

Title Evaluating the storage environment in hypobaric chambers used for disinfesting fresh fruits

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Abstract

Low pressure (LP) treatment has potential as an alternative non-chemical postharvest disinfestation method for fresh fruits. A validated computer simulation model was used to determine the thickness of foam insulation needed to cover the hypobaric chamber walls in order to stabilise the air temperature within the hypobaric chambers that were housed in a cold storage room with fluctuating air temperatures. The stability of pressure, temperature and relative humidity levels in the LP system was evaluated together with various O₂ concentrations, evacuation, venting and leakage rates. Results showed that the added foam covering the chambers maintained the temperature variation of the hypobaric chamber wall to within ± 0.2 °C and inside air to within ± 0.1 °C. The regulating system kept pressure to within $\pm 1\%$ of the set point, and maintained relative humidity at nearly saturated levels ($>98\%$) under various air exchange rates and pressures, with a chamber leakage rate of 0.009 kPa h^{-1} and LP system leakage rate of 0.480 kPa h^{-1} . Given that the hypobaric chamber displayed adequate performance characteristics, further studies will be conducted to evaluate LP treatment efficacy for fresh fruits.