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## VERMICOMPOSTING

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Aman Kumar Gupta<sup>a\*</sup>, Ashish Chaudhary<sup>b</sup>, Bipin Panthi<sup>c</sup>, Avdhesh Kumar Chaudhary<sup>d</sup>, Era Gautam<sup>e</sup>, Sirpat Badhai<sup>f</sup><sup>a</sup>Science in Agronomy, Bhavdiya Educational Institute, Dr. Rammanohar Lohia Avadh University, Faizabad, 224001, U.P., India<sup>b</sup>Science in Aquaculture, Institute of Agriculture and Animal Science, Tribhuvan University, Kirtipur, Kathmandu, Nepal.<sup>c, e, f</sup>Institute of Agricultural Sciences, Banaras Hindu University, Varanasi-221005 U.P. India.<sup>d</sup>Science in Soil Science and Agricultural Chemistry, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi-221005 U.P. India.\*Corresponding Author Email: [amangupta16160@gmail.com](mailto:amangupta16160@gmail.com)

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## ABSTRACT

Vermicomposting is a method of composting by using earthworms, in this process earthworms eat biodegradable wastes (Such as vegetables and fruits peels), and they break down these natural materials into organic fertilizer. Vermicompost is generally used for organic farming and also maintains the health of the soil. The amount of Nitrogen is more as compared to Phosphorus and Potash in vermicompost. Vermicompost doesn't harmful to the soil and also helps in increasing the nutrient content of the soil. The life of earthworms is 4 - 8 years depending upon the species. The nutrients contents like Nitrogen, Phosphorus, Potash, Calcium, Magnesium, Iron, Manganese, and Zinc are found in vermicompost. Endozoic earthworms are found in a deep layer of soil and they eat 90 % soil and 10 % organic matter. Epizoic earthworms are found on the surface of the soil and they eat 10 % soil and 90 % organic matter. Epizoic earthworms are famous for vermicomposting because they produce more vermicompost as compared to Endozoic earthworms. The weight of earthworms is between 0.5 to 0.6 g. one kg earthworm produces 0.8-7 kg vermicompost per day.

## KEYWORDS

Vermicompost, Earthworms, Nutrients, Advantage and Disadvantages.

## 1. INTRODUCTION

Vermicompost is known as a technology that is used for the conversion of crop residues and other solid wastes into organic fertilizer by using earthworms. Vermicomposting is defined as a scientific method of making an eco-friendly compost by using earthworms. Vermicomposting is an environmentally adopted process that changes the organic waste into vermicompost and also provides valuable nutrients for increasing the fertility of the soil. The word "Vermiculture" defines that's farming or breeding of earthworms. The combination of vermiculture and vermicomposting is known as vermotechnology. More than 4000 earthworms species are found in the world but some earthworms are only useful for composting. Earthworms belong to the kingdom:-Animalia, Phylum: Annelida, Class: Clitellata, and Order: Oposthopora. The Red wigglers (*Eisenia foetida* or *Eisenia Andrei*) are most commonly used for vermicomposting. Some other species like European nightcrawlers (*Eisenia hortensis* or *Dendrobaena veneta*), red earthworm (*Lumbricus rubellus*), and African nightcrawlers (*Eudrilus eugeniae*), and Blueworms (*Perionyx excavantus*) are also used for vermicomposting. *Eisenia foetida* sps are found on the surface of the soil and *Lumbricus rubellus* sps are found in a deep layer of soil.

Biodegradable wastes and earthworms are used for the preparation of vermicompost. Pit method and bed methods are used for composting but bed methods are very easy for preparing organic matter. Organic materials, leaf fall, vegetables, and fruits peels are the basic raw material required for vermicompost. Starters like cow dung, biogas slurry, or urine of cattle animals are also required for the preparation of vermicomposting. The range of pH between 6.5 and 7.5 is favorable for vermicomposting. 50% aeration and temperature between 18 °C to 35 °C were found better for vermicomposting. On average 1.6 % of Nitrogen, 0.7 % of Phosphorus, 0.8 % of Potassium, 0.5 % of Calcium, 0.2 % of Magnesium, 175 ppm of Iron, 96.5 ppm of Manganese, and 24.5 ppm of Zinc are nutrient contents found in the vermicomposting.

Table 1: Nutrient composition of vermicompost.

S.N	Nutrient	Content
1	Organic Carbon	9.15 to 17.98 %
2	Total Nitrogen (N)	1.5 to 2.10 %
3	Total Phosphorus (P)	1.0 to 1.50 %
4	Total Potassium (K)	0.60 %
5	Calcium (Ca) and Magnesium (Mg)	22.00 to 70.00 m.e / 100 g
6	Available Sulphur (S)	128 to 548 ppm
7	Copper (Cu)	100 ppm
8	Iron (Fe)	1800 ppm
9	Zinc (Zn)	50 ppm

Source: Kale (1983) in Vermicompost published in Agro bios Vol.I, No.XI, April, 2003 Edited by Purohit, S S.

Enzymes like Enzymes: Protease, Lipase, Amylase, and Cellulose are also found in vermicompost. 1000 earthworms converted 5 kg of waste material in a single day and the weight of 1000 worms was about a kilogram.

## 2. PROCEDURE

The pit or heap method is mostly used for Vermicomposting. 10 x 4 x 2 feet dimensions are used in the heap or pit method. Depending upon the availability of material the length and width can be increased or decreased but the depth keeps only 2 feet. On the surface layer, soft leaves of Plants are kept as bedding material 1 inch thick then put the biodegradable residues as chaffed material 9 inches thick after 1<sup>st</sup> layer. After the 2<sup>nd</sup> layer kept the mixture of Dung + Water in a 2-inch layer on the 3<sup>rd</sup> layer. Cow

dung and chopped dried leafy materials are mixed in the ratio of 3 : 1 and are kept for partial decomposition for 15 – 20 days before applying into the pit. Protection of tank should be done by covering with a curb roof to avoid entry of lizards, mice, snakes, ants, etc. also to avoid direct sunshine and rainwater. To maintain the moisture and temperature turnings and subsequent staking should be done. Put 4000 to 4500 worms on the day of the 24<sup>th</sup> into the pit [1m<sup>2</sup> =2000 worms]. Bed should be sprinkling of water (daily) and by covering with gunny bag for preservation of moisture. Bed should be turned once after 30 days for maintain the aeration and for proper decomposition. Compost gets ready in 50- 60 days. The finished product is ¾<sup>th</sup> of the raw materials used. Stop watering before one week of harvesting the vermicompost. All the earthworms spread from the pit and penetrate each other in the form of a ball in 2 or 3 places. After removing the balls and place them in a bucket. After that material is sieved in a 2 mm sieve. The material kept in a sieve is known as vermicompost.

### 3. ADVANTAGES OF VERMICOMPOSTING

- Vermicompost improves the fertility level and water resistance level of the soil.
- Maintain and improves the soil health and physical structure of the soil.
- Helps in developing the roots of plants.

- Maintain and helps in plant growth, development, germination rate of seed and also increases the crop yield.
- Vermicompost act as a biofertilizer therefore used for organic farming and also provides better performances.
- Vermicomposting helps to neutralize the pH of the soil.
- Vermicompost is free from pathogens, insects, and harmful materials.

### 4. DISADVANTAGES OF VERMICOMPOSTING

- Vermicomposting is a time-consuming process that requires at least 6 months to convert organic matters into vermicompost.
- Vermicomposting requires high maintenance for the production of compost.
- The amount of application dose requires more as compared to fertilizers (like Urea, DAP, Potash).
- Monitoring periodically is required for maintaining the moisture level.
- Vermicomposting requires more care as compared to other compost and also requires regular composting.

