RECONSTITUTION OF SOLAR DEHYDRATED POTATO SLICES AND CUBES

Manju Rani and R. Ezekiel

Central Potato Research Institute, Shimla-171001, HP, India

Abstract: Solar dehydration of 2 and 4 mm thick slices and 1 cm cubes prepared from tubers of Kufri Jyoti was done under a temperature range of 23-28°C and RH range of 20-36%. Slices of 2 mm thickness took 4 h to achieve 80% weight loss whereas, 4 mm thick slices took 7 h and 30 min. In the case of 1 cm cubes, 13 h and 40 min of solar dehydration were required to achieve 80% weight loss. The rate of rehydration was 450%, when 2 mm thick dehydrated slices were soaked in boiling water for 45 min. It was concluded that potato slices can be solar dried, stored and utilized in two ways. They can be fried when needed and consumed as chips or they can be reconstituted by soaking in boiling water for 15-30 minutes, mashed and used during summer months when the price of potatoes is quite high. Reconstitution of cubes was not satisfactory.

Potato production is increasing in India every year and inadequate storage facilities result in gluts in the market during harvesting season which lead to financial loss to growers and wastage of food. Under such circumstances, processing of potatoes into various processed products can help solve the problem of storage and increase its utilisation. Among various processed products, dried potatoes are most important because of ease of their storage and transportation. Solar dried chips can be prepared easily since no investment on processing machinery is needed and potatoes are available at a low price during glut (Srivastava et al., 1973, Verma, 1991). The objective of present study was to determine weight loss during dehydration of potato slices and cubes and weight gain during their reconstitution so that they can be reconstituted and used when needed.

The experiment was carried out at Central Potato Research Institute, Shimla with potato tubers of variety Kufri Jyoti during April-May, 2001 and 2002. Tubers were washed, peeled and sliced with a hand slicer. Two different thickness i.e. 2 mm and 4 mm potato slices were prepared and the cut slices were allowed to fall directly into cold water to prevent enzymatic browning. The slices were blanched with 0.5% potassium metabisulphite for 2 minutes and were spread on a filter paper and allowed to dry in open sunlight between 10.00 AM and 4.00 PM. For preparation of cubes, tubers were washed, peeled and cut into 1 cm cubes. There were three replications for each treatment. Marking was done on one surface of the slice so that only one surface was exposed to sunlight in one experiment. The rate of dehydration in slices was determined by weighing at 30 minutes intervals and in cubes by weighing at 60 minutes intervals. Temperature and relative humidity were measured at 60 minutes intervals using thermometer and hygrometer, respectively. Temperature range of 23-28°C and RH range of 20-36% was recorded during dehydration of potato slices and cubes. The dehydrated slices and cubes were stored in sealed polythene bags and were used for rehydration studies. The rate of rehydration of dehydrated slices and cubes was determined by soaking them in water at room temperature and in boiling water. The rate of rehydration was measured by weighing the slices at 15 minutes interval and cubes at 30 minutes interval.

The potato slices dried faster when both sides were exposed alternately as compared to only one side (Fig. 1). However, the differences narrowed down as the drying progressed and there was little difference after 5 h. when complete drying was achieved in both the cases. In 4 h, about 80% weight loss was observed in case of 2 mm thick slices whereas, in 4 mm thick slices the weight loss was about 60% (Fig. 1). In 1 cm cubes, weight loss continued to occur up to 13 h and 66 min of drying (Fig. 3). i.e. 8 h and 40 min more than the time required for the drying of 2 mm thick slices. Rehydration of solar dried slices in boiling water was better than that in water at room temperature (Fig. 2). In boiling water the rate of rehydration was up to 450% whereas, in water at room temperature the rate of rehydration was only 188%. It was found that weight gain was better in 2 mm thick dehydrated slices. In 4 mm thick dehydrated slices, the rate of rehydration was 400% after 1 h and 45 min of soaking whereas, in 2 mm thick dehydrated slices it was 485%. Weight gain in 1 cm cubes after 2 h in boiling water was 383% whereas, in water at room temperature it was only 179%.

The rate of dehydration was rapid in the first one hour and it declined thereafter. Similar trend has been reported by Ezekiel et al., (1992). Though exposing both the surfaces alternately helps in faster drying, considering the additional labour involved in turning the slices frequently, it does not offer much advantage. Slower rate of dehydration in 4 mm thick slices and 1 cm cubes could be attributed to the longer distance over which the moisture from inside the slices has to move and also the much greater absolute amount of moisture for an equivalent surface.
area. The higher rate of rehydration of up to 450% in 2mm thick dehydrated slices shows that it is possible to reconstitute solar dehydrated slices by soaking them in boiling water for 45 minutes. The reconstituted slices can be mashed and used in preparations like stuffed paranthas. Cubes take a long time to dry in open sun. Similar observation has been made by Manish Das et al., (2002) who found that rehydration of cubes was not satisfactory. Although rehydration to the extent of 383% observed by us was much higher than that reported by Das et al. (2002), still some hardness remained in the core of the cubes. It may be concluded that potato slices can be solar dried, stored and utilized in two ways. They can be fried when needed and consumed as chips or they can be reconstituted by soaking in boiling water for 15-30 minutes, mashed and used during summer months when the price of potatoes is quite high. Reconstitution of cubes was not satisfactory. More work is needed to make reconstitution of solar dehydrated potato cubes satisfactory.

**Fig. 1.** Weight loss in potato of Kufri Jyoti; (A) different sides of 2mm thick slices exposed, (B) slices of different thickness

**Fig. 2.** Weight gain in dehydrated potato slices of Kufri Jyoti; (A) Soaked in cold and boiling water, (B) Slices of different thickness

**Fig. 3.** Weight loss during sundrying (A) and weight gain when soaked in cold and boiling water (B) in 1 cm cubes of Kufri Jyoti

**Acknowledgements:** The authors are grateful to the National Agricultural Technology Project (NATP), New Delhi for financial assistance and to the Director, CPRI, Shimla for the facilities.

**Literature cited:**


