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Balchem® Plant Nutrition Research Paper

How to Take A Sample

by Kevin Dickinson

Many factors influence growth of plants and the production of our crops. Crop management is a process of optimizing as many of these factors as possible to maximize the productivity, quality and profitability of the crop. For example, we put a large amount of our resources toward controlling insects, diseases and weeds. In addition, we develop irrigation and drainage systems to maintain the proper amount of available moisture in the soil. Mineral nutrition of the plants is also a vital component of crop management.

How do we know that we are applying the correct amounts of the right nutrients to our crops? For pest control we use field scouting to determine the particular species and populations of these organisms that are damaging our crops. Similarly, we can use laboratory analysis to determine the nutritional status of our plants. Soil testing will indicate the amount of each nutrient that is available in the soil as well as various factors that influence their availability. Plant tissue analysis shows us how much of each element is absorbed by the plant and moved into the leaf or other plant part.

The first consideration is to determine the area to be sampled. This is generally a block or field that is managed as a unit. Ideally this area is relatively uniform in soil type and crop variety. If there is an area of the field that is significantly different, then it should be sampled separately.

To provide useful information we must take a sample that is representative of the area. A good representation is a composite of 15 or more sub-samples. These sub-samples should be taken from a large area of the field or block then mixed together. It is best if the sub-samples are taken in a zigzag pattern across the area. See Figure 1.

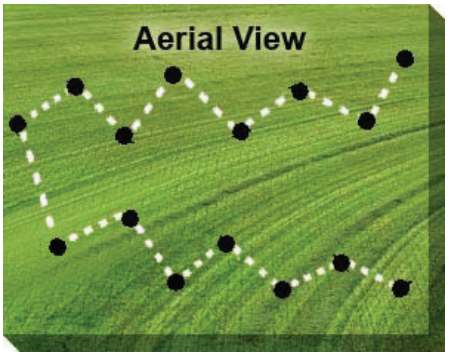

Figure 1. Sampling Area

Soil Sampling

Soil samples are normally taken to a depth of 1 foot or 30 centimeters. This is the depth of soil where the roots of most plants are actively absorbing nutrients. Shallow-rooted plants such as turf grasses may be sampled to a depth of 6 inches or 15 centimeters. The sample can be taken with a soil probe, auger, or shovel. If a shovel is to be used, it is important that a square slice of soil approximately 1 inch by 1 inch or 3 centimeters by 3 centimeters be taken the depth of the shovel. See Figure 2.

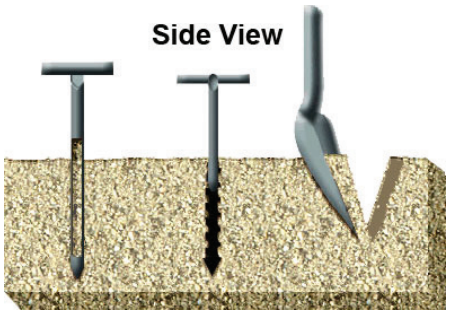

Figure 2. Soil Collection

Leaf Sampling

The leaf is the factory of the plant. This is where most of the nutrients are actively participating in the various biological reactions taking place within the plant. The leaf is where carbohydrates are manufactured during the process of

photosynthesis. Nitrogen absorbed by the plant is converted into protein and other organic acids within the leaf. This is the reason we recommend that the leaf be analyzed to determine the nutritional status of the plant.

Petioles, which are the stems of the leaves, can also be analyzed. The petiole is primarily made up of conductive tissue. Analysis of this tissue will show us the amount of each nutrient that is moving into or out of the leaf. The movement of materials in the plant can change based on various factors including temperature, soil moisture conditions, stage of growth and time of day. This makes the results somewhat variable. Petiole analysis has been used very successfully in nutrient monitoring programs on many crops. This is when nutrient movement in the plant is measured with periodic sampling throughout the season. However, for crops that are sampled only once or twice during year we recommend the analysis of the entire leaf.

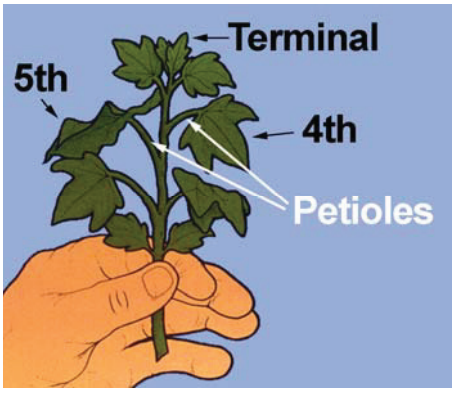

Figure 3. Leaves and Petioles

In general, the proper leaf to sample is the youngest full-sized leaf. On most plants this would be the 4th or 5th leaf down from the terminal. Each crop has an optimal time for sampling that has been established through research.

Figure 4. Leaf Sampling

Deciduous trees are sampled just after the end of terminal growth. This normally takes place in late summer. In subtropical and tropical trees, the youngest leaf is taken from the previous growth flush. These samples are typically taken in the autumn of the year. More complete information on the sampling of various crops can be found on our website www.albion-an.com/plant/sampling.htm.

Analysis Reports

When you receive your analysis report from the laboratory, the results will need to be interpreted. Information on an Albion® soil-analysis report is on our website www.albion-an.com/plant/newsletter/June2005.pdf. For plant-tissue analysis Albion has developed a unique method of interpreting the results based on the relationships between the nutrients. We call this our T.E.A.M.® report. T.E.A.M. stands for Technical Evaluation Albion Minerals. Information on this report is on our website www.albion-an.com/plant/newsletter/October2004.pdf. Recommendations for nutrient applications are made based on the interpretation of the analysis results.

Crop management is a complex process. Managing the nutrition of the plants is essential if we are to obtain efficient yields and top quality crops. The information from soil and plant tissue analysis will help us to make good decisions on the application of nutrients. Proper sampling techniques will ensure good results from our analyses and provide the data necessary to optimize crop nutrition and to maximize profitability.

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