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CC274 Farm Energy Tips - Use Energy Wisely - Soil Testing

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Farm Energy Tips

USE ENERGY WISELY

Soil Testing

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As fertilizer costs rise, farmers must be able to predict the amount of fertilizer needed to produce the best yield for a particular crop. Soil testing is the best way to predict these requirements.

However, according to U.S. Department of Agriculture statistics, fewer than 25% of U.S. cropland acres had soil tests in 1976. Testing checks for nutrient availability and carryover, and provides a base from which to recommend fertilizer application rates.

Nitrogen fertilizers have unmistakenly contributed to the greatly increased crop yields in this state and across the nation. However, we can use less nitrogen and still maintain present crop yields. To do this, though, we must become more efficient users of nitrogen and, in turn, energy.

Fertilizer is used to replace or supplement nutrients supplied by the soil to growing plants. If the soil can provide the necessary nutrients for the crop, much of the fertilizer that is applied is wasted. By applying fertilizer based on soil test results, you can reduce or eliminate wasted fertilizer. This will save you money.

Since soil testing is a management practice, it should be done regularly. For average conditions and crop yields, test your soil at least every three years. Where crops show signs that something is wrong, or if high rates of fertilizer or manure have been recently applied, an annual test is recommended.

Collect soil samples before planting, seeding, or fertilization. Samples taken in the fall on fields to be planted the following spring allow you to plan your fertilizer program in advance. Fall may also give you the chance to spend more time taking samples than during the spring rush.

Collecting Soil Samples

"Soil tests can be no better than the sample." This statement emphasizes the need for obtaining a representative soil sample. Following are guidelines for collecting soil samples.

Here is a list and explanation of equipment you will need (Figure 1):

A tool that will take soil from the ground—a spade or shovel, posthole digger, soil auger, or soil probe are tools commonly used for taking samples.

Pails or buckets to put the soil in when collecting samples—use plastic pails if a test for zinc is desired. A galvanized bucket will contaminate the sample.

Sheets of paper or plastic on which to place the soil to dry.

Labels to distinguish between different soil samples—this will avoid inaccurate test results due to mixed-up soil samples.

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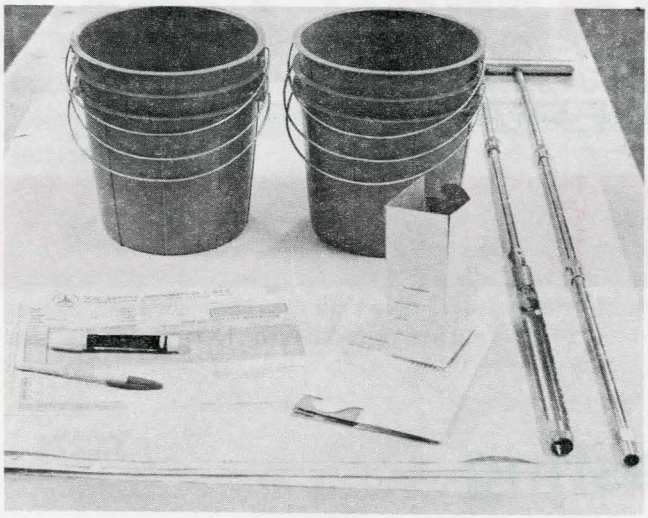

Figure 1. Recommended equipment for taking soil samples.

Soil cartons and information sheets to mail with the samples to the laboratory—soil cartons and information sheets can be obtained from your county agent or directly from the testing laboratory.

How to sample a certain field and how many samples to take are important questions that need to be answered to assure accurate fertilizer recommendations (Figure 2).

1. Divide the field into areas (called sampling units) based on soil type. Use a soil survey, if available for your field, to determine sampling unit boundaries. If a soil survey is not available, sampling units can be estimated on the basis of changing slope, soil color, and soil texture. Because soils in most fields have more than one soil type, sampling units based on field boundaries will usually result in highly variable soil test results.

2. Subdivide the areas according to past fertilization, cropping practices, and visible soil differences. Visible differences may include wet spots, cut or fill areas, eroded areas, and fence rows. These spots can result in extreme differences in soil nutrient levels. If these subdivisions are not large enough to warrant separate fertilization, they should simply be avoided while sampling so they do not influence the fertilizer practice recommended for the major part of the field.

If two or more areas of the field have had a history of *widely* different fertilization or crop rotation, they must be sampled as separate units because of varying nutrient levels which may exist from one unit to the other.

3. Decide what nutrients you are going to test for. This will determine whether you need a surface sample, a subsoil sample, a deep subsoil sample, or all three. Surface samples are those taken from a depth of 0-8" (0-20 cm) or about as deep as you plow or till. Tests for phosphorus, potassium, pH, lime requirement and zinc use the surface sample.

Take subsoil samples as well as surface samples to test for "residual nitrate." This is available nitrogen that has accumulated in the soil due to cropping practices, over-fertilization, or other factors.

Dryland soils can be adequately sampled to a

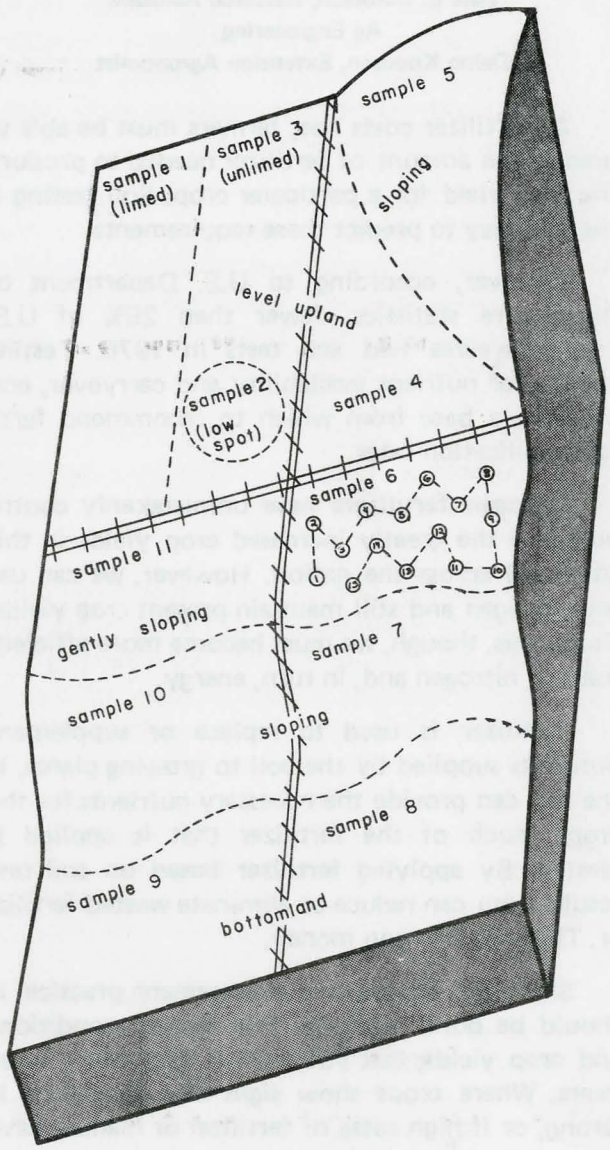

Figure 2. Sampling area must be divided into units that are as uniform as possible.

depth of three feet. A subsoil sample should include soil from two depths, the 8-24" (20-60 cm) layer and the 24-36" (60-90 cm) layer.

Tests on irrigated sandy soils, heavily irrigated soils, and/or fields that will be planted to deep-rooting crops such as sugarbeets, should include a deep subsoil sample. A deep subsoil sample includes the soil from 3-6 feet (1-2 meters). The purpose of this deeper sample is to locate the region of nitrogen accumulation in the root zone so that an accurate estimate of the amount of this nutrient can be made (Figure 3).

4. Take the soil cores randomly throughout each sampling unit. To take a surface sample, push the soil probe into the ground about 8" (20 cm). Pull it out and put the soil core into the pail. Go to another spot in the field and take another core. Do this until you have adequately covered the area you want tested, remembering to avoid spots in the field that are different (see Step 2).

To take a subsoil sample, remove soil cores from the 8-24" (20-60 cm) layer, and place in one pail. Then put the cores from the 24-48" (60-120 cm) layer in another pail, and the cores from the 48-72" (120-180 cm) layer in a third pail. For deep subsoil samples, it is also possible to take cores from each one foot depth. This requires four samples (2-3', 3-4', 4-5' and 5-6'). Keep in mind that the deeper you sample, the more cores you need to take to obtain accurate results.

5. Thoroughly mix the soil cores from each sampling depth separately. Then air dry as rapidly as possible. Air dry the samples by spreading the soil in a thin layer on a piece of paper or plastic and label according to the sampling depth. If the soil is not dried, microorganisms have a chance of changing the nitrate levels in the soil before it gets to the lab. This will lead to inaccurate recommendations and your soil test will not be valid.

6. After the sample has dried, pour the soil into the carton and wrap securely for mailing. Fill out the necessary information sheets requested by the laboratory and mail the carton, fees, and information sheets to the testing facilities.

Where to Get Test Results

Some companies or cooperatives that sell fertilizer offer soil testing services. There are other soil

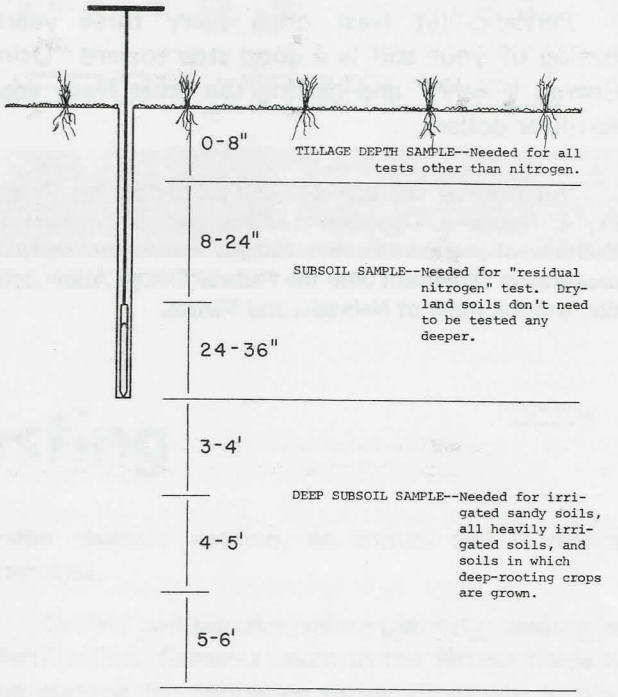

Figure 3. Sampling depths for various tests.

testing laboratories in Nebraska and surrounding states available for your use, including the Soil Testing Laboratory of the Cooperative Extension Service in Lincoln. Some agricultural consulting services will also take samples and test soil for you.

You may want to use more than one laboratory for comparison purposes. Differences in fertilizer recommendations between laboratories are known to exist. These differences can sometimes amount to quite a few dollars being spent on fertilizer that doesn't increase crop yields.

Soil samples to be tested may be sent to:

Soil Testing Laboratory
University of Nebraska
Department of Agronomy
125 Keim Hall
Lincoln, Ne 68583
(Telephone: (402) 472-1571

Results of a soil test from the University of Nebraska are generally returned within 10-14 days. When you receive the test results, use the recommendations (which are based in part on yield goal and the type of crop to be grown), and your judgment in deciding the best fertilizer program for your operation.

Periodic (at least once every three years) testing of your soil is a good step toward "Using Energy Wisely," and getting the most from your fertilizer dollars.

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