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

Zoë Lenkiewicz and Mike Webster
Illustrated by Susan Hatfield
October 2017

wasteaid.org.uk/toolkit
How to turn organic waste into compost using worms

WasteAid UK is a charity working to make an impact on the global waste emergency by:

- 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.

www.wasteaid.org.uk

CIWM (Chartered Institution of Wastes Management) is the leading professional body for the resource and waste management sector, representing around 6,000 individuals in the UK, Ireland and overseas. It awards the title of Chartered Waste Manager to qualifying members.

The objectives of the CIWM are to advance the scientific, technical and practical aspects of wastes and resource management worldwide for the safeguarding of the natural environment, to promote education, training, and research in wastes and resource management, and the dissemination of knowledge of the topic; and to strive to achieve and maintain the highest standards of best practice, technical competence and conduct by all its members.

www.ciwm.co.uk

Creative Commons

Under this licence, our work may be shared freely. This provides the freedom to copy, distribute and transmit this work on to others, provided WasteAid UK and CIWM are credited as the authors, text and images are unaltered. This work must not be resold or used for commercial purposes. These conditions can be waived under certain circumstances with the written permission of WasteAid UK. For more information about this licence go to http://creativecommons.org/licenses/by-nc-nd/3.0/

Disclaimer

The information in this Toolkit and associated How-to guides is provided in good faith and is intended as an indicative guide to the processes and activities referred to only, based on information provided by currently active operators and practitioners. It should not be taken as a definitive guide to the activities referred to, and should not be used as a substitute for undertaking a full site-specific health and safety risk assessment. WasteAid and CIWM recommend always undertaking a full feasibility and environmental and health and safety risk assessment, based on the specific conditions applying to the community, waste, and site in question. WasteAid and CIWM do not accept any legal responsibility for any errors, omissions or misleading statements, or for any injury or loss resulting from the use of or reliance upon the processes outlined in this Toolkit and associated How-to guides. WasteAid and CIWM are not responsible for, and cannot guarantee the accuracy of, information on sites they do not manage, nor should the inclusion of a hyperlink be taken in itself to mean the endorsement of the site, the site owner or any specific content to which it points.

How to turn organic waste into compost using worms
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.

Red Worm

European Nightcrawler

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.
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.


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.
How to turn organic waste into compost using worms

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.

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 1: The box method of worm composting.*
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).

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.
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).