DRYING OF PERSIMMON: MATHEMATICAL MODEL FOR DIFFUSIVITY AS A SIMULTANEOUS FUNCTION OF MOISTURE CONTENT AND SHRINKAGE

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The persimmon (Diospyros kaki) is native to East Asia, most likely China and Japan. It has been cultivated in the Mediterranean basin for more than a century and is as appreciated as apple in the West. This fruit arrived in Brazil in 1890 and its culture was expanded in the Sao Paulo State only from 1920, with Japanese immigrants, which brought new varieties and know how. There are over 400 species of persimmon that vary widely in shape and colour. Commercially in Brazil it has been considered the following varieties: Rama Forte, Taubaté, Giombo and Fuyu. The fresh persimmon has a high moisture content (about 85% wet basis) making it highly perishable, requiring adequate drying conditions to obtain an acceptable dehydrated product. Mathematical modelling of the dehydration process is very useful in the design and optimisation of dryers. However, theoretical simulations of drying process require a substantial amount of computing time as a consequence of the complexity of diffusion equations governing the process. The drying kinetics of persimmon of the Rama Forte variety was studied by using a fixed bed dryer at temperatures in the range of 50 to 80oC, and air velocity of approximately 1.5 m/s. The volume change or shrinkage during convective air-drying was described by a linear correlation in respect to the water content. The method for evaluating effective diffusivity as a function of moisture content and undergoing shrinkage during drying of persimmons was based on numerical solution of Fick's diffusion equation. The effective diffusivity values at moisture contents between 0.35 - 3.97 kg water/kg dry matter were found to be 1.2 ´ 10-10 m2.s-1 to 8.9 ´ 10-10 m2.s-1. Acknowledgments: FAPESP (Procs. 98/05130-8 and 98/08738-7).