

Wichamanee Yuenyongputtakal 2006: Osmotic Pre-treatment in Fruit Product Development from Persimmons (*Diospyros kaki*). Doctor of Philosophy (Agro-Industrial Product Development), Major Field: Agro- Industrial Product Development, Department of Product Development. Thesis Advisor: Assistant Professor Phaisan Wuttijumnong, Ph.D. 150 pages.
ISBN 974-16-2161-2

Persimmon (*Diospyros kaki*) samples (disk, cube and whole fruit) were dehydrated by immersion in ternary solutions consisting of sucrose and NaCl at a constant temperature (30 °C). A second-order central composite design (CCD) with two variables was used involving combinations of sucrose concentration from 30 to 60 g / 100g and NaCl concentration from 0 to 10 g / 100g. The mass transfer parameters were experimentally determined by measuring Weight Reduction (*WR*), Water Loss (*WL*) and Solid Gain (*SG*). After 6 h the *WR* and *WL* were more than 0.4 kg/kg whereas *SG* was less than 0.002 kg/kg for disks as well as cubes. In the case of whole fruit, after contact for 48 h the *WR* and *WL* were more than 0.4 kg/kg and the *SG* was less than 0.13 kg/kg. Equilibrium moisture content and equilibrium solid content (m_e and s_e , respectively) were also determined graphically; and water and solute diffusion coefficients (D_{ew} and D_{es} , respectively) were estimated on the basis of Fick's second law. It was found that the values of m_e ranged between 0.197 and 0.938 kg/kg of initial dry matter for disks, and 0.807 to 0.970 kg/kg for cubes. The values of s_e ranged between 1.004 and 1.007 kg/kg for disks, and ranged between 1.003 and 1.008 for cubes. The estimated values of D_{ew} varied from 1.345×10^{-10} to 2.061×10^{-10} m²/s for disks and from 2.582×10^{-10} to 3.437×10^{-10} m²/s for cubes. D_{es} varied from 1.267×10^{-10} to 4.302×10^{-10} m²/s. for disks and from 1.179×10^{-13} to 4.311×10^{-13} m²/s for cubes. The mathematical models for the mass transfer parameters were fitted to 2nd order polynomial function of osmotic solution concentration. The model performance and verification showed the satisfactory values of goodness of fit. Sucrose and NaCl were shown to have synergistic effect on mass transfer. Response surface plots were able to optimize the solution concentrations. In addition, the developments of value-added fruit products from persimmons using osmotic dehydration as pre-treatment steps were investigated. The final products were osmodehydrated product of whole fruit and osmodehydrofrozen of cubes.

Student's signature

Thesis Advisor's signature

