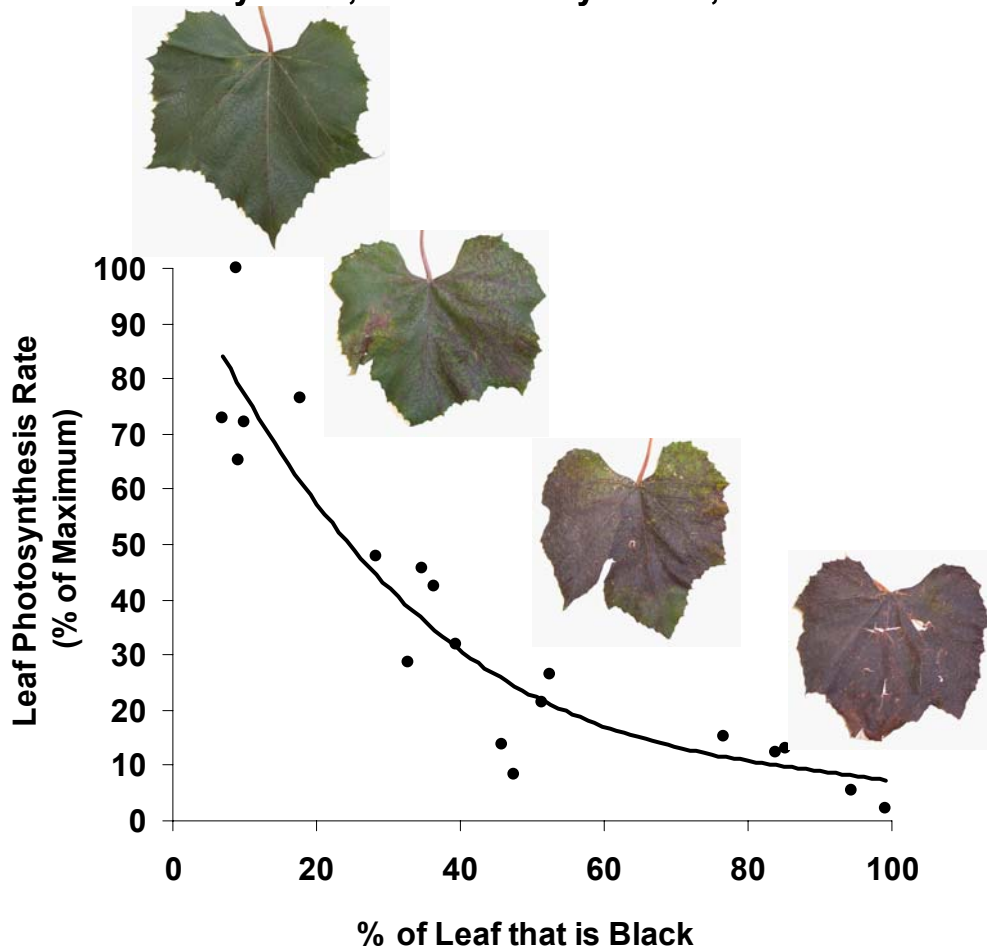


Dr. Terry Bates, Fredonia Vineyard Lab, 10/9/2003



Many Concord grape leaves are starting to turn black and growers have been asking how this will affect photosynthesis and sugar accumulation. Many factors can cause leaf chlorophyll to break down, including but not limited to age, mildew, and nutrient deficiencies. Since chlorophyll is needed for photosynthesis, it makes sense that the less green a leaf is, the less photosynthesis that leaf is doing. On 10/9/03, I measured leaf photosynthesis on a population of leaves ranging in their degree of green tissue. I collected the leaves and took digital photos of each leaf. Using image analysis software, I could then measure the % of the leaf area that was either green or black. The “blackness” of the leaf was then compared to the photosynthesis reading. As you might expect, the more black the leaf, the lower the photosynthesis reading. Although the chart shows a curve, I would suspect that the relationship is more linear (i.e. if the leaf is 50% black then it is only doing about 50% photosynthesis). The same principal will apply when looking at the whole canopy. If 75% of your canopy has turned black then your vines are probably only photosynthesizing at 25% of their maximum potential.

So what is driving sugar accumulation at this point? Thanks to a few clear warm days, sunlight interception and photosynthesis are still the driving force behind sugar accumulation in the fruit (if your canopy is still green). However, you have probably noticed that the rate of sugar accumulation has slowed over the past couple weeks.

Roughly, healthy green leaves this time of year are only photosynthesizing around 60% of the yearly maximum and we are losing day length and heat – all contributing to sluggish ripening. Two other processes can increase sugar concentration in the fruit, remobilization and dehydration. In one of the old experiments at the Fredonia Lab, a set of vines were completely defoliated at 12 degree brix and the fruit continued to gain a couple brix until the first frost. This happens because the fruit is a strong sink for carbohydrates after veraison and the vines are able to remobilize stored carbohydrates in the vine structure and move it to the fruit. Finally, as the fruit ages, it becomes more susceptible to dehydration. When the fruit loses water the concentration of sugar (and all the other solids) in the fruit increases. Interestingly, some red wine grapes are not harvested until slight dehydration has occurred to increase sugar, color, and flavor compounds in the fruit – not something we usually think about with Concord.