HOW YOU SHOULD SOIL TEST

Most growers have someone else take soil samples on their land, but you can do it yourself. For directions, see the University of Wisconsin-Extension publication, *Sampling Soils for Testing* (A2100) from your county's Extension office or online at http://learningstore.uwex.edu/Sampling-Soils-for-Testing-P183C43.aspx (the download is free). Routine laboratory analysis of soil samples costs \$7.00 per sample at the University's labs. Whether you or someone else collect and send soil samples to a lab, there are important things to know so you can get the most out of the results.

Fill out the soil information sheet completely. The information you provide to the lab is important in obtaining accurate and reliable fertilizer and lime recommendations. Step-by-step instructions are on the back of the information sheet. The example in this publication provides further explanation and some additional information.

Accurately sample your fields. Soil samples that are not representative of the field will result in inaccurate nutrient and lime recommendations. Generally, one soil sample should be collected per five acres. A less intensive sampling frequency can be used for fields that had very high or excessively high P and K levels when last tested—provided that soil test is no more than four years old (see table below). Each soil sample should be a mixture of at least ten soil cores from within the sampling area. Use a soil probe or auger to sample to the plow depth or at least 6 inches. Be certain to label each sample with your name, field ID, and sample ID notation. Every field should have at least two soil samples. Crop strips should be sampled individually even when they are less than five acres in size unless each strip has the same crop and management history.

| Field Characteristics | Field Size (acres) | Suggested Number of Samples ¹ |
|---|-----------------------|---|
| Responsive fields, <u>or</u> fields tested more than 4 years ago | All fields | 1 per 5 acres |
| Non-responsive ² fields tested within | 5-10 | 2 |
| the past 4 years | 11-25 | 3 |
| ¹ Each sample should contain at least 10 | 26-40 | 4 |
| soil cores. | 41-60 | 5 |
| | 61-80 | 6 |
| ² P and K levels tested very high or excessively high. | 81-100 | 7 |

Avoid fertilizer bands and places in the field that seem very different from the majority of the field when soil sampling.

Use a WDATCP certified soil testing lab. Labs certified by the Wisconsin Dept. of Agriculture, Trade & Consumer Protection use approved analytical techniques and provide University of Wisconsin recommendations that are based on field trial research conducted in Wisconsin. Use of WDATCP certified labs is required if the soil testing is being done for a nutrient management plan that needs to comply with the USDA-NRCS 590 Nutrient Management Standard. A current list of certified soil testing labs is available online at http://uwlab.soils.wisc.edu/madison/.

Make sure you receive the full results. Complete soil test reports include field-by-field information on the analysis results as well as crop specific fertilizer and lime recommendations for a four-year rotation. Some labs may only supply a fertilizer application plan. To get the full value from your soil tests and to use them to evaluate future cropping plans, you should get both the analysis results <u>and</u> the interpretation.

Soil & Plant Analysis Lab 8452 Mineral Point Road Verona, WI 53593 (608) 262-4364

Date Rec'd

Department of Soil Science College of Agricultural and Life Sciences University of Wisconsin-Madison/Extension Soil & Plant Analysis Lab 8396 Yellowstone Drive Marshfield, WI 54449 (715) 387-2523

Soil Information Sheet For Field, Vegetable and Fruit Crops

| Lab No. | (Lab Use Only) | | County | Nashingto | n | FS | A No. | | | Method of Payment | | | | | |
|----------|----------------------------------|--------------------|------------------------------------|----------------|------------|--|-------------------------------------|---------------|-------------|-------------------|----------------------|----------------|---------------------|--------------------------|--------------------------------------|
| | | | Name 1 | The Progre | essive F | ive Farm The "FERTILIZER CREDIT INFORMATION" section important for obtaining accurate recommendation | | | | | | | | | |
| | | | Adda | | | | | | . | | | | | | |
| | | | | 4-YEAR CR | | | • | • • | | | - | • | • | | r soybean wi |
| | | | | en in doubt, o | | | | | | Zip | | | | | next crop. |
| County | Code | | Email add like | ely crop choic | es, so you | get the reco | mmendat | ions for eacl | n. | | | | | | nal N, P ₂ O ₅ |
| TOTAL | NUMBER 1 | 7 | | | | PLOW 1 | 8″ | | Cre | dit Card No | K ₂ 0 fer | tilizer ree | commendati | ions. | |
| OF SAN | | ' | | | | DEPTH } | 0 | | | . Date | / | | VISA_ | M | C |
| | | | | | | 4.1 | | | | | FERTILIZE | | INFORMATI | | |
| | | 7 | | | | 4-YEAR | CROP RO | DIATION | Р | revious Legu | me Crop | Manur | e Applied to | Field Since | Last Crop |
| FIELD | | Check if irrigated | | Acres | | | ioi | | 1 | Legum | | | Anglighting | | Consecutive |
| ID | SAMPLE | i i i | SOIL NAME | in | Slope | Sequence to be Grown | ik if ervat | Yield | Legu Cri | 1.0.090 | | Manure Code | Application Rate | Application Method | Years of Application |
| U | NO (S) | Chec | (if known) | Field | % | (crop code) | Check if Conservation Tillage | Goal | (crop o | | in fall | (see below) | | (circle one) | (circle) |
| | | | | | | 17 | | 160 | | <30 | | | | Surface | 1 |
| 1 | 1-3 | | Sisson | 15 | 1 | 29 | | 3 | | 30-70 | | 1 | 20 | Incorporated | 2 |
| | | | | | | 1 | | 6 | | >70 | | | | Injected | 3+ |
| | | | | | | 17 | | 160 | - | e realistic y | المام | | | Surface | 1 |
| 2 | 4-7 | | Sisson | 20 | 5 | 29 | | 3 | | als. This is i | | 1 | 20 | Incorporated | 2 |
| | | | | | | 1 | | 6 | | getting the | | | | Injected | 3+ |
| | | | | | | | | | | d K recomme | | | | Surface | 1 |
| | | | | | i I - | | | | - 4110 | 30-70 | iluariviis. | | | Incorporated | 2 |
| | Soil nam | ie is i | important to kn | ow because | | | | | _ | >70 | | | | Injected | 3+ |
| | fertilize | r reco | ommendations v | ary with | | A list o | f crop co | des with | | <30 | | | | Surface | 1 |
| | soil type | . One | e way to find so | il type is | | | al units | | | 30-70 | | | | Incorporated | 2 |
| | | | r farm's conser | | | | | k of the soi | | >70 | | | | Injected | 3+ |
| | | | the name of th | | | | | et. In this | | <30 | | | | Surface | 1 |
| | abbrevia | tion (| on each field. If | ' you don't | | | | cates corn | | 30-70 | | | | Incorporated | 2 |
| | | | e abbreviation s | • | | - | | nels/acre, 2 | 9 | >70 | | | | Injected | 3+ |
| | call your | Land | Conservation I | Department | | - | | grain silage, | | <30 | | | | Surface | 1 |
| | | | l Resources Co | • | | | | h alfalfa in | | 30-70 | | | | Incorporated | 2 |
| | Service. | Perce | ent slope should | d also be | | | | indicates | | >70 | | | | Injected | 3+ |
| | | | he conservation | | | | | fa in tons/ | | <30 | | | | Surface | 1 |
| | | - | | · | ļ | acre. | | | | 30-70 | | | | Incorporated | 2 |
| | | | | | | | | | | >70 | | | | Injected | 3+ |
| | | | | | | | | | | <30 | | | | Surface | 1 |
| | | | | | | | | | | 30-70 >70 | | | | Incorporated Injected | 2 3+ |
| | | | | | | | | | | | | | | | 3+ |
| | | In th | is section you | can request or | alveie for | coil nutriant | e heven | | | <30 30-70 | | | | Surface Incorporated | 2 |
| | | | e included with | | • | | • | | | >70 | | | | Injected | 3+ |
| | | | sample(s) and t | | | | o no sp | | | <30 | | | | Surface | 1 |
| | | 3011 | sampio(s) and | | | | | | | 30-70 | | | | Incorporated | 2 |
| | | | | | | | | | | >70 | | | | Injected | 3+ |
| | 1 | 1 | <u> </u> | | | | | | | | | NA | | | 1 |
| | | | | al Soil Te | | | ee) | | | | | - | ure Coo | ie List | |
| | | | (Lis | t field or sa | • | ntification) | | | | | Solid | | Liquid | | |
| | -Magnesium | | | | Zinc | | | | | | 1 Dairy | | 11 Dairy | | |
| Boron | | | | | Sulfate | 1-3 | | | | | 2 Beef | | 12 Veal C | alf | |
| langane | | ام بر ما | ad if i | | Other | | | | | | 3 Swine | | 13 Beef | | |
| | sts recomm | | | | | | | | | | 4 Duck | | 14 Swine, | indoor n | it |
| | orn (field or sw egume forage | | | | | | | | | | 5 Chicke | | 15 Swine | | |
| rowing s | mall grain or se | oybea | ın (with pH>7.0) | | | | | | | | 6 Turkey | | 16 Swine | | |
| rowing p | otato or apple | (with | pH<5.5) Ca/Mg | | | | | | | | 7 Sheep | | 17 Duck | ianow-nuise | siy maaari pit |
| rowing s | | | e crop B, Zn, an nounts of applied | | | | | | | | 8 Horse | | 18 Poultr | v | |
| | | | | | | | | | | | | | $\omega = 0.000$ | | |

Soil Test Results

Using University of Wisconsin Recommendations

Your soil test result report will be a grouping of tables, numbers, and footnotes. At first this may look confusing, but the information can be divided into three main sections: nutrient recommendations, test interpretation, and laboratory analysis. Each section will be explained below. On the following page, actual results are illustrated and discussed. But first, a couple of things about what a soil test actually determines.

A soil test <u>does</u> indicate the plant availability of two important soil nutrients: phosphorus (P) and potassium (K). The result of these analyses is called the soil test level of the nutrients. A routine soil test <u>does not</u> directly indicate the amount of nitrogen (N) in the soil; however, the test does measure soil organic matter. Soil organic matter along with soil type information (texture, yield potential, irrigation), crop to be grown, tillage, and previous crop determine your N fertilizer recommendation.

NUTRIENT RECOMMENDATIONS

The most important information you will use is in this section! The actual amounts of nutrients and lime to apply for your specific crop rotation and yield goals are listed in the last box.

The "Nutrients to Apply" recommendation is your "Crop Nutrient Need" (based on the interpretation of the actual soil test levels) minus the "Fertilizer Credits" (based on information you submitted with your soil test).

TEST INTERPRETATION

This section is a graphic interpretation of your soil test levels. Basically, it tells you where your soil test levels fall on a relative low to high scale for your soil and crops. Your fertilizer recommendations are based on this interpretation.

The last line in this section is the rotation pH. The optimum is the target pH for the most acid-sensitive crop in the rotation. The lime recommendation (located under the "Nutrient Recommendations" section) is based on this interpretation.

LABORATORY ANALYSIS

The actual results of the individual soil samples and the adjusted averages are listed in this section. It is interesting to look at the numbers and see the variation (or lack thereof) among the samples.

NUTRIENT RECOMMENDATIONS

The "Nutrients to Apply" recommendation (right side of the section), is made in pounds of actual nitrogen, phosphate (P₂O₂), and potash (K₂O) per acre. To determine the pounds of fertilizer material to apply, divide the actual pounds needed by the percent contained in the material. (Fertilizer analyses are written as percent of N - P_2O_c - K_2O_c)

In this example, 135 lbs/acre of actual N is recommended for the corn crop at a N:corn price ratio of 0.10. Reducing this recommendation by 60 lbs N/acre to reflect the manure-N credit results in an adjusted N recommendation of 75 lbs N/acre. If using urea (46-0-0) as a fertilizer, divide 75 lbs by 0.46 to get 163 lbs/acre of urea to apply.

The soil tested in this example is excessively high in both phosphorus (P) and potassium (K) relative to the needs of corn and small grain silage/ alfalfa seeding; therefore, no additional P.O. or K.O is recommended for these cropping years. However, the soil test K value relative to established alfalfa is very high and some K₀O (90 lbs/acre) is recommended for this crop. The pH for the whole rotation is adequate; subsequently, no lime is recommended.

Detailed information about nutrient recommendations based on soil test results can be found in the University of Wisconsin-Extension publication, Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin (A2809), which is available from your county's Extension office or online at http://learningstore.uwex.edu/Nutrient-Application-Guidelines-for-Field-Vegetable-and-Fruit-Crops-in-Wisconsin-P185CO.aspx (the download is free).

The "Additional Information" section contains other useful advice about your soil test results.

TEST INTERPRETATION

Soil test interpretations are based on three variables: the actual soil test levels, the crop demand levels, and your soil type. The soil test report considers these variables to set optimum levels for P, K, and soil pH for your specific situation. The interpretation of your soil test levels relative to these optimum values is illustrated in the "Test Interpretation" section of the report.

The interpretations are based on extensive field trials conducted in Wisconsin that determined the response of crops to varying amounts of fertilizer at different soil test levels. The trials have been run at locations with a wide range of soil and climatic conditions. Through these trials, the amount of additional P.O. or K.O needed to maximize economic return at a particular soil test level was measured. At optimum soil test levels, nutrient application recommendations are about equal to the amount of nutrient removed by the harvested portion of the crop.

LABORATORY ANALYSIS

This section shows the individual soil test results of each sample indicated on the soil information sheet you submitted.

In this example, tests for soil pH, organic matter content (%), P, K, and sulfate-sulfur ppm (parts per million) were run and the actual test values are listed. It is interesting to look at the ranges of values within a category. If at least three soil samples are submitted, the "Adjusted Averages" calculation eliminates any extremely high values (i.e. outliers).

Samples Analyzed By:

UW Soil & Plant Analysis Lab 8452 Mineral Point Road Verona, WI 53593 (608) 262-4364

Acres

15

Account No

LAB #:

Washington Date Received

6/26/2007 Slope

1%

Soil Name

Sisson Field Name

Previous Crop

County:

SOIL TEST REPORT

The "Crop Nutrient Need" section is the field's nutrient recommendations based on your soil test results and crop to be grown. These recommendations have NOT been adjusted for any fertilizer credits.

The "Fertilizer Credit" section is based on the numbers entered on your soil test information form. If you didn't put them on the form but do have credits, you can subtract them from the "Crop Nutrient Need" to get the "Nutrients to Apply."

This is the most important information on the entire report!

The "Nutrients to Apply" section tells you the actual pounds per acre of N, P.O. and K.O to apply. This recommendation has been adjusted to reflect any fertilizer credits you indicated.

| 000000 | | | | | <u>v gor no no</u> | | | | 41.7 10 | | 4110 704 | marcaroa |
|-----------------------------|----------------------------|-------------|-----------|------------|--------------------|----------|----------------------------|---------------------------------------|---------|------------|------------------------|----------|
| 000000 | | | NUTRI | IENT RE | COMMENDATIO | ONS | | 7 | | | | |
| Date Processed 6/26/2007 | Cropping Sequence | Yield Goal | Crop N | Nutrient I | Need K_O | Legume N | Fertilizer Cre Manure N | edit P _a O _c | K.0 | Nutri N | ients to Apply P.O. | у К.О |
| Plow Depth | | per acre | | Ibs/a | 2 | lbs/a | | 2 5 | 2 | | bs/a | 2 * |
| 8" | Corn, grain | 151-170 bu | see below | 0 | 0 | 0 | 60 | 60 | 144 | see below | 0 | 0 |
| | Sm grain silage, w/alf sdg | 2-3.5 ton | 20 | 0 | 0 | 0 | 20 | 10 | 115 | 0 | 0 | 0 |
| | Alfalfa, established | 5.6-6.5 ton | 0 | 0 | 90 | 0 | 10 | 5 | 9 | 0 | 0 | 90 |
| | Alfalfa, established | 5.6-6.5 ton | 0 | 0 | 90 | 0 | 0 | 0 | 0 | 0 | 0 | 90 |
| | There is no lime recommen | dation. | 1 | | | | | | | | | |

| SUGGESTED N APPLICATION RATES FOR CORN (GRAIN) AT DIFFERENT N:CORN PRICE RATIOS | | | | | | | | | | | | |
|---|--------------------------------------|---------|-------------------|----------------|-------------------|---------|-------------------|--------|--|--|--|--|
| Previous Crop | | | | N:Corn Price R | atio (\$lb/N:\$ | /bu) | | | | | | |
| | 0. | .05 | 0 | .10 | 0. | 15 | 0.20 | | | | | |
| High / Very High Yield Potential Soils | Rate ¹ | Range | Rate ¹ | Range | Rate ¹ | Range | Rate ¹ | Range | | | | |
| Corn, Forage legumes, Leguminous vegetables, | lb N/a (Total to Apply) ² | | | | | | | | | | | |
| Green manures ³ | 165 | 135-190 | 135 | 120-155 | 120 | 100-135 | 105 | 90-120 | | | | |
| Soybean, Small grains ⁴ | 140 | 110-160 | 115 | 100-130 | 100 | 85-115 | 90 | 70-100 | | | | |
| | | | | | | | | | | | | |

¹Rate is the N rate that provides the maximum return to N (MRTN).Range is the range of profitable N rates that provide an economic return to N within \$1/a of the MRTN.

² These rates are for total N applied including N in starter fertilizer and N used in herbicide applications. ³ Subtract N credits for forage legumes, leguminous vegetables, green manures, and animal manures. This includes 1st, 2nd, and 3rd year credits where applicable. Do not subtract N credits for leguminous vegetables on sand and loamy sand soils.

⁴ Subtract N credits for animal manures and 2nd year forage legumes.

Guidelines for choosing an appropriate N application rate for corn (grain)

1) If there is > 50% residue cover at planting, use the upper end of the range

2) For small grains on medium and fine textured soils, the mid-to-low end of the profitable range is most appropriate.

3) If 100% of the N will come from organic sources, use the top end of the range. In addition, up to 20 lb N/a in starter fertilizer may be applied in this situation.

4) For medium and fine textured soils with: > 10% organic matter, use the low end of the range; < 2% organic matter, use the high end of the range.

5) If there is a likelihood of residual N (carry-over N), then use the low end of the range or use the high end of the range and subtract preplant nitrate test (PPNT) credits.

6) For corn following small grain on medium and fine textured soils, the middle to low end of the range is appropriate. ADDITIONAL INFORMATION

Fertilizer credit based on 1 year(s) of 20 tons/acre of surface dairy manure

Recommended rates are the total amount of nutrients to apply (N-P-K), including starter fertilizer Starter fertilizer (e.g.10+20+20 lbs N+P₂O₆+K₂O/a) is advisable for row crops on soils slow to warm in the spring. Because of excessively high P levels, no P.O. fertilizer or manure is recommended on this field.

If alfalfa will be maintained for more than three years, increase recommended K_2O by 20% each year. N.R. = Not required for calculation of lime requirement when soil pH is 6.6 or higher.

This section will have comments and suggestions for modifying the nutrient recommendations based on crop management practices.

The N recommendations for corn are listed in this section. These rates are

adjusted according to your cost of N fertilizer and your anticipated price for

corn - expressed as one of four N:corn price ratios. Each price ratio suggests

an N rate for maximum economic return and also a range of profitable N rates

that are within \$1.00/acre of the maximum return rate. The guidelines below

the table provide advice for selecting an N rate within the range.

| | | | TEST INTERPRETATION | | | |
|----------------------------|---|-------------|---|------------|-----------|-----------|
| Cropping Sequence | Very Low | Low | Optimum | High | Very High | Excessive |
| Corn, grain | | | PPPPPPPPPPPPPPPPPPPP KKKKKKKKKKKKKKKKK | | | |
| Sm grain silage, w/alf sdg | | | PPPPPPPPPPPPPPPPPPPP KKKKKKKKKKKKKKKKK | | | |
| Alfalfa, established | | | PPPPPPPPPPPPPPPPPPP KKKKKKKKKKKKKKKKKK | | | РРРРРРРР |
| Alfalfa, established | | | PPPPPPPPPPPPPPPPPPP KKKKKKKKKKKKKKKKKK | | | РРРРРРРРР |
| Rotation pH | XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX | XXXXXXXXXXX | xxxxxxxxxxxxxxxxxxxxxxx | XXXXXXXXXX | | |

| LABORATORY ANALYSIS | | | | | | | | | | | | | | | | |
|-------------------------------------|---------------|--------|-------------------|------------------|-------------------------|--|------------------|------------------|--------------|------------------|-------------|-----------------------|------------------------|-----------------|-------------------|--------------|
| Sample Identification | Soil pH | O.M. % | Phosphorus ppm | Potassium ppm | 60-69 Lime Req (T/a) | Calcium ppm | Magnesium ppm | Estimated CEC | Boron ppm | Manganese ppm | Zinc ppm | Sulfate-Sulfur ppm | Sulfur Avail. Index | Texture Code | Sample Density | Buffer pH |
| 1 | 7.6 | 3.2 | 106 | 205 | 0 | | | | | | | 1.0 | 49 | 2 | 1.06 | N.R. |
| 2 | 7.4 | 2.9 | 96 | 195 | 0 | /1.1 | | T | | | | 1.0 | 48 | 2 | 1.04 | N.R. |
| 3 | 7.5 | 2.7 | 102 | 210 | | on't be misled by this section. The micronutrients that are 1.1 48 | | | | | | | | | 1.08 | N.R. |
| Adjuste Average | 101 | 203 | lis | ted are n | iot analyzed | unless you | specify th | at they shoul | d be. | 1.0 | 48 | | | | | |
| | | | | | S | ECONDA | ry and Mici | RONUTRIENT | S RECOMM | IENDATIONS | | | | | | |
| nterpretations Repsonse to sulfu | propertations | | | | | | | | | → | SAI-H | | | | | |

Soil Testing Basics

WHY YOU SHOULD SOIL TEST

Soil testing is an effective method for reliably predicting fertilizer and lime needs before crops are planted. It is a good business practice, one that can provide a high return for the investment of a few dollars per acre.

Soil testing can help Wisconsin farmers increase their profitability by indicating fields where fertilizer or lime applications can improve crop yields. On the other hand, soil testing can also identify fields where soil nutrient levels are already high, so that only minimal amounts of fertilizer, if any, should be applied.

Soil tests provide useful information that can help you determine how to most profitably allocate your fertilizer dollars. Applying fertilizer without soil testing can either lead to excess nutrient applications, which may reduce profits and contribute to water pollution, or inadequate nutrient applications that may reduce potential crop yields.

WHAT A SOIL TEST TELLS YOU

Routine analysis of soil samples includes plant-available phosphorus (P) and potassium (K) levels, organic matter content (%), and soil pH. These analyses are combined with information you provide about your field, your planned crop and yield goals to make crop-specific fertilizer and lime recommendations.

WHEN YOU SHOULD SOIL TEST

Most fields should be sampled every three to four years (every two years for sandy soils). The best time for routine soil sampling is in the fall, in order to get results back in time to plan for the next cropping season. Soil tests can also be taken in the early spring after frost has left the ground. Regardless of when you sample, it is best to be consistent from one year to the next.

Although many people have a few fields sampled every year, there is an advantage to sampling your farm all at once. When you know the fertility status of every field, you can apply fertilizer, manure and lime on the fields where it will do the most good.

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