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Fresh Fruit & Vegetable Analysis

A Crop Management Tool

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Potato tuber
Blueberry fruitlet
Early season sample
Late season sample
Mineral imbalance
Bitter pit
Post-harvest storage

INTRODUCTION

Nutrient analysis of fruitlets, fruit, or tubers provides an innovative, supplementary approach to monitoring crop performance, crop health and overall quality. This testing refers to the mineral analysis of the fruitlet or tuber being produced by a crop rather than the plant tissue of the crop itself. The testing is performed during their immature and mature stages of fruit/tuber development. This testing differs from the traditional plant tissue test in that the sample is not dried; rather a slurry is generated and used in mineral content determination. These analyses are aimed at improving total management practices and producing the highest marketable quality fruit or tuber possible.

GENERAL FRUIT ANALYSIS

Plant tissue testing and fresh fruit testing differ in interpretation. Plant tissue mineral sufficiency ranges come from extensive research that has been incorporated into textbooks and therefore is relatively uniform amongst laboratories. On the other hand, since fresh fruit testing is a newer approach to crop management, research in determining optimal ranges in minerals is conducted in the laboratory where a three year minimum of data collection is required to determine trends. For example, the analysis of apple fruit is in its fifth year at our laboratory, with previous research being conducted at Washington State University. In light of the amount of time that is devoted to interpreting fruit data over several seasons, very few laboratories offer this service. To our knowledge, Waypoint Analytical in Leola, PA (formally Agri Analysis, Inc.) is the only laboratory that provides interpretation of apple fruit mineral data.

Mineral imbalances, especially those related to calcium can be detected before the harvest. With prior warning, growers can take corrective action leading to a higher quality apple with longer storage capabilities.

In the case of **blueberry fruitlets**, lower calcium levels have been shown to increase berry size and overall better quality.

Several variables must be considered in significant quantities to interpret mineral status results correctly. These variables must be observed and trended independently of variety, region, year of sampling, etc. This is a lengthy process. If all variables are not represented over that initial three year research period, additional data must be collected to avoid introducing bias into the interpretation. For example, current apple fruit analysis offers interpretation on optimal mineral ranges as well as mineral relationship interpretation in terms of ratios (i.e N/B etc). This information provides recommendations on the basis of storability and the potential of **bitter pit**. Not only does fruit testing provide a method for taking corrective action prior to harvest, but can also assist in determining the end use of the fruit product (i.e. market, juice, storage etc.).

To make full use of our fresh fruit analysis test code, we recommend that **early season** samples are submitted, i.e. a fruitlet (**30mm, or 30mm-50mm diameter**), as well as closer to harvest (**pre-harvest**) fruit. The early and late season samples can be used to determine potential mineral problems in the fruit and assess the effectiveness of treatments, respectively.

POTATO TUBER ANALYSIS

The **potato tuber** is a dynamic system. Both nutrient content and nutrient distribution within the tuber itself varies across the season in pre and post-harvest tubers (Subramian et. al., 2011). Therefore, monitoring tuber nutrient progression during the *immature (tuber bulking) phase, pre-harvest (2 weeks prior to harvest) phase*, and *post-harvest* is fundamental. This nutrient variability information can be implemented within traditional crop health management practices in spite of field to field or cultivar differences.

Post-harvest disorders can be anticipated and managed by determining mineral imbalances via early-season tuber analysis. In their 1984 publication, McGuire and Kelman showed that higher levels of calcium and magnesium reduced the potential for soft rot in potatoes. Higher calcium and magnesium levels also produce a more robust skin that can aid to minimize bruising during harvest (Karlsson and Palta, 2003).