

Application of Hyper Spectral Imaging for early detection of rachis browning in table grapes

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Abstract

Rachis browning is a common abiotic stress that occurs during postharvest storage, leading to a decrease in commercial value of table grapes and resulting in significant economic losses. Its early detection could enable the implementation of preventive strategies. In this report, we show the feasibility of a non-destructive early detection of browning based on Hyper Spectral Imaging (HSI). Furthermore, rachis samples were subjected to transcriptomic analysis to understand putative pathways causing differences in browning within varieties. The onset of visible browning of rachis was quantified with ImageJ software analysis in six different table grape varieties (red and white). The varieties investigated are novel table grapes obtained in an ongoing breeding program at CREA-VE in Southern Italy. After harvesting, the bunches were packed in cardboard boxes and stored for two weeks at 2°C with 95% relative humidity to evaluate the shelf-life. The berries were not removed from the grape bunch to follow the onset of browning on the same bunches. Anyway, due to differences in cluster and berry size, the internal area of the rachides was not always visible. Therefore, changes were followed in the apical portion of the rachides. A Specim IQ camera was employed for image detection in the laboratory and the Specim IQ Studio software was used to detect Areas Of Interest (AOIs). Differences in both the visible and Near Infra-Red (NIR) spectral regions were detected before the onset of browning of the rachides. It was possible to observe different changes in the spectral profiles among the varieties.

Keywords: *Vitis vinifera*, postharvest, image analysis.