Improving the phenolic concentration of wine grapes using reflective mulches

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Improving phenolic concentration of wine grapes is a goal of many growers, particularly those in cooler climates where ripening can be limited. Through a series of experiments we tested three types of reflective mulches with the aim of improving phenolic concentration: 1) A synthetic mulch called Extenday®, which is a white woven fabric that can overwinter in the vineyard for up to four years, 2) a synthetic mulch called Brite ‘N Up®, a silver aluminized material which must be applied annually and cannot be reused, and 3) a natural mulch of crushed quahog shells, which are bright white, and are a byproduct of the local seafood industry in coastal New England.

The Extenday® mulch (EM) was compared to control plots (i.e., herbicide strip) on Pinot noir and Merlot at a commercial vineyard near Newport RI in 2004 and 2005. Reflectance of photosynthetically active radiation (PAR) into the canopy was higher in the EM plots compared to in the control, though the difference between the two treatments decreased as the season progressed. Visual observations confirmed that the mulch was frequently covered with some degree of debris or dirt during the growing season. Canopy density (as measured using point quadrat analysis), yield, berry size, Brix, pH, TA, total phenolics, total flavonols, and total anthocyanin concentration were unaffected by EM in both cultivars and both years. Soil temperature underneath the EM in the spring of 2005 averaged 3.2°F cooler (daily mean difference) compared to the unmulched soil. Soil temperature differed between the two treatments by as much as 19°F.

The Brite ‘N Up® (BNU) and the crushed quahog shells (QS) were tested on Merlot at a commercial vineyard near Newport RI in 2005 and 2006. PAR reflectance was significantly greater in BNU and QS plots compared to the control. PAR reflected by the BNU had a higher R:FR ratio compared to QS and control plots. Canopy density, yield, berry size, brix, pH, and TA were unaffected by the treatments in both years of the experiment. In 2005, total flavonol concentration in the grapes was improved by 21% in the BNU plots, while total anthocyanin concentration was improved by 13% in grapes from the QS plots compared to the control. In 2006, the treatments had no significant effect on fruit composition. In the fall of 2006 soil analysis indicated that calcium concentration and Ca % base saturation were significantly higher in the QS plots compared to the control, however there were no visible differences in vine nutrition among the treatments.

In 2006 an additional experiment was established on Cabernet franc at a vineyard in Orleans MA to further investigate the effect of QS on fruit composition. The treatments did not affect canopy density, yield, pruning weight, berry size, brix, pH, TA, total anthocyanins or total flavonols, but did improve total phenolic concentration by 15% compared to the control. Sensory analysis of wines from the two treatments in this study is ongoing.