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# LOW-COST COOLING METHODS for VEGETABLES

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*The shelf life of vegetables as well as their quality can be increased by keeping them in a cool environment. This will allow more time for marketing the crop, reduce the rate of deterioration, and allow higher quality produce to reach consumers.*

Three simple but effective methods to keep vegetables cool are: *shade, evaporative cooling, and Coolbots*

## SHADE

Keeping produce in the shade, especially immediately after harvest, will reduce the surface temperature and slow down deterioration and water loss. Vegetables in the sun can be as hot as 35°C even if the ambient temperature is about 25°C. Shade structures can be constructed using local materials such as thatch and wood poles, or the containers can be covered by moist fabric or leaves.

## EVAPORATIVE COOLING

Evaporative cooling principles can provide a cool environment. A simple brick and sand structure can be constructed using a double brick wall with the space between the two walls filled with moist sand. A charcoal evaporative cooler will perform the same function.



### *Keeping vegetables cool*

1. Shade constructed using woven fabric.
2. Shade constructed using locally available materials.
3. Evaporative cooler made from bricks and sand.
4. Evaporative cooler with walls filled with charcoal.

## COOLBOT TECHNOLOGY

If electricity is available, a low cost cold room can be constructed that uses an air conditioning unit to provide cooling. The air conditioning unit can be attached to a Coolbot that enables it to reach lower temperatures.

The Coolbot was developed in the USA and uses a device (Coolbot™) that overrides the air conditioner's temperature gauge to achieve lower temperatures (4°C, compared the normal lowest set point (usually 16 - 18°C).

The cold room should be insulated and the door can be fitted with a curtain of plastic strips to reduce warm air entering the room.

A Coolbot cold chamber can measure 2.5 m (length) x 1.5 m (width) x 2.5 m (height) with a 2.15 x 1.66 m door, all insulated with 10 cm Styrofoam. A 2.5 hp (6,360 BTU) air conditioner can be used. For a 2.4 x 2.4 x 2.4 m cold room, provide Styrofoam insulation and use a 3 hp air conditioner.

Maintain 11-13°C for tropical vegetables and 5-7°C for subtropical produce. Do not mix them. If tropical produce is stored at 5-7°C, chilling injury develops; if subtropical produce is stored at 11-13°C, shelf life is shortened.

Low relative humidity (below 60%) may prevail during Coolbot storage, rapidly desiccating the vegetables. Covering with wet cloths, misting with water, packing produce in plastic bags, or using a humidifier can maintain high relative humidity.



(above) A Coolbot can keep a room at recommended storage temperatures.

(below) Air conditioning unit for cooling with Coolbot attached.

### READ MORE

Coolbot™ - Appropriate Cooling Technology. UC Davis HortCRSP/USAID Technology Information:

<http://StoreItCold.com/>

### Use of a Coolbot-controlled cold room reduces weight loss and increases shelf life

Vegetable	Weight Loss (%)		Shelf life (days)	
	Coolbot 13°C	Ambient (22-35°C)	Coolbot 13°C	Ambient (22-35°C)
Tomato	5	10-12	18-24	9-12
Eggplant	2	7	14	4
Cauliflower	18	44	9	7
Cabbage	6	19	14	8
Cucumber	3	10	4	2
Green Beans	4	12	3	1
Leaf Mustard	5	13	6	0.5

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#### ACKNOWLEDGEMENT

Financial support is provided by the Bureau for Food Security, U.S. Agency for International Development (USAID), under the terms of Award No. AID-BFS-IO-12-00004.

All opinions expressed in this technology brochure do not necessarily reflect the views of USAID.