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Production of Aerated Vermicompost Teas and Their Effects on *Xanthomonas Compestris* and Black Spot Infected Rose Plants

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Abstract: ***Vermitea is an excellent organic fertilizer and pesticide. In my projectI try to explore the suitability and potential use of Eisenia foetida to the management of food wastes (vegetable, tea and fruit), agro wastes (sugar cane, corn, neem leaves and coir) and newspaper waste with the production of vermicomposts and to prepare Aerated Compost Teas (ACT) using different vermicomposts.Finally the nutrient quality of different Aerated Compost Teas (ACT) are analyzed and the effect of different Aerated Compost Teas (ACT) on Black spot infected rose plants are tested.***

Keywords: vermicomposts, Eisenia foetida, Aerated Compost Teas (ACT), Antibacterial assay, Xanthomonas compestris

1. Introduction

Environmental degradation is a major threat confronting the world, and the rampant use of chemical fertilizers contribute largely to the deterioration of the environment through depletion of fossil fuels, generation of carbon dioxide and contamination of water resources.

Under present day condition, it becomes very essential to protect environment from further degradation, develop appropriate technologies for use in recycling various organic waste and to harness energy thus minimizing environmental stress. Vermitechnology is a promising technique that has shown its potential in certain challenging areas like augmentation of food production, waste recycling, management of solid wastes etc. Vermicompost tea (or termites) is the liquid extract from fermented vermicompost.. Vermitea is also an excellent plant growth promoter on the soil amendment

Regular use of compost tea can reduce or eliminate the need for costly chemicals or pesticides. It has been shown to be effective in preventing a variety of diseases on different crops and landscape materials. These include Black spot, Powdery and Downy Mildew, Phytophoria

2. Materials and Methods

2.1. Materials

2.1.1. Collection of materials:

Cow dung, newspaper waste, food waste (vegetable, fruits and tea) and agro wastes (sugarcane, corn, neem leaf and coir) were collected from the market area of Theni district. After collection, the organic wastes and cow dung were exposed to sunlight for 5 to 10 days to remove the various harmful organisms and noxious gases.

2.1.2. Collection of earthworms:

Earthworms *Eisenia foetida* were collected from vermicomposting farm, Thappukundu. The collected earthworms were acclimatized in the laboratory conditions.

2.1.3. Experimental design for vermicomposting:

The experiment for vermicomposting was conducted on eight plastic tubs, (each size of 15cm×20cm×30cm). Vermibeds were prepared by taking cow dung and different types of wastes with the ratio of 3:1 as per the following way.

T0 - Cow Dung only
T1 - Cow dung+ Newspaper Wastes
T2 - Cow dung+ Vegetable Wastes
T3 - Cow dung+ Tea Wastes
T4 - Cow dung+ Fruit Wastes
T5 - Cow dung+ Sugarcane Wastes
T6 - Cow dung+ Corn Wastes
T7 - Cow dung+ Neem leaf Wastes
T8 - Cow dung+ Coir Wastes

All the vermibeds were moistened and 40g of cultured *Eisenia foetida* was inoculated in each vermibed, and then covered the beds by jute pockets. The vermibeds were moistened up to 15 days to maintain moisture content & temperature (19.1˚C to 25.1˚C). Then eight types of vermicomposts were harvested from the vermibeds. The nutritional quality of different vermicomposts was analyzed.

2.1.4 Experimental set up for the preparation of different aerobic vermicompost teas:

1 liter of chlorine free water was taken in the pail. 40 g of brown sugar was added and mixed well until it was fully diluted. The power head pump was attached inside the pail. The outlet should be submerged just right below the water's surface. Once securely attached the power head was switched on. 40 g of the vermicompost was put in cheese cloth bag. It was tied with a string. The string should be long

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enough to facilitate drawing out the bag from the liquid after fermentation.

The bag containing vermicompost was submerged in the water. The lid was put on to prevent dust, insects, etc., from contaminating the mixture. The mixture was tested for bad odors. The vermicompost teas should have a pleasant, earthy smell. The cheese cloth bag and the power head were pulled out. The remaining liquid was the vermitea, an organic foliar fertilizer and pesticides. Then the vermicompost teas were analysed for the determination of chemical properties.

2.2 Methodology

2.2.1. Physico- chemical analysis of different vermicompost teas:

1. pH Determination
2. Organic carbon Determination
3. Nitrogen Determination
4. Phosphorus Determination
5. Potassium Determination
6. Calcium Determination

2.2.2 Application of different compost teas on Rose plants.

2.2.3. Isolation of *Xanthomonas compestris* from the infected seeds of *Lablab purpureus.*

2.2.4. Identification of *Xanthomonas compestris.*

2.2.5. Antibacterial Activity of different vermicompost teas on *Xanthomonas compestris.*

Vermicompost Teas





3. Results And Discussion

The present study was carried out to investigate the "Production of aerated vermicomposts teas and their effects on *Xanthomonas compestris* and Black spot infected rose plants".

3.1 Physico- chemical properties of vermicomposts teas

Chemical properties of different vermicomposts teas were analyzed and the results were shown in figures.

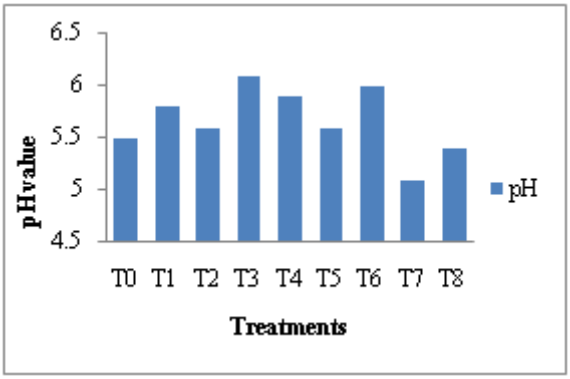


Figure 1: Variation in the pH of different vermicompost teas

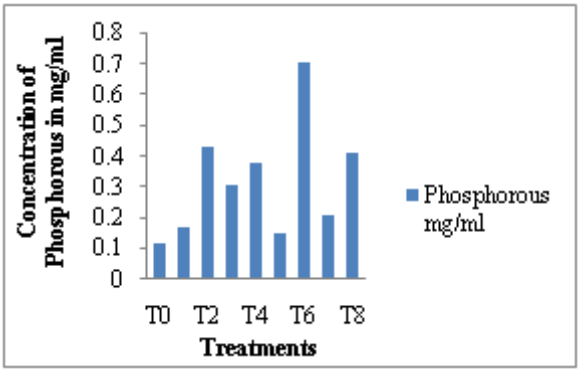


Figure 2: Variation in the Nitrogen content of different vermicompost teas

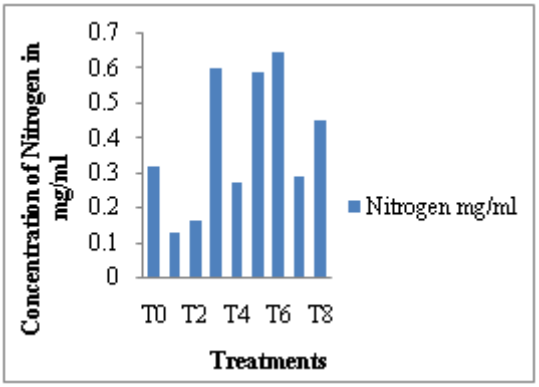


Figure 3: Variation in the Phosphorous content of different vermicompost teas

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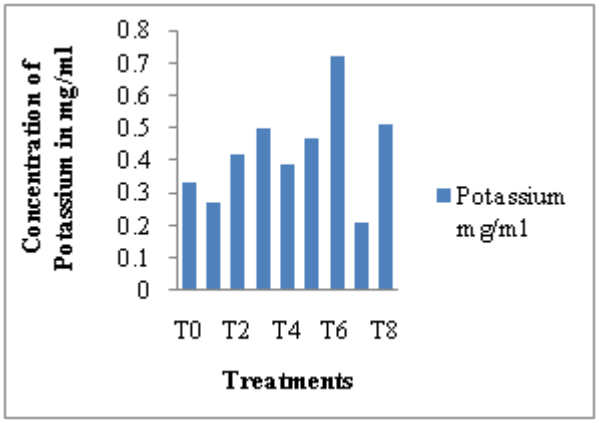


Figure 4: Variation in the Potassium contentof different vermicompost teas

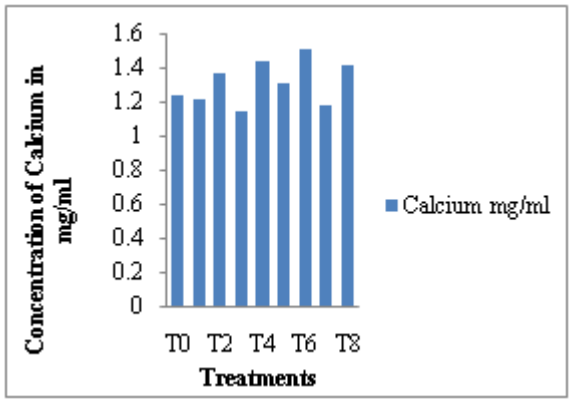


Figure 5: Variation in the Calciumcontent of different vermicompost teas

3.2. Antibacterial assay of different vermicompost teas on *Xanthomonas compestris:*

The antibacterial assays of different vermicompost teas were done on*Xanthomonas compestris* by standard disc diffusion method. The zone of inhibitions for different vermicompost teas against *Xanthomonas compestris* was shown in Table, Figure and photo.

Table 1: Antibacterial assay

Treatments	*Zone of Inhibition(cm)*
T0	0.9
T1	0.7
T2	0.8
T3	1.0
T4	0.8
T5	0.9
T6	1.3
T7	0.6
T8	0.7

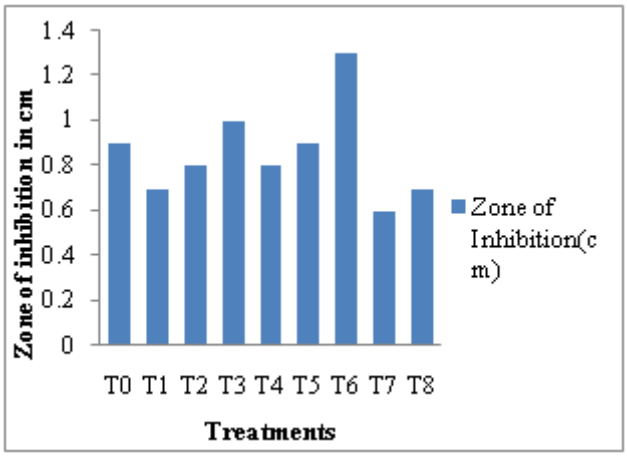
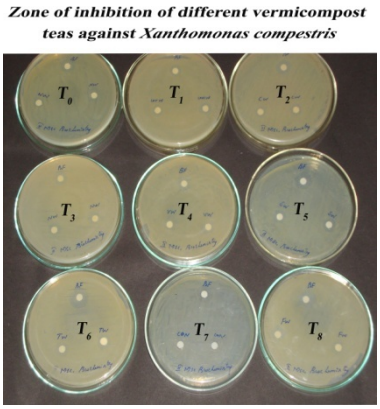


Figure 6: Zone of Inhibition for different vermicompost teas against *Xanthomonas compestris:*



In this study ACT prepared from various compost types were evaluated for their ability to control pathogens of hyacinth bean plants. The experimental results showed that types of ACTs had greater suppressive activity on *Xanthomonas compestris*. The results are supported by the previous findings.

Compost teas are perceived as potential alternatives to synthetic chemical fungicides (Siddiqui, *et al.*, 2009). Vermicompost teas produced from various compost types demonstrating an inhibitory effect on plant pathogens in numerous plant pytosystems, these effects remain variable (Scheuwell and Mahaffar, 2006).The efficacy of compost teas to control plant pathogens have been reported as single or multible mechanisms, involving microbial antagonism (through antibiosis, parasitism, competition for nutrient / space or induced plant resistance.

3.3 Effect of different vermicompost teas on rose plant pathogens:

Different vermicompost teas were applied on the infected rose plants for 15 days. The change in the rose leaves were shown in photos

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4. Conclusion

The production of degradable organic waste and its safe disposable becomes the current global problem. Meanwhile the rejuvenation of degraded soil by protecting topsoil and sustainability of productive soils is the major concern at the international level. Provision of a sustainable environment in the soil by amending with good quality organic soil additives enhances the water holding capacity and nutrient supplying capacity of soil and also development of resistance in plants to pests and diseases. By reducing the time of humification process and by evolving the methods to minimize the loss of nutrient during the course of decomposition, the fantasy becomes fact. Earthworms can serve as tools to facilitate these functions. They serve as "nature's plowman" and form nature's gift to produce good humus, which is the most precious material to fulfill the nutritional needs of crops. The utilization of vermicompost results in several benefits to farmer, industries, environment and overall national economy.

In the present study, composting of cow dung, newspaper waste, agro waste and food waste using earthworms (*Eisenia foetida*) resulted in the conversion of waste into value added product i.e., vermicompost. Analysis of vermicomposts obtained from different treatments clearly indicates the use of *Eisenia foetida* for vermicomposting in appropriate ratios.

Control of plant disease is a major limiting factor in organic vegetable production and nursery plants. Particularly in the south where warm, moist growing conditions are highly favorable for disease development. Nevertheless organic growers manage disease with variable success through a combination of cultural and biological methods, and are continually seeking more cost-effective strategies. Because vermicompost teas can be produced cheaply on-farm it represents a potentially valuable disease management tool for small scale, limited resource farmers.

Aerated vermicompost teas (ACT) were prepared using different vermicomposts. The nutritional quality of ACTs was analyzed. Compared to vermicomposts, ACTs have high NPK values and calcium contents. Hence they have enormous economic potential for increasing crop yields and suppressing attacks by important pests and diseases.

When the different vermicompost teas were used to analyze the antibacterial activity against *Xanthomonas compestris*, ACTs have high inhibitory activity. In the field experiments, ACTs were applied to the rose leaves which were infected by black spot disease. After 15 days of application, the infected rose leaves become cured.

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