

ABSTRACT

Capsicum is plump, bell-shaped vegetable and is rich sources of vitamin C and A, and antioxidant. Their medicinal property helps in preventing or reducing degenerative diseases, including ageing, cancer, diabetes, and cardiovascular diseases. Its demand is high in the market throughout the year whether in household or in hotel industry, but internationally, its demand is high in European market. Water loss, tissue softening, shriveling, and chilling injury are the major challenges, which limit the quality and post harvest life of capsicum.

Respiration rate of capsicum was studied at different temperatures using closed system respiration method. Respiration was found to be influenced by the temperature and it followed Arrhenius law. The generated data were used to develop different types of models. Models based on principle of enzyme kinetics with Arrhenius type and the four parameter second-order polynomial showed better fit to experimental data than non linear model.

Gas exchange was studied through a macro-perforated packet containing capsicum having different number of holes at different temperatures. A model was developed combining the Michaelis-Menten kinetics to describe the respiration rate of the product with mass transfer equation to describe the gas transfer across the package under perforated and non-perforated packaged condition. The highest mean relative deviation modulus (E) value was observed for the case of single hole at the temperature of 5 °C for CO₂, which was found to be 7.53 %, whereas the E value was lowest for O₂ at 5 °C and was 0.71 % for two holes. Developed model provided a good fit to the experimental data, as the recorded E value was less than 10 %. Developed model applicability was further validated in a dynamic test, subjecting a package to a variable temperature program simulating conditions in distribution chains. Model showed good agreement between predicted and observed value.

Storage study was conducted to evaluate the developed packets for various physiochemical and sensory attributes. Based on the taste score, packaged non perforated and with one hole allowed a storage life of 40 and 20 days at temperatures of 5 and 15 °C respectively, while, two holes MAP packets were safely stored for 30 days and 20 days at temperatures of 5 and 15 °C respectively. Four holes MAP packet had a life of 30 days and 16 days at the temperatures of 5 and 15 °C, respectively. However, unpacked control was unacceptable after 23 and 11 days of storage at temperatures of 5 and 15 °C respectively. Comparative study of modified atmospheric packaging under perforated and non perforated with ambient storage established the advantage of modified atmospheric packaging.

Keywords:

Capsicum, Respiration rate, Perforated modified atmospheric packaging, Modeling, Michaelis-Menten kinetics