

The effectiveness of combined infrared and hot-air drying strategies for sweet potato.

ABSTRACT

This study examined the performance of different combined infrared (IR) and hot-air drying (HAD) strategies for sweet potato. Experiments were conducted for simultaneous infrared and hot-air drying, two-stage sequential hot-air and infrared drying, two-stage sequential infrared and hot-air drying, and intermittent infrared and hot-air drying in a laboratory scale combined infrared and hot-air dryer. The drying air temperature varied between 50 and 70 °C, the infrared intensity was 1100 W/m², the air-velocity was 1.5 m/s, and the pulse ratio (PR) ranged from 1 to 3. Results indicated that the drying rate, drying time, effective moisture diffusivity, shrinkage, specific energy consumption (SEC), colour attributes and phytochemical compounds of sweet potato were affected by the different drying combination strategies. The drying kinetics, product shrinkage, and sample temperature were also influenced by drying time and air temperature. The two-term exponential model adequately explained the drying behaviour of sweet potato for all the different combination strategies. The intermittent IR and HAD combination strategy proved to be the most suitable based on the combined effect of total drying time (113–120 min), SEC (27.67–41.44 kWh/kg), total colour change (17.15–26.48) and bioactive compounds.

Keyword : Drying; Combined infrared and hot-air drying; Combination strategy; Energy consumption; Product quality; Sweet potato.