



# FactSheet

Extension

## Ohio State University FactSheet

### Horticulture and Crop Science

2001 Fyffe Court, Columbus, OH 43210-1096

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## Guidelines for Choosing a Soil-Testing Laboratory

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**Maurice E. Watson**  
Extension Specialist

### Choosing a Soil-Testing Laboratory

Growers should consider several factors in choosing a soil-testing laboratory. This Fact Sheet refers to laboratories that determine concentrations of plant-available nutrients in the soil. Soil-testing laboratories are generally not regulated by state or federal agencies. Consequently, 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 quality, be credible, and meaningful. Specific guidelines are discussed here to aid the grower in evaluating a soil-testing laboratory.

### Factors to Consider

1. **Test Methods** - The use of appropriate test methods is very important in order to accurately determine the concentrations of plant-available nutrients in the soil. Research at many land-grant universities over many decades has resulted in soil-testing methods that are specific for soils in

particular regions of the United States. For example, methods developed for testing 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. A publication of these methods is entitled Recommended Chemical Soil Test Procedures for the North Central Region (1). Laboratories that test Ohio soils should use these procedures. Therefore, potential clients need to determine if these testing methods, recognized for Ohio soils, are being used by the laboratory.

2. **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 professional scientific organization, the Soil Science Society of America. A main purpose of the NAPT is to provide "double-blind" check samples to laboratories who 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.
3. **Laboratory's NAPT Results** - It is important that a representative of the laboratory review with the potential client their NAPT quarterly test results with those summarized for all NAPT participating laboratories. Information for each test parameter of interest to the client should be included. Growers should ask for this comparison in order to make a good decision about a laboratory.
4. **Other Customers** - The potential client should ask the laboratory to provide the names and telephone numbers of 10 customers. This allows the grower to evaluate the laboratory from the perspective of users like themselves.
5. **Units of Results** - Ask a laboratory representative what units are used for each test parameter. Some laboratories use lbs/a, ppm, or lbs/1,000 square feet. If results from different labs are compared, 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/a, multiply the ppm value by 2. Certain test parameters may have unfamiliar units, such as meq/100 g for cation exchange capacity. Ask the laboratory representative to explain the meaning of the units if they are unclear.
6. **Categories of Quantity** - Some laboratories may place test results into categories. Examples are the categories of low, medium, and high. There may be additional categories or different categories 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 low for another crop.
7. **Lime and Fertilizer Recommendations** - Determine if the soil-testing laboratory provides recommendations for the application of lime and fertilizer for the crops of interest. The Tri-State

Lime and Fertilizer Recommendations provide guidelines for corn, soybeans, alfalfa, and wheat that will be grown in Ohio soils (2). In addition, lime and fertilizer recommendations for these crops and other agronomic crops are available through The Ohio State University's Ohioline Internet service. The web address to access Ohioline is: <http://ohioline.ag.ohio-state.edu>. The Ohio Vegetable Production Guide lists fertilizer recommendations for vegetable crops (3). The basis for these recommendations is the 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.

8. **Turn-Around Time** - Ask how long it takes the laboratory to do the routine soil testing and return the results. In order for the results and recommendations to be useful, the turn-around time must be as short as possible. A good laboratory should be able to provide the results in two to three working days for the routine soil tests of pH, lime requirement, phosphorus, potassium, calcium, and magnesium. It is also very important to make sure the laboratory does not sacrifice accuracy by short cutting the methods to attain this turn-around time. It is a good idea to check the turn-around time with those who have used the laboratory.

The Internet can be a useful system to obtain test results rapidly. Find out if the laboratory can provide the results on the Internet. In addition, determine if the recommendations for the application of lime and fertilizer can also 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 manager and/or laboratory professional.

9. **Visiting the Laboratory** - It is important to visit the soil-testing laboratory before submitting samples. A representative of the laboratory should not hesitate to show a potential client the testing area. 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 that is used.
10. **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.
11. **Charting 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.

12. **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.
13. **Test Kits** - Most soil-testing laboratories supply test kits for their customers. As 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. Find out about the sample kits and how they are obtained from the laboratory.
14. **Production Professionals** - Find out if the laboratory has professionals who are trained in agronomy, horticulture, or soil science to work with the customer. Before deciding on a soil-testing laboratory, visit the laboratory and meet with a professional to discuss concerns about testing soil. When visiting a laboratory, ask to review the educational credentials of the professionals. Find out about the training background.
15. **Laboratory Test Prices** - Prices for soil testing often vary greatly from one laboratory to the next. Ask about the prices. Determine if the price for each test or test package is given in writing. Also find out if discounts are given for large numbers of samples and whether prices are negotiable.
16. **Other Testing Services** - Determine what other services the laboratory offers that are in conjunction with soil testing. Especially, find out if the laboratory offers plant-tissue analysis. This tool can be very useful along with soil testing to monitor the nutrient status of the soil or to isolate problem fertility situations in the field. Find out if the laboratory includes sample collection as an optional service.

Consultation with your local county Extension agent may also be worthwhile in deciding which laboratory to use. In addition, if a crop consultant is used, then the grower should discuss these factors with the consultant in regard to the selection of a soil-testing laboratory. Additional time and effort in selecting a quality soil-testing laboratory will pay off. Don't just assume the laboratory gives quality test results. Find out for sure.

## References

1. Brown, J. R. (ed.). 1998. Recommended Chemical Soil Test Procedures for the North Central Region. North Central Regional Research Publication No. 221. Missouri Agricultural Experiment Station SB 1001. Columbia, MO.
2. Vitosh, M. L., J. W. Johnson, and D. B. Mengel (eds.). 1995. Tri-State Fertilizer Recommendations for Corn, Soybeans, Wheat & Alfalfa. Extension Bulletin E-2567. Michigan State University. East Lansing, MI.
3. Precheur, R. J. (ed). 1999. 1999 Ohio Vegetable Production Guide. Extension Bulletin 672. The Ohio State University. Columbus, OH.

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Keith L. Smith, Associate Vice President for Ag. Adm. and Director, OSU Extension.

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