

**S.I.C.E.S. DEGREE COLLEGE OF ARTS, SCIENCE  
AND COMMERCE**

DEPARTMENT OF ZOOLOGY

WELCOMES

**Certificate course in “Vermicomposting”**

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**Certificate course in “Vermicomposting”**

**Lecture No.1**

**Dr. Jyothi V.Mallia**

**Co-ordinator & Assistant Professor,  
Department of Zoology**

# Waste Waste Everywhere

- What do you see in the image?... Why Different colours....
- What are different types of wastes ?
- What do we do with it?
- Can you use an animal factory to manage your waste?
- Which animal?
- Any inexpensive technique where the byproducts can be economical ?
- Any technique which you can use in your household or neighbourhood?
- How it will help in sustainability and environmental Health



# TITLE: Vermicomposting



# Scope

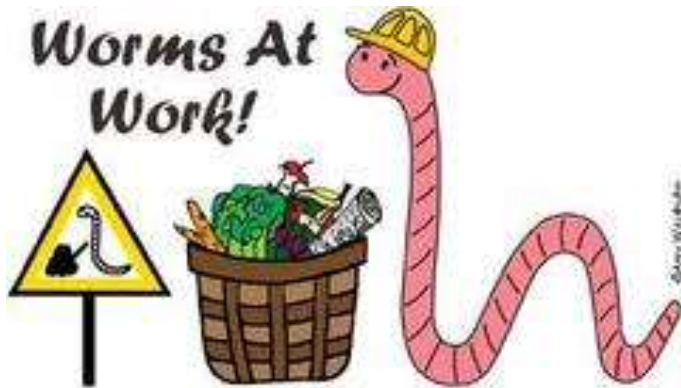
- ❖ Consequences of not managing the waste and 5 R's
- ❖ What kind of work force is required by our govt. to manage the waste but at individual level how can we contribute.
- ❖ At a personal level / in societies we can have Vermicomposting units/ wet waste composting units?
- ❖ List the advantages of managing waste.....



# Curriculum concepts to be covered in certificate course

1. Organic waste/House hold especially Kitchen waste management
2. Compost
3. Vermiculture
4. Advantages of Vermiculture
5. Funding facility available of Vermiculture
6. Training on composting & Vermi Composting and comparing its significance
7. Case study- Interaction and discussion with well established entrepreneur

# Activity



## ASSESSMENT: By Using point Scale

- Continuous assessment for 30 days  
5 points/day
- Feedback given on the problems encountered ( Eg. pest attack) 5 points
- Summative assessment (after 30 days)
- Final report - 5 points



# REFERENCES

[Waste recycling: Utilization of coffee grounds and kitchen waste in vermicomposting - ScienceDirect](#)

<https://api.taylorfrancis.com/content/books/mono/download?identifierName=doi&identifierValue=10.1201/b10453&type=googlepdf>

[https://www.wormfarmingsecrets.com/downloads/Vermiculture\\_FarmersManual\\_gm.pdf](https://www.wormfarmingsecrets.com/downloads/Vermiculture_FarmersManual_gm.pdf)

<http://iskv.in/wp-content/themes/iskv/volume-pdfs/2ec54d5af0747a4f5ee7160469e75dc0jkv-3-1-010.pdf>

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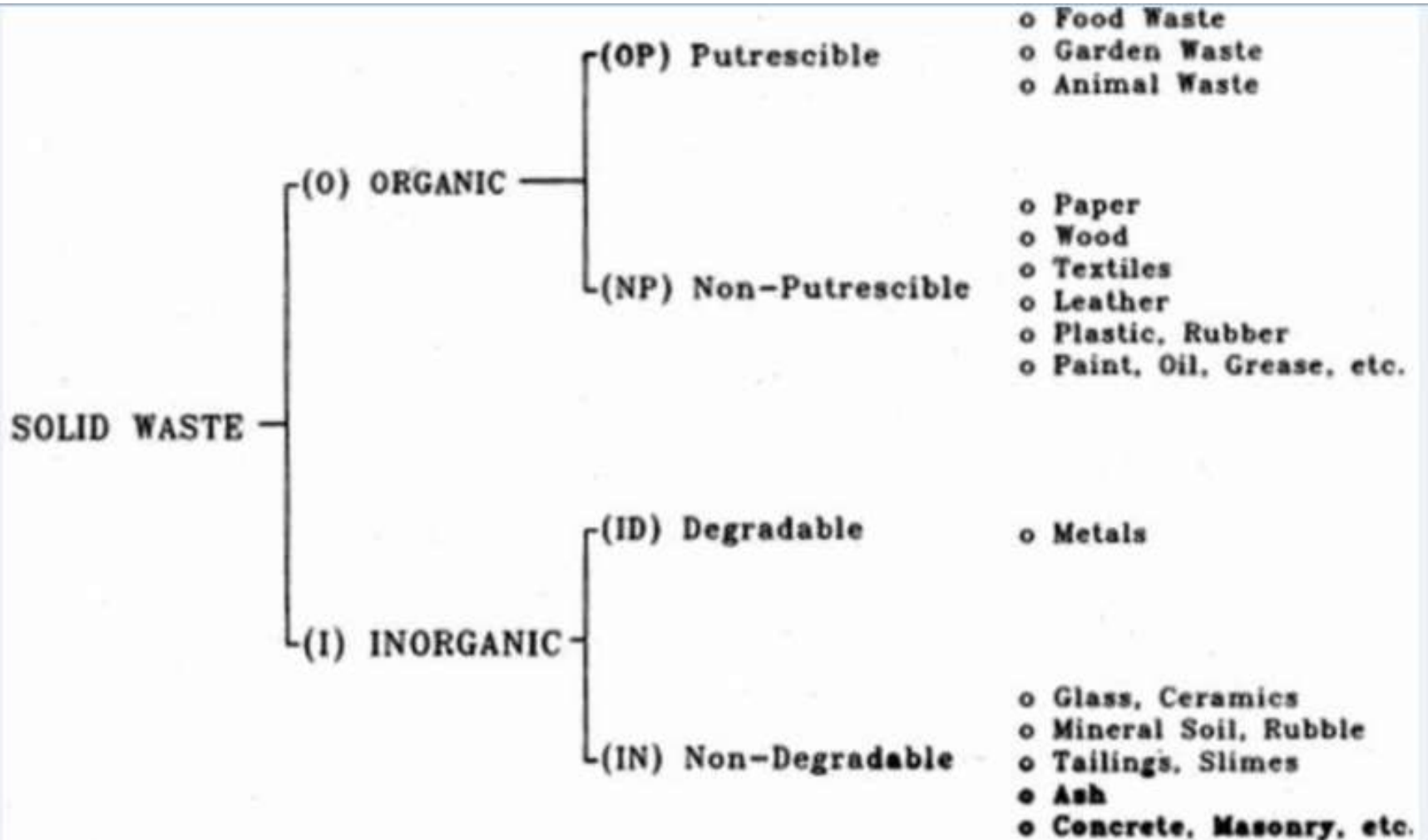
**Lecture No.2**

**Dr. Jyothi V.Mallia**

**Co-ordinator & Assistant Professor,  
Department of Zoology**

What is waste??

# Waste Classification



# Practical

- Earth worm & waste separation

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**Lecture No.3**

**Dr. Jyothi V.Mallia**

**Co-ordinator & Assistant Professor,  
Department of Zoology**

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# Earthworms of India

## Identification Key & Digital library

Developed by: Department of Zoology, School of Biological Sciences  
Doctor Harisingh Gour Vishwavidyalaya (A Central University)  
Sagar- 470003 (M.P.), India



[Home](#) [About Earthworms of India](#) [Taxonomic Parameters](#) [Photo Gallery](#) [Research Team and Acknowledgement](#)

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# Earthworms of India

- The earthworm fauna of India is well reported as compared to other Asian Countries. Presently, 445 valid species / subspecies of earthworms under 71 genera are known from the Indian territory, including the islands of Andaman, Nicobar and Lakshadweep.

| Sl No. | Family          | Genus (No) | *Species (No) |
|--------|-----------------|------------|---------------|
| 1.     | Acanthodrilidae | 02         | 24            |

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## External Characters

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- (i) Form, shape, length, diameter, number of body segments and colour (usually colour changes after preservation).
- (ii) Type of prostomium prolobic, epilobic, zygalobic, tanylobic.
- (iii) Number of annuli/segment at pre and post clitellar region.
- (iv) Number of segment from which dorsal pore begins.
- (v) Type of setal arrangements (perichaetine or lumbricine) distances between the pairs and setal formula.
- (vi) Position of spermathecal pores, male pores, female pores and prostatic pores. Position of pores has to be observed in synchronization of setal arrangement.
- (vii) Structure of pineal setae: to observe their structure, remove the pineal setae from the inner side of worm and mount on a slide in a drop of glycerine.
- (viii) Genital markings viz., papillae, pits, tubercula pubertitus (may or may not be present).

## Clitellum

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A mature earthworm shows a prominent circular band-like swelling in the skin near the anterior end is called as Clitellum. It covers over a few segments which are fused together. It can be flared, non-flared, saddle-shaped or annular.

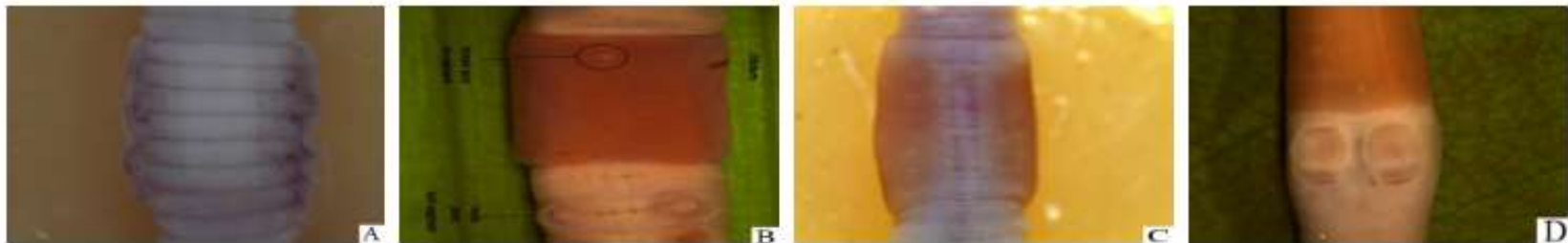


Fig: Various forms of clitellum in: A. *Glyphidrilus annandalei* (flared Clitellum); B. *Polypheretima elongata* (non flared Clitellum);

C. *Pontoscolex corethrurus* (saddle-shaped Clitellum); D. *Megascolex insignis* (annular Clitellum)

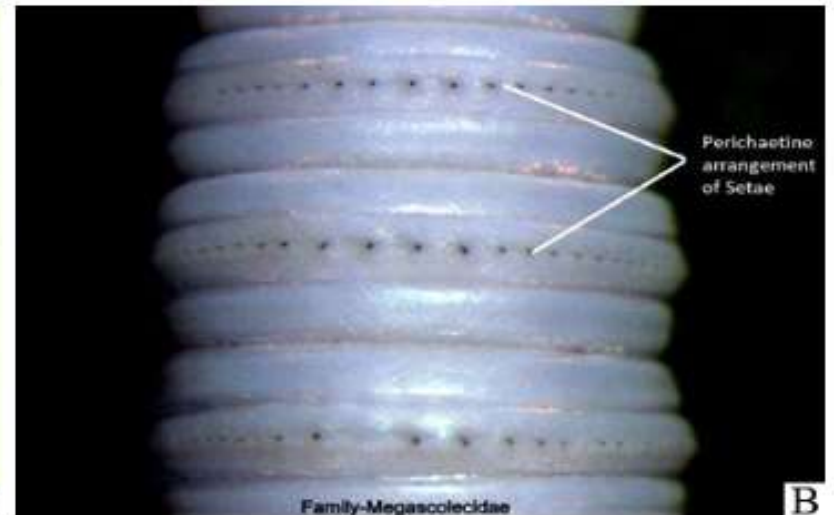
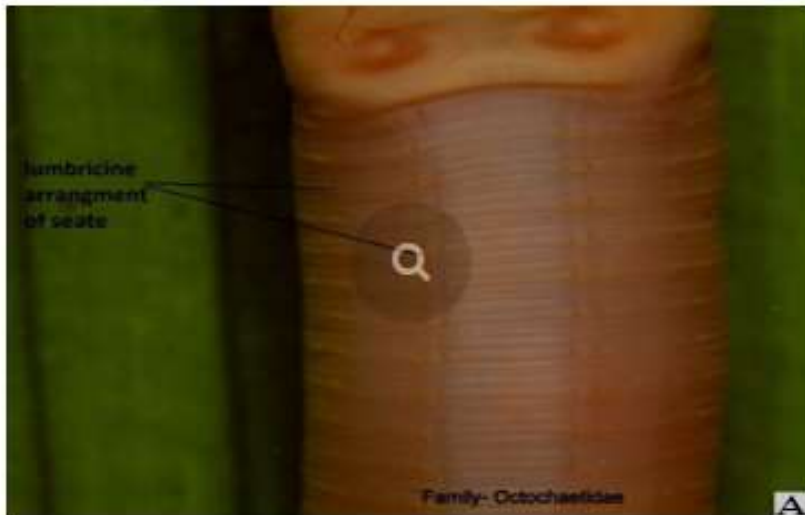
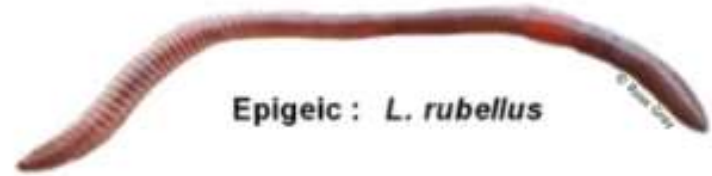
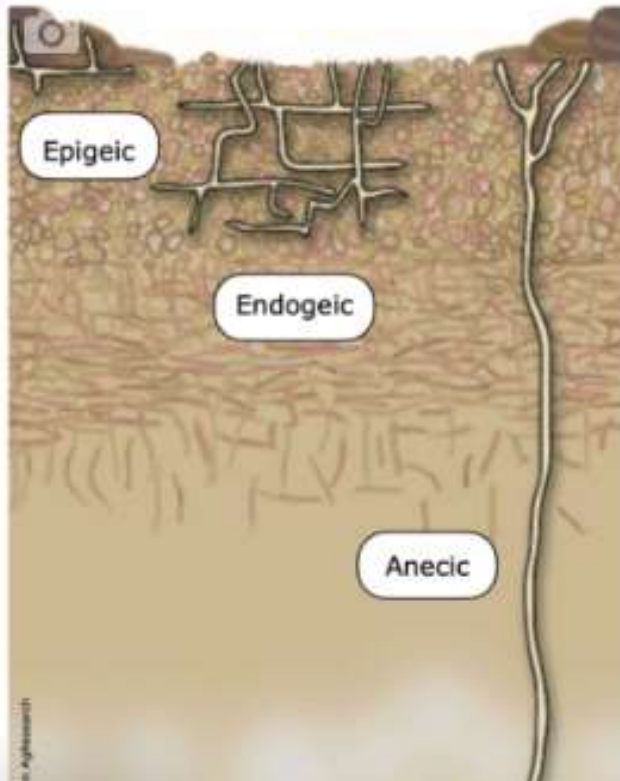


Fig: View of different arrangement of setae: A. Lumbricine arrangement; B. Perichaetine arrangement

# What we will cover

- Soil-dwelling earthworms fall into three main niche groupings: compost and soil-surface dwellers (epigeic),
- topsoil dwellers (endogeic)
- and deep-burrowing subsoil dwellers (anecic).



Epigeic : *L. rubellus*

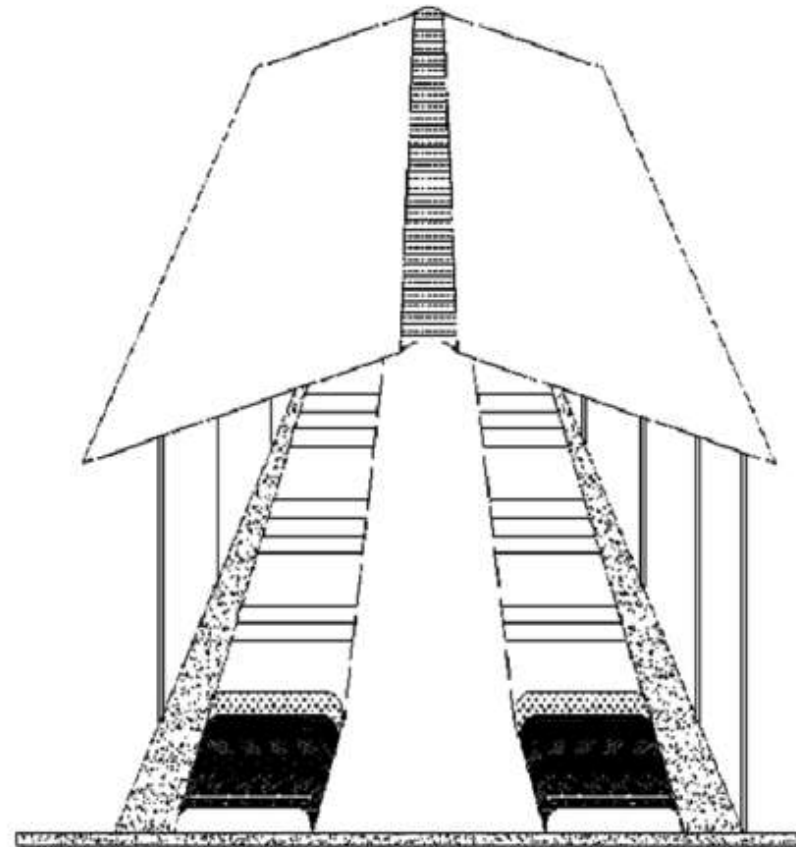
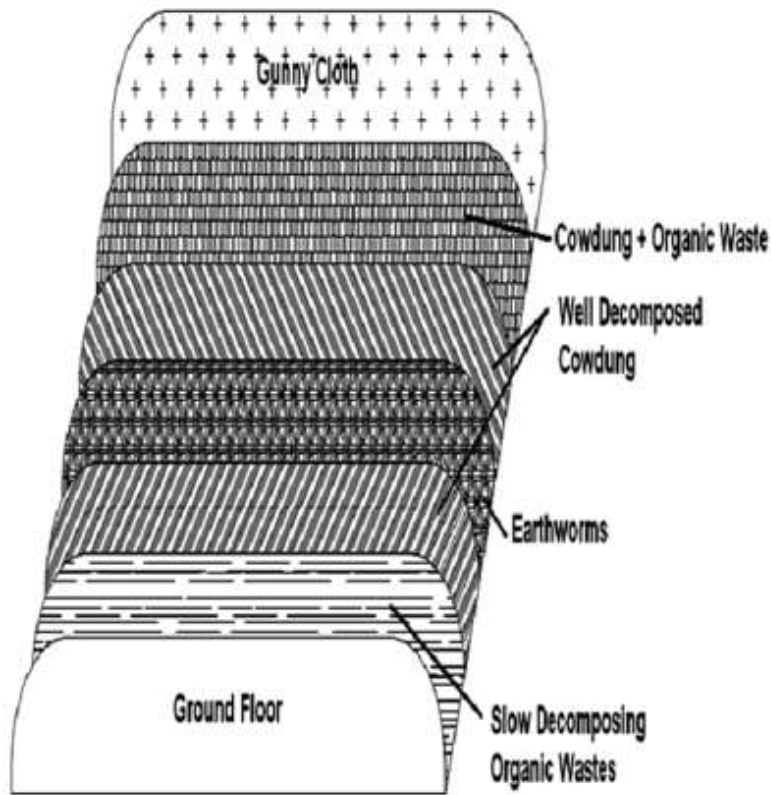


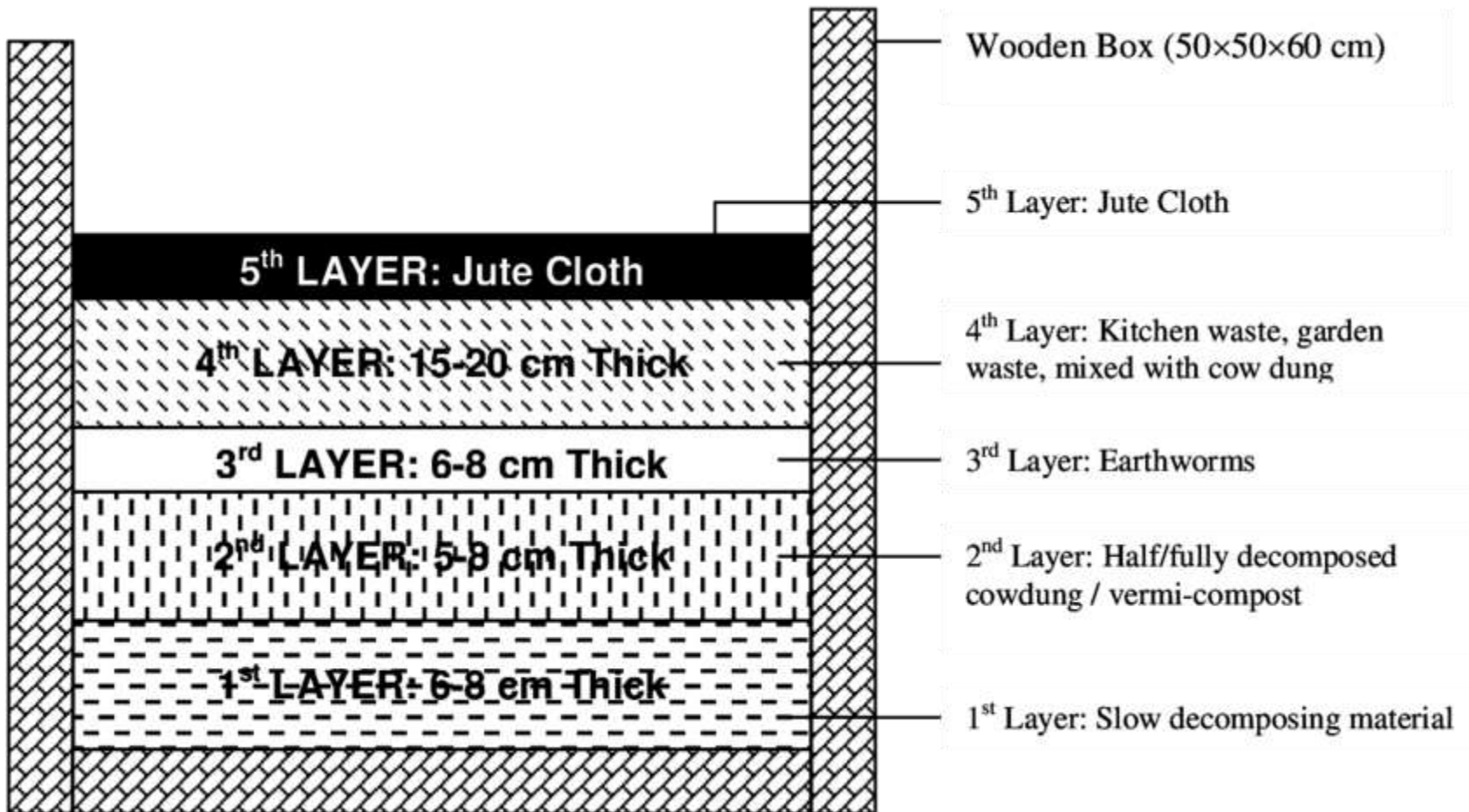
Endogeic : *A. caliginosa*



Anecic : *A. longa*

# formation of vermi bed and commercially established vermin beds





[https://www.researchgate.net/publication/262224852\\_Residue\\_management\\_and\\_composting\\_In\\_Organic\\_Agriculture](https://www.researchgate.net/publication/262224852_Residue_management_and_composting_In_Organic_Agriculture)

# VERMICOMPOSTING

Vermicompost is the product of composting using earthworms to create a homogeneous mixture of decomposing vegetable or food waste, bedding materials. It is the end-product of the breakdown of organic matter by earthworms containing water soluble nutrients. Vermicompost is an excellent, nutrient-rich organic fertilizer and soil conditioner. The process of producing vermicompost is called as vermi composting.

## SUITABLE SPECIES

The earthworm species most commonly used for Vermicomposting are:

- *Eisenia foetida* or *Eisenia andrej*
- *Perionyx excavatus*

## METHODS OF VERMICOMPOSTING

**Large Scale** - There are two main methods of large scale vermiculture

- **Windrow:** It consists of bedding materials for the earthworms to live in and acts as a large bin; organic material is added to it.
- **Raised bed or Flow-through system:** This system is well suited to indoor facilities, making them preferred choice for operation in colder climates.
- **Pits:** Some farmers opt for vermicomposting pits, digging a large hole in which to bury the worms and organic waste material. Of course, before adding the worms and bedding, farmers must line the pit to prevent worms from escaping into the surrounding soil.

**Small Scale** - For vermicomposting at home a large variety of bins are commercially available, or a variety of adapted containers may be used. They may be old plastic containers, wood, Styrofoam or metal containers. Bins however need holes or mesh for aeration.

## CLIMATE AND TEMPERATURE:

The most common worms used in composting systems, *Eisenia foetida* feed most rapidly at 15-25°C. They can survive at 10°C but temperatures above 30°C may harm them. If a worm bin is kept outside, it should be placed in a sheltered position away from direct sunlight and insulated against frost in winter.

## FEED STOCK

### SMALL-SCALE OR HOME SYSTEMS

Such systems usually use kitchen and garden waste, using "earthworms to digest organic wastes, such as kitchen scraps" This includes:

- All fruits and vegetables (including citrus and other "high acid" foods)
- Vegetable and fruit peels and ends
- Coffee grounds and filters, tea bags
- Grains such as bread, cracker and cereal (including moldy and stale)
- Eggshells (rinsed off)
- Leaves and grass clippings (not sprayed with pesticides)

### LARGE-SCALE OR COMMERCIAL

**Systems presently operating<sup>1</sup> use:**

- Dairy cow or pig manure
- Sewage and sludge
- Agricultural waste
- Food processing and grocery waste
- Cafeteria waste
- Grass clippings and wood chips

## PROPERTIES

Vermicompost has been shown to be richer in many nutrients than compost produced by other methods. It also has outperformed a commercial plant medium with nutrients added, but needed adjustment for magnesium and pH.

Unlike other compost, worm castings also contain worm mucus which helps prevent nutrients from washing away with the first watering and holds moisture better than plain soil.

### **BENEFITS**

- Improves soil aeration, enriches soil with micro-organisms by adding enzymes.
- Improves water holding capacity of soil.
- Enhances germination, plant growth and crop yield. It also improves root growth and structure.
- It enriches soil with micro-organisms (adding plant hormones).
- Bio-waste conversion reduces waste flow to landfills.
- Creates low-skill jobs at local level.
- Low capital investment and relatively simple technologies makes vermicomposting practical for less-developed agricultural regions.
- Production reduces greenhouse gas emission produced in landfills when not composted.

**THANK YOU**