Evaporative Cooling for Fruit & Vegetable Storage

A Guide to Assembling, Using, and Maintaining Clay Pot Coolers

MIT D-Lab
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Why Use Clay Pot Coolers?

Using a clay pot cooler to store fruits and vegetables can reduce spoilage and prevent post-harvest losses.

If properly maintained, evaporative coolers provide many benefits to households, including:

- Reduced post-harvest losses
- Fewer trips to the market
- Cost savings
- Increased availability of nutritious vegetables

How Does it Work?

Clay pot coolers are designed to cool air through the evaporation of water, providing a stable environment to store most fruits & vegetables.

- Wet sand placed between a larger outer pot, dish, or basin, keeps the fruits and vegetables inside the inner chamber cool.
- A jute bag or other absorbent cloth material placed over the opening protects its contents.

Left: Djiguiba Boureima, Right: Kadidia Nienta, Photo credit: Ba Germain Diarra

[Diagram of clay pot cooler showing water evaporation process]
Design Options

Pot-in-pot
- The inner pot can be clay, plastic or metal.
- The outer pot is made of clay and should be large enough to leave a 3-5 cm gap for sand to go between the two pots.

Clay pot-in-plastic basin
- The inner pot is clay and can either be a round pot (like the ones commonly used for storing water) or have straight walls.
- The outer dish can be metal or plastic, and should be sized to leave at least a 3 cm gap between the outside of the clay pot and the inside of the dish.

Clay pot-in-clay dish
- The inner pot is clay and can either be a round pot (like the ones commonly used for storing water) or have straight walls.
- The outer dish is made of clay and should be sized to leave at least a 3 cm gap between the outside of the clay pot and the inside of the dish.

Preparing the Sand

Large particles and dust need to be removed from the sand in order for it to evenly retain water for evaporation.

Remove large particles
- It is a good idea to remove large particles and stones so they do not take up too much space.
- This can be done by hand or sieved through a 3-5 mm wire mesh.

Remove dust
- It is very important to remove as much dust as possible so that it won’t clog the pores of the clay pot.
- Remove the dust either by sieving through a thin cloth, or by “winnowing,” which uses the wind to remove the dust. (See picture below.)

Winnowing
To remove dust by winnowing, slowly pour the sand from shoulder height (you may need a stool depending on your height) onto a cloth on the ground.
## Assembling the Clay Pot Cooler

Consider assembling the clay pot cooler where it will be used, since the cooler is heavy and difficult to move when fully assembled.

<table>
<thead>
<tr>
<th>Instructions</th>
<th>Pot-in-pot design</th>
<th>Pot-in-plastic basin</th>
<th>Pot-in-clay dish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Add a layer of sand</td>
<td><a href="#">Image</a></td>
<td><a href="#">Image</a></td>
<td><a href="#">Image</a></td>
</tr>
<tr>
<td>• Pour sand in the bottom of the outer pot to create an even surface for the inner pot to sit.</td>
<td><img src="#" alt="Image" /></td>
<td><img src="#" alt="Image" /></td>
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<tr>
<td>• The sand can be wet or dry when adding it to the pot.</td>
<td><img src="#" alt="Image" /></td>
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<tr>
<td>2. Insert the inner-pot</td>
<td><a href="#">Image</a></td>
<td><a href="#">Image</a></td>
<td><a href="#">Image</a></td>
</tr>
<tr>
<td>• Center the inner pot on the layer of sand inside the outer pot and fill the space between the two pots with additional sand.</td>
<td><img src="#" alt="Image" /></td>
<td><img src="#" alt="Image" /></td>
<td><img src="#" alt="Image" /></td>
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<tr>
<td>• Make sure the top of the inner pot is at least 2 cm higher than that of the outer pot.</td>
<td><img src="#" alt="Image" /></td>
<td><img src="#" alt="Image" /></td>
<td><img src="#" alt="Image" /></td>
</tr>
<tr>
<td>3. Water the sand</td>
<td><a href="#">Image</a></td>
<td><a href="#">Image</a></td>
<td><a href="#">Image</a></td>
</tr>
<tr>
<td>• Add enough water to thoroughly wet the sand.</td>
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<td><img src="#" alt="Image" /></td>
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</tr>
<tr>
<td>• Enough has been added when it takes a few seconds for the water to absorb from the top.</td>
<td><img src="#" alt="Image" /></td>
<td><img src="#" alt="Image" /></td>
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</tr>
<tr>
<td>• If the inner pot begins to float, too much water has been added and will need to be drained before using the cooler.</td>
<td><img src="#" alt="Image" /></td>
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<td><img src="#" alt="Image" /></td>
</tr>
</tbody>
</table>
**Filling the Clay Pot Cooler**

Make sure the fruits and vegetables are dry, in good condition, and free from dirt and insects.

**Store the fruits and vegetables**

Place the fruits and vegetables in the inner pot. Be sure that the items added are able to be stored together. (See important information on page 9 about fruit and vegetable compatibility.)

**Cover the cooler**

Wet a cloth or a piece of burlap and place it over the top of the inner pot so it is completely covered.

Squeeze out excess water before placing on the cooler.

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**Important to Know**

The following tips will help you avoid spoiling your fruits and vegetables.

**Ethylene Producing**

Many fruits produce a gas called ethylene, which spoils fruits and vegetables that are sensitive to it. These fruits should be stored separately from vegetables and each other.

Examples of ethylene producing fruits include:

- Melon
- Tomato
- Mango
- Avocado
- Banana

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**Odor Emitting/Producing**

Certain fruits and vegetables can transmit their odors to others, effecting their taste.

**Emitters**

- Carrots
- Sweet Peppers
- Orange

**Absorbers**

- Garlic
- Onions

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**Not Suitable**

Vegetables and other foods that easily rot in high humidity such as:

- Eggplant
- Cabbage
- Carrots
- Cereals/millet
- Potatoes
Maintaining Your Cooler

Follow these best-practice guidelines to gain the maximum benefit from your clay pot cooler:

<table>
<thead>
<tr>
<th>Shade</th>
<th>Keep the cooler in a cool, shaded location, out of direct sunlight.</th>
<th>DO NOT store the cooler in direct sunlight.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watering</td>
<td>The sand and cloth should be kept damp at all times. Typically, water should be added once a day.</td>
<td>DO NOT allow sand and covering to dry out.</td>
</tr>
<tr>
<td>Covering</td>
<td>A damp cloth or burlap sack folded over several times should be placed over the top of the cooler.</td>
<td>DO NOT leave the cooler uncovered.</td>
</tr>
<tr>
<td>Hygiene</td>
<td>The cooler should be kept clean and sponged off regularly.</td>
<td>DO NOT allow dust and dirt to accumulate.</td>
</tr>
<tr>
<td>Ventilation</td>
<td>The coolers should be located in a room with good air circulation or exposed to outside winds/breezes.</td>
<td>DO NOT store in poorly ventilated areas.</td>
</tr>
<tr>
<td>Suitability</td>
<td>Only fruits and vegetables should be stored in coolers. They are not suitable for meat, dairy or medicines.</td>
<td>DO NOT store meat, medicines or vaccines.</td>
</tr>
</tbody>
</table>