Title: Determining the Optimum Time for Leaf Sample Southeastern Blueberries

Progress Report

Grant Code: 2013 E-03

Extension Proposal

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Objectives:

The information generated by this project should enable identification of the preferred time to collect leaf samples from blueberries for nutrient monitoring purposes in the Southeast. Leaf analysis is one of the primary tools used in developing an effective nutrient application program for crops. Timely sample collection is one vital component of an effective foliar analysis program.

When used for nutrient monitoring purposes, it is important that the proper time to collect leaves for analysis be identified as levels of certain nutrients in the plant vary with time throughout the growing season. There often is a period during the growing season when the rate of change in nutrient concentration within the plant slows for a period of time. Samples collected during such a period provide a more realistic view of the nutrient status of the plant since analytical values would not be highly influenced by time. Sufficiency ranges for plant nutrient content should reflect plant nutritional status during this sampling window.

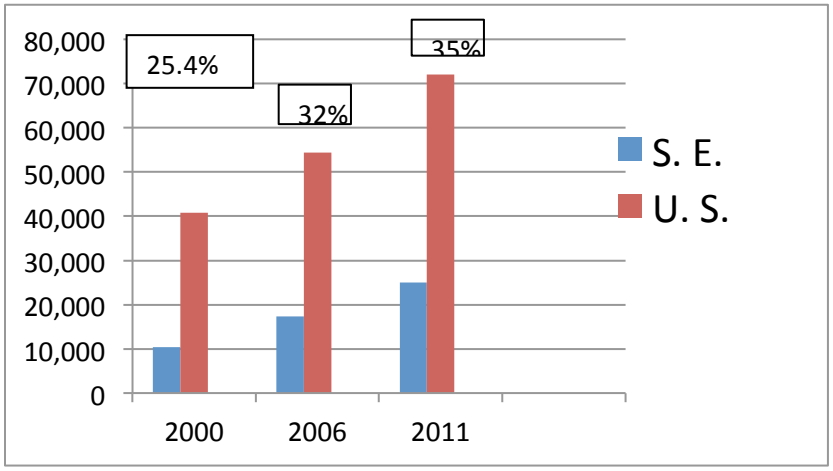
Recommendations of when to collect leaf samples from blueberries vary from before harvest, early harvest, and mid-harvest, last week of harvest to within two weeks following harvest or in reference to a specific calendar period, generally in the period from mid-July to mid-August.

Trials should be conducted to either validate existing recommendations for leaf sampling or to establish new information specific to blueberries grown in the Southeast. Such information should also be of significant value in future work aimed at establishing "sufficiency ranges" for nutrient content for southern highbush blueberry cultivars.

Justification and Description:

Blueberries acreage is increasing in the U. S. Such is definitely the case in the Southeast as the increase in blueberry acreage, production and value has increased substantially over recent years(figures 1, 2 and 3).

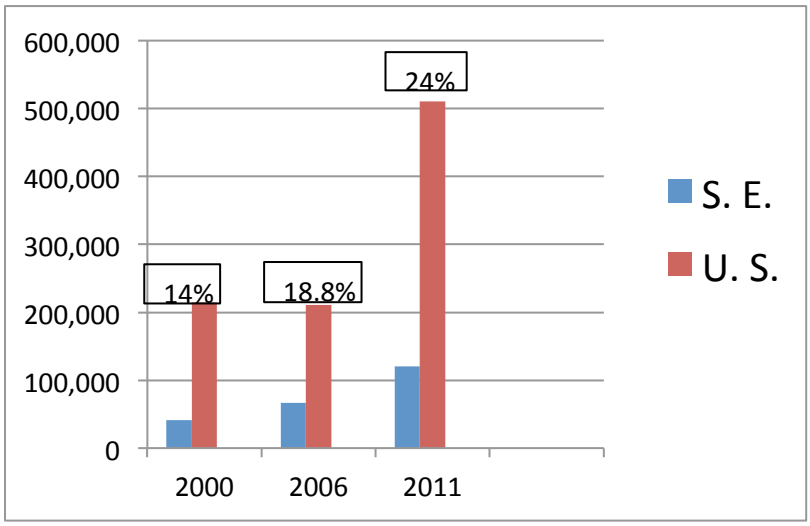
Figure 1. Harvested Blueberry Area (Acres)



Southeastern states included in figures 1,2 & 3 are Alabama, Arkansas, Florida, Georgia, Mississippi and North Carolina

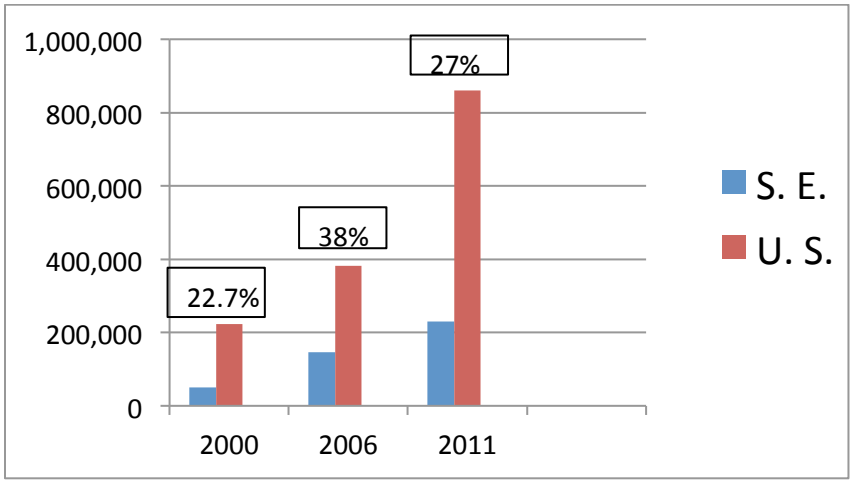
Source: USDA, National Agricultural Statistics Service, *Noncitrus Fruits and Nuts Summary*

Figure 2. Production & Utilization (cultivated & wild) – 1,000 pounds



Source: USDA, National Agricultural Statistics Service, *Noncitrus Fruits and Nuts Summary*

Figure 3. Ave. Farm Gate Value of Blueberries (thousand dollars)



Source: USDA, National Agricultural Statistics Service, *Noncitrus Fruits and Nuts Summary*

Northern highbush (*Vaccinium corymbosum*), southern highbush (hybrid of northern highbush and southern-adapted *Vaccinium* species) and Rabbiteye (*Vaccinium ashei*) blueberries are all grown in the Southeast. Northern highbush cultivars are grown primarily in the higher elevations of the southeastern states since they possess more cold hardiness than the others and tend to bloom later than rabbiteye cultivars. Southern highbush blueberries are grown throughout southeastern states, with the exception of the higher elevations. The desired area of production can be matched to the chilling requirement for different cultivars. Although highbush blueberries in general are more difficult to grow than rabbiteye, they offer the advantage of ripening their fruit earlier in the growing season. Rabbiteye blueberries are grown throughout much of the Southeast. They tend to be more adaptable to a wider range of soil conditions than highbush and are often used to extend the harvest season.

In 1996, rabbiteye cultivars comprised 89 percent of the blueberry acreage in Georgia with the rest being southern highbush cultivars (1). In 2012, it is estimated that southern highbush makes up between 35 and 40 percent of this acreage. Some northern highbush cultivars are being grown in the higher elevations of North Georgia.

In North Carolina, over 90 percent of the highbush production was located in four counties of the Southeast Coastal Plain: Bladen, Sampson, Pender and Duplin. Rabbiteye production is scattered throughout the state and northern highbush blueberries are recommended for the higher areas of Western North Carolina (2). Estimates are that southern highbush cultivars comprise about half of the blueberry acreage with northern highbush and rabbiteye cultivars each representing about one quarter of the acreage.

Blueberry production involves high establishment and high annual production costs. Success is dependent on getting good crops of high quality blueberries on a consistent basis. Sound plant nutrition

is a critical part of achieving these objectives. However, this is often described as being one of the most frequently limiting factors in blueberry production. Soil testing is invaluable in preparing a site for planting. However, once the bushes are in the ground, soil testing takes on a new role – that of tracking soil pH. The correlation between soil test results and the actual nutrient content of the plant is poor. Tissue analysis gives a view of the nutrient content of the plant, if properly done.

As with soil testing, the reliability of leaf analysis is greatly influenced by the care taken in collecting samples for analysis. Three areas need to be investigated for developing foliar analysis procedures for blueberries in the Southeast:

1. When should leaf samples be collected? Existing recommendations within the U. S. vary from before or during harvest (Nova Scotia), during the first week of harvest (Pennsylvania, New Hampshire), during or just after harvest (Cornell), mid-July to mid-August (Michigan), late July to mid-August (Oregon) and late July (Ontario). The Univ. of GA recommends collecting leaf samples within two weeks following harvest for rabbiteye cultivars.
2. Which leaves should be collected? The two sites most frequently listed were midway on the current season's shoots, taking care to avoid vigorous suckers, and the most recently matured leaf on a shoot (about the 5^{th} to 6^{th} leaf back from the terminal).
3. Establishment of "sufficiency ranges" for both southern and northern highbush blueberries and revisiting those for rabbiteye cultivars in the Southeast.

Methodologies:

Samples were collected from rabbiteye (Premier, Tifblue and Powderblue), northern highbush (Duke) and southern highbush (Legacy) cultivars in North Carolina. In Tennessee, samples were collected from Duke at the Highland Rim Research and Education Center in Springfield on 7/26, 8/2, 8/12 and 8/21. Tifblue and Legacy leaf samples were collected at the Middle Tennessee Research and Education Center in Spring Hill, TN at nine times corresponding to the harvest period for Tifblue in 2013. Leaf samples are being analyzed at the Univ. of TN Soil and Plant Pest Diagnostic Center.

Request for Extension of Grant:

We are requesting a "no-cost" extension on this grant to investigate areas that could provide valuable information for future investigations on sufficiency range determinations. Funding to cover the costs of sample analysis remains from the original grant.