Measured Irrigation for Smallholders

more crop per drop

Measured irrigation evaporator

Dr Bernie Omodei
Measured Irrigation
5/50 Harvey Street East, Woodville Park SA 5011
Phone (618) 8244 0071
Mobile 0403 935277
Facebook Measured Irrigation
Email bomodei@measuredirrigation.com.au
www.measuredirrigation.com.au

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Upgrading drip irrigation to unpowered MI

Many smallholders use gravity feed drip irrigation to irrigate a small garden (less than an acre). The most commonly used scheduling method is programmed scheduling and this method wastes a lot of water because it does not respond to the prevailing weather conditions. By upgrading from programmed irrigation scheduling to measured irrigation scheduling, water consumption may be reduced by 50% or more without affecting the yield (see the Research Report: Improvement in crop yield per litre using Measured Irrigation, available from the Measured Irrigation website www.measuredirrigation.com.au).
The cost of the upgrade is negligible (the cost of a bucket and a steel pipe).

Measured irrigation evaporator

The evaporator is any container with vertical sides with a suitable surface area of evaporation.

Draw a level line on the inside of the evaporator about 3 cm below the overflow level.

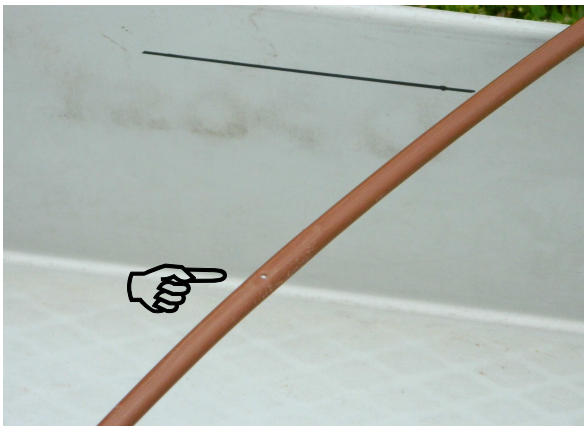
The evaporator may simply be a bucket

Level line on inside of evaporator

Position the evaporator in the garden, preferably exposed to full sun.

Position a dripper so that it will drip water into the evaporator. This dripper is called the control dripper and it should be at the same level as the other drippers in the garden.

The volume of water delivered by each dripper in your garden during an irrigation event is the same as the volume of water delivered to the evaporator by the control dripper.



Control dripper will drip water into the evaporator

How to use the evaporator

Check the water level in the evaporator at sunset each day.

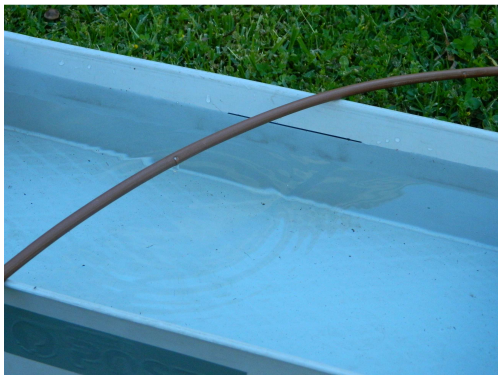
If the water level is below the level line, start irrigating.

Stop irrigating when the water level reaches the level line.

If the garden requires less frequent watering, you may choose not to irrigate on certain evenings. If the garden requires more frequent watering, you may choose to irrigate during the day as well as at sunset (for example if the weather is very hot and dry).

Water level below level line

Start irrigating at sunset



Stop irrigating when the water level reaches the level line

How to adjust the surface area of the evaporation

The amount of water that your plants need will depend on many factors in addition to the weather. For example, as the plants grow and become bigger they will need more water. Plants growing in sandy soil will need more water than plants growing in heavy soil.

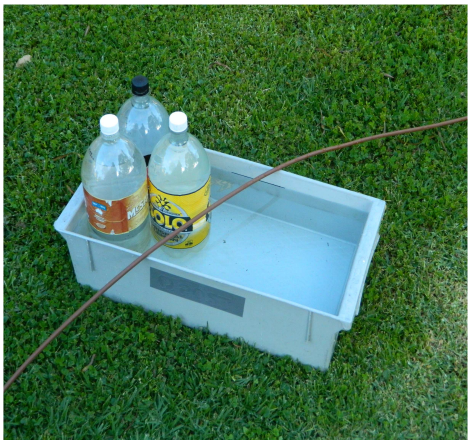
To take account of all these additional factors, I recommend that you use a length of steel pipe to check the moisture level in the soil. I suggest that the diameter of the pipe be between 40 and 50 mm. An angle grinder can be used to cut some slots in the steel pipe to that you can inspect the core sample of soil inside the pipe. I suggest that the width of the slots be about 13 mm.

An angle grinder can be used to cut some slots in a length of steel pipe.

By checking the moisture level in the core sample of soil through the slots in the steel pipe, you can decide whether the plants have been irrigated the night before with too much or too little water. It may be helpful to use the slots to remove a small sample of soil and to squeeze it between your fingers. If the plants have been given too much water then you can reduce the water usage by reducing the surface area of evaporation. For example, the surface area of evaporation can be reduced by placing full bottles of water in the evaporator. On the other hand, if the plants have not been given enough water then you will need to increase the surface area of evaporation. After irrigation and adjustments over several days, the surface area of evaporation should stabilise at an appropriate level for the plants at their current stage of growth.

As your crop grows and the water requirement of the crop changes, you may wish to repeat the process of adjusting the surface area of evaporation.

Early in the morning after irrigation the night before, push (or hammer) the steel pipe into the soil near a dripper.



In this case 3 large drinking bottles have been used to adjust the surface area of evaporation.

Remove the steel pipe from the soil and use the slots to inspect the moisture level in the core sample and the position of the wetting front.

MI on sloping ground

One sloping ground you will need to organise your plants into a number of zones so that the plants within each zone are at approximately the same level. Each zone should have its own evaporator, control dripper and inlet valve. The irrigation of a zone is independent of the irrigation of all the other zones.