Interpreting Soil Test Reports

Once soil tests are completed, the next step is interpreting the data. What do the soil report numbers mean, and where would the test be considered optimal? Remember, the soil test measures the plant available portion, not the total amount of nutrient. The soil test is essentially measuring the ability of the soil to provide each nutrient to the soil solution.

pH/BpH –The primary importance of soil pH is its influence on nutrient availability. Most plant nutrients, are most available between soil pH of 6.0 and 7.5, with pH 6.8 being the optimum. Fertilizer is less efficient when applied to soil outside this range.

BpH is the Buffer pH, or the soil's ability to resist change in acidity. A soil's buffering capacity changes depending on content of clay, organic matter, and base saturation. The lime recommendation for a low pH soil is based on the BpH value.

Organic Matter – Organic matter is measured as a percent by weight. The typical range of organic matter is 2 to 6%, but an ideal target would most depend on the clay percent of a soil. The value of organic matter should not be underestimated, as it enables better drainage and water holding capacity, improves compaction resistance and recoverability, provides food for microbial populations, and increases CEC thus holds more nutrients.

Clay %	10	20	30	40	50
OM% target	3	4	5.5	7	9

Phosphorus – An ideal target would be 20 ppm, as soil testing higher than this does not need to rely on fertilizer for optimum yield. However, as phosphorus moves very little in the soil solution adding a planter-placed starter fertilizer is often sound practice. For vegetable production, 40 ppm would be a the target.

Potassium – Maintaining soil test potassium at or above 120 ppm would be desirable. Potassium is more mobile in the soil solution than phosphorus, therefore broadcasting is an effective application method. For vegetables 150 to 200 ppm is a good range to maintain soil fertility.

Magnesium – A minimum soil test magnesium value should be 100 ppm, however maintaining a good balance between potassium and magnesium is also important. It is ideal for magnesium to be approximately 2x the level of the potassium test to minimize potassium-induced magnesium deficiency.

Calcium - Where soils test in the optimal pH range, calcium levels are usually fine. It is common for calcareous soil to be between 1000 and 4000 ppm. When calcium is required, lime or gypsum is the most common broadcast source.

Zinc, Manganese, and Index Values – Zinc and manganese are two nutrients that are less available as pH rises, therefore an index value is also calculated which factors in soil pH. A general thumbrule, is that the index values for both nutrients should be greater than 15.

Sulphate-Sulphur – Similar to nitrogen, sulphur can also undergo many changes. The sulphate form is plant available and is mineralized by bacteria. Typically, tests greater than 10 ppm do not require additional S inputs.

Copper, Iron, and Boron – Copper and iron are usually abundant in Ontario soils. For boron, there is a fine line between adequate and toxic, and for the major cash crops it is not usually required. Boron testing of alfalfa fields and some vegetable crops is important though, as it can be required to optimize yield and improve quality.

Nutrient recommendations may differ depending on approach or philosophy. A 'Sufficiency' approach considers crop response and is best for short term rent farms, or when crop value is low and/or fertilizer prices are high. The 'Build and Maintain' method desires to increase soil fertility to the point that yield should not be limited, and is maintained at these levels. It is best utilized for long term operations or when the ratio between grain and nutrient prices is favourable. 'Crop Removal' provides nutrient additions that match harvest removals, and should maintain fertility over time, and the 'Base Saturation' recommendation attempts to balance the cations K:Mg:Ca in an optimum ratio.

Lime Recommendations – The recommended amount of lime assumes an Ag Index of 75 of the liming product, and is based on the soil BpH and target pH for a specific crop or rotation. Where lime is required and soil magnesium is <100 ppm, or is imbalanced with potassium, add dolomitic lime. If lime is required and magnesium is >100 ppm, either dolomitic or calcitic lime may be used.

Of course, a fertile soil is not necessarily a productive soil; physical and biological properties are also important, as are favourable weather conditions for optimum growth. However, managing soil chemical properties to ensure yields are not limited by plant nutrients is an important part of the equation to optimize production.