STUDIES ON DRYING BEHAVIOUR OF SOME SELECTED FRUIT VEGETABLES

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ABSTRACT

Drying behaviour of potato, cauliflower, brinjal, okra and karela in tray dryer investigated. The drying rates were observed to be at higher magnitude during initial drying period and then slowed down in case of potato and brinjal slices. Cauliflower, okra and karela showed only increasing drying rate till the drying period existed. The approximate drying period at 78 ± 2°C temperature, drying air was estimated till the product contains about 10% moisture level.

INTRODUCTION

Water removed from vegetables by drying is applied to increase its shelf life, to decrease transport and storage cost by volume reduction and/or weight reduction. The drying of vegetables assists to make them available to use on off-season. The study of drying mechanism has been the subject of intensive studies as the mechanism of moisture transport are so varied with types, maturity, drying modes, pre-drying stages adopted etc. etc. (Bruin et al., 1980). To select a dryer it is necessary to determine the drying rate at a specific air temperature and humidity. These data are scares for food materials and must be obtained experimentally by plotting the free moisture contents verses drying time. This plot is converted to a drying rate curve by calculating the derivative of the curve over the time. In constant rate drying period the surface temperature of solid will equilibrate or close to wet bulb temperature of air temperature (Bimbenet et al., 1985). Hence, the rate of drying can easily known for this period. However, during falling rate period due to additional resistance, which varies with type of product, plays significant role in moisture transfer. This internal resistance to moisture transfer becomes as limiting criteria in selecting the process equipment as well as operating parameters.

MATERIAL AND METHODS

The fruits vegetable under study viz., potato, cauliflower, brinjal, okra and karela were procured freshly. They were sorted out as per their maturity, size, and physical appearance. These vegetables were made dirt/dust free by through water rinsing and sliced or cubed by stainless steel knife in required sizes.

The vegetables then steam blanched using saturated steam at 100°C for 3-4 minutes to remove any contaminant load on surface and to avoid any further activity due to presence of enzymes (Lee et al., 1967). The slices were treated with 0.5% Sodium Sulphate for 6-7 minutes to maintain the stabilization of valuable nutrients. A laboratory tray dryer adjusted with temperature of 78 ± 2°C was used for drying study. The airflow rate of 8.2 - 8.5 m³/min was maintained constant throughout the test. The thin layer of pretreated samples was laid on perforated trays after knowing its initial moisture level. The loss of weight due to moisture removal was recorded accurately during successive drying operations. The drying of samples continued till the samples attended 10% moisture level. The readings were replicated twice.

RESULTS AND DISCUSSION

Typical curves were presented in Fig. 1 to Fig. 5 illustrating trend of moisture...
Fig. 1. Profile of drying rate and moisture removal for potato (slices).

Fig. 2. Effect of drying time on removal of moisture and drying rate for cauliflower.
Fig. 3. Profile of drying rate and moisture removal for brinjal (slices)
Fig. 4. Effect of drying time on removal of moisture and drying rate for okra

Fig. 5. Effect of drying time on removal of moisture and drying rate for karela
depletion with drying time. The drying rates were observed to be at higher magnitude during initial drying period and then slowed down in case of potato and brinjal slices as shown in Fig.1 and Fig. 4. From Fig. 3, 4 and 5 its is revealed that the cauliflower, okra and karela showed only increasing drying rate till the drying period exist. This type of behavior change is altogether due to the inner structure of product. The slices of potatoes and brinjal have relatively compact structure thus the diffusion of inner moisture to surface takes time due to more internal resistance as compared to slices of latter. The spongy structures of cauliflower, okra and karela have therefore comparatively observed with faster moisture migration. The approximate drying period at 78±2°C temperature, drying air was estimated till the product contains about 10% moisture content Table 1.

This data may serve as basis for retention period for product while designing tunnel on belt drying system. The color of the most of the dried products were retained well as compared to sun dried samples as control.

REFERENCES