

VERMICOMPOST PRODUCTION TECHNOLOGY

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SELECTION OF SUITABLE EARTHWORM

Vermicompost is a method of making compost with the use of earthworm, which eats biomass and excreta in digested form. This compost is generally called Vermicompost. Locally available earthworms are also used for vermicomposting but their mode of feeding is very slow and the earthworm which lives below the soil is also not suitable for vermicompost production. The Red worms (*Eisenia foetida*) and African earthworm (*Eudrillus engenae*) are promising worms used for vermicompost production. All the two worms can be mixed together for vermicompost production.

SELECTION OF SITE

Vermicompost can be produced in any place with shade, high humidity and cool. Abandoned cattle shed or poultry shed or unused buildings can be used. If it is to be produced in open area, shady place is selected. A thatched roof may be provided to protect the process from direct sunlight and rain. The waste heaped for vermicompost production should be covered with moist gunny bags.

DIFFERENT STRUCTURE OF VERMICOMPOST PRODUCTION

A cement tub may be constructed to a height of 2.0- 2.5 feet and a breadth of 3 feet. The length may be fixed to any level depending upon the size of the room. The bottom of the tub is made to slope like structure to drain the excess water from vermicompost unit. A small tank is necessary to collect the drain liquid. Vermicompost can also be prepared in wooden boxes, plastic bin or in any containers (except metal) with a drain hole at the bottom.

WASTE SELECTION FOR VERMICOMPOST PRODUCTION

Cattle dung (except pig, poultry and goat), farm wastes, crop residues, vegetable waste, agro industrial waste, fruit market waste and all other bio degradable waste are suitable for vermicompost production. The cattle dung should be decomposed before used for vermicompost production. All other waste should be pre-digested with cow dung for twenty days before put into vermibed for composting. Heavy spices and metallic products are not used in this process.

MATERIALS REQUIRED

1. Vermi bin/cemented tank
2. Thatch roof
3. Polythene sheet (black)
4. Waste materials
5. Cow dung
6. Water
7. Gunny bags
8. Plastic net (Happa)
9. Vermi worm

METHOD FOR VERMICOMPOSTING

1. Vermicomposting of wastes in field pit
2. Vermicomposting of wastes on ground heap method
3. Vermicomposting of wastes on improved method

PROCEDURE FOR VERMICOMPOSTING

1. The compost can be prepared in concrete tank (size is depending upon the availability of raw materials) could be used.
2. Collect and heap the weed biomass under sun for about 7-10 days or until well decomposed. Chop the hard materials required.
3. Sprinkle cow dung slurry on the heap for quick decompose
4. Place a thin layer of surface soil/sand (1-2 inch) at the bottom of the tank.
5. Place fine bedding material such as partially decomposed cow dung/dried leaves etc. over the soil or sand layer
6. Place the chopped bio-waste and partially decomposed cow dung layer-wise in the tank up to a depth of 0.5-1.0 ft.
7. Release about 1000-2000 worms/m² of any of the above earthworm species over the mixture.
8. Cover the compost mixture with dry straw or thatch or gunny bag.
9. Sprinkle water as and when necessary to maintain 70-80% moisture content.
10. Provide shade over the compost mixture to protect from rain water and direct sunshine.

11. Stop sprinkling of water when 80-98% bio waste is decomposed. Maturity could be judged visually by observing the formation of granular structure of the compost at the surface of the tank
12. Collect the vermicompost by scrapping layer-wise from the top of the tank and keep it under shade.

SEPARATION TECHNIQUES

- ❖ Heap the harvested vermicompost for 6-12 hrs. under shade for separation of the worm.
- ❖ Make small balls of cow dung are kept inside the heap for 2-3 days.
- ❖ Remove the balls and earthworm can separate from the whole compost for reuse.
- ❖ Sieve gently the vermicompost and pack it for further use or sale.
- ❖ Dry vermicompost (if necessary) under shade to keep the moisture content below 20 per cent.

POINTS TO REMEMBER

- ❖ Bio-wastes free from ants/termites/flies, etc. are to be used for vermi-compost preparation.
- ❖ Cover the bin or tank with a plastic to protect from rat/mouse.
- ❖ Kerosene oil could be used (if necessary) on the brim of the tank.
- ❖ Frequent check the vermi- bin/tank to avoid from over heat and moist inside the compost.
- ❖ Green un-decomposed materials damaged the compost.
- ❖ Avoid use of heavy spices from kitchen waste and un-consumable things in the composting.
- ❖ Direct sunlight and rain to the vermi-composting is avoided.
- ❖ The worms that are used in composting systems prefer temperatures between 12-21 °C and temperature of the bedding should not get below freezing or above 29 °C

CHEMICAL COMPOSITION

NUTRIENTS	PERCENT
Nitrogen	1.5 – 3.0
Phosphorus	1.2 – 1.8

Potash	1.5 – 2.4
Calcium	0.5 – 1.0
Magnesium	0.2 – 0.3
Sulphur	0.4 – 0.5
Iron	0.8 – 1.5
Copper (ppm)	22 - 36
Zinc	500-1000 ppm
Manganese	1000-2000 ppm

The per cent containing in nutrient also differs from the materials adds to the bin.

BENEFITS

- I. It improves the physical structure of the soil.
- II. It improves the biological properties of the soil enrichment of micro-organisms, addition of plant hormones such as Auxins and Gibberellic acid, and addition of enzymes, such as phosphates, cellulase, etc.
- III. It attracts deep-burrowing earthworms already present in the soil.

PROBLEMS IN VERMICOMPOSTING

1. Odours
Putting overabundance of "greens" in the bin, which is actually too much nitrogen combining with hydrogen and forms the ammonia? To neutralize the odours, add some sources of carbon like, paper and dried leaves etc.
2. Pests
Bad odour can attract pests such as rodents and flies. Fix plastic nets around the bins.
3. Environment
Eisenia foetida worms can attack native worms in natural areas. Don't allow to go out natural places.

4. Climate

Rain and bright light is drastically effect to the worms

NATURE OF WORM

- 1 *Eisenia foetida* is mostly used for vermi-composting, because this worm is heavy feeder and turns compost within a short period compared with other worms.
- 2 *Eudrilus euginae* is used for vermiculture due to its rapid multiplication.
- 3 Life cycle is almost one year.
- 4 It casts/lays 2 eggs or cocoons/ worm once a month within its life cycle.
- 5 Its cocoon content at least 2 worms.

Compost worms are heavy feeders. Under ideal conditions, they are able to consume in excess of their body weight each day, although the general rule-of-thumb is ½ of their body weight per day

1. African Night crawlers (*Eudrilus euginae*)

- Hermaphrodites (male and female reproductive organs are present in each worm)
- Matures in 6 weeks
- Population doubles in about a month
- Temperature Requirement 25°C-29°C under shade

2. *E. foetida* - the compost worm

- The cocoons of *E. foetida* can survive unprotected freezing for several weeks and remain viable.

This species ability, combined with very high and fast reproduction rates, is what allows these surface-dwelling, non-burrowing worms to thrive in regions with long, cold winters.