Mahasagar-Bulletin of the National Institute of Oceanography, *13*(4), 1980, 383-384.

A SOLAR DRYER FOR MARINE-CUM-FARM PRODUCTS

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ABSTRACT

A new solar dryer for drying marine and farm products has been developed and described. The working model occupies 0.5 m^2 of floor area. Its detachable metallic hanger aecelerates the drying process. This is simple in design and can be fabricated easily. Dehydration period for various products has been studied.

Sun drying of marine and farm products is the cheapest and traditional method of food preservation. However, the sun drying method in general is time consuming and very often needs a lot of manual labour. Also, the traditional sun drying is generally not complete with the result that the product, because of moisture content, become prone to attack by bacteria and fungi (Merindal, 1969). In view of these, kilns and mechanical dryers using various fuels (wood, charcoal, furnace oil and electricity etc.) were introduced. No doubt, such man-made gadgets take less time in drying than sun drying, but the dried products are invariably duller in appearance and brittle in quality. Over and above, the cost of all the conventional fuels has increased many folds. For example, it has been reported by Thampan and Pankajakshan (1976) that copra prepared by kiln drying costs about 5 times more than that by sun drying method. Resultantly, large scale applications of the kilns and dryers are not only becoming uneconomical but are also being discouraged with the sole aim to conserve the fuels as far as possible.

Farrington (1974) observed that by passing air over the blackened flat plate in solar collectors, it is possible to raise its temperature substantially. Keeping this in view, an attempt was made to develop a cabinet type solar dryer (Fig. 1 and 2) from the design of multi-surface solar still developed earlier (Anand, 1978).

The dryer comprises of a rectangular wooden box with an inclined top cover. Its side walls, excepting the southern wall, are insulated. To maintain the air circulation a number of holes on the bottom and below the top-cover have been provided. For its operational use the dryer is kept on an open space with its longitudinal axis in the east-west direction and the tilted cover facing the south. The material to be dried is loosely spread in the 4 trays provided in the dryer and these are shown in Fig. 2. Then its side doors are closed. Once every morning the dryer is opened, the material is remixed and the positions of trays are also interchanged. Depending upon the type of material and the degree of dehydration required the drying period differs for the different materials (Lal, Siddappa, and

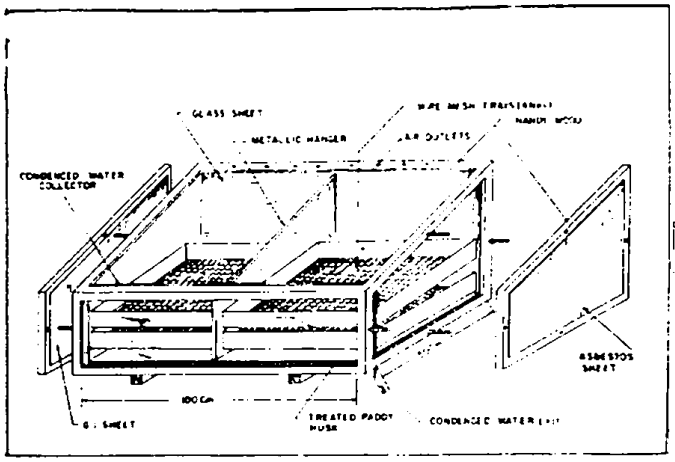

Fig. 1. Schematic diagram of Marine-cum-Farm Product Solar Dryer.

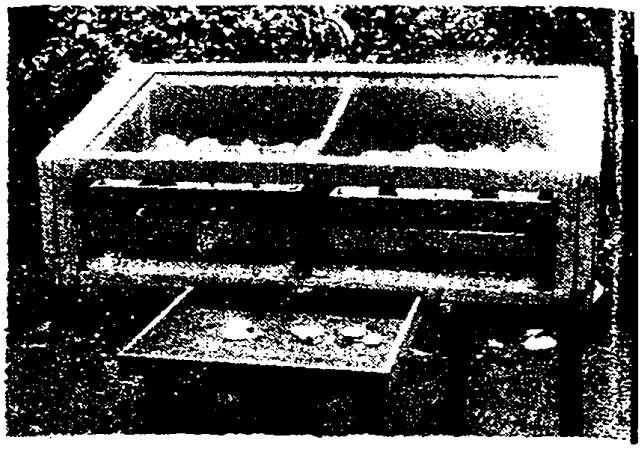

Fig. 2. Experimental set-up for drying of coconuts in the solar dryer and in open sun drying.

Tandon, 1967 and Stansby and Dassow, 1963). The solar drying period for different products can be known by a few initial trials. An important feature of the design is that its components can be dismantled, packed and reassembled easily.

The present working model of the dryer, which occupies a surface area of 0·5 m^2 (100 × 50 cm) can dry 50 large size coconuts in about 48 hours whereas the open sun drying for the same quantity takes about 7 days. Drying time for the chillies and grapes has been noted to be about 72 hours. However, the application of this dryer for drying different types of fish, prawns, seaweeds and other seafoods are being studied in detail, since each of these would need a specific temperature-range and rate of air circulation.

ACKNOWLEDGEMENT

The author expresses his gratitude to Dr. S. Z. Qasim, Director, NIO for the due encouragement in the present work.

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