

Vermitechnology essay sample



**ASSIGN
BUSTER**

The present world is full of machines and its pollution. These pollutions and its problem should be reduced and solved only by the replacing of the chemicals with the natural products. In the way of this attempt lead to the new field named Vermitechnology. It is the growing field of biological studies. It is widely used in many of the fields such as agriculture, food industry, preservation industry, and decomposing or combusting industry etc. This essay says the complete use of the Vermitechnology and its application in the present day workings. Some of the techniques in the Vermitechnology, their application, their uses, and their advantages are discussed in this essay.

VERMITECHNOLOGY:

Vermitechnology is the branch of science deals with the techniques involving the biological worms. Bio-Conversion of organic waste is a natural biological process, carried out under controlled conditions, which converts organic material into a stable humus-like product called Bio-compost. During the composting process, various microorganisms, including bacteria and fungi, break down organic material into simpler substances. 'Bio-Composting' is an aerobic process with the help of special type of worms in the process to maintain oxygen level during aeration process, because the microorganisms require oxygen to do their work.

The two most important work involving in the Vermitechnology is the process of converting the wastes into the organic fertilizer and organic water for the crop production. They are •Vermicompost

- Vermiwash

VERMICOMPOST:

Vermicompost can be defined as a process of converting organic waste into vermicompost through the activities of earthworm. It is the advanced method of composting where earthworms eat the decomposed material and excrete it out as casting which is known as vermicast or vermicompost. During feeding, earthworms use 5-10% of the food intake for their growth and the rest is excreted.

VERMIWASH:

Vermiwash is liquid manure obtained from earthworms and is used as a foliar spray. It contain plant Growth hormones like Auxins and Cytokinins apart from nitrogen, phosphorus potash and other micro-nutrients.

VERMICOMPOST PREPARATION:

Preliminary treatments of organic waste:

Plastic, stones, wood piece etc. non-decomposable material should be separated first and then the waste, if possible, is spread on the ground to expose into sunlight for two days. This will help to reduce insect population.

Requirements for Vermicomposting:

1. Container I Pit: Container of any shape or size can be used. The container may be made of plastic earthen or concrete that depends on the choice of the person who want to do composting.
2. Bedding material: Pre-decomposed organic waste mixed with 80% organic waste and 20% cow

dung. 3. Moisture content: Moisture content during composting should be maintained at 30-40%. 4. Temperature: Optimum temperature for food material is 20-30°C. 5. Cover of feed substrate: Cover on feed material by using gunny bags or black plastic sheets helps to reduce water loss, unwanted movement of worms and more feeding by worms as they do not prefer light. 6. Selection of right type of worms: The most important worms are as follows;

Exotic worms-

- a) *Eisenia foetida*- Red worm, tiger worm
- b) *Eudrillus euginae*- Night crawler

Local worms-

- a) *Perionyx excavates*
- b) *Perionyx sansbaricus*

Vermicompost production process:

1. Pre-decomposition organic waste: Preliminary treated organic waste materials has to be pre-decomposed in a pit size dug in soil in a length 2m, breadth 1-1.5m and height 0.9m-1m. First put one layer of organic waste and then one layer of cow dung, maintaining the ratio of 80% waste and 20% cow dung. Repeat the layering process and then cover the pit with thin layer of cow dung. Leave it for 20-30 days depending on the climatic conditions. When the materials are partially decomposed transfer these materials to vermin pits by cutting vertically, not layer wise from top. It will help homogeneous mixing of material in the pits. 2. Preparation of vermin pits: Before placing the partially decomposed material in the pit, put one layer of

straw (say 2 inches thickness). And then put pre-decomposed organic waste. Keep about 10 cm from the top of the pit unfilled. Remove non-decomposed like plastic, big branches, etc. from the pit and make the material levelled. 3.

Inoculation of worms: Depending on the condition of the material, we can inoculate worms after 5-10 days. 2000-3000 no worm per sq meter feeding material is sufficient but more than this no. can also be used. Regular watering is must to keep the food material moist. 4. Harvesting of Vermicast/ compost: Earth worm starts feeding from upper surface of the feed material. When the material becomes granular, blackish in colour, just like used tea, it indicates that the material is ready for harvesting. Scrapped this material up to the depth where there is no vermicompost worm. Collect all scrapped material and make one heap and leave it for 2-3 days. All worms will go down to the bottom of the heap and it will be easier to separate the worms manually. 5. Drying and Sieving: Vermicompost should be dried in shade, as sunlight will destroy the cocoons.

There should be 20-25% moisture, in this time. For this measurement, make a small ball of vermin-compost and if it immediately cracks down it indicates 20-25% moisture. Then sieve it by using 3-4mm sieve. Sieved material is the vermin-compost ready to be used. Material on the sieve can be put in to the composition pit or it can be used around plants. 6. Packaging: Sieved material is ready for packaging. So, depending on the choice it can be packed in 1Kg, 2Kg, 3Kg, Polybag or if higher amounts used H. D. P. E bags. Closed the opening of the bag tightly as it may absorb moisture from the atmosphere.

Maintenance of Vermin Beds

1. After inoculation of worms in the pit, regular watering is a must to keep the feeding moist. Depending upon the weather conditions 1-2 times watering is necessary. 2. During summer months covering of the vermin beds with gunny bags are essential, as it will check moisture loss from the beds and restrict upward movements of worms. 3. After harvesting of vermin-compost, if the feeding material is compact, loosen it by using one bamboo stick. 4.

Periodical removal of cast also increases the feeding efficiency of worms. 5. Almost all the worms will get accumulated in the last layer of feed material. So, place the worm with organic waste into another pit which is ready to be inoculated with worms. So, minimum 2 pits will help to recycle the worms.

VERMIWASH PREPARATION:

1. Select one sufficiently large container made of concrete or plastic bucket or earthen pot. 2. Drill a hole at the base of the container to fix a tab to it. 3. A base layer of gravel or broken small pieces of bricks are place to a height of 10-15 cm. 4. Above the gravel layer another layer of coarse sand of 1-15 cm is put. 5. On the coarse sand layer place 40-45 cm pre-decomposed organic wastes and moistens the different layer by using water. 6. Introduce about 2000 No's of earthworms into the container. 7. To get vermiwash continuously suspend a mud pot or a small bucket with some holes. 8. Cotton wicks/or bamboo sticks are place in the holes so that water can trickle down. 9. Fill the container with 4-5 litres water every day.

10. After 10 day's vermiwash starts forming in the container. 11. Everyday about 3-4 litres of vermiwash can be collected.

APPLICATION OF VERMICOMPOST:

For field crops and vegetables, vermicompost is applied at the time of final land preparation using broadcasting method. For horticultural crops base application is the best. For flower tabs and flower beds, mix vermin-compost with soil and then do the sowing or planting.

APPLICATION OF VERMIWASH:

1. Dilute 1 litres of vermiwash with 4-5 litres of water and spray as foliar spray during the late evening hours. 2. A mixture of vermiwash (1 litre) with cow urine (1 litre) in 10 litres of water acts as bio-pesticide and liquid manure.

Benefits

It acts as a plant tonic and helps to reduce many plant diseases.

FUTURE ASPECTS OF VERMITECHNOLOGY:

Millions of tons of municipal solid wastes (MSW) comprising a great proportion of 'food and green garden wastes' generated from homes and institutions are ending up in the landfills every day, creating extraordinary economic problems for the local government and environmental problems for the society due to increasingly high cost of landfill construction, waste disposal and monitoring for emission of powerful 'greenhouse gases', 'toxic gases' and discharge of 'leach ate' with serious risk of polluting groundwater. Studies indicate that vermicompost of food and garden wastes

by waste-eater earthworms is more efficient over the conventional aerobic systems and the Tiger Worms (*Eisinea fetida*) are most voracious waste eaters and bio degraders.

Vermicomposting is faster by 60-80 %, reduces emission of GHG and the end-product is more nutritive, disinfected and detoxified. In the vermicompost system _with worms ' degradation of mixed food wastes started within hours (5 % after 24 hours) and after 15 days there was 100 % degradation. But there was no degradation in the conventional aerobic system _without worms' until after 30 days. This was achieved with about 1000 starter worms which multiplied to about 2500 worms during the 3 months of Vermicomposting study.

COMPARISON TO THE OTHER CHEMICAL PRODUCTS:

Operability and Suitability

The costs of the System compare favourably with other technologies for the advanced treatment of bio solids, such as thermal drying and in-vessel composting. Sales of the end product can provide additional offsets to the running costs. The System is easy to operate and uses relatively little manpower and resources. The process can be designed for operation with a variety of climates and bio solids types and is modular, so that treatment capacity can be increased simply by adding more beds. A mid-sized facility (50 wet tons per week) requires a footprint of about 1 acre. These features, and the fact that the end product is intended for use locally in agriculture, means the system is ideally suited to non-metro towns and municipal authorities who are looking for a reliable and attractive recycling option.

ADVANTAGES OF VERMITECHNOLOGY:

Environmental Hazards are compounded by accumulation of organic waste from different sources like domestic, agricultural and industrial wastes that can be recycled by improvised and simple technologies. Vermicompost could be effectively used for the cultivation of many crops and vegetables, which could be a step towards sustainable organic farming. Such technologies in organic waste management would lead to zero waste techno farms without the organic waste being wasted and burned rather than would result in recycling and reutilization of precious organic waste bringing about bio conservation and bio vitalization of natural resources.

CONCLUSION:

Vermitechnology is an eco-friendly, economic and enduring process to reclaim problem soils, especially the sodic (salt-affected) soils. It is a more suitable bio-remedial measure than chemical treatment with gypsum and other amendments. In extensive field experiments conducted in the sodic soils scientists have established that Vermitechnology brought about remarkable change in the soil structure. Application of compost and earthworm management improved the soil nutrient level and crops such as wheat, rice, spinach, onion and potato grew well in reclaimed sodic soils. In Uttar Pradesh more than 1.2 million hectares of farmlands are salt-affected, and agricultural productivity remains low. This was solved by the Vermitechnology. “ About two thousand five hundred species of earth worms are recorded around the world, and more than five hundred of them can be cultured or used in composting through simple processes.

The earthworms can be grown in a host of systems including pits, crates, tanks, concrete rings or any other containers. The organic material to be used for Vermicomposting should be pre-processed or pre-digested through partial anaerobic phase (using a black polythene cover or with a clay seal layer). This Vermitechnology have led to the high inventions of organic fertilizer. It is also used in the solid waste management system.