

Modelling of firmness variability of Jonagold apple during postharvest storage

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Abstract

The firmness of Jonagold apples is an important quality attribute during postharvest chain. However, postharvest handlers are faced with variability in the firmness that exists within apples even of those of the same batch and cultivar. Here, Jonagold apples were stored at 1 °C and 4 °C with different controlled atmospheric gas compositions for 170 d, and then exposed to shelf-life conditions for 15 d, and other portion of apples was immediately stored to shelf-life scenario for 21 d. The firmness and ethylene emission of the apples were quantified during storage. A kinetic model equation was established to predict the firmness breakdown of apples depending on storage conditions. The model was based on a stochastic technique that incorporated biological variability in firmness. A relative sensitivity analysis was carried out to analyse the utmost stochastic parameters and fruit-specific data were obtained. The Monte Carlo method was applied to predict how the initial fruit variability in firmness within Jonagold apples propagates throughout the postharvest storage. The simulation outputs suggest that the model established in study may be useful to manage the biological variability and describe how the initial firmness variability propagates during the postharvest chain.