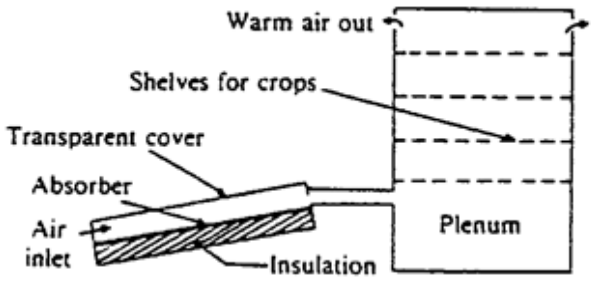
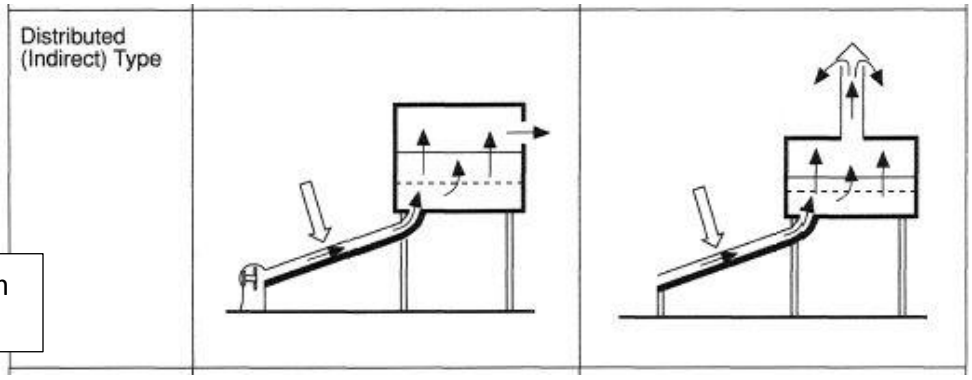
SOLAR DRYERS – improved indirect models

Introduction: Horticultural produce can be dried using direct or indirect solar radiation. Indirect driers are constructed so the sun shines on a large flat, solar collector (a shallow box, the insides painted black, topped with a pane of glass or plastic sheeting), heating air which then moves into the plenum chamber and upward through a stack of four to six trays loaded with produce. The warmed air dries the produce without over-heating or causing sunburn damage, and the trays are protected from dust and pests.

Design Options & Materials Needed: The solar dryer can be constructed using wood, metal, polycarbonate (such as are used for greenhouse walls) or UV resistant plastic sheeting stretched on a wooden frame. A chimney added to the top of the drying chamber will speed drying by pulling moist air up and out of the stack. As a general rule, if the volume of the chamber is 3 cubic meters, you will need about 9 square meters of solar collector surface area.

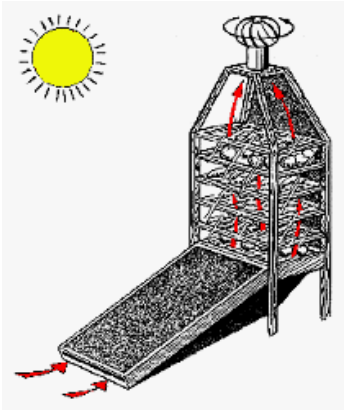


Source of illustration: Yaciuk, G. 1982

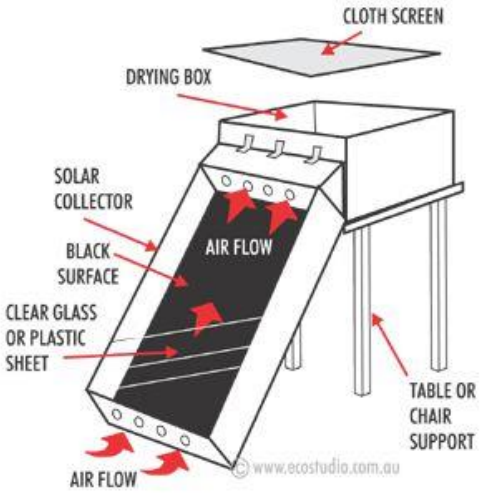


Source: www.thermopedia.com

Zero Energy Solar Dryer: wind turbine added for enhanced air flow



http://www.rudrasolarenergy.com/solar-dryer.html



Drying trays can be made of wood, wire mesh or heavyweight screening materials in a wooden or metal frame.

Produce should be cut or sliced into uniformly sized small pieces and placed on the trays in a single layer, leaving space between each piece in order to allow the warmed air to flow through the chamber.

Costs & Benefits

Indirect models of solar dryers and drying trays can be self-constructed using simple materials at a cost of US$100 to $200. The financial benefits will depend upon the value of the fresh F&V that are saved from being wasted and the market value of the dried products. As a rule you'll need one square meter of tray area to dry about 2 kg of fruits or vegetables, and drying will take one day or more, depending upon the weather. Using solar drying to process surplus F&V that cannot be marketed or eaten before its shelf life is expended can enhance food security for small-scale farmers and marketers. Drying valuable perishable crops for later sale or use can be an inexpensive way to extend the storage potential and marketing period of these food products.

References cited

Yaciuk, G. 1982. Food Drying: Proceedings of a Workshop held at Edmonton, Alberta, 6-9 July 1981. Ottawa, Ontario: IDRC 104 pp.

For further information

Illustrations of solar dryer models and solar collectors http://www.thermopedia.com/content/1136/
Solar dryer sketches http://climatetechwiki.org/technology/jiqweb-edf
Solar dryer photos and example of solar dryers for sale: http://www.rudrasolarenergy.com/solar-dryer.html

Small-scale postharvest handling practices: A manual for horticultural crops (Chapter 10; 5th edition 2015) http://ucanr.edu/sites/Postharvest_Technology_Center_/files/231952.pdf

Postharvest Technology Center (UC Davis) http://postharvest.ucdavis.edu
The Postharvest Education Foundation http://www.postharvest.org
Postharvest Innovations LLC http://www.postharvestinnovations.com

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