Start Tissue Testing Programs Early Before Problems Occur

FACT SHEET

The Increasing Need

Modern agriculture demands top yields…and quality yields. Additionally, you demand profitable yields. In satisfying these demands, plant analysis has become a valuable tool.

Top quality and profitable yields, unfortunately, don't just happen. Many factors need to be considered … like adequate moisture and fertility, proper plant population adapted varieties for disease resistance, insect control … the list goes on.

One of the more important factors affecting crop yields is the ***nutrient status*** of the plant or the flow of nutrients to plant tissues during the growing season. Nutrient status is an "unseen" factor in plant growth, except when deficiencies become so acute that visual deficiency symptoms appear on the plant.

Plant populations can be counted, and variety names or numbers can be read on the label. "Rainfall can be measured with gauges. However, the determination of nutrient status of plants requires precision laboratory analysis of a plant tissue sample during the growing season.

How Can Tissue Analysis Help?

A plant tissue analysis wills how the nutrient status of the plants during the growing season and detect unseen ***"Hidden Hungers".*** Plant tissue analysis can also supply information to confirm visual deficiency symptoms.

Though usually used as a diagnostic tool for future correction for nutrient problems, a plant tissue analysis from young plants will allow for a corrective fertilizer application the same season. The earlier the deficiency is detected in the season the greater the success of correcting the deficiency before it becomes yield and or quality limiting.

Combined with data from a soil analysis, a tissue analysis is an important tool in determining proper fertilizer applications and supplementations to balance the nutrient requirements of the crop.

A complete plant tissue analysis from A&L Canada Laboratories will identify the nutrient status of the following elements at strategic times during the growth stage of the plant.

Nitrogen	Iron
Sulfur	Aluminum
Phosphorus	Manganese
Potassium	Boron
Magnesium	Copper
Calcium	Zinc
Sodium	

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

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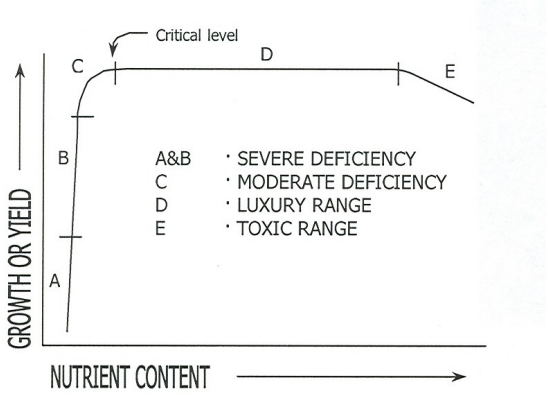
affecting the plant's growth. The relationship between nutrient content and crop growth is indicated in the graph below.

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 analysis. 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.

Field Observation:

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.

Plants Appearance:

Does the plant appear to be healthy or under stress? Is there stunting or discoloration? Stunted or discolored 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 also contribute to reduced nutrient up take.

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 thought 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:

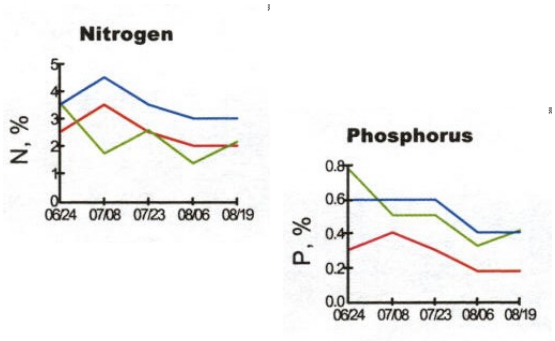
Root systems may vary among varieties. Those with inefficient or weak roots may show low nutrient uptake under stressful conditions. Uptake and utilization of nutrients may also be influenced by the plant's genetic makeup.

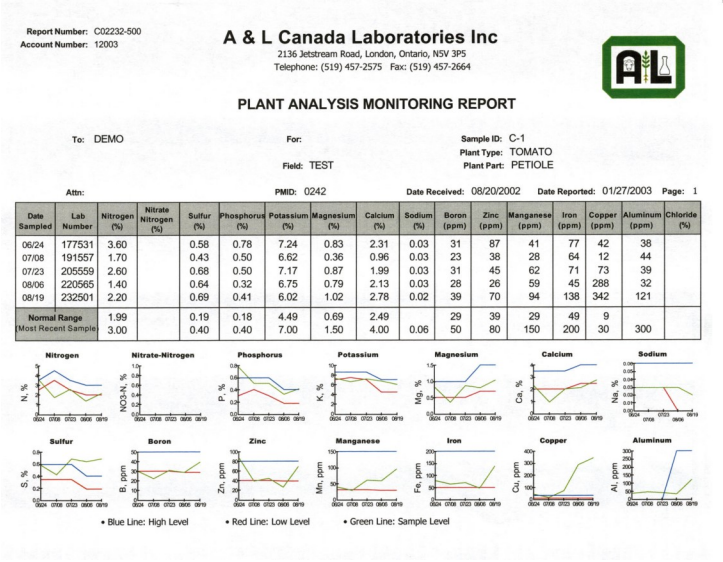
PNMP - A&L Canada Plant Nutrient Monitoring Program

Using our extensive database of nutrient levels for crops at all stages A&L offers a program that allows the grower or crop consultant to monitor the status of the crop throughout the season.

This graphic interpretation visually demonstrates the trends in nutrient status throughout the season. Monitoring the trend lines on each of the nutrient graphs enables the producer to see trends in nutrient status happening before they reach critical levels.

The following report is an example of the PNMP program as it tracks nutrient status in the cropping season.





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Account Number: 12003

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PLANT ANALYSIS MONITORING REPORT

To: DEMO
For:
Field: TEST
Sample ID: C-1
Plant Type: TOMATO
Plant Part: PETIOLE
Attn:
PMID: 0242
Date Received: 08/20/2002
Date Reported: 01/27/2003
Page: 1

Date Sampled	Lab Number	Nitrogen (%)	Nitrate Nitrogen (%)	Sulfur (%)	Phosphorus (%)	Potassium (%)	Magnesium (%)	Calcium (%)	Sodium (%)	Boron (ppm)	Zinc (ppm)	Manganese (ppm)	Iron (ppm)	Copper (ppm)	Aluminum (ppm)	Chloride (%)
06/24	177531	3.60		0.58	0.78	7.24	0.83	2.31	0.03	31	87	41	77	42	38	
07/08	191557	1.70		0.43	0.50	6.62	0.36	0.96	0.03	23	38	28	64	12	44	
07/23	205559	2.60		0.68	0.50	7.17	0.87	1.99	0.03	31	45	62	71	73	39	
08/06	220565	1.40		0.64	0.32	6.75	0.79	2.13	0.03	28	26	59	45	288	32	
08/19	232501	2.20		0.69	0.41	6.02	1.02	2.78	0.02	39	70	94	138	342	121	
Normal Range (Most Recent Sample)		1.99 – 3.00		0.19 – 0.40	0.18 – 0.40	4.49 – 7.00	0.69 – 1.50	2.49 – 4.00	0.06	29 – 50	39 – 80	29 – 150	49 – 200	9 – 30	300	

Nitrogen | Nitrate-Nitrogen | Phosphorus | Potassium | Magnesium | Calcium | Sodium
Sulfur | Boron | Zinc | Manganese | Iron | Copper | Aluminum

• Blue Line: High Level • Red Line: Low Level • Green Line: Sample Level

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 soil 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 where by 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 than is the soil test or simply the crop performance is not at a level to reach the nutrient requirement.

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 aluminum, on the other hand, become very soluble in very acid soils. This may create toxic conditions along with increased concentrations of these elements in the plant tissue.

Interactions:

High concentrations of one element may induce a deficiency of another element. Fro 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 which 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 aluminum 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.