



**DETECT HIDDEN HUNGER before DEFICIENCY SYMPTOMS OCCUR**

**ASK YOUR PLANTS WHAT FOOD THEY NEED WITH A PLANT ANALYSIS! WHY GUESS?????**

**L** -- Leaf Analysis reports the % N & P plus the minerals K - Ca - Mg - Na and micronutrients Zn - Fe - Mn - Cu - B that have been **utilized by the plant to date**, it might also contain some of the residuals from foliar sprays on the leaf surfaces. Used for slower growing plants, called an autopsy or post mortum test, but still useful.

**P** -- Petiole analysis reports accurate Lab tests of what is in the **SAP for future growth** that will be seen as the plant grows in 7 to 21 days. NO<sub>3</sub> (soluble N) and PO<sub>4</sub> (soluble P) plus minerals and micronutrients that are in the sap stream: - - - can be corrected rapidly before damage to growth occurs.

-- Tissue Test usually refers to quick test ratings conducted on tissue in the field.

**TPSL REPORTS: NUTRIENTS - DATE (of sample) - TEST VALUE (lab) - FIELD (location) - L or P - plus GRAPH of desired levels of each nutrient plus some main functions of nutrients.**

**LAB analysis of dried samples with BUCK Scientific, Atomic Absorption Spectrophotometer.**

LISTENING TO WHAT YOUR PLANTS ARE SAYING: Using a periodic program of plant analysis is termed CROP LOGGING. **FOR VALID COMPARISONS** it is essential to sample the **exact same part of the plants from the same area of the field** (the most recent fully expanded leaf **OR** full petiole, one per plant/from 20+ plants) **each time**. TPSL's crop experience from logging **hundreds of fields on thousands of acres** has revealed the following ways of using physiology to evaluate the plant's nutritional requirements.

**General standards are better than a guess but the following factors can improve profits from better yields of higher quality when the right kinds & amount of plant nutrients are used in a timely program.**

**IRON (Fe)** when soil supply is adequate can be a rapid indicator (hours) of root activity: - WET SOIL cuts off oxygen supply reducing the availability of Fe so plants accumulate unusable forms resulting in a false high plant test value - DRY SOIL gradually lowers uptake. This may be followed by **lower plant uptake of PO<sub>4</sub> - Ca - B and others if plant stress continues.** Low soil O<sup>2</sup> reduces beneficial microbes -- increases pathogens.

**PHOSPHATE (PO<sub>4</sub>)** uptake is an indicator (days) of root activity. Anything that slows the root tip growth where the young root hairs are initiated can slow P uptake. Dry/wet soils, hard pans, nutrient supply, advancing age of plants, fruit loads, insect/disease/tillage damage etc are factors. This is why **field notes as to actual growing conditions** at time of sampling and uniform plant parts are so very important when **adjusting** standards and making interpretations for proper recommendations (these are often missing with many lab analyses). Young active root hairs are the feeders; as they age the uptake of nutrients slows.

STIMULATING ROOTS FOR MORE PO<sub>4</sub> UPTAKE: **Drip & Sprinkle systems allow better control.**

PHOSPHATE SUPPLY, often 1 - 2 Qts used weekly is better than gallons used infrequently.

+ HUMIC ACID (is alkaline, acid reduces availability) -- improves P uptake.

+ FULVIC ACID (is acid and much more active than humic) -- improves P uptake.

+ PGR IV type multiple hormones stimulates overall growth, roots and fruiting.

use 1 - 2 oz/ac regularly - not to exceed 4 oz. per month - use as long as crop is producing, much better than single type hormones.

+S -- zone acidity can help keep P available in alkaline conditions (note humic acid).

+SI -soil inoculants feeding on humus (C) increases uptake of P and other nutrients.

- Regularly use 1-2 pints / acre, may also improve soil structure, among benefits.

**CALCIUM (Ca)** is the building block of all cells for health and quality. Petiole (sap) test indicates supply coming from roots to leaves for future utilization. Leaf test shows content in leaf. Deficiencies are first visually seen by deformities in the growing tips of the terminal leaves. Ca does not translocate within the plant tissue but the plant can test adequate even though there are visual deficiencies in the leaves. **BORON** is essential in the physiological transport functions of plant nutrition and utilization to prevent visual signs.

Ca can be deficient in plants even in high calcium soils. It must be soluble (H<sub>2</sub>O-Ca) for plant uptake and even then other physiological functions are involved. The physiological kreb cycles govern mineral (K-Ca-Mg) utilization. These complex functions involve organic compounds supplied by carbon (C) from the humus fractions.. Several products improve Ca-Mg-K efficiency - carboxyls (promesol, quick start, amisorb, etc.), fulvic & humic acids, enzymes, amino acids, polymers, soil microbes, hormones, sugars, etc.

**BORON (B)** has many functions as a transporter of carbohydrates (sugars) and Ca. B does not translocate in the plant tissue and must be applied frequently so it is available in sap at all times for optimum activity. Soil humus (organic matter/OM) is the reservoir for the B supply. Most soils are very depleted in humus so currently the need for B is increasing for all crops. Excess B can be toxic with some crops (such as Citrus where it accumulates in the leaves with age.) However, new citrus tissue can be very deficient in B at early bloom which can cause poor pollination. Excess B can be leached from the root zone when good soil structure (tilth) is maintained. Soil Test soluble (H<sub>2</sub>O) Ca and humus are indicators of tilth..

**SOIL INNOCULANTS** of naturally occurring beneficial soil microorganisms are available in many combinations. Some contain other beneficial compounds such as hormones, enzymes, carboxyls, vitamins, amino acids, polymers, wetting agents, etc. When fed carbon sources these microbes can multiply rapidly and improve nutrient uptake, soil tilth, salt leaching and decrease soil pathogens. Benefits can increase with continuous use for several years; research is beginning to validate these antidotal results. USDA research in Colorado on hard pan soils with corn show increased deep roots and yields. Citrus and Blue berries in Florida show easy-to- measure deep tilth and increased yields and quality. Midwest, Mexico and Texas results have been reported with all of these benefits, especially soil diseases. We have observed and heard reports of these benefits in fields for several years from many areas coast to coast, need Research validation.

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**TPSL LAB ANALYSIS** furnishes more than just lab numbers - *also interpretations & recommendations*

**TPSL STANDARDS** are adjusted *for optimum yields and quality* under your field conditions. Average growing seldom reaches **Maximum Economic Profits**. Optimum goals can reward top producers by eliminating much of the guess-work from plant nutrition. Drip and sprinkle irrigation allow better results.

**A SUCCESSFUL CROP LOGGING PROGRAM** requires *team work*. A **Private Independent Consultant** (that does not sell or endorse products) specializing in soil fertility and plant nutrition with a working knowledge of field operations, disease and insect problems using field observations & lab analysis as a connecting link from the **Grower** to the **Product Suppliers** for the most efficient products to be used in a timely manner. **Crops and Soils are a dynamic, constantly changing system.** -- No two seasons are ever the same!

For more info: check web site - [www.txplant-soillab.com](http://www.txplant-soillab.com)