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A Preliminary Study on Different Feeding Habits of Beetles (Coleoptera)

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Abstract

In the present communication, concerted efforts were made to study the different feeding habits of beetles. The study was carried out in Gauhati University campus, Assam, which is a part of biodiversity hotspot area. During the present survey 12 species belonging to 10 genera and 6 families were recorded, among which 7 species were phytophagous, 3 species were coprophagous and only 2 species were aphidophagous.

Keywords: *Assam, Beetles, Feeding habits, Phytophagous.*

1.Introduction:

Insects are the most species rich group of organisms on the planet. They dominate every major terrestrial biome and are responsible for many ecosystem processes (Samways, 2005). Order Coleoptera is extremely rich in species and wide spread in many terrestrial and freshwater environments throughout the world. These are the most diverse in all animal groups, with 3,50,000 described species (New, 2007) and approximately 15,088 species were recorded from India (Kazmi and Ramamurthy, 2004). They are found in nearly all natural habitats such as vegetative foliage, trees and their bark to flowers, leaves, and underground near roots, even inside plants like galls, tissue, including dead or decaying ones (Gullan and Cranston, 2010).

About 25% of beetle species are phytophagous in both the larval and adult stages, living in or on plants, wood, fungi, and a variety of stored products, including cereals, tobacco, and dried fruits. These plants are important for agriculture, forestry and the household so the beetle can be considered a pest (Gilliott, 1995). On the other hand beetles are also beneficial, usually by controlling the populations of pests. For example, both the larvae and adults of ladybug or ladybird beetle (family Coccinellidae) are found feeding on aphid colonies. Other ladybugs feed on scale insects and mealy bugs. Scarcity of food sources in their particular habitats may compel them to feed on other things, such as small caterpillars, young plant bugs, honeydew, and nectar (Brown, 2010). Ground beetles (family Carabidae) are common predators of many different insects and other arthropods, including fly eggs, caterpillars, wireworms etc (Kromp, 1999). Dung beetles (family Scarabaeidae) are use to reduce the populations of pestilent flies and parasitic worms that breed in cattle dung. Dung beetles are taxonomically as well as functionally very important constituent of terrestrial ecosystem (Kakkar and Gupta, 2009).

Assam is a biodiversity rich area with many rare and endemic plant and animal species (Evans, 1932) and Gauhati university is a part of it. As the Gauhati University campus lies near the Rani Reserve Forest and Deepor Beel Ramsar site, it represents a very important area for faunal diversity as well as insect diversity. Therefore, the present study aim to study the feeding habits of different Coleopteran beetles in present in Gauhati University Campus.

2. Materials and Methods:

2.1 Study Site:

The Gauhati University campus is located 13.1Km from the Borjhar Airport, Guwahati adjoining the Deepor Beel Bird Sanctuary which lies 3km South-West from the Campus. It lies in between the geographical location of 26º12′ N latitude and 91º05′ E longitude and is 45m above mean sea level. The vegetation types found in the area are mixed-moist deciduous forests, semi-evergreen forests and scattered deciduous forests. Degraded and Shrub type of forests are also found here. The University Campus harbours varied natural habitats ranging from wetlands, grasslands, forests and many small and medium size ponds. There is also a botanical garden present within the Campus. The climate of the campus is subtropical with an average annual rainfall of around 2500mm. The temperature varies from around 7ºC in the winter up to 37ºC in summer and the relative humidity ranges between 45-80%.

The survey was carried out in the whole campus which was divided into 4 different sites as follows,
Site 1: The garden in front of K.K. Handique library.
Site 2: The garden in front of Administrative building.
Site 3: Girls hostel campus.
Site 4: Botanical garden.

2.2 Survey Time:

The present study was conducted from March 2015 to May 2015. The survey and collection was done in morning (6.00am-11am) and evening (3.30pm-6.30pm) in the University Campus.

2.3 Data Collection:

The main materials like camera, copy, pencil, chloroform containing container, test tubes were taken during survey period. Beetles were collected mainly by hand picking method with the help of the test tubes. Butterfly nets were employed for catching flying beetles. Some beetles were collected during night with the help of light traps with a source of white light. Dung beetles from the family Scarabaeidae were collected from the dung with the help of forceps, then beetles were put in the chloroform containing container. Then specimens were photographed for identified. The host plant species were observed with reference to family, habit, flower type, flower size and colour in order to understand the relationship of these characters to the feeding activity of the beetles.

2.4 Identification:

Species identification was done with the help of taxonomic keys (Horn, 1905; Gahan, 1906; Jacoby, 1908; Maulik, 1919; Arrow, 1995; Cameroon, 1930; Maulik, 1926).

3. Results and Discussion:

In the present study 12 species belonging to 10 genera and 6 families namely Coccinellidae, Chrysomellidae, Scarabaeidae, Carabidae, Cerambycidae and Meloidae were recorded from Gauhati University campus (Table 1). The feeding habits of each species are different. Among the 12 species 7 species are phytophagous, 2 species are aphidophagous and 3 species are coprophagous (Table 2). All 3 species belonging to the Scarabaeidae family namely *Aphodius obscurus*, *Costelytra zealandica*, *Scarabaeus semepunctatus* are coprophagous. *Carabus convexus* belonging to the Carabidae family and *Epilachna vigentioctopunctata* belonging to the Coccinellidae family are *aphidophagous.* 2 species belonging to the Carabidae family namely *Calosoma externum* and *Carabus scheidleri* are phytophagous. 2 species belonging to the Coccinellidae family namely *Coccinella septampunctata* and *Coccinella transversalis* are phytophagous. *Podontia quatourdecimpunctata* belonging to the Chrysomellidae family, *Agapanthia viridescens* belonging to the Cerambycidae family, *Mylabris pustulata* belonging to the Meloidae family are phytophagous.

Table 1: List of beetles found in the Gauhati University Campus.

S. No	Family	Genus	Species
1	Coccinellidae	*Coccinella*	*Coccinella transversalis*
2	Coccinellidae	*Coccinella*	*Coccinella septempunctata*
3	Coccinellidae	*Epilachna*	*Epilachna vigentioctopunctata*
4	Scarabaeidae	*Costelytra*	*Costelytra zealandica*
5	Scarabaeidae	*Scarabaeus*	*Scarabaeus semepunctatus*
6	Scarabaeidae	*Aphodius*	*Aphodius obscurus*
7	Carabidae	*Calosoma*	*Calosoma externum*
8	Carabidae	*Carabus*	*Carabus convexus*
9	Carabidae	*Carabus*	*Carabus scheidleri*
10	Chrysomellidae	*Podontia*	*Podontia quatuordecimpunctata*
11	Meloidae	*Mylabris*	*Mylabris pustulata*
12	Cerambycidae	*Agapanthia*	*Agapanthia viridescens*

Beetles are primarily phytophagous and show monophagy, oligophagy and polyphagy (Raju et al, 2016). *Mylabris* species are polyphagous and have selective host plants from different families (Durairaj and Ganapathy, 2003). Carabids are mostly polyphagous that consume animal (live prey and carrion) and plant material but several species are also phytophagous (Luff, 1982; Thiele, 1977).The polyphagy practiced by the beetle is an adaptive benefit and ensures its survival and build up of population in different ecosystems.

Table 2: List of different Beetles along with their feeding habits in the study area.

S. No	Species	Feeding Habits
1	*Calosoma externum*	Phytophagous
2	*Carabus scheidleri*	Phytophagous
3	*Coccinella septampunctata*	Phytophagous
4	*Carabus convexus*	Aphidophagous
5	*Coccinella transversalis*	Phytophagous
6	*Podontia quatourdecimpunctata*	Phytophagous
7	*Epilachna vigentioctopunctata*	Aphidophagous,mites,scale insects
8	*Aphodius obscurus*	Coprophagous
9	*Costelytra zealandica*	Coprophagous
10	*Scarabaeus semepunctatus*	Coprophagous
11	*Agapanthia viridescens*	Phytophagous
12	*Mylabris pustulata*	Phytophagous

On the other hand the oligophagous and monophagous beetles do not have adaptive benefit due to their restricted feeding to many or only one plant species. In the absence of their specific host plants, they do not survive and finally disappear. The feeding activities of beetles on different live and dead plant and animal species indicate that they have important role in the structure and function of different ecosystems.

This paper provides a starting point with which to address the question about the feeding habits of different beetles. In the present study highest number of beetle species were recorded phytophagous means these beetle species are feeding on plants. This may be because of Gauhati University campus is rich in vegetation. In case of monophagous and oligophagous beetles, there is little or no scope for adaptation and survival in the habitat. Because, their host plants range from one to few and if they are not available in that particular habitat, the beetles may have to leave the habitat in search of food in other places or may have to face death. In case of polyphagous beetles, there is lot of scope for adaptation and survival in the habitat as they are usually assured of at least one or more host plants at any time of the year in the habitat. Seasonal variation occurs in the feeding habits of some beetle species. For example many coccinellids do not feed on a single type of food throughout the year (Sloggett and Majerus, 2000). In such cases detail study on the seasonal variation of food source along with the feeding preferences of beetles will be required.

4. Conclusions:

The present study highlighted different feeding habits of Coleopteran beetles in Gauhati University Campus with species variation. Therefore further extensive study will be required regarding the seasonal variation as well as inter-specific relation in case of their feeding habits.

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