

# Sampling lawn and garden soils for analysis

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## Why analyze soil?

Soil should be analyzed to determine nutrient levels and fertilizer recommendations, and the presence of elevated lead levels in soil.

Gardening magazines and handbooks and fertilizer product labels make general recommendations for applying fertilizer and other amendments to gardens and lawns. The recommended amounts often are in excess of what is necessary for plant health. Soil nutrient analysis will give you precise scientific information on your soil's ability to supply nutrients to your plants. Since soil analysis is equally useful for telling you what needs to be added and what does not, this knowledge will allow you to develop a tailored plan to maximize potential plant growth and minimize unnecessary costs. You can save money and limit potential water pollution by applying only the nutrients your plants can use.

For people living in housing built prior to 1979 or living near major roadways, soil analysis can also show if yard or garden areas have elevated levels of lead. Lead is naturally occurring in all soils and found at higher levels almost everywhere people live due to its widespread use in paint and gasoline until the early 1980s. Since lead does not move around readily in soil, knowing if parts of your yard or garden have elevated lead levels will help you plan where to garden and how to minimize any possible soil lead exposure to you and your family. UW-Extension publication A4089, *Lead in Home Garden Soil*, discusses soil lead issues more thoroughly, and publication A4088, *Reducing Exposure to Lead in Your Soil*, will help you plan steps to reduce exposure to lead in your soil. Both publications will be helpful if you choose not to analyze for lead, but want to

take precautions. In addition, university or county Extension staff and public health departments can help explain your results.

## What will you get with a soil test?

- Soil nutrient content (organic matter, phosphorous and potassium) and pH
- Recommendation of type and amount of fertilizer to add.

## When to sample?

You can sample the soil anytime as long as it is not frozen. It is recommended to sample in early spring or late fall to assure that you will have the test results before you need to amend your soil. It generally takes two weeks for the laboratory to complete the soil analysis. It is important to avoid sampling soon after applying fertilizer—this would only tell you how much you just added, not what your soil really needs! Soil nutrient levels do not vary wildly from year to year so checking every three to five years is sufficient.

Since soil lead amounts do not change over time, screening only needs to occur once unless large amounts of soil and compost are added. Adding soil or compost will lower the total amount of lead by diluting it.

## Where and How to Sample?

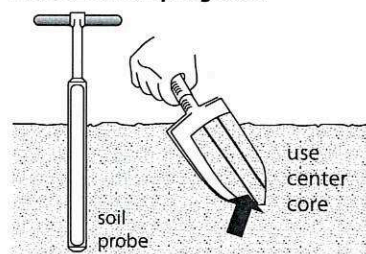
The samples you collect need to be from areas that have been managed similarly in the past or the recommendations will not be correct. In practice this means to sample gardens and lawns separately. If you have lawn areas where the grass grows differently (i.e., front versus back yard) it may be worthwhile to sample each of these areas separately. Soil around homes

can vary. Soil is moved around during construction, and some soil is brought in as fill or topsoil. Because of this, different parts of your yard may have distinct fertilizer needs.

## Established gardens and lawns:

1. From each area to be sampled separately, remove any overlying mulch, compost or sod. Soil samples should be collected from the top 5-7 inches of soil. Collect approximately one cup of soil with a clean trowel or shovel at four random locations and ten random locations if using a soil probe (see Figure 1).
2. Place the four or ten soil samples collected from a distinct sampling area into a clean plastic container and mix those samples together thoroughly. Samples from different areas should not be mixed together. Remember, the sample should only contain soil and no organic matter (you want to test the soil, not the mulch or sod).
3. One cup of soil from each area to be analyzed should be placed in a heavy-duty plastic or soil sample bag for analysis.
4. Label the bag with your name and contact information and send it to a soil lab.
5. Repeat this procedure for each distinct sampling area or your yard or garden.

FIGURE 1. Sampling tools





## New gardens in neighborhoods developed before 1979:

If you live in an area developed before 1979 and are starting a new garden please consult UW-Extension publication A4089, *Lead in Home Garden Soil*, for guidance on garden site selection. Studies have shown that high soil lead levels are frequently found in soil next to painted structures (houses, garages, etc.). It is strongly recommended that gardens not be placed within 20 feet of any painted structure built before 1979. UW-Extension publication A4088, *Reducing Exposure to Lead in Your Soil*, details a variety of options you can take if you prefer not to analyze your soil for lead.

Ideally, at each new garden sampling location, samples should be collected at the surface (removing any surface vegetation) and at a depth of 10 inches. This would reveal the extent of contamination through the root depth of most garden plants. In urban areas, frequent soil relocation through landscaping, repurposing of sites and aerial deposition over time has contributed to lead being found up to two feet below the surface. Surface samples alone are not sufficient to determine if a site can be considered hazard free.

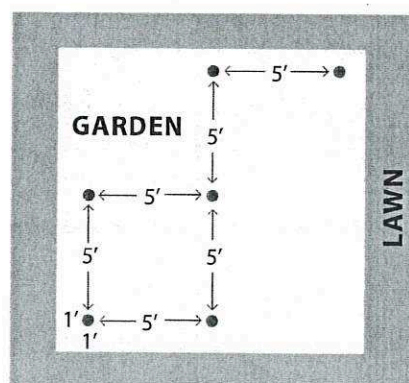
Once you identify where you want to garden;

1. Mark off the borders (using stakes and string for example).
2. Collect samples from a grid of sites starting one foot from the inside corner of your garden and additional samples separated by about five feet in each direction inside the garden (see Figure 2).
3. After removing surface vegetation or mulch, collect about one measuring cup of soil from just below the vegetation layer and from 10" below the soil surface with a clean trowel or shovel. Place each of these samples into individual clean plastic or soil sampling bags.
4. Label the bags so that you know where in your yard they were collected. Then if the lead levels are high in a particular sample, you will know which part of your yard to avoid when building a garden.

## Where can I get my samples analyzed?

Both the University of Wisconsin and Milwaukee Health Department have laboratories available to analyze your soil and will be most convenient for gardeners and homeowners. County Extension offices have contact information for private soil testing laboratories. Outside of Wisconsin, contact your state extension office for a list of labs.

FIGURE 2. Example Garden Site



## Analytical laboratories:

### The University of Wisconsin Soil and Forage Analysis lab

2611 Yellowstone Drive

Marshfield, WI 54449

(715) 387-2523

[uwlab.soils.wisc.edu](http://uwlab.soils.wisc.edu)

Samples sent to the UW lab will be analyzed for soil nutrients. Lead analysis is available at additional cost.

### Milwaukee Health Department Laboratory

841 N. Broadway, Room 205

Milwaukee, WI 53202-3653

(414) 286-3526

[www.milwaukee.gov/healthlab](http://www.milwaukee.gov/healthlab)

Samples sent to the Milwaukee Health Department will be analyzed for both soil nutrients and lead.

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## Sampling Lawn and Garden Soils for Analysis (A2166)

R-7-2015-1000





For Lab Use Only:

Date:

## Lawn and Garden Submission Form

Lab No.:

Customer Information	Payment Information
<b>Please check the box below on how you would like your results sent to you:</b> (Allow 2-3 days extra for US Mail)	
<input type="checkbox"/> Email OR <input type="checkbox"/> US Mail OR <input type="checkbox"/> Both	
Name: _____	Account Number: _____
Address: _____	OR Amount Paid: \$ _____
City: _____ State: _____ Zip: _____	<b>Method of Payment:</b>
Phone: _____	<input type="checkbox"/> Cash
Email: _____	<input type="checkbox"/> Check – Number: _____
	<input type="checkbox"/> Credit card – We will call you for number.

Sample Description:			
Sample No.	Sample Name (so you know where sample was taken from)	County (where your sample was taken) If more than one county – use separate sheet for each county	What are you going to grow in this area? (See Landscape Category below – Only one per sample)*
1	Lawn or garden		
2			
3			
4			
5			

Landscape Category: (Choose Only ONE category per sample)			
Landscape Category	Landscape Category	Landscape Category	Landscape Category
<b>Lawn</b> <ul style="list-style-type: none"> <li>Established L1</li> <li>New from seed L2</li> <li>New from sod L3</li> </ul>	<b>Mixed Beds</b> <ul style="list-style-type: none"> <li>Annual &amp; perennial flowers M1</li> <li>Annual flowers &amp; roses M2</li> <li>Annual &amp; perennial flowers &amp; shrubs M4</li> <li>Perennial flowers &amp; shrubs M3</li> </ul>	<b>Fruits</b> <ul style="list-style-type: none"> <li>Apple F6</li> <li>Apricot F9</li> <li>Blueberry F2</li> <li>Bush fruit (current, gooseberry, elderberry) F5</li> <li>Cherry F8</li> <li>Grape F3</li> <li>Peach F9</li> <li>Pear F7</li> <li>Plum F9</li> <li>Raspberry (red, black purple) F4</li> <li>Strawberry F1</li> </ul>	<b>Shrubs</b> <ul style="list-style-type: none"> <li>Azalea S3</li> <li>Bush fruit (viburnum, juneberry) S1</li> <li>Deciduous S5</li> <li>Evergreen S4</li> <li>Rhododendron S3</li> </ul>
<b>Vegetable Gardens</b> <ul style="list-style-type: none"> <li>Mixed vegetables G1</li> <li>Asparagus G2</li> </ul>	<b>Annual Cover Crops (Green Manure)</b> <ul style="list-style-type: none"> <li>Alfalfa AC2</li> <li>Barley AC1</li> <li>Buckwheat AC1</li> <li>Clover AC3</li> <li>Oat AC1</li> <li>Rye AC1</li> <li>Wheat AC1</li> </ul>		<b>Trees</b> <ul style="list-style-type: none"> <li>Evergreen T3</li> <li>Hardwood flowering T2</li> <li>Hardwood shade T1</li> </ul>
<b>Flower Gardens</b> <ul style="list-style-type: none"> <li>Annual FG1</li> <li>Perennial FG2</li> <li>Prairie FG3</li> </ul>			<b>Topsoil</b> – choose a landscape category that best describes the crop to be grown. (See back for sampling details.)
<b>Permanent Cover Crops</b> <ul style="list-style-type: none"> <li>Native/Bluegrass PC2</li> <li>Prairie PC1</li> <li>Trefoil PC4</li> <li>Vetch PC3</li> </ul>			

\*If no Landscape Category is given, we will assume L1.

Prices listed are per sample bag.

**Routine test includes:** pH, lime requirement, organic matter, phosphorous (P), and potassium (K) (\$15)

**Additional tests:** Calcium and Magnesium (\$3), Soluble salts (\$7), Texture: Percent Sand, Silt, Clay (\$23),  
**Lead screening:** Must fill out separate lead screening submission form (\$15)

**Sample size required for analysis:** 1-2 cups.



## Instructions for Submitting Samples:

**Customer Information** – Print your **name and address** in the space provided. **Check** the appropriate box as to how you wish to receive your results. Your results can be emailed or mailed through U.S. mail. Note that receiving the results by email is the quickest form in which you will receive your results. Please fill in your email if this is how you would prefer to receive your results. Leave blank if you only want the results mailed.

**Payment Information** – Enter your **account number** or the **amount** paid. The cost is **\$15.00 per sample**.

Indicate the **method** of payment (cash, check, or credit card) you are making. **Please make checks payable to: UW Soil Testing Lab**. Include a day-time phone number so we can call you for credit card information.

Your sample will be analyzed for pH, organic matter, available phosphorous (P) and available potassium (K). Based on the results of your test and what you told us you wish to grow in the sample area, we will tell you if you need to add nitrogen (N), phosphorous (P) or potassium (K) to achieve your goal of growing these plants. We will provide you with the pH of your soil and advise you on whether or not you should lime your soil. We will also provide you with the percent of organic matter which is currently in your soil.

Some common additional tests are as follows: lead, soluble salts, or physical analysis. Other tests include the secondary nutrients: calcium, magnesium, or sulfur, or the micronutrients boron, manganese, and zinc.

**Required Sample Size:** 1-2 cups

**Sample Description** – **Name** your sample. In other words, describe your sample or the area in which the sample was taken so you are able to identify which sample corresponds to which results. (This is particularly important if several samples are submitted at the same time). Indicate the **county** in Wisconsin where the sample was taken from (this is important for us to provide recommendations). Choose the appropriate **Landscape Category** from the list which BEST describes the plants to be grown (for example, M4 for a mixed bed of annual and perennial flowers and shrubs). Only **one** landscape category per sample, please. We recommend that you provide us with different samples per landscape category.

**Topsoil Samples** – If sampling from a pile of topsoil, recommendations will be given assuming the entire area will be spread with at least 6 inches of new topsoil. If the entire top 6 inches will not be replaced and the new topsoil will be spread over the existing soil, take the sample after spreading.

**Submitting Samples** – Send your sample by U.S. mail, UPS or other delivery system OR drop your sample off at the address below. Please be sure to include this sheet.

**Soil & Forage Analysis Lab**  
2611 Yellowstone Dr.  
Marshfield WI 54449

**Phone:** (715) 387-2523  
**Hours:** 7:45 to 4:30 Monday – Friday

Results may take 3-7 days from the time we receive your sample for you to receive your results, but this may vary depending on the time of year. If you do not receive your results after 2 weeks, please call. Thank you!



## Understanding Your Soil Analysis

Had your soil tested and are looking at the report—wondering what it means? The report has three sections—recommendations, interpretations and test results. The lime and fertilizer to apply and other management information is listed in the Recommendation section of the report. These recommendations are followed by graphical interpretation of the results of the laboratory analysis in the Test Interpretation section. The actual results of the sample analysis are listed in the Laboratory Analysis section of the report. The tests that are reported include pH, organic matter, plant available phosphorus and plant available potassium. Do not try to build up nitrogen levels in your soil by applying above recommended amounts of nitrogen fertilizer — excess nitrogen may delay crop maturity and can leach beyond the crop root zone to contribute to groundwater problems.

### Soil pH

Soil pH is a measure of soil acidity or alkalinity. Optimum soil pH depends on the plant you are growing. Some soils, especially those of central and northwestern Wisconsin and many coarse-textured soils may test lower in pH. Soils in the southern and eastern region generally have high pH and may contain calcium carbonate. Add lime only if recommended by your soil test report — the amount to add will depend on the pH of your soil and the target pH of the plant you are growing.

Maximum effectiveness of lime applications depends on thorough mixing and repeated tillage. Topdressing or spreading lime on the surface without incorporating is not very effective. Dolomitic limestone also adds magnesium to the soil. One pound of limestone is equivalent to 1 cup. It may take 2 to 3 years for lime to completely react.

Most crops including vegetables and turf are quite tolerant of alkaline soil conditions. However, some specialty crops such as blueberries and azaleas and sensitive ornamentals such as pin oak and roses require acid soil. Most soils will require the application of a sulfur amendment to decrease pH to the required level. Either aluminum sulfate or elemental sulfur can be added to reduce pH. Elemental sulfur should be applied and incorporated to a depth of 6-8 inches well in advance of planting. The pH change will take 2-3 months. Aluminum sulfate reacts much faster with the soil, however about six times more is needed to get the same pH change. One pound of either elemental sulfur or aluminum sulfate is equivalent to 2 cups. If your soil has pH greater than 7.5 you will probably not be able to easily achieve or maintain acid soil conditions with reasonable applications of a sulfur amendment.

### Organic Matter

Soil organic matter consists of plant and animal residues, in various stages of decay, living microbial cells and residues of dead ones and decomposition products of plant and animal residues. Most medium and fine textured soils in Wisconsin have between 2 and 4% organic matter. Sandy soils usually have less than 2%. Adding organic materials such as manure, compost, peat moss or chopped leaves will improve the physical characteristics of soil, such as water holding capacity, drainage, and tilth, but have little influence on the actual amount of organic matter measured by the test. The amount measured is inherent to each different soil and very difficult to change. For every 100 lbs of organic residues added, only 10 lbs will remain at the end of the first growing season as stable organic matter — the other 90 lbs is used as food by microbes and released as carbon dioxide and water.

### Available Phosphorus and Potassium

The interpretation section of the soil test report indicates graphically if there is an adequate or optimum amount of each nutrient, a potential for deficiency or an excess. If quantities are low or optimum, the recommendations section will indicate how much extra phosphate and/or potash fertilizer is needed. If there is excess, no additional phosphate or potash fertilizer will be recommended.

Phosphorus and potassium additions can accumulate in soils. Most home garden and turf soils typically have high to excessive levels of available phosphorus. Excessive phosphorus will not be detrimental to plant growth. However, adding more phosphate either from fertilizer blends or organic sources will not benefit crops and may contribute to environmental degradation. If your soil is high in either phosphorus or potassium, minimize use of 'balanced blend' fertilizers and most organic fertilizers. 'Balanced blend' fertilizers are those with equal amounts of nitrogen, phosphate and potash such as 10-10-10. Most organic fertilizers are 'complete', having nitrogen, phosphate and potash and should also be used sparingly if soil test phosphorus and/or potassium are excessive.

### **Fertilizer Recommendations**

Fertilizer is any material that supplies one or more plant essential elements and traditionally falls into two categories — inorganic or organic. Inorganic fertilizers are chemically much simpler than organic fertilizers and are generally obtained from non-living sources. Organic fertilizers are complex chemical substances containing carbon. Most are naturally occurring or are by-products or manufactured wastes. Inorganic fertilizers such as urea, triple superphosphate, muriate of potash or blends of these are very soluble and dissolve rapidly. Nutrients in organic fertilizers become available slowly because organic compounds must be broken down by soil microorganisms to release nutrients in the inorganic form used by plants. Plants cannot distinguish nor do they discriminate between nutrients provided from inorganic or organic sources.

The grade or analysis of a fertilizer is expressed as a series of numbers and is always printed on the label. For example, 27-3-3 is a common 'regular' or high nitrogen turf blend. The analysis is in units of percent and in the order nitrogen (N), phosphorus expressed as phosphate ( $P_2O_5$ ) and potassium expressed as potash ( $K_2O$ ). One hundred pounds of a 27-3-3 fertilizer blend contains 27 lbs of N, 3 lbs available  $P_2O_5$  and 3 lbs available  $K_2O$ . The other 67 pounds consists of carrier and anticaking agents to minimize water adsorption and evenly-size particles for uniform spreading. About 2 cups of fertilizer is equivalent to 1 pound.

Annual nitrogen applications either from a high nitrogen turf fertilizer or urea will almost always be suggested on the report. Depending on the phosphorus and potassium soil test levels, starter (high phosphate) and/or winterizer (high potash) turf fertilizer blends are "mixed and matched" with the nitrogen application. This allows for gradual buildup of soil test P and/or K to optimum levels or gradual draw down of soil P and/or K if soil test levels are above optimum.