# Foliar Nutrient Concentration in Southern Highbush Blueberry Plants

## and Impact of Grafting Onto Vaccinium arboreum

**University** of **California** Agriculture and Natural Resources



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## ABSTRACT

Sparkleberry (*Vaccinium arboreum*) is used as a rootstock for blueberry (*Vaccinium sp.*) production to improve tolerance of high pH soils. The present research examined foliar nutrient concentration in shoots from the rootstock and in grafted and non-grafted blueberry shoots grown in soil without acidification (pH 6.1). Sparkleberry shoots had an overall higher concentration of nutrients, except Cu, compared to either grafted or non grafted blueberry. With this, it can be concluded that there is not any benefit for grafted blueberry despite of being grafted in a rootstock with clear advantages in concentrating nutrients in their leaves. Also it was observed that the tendency of foliar concentration in sparkleberry and blueberry has a strong relationship with the time of the year instead of the growth pattern or phenology.

## FOLIAR NUTRIENT DYNAMICS

Nutrients that are mobile in the plant (N, P, K) typically decreased over the year, consistent with reallocation to new tissue, with sparkleberry showing limited advantage relative to blueberry, and little advantage to grafted blueberry. Non-mobile nutrients largely increased or stayed constant over the year, with sparkleberry showing limited improvement relative to blueberry. However, sparkleberry showed a larger ability to take up some divalent and trivalent ions (Fe, Zn and Mn), but did not transfer this advantage to grafted blueberries. Statistical confirmation of these trends awaits 2017 nutrient analysis.

## SparkleberryBlueberry<br/>graftedBlueberry<br/>non-grafted

Optimum levels for Northern Highbush blueberry according to Hart et al. 2006.

## **METHODS**

Samples were taken from an established grafting trial in the San Joaquin Valley, California with two varieties of southern highbush blueberry, "Jewel" and "Star". Shoots from non-grafted blueberry, sparkleberry rootstock (*Vaccinium arboreum*), and blueberry grafted onto sparkleberry were analyzed from May to August 2016. Leaf emission and stem diameter were measured once a month. The phenological stage was observed, and foliar samples were collected and sent to Brookside Laboratories to analyze nutrient concentration.

### GROWTH

Southern highbush blueberry var. "Star" and "Jewel" showed similar growth patterns and phenology for both grafted and non-grafted plants along the year, with decreasing growth rate (leaf emission and stem diameter) once fruits were formed. On the other hand, sparkleberry growth rate increased during this period, and it was during a different phenological stage (early bloom).







**Figure 1.** Leaf emission in Sparkleberry and Southern Highbush Blueberry during the growing season in 2016. **Figure 2.** Growth in diameter of branches in Sparkleberry and SH Blueberry during the growing season in 2016.



advantages on blueberry being grafted

decrease along the year, and no



April/16 May/16 August/16

Figure 6. Mg, Ca, Al, B. Foliar concentration increase along the year, and no advantages on blueberry being grafted.





**Figure 3.** Phenological stages in Southern Highbush Blueberry and Sparkleberry during a growing season in the San Joaquin Valley – California.

**Figure 7. Mn, Zn, Fe.** Sparkleberry has an advantage compared to blueberry, however grafted blueberry is not affected. Figure 5. S, Cu.Foliar concentrationsimilaralongtheyear,someadvantagesonblueberrybeinggrafted

### **CONCLUSIONS:**

- Sparkleberry seems to be better at accumulating nutrients in leaves. But, it does not generally impact the concentration in the scion leaves of blueberry grafted on sparkleberry.
- The foliar concentration of nutrients in blueberry and sparkleberry have similar patterns of change over the year despite having different phenology.
- Grafting blueberry onto sparkleberry does not seem to have an impact (either positive or negative) on nutrient uptake or foliar concentration of nutrients in high pH soil.