

Title Improved quality and energy performance of a fixed-bed longan dryer by thermodynamic modifications

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Abstract

Modifications including air deflector installations in the plenum and insulation to improve performance of an industrial longan dryer were evaluated. Trials were carried out at a commercial drying facility according to industrial practices. Analyses of drying conditions, product quality and energy consumption were conducted. The study found that air velocity distribution was improved by plenum modifications and heat supply was more consistent after insulation. Modifications increased drying uniformity and insulation produced more homogenous product color. Evaluation of dryer performance showed that inverted mesh in the plenum and insulation reduced energy demand and increased efficiency by 1.51–4.27% respective of dryer modification. Cost savings of US\$ 4–10 per batch were calculated with an estimated payback period of 5–12 batches. In conclusion, simple modifications of this dryer type show potential for improving product uniformity, reducing energy requirement and increasing profitability. Combination of the best modifications is recommended for further research.