

## ABSTRACT

The huge loss of potato due to inadequate storage facilities coupled with ever increasing demand for ready-to-eat food products in India, have created the need for development of a simple process technology for ready-to-eat dehydrated puffed potato cubes with long shelf life and high consumer acceptability. A suitable technology was developed for production of such a product which involved high temperature short time (HTST) whirling bed treatment required for puffing of the blanched and partially dried potato cubes (1cm<sup>3</sup>) to improve heat and mass transfer through better fluid-particle interaction and finally oven toasting to impart the desired texture.

The relevant physical properties of Kufri Chandramukhi variety of potato, like true and bulk densities and terminal velocity were measured and found to be moisture dependent. Thermal properties like specific heat, thermal conductivity and thermal diffusivity were also measured and found to increase with moisture content and temperature. Several blanching techniques such as hot water, steam and steam-air mixture blanching were studied and whirling bed blanching with steam-air mixture at 85°C and 93s was found to be most effective. Thin layer hot air drying at 70°C was found to be most beneficial for the partial dehydration of the blanched potato cubes upto the desired moisture level of 0.666 kg/kg d.b. and to impart the necessary hard crust formation before the cubes were subjected to HTST dehydration-cum-puffing. A laboratory model HTST whirling bed dehydrator was developed for the purpose. Using CCRD, the optimum puffed product qualities in terms of volume expansion (2.6 times), toughness, colour and ascorbic acid loss were obtained at an air temperature of 210°C, air velocity 3.76m/s and retention time of 80s. The heat and mass transfer parameters studied during HTST process showed that the surface heat transfer coefficient varied from 57.72 to 68.79W/m<sup>2</sup>°C corresponding to air temperature of 125 to 210°C. Effective moisture diffusion coefficient varied between 2.2160x10<sup>-8</sup> and 5.6190x10<sup>-8</sup> m<sup>2</sup>/s corresponding to the air temperatures of 150 to 240°C. Further dehydration (upto .09 kg/kg d.b.) for better storability of puffed potato cubes was carried out in low temperature fluidized bed at 55°C and 4m/s air velocity. To impart desired crispness, the dehydrated and puffed potato cubes were subjected to oven toasting at 125°C and 16.5 min, optimized by response surface methodology following CCRD, without much change in the levels of colour and ascorbic acid.

Sensory evaluation of the final product showed it to be highly acceptable. Storage studies conducted with different packaging materials at different temperatures and relative humidities showed that the product had long shelf life and remained acceptable for 3 months of storage period studied in metallised polyester package (200 gauge) at an ambient condition of 30°C and 65% RH.

**Key words:** *Blanching, dehydration, diffusivity, HTST puffing, oven toasting, puffed potato cubes, RTE vegetable product, whirling bed.*