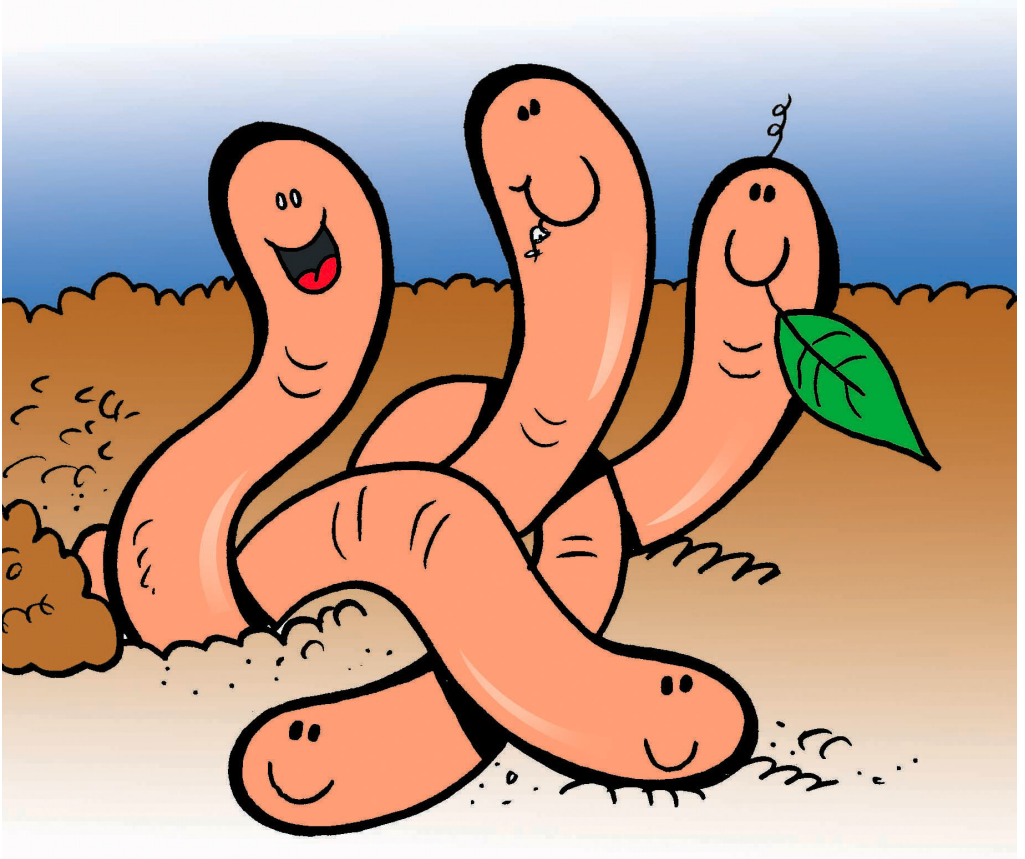


# Worm farming



## **Worm farm rebate**

West Torrens residents can use the food waste recycling voucher in the 'Four easy ways to recycle your food scraps' booklet available from Council for a rebate of up to 50 per cent (up to \$50) on a new worm farm, whether purchased through Council or privately.

The voucher offer is limited to one per household while funds are available.



### **Sources:**

Worm Farming: Environmental Educator Fact Sheet, Department of Environment and Conservation, Waste Authority, WA.

Compost Revolution, [compostrevolution.com](http://compostrevolution.com)

Composting and Worm Farming Manual: Christopher Day, Every Day Sustainable Living

Instruction Manual: Tumbleweed ReIn

KnowWorm: Fact Sheet, Zero Waste SA

Worm farms: Fact Sheet, Zero Waste SA

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Images courtesy of WA Waste Authority

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# Worm farming - the benefits

Worm farming is a fun way to turn food scraps into a rich, organic, soil-like fertiliser called worm castings. It's ideal for people living in units or with small back yards as worm farms don't take up a lot of space. They can be kept inside, outside, on a balcony or in a shed.

Worms are unique natural recyclers of organic waste, producing castings (poo) and liquid (wee) in the process.

## Worm castings

Castings (worm poo) are a rich, natural organic fertiliser which:

- Contain nitrogen, phosphorus and other plant nutrients.
- Are pH neutral and provide nutrients which cannot harm or burn plants.
- Improve soil structure.
- Improve water retention of soils, reducing water use.
- Improve drainage.
- Saves money spent on fertilisers.
- Need to be used once collected or they will dry out.



## Worm liquid

- Is full of nutrients which can be watered down and sprayed or poured on plants, especially seedlings and pot plants.
- Will not harm plants.
- Unless it is weak (it resembles weak tea) it should be diluted by as much as 1:10. Dilution will not affect the nutrient potency. It is best to use rain water where possible as the chlorine in tap water kills the good microbes.
- Can be stored in a container which will need to be shaken before use.

## Which worms to use

Ordinary garden earthworms do not survive in worm farms; they prefer a diet of soil and humus rather than rich organic matter and are happy burrowing into the lower layers of soil. Compost worms thrive in a rich organic environment and are happy to live in the top of soils or mulch layer. They include:

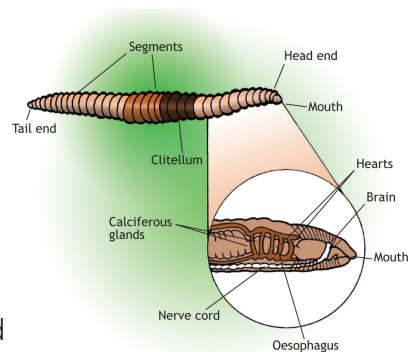
- Tiger worms
- Red wrigglers
- Indian blues

## Compost worm facts

- Worms consist largely of water and breathe through their skin.
- They need dark, cool or temperate conditions, ideally 15°C - 30°C.
- They need a moist environment but not water-logged.
- Although hermaphrodites, they still need a partner to reproduce.
- In favourable conditions, they breed every seven - 10 days and can double their population in 90 days.
- Worms breed according to the available food supply and space: with small quantities of food the population will remain small, with large quantities they will breed until there is no more space and will then stop breeding.
- Worms can eat up to half their own body weight in food per day.

## How compost worms work

Soon after adding raw material, moulds and fungi appear on the surface and pre-process the material before bacteria and worms set to work. Worms don't actually eat the food (they don't have teeth) but rather the bacteria that feed on the rotting material. Worms ingest the bacteria and digested food processed by micro-organisms 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 passes into the intestine which runs almost the entire length of the worm. Castings are passed out of the intestine through the anus.



## What to feed your worms

Most things that once grew, or are made from something that once grew, can be fed to worms.

- Most food scraps (fruit, vegetable matter).
- Bread, cake, pasta and cereals (small amounts only).
- Crushed egg shells (they don't eat them but clean them and benefit from the calcium).
- Tea leaves, bags and coffee grounds.
- Leaves.
- Manures from herbivores (fowl, horses, sheep, cattle) but not from animals wormed in the past few weeks.
- Hair (pet and human) and wool.
- Paper (moistened) e.g. tissues, paper towel, newspapers (shredded).
- Cardboard (heavily-soiled pizza boxes, egg cartons that have been ripped and moistened/soaked).



## What not to feed your worms

- Citrus and acidic food (pineapple, tomatoes, capsicum).
- Plants from the onion family (garlic, shallots, onion).
- Chilli.
- Meat and seafood - can cause odours and lead to maggots.
- Dairy products - can cause odours and lead to maggots.
- Fats and oils.
- Dog and cat faeces



## Setting up your system

Worm farms can be constructed in a variety of ways: using a single container, such as a polystyrene produce box, old fridge, freezer or bath and more

commonly, plastic stackable farms available from hardware stores and nurseries or from the Council. They can comprise one to four stackable layers.

The base or bottom layer should be solid to collect the liquid fertiliser (wee) that percolates from the feeding layers above. Depending on the worm farm used, it may need to be placed on a slight angle to allow the liquid to be drained off into a container via a plugged hole or tap. Alternatively, a bucket can be left under the tap which is left open.

Farms with multiple layers will have interlocking trays with a perforated base to allow the worms to move between the layers or levels and for drainage.

When setting up the system, you will use two layers, a base and a layer for bedding and feeding. You may need to place a container in the bottom layer which touches the layer above. This allows the worms to climb to the layer above and not drown in the liquid which collects there. Some purchased worm farms come with this feature.

1. Place a perforated tray on the base. Line it with wet newspaper or cardboard. On top of this you can add either shredded, wet newspaper or spread over a block of coir which has been pre-soaked in water (15 - 30 minutes). This can be purchased from hardware stores.
2. Spread the worms on this bedding layer or home tray. Give the worms a small handful of food scraps and cover with damp newspaper, hessian or other natural fibre cover to protect them from the elements, flies, and to help retain moisture. Place a lid on top if supplied.
3. Worms do not need to be fed straight away as they tend to eat through the bedding material before eating food. Feed them small amounts of food after a week or so. Peel back the covering material, place the food and replace the cover. Feed them small amounts every day or so, increasing the quantity as they start to multiply but only as much as they will eat in a week so as not to overfeed them. They will double their population every few months and will eat more food as the farm grows.



4. If your system has an extra layer it will not be needed until the first layer, the bedding tray, fills and touches a tray placed on top. Worms move between the layers through the holes but they can't jump so you need to make sure that the layers touch.
5. Place the next tray on top of the bedding tray (which will contain castings). The top tray will become the kitchen tray where food scraps are placed. Cover this with damp newspaper, hessian etc as before. The worms will start to move up and live in this layer. Worm castings will continue to build up slowly in both trays.

## Collecting the castings

Castings are ready to use when they are a rich, dark brown colour, almost black. They will have an earthy smell and will feel soft and smooth. You will not be able to identify what has been fed to the worms.

Once the worms are well established in the new kitchen or feeding tray, the second lowest tray should be only castings and you can remove it and empty them out.

Place the former bedding tray on top of the kitchen tray, or add another tray if supplied with your system. The top tray now becomes the kitchen tray. Over time the lowest tray will start to resemble the former bedding tray and you will be able to collect the castings by repeating the process above.

If you have a worm farm in a single container e.g. bath or with one working tray only, there are two options for collecting the castings:

- Stop feeding one side for several weeks so that the castings build up in that side. To remove the castings, use the process outlined above for multi-tiered systems; or
- When the system is full, move the top five to six centimetres of surface material from one side to other to access the castings lower down. Level out the remaining materials and continue feeding as before.





# Helpful hints and worm care

## Feeding

- Worms find small scraps of food easier and quicker to digest.
- To speed up the process, mix/mash food scraps with water or pulp or blend before feeding them.

## Going on holidays

If you are going away for up to a month or so, feed your worms a thick layer of soaked shredded paper (five - 10 cm). It takes longer to digest so is a 'slow release food'. Don't feed them lots of food scraps as these may turn acidic and smelly and spoil the system.



## Hot weather

- Ensure the system is located in a cool, shady position outdoors e.g. on the shaded side of the house under eaves or under a dense canopy of trees or indoors e.g. laundry.
- Feed more soaked shredded paper to cool the system.
- Treat in a similar way as you would a fernery - moist, cool airflow is needed.
- Check the moisture level: the consistency of a wet sponge is ideal. Add cool water gently to cool and hydrate them if need be and allow to drain.
- Leave the drainage hole or tap open to drain into a container. This will ensure that the hole does not block and waterlog the layer above, flooding the worms with heated liquid. It also assists air circulation.
- On days of high temperatures (> 35°C), freeze an ice cream container of water and place the block in the top of the farm on top of some newspaper. Remove the lid if supplied and cover with a damp hessian bag, blanket, carpet or newspaper. Replace the lid at night to stop the worms wandering.
- If the worms have died, worm eggs may still hatch if the conditions become more favourable.

## Smells

- The system may have become acidic due to anaerobic conditions caused by bacteria tolerant to low oxygen levels. This can be a sign of too much uneaten food scraps. Stop feeding and stir the food scraps in the top tray lightly with a garden fork to aerate the organic material and allow the worms to move through it more easily. Start feeding again when the offensive odour is gone.
- Check that the system is not water-logged. If not, add soaked, shredded paper and/or sprinkle garden lime or dolomite to restore the pH balance.
- If the system is water-logged, check that the base is draining properly. Break up the surface with a small garden fork and mix in some dry, shredded newspaper. Reduce the food (which is largely water) until the worms have eaten everything.



## Slow eaters

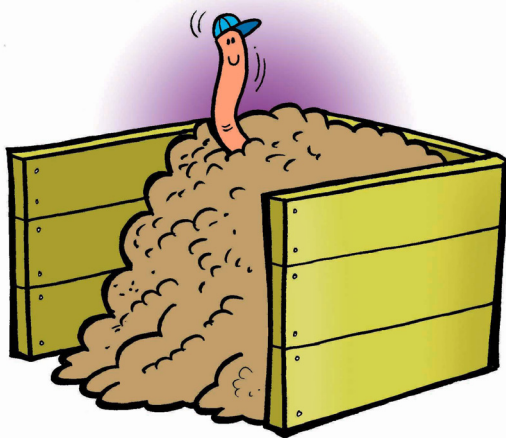
- If the system is new, the worms are probably eating the bedding material first. They need time to breed and increase the population.
- It may be a sign that you have fed them too much or something that they are avoiding so they are not eating other food either. Remove what you think might be the offending food.
- White mould in the system is fine as this is a mould that pre-processes the food for the worms. This mould could suggest that the worms reject that food anyway.
- Worms slow down when it is cold. In winter, feed them more food scraps and aged manure to build up heat in the system. Find a warmer position and cover with an old carpet or blanket to help retain the warmth.

## Ants

- Ants don't kill worms but they do compete with them. They indicate either that the system is too dry or too acidic. If it is too dry, gently pour water through the system and disturb the area where the ants have accumulated. If the system is too acidic from over-feeding or too many rich materials being added, treat as for a smelly system.
- If your system has supports, place them in containers of water or smear Vaseline or horticultural glue around the bases.

## Maggots

- This would tend to indicate that meat or dairy has been fed to the worms. Maggots may also indicate the presence of Soldier Fly larvae which can grow to two centimetres long and are not a cause for concern.
- To eradicate the maggots/larvae, place a piece of bread soaked in milk on the surface overnight. This will attract them and infest it. After two to three days, remove the bread and its infestation.
- If this method does not work, consider cleaning out the system and starting again.



## Slugs

- Your worm farm is a small ecosystem so these are to be expected. However, if they are in plague proportions, add garden lime. If they persist, you may need to clean and restart your system.

## Flies

- Fruit scraps can attract small vinegar flies but these do no harm. However if they are in large numbers it may suggest that your system is acidic and will soon develop an unpleasant odour.
- Flies may result from overfeeding. Slow the rate of feeding and make sure that the worms consume most of the materials before adding more. Also dig in the food scraps as the worms will eat them faster. Add garden lime or dolomite to neutralise the pH level.



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