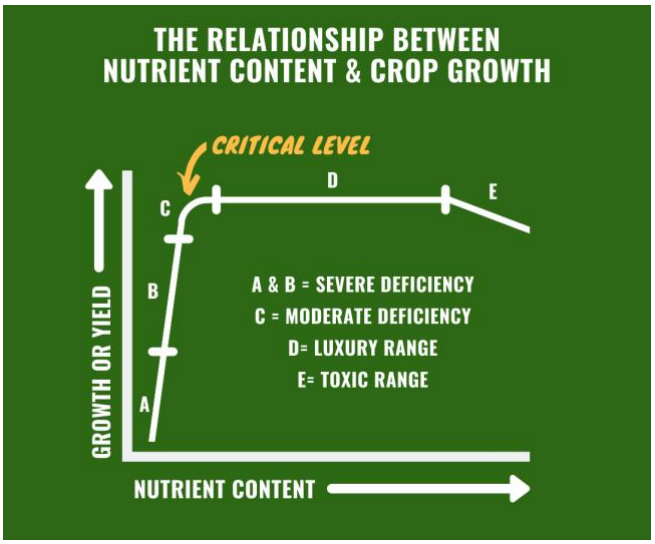
**A&L Canada Laboratories Inc.**

# INTERPRETING PLANT ANALYSIS

Plant analysis measures the concentration of nutrients in a plant tissue. The analysis is based on the concept that the nutrient level present is a result of all factors affecting the plant's growth. The relationship between nutrient content and crop growth is indicated in the graph below.

As nutrients are added, growth increases to an optimum level. Nutrients that have been added beyond the critical level will continue to accumulate in the plant tissue without any further yield increase. Continued concentration of nutrients in the plant tissue may eventually cause toxicity.




A&L Canada uses the critical level approach in interpreting plant analyses. The point below which yields decrease or deficiency symptoms appear is the critical level. This approach requires that the plant tissue being analyzed be compared with critical levels that have been predetermined for a particular plant part and stage of growth.

It is very important that soil analysis data and field observations are used in conjunction with a plant analysis report. The more information available, the easier it is to understand the data.

## FIELD OBSERVATIONS

Crop diagnosis requires knowledge of the plant's environmental conditions. Factors that influence crop growth also affect nutrient uptake and concentration in the plant's tissue.

**Plant Appearance -** Does the plant appear to be healthy or under stress? Is there stunting or discoloration? Stunted or discoloured plants are often low in one or more nutrients. Nutrient levels usually appear abnormally low or high in severely stunted, nearly dead, or dead plants.

**Root Growth -** Anything that restricts root growth can reduce nutrient uptake. Shallow, compacted, wet, or poorly drained soils result in shallow root systems and therefore poor nutrient uptake. With shallow root systems, deficiency symptoms often occur even though the soil contains adequate nutrients. Insects, diseases, fertilizer burn, and herbicide damage may cause root injury and contribute to reduced nutrient uptake.

**Soil Moisture -** Plants have difficulty absorbing nutrients in dry soil. Therefore, tissue concentrations may be lower than normal. Potassium and other nutrient deficiencies commonly occur in crops during dry years even though the soil test shows adequate amounts.

**Air and Soil Temperature -** Plant growth is slow, root systems are small, and nutrient uptake is low in cold soil. Low temperatures may cause deficiency symptoms to appear early in the spring that the plant "grows out of" as the season progresses.

**Tillage and Fertilizer Placement -** Tillage practices will influence soil temperature, moisture, aeration, and will therefore affect nutrient uptake. Fertilizer placement may influence nutrient availability and may, depending upon conditions, either enhance or reduce nutrient uptake.

**Hybrid or Variety -** Root systems may vary among varieties. Those with inefficient or weak roots may show low nutrient uptake under stressful conditions. Uptake and utilization of nutrients may also be influenced by the plant's genetic makeup.

## SOIL TEST DATA

Although soil tests estimate the available supply of nutrients in the soil, there is no assurance that the plant can take up these nutrients. Nutrient deficiencies commonly occur because the oil is infertile, but it must be recognized that there are other factors that affect uptake and cause deficiency symptoms to appear.

**Soil Test Levels -** Soil test values do not always agree with nutrient levels in the plant tissue. If root growth is being restricted, it is likely that deficiencies will appear in the plant even though the soil test shows adequate amounts.

The reverse can also occur whereby the soil test shows nutrient deficiencies and the plant tissue shows adequate amounts. Soil tests often indicate low or deficient amounts of sulfur or micronutrients when the plant tissue sample indicates sufficiency. In this case, the plant tissue is a better indicator of nutrient availability that is the soil test.

Nutrient deficiencies are often related to soil pH. Some nutrients decrease in solubility in high pH soils to the point that deficiencies may appear. Manganese and aluminium, on the other hand, become soluble in very acid soils. This may create toxic conditions along with increased concentrations of these elements in the plant tissue.

**Interactions -** High concentration of one element may induce a deficiency of another element. For example, a high amount of phosphorus may cause a zinc deficiency. A high level of potassium may induce a magnesium deficiency. High rates of ammonia nitrogen may reduce concentrations of potassium in the plant.

## SAMPLING PROCEDURE AND CONDITION OF SAMPLE

Correct interpretation cannot be made unless proper sampling procedures are followed. The sample must also be in good condition when the laboratory receives it.

**Stage of Growth -** The nutrient concentration that is considered adequate will change as the plant grows and matures. Young actively growing leaves usually contain higher concentrations of nutrients than older leaves.

**Plant Part -** Different parts of plants contain and accumulate varying amounts of nutrients. Generally, upper, recently matured leaves are sampled. It is advisable, however, that sampling instructions be followed for each crop.

**Soil Contamination -** Soil particles in or on the leaves will elevate iron and aluminium values. A plant sample should be wiped clean in the field to avoid contamination. Do not wash samples prior to analyses because certain water-soluble nutrients may be lost.

## SOFTWARE FOR INTERPRETING TISSUE ANALYSIS

A&L Canada has available a simple computer program that will assist you in understanding tissue analysis.

DEVIATION FROM OPTIMUM PERCENTAGE or "DOP" is a new methodology for plant mineral analysis interpretation and diagnosis that can provide information both on the qualitative and quantitative aspects of nutrition. DOP allows for simultaneous evaluation, in a given sample, of the nutrient concentrations, nutritional balance, and order of limitation of nutrient contents.

For more information on software and availability, please contact the laboratory at 519-457-2575 or email alcanadalabs@alcanada.com.