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Hydrodynamics Investigations of Kaffir Lime Leaves Drying in a Swirling Solar Drying Chamber with Inclined Slotted Angle Air Distributor

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Abstract

The present work aims to investigate the behavior of drying kaffir lime leaves in a swirling solar drying chamber (S-SDC) fitted with an inclined slotted angle air distributor. A distributor plated with inclined slotted angle was located at the air inlet at the bottom of the chamber. Experimental and numerical methods have been applied to analyze the efficiency of developed S-SDC assisted solar drying system based on the moisture content (MC), moisture content ratio (MR) and drying rate (DR) were examined. The experimental results showed that the S-SDC can reduce the moisture content of

kaffir lime leaves more rapidly than a conventional solar drying chamber (CSDC). The S-SDC gave a higher DR and decreased drying time compared to that of C-SDC. The results also indicated that operation at higher air velocities resulted in a greater DR, especially at the beginning stage of the drying process. For the S-SDC, the reduced of MC, MR and DR at a high air velocity ($v = 2.0 \text{ m/s}$) was better than at low air velocities ($v = 0.5$ and 1.0 m/s). Drying chamber efficiency is also observed at a higher air velocity of 2 m/s for both SSDC and CSDC. In addition, obtained experimental findings are in line with numerical results. The outcomes of this study present the potential of using the S-SDC compared to the C-SDC to be used in drying crops. © 2023, Penerbit Akademia Baru. All rights reserved.

Author keywords

Drying chamber; Hydrodynamics; Swirl flow; Swirling Solar Drying Chamber (SSDC)

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Abstract

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