

## Effective microwave drying characteristics of ginger (*Zingiber officinale*)

■ ASHOK KUMAR, P.S. CHAMPAWAT AND BIRENDRA KUMAR MEHTA

**SUMMARY :** Ginger rhizomes and slices were dehydrated in a microwave dryer at 1.0, 1.5, 2.0 and 2.5 kW power levels and their drying characteristics such as rate of drying, diffusion rate, re-hydration ratio were studied. The qualities of dehydrated samples were evaluated on the basis of colour and ascorbic acid content. The entire drying process took place in the falling rate period. Drying curves were constructed using non-dimensional moisture ratio (MR) and time. The effective moisture diffusivity was determined by Fickian method using uni-dimensional moisture movements and values ranged from  $1.2982 \times 10^{-10}$  to  $1.2678 \times 10^{-9} \text{m}^2/\text{s}$  within the power levels (1.0 to 2.5 kW) were studied. The samples dehydrated at 2kW showed highest retention of ascorbic acid with superior quality.

**Key Words :** Ginger, Ascorbic acid, Moisture diffusivity, Rehydration ratio, Drying rate

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Ginger is the most important and export oriented spice in India with largest share of 32.75 per cent of world production. However, they contain large quantity of water (approximately 85.6 per cent) and therefore suffer considerable weight loss during transportation and storage. This in the turn causes serious economic losses, due to reduction in weight and quality. Among various methods employed for preservation of ginger, drying is one of the oldest most cost effective means of preservation of foods in all varieties (Mujumdar, 2000). The present study was conducted to generate information on dehydration characteristics and effect

of microwave drying of ginger.

### EXPERIMENTAL METHODS

The fresh ginger rhizomes were procured in bulk from the local market of Udaipur in the state of Rajasthan (India) which were, then washed under running water to remove adhering impurities. The ginger rhizomes were hand peeled, cut into slices ( $5 \pm 1$  mm thickness) with a sharp stainless steel knife in the direction perpendicular to the vertical axis. Three measurements were made on each slice for ensuring proper thickness.

#### Microwave drying of ginger rhizomes and slices:

The ginger rhizomes and slices were dehydrated in the microwave dryer at 1.0, 1.5, 2.0 and 2.5kW. The initial mass of the samples and the mass after every 5 min during first 30 min, 10 min during second 60 min, 15 min during third 60 min drying were recorded. Subsequently the masses were recorded after every 20 minutes interval till the constant mass was observed. The moisture contents of the samples during drying were predicted by mass balance calculations. The initial moisture contents of the samples were determined by air oven method

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