Comparison of a gas fired hot-air dryer with an electrically heated hot-air dryer in terms of drying process, energy consumption and quality of dried onion slices

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Publication date
2012/8/14
Journal
African Journal of Agricultural Research
Volume
7
Issue
31
Pages
4440-4452
Publisher
Academic Journals

Abstract
Onion slices were dried in either a gas-fired hot air dryer or an electrically heated hot air dryer at air temperatures of 50, 60 or 70°C, and at air flow velocities of 0.5, 1.0 or 2.0 m/s. Records of the drying rates and energy consumption were kept by using electronic weighing balances and an electric metering device. The results showed that the drying rate and final product quality in the two dryer were not significantly different at $P < 0.05$ level for the same setting of air flow and air temperature, and all dried products were of acceptable quality in terms of rehydration ratio and appearance. The specific energy consumption was found to decrease with increase in temperature but to increase with increase in air velocity in both dryers and for all conditions within the range of these experiments. The thermal efficiency of the gas dryer was between 54.87 to 69.52% while that of the electrically heated dryer was between 31.27 to 53.84%. The thermal efficiency of both dryers increased with increase in temperature and decreased with increase in air velocity. However, there was considerable difference in the energy consumption and efficiency of the two dryers, with the gas-fired dryer being more efficient at all settings.