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Popular Article

Vermicomposting: A Better Option for Organic Solid Waste Management

Sushreeta Priyadarshini¹, Jeebanjyoti Behera², Bhagya Laxmi Sahu³ and Gali Krishna Chaithanya⁴

¹M.Sc. student, Dept. of Fruit Science and Horticulture Technology, OUAT, Bhubaneswar- 751003
 ²Assistant Professor, Dept. of Extension Education, OUAT, Bhubaneswar- 751003
 ³Ph.D. Scholar, Dept. of Extension Education, OUAT, Bhubaneswar- 751003
 ⁴Ph.D. Scholar, Dept. of Agricultural Economics, SKUAST-K, Srinagar, Jammu & Kashmir- 190025

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Introduction

Vermicomposting is a scientific method of making compost with the use of earthworms, which generally live in soil, feeds on biomass and excrete it in a digested form. The end product of vermicomposting is called vermicompost. It is one of the easiest methods to recycle agricultural wastes and to produce quality compost. It contains nitrogen (1.2-1.6%), phosphorus (1.8-2.0%) and potassium (0.5-0.75%). It is stable, fine granular organic manure, which enriches soil quality by improving its physicochemical and biological properties.

Vermiculture means "worm-farming". Earthworms feed on the organic waste



Vermicomposting comprises two methods:

- Bed Method: This is an easy method in which beds of organic matter are prepared.
- **Pit Method:** In this method, the organic matter is collected in cemented pits. However, this method is not prominent as it involves problems of poor aeration and waterlogging.

Principle of vermicomposting

This process is mainly required to add nutrients to the soil. Compost is a natural fertilizer that allows an easy flow of water to the growing plants. The earthworms are mainly used in this process as they eat the organic matter and produce castings through their digestive systems.

The nutrients profile of vermicompost- 1.6 per cent of Nitrogen, 0.7 per cent of Phosphorus, 0.8 per cent of Potassium, 0.5 per cent of Calcium, 0.2 per cent of Magnesium, 175 ppm of Iron, 96.5 ppm of Manganese, 24.5 ppm of Zinc.



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Materials Required

Water, cow dung, thatch roof, soil or sand, gunny bags, earthworms, weed biomass, A large bin (plastic or cemented tank), dry straw and leaves collected from paddy fields, biodegradable wastes collected from fields and kitchen.

Favourable conditions for earthworms in the composting materials: pH range between 6.5-7.5

Moisture -60-70%

Aeration-50%

Temperature-18 -35 degree Celsius
Procedure

Procedure

- To prepare compost, either a plastic or a concrete tank can be used. The size of the tank depends upon the availability of raw materials.
- Collect the biomass and place it under the sun for about 8-12 days. Now chop it to the required size using the cutter.
- Prepare a cow dung slurry and sprinkle it on the heap for quick decomposition.
- Add a layer (2 3 inch) of soil or sand at the bottom of the tank.
- Now prepare fine bedding by adding partially decomposed cow dung, dried
 leaves and other biodegradable wastes collected from fields and kitchen.
 Distribute them evenly on the sand layer.
- Continue adding both the chopped biowaste and partially decomposed cow

dung layer-wise into the tank up to a depth of 0.5-1.0 ft.

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- After adding all the bio-wastes, release the earthworm species over the mixture and cover the compost mixture with dry straw or gunny bags.
- Sprinkle water on a regular basis to
- maintain the moisture content of the compost.
- Cover the tank with a thatch roof to prevent the entry of ants, lizards, mouse, snakes, etc. and protect the compost from rainwater and direct sunshine.
- Have a frequent check to avoid the compost from overheating. Maintain proper moisture and temperature.
- After the 24th day, around 4000 to 5000 new worms are introduced and the entire raw material is turned into the vermicompost.

Harvesting of vermicompost

- Stop watering before 1 week of harvest.
- All the worms spread across the pit come closer and forms balls in 2-3 locations inside

the pit.

- Heap the compost by removing the balls.
- Then the materials are sieved in 2mm sieve, the materials that passed through the sieve is called vermicomposting.



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Store the vermicompost in polythene bags.

Preventive measures

- The floor of the unit should be compact to prevent earthworms' migration into the soil.
- To avoid excess heat 15-20 days old cow dung should.
- 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 degree Celsius temperature should be maintained for proper decomposition.

Turn over: Turnover of the compost is 75%. The total material accommodated in the pit is 1000kg; the out turn will be 750kg.

Conversion rates: 1000 earth worms convert 5kg waste materials per day.

Advantages of Vermicomposting

- Develops roots of the plants.
- Improves the physical structure of the soil. It is a valuable soil amendment. OTC.
- Vermicomposting increases the fertility and water-resistance of the soil.
- ✤ Helps in germination, plant growth, and crop yield.
- ✤ Nurtures soil with plant growth hormones such as auxins, gibberellic acid. etc.

- It microbial harbours certain populations that help in N fixation and P solubilization.
- ✤ Its application enhances nodulation in legume and symbiotic mycorrhizal associations with the roots.

Disadvantages of Vermicomposting

- ♦ It is a time-consuming process and takes as long as six months to convert the organic matter into usable forms.
- It releases a very foul odour.
- Vermicomposting is high maintenance. The feed has to be added periodically and care should be taken that the worms are not flooded with too much to eat.
- The bin should not be too dry or too ** wet. The moisture levels need to be monitored periodically.
- They nurture the growth of pests and * pathogens such as fruit flies, centipede and flies.

Conclusion Vermicomposting turns the kitchen waste and other green waste into dark, nutrient-rich soil.

Due to the presence of microorganisms, it maintains healthy soil. Vermicomposting is an eco-friendly process that recycles organic waste into compost and produces valuable nutrients. It can produce high quality fertilizers which are better as compared to other commercial fertilizers in the market. It increases crop yield and reduce dependence on chemicals fertilizers thus mitigating climate change, can be made into a livelihood program and become a source



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of extra income through selling the vermicast and also vermi worms.

References

- Aalok, A., Tripathi, A. K., & Soni, P. (2008). Vermicomposting: A better option for organic solid waste management. Journal of Human Ecology, 24(1), 59-64.
- or nt. 59-ultidisciplinary e-Magazziii 13). Manyuchi, M. M., & Phiri, A. (2013).Vermicomposting in solid waste management: A review. International Journal of Scientific Engineering and Technology, 2(12), 1234–1242.
- Yadav, S. K., & Garg, S. R. (2023). Sustainable organic waste management using vermicomposting: A critical review. Environmental Science: Processes & Impacts, 25, 123–145.
- Abu, A., May, C., Zalima, N., & Abdullah, N. (2022). Solid waste management and vermicomposting: A review. IOSR Journal of Agriculture and Veterinary Science, 18(1), 61-67.
- Sultana, M. (2020). Vermicomposting organic Research Journal, 12(2), 83–90 Grow waste: A review. *Vidyabharati*