CONCLUSION

This thesis focuses on fruit product development from persimmons, especially the astringent cultivar by using osmotic dehydration as a pre-treatment step. The mass transfer behavior of persimmons during osmotic pre-treatment was studied. Persimmon samples (disk, cube and whole fruit) were dehydrated by immersion in ternary aqueous system consisting of sucrose and NaCl. The results shown that the rates of weight reduction and water loss were much higher than the rate of solid gain during the osmotic processing. After 6 h the weight reduction and water loss were more than 0.4 kg/kg whereas solid gain 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 weight reduction and water loss were more than 0.4 kg/kg and the solid gain was less than 0.13 kg/kg. Sucrose and NaCl concentrations in the osmotic solution critically influence mass transfer parameters. Weight reduction, solid gain and water loss were affected by sucrose and NaCl concentration. However, NaCl concentration was greater influence than sucrose concentration. Equilibrium moisture content and equilibrium solid content were also determined graphically; water and solute diffusion coefficients were estimated on the basis of Fick's second law. Generally, equilibrium moisture content decreases and equilibrium solid content increases with increasing sucrose and NaCl concentrations. Water and solute diffusion coefficients values also increase similarly with sucrose and NaCl concentrations. A small amount of NaCl used in the osmotic solution results in a considerable enhancement in mass transfer.

Based on the experimental data, mathematical models were developed to relate osmotic solution concentration and mass transfer parameters. The mathematical models were fitted to 2^{nd} order polynomial. The model performance and verification showed the satisfactory values of goodness of fit. These mathematical models developed in this study can be useful in the design optimum concentrations of solutes in ternary solutions for persimmon. Response surface methodology was use to optimize the osmotic solution concentrations in a pre-treatment step.

The developments of value-added fruit products from persimmons using osmotic as a pre-treatment steps were investigated. The final products were osmodehydrated product of whole fruit and osmodehydrofrozen of cubes. The appropiated procedure to obtain osmodehydrated persimmon product was placing the whole fruit in 2%$CaCl_2$ for 2h. Then immerse the fruit in an osmotic solution containing of 40 g/100g of sucrose, 1 g/100g of NaCl and 100 ppm of sorbic acid and sodium metabisulphite until the solid content reached 35% (12 h 45 min). The osmosed product was then subjected to microwave-vacuum dryer operated at the following power settings: 640 W for 10 min, 320 W for 15 min and 160 W for 10 min. at vacuum pressure gage of -600mmHg. The quality of the osmodehydrated persimmon product was better than the dehydrated one. For osmodehydrofrozen persimmon, osmotic pre-treatment was done by immersing the cube in the osmotic solution containing of 35 g/100g of sucrose and 2 g/100g of NaCl for 6 h. After that osmotically treated samples were sealed in polyethylene bag and then frozen at -40 °C in cryogenic freezer. It was found that applied osmotic treatment before freezing, significantly reduced the drip loss after thawing. The lower water content of the products protects the tissues from freezing damage. The osmodehydrofrozen persimmon stored at -18 °C for 4 weeks shows no significant changes in color, taste, flavor and overall acceptability except for texture.