Title Postharvest response of fresh produce to low-pressure stress occurring during air cargo transportation conditions: A simulation

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Citation Thesis, Doctor of Philosophy (Food and Nutrition Science). Universite Laval .160 pages. 2006

Keywords Postharvest; Produce; Air cargo; Transportation; Vapor pressure deficit

Abstract

The aim of the present research work was to develop a better global knowledge of the effects of low pressure of 0.7 atm normally found aboard aircraft on the postharvest behavior of perishables. The first objective of this work was to investigate the effect of a short (6 to 8 hours) low-pressure treatment and to determine if negative effects were induced on strawberry quality characteristics. Results showed that a short exposure to 0.7 atm did not induce any negative effects in the quality of strawberry. Hence, these results lead to further investigation using longer exposure times to 0.7 atm on the effect on volatiles emission profile in strawberries. Results showed that a 14-hour exposure treatment, which represents the longest non-stop cargo flight for perishables, was sufficient to induce a stress response. Specific volatiles (i.e. ethyl acetate) were identified as potential fingerprints to trace the residual shelf-life of strawberries throughout the distribution chain.

Secondly, the study focused on the understanding of the relationship between low pressure and the vapor pressure deficit (VPD), the water loss and stomata behavior in cucumbers. Hence, the relation between the evolution of VPD and water loss from cucumbers was investigated under normal conditions found aboard aircraft. The results suggested that low-pressure stress found aboard aircraft might induce a residual effect in the post-harvest behavior of cucumbers. The latter results lead to further investigation on the effects of low-pressure stress on stomata behavior. Results suggested that cucumbers exposed to a low pressure of 0.7 atm for only 6 h, may express an indirect stress response that occurs only when the fruit are returned to normal pressure storage, preventing stomatal closure. This residual effect may be explained by the possibility that low pressure enhances outward diffusion of CO_2, reducing intercellular CO_2 concentration (C_i) and causing stomata to open. When the fruit are transferred to normal pressure, stomata may remain open to restore the C_i.