Title Development of vertically ventilated pallet systems

Author Smale, N., Tanner, D. and Amos, N.

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Abstract

Packaging design plays an important role in regulating cooling and preventing weight loss during storage and transport of horticultural produce. Respiratory heat can create problems in these systems, causing the cartons in the centre of a pallet to be significantly warmer than those on the outside of the pallet. This temperature variability can cause variable quality at out-turn and can lead to marketing problems. A traditional approach to this problem has been the design of cartons with open vents, but unfortunately open vents and the high airflow rates used in marine transport systems can contribute to product dehydration and quality loss such as shrivel. To address these issues, three integrated packaging systems were designed to increase cooling rates and reduce temperature variability during transport. In the trials of these packaging systems, the cooling performance of each new design was compared with the existing ZESPRI 'Modular bulk' carton. All four palletized packages were tested using a vertical flow rig specifically designed for testing packaging performance in transport environments. The rig was used to characterise the airflow rate through a single pallet over a range of pressures and to assess the cooling rate and temperature variability. Simulated shipments in a 40' marine container using 20 pallets of kiwifruit in each packaging system were also conducted. Results of both trials showed the prototype packaging systems improved cooling rates and reduced temperature variability during transport.