

Albion's Exclusive T.E.A.M.[®] Approach to Crop Nutrition

Plant tissue and soil analyses are invaluable tools in determining nutritional needs of plants. Soil analysis can show the nutrient levels in the soil as well as a number of factors that influence their availability. Plant tissue analysis indicates the exact amount of each mineral that the plant is removing from the soil and accumulating in the leaves. Each of these analyses will present a different part of the crop nutrition picture. Plant tissue analysis is also a very effective way to determine if your current fertility program is effective or if

there are areas where it could be modified to achieve an increased benefit.

Visual symptoms of mineral deficiencies are oftentimes a misleading way of diagnosing the nutritional status of plants because deficiency symptoms of different deficiencies are similar. Furthermore, a specific mineral deficiency can result in different symptoms on different crops under different conditions. There are also non-nutritional problems that can look very similar to deficiencies. Further, in many

cases, by the time a visual symptom is apparent, severe damage to the crop has already resulted and yields have been reduced. ∞

Advantages of Albion's T.E.A.M. Evaluation and The Importance of Nutrient Relationships and Balance

Besides perfecting soil and plant tissue analyses, Albion Laboratories has also developed a unique program to aid in the interpretation of plant tissue analysis results.¹ In the past, before the introduction of T.E.A.M. program, tissue analysis was interpreted in a number of ways. One such interpretation relies on the critical levels of the minerals in the plant tissue.² The critical level is defined as the point below which a nutrient deficiency will result in a 10% or greater reduction in yield, provided that all the other nutrients and growth factors are not limiting the growth. Critical levels for each nutrient have been established by investigations in the greenhouse using plants growing in nutrient solutions.

Another way of interpreting plant tissue analysis is to look at optimum ranges. The optimal ranges are widely used in the interpretation of some plant tissue test results. These ranges include



upper and lower limits that have been found in crops producing satisfactory yields. To establish these ranges, nutrient levels have been compared against yields by researchers.³ While it is important to maintain each nutrient within its optimal range, this system does not address the relationships that may take place between the minerals.

Albion's T.E.A.M. (Technical Evaluation of Albion Minerals) analysis not only evaluates how much of each nutrient is found in the tissue and compares that finding against its optimal level, but the T.E.A.M. program also measures the relationships between the minerals. The program ranks the minerals based on their limitation to optimal crop production. The most deficient elements are placed at the top of the list and the nutrients present in excessive levels are placed at the bottom of the ranking. The program also calculates an index for each mineral. A negative index indicates a relative level is too low, zero is the optimal level and a positive number means the nutrient concentration is excessive. If the index is very negative then a deficiency is indicated, and if the index is extremely high, the element may be present in toxic concentrations.

Finally, the T.E.A.M. program makes a recommendation for the foliar application of nutrients to correct the deficiency or the imbalance. In the case of the macro nutrients (N-P-K-S) the foliar application can only be considered a supplement to these elements being supplied by the soil. In most cases soil applications of these elements



will be required in addition to the recommended foliar sprays. The amount of Metalosate® products recommended by the T.E.A.M. program will be adequate to satisfy the need of the crop at the time of the analysis. It is possible that additional applications will be needed if the deficiency is severe or at critical stages when the requirement for specific minerals is greater in the crop. ☺

Plant Tissue Sampling Procedures

Taking plant tissue samples is a relatively simple process. Listed below are some general guidelines to follow when taking plant tissue samples. If followed closely, this will provide reliable results that will lead to optimum plant yields.

- In most cases, the youngest, fully mature leaves should be taken as samples.
- Most plants have established nutrient levels for a certain growth period. For example, deciduous tree fruits should be sampled at the end of terminal growth. The grower

can contact Albion for recommended sampling times.

- For trees, the sample must be random, and representative of the whole block, orchard or grove. Samples should not be taken from the edges of the block. The size of the leaves determines how many to take. Albion's laboratory requires approximately 10 grams of dried material to completely analyze the plant tissue. Each block should be sampled separately.
- For field and row crops it is best to pick an area of the field that is representative of the whole field, and then randomly sample that area. It is important to stay 20 to 30 feet (7 to 10 m) away from the edges of the field. The amount of leaf matter required is the same as above. Each field should be sampled separately.

Listed below are specific sampling procedures for some of the crops that are frequently sent to Albion Laboratories:

- Avocado: Sampling should be done at the time of the fall flush. The youngest fully mature leaf from the spring flush should be taken from a non-fruiting branch.
- Beans: Sampling should be done at about the third trifoliate leaf. This leaf should be taken when it is fully mature. The whole leaf should be taken.
- Citrus: Sampling should be done at the time of the fall flush. The youngest fully mature leaf from the spring flush should be taken off of a non-fruiting branch.
- Coffee: Sample early to mid season and take mature leaves from the current year's growth.
- Deciduous tree fruit: Sampling should be done at the end of terminal growth. Take the youngest fully mature leaf.
- Grapes: Sample during bloom period. Take leaves and petioles opposite the flower cluster.
- Grass: Take the uppermost leaf blades.
- Onions: Sampling should start at 4 to 6 leaf stage. Take the youngest fully mature leaf.
- Pines and Conifers: Take 3 to 4 inches (8 to 10 cm) of the newest mature growth at the same height on all trees sampled.
- Potato: Sample during vegetative growth. Take the third to sixth leaf back from the growing tip.
- Roses: Sample before and during early flowering. Sample the upper mature leaves on the flowering stem
- Wheat: Prior to heading take the first 4 leaf blades from the top of the plant.

When leaf samples are taken in North America, the leaves should be sent to Albion Laboratories in a paper bag. They should not be sent in a sealed plastic bag, as this will cause the leaves to rot before arrival. It is crucial that bags be properly labeled to identify the contents.

Leaf samples taken outside the United States **must be dried and finely ground** before sending them to Albion. Samples should be placed in secure plastic bags and packed in a box with proper identification both inside and outside. If the samples are not dried they will likely be quarantined at the border by the USDA and may be destroyed. If by some chance Albion does receive them, they must be destroyed upon receipt.

It is essential to attach the following statements to each imported plant tissue sample:

Customs Declaration

Processed plant material for mineral analysis. Sample baked in excess of 212 degrees Fahrenheit (100 degrees Celsius) and ground to flour consistency. No living cells included. May be forwarded directly to Albion Laboratories, Inc. for mineral analysis.

Certificate of Origin

This is to certify that this processed plant sample for mineral analysis was collected and processed in (country name). ∞

Summary

Agriculture throughout the world is becoming more and more competitive which requires an increased scientific approach to the business. To be successful in today's markets it is essential to produce high yields of top quality crops. As a result, accurate information on plant nutrient requirements has become vital in agricultural production. Growers must not only know which products to use, but how to use them properly to get optimal responses in their crops.

This is the reason Albion Laboratories is in the information business as well as being in the nutritional business. The information provided shows which nutrients are required, which quantizes should be applied, and the times of application that are optimum to maximize crop production and quality. The agricultural consultant's utilization of this information, coupled with the expertise of Albion's representative, will enable the consultant's to better service the needs of his growers as well as to empower them with the knowledge they need to be successful in what they do. ∞

References

1. Ashmead, H.D., et al., eds, Foliar Feeding of Plants With Amino Acid Chelates (Park Ridge: Noyes) 183-200, 1986.
2. Okhi, K., “Critical Nutrient Levels Related to Plant Growth and Some Physiological Processes,” J Plant Nutr 10:1583, 1987.
3. Beaufils, E.R., “Diagnosis and Recommendations Integrated System (DRIS),” Soil Sci Bull No 1, U of Natal, South Africa, 1973.



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