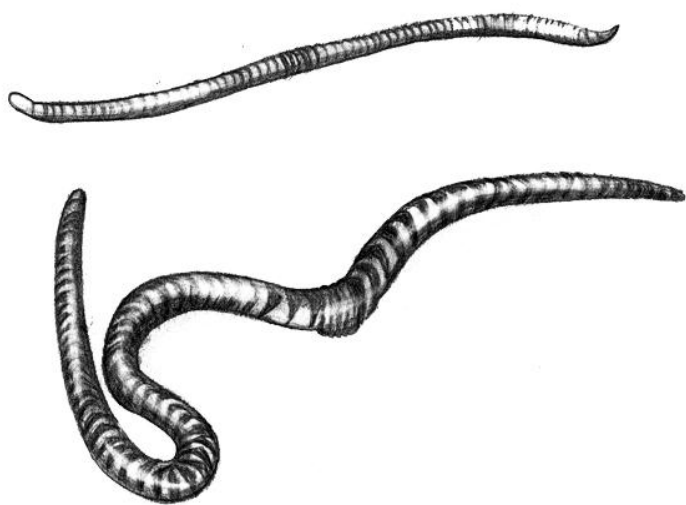


Making Waste Work: A Toolkit

How to turn organic waste into compost using worms

A step-by-step guide



How-to guide 6

Part of
Making Waste Work: A Toolkit
for community waste
management in low and middle
income countries

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wasteaid.org.uk/toolkit





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- Partnering with local organisations to improve the health, environment and livelihoods of people without waste services.
- Building the skills of local people to deliver practical solutions to the waste management crisis in their own communities.
- Raising awareness of the benefits of proper waste management and campaigning for greater change.

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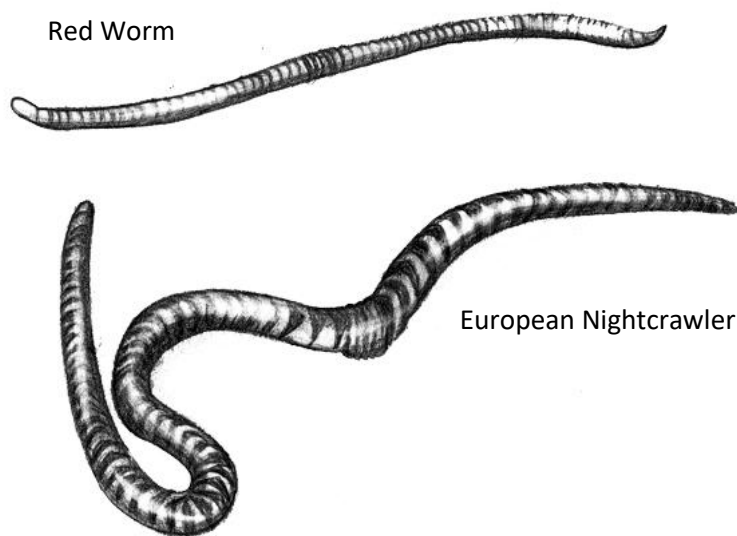
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6 How to turn organic waste into compost using worms

You can make very high-quality compost quickly in a small space using special worms.

Summary: Composting using worms, also known as vermicomposting is the process in which worms turn organic wastes into very high-quality compost very quickly.

Waste materials: Organic materials, especially food waste.



Product: Worm cast compost – also known as vermicompost. This is very high quality compost, suitable for kitchen gardens and agricultural uses.

Benefits: Worms can consume large amounts of organic waste, equivalent to their own body weight per day (1 kg of worms can consume 1 kg of “food” every day). The excreta or “castings” of the worms are rich in nitrate and available forms of phosphorus, potassium, calcium and magnesium. (See *How to turn organic waste into compost*, How-to guide 5 for the benefits of compost.) This type of composting is quicker and the box method uses very little space indeed, so it may be useful in a small compound or campus, or in urban areas where space is limited.



To produce a quality product, always use clean materials which have been kept separate from other wastes at the source.



Composting with worms is generally a very safe activity, but:

There can be a risk from disease from the compost heap or the organic waste you are adding to it. You should always wear gloves when handling compost and wash your hands afterwards.

There can be spores from fungus in the compost heap. People with breathing problems should avoid turning compost heaps. Do not open bags of compost with your head right over it, and damp down compost before use. If the heap is dry wear a facemask to protect your lungs from the dust.

Choosing the right worms

Not all worms are suitable for worm composting (sometimes called vermicomposting). Good vermicomposting worm varieties:

- Can live in dense colonies
- Prefer making their home in airy bedding material instead of soil
- Reproduce quickly
- Have a big appetite for decaying organic matter.

Examples of good vermicomposting worms are: Red / Tiger Worm (*Eisenia Fetida*), European Night Crawler (*Eisenia Hortensis*), African Night Crawler (*Eudrilus Eugeniae*), West African Earthworm (*Hyperodrilus Africanus*), Blue Worm (*Perionyx Excavatus*), Alabama Jumper (*Amyntas Gracilis*) and Dendrode (*Dendrodrilus Rubidus*).

It is better to identify your local species because importing them can be costly, and many worms can die in transport. Introducing foreign species can also be harmful to the local ecology. Ask farmers if they know about any locally available worms, and experiment with different varieties.

Make sure you feed your worms the correct “food” and keep them at the right temperature and moisture.

Choosing the right vermiculture system

There are several simple systems – we will look at two:

- The box method, suitable for a single or small number of households, and
- The pit method, suitable for community-scale vermicomposting.

The box method

This is suitable for smaller or household scale projects. You could also use this to breed more worms.

1. Find a suitable bin or box – an old drawer from furniture, any wooden box or plastic container – approximately 40cm x 60cm x 20cm or 10 gallons. Make sure the box is clean by rinsing it with clean water to remove any residues which may be harmful to the worms. For wooden boxes, line the bottom and sides with plastic.
2. Prepare the bedding. Instead of soil, use moist newspaper bedding. Like soil, newspaper strips provide air, water, and food for the worms. Using about 50 pages, tear newspaper into 1cm to 2cm strips. Place the newspaper strips into a large plastic waste bag or container. Add water until the bedding feels like a damp sponge, moist but not dripping. Add dry strips if it gets too wet.
3. Add the strips to the box, making sure the bedding is fluffy (not packed down) to provide air for the worms. The box should be 3/4 full of wet newspaper strips.



Figure 1: The box method of worm composting.

4. Sprinkle 2-4 cups of soil into the box. The soil introduces beneficial microorganisms, and gritty particles to aid the worms' digestive process. Potting soil or soil from outdoors is fine.
5. Weigh your worms and then add them to the box. If you can't weight them, put them in a measuring jug and record the volume (e.g. 300 ml worms or one cup of worms). This is important for record-keeping and will help you know how much to feed them.



Figure 2: Add worms to the compost box.

6. Bury food scraps under the bedding. Feed the worms fruit and vegetable scraps that would normally be thrown away, such as peels, rinds and cores. Limit the amount of citrus fruits that you place in the box. **Do not add meats, bones, oils or dairy products.** Cut or break food scraps into small pieces: the smaller, the better.
7. Measure the amount of food. Feed worms approximately 3 times their weight (or volume) per week. Monitor the box every week to see if the worms are eating all the food. Adjust feeding levels accordingly. (If you start with 300 ml of worms, add 900 ml of food per week.) Bury food scraps in the box. Lift the bedding, add food scraps; then cover food with the bedding.
8. Place a full sheet of dry newspaper on top of the bedding. This will help maintain the moisture balance, keep any possible odours in the box, and help prevent fruit flies from making a home in the box. Replace this sheet frequently if fruit flies are present, or if box gets too wet.
9. Cover and choose a spot for the box. Cover the box with a lid made of plastic, plywood or cloth, but leave the lid ajar so the worms receive some air. If desired, you may drill holes into the box. Place the box away from windows and cook stoves (this will help the temperature stay stable).
10. **Feed, water and fluff!** To keep worms happy, feed them about once a week. If the bedding dries up, spray with water. (If bedding gets too wet, add dry newspaper strips.) Fluff up bedding once a week so the worms get enough air.
11. To harvest the worms – empty 2/3 of each box for adding to the compost pit. Add bedding material to the remaining 1/3 in the box – these will multiply again.



The pit method

This is suitable for medium to larger scale projects.

1. Dig a series of pits around 3m x 4m x 1m deep with sloping sides. (Vary the number and size according to the amount of food waste you have to process.)
2. Lay bamboo poles (or similar) in a parallel row on the pit floor and cover with a lattice of wood strips to provide drainage (worms cannot survive in a waterlogged environment).
3. Line the pit with a suitable material to keep worms from escaping into the surrounding soil whilst allowing drainage of excess water (old animal food sacks, for example – not plastic).

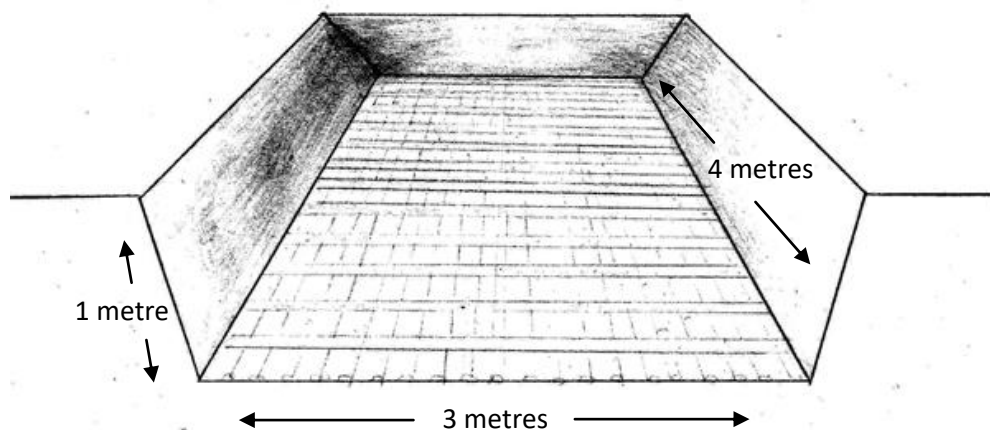


Figure 3: The pit method of worm composting.

Add the compost and worms to the pit:

4. Fill the pit with organic waste (food waste). Cover loosely with soil and keep moist for a week or so.
5. Apply a good amount of water to one or two spots on the heap and place the vermicomposting worms on top. They will burrow rapidly into the damp soil.
6. Leave the pit for 2 months, preferably shaded from hot sun and kept moist.

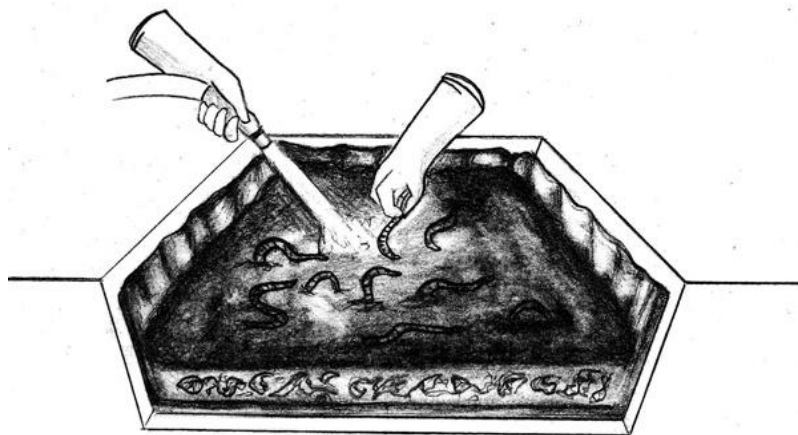


Figure 4: Apply worms to the compost pit (picture not to scale).

Digging out / re-filling the pit and harvesting the worms:

7. After 2 months, dig out 2/3 - 3/4 the contents of the pit and remove the bulk of the worms (by hand or sieving).
8. Refill the pit with fresh organic residues and the remaining worms will continue the composting process.
9. Sun-drying and sieving the compost improves the quality of the final product.
10. The excess worms that have been harvested as above can be used in other pits, sold to other farmers or used/sold for use as animal feed supplement or fish food.

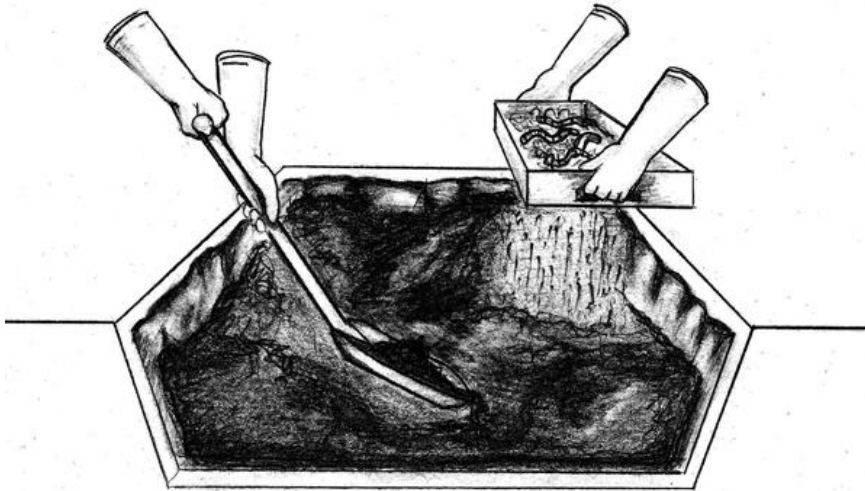


Figure 5: Digging out, re-filling and harvesting worms (picture not to scale).