Title	The firmness of stored tomatoes (cv. *Tradiro*). 1. Kinetic and near infrared models to describe firmness and moisture loss
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Abstract

The aim of this research was to develop practical applicable models capable to describe and to predict the temperature dependent firmness and moisture loss of tomatoes during storage. To gather the required information to develop these models batches of 20 tomatoes (cv. *Tradiro*), each harvested at two maturity stages, were stored at four different temperatures (3, 12, 20 and 25 °C) up to four weeks. One temperature (3 °C) is known to cause chilling injury to the product. During storage at these temperatures firmness loss, moisture loss and near infrared spectra were measured on individual tomatoes at regular intervals. The decrease in firmness was measured non-destructively by flat-plate compression, moisture loss was measured by weight loss. The information on firmness and moisture loss was used to develop two types of models. The first type of model was based on fundamental laws of chemical kinetics, assuming plausible chemical reaction mechanisms. These reaction mechanisms describe the processes underlying either firmness, or moisture loss. From these reaction mechanisms a set of differential equations was derived and solved at constant temperature. For these kinetic models, both for firmness, and moisture loss, two independent processes were assumed. One process is mainly expressed at low (<10 °C) temperatures and relates to chilling injury; its contribution increases at decreasing temperatures. The other process relates to the normally observed fruit softening and moisture loss process during storage. Throughout the entire temperature range its contribution increases at increasing temperature. The second type of model was based on Partial Least Squares Regression analysis, relating the data on firmness to the near infrared spectral data. Due to their difference in nature the kinetic models describe the firmness change and moisture loss in time at constant external condition. The regression model describes the actual firmness of a homogeneous batch of tomatoes.