كلية الزراعة
قسم الهندسة الزراعية

جامعة الفيوم

البحث الرابع

مشترك - منشور بمجلة دولية ((غير مستخلص من رسالة))

عنوان البحث:

Comprehensive analysis and experimental study on the novel intermittent solar-electric onion drying technology

تحليل شامل ودراسة تجريبية لتقنية التجفيف الشمسي-الكهربائي المتقطع المبتكرة للبصل

Abstract:

The thermal performances and quality attributes of dried onion using stationary solar-electric drying (SED), intermittent solar-electric drying (ISED), and intermittent solar-electric drying with sensible storage medium (ISEDS) were compared. The tempering in processing time by 60 min elevated the drying time and reduced the diffusivity from 3.67×10^{-6} m^2/s using SED to 2.06×10^{-6} and 2.11×10^{-6} m^2/s using the ISED and ISEDS, respectively. The obtained drying efficiency was 21.05 %, 35.69 %, and 35.39 %, respectively, for the SED, ISED, and ISEDS. The average *SEC* values were found at 0.76 and 0.66 kWh/kg using ISED and ISEDS, respectively. The sustainability index (S_i) and waste exergy ratio (*WER*) values were S_i = 1.99, 1.45, and 1.51 and *WER* = 0.49, 0.63, and 0.61, respectively for SED, ISED, and ISEDS. The improvement potential (*IP*) of 1.69, 1.84, and 1.74 W were obtained using SED, ISED, and ISEDS, respectively. For SED, ISED, and ISEDS, the payback period (P_b) values were estimated at 1.08, 0.75, and 0.70 years, with the highest annual savings (S_j) obtained using the ISEDS at 16203.3 CNY. Better visual quality was observed for ISEDS. Compared to stationary drying processes using high-extensive energy dryers, intermittent solar drying is a promising technique for preserving agri-food products.

الباحثون:

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