

## Solar drier for the Tropics



The solar dryer provides an effective means of drying fruits and herbs because:

1. a temperature of 35 to 45°C is easily achieved.
2. it is hygienic; the materials are protected from dust and insects.
3. leaves and fruits are dried in darkness, so vitamins are preserved.

This temperature range is ideal because

- a) the materials dry quickly, thus preventing any danger of mould forming.
- b) valuable vitamins and medicinal components are not destroyed.

### Construction of the drier

The solar dryer consists of a solar collector, a drying chamber, drying trays and a chimney, see the diagram. The measurements of the dryer can vary, but the proportions should be maintained. For example, instead of being 1 metre square, drying trays of about 60cm square may be better the first time a dryer is constructed.

This solar dryer is called an “updraft dryer”: as a result of the air being significantly warmed in the solar collector, there is an upward movement of air through the drying trays and the chimney.

1. The **solar collector** comprises
  - a) a corrugated iron sheet which is painted black to absorb the heat of the sun. It is secured in the middle of the collector so that the air can pass above and below this sheet.
  - b) a frame constructed out of plywood.
  - c) a transparent cover. This is ideally made of glass, but glass is expensive and breakable. Plastic sheeting, e.g. thin polythene, is cheaper but not so transparent nor so durable.
  - d) an inlet for the air which is covered with a fine metal mesh to prevent insects or small animals from entering.

The collector should be placed at an angle corresponding in degrees to the geographical latitude of the location. Close to the equator the collector must have an inclination of at least 10 degrees.

2. The **drying chamber** is made from square corner posts and side walls of plywood. The side walls should not be made of transparent material, so that the ultra violet light does not destroy the vitamins. The roof of the drying chamber is made of sheet metal and painted black to absorb heat from the sun. The floor is provided with a drip tray. At the back of the chamber there is a door, which can be opened to enable the drying trays to be removed and replaced.
3. The drying chamber in the diagram contains four **drying trays**, each of which measures 1 metre by 1 metre. The floors of the drying trays consist of grids, made of metal or plastic. Mosquito grids such as are used in house windows are ideal. The drying trays are made like drawers.
4. The purpose of the **chimney** is to increase the flow of air through the dryer.

The drier must be in placed such that the solar collector faces directly towards the midday sun.

If the temperature inside the dryer exceeds 45°C, the solar collector can be partially covered.

### Use of the drier

No more than two thirds of the grids should be covered, in order to allow the air to flow freely. If the material dries unevenly, then rotate the trays through 90° or 180°, or exchange the trays with each other – the material on the lower trays tends to dry more quickly.

### What can be dried?

For the production of teas or medicinal oils and ointments: Leaves of *Artemisia annua*, *Psidium guajava*, *Azadirachta indica*, *Cassia alata*, *Euphorbia hirta* (whole plant except the roots), *Eucalyptus globulus*.

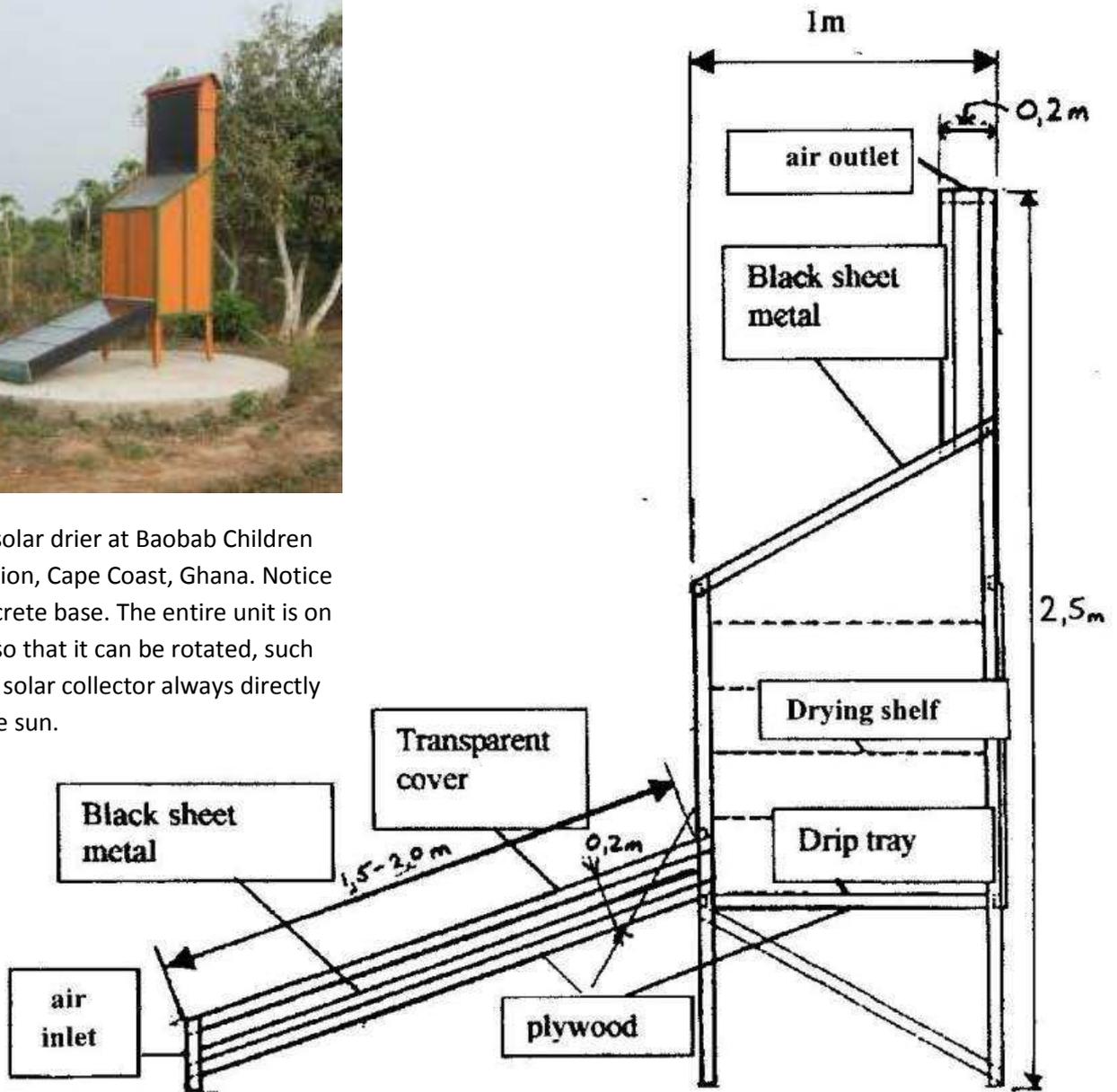
For the preservation of fruits: slices of mango, pineapple, banana, jack fruit, guava.

How dry the material is can be tested using a hygrometer, see below. The finished products should be stored in labelled, air-tight containers.

**Caution:** As the air passes through the drying trays, it will become moist and cooler. When the sun shines, the natural draft will take the cooled, moist air out through the chimney. If, however, the weather becomes cloudy, the air will not be warmed so much, and then as it passes through the fruits or herbs it may become just as cool as the outside temperature. This air will then fall rather than pass upwards through the chimney. The result will then be stagnant air, the plant material will not dry and there danger of mould forming. Thus if it remains cloudy for more than one day the plant material should be removed and placed on a sheet inside the house where the air can circulate freely.



A large solar drier at Baobab Children Foundation, Cape Coast, Ghana. Notice the concrete base. The entire unit is on wheels so that it can be rotated, such that the solar collector always directly faces the sun.



### Two more driers

On the right, a simple but effective tower drier made from timber and polythene.

Below a simple tunnel drier. This can be improved by installing a fan powered by a solar panel.

