

Spatial variation of fruit cooling rate and relative humidity inside 'Super-Vent' packaging for citrus during static cooling

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Abstract

Inadequate cold chain maintenance contributes to high incidence of postharvest losses and wastage of horticultural fresh produce. Packaging plays a critical role in fresh produce handling and contributes to maintaining the cold chain and reduction of handling damage. A wide range of packaging designs and vent characteristics (size/shape of opening and position on package) are used in the fruit industry. The use of inappropriate ventilated packaging can result in cooling heterogeneity and incidence of physiological disorders during cold storage. The objective of this study was to investigate the effects of package position inside the cold store and vent position on package on fruit cooling rate. Results of studies on 'Valencia' orange packed inside 'Super-vent' cartons showed that the position of packaging inside a cold store affected heat transfer and cooling rate of fruit. The regions that were exposed to cooling air showed a significantly higher cooling rate of the fruit than the center positions. The effects of conductive heat transfer between the floor and the package was significant in promoting rapid fruit cooling. Results obtained also showed that fruit near the vent area cooled significantly faster than fruit in other locations inside the carton. These findings highlight the need to adopt cost-effective and resource-efficient approaches to the design of vents on horticultural packaging.