Biochemical Studies on Leaf Litter for the effective Earthworm processed compost

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Abstract: *Earthworms are extremly important and play a vital role in recycling plant nutrients and areating the soil. Leaf litters of two different plants have been used to prepare vermicomposts, their phytochemical constituents, nutrient level, chlorophyll estimate, and relative water content were studied in the present investigation. The present investigation of phytochemical analysis of the Tectona grandis leaves and Saccharum officinarum leaves revealed that the presence of saponins, alkaloids, flavonoids, glycosides, sterols, tannins, carbohydrate, amino acids and protein but sterols was absent in Saccharum officinarum leaves. It was also found that Tectona grandis is the substrate in which vermicomposting rates are high when compared to the Saccharum officinarum in the current study The earthworms are also grow and multiply rapidly in this substrate. The low cost Technology followed in the current study can be transferred to the local farmers for revenue generation*

Key Words: *Vermicompost, Chlorophyll content, Water content, NPK, and, Phytochemical analysis.*

1. INTRODUCTION:

Earthworms are the most important soil dwelling organisms involved in the process of soil formation and organic matter decomposition *Eudrilus euginiae.* (Kinberg) is the commonly used earthworms for vermicomposting in tropical and sub–tropical countries (Kale *et al.,* 1992) residue. Chlorophyll is a green photosynthetic pigment which helps plant to get energy from light. The plants use the energy to combine carbon dioxide and water into carbohydrate to sustain their life process. There may be many factors affect the photosynthesis; the main factors are light intensity, carbon dioxide concentration, and temperature (P.A. Jolliffe and E.B. Tregunna, plant physiol 1968). Measurement of water content expressed on a tissue fresh or dry mass have been mostly replaced by measurements based on the maximum amount of water a tissue can hold. Several studies have focused on developing appropriate techniques for measuring RWC (Weatherley,1950; Catsky,1960; Barrs & weatherley). Water content and water potential have been widely used to quantity the water deficits in leaf tissues. In the present investigation of this study waste management and a trial has been undertaken with the locally available leaf litter vermicomposts to find out the Nitrogen, Potassium, Phosphorus, water content chlorophyll content. Phytochemical screening of *Saccharum officinarum* Linn with different fractions of solvents revealed the presence of flavonoids, carbohydrates, phenols, anthraquinones, glycosides, proteins, alkaloids, tannins, sterols, terpenoids and saponins. Phenolic compounds are synthesized in plants as secondary metabolites. They exhibit several biological activities such as: antioxidation, anti-inflammation, anti-ageing, as well as inhibition of angiogenesis and cell proliferation

2. MATERIALS AND METHODS:

COLLECTION AND PRE DECOMPOSITION OF LEAF LITTERS

The leaf litter was collected from vaigai in and around agricultural area Periyakulam Taluk, Theni district. The collected leaf litter (*Tectona grandis* and *Saccharum officinarum)* was chopped into small pieces and allowed to partial decomposition for fifteen days. Then the waste was then mixed with cow dung in 3:1 ratio.

The present study aimed at finding out the biophysical and biochemical parameters of the earthworm, and vermicomposts obtained from the leaves teak (*Tectona grandis and* sugarcane *(Saccharum officinarum)* leaf litter.

COLLECTION OF EARTHWORM

In the present investigation has been carried out in the laboratory for a period of 5 months. The experimental earthworm was collected initially from local vermiform. It was cultured in the laboratory itself and was as used as a pool which from the worms was taken for further examination. This will provide the suitable temperature for the worms. The earthworm was acclimatized to the laboratory condition for a period of 15 days before the commencement of the experiment. 20 numbers of earthworms (*Eudrilus euginiae)* was inoculated into experimental trough. Each trough contains 1kg of decomposed materials and 20 numbers of earthworm (*Eudrilus euginiae*). Jaggary and ragi flour mixed with water was sprinkled. These materials are helpful for easy consumption of food. Water was sprinkled on alternate days and hand mixing was done regularly.

Chlorophyll content of the leaf litter

- One gram of finely cut and well mixed sample of lea was taken. It was ground to fine pulp with mortar and pestle by adding pinch of MgCO3and 1ml of acetone.
  The mixture was washed with 9ml of acetone and it was then centrifuged at 5
  00rpm for 5 minutes.
  Calculation
  Supernatant was collected and Optical density was read at 600 and 540 nm.

M_g of total chlorophyll tissue = 20.2 x (absorbance at 660 nm) +
8.02 (absorbance at 540 nm) x V/100 × W

V = Final volume of extract in ml.
W = 1 gm (Weight of the sample).

Estimation of Water Content of the Leaf Litter

In order to calculate RWC, leaf fresh weight samples were weighed, then were submerged in distilled water and finally were direct at 70° C for 48hrs and were weighed again. RWC was calculated according to Dhopte and Manuel (2002).

RWC = (FW – DW / TW – DW) ×100 Where FW is fresh weight, DW is dry weight and TW is turgor weight of leaf samples. Estimation of NPK and Phytochemical analysis of the leaf litter

3. RESULT AND DISCUSSION:

Earthworms can be cultured and put to various uses ie. To improve and maintain soil fertility, to convert organic waste into manure, to produce earthworm based protein food (earthworm meal) for livestock, drug and vitamins source, as natural detoxicant (Paoletti, 1991) and a bait for fish market (Ghosh, 2004).

Earthworms are the most important soil dwelling organisms involved in the process of soil formation and organic matter decomposition *Eudrilus euginea* (kinberg) and *Perionyx excavatus* (perrier) are the commonly used earthworms for vermicomposting in tropical and sub – tropical countries (Kale et al., 1982; Edwards, 1998 arket (Ghosh, 2004). Golchin *et al*., (2006) reported that leaf area index (LAI) and chlorophyll content of the leaves of pistachio seedlings, as well as the photosynthesis rate were better in vermicompost treatments relative to the treatments without vermicomposts.

The present investigation deals with the biochemical studies on leaf litter for the effective earthworm processed compost for enhancement of crop production.

The chlorophyll content was more in *Tectona grandis* and was lower in *Saccharum officinarum* leaf litter.

The water content was more in sugarcane and was lower in *Tectona grandis*.

The two leaf litter was used to raised on the vermicomposts in the present study and to analysis of Nitrogen, Phosphorus and Potassium.

In the present investigation, leaf litters of two different plants were u prepare vermicomposts, their nutrient level was studied. The results revealed that the nutritional status (NPK) higher in the vermicomposts *Tectona grandis* and lower in *Saccharum officinarum* leaf litter then the compared with control.

Table1. Effect of water deficit on related water content in *Tectona grandis and Saccharum officinarum* leaf litter.

S.NO	Name of the leaves	Fresh weight	Dry weight	% RWC
1.	*Tectona grandis*	7.43 ± 0.s81	4.77 ± 0.63	154.2
2.	*Saccharum officinarum*	18.01 ± 1.53	13.01±1.51	397.36

Fig 1.Effect of chlorophyll content of the*Tectona grandis and Saccharum officinarum* leaf litters.

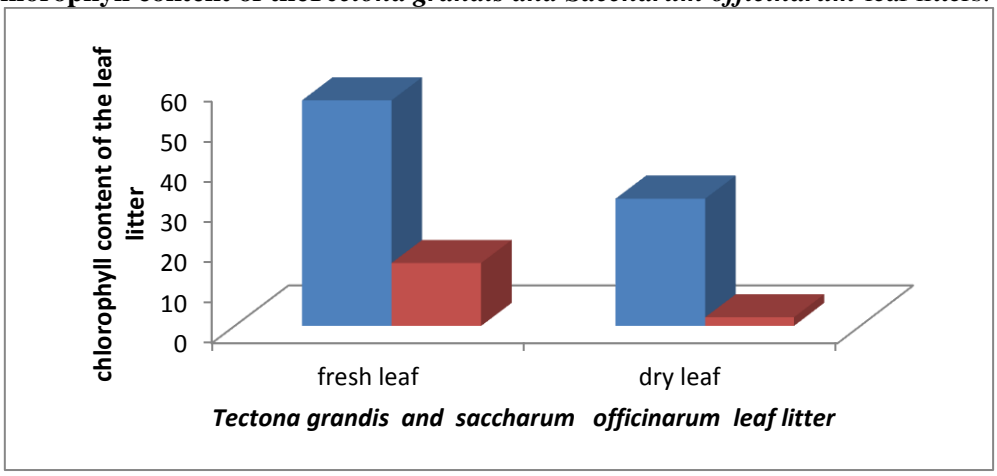

Table 2. The NPK level of the leaf litter vermicomposts.

S. No	Name of the substrate	N %	P%	K%
1	*Tectona grandis*	5.43	0.8	0.6
2	*Saccharum officinarum*	2.93	0.3	0.3
3	Control	1.3	0.1	0.6

Phytochemical constituents of leaves *Tectona grandi s*and *Saccharum officinarum*

Constituents	Test	*Tectona grandis*	*Saccharum officinarum*
Alkaloids	Mayer's test Draendroff's test Wagner's test	+ + -	+ + -
Carbohydrate	Molish test Fehling test Benedicts test	+ + -	+ + -
Protein and amino acids	Millon's test Ninhydrin test Biuret test	+ - +	+ - +
Glycosides	Keller killiani test	+	+
Phytosterols	Salkowski test Leibermannburchard test	+ +	-
Flavonoids, Saponins	Broth test	+	+
Cowmarins	NaOH test	+	+
Tannins	FeCl3	+	+
Flavonoids	NaOH test	+	+

The present investigation on phytochemical analysis of the *Tectona grandis* leaves and sugarcane leaves revealed that the presence of saponins, alkaloids, flavonoids, glycosides, sterols, tannins, carbohydrate, amino acids and protein but sterols was absence in *Saccharum officinarum* leaves.

The various phyto constituents isolated from *Tectona grandis* areJuglone, which has been reported to anti-microbial activity (GupthaPK.,*et al.,* 2008), betulin aldehyde shows anti-tumor activity (pathak KR.,*et al.,*1988) , lapachol shows anti-ulcerogenic activity(Goel RK., *et al.,* 1987). Phytochemical screening of *Saccharum officinarum*Linn with different fractions ofsolvents revealed the presence of flavonoids, carbohydrates, phenols, anthrax quinones, glycosides, proteins, alkaloids, tannins, sterols, terpenoids and saponins. Phenolic compounds are synthesized in plants as secondary metabolites. They exhibit several biological activities such as: antioxidation, anti-inflammation, anti-ageing, as well as inhibition of angiogenesis and cell proliferation. Most of these biological activities have been associated with their intrinsic reducing capability towards proxidants.

4. SUMMARY:

- Earthworms are extremly important and play a vital role in recycling plant nutrients and areating the soil. Leaf litters of two different plants have been used to prepare vermicomposts, their phytochemical constituents, nutrient level, chlorophyll estimate, and relative water content were studied in the present investigation.
- The present investigation of phytochemical analysis of the *Tectona grandis* leaves and *Saccharum officinarum* leaves revealed that the presence of saponins, alkaloids, flavonoids, glycosides, sterols, tannins, carbohydrate, amino acids and protein but sterols was absent in *Saccharum officinarum* leaves.
- It was also found that Tectona grandis is the substrate in which vermicomposting rates are high when compared to the *Saccharum officinarum* in the current study.
- The earthworms are also grow and multiply rapidly in this substrate.
- Chlorophyll content is high in *Tectona grandis* when compared to the *Saccharum officinarum* leaf litter.
- Water content is high in *Saccharum officinarum* leaf litter when compared to *Tectona grandis* leaf litter. Therefore,*Tectona grandis* may be considered as High rate composter from this present investigation.
- The low cost Technology followed in the current study can be transferred to the local farmers for revenue generation

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