

Footprints

Environmental Centre

Guide to Earthworm Farming

Contents

Page

3. Earthworm Composting
 - Worm Castings
 - How Much Will Earthworms Eat
 - Basic Worm Farming
 - Where to place farm
 - Bedding
 - Starting a Bin
4. Starting a Bin
 - Feeding the worms
 - Worms will Eat
 - Worms don't like (i.e. avoid feeding these to your worms)*
5. Harvesting
 - Technique One
 - Technique Two
6. Worm castings/compost
 - "Worm Juice"
 - Reproduction
 - Worm Capsules (Eggs) and Babies
7. Common Problems and Solutions
 - "My worm farm smells"
 - "My worms aren't eating"
 - "My worm farm is too wet"
8. "My worm farm is too dry"
 - "Will My Worms Crawl out of the Bin?"
 - How much will my worms eat?
 - Can I Have Too Many Worms?
9. Why are my worm so small
 - "My worm farm has unwelcome pests"
 - "What Other Creatures Will Live in My Bin?"
 - MITES
10. Enchytraeids
 - Ants
 - Fruit Flies
 - Can I Use My Worms for Fishing?
 - Contact Details

Earthworm Composting

Worm composting (or vermin culture) is the decomposition by a type of earthworm called "red-wrigglers" (*Eisenia fetida*) which eats your organic raw food waste and leaves rich compost and a liquid fertiliser in return.

Worm Castings

Worm castings are the richest form of natural fertiliser known to man. It promotes a higher than average growth in plants (ideal to start seedlings, when mixed with potting mix or as a top-dressing around plants).

How Much Will Earthworms Eat

Earthworms will chomp (suck, really!) their way through about ½ their own weight in food each day. 1kg of worms will consume about 500g of food per day.

Basic Worm Farming

- Provide a dark moist environment that is not disturbed too often.
- Provide loads of bedding (for e.g. shredded and damp newspaper, cardboard, straw, leaves, compost or Hessian bag). Layers of bedding laid over the surface of the bin helps prevent the worm bin from drying out too much.
- Provide food.

Where to place farm

- Place your worm farm in a convenient, cool and shady spot.
- Worms do well in temperatures between 50 and 80 degrees.
- Your worm farm can be kept indoors (in the garage, shed, laundry or even under the kitchen sink) or out doors.
- It is important that your worm farm stays cool and moist, and is kept out of direct sun, (heat build up in the bin from direct sun will kill the worms).

Bedding

Bedding is what the worms live in. The worms will also eat the bedding so it needs to be replaced regularly. Shredded damp newspaper (no colour ink preferably) is the most convenient type of bedding. Straw, shredded paper or cardboard, coir (coconut fibre), Hessian, cotton rags or old leaves can also be used. A mixture of these things makes a good bedding material. '**Aged**' horse or cow manure can also be used. (Fresh manure can heat up). Soak the bedding materials in water for a

while, squeeze out the excess water before placing it in the bin. **IMPORTANT all new bedding and soil must be moist before placing in bin.**

Starting a Bin

1. Line the worm farm with wet newspaper.
2. Fill half the bin with bedding materials.
3. A few handfuls of soil should be added to the bedding to supply a "grit" to aid in the worm's digestion process and to introduce helpful digesting micro-organisms into the bin.
4. Add the worms to the bedding material.
5. Make sure the worm bin has a lid. This helps prevent the worm bin from drying out, helps keep "undesirables" out and helps keep the light out.
6. Layers of un-shredded newspaper, Hessian or cotton fabric should be placed over the bedding and it acts as an additional covering.
7. Your worm farm should be kept moist (the consistency of a damp sponge is ideal), especially in hot and windy weather.

Feeding the worms

Start by adding food scraps regularly in small amounts. Put the food into the worm farm underneath the newspaper, carpet or hessian. Be careful to not overfeed your worms. Only feed them once they have partly eaten their previous food. The secret is not too much of any one thing – worms like a varied diet just like people do! Worms also don't have teeth, so if you chop or mash your food scraps it will be eaten quicker. Pick a new spot each time.

Worms will eat:

- Most Fruit & Vegetable Scraps & Peels (except citrus fruits, onion, garlic and chilli).
- Tea bags/tea leaves.
- Coffee grounds and filters.
- Crushed Eggshells provide calcium.
- Newspaper, cardboard, egg cartons and pizza boxes (shredded and soaked).
- Old flowers and small amounts of garden waste.
- Pasta (No Meat) & Rice
- Bread & Cereal (ideal to moisten before adding)
- Hair and small amounts of dust from vacuum cleaner

Worms don't like (i.e. avoid feeding these to your worms):

- Onions, garlic, citrus fruits (oranges, lemons, limes, mandarins) and chillis – worms breathe through their skin and these are too acidic for them.
- Meat

- Seafood
- Dairy products (milk, cheese)
- Oil
- Too much bread, pasta and rice
- Pet droppings (some people do feed their worms these)

Harvesting

After about 6-8 weeks (this can be longer depending on how many worms you start with and the seasons) you will notice that there is less bedding material and the worm farm will start filling up with dark, crumbly worm castings at the bottom part of the worm farm. When your bin has built up sufficient casting the castings or worm compost can be harvested.

There are various techniques to harvest compost

Technique One

1. Gently stir up existing bin and tip/scoop contents into a temporary storage container.
2. Put new bedding material, moist soil and food into your now empty bin.
3. Place shade cloth with big enough holes for worms to crawl through over new bedding and food.
4. Tip contents from the temporary storage container on top of shade cloth.
5. The worms don't like the light and will move down through the shade cloth to the new bedding and food.
6. Once all worms have moved out of castings the shade cloth can be lifted and removed.
7. The harvested compost can then be used.
8. There are likely to be eggs in this compost. One of two things can be done, either use compost and eggs or place the harvested compost into a temporary hatching container and place loads of moist newspaper over the harvested compost. The paper will provide food for any eggs that hatch. Once eggs hatch and the worms become visible they can be removed by hand and placed with other worms or the same harvesting technique mentioned above can be carried out. The worms usually congregate in and around the newspaper so are fairly easy to remove still attached to the newspaper.

Technique Two

1. Place a layer of moist newspaper or plastic sheet on a table or the ground or you can use the lid of your worm bin. (If you have a tray or large piece of flat wood it helps with moving the compost once harvested and cleaning up afterwards).
2. Gently stir up existing bin and tip/scoop contents onto paper/plastic sheets.

3. Make pyramid shape mounds.
4. Leave for about an hour. Worms will all move to the middle of the mounds.
5. Gently remove the outer layers of compost from the mounds.
6. Towards the middle you will find all the worms knotted together in a ball.
7. Gently pick them up and place them back into the bin. (Obviously you have prepared the bin with new bedding and food).
8. Some worms may still be in the compost so you can repeat the pyramid making process if you like.
9. The harvested castings/compost will contain eggs see point 8 in technique one.

Worm castings/compost

Worm castings is a very concentrated compost so it should be mixed into compost or the soil. It is most effective if dug into the drip line of plants, or mixed with potting soil when potting plants. You can also dilute a handful of worm castings in a bucket of water to make a "tea" and use it as a liquid fertiliser.

"Worm Juice"

The liquid that collects in the bottom of the tray/collection container under your bin is "worm wee" or "worm juice" and is a great liquid fertiliser. Simply dilute it to the colour of weak tea and water it into your plants.

Reproduction

Worm Capsules (Eggs) and Babies

- Each worm is both male and female, and can produce as well as fertilize eggs.
- The swollen white band on the worm's body will shed and become an egg (or cocoon) in approximately three weeks.
- On average about 4 baby worms hatch per capsule.
- Capsules take about 3 - 4 weeks to hatch.
- 1000 capsules can be expected to yield about 4000 worms (about a kilo when they are adult size).
- Numbers of capsules and hatching will depend on the season and bedding temperature and the correct moisture level (damp) of the bedding.
- Babies are hard to see and may take a week or two to be visible.
- When capsules are a rusty brown colour, they are close to hatching. If they are transparent, the babies have probably hatched.
- New baby worms are transparent, with a slight red tinge. Can sometimes be seen crawling on the sides or lid of your worm bin.
- The worms will reach breeding age in about 2 or 3 months, and maturity in about 12 months.
- When worms mate they look like they are 'knotted' together.

- Once new worms hatch you will notice an increase in the feeding rate. (Worm population will have doubled). Increase food.

Common Problems and Solutions

“My worm farm smells”

This can be the result of too much food, too wet and/or not enough air.

- Stop feeding your worms and give the materials in the worm farm a stir.
- Sprinkle some wood ash or garden lime diluted in water onto the worm farm.
- Don't start feeding again until all visible food scraps have been eaten.
- Avoid foods such as citrus, onions, garlic, chilli, meat, seafood and dairy products.
- Also avoid large amounts of bread, pasta and rice.
- Eggshell help keep ph balanced.

“My worms aren't eating”

- Worms will avoid eating certain foods, such as citrus fruits, onions, garlic and chillis which are too acidic.
- Don't overfeed your worms – only put more food in once they have partly eaten their previous meal – and keep their diet as varied as possible.
- It may also help to chop food scraps into smaller pieces.
- Check that the worm farm is moist enough – spray some water in it if it's dry.

“My worm farm is too wet”

Food is 80% moisture, so even though you are not actually adding water to your bin it may appear to be getting wetter over time. If there is pooling in the bottom of the bin or there are several drops of water dripping from the bedding when you squeeze it, the bedding is too wet. Some easy solutions are:

- Make sure there is sufficient drainage for your worm farm and that it is under cover if outside.
- Worms can't swim so make sure that any liquid is able to drain away.
- Add shredded newspaper or cardboard to absorb some of the moisture and mix this into the bedding material. A full toilet roll or paper egg boxes will also do the trick (Worms will eventually eat it).
- Mix in dry bedding near the bottom
- Periodically leave the lid off or ajar until bedding returns to normal dampness.
- Dig a trench in the middle of the bin and insert a full roll of toilet paper or paper egg boxes.

“My worm farm is too dry”

- The water cycle should occur in the bin. The easiest way to see if this is happening is to check if condensation is occurring on the lid of the bin.
- If the lid is moist the water content within the bin is probably good. If no moisture on the lid your bin is probably too dry.
- Another way to know if the bin is too dry is to look at the newspaper sheets covering your worms. Is it drying out?
- The position of your worm bin especially if it is outside will also influence the moisture content. Wind, hot days etc all cause evaporation and as the worm bin needs some air circulation moisture will be lost due to evaporation.
- A spray bottle filled with water kept next to your bin can be an easy solution to create a gentle “rain” when things start drying out.

“Will My Worms Crawl out of the Bin?”

- Generally No. However if conditions in the bin become undesirable the worms will try and escape.
- If too much acidic food is given the worms will try to leave the bin.
- If the worms are leaving and it is not due to too much acidic food being given, it may be a result of acid build up in the bin.
- Remove all food (it may be rotting and causing changes in pH), gently stir in crushed egg shells – this usually solves the problem.
- Can also add garden lime mixed in water to neutralise.

How much will my worms eat?

Worms will process half their own weight each day. Therefore, 1 kg of worms will process about ½ kg of waste per day. However, this amount relates to conditions the worm bin is exposed to. For instance, in cooler weather, if the bins are outdoors, the processing rate can be slower. The amount of airflow in the bin is another factor that is important. It is best to get a 'feel' for your own worm bin. Watch the food you put in, and when it has nearly gone, you can put more in. Over time, the feeding rate will become faster as your worm population increases. Part of the bedding material will be included in the worm's diet as well.

Can I Have Too Many Worms?

No, they will breed quickly and you may notice more and more worms as the months go by. If you don't harvest the worms to give to your friends, sell or for fishing, they will continue to multiply relative to the size of your bin and how much food you feed them.

Why are my worms so small?

Small worms are usually a signal that the worm bin is becoming overcrowded or underfed. The remedy for this is to divide the worm population, placing half into another bin, or giving some away. Also, make sure you are feeding the worms well. A good combination of food waste (nitrogen) and shredded paper or cardboard etc (carbon) will ensure the microbial content is good, and the worms have plenty to eat (worms mostly eat the microbes that are produced during the decomposition process). Check to make sure the bottom of the bin isn't becoming compacted, it may be time to remove the old castings and replace with fresh bedding material.

“My worm farm has unwelcome pests”

- Make sure the bedding and food in the worm farm is covered with newspaper, Hessian sack or old carpet or cotton rag to prevent flies and pests getting in.
- Ants and cockroaches can become a problem if the worm farm is too acidic.
- Add water and lime to moisten the worm farm and neutralise the acidity.
- To get rid of maggots put a piece of bread soaked in milk in the feeding tray. Leave it there for a day or two and then dispose of it, maggots and all. (Maggots generally only appear if meat/dairy products and such like are added to the bin, normal uncooked fruit and veg scraps should not attract flies)
- Flies may not have got into the bin to lay their eggs but may have laid their eggs on the food scraps before they were put into the bin. This can easily be avoided by insuring food scraps are kept in a sealed container or stored in the fridge.
- Avoid feeding your worm's meat, seafood, dairy and fatty foods, which will go off and attract pests.

“What Other Creatures Will Live in My Bin?”

You will find other decomposers living and working in your bin. Most of them, in small quantities, are harmless and actually help the worms do their work. A few common creatures that you may notice are:

MITES

These are difficult to see due to their size, but look like minute white, gray or brown dots that move slowly. In small numbers they are harmless, but if large quantities are noticed on the bedding and the inside walls of the bin, you can wipe them off and remove large bunches found on food. They will not harm your worms in any way but large numbers may eat too much food and not leave enough for your worms. They help the worm's access food quicker so are valuable. Remember the objective of the worm bin is to process your food scraps so its not really that important which creature does the job the worms and/or mites the thing is to just insure there is

enough food for them all. If you do not generate enough food for both the worms should have preference as they have a longer life cycle than the mites.

ENCHYTRAEIDS

Known as white worms, or pot worms, they are 1/4 to 1 inch long, white, segmented worms and sometimes are confused with newly hatched baby redworms. They are harmless and can be left alone.

Ants

Ants will find the worm bin is a good nesting place if the bedding has become a bit dry. Adding more moisture to the bin will help (but don't add too much!). Turning the surface of the bedding around the area that has ants will disturb the ants and they will move on. Repeat the turning every couple of days till they are gone (ants don't like to be disturbed). If you have a major ant problem, try sitting the legs of the bin in cans of soapy water to stop ants climbing up the legs. Remember, commercial ant poisons can be harmful to children, pets, your worms and the environment.

Fruit Flies

Unfortunately, those little annoying flies are attracted to fruit and vegetable waste, particularly during warmer weather. Keeping your food waste covered at all times will help control them. Use a good layer of damp shredded paper on top of the bin, tucked right up against the sides of the bin (replace regularly). Place food under the cover.

Can I Use My Redworms for Fishing?

Yes, as long as you have not become too attached.

Happy Farming!!!!!!!!!!

For more information please contact

Michelle Sholto-Douglas
021 794 5586
gsdouglas@worldonline.co.za