

Title Energy conservation in drying of peeled longan by forced convection and hot air recirculation
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Abstract

Longan (*Dimocarpus longan* Lour.) is an economically important fruit crop in the north of Thailand. Despite its high energy consumption, hot air drying is still the most common method for the Thai agro-industry to process fresh longan. The aim of this study is to improve energy efficiency and reduce operating cost of current peeled longan drying process. This paper presents and evaluates methods for improvement of energy utilisation and reduction of energy cost per unit product mass in traditional longan fruit drying. A novel forced draft, recirculating air dryer was introduced. Performance in terms of specific energy utilisation, thermal efficiency and operating cost for both traditional and new designs was evaluated. Results showed that similar fresh to dried longan fruit ratio, colour and texture of dried products from traditional and new dryers were obtained. It was found that the new dryer yielded an average thermal efficiency of 29%, compared to 19% for the existing design. For the same mass of dried longan fruit produced, specific energy utilisation, fuel cost and operating cost were reduced by more than 42%, 45% and 27%, respectively. The improvement was attributed to enhanced heat transfer from free to forced convection, heat recovery *via* hot air recycling, better thermal insulation, and better temperature and humidity control.