



## Boron Fertilization in Vineyards

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Boron fertilization methods and rates should be carefully defined because of the small amounts needed for correction while avoiding over-application and possible toxicity. All of the original vineyard trial data published in California involved single, hand-broadcast application intended to be corrective for several years. On the basis of this work, the general recommendation has been to apply 2/3 oz./vine of Solubor 20% B (65% B203). Experience has shown that this treatment will typically last 4 to 5 years in the San Joaquin Valley. However, higher rainfall viticultural areas and vineyards with limited root systems could possibly develop earlier reoccurrences of deficiency at these rates.

Subsequent to the original work, more economical and convenient application methods have been suggested and used commercially. These include soil spray broadcasting, berm spray (usually included with herbicide spray), foliar spraying, and drip application. Of these, berm spraying in the winter and foliar spraying during the growing season are most common. Either method could be used as a combination with other sprays, eliminating a special spray application. Examples are herbicide, fungicide, and insecticide treatment. Also, such applications involve careful sprayer calibration, important to boron fertilizer as well as pesticide usage.

Berm spraying and foliar spraying were compared with standard hand broadcasting in a 4-year Fresno County study. The results verified the experience of boron application versatility. Generally, the berm spray treatments were the most effective. This is probably because the fertilizer spray was uniformly distributed over the berm surface where roots are more concentrated. Also, the berm area received no irrigation water, which would otherwise leach some of the boron below the root zone. It was concluded that boron rates can be lighter when applied with berm sprays as compared to broadcast application.

It was also found that applying annual, lighter rates on berms provided for more efficient and consistent vine uptake as compared to higher rates every 2 to 4 years. All treatment frequencies (1, 2 or 4 years) with appropriately adjusted rates gave sufficient longevity of correction and could be recommended. However, annual or biannual applications would seem most appropriate in situations with high rainfall and known low boron.

Foliar spraying has been most often used as an emergency measure to correct boron deficiency. However, it can ultimately also provide for root uptake, as the boron ends up on the vineyard floor at leaf fall. It could be useful as a follow-up maintenance tool after soil levels are increased through soil application.

Hand-broadcast application was not as effective as berm spray in the study. However, it is especially useful on small acreages or for spot treating. A single application was shown to last beyond 4 years under winter rainfall averaging 10.5 inches.

On the basis of the work presented here and years of commercial experience, the following tentative guidelines are given. These should be adjusted to local experience and soil, water, and rainfall conditions. Treated vineyards should be monitored with leaf petiole or blade analysis to determine if the application timing and rate is satisfactory.

You will note that the basic recommendation is 1 lb actual B/acre/year with amounts adjusted to frequency of application. It can be modified by local experience, rainfall amounts, irrigation practices, etc. and through tissue analysis monitoring.

<b>Soil Application of Boron Fertilizer (Broadcast or Herbicide Spray)</b>		
<b>Frequency</b>	<b>Rate, Lbs/acre</b>	
	<b>Actual B</b>	<b>Product (20% b)</b>
Annual	1	5
2 years	2	10
4 years	4	20*

\*Equivalent to 2/3 oz/vine at 7' x 12' to 8' x 12' or 1/2 oz/vine at 6' x 10' to 7' x 11' vine spacings.

Interest in applying boron through drip irrigation systems is expected. However, there is no trial work on which to base recommendations. Obviously, a good system calibration and uniformity of application are important. The known efficiency of fertilizer uptake from drip irrigation and plant sensitivity to boron make this a tricky issue. One should keep in mind that grapevines regularly irrigated with water containing 1 ppm boron can develop boron toxicity. How this translates into occasional or infrequent boron applications through a drip system remains to be determined experimentally.

Growers have successfully applied B through the drip system in very small amounts without vine injury and with good results. For an established vineyard, they apply no more than 0.5 pound per acre of Solubor (0.1 pound actual B) through the drip system in a single application. This is done two to four times a year during a two month period in the spring to early summer. Applications should be separated by two weeks. To avoid B toxicity, it is important to apply no more than a total of 2 pounds of product (0.4 pounds of actual B) for the season.

### **Foliar Spray Application of Boron Fertilizer**

2-3 lbs/acre soluble boron spray product containing 20% B per application. Do not exceed concentrations of 2 lbs/100 gals. in full wetting foliar application. First spray should be applied 2 to 3 weeks before bloom. Total annual application should not exceed 5 lbs product/acre (1 lb B). Pesticides in water soluble bags must be added to the spray tank first. After the bags are completely dissolved, boron may be added.