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"A STUDY OF VERMICOMPOSTING OF AQUATIC WEED AND EFFECT OF VERMICOMPOST ON THE GROWTH OF LADY FINGER *HIBISCUS ESCULENTUS*"

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ABSTRACT

As India is an agriculture based country, farmers need suitable resources to replenish soil fertility and maintain the productivity of soil. Really, the green revolution has popularized the use of chemical fertilizers to achieve higher productivity. But due to continuous and indiscriminate use of fertilizers, the natural fertility of soil has been lost and this activity has contaminated our soil, water and food. Therefore farmers are in need of searching another to replace the chemical fertilizers. In recent days, the use of organic inputs like vermicomposting, biofertilizers and biopesticides is becoming popular in the world wide. There is a need of effective technology to deal with disposal of wastes which continues to be a challenge as population increases. Vermicomposting has been identified as one of the potential processes in managing waste, since it is a natural process, cost effective and required only shorter duration. The aim of the present research was to study the effect of vermicompost prepared from water hyacinth, leaf litters and cow dung on growth and yield of *Hibiscus esculentus* under greenhouse conditions. Vermicomposting of organic wastes was carried out by using surface burrowing type of earth worms (*Lampito marutii*). The pot experiment was conducted with four treatments via T_1 Control, T_2- Cow dung, T_3 – Leaf litter vermicompost. The results showed significant variations in plant growth parameters of vermicompost. The growth characters of lady finger such as plant height, number of leaves per plant were observed at 15th day, 30th day, and 45th day from the date of planting. There was maximum value of growth parameters observed in leaf litter vermicompost followed

by Eichhornia vermicompost, cow dung vermicompost and control. Yield parameters also showed the similar trend of growth parameters. The investigation clearly reveals that the biochemical properties of vermicompost play major role in growth and yield of *H.esculentus*. Key words: Vermicompost, *Hibiscus esculentus*, water hyacinth.

INTRODUCTION

Vermicomposting is a low-cast and eco-friendly process used to treat organic waste. Vermicompost is nutrient rich organic compost with active microorganisms resulting from the interface between earthworm and microorganisms on the breakdown of organic matter. Earthworms convert the waste material in to small particles by breaking in the gut of earth worm finding nutrients from the microbes that harbor on them. These processes increase the rate of degradation of the organic waste matter, modify the physical and chemical properties of the waste materials and forms humus in which unstable waste matter is completely oxidized.

Vermicomposts are products derived from the accelerated biological degradation of organic wastes by earthworms and microorganisms. Earthworms consume and fragment the organic wastes into finer particles by passing them through a grinding gizzard and derive their nourishment from microorganisms that grow upon them (Tomati, 1983).

Vermicompost is made up primarily of C, H and O, and contains nutrients such as NO3, PO4, Ca, K, Mg, S and micronutrients which exhibit similar effects on plant growth and yield as inorganic fertilizers applied to soil (Singh *et al.,* 2008). Vermicompost an organic source of plant nutrients contains a higher percentage of nutrients necessary for plant growth in readily available forms (Nagavallemma *et al.*, 2004). Vermicompost plays a major role in improving growth and yield of different field crops, including vegetables, flowers and fruit crops. In a study involving a wide range of vegetable and ornamental seedlings, result showed earlier and better germination in a vermi compost compared with control (Gutierrez-Miceli *et al.*,2007).

The soil enriched with vermi compost provides additional substances that are not found in chemical fertilizers (Kale, 1988). Vermicompost's produced commercially from cattle manure, food waste or recycled paper, were applied to field plots compared with those receiving equivalent amounts of inorganic fertilizer. (Alam *et al.*,2007) on the effect of vermicompost and N, P, K and S fertilizers on the growth and yield of red amaranth (*Amaranthus cruentus*), showed that chemical fertilizers were more efficient in the first four weeks of application suggesting that the vermicompost may have taken at least four weeks to have a more favorable effect on plant growth.

Baldatto *et al.* (2009) established significant accumulation of N, P, K, Ca and Mg in the roots shoots and leaves as a result of the application of humic acids derived from vermicompost.

Golchin *et al*. (2006) reported that vermicomposted animal manures tend to have a higher nutritional status, compared with that derived from organic municipal waste. Vermicompost produced from cattle and pigs' manure as well as food wastes increased the rate of germination, growth and flowering of a range of ornamental and vegetable seedlings compared with vermicompost from other sources (Atiyeh *et al.,* 2002a).

MATERIALS AND METHODS

Expermental animal

The earthworm *Lampito mauritii* were collected from plantain farm in and around Pudukkottai. Of these several methods currently used for collection of worms the hand sorting method was employed since this method was proved the best of all method. The earthworm was reared in garden soil. After acclimation, for a period of 15 days, the worms selected for experiment.

Biology of *Lampito mauritii*

The Indian speacies *Lampito mauritii* are Endogenic and living in humas. This has its native of plains of Indian peninsula.

Phylum : Annelida
Class : Oligochaeta
Order : Haplotaxida
Genus : *Lampito*
Species : *mauritii*

Expermental Design

The aquatic weeds were collected from ponds in around Pudukkottai. The cow dung was collected from the nearby school campus. The vermi sheds were prepared using plastic trays containing soil (control), (T1), Soil + cow dung+ Aquatic weed (T2), and c. Twenty earth worms were introduced in to each tray. The bedding was kept moist throughout the experiment by regular watering. The experiment was termined on the 45 days. Project period from 20 August 2019 to 3 October 2019.

Experimental details of vermicomposting of Aquatic weed.

DESIGN	COMPLETELY RANDOMIZED BLOCK DESIGN
Replication	Three
Treatment	Four Soil+ Aquatic weed (T1) Soil + cow dung+ Aquatic weed (T2) soil+ cow dung+ Aquatic weed+ Earth worm (T3)
No. of days	45
No. of Earth worms	20

Plate. 1

PLANT GROWTH STUDIES

Further investigation was carried in the first took nine pots and three pots were filled with soil (T1), three pots were filled with Soil + Cow dung + aquatic weed (T2) and further three pots were filled with soil + Aquatic weed + cow dung+ earthworm compost (T3). After that seed were allowed to germinate for 1 week. Various growth and yield parameters like average height of the plant, average number of flowers, and yield, were recorded based on 10 plants randomly selected from each pot once in three days from 3 to 45 days. The average shoot length was calculated on 15th, 30th and 45th days calculated on the respective days. The average plant height was recorded using scale. The yields of vegetables in plants were measured by the size and weight.

RESULTS

Plant growth was significantly influenced by application of vermicompost, urea compared to control. The average plant height, the percentage of germination and number of flowers and average yield increased as the levels of organic and inorganic fertilizers application increased. The germination percentage was observed on 15th, 30th and 45th days, in control,(T1) treatment 1(T2) and treatment 2(T3). On 15th day, the germination percentage of *Hibiscus esculentus* in Control and experiment 1 and 2 it was noted as 10%, 30%, and 50% respectively. On 30th day, the germination percentage was noted as 15%, 50% and 70% respectively. On 45th day, the germination percentage of *Hibiscus esculentus* in control and experiment 1 and 2 it was noted as 20%, 70%, and 90% respectively.

Table 1. Different growth parameters of *H. esculentus* on 15th day

Experiment	Leaf No.	Leaf length (cm)	Leaf width (cm)	Shoot length (cm)
T1	14	1.8	1.3	3.9
T2	19	2.2	1.6	6.5
T3	21	2.4	1.8	8.1

Fig.1 Effect of Vermicompost on *H. esculentus* plants height after 15 days

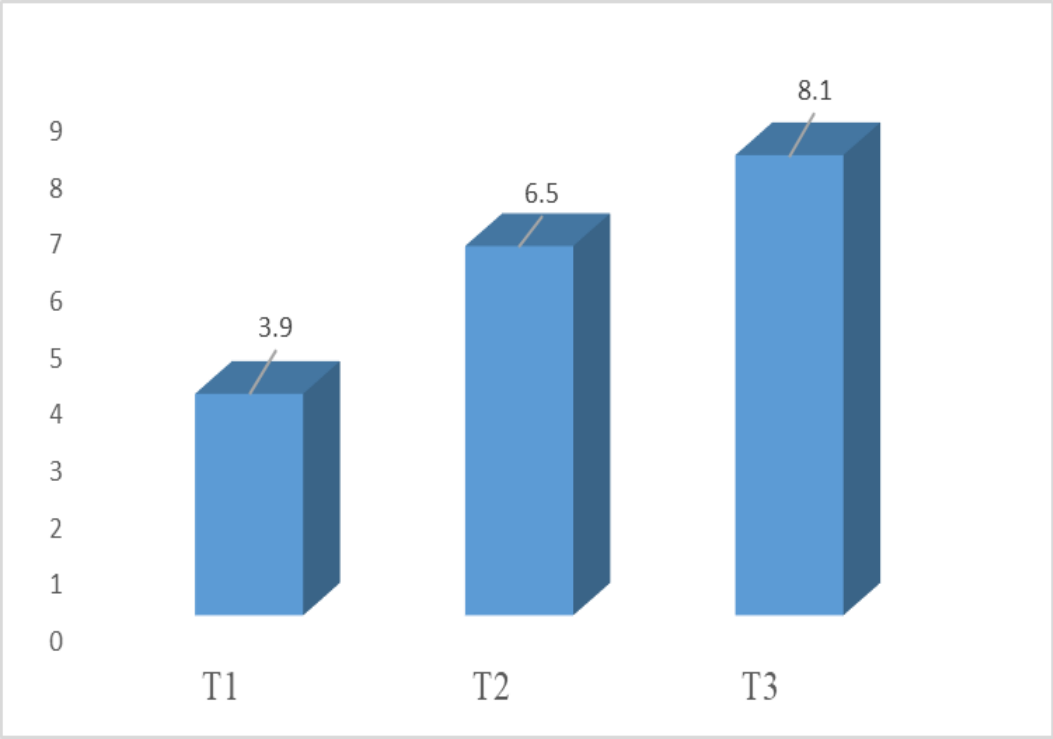


Table 2. Different growth parameters of *H. esculentus* on 30th day

Experiment	Leaf No.	Leaf length (cm)	Leaf width (cm)	Shoot length (cm)
T1	29	2.6	1.8	10.6
T2	34	2.9	1.9	15.2
T3	42	3.5	2.5	20.5

Fig.2 Effect of Vermicompost on *H. esculentus* plants height after 30 days

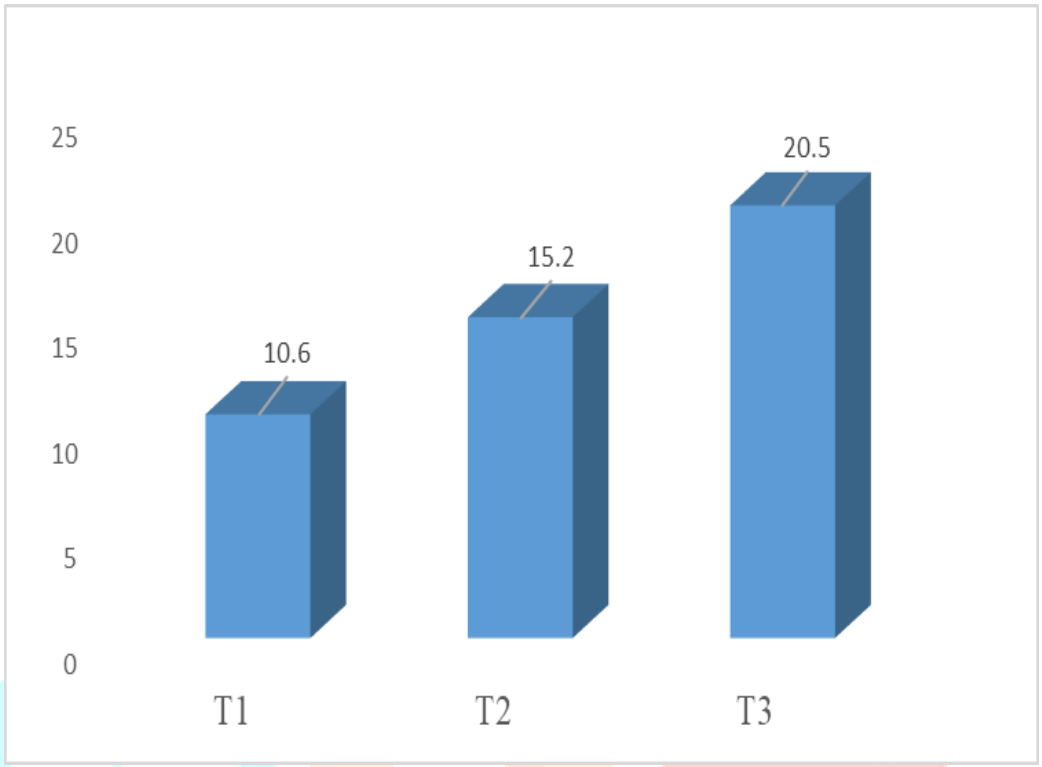
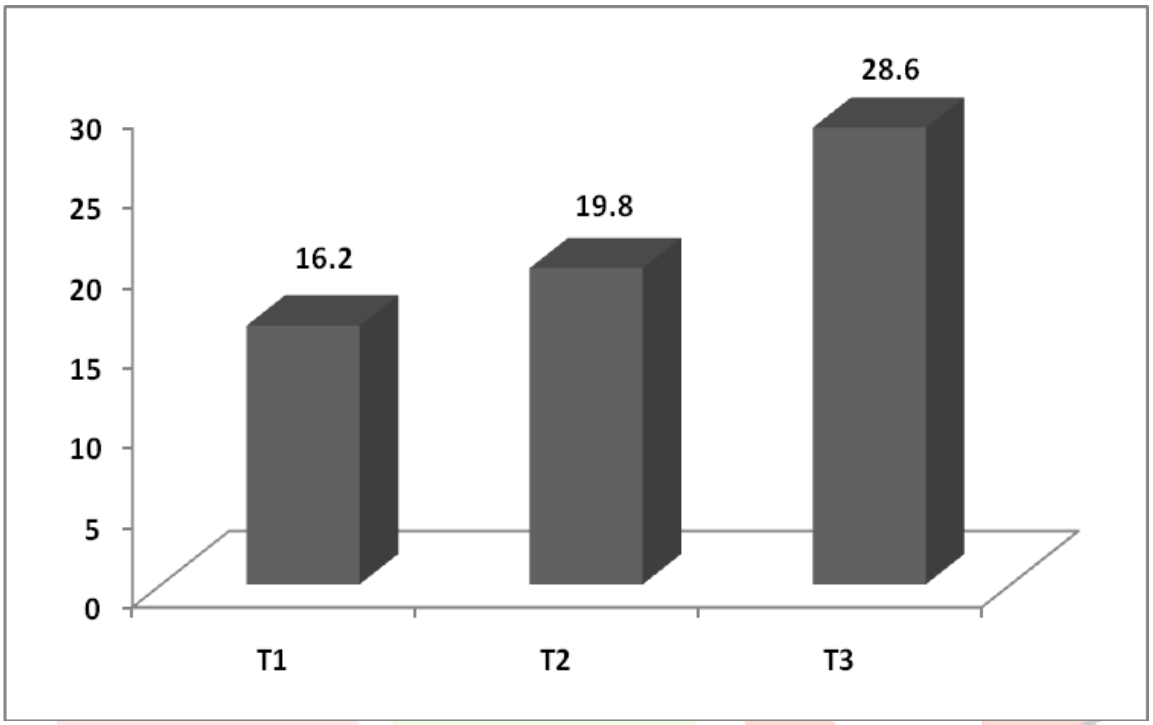


Table 3. Different growth parameters of *H. esculentus* on 45th day

Experiment	Leaf No.	Leaf length (cm)	Leaf width (cm)	Shoot length (cm)
T1	32	2.7	2.2	16.2
T2	46	3.2	2.8	19.8
T3	58	3.8	3.1	28.6

Fig.3 Effect of Vermicompost on *H. esculentus* plants height after 45 days



DISCUSSION

The present study stated that the germination percentage was higher in vermicompost treatment when compared to control. The higher percentages of germination were significantly improved by the sole application of vermicompost fertilizers. Table.1 is a clear evidence to support that the Vermicompost medium promote and enhanced the germination process of the *Hibiscus esculentus*. The application of vermicompost gave higher germination of hung bean (*Vigna radiata*) compared to the control. The growth and yield of mung bean was also significantly higher with vermicompost application (Karmegam *et al.*, 1999).The increases in growth, flowering and crop yields are due to earthworms as they increase microbial populations that produce plant growth hormones (Paterson, 2003).

The result in the two tables demonstrate that the growth of lady finger plants grown in vermicompost soil was maximum (19.8cm) along with number of leaves (46) as compared to growth of lady finger plants grown in cow dung and soil compost (28.6cm) and number of leaves (58) which was further maximum than the lady finger plants grown in garden soil height (16.2cm) and number of leaves (32) respectively.

SUMMARY AND CONCLUSION

In this present study, application of vermicompost alone recorded higher shoot length, over the control. The plant height was increased significantly due to the application of vermicompost and inorganic fertilizer. It is also suggested that vermicompost is more favorable for better yield of *Hibiscus esculentus* plant and maintenance of soil environment and it can be economically and also environmentally suitable. The effect of vermicompost on the growth and yield significance when compared to control. Marketing vermicompost is know potential and flourishing Industry due to the growing awareness among the people about the ill effect of chemical fertilizer and the relative benefit of organic farming.

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