



## Vermicomposting potential of earthworm species of Jammu on leaf litter of avenue trees.

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### ABSTRACT

In present study the dry leaf litter of avenue trees has been vermicomposted in 28-44 days using four local earthworm species *Perionyx sansibaricus* (Michaelsen, 1891), *Lampito mauritti* (Kinberg, 1866), *Metaphire posthuma* (Vaillant, 1868) and *Amyntas morrisi* (Beddard, 1892). Out of four species the *Perionyx sansibaricus* produced maximum vermicompost exhibiting vermicomposting potential of 29%, 30.96%, 25.07% and 26.0% during May-July, Aug-Oct, Nov-Jan. and Feb-Apr. respectively. The vermicompost produced by *Perionyx sansibaricus* also showed a maximum concentration of NPK.

**KEYWORDS :** Earthworms, leaf litter, Potential, vermicomposting and Vermiculture.

### Introduction:

Increasing afforestation in urban area due to increase in awareness of climate change, air pollution and many more ultimately leads to increase in leaf litter generation. Almost all the trees exhibit sequential senescence of leaves throughout the year and all the deciduous trees exhibit synchronous senescence of leaves during winter. All these leaves are collected at a spot and are burnt and it is known fact that burning of these leaves releases the carbon that has been sequestered in them. Moreover, these leaves are not decomposed due to metalled roads as well as cemented ground. In presence of humid conditions or dampness these become favorable environment for breeding and multiplication of various insect vectors. If this leaf litter is subjected to vermicomposting it would help in combating the spreading problem of environmental pollution in addition to generation of resource (Vermicompost).

In present study attempt has been made to vermicompost the dry leaf litter of avenue trees using four local earthworm species *Perionyx sansibaricus* (Michaelsen, 1891), *Lampito mauritti* (Kinberg, 1866), *Metaphire posthuma* (Vaillant, 1868) and *Amyntas morrisi* (Beddard, 1892).

### MATERIALS AND METHOD:

**Collection of earthworms:** Epigeic species of earthworms (*Perionyx sansibaricus* (Michaelsen, 1891), *Lampito mauritti* (Kinberg, 1866), *Metaphire posthuma* (Vaillant, 1868) and *Amyntas morrisi* (Beddard, 1892), has been identified by Dr JM Julka Former Jt Director & Emeritus Scientist Zoological Survey of India ) has been collected from moist, well aerated, loose soils rich with organic matter, at a depth of 3 to 10 cm from soil surface in the urban and sub-urban areas of Jammu District.

**Preparation of Vermibeds:** Vermibeds were prepared in wooden boxes of size 40cm x 30 cm x 26 cm using paddy straw, sand and garden soil and 40g of earthworms in each vermibed. **Processing of bio waste:** 240 gm of Shredded leaf litter was separately transferred after soaking in 24hrs into vermibeds slowly in a period of 2-3 days replicas of three sets of vermibeds for each type of waste were prepared **Collection of vermicompost:** After the completion of vermicomposting process, the loose layer of soil along with decomposed organic material (bio waste) from each type of vermibed was collected. **N,P,K analysis** of all types of vermicompost produced by different types of earthworm species on leaf litter was carried out in fertilizer lab of Agriculture Department Jammu using Kjeldahl method for nitrogen, Gravimetric Quinolinium Phosphomolybdate method for Phosphorus and (Sodium Tetra Phenyl Borate) method for Potassium respectively.

### RESULT AND DESCUSION: (Table-1 and II ).

Overall analysis of vermicompost production by different species of earthworms on leaf litter revealed that *Perionyx sansibaricus* produced maximum (87.23±4.80 Gm, 92.87±13.43 gm, 75.25±1.81 gm and 78.00±2.64 gm) vermicompost during May-July, Aug-Oct, Nov-Jan. and Feb-Apr. exhibiting vermicomposting potential of 29%, 30.96%, 25.07% and 26.0% respectively followed by *Amyntas morrisi* which produced 63.05±4.14 gm, 67.06±10.32 gm, 44.96±2.46 gm and 51.29±4.05 gm vermicompost and *Lampito mauritti* which produced 63.91±5.01 gm, 71.65±8.48 gm, 44.12±1.85 gm and 46.02±6.58 Gm vermicompost during May-July, Aug-Oct, Nov-Jan. and Feb-Apr. respectively. Minimum vermicompost of 45.11±4.01 Gm, 50.79±7.33 Gm, 42.01±1.00 Gm and 43.65±4.15 Gm was produced by *Metaphire posthuma* during May-July, Aug-Oct, Nov-Jan. and Feb-Apr. respectively.

From the above analysis it can be concluded that the vermicompost production potential of earthworm species varied with type of earthworm species used and also during different seasons of the year. More or less similar observations were made by different workers using different species of earthworms on different substrates. Sinha and Sinha (2000), Chaudhuri *et al.* (2003) while studying the biodegradation potential of different earthworm on organic waste using mixed species of *Eudrilus eugeniae*, *Eisenia foetida* and *Perionyx excavates*.

The pH of all the vermicomposts was slightly alkaline. The N,P and K content of vermicompost varied with type vermicompost produced by different species of earthworm. The N,P and K content of vermicompost produced by *Perionyx sansibaricus* exhibited higher values as compared with that of produced by other species. The vermicompost produced from leaf litter by different species of earthworms was observed to be rich in concentration of NPK, similar observation were also made by Graff (1970), Dussere (1902) and Nethra *et al* (1999) while working on different substrates using different earthworm species. The vermicompost produced from leaf litter can be used in agricultural fields for production of crop as Indian farmers already facing the challenge for shortage of chemical fertilizer and Govt. of India have subsidies on chemical fertilizer, in the year 2014-15 Indian Govt. released approximately 2163.07 crores for P&K fertilizers. So it is the time to switch over easy and sustainable green technology like vermicomposting for increase in production of agricultural products and give solution for scientific management of leaf litter.

**Table: 1 Vermicompost production potential of different earthworm species during different season of the year.**

Season	Earthworm species				
	Parameter for vermicompost Production potential.	<i>Perionyx sansibaricus</i>	<i>Lampito mauritti</i>	<i>Metaphire posthuma</i>	<i>Amyntas morrisi</i>
May-July	Avg. vermicompost production in gm.	87.23±4.80	63.91±5.01	45.11±4.01	63.05±4.14
	Avg. percentage of vermicompost harvested	29.08%	21.30%	14.96%	20.04%
	Average number of days for harvesting	30.66	31.00	32.00	31.33

Aug-Oct	Avg. vermicompost production in gm.	92.87±13.43	71.65±8.48	50.79±7.33	67.06±10.32
	Avg. percentage of vermicompost harvested	30.96%	24.00%	17.04%	22.93%
	Avg. number of days for harvesting	28.33	29.00	32.00	31.00
Nov-Jan	Avg. vermicompost production in gm.	75.25±1.81	44.12±1.85	42.01±1.00	44.96±2.46
	Avg. percentage of vermicompost harvested	25.07%	14.71%	14.00%	14.99%
	Avg. number of days for harvesting	41.5	42.00	44.00	43.00
Feb- Apr	Avg. vermicompost production in gm.	78.00±2.64	46.02±6.58	43.65±4.15	51.29±4.05
	Avg. percentage of vermicompost harvested	26.00%	15.20%	14.55%	17.1%
	Avg. number of days for harvesting	29.66	29.66	31.66	30.66

Table -2 Nutrient status of vermicompost produced by different species from avenue tree.

S.No	Vermicom post	pH	Total N %	Total P %	Total K %
1	VLP*	7.3±0.01	3.36±0.45	1.78±0.07	1.52±0.025
2	VLL*	7.1±0.03	3.1±0.4	1.48±0.08	1.47±0.03
3	VLM*	7.4±0.06	2.7±0.02	1.44±0.04	1.46±0.07
4	VLA*	7.2±0.15	2.41±0.06	1.13±0.12	1.21±0.05

- \*VLA – Vermicompost produced by *Amyntas morrisi* on Leaf litter.
- \*VLL- Vermicompost produced by *Lampito mauritii* on Leaf litter.
- \*VLM- Vermicompost produced by *Metaphire posthuma* on Leaf litter.
- \*VLP- Vermicompost produced by *Perionyx sansibaricus* on Leaf litter

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