MAHARANI CLUSTER UNIVERSITY

MAHARANI SCIENCE COLLEGE FOR WOMAN

PALACE ROAD, BENGALURU-560001

KSCST Student Project selected for 46th series of Student Project Programme

SYNOPSIS ON

STUDY OF MICROBES ASSOCIATED WITH VERMICOMPOST AND ITS INFLUENCE ON PLANT GROWTH

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SUBMITTED BY

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INTRODUCTION:

Vermicomposting is described as "biooxidation and stabilization of organic material involved by joint action of earthworms and mesophilic microorganisms". Vermicompost produced by the activity of earthworms is rich in micronutrients and macronutrients, vitamins, growth harmones, enzymes such as proteases, amylases, lipases, cellulase and chitinase and immobilized microflora. The enzymes continue to disintegrate organic matter even after they have been ejected from the worms (Barik et al. 2011).

In recent years disposal of organic wastes from domestic, agricultural and industrial sources has caused increasing environmental and economic problems and many different technologies to address this problem have been developed.

The beneficial effects in using vermicompost based substrates in agriculture (olle.2016 b).

- It accelerates environment for beneficial microorganisms.
- Permanently improves soil structure.
- Increases plant secretion.
- 100% natural, ideal for using organic farming and in artificial environments.

Charles Darwin described earthworms as the 'unheralded soldiers of mankind' and Aristotle called them as 'intestine of earth', as they could digest a variety of organic materials (Darwin 1881).

Eudrilus eugeniae (Kinberg, 1867), an adaptable exemplar of an anatomically advanced earthworm having direct fertilization, in reviewed ecologically a Tropical West African species originating in savannah soils, it thrives on organically rich substrates. It has a rapid life cycle from cocoon to maturity in as little as 47 days. Passage of organic material through its gut reduces microbial pathogens and the resulting vermicompost product has enhanced nutrients and microbial and enzymatic properties. (Pietermaritzburg, 2015).

OBJECTIVES:

1. Preparation and setting up of vermicomposting bed.
2. Physico-chemical characterization of vermicast and vermiwash.
3. Isolation and identification of microorganisms associated vermicast and vermiwash.

4. Influence of vemicompost and vermiwash on plant growth.

METHODOLOGY

1. PREPARATION AND SETTING UP OF VERMICOMPOSTING BED:

MATERIAL REQUIRED:

- UV stabilized fabric vermicompost maker bed (vermibed).
- Earthworms (*Eudrilus eugeniae*).
- Cow dung
- Organic residues (leaf litters, vegetable waste).
- Soil or sand.
- Water.

i. **COLLECTION OF EARTHWORMS:** Species of mature *Eudrilus eugeniae* were randomly picked from a Vermiculture Farm, Doddaballapura in the plastic containers (Fig 1.1).

Fig 1.1 *Eudrilus eugeniae*

ii. **INSTALLATION OF VERMIBED:** It is a readymade vermibed with easy setup. Here we have used ISO certified UV stabilized, fabric vermibed were installed (Fig 1.2 and 1.3).

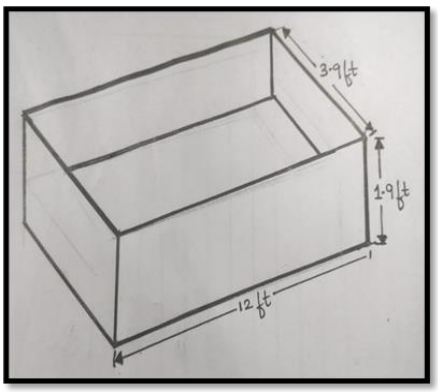

Fig 1.2: Sketch of vermibed **Fig 1.3: 3D view of vermibed**

iii. PREPARATION OF VERMIBED:

Once the vermibed was installed, a layer of organic residues like dried leaf litters and vegetable wastes were added. Then a layer (2-3inches) of soil was added. Cow dung slurry was prepared and sprinkled on the heap for quick decomposition. Again, organic residues were added to makeup to 0.5ft-1.0ft of vermibed. Earthworms of species *Eudrilus eugeniae* were released over the mixture and compost mixture covered by gunny bags water was sprinkled on a regular basis to maintain the moisture content of the compost.

Fig 1.4: Prepared vermibed

OUTCOME:

Once the vermicomposting bed was set up and was filled with organic residues (dry leaf litter, vegetable waste, cow dung slurry) the moisture of the bed was maintained up to 60-70% then after some days with the association of earthworms (*Eudrilus eugeniae*) and microorganisms, the organic residues were half decomposed (Fig1.5), vermicast (Fig1.6). After complete decomposition, the vermicompost and earthworms were separated by sieving method. The vermicompost was shadow dried (Fig1.7) and was given for analysis of physico-chemical characteristics (Fig 1.8).

Fig 1.5: Half decomposed Organic Residues

Fig 1.6: Fully decomposed Vermicast

Fig 1.7: Shadow drying of Vermicast

Fig 1.8: Ready Vermicompost

2. PHYSICO-CHEMICAL CHARACTERIZATION OF VERMICAST AND VERMIWASH:

For determination of pH, electrical conductivity, total organic carbon, nitrogen, phosphorus, potassium, macronutrients, micronutrients the completely degraded vermicompost was given to SCIENTIFIC AND INDUSTRIAL RESEARCH CENTRE(SIRC). The results are given below in **Fig 2.1.**

SCIENTIFIC & INDUSTRIAL RESEARCH CENTRE
#91/43,1st Floor,8th cross Goraguntepalya,Yeshwanthpur Industrial Area,Bangalore-560022.
E-mail:sircbangalore@yahoo.com. Web site: www.sircblr.in
Mob:8494900231, 8892972297, 9632917186

Recognized by MoEF&CC.
ISO 9001:2015 & OHSAS 45001:2018 Certified Laboratory.

TEST REPORT

Name and Address of Customer:	Date of Receipt of sample: 15/05/2023
M/s. Maharani Cluster university Vidyashree, Spoorthi, Prakruthi	Test Performed On: 16/05/2023
	Test Completed On: 19/05/2023
	Report Date: 19/05/2023
	Test Report No: SIRC/2023/05/15

Chemical Testing

Sample Collected By	Sample Description	Sample Location	Sample Condition on Receipt
Sample Given by Customer	Vermi Compost sample	Company Premises	Satisfactory

Sl. No	Test Parameter	Result	Test Method
1.	pH @ 25°C	7.04	Soil Analysis, Indian Society of soil Science Soil Science (2020) New Society publisher
2.	Total Nitrogen as N, mg/kg	322	
3.	Total Organic Carbon, in %	7.93	
4.	Phosphate as Po_4, mg/kg	75.02	
5.	Conductivity, µS/cm	2100	
6.	Zinc as Zn,mg/kg	184.40	
7.	Iron as Fe, mg/kg	3033.15	
8.	Soil Moisture, mg/kg	6.93	
9.	C:N ratio	99.6:0.4	
10.	Potassium as K, mg/kg	1140	
11.	Calcium as Ca, mg/kg	3320	
12.	Sulphate as So_4 mg/kg	139.65	
13.	Magnesium as Mg, Mg/kg	168	

AUTHORIZE SIGNATORY
Dr.Siddalingeshwara K G
Quality Manager

NOTE
1. The results listed refer only to the tested samples & applicable parameters. Endorsement of product is neither inferred nor implied.
2. Samples will be destroyed after specified retention time.
3. This report is not to be reproduced wholly or in part & cannot be used as evidence in the court of law & should not be used in any advertising media without our special permission in writing.
4. Sample(s) not drawn by us unless otherwise stated.
5. Total liability of our laboratory is limited to the invoice amount. Any dispute arising out of this report is subjected to Bangalore Jurisdiction only.

*****We Provide Environmental Services*****

Fig 2.1:Report of Vermicompost Analysis

FUTURE SCOPE:

In recent years, disposal of organic wastes such as agricultural wastes, domestic wastes and industrial wastes as caused increasing environmental and economical problems. Using vermicomposting process, these problems can be reduced to a certain extent with low cost.