

Title Energy efficiency in drying
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Abstract

Purpose of the review: In recent months, the cost of fuel has increased dramatically. As dryers are major consumers of energy, it is an opportune time to revisit techniques that may be of value in containing the escalating cost of postharvest drying. This paper therefore focuses on methods that can be used to reduce the energy expended in removing moisture from agricultural crops.

Main findings: A range of techniques that have the potential, either now or in the future, for reducing the energy consumption of agricultural dryers were identified. Low-cost measures, such as good housekeeping, effective control systems, and good operating practice are of prime importance as they can be applied to good effect immediately. Greater efforts, perhaps, need to be made to “educate” the diverse users of crop-drying equipment as to the potential benefits of these well-established methods. Computer simulations of dryers, which can often improve their performance, are also discussed. A number of potentially more efficient technologies are available that in theory can replace or be used in conjunction with conventional convective dryers are then described. However, many of these are likely to find only limited application or prove to be impractical or uneconomic.

Directions for future research: Most of the technologies discussed in this review would benefit from further study; specific suggestions are made in the “Conclusions and Directions for Future Research” section. Particular emphasis should be placed on the less developed technologies such as high electric field drying and electroosmotic dewatering in order to provide a better understanding of the underlying physics and to assess their ultimate industrial potential. In addition, a comprehensive techno-economic evaluation of the techniques that have been identified in this review as having the potential for reducing the energy consumption of agricultural drying would be of value in focusing research priorities.