



Foliar Ca during Fruit Development in Blueberry

Agronomics / Background

Fruit calcium (Ca) level is one of the most important factors relating to fruit quality in blueberry production. Calcium plays a critical structural role in the formation and stability of both cell walls and cell membranes. High fruit calcium levels have been shown to improve blueberry flesh firmness at harvest. This is due to stronger cell walls at harvest and a decrease in activity of enzymes that degrade fruit pectins. As a result, high Ca blueberries have better shelf life for the fresh market. Soft rots that occur post-harvest like *Botrytis*, *Colletotrichum*, and *Anthraco* may be less prevalent in high Ca berries due to less physical injury of fruit after picking.

Green fruit drop (GFD) common to the 'Draper' variety has also been associated with low fruit calcium. Foliar Ca applications can significantly reduce this disorder.

Conditions Leading to Ca Deficiencies

Blueberry plants require an acidic soil environment in order to grow properly. This combined with the high soil organic matter common to most blueberry growing regions can make calcium less plant available. Despite this, most blueberry plantings will have adequate calcium levels for proper leaf development. Ca deficiencies can still occur in the fruit due to the lack of mobility of Ca within the plant. Early in fruit development, Ca will move through the transpiration stream via the xylem directly from the soil into the fruit. Excess early season vegetative growth due to high nitrogen levels or inadequate pruning can lead to an imbalance of too much Ca going to the leaves and not enough into the fruit. Low soil moisture and/or high heat will also diminish Ca uptake from the soil.

As the fruit gets larger, the xylem delivery into the fruit will be cut off and only the phloem will be able to supply the fruit. Calcium is completely immobile in the phloem so from this point forward only foliar calcium applications that directly contact the fruit will increase fruit Ca levels.

Desired Ca Tissue Test Values

During late summer, Ca levels in mature leaves from laterals should be around 0.41-0.70%. However, this may not be a good indicator of how much calcium actually got into the fruit where it is most needed in blueberries. Analyzing fruit calcium levels can be helpful in predicting Ca related disorders, but it varies significantly between varieties. It is much more reliable to examine past effects of cultural and fertility practices on actual fruit quality parameters like firmness.

Key Application Timings and Rates

Foliar calcium applications can begin as early as petal fall. Early applications may be especially advantageous if conditions for soil uptake are impaired or if there is excess early season shoot growth. Some research has shown that foliar Ca applications are more successful in blueberries early in the season. This may be due to a higher density of stomata on the fruit surface which allows better penetration of the fruit cuticle.

Most cultivars will benefit from at least 2-3 foliar applications. These should be spaced out throughout green fruit development in order to maintain adequate fruit Ca concentration as the fruit get larger.



Information
to Grow On

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BRANDT Products

BRANDT has several foliar calcium formulations that are highly effective and provide good crop safety:

Foli-Cal[®]

BRANDT[®] Manni-Plex[®] Cal Zn

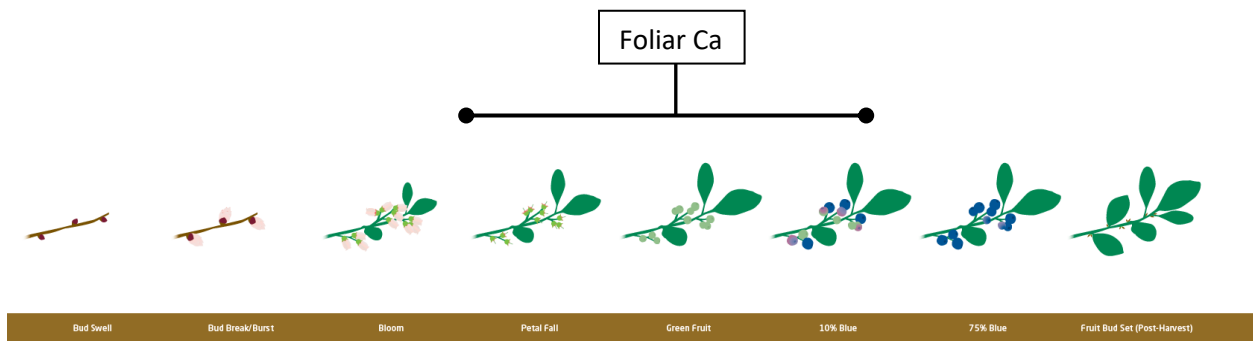
BRANDT Manni-Plex Cal Mag

BRANDT Manni-Plex Cal-B

These formulations are all complexed with sugar alcohols to improve nutrient delivery.

BRANDT[®] Organiplex[®] 8% Ca is an amino acid complex and is approved for organic use.

For all these formulations, 1-2 quarts per acre per application will work well.



Cross-section of green fruit drop affected berries (source: Washington State University Extension)

