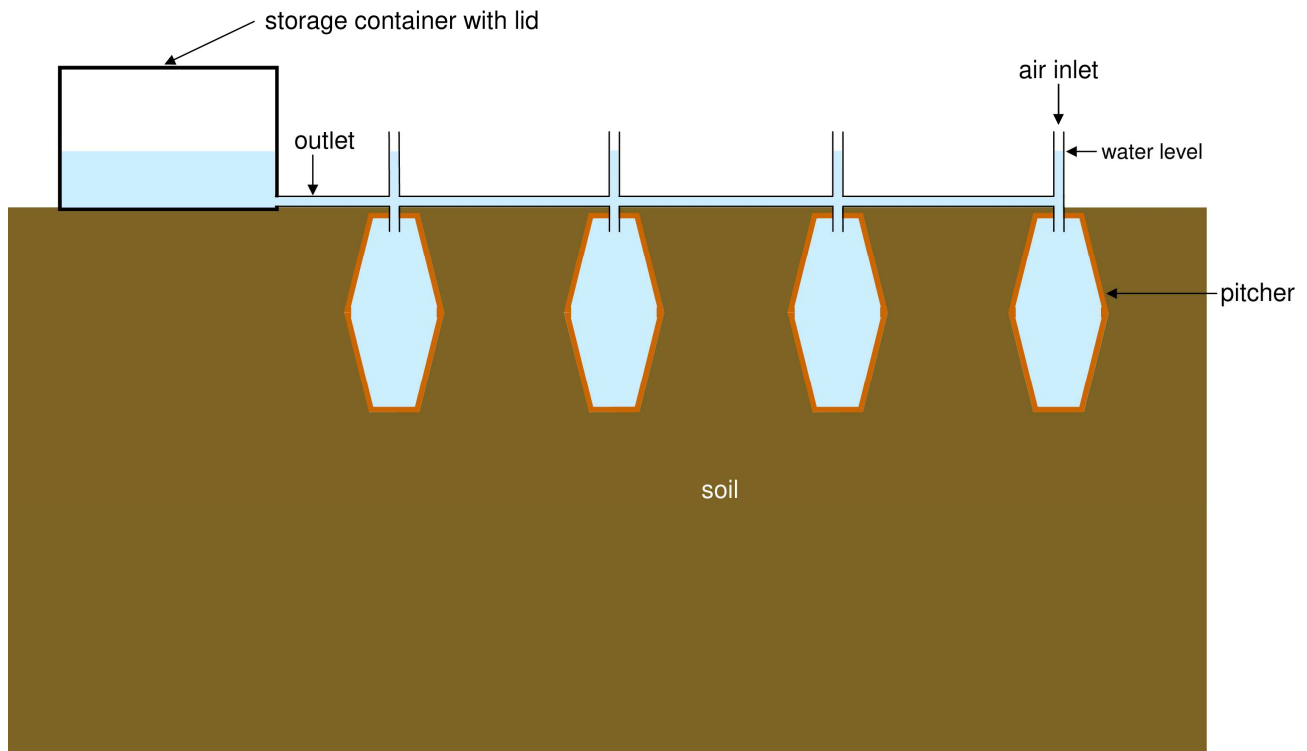


DIY automatic clay pot irrigation

food security for smallholders

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DIY automatic clay pot irrigation may facilitate food security for thousands of smallholders.

- Unpowered
- For the same yield, clay pot irrigation uses less water than any other irrigation system
- Gravity feed from any water source (no pump required)
- An unlimited range of crops (fruit, vegetables, grains) can be irrigated at the same time
- Water usage responds automatically to changes in the weather and the crop requirements
- The smallholder may leave their plot unattended for months on end

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1. Introduction

It is recommended that you watch the Gardening Australia video “Irrigate like it’s 2000BC with these easy DIY terracotta pots called ollas”: <https://www.youtube.com/watch?v=0MDQsydIGlg>

It is also recommended that you watch the video “A major advance in clay pot irrigation”: https://www.youtube.com/watch?v=D_DKlpO4SCU

With clay pot irrigation, round porous clay pots (pitchers) are buried into the soil near the crop and filled with water. The water seeps out slowly through the porous walls of the pot and reaches the roots of the plants. As the plants consume the water, more water will seep out from the pot. In this way, the pot provides exactly the right amount of water needed for the plants.

With automatic clay pot irrigation, the clay pots are refilled automatically so that smallholder may leave their plot (or garden) unattended for months on end.

The cost of drip irrigation is too expensive for many smallholders. Automatic clay pot irrigation provides a DIY cheaper alternative that uses less water. For drip irrigation, the smallholder has to guess how much water to give the plants and how frequently. However, for automatic clay pot irrigation, the plants decide how much water they need depending upon their stage of growth and the prevailing onsite weather conditions.

It is recommended that automatic clay pot irrigation should only be used on flat (or almost flat) land.

2. How to make DIY very low cost clay pots



Small clay pot made from two 9cm terracotta pots (AU\$1.27 each at Bunnings)
Medium clay pot made from two 12cm terracotta pots (AU\$1.76 each at Bunnings)
Large clay pot made from two 16cm terracotta pots (AU\$2.31 each at Bunnings)



Step 1. Select two identical unglazed terracotta pots and seal one of the drain holes (for example, use silicone adhesive or masonry adhesive)



Step 2. Apply a bead of silicon sealant or masonry adhesive (Selleys Liquid Nails Landscape for example) to the rim of the pot with the sealed drain hole



Step 3. Carefully position the upper pot directly above the lower pot



Step 4. Gently press the pots together and allow 24 hours for the sealant to cure

Use 13mm (or 19mm) barbed poly tees to connect the water supply to the clay pots. Connect a tee to a clay pot using a rubber grommet. A 13mm rubber grommet requires a 16mm hole and 19mm rubber grommet requires a 23mm hole. It is recommended that you cut off the barb before you insert the tee into the grommet.



3. Installing automatic clay pot irrigation

Estimate the radius of the wetting zone (see Section 5)) for the clay pots you intend to use. Position the pots at appropriate locations in your garden so that the root zone of each plant has access to the wetting zone of at least one pot.



Create a network of polypipe and poly tees to deliver water to the clay pots.



For each clay pot, insert a rubber grommet into the hole in the pot. Cut off the barb from the tee and insert the tee into the grommet. Connect polypipe to the tee and attach a short piece (8 cm) of vertical polypipe as an air inlet.



Connect the polypipe network to the outlet of a clay pot irrigation valve or a storage container with a float valve.



Polypipe network connected to the outlet of a clay pot irrigation valve



Polypipe network connected to the outlet of a storage container with a float valve

Connect the water supply to the inlet of the clay pot irrigation valve or the float valve. Turn on the water supply and the clay pots will fill with water and never run dry.

For maximum water-efficiency, the polypipe network should be at the same level throughout the irrigation application.

To decide between the clay pot irrigation valve or the storage container with float valve, you may wish to consider the following:

clay pot irrigation valve

- The [clay pot irrigation valve](#) may be purchased online from the Measured Irrigation website
- The minimum pressure for the water supply is one metre head

storage container with float valve

- The storage container and the float valve can be purchased locally
- The float valve should be mounted on the storage container so that the water level in the container is as low as possible when the float valve closes
- The storage container should have a lid to prevent evaporation
- If you can't afford a float valve, you can always refill the storage container manually

4. DIY soil moisture probe

A very simple soil moisture probe is a length of steel pipe with a long slot. I suggest 30mm for the diameter of the pipe and 15mm for the width of the slot. An angle grinder can be used to cut the slot in the steel pipe.



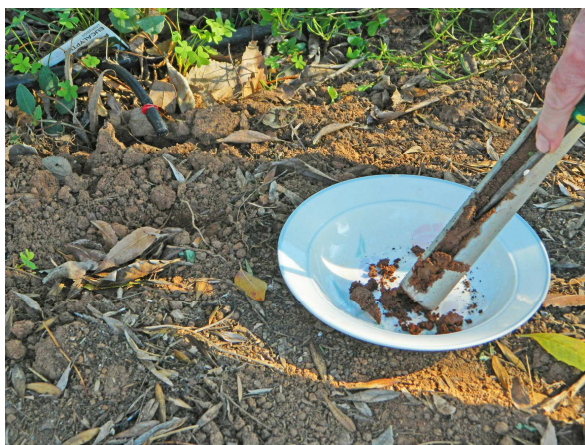
Hammer the steel pipe into the soil. Remove the steel pipe from the soil and transfer the soil in the pipe to a ceramic bowl. Record the weight of the moist soil. Place the bowl in an oven at about 110 degrees C for 12 hours or more (temperatures higher than 110 degrees may break the crystalline structure of clay particles which may cause loss of chemically bound water). Higher temperatures may be used for non-clay soils. When the soil is dry, take the bowl out of the oven and reweigh. To check that the soil is dry, you may wish to repeat the process until you get the same weight. Record the weight of the dry soil. The moisture content of the soil is the difference of the two recorded weights divided by the weight of the moist soil.



Hammer the steel pipe into the soil near a clay pot



Remove the steel pipe from the soil

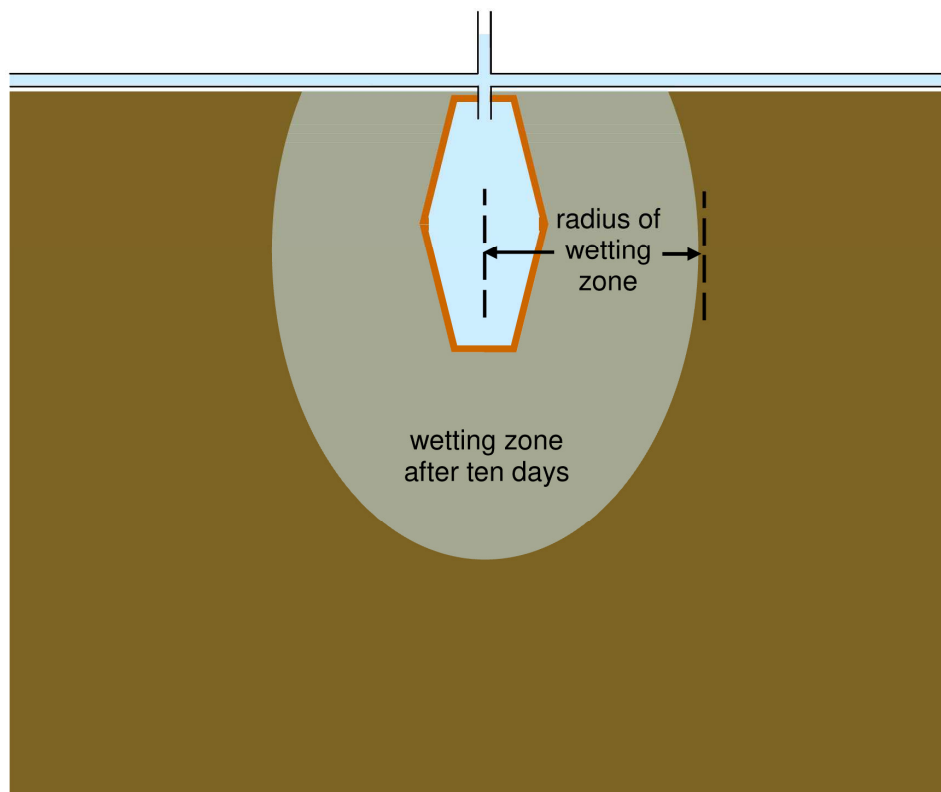


Transfer the soil in the pipe to a ceramic bowl



Measure the moisture content of the soil by weighing the moist soil, drying the soil in an oven, and then weighing the dry soil

5. Radius of the wetting zone



To estimate the radius of the wetting zone of a clay pot, bury the clay pot in dry soil. Then turn on the water supply and after 10 days without rain, check the moisture in the soil to determine the horizontal distance travelled by the water in the clay pot. If rain is expected then the soil needs to be protected from the rain.

The radius of the wetting zone is the horizontal distance from the centre of the clay pot to the nearest location where the soil moisture content is less than 10%. Use the DIY soil moisture probe to measure the soil moisture content at various horizontal distances from the centre of the clay pot.



Use the soil moisture probe to measure the soil moisture content at various distances from the centre of the clay pot