

A REPORT ON VERMICOMPOSTING

OBJECTIVES:

- To create awareness in students on composting practice
- To make students learn about eco-friendly organic fertilizers
- To know about the role of earth worms in nitrifying soil structure
- To make students understand about recycling and decomposition of solid waste materials in college campus.

CONTEXT:

The vermicomposting as best practice in college campus is practiced by Zoology and Botany departments. Zoology students of 1 st semester as part of their project work are involved in this work. The times lines were given to the students to follow strictly. Students are grouped and each group is assigned a particular day in a week to collect litter and to dump in the composting pits followed by addition of earthworms.

VERMI COMPOSTING

Vermicomposting is a system for turning organic waste into nutrient rich soil as it is processed by worms.

Solid waste management is being conducted in the college campus by converting it into Vermi compost. Vermicompost is an odorless, dark brown bio-fertilizer obtained from the process of vermicomposting. It is the natural organic manure produced from the excreta of earthworms fed on scientifically semi-decomposed organic waste.

Planning a systematic way and united effort for collection of waste from college campus resulted in efficient way of solid waste management.

List of compostable materials:

Food scrap, fruits and vegetable waste, Agricultural scrap, Egg shells, tea dusts, rotten leaves, twigs and fallen unripe fruits.

METHODOLOGY FOLLOWED



The solid waste management practice is conducting in college campus by the departments of Botany and Zoology collectively. It is going on successfully at regular intervals on every Monday and Saturday from 4PM to 5 PM that students were made into groups to sent to various locations to collect the campus wastage. The time lines were given to the students to follow strictly. The litter collected by the students is dumped into the composting pits that allowed for decomposition.

The vegetable wastage is also collecting from the hostel kitchen by employing to workers .the composting pits are regularly added with collected litter and farm yard manure. Meanwhile the earthworms are purchased from .krishiVignankendram, Nellore and introduced into the composting pits. The pits are regularly watered and monitored.

After complete decomposition the vermicompost is dugout and sieved to prepare the vermicompost manure .The manure is made into packets and some packets were inoculated with bio fertilizers like Rhizobium, Azospirillum, Nostoc, Anabaena, etc. to enhance the productivity. Some plants like Banana fertilized with the vermicompost produced large fruits with an elongated flower stalk.

SOLID WASTE MANAGEMENT



Students collecting the litter in the college campus



VERMICOMPOST UNIT



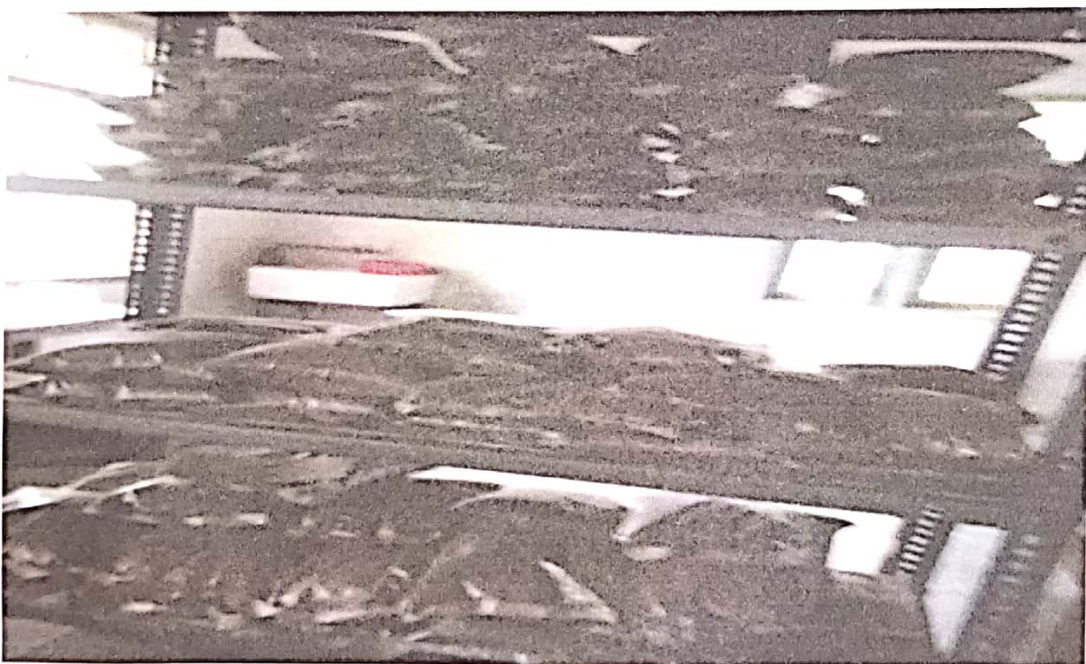


EARTHWORMS





PITS WITH MANURE



VERMICOMPOST BAGS INOCULATED WITH BIOFERTILIZERS

VERMICOMPOST

“Vermi compost is a product of the composting process using various species of worms, Usually Red wigglers, White worms and other earthworms, to create a mixture of decomposing vegetable wastes or food waste bedding materials and vermi east ”

“Vermicompost is also called as worm castings, worm humus, worm feces is the end product in vermicomposting ”.

Materials used for vermicompost

1. News papers
2. Crop residues
3. Weed biomass
4. Vegetable waste
5. Leaf litter
6. Agro industries waste
7. Biodegradable portion of urbon and rural wastes
8. Suitable worm species
9. Compost Bin

All these are the good bedding materials for worm composting.

Types of Earthworm Species used in vermicompost

1. Eisenia fetida
2. Dendrobena venta
3. Lumbricus rubellus
4. Eisenia andre

1. Eisenia fetida



Common names : Tiger worm, Manure worm, Branding worm

Colour : Rust brown with yellow strips around its body just like Tiger

Length : Up to 130 mm

Ideal working Temperature range 15-25 c

2. Dendrobena venta :



Common names Dendras , Blue noses.

Colour : Violet purple or Olive brown & sometimes Striped

Length : up to 155 mm

Ideal working Temperature range 18-25 c

3. Lumbricus rubellus



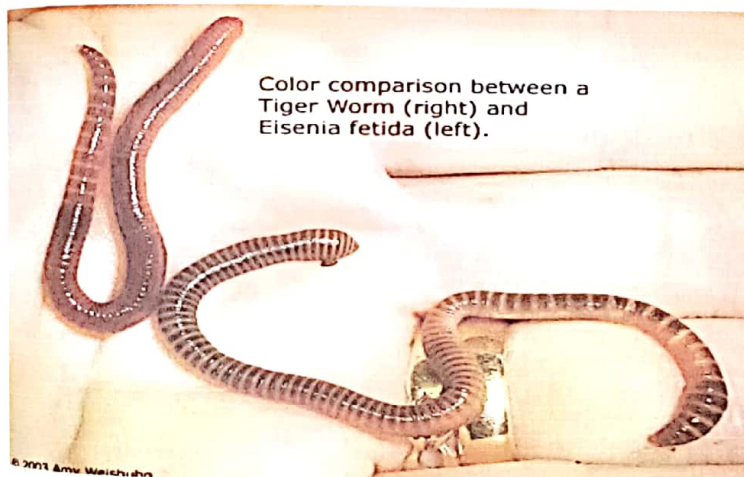
Common names : Redworm, Blood worm, Red wriggler

Colour : dark red to maroon , No stripes and Light yellow Underneath

Length Up to 105 mm

Ideal working Temperature 18-23 c

4. Eisenia andre



Common name : Red tiger worm

Colour : Dark red to purple with may be some stripes

Length : Up to 130mm

Ideal temperature range 18-23c

Favourable conditions for vermicomposting

Temperature:

The Earth worms will die in freezing Temperatures, so they protect themselves by moving to lower depth in growing beds or soils. They will and breed at temperatures upto about 85-90c for commercial earthworm production, ideal temperatures for growth and activity range from 60-80c for cacoon production and hatching, bed temperatures should be between 60-70c.

Moisture

Earth worms require adequate moisture for growth and survival. Beds Should be crumbly moist, not wet they should not expose to direct sunshine. To enhance cacoon production after worms are fully established, beds should be allowed to dry until the top 2 inches are barely moist then sprinkle sufficiently to restore normal moisture content.

Aeration

Earth worms can live at relatively lower oxygen and high Co₂ levels & Can survive in oxygenated water. In the complete absence of oxygen, However, they may be adversely affected or may die. Oxygen may be Depleted if the beds are kept soggy wet under such condition Anaerobic bacteria may produce toxic substances.

PH(potential hydrogen) Acidity & Alkalinity:

Earth worms will grow over a range (ph range) of 4-2 (acid) to 8.0 (alkaline) for commercial production however, it is best to maintain a PH of 7.0 check PH regularly with litmus paper or PH kit, which is available in most feed stores. Ground limestone may be mixed with bedding material to correct acidity.

Steps involved in vermicomposting

1. Spread a 1-2 inch layer of damp bedding on a bottom of top bin .
2. Add compost worms to the bedding , do not need to spread them out.
3. Add a small amount of food scraps to the bin, about 1-2 cups
4. cover the scraps with another layer of damp bedding, don't block the side air turns.
5. Make sure all food scraps are covered by bedding materials.
6. Replace the lid excess moisture will drain to the lower bin
7. Remove any excess liquid from lower bin as it accumulates .
8. make a note of the date started worm bin.
9. Feed the worms a small amount , when starting a bin and then nothing for 2 weeks.

Natural enemies and their control :

MOLES

Earth worms are Moles natural feed . so if a mole gets access to the wormed bed. We may lose a lot of worms quickly. This is usually only a problem when using windows or other open air system is in fields . It can be prevented by putting some form of barriers, such as wire mesh , or a good layer of clay under the window.

BIRDS

They are not usually a major problem, but if they discover your beds they will come around regularly and help themselves to some of your work force. Putting a window cover over the material eliminates the problem. These covers are also useful for retaining the moisture and preventing too much leeching during rain fall events. Old carpet can be used for this purpose and is very effective.

CENTIPEDES

These insects eat compost worms and their cocoons. Fortunately they don't seem to multiply to a great extent within the worm beds or windows, so damage is usually light. If they do become a problem, the method suggested for reducing their numbers is to heavily wet the worm beds. The water forces

centipedes and other insect pests to the surface, where they can be destroyed by means of hand held propane torch or something similar.

ANTS

These insects are more of problem because they consume the feed meant for the worms. Ants are particularly attracted to sugars so avoid sweet feeds in beds reduces this problem to a minor one. Keep the bedding above PH 7 also helps

MITES

These are a number of different types of mites that appears in vermiculture and Verme composting operations, but only one type is a serious problem. Red mites, white and brown mites complete for food and can thus have some economic impacts, but Red mites are parasitic on earthworms. They suck blood or body fluid from worms and they can also suck fluid from cocoons. The best prevention for red mites too

Nutrient content in vermicomposting

The nutrients content in vermicomposting vary depending on the waste materials, that is being used for compost preparation. If the waste materials are heterogonous one, there will be only certain nutrients available. The common available nutrients in vermicompost are

S.No	Name of the Nutrient	Percentage
1.	Organic Carbon	9.5-17.98 %
2.	Nitrogen	0.5-1.50%
3.	Phashorous	0.1-0.305
4.	Potassium	0.15-0.30%
5.	Sodium	0.06-0.30%
6.	Calcium & Magnesium	22.67-47.60 mg/100g
7.	Copper	2-9.50 mg/100mg
8.	Iron	2-9.30mg/kg
9.	Zinc	5.70-11.50mg/kg
10.	Sulpher	128-548mg/kg

Precaution to be taken while processing

Moisture level in the bed should exceed 40-50 % this in turn increases the pH level of the medium and hampers the normal activities of worms leading to weight loss and decline in temperature of bed should be within the range of 20-30

Worms should be injured during handling beds should be protected from predators like red ants, white ants, centipedes and other like toads, rats, cats, poultry, birds and even dogs.

Frequent observation of cultured bed is essential as accumulation of casts retards growth of worms.

Space is necessary for growth and establishment of culture. minimum space required is 2 square meter per 2000 worms with 30-45 cm thick bed.

Addition of inoculation as abait from earlier habitat in early adaptation of worms to new set of rearing.

USES OF VERMICOMPOSTS

1. Provides excellent effect on overall plants growth, encourages the growth of new shoots and leaves improve the quality and shelf life on the produce.
2. Vermicompost is free flowing, easy to apply, handle and store doesn't have a odour.
3. Vermicompost helps in recycling of degradable waste.
4. By using vermicompost we can own extraordinary help on garden or fields.
5. Vermicompost reduces the seepage in the field.

VERMICOMPOST TEA

1. Spraying nutrient enriched water on garden, organic garden and large farms distributed protozoa to rejuvenate the soil by eating bacteria and producing nitrogen which is useful for plants.
2. As the vermicompost is rich in the NPK which is readily available forms, given a better yield.
3. Vermicompost also benefits the environment by reducing the need of chemical fertilisers and decreasing the amount of waste going to landfills.

CONCLUSION

Organic solid waste poses a serious threat to the environment. There is an immense possibility for adopting a sustainable waste management system in the college campus as the institute is under one authority, hence improved solid waste management can be easily adopted. If Good waste management practices will be institutionalized at the university level then they will definitely trickle down to the society.

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