

Title Effect of Shifting Practices on Performance of a Fixed-Bed Convection Dryer for Longan

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Abstract

Longan (*Dimocarpus longan* Lour) is a seasonal fruit notable for its nutritional and medicinal value that is grown mostly in Asia. Fresh longan has high moisture content and cannot be stored extendedly. Various post-harvest treatments have been found to prolong edibility, but longan is still mainly exported in other forms. Drying reduces the longan weight by approximately 66% and adds value to the product. However, dried longan must be undamaged and free of contaminants and have optimum colour and moisture content on import. Overall, an adequate and consistent drying process is critical in achieving the standards of international markets. Thailand is currently the largest exporter of longan in the world, a third of which is dried. Production is concentrated in the north, where longan is a major component of the local economy and much of the harvest is dried for export. The most common dryer for longan in this region is the Taiwan"-type fixed bed convection dryer, which is used for the bulk drying of unpeeled longan. However, it has been observed that the present design doesn't allow for uniform drying and techniques used to remediate this are labor"-intensive and damage the product. So far, little research has actually characterised the performance of this dryer type, or suggested improvements.

Experiments were conducted in Thailand using different shifting configurations compared to the conventional. Drying conditions, energy consumption and product quality were monitored. Results showed that air velocity and temperature were heterogeneous. However, distribution patterns did not correspond. As temperature is highly influential in determining final colour and moisture content of the fruits, product quality was affected. Only samples in the centre positions and the side opposite the air inlet did not show significant differences when compared to a standard sample. High initial relative humidity and convective cooling of exhaust air resulted in condensation on top of the bulk. It was observed that one shifting scheme was superior to the others. To obtain a uniform product in the Taiwan type dryer, the main issues are to create a more uniform distribution of air and temperature in the bulk and prevent condensation.