

Worm Farming

Environmental Educator Fact Sheet



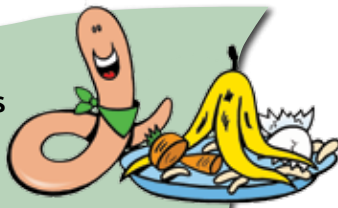
WHAT IS WORM FARMING?

Worm farming is a simple way of converting food scraps and organic matter into a nutrient rich organic fertiliser called worm castings. A specially designed container - a worm farm - is used to provide a suitable environment for the growth of worms, which feed on organic matter. Worm farming not only provides a great way of diverting organic materials from landfill, it also produces a useful organic fertiliser that can help create a healthy and sustainable garden.

WHAT CAN BE PLACED IN A WORM FARM?

Yes ✓

Tea leaves & tea bags
Coffee grounds
Crushed egg shells
Most vegetable & fruit scraps
Grass clippings (lightly sprinkled)
Garden organics (non woody)
Paper & cardboard (shredded and pre-soaked in water)
Hair clippings



No ✗

Animal droppings
Meat products
Fish, Dairy product
Plastic, Glass, Metal
Nappies
Citrus fruits/onion
(smell too strong)



FIVE EASY STEPS

1) Find a site

Select a convenient, cool and shady spot in your garden for your worm farm. A worm farm can also be located on the balcony of your apartment. However, the worm farm should be positioned to avoid the hot sun - worms do not tolerate hot conditions.



2) Find housing

A variety of containers can be used to house your worms. A purpose designed worm farm with internal trays and a drainage system are easiest to use, and are available from your local nursery or hardware store. Alternative low-cost containers can be used, such as wooden or white polystyrene foam boxes. These need to have a lid with aeration holes, as well as a drainage hole at the base to allow excess water to escape. When choosing a container for the worms, consider the amount of food scraps you intend to feed the worm farm.

The bin should also be shallow rather than deep for a number of reasons:

- Worms are surface feeders, preferring to live in the top 15 centimetres of soil
- Greater surface area for burying waste
- Better aeration

The best worm farms are ones where the worms have room to move; where there is a drainage system so that excess water can escape; and where you can remove the finished worm castings easily.



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3) Worm bedding

In all worm farms, a bedding layer of worm castings is needed to provide a 'home' for the worms to live in when they're not feeding on food scraps. Place a few sheets of wet newspaper on the bottom



of the tray and then load in about 5 centimetres of moist worm castings. Enough worm castings should come with the worms you buy. If not, you can add some pre-soaked peat or coconut fibre (coir).

4) Moving the worms in

Worms are available from nurseries and hardware stores. They usually come in 1 or 2 kg boxes, with worm castings. Add the worms to your bedding, and place a pre-soaked newspaper or hessian bag to cover the surface. This helps to keep light out (which worms prefer!) and helps keep the bedding moist. Place the lid on the worm farm.

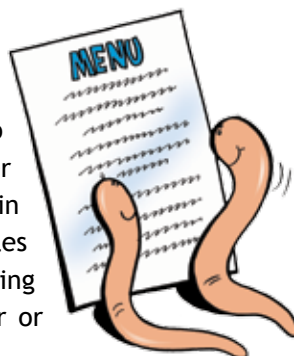
The most suitable worm species for farms include:

- Red worm (*Lumbricus rebus*)
- Tiger worm or Red Wigglers (*Eisenia foetida*)
- Red Tiger Worm (*Eisenia Andrei*)

These composting worms are also known as 'mulch layer' worms as they are happy to live in the top of soils rather than burrowing into the lower layers. Ordinary garden variety worms do not survive well in worm farms.

5) The first meal

Worms don't have teeth, so make sure you chop the organic matter into small pieces. Pull back the newspaper or hessian layer and spread a thin layer of chopped fruit and vegetables (not citrus or onion) onto the bedding surface. Ensure that the newspaper or



hessian is placed back and the lid is positioned on top of the worm farm. Check to see if the food has been consumed after about a week, and if so, add additional food scraps or organic matter as required.

MONITOR AND MAINTAIN

Monitoring of conditions in your worm farm on a regular basis - at least once a week - is important to ensure the worms are in good condition. This is critical to ensure the continuing function of your worm farm. A quick check of the following can be done when adding more material to the worm farm:

- **Odour:** If the worm farm smells, it is an indication that anaerobic (low oxygen) conditions have developed, either because too much food has been added or the system has too much moisture. Break up the surface with a small garden fork and mix in dry shredded paper or cardboard and wait until the worms have eaten everything before adding more material.
- **Pests and insects:** Flies are a common problem with worm farms, especially if too much raw material is added. Make sure the worms have consumed most material before adding more.
- **Leachate:** Worm juice or leachate can accumulate at the bottom of the farm, and is a good environment for pest breeding. Make sure this is emptied regularly.
- **Worm condition:** Using a small garden fork, gently dig into the surface layer and there should be plenty of worms consuming the above raw material.
- **Depth of bedding:** When the bedding or worm castings build up over time (more than 20 centimetres deep), finished worm castings should be removed and a new tray started (see Harvesting worm castings).



HARVESTING

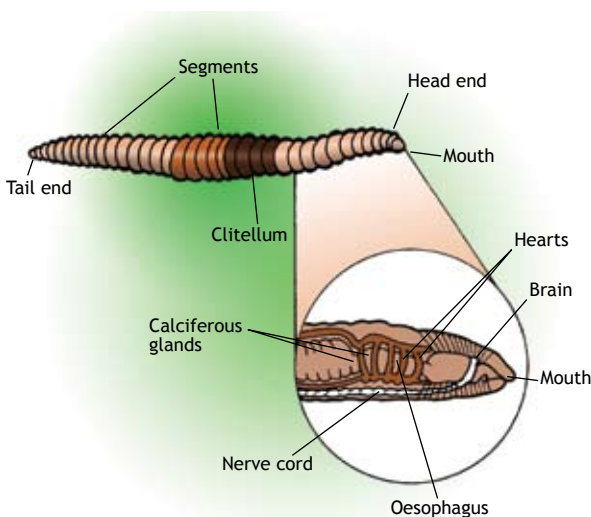
After several months, worms need to be separated from their castings which have built up in the worm farm. To prepare for harvesting, do not add new food for two weeks.

The easiest way of separating worms from castings is by using light. Remove the finished material from the worm farm and spread onto a surface. Worms will quickly burrow downwards, allowing the surface material to be removed. After repeating this operation a thin layer of material remains containing all of the worms which should be added to the new bedding with a fresh supply of food. This leaves a harvest of worm castings. The castings should be stored for a week or two before use as a fertiliser.



HOW DOES WORM FARMING WORK?

Shortly after adding raw material, moulds and fungi appear on the surface and pre-process the material before bacteria and worms take over. Worms ingest bacteria and digested food processed by microorganisms through their throat (pharynx). After the food is swallowed, it passes through the oesophagus to the crop and then to the gizzard, where small stones grind it up. The food is passed into the intestine, which is almost as long as the worm itself. At the end of the intestine is the anus, for passing out castings.



WORM FARMING PRINCIPLES

Air

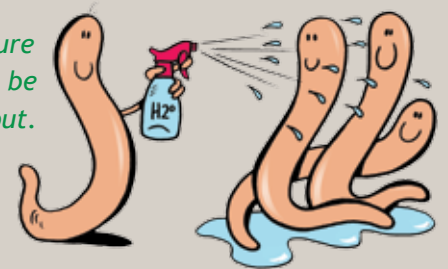
Worms require oxygen so make sure the worm farm you purchase or make has aeration holes. You should also turn the bedding with a small garden spade periodically to improve air circulation. Worms use oxygen in their bodily processes producing carbon dioxide.

Light

Worms usually live underground so they thrive in an environment that is cool, dark and moist. To keep the worm farm dark put newspaper, Hessian or another bin on top of the 'food' bin, but always lift this cover before adding more food or another bin. Worms have an aversion to bright lights. One hour's exposure to ultraviolet rays from strong sunlight causes partial-to-complete paralysis and several hours are fatal.

Moisture

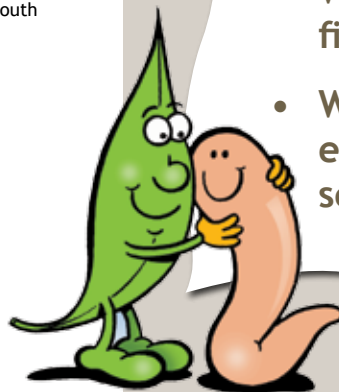
Worms need moisture and should not be allowed to dry out. A light spray of fresh water when the worm farm is first constructed



will generally provide sufficient moisture for the farm. Once the farm is settled in you should not need to add extra water. If you add too much extra water or allow rainwater to get into the bins, the worms may drown. They breathe through their skin, which must be moist for exchange of air to take place. Too much moisture can lead to anaerobic conditions, odours and pests.

Worm Facts

- Worms have a brain and five hearts
- Worms don't have eyes or ears but are sensitive to vibrations



HEALTH AND SAFETY

Health concerns relating to worm farming are dependent on the individual and on the material being recycled. Dog and cat manures can contain harmful pathogens and should be avoided. Few human pathogenic organisms are found in fruit and vegetative wastes. However, good hygiene is important - such as wearing gloves and washing hands in warm soapy water after touching food waste or contents of the worm farm.

Research is ongoing to obtain definitive information on the removal of pathogenic bacteria during worm farming. Pathogens are eliminated at various temperatures. Whilst some may be reliably eliminated at lower temperatures, the removal of others may require temperatures too great to sustain earthworms. In contrast, some sources claim that one of the great benefits of worm farming is that disease pathogens are reliably eliminated within the worms' digestive system.



TROUBLESHOOTING GUIDE

Symptom	Problem	Solution
Vinegar flies	Too acidic, due to excess food added	Add some lime & mix in. Wait until all food consumed before adding more
Worm farm smells	Too much food	Reduce amount of food added
	Not enough air, due to excess moisture	Mix in some shredded cardboard or paper into surface
	Feeding with wrong foods	Remove any meat or fats
	Worms have died due to very hot conditions	Put farm in cool position and start the process again
Worms trying to escape	Insufficient food material	Add more food
	Too dry	Moisten bedding
	Too wet	Mix in some shredded cardboard or paper into surface
	Too hot	Move farm to cooler location
Worms dying	Too hot	Move farm to a cooler position
	Too dry	Add water and moist food material

MORE INFORMATION

Visit the ZeroWaste WA website: www.zerowastewa.com.au