WSU Clark County Extension Master Gardener Soil Test Kit

This kit is designed to provide information on:

- Why soil testing might be a good idea for you.
- Where and how to submit a soil sample.
- Interpreting your soil test results and recommendations.

The kit includes:

- A **submission form**
- A description of **Available Soil Tests**
- **Sampling Guidelines and Mailing Tips**
- A **sample soil test report.** Includes analytical results and interpretive information.

Step 1: Decide if a soil test is likely to be helpful.

You might need a soil test if…

- You are new to the location or new to gardening and/or just want baseline information on your soil.
- You are gardening on new construction.
- You have added a lot of amendments (like lime or sulfur) to your garden or lawn and you don't know the current levels.
- You have been experiencing declining productivity and/or vitality of your plants or lawn over the past few years.

Step 2: If you decide a soil test would be helpful, use the sampling guidelines to collect your soil sample.

Step 3: Complete the submission form, selecting the appropriate test. Submit your sample.

Step 4: Use your soil test results and recommendations to determine how to amend your soil.

Note: Simply Soil Testing's website has a wealth of additional information about soil testing; *http://www.simplysoiltesting.com/index.html*

Soil Testing Laboratories

The labs listed below offer soil testing on the west side of the cascades. If you prefer one of the agriculturally oriented labs, you will find a submission form on their website that you can print. We have offered suggestions below for the tests that you may want to order.

Simply Soil Testing, oriented to testing home garden soils: fruits, vegetables, and lawns. http://www.simplysoiltesting.com/ 20312 Lafayette Rd, Burlington, WA 98233. (360) 202-1086.

Offers "full testing," S5, for $24, including pH, lime requirement, all plant nutrients, soil organic matter, soluble salts and fertilizer recommendations. They make recommendations for how much nitrogen to add based on plants you select. Their recommendations are tailored for specific fruits, vegetables, or lawns. The fertilizer recommendations include both organic and conventional amendments, your choice. If you are not concerned about the micronutrients, a basic soil test plus soil organic matter, S2, is a good option at $16.

A & L Western Agricultural Laboratories oriented to meeting the needs of the agricultural community. http://www.al-labs-west.com/ 10220 SW Nimbus Ave. Bldg., K-9, Portland OR 97223. (503) 968-9225.

Offers a "complete analysis" S3C, with recommendations for $35 (graphical report for $36). That includes all the plant nutrients, soil organic matter, estimated nitrogen release, pH and lime requirement, soluble salts, CEC (cation exchange capacity) and the major cations as a percent of the CEC. They offer fertilizer recommendations based on the crop(s) you specify. They offer a basic soil analysis, S1B, without the micronutrients for $14 with fertilizer recommendations.

A&L Western Agricultural Laboratories tests "nursery and greenhouse media," S7, an useful option if gardening on mixtures that are a high percentage of non-native soil, such as raised bed 3-way, 4-way, or 5-way mix, straw-bale plots, or other mainly non-native soil mixtures. This is $32 but comes without fertilizer recommendations.

KUO Testing Laboratories, Inc, oriented to meeting the needs of the agricultural community. www.kuotestinglabs.com 337 S First Ave., Othello, WA 993344. (509) 488-0112.

Offers options W1 through W7-3 for soils west of the cascades. The complete analysis, W1, for $50, analyzes all of the plant nutrients, both ammonium and nitrate nitrogen, and Ph and lime requirement. If you don't need the micronutrients, W3 for $35, includes pH, SMP Buffer, P, K, Ca, Mg, SO4-S & B.

Soiltest Farm Consultants, Inc. oriented to meeting the needs of the agricultural community. www.soiltestlab.com 2925 Driggs Dr., Moses Lake, WA 98837 (509) 765-1622.

Gardeners west of the cascades can select S-7, "Complete garden analysis," $54, on their Lawn/Garden form under residential. Agricultural soil testing includes S7 West of the Cascades complete test for $54, and the S10 West of the Cascades option for $31, giving you pH, lime requirement, and the major plant nutrients.

Simply Soil Testing
20312 Lafayette Rd, Burlington, WA 98233
Email: service@simplysoiltesting.com
Phone: (360) 202-1086

Soil Sample Submission Sheet

Mailing Address (please print)

Name _____ Phone _____

Address _____

City, State _____ Zip _____

Date _____ Email* _____

☐ Check if you would like organic, rather than conventional fertilizer recommendations.

* In order to expedite reporting of results, please provide an email address. Otherwise, results will be sent by US mail.

Fill in all requested information, using one line per sample and additional sheets for more than 8 samples.

Sample No.	Lab use only	Sample ID	Plant Code (see page 2)	Test ID, S1-M1 (see below)	Fee (see below)
1					
2					
3					
4					
5					
6					
7					
8					

Order Total: _____

Please enclose your check made payable to Simply Soil Testing with your order.

Test ID's (S1 - S5, T1, M1)		Fee
S1	**Basic soil test.** Includes pH, lime requirement, potassium (K), phosphorus (P), calcium (Ca), magnesium (Mg), soluble salts and fertilizer recommendations.	**$12.00**
S2	**Basic soil test with Organic Matter.** Same as the S1, plus a determination and interpretation of the organic matter content in the soil.	**$16.00**
S3	**Basic soil test with Zn, Mn, Cu and Fe.** Same as S1, plus a determination and interpretation of the zinc, manganese, copper and iron content of the soil.	**$16.00**
S4	**Basic soil test with Sulfur and Boron.** Same as S1, plus a determination and interpretation of the sulfur and boron content of the soil.	**$18.00**
S5	**Full Soil Test.** Same as S1, plus a determination and interpretation of the organic matter, S, B, Zn, Mn, Cu and Fe content of the soil.	**$24.00**
T1	**Soil texture.** Percentage of clay, silt, sand and gravel in the soil, and classification of the soil type.	**$12.00**
M1	**Heavy metal testing.** Measures the levels of lead, cadmium and arsenic in the soil, and interprets the results as being safe or possibly unsafe.	**$18.00**

Important Information for Sample Collection and Submission

Make sure that your samples are representative of your yard, garden or field. To do this, take at least 5 samples from the area to be tested and mix them to form a composite. If your garden or field has areas with different soil texture, color or fertilization history, they should be sampled separately.

Collecting Samples:

1. Scrape off surface residue/litter.
2. Sample from the soil surface to the depth of tillage - usually 6-8 inches for cultivated crops and 3 inches for turf.
3. Take a minimum of 5 samples and combine them in a clean container. One common sampling method is to sample in a "W" pattern, with a sample at each point. Mix the soil thoroughly.
4. Place about 1 cup in a plastic bag or other container. Mark the bag with a sample description or ID.

Sending the Samples

1. Enter the sample description that is written on the sample bag in the sample ID column. Use a separate line for each sample.
2. Enter the test ID for the desired test.
3. If you would like lime and fertilizer recommendations, enter a plant code for each sample (see below).
4. Enter the test fee and add up the costs for all samples.
5. Include the submission form and a check payable to "Simply Soil Testing" in the package with your samples. Checks written in any other names will NOT be honored and returned and will cause avoidable delay in processing the samples.
6. Include the completed Soil Submission Sheet and the check or money order in the shipping box with the sample(s).

Test results

1. A soil test report will be emailed / mailed to you within 5 to 10 days after your sample arrives.
2. Although we make a sincere effort to make sure the test results are accurate, the liability of Simply Soil Testing is limited to the cost of the test only.

Plant Codes for Amendment Recommendations

Home Garden / Landscape

01	**Vegetable Garden**
02	**Flowers, Herbs & Rose**
06	**Fruit Tree (established)**
07	**Fruit Tree (new planting)**

Fruit

08	**Blueberries**
09	**Raspberries & blackberries**
10	**Cranberries**
11	**Grapes**
12	**Strawberries**

Turf / Trees

03	**Existing Lawn**
04	**New Lawn (unplanted)**
05	**Nursery (write in tree type on form)**

Field Crops

33	**Alfalfa**
34	**Field Corn**
35	**Hay & Pasture (topdress)**
36	**Oats**
37	**Soybeans**
38	**Wheat**
39	**Legumes**
40	**Hops**

Vegetables

13	**Asparagus**
14	**Beets, Swiss Chard**
15	**Cauliflower, Cabbage**
16	**Carrots, Parsnip**
17	**Celery**
18	**Eggplant**
19	**Gourds (ornamental)**
20	**Lettuce, Endive, Escarole**
21	**Melons, Cucumbers**
22	**Onions, Leeks**
23	**Peas**
24	**Peppers**
25	**Potatoes**
26	**Pumpkins, Squash**
27	**Radishes**
28	**Rutabagas, Turnips**
29	**Snap Beans**
30	**Sweet Corn**
31	**Spinach**
32	**Tomatoes**

99	**Other (write on form)**

Available Soil Tests

Test ID	Parameters Tested	Additional Test Information	Fee
S1	**Basic Soil Test** • pH • lime requirement • potassium (K) • phosphorus (P) • calcium (Ca) • magnesium (Mg) • soluble salts • fertilizer recommendation	The basic test measures the four major macronutrients necessary for plant growth (K, P, Ca, Mg), as well as, pH and lime requirements. Nitrogen is not tested since the available nitrogen fluctuates rapidly due to many factors, and the nitrogen level at a specific point in time is not indicative of the soil's general nitrogen status. Soil pH is one of the most important factors affecting plant growth. If the soil pH is too low (acidic), the test report will show that amount of lime needed to raise the pH to the optimal range.	$12.00
S2	**Basic Test plus Organic Matter** • All basic tests (S1) • Organic Matter	Soil organic matter serves as a reservoir for nutrients and water. Organic matter contributes to the cation exchange capacity of the soil, thus reducing leaching of potassium and other nutrients. When organic matter decomposes, it slowly releases nitrogen and other nutrients. It also improves water infiltration into the soil. If you have been adding organic matter, or are considering doing so, this test will tell you the current organic matter level.	$16.00
S3	**Basic Test plus Micro-nutrients** • All basic tests (S1) • Iron (Fe) • Manganese (Mn) • Zinc (Zn) • Copper (Cu)	Althogh metallic micronutrient are required by plants in miniscule amounts, they are essential for plant health. Deficiencies are less common than other nutrient deficiencies, and are generally limited to particular geographical regions. Testing is usually only advised for soil in such areas. Fertilizing with micronutrient is usually inexpensive, so sometimes micronutrients are added just for "insurance" sake. However, this can be risky, since some micronutrients, such as manganese, can be toxic in excess.	$16.00
S4	**Basic Test plus Sulfur and Boron** • All basic tests (S1) • Sulfur (S) • Boron (B)	Plant-available sulfur is in the form of sulfate. Sulfate is not readily held by soil particles, so in most soils it can be readily leached below the root zone. Acidic soil in areas with high rainfall can become deficient in sulfate. Organic matter contains sulfur, which is released as sulfate as the organic matter decays. Deficiencies are more likely to occur in the spring when the rainfall is high, and soil temperature is low, thus reducing release of sulfate from organic matter. Most of the available boron in soils is found in the organic matter. Sandy soils that are well drained are most likely to be B deficient in high rainfall situations because of their greater leaching potential. Boron can be toxic in excess, and levels should not exceed a few parts per million.	$18.00
S5	**Full Testing** • All basic tests (S1) • Organic Matter • Metals Fe, Mn, Zn and Cu • Sulfur and Boron	See above information for tests S1 through S4. If this is the first time you are testing your soil, this test will establish a baseline and an overview regarding potential problem areas.	$24.00
T1	**Soil Texture** • % clay, silt, sand and gravel • Classification of the soil type.	Soil texture influences nutrient retention - a finer textured soil has a greater ability to store nutrients. Soil texture also influences the water holding capacity of the soil, and the water infiltration and drainage characteristics of the soil. Excessively sandy or clayey soils can pose problems depending on the crop. Soil texture can be modified through the addition of amendments such as organic matter, vermiculite, sand or clay. But depending on the size of the area under cultivation, the cost of modifying soil texture may be prohibitive.	$12.00
T1	**Heavy Metal Screening** • Level of extractable lead. • Level of extractable cadmium. • Level of extractable arsenic. • Interpretation of results.	Mining, metal smelting, manufacturing, and the use of synthetic products (e.g. pesticides, lead paints and pressure-treated wood) can result in heavy metal contamination of urban and agricultural soils. Although such products and industrial processes have been phased out over time, the toxic residues can remain in the soil for decades. This test measures the levels of lead, cadmium and arsenic in the soil, and determines whether the levels are in excess of what would be expected in native soil. If heavy metals are found in the soil at possibly unsafe levels, we will recommend that you have your soil tested by an accredited environmental laboratory.	$18.00

Sampling Guidelines

One of the keys to getting accurate test results is proper sampling. Soil composition can vary from one spot to another in areas that look uniform. This may be due to uneven application of ferilizer in previous years, or simply due to natural variations. Make sure that your samples are representative of your yard, garden or field. To do this, take at least 5 samples from the area to be tested and mix them to form a composite. If your garden or field has areas with different soil texture, color or fertilization history, they should be sampled separately.

1. Scrape off surface residue/litter.

2. Sample from the soil surface to the depth of tillage - usually 6-8 inches for cultivated crops and 3 inches for turf.

3. Take a minimum of 5 samples and combine them in a clean container. One common sampling method is to sample in a "W" pattern, with a sample at each point. Mix the soil thoroughly.

4. Place about 1 cup in a plastic bag (such as a zip-top sandwich bad) or other container. Mark the bag with a sample description or ID.

Mailing Tips

You may consider using flat-rate mailers from the post office. The small box will hold about 4 one-cup soil samples, and costs $6.10 to ship using priority mail. The medium box will hold about 25 samples, and costs $11.95 to send.

For local customers, there is a drop box by the side door.

Mail samples together with submission form and payment to:

Simply Soil Testing
20312 Lafayette Rd
Burlington, WA 98233

 service@simplysoiltesting.com (360) 202-1086

Sample Soil Test Report

The report shows the levels of macro-nutrients, phosphorus and potassium (in ppm). Nitrogen levels are not customarily tested.

The secondary nutrients, calcium, magnesium and sulfur are often deficient in NW soils, and are not included in conventional fertilizer blends.

Organic matter improves the texture of garden soil and serves as a reservoir for many nutrients.

This graph shows the current soil pH and whether it is within the optimal range for your garden, orchard or lawn.

This section shows which nutrients are deficient and how much of each nutrient is needed to achieve recommended levels.

Recommended addition rates of various conventional or organic fertilizers (your choice) in pounds per 1000 sq ft.

Analytical Results — ***Sample: 'Veggie Garden'*** — **Simply Soil Testing**

Customer:	Joe Customer 1432 E Jameson St Seattle, WA 98199	Date received: Report date: Sample reference # Plant code: Tests requested:	01/04/14 01/07/14 00273 01 - Vegetable Garden Basic, OrgM, B, S, Zn, Mn, Cu, Fe

Customer's description of the location where the soil sample was taken.

The plant or crop that the customer has indicated will be planted. The fertilizer and lime recommendations are tailored to the selected plants.

RESULTS / **INTERPRETATION**

Nutrient	Level	Low	Medium	High	V High	Result
Phos. (Bray-P1)	52 ppm					High
Potassium (K)	141 ppm					Medium
Calcium (Ca)	1057 ppm					Medium
Magnesium (Mg)	412 ppm					Very High
Boron (B)	0.99 ppm					High
Sulfur (S as SO4)	5.4 ppm					Medium
Organic Matter	16.5 %					Very High
Soluble Salts	0.1 mS/cm					Satisfactory

The bar graphs show, at a glance, whether the soil nutrient levels are adequate.

Micronutrients		Critical Range	Result
Zinc	14.9 ppm	0.5 - 1.0 ppm	Very High
Manganese	4.2 ppm	0.7 - 1.4 ppm	Very High
Copper	0.7 ppm	0.4 - 0.7 ppm	High
Iron	105.5 ppm	2.5 - 5.0 ppm	Very High

The micro-nutrients are less often deficient. Deficiencies are usually only observed in particular geographical regions.

pH and Lime Requirements

Current pH = 5.35 (too acidic)

Optimal pH range: 6 - 7

Lime Recommendation

36 lbs / 1000 sq ft (0.8 tons / acre)

Mix the above quantity of ag lime with the top 8 inches of soil. See next page for more details.

If the soil pH is below what is recommended for your plants, this section will show the recommended amount of lime to add.

Fertilizer Recommendations

Nutrient	Weight / 1000 sq ft	Nutrient	Weight / 1000 sq ft
Nitrogen	2.0 lbs (85 lbs/acre)	Boron (B)	none required
P (as phosphate)	none required	Sulfur (S)	8 oz (2.5 lbs as gypsum)
K (as potash)	2.1 lbs	Iron (Fe)	none required
Calcium	24 lbs (60 lbs as CaCO3)	Manganese (Mn)	none required
Magnesium	none required	Copper (Cu)	none required
		Zinc (Zn)	none required

N-P-K Fertilizer Options

N, P and K are recommended in the proportions 19:0:20. There aren't any organic fertilizers with this specific proportion of nutrients, so nitrogen and potassium should be applied individually. Below is a list of some organic fertilizer options, along with the quantity needed:

Nitrogen:	Blood meal - 16 lbs/1000sf, or Milorganite - 33 lbs/1000sf, or Urea - 4.2 lbs/1000sf or Organic manure - 49 lbs/1000sf
Potassium:	Greensand - 30 lbs/1000sf, or Potassium chloride - 3.5 lbs/1000sf or Potassium sulfate - 4.2 lbs/1000sf

Pages 2 and 3 provide additional details and explanations concerning the test results for your soil.

Test Interpretation	*Sample: 'Veggie Garden'*	Simply Soil Testing

Definitions

The nutrient levels in the soil are classified into four categories: low, medium, high and very high.

Low: This means that the nutrient is definitely deficient.

Medium: (also called the "Critical Range") – The nutrient may or may not be deficient depending on various factors. There is also some disagreement among scientists concerning the minimum nutrient levels required by different plants.

High / Very High: The nutrient is definitely present in sufficient quantities. If the nutrient level is "Very High", then there is probably enough of the nutrient already in the soil to last a few years.

Specific nutrient level interpretations

Phosphorus The phosphorus level in the soil is sufficient (currently 52 ppm).

Potassium Additional potassium is recommended (currently 141 ppm). See the fertilizer recommendations section on the first page for suggested application rates.

Nitrogen Nitrogen is very mobile in the soil and is readily leached out by rainwater. Nitrogen levels are generally not tested, since they tend to fluctuate rapidly and test results are not very meaningful. Nitrogen requirements are estimated based on specific plant requirements and other factors such as release of nitrogen due to the breakdown of organic matter in the soil. Nitrogen is generally applied every year, once in the spring, and sometimes again in mid season when growth rates are high. High levels of organic matter reduce the need for nitrogen fertilizers.

Calcium Additional calcium is recommended (currently 1057 ppm). Since your soil will require lime in order to raise the pH, the added lime will supply a sufficient amount of calcium to correct the deficiency.

Magnesium The magnesium level in the soil is sufficient (currently 412 ppm).

Boron The boron level in the soil is sufficient (currently 0.99 ppm).

Sulfur The sulfur level in the soil may be insufficient (currently 5.4 ppm). As with nitrogen,sulfur levels in soil can fluctuate rapidly which makes test interpretation difficult. Rain can leach sulfur from surface soil, and carry it to the sub-soil where it accumulates. Plants with shallow roots are more likely to be affected. Epsom salt or gypsum can be added to the soil to correct a deficiency. Spread about 4 lbs of Epsom salt or 2.5 lbs of gypsum over 1000 square feet.

Organic Matter The organic matter level in the soil is very high (16.5 %). Organic matter is beneficial for holding moisture and nutrients. Organic matter gradually releases many nutrients into the soil as it decomposes, including nitrogen.

Micronutrients Sufficient: zinc (14.9 ppm), manganese (4.2 ppm), copper (0.7 ppm), iron (105.5 ppm)
Deficient: none

pH and Lime The soil is too acidic (pH = 5.35) for a vegetable garden. The amount of lime required to raise the pH depends on the depth of tillage and the type of lime used. The below recommendations are based on lime with a CCE (calcium carbonate equivalent) of 100%.

If using lime with a CCE of 75%, increase amounts by 33%. For surface application, such as for existing lawns or trees, do not apply more than 50 lbs / 1000 sq ft at one time.

Tillage Depth	lbs / 1000 sq ft
Surface	9 - 12
6 inches	27
8 inches	36

Added lime per cubic foot of soil: 0.9 oz

Soluble Salts

The amount of soluble salt is acceptable (0.1 mS/cm). Generally, the lower the soluble salt, the better.

Summary

The following soil test results are satisfactory

Phosphorus	Magnesium	Boron
Iron	Manganese	Copper
Zinc	Soluble salts	

The following soil amendments are recommended

1. Choose from the NPK fertilizers options from the first page, or equivalents. Nitrogen should be applied annually. The soil contains sufficient phosphorus for the coming year.
2. Apply lime to raise the soil pH to the 6.0 - 7.0 range. See the table above for the amount of lime to add.
3. Additional calcium is recommended. Since your soil will require lime in order to raise the pH, the added lime will supply a sufficient amount of calcium to correct the deficiency.
4. A sulfur-containing amendment such as Epsom salts or gypsum (see above).