Environmental Measurement USA
PO Box 1324 (Mailing)
2880 HWY 93 N (Physical)
VICTOR, MT 59875

EMUSA

Phone/Fax: 406-642-3526
Email: d.irwin@mac.com

SOIL ANALYTICAL REPORT

April 6, 2009 SAMPLE ID#: E1324

Colleen Miller
825 Foxy Lane
Stevensville, MY 59875, cmiller@cybernet1.com

Soil pH: - This soil sample is 6.6 (7.0 is neutral). The pH scale is logarithmic. Acid values of 0.0 to 7.0 are acid and values from 7.0 to 14 are alkaline. A pH of 6 is a suggested minimum, 6.5 – 7.2 is optimal and 8.0 is maximum. Your sample is slightly acidic but within the suggested range for most garden plants. Some plants benefit from acid soils, raspberries for example.

Soil texture for this sample was as follows:
Sand: 50%
Silt: 45%
Clay: 5%
Interpretation: Sandy soil is described as soil material that contains 85% or more sand. Silt soil is described as soil material that contains 80% or more silt and less than 12% clay. Clay soil is described as soil material that contains 40% or more clay, less than 45% sand and less than 40% silt.

Soil texture is classified as clay, sandy clay, silty clay, sandy clay loam, clay loam, silty clay loam, sandy loam, loam, silt loam, loamy sand, sand, silt loam or silt.
Your sample is: Loam

Nitrate Nitrogen (NO_3-N): 477 parts per million (ppm) or 954 lbs/acre.
Interpretation: Nitrate Nitrogen is the available nitrogen for your soil. 1ppm or 2 lbs/acre is minimal, 30 – 100 ppm or 60 – 200 lbs/acre is optimal and 236 ppm or 472 lbs/acre is very high. Sand content at very high levels tends to inhibit N retention in soil. N is a component of chlorophyll in plants. N promotes succulence in forage crops and leafy vegetables. It also stimulates the utilization of phosphorous, potassium and other essential nutrient elements. Above ground growth of plants is enhanced by nitrogen. N hastens crop maturity (unless excessive rates have been applied). N is very influential in fruit sizing. The Nitrogen content of your soil is very high. No amendments containing significant amounts of available Nitrogen should be added this season.

Phosphorus (P) in the form of orthophosphate: 192 ppm or 384 lbs/acre.
Interpretation: Phosphorus helps keep plants hardy. P encourages root development and hastens the maturity of plants. It is known to increase crop yield, and to play a part in the palatability of plants. It stimulates the formation of fats, convertible starches and healthy seed. It increases resistance to disease. An excess of P does not cause the harmful effect of excessive nitrogen and has an important balancing effect on the plant. 0.2 ppm or 0.4 lbs/acre

is minimal, 40 – 90 ppm or 80 – 180 lbs/acre is optimal and 196 ppm or 392 lbs/acre is very high. Available Phosphorus (Orthophosphate) in your soil is Abundant.

Potassium (K): 770 ppm or 1540 lbs/acre
Interpretation: Potassium enhances disease resistance by strengthening stalks and stems, activates various enzyme systems, contributes to a thicker cuticle (waxy layer), helps to prevent wilting, enhances fruit size, flavor, texture and development. It is involved in the production of amino acids, chlorophyll formation, starch formation and sugar transport. When testing for K, very high concentrations of calcium and magnesium can act as an interference of actual potassium values (false high values). Potassium levels of 52 ppm or 104 lbs/acre are minimal, 250 - 500 ppm or 500 – 1,000 lbs/acre is optimal and 2,820 ppm or 5,640 lbs/acre is very high. Potassium levels are good.

Calcium (Ca): 640 ppm or 1280 lbs/acre.
Interpretation: The amount of total calcium in soils may range from as little a 0.1% to as much as 25%. It is generally assumed that if the soil pH is maintained within the proper range for the plants being grown, there will be sufficient Ca to meet most crop requirements for this essential element. Ca is a component of cell walls in plants and is known to stimulate root and leaf development as well as activate several enzyme reactions involved in plant metabolism. Indirectly, Ca also contributes to reducing soil acidity, and reducing toxicity of several other soil minerals such as manganese, zinc and aluminum. Calcium levels of 1161 ppm or 2322 are minimal, 1,500 - 2,000 ppm or 3,000 – 4,000 lbs/acre are optimal and 2,666 ppm or 5,332 lbs/acre are very high. Your soil is relatively young, granitic soil. Older limestone has been removed via glaciation. Adding calcium amendments that also contain magnesium will benefit your garden and also increase the soil pH.

Magnesium (Mg): 93 ppm or 186 lbs/acre.
Interpretation: Magnesium is an important plant food for stimulating the assimilation of phosphorous. Magnesium soil chemistry is quite complex and generalizations are difficult to make. 70 ppm or 140 lbs/acre is minimal, 200 - 450 ppm or 400 – 900 lbs/acre is optimal, and 696 ppm or 1,392 lbs/acre is very high.

Low Calcium & Magnesium levels in soils are unlikely in most of the West but are common in much of western Montana. Ca and Mg deficiencies may occur in acid sandy soils. Soil tests less than 100 ppm Mg are generally considered low. If Ca & Mg deficiencies are known or suspected on acid soils, the use of dolomitic limestone is the best long range approach. Apply low rates (approximately 1000 lb/A) if maintenance of soil acidity is desired. If Mg is adequate or abundant but Ca is low, Calcitic Limestone may be preferred.

Percent Organic Matter: Not Tested but is generally low in western Montana.

Humus: 5 On a scale of 1 - 5 (Refer to Table)

Humus Reading	1	2	3	4	5
Ag Soils	Low	Medium	High		
Garden/Greenhouse Soils		Low	Medium	High	

Humus Reading	1	2	3	4	5
Organic Soils			Low	Medium	High

Humus is thoroughly decayed organic matter. Added to lawns, gardens or beds, it will increase a soil's water-holding capacity, improve aeration and support beneficial microbial life in the soil. Addition of organic material including manure is recommended for soils with low OM. Your soil is VERY well supplied with immediately available organic matter (humus).

Soil color is best determined in the field. In general, black colors indicate organic matter (Carbon), reddish-yellowish brown colors indicate iron oxides and well-drained conditions, and blotchy color patterns are caused by saturation and reduction by a water table.

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Note on parts per million to pounds per acre conversion: 1 ppm = 2 lbs per acre if you consider the top 6 2/3rds of soil in your analysis. This is based on the assumption that one acre of a loamy soil 6 2/3rds inches deep weighs 2 million pounds. This does not take into account the density of the soil (for example, mineral soil like sand is denser than organic soil like silt). Conversions from ppm to lbs/acre are generalized.

Acres to square feet conversion: One acre = 43,560 square feet. Ex: If you have a garden measuring 35 ft x 40 ft, you have 1,400 sq feet. 1,400 sq ft divided by 43,560 = .032 acre.

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This report has been generated to provide you with an indication of the soil structure, pH and essential nutrient levels of your soil. Individual soil amendments may be purchased at a well-equipped garden or farm supply center, or premixed fertilizer blends may be purchased. If you are in need of soil amendments, we suggest that you take this report with you to a garden or farm supply center.

SUMMARY: Your soil sample indicates you have added organic material and likely other amendments to improve its quality. The sample was significantly better quality than most samples I test in the valley. I am certain your efforts will pay off this growing season. The only deficiency noted was calcium and magnesium. If available, dolomitic limestone is recommended to increase the cell wall strength of your plants.

During the sieving process and also during extraction for a liquid testing solution, I observed that you have quite a bit of organic matter in your soil. Good work! This will pay off for seasons

to come. You stated that one of the amendments you added was wood ashes. It is suggested in the literature that wood ashes must be applied with caution. It is easy to add to much.

Thank you for doing business with EMUSA!
David Irwin, Owner, Environmental Measurement USA