

EARTHWORMS

Earthworms are an important part of the soil food web. They are major decomposers of organic matter and gain their nutrition from fungi and bacteria that grow on the organic matter. In the soil worms are major contributors to recycling the nutrients from decomposing organic matter. They can be found in most temperate soils, but also in many tropical soils. Their presence in the soil is an indicator of a healthy system. There are many types of earthworms that can be found in the soil, categorized in the main groups: surface soil and litter species, upper soil species, and deep-burrowing species.

Benefits from earthworms

Earthworms in the soil are important for **stimulating microbial activity** – many microorganisms are found in the worm castings, which will again facilitate the cycling of nutrients and making them readily available for plants uptake. As worms consume foods (organic matter) and moves through the worm intestines, it is broken down and inoculated with beneficial microorganisms.

Earthworms are **improving the soil** – as they move through the soil burrowing, they are increasing soil's porosity. This improves soil's water storage, drainage and decrease water runoff. With the organic matter they are decomposing, soil has a better water-holding capacity and also more nutrients available for the plants. Roots can easier penetrate deeper into the soil. Worms turn soil and as they burrow deeper in the soil also carry organic matter in the lower soil layers.

Worms bedding

Bedding should be a material high in carbon and moisture absorbent. Local materials that you have available should be used:

- Newspapers – non-coloured, non-glossy
- Shredded office paper
- Cardboard - non-coloured, non-glossy
- Toilet paper rolls
- Brown leaves
- Moist straw
- Moist woodchips
- Coconut fibre (for tropical climate areas)
- Bark
- Peat moss

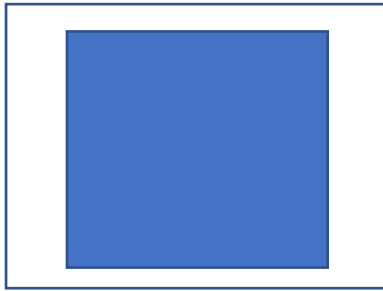
Bedding should be moist, but not too wet. Moisture should be about 75%. For an easy check: when you squeeze the bedding material, only a drop should be extracted from it – it shouldn't be dripping. If the bedding gets dry, spray it a bit with water. If it is too wet, add more dry bedding such as shredded newspaper. The bedding should be well aerated.

The bedding is one part of the worm's food. Earthworms need a balanced diet with carbohydrates, proteins, and nitrogen.

Feeding earth worms

Its best to feed worms every 3 days: apply enough food for 3 days. A thin layer is best and ideally cover the layer of food with a thin layer of bedding - shredded newspaper or cardboard. Cardboard doesn't have to be shredded. Worms love to lay eggs in shredded newspaper and on cardboard. Newspaper and cardboard (C) offer insulation, plus helps with the carbon to nitrogen ratio C/N to your mix of veggie and fruit resources (nitrogen) from your juice production. Covering the bedding and food scraps/pulp with also prevent fruit fly problems. A very light dusting of dolomite lime will also balance out PH.

When you apply food leave an area of each edge of the food layer so worms can escape to the sides if food is to hot or not to their liking.



Blue area is where to feed, white area safe edges.

Worms enjoy food that's a bit older that has already started to break down. All material added to the worms as food must be free of chemicals, pesticides, plastics, metal, etc.

Food to avoid: Never add dairy products, meat, bones, oils, non-fermented manure.

Other options: You could experiment mixing bulk pulp with carbon, try different ratios of C/N. I would start with 60% (C) woodchip, or sawdust (expensive to buy), shredded newspaper and shredded cardboard mixed with 40% (N) pulp. Mix and leave for a month in the containers then add worms and leave and see how long it takes to turn into worm castings.

Composting units

The composting bins need to be covered all year to stop heat, cold, and rain. **Composting bins** can be made of different materials: plastic, plywood, etc. with holes for air on the lid. There are also ready-made worm compost bins available to be bought, with trays one above another, so when the castings are ready, they are falling through the sieve to the tray below. Small compost bins are portable, but there is also the possibility of having long rows for composting dug or placed into the ground; or, **windrows** above the ground - 1m high mounds and in long rows. Leave the material in the windrow for a few weeks before transfer into bins or just leave the mix to compost then add worms. Windrows above ground and long worm beds in the ground can be appropriate for worm farming (not for small-size composting in your kitchen garden) and they do not have the problem with temperature changes in the bedding. Temperature of the bedding in which earthworms thrive is 15-25°C. Temperature above 30°C may kill them. The composting units should be placed in cool, moist, and shaded place.

Compost

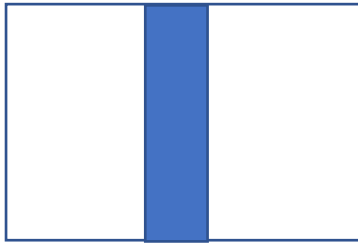
The final product from the worms are the castings, also called **vermicompost**. If composting in bins, the vermicompost will be in the tray below the worms. This material will be dark-coloured and moist. It is rich in nutrients, readily available for plants (N, P, K, and others; the ratio will depend on the food they are getting).

Juice: If you want to collect juice, your bins will need a sump at the bottom to collect the liquid worm juice. This juice is rich in nutrients.

Earthworm stock

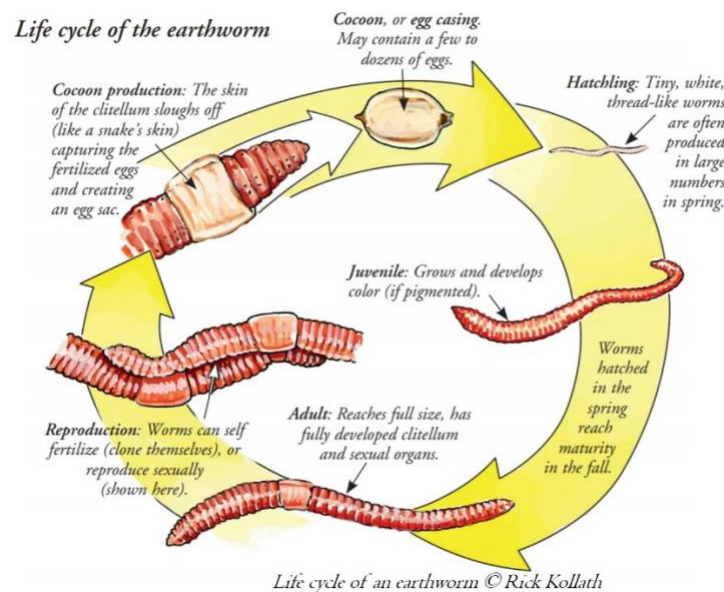
Don't sell your stock.

The worms are your feeding stock, once a full bin of food has been consumed by worms, only feed in a narrow band (see blue below).



Over the narrow band lay a very thin narrow layer of crushed eggshells on top of the food. Then cover with moist hessian, every few days scoop out the worms and move to a new fresh bin. Keep scooping worms until you only see the juvenile worms.

Eggs: Leave the bin you have removed the worms for 4 to 6 weeks to allow all the worm eggs to hatch out and recolonise the bin for sale. The last 2 weeks you could mix a few chicken foods pellets into the food mix to add size and body weight to the earth worms.



Selling worms

If you want to sell worms on their own just keep one or two bins just for breeding worms for sale.



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