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# LOW-COST PORTABLE HYDROCOOLER for VEGETABLES

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## PRESERVING QUALITY

Systems that cool fresh vegetables quickly are important for rapidly reaching optimal product temperature. Heat from the produce is the largest source of heat in cold storage facilities.

A hydrocooler uses sprayed water to cool down harvested vegetables quickly. Despite the well-known benefits of hydrocooling for postharvest handling, the technique has not been fully utilized in developing countries since conventional hydrocoolers are usually expensive and out of reach for most subsistence farmers.

*Temperature control is important for preserving the quality of freshly harvested vegetables. Cool temperatures are essential for preserving flavor, texture, aroma and appearance, and for prolonging shelf life and maintaining quality of fresh produce.*

The World Vegetable Center, in partnership with the Jomo Kenyatta University of Agriculture and Technology (JKUAT) Department of Food Science and Technology, developed a low-cost and portable hydrocooling system to prolong the shelf-life of vegetables. The hydrocooler built and tested at JKUAT was found to be effective in reducing deterioration for a range of vegetable crops. The materials for this hydrocooler are locally available in developing countries, lightweight, flexible, and can be moved easily from one location to another.

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## HYDROCOOLER: MATERIALS NEEDED

1. An **insulated box** 105 x 50 x 48 cm (L x W x H)
2. **Pipes:**  $\frac{3}{4}$  inch diameter Polypropylene (245 cm length); three elbows, four T-pieces; one union; and two nipples. These are connected to supply water from the insulated box through two shower nozzles to spray water from above.
3. A **water pump** (0.37 kW) to circulate the water.
4. **Plastic crates** to hold freshly harvested vegetables.



## Build and use a hydrocooler

1. Assemble the different parts of the hydrocooler as shown in Figure 1. Pipe lengths can be adapted to fit local needs.
2. Add potable water and crushed ice into the insulated box until the water temperature reaches below 10 °C (Figure 2). Using 6 kg of ice with 20 liters of water is normally adequate.
3. Put the produce in crates above the insulated box as in Figures 3 & 4. Up to 2-3 layers of crates containing produce can be used.
4. Turn on the water pump and shower the produce with ice cold water for at least 5 minutes (longer cooling times are preferable).
5. Drain excess water from produce before storage. Store the produce under cold conditions.



Fig. 2



Fig. 3

**Table 1. Surface and core temperatures for tomatoes cooled with hydrocooler**

Time (min)	Surface temp (°C)	Core temp (°C)	Water temp (°C)
0	19.4	19.4	8.1
2	8.8	17	8
5	8.4	16	9.4

## Application

This hydrocooling system has been tried and promoted by Kasetsart University, Thailand and the Royal University of Agriculture, Cambodia. Vegetable farmers, packhouses, collection centers and traders can use this technology to extend the marketing period and shelf-life of harvested vegetables, reduce losses, and produce better quality products to meet the requirements of higher value markets. This treatment is only suitable for fruit-type vegetables, such as tomatoes, eggplant, carrots, green beans, courgettes and sweet peppers. It is not recommended for leafy vegetables.

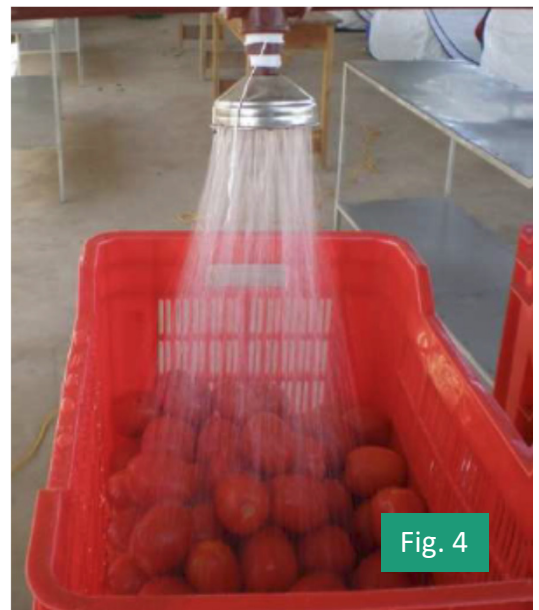


Fig. 4

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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.