THE OHIO STATE UNIVERSITY EXTENSION

FACT SHEET

Agriculture and Natural Resources

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Soil Testing Is an Excellent Investment for Garden, Lawn, and Landscape Plants, and Commercial Crops

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Soil testing is an excellent measure of soil fertility. It is a very inexpensive way of maintaining good plant health and maximum crop productivity (figure 1). The standard soil test provides the status of phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), pH, cation exchange capacity, lime requirement index, and base saturation. Additional tests are also available for iron (Fe), zinc (Zn), manganese (Mn), soluble salts, nitrates, and organic matter content. With a representative soil sample and an accurate test, sound fertilizer recommendations can help gardeners and growers improve plant quality and productivity, and save money, too!

The Research and Extension Analytical Laboratory (REAL-LAB) run by The Ohio State University was closed in December 1998. However, there are several commercial labs that offer the same or similar tests as were used by the REAL-LAB. There are also soil and tissue testing labs administered by land grant universities such as Michigan State University, Penn State University, and the University of Kentucky. For a fee, most of these labs will test soil, soilless media, plant tissue, compost, and water. The amount of fertilizers, timing of fertilization, and amount of soil pH modifying agents such as lime, will be given according to the type of crop, based on soil test results. Refer to table 1 for a list of these soil and tissue testing labs in Ohio and neighboring states.

Gardeners, homeowners, landscapers, growers, farmers, and all other interested parties should contact their local OSU Extension office to find out the scope of services in each county, if they have questions about soil testing. See **http://extension.osu.edu/counties.php** for a list of OSU Extension offices, their contact information, and services that each office offers.

Figure 1. Do not guess, soil test! Shown here is Cindy Kaelber, an office assistant with OSU Extension in Delaware County. She can help homeowners or commercial growers complete their soil sample form. Photo credit: Gary Gao.

Figure 2. Soil tests reveal soil pH and nutrient level and provide necessary information needed to maintain optimum fertility. Shown here is a soil probe. Photo credit: Gary Gao.

Figure 3. Nutrient deficiencies, such as iron chlorosis, can develop when there is a pH imbalance and/or insufficient nutrients present in the soil. Photo credit: Joe Boggs.

Why Do I Need to Soil Test?

Soil fertility fluctuates throughout the growing season each year. The quantity and availability of mineral nutrients are altered by the addition of fertilizers, manure, compost, mulch, and lime or sulfur, in addition to leaching. Furthermore, a large quantity of mineral nutrients are removed from soils as a result of plant growth and development, and the harvesting of crops. The soil test will determine the current fertility status (figure 2). It also provides the necessary information needed to maintain the optimum fertility year after year.

Some plants grow well over a wide range of soil pH, while others grow best within a narrow range of pH. Most turfgrasses, flowers, ornamental shrubs, vegetables, and fruits grow best in slightly acid soils which represent a pH of 6.1 to 6.9. Plants such as rhododendron, azalea, pieris, mountain laurel, and blueberries require a more acidic soil to grow well. A soil test is the only precise way to determine whether the soil is acidic, neutral, or alkaline.

Most soil nutrients are readily available when soil pH is at 6.5. When pH rises above this value, nutrient elements such as phosphorus, iron, manganese, copper, and zinc will become less available (figure 3). When soil pH drops below 6.5, manganese can reach a toxicity level for some sensitive plants.

The soil test takes the guesswork out of fertilization and is extremely cost effective. It not only eliminates the waste of money spent on unnecessary fertilizers, but also eliminates over-usage of fertilizers, hence helping to protect the environment.

When Do I Soil Test?

Soil samples can be taken in the spring or fall for established sites. For new sites, soil samples can be taken anytime when the soil is workable. Most people conduct their soil tests in the spring. However, autumn can also be a great time to take soil tests if one wants to avoid the spring rush and suspects a soil pH problem. Fall soil testing will allow you ample time to apply lime to raise the soil pH. Sulfur should be applied in the spring if the soil pH needs to be lowered (figure 4).

Figure 4. Spring is a good time to have your soil tested. However, the autumn before plants are installed is an excellent time, too. Photo credit: Gary Gao.

Figure 5. In addition to a soil probe, a spade, knife, or trowel can also be used to take thin slices or sections of soil. Photo credit: Gary Gao.

Figure 6. Remove the top debris, residue, or turf thatch from the soil surface before taking the sample. Photo credit: Gary Gao.

How Frequently Should I Soil Test?

A soil test every two to three years is usually adequate. Sample more frequently if you desire a closer monitoring of the fertility levels, or if you grow plants that are known to be heavy feeders.

What Soil Sampling Tools Do I Need?

A soil sample is best taken with a soil probe or an auger. Soils should be collected in a clean plastic pail or box. These tools help ensure an equal amount of soil to a definite depth at the sampling site. However, a spade, knife, or trowel can also be used to take thin slices or sections of soil (figure 5).

How Do I Take Soil Samples?

1. Remove the top debris, residue, or turf thatch from the soil surface before taking the sample (figure 6).
2. Sample gardens, trees, shrubs, flower beds, and orchards 6–8 inches deep.
3. For the lawn, lift the sod and sample 3 inches deep.
4. Take soil cores or slices from as many places as possible to cover the entire sampling area by going zigzag as shown in figure 7.
5. Sample a row crop field or garden between rows to avoid fertilizer bands.
6. Sample when soils are suitable for spading or plowing.
7. Take separate samples from fields that have received different fertility programs.
8. Take separate samples from soils that are distinguishable by color (i.e. light vs. dark), drainage, or other factors.

The test results are only as good as the sample taken. It is extremely important to provide a representative sample to the testing lab so that a reliable test and recommendations can be made for the entire area. This can be accomplished by submitting a composite sample. A good representative composite sample should contain at least 15 cores or slices. Each core or slice should be taken at the same depth and volume at each site. Sample at random in a zigzag pattern over the area (figure 7) and mix the sample together in a clean plastic bucket.

Figure 7. Take 15 cores or slices by zigzagging to cover as much of the sampling area as possible, shown as stars in this lawn. Photo credit: Gary Gao.

Figure 8. Air dry the sample overnight, break up the clumps, and make a composite sample. Photo credit: Gary Gao.

Figure 9. Follow mailing instructions from the lab of your choice. Make sure enough soil sample is sent for testing. Photo credit: Gary Gao.

More samples need to be taken if the area was recently limed or fertilized. Separate samples need to be taken from lawns, gardens, flower beds, or shrub borders. Separate samples should be taken from areas with distinctive soil types or plant performances.

How to Prepare Soil Samples for Submission

1. Contact a soil testing lab for instructions, soil test kits, and appropriate forms.
2. Break up lumps and air dry the soil at room temperature with no artificial heat (figure 8).
3. When the soil is dry, mix well and crush soil lumps to the size of wheat grains or smaller.
4. Take about one pint of the composite sample and place it in the sample bag associated with the kit.

Where Do I Send My Soil Sample?

You need to mail soil sample(s), completed sample form(s), and appropriate payment to the soil testing lab you selected (figure 9). Generally, soil testing labs will provide a complete set of instructions, either with sample kits or upon request. Follow the instructions carefully.

How Long Does the Soil Test Take?

Soil test results and fertilizer recommendations are usually mailed in two weeks, depending on the labs you work with. Some labs e-mail the results and recommendations to you. Rush service might be available for an additional fee. In addition, make sure you fill out the form for the types of plants you grow or will be growing. Otherwise, no recommendations will be given. Indicate whether this is a new planting or established planting. Incomplete forms may cause delays in receiving results and recommendations.

What Kinds of Soil Tests Are Available?

The kinds of available tests vary with different soil and tissue testing labs. Some of the common tests are lawn and garden, horticultural, agronomic soil tests, and soilless media tests (figure 10).

Refer to table 1 for a suggested partial list of soil and tissue testing labs and the types of tests available in Ohio and neighboring states. Please note that the types of tests that individual labs offer could change without notice. Check with the lab for current tests

Figure 10. There are lawn and garden, commercial horticulture, agricultural soil tests. Consult the lab of your choice for more information. Photo credit: Gary Gao.

available. The list in table 1 was initially provided in 1999 by Dr. Maurice Watson, professor emeritus of the School of Environment and Natural Resources, Ohio Agricultural Research and Development Center, The Ohio State University. Several labs have gone out of business since then. The authors do want to mention that inclusion of a lab on this list does not necessarily imply any endorsement by Ohio State University Extension, nor does the exclusion of a lab imply any condemnation. Hence, Ohio State University Extension does not assume any liabilities associated with the selection and use of these labs.

Table 1. A List of Soil and Tissue Testing Labs and the Types of Materials Tested.*

Name, Address, and Phone Number of Soil and Plant Tissue Testing Labs	Types of Materials Tested
Soil and Plant Nutrient Laboratory MSU Extension Service Department of Crop and Soil Sciences Michigan State University East Lansing, MI 48824-1325 Phone: (517) 355-0218 Web site: http://www.css.msu.edu/SPNL/	Soil, soilless media, plant tissue, compost, nutrient solutions, water, and other special analysis upon request.
Agricultural Analytical Services Laboratory Penn State University University Park, PA 16802 Phone: (814) 863-0841 Web site: http://www.aasl.psu.edu/	Soil, soilless media, plant tissue, manure, compost, sludge, and other special analysis upon request.
Regulatory Services University of Kentucky 103 Regulatory Service Building Alumni & Shawneetown Roads Lexington, KY 40546-0275 Phone: (606) 257-7355 Web site: http://soils.rs.uky.edu/index.php	Soil, soilless media, plant tissue, compost, nutrient solutions, water, and other special analysis upon request.
Alloway Testing 508 Bissman Court Mansfield, OH 44903 Phone: (419) 525-1644 (Mansfield) Phone: (419) 223-1362 (Lima) Phone: (800) 436-1243 Web site: http://www.alloway.com/	Soil, manure, sludge, water, and other special analysis upon request.
A & L Great Lakes Laboratories 3505 Conestoga Drive Fort Wayne, IN 46808 Phone: (260) 483-4759 Web site: http://www.algreatlakes.com/	Soil, soilless media, plant tissue, feed, manure, compost, sludge, nutrient solutions, water, and other special analysis upon request.
Brookside Laboratories, Inc. 308 South Main Street New Knoxville, OH 45871 Phone: (419) 753-2448 Web site: http://www.blinc.com/	Soil, soilless media, plant tissue, feed, manure, compost, sludge, nutrient solutions, water, and other special analysis upon request.

*The listing of laboratories in this fact sheet does not imply endorsement nor does exclusion of any lab imply any criticism or disapproval. Contact your local OSU Extension office or the lab of your choice for more information.

Table 1. A List of Soil and Tissue Testing Labs and the Types of Materials Tested.*

Name, Address, and Phone Number of Soil and Plant Tissue Testing Labs	Types of Materials Tested
CLC Labs 325 Venture Drive Westerville, OH 43081 Phone: (614) 888-1663	Soil, plant tissue, water, and other special analysis upon request.
Calmar Soil Testing Labs 130 South State Street Westerville, OH 43081 Phone: (614) 523-1005 Phone: (800) 80-SOILS Web site: http://www.calmarlabs.com/	Soil, soilless media, and plant tissue.
Holmes Lab 3559 U.S. Rt. 62 Millersburg, OH 44654-8834 Phone: (330) 893-2933 Phone: (800) 344-1101 Web site: http://www.holmeslab.com/	Soil, feed, manure, and water.
Ream & Haager Laboratory 1226 Kaderly Street New Philadelphia, OH 44663 Phone: (330) 343-3711	Soil and other special analysis upon request.
Spectrum Analytic, Inc. 1087 Jamison Rd NW Washington Court House, OH 43160-8748 Phone: (740) 335-1562 Phone: (800) 321-1562 Web site: http://www.spectrumanalytic.com/	Soil, soilless media, plant tissue, feed, manure, compost, sludge, nutrient solutions, water, and other special analysis upon request.

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