

Vermicompost - Production and Practices

Vermicomposting is a method of preparing enriched compost with the use of earthworms. It is one of the easiest methods to recycle agricultural wastes and to produce quality compost. Earthworms consume biomass and excrete it in digested form called **worm casts**. Worm casts are popularly called as **Black gold**. The casts are rich in nutrients, growth promoting substances, beneficial soil micro flora and having properties of inhibiting pathogenic microbes.

Vermicompost is stable, fine granular organic manure, which enriches soil quality by improving its physicochemical and biological properties. It is highly useful in raising seedlings and for crop production. Vermicompost is becoming popular as a major component of organic farming system.

Vermicomposting materials

Decomposable organic wastes such as animal excreta, kitchen waste, farm residues and forest litter are commonly used as composting materials. In general, animal dung mostly cow dung and dried chopped crop residues are the key raw materials. Mixture of leguminous and non-leguminous crop residues enriches the quality of vermicompost.

There are different species of earthworms viz. *Eisenia foetida* (Red earthworm), *Eudrilus eugeniae* (night crawler), *Perionyx excavatus* etc. Red earthworm is preferred because of its high multiplication rate and thereby converts the organic matter into vermicompost within 45-50 days. Since it is a surface feeder it converts organic materials into vermicompost from top.

Important characteristics of red earthworm (*Eisenia foetida*)

Characters	<i>Eisenia foetida</i>
Body length	3-10cm
Body weight	0.4-0.6g
Maturity	50-55days
Conversion rate	2.0 q/1500worms/2 months
Cocoon production	1 in every 3 days
Incubation of cocoon	20-23days

Types of vermicomposting

The types of vermicomposting depend upon the amount of production and composting structures. Small-scale vermicomposting is done to meet the personal requirement and farmer can harvest 5-10 tonnes of vermicompost annually. While, large-scale vermicomposting is done at commercial scale by recycling large quantity of organic waste with the production of more than 50 – 100 tonnes annually

Methods of vermicomposting

Vermicomposting is done by various methods, among them bed and pit methods are more common.

Bed method : Composting is done on the pucca / kachcha floor by making bed



Fig. 1 Bed method

(6x2x2 feet size) of organic mixture. This method is easy to maintain and to practice (Fig.1).



Fig. 2 Pit method

Pit method: Composting is done in the cemented pits of size 5x5x3 feet. The unit is covered with thatch grass or any other locally available materials. This method is not preferred due to poor aeration, water logging at bottom, and more cost of production (fig.2)

Process of vermicomposting

Following steps are followed for vermicompost preparation

- Vermicomposting unit should be in a cool, moist and shady site
- Cow dung and chopped dried leafy materials are mixed in the proportion of 3: 1 and are kept for partial decomposition for 15 – 20 days.
- A layer of 15-20cm of chopped dried leaves/grasses should be kept as bedding material at the bottom of the bed.
- Beds of partially decomposed material of size 6x2x2 feet should be made (fig.3).
- Each bed should contain 1.5-2.0q of raw material and the number of beds can be increased as per raw material availability and requirement.
- Red earthworm (1500-2000) should be released on the upper layer of bed (fig.4).
- Water should be sprinkled with can immediately after the release of worms (fig.5)
- Beds should be kept moist by sprinkling of water (daily) and by covering with gunny bags/polythene (fig.6)
- Bed should be turned once after 30 days for maintaining aeration and for proper decomposition.
- Compost gets ready in 45-50 days (fig.7).
- The finished product is 3/4th of the raw materials used.

Harvesting

When raw material is completely decomposed it appears black and granular. Watering should be stopped as compost gets ready. The compost should be kept over a heap of partially decomposed cow dung so that earthworms could migrate to cow dung from compost (fig.7). After two days compost can be separated and sieved for use (fig.8).



Fig.3 Bed of raw materials



Fig.4 Red earthworms for use



Fig.5 Watering of beds



Fig.6 Beds covered with gunny bags



Fig.7 Harvesting in heaps

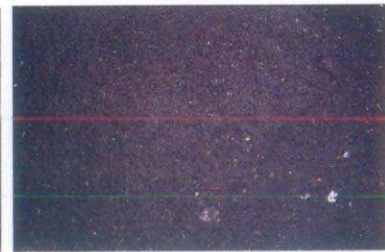


Fig.8 Final product after sieving

Preventive measures

- The floor of the unit should be compact to prevent earthworms' migration into the soil.
- 15-20 days old cow dung should be used to avoid excess heat.
- The organic wastes should be free from plastics, chemicals, pesticides and metals etc.
- Aeration should be maintained for proper growth and multiplication of earthworms.
- Optimum moisture level (30-40 %) should be maintained
- 18-25°C temperature should be maintained for proper decomposition.

Nutrient content of vermicompost

The level of nutrients in compost depends upon the source of the raw material and the species of earthworm. A fine worm cast is rich in N P K besides other nutrients. Nutrients in vermicompost are in readily available form and are released within a month of application.

Nutrient Analysis of Vermicompost

<i>Parameters</i>	<i>Content</i>
pH	6.8
OC%	11.88
OM%	20.46
C/N ration	11.64
Total Nitrogen (%)	1.02
Available N (%)	0.50
Available P (%)	0.30
Available K (%)	0.24
Ca (%)	0.17
Mg (%)	0.06

Advantages

There are many advantages of vermicompost :

- It provides efficient conversion of organic wastes/crop/animal residues.

- It is a stable and enriched soil conditioner.
- It helps in reducing population of pathogenic microbes.
- It helps in reducing the toxicity of heavy metals.
- It is economically viable and environmentally safe nutrient supplement for organic food production.
- It is an easily adoptable low cost technology.

Doses

The doses of vermicompost application depend upon the type of crop grown in the field/nursery. For fruit crops, it is applied in the tree basin. It is added in the pot mixture for potted ornamental plants and for raising seedlings. Vermicompost should be used as a component of integrated nutrient supply system.

<i>Crops</i>	<i>Dose/rate</i>
Field crops	5-6t/ha
Fruit crops	3-5kg/plant
Pots	100-200g/pot

Benefit

Vermicomposting is a highly profitable venture for farmers having dairy units. The approximate cost and benefit under different scale of production is given below.

Scale	App.cost per annum (Rs)	App.benefit per annum (Rs)	Cost/benefit ratio
Small	52,000	90,000	1 : 1.73
Medium	1.0 lakh	1.85 lakh	1 : 1.85
Large	2.25 lakh	4.5 lakh	1 : 2.0

Published by

ICAR Research Complex for NEH Region,
Umiam – 793 103, Meghalaya

For Further information contact

Joint Director,

ICAR Research Complex for NEH Region, Mizoram Centre
Kolasib – 796081, Mizoram