

Vermicomposting

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What is Vermicomposting?

- Vermicomposting is a [type of composting](#) in which certain species of earthworms are used to enhance the process of organic waste conversion and produce a better end-product.
- It is a mesophilic process utilizing microorganisms and earthworms.
- Earthworms feeds the organic waste materials and passes it through their digestive system and gives out in a granular form (cocoon) which is known as vermicompost.
- Simply speaking, vermicompost is earthworm excrement, called castings, which can improve biological, chemical, and physical properties of the soil.
- The chemical secretions in the earthworm's digestive tract help break down soil and organic matter, so the castings contain more nutrients that are immediately available to plants.

Materials for vermicomposting

- A wide range of organic residues, such as straw, husk, leaves, stalks, weeds etc can be converted into vermicompost.
- Other potential feedstock for vermicompost production are livestock wastes, poultry litter, dairy wastes, [food processing wastes](#), organic fraction of MSW, bagasse, [digestate from biogas plants](#) etc.
- Earthworms consume organic wastes and reduce the volume by 40–60 percent.

Earthworms

- There are nearly 3600 types of earthworms which are divided into burrowing and non-burrowing types.
- Red earthworm or red wigglers species, like *Eisenia fetida* and *E. andrei*, and are most efficient in [compost making](#).
- The non-burrowing earthworms eat 10 percent soil and 90 percent organic waste materials; these convert the organic waste into vermicompost faster than the burrowing earthworms.
- They can tolerate temperatures ranging from 0 to 40°C but the regeneration capacity is more at 25 to 30°C and 40–45 percent moisture level in the pile.
- The burrowing types of earthworms come onto the soil surface only at night. These make holes in the soil up to a depth of 3.5 m and produce 5.6 kg casts by ingesting 90 percent soil and 10 percent organic waste.

...Earthworms

- Each earthworm weighs about 0.5 to 0.6 gram, eats waste equivalent to its body weight and produces cast equivalent to about 50 percent of the waste it consumes in a day.
- The moisture content of castings ranges between 32 and 66 percent and the pH is around 7.
- The level of nutrients in compost depends upon the source of the raw material and the species of earthworm.

VERMICOMPOST PREPARATION PROCESS

1. **Choose the suitable site for setting up vermicomposting**, this should include protection, availability of dung or manure, water access and a conducive environment for earthworms
2. **Collect and gather stock piles of manure** on top of the soil in heaps at a chosen spot.
3. Ensure that the manure is dry, screen the feedstock to **remove undesired materials** such as *weed seeds, stones, thorns, wire pieces* etc.
4. **Chop or grind the materials** into small pieces (at least less than 10 mm), this makes it easy to handle during preparations. These chopped materials are then stock piled to allow pre-decomposition before they are introduced to the earthworms.
5. **Preparations on windows on the soil surface** measuring 1.2m-1.5m width x 0.3m high, and any length is convenient.
 - Alternatively, construct bricks and mortar beds with drainage holes on the sides and apply water on the soil surface thoroughly, then apply the first layer of bedding materials (such as *wood chips, dry leaves or grass* etc.) and follow by attaching neem leaves (about 20 mm thick layer), and lastly attach manure up to a height of 0.3m for better air circulation inside the heap and prevent compaction.

... VERMICOMPOST PREPARATION PROCESS

6. **Sprinkle water after each layer is a must to moisten the materials**, this activates initial decomposition by micro-organisms. If materials are too dry, first soak it in 100 or 200 liters of water and apply to the window or vermin beds. This process facilitates easy moistening of materials, it also prevents rotting of the piles, ingredients can be added at the middle of the heap in the process after the bedding.
7. **Earthworms are then introduced** in the window or vermin bed at 5-10 cm below surface of the bed. **Cover the vermin bed with gunny bags** or other materials that can provide cooling and blocks sunlight (this can also be grass straws, broad leafed leaves, reeds), but please avoid using plastic.
8. **Continue watering** (at least twice or thrice a week) and turning the vermin beds, if necessary, once or twice a month. **This step is a very important management activity in the process of maturing of the vermicompost.**
9. **The vermicompost is produced after 3-5 months.** This depends on the area size and number of worms initially introduced in the vermin bed.
10. Before harvesting, stop watering to allow drying of the top part of the vermicompost. After screening to remove undecomposed materials and worms, **the final product is then dried for few days, weighed and bagged** in 50 kg.

Applications of Vermicompost

- The worm castings contain higher percentage of both macro and micronutrients than the garden compost.
- Apart from other nutrients, a fine worm cast is rich in NPK which are in readily available form and are released within a month of application.
- Vermicompost enhances plant growth, suppresses disease in plants, increases porosity and microbial activity in soil, and improves water retention and aeration.
- Vermicompost also benefits the environment by reducing the need for chemical fertilizers and decreasing the amount of waste going to landfills.
- A relatively new product from vermicomposting is vermicompost tea which is a liquid produced by extracting organic matter, microorganisms, and nutrients from vermicompost.
- Unlike vermicompost and compost, this liquid organic fertilizer may be applied directly to plant foliage, reportedly to enhance disease suppression.
- Vermicompost tea also may be applied to the soil as a supplement between compost applications to increase biological activity.