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"STUDY OF FORCED CONVECTION EVACUATEDTUBE SOLAR GRAPE DRYER"

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Abstract - Environmental pollution and energy crises are very severe environmental and sustainable environmental issues in the globe. It becomes essential to apply solar energy to heat, generate electricity, dry plants, etc. Many scientists have created effective solar collectors over the past two centuries. Solar drying is one of the major solar energy apps used to remove moisture from agricultural products. This research was performed to select the optimum bed thickness of heat storage products and optimum wind speed for a 0.5 m2 drying chamber region and 0.5 m2 heat storage cabin area intended for solar dryer. However, most of the models have been shown to enhance the solar collector structure, the recent absorber coating methods or to reduce the absorber or collector losses. Many scientists have proved solar drying for the multiple foods and agricultural products. This is a cost-effective and cost-effective solution to standard drying.

Key Words: **ENVIRONMENTAL POLLUTION, SOLAR ENERGY, DRY PLANTS, HEAT STORAGE, SOLAR DRYING.**

1. INTRODUCTION

One of the oldest types of agricultural product conservation techniques is to reduce the moisture content by drying vegetables and fruits. It is the most significant method to maintain food content because it has a lot of impact on the dried products ' quality. India currently spends around 100 million tons of fossil fuels (FF) annually for multiple uses, where 40% is consumed exclusively by the sectors. Approximately 40-50 percent of almost 15 MT of fuel oil per year is used for heating appliances below 250 ° C to meet an enormous annual energy requirement in India of around 150 GW / hr. The abundantly accessible solar energy can be efficiently harnessed to meet the heating demands of different sectors. The use of heated air for drying applications in automobiles, plastic packing, printing, food and beverage, dragging and chemical sectors is one such significant application.

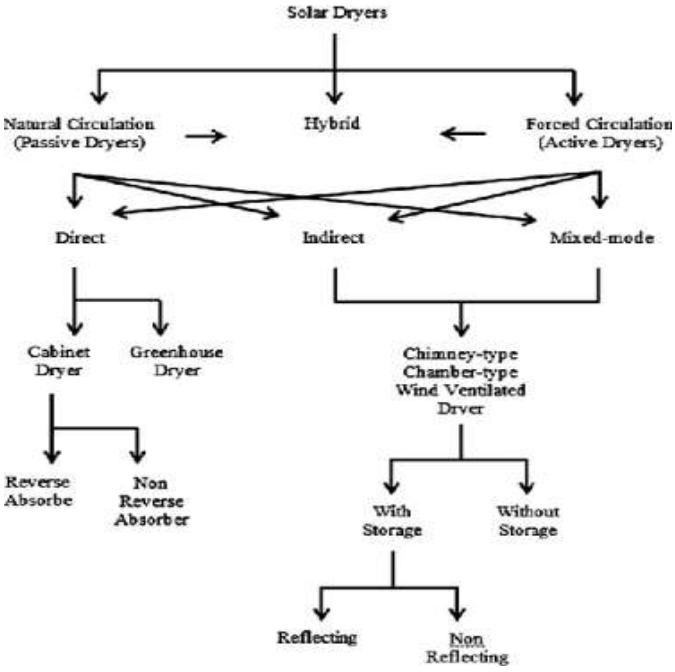

Figure 1: Classification of greenhouse solar dryer

The greenhouse solar dryer essentially comes below the group of direct solar drying and sometimes varied mode solar drying system. Greenhouse is an fenced structure which ruses the solar radiation of shorter wavelength. Long wavelength solar radiation in the method of infrared radiation is produced by earth's surface and becomes stored confidential the greenhouse increasing the greenhouse temperature. Greenhouse structure can be used to achieve multitask including crop cultivation, soil solarisation, poultry farm, aquaculture etc. Low-temperature drying is ideal for vegetable and cash crop drying and it can be simply achieved in greenhouse structure. The solar greenhouse dryer can work under natural convection mode and forced convection mode dependent upon the dampness gratified of the product to be dried. Here in this paper variety of active solar greenhouse dryer built on the base of structure, mode of convection, provision of auxiliary equipment etc have been deliberated. The determination of the discussion is to know the implication of active mode or particularly constructed solar greenhouse dryer over others.

2. Classification of Solar Dryer:

Solar dryers are accessible in a variety of sizes and designs and are used to dry different agricultural products. Different

kinds of dryers are accessible on the market according to farmers ' requirements. Based on their working temperature ranges, which is a high temperature solar dryer and low temperature solar dryer, all drying devices are primarily categorized.

- **Air movement mode**
- **Insulation exposure**
- **Air flow direction**
- **Dryer arrangement**
- **Solar contribution**
- **Type of fruit to be dried**

2.1 Direct Solar Dryer

It is a type of dryer in which the drying product straight absorbs solar radiation. It is also referred to as a natural convection cabinet dryer as the solar radiation falls straight on the item; product quality is decreased. This dryer consists of a drying chamber covered with a transparent glass plastic cover. This dryer consists of a drying chamber covered with a clear glass plastic cover. Usually the drying chamber is a shallow, isolated box with air-holes in it to allow air to enter and exit the box.

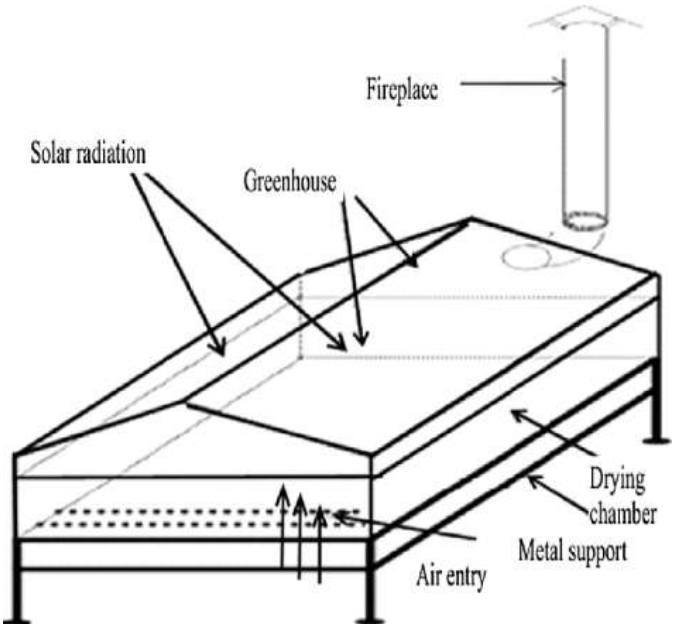

Figure 2: Direct solar drying

2.2 Indirect Solar Dryer:

The system's solar radiation is used to heat the air that flows through the item in this dryer to be dried. In this dryer product quality enhanced with enhanced drying speed. In the drying chamber, heated air is blown through. At the top of the drying chamber vents are supplied by removing moisture. A better control over drying is accomplished in indirect types of solar drying systems. Figure 3.3 Describes another indirect solar drying principle commonly recognized as standard dryers.

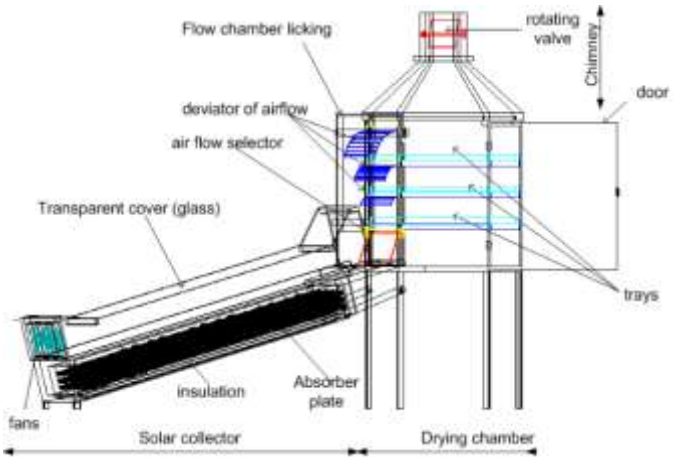

Figure 3: Indirect solar drier

CONCLUSION:

This research work is conducted to study the solar grape dryer's efficiency analytically and experimentally using the evacuated tube solar collector under the heat transfer forced convection. This scheme shows the use of the entire non-conventional energy source. Here the drying efficiency under uncontrolled circumstances is researched, taking into account all the researchers ' prior results. The solar collector evacuated tube is intended and manufactured on the basis of analytical calculations. The grapes ' drying conduct is analytically and experimentally studied at the same time. The solar collector's thermal efficiency and the manufactured dryer's drying effectiveness were discovered more than previously accessible information. This model is more appropriate for practical implementation as it maintains the same drying circumstances as traditional schemes.

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