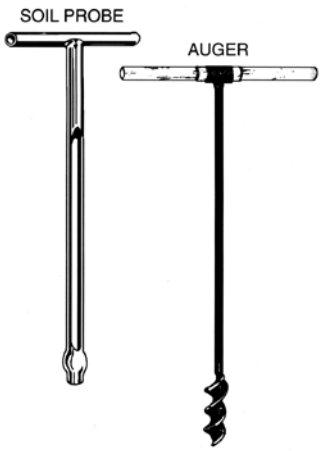
Soil Testing for the Farmer

MISSISSIPPI STATE UNIVERSITY EXTENSION

High crop yields and efficient production bring the highest farm incomes. However, high-yielding crops require large amounts of plant nutrients that must be supplied in proper balance from the soil.

Soils constantly undergo physical and chemical changes. Some plant nutrients are removed in harvested crops or are lost by leaching and erosion; others become available from the soil or are added from fertilizer. Soil tests measure available nutrients in the soil and serve as the best guide to profitable use of commercial liming and fertilizing materials.

One of the most important steps in a soil testing program is to collect the soil sample so it represents the area to be tested. If the sample does not represent an area, the test results and recommendations can be misleading. Get a representative sample so the soil test and recommendations are reliable for the area tested. The following procedures help ensure that you collect representative soil samples.



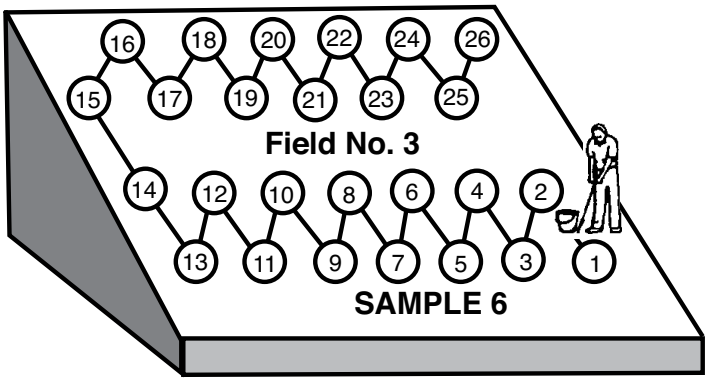
How to Take Good Samples

1. Select the proper tools. A soil probe, auger, spade, and clean buckets may be used in taking soil samples. A soil probe or an auger is better than any other tool because it gets equal amounts of soil from a certain depth.
2. Use the correct soil sampling technique. Sampling is best done when soil moisture conditions are suitable for plowing. Do not include cores from dead furrows, turnrows, strips near trees, old fence rows, fertilizer or lime spill areas, or any other unusual spots.
   - Using a soil map, sample the soils in a field; sample separately the light- and dark-colored soils and recently limed and unlimed areas (see map next page). Scrape off crop residue before sampling.
   - Sample cropland to plow depth or another constant depth, depending on crop and tillage practices. Generally, a 6-inch depth is recommended.
   - Sample pastures and lawns to a 4- to 6-inch depth.
   - Sample a row-crop field between the rows, thus avoiding fertilizer band areas.
3. Get a composite sample. Think of a "soil sample" as the mixture of several borings or spade slices from one distinct area. The word "area" here means the field or part of a field that represents each distinct kind of land (upland as compared to bottomland), soil texture (silt loam as compared to sandy), soil organic matter (light-colored as compared to dark-colored), fertility level (as indicated by crop growth), and management unit (field or portion of field).

The biggest mistakes made in estimating the fertility level of a soil area generally are from improper soil sampling. Laboratory data can be no better than the soil sample.

- To get a representative soil sample, gather at least 15 to 20 cores. If the tilled soil has been limed or fertilized by broadcasting in the last 2 years, take 30 or more individual cores, depending on soil variability or unknown locations of fertilizer bands. Take each core the same depth, and take the same amount of soil at each site.
- Gather cores at random in a zigzag pattern over the area involved. This procedure is good because it lessens the effect of any one boring. For example, if you take 20 equal-sized borings in an area and one of them was, by chance, taken in an old fertilizer spill area, it would have little effect on the results of the composite sample. However, if you take more soil at the fertilizer spill area than at any one of the other sites, the larger volume of soil influences the results of the composite sample.

4. Divide fields into uniform areas. Judge for yourself if an area is large enough for a different lime fertilizer rate or treatment. Examples of field situations are illustrated. For example, Field No. 4-S has a low spot that may be too small, while the sloping area in Field 2 is definitely large enough for special lime or fertilizer treatment. Consult the soil map.



5. Process the soil sample.
   - Break up clods or lumps, spread them out, and dry them at room temperature. Caution: Apply no artificial heat by stove or furnace because this can change the sample for analysis.
   - Thoroughly mix the soil sample after it has dried. Mildly crush the soil (but do not pulverize it) to reduce the coarser granules to about the size of wheat grains or smaller (a rolling pin works nicely).
   - Keep 1 pint from the original sample. Place this pint in a soil sample box that is available from your county Extension agent or the Extension Soil Testing Laboratory at Mississippi State University.
   - Label carefully to ensure identification (maximum of five digits or characters). For example, SE-10, WF1, EA8, 127, B. Prepare a map or sketch of your farm or field layout, showing areas sampled. This helps keep an accurate record of your soil test report.

How Often and When to Test

Test each field once every 3 years or once per crop rotation. If you avoid the rush times at the laboratory, you get faster service and the results of the soil test in time to serve as a guide for buying and applying fertilizer. For fall plantings, take samples in May, June, July, and early August. For spring plantings, collect the samples the latter part of October, November, December, and January.

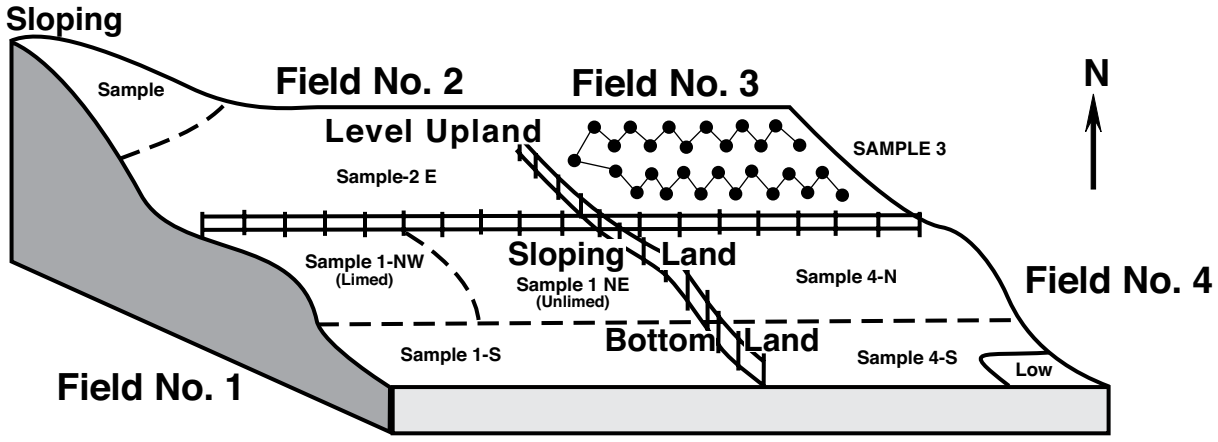
Available Tests and Their Costs

The soil testing laboratory offers the following tests for $6 each sample:

- Standard tests for all samples: pH, lime requirement, available phosphate and potash, calcium, magnesium, sodium, and zinc.
- Organic matter and estimated reserve sulfur for all row and field crops.
- The total soluble salts test is performed on all greenhouse and home horticulture samples.

Interpreting the Soil Test Report

An example of a completed soil test report is on the next page. Identical copies of your report are mailed to your county Extension agent; copies also are on file at the soil testing lab.



AAA-352745 Soil Test Results Page: 1

Mississippi State University Extension Service
Mississippi State University and U.S. Dept. of Agriculture Cooperating

Plant and Soil Sciences—Soil Testing Lab
Box 9610
Mississippi State, MS 39762

9310

January 3, 2000

Jane Doe
P.O. Box XXX
Ackerman, MS 39735

Choctaw County

Agent: XXXXXXX
Ackerman

AAA-352745

Lab# : 2393-2393

Field ID	Extractable Nutrient Levels (lb/acre)										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	(Tons/Acre)	YR	N	$P_2 0_5$	$K_2 0$	Example1	Example 2
1	4.8	21 L	232 H	1415	339 H+		6.5 H+	166	10.1		2.5	1	060	50		60# actual N 109# 0-46-0	60# actual N 250# 0-20-0
												2	060	50		60# actual N 109# 0-46-0	60# actual N 250# 0-20-0
												3	060	50		60# actual N 109# 0-46-0	60# actual N 250# 0-20-0

Crop: Perennial summer grass pasture

At Bottom of Report, See Comment Nos. 340, 9050

Keys:
*pH = Soil Acidity
*PH = Phosphorus
*CA = Calcium
*MG = Magnesium
*S = Sulfur
*ZN = Zinc
*NA = Sodium
*K = Potassium
*N = Nitrogen
*OM = Organic Matter
*$P_2 0_5$ = Phosphate
*$K_2 0$ = Potash
*CEC = Cation Exchange Capacity
*VL = Very Low
*L = Low
*M = Medium
*H+ = Very High
*EX = Excessive
*TX = Toxic

These are only examples for each mixture;other fertilizer mixtures can be used. Call your county agent if you need assistance determining the amount of other mixtures to be applied.

Comment: 340 Perennial summer grass pasture includes bahia, bermuda, and dallis. Apply P & K and 60-80 lb of N before growth starts. Repeat the N application by mid-July if more growth is desired. When both P & K levels are medium, an application of 50 lb P and 50 lb K on alternate years is a better alternative. Loss of stand is sometimes because of K deficiency. If pasture is regularly cut for hay, apply an additional 30 lb of K per acre for each ton of hay harvested.

Comment: 9050 The lime recommendation for this crop is for establishment and assumes the lime will be incorporated into the soil with tillage. If the lime is to be placed on top of the ground and not incorporated, only use 1 ton per acre per year; for example, if the lime recommendation is 2 tons per acre, use 1 ton now and 1 ton at the same time next year.

Dr. Keith Crouse, Extension Soil Testing Specialist

If you have any questions regarding this report, please call your county Extension agent.

The pH value indicates whether or not soil needs lime.

Samples are listed by grower's designation (use five characters or less).

Available amounts are given in pounds per acre and fertility levels for these elements.

Comments concerning crops to be grown.

General recommendations on lime and fertilizer applications.

Recommendation for lime in tons per acre.

Recommendations are given for this specific crop to be used for three consecutive growing seasons.

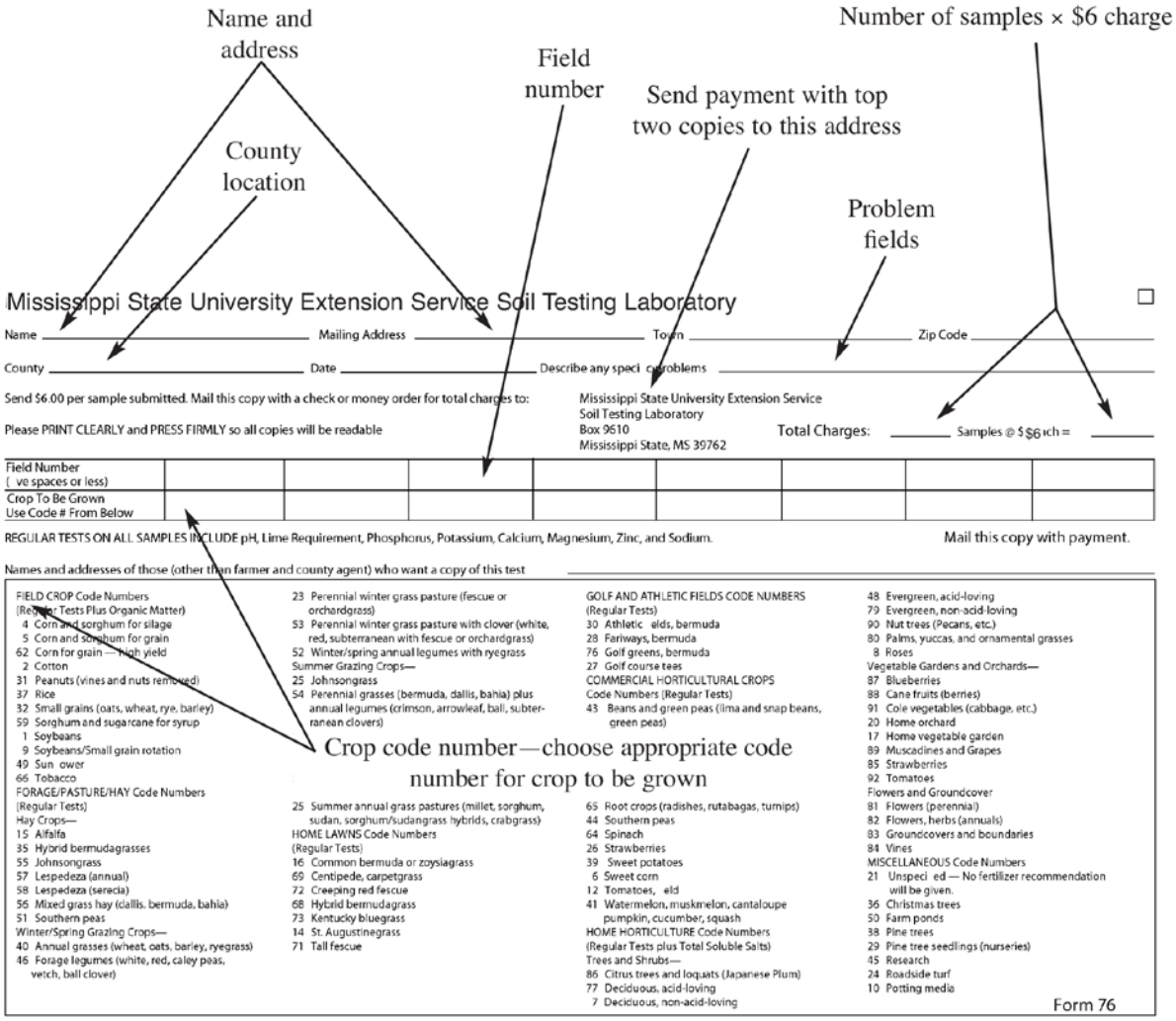
N—Nitrogen fertilizer recommended as pounds per acre is based on research trials at experiment stations.

Two examples are given for fertilizer materials that will supply needed plant nutrients.

P_2O_5 — Phosphate
K_2O — Potash
Pounds per acre of fertilizer needed

How to Submit Samples

1. Completely fill out the upper half of the form (MSU Extension Form 76). List fields by number; use the list of crops on the front of the form to select the appropriate code number for each sample.
2. Total the number of samples and calculate the charge in the upper-right-hand corner of the form (_____samples @ $6 each = _____).
3. Mail the top two copies of the form, your check or money order, and the soil samples to: MSU Extension Service, Soil Testing Laboratory, Box 9610, Mississippi State, MS 39762. Keep the third copy for your files. When you mail the samples, enclose a small number of samples in a sturdy, corrugated mailing container with the top two copies of the form. The package should weigh no more than 20 pounds.
4. Forms, soil sample boxes, and mailing containers are available at your county Extension office. See the county agent for these supplies and for advice on taking soil samples. You may also get these supplies from the Extension Soil Testing Laboratory, Bost Extension Building, Mississippi State University.



Information Sheet 346 (POD-10-15)

Revised by Dr. Keith Crouse, Associate Extension Professor, Plant and Soil Sciences.