Solar dryer donated to uqpe ghana

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In this article, we review all aspects of natural food dehydration with a solar dryer: the different drying methods – how solar dryers work – the benefits of solar dehydration. Enjoy your reading!

Unlike sun-drying, where food is exposed directly to the sun, the solar drying method uses indirect solar radiation. The principle of solar drying technology is to collect solar energy by heating the air volume in solar collectors, and to conduct the hot air from the collector to the drying chamber. This is where the products to be dried are placed.

The solar dryer or solar dehydrator is a relatively simple concept. An important feature of drying systems is the size of the solar collectors. Depending on the quantity of product to be dried, the collectors must be able to supply sufficient quantities of hot air to the drying chamber. Collectors too small for the quantity of food to be dried will result in failed attempts and food spoilage.

2. Heat trapping: insulating the air inside the dryer from the outside air makes an important difference. Using a transparent solid, such as a plastic bag or glass lid, allows light to enter, but once the light is absorbed and converted into heat, the plastic bag or glass lid traps the heat inside to dehydrate the food. This makes it possible to achieve similar temperatures in cold, windy weather as in hot.

3. Moving heat to the food: Both the natural convection dryer and the forced convection dryer use heated air convection to move heat to the food. When the heat is redirected into the hot chamber, the humidity in the air is drastically reduced, enabling dehumidification and drying of fruit, for example.

The structure consists of three main elements: a solar collector, a drying tank and a solar chimney. Smaller, natural convection dryers are essentially wooden boxes with top and bottom vents. Food is placed on wire mesh frames that slide into the boxes. An appropriately sized solar air heater, with south-facing plastic glazing and a black metal absorber, is connected to the bottom of the boxes. Air enters at the bottom of the solar air heater and is heated by the black metal absorber. Hot air rises along the food and exits through vents at the top.

In operation, these dryers produce temperatures of 54 to 82?C, which is desirable for most food drying and pasteurization processes. With these dryers, food can be dried in a single day, even when the weather is partly cloudy, misty and very humid. Inside, there are thirteen shelves that hold 35 to 40 medium-sized apples or peaches, cut into thin slices.

Convection is forced onto the food using a fan. In the case of forced convection dryers, the structure can be relatively similar. However, the forced convection dryer requires a power source for the fans to provide the airflow. The forced convection dryer does not require an incline for the air flow, but the collector can be placed horizontally with the fan at one end and the drying tray at the other.

In addition, the forced convection dryer is less dependent on solar energy, as it provides the airflow itself; this enables the design to operate in weather conditions in which the natural convection dryer does not function. Since inadequate ventilation is one of the main causes of food loss in solar dryers, and is exacerbated by intermittent heating, proper ventilation is essential. The addition of a forced convection flow, for example provided by a PV solar cell connected to a fan, will prevent food loss.

The structure of a tunnel dryer is relatively simple, with a polyethylene wall that is particularly resistant to high temperatures. Unlike other types of dryer, the structure is large enough for one person to fit inside.

Moisture content: After drying, it is essential that the foodstuff has a moisture content suitable for storage. The desired moisture content will depend on the type of feed, the length of storage and the storage conditions available. The drying operation is also essential to minimize the range of moisture levels in the food batch, as insufficiently dried food portions can lead to spoilage of the whole batch.