

Title Analysis of the drying kinetics of chestnuts
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Abstract

Chestnuts are widely produced in Portugal and have an unquestionable economic interest, allowing a multiplicity of potential industrial applications, either in their natural form or after dehydration.

In this work, the experimental dehydration behaviour of three different varieties of chestnuts (*Castanea sativa*) was investigated, and the experiments were carried out under isothermal conditions, using ventilated driers at 70, 80 and 90 °C.

The experimental data obtained for the variations of water content along the drying time was fit to a two-term exponential model with success. The experimental drying rate points were calculated by approximating the derivatives to finite differences, and the drying rate versus moisture content and time curves were fit, respectively, to a sigmoid function and a first-order kinetics, with relatively good results. Moreover, it was possible to conclude that the varieties *Longal* and *Martainha* show better drying features than the variety *Viana*, and thus seem to be more suitable for industrial purposes. The influence of temperature on the drying rates was evidenced, with higher drying temperatures corresponding to faster processes, which represents an advantage when evaluating production costs.

Finally, the experimental data was used to predict effective diffusivity according to Fick's second law equation, assuming that the variation of diffusivity with temperature could be expressed by an Arrhenius type function, and the values of diffusivity obtained ranged from 4.45×10^{-9} to 7.65×10^{-9} m²/s, respectively, for chestnuts of the variety *Longal* at 70 °C and *Viana* at 90 °C.