



## Boron and Fruit Set

By Mark L. Chien, Wine Grape Extension Educator

As we head into bloom, the matter of fruit set is on the mind of growers. Fruit set is one of the most unpredictable events of the entire growing season and the resulting crop load never seems to be “just right.” If yields are down, vineyard economics suffer and it can even lead to overly vigorous vines. If the crop is too heavy, well, I’ve preached ad nauseum on that topic but mainly fruit and/or wood may not ripen properly with unpleasant consequences. Even if it is right on target, good set may mean tight clusters on some varieties that can increase risk to bunch rot pathogens.

In 1987 in Oregon we had the unpleasant surprise of hardly any crop on the vines. This was an industry-wide phenomenon. It caused a lot of head scratching. Lots of BB sized berries, hens and chicks and zig-zaggy, stunted shoots. We suffered a classic case of severe boron deficiency. Researchers at Oregon State University got right on it, explaining that very dry conditions during the previous fall caused the problem. Recommendations included pre-bloom split foliar applications of solubor and eventually, foliar B applications in the fall, after leaf drop. With that, the problem was pretty much solved.

There was actually some debate about the effects of mild boron deficiency on wine

grape quality. Since botrytis is a big late season problem in Oregon and modifying cluster architecture was viewed as a potential solution to the problem, the hens and chicks phenomenon was not viewed as all that bad. Most of us were thinning crop anyway at lag phase, so it could actually save us some labor costs. But fine tuning boron to regulate crop was just too difficult to do and the possibility of drastically reducing yields was considered too risky.

A recent study by Pete Christensen, Robert Beede and Bill Peacock in California published by California Agriculture<sup>1</sup> highlighted the options for boron supplements to improve fruit set potential. Boron and zinc are identified as the two micronutrients most often deficient in California vineyards and in particular the basaltic and granitic parent materials in the Sierra Nevada (similar to the soils of the Eola Hills in the Willamette Valley). Typically growers would correct by adding boron to the soil but the timing was tricky to get the B where and when it was needed so they decided to evaluate foliar and drip applications. A successful first trial with foliar boron demonstrated that it was relatively easy to boost bloom-time boron with early applications. A follow up study was expanded and yielded interesting

<sup>1</sup> Christensen, Peter L. Robert Beede, William Peacock. California Agriculture. Vol. 60. No 2. pp 100-103.

results. Five treatments were included: 1) untreated control; 2) previous fall foliar (10/19); 3) dormant soil berm (2/18); 4) pre-bloom foliar (5/4); and 5) bloom foliar (5/20, 50% cap fall). All treatments were applied at one pound boron per acre (20.5% solubor product). Foliar applications were made with 150 gpa, berm sprays at 30 gpa on a 4' band. Dormant canes/buds, petioles (opposite clusters) and veraison shoot tips were sampled. Fruit response was determined by grading individual clusters (8/15) in each plot for boron deficiency symptoms. The results were quite dramatic with the fall foliar application having the greatest impact on reducing both severity and incidence of boron deficient fruit, even over the pre-bloom application. Interestingly, the boron tissue levels at fruit- set were higher in the pre-bloom plot than the fall plot but without the best effect.

The authors presume that the pre-bloom treatment was not early enough to reverse the effects of boron deficiency on primordial tissue development in developing buds. Also, boron mobility in the plant as well as uptake may be slow, thus preventing enough timely accumulation in critical reproductive tissues.

The recommendation based on these research results is for fall foliar applications of boron. This can be made in a single application of 1 lb boron (actual) to the post-harvest canopy. In Oregon, we applied boron to dormant canes with the intent of getting better access to the bud scales although the California researchers and Terry Bates suggest that applying boron on canes still with leaves is effective. Increased rates are only valid for fall applications. Since boron can easily be toxic as well, great care needs to be taken

when applying to green tissue. Toxicity symptoms include downward leaf cupping and burning of the leaf margins. Split applications of spring boron can be made safely. My experience was to make 3-5 applications of boron at 1 lb solubor (0.2 lb actual) per acre. It is possible to tank-mix boron with some fungicides but boron will affect the pH of your spray water so be sure to read the product label for compatibility and buffer if necessary. There is no problem tank-mixing boron with sulfur. To prevent burning, do not apply 0.5 lb rates within 14 days and do not use water soluble packets, oils or surfactants in the same tank<sup>2</sup>.

While foliar applications offer a good annual maintenance approach to boron deficiency, a longer term solution may be a correction of soil boron levels. Soil applications vary according to soil texture but range from 1-4 lb/ac. Soil boron should be in the 2 ppm range. Timely irrigation can also help to improve boron levels at bloom.

The adequate range for boron is 25-50 ppm<sup>3</sup> and staying in or near these boundaries is critical due to the easily deficient or toxic nature of this micronutrient. Soil pH will affect the uptake of boron although movement is most strongly influenced by water availability. It will readily leach and become very inaccessible in drought conditions.

As we move towards bloom you can take a petiole test if you suspect boron or zinc might be a problem. Foliar applications should begin around 5-6". A petiole test at

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<sup>2</sup> Terry Bates. Vineyard Nutrient Management. 2001.

<sup>3</sup> Ibid.

bloom will reveal boron status for future reference and vine nutrition maintenance.

To download a .pdf of the California Agriculture article, please visit their web site at <http://californiaagriculture.ucop.edu/>.

You can read Dr. Terry Bates' Vineyard Nutrition Management at his web site <http://lenewa.netsync.net/public/Bates/Home.htm>.

I would like to thank Dr. Terry Bates for his review of the contents of this article.

## **Grape Disease Considerations for Pre-bloom to Bloom**

by J. W. Travis

**With Grape Diseases: Looks Can Be Deceiving!**

The early season dry weather has served to delay severe disease epidemics so far this season. However, some significant wetting events have occurred since bud break so there is a risk of early season Phomopsis and black rot infections. Check the first few inches of new shoot growth for phomopsis lesions which will appear black and sunken. Black rot lesions may begin to become visible on the first leaves on the shoot. They will appear as small and brown spots about the diameter of a pencil eraser with small black spots in the center. Phomopsis and black rot risk of infection will continue through bloom and after bloom as long as there is new leaf and shoot growth, and wet conditions. Apply fungicides to protect new shoots and foliage from infection before the rain begins. Refer to the 2006 Pest Management Guidelines available through your county extension office for the best fungicides to use.

Risk of downy mildew infection is delayed until about 10 inch shoot stage. The mid-May wetting period that occurred across most of the state could have triggered the beginning of downy mildew infection. This is particularly true of vineyards with a history of downy mildew or on varieties especially susceptible to downy mildew

such as Chancellor, Vidal, Niagara and many of the vinifera varieties. Several fungicides have good efficacy on downy mildew, refer to the 2006 Guidelines for best materials. Formulations of phosphorous acid have also shown to be effective against downy mildew. Some phytotoxicity has been reported with the higher rates.

The greatest risk the early season dry weather provided was increased risk for powdery mildew. Powdery mildew is the most important grape cluster disease in PA and frequently causes significant crop loss at harvest. Dry weather conditions are optimal for powdery mildew infections. The period from immediate pre-bloom through pea-sized fruit is the most critical to prevent fruit cluster infections. Make sure that each fungicide application made during this period contains a fungicide that is effective in controlling powdery mildew.

The mid to late May wet weather may have increased the potential for Botrytis flower infection at bloom. Botrytis survives on dead leaf tissue in the vineyard and increases growth and sporulation during periods of wet weather. Where there is a history of Botrytis or highly susceptible varieties apply effective Botrytis fungicides during bloom before a wetting event. If bloom is extended and wet weather is predicted, more than one

application may be necessary. Botrytis bloom infections will not become evident until berries begin to ripen with increased levels of gray mold at harvest.

Ripe rot is a new disease to PA grape growers. It is not yet clear if it occurs across the state or in isolated areas. Where ripe rot has been identified, including captan or Pristine in the fungicide program may prove to reduce disease development. Fungicide timing trials are on-going this season at the Penn State Fruit Center in Biglerville Adams County to determine when infection occurs.

Vineyards across PA look very healthy and green with abundant new growth and fruit cluster formation as bloom approaches. All appears well but looks can be deceiving. Disease risk is highest on new shoots and leaves with symptom development delayed for several weeks. Apply fungicides on a preventative basis and scout your vineyard for any unusual

spots and mildews. Fungicide protection is the best course of action but when a problem has occurred, early detection and the appropriate response may save the crop.

PAW Walk Around: Penn State Fruit Research Center, Biglerville, PA

The Walk Around is scheduled for the August 17, 2006 at the Penn State Fruit Center. There are 2 ½ acres of research vineyard including 5 hybrid and 5 vinifera grape varieties trained to high wire cordon, VSP and Scott Henry. Research trials focus on the use of compost in vineyards, several disease management fungicide trials including ripe rot, and Botrytis management. An alternative fungicide evaluation trial can also be viewed on several seedless table grape varieties and the impact of ozone air pollution on wine grapes, specifically Chambourcin will also be observed and discussed.

## Erie County Update

by Lake Erie Regional Grape Research & Extension Center

This is a brief update from the Lake Erie Regional Grape Research and Extension Center in Erie county PA. The 2006 grape season started out as touch and go for many growers around the great lakes. An early bud break was anticipated, and as always, this raises fears of frost damage to opening buds and young shoots. Buds of Concord, Niagara, and some early wine varieties like Chancellor, began to open during the last week in April. Dangerous frost events occurred on 26 and 28 of April, and again on 7 May.

The 26 April event was the most severe. At our location just a quarter mile from Lake Erie (lake water temperature of 45 F), we recorded a low of 29 F and suffered no damage. However, other

vineyard sites farther inland experienced lows in the mid to lower 20s and saw severe damage to primary buds. Fortunately, buds were just beginning to open at that time and damage along the Pennsylvania lakeshore was not widespread. Vineyards in Michigan and parts of New York were not so lucky.

Rain on 11 May ended over two weeks of dry weather and resulted in the first infection periods for Phomopsis, powdery mildew and black rot. Most vineyards ended up last season under relatively light disease pressure leaving a smaller than average over-wintering pathogen population to jump start their disease epidemics this spring. Growers in the Lake Erie area will generally not be applying fungicides at this time (3-5" shoots) unless

they are growing *Vitis vinifera* and/or they've had problems with Phomopsis shoot and cluster rachis infections and powdery mildew in the recent past. Black rot is generally not a threat up here yet unless it is established in the vineyard with cane lesions (which can release spores as early as bud break) and fruit mummies in the trellis and on the vineyard floor.

Our research efforts continue to investigate alternative fungicides for grape disease management. Our newest area of focus has been the examination of alternatives for black rot control that are allowable for organic production systems. Growers wishing to reduce their use of

synthetic disease control materials or who wish to farm grapes organically, have but one material, copper, for black rot control. But copper isn't very effective against black rot. In 2005 we examined a number of materials on the OMRI (Organic Materials Review Institute) list for efficacy on black rot leaf infections on potted grapes in the greenhouse. We identified several materials with some activity against black rot and we will be challenging the best of these materials in field tests this year. We are also continuing to examine alternative methods of late season bunch rot control.

## **Pennsylvania Farming Transitions**

by Stephen Menke, PSU Extension Enology Educator

American agriculture always responds to challenges, but not always predictably, and sometimes not in a timely manner.

Who in the 1930's would have predicted the development of corn and soybean monocultures, based on hybrid genetics and chemical pest control, that dominated American agriculture in the 1960's and 1970's. Who would have predicted that huge surpluses of program grain and fiber crops would lead to the permanent loss of marketing ability by American farmers to the grain cartels? Who would have predicted that government subsidies and tax exemptions, when combined with low land prices and cheap surplus grains, would lead to the great consolidation of farms, loss of farmland to sprawl, loss of farmers, deterioration of small rural communities, and sharp increases in agricultural land prices that ravaged American agriculture infrastructure in the 1980's and 1990's? Who would have predicted that the 21<sup>st</sup> century would lead to the revival of the American small farm, with value-added specialty crops and agricultural tourism as potent marketing instruments, with non-traditional farmers often leading the way? Who would think that juice grapes in Erie County and apple crops in Adams County could be switched to wine grapes and fruit for fruit wines, with

wineries as the nuclei of clusters of value-added farm and agri-tourism enterprises?

Well, in each of those eras, there were people who did foresee such results, some people who listened to them, and some who kept their heads busy with hoping such changes wouldn't occur or wouldn't harm their enterprises or their way of life.

The lesson is not that hindsight is very good at picking historical leaders of change. The lesson is that we should always take time to plan for the possibility of the improbable, if we want to avoid being the probable victims of possible changes.

We in American agriculture are going through another transitional sea-change. How do we ride the waves of change and not drown in them? How do we preserve the best of our history and lifestyle, and yet find room in future agriculture for ourselves, our next generations, and the refugees of urbanism moving into our space? How can we make our land produce goods that justify the value that is being placed on our land by development and the costs of generational transfer?

We look at urban societies in America, and they do not appear to be economically or socially sustainable. We look at the present model of agriculture, and our rural communities do not look economically or socially sustainable. This means that the opportunities of transition are at hand.

The answer seems to be that we in agriculture must become the savvy leaders of sustainability, where value-added income opportunities, good land and ecological stewardship, and open mingling of rural and urban values lead to the creation of local and regional cultures that grow ever more supportive of each other. The current buzzword phrase, "Think global and act local." has real meaning in this context. These local cultures, which I call agrurban, can be the

grassroots food for change, like the forests and prairies of America were to our ancestors.

But we must be willing to work hard for our future, and have open minds. We must not only live the rural values we hold dear, we must have the foresight to incorporate them into a shared vision with our urban neighbors, where a balance of preservation and change leads to long-term sustainability.

So plan for a positive future, where increased concentration of agricultural effort and increased interaction with our urban neighbors forms a richer and more sustainable community and a more wholistic nation. If we are vital locally, we can be examples regionally and nationally, and be part of a more rational global solution.

### **News and Notes, Spring 2006**

by Stephen Menke, PSU Extension Enology Educator

The last several months, I have spent much time meeting with growers and wineries who are looking for each other. These people include: tree fruit farmers looking at either growing some wine grapes or at supplying ripe fruit to wineries for fruit wine; juice grape growers who want to know whether wineries want them to grow wine grapes for them and how the relationship would work; owners of small pieces of land who want to know if wine grapes and wineries will fit into their future; and of course, more second career people who want to become part of the growing trend of non-farmers getting into farming through grapes and wine.

I tell them all the same thing. If you stress quality and sustainability, both in your dealings with the land and with the people, you will be quite likely to both do well and be happy.

If you want to do it fast and cut corners on quality, you may reap short-term benefits, but not be able to sustain them over the long haul.

I hope existing wineries are also willing to commit to paying for quality grapes, making quality wine from those grapes, maintaining quality relationships with growers, and to growing their wine volume and aggressively marketing that increased volume. Otherwise, we may soon have lots of high quality PA grapes and fruit that will leave PA to enhance the reputations of our competitor states in the Mid-Atlantic and Midwest. I have already tasted some very nice vinifera varietal wines, made in New Jersey that came from PA fruits. The same year, PA wineries across the Delaware had the same varietal wine made from far lesser fruit. It is a sad day when we get out-competed for our own fruit!



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