Red drupelet reversion in blackberries caused by mechanical damage is not linked to a reduction in anthocyanin content

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Abstract

Red Drupelet Reversion (RDR) in blackberry is a physiological disorder where numerous fruit drupelets regress to red from black color during post-harvest handling. The specific mechanism causing RDR is still unknown; however, numerous studies have suggested that anthocyanin contents could be involved in this phenomenon. Recently, it has been reported that RDR in cultivars 'Ouachita', 'Triple Crown' and 'Apache' could be associated with a reduction (56–63 %) in anthocyanin contents after 24 h of storage. Interestingly, other studies have observed that RDR could be linked to fruit mechanical damage during transportation; specifically, due to fruit vibration (10 Hz and acceleration of 0.5 g). Based on this notion, the main goal of the present study was to establish a fruit vibration model to evaluate the relationship between mechanical damage, anthocyanin content and RDR appearance. Blackberry clamshells *cv*. 'APF-122' (170 g) were subjected to vibration (10 Hz and acceleration of 0.5 g) during 1, 3, and 5 min to induce RDR. Color and anthocyanin content were evaluated at 0, 24, 48, 72, 96 and 120 h of storage at 1 °C. RDR was observed immediately after fruit was subjected to 5 min vibration; however, no changes were observed in anthocyanin concentration. Multiphoton microscopy revealed that reverted fruit possessed anthocyanins dispersed within the cells; in contrast, no reverted fruit held anthocyanins in spherical agglomerates. Also, it was observed that anthocyanin fluorescence emission was reduced in reverted drupelet, suggesting changes in intermolecular interactions between anthocyanins. Interestingly, a reduction in anthocyanin concentration in reverted fruit was observed only after 72 h of storage; indicating that anthocyanin content may not be involved in the RDR process. Taken together, these results suggest that blackberry color reversion could be associated with changes in anthocyanin intermolecular interactions. Further studies are in progress to corroborate this hypothesis.