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Effect of syrup concentration on water gain and solid loss of grapes during raisin preparation

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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 than 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 hr for osmotic dehydration. The effective diffusivity for water loss and solid gain were determined by Factorial Completely Randomized Block Design (FCRBD). Thus, it was concluded that, water loss and solid gain increases with increase in syrup concentration.

Key words : Osmotic dehydration, Solid gain, Water loss and raisin

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. The area, production and the productivity of grapes in India is 42,600 ha, 1.1 million tones and 25.4 t/ha, respectively. Maharashtra is the leading state and rank first in area and production *i.e.* 27,000 ha and 67,000 tonnes, respectively.

The main objective of removing water is to improve the keeping quality by reducing water activity and the other object is to reduce the bulk. So it may be economical for handling, transportation and distribution. The fruits are preserved as a dehydrated product to store for longer period. The conventional raisin preparation includes the pretreatment of the grapes followed by shed drying in order to bring the moisture content of the final product upto 15-18 per cent from initial moisture content of grapes *i.e.* 70-85 per cent.

This process requires very long period for drying that is about 15-21 days depending upon different weather condition (Anonymous, 2003). Hence the use of[1] osmosis allows both ways of decreasing water activity in food to be applied simultaneously. The permeability of plant tissue is low to sugars and high molecular weight compounds; hence, the material is impregnated with the osmoactive substance in the surface layers only (Lewicki and Lenart, 1995).

The osmotic dehydration does not reduce water activity sufficiently to hinder the proliferation of microorganisms. Hence, the application of other preservation methods, such as freezing, pasteurization or drying is necessary after osmosis. However, processing of osmotically dehydrated products is less expensive and preserves most of the characteristics acquired during the osmosis. The osmotic dehydration of grapes followed by hot air drying is likely to result in to better quality with less drying time. In order to decide suitable levels of osmotic dehydration parameters the present investigation is undertaken with the following specific objectives to study the effect of syrup concentration, time of immersion and temperature of solution on mass transfer during osmotic dehydration of grapes.

METHODOLOGY

Grape varieties 'Arkavati' and 'Thompson Seedless' with a TSS of 22-24^0 Brix produced good quality raisins with low acid and high sugar content (Anonymous, 2003). Hence, the Thompson Seedless variety was procured from the grower. Fully ripe, fresh, healthy, green grapes were purchased. Then the uniformly riped clusters containing berries of uniform size, shape, colour and bloom were selected for experiment. The moisture content, acidity, ascorbic acid, sugars *i.e.* reducing sugar, non-reducing sugar and total sugars were determined for the fresh grapes. Australian cold dip method was used as a pretreatment since it was observed to be best during the study conducted by (Gawade, 2003). Based on review of literature and based on the preliminary trials, 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). The weight reduction, solid gain