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VERMI-COMPOSTING OF MUNICIPAL SOLID WASTES AND *Eichorniacrassippes USING Eudriluseuginiae*

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Short Profile

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ABSTRACT:

Biodegradable wastes constitute about 50 percent of the Municipal Solid Wastes in India. Vermi-composting is an age-old and proven technology of converting organic wastes into useful compost. In the present study, an attempt has made to produce vermi-compost using *Eudrilluseugi- niae* from various ratios of mixtures of 3 different solid wastes and one weed plant. They were food wastes, vegetable wastesand garden wastes, and *Eichornia crassippes* plant. The quality of compost prepared from various combinations was compared. The compost prepared from the combination in which *Eichorniacrassippes* was taken in 2 portions and others taken in 1 portion each was found to be of supreme in quality in terms of nutrient content.

KEYWORDS

Earth-worm,biological decomposition, compost, weed plant, NPK.

INTRODUCTION :

Large amounts of municipal solid wastes are generated every day all over the world. In India 30.3 million tons of Municipal Solid Wastes is generatedevery year (Chandra and Devi, 2009). Safe disposal of municipal solid wastes is a great challenge for the municipal bodies in India(Rathi, 2006; Sharholy*et al*., 2005; Ray *et al*., 2005; Jha*et al.*, 2003). It has been found that, more than 40% - 50% of its composition is of biodegradable in nature in India (Sharholy*et al*., 2007). It suggests that, by subjecting these wastes to biological decomposition (aerobic / anaerobic) the burden on landfilling can be greatly reduced (Achsah and Prabha, 2013). Moreover, the compost produced from aerobic decomposition can reduce the usage of inorganic fertilizers (Chauhan *et al*., 2010, Euras., 2009) and thereby reduce the carbon footprint substantially. *Eichorniacrassippes* is a weed plant found infested in many of the surface water bodies in Tiruchirappalli due to water pollution. Removal and disposal of this weed is another challenge for the local bodies.

Vermi-composting is an age-old, proven and promising technology in converting the organic wastes into useful compost (Mathur*et al*., 2006). Many research studies have been already done in this field and are being conducted to improve and optimize this technology. In the present study, an attempt has made to produce vermi-compost using *Eudrilluseuginiae* from various ratios of mixtures of 3 different solid wastes and one weed plant with cow-dung. They were food wastes, vegetable wastes and garden wastes, and *Eichornia crassippes* weed plant. The quality of compost prepared from various combinations was compared.

Materials and Methods

The organic wastes for the present study were procured from different sources: food wastes, vegetable wastes and garden wastes from Bishop Heber College, Tiruchirappalli; and cow dung from Bharathi Nagar, Tiruchirappalli, a residential area. The weed plant, *Eichorniacrassippes* was collected from the Uyyakondan channel, Tiruchirappalli. The solid materials were mixed in different ratios as described in table 1 and subjected to initial decomposition without earthworms for 10 days to produce semi-compost. The chemical characteristics (including N, P, K) of these mixtures of semi-compost were determined. These semi-decompost mixtures were subjected to vermi-composting by introduction of the earth worm, *Eudrilluseuginiae*. About 60 adult individual earth worms were introduced in each of the mixtures (combinations) taken in separate bins. A control bin with soil only was also introduced with earthworms. At the end of 45th day, the vermi-compost was harvested from 5 combinations of mixtures and one control and their chemical characteristics were determined using standard methods (Trivedy and Goel, 1998).

Table 1: Waste mixtures and their ratios

Combination	Semi-decompost	Ratio by mass
I	*Eichorniacrassippes:*Food wastes: Vegetable wastes: Garden wastes: Cow-dung.	2:1:1:1:1
II	Food wastes: Vegetable wastes: Garden wastes: *Eichorniacrassippes:* Cow-dung.	2:1:1:1:1
III	Vegetable wastes: Food wastes:Garden wastes: *Eichorniacrassippes:*Cow-dung.	2:1:1:1:1
IV	Garden wastes: Food wastes:Vegetable wastes: *Eichorniacrassippes:*Cow-dung.	2:1:1:1:1
V	Cow-dung: Food wastes: Vegetable wastes:Gardenwastes:*Eichorniacrassippes.*	2:1:1:1:1
Control	Only soil	---

RESULT AND DISCUSSION:

The chemical characteristics of semi-compost and vermi-compost are presented in Figures1-5.

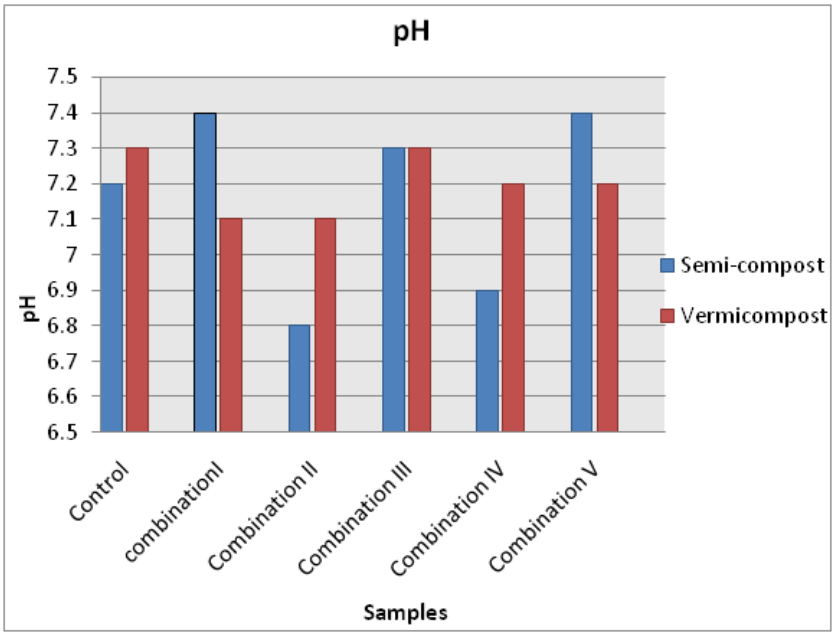

Figure 1: pH of semi-compost and vermi-compost

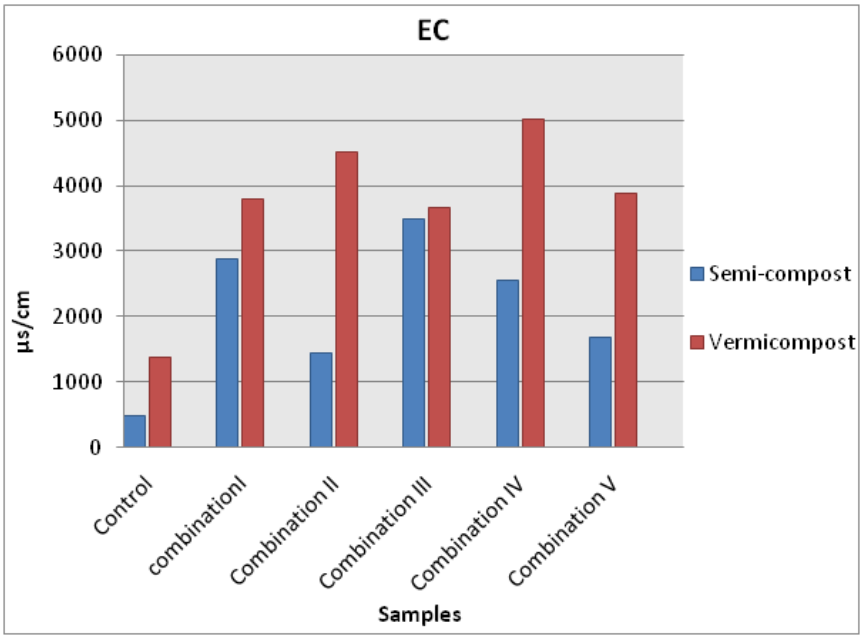

Figure 2: Electrical Conductivity of semi-compost and vermi-compost

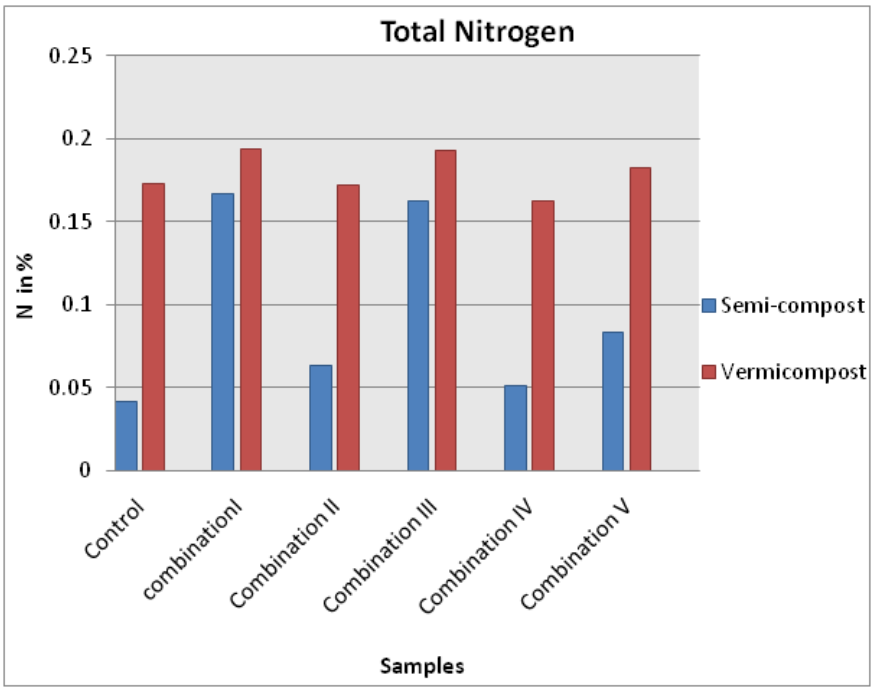

Figure 3: Total Nitrogen of semi-compost and vermi-compost

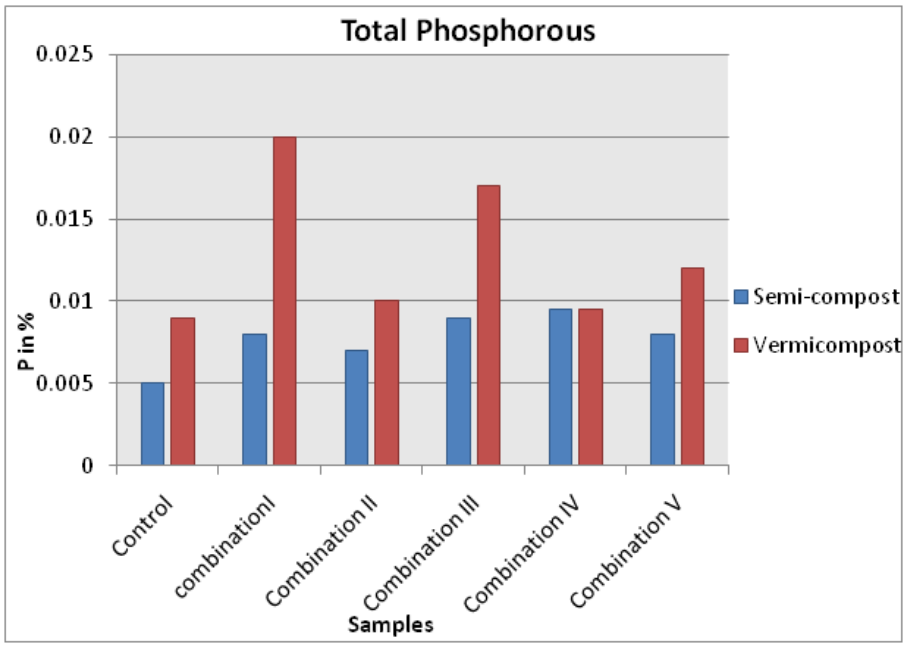

Figure 4: Total Phosphorous of semi-compost and vermi-compost

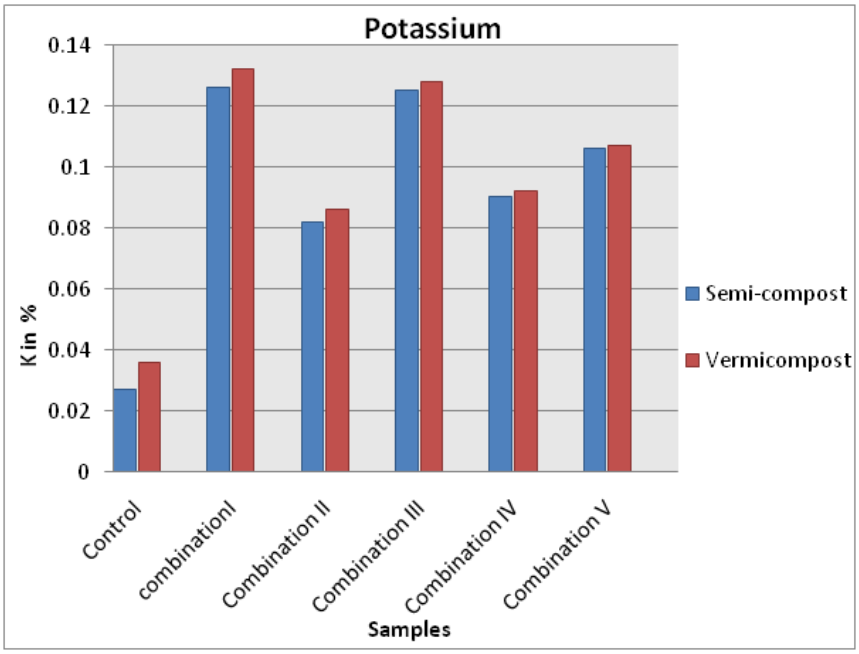

Figure 5: Potassium of semi-compost and vermi-compost

The pH of Vermi-compostof the different combinations varied from 7.1 to 7.4 while, that of semi-compost varied from 6.8 to 7.4. In some cases, the pH increased in vermi-compost when compared to that of semi-compost while in others, the opposite was noticed. However, the pH values were within the accepted range.

EC values increases substantially in vermi-compost of all combinations. It is due to breaking down of organic substances into inorganic materials by earthworms through ingestion and then defecating (Shanmugapriya and Lakshmiprabha, 2011).

There was significant increase in total Kjeldhal Nitrogen values in vermi-compost. It ranged from 0.162%, to 0.194%.The highest TKN – 0.194% was found in combination I. The increase in nitrogen is due to metabolic product of earthworms in the form of cast, excretory product, mucoproteins and earthworms' tissue (Muthukumaravelet al, 2008).

Phosphorous too increased substantially in vermi-compost of all combinations. It ranged from 0.009% to 0.02%. The highest phosphorous was found in combination-I.

Potassium values slightly increased in vermi-compost in all the combination. It ranged from 0.086% to 0.132%. The highest K value was found in combination I.

It is also noted that, the NPK values increased in final product in control too. It is due to excretory products and wastes products and wastes products of earthworms.

Of all the combinations, the combination I (in which 2 portions of *Eichorniacrassippes* plant was taken) was found to be supreme in quality in terms of NPK.

CONCLUSION:

It is observed from this present study that, organic wastes and *Eichorniacrassippes* plant can be converted into useful vermi-compost by subjecting them into vermi-composting process. It is concluded that, *Eichornia crassippes* plant contributes to increase in NPK values.

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