

MINIMIZING INTERNAL BROWNING IN APPLES AND PEARS

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In July 2001, I attended the 8th International CA Research Conference in Rotterdam, The Netherlands, where I was treated to an excellent summary on the causes of CA related disorders presented by Dr. Josef Streif of the University of Hohenheim in Germany. Dr. Streif has given me permission to recount his work for Washington growers.

Low oxygen and/or high carbon dioxide injury results from holding fruit in atmospheres below or above its tolerance. Several factors influence the appearance and severity of the symptoms, which can include external skin discoloration, core browning and flesh cavities. Growing conditions as well as variety characteristics determine susceptibility. Of course the major problem with these disorders is that neither the packer nor the consumer can determine what is inside the fruit until it is consumed.

There have been special challenges with apple varieties such as ‘Braeburn’, ‘Fuji’, and ‘Elstar’. Growers in the European Community have had serious problems with atmosphere-induced injury to ‘Conference’ pears and have funded numerous researchers in several countries to study ways of minimizing these problems.

These studies have elucidated a number of reasons for these problems. There are several preharvest factors that influence internal browning disorders.

- Trees with low crop load develop cavities and browning more than those with a balanced crop.
- Fruit become more sensitive to CA related disorders when picked in a more advanced state.
- Foliar sprays of boron beginning two months prior to harvest reduced browning one year, but not the next, and may have even promoted problems the second year.
- Calcium sprays alone could not prevent browning in ‘Braeburn’.

Postharvest there are several important factors that influence the susceptibility to disorders.

- Delaying CA is a powerful tool to preventing internal browning.
- High CO₂ levels immediately after harvest, especially with low oxygen promote internal browning.

- Low CO₂ levels rising to higher levels over time did not promote internal browning as fruit become acclimated.
- Things that restrict gas diffusion (waxes, polyliners) will increase internal browning.

Living cells need a continuous supply of energy, even in storage. Disorders can develop when the CA conditions lower this supply. This is illustrated by some research done by Dr. David Johnson of IHR in England in which he scrubbed ethylene from fruit that had been sprayed with ReTain. This lowered the respiration rate to the point at which internal browning resulted. The question of “how low can you go?” can be answered by too low!

(These international meetings do come up with important information at times! Thanks to Drs. Streif and Johnson for permitted me to share this information with you).