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Research Article

SMART IOT-ENABLED IR-ASSISTED REFRACTANCE WINDOW DRYING KINETICS OF GUAVA PULP AND QUALITY ANALYSIS

Prachita Sharma[1], Penumala Indu[1], Harsh Dadhaneeya[1], Prabhat K. Nema[1,✉]

[1]*Department of Food Engineering, National Institute of Food Technology Entrepreneurship Management-Kundli, Sonipat, India*

✉*drpknema.niftem@gmail.com*

ORCID - 0000-0001-6419-4973

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Abstract

This study evaluates the effect of Smart IoT-Enabled IR-Assisted Refractance Window Drying (IR-RWD) on drying kinetics as well as physicochemical and thermal characteristics of peeled and unpeeled guava pulp samples, with respect to other three drying techniques which are tray drying (TD), vacuum drying (VD), and refractance window drying (RWD). The drying experiments conducted at 60°C across four different drying techniques and revealed significant variations in drying time. The average drying times recorded for the peeled sample were 420, 420, 390, and 300 minutes for TD, VD, RWD, and IR-RWD, respectively, whereas the unpeeled guava sample exhibited drying times of 510, 450, 420, and 300 minutes. Moreover, this study highlighted that the RWD and IR-RWD dried sample displayed notably higher levels of total phenolic content (TPC) and total flavonoid content (TFC) as compared with TD and VD sample. Specifically, the TPC was observed 205.1 mg GAE/100g, and the TFC was 645.4 mg QE/100g in IR-RWU samples. An SEM analysis reveals that the peeled samples display smoother and more uniform textures than their unpeeled equivalents. Among the different drying techniques, the IR-RWD method was the most efficient, retaining the highest levels of nutrients while requiring the shortest drying time. This suggests that the IR-RWD technique could be a superior method for drying guava pulp, preserving its nutritional and antioxidant properties more effectively than the traditional TD and VD methods.