*Research Article*

# TAXONOMIC DOCUMENTATION OF COLEOPTERAN PHOTOTACTIC INSECT FAUNA OF RICE COLLECTED IN LIGHT TRAP AT JABALPUR DISTRICT OF MADHYA PRADESH, INDIA

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**ABSTRACT**

The present research work was carried out at two distinct locations (Research Field and Farmer's Field). The Research Field, Jawaharlal Nehru Krishi Vishwa Vidyalaya and Farmer's Field Village - Jatwa, Panagar Block of district Jabalpur Madhya Pradesh during two cropping season of rice *i.e.* Kharif of 2015 and 2016. Light trap was used for the taxonomic documentation Coleopteran phototactic insect fauna. Total 34 species of order Coleoptera belongs to 8 families were collected from rice ecosystem. Family Carabidae was the dominating family among the all 8 families. 34 species were collected at Farmer's Field while 29 species at Research Field.

## INTRODUCTION

Rice is very important crop in India it was occupied 37.38 million ha area under cultivation and production was 104.8 MT (State of Indian Agriculture, 2015-16), while in Madhya Pradesh area under rice cultivation was 2.02 million ha and production was 5.32 MT (Statistics of Madhya Pradesh, 2015-16). Rice ecosystem provides favorable conditions for various kinds of invertebrates that inhabit soil, water and vegetation. Over 800 species of insects in rice ecosystems have been reported worldwide. Out of these, 100 species attack rice, while rests are considered as friendly insects (Pathak, 1970). Almost 20 insects are considered as rice pests of economic importance that include stem borers, gall midge, defoliators and vectors like leafhoppers and plant hoppers (Pathak, 1994). According to biodiversity productivity hypothesis (Yachi and Loreau, 1999), biodiversity plays significant role in maintaining a sustainable agronomic systems.

Coleoptera is an order of insects commonly called beetles. The order Coleoptera is the largest insect order constituting almost 25 percent of all known life-forms. Beetles are widely distributed found in all major habitats. Beetles play an important role in maintaining the eco-system. They are not only pests but can beneficial, like Ground beetles (Family Carabiadae) are common predators of many different insects (Gullan and Cranston, 2010) and Dung rollers (Family Scarabaeidae) are efficient scavengers.

Practices like over use of pesticides, monoculture, grazing, poor farming techniques etc. are posing threats to biodiversity associated with rice farming system (Asghar *et al.*, 2013). Agricultural activities create fragmented landscapes, which cause small isolated patches of species to go extinct (Tscharntke *et al.*, 2005). These oversimplified environments lead to intensified pest outbreaks, as well as a reduction in critical components of an ecosystem, such as pollinators (Letourneau and Bothwell, 2008). In order to gain productive results, it is necessary to conserve diversity in agricultural systems.

Light trap is a well-known tool for study the biodiversity of phototactic insects. Light-trapping has become a general term which refers to all methods of attracting nocturnal insects with lamps or artificial light sources. Phototropic behavior and phototactic response of insects are being largely used to monitor pest activity for their effective suppression (Dhiman, 2001). Light trap still occupied an important place in entomological studies worldwide for survey, detection and management of insect pest population in various Agro-Horticulture crops (Sharma and Bisen, 2013). Keeping the importance of biodiversity in mind for maintaining a sustainable agronomic system, this study propose to study of insect diversity Coleopteran insect fauna in rice ecosystem by using the light trap.

## MATERIALS AND METHODS

The present research work was carried out at two distinct locations (Research Field and Farmer's Field). The Research Field, Jawaharlal Nehru Krishi Vishwa Vidyalaya and Farmer's Field Village - Jatwa, Panagar Block of district Jabalpur Madhya Pradesh during two cropping season of rice i.e. Kharif of 2015 and 2016.

### *Research Field (RF)*

RF is located in the JNKVV campus. Breeder seed production is carried out in almost all the field of JNKVV, except research plots. Use of fertilizers, intercultural operations, weedicides and insecticides is a regular feature in these fields. Soil is black and irrigated, Rice-wheat cropping system is practiced. Research Field located in semi-urban area where light illumination due to street light during night was comparatively more than FF.

### *Farmer Field (FF)*

FF was located in village- Jatwa, Panagar block of district Jabalpur which is 12 kilometre away from the RF. The farmer followed the traditional cultivation practices. No use of insecticides, less use of fertilizers, minimum intercultural operation with limited irrigation. Rice-wheat cropping system was also followed in black soil. The farmer's field was surrounded by dense vegetation and illumination was less due to no street light.

For the taxonomicdocumentation, the light trap was operated every night and collection was observed on the next day morning. Observations were recorded every day throughout the *kharif* season of, 2015 and 2016. Total insects were observed and sorted out on the basis of their order and family. Identification of insects were done on the basis of specimens available in insect museum of the Department of Entomology, JNKVV, Jabalpur, Department of Entomology, UAS, Bangalore and Zoological Survey of India, Jabalpur. Dried specimens were prepared by keeping the pinned insects in oven for 24 hours at 54°C and thereafter well labeled specimens were stored in insect boxes and show cases.

## RESULTS AND DISCUSSION

### *Taxonomic Documentation of Coleopteran Phototactic Insect Fauna in Year 2015 at FF and RF*

In year 2015 at FF, order Coleoptera was represented by 28 species and 8 families. Carabidae family of order Coleoptera represented by highest number (11 species) of species followed by Scarabaeidae (4 species), Meloidae (4 species), Cerambycidae (3 species), Chrysomelidae and Dytisadea (2 species). Hydrophidae and Staphylinidae were represented by one species each, while at RF, order Coleoptera was represented by 23 species and 7 families. Carabidae family was represented by highest number of species (10 species) followed by Scarabaeidae (4 species), Meloidae (3 species), Chrysomelidae (2 species), Dytisadea (2 species) while Cerambycidae and Hydrophidae represented by one species each. In year 2015, 5 species were found more in number at FF in comparison to RF.

### *Taxonomic Documentation of Coleopteran Phototactic Insect Fauna in Year 2016 at FF and RF*

In year 2016 at FF, order Coleoptera was represented by 34 species and 8 families. Carabidae family of order Coleoptera represented by highest number of species (14 species) followed by Scarabaeidae (6 species), Meloidae (5 species), Cerambycidae (3 species). Chrysomelidae and Dytisadea were represented by two species each, while Hydrophidae represented by one species, while at RF, order Coleoptera was represented by 29 species and 7 families. Carabidae family was represented by highest number of species (13 species) followed by Scarabaeidae (6 species) and Meloidae (4 species). Chrysomelidae and Dytisadea were represented by 2 species each. Cerambycidae and Hydrophidae were represented by one species each. In year 2016, 5 species were found more in number at FF in comparison to RF.

### *Pooled Data Results (FF AND RF)*

Order Coleoptera was represented by 34 species and 8 families. Carabidae family was represented by highest number of species (14 species) followed by Scarabaeidae (6 species), Meloidae (5 species), Cerambycidae (3 species), Chrysomelidae and Dytisadea were represented by 2 species each while Hydrophidae and Staphylinidae were represented by one species each, while at RF order Coleoptera was represented by 29 species and 8 families. Carabidae family was represented by highest number of species (13 species) followed by Scarabaeidae (6 species), Meloidae (4 species), while Chrysomelidae and Dytisadea were represented by 2 species each. Cerambycidae and Hydrophidae were represented by one species each. Pooled data study revealed that 5 species were found more in number at RF in comparison to RF. Similarly Banerjee (2014) reported nine family of Coleoptera from three different sites. Similarly Sharma *et al.* (2015) also reported significantly very high activity of beneficial predacious species in light trap at farmer's field, compared to research farm shows the importance of minimum use of pesticides and least disturbances to ecosystem.

### *Taxonomic Documentation of Total Coleopteran Phototactic Insect Fauna at FF and RF*

Order Coleoptera was represented by 34 species and 8 families. Carabidae family of order Coleoptera represented by highest number of species (14 species) followed by Scarabaeidae (6 species), Meloidae (5 species),

Cerambycidae (3 species), while Chrysomelidae and Dytisadae reperesented by 2 species each. Hydrophidae and Staphylinidae represented by one species each. Similarly Sharma *et al.* (2010) also reported a record of 12 species of order Coleoptera in rice ecosystem. Again Sharma *et al.* (2013) reported 11 species of order Coleoptera in vegetable field.

**Table 1:** Taxonomic distribution of Coleopteran phototactic insect species collected in light trap in rice ecosystem (farmer field and research field) during kharif 2015 and 2016

| Sl. No. | Insect species collected | Number of insect collected in light trap | | | |
|---|---|---|---|---|---|
| | | FF | | RF | |
| **Order - Coleoptera** | | | | | |
| **A) Family -** Carabidae (14) | | | | | |
| 1 | *Chlaenius sp.* | 48 | 42 | 24 | 28 |
| 2 | *Calosoma sp.* | 2 | 3 | 0 | 0 |
| 3 | *Brachinus longipalpis* Wiedemann, 1821 | 0 | 6 | 0 | 2 |
| 4 | *Prothyma sp.* | 968 | 1220 | 685 | 942 |
| 5 | *Cicindela flexuosa* Linnaeus, 1758 | 301 | 350 | 23 | 48 |
| 6 | *Chlaenius medioguttatus* Chaudoir, 1876 | 34 | 44 | 10 | 16 |
| 7 | *Chlaenius sp.* | 50 | 60 | 22 | 42 |
| 8 | *Ophionea indica* (Thunberg, 1784) | 6162 | 9040 | 3868 | 6640 |
| 9 | *Chlaenius circumdatus* (Dejean, 1826) | 48 | 49 | 4 | 9 |
| 10 | *Zuphium sp.* | 0 | 16 | 0 | 9 |
| 11 | *Macrochilus* tripustulatus (Dejean, 1825) | 64 | 69 | 20 | 20 |
| 12 | *Chlaenius panagaeoides* Chaudoir, 1876 | 54 | 69 | 23 | 33 |
| 13 | *Brachinus sexmaculeatus* (Dejean, 1852) | 24 | 44 | 8 | 9 |
| 14 | *Crosopedophorus elegans* (Dejean) | 0 | 15 | 0 | 9 |
| **B) Family - Scarabaeidae (6)** | | | | | |
| 15 | *Catharius sp.* | 10 | 13 | 5 | 4 |
| 16 | *Onthophagus sp.* | 99 | 44 | 3 | 16 |
| 17 | *Adoretus sp.* | 27 | 22 | 6 | 9 |
| 18 | *Heterorychus sp.* | 0 | 12 | 0 | 3 |
| 19 | *Apogonia sp.* | 0 | 16 | 0 | 12 |
| 20 | *Holotrichia consanguinea* Blanchard, 1851 | 31 | 44 | 40 | 63 |
| **C) Family - Meloidae (5)** | | | | | |
| 21 | *Epicauta sp.* | 50 | 54 | 2 | 9 |
| 22 | *Epicauta sp.* | 7 | 12 | 0 | 0 |
| 23 | *Epicauta sp.* | 11 | 9 | 3 | 3 |
| 24 | *Epicauta sp.* | 0 | 12 | 0 | 3 |
| 25 | *Lytta sp.* | 26 | 26 | 22 | 22 |
| **D) Family - Cerambycidae (3)** | | | | | |
| 26 | *Xystrocera globosa* (Olivier, 1795) | 2 | 4 | 0 | 0 |
| 27 | *Stromotium sp.* | 2 | 3 | 0 | 0 |
| 28 | *Xylotrechus sp.* | 2 | 3 | 1 | 1 |
| **E) Family - Chrysomelidae (2)** | | | | | |
| 29 | *Raphidopalpa foveicollis* Lucas, 1849 | 765 | 440 | 635 | 448 |
| 30 | *Alticao leracea* (Linnaeus, 1758) | 918 | 888 | 1359 | 1220 |
| **F) Family - Dytisadae (2)** | | | | | |
| 31 | *Sandrac ottus sp.* | 56 | 93 | 40 | 66 |
| 32 | *Dytiscus marginalis* Linnaeus, 1758 | 24 | 22 | 20 | 36 |
| **G) Family - Hydrophidae (1)** | | | | | |
| 33 | *Hydrochara caraboides* (Linnaeus, 1758) | 518 | 620 | 420 | 520 |
| **H) Family - Staphylinidae (1)** | | | | | |
| 34 | *Aleochara sp.* | 4 | 4 | 0 | 0 |

## CONCLUSION

Total 34 species of order Coleoptera belongs to 8 families were collected from rice ecosystem. Family Carabidae was the dominating family among the all 8 families. 34 species were collected at Farmer's Field while 29 species at Research Field. Five species were found more in number at Farmer's Field in comparison to Research Field shows the importance of minimum use of pesticides and least disturbances to ecosystem.

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