

Soil Testing for the Farmer

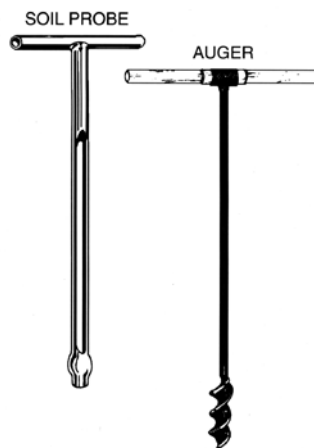
High crop yields and efficient production bring the highest farm incomes. However, high-yielding crops require large amounts of plant nutrients that must be supplied in proper balance from the soil.

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).

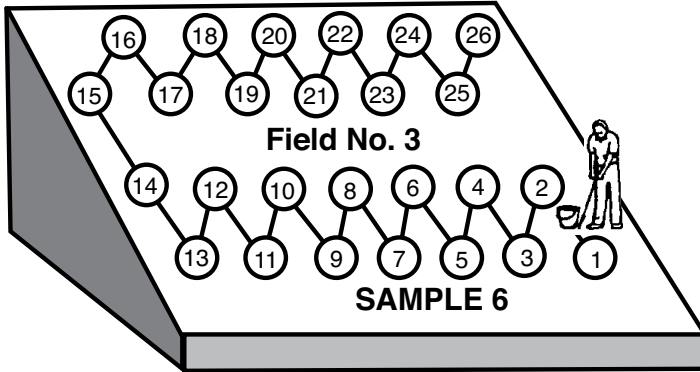
The biggest mistakes made in estimating the fertility level of a soil area generally are from improper soil sampling. Laboratory data can be no better than the soil sample.

- 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.

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.



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

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.

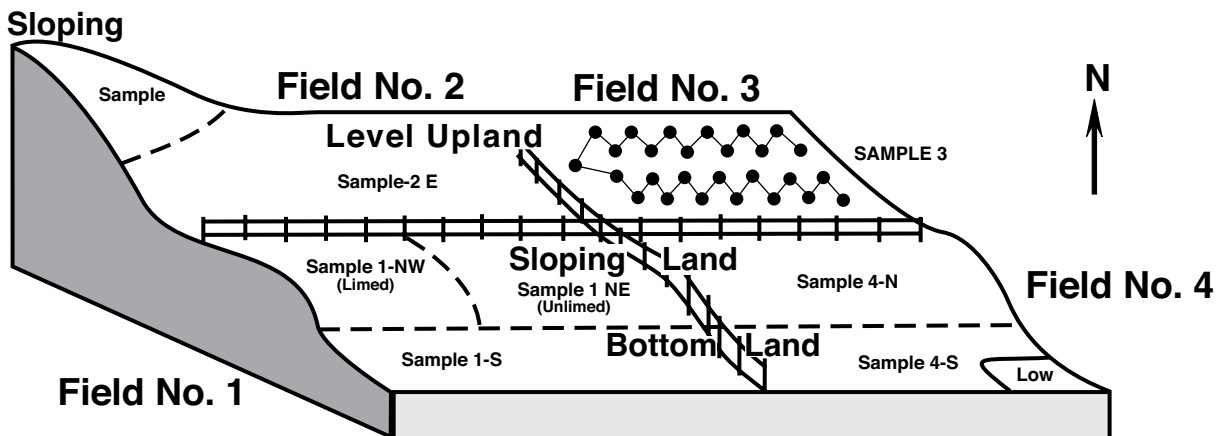
Available Tests and Their Costs

The soil testing laboratory offers the following tests for \$8 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.



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

Recommendation for
lime in tons per acre.

January 3, 2000

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

Agent: XXXXXXX
Ackerman
AAA-352745

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

The pH value indicates
whether or not soil
needs lime.
Samples are listed by
grows's designation (use
five characters or less).
Available amounts are
given in pounds per acre
and fertility levels for
these elements.

Field ID	Extractable Nutrient Levels (lb/acre)					CEC %OM	NA	S	Zn	H+	pH	Recommended Plant Nutrients Pounds Per Acre			Lime (Tons/Acre)	Example of Fertilizer Mixture to Supply Recommended Plant Nutrients		
	P	K	CA	MG	NA							YR	N	P ₂ O ₅		K ₂ O	Example 1	Example 2
1	4.8	21	232	1415	339	6.5	166	10.1		H+		1	060	50	2.5	60# actual N 109# 0-46-0	60# actual N 250# 0-20-0	60# actual N 109# 0-46-0
		L	H	H+	H+					H+		2	060	50		60# actual N 109# 0-46-0	60# actual N 250# 0-20-0	60# actual N 109# 0-46-0
												3	060	50		60# actual N 109# 0-46-0	60# actual N 250# 0-20-0	60# actual N 109# 0-46-0

Crop: Perennial summer grass pasture

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

- *pH = Soil Acidity
- *PH = Phosphorus
- *CA = Calcium
- *MG = Magnesium
- *S = Sulfur
- *ZN = Zinc
- *NA = Sodium
- *K = Potassium
- *N = Nitrogen
- *OM = Organic Matter
- *P₂O₅ = Phosphate
- *K₂O = Potash
- *CEC = Cation Exchange Capacity

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.

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

Comments concerning
crops to be grown.

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.

General recommen-
dations on lime and
fertilizer applications.

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.

P₂O₅ — Phosphate
K₂O — Potash

Pounds per acre of
fertilizer needed

Dr. Keith Crouse, Extension Soil Testing Specialist

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

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 @ \$8 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.

Mississippi State University Extension Service Soil Testing Laboratory

Name _____ Mailing Address _____ Town _____ Zip Code _____
 County _____ Date _____ Describe any special problems _____

Send \$8 per sample submitted. Mail this copy with a check or money order for total charges to: Mississippi State University Extension Service
 Soil Testing Laboratory
 Box 9610
 Mississippi State, MS 39762

Please PRINT CLEARLY and PRESS FIRMLY so all copies will be readable

Total Charges: _____ Samples @ \$8 each = _____

Field Number (leave spaces or less)									
Crop To Be Grown Use Code # From Below									

REGULAR TESTS ON ALL SAMPLES INCLUDE pH, Lime Requirement, Phosphorus, Potassium, Calcium, Magnesium, Zinc, and Sodium. Mail this copy with payment.

Names and addresses of those (other than farmer and county agent) who want a copy of this test

FIELD CROP Code Numbers (Regular Tests Plus Organic Matter) 4 Corn and sorghum for silage 5 Corn and sorghum for grain 62 Corn for grain — high yield 2 Cotton 31 Peanuts (vines and nuts removed) 37 Rice 32 Small grains (oats, wheat, rye, barley) 59 Sorghum and sugarcane for syrup 1 Soybeans 9 Soybeans/Small grain rotation 49 Sunflower 66 Tobacco FORAGE/PASTURE/HAY Code Numbers (Regular Tests) Hay Crops— 15 Alfalfa 35 Hybrid bermudagrasses 55 Johnsongrass 57 Lespedeza (annual) 58 Lespedeza (seecia) 56 Mixed grass hay (dallis, bermuda, bahia) 51 Southern peas Winter/Spring Grazing Crops— 40 Annual grasses (wheat, oats, barley, ryegrass) 46 Forage legumes (wheat, red, casky peas, vetch, ball clover)	23 Perennial winter grass pasture (fescue or orchardgrass) 53 Perennial winter grass pasture with clover (white, red, subterranean with fescue or orchardgrass) 52 Winter/spring annual legumes with ryegrass Summer Grazing Crops— 25 Johnsongrass 54 Perennial grasses (bermuda, dallis, bahia) plus annual legumes (crimson, arrowleaf, ball, subterranean clover)	GOLF AND ATHLETIC FIELDS CODE NUMBERS (Regular Tests) 30 Athletic fields, bermuda 28 Fairways, bermuda 76 Golf greens, bermuda 27 Golf course tees COMMERCIAL HORTICULTURAL CROPS Code Numbers (Regular Tests) 43 Beans and green peas (lima and snap beans, green peas)	48 Evergreen, acid-loving 79 Evergreen, non-acid-loving 90 Nut trees (Pecans, etc.) 80 Palms, yuccas, and ornamental grasses 8 Roses Vegetable Gardens and Orchards— 87 Blueberries 88 Cane fruits (berries) 91 Cole vegetables (cabbage, etc.) 20 Home orchard 17 Home vegetable garden 89 Muscadines and Grapes 85 Strawberries 92 Tomatoes Flowers and Groundcover 81 Flowers (perennial) 82 Flowers, herbs (annuals) 83 Groundcovers and boundaries 84 Vines MISCELLANEOUS Code Numbers 21 Unspaced — No fertilizer recommendation will be given. 36 Christmas trees 50 Farm ponds 38 Pine trees 29 Pine tree seedlings (nurseries) 45 Research 24 Roadside turf 10 Potting media
---	--	--	---

Crop code number—choose appropriate code number for crop to be grown

Form 76

Information Sheet 346 (POD-07-16)

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



Copyright 2016 by Mississippi State University. All rights reserved. This publication may be copied and distributed without alteration for nonprofit educational purposes provided that credit is given to the Mississippi State University Extension Service.

Produced by Agricultural Communications.

We are an equal opportunity employer, and all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, disability status, protected veteran status, or any other characteristic protected by law.

Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. GARY B. JACKSON, Director