

Title Analysis of water vapour transmission rate of perforation-mediated modified atmosphere packaging (PM-MAP)

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Abstract

Perforation-mediated modified atmosphere packaging relies on the use of perforations (tubes) of different dimensions to control O₂ and CO₂ exchange in order to create the desired atmosphere for preservation of fresh fruits and vegetables. No work has been done so far to measure the water vapour transmission rate (WVTR) of this new system. The present study analyses WVTR in different perforation dimensions (diameter: 9, 13 and 17 mm; length: 10, 20 and 30 mm) and storage temperatures (4, 10 and 16 °C). Diameter was the variable with the greatest influence on WVTR, followed by tube length and temperature. The WVTR of perforation-mediated packages increased with increasing temperature and tube diameter while it decreased with increasing tube length. A mathematical model to describe the changes in WVTR as a function of perforation diameter, length, porosity and storage temperature was developed and validated successfully at 7 °C. An experiment with mushrooms showed that the perforation-mediated modified atmosphere packaging could be used for fresh produce provided that the condensation is minimised by using a moisture absorber.