# Desert fridge — Zeer pot

## Introduction

In countries where temperatures frequently exceed 20°C, food does not stay fresh for long. A tomato, for example, can spoil in just two days. Given the cost and energy consumption of a refrigerator, food preservation is also a recurring problem in developing countries. Without ways to preserve food, even a family affected by poverty that produces enough to eat has limited means of preventing hunger.
A food-preservation system can therefore greatly improve daily life for many families. It also creates economic opportunities: keeping food fresh makes it possible to sell it. Even without financial concerns, a family may want to use less energy by choosing natural cooling methods and thus reduce its environmental impact.
The Zeer pot, or desert fridge, can offer a viable solution. It keeps food cool without electricity by using evaporative cooling.
This inexpensive, easy-to-build technology can cool water, food or medicines sensitive to high temperatures. It keeps flies and other insects away. Most foods placed in a Zeer pot also keep for 15–20 days longer than in the open air, and vegetables retain their vitamins better. Under suitable conditions, explained later in this tutorial, the temperature inside can be as much as 10°C below the outside temperature.

## Materials

- One terracotta or clay pot, 50 × 46 cm, preferably round (50 cm diameter)
- One terracotta or clay pot, 30 × 40 cm, preferably round (30 cm diameter)
- Approximately 45 kg of fine sand
- Approximately 15 litres of drinking water*
- One breathable cloth or lid

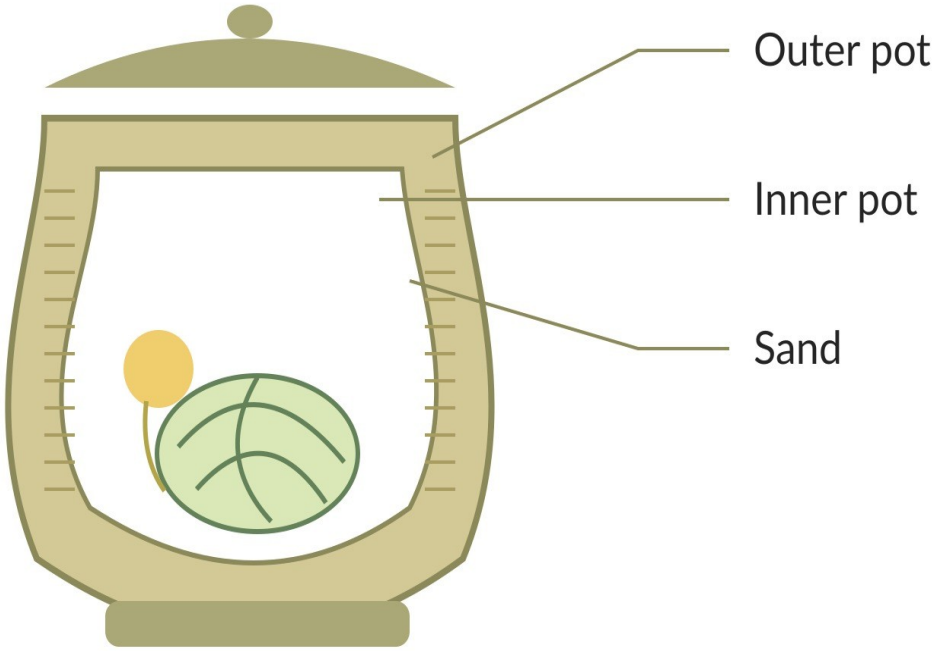
Adapting the size:
The dimensions of the two pots depend on how much food you want to store. This design holds 12 kg of food, using an outer pot 50 cm in diameter and an inner pot 30 cm in diameter. The size can be adapted to your needs as long as the proportions are maintained.
Hygiene precautions:
Warning: *using contaminated water could contaminate food in the inner pot. The same applies if the sand contains harmful substances such as hydrocarbons.

## Tools

No tools are needed to make a Zeer pot.

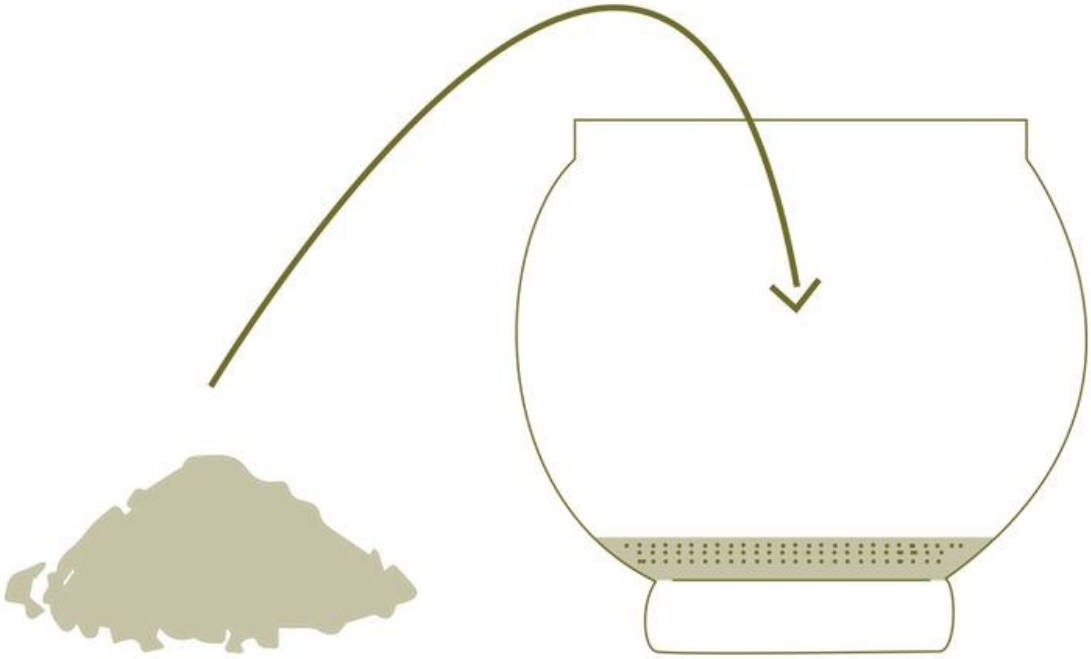
## Step 1 — How it works

A Zeer pot consists of two terracotta or clay pots nested inside each other, with a layer of damp sand approximately 4 cm thick between them. The inner pot holds the food. The sand provides cooling, and the outer pot contains the whole system.
Water in the sand needs energy to turn into vapour: this is evaporation. Here, heat from the inner pot provides part of that energy, allowing the water to evaporate. This thermal process lowers the inner pot's temperature and keeps food cool.



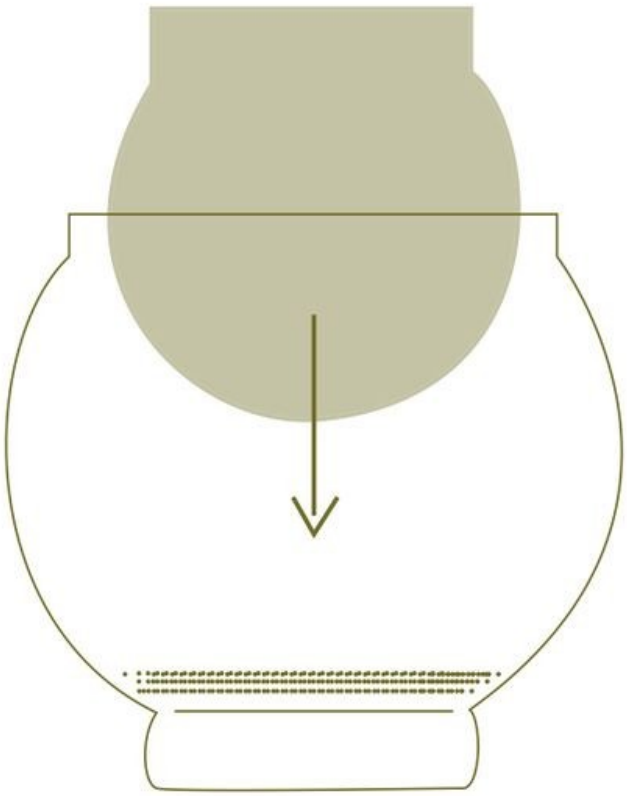

## Step 2 — Outer pot

Place a layer of sand in the bottom of the outer pot, thick enough for the inner pot's rim to sit level with the outer pot's rim. Then moisten it.



## Step 3 — Inner pot

Place the inner pot inside the outer pot.
Warning: the pot must sit firmly on the first sand layer and be centred within the outer pot.



## Step 4 — Sand

Fill the gap between the pots with successive layers of sand…

## Step 5 — Water

…remembering to moisten each layer.

## Step 6 — Use

- Place the system in a dry, shaded and draughty location.
- Fill the Zeer pot with food.
- Moisten the breathable cloth and place it over the system as a lid.
- Rewet the sand as soon as it starts to dry, approximately twice a day.

## Step 7 — Getting the most from the Zeer pot

What can go in a Zeer pot?
• Fresh vegetables that are likely to spoil quickly
• Water, to keep it cool
• Medicines that do not tolerate heat well
Warning: the sand must remain damp, and a continuous flow of air must circulate all around the pot. Raising it on a stand, for example, is strongly recommended to improve airflow.
Warning: some vegetables release ethylene as they ripen, and other foods can spoil when exposed to this gas. Avoid mixing cucurbits with apples, tomatoes, peppers and similar produce. The linked document provides further information and a summary table for storing everyday foods:
http://horizonalimentaire.fr/sites/horizonalimentaire.fr/files/fichiers/guide_conservation_fetl_comite_conso_aprifel.pdf

## Step 8 — Monitoring

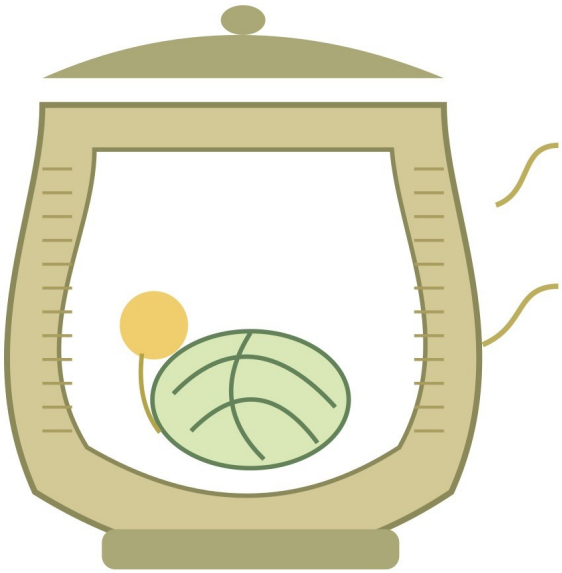
Sensors can be installed inside and outside the Zeer pot to monitor its performance at different ambient temperatures.

## Step 8 — Downloadable educational materials

A teaching sheet created by Low-tech Lab can be downloaded from the tutorial's "Files" section, using the tab alongside "Tools–Materials".

# ZEER POT

**The Zeer Pot is used in desert regions to keep food cool. This desert refrigerator works without electricity.**



1. Two terracotta pots are placed inside one another, separated by a 4 cm layer of sand that is moistened twice a day.

2. The temperature in the inner pot falls as the water in the sand evaporates. The drier the air, the greater the cooling effect.

3. The temperature difference can reach up to 10°C. Vegetables may therefore keep for up to 20 days longer than in the open air.

Based on the infographic by Coralie Dubard · Low-tech Lab

**Find the construction tutorial at lowtechlab.org**

# Notes and references

- An informative explanatory video produced by the Cité des Sciences et de l'Industrie: here

- Practical Action tutorial: https://practicalaction.org/knowledge-centre/resources/evaporative-cooling-the-clay-refrigerator/