

## **FEASIBILITY OF APPLYING FAR-INFRARED RADIATION FOR DRYING TURMERIC**

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The curcumin content in turmeric is lost due to longer heat exposure times. Therefore, the feasibility of drying turmeric using the Far-Infrared Radiation (FIR) was studied. The temperature of the IR emitters determines the wavelength at which the maximum radiation occurs. The wavelength of the FIR was controlled by the surface temperature of the IR emitters. The surface temperature of the IR emitters was controlled to get the FIR wavelengths of 6.51  $\mu\text{m}$ , 5.91  $\mu\text{m}$ , 4.94  $\mu\text{m}$ , and 4.74  $\mu\text{m}$  using a microcontroller-based control system. The fresh turmeric samples at 80% moisture content (wb) were cut into 3 mm thickness and placed on a ceramic plate as a thin layer to facilitate the absorption of incident radiation. The samples were exposed to the selected wavelengths, and the moisture content and the colour of turmeric at different time intervals were measured. Further, the energy consumption during the FIR exposure time and the dried sample curcumin percentage were measured. The moisture content of samples at 6.51  $\mu\text{m}$ , 5.91  $\mu\text{m}$ , 4.94  $\mu\text{m}$ , and 4.74  $\mu\text{m}$  wavelengths were reduced to 25.89% (wb), 14.12% (wb), 8.49% (wb), and 3.79% (wb) within 70 minutes, 30 minutes, 25 minutes, and 20 minutes, respectively. The curcumin content of dried turmeric at 6.51  $\mu\text{m}$ , 5.91  $\mu\text{m}$ , 4.94  $\mu\text{m}$ , and 4.74  $\mu\text{m}$  wavelengths was 3.89%, 3.78%, 2.10%, and 1.18%, respectively. The respective yellowness of the samples was 23.45, 15.73, 15.11, and 11.21, and the respective energy consumption was 3.37 kWh, 1.46 kWh, 1.22 kWh, and 0.98 kWh. The results indicated that the moisture content, drying time, curcumin content, and yellowness of turmeric reduced with decreasing wavelength of IR emitters due to the energy of IR was increased by decreasing the wavelength. The optimum drying and quality parameters were achieved by 5.91  $\mu\text{m}$  and 4.94  $\mu\text{m}$  FIR wavelength range during a shorter period with less energy consumption.

**Keywords:** Curcumin content, Drying, Far-Infrared radiation, Turmeric