

# STUDY OF DIVERSITY OF INSECT FAUNA FROM THE HOUSEHOLD BIOCOMPOST

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**ABSTRACT :** Bio-composting is one of the most beneficial and eco-friendly activity in current age to cope up with the increasing pollution in all the strata. Household composting is a simple way to manage kitchen and garden waste. In this compost, along with the microbes, there is a large population of helpful macro organisms especially insects. However, the data available is fragmentary and it is necessary to have a detail investigation of the same. Hence, the study was carried out to find the diversity of insects from different household Biocompost. Different extraction methods were used for the separation of fauna. Phylum Arthropoda and class Insecta among it were dominant. The observations thus reveal the un-noticed diversity of insect fauna from the household biocompost.

**Keywords:**  
:Biocompost,  
macro-fauna,  
insects, diversity

## INTRODUCTION:

Diversity means the fact or quality of being diverse. It is observed in every field however, it is more evident in nature than anywhere else. The term biological diversity encompasses different ecosystems, organisms in them and their relative abundance. Hence in short, natural diversity with respect to living organisms can be called as biodiversity.

This biodiversity like in all other types of ecosystems is also found in compost which is nothing but a detritus ecosystem. Other than natural composting, its other assemblages include household composting, farmyard composting, poultry, manure composting etc. which are rich in biodiversity.

The life in the household compost includes several organisms bringing about the whole process of composting. It has its own micro flora-fauna and macro flora-fauna which include predators, scavengers and decomposers.

Many scientists have noticed the role of these compost organisms. But a lot of emphasis has been given on either microorganisms or earthworms in the compost. Very scanty references are available regarding macro-organisms from organic trash or compost. Among Indian scholars, Hazra and Choudhary (1990), De and Mitra (1995) and Hazra *et. al.* (1999) have studied macro-organisms from litter and trash.

But it has been observed that amongst the macro decomposers, the maximum population (of about 95 %) is of arthropods and they are seen in all strata of the compost ([www.earthlife.net/insects/soileco.html](http://www.earthlife.net/insects/soileco.html)).

Despite the arthropods being prevailing decomposers, besides few references, significant information of these decomposers is not available. During the present study also, phylum Arthropoda showed the dominance, as about 81 % of the total fauna was of arthropods. In this phylum, class Insecta was leading with 9 organisms out of 15 arthropods. Hence this study was undertaken to

throw light on the unexplored insect fauna of the compost

## MATERIALS AND METHODS

**A) Sample selection-** For the present study, samples of compost from six different sites was collected seasonally. The samples contained different types of feedstock (raw materials) and method of preparation for each of them was different.

**B) Methods of collection of samples-** Samples were collected seasonally as Winter, Summer and Monsoon. While collecting, compost was hand picked in random amount from different levels and the process was repeated twice so that organic matter from all the strata was collected. Though samples were collected randomly, defined amount (100 gm) was used every time for study of fauna.

**C) Methods for extraction of the fauna-** The insect diversity observed among the compost samples were recorded using various extraction methods. For the extraction of the compost insect, at present no standard methods are available. Hence the methods used for extraction of soil organisms were modified and used in study. The mechanical methods including hand sorting and flotation methods were used along with direct microscopic observations for separation of insect fauna. Among flotation methods, Ladell's modified method and Salt and Hollick's method were used for the separation of insects.

**D) Methods of preservation and identification of insects-** The organism were collected using pointed and blunt forceps and were preserved in the commonly used insect preservative, which is a mixture of 70% alcohol and Glycerol [70:30]. The preserved organisms were further identified and classified using identification keys. The references and keys used for the study included- A general textbook of Entomology by A.D. Imms (Ninth edition 1957), Fauna of British India, Ceylon and Burma by Arrow G. (1910) and Guide to invertebrate animals by Webb *et. al.* (1978). Along with these major

reference books some Internet references were also used for the identification purpose.

was followed. Phylum Arthropoda was represented by fifteen organisms and among this phylum class Insecta was dominant and represented by eleven organisms (Table 1.0)

**Observations :**

For classification, binomial nomenclature method

**Table 1.0 Phylum Arthropoda**

Phylum	Sub phylum	Class	Sub class	Order	Sub order	Family
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Polyphaga	Cetoniidae
	Hexapoda	Insecta	Pterygota	Coleoptera	Polyphaga	Nitidulidae
	Hexapoda	Insecta	Pterygota	Coleoptera	Polyphaga	Tenebrionidae
	Hexapoda	Insecta	Pterygota	Coleoptera	Polyphaga	Staphylinidae
	Hexapoda	Insecta	Pterygota	Diptera	Brachycera	Stratiomyidae
	Hexapoda	Insecta	Pterygota	Diptera	Nematocera	Mycetophilidae
	Hexapoda	Insecta	Pterygota	Diptera	Cyclorrhapha	Drosophilidae
	Hexapoda	Insecta	Pterygota	Diptera	Cyclorrhapha	Calliphoridae
	Hexapoda	Insecta	Pterygota	Dermaptera	Forficulina	-
	Hexapoda	Insecta	Pterygota	Dictyoptera	Blattaria	Blattidae
	Hexapoda	Insecta	Pterygota	Hymenoptera	Apocrita	Formicidae

The organisms are identified and described as follows-

**1. *Protaetia aurichalcea***

Phylum: Arthropoda,  
 Sub-phylum: Hexapoda,  
 Class: Insecta ,  
 Sub-class: Pterygota  
 Division: Endopterygota ,  
 Order: Coleoptera ,Sub-order: Polyphaga,Super-family: Scarabaeoidea (MacLeay, 1819) ,  
 Family: Cetoniidae (Leach, 1815),  
 Sub-family: Cetoniinae (Leach, 1815),  
 Tribe: Cetonini (Leach, 1815),  
 Sub-tribe: Cetoniina Leach, 1815),  
 Genus: *Protaetia* (Burmeister, 1842),  
 Sub-genus: *Potosiomima* (Miksic, 1968),  
 Species: *aurichalcea* (Fabricius, 1775) (described as *Cetonia aurichalcea*),  
 Synonyms: *Scarabaeus antheus* Voet, 1779 and *Cetonia maculata* Fabricius, 1781,  
 Sub-species: *aurichalcea aurichalcea* (Fabricius, 1775), (Fig. 1)

**2. Nitidulid beetle**

Phylum: Arthropoda  
 Sub-phylum: Hexapoda  
 Class: Insecta  
 Sub-class: Pterygota  
 Division: Endopterygota  
 Order: Coleoptera  
 Sub-order: Polyphaga  
 Super-family Cucujoidea  
 Family: Nitidulidae  
 (Fig. 2)

**3. Tenebrionid beetle**

Phylum: Arthropoda  
 Sub-phylum: Hexapoda  
 Class: Insecta  
 Sub-class: Pterygota  
 Division: Endopterygota  
 Order: Coleoptera  
 Sub-order: Polyphaga  
 Super-family: Cucujoidea  
 Family: Tenebrionidae  
 (Fig. 3)

**4. Rove beetle**

Phylum: Arthropoda  
 Sub-phylum: Hexapoda  
 Class: Insecta  
 Sub-class: Pterygota  
 Division: Endopterygota  
 Order: Coleoptera  
 Sub-order: Polyphaga  
 Super-family: Staphylinidae  
 Family: Staphylinidae  
 (Fig. 4)

**5. Soldier fly**

Phylum: Arthropoda  
 Sub-phylum: Hexapoda  
 Class: Insecta  
 Sub-class: Pterygota  
 Division: Endopterygota  
 Order: Diptera  
 Sub-order: Brachycera  
 Family: Stratiomyidae

**6. Fungus gnat**

Phylum: Arthropoda  
 Sub-phylum: Hexapoda  
 Class: Insecta  
 Sub-class: Pterygota  
 Division: Endopterygota  
 Order Diptera  
 Sub-order: Nematocera  
 Family: Mycetophilidae  
 (Fig. 6)

**7. Fruit fly**

Phylum: Arthropoda  
 Sub-phylum: Hexapoda  
 Class: Insecta  
 Sub-class: Pterygota  
 Division: Endopterygota  
 Order: Diptera  
 Sub-order: Cyclorrhapha  
 Family: Drosophilidae  
 (Fig. 7)

**8. Green bottle fly**  
 Phylum: Arthropoda  
 Sub-phylum: Hexapoda  
 Class: Insecta  
 Sub-class: Pterygota  
 Division: Endopterygota  
 Order: Diptera  
 Sub-order: Cyclorrhapha  
 Family: Calliphoridae  
 (Fig. 8)

**10. Cockroach**  
 Phylum: Arthropoda  
 Sub-phylum: Crustacea  
 Class: Insecta  
 Sub-class: Pterygota  
 Division: Exopterygota  
 Order: Dictyoptera  
 Sub-order: Blattaria  
 Family: Blattellidae  
 (Fig. 10)

**9. Earwig**  
 Phylum: Arthropoda  
 Sub-phylum: Hexapoda  
 Class: Insecta  
 Sub-class: Pterygota  
 Division: Exopterygota  
 Order: Dermaptera  
 Sub-order: Forficulina  
 (Fig. 9)

**11. Ants**  
 Phylum: Arthropoda  
 Sub-phylum: Crustacea  
 Class: Insecta  
 Sub-class: Pterygota  
 Division: Exopterygota  
 Order: Hymenoptera  
 Sub-order: Apocrita  
 Super-family: Vespoidea  
 Family: Formicidae  
 (Fig. 11)



Fig.1



Fig.2



Fig.3



Fig.4



Fig.5



Fig.6



Fig.7



Fig.8



Fig.9



Fig.10



Fig.11

## RESULTS AND DISCUSSION :

The invertebrate macro-fauna of the compost is vast in number and to find out its role in compost it needs to be studied with more attention. Among foreign researchers, Odegaard and Tommeras (2000) surveyed the beetle fauna from the compost heaps in the Nordic countries during the 20th century and Lundberg and Persson (1973) found 273 beetle species in grass and weed composts from Leulea in northeastern Sweden. Nevertheless, insect fauna from the compost was not studied earlier in Indian context, hence current studies were performed.

However, to correlate the observations of the present studies, no such specific research work was found to be conducted in India or abroad. The literature surveying the insect fauna of the household biocompost was not obtained in Indian as well as international studies; hence, this work could not be compared.

The study carried out during this work revealed presence and role of known invertebrates from the compost, acting as enhancers. Detailed studies of more compost specimen from different locations in future may be helpful to put a large data of presence and role of this macro-fauna giving their due credit.

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