

Solar Food Dehydrator

by Stephan Grabner

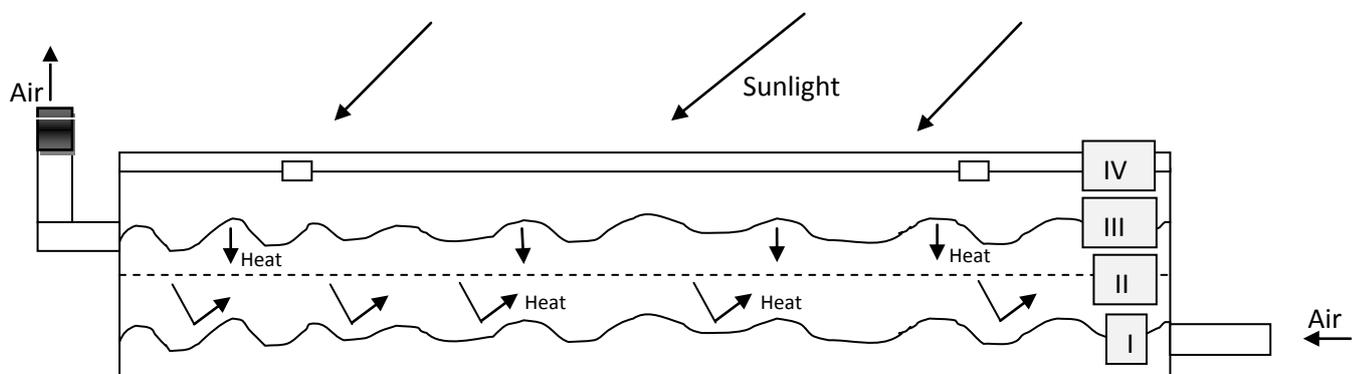
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- Purpose
 - To dry fruits, vegetables, herbs, grains and seeds for storage
- Method
 - The dehydrator works with *heat*. A black surface is heated by the sun and reradiates the heat onto a drying tray below.
- Design
 - The dehydrator consists of a 1x1m wooden box with transparent, hinged cover and three removable trays inside.

Sunlight enters through layer IV, the cover, and heats up layer III, a black sheet of metal (corrugated roof material, to increase surface area and thus heat reradiated). The heat is reradiated onto layer II below, a mesh tray on which the produce is placed. Heat is also reflected back up onto the produce by layer I (corrugated roof material).

The dehydrator also has four vents each for entry and exit of air. As shown in the illustration below, air enters through the lower vents, gets distributed along the channels of layer I and exits through the upper vents. The uppermost parts of the top vents are painted black, which heats up the air inside the pvc tube, causing it to rise out of the vents. As it does so, it sucks air (loaded with humidity from the drying produce) out of the dehydrator, causing fresh air to be sucked in through the lower vents.

Holes or cracks in the wood have been plugged with glue or silicone, and the vents are covered with mesh to keep insects out.



- Use
 - Cut up fruits or vegetables finely (as fine as possible without them falling apart- if you want the dried goods to be chewier, cut them thicker but be aware that they will need longer to dry). Wash herbs and make sure seeds (café, cacao,...) are clean (no pulp) and free from insects before placing them on the drying tray. Assemble the dehydrator, close the lid, secure it, and place the dehydrator in a place where it will receive maximum sun exposure. If it rains, cover it with plastic sheets or, ideally, move it into or beneath the house.
 - Two to three half-days of good sunlight are enough to fully dry banana or papaya slices. Herbs are dry after one half day. Fruit are dry enough for storage when dry but still bendable; vegetables and herbs should be brittle. Store dehydrated produce in airtight jars with a bit of rice (to absorb moisture). Vegetables could also be kept in oil (think sundried tomatoes).
 - Always clean the mesh tray after use, and keep the lid open when not using the dehydrator for a while.
- Troubleshooting
 - Insects. If insects get into the dehydrator, check the vent coverings and spaces between the boards to make sure the mesh is intact and the glue still there. There is some space between the lid and the body of the box which I have attempted to fill with wood chips, rubber tubes etc, but critters could still get in. So far, no insects have entered while the dehydrator was in action (it is too hot inside), however some ants and a cockroach have gone in when fruit were left in it for a few rainy days (bad idea).
 - Mold. If the produce gets moldy, the dehydrator has probably not been getting enough sun. Don't leave stuff in it for more than a day without sun. If after starting the drying process it gets rainy for more than that, consider finishing the drying process in pots/pans in the oven or even on the stove. If it has been sunny but the produce still gets moldy, check the vents to make sure the moist air gets sucked out (i.e. that the vents are not clogged etc).
 - Doesn't dry. If the produce doesn't dry, think about slicing it more thinly and make sure the dehydrator gets enough sun.
 - Trays won't go in. The trays do all fit, though at times you need to figure out which side has to go in first. Unfortunately the box is not perfectly quadratic and two side boards are bent, so there is only one way the trays fit in. One corner of each tray and the box has been marked with a black sharpie to indicate which corner goes where.
- Ideas for further improvements
 - Lid. While the plastic foil seems to work fine at the moment, a plexiglass- or even glass plate would be better. There is the obvious problem of fragility, but the foil will turn a dull yellow and get brittle after a while.
 - Insect proofing. The space between the lid and the body should probably be filled at some point. Maybe a type of synthetic sponge would work, as it would allow for the dehydrator to be closed well even if the wood changes shape a bit over time.
 - Positioning. Ideally, a sort of platform or legs/stilts could be built for the dehydrator in a spot which has great sun exposure for most of the day and year. This would not only make use easier (since it would not have to be moved back

and forth all the time) but would also help to keep ground moisture and insects out.

- Weatherproofing. It would be great to weather-/ waterproof the wood so the dehydrator can be left out in any weather without the wood rotting all too fast.
- Research/ Testing. I did not have enough time after finishing the dehydrator to see how well it works on overcast days, or how long different vegetables/seeds etc take to dry. It would be great to add drying times for different produce and under different conditions to this manual!