

Postharvest calcium treatment of apple fruit increased lenticel breakdown and altered cuticle structure

Vikram Singh, Dan Gamrasni, Pragna Parimi, Bettina Kochanek, Shaul Naschitz,
Hanita Zemach and Haya Friedman

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Abstract

Lenticel breakdown (LB) mainly occurs in susceptible ‘Gala’ and ‘Red Delicious’ apples following storage. Postharvest calcium treatment increased LB of both cultivars as well as the less susceptible ‘Orleans’ and ‘Granny Smith’. Calcium increased the number and size of damaged lenticels. Callose was deposited in the sub-lenticular cells and the cuticle of the damaged lenticels, as well as in non-damaged lenticels. Suberin was deposited in the sub-lenticular cells, but only in the most severely damaged lenticels, and especially in calcium-treated fruit. Postharvest calcium treatment increased the micro-cracking of the skin surface and removed the epicuticular wax following storage. It also decreased the thickness of the cutin and wax layers. Gene expression, mainly of those involved in the wax biosynthesis and cutin and wax transport, were reduced in peel of calcium-treated fruit. Our study suggests that the deleterious effect of calcium on fruit skin occurs due to a decrease in cuticle deposition during storage, resulting in a thinner cuticle, leading to micro-cracks, which culminates in increased lenticel damage.