Addendum B—Sampling Soils for fertilizer and Lime Recommendations

A good representative soil sample is the basis for a good soil test. The major objective of soil testing is to have a basis for intelligently using fertilizer and lime.

Soil testing is widely used for diagnosing problems, sometimes called "troubleshooting," because nutrient deficiencies and toxicities may result in growth characteristics and visual symptoms similar to those caused by insects, diseases, air pollutants or certain herbicides.

Soil testing is an important diagnostic tool for evaluating nutrient imbalances, measuring trends in nutrient levels and identifying locations where nutrient losses (pollution) may occur.

When to test

For general rotation crops, test soils at least once every three years.

Where large amounts of fertilizer are used, test annually' for example, for truck cropping, home gardens and crop production in greenhouses.

Uniform sampling areas

For homeowners, areas near the house are likely to be different from those a few feet away. Carefully evaluate your lot to determine where subsoil has been exposed in the process of grading around the building.

If there is variation, whether it be around the home or in the field, take a composite sample from each predetermined area. A composite sample made up of samplings from two distinctly different areas is not representative of either area.

Taking the sample

Soil samples may be taken at any time during the year when temperatures (lack of frost) and moisture conditions permit. With appropriate equipment, it is possible to sample the soil even when it is frozen. The same standards should be observed when sampling frozen soil. A given area should be sampled about the same time each year—variations in nutrient availability may arise with time of sampling.

From each predetermined area, regardless of size or use, prepare a composite sample by taking not less than 20 samplings consisting of vertical columns or cores of soil approximately ½ square inch in cross-section and to plow depth. That is, each sampling should be a vertical column of soil ½ inch by 1 inch by 8 inches deep, or a cylindrical column of soil ¾ of an inch in diameter to plow depth.

It has been found that 20 well taken samplings or soil cores per composite sample from a given area, regardless of size, will result in laboratory tests that can be duplicated much more frequently than samples made up of only five or 10 samplings, Furthermore, 20 samples per area appear to give results as good as 40 or even 100 samples.

Avoid sampling unusual areas unless such locations are sampled and packaged separately—those close to gravel roads; dead furrows; previous locations of brush, lime or manure piles; fencerows; potholes; fertilizer bands, or burned muck areas.

Subsoil samples taken at a depth of 18 to 24 inches, especially with organic soil, will often aid in making lime recommendations. Subsoil samples need not be a composite.

Soils for Plant Growth

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Break clods, mix thoroughly

As the individual samplings are taken, place them in a plastic pail until 20 or more are collected from the area involved. Then mix the soil in the pail thoroughly with the hands while revolving the pail held at an angle of 45 degrees. Do not use a metal pail if the sample is to be tested for micronutrients.

If the soil is very wet at sampling time, it may be necessary to partially air-dry the sample to obtain an adequately mixed sample. The drying should not be done with artificial heat. Avoid drying soil samples in areas containing gases such as ammonia.

If the soil is very dry, it may be necessary to crush the cores before a good mix can be obtained. A clean wooden surface and a rolling pin work well.

Preparing and packaging the sample

After the sample is thoroughly mixed, place a pint of the soil in the container for transferring to the testing laboratory. You can get special containers provided by the MSU Crop and Soil Sciences Department at you county Extension office, from fertilizer dealers, or salespeople, from lime vendors or directly from the MSU Cop and Soil Sciences Department. The purchase of the soil container pays for the cost of the soil test.

If these are unavailable, any clean container of 1-pint capacity that can be tightly closed should prove satisfactory. But do not use rusty or otherwise contaminated containers, such as metal cans—any foreign material may affect the soil test.

Changes in nutrient availability in the soil samples, particularly phosphorus, have resulted from drying the soil samples prior to the analysis. Do not force-dry the samples by placing them on radiators or inside ovens before submitting them to the laboratory.

Provide complete information

The more complete the information you provide, the better the fertilizer recommendation will be.

Fill in the information requested on the special soil container, or, if any ordinary container is used, label the package with the owner's name and address and the field number. Use a waxed pencil or pen.

The following information should accompany the sample:

1. Previous crop grown.
2. Crop or crops to be grown.
3. Whether the field will be manured for the crop being grown (kind and rate of application).
4. Depth of plowing.
5. Soil type, series or soil management group name.
6. Yield goal.
7. Whether irrigation is to be used.
8. Special problems or conditions.

Information on the various soil tests available from the MSU Soil Testing Laboratory may be obtained from your county Extension office.

The interpretation of the soil test results and the fertilizer recommendations will accompany your soil test report. Various university publications may help you understand the fertility conditions of your soil and what you can do about them. Contact your county Extension office for pertinent and timely publications.

Lawn Establishment, Care and Maintenance

Fertilizing Turfgrass

Fertilizer calculations

Most lawn fertilizer applications are based on 1 pound of actual nitrogen applied per 1,000 square feet. The following are examples of useful calculations that can be applied to a variety of fertilizer situations.

Q) How much nitrogen is available in a 50-lb. bag of 20-5-10?

A) 50 lb. X 0.20 = 10 lb. nitrogen

Q) How much 20-5-10 is necessary to supply 1 lb. nitrogen?

A) 100/20 = 5 lb. of 20-5-10 provides 1 lb. of nitrogen; as a check, 5 lb. X 0.20 = 1 lb.

Q) Based on economics alone, which of the following fertilizers is a better buy? Twenty lbs. of 10-6-4 at $4 or 20 lbs. of 20-5-10 at $6.

A) Consider the 10-6-4: 20 lb. X 0.10 = 2 lb. Nitrogen,$4/2 = $2 per lb. Nitrogen

Consider the 20-5-10: 20 lb. X 0.20 = 4 lb. Nitrogen, $6/4 = $1.50 per lb. Nitrogen

Fertilizing established turf

Test your soil

Soil testing is the only way to determine how much phosphorus, potassium and lime your lawn may need for optimum growth. The soil in your lawn should be tested every two to three years. Be sure to sample the soil well in advance of when you plan to apply fertilizer. If a fall application is planned, submit a sample in early summer. Remember not to take a soil sample three to four weeks after applying fertilizer or lime. If the soil is consistent throughout the lawn area, take approximately a dozen samples randomly throughout the lawn. Generally, each sample should be taken to the soil depth penetrated by the grass roots, usually 3 to 4 inches. Discard roots and other debris. Mix all the samples and allow the soil to air-dry before packaging a pint for shipment to the lab. Be sure to indicate that the test is for a lawn (turf). Indicate whether the lawn is established or if the test is for soil preparation before establishment. For more specific information, contact your county Extension office. A standard soil test will provide pH, phosphorus and potassium levels and an approximation of soil texture. Others tests for special concerns are also available. A soil test will help you select a fertilizer well suited to your soil's condition.

Frequency

How often you fertilize depends on your circumstances and aesthetic standards. How much nitrogen fertilizer a lawn requires depends on many factors, such as the predominant species of turfgrass, soil type, desired turfgrass quality and climatic factors. Most Michigan lawns need between 2 and 5 pounds of actual nitrogen per 1,000 square feet during the growing season. For example, unirrigated lawns that contain mostly fine-leafed fescues should need about 2 pounds of nitrogen per 1,000 square feet during the year. Improved Kentucky bluegrass lawns that are irrigated may need up to 5 pounds of nitrogen. In general, lawns on sandy soils that re routinely irrigated and/or receive heavy traffic require more nitrogen and potassium.

Rate

Lawn fertilizer manufacturers have made fertilizer application convenient and easy by providing information directly on the fertilizer bag. The bag lists the total amount of fertilizer, the fertilizer analysis, the area to be covered at a given rate and the settings for various fertilizer spreaders. When this information is not available, you need to determine the proper rate for a single

application. Consider only the first figure in the fertilizer analysis. In a 10-6-4, the 10 represents the nitrogen content percentage. Do not apply more than 1 pound of nitrogen per 1,000 square feet in a single application. If you had a 10-6-4 fertilizer and planned to apply 1 pound of nitrogen, you would use 10 pounds per 1,000 square feet.

Timing

The best time to fertilize lawns is when the turfgrass needs the nutrients most. For established lawns in Michigan, spring and late summer to early fall are best. Temperature during these periods usually run from 70 to 80 degrees F during the day and 40 to 45 degrees F at night and are the most conducive for turfgrass growth. Other factors to consider when how often to apply fertilizers include the total amount of fertilizer to be applied annually, the type of fertilizer, the soil type and irrigation practices. On irrigated sandy soils, slow-release fertilizers should be used to reduce the potential for nutrient leaching. An alternative approach is to apply lighter doses more frequently.

The number of fertilizer applications needed is based in part on the total pounds of nitrogen to be applied annually. The maximum rate of application of nitrogen is 1 pound per 1,000 square feet per application. Therefore, if you plan to apply 3 pounds of nitrogen per 1,000 square feet per year, a minimum of three applications must be made.

If you plan to fertilize your lawn only once per year, then a late summer or early fall treatment is best.

Note that all fertilization programs are approximate guideline. Adjustments may be needed based on soil tests, weather conditions, pest problems and site conditions. Improper fertilizer applications can create lawn problems. For example, early spring applications can stimulate excessive foliage growth at the expense of root growth and summer stress tolerance. Excessive fertilizer applied during the summer can also directly damage or kill turfgrass. Slow-release products provide a greater margin of safety if a misapplication should occur.

In summary, though guidelines can provide a baseline for developing a fertilization program, the actual program should be adjusted according to the health of the turfgrass and the expectations of the owner or site manager.

Note that another fertilizer schedule used for high quality lawns calls for fertilizing after the lawn has stopped foliage growth in the fall but while the roots are still active. Little or no fertilizer is applied until late spring or early summer, and reduced rates are applied during the summer. This approach, used by many commercial lawn care services, promotes root development and reduces rampant foliage growth in the spring while promoting density and color. On sandy soils, leaching may be a concern.

Special situation: lakefront lawns

The movement of nutrients into lakes is undesirable because it promotes aquatic weed growth and deterioration of the lake for recreation. Lakefront lawns should be fertilized with slow-release nitrogen sources or, if water-soluble sources are used, fertilizers should be applied more frequently but at reduced rates. No phosphorus should be applied unless a soil test indicates a significant phosphorus deficiency. In general, apply only sufficient nutrients to maintain an acceptable lawn—the quality and vigor of the lawn rather than the calendar should be the guide for applications. Do not fertilize lawns at the interface between the lawn and the water. If possible allow a 10 to 20 foot buffer, and consider planting this area with other vegetation that is adapted to that environment.