

# Boron Applications for Increased Grape Production

- Boron is essential for all plant growth. It aids in the transfer of sugars and nutrients from leaves to fruit, and increases pollination and seed development.
- Grapes require an adequate supply of available boron, especially during flowering and fruit set.
- Multiple foliar sprays of *Solubor*<sup>®</sup> or *Solubor*<sup>®</sup> DF applied alone or with insecticides will ensure an adequate supply of boron during the critical stages of flowering and berry development.
- Preplant soil application of *Granubor*<sup>®</sup> plus foliar sprays of *Solubor* during the season are recommended for soils testing low in available boron.

Grapes grow best in sandy soils, but these soils also tend to be low in available boron (B), which is a key nutrient for vine growth, and fruit set and quality. While B is essential for all stages of plant growth, an available supply is most important during flowering and fruit development.

Grapes have difficulty transporting enough B to new flower buds, so spray applications of *Solubor* at flowering will ensure an adequate supply during this critical reproductive stage. Cell wall strength, cell division, fruit and seed development and sugar transport are some of the plant functions related to B.

Available B in the soil is mainly associated with organic matter content, which must be mineralized to release B for plant uptake. While B requirements for optimum plant nutrition are low compared with those of the primary nutrients, the need for B is especially significant in fruit development.

## Deficiency Symptoms

Because B is vital to flower formation, fruit set and development, a decrease in B supply during these critical stages can result in decreased yields. The first B-deficiency symptoms appear before bloom on the shoot tips and on stalks of inflorescence, with dark, knotty bulges forming and becoming necrotic, as well as shortened internodes. Flower clusters may die.

Younger internodes may swell and darken during rapid shoot growth. Older internodes develop swellings with deep folds and pits, which are the most characteristic B-deficiency symptoms. Leaves may have short, thick petioles with necrotic spots.

Leaves may have a light mosaic pattern of chlorosis in interveinal areas and red-brown spots interveinally and on the margins. Roots may remain short, thicken, swell into knots and break open longitudinally.

### Soil Tests and Plant Analyses

Soil testing and plant analyses are both helpful in assessing the potential B-supplying capacity of the soil and the current B status of the growing plant.

The critical level of hot-water-soluble B for grapes in most soils is less than 0.5 ppm, depending on the soil pH, organic matter content and texture. The availability of B in acid soils generally decreases when these soils are limed.

Results have shown that B applications may improve grape yield and quality when B soil test levels are less than 0.4 ppm in sandy soils which have been limed to pH 6.2 or higher, and less than 0.5 ppm in fine-textured soils which have been limed to pH 6.0 or higher.

Boron Recommendations for Grapes	
<b>Marginal soil test B and/or leaf analyses or dry weather during critical stages:</b>	<b>Low soil test B and a prior history of B response:</b>
Multiple foliar sprays at rates of 0.5 lbs. of <i>Solubor</i> /acre (0.1 lb. of B/acre) weekly for 3 - 5 times before flower initiation and development. <i>Solubor</i> can be applied to vines alone, or with insecticides.	A soil application of 7 lbs. of <i>Granubor</i> /acre (1 lb. of B/acre) surface broadcast plus one or more foliar sprays at 0.5 lbs. of <i>Solubor</i> /acre per spray applied before flowering and development.

The critical level of B in the top mature grape leaves is about 20 ppm, but the ideal range is from 25-50 ppm. Trees with leaf B contents below the critical level should be sprayed one or more times with *Solubor* after flower initiation and during fruit set and development. Leaf concentrations over 80 ppm of B may indicate possible B toxicity.

### Recommendations for Grapes

Yield responses to applied B are inconsistent and seasonal, probably due to environmental effects on flowering and berry development. However, both yield and quality of grapes may be improved with B applications because available B levels are low in some soils.

Boron should be applied for grapes, especially on sandy soils in high rainfall regions or with over-irrigation because soluble B can be easily leached from the root zone. Response to applied B generally is greatest when there are adequate supplies of other nutrients.

Data below show increased B uptake with broadcast and berm spray applications of *Solubor* to soil. Berm spray applications (providing 1.5 lbs. of B/acre annually or biannually) resulted in greater B uptake than broadcasting B over the entire soil area at higher B rates, possibly because most of the roots are located in the berm region of soil.

<b>Response of Grapes to Soil and Foliar Applications of <i>Solubor</i></b>				
Application method	B applied, lbs./acre		B concentration, ppm	
	Soil	Berm	Bloom petioles	Mid-summer blades
Untreated	—	—	35 bc	52 d
Broadcast	3	—	37 b	55 d
Broadcast	6	—	40 ab	66 c
Biann. spray	—	1.5	52 a	95 b
Ann. Spray	—	1.5	53 a	152 a

Values in columns followed by the same letter are not significantly different at a probability level of 0.05. P. Christensen, California Agriculture, March - April issue: 17 - 18, 1986.

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