

Studies on convective drying of pomegranate arils

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SUMMARY : The study of convective drying of pomegranate arils was carried out to observe the effect of temperature on drying characteristics and physicochemical properties of pomegranate arils. The drying is done at 45, 50, 55 and 60°C to reduce initial moisture content 377.09 - 442.68 per cent (d.b.) to final moisture content of 5.7 - 9.62 per cent (d.b.) in 26.5, 17.5, 14 and 7.5h, respectively. The entire drying of pomegranate arils takes place in falling rate period. For arils, the moisture diffusivity increased from $2.54 \times 10^{-7} \text{m}^2/\text{s}$ at 45°C, to $4.18 \times 10^{-7} \text{m}^2/\text{s}$ at 50°C, to $5.42 \times 10^{-7} \text{m}^2/\text{s}$ at 55°C, to $7.95 \times 10^{-7} \text{m}^2/\text{s}$ at 60°C. The mathematical models for convective dehydration based on the Fick's law of diffusion were found quite adequate to predict the mass transport data during convective dehydration process.

KEY WORDS : Convective drying, Diffusivity, Physico-chemical properties

How to cite this paper : Santra, Ishita and Jain, S.K. (2012). Studies on convective drying of pomegranate arils. *Internat. J. Proc. & Post Harvest Technol.*, 3 (2) : 172-175.

Research chronicle : Received : 16.05.2012; Revised : 10.07.2012; Accepted : 10.09.2012

P*unica granatum* L., the pomegranate belongs to the Punicaceae family, is an important fruit of arid and semi-arid regions. It is sometimes called Chinese apple, and is native of Iran and extensively cultivated in Spain, Russia, France, Argentina, china, Japan, USA and India (Patil and Karade, 1990). In India, it is commercially grown in Maharashtra, Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, Himachal Pradesh and Rajasthan, (Singhal, 1999). The fresh juice is best for leprosy, heart, kidney and tuberculosis patients. The juice is a blood tonic and good for fast and high blood pressure. It is even a good brain tonic. Extract of fruit has antiviral activity (polio-virus) (Konowalchuk and Speirs, 1976). The edible part of the fruit (seeds) contains a considerable amount of sugars, vitamins, polysaccharides, minerals and polyphenols (Espiard, 2002). Despite all these advantages, the consumption of pomegranate seeds is limited to the crop season due to problems of preservation (Defilippi *et al.*, 2006).

Drying is the most widely employed method for preserving food materials, which is based on reduction of the water activity values through moisture removal to achieve physicochemical and microbiological stability (Gorjian *et al.*, 2011). Dried products have almost unlimited shelf-life in proper packages and substantially lower transportation, handling and storage costs compared to foodstuffs produced with other preservation methods (Ertekin and Yaldiz, 2010). Traditionally, fruit and vegetables are dried in open sunlight. However, sun drying is weather dependent, affecting the homogeneity and quality of the final product. Moreover, the products are prone to microbial and other contaminations. To overcome these problems, the use of industrial type dryers (solar or convective dryers) should be used (Kingsly and Singh, 2007; Falade and Solademi, 2010). During open sun drying, due to exposure to open atmosphere for a long time causes microbial contamination and spoilage of product (Vagenas and Morinos-Kouris, 1991). Industrial drying ensures uniform, hygienic and quality maintenance of dried product by more rapid drying (Doymaz, 2004). Hence, an attempt was, therefore, made by using convective drying to obtain good quality dried arils as well as dried rind. The study was undertaken with the objective to study the drying characteristics of arils of pomegranate during convective drying and to evaluate the quality of dried pomegranate arils.

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