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## Review on Solar Dryer and Solar Cooker

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**Abstract** The solar drying system uses solar energy to heat air and dry any food substance loaded, which is advantageous in lowering agricultural product waste and aiding in their preservation. A solar cooker is a device that sterilises or heats food or beverages using the energy of the sun. The wide range of solar cookers currently in use are inexpensive, low-tech tools because they require no fuel and cost nothing to operate. They also help to reduce air pollution and slow the encroachment of desertification and deforestation.

Solar cooking is a type of outdoor cooking that is frequently used when minimizing fuel consumption is crucial or there is a high risk of accidental fires. Solar energy is a non-polluting, endlessly renewable source of power that can be economically used to meet all of humanity's energy needs. It was done to assess the system's performance. Food materials were cooked and dried on this equipment.

**Keywords** Solar Dryer, Solar Cooker, Solar cooking

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### 1. Introduction

Since the turn of the century, numerous nations have continued to use solar energy. There are many methods currently available to use solar energy in different aspects of homes and commercial buildings [1]. Sources In addition, solar energy is a non-polluting fuel because it doesn't burn, making it a clean fuel. By using it, we can maintain our health and avoid a number of harmful diseases that are brought on by the burning of biomass, in addition to saving money and fuel. The product is dried using solar energy inside a closed cabinet structure. The drying cabinet's top surface is transparent to allow the radiation to be absorbed.

The solar radiation is captured by the incline surface. A solar cooker is a device that cooks food by using the energy of the sun's rays. Although some solar cookers are as powerful or expensive as conventional stoves, the majority of them are currently in use are relatively cheap, low-tech gadgets. Additionally, modern, large-scale solar cookers are capable of cooking for hundreds of people [2]. Many non-profit organizations are promoting their use globally because they consume no fuel and have no operating costs, which will help cut down on air pollution, fuel costs, and the rate of deforestation and desertification. The significant improvement in product quality and the absence of insect, microbial, and mycotoxin contamination, which indirectly enhances product hygiene, are just a few of the many advantages of solar drying. Additionally, a solar dryer can lengthen the shelf life of dried goods. Simple local materials like cardboard, mud, bricks, and aluminum foil can be used to build solar cookers that can be used to cook food and support small local businesses like those that use the sun to dry fruits and vegetables [3].

### 2. Various Solar Dryer Types

There are basically three different types of solar dryers: direct, indirect, and combined.



**2.1 Direct dryers**

Direct sunlight is used to heat the product. Moving air evaporative removes the grain's moisture [4-5]. A product can be dried too quickly, causing "case-hardening," or at a temperature that is too high, producing a product of poor quality because temperature control in drying with this type of dryer is difficult.

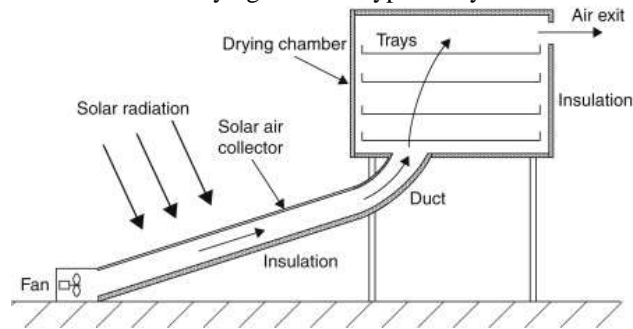


Figure 1: Direct Solar Dryer System

**2.2 Indirect dryers**

Moving heated air from outside the drying chamber dries the product.

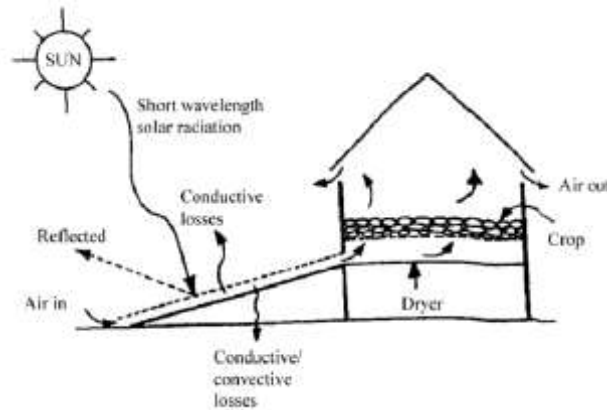


Figure 2: Indirect Solar Dryer System

**2.3 Concurrent dryers**

Both heated moving air and direct radiation are used to dry the product.

**2.4 Active solar drying**

In this kind of drying system, the drying systems are forcedly blown with air. A blower to force air through the product, a chamber, and a transparent sheet are the main components of this system [6]. Figure depicts an active solar dryer that uses a fan to force air through the product being dried.

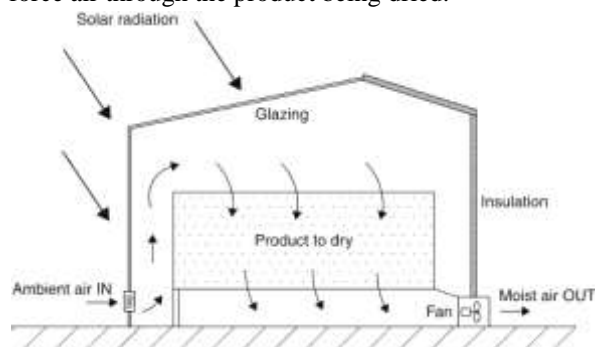


Figure 3: Active solar Dryer



### 2.5 Passive solar drying

Air is heated and circulated naturally in a passive solar dryer by buoyancy force, wind pressure, or a combination of the two. The passive mode is used by greenhouse dryers and normal and reverse absorber cabinet dryers.

In many Mediterranean, tropical, and subtropical areas, particularly in Africa and Asia, or in small agricultural communities, this technique is still widely used [6].

Small batches of dried fruits and vegetables, such as bananas, pineapple, mangoes, potatoes, carrots, etc., are best dried using passive dryers. Below is a schematic representation of a passive solar drying system.

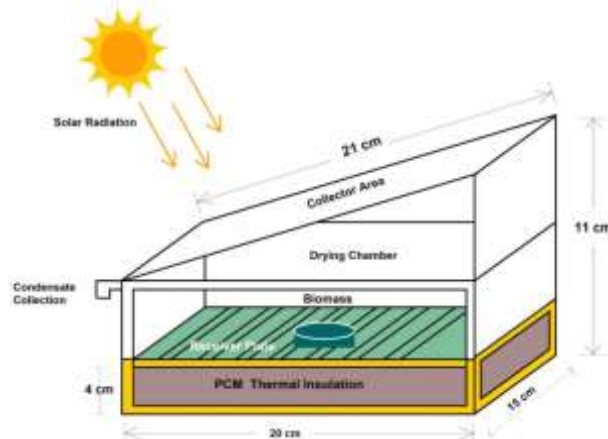


Figure 4: Passive solar Dryer

### 3. Various solar cooker types

In general, there are three categories of solar cookers on the market:

Box solar Cooker

Panel solar Cooker

Parabolic solar Cooker

#### 3.1 Box solar Cooker

The most popular and affordable type of solar cookers are solar box cookers, also referred to as solar ovens. These box cookers are made of inexpensive materials and have a very straightforward design (Cantina West, 2014). Solar Cooker International claims that solar box cookers often support multiple pots and cook at moderate temperatures. It is capable of reaching 140 C. These cookers are widely promoted by non-profit organizations around the world in an effort to lower fuel costs and reduce the rate of deforestation brought on by the production of charcoal and firewood. Over the course of an hour, it can be primarily used for meat, vegetables, and toast.

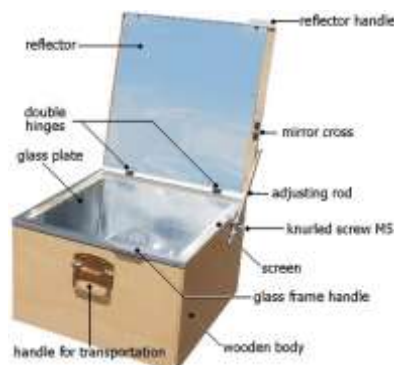


Figure 5: Box Solar Cooker



### 3.2 Panel solar Cookers

Flat panels are used in panel cookers to reflect and concentrate sunlight for heating and cooking. Panel cookers incorporate features of box and curved concentrator cookers, claims Solar Cooker International. They are easy to use and reasonably priced to purchase or produce. Rice, pasta, lentils, vegetables, chicken, goat, baby food, and pasteurized water can all be cooked using the Cook it, a low-cost solar cooker. The food takes two to three hours to prepare in direct sunlight. The solar box cooker and the panel cooker both use a sizable (often multifaceted) reflective panel to cook food. Additionally, when the sun is hidden by clouds, it cannot retain much heat. It is primarily used to bake cakes and loaves of bread.



Figure 6: Panel Solar cooker

### 3.3 Parabolic solar cookers

According to Solar Cooker International, parabolic cookers (also known as curved concentrator cookers) can reach much higher Temperatures and cook more quickly than solar box and panel cookers but also need frequent adjustment and supervision for safe operation. To focus the sunlight on the food in the pan, more accuracy is required.



Figure 7: Parabolic solar cooker

The food won't cook properly if the light is not properly focused on what's in the pan. It can be used for grilling, roasting, and baking. When used properly, parabolic solar cookers perform well. They require a lot of care when using them and are not simple to make. Parabolic cookers require direct sunlight just like other solar cookers do; they cannot capture and hold sunlight for later use. It can be used to quickly boil water, bake bread, and make soup.

## 4. Advanced solar dryer

The fundamental process for lowering the moisture content of products to a particular point below which product deterioration does not occur is solar drying. This study's primary goal is to evaluate all of these solar dryer varieties in light of the properties of the product being dried as well as technical, financial, and environmental factors [7].

Direct sun drying necessitates a large open area, is highly dependent on the presence of sunshine, and is prone to contamination by foreign materials. One of the most alluring and promising uses for solar energy systems is the solar drying system.



## 5. Advanced solar cooker

The only source of light the solar cooker needs to function is our sun directly. No gas, charcoal, or biomass is needed; only endless solar energy is available [8]. With its cutting-edge design, the Solsource Cooker lets you use sunlight to grill, pan fry, slow cook, and boil water. The durability and effectiveness of the solar reflector are enhanced by the advanced self-healing polymer.

Compared to conventional charcoal, the Solsource cookware heats up five times faster. Therefore, you can start cooking more quickly.

The best alternative technology to the drawbacks of traditional drying techniques is the solar dryer. For many years, scientists from all over the world have worked very hard to develop various types of solar cookers. Solar energy is free and doesn't cause pollution. The Cooker powered by solar energy is also used for drying. Drying could be accomplished with a solar cooker. The hybrid solar cooker has been designed and developed, and if it is commercialized, it will be able to compete with the traditional solar cooker while cooking more quickly and proving to be beneficial to society.

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