Title Development and modelling of an active packaging system for tomato incorporating a volatile antimicrobial agent

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Abstract

The focus of this research is the development of an active packaging system in which a volatile component can be delivered and sustained in the headspace at an appropriate concentration to control postharvest pathogens throughout the required storage period. Hexanal vapour was taken as a model volatile due to its degree of volatility and proven antimicrobial activity. Its antifungal activity was tested against *Botrytis cinerea* inoculated on tomato and the minimum inhibitory concentration (MIC) for continuous exposure was determined to be 40-70 ppm. Sachets for the controlled release of hexanal vapour were developed using different masses of silica gel adsorbent contained within low density polyethylene (LDPE) film. These sachets were inserted within LDPE bags (250 x 300 mm) containing intact tomatoes and the gas atmosphere and tomato quality parameters were measured during storage periods of up to 14 d at 20°C. Hexanal vapour concentrations in the package headspace were sustained above the MIC level during the first 7 days of the storage period. Mathematical models were developed to predict the concentrations of hexanal and other key gases (O_2, CO_2 and H_2O) in the package atmosphere. Model predictions were assessed against experimental data and showed good agreement (95% confidence level) The models and their potential to be further developed to design active packaging systems for other horticultural products will be discussed.