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Effect of osmotic dehydration on drying characteristics of grape

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ABSTRACT

The process of osmotic dehydration followed by tray drying was studied on grapes for raisin preparation. Grapes were dried out by osmosis using sugar syrup at grapes to sugar syrup ratio of 1:4, which were then dried in a commercial tray dryer maintained at 50^{0}C temperature to obtained raisin. The grapes were dipped in sugar syrup of 60, 65 and 70^{0}B concentration in beakers having fruit to syrup ratio 1:4 at 40, 45 and 50^{0}C temperature and time of immersion was 6, 7 and 8 h for osmotic dehydration. Drying characteristics were determined by Factorial Completely Randomized Block Design. From this it was concluded that, drying rate decreases for initial three hours and moisture ratio was found higher at higher concentration of solution. The dehydration ratio was found in between 1.45:1 to 1.98:1.

Key words : Osmotic, Dehydration, Drying, Grape.

Grape (*Vitis vinifera* L.) is well known for its medicinal properties and refreshing fruit in the world. Grape is grown under a variety of soil and climatic condition in three distinct agro-climatic zones in India. The total world production of grapes is estimated to about 63 million tonnes, which amount to about 16 per cent of total fruit production. About 20 per cent of the table grape production is exported as compared to 9 per cent export of other fruits. The area, production and the productivity of grapes in India is 42,600 ha, 1.1 million tonnes and 25.4 tonnes/ha, respectively (Anonymous, 2003).

About 85 per cent of total productions are used for table purpose and remaining is used for raisin, wines and beverages and also in medicinal formulations. Grape is seasonal fruit, available only during January to March hence the importance of drying permit early harvest, long storage time, a better quality product, etc.

Drying is a thermo-physical and physico-chemical operation by which excess moisture from product is removed. Drying is simultaneous heat and mass transfer under adiabatic condition.

It removes water from food material at appropriate temperature and most suitable rate to retain maximum food values hence, the study taken on effect of syrup concentration, temperature of syrup time of immersion on drying characteristics.

METHODOLOGY

The parameters selected for osmotic dehydration were syrup concentration (60, 65 and 70^{0}B), temperature of solution (40, 45 and 50^{0}C) and time of immersion (6, 7 and 8 hr). The fruit to solution ratio was taken as 1:4 (w/v) (Pokharkar *et al.*, 1997). Australian cold dip method was used as a pretreatment since it was observed to be best during the study conducted by (Gawade *et al.*, 2003) then the drying rate, moisture ratio and dehydration ratio was determined.

Drying rate:

Drying curves of moisture ratio vs drying time and drying rate vs drying time were plotted.

Drying rate (DR) was calculated by following equation (Chakraverty, 1981). The drying rate was expressed as water removed, g/hr-100g b. d. m.

$$\text{Drying rate} = \frac{\text{Amount of moisture removed (g)}}{\text{Time taken (hr)} \times \frac{\text{(Bone dry wt of sample)}}{100}} \times 100$$

Moisture ratio:

The moisture ratio (MR) was calculated by following equation (Chakraverty, 1981).

$$MR = \frac{M - M_e}{M_o - M_e}$$

Dehydration ratio:

Dehydration ratio was determined by using following equation.

$$\text{Dehydration ratio} = \frac{\text{Weight of raw material (g)}}{\text{Weight of dehydrated material (g)}}$$

RESULTS AND DISCUSSION

Drying rate:

The drying rate is plotted against drying time for all concentrations at 40^{0}C and shown Fig. 1. It was observed