

# Interpreting Soil Health

Soil health testing focuses on measuring the rate of biological activity in a soil sample. Available levels of carbon and nitrogen in the soil control the biological activity rate and influence the release of other nutrients. A Soil Health Score provides a number related to these biological characteristics, with a higher number indicating a more healthy soil.

A Soil Health report combines the traditional chemical and physical soil testing, used to provide fertilizer guidelines and management practices, with water and weak acid extractions for the biological assessment.

**Recommendations** that enhance soil health are based on these biological assessments. Cover crops are recommended as the best way to enhance soil health. By retaining fertilizer nutrients and adding plant residue that easily decomposes, cover crops release nutrients to the soil over a longer period and boost biological activity. When the Soil Health Score is low a cover crop mixture high in legumes is recommended so that nitrogen is added to the soil thus reducing the carbon to nitrogen ratio.

## Basic Assessment

**Soil Health Score** – Calculated by combining five measurements of the soil, including microbial respiration and the availability of carbon and nitrogen, into a simple number that ranges from a low of 0 up to 50. Increasing this score indicates an improvement in Soil Health. Scores above 20 are considered very good. Higher respiration rates or lower C:N ratios increase the score.

Low	Med	High
0-9	10-29	30-50

**Solvita CO<sub>2</sub>** – Measures the respiration rate of the soil micro-organisms. A dry sample is allowed to absorb water and is kept in a sealed chamber for 24 hours. This one-day Solvita CO<sub>2</sub> measurement predicts the average respiration rate in the soil under normal field conditions. Increasing respiration values are a sign of vigorous microbial growth.

Low	Med	High
0-60	61-150	151-300

**C:N Ratio** – Measures the availability of the two most important nutrients for micro-organisms in the soil. Carbon is used as an energy source and nitrogen is a requirement for building proteins and enzymes. A desired C:N ratio for a productive soil with 3 to 5 % organic matter would be around 10 or 12. The right balance of carbon and nitrogen is important. A high number is not better in this case!

Low	Desired	High
<8	8-17	18-30

## Routine Assessment adds:

**Water Soluble Extraction** – Evaluates the forms of nutrients that are utilized most easily by soil organisms and plants.

**Carbon and Total Nitrogen** – Used in determining the C:N ratio, are highest in concentration and regulate the soil biologic life. The water extraction includes the organic forms of nitrogen such as soluble organic matter, proteins and other by-products of decomposition as well as inorganic nitrate and ammonium nitrogen. Organic forms of nitrogen are converted to inorganic forms as by-products of the biological processes naturally occurring in the soil.

**Orthophosphate-P** – The form of phosphorus that is soluble in water and easily absorbed by plants and organisms in the soil. Because the solubility of phosphate is very low and is controlled by pH and concentrations of calcium, iron and aluminum in the soil the water extracted values are very low.

**Water Saturation %** – Indicates the amount of water held in the soil when allowed to freely absorb water upwards by capillary action. Values range from 40 to 70% and higher amounts of organic matter will increase the saturation percentage, indicating a greater supply of water for crops growing on this soil.

**Mineralizeable N and P** – Estimates the potential release from organic matter of these elements. Fertilizer guidelines have been adjusted for N availability based on past crop and OM. Only minor adjustments should be made. Phosphorus credits in the guidelines are general, reflecting the low efficiency of applied P. Mineralizeable P indicates just the organic release and about 50% will be crop available (multiply P by 2.3 to convert to P<sub>2</sub>O<sub>5</sub>).

## Complete Assessment adds:

**H3A (Haney) Extraction** – a weak acid combination designed to mimic the acids secreted from plant roots during growth. This method evaluates the concentration of plant nutrients available at the root surfaces and helps to identify low availability and imbalances of nutrients in the soil.

The value of H3A extracted Orthophosphate will be higher than the water soluble Orthophosphate because of the weak acid in the extracting solution. The value reported as Phosphorus measures both the Orthophosphate-P and forms of phosphorus bound to organic compounds. This organic P is made plant-available by microbial action.

Extracted amounts of K and Ca are lower than those reported in the standard soil test and are not used in making crop fertilizer recommendations.

The ratios of P:Al+Fe and P:Ca in the H3A extraction evaluate the ability of the soil to remove or 'fix' applied phosphorus in forms that are unavailable to plants. Values below 3-5% indicate a greater tendency for this P fixation to take place. A Ca:Al+Fe ratio below 100% indicates a potential of improving P availability through liming.

**For more info, view the complete Soil Health technical bulletin online at [www.agsource.com/agronomy](http://www.agsource.com/agronomy).**



**AgSource  
Laboratories**

A Subsidiary of Cooperative Resources International

Testing today for a **BETTER TOMORROW.**