



Photo: c k reynolds

## What is worm farming?

Worm farming is another alternative to composting; it is also referred to as 'vermiculture' or vermi-composting. Usually tiger worms are used for worm farming in New Zealand, though red worms can also be used.

Worm farming uses the same principles as composting, but it does not generate heat, making it cold composting.

Worms happily eat food scraps and excrete valuable materials known as vermicasts and worm tea which are high in nitrogen, phosphorous and potassium (NPK) compared to ordinary soil.

This makes them valuable for plant leaf growth, root and stem strength, flower and fruit growth.

## The benefits of worm farming

- Casts and worm tea are fantastic for plants (always dilute the worm tea with water to the colour of weak tea - usually about 1:10).
- If you have mostly kitchen waste and live in a home with little or no outdoor space, a worm farm is a good option.
- Same environmental and cost benefits as composting.
- Kids enjoy them.
- Easy care.

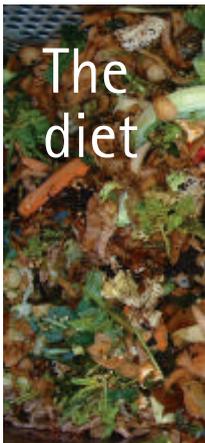
## How to get started

- Choose a site which is sheltered from sun, wind and rain. Carports or porches are ideal.
  - Use a layer of bedding first—e.g., hay/coconut fibre/shredded cardboard/paper. Bedding should be damp and porous.
  - Add worms. 1,000 (250g) is fine; 2000 is even better!
  - Food can then be added. You can cover food scraps with damp newspaper or cardboard to limit flies and odour.
  - Worms can eat their own weight each day but do not overfeed at start (e.g. for 250g of worms give about 200g of food).
  - Worms need air but not light (worms are photophobic). They also like a moist environment, so lightly water occasionally. They do not like very hot or cold conditions (10-30 degrees is OK).
  - Add dry leaves or torn up paper products if it is too wet - the working area should be as damp as a wrung out sponge.
  - Add food scraps regularly. Smaller pieces will be eaten more quickly and prevent odours.
  - Small flies or white worms/bugs indicate the worm farm has become too acidic; add a sprinkling of garden lime to neutralise the pH.
  - After a few months or when a layer is full, you should harvest the casts.
  - Remove the top layer and take off the bottom layer. This bottom layer contains the casts. It is ready when few worms can be seen.
  - Remove worm tea from the bottom level (dilute when using) and put on your garden or pot plants.
- When current layer is full, you can add another layer to your worm farm. Place a new layer on top of the old one and then add bedding (paper/straw/manure) and then add more food scraps.
  - Only add food to the new layer. The worms will migrate slowly to the food layer.

## Types of worm bins

Bins generally have two to three layers; some bins can have extra layers added to increase capacity. Note that it is easier to harvest worm casts from bins which have more shallow layers. Size, price and functionality vary a lot, so ask questions before you buy!

- A tray/layer/stacker system allows for easy removal of worm casts.
- Bins with taps allow the worm tea to be extracted easily.
- Some bins stand on legs which can be easier to proof against pests.
- Some bins are made from recycled plastic and made locally.
- Sizes and costs vary from \$30 to \$200.
- Worms and food scraps are added to the top working tray which has a vented lid. More levels can be added once the first working tray has filled with worm casts.
- A three-tray system allows for easy removal of worm casts with minimal loss of worms.



## The diet

### What worms like

- Moist fruit and vegetable scraps
- Coffee grounds and tea bags
- Aged horse manure
- Dirty paper (not paint)
- Crushed eggshells
- Vacuum cleaner dust
- Hair
- Pizza boxes

### What worms do not like

- Spicy food, chilli, onion, garlic
- Meat and milk products
- Flour products
- Large amounts of cooked food
- Garden waste
- Shiny paper
- Citrus/very acidic fruit
- Chemicals, paint on newspaper, treated sawdust or carpet.



Bath with plastic and carpet covering the worms, with a wooden and iron lid

## Stockists

Worm bins can be purchased from various outlets including your local garden or hardware store. Look under "worm farming" in the Yellow Pages and call first to get an idea of products and prices, or call the Environment Centre Hamilton, 07 839 4452

## Make your own worm bin

You can easily make a worm bin out of large buckets, tyres or an old bath.

If you use a bath, remove the plug. If you want to, you could build a frame to allow the bath to sit securely at waist height. Bricks, posts or blocks may be used for elevation, and for stability, i.e., 100-150mm height (allowing room for the liquid collection container placed beneath the plug outlet). The plug outlet end must be no less than a 5 degree fall to the lowest point to

achieve adequate drainage. Roofing such as ply or corrugated iron will be needed to shed water and provide protection from summer sun.

Place into the base of the bath 1.5m of 65mm perforated drainage pipe with two layers of old stockings. This seals the ends and covers the perforations which stop the pipe blocking. Add pumice sand or scoria to a depth of 75mm then place shade cloth, doubled over and cut to fit, on top of filtering layer.

Free-draining fibrous matured compost is ideal given that it is not going to produce heat. Dampened shredded corrugated cardboard and lunch paper give increased air availability and reduce the risk of bedding material heating up. You need to water well and leave at least two days before adding the worms. Then check for temperatures over 25 degrees. If there are any unpleasant odours, apply two handfuls of garden lime and mix in. Only apply old lawn clippings, as fresh clippings heat up and cook the worms.

For quick results, 500g-1kg (2,000-4,000 worms) should be enough for your worm farm to cope with 400gms to 800gms of mixed food waste each day. This volume will increase as the worms multiply. Spread worms on to the bedding and spread food scraps in one area and

rotate feed sites. As the bath fills use a garden fork and loosen the bedding; this increases air circulation and reduces bedding compaction.

To remove the casts, once the worm farm is full (after 9 to 18 months), place a plastic sheet or large container next to the bath and using a garden fork remove the top half of the worms' bedding. This is undigested food and is where a majority of the worms will be. Place this to one side.

Remove all casts. Rinse drainage layer thoroughly catching all liquid. Replace the contents that were put aside and commence the feeding, forking, watering process when required. Your bath worm farm will ultimately digest about 1-2 litres of mixed organic waste a day.

## Common worm farming problems

Problem:	Cause	Solution
Fruit/vinegar flies around farm or small white bugs and worms	Too acidic	Cover food with damp paper and add small handful of lime to increase pH
Worms climbing up sides/ worms very fat and pale	Too wet	Add paper products and dry leaves, gently fork holes in the working layer
Ants	Too dry or acidic	Add water/lime. If your worm farm is on legs, place each leg in a container of water to stop such pests from getting in.
Food rotting and not eaten	Too much food/wrong food/ pieces too big	Add less food, break into small pieces
No worm tea	Not enough water	Add water
Other bugs and creepy crawlies	Natural part of the process of breaking down food	Enjoy watching them

## Frequently asked questions

### Worm Farming

#### How many worms do I need to start?

1000 is OK, but a bin takes some time to get going; 2000 worms (500gms) will get a bin working much more quickly and efficiently.

#### What food can I use in a worm bin?

Worms like a mix of fruit and vegetables (70%) and carbon material (30%). Carbon material includes scrunched up envelopes, handee towels, tissues, shredded paper – any paper that is NOT shiny and coloured or plastic coated is OK. Worms don't like citrus, bread, meat, onions, garlic, excess kiwifruit or large amounts of grass and leaves.

#### What if there are lots of fruit flies?

Add a decent sprinkling of lime and wait a day or two. If you still have flies, add more lime and carbon material (e.g., paper or dried leaves).

#### Do I need to lime my worm bin?

A small handful of lime or gypsum once a month helps to keep the pH neutral.

#### What do I do if I go on holiday?

Add to the bin as follows:

1-2 weeks: empty out your fridge of any fruit and vegetables

2-3 weeks: dried grass or coconut fibre from a garden centre or worm grower

4+ weeks: coconut fibre block from garden centre or worm grower.

#### How much do I dilute the 'worm tea'?

Worm tea is very high in nitrogen and needs to be watered down to about 1:10, or so it is the colour of weak tea. The liquid is so rich that it can burn plants if not diluted.

#### What can I do with the worm casts?

Worm casts can be mixed with potting mix, seed raising mix and compost (about 20% casts to 80% mix), and is the perfect medium into which to plant seedlings, plants and trees. Casts do not have to be diluted for use in the garden, but make sure they are mixed in to the soil. For best results, add compost and mulch as soil cover.

### Composting

#### What makes my compost smell?

A compost high in nitrogen with no air will become acidic. Add carbon and turn your compost.

#### How do I keep rodents out?

Add grass clippings to increase heat and turn regularly. Put wirenetting under plastic bins to stop rats burrowing in.

#### What can I not put in a compost bin?

Do not put in meat, bread, heavy unshredded prunings (see "What not to compost").

#### How long do I have to wait until my compost is ready?

A well maintained compost bin will produce compost in 3-4 months in summer, and up to 6 months in winter. However, times vary depending on the method, bin contents, time of year and regularity of turning.

#### Do I need to add water?

If you add a 50/50 mix of nitrogen, materials which are wet, and carbon materials that are dry, it will be of a crumbly consistency.

#### How will compost help my garden?

Compost feeds the soil, helps with water retention and encourages earthworms into your garden.