

Oregon Wine Advisory Board Research Progress Report

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Ammonium Metabolism in Grapes

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INTRODUCTION AND OBJECTIVES

Oregon grape growers are sometimes troubled with fruit set problems. There are many types of fruit set disorders, but a recently described one is inflorescence necrosis (IN). Though many studies related to the disorder have been done at OSU and elsewhere, investigation into IN is still in its infancy. Several OSU researchers have shown that high levels of ammonium (NH_4^+) in inflorescences are associated with severe IN.

RESULTS AND DISCUSSION

At this point, simple surveys of (NH_4^+) in different tissues and vineyards can help in finding some answers about IN. Shown here (Figure 1) is an example of how diverse factors such as vineyard location, cane thickness, and shoot orientation affect NH_4^+ (the prime suspect for causing IN) within inflorescences.

Clusters from shoots arising from thick canes had a higher concentration of NH_4^+ than clusters arising from thin canes. It's possible that the more vigorous shoot growth associated with large diameter canes increased the shade around the shoots, which caused NH_4^+ to be higher. However, there may be some other association between vigor and an NH_4^+ response in the tissue.

Clusters from upward trained shoots had slightly lower NH_4^+ than clusters from downward trained shoots at Lewis Brown Farm (LBF). At present, there isn't a satisfactory explanation as to why there should be a difference between the up and down shoots. This early in the season there might be a slight temperature difference caused by the downward shoots being closer to the ground. This could affect NH_4^+ directly or indirectly.

Note the difference in NH_4^+ levels between the two vineyards. The Buchanan vineyard has a history of IN and high cluster NH_4^+ levels; the LBF has had fewer problems with IN. Neither of the rows where the clusters were collected showed appreciable IN.

Research plans for 1993 include: obtaining antibodies to probe for the glutamine oxoglutarate amino transferase (GOGAT) enzyme in different aerial tissue of the grapevine, specifically those tissues susceptible and not susceptible to IN; developing a feasible extraction procedure for retrieving the GOGAT enzyme from grapevine tissue, and determining the activity of the recovered enzyme.

Figure 1. Ammonium (NH_4^+) concentrations (mg/gram cluster dry weight) in flower clusters from two different cane-pruned vineyards and different shoot categories. Inflorescences were collected from shoots on thick (about 1.5cm diameter) canes and thin (<~1cm diameter) canes from a single row of vines at the Buchanan vineyard, Corvallis, Oregon. At the Lewis Brown Farm (LBF), Corvallis, Oregon, flower inflorescences were collected from shoots on upward trained vines and downward trained vines in the trellis trial. Flower clusters collected at Buchanan were near first bloom, 1992; those collected at LBF were slightly farther along.

