Abstract

Scope and objective: Horticulture is one of New Zealand's fastest growing export sectors but products always requires lengthy transport during which the cool chain can be interrupted. These temperature changes can have detrimental effects on broccoli; therefore broccoli is often top-icing, although ensuring constant cooling, favours the spread of micro organisms in melt water and greatly increases product weight and thus transport cost. Modified atmosphere packaging presents a possibility to extend storage life even under less favourable temperature conditions. Therefore the objective of this study was to investigate the influence of the extent, timing and duration of temperature abuse on the quality of broccoli stored in modified atmosphere packages.

Methodology: Broccoli heads were cooled to 2ºC and packaged in polyethylene bags. Several cool chain scenarios were implemented to simulate the range of temperature abuse possibly experienced during transport and distribution. These cool chains included continuous storage at 2ºC, temperature abuses of 10 and 20ºC early or late during storage, and combinations of all of these. Quality was assessed at different times during storage as weight loss, visual appearance, odour, colour, taste, and consumer liking. Results and conclusion: Minor fluctuations around the desired air temperature did not markedly influence broccoli quality and the established atmosphere of 6.5% O_2 and 4% CO_2 was generally favourable for protecting product against imposed temperature changes. Overall weight loss was increased by a storage period at 20ºC, but not by temperature increases to 10ºC. Yellowing occurred in larger heads as soon as temperature changes took place. Produce subjected to temperature abuse towards the end of storage showed a higher rate of yellowing, suggesting transport of broccoli directly after harvest is preferable. However the sensory panel did not detect a decrease in quality over the storage period. Rots occurred on some larger heads and could be attributed to the presence of condensation water resulting from the temperature fluctuations.