



Research article

COMPARATIVE ANALYSIS OF INFRARED AND CONVENTIONAL OVEN DRYING ON THE KINETICS, EFFECTIVE MOISTURE DIFFUSIVITY AND SHRINKAGE OF CALAMANSI (*CITRUS MICROCARPA*)

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ABSTRACT

Calamansi (*Citrus microcarpa*) is a Southeast Asian citrus fruit valued for its distinctive sour taste and bioactive compounds. However, its high moisture content contributes to rapid deterioration, making drying an important preservation method. Drying is a common preservation technique that lowers water activity and enhances the stability of food. This study investigated the effect of infrared (IR) and oven drying at 50, 60, 70, and 80 °C on the drying kinetics, effective moisture diffusivity, and shrinkage of calamansi slice. The results showed that higher temperatures and the use of the IR dryer led to a faster drying rate. Five thin-layer drying models -Newton, Page, Modified Page, Henderson and Pabis, and Midilli were fitted to the experimental moisture ratio data to describe the drying behaviour. The effective moisture diffusivity values were found to range from 0.35×10^{-8} to 5.05×10^{-8} m²/s and generally increased with drying temperature. Shrinkage increased at higher drying temperatures and was more pronounced during IR drying. The Midilli model nevertheless demonstrated high flexibility across IR and high temperature oven drying, achieving $R^2 \geq 0.999$ at IR drying at 60 °C and oven drying at 80 °C. Overall, IR drying provided moisture removal faster than conventional oven drying of calamansi slices under the investigated conditions.