

# more crop per drop for smallholders

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Zero cost method of saving water

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## 1. Saving water without spending any money

It is assumed that a smallholder is using drip irrigation on a garden or a small plot of land.

Without spending any money, you can install an irrigation controller that responds to the prevailing onsite weather conditions, namely evaporation and rainfall. All that is needed is a suitable control container.



Examples of suitable control containers

### Instructions for installing and using a control container

Step 1. Draw a level line on the inside of the control container about 1.5 cm below the overflow level.



Step 3. Place an empty measuring container under one of the irrigation drippers.



Step 4. Position one of the irrigation drippers so that it will drip water into the control container during the irrigation.



Step 5. At sunset, fill the control container with water until the water reaches the level line.



Step 6. At sunset the following day, start irrigating if the water level is below the level line.



Step 7. Stop irrigating when the water level reaches the level line.



Step 8. Check the amount of water in the measuring container.



Step 9. If the plants have not received enough water, change the control container to one with a larger surface area. If the plants have received too much water, change the control container to one with a smaller surface area.



Step 10. Empty the measuring container and repeat from Step 6.

This simple water-saving method replaces the water that has evaporated from the control container since the previous irrigation. If the evaporation rate doubles due to a heat wave, then the amount of water discharged from each dripper will also double.

If rainfall is more than evaporation, the water level in the control container will rise above the level line. The irrigation is delayed until the water level has fallen below the level line,

If your plants require less frequent watering than daily, you may choose not to irrigate on certain evenings. For example, at sunset one day the water level is below the high level and you decide not to irrigate. At sunset the following day the water level will have fallen even further, and so when you irrigate the irrigation volume will be the sum of the irrigation volumes for both days. Changing the irrigation frequency does not affect the water usage rate (litres per week for example).

If the garden requires more frequent watering, you may choose to irrigate at the middle of the day as well as at sunset (for example, if the weather is very hot and dry).

## 2. Unpowered Terracotta Valve

Provided the water supply is continuous, the Unpowered Terracotta Valve allows a smallholder to leave their drip irrigation application unattended for months on end.

The [Unpowered Terracotta Valve](http://www.measuredirrigation.com.au) can be purchased at the Measured Irrigation website: [www.measuredirrigation.com.au](http://www.measuredirrigation.com.au)

To reduce the cost to smallholders, the valve is also available as a [DIY Unpowered Terracotta Valve Kit](#) with **free delivery** to any postal address in the world.

The User Manuals for the Unpowered Terracotta Valve and the DIY Unpowered Terracotta Valve Kit can be downloaded from the Measured Irrigation website: [www.measuredirrigation.com.au](http://www.measuredirrigation.com.au)

It is recommended that you watch the YouTube video Unpowered Terracotta Valve: <https://www.youtube.com/watch?v=A90f5aAxvHA>



Unpowered Terracotta Valve



DIY Unpowered Terracotta Valve Kit

The Unpowered Terracotta Valve has a half inch inlet and outlet. The valve operates with water supply pressure of at least 10 kPa (1 m head). The interval between irrigation events responds automatically to the prevailing on-site weather conditions, namely evaporation and rainfall.

This remarkable low-cost invention may enable poor smallholders in remote locations to grow higher-valued crops cost-effectively.

Provided the water supply pressure is at least 1 m head, the Unpowered Terracotta Valve can deliver water to 300 drippers (2 L/h at 100 kPa) on level land. However, to improve irrigation uniformity, it is recommended that the water supply pressure be kept above 1.5 metres.

The Unpowered Terracotta Valve can irrigate automatically by gravity feed from a header tank.

### Key features

1. Unpowered (no batteries, no solar panels, no electronics, no computers, and no WiFi)
2. Water supply pressure 10 kPa to 800 kPa
3. Half inch inlet and outlet
4. Adjust the water usage rate by adjusting the control dripper
5. Adjust the interval between irrigation events by adjusting the float
6. Responds automatically to on-site evaporation and rainfall
7. The irrigation frequency increases significantly during a heat wave
8. With a continuous water supply, you can leave your irrigation application unattended for months on end

### 3. Clay pot irrigation of crops

Provided the water supply is continuous, an Unpowered 15mm Valve Box allows a smallholder to leave their drip irrigation application unattended for months on end.

The [Unpowered 15mm Valve Box](http://www.measuredirrigation.com.au) can be purchased at the Measured Irrigation website: [www.measuredirrigation.com.au](http://www.measuredirrigation.com.au)

The User Manual for the clay pot irrigation of crops can be downloaded from the Measured Irrigation website:

[www.measuredirrigation.com.au](http://www.measuredirrigation.com.au)

It is recommended that you watch the YouTube video clay pot irrigation of crops:

[https://www.youtube.com/watch?v=gPEp849wK\\_s](https://www.youtube.com/watch?v=gPEp849wK_s)



Unpowered 15mm Valve Box



Subsurface clay pot

As well as Unpowered 15mm Valve Box, you will also need to purchase or make one or more [subsurface clay pots](#). Water seeps through the pores of the subsurface clay pot according to the demands of the plants in the vicinity of the pot. Because the Unpowered 15mm Valve Box responds to the actual water requirements of the plants, it is more water-efficient than the Unpowered Terracotta Valve.

Provided the water supply pressure is at least 1 m head, the Unpowered 15mm Valve Box can deliver water to 300 drippers (2 L/h at 100 kPa) on level land. However, to improve irrigation uniformity, it is recommended that the water supply pressure be kept above 1.5 metres.

The Unpowered 15mm Valve Box can irrigate automatically by gravity feed from a header tank.

#### Key features

1. Unpowered (no batteries, no solar panels, no electronics, no computers, and no WiFi)
2. The water usage rate is controlled by the demand from the plants
3. The discharge from each dripper during an irrigation event is the same as the average on-demand discharge from one subsurface clay pot since the previous irrigation event
4. Adjust the interval between irrigation events by adjusting the float inside the Unpowered 15mm Valve Box or changing the number of subsurface clay pots
5. The water usage rate increases significantly during a heat wave
6. With a continuous water supply, you can leave your irrigation application unattended for months on end

#### 4. Automation Kit for Farm Pond Irrigation

The Automation Kit for Farm Pond Irrigation allows a smallholder to leave their farm or plot of land unattended for months on end, and so you can become involved in other activities away from the farm; for example, travelling to the market to sell your produce. A pump at the bottom of the farm pond automatically fills the header tank, and an Unpowered Terracotta Valve automatically irrigates the plants.

The [Automation Kit for Farm Pond Irrigation](http://www.measuredirrigation.com.au) can be purchased online at the Measured Irrigation website: [www.measuredirrigation.com.au](http://www.measuredirrigation.com.au)

The User Manual for the clay pot irrigation of crops can be downloaded from the Measured Irrigation website: [www.measuredirrigation.com.au](http://www.measuredirrigation.com.au)

It is recommended that you watch the YouTube video DIY Solar Drip Irrigation Kit: <https://www.youtube.com/watch?v=rVkkQvdJa4g>



Farm pond in Kenya

The Kit includes an Unpowered Terracotta Valve to supply water to approximately 300 non-pressure compensating (NPC) drippers on flat land (assuming that each dripper has a flow rate of 2 L/H at 100 kPa). If your farm requires more than 300 drippers, you can subdivide your farm into zones with up to 300 drippers per zone (each zone has a separate Unpowered Terracotta Valve). However, to improve irrigation uniformity, it is recommended that the water supply pressure be kept above 1.5 metres.