Growers, landcapers, turf managers, and other professionals should consider several factors when choosing a soil analytical laboratory. This fact sheet refers to laboratories that determine concentrations of plant-available nutrients in the soil. Soil analytical laboratories are generally not regulated by state or federal agencies, so it is important for growers to investigate these laboratories by obtaining information about their performance, operation, and service before sending soil samples for analysis. A grower requires assurance that the test results will be of high quality, credible, and meaningful. In addition, any recommendations provided with the soil analysis should be based on valid research data. Specific guidelines are discussed here to aid the grower in evaluating a soil analytical laboratory.

Factors to Consider

Test Methods

The use of appropriate analytical methods is very important in order to accurately determine the concentrations of plant-available nutrients in soil. Research at many land-grant universities over many decades has resulted in soil analytical methods that are specific for soils in particular regions of the United States. For example, methods developed for analyzing the predominant soils in the southern region of the United States may not be applicable for soils in the north central region. The North Central Regional Research Committee (NCR-13) has developed methods that work best on soils in the north central region. This summary, entitled Recommended Chemical Soil Test Procedures for the North Central Region, can be located with the citation at the end of this fact sheet. Laboratories that test Ohio soils should use these procedures. Therefore, potential clients need to determine if these testing methods are being used by the laboratory.

Laboratory Proficiency

The proficiency of a laboratory refers to its ability to produce accurate and precise test results. It is difficult for a laboratory to independently assess this factor. Thus, regional soil-testing research committees and other organizations established the North American Proficiency Testing (NAPT) program in 1998. This program is backed by the Soil Science Society of America. The main purpose
of the NAPT is to provide “double-blind” check samples to laboratories that wish to monitor and improve the quality of their soil-testing data. NAPT not only provides the check samples but also collects and statistically analyzes the data from laboratories in the program. Participating laboratories receive a summary of their performance for each soil-test method. Continued self-evaluation and adjustment improves the integrity of the soil-test results. A prospective client should ask the laboratory management if they are members of the NAPT program, and inquire about their NAPT results.

**Other Clients**

A potential client should ask the laboratory to provide the names and telephone numbers of five customers. This allows you, the grower or consultant, to evaluate the laboratory from the perspective of other growers/consultants.

**Units of Results**

Ask a laboratory representative which units are used for each test parameter. Some laboratories report results in pounds per acre (lbs/ac), parts per million (ppm), or pounds per 1,000 square feet (usually reserved for turf and lawn applications). When comparing results from different labs, make sure the units associated with the results are the same. For a valid comparison, a simple conversion may be necessary. For example, to convert ppm to lbs/ac, multiply the ppm value by 2. To convert pounds per acre to pounds per 1,000, divide pounds per acre by 43.56. Certain test parameters may have unfamiliar units, such as meq/100 g for cation exchange capacity. Ask the laboratory representative to explain the meaning or provide conversion factors of the units if they are unclear.

**Categories of Quantity**

Some laboratories may place test results into subjective categories. Examples of the categories might be “very low, low, medium, high, and very high.” There may be additional categories or categories different than these. These categories usually denote a range of test values. It is likely that the categories given by one laboratory do not represent the same nutrient concentrations for another laboratory. Ask the laboratory to define each range that is used. In addition, find out if the categories are crop-dependent or calibrated for specific soil conditions (e.g., soil types). That is, results that may be regarded “medium” for one crop may be considered “very low” for another crop.

**Lime and Fertilizer Recommendations**

Determine if the analytical laboratory provides recommendations for the application of lime and fertilizer for the crops of interest. The *Tri-State Fertilizer Recommendations for Corn, Soybeans, Wheat, and Alfalfa* and the *Ohio Agronomy Guide* provide guidelines for corn, soybeans, alfalfa, and wheat that will be grown in Ohio soils (free links are found at the end of this fact sheet). The *Ohio Vegetable Production Guide* lists fertilizer recommendations for vegetable crops, and is also available online (free link is found at the end of this fact sheet). The basis for these recommendations is university research that has been conducted for the soils and growing conditions of Ohio. Ask the laboratory representative if these recommendations are used. Also ask about the basis for lime and fertilizer recommendations that are used for other crops. Are they calibrated for your specific soil types or growing conditions? Ask if crop rotations and yield goals are considered. In addition, ask if the timing of the application of lime and fertilizer is included in the laboratory’s recommendations.

**Turnaround Time**

Ask the laboratory (and referred clients obtained in “Other Clients” section) how long it takes the laboratory to do routine soil testing and return results. In order for the results and recommendations to be useful to a grower, the turnaround time must be as short as possible. A good laboratory should be able to provide the results in two to three working days for standard soil analyses of pH, lime requirement, phosphorus, potassium, calcium, and magnesium. It is also very important to make sure the laboratory does not sacrifice accuracy for turnaround time. Some laboratories may offer to make results available via e-mail or laboratory web
site. In addition, determine if the recommendations for the application of lime and fertilizer can be obtained on the Internet. In some cases, the laboratory may be able to accept the customer's sample identification information over the Internet, rather than using the sample information form. Most laboratories will also have an e-mail address that will allow direct and rapid communication with the laboratory professional or manager.

**Visiting the Laboratory**

If you arrange a visit to a nearby laboratory, a representative of the laboratory should not hesitate to show a potential client the testing area and explain their methods. During the visit, observe the orderliness and cleanliness of the work area. Ask how the samples are handled. In addition, ask how the data is handled and ask about quality control/ quality assurance protocols that are used.

**Reference Check Samples**

Find out if the laboratory routinely uses internal “blind” and “double-blind” check samples where possible. A “blind” check sample is one that the laboratory technician knows is a check sample and is aware of the range of acceptable values for the parameters being tested. The technician uses this kind of check sample to make sure the method and instrument are performing normally. A “double-blind” check sample is one that the laboratory technician does not know is an internal check sample. In this case, the laboratory manager evaluates the data and determines if the test results produced are in the acceptable range. If they are not, then corrective action must be taken to solve the problem.

**Tracking Quality Control**

The testing laboratory should continuously evaluate its quality by charting its check soil sample results over time. This allows for measurement and assessment of the variation over time. Warning limits and action limits should then be established to assist in the recognition of unacceptable results if a problem with the test should arise. Ideally, quality control charts need to be used for each test parameter. A potential client should ask to review these charts with the laboratory management prior to selecting a laboratory.

**Sample Information and Test Result Forms**

Ask the laboratory for examples of the information form and the final test result form. Study these forms and ask for an explanation of anything that is unclear. Determine how many samples can be represented on each form. Also, sampling instructions are usually provided on the information form. Containers that hold the sample are usually provided along with the information form. Ask to see an example of the container.

**Sample Collection Kits**

Most soil analytical laboratories supply sample collection kits for their customers. At a minimum, the test kits should contain the sample information form and soil sample container. Some additional information may be included with the test kit. For guidelines on taking soil samples, links to OSU Extension fact sheets can be found at the end of this fact sheet.

**Field Professionals**

Some laboratories employ consultants who are trained in agronomy, horticulture, or soil science to work with the customer. Before deciding on a soil analytical laboratory, visit the laboratory and meet with a professional to discuss concerns about testing soil and growing decisions. When visiting a laboratory, ask to review the education and professional credentials of the consultants.

**Laboratory Test Prices**

Prices for soil analysis often vary greatly from one laboratory to the next. Determine if the price for each test or test package is given in writing. Also find out if quantity discounts are given for large numbers of samples and whether or not prices are negotiable.

**Other Testing Services**

Determine if other services are offered in conjunction with soil testing. Many laboratories offer plant tissue analysis in addition to soil analysis. Tissue analysis can be very useful when coupled with soil testing to monitor the nutrient status of the soil or...
troubleshoot crop issues that may be related to soil fertility. Other services may include sample collection, manure analysis, and water quality testing.

**Summary**

Consultation with your local OSU Extension educator may also be worthwhile in deciding which laboratory to use. Although OSU Extension does not endorse any particular laboratory, we have compiled a short list of nearby labs. Check at the end of this fact sheet for the link or consult your local OSU Extension office. In addition, if a crop consultant is used, the grower should discuss these factors with the consultant. Additional time and effort in selecting a quality soil analytical laboratory will pay off. Don’t just assume the laboratory gives quality test results; find out for sure. Once a soil analytical lab passes your “screening test,” then send several soil samples to that lab. If the lab turns out to be a reliable one, you should use the same lab for all your soil samples so the results and recommendations are comparable from year to year.

**References and Links for More Information**


List of Soil Laboratories: http://agcrops.osu.edu/tools/testlabs.pdf


**Other Sites of Interest**

OSU Extension Agronomic Crops Team: http://agcrops.osu.edu/

OSU Extension Soil Fertility web site: http://agcrops.osu.edu/fertility/

OSU Vegetable Crops Team: http://vegnet.osu.edu/


Find a local OSU Extension educator: http://extension.osu.edu/counties.php

Printed copies of the *Ohio Agronomy Guide* and the *Ohio Vegetable Production Guide* are also available for purchase at your local OSU Extension office or online at http://estore.osu-extension.org/

---

**EMPOWERMENT THROUGH EDUCATION**

Visit Ohio State University Extension’s web site “Ohioline” at: http://ohioline.osu.edu

Ohio State University Extension embraces human diversity and is committed to ensuring that all research and related educational programs are available to clientele on a nondiscriminatory basis without regard to race, color, religion, sex, age, national origin, sexual orientation, gender identity or expression, disability, or veteran status. This statement is in accordance with United States Civil Rights Laws and the USDA.

Keith L. Smith, Ph.D., Associate Vice President for Agricultural Administration and Director, Ohio State University Extension

TDD No. 800-589-8292 (Ohio only) or 614-292-1868