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ESSENTIAL PARAMETERS IN SUCCESSFUL VERMICULTURE PRACTICES

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ABSTRACT:

An attempt has been made to study the methodologies that are essential parameters in successful vermiculture practices Vermiculture which is the cultivation of worms for agriculture purposes. The literal meaning of vermiculture is worms are used for compost formation and called vermicomposting. In general earthworms are nocturnal and feed on organic matter. Factors such as soil, temperature, moisture, mineral content aeration and availability of food, reproductive potential and adaptability are essential, these earthworms live in different levels in soil strata. perionyx excavatus is tolerant to wide range of temperature found in tropical countries drawida shows high affinity for high moisture conditions dichogaster and lampto mauritius need moderate moisture content. Worms feed on leaf litter, organic humus, dung, compost, effluent, vegetative parts, fruit peels and every type of biologically degradable waste. Majority of worms are organic matter feeders except a carnivorous species of a gastrodrillus. This study shows if proper methodologies were used in vermiculture would gives good results in production of vermicompost.

KEYWORDS: Vermiculture, Parameters, Vermicompost.

INTRODUCTION:

Earthworms are true segmented worms, classified under class oligochaeta of phylum annelida. there are more than 4,200 species of earthworms distributed throughout the world. of these 280 species are aquatic worms known as microdrilli and 3,920 terrestrial earthworms known as megadrilli.

In India there are about 509 species of earthworms belonging to 67 genera.In addition more than 20 species from other countries have been introduced into India. These are called as peregrines". Earthworms are ubiquitous,which live seashore to snowy areas .these worms show good adaptability and vegetable except in sea and arid area. some of the terrestrial worms that is "DRAWIDA GRANDIS". burrows more then three meters deep. According to habitat, distribution of earthworms can be classified as surface litter dweller sub-soil dwellers, deep soil dwellers, are boreal and high-altitude dwellers. some earthworms prefer habitat which has higher organic humus and high moisture that is sewage, compost, soil water with effluent. Earthworms are known as "friends of farmers" as they improve the soil fertility. worms feed, barrow, cast, fragment soil particles, aerate, mix and digest organic substrate increase nutrients and microflora. one earthworm consumes 15-40 gr. Animal dung per year. soil with good number of earthworms can convert tones of soil, to contribute to soil humus formation, feeding and defecation involve several biological and behavioral activities that improve soil fertility and productivity.

MATERIAL AND METHOD:

MATERIAL:

1. Earthworms
2. Cattle dung
3. Water supply
4. Dried leaves
5. Black soil
6. Dry grass

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1. Earthworms:

Fig. 1. Earthworm

Classification:
Kingdom: Animalia
Phylum: Annelida
Class: Oligochaeta
Order: Opisthopora
Family: Megascolecidae
Species: postuma

Fig. 2. Vermicompost bed in cooler shady area

METHODS:

Selected a place outside of the college, cleaned it and built a tank with the help of bricks and cement. After one week it is painted with white paint. Later that day started vermicompost processing. firstly, layered dry leaves as a first layer and sprinkled some water. next layered dry grass as a second layer again sprinkled water. meanwhile added black soil as a third layer again it is sprinkled with water and introduce cow dung as a fourth layer repeated this procedure intel tank fill and .at the end this process added earthworms and covered with gunny bags and leave it for 2-3 months.

Bedding: for Containers for vermicompost production: A cement tub may be constructed to a height of 2 ½ feet. The length may be fixed to any level depending upon the size of the room. The bottom of the tub is made up of a slopelike structure to drain the excess water from the vermicompost unit. A small sump is necessary to collect the drain water.

Vermiculture bed: Vermiculture bed or worm bed (3cm) can be prepared by placing after saw dust or husk or coir waste or sugarcane trash in the bottom of the tub /container. A layer of fine sand (3cm) should be spread over the culture bed followed by a layer of garden soil(3cm). All layers must be moistened with water.

Worm food: Compost warm are big eaters. In An ideal condition, they are able to consume in excess of their body weight each day, although the general rule of thumb is ½ of their body weight per day . Manures are the most commonly used worm feedstock, with dairy and beef manures generally considered the best natural food for Eisenia , with the possible exception of rabbit manure.

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Putting the waste in the container: The pre designed waste material should be mud with 30 percent cattle dung either by weight or volume. The mixed waste is placed into the container up to brim. The moisture level should be at 60 percent. Over this material, the selected uniformly. For one– meter length, one–meter breadth and 0.5 meter height , 1kg of worm(1000 Nos) are required. It is not necessary that earthworms should be put inside the waste. Earthworms will move inside on their own.

Watering the vermin bed: Daily watering is not required for vermin beds. But 60 percent moisture should be maintained throughout the day. If necessity arises,water should be sprinkled over the bed rather than pouring the water. Watering should be stopped before the harvest of vermicompost.

Essential parameters of vermiculture: System of composting

Windows: Vermicomposting windows can be opened, under the cover or indoors and they require ample land or large buildings. A typical worm window ranges from 1 to 2.5m wide and can be as long as 0.5 km and at the most up to 1m high. They require a well-drained soil as a base or a sloped concrete pad to prevent accumulation of water and anaerobic decomposition from occurring at the bottom. A thin layer of feedstock is added repeatedly at a thickness of 4 to 7 cm. Addition of feedback can be continued by layering fresh material on top of the previous one , when it is converted into castings.

Beds and Bins: Beds and Bins have been used extensively throughout the vermicomposting industry to varying degrees from home enthusiasts to part time worm growers to medium scale operations. They can be constructed with wood or purchased from the market . A commercially available home vermicomposting plastic bin will serve the purpose. Regardless of the shape of the bin the container must have holes in the sides top and bottom for adequate aeration and drainage.

Management:

a. Smells: In closed conditions, a well– maintained bin is odorless ; when opened it should have little earthy smell. Worms require gaseous oxygen. Oxygen can be provided by air holes in the bin, occasional stirring of bin contents and removal of some bin contents if they become too deep or too wet. Decomposition becomes anaerobic when excess wet feed stock added to the bin or the layers of food waste have become too deep. Then the bin will begin to smell of ammonia.

b. Moisture: Moisture must be maintained above 50 percent less moisture reduces worm respiration and can increase mortality. Operating moisture reduces worm respiration and can increase mortality between 70-80 percent with a suggested content of 70-80 percent for vermicomposting operations.

c. Pest species: Pest such as rodents and flies are attracted by certain materials and odors usually from large amounts of kitchen waste, particularly meat. Eliminating the use of meat or dairy products in the worm bin decreases the possibility of pests. In warm weather, fruits and vinegar flies breed in the bins, if fruit and vegetable waste is not thoroughly covered with bedding .This problem can be avoided by covering the waste by at least five centimeters of bedding .

d. Worms escaping: worms are generally confined to the bin, but try to leave the bin when first introduced, or often after a rainstorm when outside humidity is high. Maintaining adequate conditions in the worm bin and arranging a light over the bin while introducing worms for the first time to eliminate this problem.

e. Nutrients levels: Small–scale and home systems use a varied mix of feed stocks, the nitrogen, potassium and phosphorus content of the resulting vermicompost will also be inconsistent. NPK testing may be helpful before the vermicompost or tea is applied to the garden. In order to avoid over fertilization issues, such as nitrogen burn, vermicompost can be diluted as a tea 5050 with water or as a solid can be mixed in 5050 with potting soil for better results. The mucus produced creates a natural time–release fertilizer.

RESULT AND DISCUSSION:

In a period of 2-3 months, the compost will be ready. The material will become moderately loose, will weigh less, shaped like granules, black in color, crumbly and rich with humus. If the earthworm casting is

present on the bed of compost, it means that the compost is ready. Prior to 2 or 3 days of emptying the compost bed, adding water to compost must be ceased. This helps in separation of the worms from the compost. The idea is to keep the compost in the sun so that most of the earthworms move to the lower part of the compost which is moister and colder. In the multi-pit system, supplying water should be ceased in the first pit, which will allow the worms to automatically migrate to another pit. In the other pit the worms have appropriate conditions for their growth and hence maintained cyclically, and continuous harvesting could be done. Vermicomposting turns the green organic waste into dark, nutrient-rich soil, which, Due to the presence of microorganisms, it maintains healthy soil for growing healthy plants. Vermicomposting transforms the organic waste which is green in color, to a dark soil which enriches in nutrients. This is mainly because of the degradation of microorganisms, and therefore maintaining a soil which is healthy for growing plants. Vermicomposting is one of the very few eco-friendly processes that recycle biomass and wastes of organic matter into a compost which has valuable nutrients. It should be encouraged around the world to encourage nature-friendly methods of waste management.

Fig.3. Collection of Organic Vermicompost

Fig.4. Showing Organic Vermicompost with Earthworms

CONCLUSION

After the analysis of data, the present study can be concluded that there is a great challenge in understanding and clarifying the mechanisms involved in the vermicomposting process. As pointed out through this review, the most urgent questions to be answered relate to the composition of bacterial communities, amount of vermicompost, effect on heavy metal content, plant pathogens, diseases, and organic waste selection. Namely, the possible application of vermicompost products certainly depends on many factors and with their optimization, it would be possible to influence the characteristics of the final product and consequently better exploit the vermicomposting process. Vermicomposting has a great potential to process a wide range of wastes produced in agriculture, food processing, sewage treatment, etc., and generate high-quality end products that can have multiple uses. Vermicomposting involves the “cooperation” between

earthworms and microorganisms during a very complex biological process. In addition, there is a possibility of vermicompost application in pollution reduction, which is for sure a topic that should be immediately addressed. Considering that, there are still many unknowns that need to be investigated and optimized in order to use vermicompost products in the context of sustainable agriculture. By answering the current knowledge gaps, it will be possible to increase the understanding of variables and parameters crucial in the process of vermicomposting and will enable wider utilization of vermicompost products.

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