SKILL ENHANCEMENT COURSE (SEC)

Four Years Zoology B.Sc. Honors Course

COURSE CODE: **SEC Z-1**

COURSE NAME: **VERMICULTURE**

SEMESTER: I

LECTURE 1

VERMICULTURE: AN INTRODUCTION

PREPARED BY:

PROF. AJAY SINGH

VERMICOMPOSTING

Definition: Vermicomposting is a scientific method of making compost using earthworms, which usually live in the soil, feed on biomass and release it in digested form.

Vermiculture way "computer virus-farming". Earthworms feed on the organic waste materials and provide out excreta within the shape of "vermicasts" which are wealthy in nitrates and minerals including phosphorus, magnesium, calcium and potassium. These are used as fertilizers and beautify soil fine.

Vermicomposting comprises of two methods:

- **Bed approach:** that is an easy technique in which beds of organic count are prepared.
- **Pit method:** in this method, the organic depend is collected in cemented pits. But, this approach isn't distinguished as it involves issues of bad aeration and waterlogging.

Process of Vermicomposting

1. Select an appropriate location for establishing vermicomposting, ensuring it provides protection, access to dung or manure, availability of water, and a favourable environment for earthworms.
2. Gather and pile up manure in mounds at a selected location on the soil.
3. Make sure the manure is dry, and sift through the feedstock to eliminate unwanted items like weed seeds, stones, thorns, and pieces of wire.
4. Cut or grind the materials into small pieces (no larger than 10 mm), as this facilitates handling during the preparation process. The chopped materials are then piled up to enable pre-decomposition prior to being introduced to the earthworms.
5. Prepare windows on the soil surface that measure between 1.2m and 1.5m in width and 0.3m in height, with any convenient length. Alternatively, build beds using bricks and mortar with drainage holes on the sides, ensuring to thoroughly moisten the soil surface with water. Next, apply a first layer of bedding materials like wood chips, dry leaves, or grass, followed by a layer of neem leaves that is approximately 20mm thick. Finally, add manure until

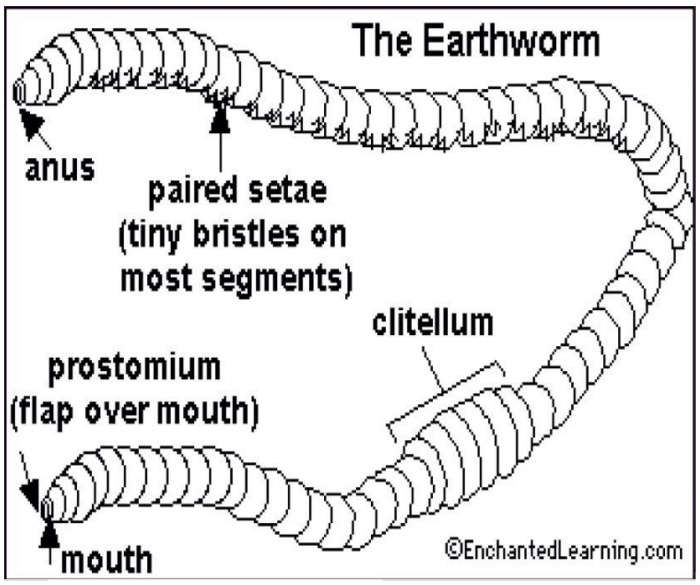
reaching a height of 0.3m to enhance air circulation within the heap and to prevent compaction.

6. It is essential to sprinkle water after each layer to keep the materials moist, which triggers the initial breakdown by microorganisms. If the materials are overly dry, soak them in 100 or 200 liters of water before adding them to the window or vermin beds. This method ensures the materials are easily moistened and also helps avoid compost pile rot; ingredients can be incorporated into the center of the heap during this process after the bedding has been placed.
7. Earthworms should be added to the worm bed at a depth of 5-10 cm below the surface. The worm bed should be covered with gunny bags or similar materials that offer shade and help maintain a cooler temperature (options include grass straws, broad leaves, or reeds), but it's important to steer clear of plastic.
8. Keep watering the beds (at least two or three times weekly) and, if needed, turn the vermin beds once or twice monthly. This step is a crucial management task in the maturation process of the vermicompost.
9. Vermicompost is generated within a time frame of 3 to 5 months. This period varies based on the size of the area and the quantity of worms initially placed in the vermin bed. Prior to harvesting, cease watering to enable the upper portion of the vermicompost to dry. Following the screening process to eliminate undigested materials and worms, the end product is dried for a few days, weighed, and then packaged in 50 kg bags.

Biology of Earthworms:

PHYLUM: ***ANNELIDA***
CLASS: ***OLIGOCHAETA***
ORDER: ***OPTHISTHOPORA***
GENUS: ***PHETRITIMA***
SPECIES: ***POSTHUMA***

The earthworm is a reddish-brown terrestrial invertebrate that lives in the upper layer of damp soil. During the day, they inhabit tunnels created by excavating and consuming the earth. In gardens, they can be identified by their droppings, which are referred to as worm castings.
The common Indian earthworms are **Pheretima** and **Lumbricus.**



Advantage of Vermicomposting:

1. **Fast Process:** Utilizing worms for composting can yield the final product in approximately two to three months, depending on the surrounding conditions.
2. **Worm populations are increasing:** After the composting process is complete, you will have a significantly larger number of worms to "play" with. In optimal conditions, worm numbers can double in approximately 90 days. This implies that after allowing your compost to rest for three months, you'll have 100% more worms than you began with. That's not so bad at all! To enhance the process of vermicomposting further, you can introduce those surplus worms into your garden.
3. Vermicomposting improves the soil's structure, texture, and porosity, as well as its water retention, drainage, and aeration, while also reducing erosion.
4. By encouraging the growth of new shoots and leaves, it improves plant growth and increases yields. As a result, the pH level of the soil is brought back to neutral.
5. Nurtures soil with plant growth hormones such as auxins, gibberellic acid, etc.
6. Helps in germination, plant growth, and crop yield.

Disadvantage of Vermicomposting:

1. Vermicomposting encourages more pathogen growth compared to traditional composting due to reduced heat generation. The heat generated by standard composting methods helps eliminate bacteria, such as E. coli.
2. Vermicomposting involves an initial cost, despite being quite affordable overall. Investing in bins is essential, unless you happen to already possess some. Additionally, if you're unable to collect enough worms from your garden, you'll need to purchase them.
3. The procedure is time-consuming and usually requires two to three months to finish.
4. The bin shouldn’t be overly dry or excessively wet. It’s essential to check the moisture levels regularly.
5. They foster the development of pests and pathogens like fruit flies, centipedes, and other flies.

Economic Importance of Vermicomposting:

1. Vermicomposting serves as a substitute for chemical fertilizers, potentially lowering fertilizer expenses by as much as 4,000 INR (USD 55) per hectare.
2. Vermicompost enhances the soil’s structure, promotes better aeration, and boosts its ability to retain water. Additionally, it raises the levels of micronutrients in the soil.
3. Vermicompost enhances the growth and productivity of crops, vegetables, flowers, and fruits. It can also help mitigate the effects of salinity on plants.
4. Vermicomposting can help decrease the infestation of pests and the growth of weeds that target crops.
5. Vermicompost can improve the color, aroma, taste, flavor, and overall quality of food.
6. In countryside regions, producing vermicompost can offer a means of livelihood for those who are unemployed.