International Journal of Entomology Research
www.entomologyjournals.com
ISSN: 2455-4758
Received: 08-08-2023, Accepted: 23-08-2023, Published: 09-09-2023
Volume 8, Issue 9, 2023, Page No. 25-32

Moth diversity (Lepidoptera: Heterocera) in the forest ecosystem of tropical forest research institute (TFRI), campus, Jabalpur, Madhya Pradesh

Sanjay Paunikar[1], Nitin Kulkarni[2], Shashi Kiran Barve[2]
[1] Zoological Survey of India, Central Zone Regional Centre, Jabalpur, Madhya Pradesh, India
[2] Forest Entomology Division, Tropical Forest Research Institute P. O. RFRC, Jabalpur, Madhya Pradesh, India

Abstract
A preliminary study of moth diversity was carried out during 2017-2021 in the campus of Tropical Forest Research Institute (TFRI), Jabalpur, Madhya Pradesh. Moths were collected and observed in and around TFRI Campus during the night under fluorescent lamps, incandescent bulbs, tube lights and light traps. During the study period, 159 moth species were identified in the variety of different species under various superfamilies and families. The species identified belongs to 159 species, 130 genera, and 23 families under 14 superfamilies. Among those, superfamily Noctuoidea was found to be dominant with 4 families with 44 (34.61%) genera and 59 (37.10%) species, Pyraloidea with 2 families 37 (28.46%) genera and 44 (27.67%) species, Geometroidea with 2 families 15 genera (11.53%) and 18 species (11.32%) and Bombycoidea with 3 families 13 (10.00%) genera and 16 (11.32%) species, respectively. The family Erebidae (26.41%) was a front runner, followed by Crambidae (23.89%), Geometridae (10.69%), Sphingidae (8.17%) and Noctuidae (5.66%). Furthermore, Pyralidae (3.77%), Tortricidae (3.14%), Nolidae (3.14%), Eupterotidae (2.51%), Lasiocampidae (1.83%), Notodontidae (1.83%), Gelechiidae (1.25%), Limacodidae (1.25%) and Blastobasidae (0.62%), Cossidae (0.62%), Hybaleidae (0.62%), (0.62%), Drepanidae (0.62%), Lyonetiidae (0.62%), Pterophoridae (0.62%), Saturniidae (0.62%), Tineidae (0.62%), Uraniidae (0.62%) Yponomeutidae (0.62%) were the least recorded families.

Keywords: Lepidoptera, Heterocera, Moths Fauna, TFRI Campus, Jabalpur

Introduction

Moths are commonly nocturnal habitat, holometabolous, phytophagous and cryptic coloration insects (Lees & Zilli, 2019) [1]. They occur in all kinds of habitats including natural forests, grasslands, forest nurseries, agro-horticulture fields and crop plantations (Joshi *et al*., 2004; Kathirvelu *et al*., 2019; Paunikar & Sharma, 2023) [2, 3, 4]. The moths provide valuable ecosystem services such as pollination of crepuscular and night blooming flowering plants and their role as prey in food chain (MacGregor *et al*., 2015; Chandra *et al*., 2019; Singh *et al*., 2022a) [5, 6, 7]. They are also prey of numbers of predators such as predatory insects, mantids, spiders, amphibians, reptiles, birds and mammals. These insects are often considered as bio- indicator material in biological studies because they are sensitive to habitat change (Kendrick, 2007; Sivasankaran *et al*., 2011) [8, 9]. Being primary herbivorous insects, they help in natural control of weeds in an agro-ecosystem. The larvae of moths are active devourer of the tender parts of host plants hence, they are often recognised as notorious pests of variety of forest nurseries, forest plantations, agricultural, plantation and vegetables crops and hence they are treated as economically important insect pests (Beeson, 1941; Bhasin and Roonwal, 1954, Browne 1968; Sharma *et al*., 2008; Paunikar *et al*. 2021; Paunikar and Sharma, 2022) [10, 11, 12, 13, 14, 15].

India has variety of moth species found in the different parts of the country and has estimated 15000 moth species have been reported so far (Chandra, 2011; Singh *et al*., 2022b) [16, 17]. In the recent past, entomologists have given the significant contribution on moth faunal diversity of different districts, national parks, wildlife sanctuaries and conservation areas of Madhya Pradesh by Joshi *et al*. (2004) [2]; Chandra and Nema, (2007) [18]; Chandra, (2008) [19]; Chandra (2009ab) [20, 21]; Chandra *et al*. (2013) [22], Chandra and Sambath (2016) [23]; Kulkarni *et al*. (2017) [24], Sambath (2018) [25]. Recently, Singh *et al*. (2022b) [17] compiled 226 species of moth from Madhya Pradesh.

Materials and methods

Study area

The Tropical Forest Research Institute (TFRI) Jabalpur is one of nine institutes under the Indian Council of Forestry Research and Education. It lies on the bank of the Gour River on Mandla Road ($79^0$59'23.50"E & $21^0$08'54.30"N) about 10 km southeast of Jabalpur. The campus is spread over an area of 109 ha amidst picturesque surroundings (Image 1); semi-arid with mean annual precipitation of 1358 mm. The campus is surrounded by agricultural fields with rural habitation. There are several species of forest trees such as *Ailanthus excelsa*, *Albizia leebeck*, *Albizia procera*, *Azadirechta indica*, *Bomboo* spp., *Bombax malabaricum*, *Dalbergia sisso*, *Delonix regia*, *Eucalyptus* spp., *Ficus* spp., *Lantana* spp., *Mangifea indica*, *Moringa oleifera*, *Morus alba*, *Tectona grandis*, *Terminalia* spp. and *Zizyphus* spp., etc. The area has trees, shrubs, grasslands and small hills. The water reservoir and the vegetation planted around the institute have created a very good habitat and source of attraction for many faunal species like insects, amphibian, reptiles, birds and mammals (Tiple *et al*. 2010, 2012; Tiple, 2012; Paunikar, 2011, 2014, 2017) [26, 27, 28, 29, 30, 31]. The information on some lepidopteran insect fauna (butterflies) are available, but no report available on important group of lepidopteran moth fauna of Tropical Forest Research Institute, Campus, Jabalpur.

The present study was aimed at preliminary level to assess the Moth faunal diversity at TFRI with a view to shed light on its richness, to elicit interest for further studies and to create awareness to the researchers, public and local people about the importance of the nocturnal moth species.

Collection of moths

Moth collection was carried out TFRI Campus during the study period 2017-2021 at night under fluorescent lamps, incandescent bulbs, tube lights and light traps in different areas such as main campus, forest nurseries, forest plantations, residential areas. In addition, moths observed during the day were noted wherever possible. The moths collected were killed by ethyl acetate and later pinned in insect stretching board. All specimens were preserved in airtight insect box, having naphthalene balls as fumigant.

Identification of moths

The identification of moths was carried out in laboratory at Forest Entomology Division, Tropical Forest Research Institute (TFRI) Jabalpur and Zoological Survey of India, Central Zone Regional Centre, Jabalpur with help of identified specimens and available literature by Hampson (1892-1896) [32], Bell and Scott (1937) [33] other published literatures of Holloway, 2005; Kirti and Singh, 2015, 2016; Shubhalaxmi, 2018, Kirti *et al*., 2019 [34, 35, 36, 37, 38].

Results and discussion

The 159 species with 130 genera of moths belonging to 14 superfamilies under 23 families recorded from Tropical Forest Research Institute (TFRI) Jabalpur, Madhya Pradesh. The families such as Blastobasidae (1 genera, 1 species), Cossidae (1 genera, 1 species), Crambidae (32 genera, 38 species) Drepanidae (1 genera, 1 species), Erebidae (32 genera, 42 species) Eupterotidae (3 genera, 4 species), Hybaleidae (1 genera, 1 species), Gelechiidae (2 genera, 2 species), Geometridae (14 genera, 17 species), Lasiocampidae (3 genera, 3 species), Limacodidae (3 genera, 3 species), Lyonetiidae (1 genera, 1 species), Noctuidae (8 genera, 9 species), Nolidae (4 genera, 5 species), Notodontidae (1 genera, 3 species), Pyralidae (5 genera, 6 species), Saturniidae (1 genera, 1 species 1), Sphingidae (9 genera, 13 species), Tineidae (1 genera, 1 species), Tortricidae (5 genera, 5 species), Uranidae (1 genera, 1 species) and Yponomeutidae (1 genera, 1 species) recorded from the study area. Among these families, Erebidae (42 species, 26.41%) was dominant families followed by Crambidae (38, species, 23.89%), Geometridae (16 species, 10.69%), Sphingidae (13 species, 8.17%) and Noctuidae (9 species, 5.66%) respectively. These five dominant families were 95 (73.70%) genera and 119 (74.84%) species contributing in total moth species identified from the campus. The Erebidae are a family of moths in the superfamily Noctuoidea. The family is among the largest families of moths by genera and species count and contains a wide variety of well-known macromoth groups.

The larval forms of several moth species under various families feeds on the variety of forest trees species in forest nurseries, forest plantation and natural trees species along with agricultural, vegetables and ornamental crops, many species of grasses and weeds also. The teak defoliator *Hyblaea puera* and teak skeletoznier, *Paligma* (*Eutectona) machaeralis* these two most important moth species dominantly found in the TFRI campus, Jabalpur. They are also very well known the major pests of important forest tree species, *Tectona grandis* (Beeson, 1941; Nair, 2007; Paunikar and Kulkarni, 2020ab) [2, 39, 40, 41]. The larvae of the both the species are devouring the leaf of the teak. The other common moth species are *Spirama retorta*, *Crysptyta coclesalis* and *Atteva fabricella*, which larvae are notorious pest of forest tree species, *Bamboo* spp., *Albzia* spp. and *Ailanthus excelsa* (Paunikar and Kulkarni 2019; Roychoudhury and Mishra, 2020) [42, 43].

The forest entomologist of this Institute recorded several species of moth with their larval host plants from forest nurseries and forest plantations from this campus. Kulkarni and Joshi, (1995) [44] and Meshram and Joshi (1994) [45] recorded a noctuid moth species *Spodoptera litura* as a pest on forest tree species *Butea monosperma* and *Jatropha curcas*. Kulkarni *et al*. (1995, 1996) [46, 47] recorded geometrid moth species *Ascotis selenaria imparata* as a pest of *Pongamia pinnata* and *Moringa pterigosperma* from forest nurseries and plantation of TFRI campus. Roychoudhury *et al*. (2000) [48] recorded first time two erebids moth species *Euproctis lunata* and *E. subnotata* on forest tree species *Sesbania sesban* in the TFRI campus. Roychoudhury and Joshi (2008) [49] reported Leaf roller, *Crypsiptya coclesalis* a major pest of bamboos in nurseries and plantations.

Some entomologist recorded the moth species from different areas of Jabalpur districts. Chandra (2008) [19] recorded the moth fauna of Jabalpur, Madhya Pradesh is represented by 42 species belonging to 38 genera under 6 families. The family Limacodidae is represented with 2 species, Pyralidae with 20 species, Geometridae with 3 species, Sphingidae with 4 species, Noctuidae with 11 species, and Arctiidae with 2 species. Sambath and Farroqui (2017) [50] added 22 species belonging to 20 genera in 7 families of moth fauna of Jabalpur district. Kulkarni *et al*. (2017) [24] compiled the pictorial catalogue of more than 750 insect fauna including moths species from Jabalpur, Madhya Pradesh and other states of India.

A lot of further work is necessary in the forest ecosystem of Tropical Forest Research Institute (TFRI), campus and surrounding areas further collections are necessary detailed periodic estimate and population dynamics of the moths diversity in this campus. The present study will provide some data for other studies in this campus, and new species and genus records will enable scientists and researchers in this region to make suitable pest control measures for forestry as well as agricultural crops.

Table1: Moth diversity of tropical forest research institute, campus, Jabalpur

Sr. No.	Superfamily/ Family	Name of the species	Host Plants/Insect
1	Gelechioidea Blastobasidae Meyrick, 1894	*Holocera pulverea* Myerick, 1907	Predator of lac of insect, *Kerria lacca*
2	Cossoidea Leach, 1815 Cossidae Leach, 1815	*Zeuzera* sp.	*Lantana, Populus* sp.
3	Pyraloidea Latreille,1809Latreille,1809	*Eoophyla cf. peribocalis* (Walker, 1859)	Diatoms and algae
4	Crambidae Latreille, 1809	*Agathodes ostentalis* (Geyer, 1837)	*Nyctanthes arbortristis*

5		*Agrotera basinotata* Hampson, 1891	*Lagerstoemia parviflora*
6		*Arthroschista hillaralis* (Walker, 1859)	*Anthocephalus cadamba*
7		*Botyodes asialis* (Guenee, 1854)	*Casearia graveolens, C. tomentosa, Diospyrostupra*
8		*Cnaphalocrocis medinalis* (Geunee, 1854)	*Orza sativa*
9		*Cnaphalocrocis poeyalis* (Boisduval, 1833)	-
10		*Cirrhochrista brizoalis* (Walker, 1859)	*Ficus* spp.
11		*Cydalima conchylalis* Guenee, 1854	*Chonemorpha fragrans, Holarrhena pubescens*
12		*Diaphania indica* (Saunders, 1851)	*Cucurbita pepo, Lagenaria siceraria, Luffa cyndrica*
13		*Glyphodes bicolor* (Swainson, 1821)	*Alstona scholaris, Artocarpus integer, Carrissa carandas, Ficus, Tectona grandis,*
14		*Glyphodes stolalis* (Guenee, 1854)	*Ficus racemosa*
15		*Glyphodes conclusalis* (Walker, 1859)	*Cassia fistula*
16		*Haritalodes derogata* (Fabricius, 1775)	*Alcea rosea, Celosia argentea, Hibiscus* sp., *Kydia calycina*
17		*Lamprosema commixta* (Butler, 1873)	*Xylia xylocarpa*
18		*Leucinodes orbonalis* Guenee, 1854	*Mangifera indica, Solanum melongena,*
19		*Maruca* cf. *vitrata* (Fabricius 1787)	*Lablab purpurens, Cajanus cajanus*
20		*Maruca testulalis* (Geyer, 1832)	*Casuarina equisetifolia, Derris elliptica, Xylia dolabriformis*
21		*Metoeca foedalis* (Geunee, 1854)	*Orza sativa*
22		*Nausinoe geometralis* (Guenee, 1854)	*Jasminum*
23		*Notarcha aurolinealis* (Walker, 1859)	*Sida rhombifolia, Helicteres isora*
25		*Parotis marginata* (Hampson, 1893)	*Alstonia scholaris, Tabernaemontana divaricata*
26		*Pygospila tyres* (Cramer, [1780])	*Holarrhena pubescens, Tabernaemontana alternifolia,*
27		*Tyspanodes linealis* (Moore, 1867)	*Bombax ceiba*
28		*Pagyda salvalis* Walker, 1859	*Tectona grandis*
29		*Spodelea recurvalis* (Fabricius, 1775)	*Amaranthus caudatus, Cchyranthes aspera,*
30		*Sameodes cancellalis* (Zeller, 1852)	*Tectona grandis*
31		*Bradina diogonalis* (Guenee, 1854)	-
32		*Parapoynx diminutalis* Snellen, 1880	*Hydrilla verticilata*
33		*Parapoynx stagnalis* (Zeller, 1852)	*Cleistanthus* spp., *Oryza sativa*
34		*Noorda blitealis* Walker, 1859	*Moringa oleifera*
35		*Noorda moringae* Walker, 1859	*Moringa oleifera*
36		*Crypsipyta coclesalis* (Walker, [1859])	Bamboo species
37		*Conogethes punctiferalis* (Guenee, 1854)	*Butea monosperma, Mangifera indica, Morus alba, Tectona grandis*
38		*Euclasta defamatalis* Walker, 1859	-
39		*Paliga machaeralis* (Walker, 1859)	*Tectona grandis*
40		*Patania balteata* (Fabricius, 1798)	*Anacardium occidentale*
41		*Massepha absolutalis* Walker, 1859	*Bamboo* sp.
42	Drepanoidea Boisduval, 1828 Drepanidae Boisduval, 1828	*Cyclidia substigmaria* (Hubner, [1831])	-
43	Noctuoidea Latreille, 1809 Erebidae (Leach, [1815])	*Aola lactinea* Cramer, 1777	*Cassia tora, Clerodendron infortunatum, Menispermum glabrum*
44		*Argina astrea* (Drury, 1777)	*Crotalaria* plants
45		*Brunia antica* (Walker, 1854)	White lichen growing on citrus plant
46		*Creatonotus gangis* (Linnaeus,1763)	Soybeans, Rice, Maize
47		*Creatonotes transiens* (Walker, 1855)	*Cedrela toona, Ehretia laevis, Ficus religiosa, Lantana aculeata*
48		*Syntomoides imaon* (Cramer, 1779)	Rice, *Soyabean and maize crops*
49		*Cyana puella* (Drury, 1773)	Lichens
50		*Olepa ricini* (Fabricius, 1775)	*Camellia sinensis, Campsis grandiflora, Coccinia grandis, Mangifera indica,*
51		*Mangina syringa* (Cramer, [1775])	*Crotalaria assamica, Crotalaria juncea, Crotalaria longipes, Musa paradisiaca*
52		*Pericyma cruegeri* (Butler, 1866)	*Delonix sp.*
53		*Plecoptera reflexa* Guenee, 1852	*Dalbergiao sisooo*

54		*Achaea janata* (Linnaeus, 1758)	*Acacia* sp. *Azadirectha indica, Dalbergia sissoo, Embelica officinalis, Shorea robusta, Tamarindus indica,*
55		*Achaea serva* (Fabricius, 1875)	*Palaquium* sp., *Castor*
56		*Anomis flava* (Fabricius,1775)	*Abelmoschus crinitus, Bombax ceiba, Hibiscus cannabinus, Hibiscus*
57		*Anomis fulvida* (Guenee, 1852)	*Alcea rosea, Bombax, Gossypium, Hibiscus, Citrus*
58		*Asota caricae* Fabricius,1775	*Ficus religiosa, Broussonetia papyrifera,*
59		*Asota ficus* (Fabricius,1775)	*Ficus* sp., *Morinda* sp.
60		*Dichromia sagitta* (Fabricius,1775)	*Dregea volubilis, Tylophora asthmatica, Tylophora ovata*
61		*Entomogramma torsa* Guenee 1852	*Albizia lebbeck*
62		*Bastilla conficiens* (Walker, 1858)	*Phyllanthus* sp.
63		*Erebus hieroglyphica* (Drury, 1773)	-
64		*Erebus macrops* Linnaeus,(1770)	*Acacia pennata*
65		*Fodina stola* Guenee, 1852	*Anogeissus latifolia, Casia fistula*
66		*Grammodes geometrica* (Fabricius,1775)	*Diospyros montana*
67		*Spirama retorta* Clerck,1764	*Albizia lebbeck* and *Albizia procera*
68		*Spilarctoia obliqua* (Walker, 1855)	Variety of forest and agricultural crops
69		*Trigonodes hyppasia* Cramer,[1779]	*Indigofera sp., Medicago sativa, Rhynchosia minima*
70		*Olene mendosa* Hubner, 1823	*Acacia, Cassia,Cedrus deodara, Mangifera indica, Tamarindus indica, Terminalia, Zizyphus*
71		*Euproctis bimaculata* Walker, 1855	*Loranthus* sp.
72		*Euproctis fraterna* Moore, 1883	*Sesbania sesban*
73		*Euproctis lunata* Walker, 1855	*Sesbania sesban*
74		*Euproctis subnotata* Walker, 1865	*Sesbania sesban*
75		*Lymantria mathura* (Moore, 1866)	*Lagerstroemia parviflora, Mangifera indica, Planchonia careya, Quercus serrata, Shorea robusta, Syzygium cumini, Terminalia sp.*
76		*Hypocala rostrata* (Fabricius, 1794)	*Erioglossum rubiginosum, Diospyros ehretioides*
77		*Sphingomorpha chlorea* (Cramer, 1777)	*Acacia, Citrus, Lantana camera, Malus pumila*
78		*Rhesala imparata* Walker, 1858	*Acacia spp., Albizzia sp., Delonix regia, Tamarindus indica, Boswellia serrata*
79		*Rhesala moestalis* (Walker, 1866)	*Acacia tortilis, Albizzia lebbeck, Albizia procera*
80		*Thyas coronata* (Fabricius, 1775)	*Terminalia* sp.
81		*Dinumma placens* Walker, 1858	*Pithecollobium lucidum*
82		*Endocima discrepans* (Walker, [1858])	*Tinomiscium petiolare*
83		*Endocima phalonica* Linnaeus, 1763	*Erythrina fusca,*
84		*Eublemma amabilis* (Sallmuller, 1891)	LAC
85	Bombycoidea Latreille, 1810 Eupterotidae Swinhoe, 1892	*Eupterote undata* Blanchard, [1844]	*Bombax ceiba, Toona ciliata*
86		*Eupterote mollifera* Walker, 1865	*Amomum subulatum, Elettaria cardamomum, Moringa*
87		*Eupterote translata* Swinhoe, 1885	*Bombax ceiba,*
88		*Ganisa plana* Walker, 1855	*Jasminum*
89	Gelechioidea Gelechiidae Stainton, 1854	*Dichormeris crepitatrix* Meyrick, 1913	-
90		*Aproaerema modicella* Deventer, 1904	Soyabean, Ground nut
91	Geometroidea Leach, 1815 Geometridae Leach, 1815	*Anisephyra ocularia* (Fabricius, 1775)	-
92		*Ascotis imparata* (Walker, 1860)	*Acacia farnesiana, Albizia procera, Dalbergia sissoo, Melia azedarach, Shorea robusta, Tectona grandis, Vitex negundo*
93		*Ascotis selenaria* Denis and Schiffermuller, 1775	*Camellia sinensis*
94		*Biston suppressaria* (Guenee, 1858)	*Acacia modesta, A.catechu, Aleurites Montana, Cassia auriculata*
95		*Biston congnatria* Guenee, 1858	*Tectona grandis*
96		*Chiasmia nora* Walker, 1861	*Acacia pennata*
97		*Chiasmia emersaria* (Walker, 1861)	*Albizia procera, Cassia renigera, Pithecellobium dulce*
98		*Cleora* sp.	*Tectona grandis*

99		*Digma* sp.	*Carissa spinarum*
100		*Hyposidra talaca* (Walker, 1860)	*Ailanthus excelsa, Acacia* sp. *Bombax ceiba, Cassia* sp., *Dalbergia sissoo Eucalyptus, Tectona grandis,*
101		*Pelagodes falsaria* (Prout, 1912)	*Mangifera indica*
102		*Isturgia (Tephrina) pulinda* (Walker, 1860)	*Acacia nilotica*
103		*Scopula cuneilinea* (Walker, [1862])	*Anthocephalus* sp., *Breonia chinensis, Neolamarckia cadamba, Haldina cordifolia,*
104		*Agathia lycaenaria* (Kollar,1848)	*Carissa spinarum, Holarrhena spp, Nerium oleander,*
105		*Thalassodes quadrina* Guenee, 1857	*Anacardium occidentale, Polyalthia longifolia*
106		*Traminda mundissima* (Walker, 1861)	*Acacia catechu, Acacia nilotica*
107		*Pingasa tephrosiaria* (Guenee, 1858)	-
108	Hybaleoidea Hampson, 1903 Hyblaeidae Hampson, 1903	*Hyblaea puera* Cramer, 1777	*Avicennia marina, Callicarpa arborea, Tectona grandis*
109	Lasiocampoidea Harris, 1841 Lasiocampidae Harris, 1841	*Chilena similis* Walker, 1855	-
110		*Strebolte siva* (Lefebvre, 1827)	*Acacia arabica, Murraya exotica, Tamarix gallica, T.indica, Zizyphus jujuba*
111		*Trabala vishnou* (Lefebvre, 1827)	*Butea monosperma, Eucalyptus robusta, Shorea robusta, Syzygium cuminii, Terminalai* sp.
112	Zygaenoidea Latreille, 1809 Limacodidae Duponchel, 1845	*Miresa* sp.	*Terminalia* sp., *Butrea frondosa*
113		*Parasa lepida* Cramer, 1799	*Butea monosperma, Cassia fistula, Mangifera indica,*
114	Yponomeutoidea Lyonetiidae Stainton, 1854	*Leucoptera sphenograpta* Meyrick,1911	*Populus deltoids, Dalbergia sissoo, Tecomella undulata*
115	Noctuoidea Latreille, 1809 Noctuidae Stephens, 1829	*Agrotis ipsilon* (Hüfnagel, 1766)	*Acacia nilotica, Albizia leebek, Cedrus deodara, Eucalyptus* sp
116		*Brithys crini* (Fabricius, 1775)	*Crinum*, *Clivia* and *Hippeastrum*, including *Crinum angustifolium, Zephyranthes candida*
117		*Chrysodeixis eriosoma* (Doubleday, 1843)	*Dahia* sp. *Hibiscus* sp.
118		*Helicoverpa armigera* (Hubner,[1808])	*Acacia catechu, Albizia procera, Arachis hypogaea, Ricinus communis Cajanus cajan, Dalbergia sissoo,*
119		*Thysanoplusia orichalcea* (Fabricius, 1775)	Sunflower, *Coreopsis*, Potao and Soyabean
120		*Spodoptera litura* (Fabricius,1755)	*Butea monosperma, Jatropha curcus, Trigoniella foenumgraecum,* and variety of Vegetable crops
121		*Spodoptera mauritia* (Boisduval, 1833)	Rose plants and variety of grasses
122		*Polytela gloriosae* Fabricius, 1871	*Gloriosa superba, Lilium* sp.
123	Noctuoidea Latreille, 1809 Nolidae Bruand, 1847	*Enligma narcissus* (Cramer, [1775])	*Ailanthus excelsa*
124		*Earias vittella* Fabricius, 1794	Cotton
125		*Selepa docilis* Butler, 1881	*Solanum melongana, S,torvum* and *S.xanthocarpa*
128		*Selepa celtis* Moore,[1860]	*Fiucs glomerata, Gmelina arborea, Mangifera indica, Shorea robusta, Terminalia* sp.
127		*Pseudelydna rufoflava* Walker, 1856	
128	Noctuoidea Latreille, 1809 Notodontidae Stephens, 1829	*Clostera cupreata* (Butler, 1886)	*Populus deltoides*
129		*Clostera fulgurita* Moore, 1865	*Populus deltoides*
130		*Clostera restitura* (Walker, 1865)	*Populus deltoides*
131	Pterophoroidea Latreille, 1802 Pterophoridae Zeller, 1841	*Hellinsia homodactyla* Walker, (1864)	Vegetable crops
132	Pyraloidea Latreille,1809 Pyralidae Latreille, 1809	*Corcyra cephalonica* Stainton, 1865	Rice
133		*Nephopteyrx strigivenata* Hampson, 1896	-
134		*Galleria mellonella* (Linnaeus,1758)	Honey comb
135		*Hypsipyla robusta* (Moore, [1886])	*Carapa guianensis, Cedrela australis, Swietenia* sp.
136		*Lamida carbonifera* Meyrick, 1932	*Anogeissus latifolia, Diospyros melanoxylon, Mangifera indica, Terminalia* sp.
137		*Lamida monocusalis* Walker, [1859]	*Mangifera indica*
138	Bombycoidea Latreille, 1812	*Actias selene* (Hubner, [1807])	*Betula alnoides, Coriaria nepalensis,*

	Saturniidae Boisduval, 1837		*Mangifera indica, Moringa oleifera,*
139	Bombycoidea Latreille, 1812 Sphingidae Latreille, [1802]	*Acherontia lachesis* (Fabricius,1798)	*Callicarpa arborea, C.macrophylla, Tectona grandis,*
140		*Acherontia styx* (Westwood, 1847)	*Tectona grandis, Jasminnum arborescens, Vitex negundo*
141		*Agnosia* sp.	*Anogeissus* sp. *and Grewia*
142		*Agrius convolvuli* (Linnaeus, 1758)	*Tectona grandis, Ipomoea* sp.
143		*Cephonodes hylas* (Linneaus, [1771])	*Adina cordifolia, Gardenia florida, Tectona grandis*
144		*Dephnis neriil* Linneaus, (1758)	*Holarrhena pubescens, Nerium oleander,*
145		*Nephele dydyma* (Fabricius, 1775)	*Carissa* sp.
146		*Nephele hespera* (Fabricius, 1775)	*Carissa carandas*
147		*Theretra clotho clotho* (Drury, 1773)	*Dillenia* sp. *Hibiscus nutabilis*
148		*Theretra lycetus* (Cramer, 1775)	*Dillenia pentagyna, Leea asiatica, Leea macrophylla, Vitis sp*
149		*Theretra pinastrina* Martyn, 1797	-
150		*Ambulyx substruigillus* Westwood, 1848	*Aglaia littoralis, Dipterocarpus tuberculatus*
151		*Macroglossum* sp.	-
152	Tineoidea 1810 Tineidae Latreille, 1810	*Gerontha captiosella* (Walker, 1864)	-
153	Tortricoidea Latreille, 1802 Tortricidae Latreille, 1802	*Acanthoclita balancoptycha* (Meyrick, 1910)	-
154		*Archips* sp.	*Citrus*
155		*Cydia jaculatrix* (Meyrick, 1910)	*Dalbergia sissoo* (seeds)
156		*Loboschiza koenigiana* (Fabricius, 1775)	*Azadirachta indica, Jasminum sambac, Melia azedarach*
157		*Strepsicrates* sp.	
158	Geometroidea Leach, 1815 Uranidae Leach, 1815	*Micronia aculeata* Guenee, 1857	*Gymnema sylvestre*
159	Yponomeutoidea Stephens, 1829 Yponomeutidae Stephens, 1829	*Atteva fabriciella* (Swederus, 1787)	*Ailanthus excelsa*

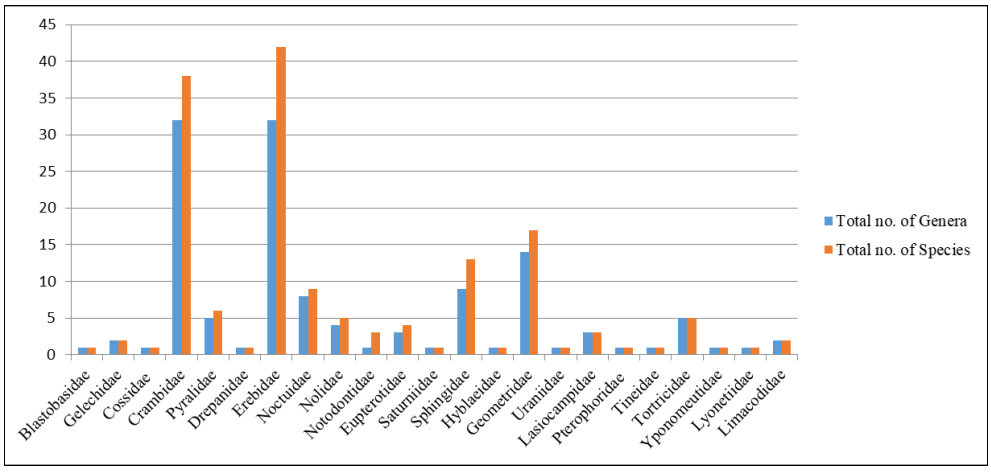

Fig 1: Relation between genera and species in different moth families

Acknowledgement
Authors are very much grateful to the Director, Dr. Dhriti Banerjee, Zoological Survey of India, Kolkata and Officer-in-Charge, Central Zone Regional Center, Zoological Survey of India, Jabalpur for providing facilities and encouragements.

References

1. Lees DC, Zilli A. *Moths: Their biology, diversity and evolution*. Natural History Museum, London, 2019, 208.
2. Joshi KC, Kulkarni N, Roychoudhury N, Chandra S, Barve S. A study of insects from Kanha National park. Journal of Tropical Forestry, 2004:20(III & IV):58-74.
3. Kathirvelu C, Ayyasamy R, Karthikeyan M. Preliminary checklist of moths (Lepidoptera: Glossata) of Annamalai Nagar, Tamil Nadu. Journal of Applied and Natural Science,2019:11(2):404-409.
4. Paunikar S, Sharma G. Moth fauna (Lepidoptera: Heterocera) in the forest ecosystem of Doon Valley, Uttarakhand. Paper Presented at *Animal Taxonomy Summit-2023* at Zoological Survey of India, Kolkata on 2nd & 3rd July-2023. Abstract Pp-162, 2023.
5. MacGregor CA, Pocock MJO, Fox R, Evans DM. Pollination by nocturnal Lepidoptera, and the effects of light pollution: a review. Ecology Entomology,2015:40(3):187-198.

6. Chandra K, Kumar V, Singh N, Raha A, Sanyal AK. *Assemblages of Lepidoptera in Indian Himalaya through Long Term Monitoring Plots:* 1-457. (Published by the Director, Zool. Surv. India, Kolkata), 2019.
7. Singh N, Lenka R, Chatterjee P, Mitra D. Settling moths are the vital component of pollination in Himalayan ecosystem of North-East India, pollen transfer network approach revealed. Scientific Report,2022:12:2716.
8. Kendrick RC. The conservation assessment of moths in Hong Kong. In Kendrick, R.C. (ed.) Proceedings of the First South East Asian Lepidoptera Conservation Symposium, Hong Kong 2006. pp. 71-82. Kadoorie Farm & Botanic Garden, Hong Kong, 2007.
9. Sivasankaran K, Gnanasekaran S, Paradhaman D, Ignacimuthu S. Diversity of Noctuid moths (Lepidoptera:noctuidae) in Tamil Nadu part of Western Ghats (Nilgiri Biosphere and Kodaikanal hills), India. Elixir Bio Diversity,2011:38:4131-4134.
10. Beeson CFC. The Ecology and Control of Forest Insects of India and Neighbouring Countries. New Delhi, India, 1941.
11. Browne FG. Pests and Diseases of Forest Plantation Trees. Clarendon Press, Oxford, 1968, 1330.
12. Bhasin GD, Roonwal ML. A list of insect pests of forest plants in India and adjacent countries. Indian Forest Bulletin (N.S) (Ent),1954:171(1):48.
13. Sharma G, Kumar R, Pathania PC, Ramamurthy VV. Biodiversity of Lepidopterous Insects associated with vegetables in India-A study. Indian Journal of Entomology,2008:70(4):369-384.
14. Paunikar SD, Sharma G, Sathiskumar VS. Diversity of Moth (Lepidoptera: Heterocera) in different forest areas of North-West Himalaya. Uttar Pradesh Journal of Zoology,2021:42(24):925-935.
15. Paunikar SD, Sharma G.A preliminary study on the moth diversity of Ranjit Sagar conservation reserve of Punjab. The Pharma Innovation Journal,2022:11(6): 2494-2498.
16. Chandra K. Insect fauna of states and union territories in India, pp. 189-218. In: Uniyal V P, Shrivastava, A. (Eds.), Arthropods and their Conservation in India (Insects and Spiders). ENVIS Bulletin: Wildlife and Protected Areas, Dehradun, Wildlife Institute of India,2011:14:1-232.
17. Singh N, Pathania PC, Joshi R, Kalawate A, Shah S, Ahmad J, Raha A, Das A, Mazumdar A. Insecta: Lepidoptera (Moths), In: Faunal Diversity of Biogeographic zones of India: Deccan Peninsula. (Published by the Director, Zool. Surv. of India, Kolkata),2022:487-514.
18. Chandra K, Nema DK. Insecta: Lepidoptera: Heterocera (Moths). In: Fauna of Madhya Pradesh (including Chhattisgarh), State Fauna Series,2007:15(Part-l):347-418.
19. Chandra K. *Insecta: Lepidoptera: Heterocera: Faunal Diversity of Jabalpur District, Madhya Pradesh*. Zoological Survey of India. Kolkata, 2008, 209-223.
20. Chandra K. *Insecta: Lepidoptera: Heterocera*. *Fauna of Pachmarhi Biosphere Reserve, Conservation Area Series*, Zoological Survey of India, Kolkata,2009:39: 337-354.
21. Chandra K. *Insecta: Lepidoptera: Heterocera*. *Fauna of Bandhavgarh National Park, Conservation Area Series.* Zoological Survey of India, Kolkata,2009:40:131-140.
22. Chandra K, Pandey R, Bhandari R, Sambath S. Diversity of Hawk Moths (Lepidoptera: Sphingidae) in Veerangana Durgavati Wildlife Sanctuary, Damoh, Madhya Pradesh. Biological Forum – An International Journal,2013:5(1):73-77.
23. Chandra K, Sambath S. Insecta: Lepidoptera: Heterocera (Moths). In: *Faunal Diversity of Singhori Wildlife Sanctuary, district Raisen*, Madhya Pradesh, Fauna of Conservation Area series,2016:57:185-215.
24. Kulkarni N, Roychoudhury N, Meshram PB, Chander S, Barve S. Pictorial catalogue of Insect Reference Collection published by Director, Tropical Forest Research Institute, Jabalpur, Madhya Pradesh, 2017, 176.
25. Sambath S. Moth Fuana of Kheoni Wild life Sanctuary, district, Dewas, Madhya Pradesh. Bionotes,2018:20(4):127-129.
26. Tiple A, Kulkarni N, Paunikar S, Joshi KC. Avian fauna of Tropical Forest Research Institute, Jabalpur central India. Indian Journal of Tropical Biodiversity,2010:18(1):165-171.
27. Tiple A, Paunikar S, Talmale SS. Dragonfly and damselfy (Odonata: Insecta) of Tropical Forest Research Institute, Jabalpur, Madhya Pradesh (Central India). Journal of Threatened Taxa,2012:(4):2529-2533.
28. Tiple AD. Butterfly species diversity, relative abundance and status in Tropical Forest Research Institute, Jabalpur, Madhya Pradesh, central India. Journal of Threatened Taxa,2012:4(7):2713-2717.
29. Paunikar S. Observation on Jungle Cat (*Felis chuas*) at Tropical Forest Research Institute, Campus, Jabalpur, Madhya Pradesh. Records of the Zoological Survey of India,2011:3(4):25-27.
30. Paunikar S. Status of Reptiles Fauna in Tropical Forest Research Institute, Campus, Jabalpur, Madhya Pradesh**.** Indian Journal of Forestry,2014:37(4):403-408.
31. Paunikar S. Diversity and distribution of amphibian in the forest ecosystem of Tropical Forest Research Institute Campus, Jabalpur, Madhya Pradesh. Newsletter of frog leg, 129 In: Zoo's Print,2017:32(4):7-10.
32. Hampson GF. The Fauna of British India including Ceylon and Burma, Moths. Taylor and Francis Ltd., London,1893-1896:1:1-611.
33. Bell TRD, Scott FB. The fauna of British India including Ceylon and Burma, Moths, Vol. 5. Taylor & Francis, London, 1937, 537.
34. Holloway JD. The Moths of Borneo: Family Noctuidae, subfamily Catocalinae. Malayan Nature Journal,2005:58:1-529.
35. Kirti JS, Singh N. *Arctiid Moths of India*, Vol. I. Nature Books India, New Delhi, 2015, 205.
36. Kirti JS, Singh N. Arctiid Moths of India Vol. II. Nature Books New Delhi. 2016, 205.
37. Shubhalaxmi V. *Birdwing field guide to Indian Moths*. Edi. I. Birdwing Publishers, Navi Mumbai, Maharashtra, India, 2018, 461.
38. Kirti JS, Chandra K, Saxena A, Singh N. Geometrid Moth of India. (Published by: Nature Books India, 6 Gandhi Market, Minto Raod, New Delhi, 2019, 300.

39. Nair KSS. Tropical Forest Insect Pests : Ecology, Impact and Management. University Press, Cambridge, 2007, 404.
40. Paunikar S, Kulkarni N. Infectivity and progeny production of new species of entomopathogenic nematode, *Steinernema dharanaii* Kulkarni *et al*., 2012 (Rhabditida: Steinernematidae) against teak defoliator, *Hyblaea puera* (Lepidoptera: Pyralidae) Walker under laboratory condition. International Journal of Entomology Research,2020:5(3):99-105.
41. Paunikar S, Kulkarni N. Pathogenicity and progeny production of new species of entomopathogenic nematode, *Steinernema dharanaii* Kulkarni *et al*., 2012 (Nematoda: Steinernematidae) against teak skeletonizer, *Eutectona machaeralis* Walker (Lepidoptera: Pyralidae) Walker under laboratory condition. International Journal of Zoology and Applied Biosciences,2020:5(3):170-170.
42. Paunikar S, Kulkarni N. Evaluation of native new-to-science species of entomopathogenic nematode, *Steinernema dharanaii*, (TFRIEPN-15) against Bamboo leaf roller, *Crypsipyta coclesalis* Walker (Lepidoptera: Pyralidae) in the laboratory. The Indian Forester,2019:145(8):767-773.
43. Roychoudhury N, Mishra RK. Ailanthus webworm, *Atteva fabriciella* and its control measures. Van Sangyan,2020:7(11):27-30.
44. Kulkarni N, Joshi KC. First report of *Spodoptera litura* (Fab.) Boursin (Lepidoptera: Noctuidae) as a pest on *Butea monosperma* (Lam) Taub. Indian Forester,1995:121(8):764-765.
45. Meshram PB, Joshi KC. A new report of *Spodoptera litura* (Fab.) Boursin (Lepidoptera: Noctuidae) as a pest of *Jatropha curcas* Linn. Indian Forester,1994:120(3):273-274.
46. Kulkarni N, Joshi KC, Sambath S. A new report of *Ascotis selenaria imparata* Walker (Lepidoptera: Geometridae) as a pest of *Pongamia pinnata* (L) Pierre. Indian Forester,1995:121(3):239-240.
47. Kulkarni N, Kalia S, Sambath S, Joshi KC. First report of *Ascotis selenaria imparata* Walk. (Lepidoptera: Geometridae) as a pest of *Moringa pterygosperma* Gertn. Indian Forester,1996:122(11):1075-1076.
48. Roychoudhury N, Joshi KC, Sambath S, Rupali Pal. New records of *Euproctis lunata* and *E. subnotata* Walker on *Sesbania sesban* (L.) Mrilll Van Anusandhan, 2000, 71-73.
49. Roychoudhury N, Joshi KC. Leaf roller, *Crypsiptya coclesalis* Walker (Lepidoptera: Pyralidae), a major pest of bamboos in nurseries and plantations. Indian Forester,2008:134(9):1229-1235.
50. Sambath S, Farooqui SA. Additions to the Moth Fauna (Lepidoptera) of district Jabalpur, Madhya Pradesh. Bionotes,2017:19(4):152-153.