

A preliminary report on the biodiversity of moths (Insecta: Lepidoptera: Heterocera) of Balaghat city from southern Madhya Pradesh, India

1Shajiya Tabassum, 2Pratima Bisen
1Assistant Professor, 2Assistant Professor
1govt. j s t p g college, balaghat (m.p). india,
2govt. j s t p g college, balaghat (m.p). india

Abstract - Moths belongs to the order Lepidoptera and the estimated number of species in India are about 10000. Present study was an attempt to explore moth diversity from different sites of Balaghat city situated in south Madhya Pradesh. Bio-diversity of the moths were investigated from July 2021 - Oct 2021. A total number of 69 moth species were recorded and identified up to family level and 14 families were recorded under 9 super families. Moths can be used as bioindicators as they are easily affected by a minute change in environment. They are also well known as agricultural pest and pollinators. As little work has been reported in this area, the present study is the first attempt to document the moth fauna, reporting 69 moth species in Balaghat city.

keywords - Balaghat, biodiversity, Lepidoptera, Madhya Pradesh, Moths

Introduction

Moths are one of the most diversified animals and are the cousins of butterflies, belonging to the order Lepidoptera. About 129 families of moths with 1.42 million moth species identified are found worldwide. Out of these about ten thousand species are recorded in India (Shubhalakshmi 2018). They are agricultural pests, night pollinators and nocturnal insects. Their population changes with slight change in climate or pollution, thus are known as potential bio-indicators.

Documentation of moth diversity can act as the first step towards conservation goals for lepidopteran insects. The present investigation is the first attempt to study and to record the diversity of moth fauna from Balaghat City. Balaghat has a rich biological diversity and about 80% of district is covered by forest. The district is situated within 21.19 to 22.24 north latitude and 79.3 to 81.3 east longitude. It is situated near Kanha National Park and at the bank of river Wainganga, and is thus surrounded by the densest forest of Madhya Pradesh.

In the present study different varieties of moths were collected from different sources and their untouched biodiversity in Balaghat city is documented. During the survey period, 69 species of moths were collected pertaining to 58 genera belonging to 9 super-families, and 14 families. Crambidae was most dominant with 18 genera. Being sensitive to environmental changes, moths act as important bioindicators for slight change in environment. Moths are also known to cause agricultural losses and their role as agricultural pest species has also been reported (Srivastava and Bogawat, 1968; Kushwaha and Bhardwaj, 1977; Sharma *et al.*, 2011; Babu and Meghwal, 2014; Haldhar *et al.*, 2016; Meena *et al.*, 2017). But as very few literatures are available on moth diversity in this area, the present investigation will be helpful to fill this lacuna.

Material and methods

Moths were reported during field visits from 1st July to 31 October 2021 from Balaghat City. For our study we visited a few localities of the area which are listed in table 1. Moths attracted to light sources were observed between 6.00 pm to 1.00 am every night. Some moths were also observed during day time, and were reported. Photographic records were documented and identified with standard references (Sondhi and Sondhi 2016, Singh *et al* 2017), and field guide (Holloway *et al* 2001 and Shubhalakshmi 2018). The classification in this article follows Nieuwerkerken *et al* 2011. Superfamilies are listed alphabetically with families, genus and species observed. Further, in each family genus are listed alphabetically. (Table 2).

Results

In the above study 69 moth taxa were reported. There are 14 families belonging to 9 super families, namely Bombycoidea, Geometridea, Incurvarioidea, Lasiocampoidea, Noctuoidea, Pterophoroidea, Pyraloidea, Tineoidea and Zygaenoidea. Details of individual taxa are recorded and given in table 2, and photographs of related moths are given from figure 1B-67. In families the highest number belongs to Crambidae (19 species; 26.8%), followed by Erabidae (14 species; 20.9 %), Noctuidae (12 species; 16.4%) and Geometridae (9 species; 13.4%) (Figure 68).

Discussion

Information on moth fauna of Balaghat district has been very poorly studied and are unreported. Maximum number of species were recorded from super family Noctuoidea with total 28 species from its four families, Erebidae (14 species), Noctuidae (12 species), Notodontidae (1 species) and Nolidae (1 species).

However, present investigation also shows that family Crambidae dominates with 18 species followed by family Erabidae with 14 species, Noctuidae with 12 species, Geometridae with 9 species, Lasiocampidae, Sphingidae, Saturniidae and Tineidae with 2 species each, and lastly families Prodoxidae, Pterophoridae, Limacocidae, Notodontidae and Nolidae with 1 species each. In the present investigation 69 species of moths were reported which supports the observation made by Anirudha Dhamorikar (2015) who reported 36 species of Moths from Kanha National Park, near Balaghat. Bharamal (2015) have reported 56 species of moths in Amboli Reserve Forest of Maharashtra. Gadhikar *et al* (2013) have reported 41 species belonging to 12 families in Amravati Maharashtra.

A preliminary study on moth at Jabalpur which is 250 km away from Balaghat, was carried out by Choubey *et al* (2017) and 22 moth species were reported. Gurule (2013) have reported 177 genera and 20 families of moths collected in North Maharashtra. Chandra and Nema (2007) have reported 313 species of months from Madhya Pradesh, and Pandhrbale (2004) has reported 128 species of moths from 74 Satara district. Only 12 moth species were reported in Washim city of Maharashtra by Jadhav *et al* (2016).

Scientific documentation of moth fauna is much lacking in Balaghat region due to which conservation efforts are lower. Thus, there is a need of further work in greater depth and covering larger areas may reveal a rich diverse biodiversity of moth fauna. Moths are easily affected by slightest disturbances in climate or by pollution. A sudden increase or decrease in population of moth can be taken as an indicator of climatic changes or increase in pollution. Thus, moths biodiversity can be used to measure ecological impact in a particular area.

Conclusion

The present study has been carried out to elucidate a fauna which was previously unknown. Thus, it can be considered as a small step towards understanding moth diversity of Balaghat City. The present work can further be used on conservation of biodiversity, especially for moths. More detailed survey is required to get complete list of moths in various ecological regions of Balaghat city and its surroundings. The present investigation will also be helpful to agricultural scientist in the region to take suitable pest control measures for crops.

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Table 1
Details of locations where observations were made from 1st July 2021 to 31st October 2021

S.N	Name of Area selected	Location	Habitat
1	Bhatera Road	North	Rural
2	Baihar Road	North East	Urban
3	Gondiya road	South	Urban
4	Moti garden and lake	West	Urban

Table 2. List of moth species with their classification

S.N.	Super Family	Family	Genus	Species
1	Bombycoidea	1. Satruniidae 2. Sphingidae	1. <i>Actias</i> 2. <i>Anthaerea</i> 3. <i>Acherontia</i> 4. <i>Daphnis</i>	<i>artemis</i> <i>mylitta</i> <i>styx</i> <i>nerii</i> (Oleander hawk moth)
2	Geometridea	3. Geometridae	5. <i>Anacamptodes</i> 6. <i>Hyposidra</i> 7. <i>Jodis</i> 8. <i>Lomographa</i> 9. <i>Oxdia</i> 10. <i>Plagodis</i> 11. <i>Scopula</i> 12. <i>S.</i> 13. <i>S.</i>	<i>defectaria</i> <i>talaca</i> <i>sp.</i> <i>sp.</i> (white spring moth) <i>sp.</i> <i>phlagosaria</i> <i>floslactata</i> <i>optivala</i> <i>perlata</i>
3	Incurvarioidea	4. Prodoxidae	14. <i>Prodoxus</i>	<i>sp.</i>
4	Lasiocampoidea	5. Lasiocampoidae	15. <i>Trabala</i> 16. <i>T.</i>	<i>ganesha</i> <i>vishnoi</i>
A	Noctuoidea	6. Erebidae 7. Noctuidae	17. <i>Anticarsia</i> 18. <i>Asota</i> 19. <i>Catocala</i> 20. <i>C.</i> 21. <i>Cretonotos</i> 22. <i>Eudocima</i> 23. <i>Grammodes</i> 24. <i>Lymantria</i> 25. <i>Parallelia</i> 26. <i>Phragmatobia</i> 27. <i>Syntomoidest</i> 28. <i>Spilosoma</i> 29. <i>S.</i> 30. <i>Zale</i> 31. <i>Anuga</i> 32. <i>Antiblemma</i> 33. <i>Condica</i> 34. <i>Chalciope</i> 35. <i>Feltia</i> 36. <i>Feltia</i> 37. <i>Marimatha</i> 38. <i>Ponometia</i> 39. <i>Spodoptera</i> 40. <i>S.</i>	<i>gemmatalis</i> <i>caricae</i> <i>fraxini</i> <i>conjuncta</i> <i>gangis</i> <i>maternal</i> <i>geometrica</i> <i>dispar</i> <i>sp.</i> <i>fuliginosa</i> (ruby tiger) <i>imaon</i> <i>lubricipeda</i> <i>sp.</i> <i>lunata</i> <i>multiplicans</i> <i>concinna</i> <i>morsa</i> <i>mygdon</i> <i>jaculifera</i> <i>sp.</i> <i>nigrotimbria</i> <i>erastrionides</i> <i>ornithogalli</i> <i>litura</i>

		8. Nolidae 9. Notodontidae	41. <i>S.</i> 42. <i>Xanthodes</i> 43. <i>Antheua</i> 44. <i>Furcula</i>	<i>exigna</i> <i>transversa</i> <i>servula</i> <i>furcula</i>
6	Pterophoroidea	10. Pterophoridae	45. <i>Sphenarches</i>	<i>anisodactylus</i>
7	Pyraloidea	11. Crambidae	46. <i>Cnaphlocrocis</i> 47. <i>Crambus</i> 48. <i>Diaphania</i> 49. <i>Elophila</i> 50. <i>Herpetogramma</i> 51. <i>Hymenia</i> 52. <i>Maruca</i> 53. <i>Nymphula</i> 54. <i>Parapoynx</i> 55. <i>P.</i> 56. <i>Parotis</i> 57. <i>Patania</i> 58. <i>Petrophila</i> 59. <i>Psara</i> 60. <i>Pyrausta</i> 61. <i>Samea</i> 62. <i>Scirpophaga</i> 63. <i>S.</i> 64. <i>Endotricha</i>	<i>medinalis</i> <i>agitatellus</i> <i>hyalinata</i> <i>tinealis</i> <i>bipiunctalis</i> <i>perspectalis</i> <i>vitratata</i> <i>depunctalis</i> <i>stagnalis</i> <i>fluctuosalis</i> <i>marginata</i> <i>ruralis</i> <i>jaliscalis</i> <i>bipunctalis</i> <i>phoenicealis</i> <i>ecclesialis</i> <i>incertulas</i> <i>percna</i> <i>flammealis</i>
8	Tineoidea	12. Pyralidae 13. Tineoidae	65. <i>Pheroeca</i> 66. <i>Tineola</i>	<i>uterella</i> (Casebearer moth) <i>bisselliella</i> (cotton moth)
9	Zygaenoidea	14 Limacodidae	67. <i>Cheromettia</i> 68. <i>Isochaetes</i> 69. <i>Phobetron</i>	<i>apicata</i> <i>beutenmuelleri</i> <i>pithecium</i>



Figure 1 A. Study area: Location of sites where observations were made in Balaghat city. Refer table 1 for list of sites.



1B. *Actias artemis*



2. *Anthraerea mylitta*



3. *Acherontia styx*



4. *Daphnis nerii*



5. *Anacamptodes defectaria*



6. *Hyposidra talaca*



7. *Jodis sp.*



8. *Lomographa sp.*



9. *Oxia sp.*



10. *Plagadis phlagosaria*



11. *Scopula floslactata*



12. *Scopula optivata*



13. *Scopula perlata*



14. *Prodoxus sp.*



15. *Trabala ganesh*



16. *Trabala vishnoi*



17. *Anticarsia gemmatalis*



18. *Asota caricae*



19. *Catacala fraxini*



20. *Cotacola conjuncta*



21. *Creatonotos gangis*



22. *Endotricha fammialis*



23. *Grammodes geometrica*



24. *Lymantria dispar*



25. *Parallela sp*



26. *Phragmatobia fuliginosa*



27. *Syntomoides imaon*



28. *Spilosoma lubricipedia*



29. *Spilosoma sp.*



30. *Zale lunata*



31. *Anuga multiplicans*



32. *Antiblemma concinna*



33. *Condica morsa*



34. *Chalciopse mygdon*



35. *Feltia jaculifera*



36. *Marimatha nigrofimbria*



37. *Ponometia erastrioides*



38. *Spodoptera exigua*



39. *Spodoptera litura*



40. *Spodoptera ornithogalli*



41. *Xanthodes transversa*



42. *Anthea servula*



43. *Furcula furcula*



44. *Sphenarchis anisodactylus*



45. *Cnaphalocrocis medialis*



46. *Crambus agitatellus*



47. *Diaphania hyalinata*



48. *Elophila tinealis*



49. *Herpetogramma bipunctalis*



50. *Hymenia perspectalis*



51. *Maruca vitrata*



52. *Nymphula depunctalis*



53. *Paraponyx fluctuosalis*



54. *Paraponyx stagnalis*



55. *Parotis marginata*



56. *Patania ruralis*



57. *Petrophila jaliscalis*



58. *Psara bipunctalis*



59. *Pyrausta pheonicealis*



60. *Samea ecclesialis*

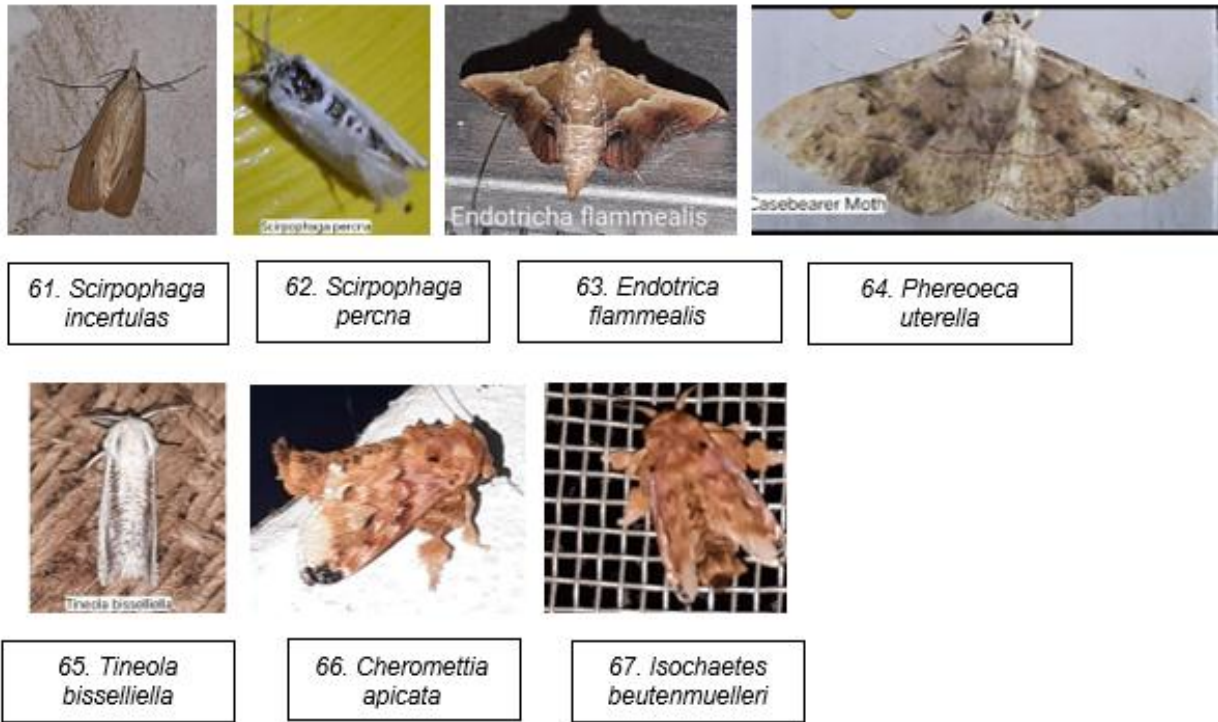


Figure 1B-67. Photographs of moths recorded in Balaghat city.

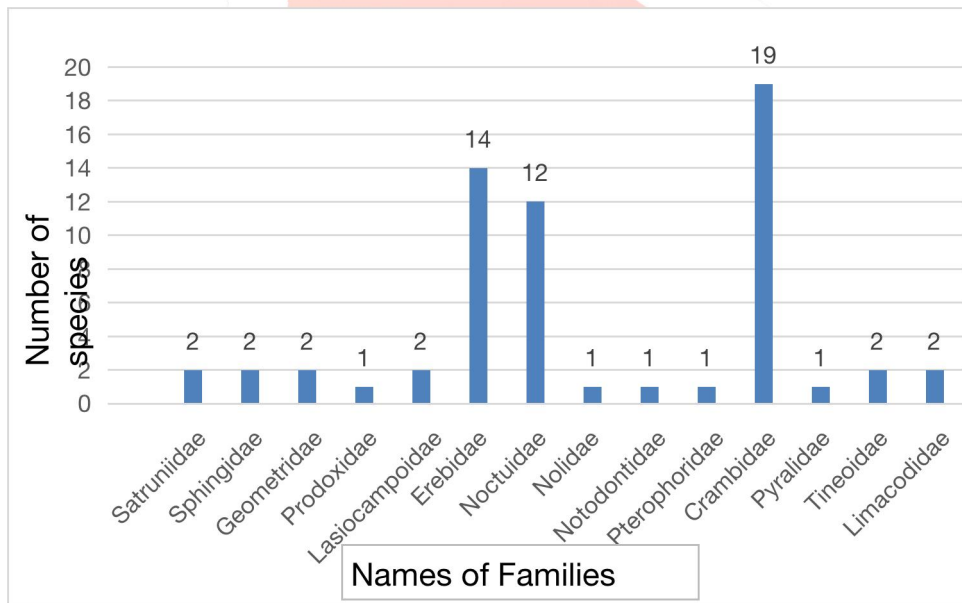


Figure 68. Number of moth species recorded in different families.