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A preliminary study of biodiversity of nocturnal lepidoptera in selected areas of Jhalawar, Rajasthan

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Abstract

The study deals with the biodiversity of nocturnal Lepidoptera in selected site of urban and rural area in Jhalawar district of Rajasthan. The specimen collections were carried out between August, 2020 to March, 2021. The specimens were trapped once in a week between 08:00 pm to 07:00 am. Light trap and manual methods were used for the collection. In present findings total 43 species were collected which belonged to 09 families from both sites.

Keywords: Biodiversity, nocturnal lepidoptera, light trap

Introduction

Insects are the most extensive, successful and dominant forms in the whole of animal kingdom and exceptionally adaptable to a variety of environments. Insects live in abundance in every part of the world, which covers more than 70% of the Earth's surface. The number of actually described insects species in the world stands at 965,431–1,015,897 (Chapman, 2009) [4], in which Lepidoptera is the second largest and the most diverse order of the class Insecta. In present total number of Lepidoptera species approaches nearly 174,250, from which nocturnal species (moths) comprises around 156,300 and diurnal species (butterflies) making up the rest (Mallet, 2007) [7]. India, with 2 per cent of global space, is one of the 17th mega diversity nations in the world in terms of insect diversity with a very rich and diverse entomofauna. About 65,000-70,000 species of insects have been known from India, representing about 7%–10% per cent of the world entomofauna. India insect's biodiversity is unique with a high level of endemism and nearly a third of the known Indian entomofauna is endemic. Recent researches have suggested that insect biodiversity and abundance are both undergoing a rapid decline.

Biodiversity extinction is one of the most complex challenges for science and society world-wide. Therefore, the 193 countries that are parties to the Convention on Biological Diversity (CBD) agreed to the political goal of reducing the rate of biodiversity loss by 2010. One of the major weaknesses of this "2010 goal" was and still is the inadequate data on changes in biodiversity in space and time. The present investigation is an effort to set up an inventory with abundance of nocturnal Lepidoptera of Jhalawar, Rajasthan.

Materials and Methods

Sweep net is best method for trapping butterflies while artificial light traps for moths. Light-trapping is an effective means of assessing species composition and relative abundances, but sampling has to be carried out all night in order to maximize catch size and avoid biases due to different flight times of species (Beck and Linsenmair, 2006) [1]. The findings presented here are based on surveys carried out at two selected sites of Jhalawar district, between the periods of August, 2020 to March, 2021. Moths are nocturnal so light traps were used for the collection. A 175W mercury vapour bulb was hung on vertical pole. The sheet method was used to record moth insects individually without any damage. A white cloth sheet (10'×6') was hung between two vertical poles in such a way that it was just above (half foot) the surface and extended forward over the ground slightly away from direct source of light placed at such a point that the whole sheet from edge to edge brightly reflected the light.

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Any moths that alighted on the screen were collected. The light trap and white sheet method was operated once in a week at the sites and ethyl acetate was used as killing agent. Then they were pinned and stretched on insect stretching board using entomological pins and kept in the insect box for identification. All specimens were well labelled and preserved in airtight insect box, having naphthalene balls as fumigant.

Results

Total 1184 specimen of 43 species from 09 families were collected from the period of August, 2020 to March, 2021. The most abundant species belongs to family Erebidae (16 species; 335 specimens) followed by Geometridae (11 species; 313 specimens), Noctuidae (7 species; 285 specimens), Crambidae (3 species; 204 specimens) and Sphingidae (2 species; 32 specimens). Only one species was found from the family of Depressariidae, Eupterotidae, Hyblaeidae and Uraniidae. *Helicoverpa armigera* and *Spodoptera litura* were the most common species found in the area (Table 1).

Discussion

In India, the diversity of nocturnal Lepidoptera has been found in large numbers as research references were presented in the past. Sharma (2011) studied Lepidoptera species related to vegetables in different places of the Aravalli range in

Rajasthan. Total 38 Lepidoptera species related to vegetables were recorded. The maximum 8 species were recorded from Crambidae and Noctuidae families followed by Arctiidae (4 species), Lycaenidae (3 species), Nolidae (2 species), Pieridae (2 species) and Sphingidae (2 species). Chandra (2017) [3] reported total 256 species belongs to 197 genera under 18 families of nocturnal Lepidoptera. A database on illustrations and descriptions of genitalia of 139 species including male of 126 and female 27 species have been presented which will be helpful in future studies related to moths. Dar *et al.*, (2020) [5] provided a taxonomic overview of moths (Lepidoptera) of Jammu and Kashmir State. Based on the critical review of related literature, museum specimens collections, and data generated from the field surveys. The moth diversity of the Jammu and Kashmir state is represented by 461 species belonging to 23 families classified under 12 superfamilies, Erebidae (with 152 species) is the most diverse family followed by Noctuidae (109 species). Komal *et al.*, (2021) [6] examine the moths of Delhi, the national capital region of India and presented an extensive checklist of 338 moth species using eight year (2012-2020) of light trapping data. The highest number of 95 moths species recorded from family Erebidae followed by Crambidae (57 species) and Noctuidae (54 species). Bhagat (2020) [2] collected 55 Lepidoptera species from Jammu, Kashmir, and Ladakh.

Table 1: List of nocturnal Lepidoptera species and their relative abundance of Jhalawar

S. No.	Name of Species	Family	Abundance
1	<i>Parotis sp.</i>	Crambidae	+
2	<i>Maruca vitrata</i>	Crambidae	++
3	<i>Diaphania indica</i>	Crambidae	+++
4	<i>Tonica niviferana</i>	Depressariidae	+
5	<i>Trigonodes hyppasia</i>	Erebidae	+++
6	<i>Eressa confinis</i>	Erebidae	++
7	<i>Euproctis lunata</i>	Erebidae	++
8	<i>Spirama retorta</i>	Erebidae	+
9	<i>Olepa ricini</i>	Erebidae	+
10	<i>Micraloa sp.</i>	Erebidae	+
11	<i>Utetheisa lotrix</i>	Erebidae	+++
12	<i>Perina nuda</i>	Erebidae	++
13	<i>Lymantria mathura</i>	Erebidae	+++
14	<i>Caeneressa sp.</i>	Erebidae	+
15	<i>Digama hearseyana</i>	Erebidae	+++
16	<i>Episparis liturata</i>	Erebidae	+
17	<i>Anomis flava</i>	Erebidae	++
18	<i>Amerila astreus</i>	Erebidae	+
19	<i>Acantholipes sp.</i>	Erebidae	+
20	<i>Plecoptera sp.</i>	Erebidae	+
21	<i>Eupterote bifasciata</i>	Eupterotidae	+
22	<i>Pingasa sp.</i>	Geometridae	+
23	<i>Comibaena sp.</i>	Geometridae	++
24	<i>Hyperythra lutea</i>	Geometridae	+
25	<i>Traminda mundissima</i>	Geometridae	+++
26	<i>Chiasmia eleonora</i>	Geometridae	+++
27	<i>Hypomecis sp.</i>	Geometridae	+++
28	<i>Isturgia sp.</i>	Geometridae	+++
29	<i>Rhodometra sacraria</i>	Geometridae	+
30	<i>Thalassodes sp.</i>	Geometridae	++
31	<i>Hyposidra talaca</i>	Geometridae	+
32	<i>Macaria sp.</i>	Geometridae	+
33	<i>Hyblaea puera</i>	Hyblaeidae	+
34	<i>Attatha ino</i>	Noctuidae	+

35	<i>Helicoverpa armigera</i>	Noctuidae	+++
36	<i>Heliothis peltigera</i>	Noctuidae	+++
37	<i>Spodoptera litura</i>	Noctuidae	+++
38	<i>Mythimna sp.</i>	Noctuidae	++
39	<i>Thysanoplusia orichalcea</i>	Noctuidae	++
40	<i>Chrysodeixis eriosoma</i>	Noctuidae	+++
41	<i>Hippotion boerhaviae</i>	Sphingidae	+
42	<i>Nephele sp.</i>	Sphingidae	+
43	<i>Micronia aculeata</i>	Uraniidae	+

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