Title Development of a vacuum heat pump dryer for drying chilli

Author Apichart Artnaseaw**,** Somnuk Theerakulpisut and Chatchai Benjapiyaporn

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Abstract

A new design of a vacuum heat pump dryer was built and tested. The dryer was used to dry chilli to study the effects of drying parameters such as pressure and temperature within the drying chamber on the qualities of the dried product and the drying time. The qualities of dried product included colour change, percentage shrinkage, rehydration ratio and surface structure. The drying data were fitted to a number of different thin-layer drying models with the Midilli model giving better predictions than the other models. Drying time decreased with an increase of drying temperature or a decrease of drying pressure. Colour change increased with an increase in drying temperature or drying pressure. Drying temperature had insignificant effects on rehydration ratio and percentage shrinkage ($P > 0.05$). Rehydration ratio notably decreased with an increase in drying pressure, while percentage shrinkage increased with an increase in drying pressure. Both drying pressure and temperature affected the surface structure of the dried chillies. It was found that the influence of drying pressure was more pronounced than that of drying temperature. The surface structure was smoother with decreasing drying pressure.