

Title Simulation of Transport Phenomena during Natural Convection Cooling of Bagged Potatoes in Cold Storage, Part II: Mass Transfer

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Abstract

Moisture loss from potato is one of the most important economically significant parameters for long-term storage. It is a mass transfer phenomenon, which has strong relevance with heat transfer and fluid flow. Therefore, attempt was made in this study to model the moisture loss in a single bag packed with potato kept in cold store under natural convective environment using the computational fluid dynamics technique. It was found that in spite of high specific humidity, maximum moisture loss occurred in the upper half of the bag during the initial cooling period. As the cooling proceeded, the zone of maximum moisture loss shifted towards the bottom of the bag. The average rate of moisture loss in the bag at steady state was found to be 0.091% (w/w) [water] week⁻¹. The contours of rate of moisture loss and specific humidity maintained symmetry about the vertical axis in a vertical plane and about both the horizontal axes in horizontal plane throughout the cooling process. The experimental total moisture loss was found to be 0.82% (w/w) against the simulated total moisture loss of 0.695% (w/w) over a storage period of 25 days.