

Title Methodology of temperature prediction in an insulated container equipped with phase change materials

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Citation ISHS Acta Horticulturae 802:83-90. 2008.

Keywords container; phase change materials; refrigeration; temperature; conduction; prediction

Abstract

This study aims to present a methodology of product temperature prediction at various positions in an insulated container along a logistic chain. The container is equipped with Phase Change Materials (PCM, melting point -0.5°C) to maintain the recommended temperature in the loading. The following steps were undertaken: 2 experiments of product temperature monitoring at various positions in the loading were carried out. The loaded cavity, 5°C initial temperature, was exposed to a constant external ambient temperature: 0°C for the first experiment and 30°C for the second. The experimental values of the temperature evolution, at various positions, were then used to develop a predictive model for a new ambient temperature varying from 0°C to 30°C . An excitation-response method, largely used in the signal treatment, was applied assuming linearity between the product temperature (response) and the external ambient temperature (excitation). The predictive model is, thus, applicable for constant or variable external ambient temperature as occurs along a logistic chain as long as the PCM is not completely melt.