

## **DIFFERENTIATION OF GRAPE (*Vitis vinifera*) VARIETIES BY ELECTROSPRAY MASS SPECTROMETRY OF JUICE PATHOGENESIS RELATED PROTEINS**

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Recently the soluble proteins that cause hazes and sediments in white wine have been identified as pathogenesis related (PR) proteins from the grape berry. The major PR proteins in the berry are thaumatin-like proteins and chitinases. Limited data from gel electrophoresis and HPLC analyses have suggested that different varieties contain a different complement of these proteins and that their molecular weights vary slightly.

With electrospray mass spectrometry (ESI), it may be possible to differentiate grape cultivars by the protein profile of berry, must and wine. Such ESI method would complement and extend the scope of varietal differentiation techniques currently available since DNA fingerprinting is not valid for wines.

Methods based on liquid chromatography-mass spectrometry (LC-MS) and protein trap mass spectrometry (Trap-MS) were developed to determine the complement of PR proteins in grape juice. Trap-MS was superior to LC-MS in terms of simplicity, rapidity and sensitivity.

Proteins with a wide range of masses (13 to 33 kDa) were found in the juices of 19 different varieties of grape (*Vitis vinifera*) and were identified as mostly PR-5 type (thaumatin-like) and PR-3 type (chitinases) proteins. Although the PR-proteins in juices of grapes are highly conserved, small consistent differences in molecular masses were noted when otherwise identical proteins were compared from different varieties. These differences persisted through different harvest years and in fruit grown in different locations. Based on the definition of 4 different masses for PR-5 proteins (range 21239 Da – 21272 Da) and 12 different masses of PR-3 proteins (25330 Da – 25957 Da) and using statistical analysis, the methods developed could be used for varietal differentiation of grapes on the basis of the PR protein composition of the juice. It is possible such a technology can be extended to wine and other fruit derived products to assist with label integrity to the benefit of consumers.

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