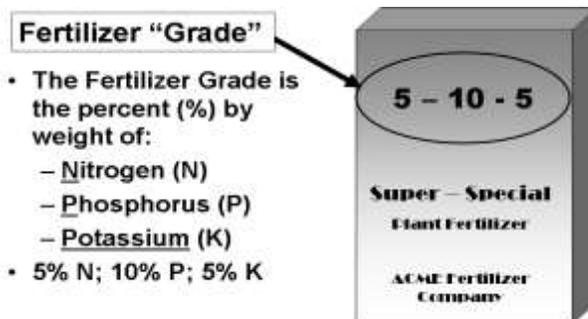
Applications: it's about the macro nutrients

- Macro nutrients are elements that are heavily used by plants. The three most significant macro nutrients are Nitrogen (N), Phosphorus (P), and Potassium (K).
 - Nitrogen moves rapidly through the soil; consequently N is not normally measured in soil tests.
 - Phosphorus and Potassium move slowly through the soil
 - Needs and rates are based on soil test results.

Grade: the percent, by weight of N-P-K in a fertilizer product.

- 5-10-5 fertilizer would have: 5% nitrogen; 10% phosphorus; and 5% potassium.
- A 10 lb. bag of that fertilizer would have: .5 lbs. of N; 1 lbs. of phosphorus; and .5 lbs. of potassium.

$$\text{Example - } \frac{10}{\text{Pounds of Fertilizer}} \times \frac{.05 \text{ lbs. of Nitrogen}}{\text{Pounds of Nutrient (\%)}} = \frac{.5 \text{ or } \frac{1}{2} \text{ pound of Nitrogen}}{\text{Pounds of that Nutrient in the entire bag}}$$



NOTE: The maximum single nitrogen application should not exceed 1 lb/1000 sq. ft.

Turf Grass Fertilization Schedules:

- Turf grass quality is significantly enhanced by fertilizer applications. However, too much fertilizer can have the opposite effect.
- Splitting the recommended fertilizer application from your soil fertility test into four applications per year is optimal for Ohio. Some lawncare companies make 6 – 8 applications per year. Keep in mind that most grasses used in SW Ohio are cool season grasses and usually go dormant when temperatures exceed 85°F. Therefore, fertilizer should **not** be applied during July and early to mid August. Watering will be required and the resulting new growth will be weak compared to that of the fall when soil temperatures are warm and the air temperatures are cool. Why waste water, time and money on fertilizer - just wait 6 weeks. It is recommended that you apply fertilizer, based on your soil test results, in March, Late May, early September and October. If you return grass clippings to the soil, you can cut the application rate in half !!

Vegetable Garden or Flower Beds Fertilization Schedule:

- Split the application recommended by your soil fertility test into two applications. Broadcast half of the fertilizer when preparing the soil for planting after March 15th. Work fertilizer as uniformly as possible to a depth of 3-4 inches. Do not work soil if it is too wet as it will destroy the structure and result in clods. The second application should be applied when plants begin to set flower or in the case of corn, when they tassel. See <http://ohioline.osu.edu/> for specific flower and vegetable recommendations.

C. Getting More Help:

- In Hamilton County, OH, soil testing kits are available through the Hamilton County Soil and Water Conservation District. Thanks to cost-sharing from the Hamilton County Storm Water District, the cost of the test kits For County residents, soil testing boxes and instructions can be obtained from the office for \$5.00/box picked up or \$7.00 if they are mailed to you. There is a limit of 2 boxes/ landowner. For out-of-county residents or residents who wish to purchase more than 2 test boxes, the cost is \$12.00/kit picked up or \$14.00 mailed. Call the office at 772-7645 for further information, or visit the website at: <http://www.hcswcd.org/about/default.asp>

References

1. Virginia Tech Cooperative Extension Publication Number: 452-129; 2002, J.R. Hunnings and S. J. Donohue, Extension Specialists;
2. Best Management Practices for Turf Grass, Joe Boggs, OSU Extension – Hamilton County
3. Fundamentals of Soil Science – 5th edition, H.D. Forth; L.M. Turk
3. The Ohio State University – OHIOLINE - <http://ohioline.osu.edu>