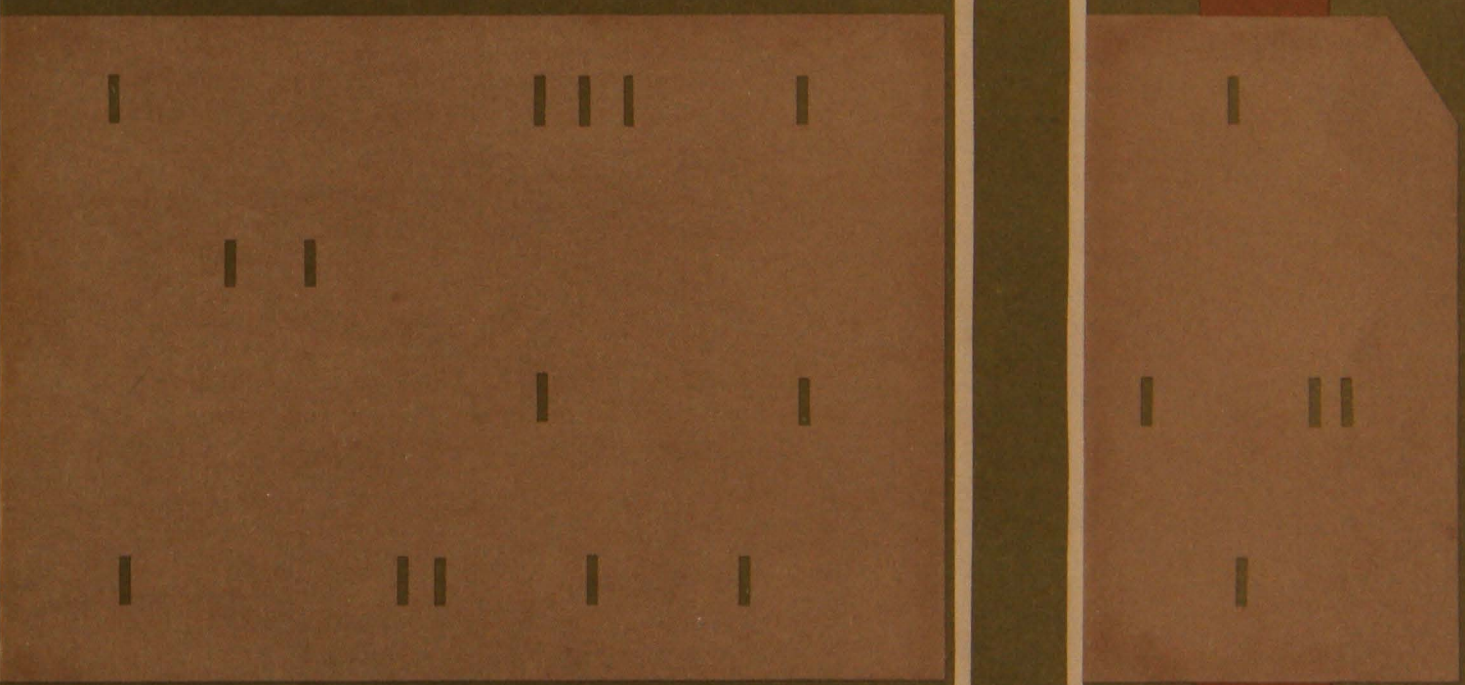
Extension Bulletin 458—1981

COMPUTER PROGRAMMED SOIL TEST RECOMMENDATIONS

FOR LAWNS, TURFS, AND GARDENS IN MINNESOTA



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Contents

Introduction

A bountiful harvest of nutritious vegetables and fruits, attractive flowers, and vigorous and durable turfs all require careful management and a sufficient supply of plant nutrients. Perhaps the most practical way of assessing fertilizer and lime needs is to have the soil analyzed in a soil testing laboratory.

Many homeowners base their fertilization and liming programs on general information, past experience, and guesswork. This often leads to under- or over-application of plant nutrients and may result in decreased growth, poor quality, salt injury, and waste of money and effort.

The University of Minnesota Soil Testing Laboratory has given assistance to homeowners and turf managers since its establishment in 1950. It is housed in the Soil Science Building on the St. Paul Campus. A computerized recommendation program for garden and lawn samples was introduced in 1972. The computer integrates analytical results with data derived from research and information provided by the customer. It then calculates fertilizer and lime needs for the specific situations.

This bulletin deals primarily with current recommendations for gardens, lawns, and turfs. It emphasizes sample collection and understanding of the computer-processed soil test report. A section on laboratory testing procedures is included.

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Soil Sampling

Soil test results can be no better than the sample. That is why proper collection of the soil sample is extremely important. Instructions on soil sampling are given on the reverse side of the *Computer Soil Sample Information* form (see appendix). In general, the requirements for taking soil samples are as follows:

1. Fill out the *Computer Soil Sample Information* form. Copies are available from the Soil Testing Laboratory (address below) and your county extension office.
2. Use sampling tube, auger, or garden trowel.
3. Sample garden soils and soils to be used for establishing a lawn to a depth of 6 inches. Existing grass turfs and professionally managed golf greens are generally sampled to a depth of 3 inches. For trees and shrubs, collect the sample to a depth of 12 inches.
4. Take 5 cores per (composite) sample for lawn and garden soils and 10 to 15 cores per sample for professionally managed turf.
5. Mix the sample thoroughly and place approximately 1 pint into a labeled sample container. Sample boxes are available from the University of Minnesota Soil Testing Laboratory and county extension offices.

These sampling suggestions are helpful to private laboratories as well as the University. Addresses of private soil testers are usually available from a county extension office, garden store, or fertilizer dealer. Persons wishing to have their soils tested by the University should deliver their samples in person to Room 29, Soil Science Building, St. Paul Campus, or mail by parcel post to:

Soil Testing Laboratory
University of Minnesota
1529 Gortner Avenue
St. Paul, Minn. 55108

Individuals not having an account with the laboratory must include payment for all services requested. Make checks payable to the University of Minnesota. Current testing fees are given on the *Computer Soil Sample Information* form. The laboratory telephone number is (612) 373-1060.

A soil sample information form should always accompany soil samples submitted to a soil testing laboratory. Since recommendations are based on information regarding the sample area, it is imperative to fill out the form as completely as possible. Information requested in sections A and B on the sample form in the appendix must be supplied to the laboratory to ensure that the appropriate recommendations will be made.

The Soil Test Report

An example of the *Soil Test Report* form for lawns and gardens is included in the appendix. The soil test report is divided into five parts: location, soil test results, interpretation of soil tests, recommendations, and name and telephone number of county extension office.

Location: This section includes the name and address of the submitter, the report and laboratory sample numbers, and the dates of receiving and reporting.

Soil Test Results: The results for the sample are reported in tabular form. Routine tests include soil texture, pH, SMP buffer index, organic matter, phosphorus, and potassium. Soluble salts are tested upon request. (See Laboratory Procedures section of this bulletin for details.)

Interpretation of Soil Tests: The computer printer uses a series of arrow-like symbols on the report form to indicate the level of various nutrients in the soil sample. A line of arrows that terminates in the "low" section of the block indicates that the soil is low in the particular nutrient to which the line is running parallel on the form. The report form the customer receives from the University laboratory uses a color code in the block. A line of arrows ending in the red area of the block represents a low level of the nutrient, one ending in the mixed-color area indicates a medium level, and one ending in the green area indicates a high level.

Recommendations: This section gives details on lime and fertilizer needs based on a given recommendation category and the soil test values. *Only one set of recommendations is given for the sample identified on the information sheet.* Lime and plant nutrient recommendations are given in pounds per area (1,000 square feet for turfs, or 100 square feet for gardens, trees, or shrubs). Plant nutrients are expressed as nitrogen (N), phosphate (P_2O_5) and potash (K_2O).

An example of fertilizer ratio, or a specific fertilizer grade and amount **may** be given. This is intended simply to illustrate how the recommendation can be accommodated, rather than to prescribe a specific fertilizer formulation. A substitute grade usually is available that fits the recommendation. Additional recommendations may specify method and time of application.

County Extension Office: The computer reports the name and telephone number of an extension agent in the county where the sample originated. The receipt

of payment of the testing fee also is acknowledged in this part of the report.

An explanation of the soil test report and information relating to fertilization are given on the reverse side of the report form.

Report Distribution

The computer prints out four copies of the soil test report. The customer (white) and dealer (blue) copies go either to the homeowner or the commercial firm submitting the sample. The third copy (green) is sent to the county extension agent. The fourth copy (yellow) is retained by the laboratory.

Recommendation Categories

A listing of all the lawn and garden plants and the appropriate recommendation categories are given in table 1.

Table 1. Recommendation categories and a key for recommendation tables

Recommendation category	Site, situation or plant type	Table number
New lawn	Before seeding or sodding	6,7
Existing grass	Home lawn	8,9,10
	Institutional grounds	8,9,10
	Athletic field	8,9,10
	Park	8,9,10
	Cemetery	8,9,10
	Golf tee	11,14,15
	Golf fairway	11,12,13
	Golf green	11,16,17
Gardens	Vegetable garden	18,19
	Flower garden	18,19
Fruits	Tree fruits	21,22
	Small fruits	21,22
Trees and shrubs	Broadleaf	21,22
	Evergreen	21,22

Recommendations for existing grass categories are further divided by variety or species of grass, as listed in table 2.

Table 2. Grass species and varieties

Bentgrass
Fescue
Common Kentucky bluegrass
Elite cultivars of Kentucky bluegrass
"Mixture" for sunny area
"Mixture" for shady area
Other

Lime Recommendations

Lime recommendations are based on soil pH and SMP buffer index determinations. The recommended amount of agricultural limestone is that required to raise the pH of a mineral soil (0- to 6-inch depth) to approximately 6.5.

1. Lime recommendations for **mineral soils** with pH less than 6.0 on which the SMP buffer index is determined are given in table 3.

Table 3. Lime recommendations

SMP Buffer Index	New turf before establishment	Existing grass	Vegetable and flower gardens
	lb./1,000 sq. ft.	lb./1,000 sq. ft.	lb./100 sq. ft.
Below 6.5	220	50	22
6.5	200	45	20
6.6	180	40	18
Above 6.6	140	35	14

2. No lime is recommended for **mineral soils** with pH 6.0 and higher.
3. For **organic soils** with pH 5.5 or less (on which SMP buffer index is not determined) use lime rates shown in table 3 for SMP buffer index above 6.6.
4. For organic soils with pH greater than 5.5 lime is not recommended.
5. For fruits, trees, and shrubs lime is not recommended.

A soil pH of 6 to 7 is suitable for a wide range of garden plants. Lawn grasses are quite tolerant of acid conditions. However, a lime application is suggested if the pH value falls below 6.0. Organic soils are limed only to pH 5.5.

Recent soil test summaries indicate that nearly half of the garden and lawn soils in Minnesota are alkaline (high pH). Soils in many areas are naturally alkaline (western Minnesota) or they become alkaline from liming or irrigating with hard water.

Overliming should be avoided. Availability of micronutrients, particularly iron and zinc, decreases when soil pH values go above 7, and deficiencies may occur. Liming should be done only if a need is indicated by soil test.

Lime is best applied to a new lawn before seeding or sodding so it can be mixed with the soil. Topdress applications of lime on established lawns are seldom necessary and much less effective than mixing with the soil at establishment.

For garden plants, check on optimum pH for specific species to be grown before applying lime. Garden and ornamental plants are listed in table 4 according to soil

pH range for satisfactory growth. Materials and amounts required to decrease the soil pH are given in table 25 in the appendix.

Table 4. Classification of garden and ornamental plants according to range of soil pH for satisfactory growth

6.8 to 6.0	6.8 to 5.5	5.4 to 4.8	5.0 to 4.0
asparagus	bean	potato	azalea
beet	broccoli	rhubarb	blueberry
carrot	cabbage		cranberry
cauliflower	cucumber		rhododendron
celery	parsley		
lettuce	pepper		
lima bean	pumpkin		
muskmelon	radish		
onion	raspberry		
parsnip	squash		
pea	strawberry		
spinach	sweet corn		
	tomato		
	turf grasses		

Fertilizer Recommendations

NITROGEN (N)

Nitrogen recommendations are given under each category. Since very little N accumulates under sod and conventional analytical methods are unreliable, N recommendations for turfgrasses must be based on species, variety, frequency of irrigation, and handling of clippings. The schedule of fertilizer split-applications is given in table 5.

For gardens, the same N rate is recommended for all mineral soils. The rate is halved for organic soils to allow for the N released from the soil.

PHOSPHORUS AND POTASSIUM

Phosphorus and potassium recommendations are given in tables 6, 7, 9, 10; 12 through 19; 21, and 22. Since garden and fruit plantings are usually smaller than lawn and other turf areas, recommendations are given in terms of P_2O_5 and K_2O per 100 square feet rather than 1,000 square feet.

NEW LAWN

Before seeding or sodding, apply 3.5 lb. N/1,000 sq. ft. and till it into the soil.

Table 6. Phosphorus recommendations for new lawn before seeding or sodding

Phosphorus (P) Soil Test	Amount of Phosphate (P_2O_5) to apply
lb./acre	lb./1,000 sq. ft.
0-20	5
21-50	2
over 50	0

Table 7. Potassium recommendations for new lawn before seeding or sodding

Potassium (K) Soil Test	Amount of Potash (K_2O) to apply
lb./acre	lb./1,000 sq. ft.
0-100	5
101-200	3
201-300	2
above 300	0

Soil preparation before seeding or sodding offers an opportunity to make basic phosphorus and potassium applications. After grading and adding topsoil, apply the recommended amounts of phosphorus and potassium. Incorporate the fertilizer into the top 4 to 6 inches of soil by rototilling. This will get the phosphorus and potassium into the root zone of grasses. Since phosphorus and potassium move very slowly in the soil from topdress application, it is important to get the fertilizer mixed with the soil before planting the grass seed.

Nitrogen, on the other hand, moves readily into the soil with rainfall or irrigation water, and can be applied as a topdress. Not more than 1 pound of actual N/1,000 sq. ft. should be applied in one application unless a slow-release form is used.

Table 5. Schedule of fertilizer split application for existing grass turf

Number of Split Applications*	5/1-5/10	5/15-5/25	5/30-6/10	6/25-6/30	8/1-8/10	9/1-9/10	10/15-11/15
6x	√		√	√	√	√	√
5x	√		√		√	√	√
4x		√			√	√	√
3x		√			√		√
2x					√		√
1x							√

*Each split application is 1 pound of actual nitrogen per 1,000 square feet.

EXISTING GRASS

The next three tables give recommendations for existing grass in home lawns, institutional grounds, athletic fields, parks, and cemeteries.

Table 8. Nitrogen recommendations for existing grass

	Grass watered regularly		Grass not watered regularly	
	Clippings Removed	Clippings Not Removed	Clippings Removed	Clippings Not Removed
	lb./1,000 sq. ft.			
Bentgrass, Elite Kentucky Bluegrass	5	4	4	3
Fescue, Common Kentucky Bluegrass, Mixtures for sunny or shady areas, Other	3	2	3	1

Table 9. Phosphorus recommendations for existing grass

Phosphorus (P) Soil Test	Phosphate (P_2O_5) to apply
lb./acre	lb./1,000 sq. ft.
0-10	2
11-20	1
21-50	0.5
over 50	0

Table 10. Potassium recommendations for existing grass

	Potash (K_2O) to apply	
Potassium (K) Soil Test	Clippings Not Removed	Clippings Removed
lb./acre	lb./1,000 sq. ft.	
0-100	2	4
101-200	1	2
201-300	0.5	1
over 300	0	0

When using readily available fertilizers, as a general rule, no more than 1 pound of actual nitrogen or potassium/1,000 sq. ft. should be applied at any one time. If a slow release (non-burn) fertilizer is used, the amount of fertilizer can be doubled, thus requiring fewer applications. Never apply fertilizer to wet grass. It is desirable to water the lawn immediately after fertilizing. Always water if liquid fertilizer is applied. Lime, phosphorus and potassium applications should follow aerification. See table 5 for schedule of split applications of fertilizer.

Table 11. Nitrogen recommendations for golf courses (fairway, tee, green)

	Grass watered regularly		Grass not watered regularly	
	Clippings Removed	Clippings Not Removed	Clippings Removed	Clippings Not Removed
	lb. N/1,000 sq. ft.			
Tee and Fairway				
Bentgrass, Elite Kentucky bluegrass	5	4	5	3
Fairway				
Fescue, Common Kentucky bluegrass, Mixtures, Other	4	3	3	2
Green	6	6	6	6

Table 12. Phosphorus recommendations for fairway

Phosphorus (P) Soil Test	Phosphate (P_2O_5) to apply
lb./acre	lb./1,000 sq. ft.
0-10	2
11-20	1
21-50	0.5
over 50	0

Table 13. Potassium recommendations for fairway

Potassium (K) Soil Test	Potash (K_2O) to apply
lb./acre	lb./1,000 sq. ft.
0-100	4
101-200	2
201-300	1
over 300	0

Table 14. Phosphorus recommendations for golf tee

Phosphorus (P) Soil Test	Phosphate (P_2O_5) to apply
lb./acre	lb./1,000 sq. ft.
0-10	5
11-20	3
21-30	1
31-50	0.5
over 50	0

Table 15. Potassium recommendations for golf tee

Potassium (K) Soil Test	Potash (K_2O) to apply
lb./acre	lb./1,000 sq. ft.
0-100	5
101-200	3
201-300	1
301-400	0.5
over 400	0

Table 16. Phosphorus recommendations for golf green

Phosphorus (P) Soil Test	Phosphate (P_2O_5) to apply
lb./acre	lb./1,000 sq. ft.
0-10	5
11-20	3
21-30	1
31-50	0.5
over 50	0

Table 17. Potassium recommendations for golf green

Potassium (K) Soil Test	Amount of Potash (K_2O) to apply
lb./acre	lb./1,000 sq. ft.
0-100	5
101-200	3
201-300	2
301-400	1
over 400	0

VEGETABLE AND FLOWER GARDENS

The nitrogen recommendations are 0.20 lb. N/100 sq. ft. on mineral soils, and 0.10 lb./100 sq. ft. on organic soils.

Phosphorus and potassium can be applied to vegetable and flower gardens in the fall or spring. They should be mixed in with the top 4 to 6 inches of soil. Nitrogen should be applied in the spring either on the surface or mixed with the topsoil.

For sweetcorn, tomatoes, cabbage, and viny crops such as squash and cucumbers, an additional N application may be desirable at midseason. This can be accomplished by applying ½ lb./100 square feet of ammonium nitrate (33-0-0) or $^1/_6$ lb. N.

Table 18. Phosphorus recommendations for vegetable and flower gardens

Phosphorus (P) Soil Test	Amount of Phosphate (P_2O_5) to apply
lb./acre	lb./100 sq. ft.
0-10	0.4
11-20	0.3
21-30	0.2
31-50	0.1
over 50	0.0

Table 19. Potassium recommendations for vegetable and flower gardens

Potassium (K) Soil Test	Amount of Potash (K_2O) to apply
lb./acre	lb./100 sq. ft.
0-100	0.4
101-200	0.3
201-300	0.2
301-400	0.1
over 400	0.0

Table 20. Organic fertilizer recommendation for vegetable gardens

Rates of organic fertilizer per 10′ x 10′ space	Manure or compost
Soil Test P	10-5-10 per ton
0-20 low	4 bushels
21-40 medium	3
41-60 high	2
over 60 very high	1
Soil Test K	
0-100 low	4 bushels
101-200 medium	3
201-300 high	2
over 300 very high	1

Use phosphorus or potassium table that requires the greatest amount according to your soil test results (look under columns P-Phosphorus and K-Potassium).

TREES, SMALL FRUITS, SHRUBS

For fruit trees, small fruits, broadleaf trees and shrubs, evergreen trees and shrubs, the nitrogen recommendation is 0.20 lb. N/100 sq. ft. Tables 21 and 22 give phosphorus and potassium recommendations.

Apply fertilizer evenly on the ground in the spring before growth starts. For large trees with large canopies, apply the fertilizer uniformly under the canopy. Small fruit crops include strawberries and raspberries. For new fruit plantings, incorporate the fertilizer into the soil prior to planting. For strawberries, sidedress the recommended fertilizer at renovation, immediately after harvest. For raspberries, apply the recommended fertilizer in early spring, before growth starts.

Table 21. Phosphorus recommendations for fruits, trees, and shrubs

Phosphorus (P) Soil Test	Phosphate (P_2O_5) to apply
lb./acre	lb./100 sq. ft.
0-10	0.20
11-20	0.10
21-50	0.05
over 50	0.0

Table 22. Potassium recommendations for fruits, trees, and shrubs

Potassium (K) Soil Test	Potash (K_2O) to apply
lb./acre	lb./100 sq. ft.
0-100	0.20
101-200	0.10
201-300	0.05
over 300	0.0

Laboratory Procedures

Following is a brief description of analytical methods used by the University of Minnesota Soil Testing Laboratory.

SAMPLE PREPARATION

At the laboratory each sample is assigned a number, transferred to a paper bag, and then placed in a metal tray. Every 24th sample is a check sample of known chemical properties.

Samples are dried overnight in a metal cabinet equipped with a heating element and an exhaust fan to remove moisture-laden air. The temperature in the cabinet is regulated so as not to exceed 98° F in order to approximate air-drying conditions. Then, samples are crushed with a mechanical mortar and auger grinder and passed through a 10-mesh sieve.

ANALYTICAL PROCEDURES

Soil pH and Lime Requirement: The pH is determined with a glass electrode pH meter on a 1:1, soil/water, suspension. Samples of mineral soils with pH values of less than 6.0 are saved for the lime requirement test. Ten milliliters of SMP buffer solution are added to each sample (5 grams soil:5 milliliters water). The buffer index of the suspension is determined with a pH meter, after the sample has been stirred intermittently for 20 minutes.

Extractable Phosphorus: The soil phosphorus measured is that which is extracted by a solution consisting of 0.025 *N* HCl and 0.03 *N* NH_4F, commonly referred to as Bray-1 extractant. One gram of soil and 10 milliliters of extractant are shaken for 1 minute. The amount of phosphorus extracted is determined by measuring the intensity of the blue color developed in the extract when treated with ammonium molybdate-hydrochloric acid and amino-naphthol-sulfonic acid solutions. An absorption spectrophotometer is used to measure this color which is converted to pounds per acre of phosphorus (P) on the basis of 2 million pounds of a mineral soil in the surface 6 inches of an acre.

For highly calcareous soils (pH above 7.4) and testing low in extractable phosphorus (less than 11 lb./acre), a 1:50 soil to extracting solution ratio is used.

Exchangeable Potassium: Potassium is extracted from the soil samples with 10 milliliters of normal neutral ammonium acetate mixed with 2 grams of soil. The amount of potassium removed by this reagent in 1 minute is designated as exchangeable potassium and is measured by analyzing the filtered extract on an atomic absorption spectrophotometer set on emission mode. This instrument is calibrated with standard solutions so that a direct reading of potassium (K) in pounds per acre can be made. Table 23 shows the relative levels of extractable phosphorus and exchangeable potassium.

Table 23. Relative levels of phosphorus and potassium

Relative level	Phosphorus	Potassium
	lb./acre	
Low	0-10	0-100
Medium	11-20	101-200
High	21-50	201-300
Very high	over 50	over 300

Texture and Organic Matter: The relative amounts of sand, silt, and clay are estimated by the feel of the soil in a plastic condition. Clay loam, silty clay loam and clay are termed *fine* textured soils. *Medium* textured soils include the loam, silt loam and sandy loam. Loamy sand and sand are *coarse* textured soils. *Organic* soils include peat and muck.

Organic matter (O.M.) is estimated visually by comparing the color of a dry soil sample with a set of standard soils. The classifications used are: "low" for light-colored soils (O.M. less than 3.1 percent), "medium" for soils of intermediate color (O.M. approximately 3.1-4.5 percent), and "high" for dark-colored mineral soils (O.M. more than 4.5 percent). The "very high" category is used for peats and mucks.

Soluble Salts: A saturation extract is prepared by adding a specific amount of demineralized water to the soil sample. After an equilibration time of 2 hours, about 5 milliliters of the saturation extract-filtrate is removed by suction and collected in a plastic tube. The electrical conductivity of the saturation extract is determined with a Solu Bridge and reported as millimhos per centimeter (mmhos/cm) at 25° C. Conductivity values of less than 4 mmhos/cm indicate that no salt problem exists. Moderately and highly saline soils may have soluble salt test readings ranging from 4 to 8, and 8 to 16 mmhos/cm, respectively. Salt tolerance levels of specific garden plants are given in table 24.

Table 24. Relative tolerance of garden plants to salt

Non-tolerant plants 1-3 mmhos/cm	Low-tolerant plants 3-5 mmhos/cm	Moderately tolerant plants 5-8 mmhos/cm
celery	broccoli	asparagus
green bean	cabbage	garden beet
radish	carrot	spinach
raspberry	cauliflower	
strawberry	cucumber	
	lettuce	
	muskmelon	
	onion	
	pea	
	pepper	
	potato	
	sweet corn	

Appendix

Table 25. Materials and amounts required to decrease the soil pH by one (1.0) unit

	Sandy loam	Loam, silt loam	Clay loam or peat
	----------lb./100 sq. ft.----------		
Aluminum sulfate	2.5	5	7
Iron sulfate	2.5	5	7
Sulfur, finely ground	0.5	1	1.5
	----------lb./cubic yard----------		
Aluminum sulfate	1.2	2.5	4
Iron sulfate	1.2	2.5	4
Sulfur, finely ground	0.2	0.5	0.7
	----------ounces/bushel----------		
Aluminum sulfate	1	2	3
Sulfur, finely ground	0.2	0.5	0.7

Because the soil may be alkaline or the water source is high in lime, it may be desirable to prevent iron chlorosis in flowers by lowering the soil pH. Materials suggested to increase soil acidity are given in table 25. The ground sulfur reacts slowly (3 to 6 months). For more rapid pH reduction, the iron sulfate is commonly used.

COMMON CONVERSION FACTORS

1,000 sq. ft. is an area 33 ft. x 30 ft.

100 sq. ft. is an area 10 ft. x 10 ft.

1 pint of dry fertilizer weighs about 1 pound.

1 pint is equal to 2 cups or 32 tablespoons.

0.1 ounce or 2.8 grams of fertilizer per bushel equals about 100 pounds per acre.

1 pound of fertilizer per cubic yard is equal to 800 pounds per acre.

20 bushels of soil mix equals about 1 cubic yard.

1 bushel of manure weighs about 50 pounds.

Computer Soil Sample Information

UNIVERSITY OF MINNESOTA
SOIL TESTING LABORATORY

Leave this space blank

For Lawns, Gardens, Trees, and Shrubs. Send one information sheet with each soil sample

A. General Information (read instructions on back)

Name_____
(please print all information)

Address_____

_____ Zip Code

Date_____

Location: County_____

Fee payment enclosed $_____

Charge fee to account_____
(commercial firms only)

If a commercial firm submitting samples (Garden Center etc.)

Name_____

Address_____

_____ Zip Code

B. Required Information for Recommendations

(do not write in this space)	Sample Identification (use numbers or letters)

Recommendations Requested for (check only one)

New lawn

- ☐ (01) Before seeding or sodding

Existing grass

- ☐ (02) Home lawn
- ☐ (03) Institutional grounds
- ☐ (04) Athletic field
- ☐ (05) Park
- ☐ (06) Cemetery
- ☐ (07) Golf tee
- ☐ (08) Golf fairway
- ☐ (09) Golf green

Gardens

- ☐ (10) Vegetable garden
- ☐ (11) Flower garden

Fruits

- ☐ (12) Tree fruits
- ☐ (13) Small fruits

Trees and shrubs

- ☐ (14) Broadleaf
- ☐ (15) Evergreen

For grass only

Is grass watered regularly?

- ☐ (1) yes
- ☐ (2) no

Clippings removed?

- ☐ (1) yes
- ☐ (2) no

For existing grass
(check only one)

- ☐ (1) Bentgrass
- ☐ (2) Fescue
- ☐ (3) Kentucky bluegrass
- ☐ (4) Merion bluegrass
- ☐ (5) Mixture (for sunny areas)
- ☐ (6) Mixture (for shady areas)
- ☐ (7) Other _____

(V) Check tests requested (see below)

Routine tests	Soluble salts

C. Desired Information: Optional

Indicate special problems

LAWN AND TURF

- ☐ Crab grass
- ☐ Weeds
- ☐ Thatch
- ☐ Shade
- ☐ Other _____
- ☐ Disease
- ☐ Insects

GARDENS, FRUITS, TREES, AND SHRUBS

- ☐ Disease
- ☐ Insects

GARDENS	TREES AND SHRUBS
list flowers, fruits, or vegetables of interest	list species of interest

Publications on some of the above subjects are available. When available, they will be included.

TESTING FEES FOR EACH SAMPLE:

$4.00 Routine tests: (pH, lime, P, K, O.M., texture) used for standard fertilizer and lime recommendations.

$3.00 Soluble salt test: see reverse side for information about this test.

Depth to sample soil:
(1) Existing grass—sample 0-3 inches.
(2) Establishing grass—sample 0-6 inches.
(3) Gardens—sample 0-6 inches.
(4) Trees and shrubs—sample 0-12 inches.

See reverse side of this form for soil sampling information and mailing instructions.

(P-0000)

HOW TO TAKE A SOIL SAMPLE

Soil test results can be no better than the sample. Therefore, proper collection of the soil sample is extremely important.
To obtain a good soil sample, follow the directions below.

WHEN

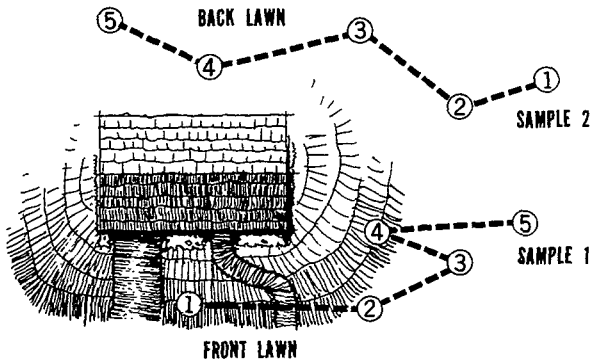
Soil samples may be taken at any time during the year except when the soil is frozen, covered with snow, or soggy wet. Just remember that it usually takes the laboratory 5 to 7 days to process the samples, so allow plenty of time for this.

WHERE

- If the area is fairly level and the soil appears to be uniform, collect a composite (mixed) sample.

- If your lawn or garden has large areas which differ in fertility, take one sample from each area. For example: you may want to sample the front lawn and the back lawn separately (see diagram).

Example of 2 areas to sample if necessary



- Do not include soil from lawn area and a garden in the same composite sample.

- Sample separately or avoid, trouble spots, or small areas, such as: borders, low spots, near trees or buildings, etc.

HOW

- Use a garden trowel, spade, sampling tube or soil auger. Scrape away or discard any surface mat of grass or litter. Sample the lawn and garden area to the sampling depth indicated on the front side of this form.

- Place the soil sample in a clean bucket or pan. Repeat sampling in 5 well-scattered spots within the chosen area. Mix soil well to make a composite sample, send about a pint of the sample to the Soil Testing Laboratory. You can air dry (do not heat) your composite sample, if wet, before placing it in a container for shipment. Sample boxes provided by the Soil Testing Laboratory are free of charge, but clean paper bags, glass jars, ice cream or cottage cheese cartons may be used.

- Label the sample container with your name, address, and sample identification. Fill out the information sheet. Keep a record for yourself of the area represented by the sample.

- **Soluble Salts Test:** This test should be requested:

  1) If "black dirt" has been hauled in and grass or other plants are growing poorly.

  2) If there is possible damage from salt used on streets and sidewalks.

  3) If the grass looks burned even when adequate water is present.

  4) If the soil is poorly drained, i.e., if water remains in low spots for some time after rains.

  5) For golf greens. Since golf greens must be heavily fertilized the salt content should be monitored and taken into consideration when making fertilizer recommendations.

HOW TO SUBMIT SAMPLES

Soil samples can be delivered in person to Room 29, Soil Science Building, University of Minnesota, or mailed by parcel post to:

Soil Testing Laboratory, University of Minnesota
St. Paul, Minnesota 55108

Enclose check or money order payable to the University of Minnesota for all services requested. The sender pays the postage. Please do not send cash. The University of Minnesota will not be responsible for cash sent through the mail.

SOIL TEST REPORT
UNIVERSITY OF MINNESOTA
SOIL TESTING LABORATORY

Soil Science Department
Horticultural Science Department
Agricultural Extension Service
Agricultural Experiment Station
Cooperating

Report NO:

Laboratory NO:

Date Received:

Date Reported:

Soil Test Results

Sample Designation	Soil Texture	Soil pH	Buffer Index	Organic Matter	P Phosphorus (lb/A)	K Potassium (lb/A)	Soluble Salts (mmhos)	

INTERPRETATION OF SOIL TESTS

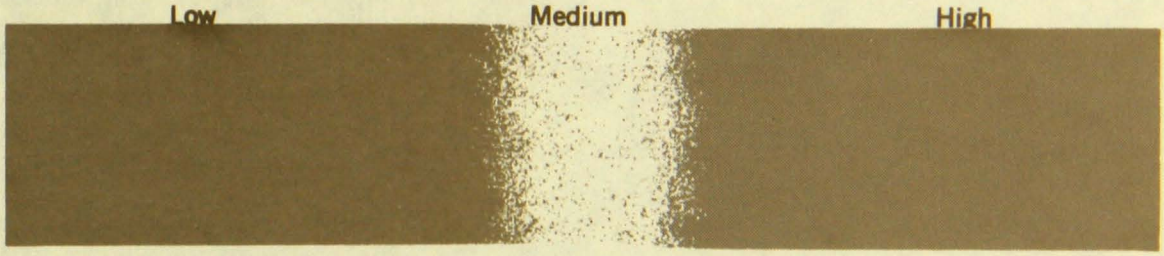
Soil Nutrient Levels:

pH

Phosphorus (P)

Potassium (K)

Soluble Salts



RECOMMENDATIONS

County:

For additional information contact your County Extension Agent:

Receipt: This is to acknowledge receipt of payment in the amount of $

Customer copy

Explanation of Soil Test Report

Soil pH

Soil pH, a measure of acidity, is important because it affects:

1) The availability of **several** plant nutrients,
2) The activity of soil microorganisms,
3) The ability of the soil to hold plant nutrients. The optimum pH for most plants and soil microorganisms is between 6.0 and 7.0. Some plants, however, such as blueberries, azaleas, and others prefer more acidic conditions (i.e., lower pH). Since grasses are quite tolerant to a wide pH range, lime is generally not recommended on established grasses.

Buffer Index

This test is used only to determine the lime requirement and should not be confused with soil pH.

Organic Matter

Organic matter has many important functions in soils, some of which are:

1) To improve soil structure, water infiltration, drainage, and soil aeration on clayey type soils,
2) To act as a reservoir of available plant nutrients,
3) To increase the water holding capacity of sandy soils. Organic matter is a basic property of soils and cannot be readily altered. When organic matter is low, large amounts of peat, compost, crop residues, manure or other organic amendments are required to change the overall organic matter content of the soil.

Soluble Salts

This test is used primarily to check for high amounts of salts in "black" dirt and possible salt damage to grass from salted streets and sidewalks. Excess salt must be leached from the soil by intensive watering before the plants will grow normally.

General Information

For Home Lawns

Follow these rules when applying fertilizer:

1) Use a formula designed for lawns (not for trees, flower beds, or farms).
2) Apply fertilizer during spring and late summer (do not fertilize frozen ground).
3) Use a mechanical spreader for uniform application, and apply the fertilizer in two directions.
4) Sweep up any fertilizer accidentally applied on sidewalks and driveways to prevent its movement to storm sewers, lakes and streams.
5) Water the lawn thoroughly after fertilizing to dissolve the nutrients and force them down to the soil surface to combine with the soil.
6) Never apply more than 1 pound of actual nitrogen per 1,000 square feet at any one time.

For Vegetable and Flower Gardens

Manure, compost, or other forms of organic matter may be added. These amendments provide a good source of trace nutrients as well as improve the soil granulation. Three to five bushels of manure or compost per 100 square feet are recommended.