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Planning of Vermicompost Unit

Vermicomposting is considered as a quality input in organic farming and it is considered residue free. Most of us know that fresh waste can directly be used for vermicomposting but it needs pre-composting. Addition of waste materials without pre-composting will increase the temperature up to 75 degree Celsius. In this temperature the earthworm gets killed. Hence it should be pre-composted for 30 days by mixing cow dung slurry with waste at the ratio of 3:1. This means that every three parts of waste and one part of cow dung slurry should be mixed and heaped for thirty days to reduce heat formation in the bed.

INTRODUCTION

Farmers are in great demand for fertilizers and scientists promote vermi-composting because vermi-compost provides growth hormones in addition to provision of nutrients essential for growth of crops. The produces obtained from agriculture and horticulture crops cultivated by applying vermi-compost vermi-wash and vermi-castings are maintained at high nutrition value with attractive colours. Individuals, institutions and government are showing interest in the production of vermicomposting. Commercial production of vermi-compost is successful in many places. In most of the places the cost of production are less than Rs.5 per kg, it can be sold with a minimum price of Rs. 10 per kg. The vermi-compost obtained from a firm is weed free and hence it can be mixed with bio-fertilizers like *Azospirillum* and phosphor-bacteria after weeding. In contrast farmyard manure always contains weed seeds and act as carrier or dissemination media for weeds. Moreover the vermi-compost is superior to FYM in all the aspects.

Commercial Vermi-composting can be followed in the places where spaces for pre-composting, adequate organic wastes, watering, shredding facility for waste and little cow dung source and labour facility available. Vermi-compost can be adopted in different methods ranging from just in shade to plastic bucket, drum or even under

thatched shed. Thatched shed is essential for large scale composting. The vermi-compost can be done even in reception hall of big building by using large sized used plastic barrel fixed in an elevated iron stand with drainage provision. The pre-composted material can be added to the barrel for vermi-compost production. Pucca shed is essential to maintain earthworm during rainy days (during rainy days the earthworm will escape and will die on open space because of sudden temperature build and water stagnation).



Pre-composting is essential to reduce the heat of production during aerobic composting (during aerobic composting the temperature may reach 65-75 degree Celsius). To avoid heating of bed it is necessary to initiate pre-composting before introduction of earthworms. The process of pre-composting of organic waste materials starts with spreading of compostable organic waste and cow dung in the ratio of 3:1 and heaping for 20-25 days. During pre-composting the organic material gets partially composted and the compost won't heat further.

Earthworms are introduced on the bed @ 1 kg earth worms per cubic meter of bed volume. Number of earthworm per kg will vary according to the type of species. Moisture should be maintained around 60 percent. Temperature of a vermi-bed should be around 20 – 30 degree Celsius. It can be monitored by using thermometers. Water can be sprayed manually or by using sprinkler/drip above the bed to maintain the temperature and moisture essential for the growth of earthworms. The earthworms feed voraciously and consume the biodegradable matter and excrete vermi-castings. The vermi-casting along with compost constitutes vermi-compost. Similarly, one kg of earthworm can be soaked in lukewarm water for 2 minutes is called vermi-wash. This is rich in nutrients and hormones essential for plant growth. Some people used extra water to the tank and collecting leachate is not the quality vermi-wash. That will also contain nutrient but does not have enough hormones.

For commercial production, fixed cost of Rs. 5,000 to 10,000 for every tonnes of production annually has to be invested in addition to working cost on fixed capitals. Large scale unit will require less expenditure per tonnes of vermi-compost produced by the way of mechanization and automation.

Suitable earth worms

In India, we are having about 350 species of earth worms naturally available and native to India. All earth worms are not same. They vary in food and burrowing habits, For commercial production we are using epigeal earthworm feeding on leaf litter only on the surface of the soil *Eudrilus eugeniae*, *Eisenia fetida* and *Perionyx excavatus* are some of the earth worms used commercially. For large scale commercial production *Eudrilus eugeniae* (exotic species of earth worms) is used extensively for vermi-compost production with more care where all resources are adequate. Other species are also commercially used depending on the place that requires little attention. Any organic materials which is toxin free ranging from pressmud of sugar industry, cotton waste of hospital and textile mill to kitchen waste can be used as a feed materials for production of vermi-compost. Vermicomposting units are not suited for the places where waste is not properly collected or available.

The earthworm attains maturity within six weeks. It lays one egg capsule (containing 7 embryos) for every 7 - 10 days. Three to seven worms emerge out of each capsule. Hence, the earthworm multiplies quickly under optimum conditions. Lifespan of earthworm is about 2 years. Matured worms are collected from the vermi-bed and it was processed to worm meal by simple process called drying that resembles similar to dried fish that increases protein content up to 70 percent in the animal feed if added. We have to avoid making worm meal from municipality waste to avoid bio magnification of pollutant in the food chain

WHERE TO LOCATE VERMI-COMPOST COMMERCIAL PRODUCTION UNIT

Outskirts of cities and villages are the ideal centers for production of vermi-compost on a large commercial scale because availability of raw material is more in these areas. Moreover, marketing is also very easy. This vermi-compost increases the quality and quantity of horticultural produces viz. fruits, vegetable and flower crop. Hence it may be located nearby fruits and vegetable markets.

Use

It is well known fact that vermi-compost contains nutrients and plant growth promoting hormones. It is more suitable organic farming without or with little use of chemicals. Recommended rate of vermi-compost application is 2 tonnes per hectare.

ESSENTIAL INFRASTRUCTURE FOR A COMMERCIAL VERMICOMPOSTING UNIT SHEDS

Commercial vermi-composting unit needs thatched sheds. Shed is essential for protection of vermi-beds from sun and rain. For temporary production of vermi-compost just heaping of pre-composted waste under shade on an impermeable layer is enough and introducing earthworms on it is enough.

HOW TO CREATE VERMI BEDS

Beds of 1 m height 1m breath and convenient length can be created above the ground. Uniform height has to be maintained.

SEED STOCK

Earthworm multiples very quickly within a short period of time. For efficient utilization of resources we have to grow earthworms one year before starting the vermicomposting business in large scale. Immediate raising of unit in large size needs introduction of earthworms at recommended rate of 2 kg per cubic meter of vermi-bed to get expected rate of production. It may vary according to the species.

CREATION OF ROADS PATHS AND FENCE

The selected site should have road facility to connect to the town and other areas. Adequate road facility within the site is also essential to make the transport of waste materials to convert into vermi-compost and automation. Fencing is necessary to protect the unit from unauthorized access of bad elements. It can be fenced with barded wires, chain link or solar fencing. Barbed wires with stone support are very cheap. Chain link fencing can be reused. Solar fencing is safe and effective but it needs maintenance.

WATER SUPPLY AND DRAINAGE SYSTEM

Water is essential for every organism. Earthworms also need water. Moisture has to be maintained at 40-60 % manual watering can be done if labour is available. Automation is essential to solve labour problem and to maximize profit. Drippers with 24 hours flow arrangement is good.

MACHINERY

Shredder is essential. Tractor operated shredder or electric powered shredders are available depending on availability of power source. Electric operated shredders are preferable. Packing machines are essential component for commercial vermicomposting. Now-a-days Mechanized sieves are necessary for finished product and to reduce the labour requirement.

STORAGE OF THE COMPOST

Vermi-compost can be stored under shade. It should pack for sales as and when required.

STANDARDS AND SALES TECHNIQUE

The finished product should meet Fertilizer control order standards of 0.5 per cent N, 0.4 percent P and 0.4 per cent K and 90 percent of it should pass through 2 mm sieve. Moisture content should be less than 20 percent.

The compost may be enriched by inoculating free living N fixing microorganism like *Azospirillum* and phospho bacteria and rock phosphate to enhance N and P to meet Government standards of sales under fertilizer control order. Production of more than 10 tonnes is necessary for sales on commercial scale. One kg and 2 kg size pockets are purchased by home gardeners. Government provides subsidy for the production of vermicomposting and installation of vermicomposting unit. Under National Horticulture Mission. Government makes arrangement for procurement and supply the vermi-compost to the farmers.

CONCLUSION

Vermi-composing is a successful venture because its raw material is organic waste (garbage) that is obtained freely or we can even get money for collecting waste. Since the farmers are in great demand for fertilizers we can create additional income through sale of earthworms, vermi-compost and vermi-wash.