

Title Studies on browning in the calyx surface and handling of 'Royal Gala' apples in water dumps
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Abstract

In the past five years, browning symptoms at the calyx end of 'Braeburn', 'Royal Gala' and 'SciEarly'/Pacific BeautyTM apples have been observed during storage following packing. The symptoms appear as a continuous or discontinuous dark brown ring within the surface of the calyx cavity, and appear to have developed in response to the collection of liquid within the cavity. The occurrences of the symptoms have been sporadic within the season and between varieties and packhouses, but in general, within a season tend to be confined predominantly to a single variety and a few packhouses. During the 2008 harvest, symptoms were observed on 'Royal Gala' apples after packing and within a few weeks of storage. Collectively the observations suggest that the symptoms develop mostly in response to the process of packing, although symptoms may develop in storage prior to packing, and that fruit from some orchards may be more prone to develop symptoms than fruit from other orchards. The symptoms were very similar to those shown as chlorine burn (http://entomology.tfrec.wsu.edu/Cullage_Site/Cards/Physiol.html). However, the appearance of symptoms without contact with chlorine, i.e. prior to packing, suggests that a preharvest predisposition factor may be involved. In this study, the effect of time in a chlorine-based water wash and dump system on the development of calyx browning symptoms in controlled atmosphere (CA)-stored 'Royal Gala' apples was studied. Fruit from CA storage were passed through the water dump and wash system and packed into cartons with or without polyliners, and then stored for 8 weeks in air before being evaluated for calyx browning symptoms. In addition, spray diaries of those orchards affected by calyx browning symptoms were examined for relationships between pesticide, fungicide and calcium use and the incidence of calyx browning symptoms. The findings indicate that the time fruit spend in chlorinated water following brushing affects the incidence of the calyx damage and that a final rinse with potable water reduced the incidence. Predisposition to developing symptoms was not related to fungicide or pesticide use, but was related to the number of early and late calcium sprays used. It is concluded that the calyx browning symptoms are most likely associated with fruit that sustained some surface growth stress in the calyx, with the expression accelerated by the use of chlorinated water.