SoilHealth.ca

Soil Health Report

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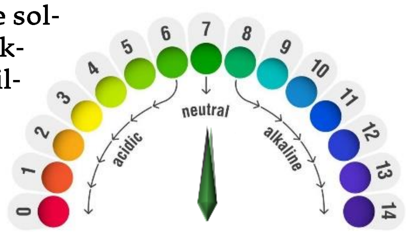
Sample ID: 01538
Test Date: 06-11-2021

1 Soil pH (pH)

pH is used to measure the acidity (below 7) or alkalinity (above 7) of soil with 7 being neutral. When soil pH changes, it can impact the solubility of nutrients by making them either more available or inaccessible. Generally, as pH decreases the solubility of metals in soil increases.



pH:	7.1	High (Good)

Buffer pH: (only if pH ≤6.5)	≠

2 Soil Texture (ST)

ST classes are used to describe the particle size distribution of soil and is graphed as a breakdown of the percentage of sand, silt, and clay. ST is not a soil property that can easily be changed and it has a broad effect on many soil characteristics, most notably influencing water storage and nutrient availability.

Class:	Silt Loam

Sand:	15.0%	**Silt:**	70.0%	**Clay:**	15.0%

3 Soil Organic Matter (SOM)

Soil is mostly made up of minerals, with air and water occupying pore spaces. SOM is a small portion of the whole mixure. Its quantity is always changing in soil ecosystems, and it plays a major role in nearly all biological, chemical, and physical properties of soil.

SOM:	4.3%	High (Good)

4 Active Carbon (AC) and Soil Microbial Respiration (SMR)

AC is strongly linked to nutrient cycling. It's a tiny fraction of the SOM that can be easily used by soil bacteria as food and energy. When a plentiful source of food is available, the soil food web is encouraged, and the overall biodiversity of living soil microbes increases.

Soil microbes scouring for food and hiding from predators use energy that is created by their metabolic activities. A by-product of making energy is gaseous wastes, which we measure as SMR. Higher rates of SMR usually correspond with a larger soil microbe community that is actively involved in nutrient cycling and breaking down organic matter. Both AC and SMR are measured as parts per million (ppm).

AC:	123 ppm	High (Good)
SMR:	917 ppm	High (Good)

5 Electrical Conductivity (EC)

Measuring the EC of soil is an indirect measure of its salt content. High salt levels may interfere with root growth, so low levels are generally desirable. EC is expressed as millisiemens per centimeter (ms/cm).

EC:	0.55 ms/cm	Low (Good)

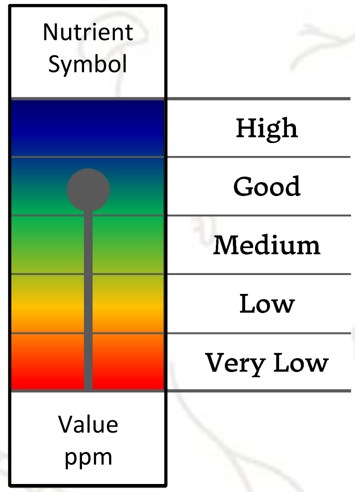
6 Essential Plant Nutrients

Plants are able to extract carbon, hydrogen, and oxygen from air and water, but the major source of the essential nutrients that they need for basic life processes comes from the soil. Plants use nutrients in very different amounts and for very different purposes, but they all play a part in vital roles, such as: strengthening stem and leaf structures; transporting energy and organic compounds throughout the plant; generating root secretions (called exudates) used to nourish beneficial soil microbes; and many more functions. Plants will respond to nutrient deficiencies in many different ways but an imbalance will usually negatively impact their growth and yield.

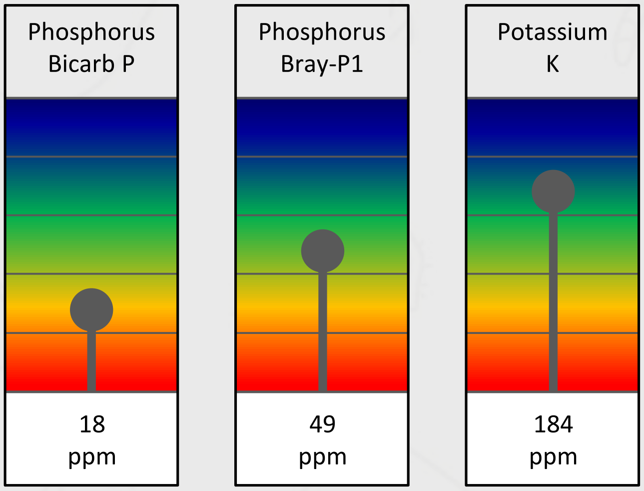
We have grouped nutrients as primary (i.e., macronutrients), secondary nutrients, and micronutrients (which also include some additional trace elements). The order matches the quantities of the nutrients needed by most plants – primary nutrients are taken-up by plants in very large quantities compared to their much smaller uptake of other nutrients.

We've provided you with an example (see right) to help you better understand your values and what they mean. The shaded background matches the legend shown on the right side of the example, which corresponds to the quantity of the nutrient determined in the sample. The height of the central gray bar represents the actual test result, and the value is presented at the bottom of the chart in ppm. Want to know more about how all these different nutrients are used by plants? Visit our [website].

Example:



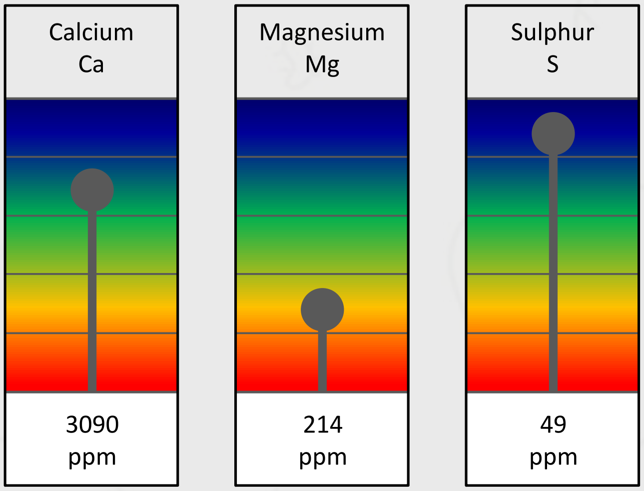
Primary Nutrients (Macronutrients)



P is needed by plants in very large quantities because it supports energy storage and transfer and is linked to the vital function of taking-up nutrients from the soil. It is also an essential part of DNA, RNA, and cellular membranes. Root growth is encouraged by P, especially lateral roots and small, fibrous rootlets that increase the surface area where chemical reactions occur.

K is unique because it supports numerous functions for plants but isn't actually incorporated into parts of organic compounds. Instead, K remains fully suspended inside the cellular solution where it is responsible for activating certain enzymes. Sufficient K nutrition enhances the colour and flavour of vegetables and fruits.

Secondary Nutrients

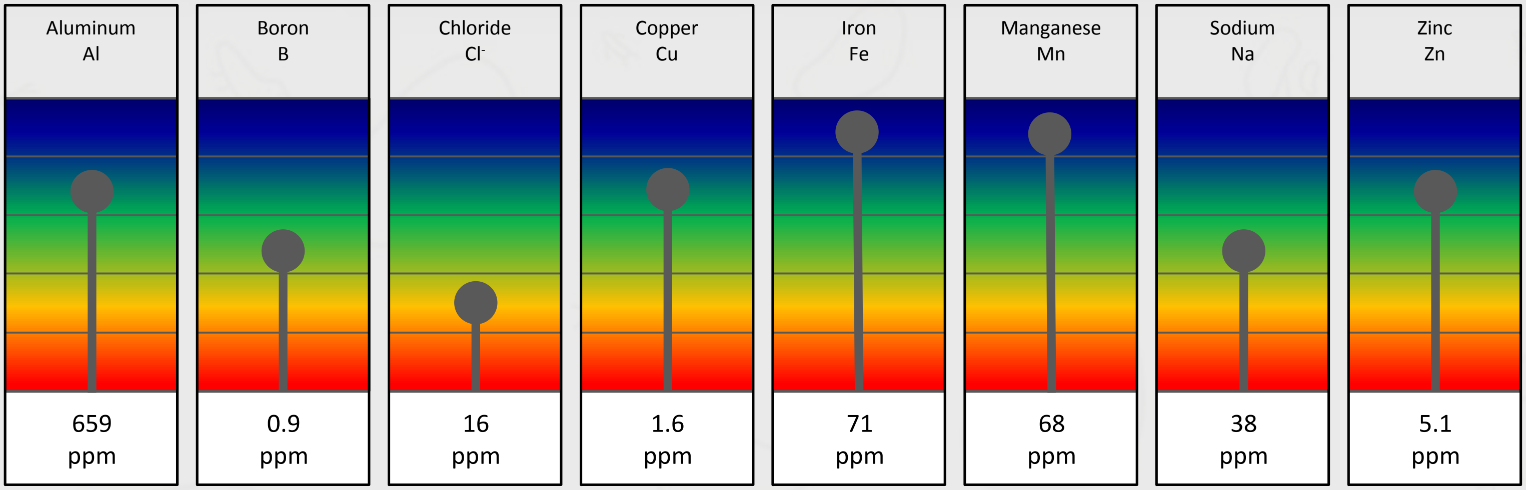


Ca is used in large quantities to help plants tolerate wide ranges in environmental stressors, such as big changes in temperature and drought periods. It plays a role in maintaining and repairing biomembranes and enhancing disease resistance.

Mg is central to the making of chlorophyll so it is strongly linked to photosynthesis. Some research shows that when Mg is adequately available, it promotes the uptake and transport of other nutrients like P.

S plays a primary role in the making of amino acids that are integral for making chlorophyll, proteins, and vitamins. It aids with the development of seeds, supports nitrogen fixation in legumes, and gives garlic and onions their distinctive odour.

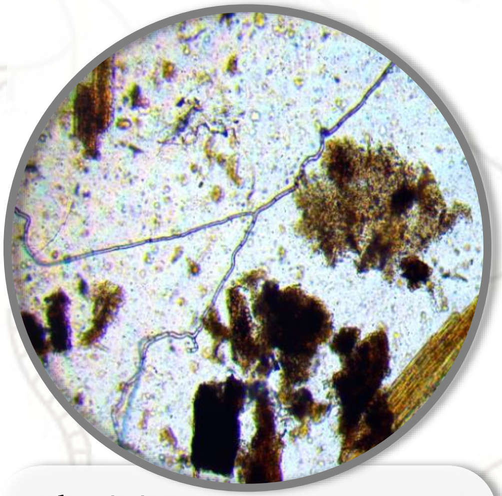
Micronutrients and Trace Elements



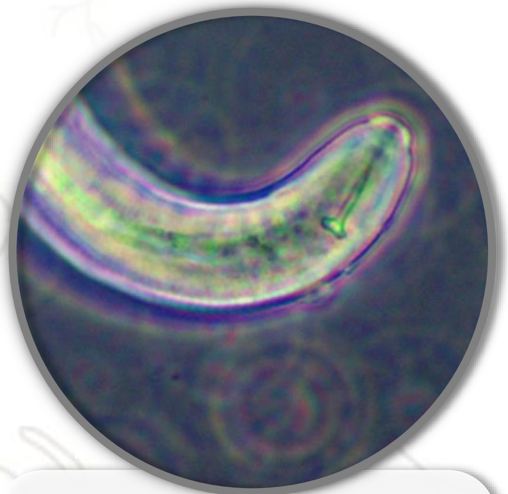
Plants may not use micronutrients in major quantities but they do play a major role in supporting a broad range of their vital biological processes. If these nutrients are deficient, or overabundant, they can limit or completely restrict the availability of the other primary or secondary nutrients. Scientists are exploring the complex way that plants use these micronutrients to influence the interactions between their roots and beneficial soil microbes. There's still lots more to '*unearth*' about the dynamics of healthy soil! Want to know more? Visit our website.

7 A Deeper Look into Your Living Soil

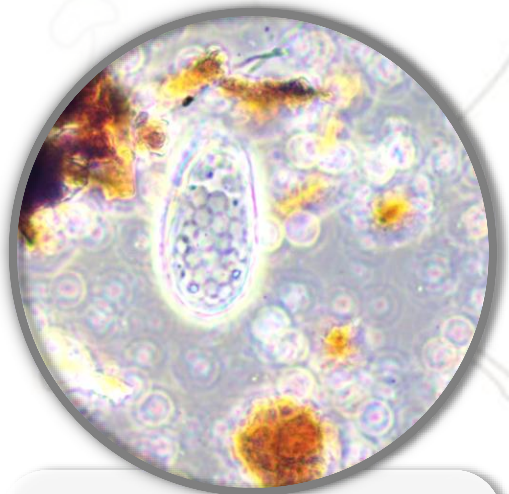
Soil is an ecosystem that is home to countless organisms. Some organisms live in soil for their full life cycle (like nematodes) or for stages of their growth (like lady bug larvae). The interactions between all of these creatures is known as the Soil Food Web. Soil organisms can be grouped by their size: macrofauna (organisms measured in centimeters like earthworms); mesofauna (organisms measured in millimeters like mites); and microfauna (organisms measured in micrometers like protozoa). To see the smallest living members of the soil community, which are most often responsible for the majority of soil nutrient-cycling and live within the roots of plants, requires specialized microscopes using a minimum of 400X total magnification. We observed these living soil microbes in your soil sample. We hope these photographs offer you a very unique glimpse into your very own living soil.



What is it?
A living fungal hypha divided by septum that is branching and growing. The large blobs are soil microaggregates and organic matter that make perfect feeding and hiding areas for soil microbes.



What is it?
A plant-feeding nematode with a clear view of the stylus it uses to forcefully pierce cell walls and suck-out the cellular solutions through the wound for nutrition. Roots may heal forming cysts.



What is it?
A testate amoeba that has created a shell into which it can collect and store bacteria to eat later. Its shell also acts as a protective habitat when it is startled or if soil conditions become inhospitable.

8 Wet Aggregate Stability (WAS)

WAS measures the ability of aggregates to withstand breaking apart when wetted (a process called slaking). Stable soils have better structure, which allows more air movement and increases water absorption and storage. A very important benefit of stable soil is its resistance to water and wind erosion. Plants growing in well-structured soil have healthier and more robust root growth.

WAS:	85%	High (Good)

10 Carbon (C) and Nitrogen (N)

C is the root of all life on Earth and is a part of every compound that makes up living plant tissues. C in soil has a major influence on its cation exchange capacity, and capturing C in soil (called sequestering) is being explored as a viable way to reduce green house gas emissions that are accelerating climate change.

N is used by plants in copious amounts versus their uptake of other nutrients. It plays a vital role in most plant processes and is needed for making chlorophyll, which gives plants their green colour. N is highly mobile in soil and is highly susceptible to denitrification, so deficiencies are common.

Are you curious to know more about C and N, what they each contribute to the soil ecosystem, and how we measure them? Visit our website!

Total Organic Carbon:	344 ppm
Total Nitrogen:	63.2 ppm
Nitrogen as ammonium ion (NH_4^+):	32.4 ppm
Nitrogen as nitrate ion (NO_3^-) :	25.1 ppm

Water Extractable Organic Nitrogen:	17.6 ppm
Water Extractable Organic Carbon:	78.0 ppm
C:N Ratio (WEOC:WEON Ratio):	4.4 (Low)

9 Cation Exchange Capacity (CEC) and Percentage Saturation

CEC measures the ability of the soil to hold positively charged nutrients that are called cations. Typically, the charge on soil colloids (very small particles of clay or organic matter) is negative, so they attract cations and are responsible for most of the nutrient holding capacity of soil. Cations are constantly being held and released (exchanged) by the soil, moving back and forth between the soil solution and the surface of soil particles.

Keeping the percentage saturation of cations in their optimal ranges permits them to diffuse more readily and ensures that sufficient quantities are constantly available for uptake by plants. CEC magnitude is strongly impacted by: percentage of organic matter; types of minerals found in the soil; and soil textural class (especially the clay fraction). CEC is expressed as centimoles of charge per soil kilogram (cmol/kg).

CEC:	19.6 cmol+/kg	High (Good)

%H	9.0	Optimal % 5 – 15
%K	2.4	Optimal % 2 – 4
%Ca	78.7	Optimal % 65 – 72
%Mg	9.1	Optimal % 10 – 20
%Na	0.8	Optimal % ≤1

Saturation %Al	0.1	Optimal % ≤1
Saturation %P	4.0	Optimal % 4 - 6

If you're interested in '*digging deeper*' into the details of the tests that we performed on your soil, you can find loads of useful FAQs & Resources on our website. We're always posting materials that may help you to '*unearth*' more facts about your Soil Health Report.

Results Authorized By:

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