

Vermiculture

Continuous breeding of earthworms in boxes for production of high quality organic compost



Vermiculture is a simple and cheap way to produce a continuous supply of organic compost of high quality.

Eisenia foetida, the **Red California earthworm** (also called 'the red wiggler') is ideal for vermiculture since it is adapted to the wide range of environmental conditions.

The compost produced by the earthworms has a dark colour, no smell and a loose and spongy structure. It is a high value product which is very rich in nutrients, and in a form that makes them readily available to vegetation.

An Application of Organic Compost can Address the Following Land use Problems

- *Low crop yields due to soil fertility decline*
- *Water and wind erosion*
- *Small holdings*

Under culture, the worms are kept under shade, in long wooden boxes (Figure 1) filled with earth, cattle manure and an absorbent material (eg straw). The box is covered by sheet metal (or wood, thick plastic sheeting, or banana leaves) to protect worms against UV radiation and birds/chickens, and also to maintain a favorably humid microclimate.

Fresh cattle manure is a perfect food for the worms, but rotten coffee pulp can also be fed. Chopped crop residues (eg cowpeas, leucaena leaves and other legumes) may be added. The content of a full box can be harvested every 3-4 months, and is used for crops, mainly coffee and vegetables, but also maize (corn) and beans.

It is very effective in increasing soil fertility, crop production, improves soil structure, infiltration and water storage capacity.

The compost can be applied directly to coffee, mixing it with an equal amount of earth and applying 1 kg to each plant.

Alternatively, it can be sprayed: for preparation of liquid fertilizer 50 kg of compost are mixed with 50 liters of water and left to soak for 5 days. The concentrated solution produced is mixed with water at ratio of 1 to 10¹ and applied to the crop using a knapsack sprayer.

The earthworms reach their reproductive age after three months and live for many years. In perfect conditions an earthworm produces up to 1,500 offspring per year. Therefore, new cultures can be easily established, or earthworm stocks can be sold according to the farmer's needs.

A certain amount of earthworm compost is kept back and being used instead of fresh earth to reinitiate the whole process, or to start new cultures.

Earthworm culture does not depend closely on the external environment, but it is essential to maintain favorable conditions inside the box- namely continuous feeding and wetting. Ants, the main enemy of earthworms, can be controlled standing the boxes on poles it can filled with water.

¹ Ratio of 1 to 10 can be prepared by using one part of concentrated solution in nine parts of water

Implementation

1. Construct 3 wooden boxes (Figure 1). Another possibility is to dig pits in the soil, same measurements, with cut-off drain above pit to protect from flooding.
2. Fill with earth and cattle manure (2 kg each box, not too wet/not too dry).
3. Put in stock of earthworms (1-2 kg per box)
4. protect from natural enemies (ants, birds etc.)

No specific timing (implementation is possible at any time).

Tools required:

Hammer, nails, buckets/wheelbarrow, shovel, possibly water hose.

Duration for Establishment:

2 days

Maintenance:

1. Feeding: every 3-5 days add another layer of cattle manure (1 kg of earthworms eat 1 kg of manure per day)
2. maintain humidity at 80%, water frequently in dry season, maintain temperature between 15-30°C. Do not exceed 42°C.
3. Gather compost every 3-4 months: discontinue feeding and irrigation for 5 days, then put a sieve with fresh manure on top of the compost. The worms migrate into the fresh manure. After 2-3 days take out the sieve and gather the ready, worm free compost.
4. Apply compost to the crops.
5. Continue the process.
6. Possible improvement: add lime to raise pH to a optimum level of 7.0

Remarks: The inputs are estimated for the production of approximately 4,000 kg of worm compost, which is enough for one hectare of coffee per year

Impacts of technology

Benefits	Description	Disadvantages
Production of socio-economic benefit	<i>Crop yield increased Production increased Farm income increased</i>	NONE
Socio-cultural benefits	<i>Improved knowledge On soil, water conservation/erosion</i>	NONE
Off-site benefits	<i>Reduced river pollution(lower inputs of chemical fertilizers)</i>	NONE
Ecological benefits	<i>Increase in soil fertility Stimulation of soil fauna Increase in soil moisture (through improvement in soil water storage capacity) Improvement of soil structure</i>	Pests: the compost attracts pests like ants, flies, chickens etc.

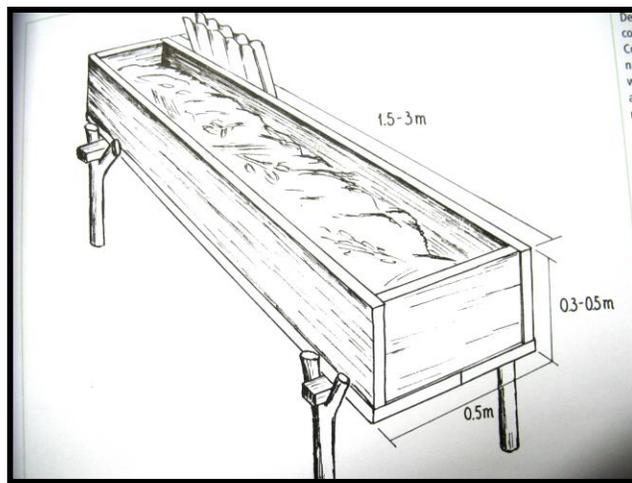


Figure 1. Detailed view of wooden box for compost production by earthworms.
Cover (zink or another alternative) is important to protect worms from light, birds and other natural enemies, and to maintain moisture in the box.

Reference: Linger Hanspeter and W. Critchley, 2007.

Where the Land is Green. Case studies and analysis of soil and water conservation initiative worldwide. WOCAT (pages 105-108).

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