



Earthworms and their role in vermicomposting

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**ABOUT
EARTHWORMS**



What are Earthworms ?

- ❑ Tube-shaped, segmented worm found in the Phylum Annelida
- ❑ Hermaphrodites—each individual carries both male and female sex organs

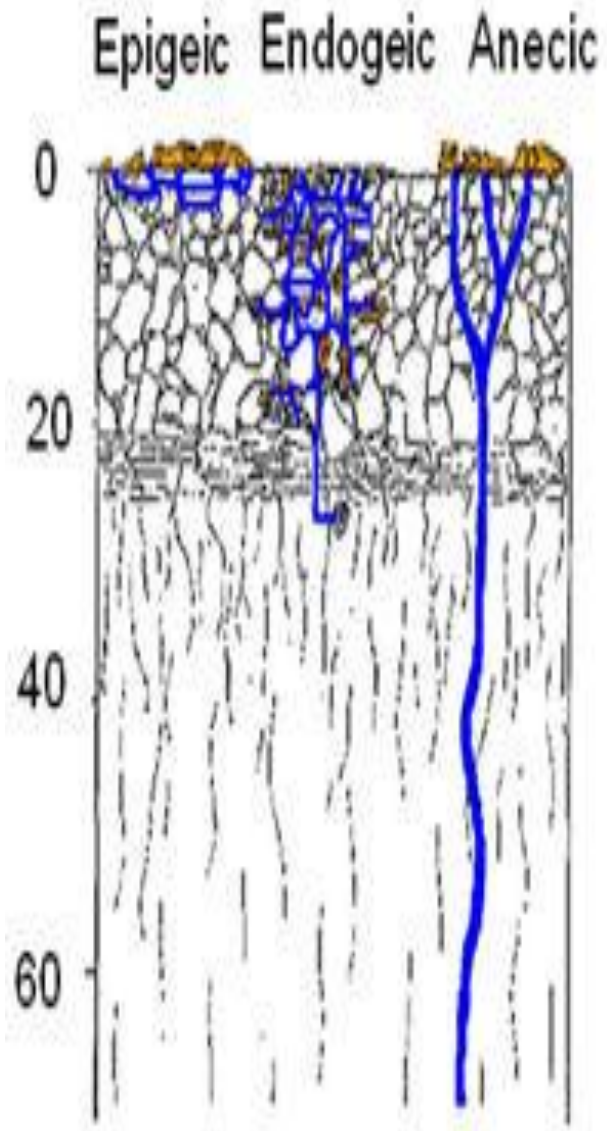
Classification

Kingdom: Animalia

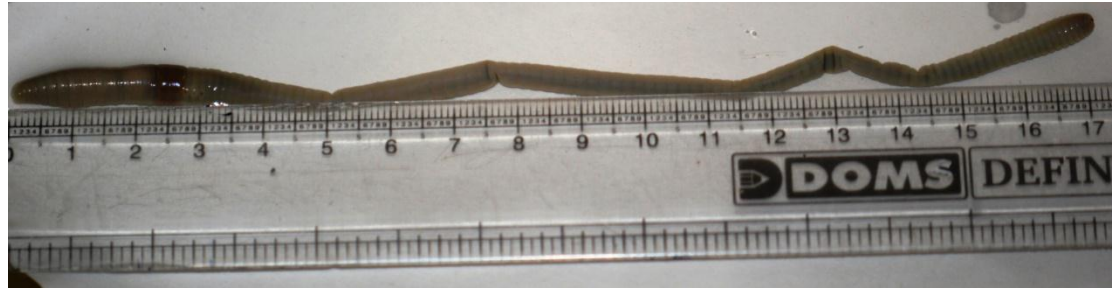
Phylum: Annelida

Class: Oligochaeta

Types of Earthworms



Epigeic : *Eisenia fetida*



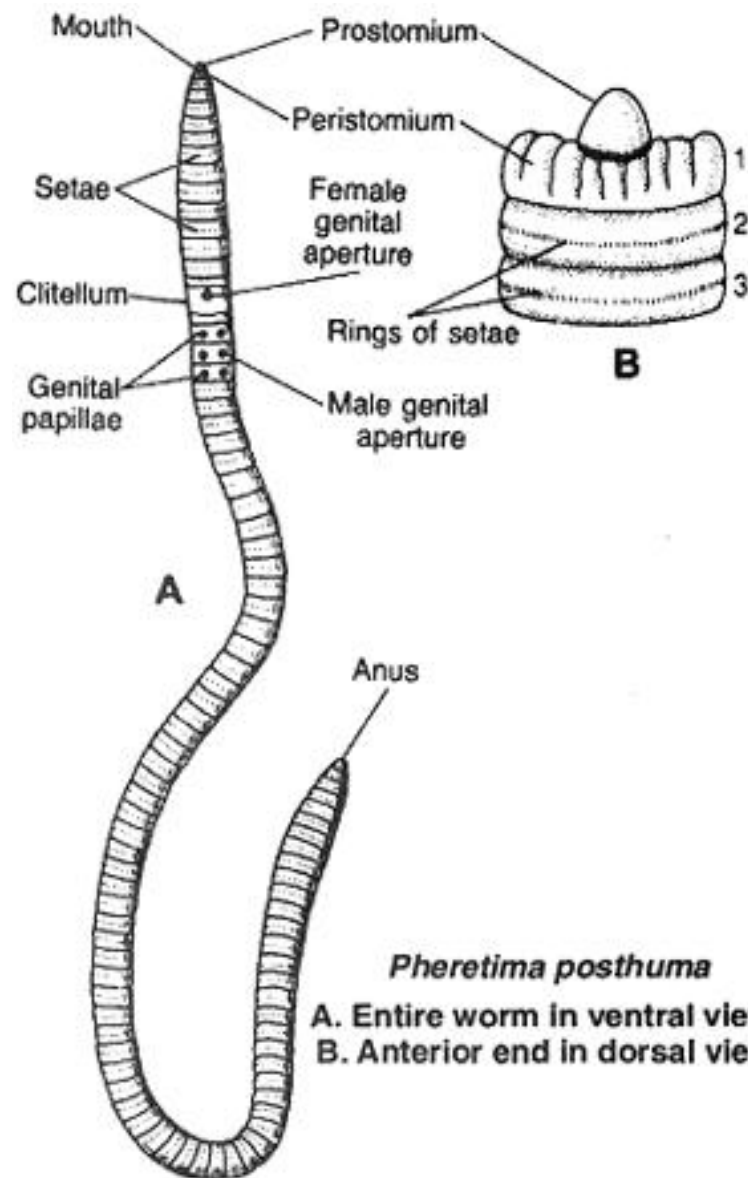
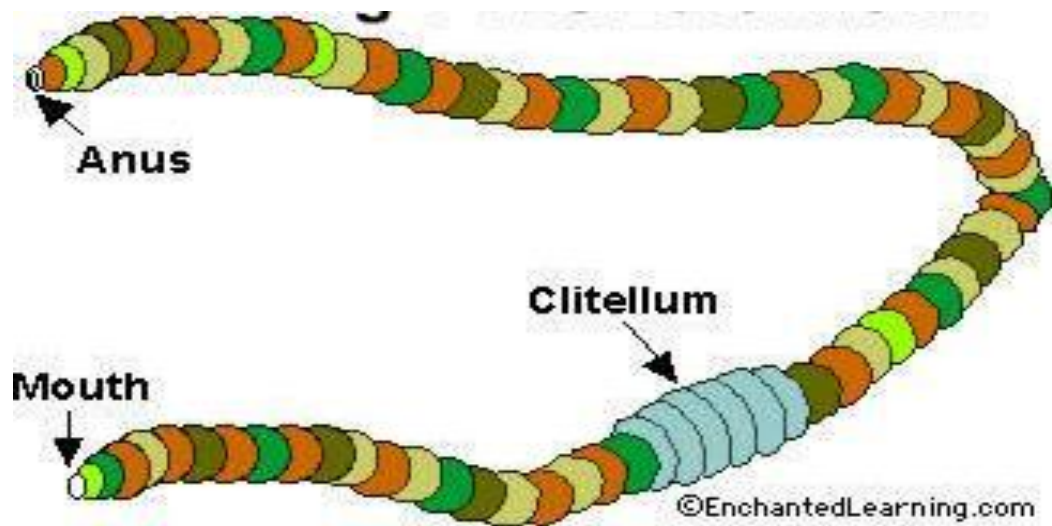
Endogeic: *Metaphire posthuma*



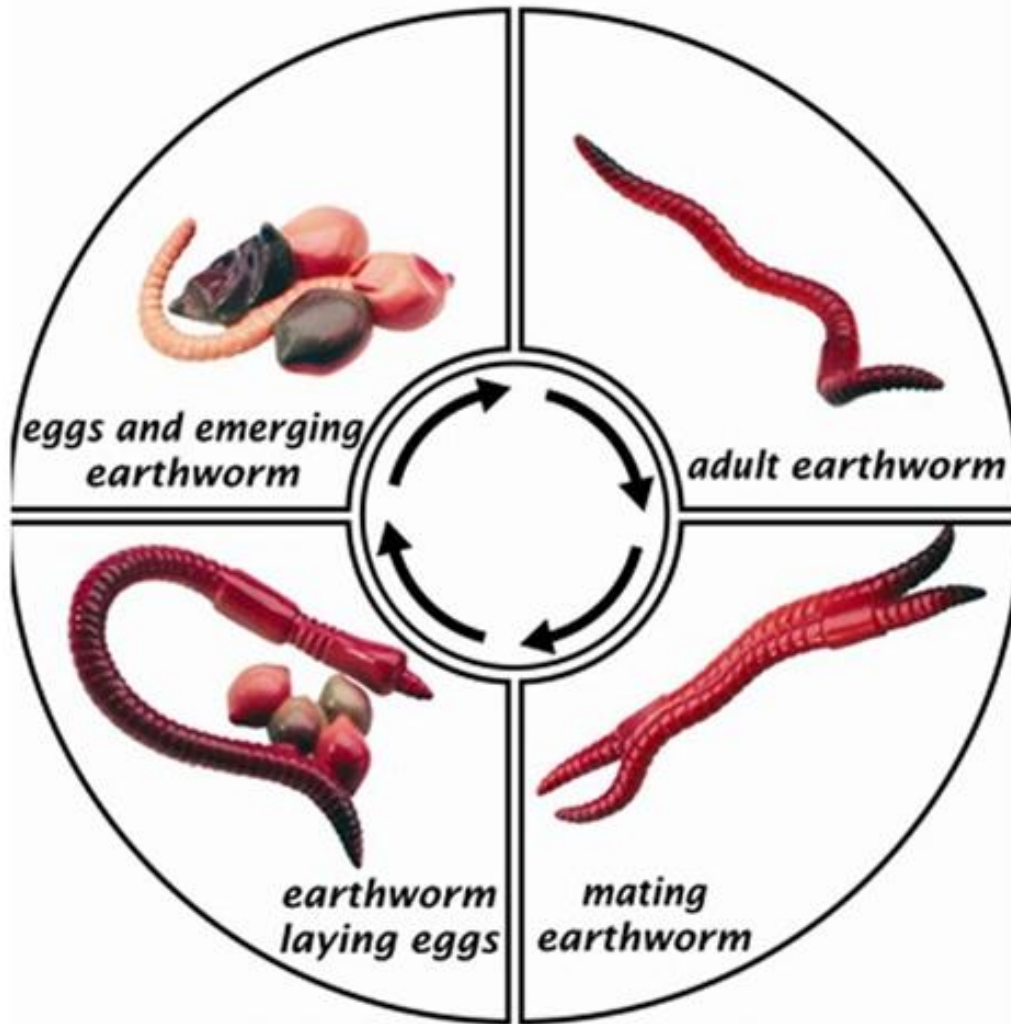
Anecic: *Lampito mauritti*

Comparative account of characteristics of earthworms species under three ecological categories.

Characteristics	Epigeic	Endogeic	Anecic
Burrowing nature and type	Surface dwelling	Shallow burrowing and horizontal	Deep burrowing and vertical
Body size	Small	Medium	Large
Body colour	Uniform	Weak pigmented	Medium pigmented
Food	Leaf litter, cattle dung	Soil with high organic matter	Leaf litter, decomposed litter
Feeding behaviour	Detritivores	Geophagous	Detritivores
Role	Biodegraders	Soil mixing and aeration	Soil organic matter decomposition
Vermicomposting efficiency	High	Low	Low
Earthworm Species	<i>Eisenia fetida</i> , <i>Perionyx excavatus</i> , <i>Eudrilus eugeniae</i>	<i>Metaphire posthuma</i> , <i>Octochaetona thurstoni</i> , <i>Aporrectodea rosea</i> , <i>Octolasion cyaneum</i>	<i>Lampito mauritii</i> , <i>Aporrectodea longa</i> , <i>Lumbricus terrestris</i>



Life Cycle of Earthworms



Cocoons



Factors affecting Earthworms

- Temperature (25-35° C)
- pH (7-8)
- Moisture (60-70 %)
- Aeration
- Shade

Agriculture activity and its effect on earthworm

- Cultivation
- Cropping
- Fertilizers
- Pesticides
- Heavy Metals

Earthworm and Soil Fertility

❑ Effect on Soil Structure

1. Breakdown of soil particles

2. Turnover of soil

3. Formation of aggregates

4. Aeration, porosity

5. Drainage

❑ Indicator of soil type

❑ Effect on crop yield



Earthworm Enemies

- Mice & Rats
- Snakes
- Mole
- Birds





Solid wastes

- All wastes arising from human and animal activities that are normally solid & discarded.
- Encompasses heterogeneous mass of throw aways from residential, commercial, bio-medical institutions & industry.
- Manner in which materials are discarded contributes to pollution of environment.
- Different cities are making different efforts to overcome the problems associated with it.

Vermicomposting

Vermicomposting deals with management of waste from various sectors (Agricultural, industrial, domestic and municipal) to generate useful products with the help of earthworm.



Species of earthworms used for vermicomposting

- *Eisenia fetida*
- *Eudrilus euginae*
- *Perionyx excavatus*
- *Lumbricus rubellus*
- *Lampito mauritii*
- *Polypheretima elongata*
- *Pontoscolex corethrurus*
- *Drawida napalensis*
- *Dichogaster modigliani*



Features for selection

- Tolerances to wide range of environmental conditions
- Capable of inhabiting high percentage of organic matter
- Prolific breeder
- High hatching rate
- Short life cycle

Vermicomposting Materials

- **Animal dung**
- **Agricultural wastes**
- **Forestry wastes**
- **City garbage**
- **Kitchen wastes**
- **Industrial waste**

Methods of vermicomposting

- *Bed method :*

Composting is done on the pucca / kachcha floor by making bed (6x2x2 feet size) of organic mixture. This method is easy to maintain and to practice

- *Pit method:*

Composting is done in the cemented pits of size 5x5x3 feet. The unit is covered with thatch grass or any other locally available materials. This method is not preferred due to poor aeration, water logging at bottom, and more cost of production.

Methodology (small scale)

Non biodegradable containers having drain holes

↓
Put cattle dung as layer

↓
Release 400gms of earthworms

↓
Sprinkle water and load cow dung if needed

↓
Leave it for 20 days with regular sprinkling of water & turning after every 10 days

↓

Load approx. 300-500 gms (2-3 inch) of kitchen/garden waste on alternate days by mixing with upper 4" layer till tub is filled



After 45-50 days, the entire waste would be converted into vermicompost, granular in appearance and ready for harvesting



Stop sprinkling water, take out harvest from the top, start reloading the waste in the tub without disturbing the base

Large scale

- Maximum width 3 feet.
- Maximum Height 1.5 feet.
- Length can be increased or decreased according to the quantity of the waste generated or space available.

Requirement to setup Vermicomposting unit in College

- **Shed : Wooden, Steel trusses, RCC Pillars,**
Essential due to bed wetting due to rain
- **Polythene sheets**
- **Bricks : To make vermibeds**
- **Cattle dung**
- **Jutemat**
- **Water supply**
- **One regular staff to take care**
the vermibeds.

EARTH WORM

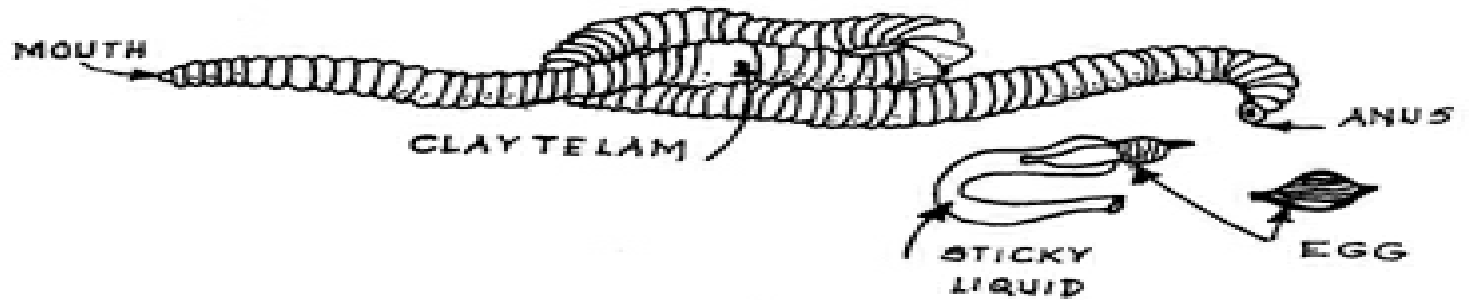


FIG-1

FILLING OF PIT (PIT SIZE 2'0" x 2'0" x 1'6")

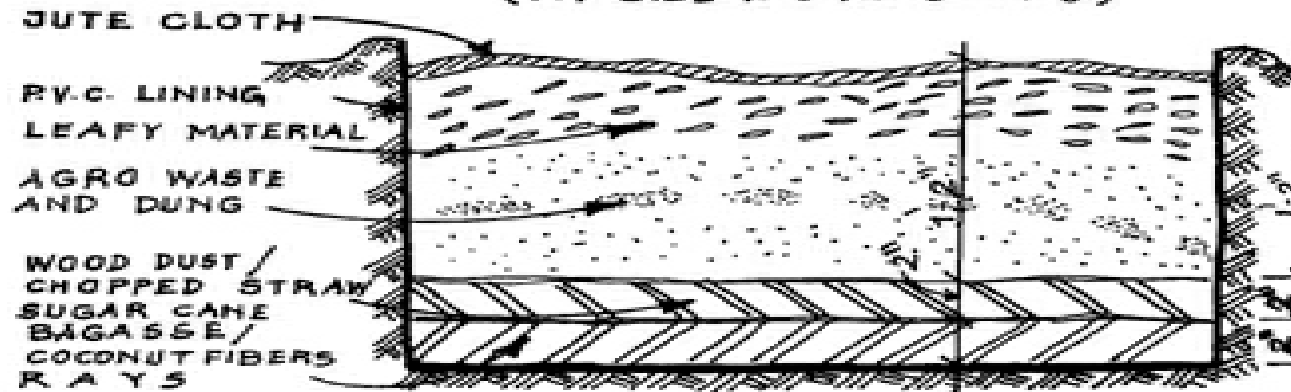


FIG-2

COLLECTION OF MANURE

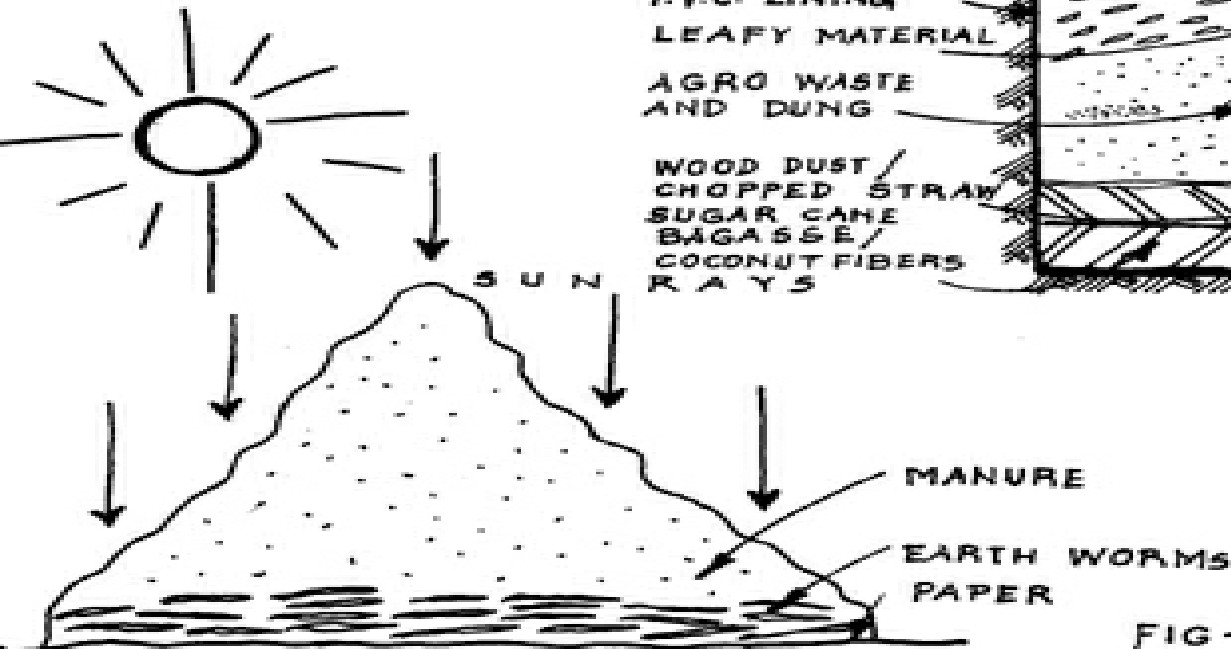


FIG-3

Conversion of Bagasse waste into manure

Pre vermicomposting



Post vermicomposting



Nutrient Profile of Vermicompost and Farm yard Manure

Nutrient	Vermicompost	Farm yard Manure
N(%)	1.6	0.5
P(%)	0.7	0.2
K(%)	0.8	0.5
Ca(%)	0.5	0.9
Mg(%)	0.2	0.2
Fe(ppm)	175.0	146.5
Mn(ppm)	96.5	69.0
Zn(ppm)	24.5	14.5
Cu(ppm)	5.0	2.8
C:N ratio	15.5	31.3



Advantages of vermicompost

- Rich in NPK, micronutrients & growth hormones
- Neutralizes highly acidic and basic soils
- Increase water retention power of the soil
- It is 100% organic, safe, non toxic and odour free
- It generates employment



Use of earthworms in medicines

Our ancestors used the native earthworms in folkloric healings of many sicknesses such as inflammation of different parts of the body, stomachaches and toothaches, to cure mumps, measles and even to help in making the birthing process easier.



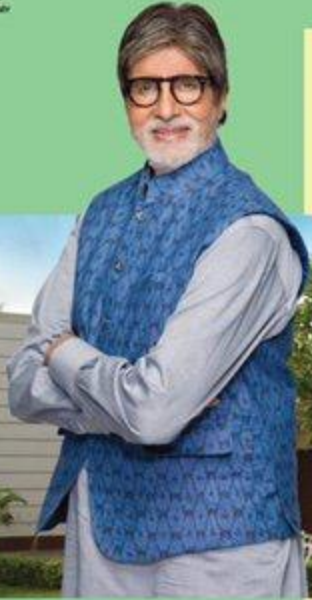
Precautions

- Avoid over watering, over loading & addition of salt, citric, acidic and cooked food
- Do not use fresh or completely degraded cow dung for vermicomposting
- Protects beds from sunlight, ants, snakes, frog, rat etc





**कम्पोस्ट अपनाओ,
फार्म हाउस में हरियाली लाओ.**



- फार्म हाउस में कम्पोस्ट
- ये मिट्टी को उपजाऊ बनाएगा
- इसे आप नज़दीकी फर्टि

कम्पोस्ट बनाओ



**कॉलेज में कम्पोस्ट बनेगा,
देश स्वच्छ बनेगा.**



- अपने कॉलेज के लिए कम्पोस्ट मशीन खरीदिए
- फल सब्जियों के छिलकों और सूखे पत्तों को उसमें डालिए
- सफाई के साथ काफी लाभदायक कम्पोस्ट पाइए
- भारत को स्वच्छ बनाने में अपना योगदान दीजिए

कम्पोस्ट बनाओ, कम्पोस्ट अपनाओ.

अधिक जानकारी
के लिए

1969

पर सम्पर्क करें

Team Members

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2. Dr. Madhvi Vashisth, Assitant Professor
3. Dr. Falwinder Verma, Assitant Professor

Thanks

