

Abstract

The work was conducted for optimization of microwave pre-treatment of turmeric rhizome in relation with texture, curcumin, water holding capacity and its drying kinetics. Effect of pretreatment on texture shows that tissue becomes softer for the higher power level of microwave. Time is an important factor for softening the tissues. The hardness gradually decreases as the treatment power and time increase. Effect of pretreatment on curcumin shows cured methods have higher values of curcumin and the values range from 2.2 to 3.2 g/100g. Effect of pretreatment on water holding capacity was found out and the values were higher at higher temperature. WHC increased at 80 °C, which may be attributed to the phenomenon of pasting or gelatinization. Hence, the starch granules gelatinize around this temperature. The net result of WHC values was 4.89 to 7.56 g/g for fresh dried and treated-dried samples. Modelling of drying at 60 °C in tray dryer was done on four empirical model viz Page model, Henderson and Pabis, Midilli-Kucuk and Logarithmic. Midilli-Kucuk model was found to be the best model fit having R² value of 0.993, 0.996, 0.997, 0.996, 0.997 and SSE value of 0.013, 0.009, 0.006, 0.008, 0.006 for fresh, traditional, improved traditional, traditional microwave treated for 900 W at 4mins, improved microwave for 900 W at 4mins respectively. Diffusivity was found to be better in microwave cured samples than the fresh sample whose value is $9.66 \times 10^{-8} \text{ m}^2/\text{s}$. Statistical analysis using ANOVA shows that time has more significant on the pre-treatment followed by power. The results of curcumin and proximate analysis of optimised microwave treatment is within the range of acceptance. The results of Rapid Visco Analyzer (RVA) shows that turmeric starches have high retrogradation property and pasting temperature is between 84.5°C- 91.4°C. Scanning Electron Microscope (SEM) analysis conclude that the microstructure of starches shows rougher edges and irregular shape with porous surface which identifies the modification of starch during treatment. This concludes that traditional method of turmeric pre-treatment (i.e. boiling in water for 45 min) can be replaced by microwave treatment at shorter time.

Keywords; turmeric rhizome, pre-treatment, texture, microwave