Structure used for vermicomposting showing above ground bin, cover, and shed (Samden Sherpa)

Vermicomposting ( )

Gadaula proyog gari mal banaune prabidhi (Main Contributor: Samden Sherpa, ICIMOD)

Vermicomposting or worm composting is a simple technology for converting biodegradable waste into organic manure with the help of earthworms.

Earthworms are valued by farmers because, in addition to aerating the soil, they digest organic matter and produce castings that are a valuable source of humus. Vermicomposting, or worm composting is a simple technology that takes advantage of this to convert biodegradable waste into organic manure with the help of earthworms (the red worm Eisenia foetida) with no pile turning, no smell, and fast production of compost. The earthworms are bred in a mix of cow dung, soil, and agricultural residues or predecomposed leaf-litter. The whole mass is converted into casts or vermicompost, which can be used as a fertilizer on all types of plants in vegetable beds, landscaping areas, or lawns.

Purpose of the Technology: Worms are so effective at processing organic waste that they can digest almost half their own weight in debris every day. Vermicomposting is a simple composting process that takes advantage of what earthworms do naturally, but confines the worms to bins making it easier for farmers to feed them and to harvest their nutrient-rich compost. Since all worms digest organic matter, in principle, any type of worm can be used; however, not all are equally well adapted to living in bins since some worms prefer to live deep in the soil while others are better adapted to living closer to the surface. The red worm (Eisenia foetida) is ideal for vermicomposting because its natural habitat is close to the surface and it is accustomed to a diet rich in organic matter, this makes it ideally suited to digesting kitchen scraps and to living in bins.

Establishment / maintenance activities and inputs: Vermicomposting can be carried out in different types of containers. There are only a few requirements for a good worm pit, the most important being good ventilation; the pit needs to have more surface area than depth (wide and shallow) and it needs to have relatively low sides. The base of the worm pit is prepared with a layer of sand then alternating layers of shredded dry cow dung and degradable dry biomass and soil are added. Under ideal conditions, 1,000 earthworms can covert 45 kg of wet biomass per week into about 25 kg of vermicompost.

Natural / human environment: Worm castings contain five times more nitrogen, seven times more phosphorous, and eleven times more potassium than ordinary soil, the main minerals needed for plant growth. The vermicompost is so rich in nutrients that it should be mixed 1:4 with soil for plants to be grown in pots and containers. Vermicompost should not be allowed to dry out before using.

Note: This type of vermicomposting is sometimes referred to as 'Pusa' vermicomposting because it was popularized in South Asia by the Rajendra Agricultural University located in Pusa, Bihar, India.

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Ready to use vermicompost ((Samden Sherpa)

- Improve fertilizer

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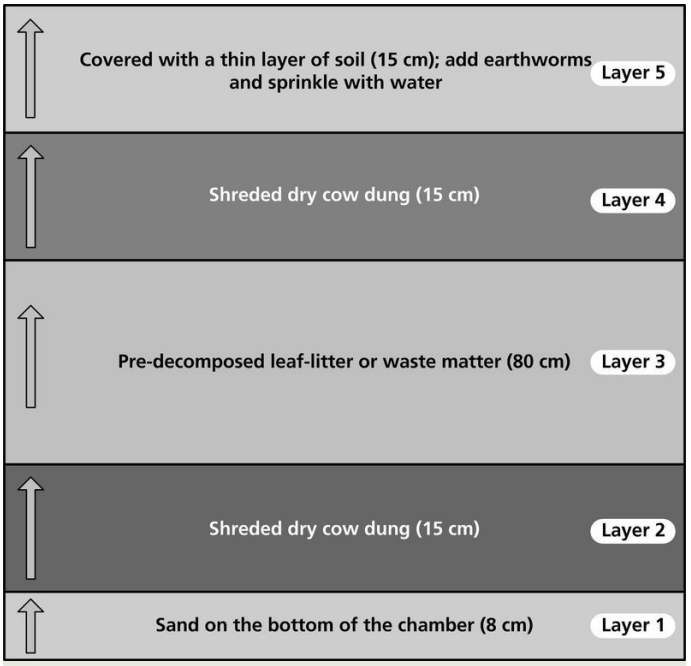
Establishing a vermicompost pit
Diagram showing the layers needed to set up a vermicompost pit. Note that the middle layer is the thickest; the worms start here and eat both upwards and downwards. It is best to house the pit under a thatched or plastic roof in order to shield it from excessive sunshine and rain.

Technical knowledge required for field staff / advisors: moderate

Technical knowledge required for land users: moderate

Main technical functions: increase in nutrient availability (supply, recycling,...), Improve Soil Fertility

Secondary technical functions: improvement of topsoil structure (compaction), Stabilizes that soil



Author: AK Thaku

- (**worm pit** volume, length: **A typical outdoor pit can measure 4 m long, 1 m wide and 0.75 m high**)
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All costs and amounts are rough estimates by the technicians and authors. This was a demonstration project conducted by ICIMOD.

1. A low cost pit can be constructed with bricks on a moist or shaded site (/ : None)
2. If bricks are not available, stones can be used for the pit construction; (/ : None)
3. alternatively, a wooden or bamboo box or a plastic tray can also be used. (/ : None)
4. Vermicompost pits are best started during the summer months. (/ : None)
5. A thatched roof was built over the pit to help retain moisture in the heap (/ : None)
6. at a level of approximately 40–50%, as well as to maintain an optimal temperature of about 20–30oC. (/ : None)
7. Sand, soil, cow dung, and leaf litter are piled up as shown in the diagram. (/ : None)
8. Material Used are Bricks and cement, dry cow dung, plastic sheet/bamboo, earthworm (around 2000) (/ : None)

			( )	( )	%
Construction of pit	persons/day/unit	10,0	5,0	50,0	
Brick and cement	unit	1,0	70,0	70,0	
Dry cow dung	unit	1,0	10,0	10,0	
Plastic sheet/bamboo	unit	1,0	70,0	70,0	
Earthworm (2000)	unit	1,0	60,0	60,0	
				260.0	
				260.0	

1. Water regularly and collect, harvest vermicompost (/ : None)
2. The pit is watered regularly. After five to six weeks, the top layer is removed and piled in one corner of the pit. After a few days, the worms will have borrowed down to the bottom of this pile and the compost can be harvested. The compost prepared in the pit should be harvested within 6 months and the pit refurbished as for the first set as discussed above. (/ : None)

			( )	( )	%
Watering pit	persons/day/unit	5,0	5,0	25,0	

Dry cow dung	unit	1,0	5,0	5,0	
Water pipe	unit	1,0	10,0	10,0	
				40.0	
				40.0	

Thermal climate class: temperate

< 250
251-500
501-750
751-1,000
1,001-1,500
✓ 1,501-2,000
2,001-3,000
3,001-4,000
> 4,000

(0-2%)
(3-5%)
(6-10%)
✓ (11-15%)
(16-30%)
(31-60%)
(>60%)

0-100
101-500
501-1,000
1,001-1,500
✓ 1,501-2,000
2,001-2,500
2,501-3,000
3,001-4,000
> 4,000

✓ (0-20)
(21-50)
(51-80)
(81-120)
(> 120)

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✓ (,)
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(> 20
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(,)
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(>3%)
(1-3%)
(<1%)

✓ < 5
5-50
> 50

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SLM

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✓ (/)
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10%
10-50%
✓ 50%

✓
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✓ < 0.5
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- [ ] 1-2
- [ ] 2-5
- [ ] 5-15
- [ ] 15-50
- [ ] 50-100
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labour 

Earthworms need to be purchased from outside

None  None

The vermicompost pit needs to be watered and maintained regularly

livelihood and human well-being

reduced  improved

Provides employment opportunities. Quality compost helps to improve the soil and increases crop production

soil fertility

decreased  increased

can be used to produce organic crops

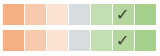
impractical  feasible

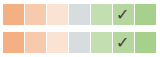
use of chemical fertilizer

improved  reduced

dependency on external inputs

increased  decreased





active in warm climate 

/

- [ ] 1-10%
- [ ] 11-50%
- [ ] > 50%

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- [ ] 0-10%
- [ ] 11-50%
- [ ] 51-90%
- [ ] 91-100%

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- The use of vermicompost reduces the need for chemical fertilizers and reduces dependence on outside sources.

  How can they be sustained / enhanced? Promote the technology by disseminating it to a large number of farmers on both small and big farms
- Vermicomposting does not require keeping livestock.

  How can they be sustained / enhanced? It is considered to be a low-cost alternative that uses local earthworms and materials to produce compost.
- On-farm composting saves the transportation cost needed to deliver compost to the farm.

/ / :

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- Purchasing earthworms from outside may be expensive for farmers. Farmers can be encouraged to harvest local earthworms for composting.
- Making compost from earthworms is not very popular in rural areas. Create greater awareness on how earthworms can be used to compost leaf-litter and other kitchen waste.

Editors

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https://qcat.wocat.net/km/wocat/technologies/view/technologies_1695/

SLM

- ICIMOD International Centre for Integrated Mountain Development (ICIMOD) -
-

- Vermicomposting: Journey to forever organic garden (no date): http://journeytoforever.org/compost_worm.html

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