

DRYING OF SOME MEDICINAL PRODUCE IN UTTARAKHAND USING SOLAR ENERGY

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ABSTRACT

Himalayan region of India is a major source of medicinal/ aromatic plants & produce, herbs, flowers and a number of cash crops; which are used in manufacturing of a number of medicinal, cosmetic and commercial products. The processing especially drying of these produce involves a big amount of energy and most of the industries use the electrical drying. Dried form of Amla, Bahera, Harde, Ginger, Turmeric, Mint and Plash are used in a number of medicinal applications and manufacturing of various cosmetic, domestic and commercial products. In the present study these medicinal products/ produce in their raw form have been dried in solar dryers and their performance has been compared with the traditionally method of drying i.e. open sun drying. For the purpose present work two prototype models of solar dryer (one simple cabinet type & other convective cabinet type) have been fabricated locally and their testing has been carried out at Srinagar, Uttarakhand (Latitude=30°13' N, Longitude=78° 48' E; and Altitude=579m) located in the mid Himalayan region.

The comparative study involves investigating the parameters viz. moisture content, drying rate, constant rate period and falling rate for these products. The climatic/operating parameters viz. solar radiation, ambient temperature, relative humidity, inside air temperature of the dryer etc. have been periodically monitored and measured during the experimental investigation. It has been found from the experimental studies that cabinet type solar drier might be very useful for processing and proper enhancement of high moisture contenting products in the climatic conditions of Himalayan regions. As an outcome of the testing exercise it has been conducted that the overall efficiency of the solar dryers is always more than 40 to 50% than the traditional method of drying for most of the selected products. The experimental results obtained from testing are presented and discussed in the paper.

Key words: Open air sun drying, solar drying, cabinet and convective cabinet type solar dryers, drying rate, and efficiency

INTRODUCTION

Medicinal plants/produce and their products have a very long history of being utilized. A worldwide increasing demand for medicinal plants may be observed during last three decades [1-3]. Himalayan region of India is endowed with rich bio-diverse medicinal & aromatic plants and herbs. Processing of medicinal plants and herbs is one of the thrust areas in its agriculture policy. Drying is an important operation before

preservation and processing of agricultural products especially medicinal plants and produces. The traditional way of drying of medicinal plants and the herbs is open air sun drying/shade drying in the Himalayan regions but the quality of marketed products is poor because of insemination of dirt, fungus etc. The climate adversities, contamination by insects and dust which constitutes a loss of quality of the dried product and need a lot of man power are the important reasons for shifting from open sun drying to controlled drier. Though electrical/fuel fired dryers help the farmers in drying their products at a relatively faster rate, but are not popular among the poor farmers of the hilly regions because of the higher cost and non-connectivity of grid electricity for electrical based drying of such dryers. As an alternative to fuel heated dryers, the introduction of solar dryers seems to be more useful due to high intensity of solar radiation and low temperature required for drying.

A number of solar dryers systems have been designed as alternatives to the traditional open sun drying/fuel heated dryer. The construction details and operational principles of such dryers have been reviewed by Ekechukwu and Norton [4]. Sodha *et al.* [5] reported an analytical and experimental study of open sun drying and a cabinet type drier for some typical products. This study concludes that the overall efficiency in open sun drying is much less than that of the cabinet type solar dryer. Muller *et al.* [1] developed a Greenhouse - type solar dryer for drying of medicinal plants and herbs. They have dried some medicinal plants viz. mint, sage and hops at the maximum drying temperature within a range of 40 to 600°C. In drying of biological products (medicinal plants, herbs etc.), the drying temperature and drying period are two most important factors in maintaining their nutritional quality. In spite of heating the drying air exclusively in solar dryers, a high quality of the crude drugs in terms of colour and content of active ingredients may be obtained.

Dried produces of Amla (*Phyllanthus emblica* L.), Bahera (*Terminalia bellerica* Roxb.), Harde (*Terminalia chebula* Retg.), Ginger (*Zingibar officinalis*), Turmeric (*Curcuma domestica*), Mint (*Mentha piperita*), and Plash (*Butea monosperma*) are used in many medicinal applications. Amla is a major ingredient of ancient Ayurvedic preparation 'Chayawanprash' and the dried fruits of amla are given in diarrhoea and dysentery. Bahera is used as an astrigent and in the treatment of dyspepsia and diarrhea. Harde is used mainly as an astrigent, laxative, stomachic and tonic. Commercially, it is used in dyeing and tanning industry and also in treatment of water used for locomotives.

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