

HOW TO MAKE A SOLAR FOOD DRYER

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TABLE OF CONTENTS

USING THE SUN TO DRY AND PRESERVE FOOD	5
WHY DO WE NEED A SOLAR DRYER?	5
INDIRECT SOLAR DRYER	8
DIRECT SOLAR DRYER	9
HOW TO MAKE AN INDIRECT SOLAR DRYER	10
HOW TO MAKE A DIRECT SOLAR DRYER	12
HOW TO USE A SOLAR DRYER	14





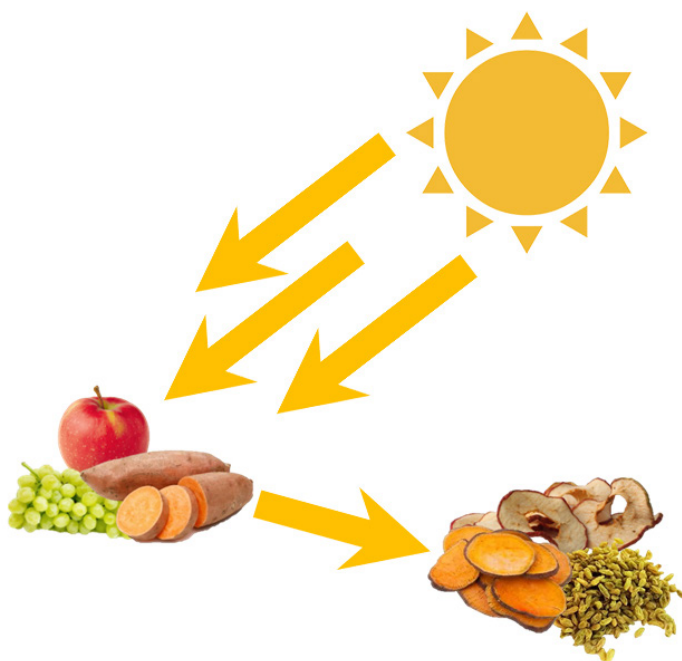
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USING THE SUN TO DRY AND PRESERVE FOOD

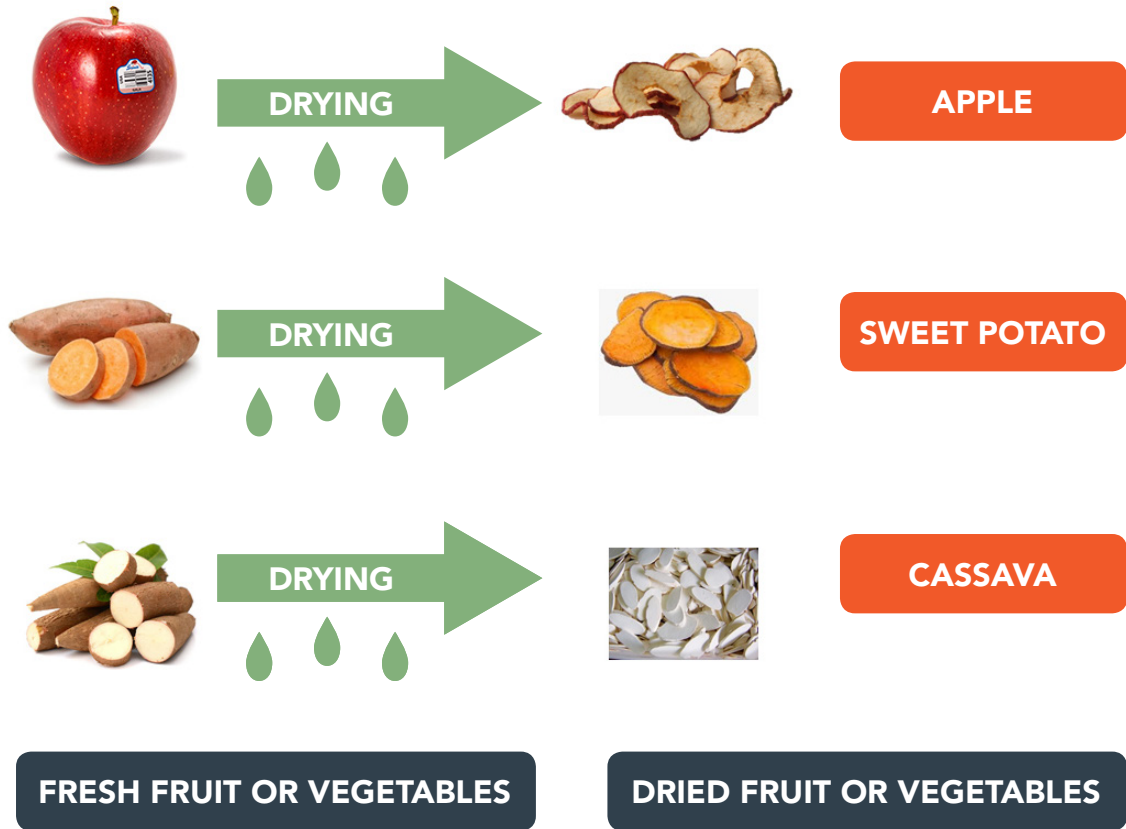
This book shows how to make and use a food dryer that uses the sun for power. The dryer was designed by the Consumer and Food Sciences department at the University of Pretoria.



WHY DO WE NEED A SOLAR DRYER?

It is important to eat fruit and vegetables to stay healthy. Fruit and vegetables give us carbohydrates for energy. They give us protein for strength. They give us vitamins, minerals and fats to help our bodies work better. And fibre to help keep our stomachs regular.

But fruit and vegetables can go bad quickly. Then we have to throw them away. But, fruit and vegetables are mostly made of water. If we dry them the water comes out, but the nutrients stay inside.



We can store dried fruit and vegetables on a shelf for a long time. They are also light and smaller to carry. One way fruit and vegetables can be dried is using the sun. But outside insects can eat them and they can get dirty. Rain can also damage fruit and vegetables.



Figure 1: Fruit and vegetables with rain and insect damage

HOW TO MAKE A SOLAR FOOD DRYER

Fruit and vegetables can be dried with a drying machine, but these are expensive and use a lot of electricity. Because of these problems the University has made machines that use the sun for power, but keep the fruit or vegetables safe inside while they are busy drying.

THERE ARE 2 KINDS OF SOLAR DRYERS, AN INDIRECT SOLAR DRYER AND A DIRECT SOLAR DRYER.



INDIRECT SOLAR DRIVER



DIRECT SOLAR DRIVER

INDIRECT SOLAR DRYER

Dryer In an indirect solar the sun does not shine straight onto the vegetables or fruit but they are dried by warm air. In this machine the warm air comes in at the bottom. The air is heated by the sun as it comes in. Then it goes up into the main part to dry the fruit and vegetables. The air goes out through a pipe at the top.

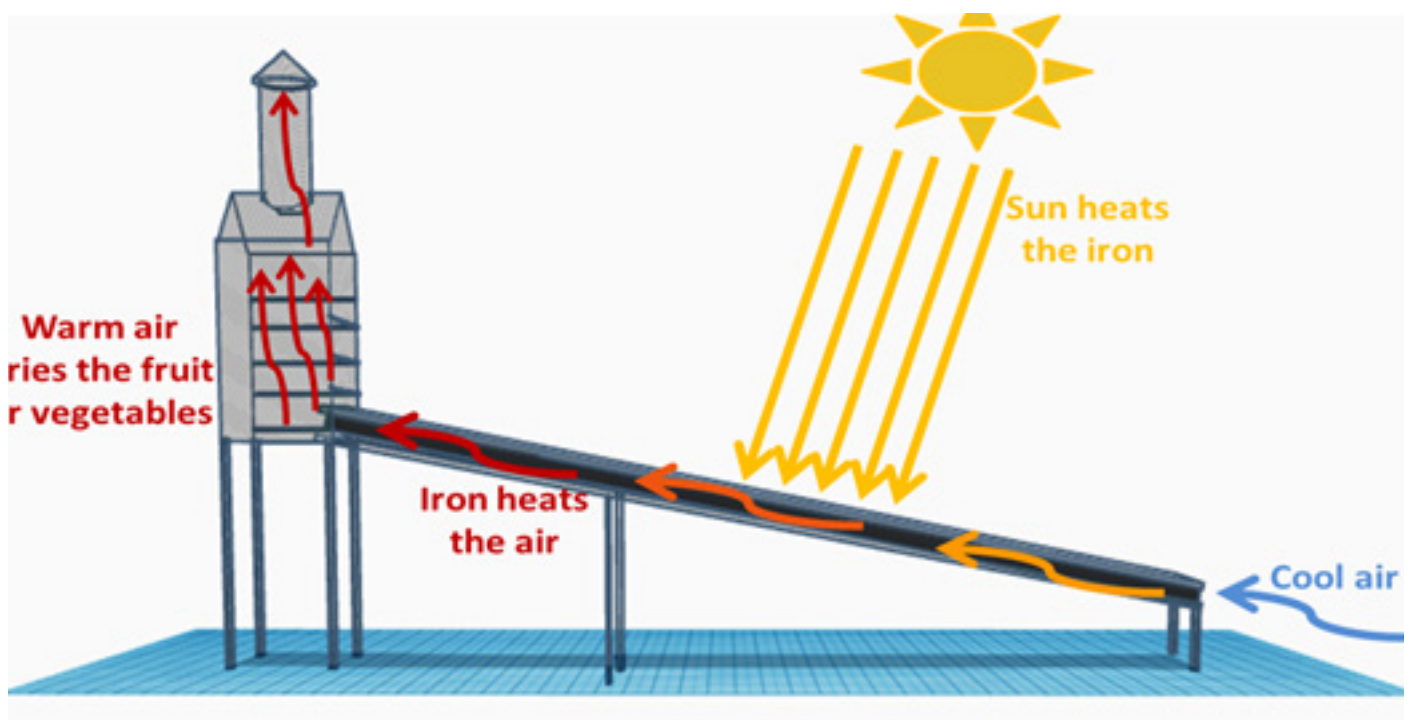


Figure 2: Picture of an indirect solar dryer

HOW TO MAKE A SOLAR FOOD DRYER

DIRECT SOLAR DRYER

In a direct solar dryer the food is heated and dried directly by the sun. To keep the fruit and vegetables safe from insects and dirt they are put in a box under a see through cover.

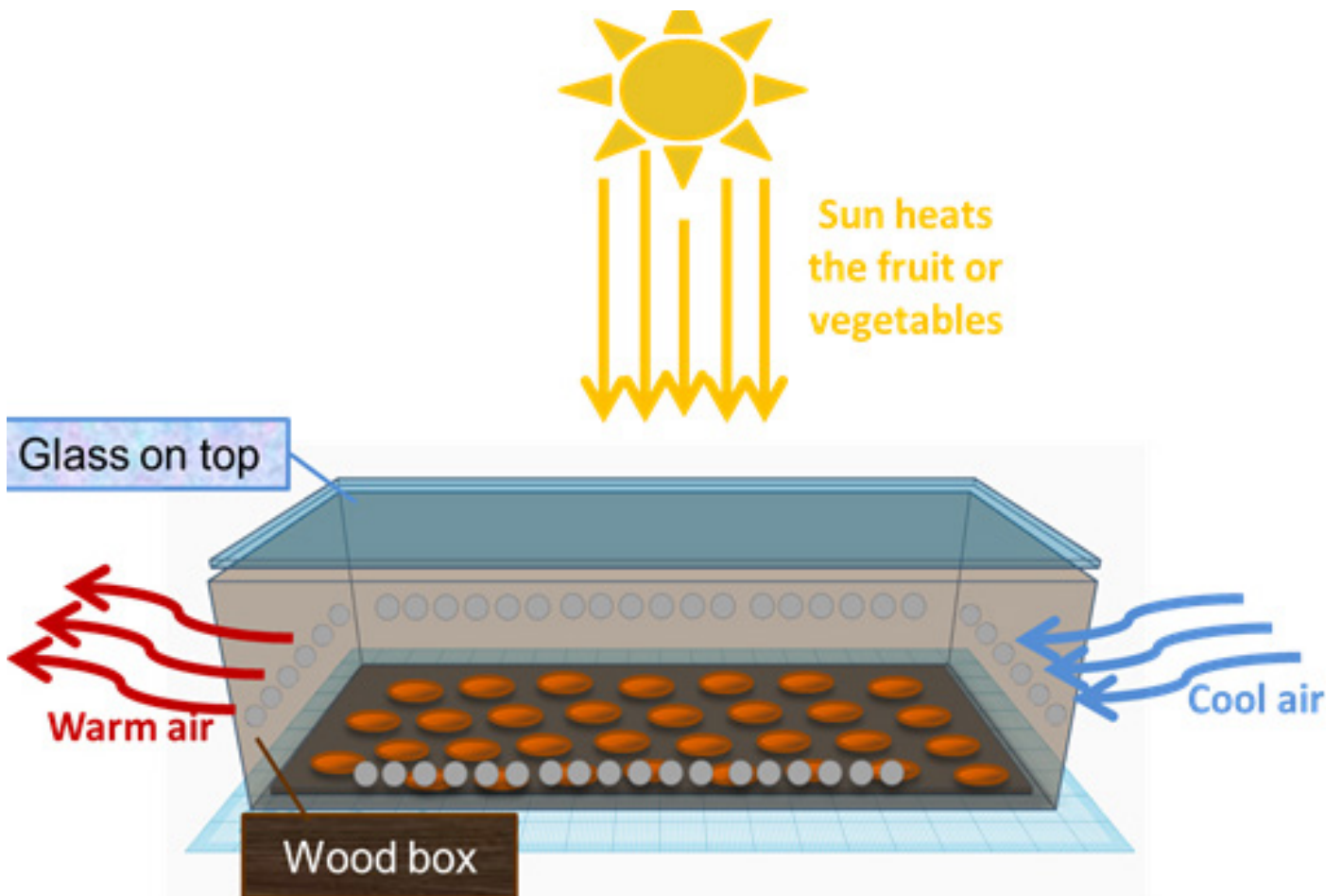


Figure 3: Picture of a direct solar dryer

HOW TO MAKE AN INDIRECT SOLAR DRYER

1. THE AIR HEATER

1. Get some wood and make a box 2 m tall 85 cm wide and 15 cm deep. The wood can be planks or plywood. Paint the box black. This will make it hot in the sun.
2. Take some corrugated metal. The metal must fit inside your wooden box. Paint the metal black. It is called the absorber plate. Put the absorber plate inside the box.
3. Put a piece of glass to fit on top of the box. The glass can be 2 m tall, 85 cm wide and half a centimetre (5 mm) thick.
4. The box needs legs that can lift one side up higher than the other side. A 35° degree angle (see Figure 4) is the best angle for the air heater. If the box is flat then it will not work so well as when one side is lifted up.
5. You can put a lever on the box to help move the absorber plate to the right angle. The air heater must be put straight in the sun.



Figure 4: Photo of an air heater.

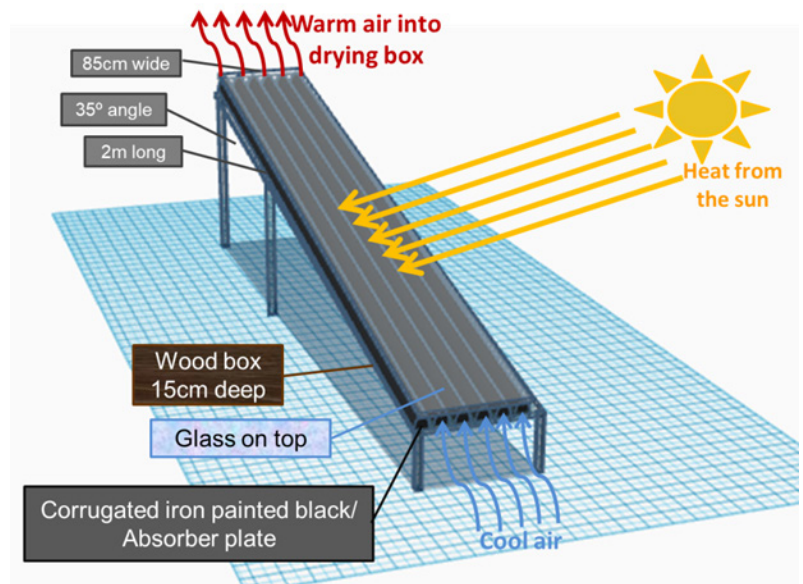


Figure 5: Diagram of the air heater

HOW TO MAKE A SOLAR FOOD DRYER

2. THE DRYING BOX

The drying box is a box made out of wood that is 2.5 cm thick so that the heat cannot escape. The box is 70 cm wide, 1.2 m high and 90 cm deep. Make a door on one side of the box. Take some Styrofoam (polystyrene) and paint it black then stick these inside the box. This will make sure that the heat stays inside the box.

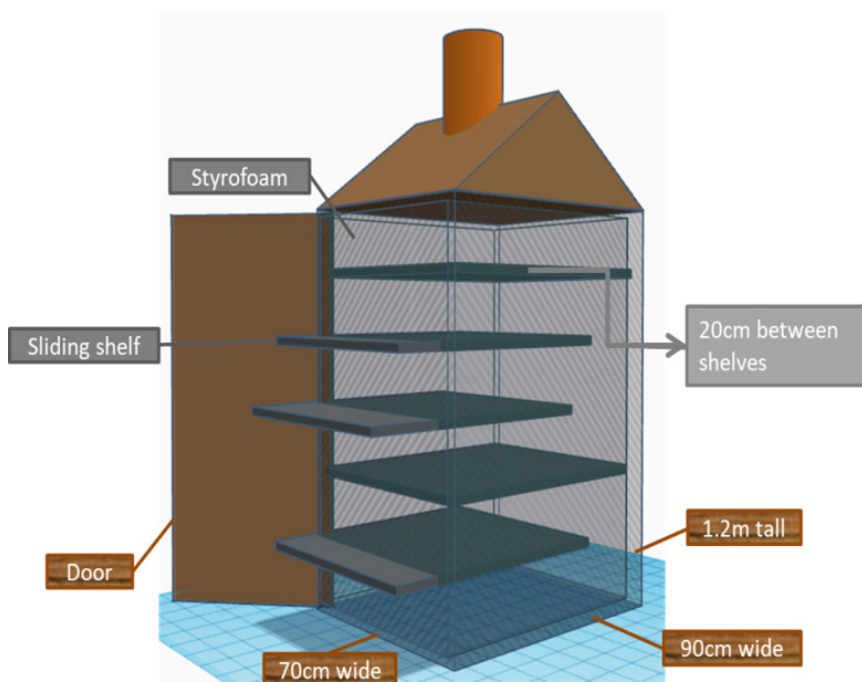


Figure 7: Diagram of the drying box



Figure 8: Photo of the drying box

- Make 5 shelves to go inside the box.
- Make the outside of the shelves from wood but make the drying trays from aluminium wire mesh.
- This is where the fruit or vegetables will sit when they are drying.

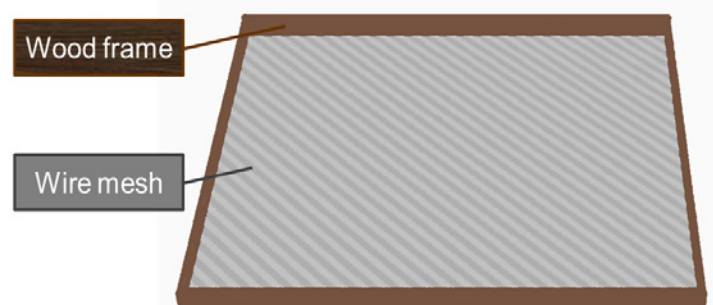
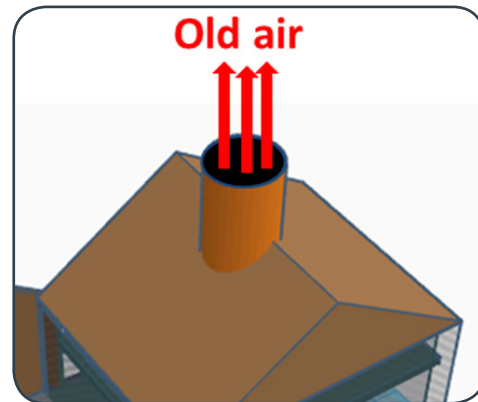


Figure 9: Picture of the drying trays

3. AIR OUT PIPE

On the top of the drying box is a galvanised metal pipe 80 cm high and 30 cm wide. This lets the old warm air out so the fresh air can come in from the bottom of the air heater.



HOW TO MAKE A DIRECT SOLAR DRYER

In a direct solar dryer the food is heated and dried by the sun. To keep the fruit and vegetables safe from insects and dirt they are put on a tray and in a box under a see through cover (Figure 11).

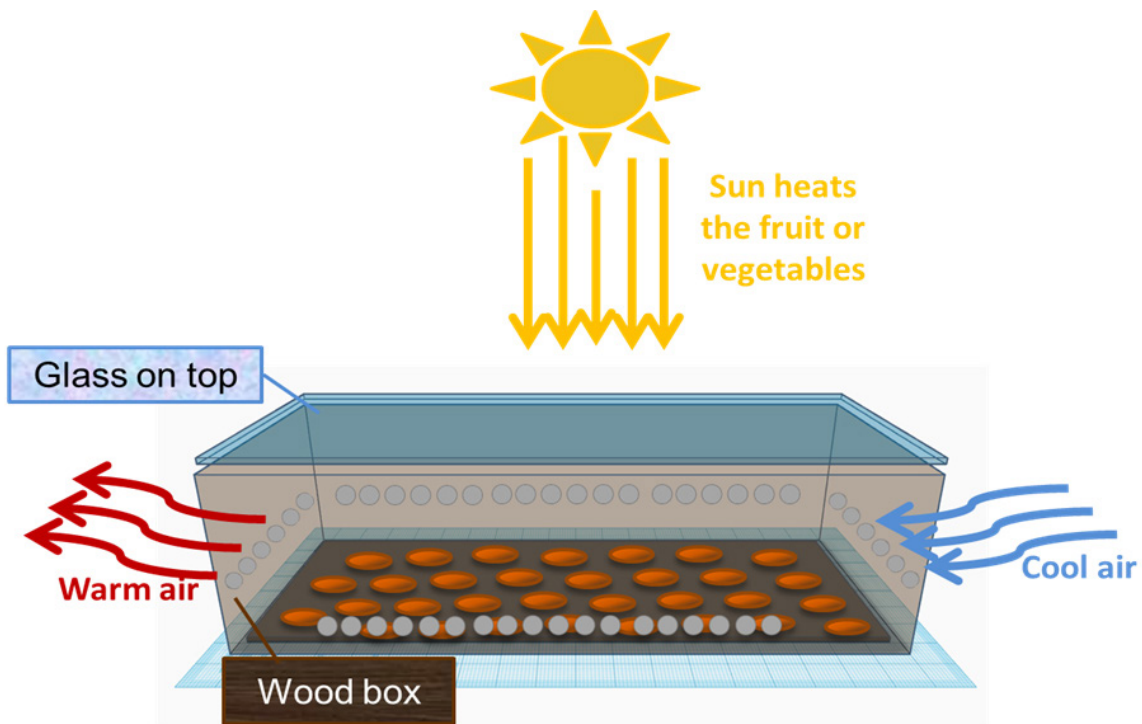


Figure 11: Diagram of a direct solar dryer

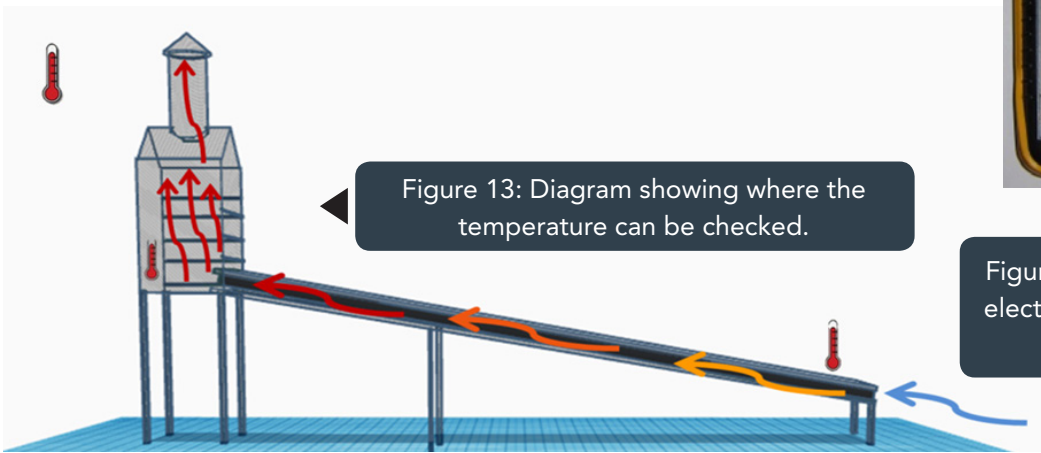
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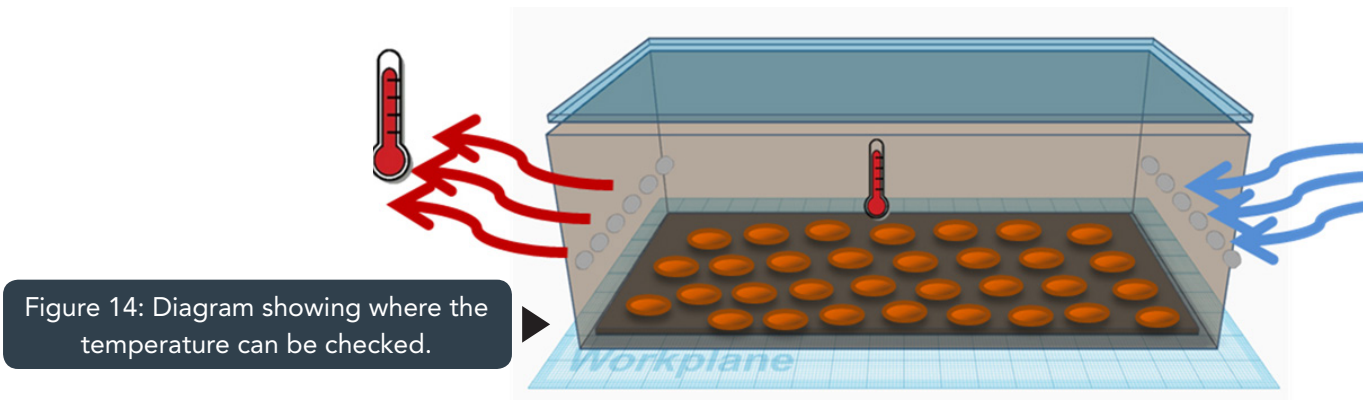
▲ Figure 12: Photos of a direct solar dryer



▲ Figure 15: A thermocouple is an electronic thermometer that can be used.



◀ Figure 13: Diagram showing where the temperature can be checked.



▶ Figure 14: Diagram showing where the temperature can be checked.

HOW TO USE A SOLAR DRYER

To use a solar dryer, fruit or vegetables should be cut into slices 2-4 mm thick for sweet potato or 4 mm for cassava.



Figure 16: Sweet potato



Figure 17: Cassava

The food is put on the tray in one layer (not on top of each other). Leave three fingers (3 cm) between each piece.

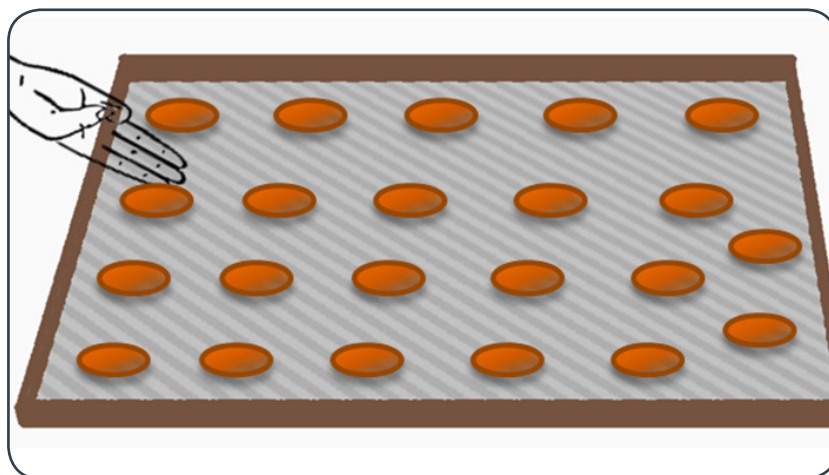


Figure 18: Slices of vegetable on a tray

HOW TO MAKE A SOLAR FOOD DRYER

In the solar dryer 5-7 kg of sweet potato, cut into slices 2-4 mm thick can be dried at one time. 4-6 kg of cassava, cut into slices 4 mm thick can be dried at one time.



Figure 19: 5-7 kg sweet potato



Figure 20: 4-6 kg Cassava

The drying of the fruit and vegetables can be measured every hour by weighing the products to see how much water has come out.



Figure 21: Weighing vegetables on a scale

Before you use your dryer and after you have finished, you must wipe the inside of the dryer, and the glass plates with a clean dry cloth. The doors must be closed when you are not using it. Every month the box should be checked for cracks or damage.



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