

Title Mathematical modelling of the kinetic of quality deterioration of intermediate moisture content banana during storage

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Abstract

Kinetic model studies describe quality deterioration rate and their dependence on environmental factors (e.g. temperature and water activity), which are essential for process optimisation. The effect of environmental factors (temperature and relative humidity) on the kinetics of the changes of colour, moisture content and water activity of intermediate moisture content (IMC) banana during storage were investigated. IMC banana samples were stored in the airtight containers with 50–57%, 61–68% and 75–76% relative humidity at 10, 15, 20, 30 and 40 °C. Colour and moisture content of samples were monitored over time. The experimental results showed that IMC banana absorbed moisture faster when stored at high temperature and at high relative humidity, at the beginning of storage. The water activity of IMC banana during storage was found to follow an exponential increase, which was described by the lumped capacity model. The zero-order reaction model showed a good fit to the colour (L and ΔE) changes of IMC banana under different relative humidity at 20, 30 and 40 °C. A secondary model was developed to describe the changes of L parameter of IMC banana during storage, accounting for the effect of environmental relative humidity and temperatures. Therefore, control of the storage conditions is of great importance to predict and extend the shelf life of IMC banana.