Impact Factor (SJIF): 6.126 E-ISSN: 2583-1615

International Journal of Research in Academic World

Received: 13/March/2025 IJRAW: 2025; 4(4):169-172 Accepted: 23/April/2025

Diversity of Moths in and around Some Agricultural Lands from Khamgaon Taluka, Buldhana District, India

*[1]Roshana K Hushare and [2]Dr. Meena T Nikam

*[1, 2]Department of Zoology, Shri Shivaji Science and Arts College, Chikhli, Buldhana, Maharashtra, India.

Abstract

Lepidoptera is an order that includes moths and butterflies. Moths are potent pollinators and bio-indicators like butterflies but there is less attention given towards their presence and fundamental roles in nature unlike butterflies. Since they are mostly nocturnal, play a vital role in the pollination of different plant species, especially nocturnal flowering plants and also perform a vital role in different food chains in an eco-system. A preliminary survey of the moth fauna in and around some agricultural lands from Khamgaon taluka was surveyed during the time period of October 2022 to February 2023. The study revealed a total of 12 species belonging 12 genera under 6 families and 11 sub-families by using simple light trap method and sometimes by direct photography. Among the recorded families viz. family Erebidae, Crambidae, Noctuidae, Uraniidae, Geometridae and Pyralidae; Erebidae was found most dominant family with 5 species, followed by 2 species each from Geometridae and Pyralidae and 1 species each from Crambidae, Noctuidae and Uraniidae. There may be opportunities for new records of different moths which affects the agricultural crops in variety of ways while some are beneficiary to such fields, depending on this study.

Keywords: Lepidoptera, Khamgaon taluka, pollinators, bio-indicators, light trap.

Introduction

Biodiversity includes every living organism which plays their immense, valuable roles at different levels in their lives and by diverse ways. Ecologically, butterflies and moths serve as a primary food source for vertebrate insectivores, they play important roles as pests and pollinators, acting as both agents and objects of natural selection; also the moths have long been recognized to respond rapidly to climate and landscape-level changes as well as anthropogenic changes (Goldstein, 2017) [4]. Day to day changes in land use pattern and for that habitat fragmentation affect biodiversity with increasing level of disturbances by destruction of natural habitats (Broadbent *et al*., 2012) [3]. As a conservation point of view, moths can help in conserving from micro-habitats to macro-habitats within an ecosystem. They are also considered vital for ecosystem services because of their various roles like butterflies such as agricultural pests (Sharma and Bisen, 2013) [11], indicators of forest health (Kitching *et al*., 2000), important nocturnal pollinators of a wide range of plants (Holloway, 2003) [6] and several species of Saturniidae being used for silk production on large scale (Holloway, 1988) [5].

Moths are extremely sensitive to climatic as well as changes in vegetation, its composition and structure, and different types of vegetation shows different species compositions moths will respond more strongly to vegetation gradients than to edaphic gradients (Sanyal *et al*., 2011) [12]. Moths also play an immense role as a key component in the regular functioning of the ecosystem through cycling, pollination, predation, parasitism, and decomposition (Biswas *et al*., 2016) [2].

In this research paper we are determining how various factors viz., light, temperature, raining, humidity in the air affects the diversity of moths and abundance in their habitat. The aim of this study is that to explore the diversity of moths in and around some agricultural lands where most of their species get killed every day by many reasons in the form of food or other instead they get proper habitats to complete their life cycles. There is a need to provide the knowledge about the importance of moths in positive ways and how they are the key component of ecosystem and helps in the maintenance of biodiversity. Moths have been found as indicators of climate change in different studies conducted in western countries (Dr. Shubhalaxmi, 2018) [10]; but in India, not enough studies have been explored with this aspect, hence this study is essential.

Materials and Methods

Study Area

The study area includes some agricultural sites in nearby villages of Khamgaon taluka, Buldhana district, Maharashtra, India. The present study is carried out to understand and measure the status of moth diversity among the agricultural lands, which are most preferred and less disturbed areas for such lepidopteron individuals. Khamgaon taluka, is largely

***Corresponding Author:** Roshana K Hushare

explored region and the urban area as well as largest industrial area situated in Buldhana district of Maharashtra state. It is 50 km away from Buldhana city and connected with many small and large villages containing agricultural lands.

Collection, Observation and Identification

Moths are the most sensitive insects, so prefer undisturbed or less disturbed places; there are some species also which prefers around urban human habitats. To checkout their diversity and status, various surveys were done in the agricultural fields. Most moth species are nocturnal and easily attracted towards light source at night as energy source.

The most efficient method to survey the nocturnal moths is the simple light traps technique. Light trap was set during the 7-10 pm time period using mercury vapor lamp over a 3×3m (square) white cloth sheet which was hung between two vertical poles. Sometimes moths were attracted naturally towards the light bulb located on the walls, sitting around it in whole nights, so observation become easy without any artificial traps. Some diurnal flying adult moths or those found in morning, were photographed in sitting positions or sometimes insect net was used to catch it and released after observation in the field. Moths were photographed using cell phones and DSLR Nikon Camera. Moths were identified with the help of available literatures and a standard field guide to Indian moths (Shubhalaxmi, 2018) [10]. To identify the moths, external morphological features were used such as wing coloration, pigmentation, size of body (wingspan), shape, venation, type of antennae, scale color etc.

Results

The study documented a total of 12 species of moths under 12 genera belonging to 6 families and 11 subfamilies from the study area. The checklist is prepared (Table 1) and found that family Erebidae was found the most abundant with 5 species, followed by 2 species each from Geometridae and Pyralidae and 1 species each from Crambidae, Noctuidae and Uraniidae (Table 2). The occurrence of moths in and around agricultural lands was observed with repeated numbers of members of family Erebidae, followed by remaining families (Fig.1 & Fig. 2), which clearly indicated the high diversity and abundance of Erebidae moths among these areas.

Table 1: Checklist of moth species recorded from the study area

Sr. No.	Family	Sub-Family	Scientific Name	Common Name
1.	Erebidae	Calpinae	*Eudocima materna*	Dot Underwing
2.		Lymantriinae	*Orvasca subnotata*	Bean Tussock moth
3.		Arctiinae	*Olepa ricini*	Castor oil plant moth
4.		Erebinae	*Mocis undata*	Brown-striped semilooper
5.		Herminiinae	*Nodaria nodosalis*	Herminie Noueuse
6.	Crambidae	Spilomelinae	*Spoladea recurvalis*	Beet Webworm
7.	Noctuidae	Noctuinae	*Spodoptera litura*	Tobacco cutworm
8.	Uraniidae	Microniinae	*Micronia aculeata*	Grey Swallowtail moth
9.	Geometridae	Sterrhinae	*Scopula umbilicata*	Swag-lined wave moth
10.			*Pleuroprucha insulsaria*	Common Tan Wave Moth
11.	Pyralidae	Phycitinae	*Ephestia elutella*	Cacao moth
12.		Galleriinae	*Corcyra cephalonica*	Rice meal moth

Table 2: Summary of families related with number of species and sub-families

Sr. No.	Family Name	Total No. of Species	Total Sub-families
1.	Erebidae	5	5
2.	Crambidae	1	1
3.	Noctuidae	1	1
4.	Uraniidae	1	1
5.	Geometridae	2	1
6.	Pyralidae	2	2

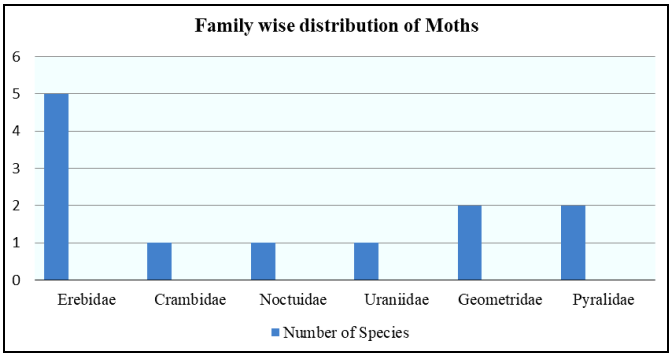


Fig 1: Family wise distribution of moth species

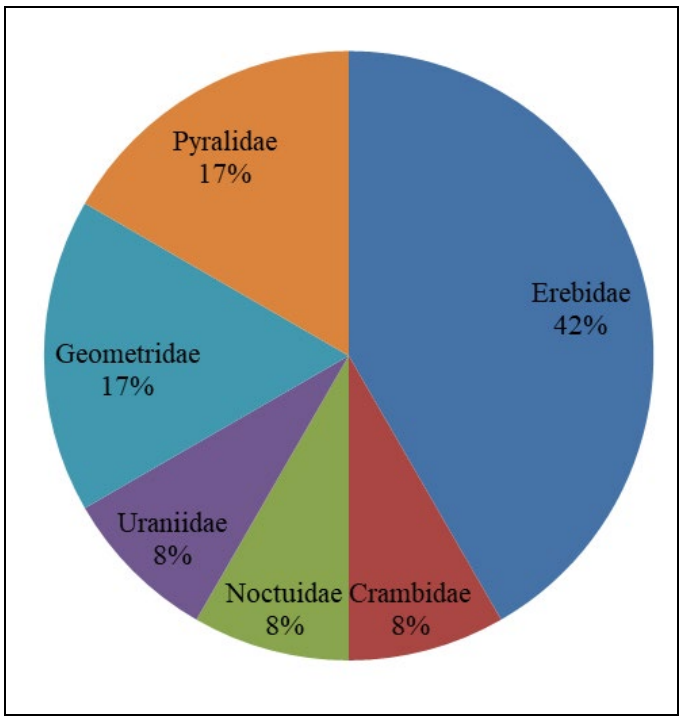
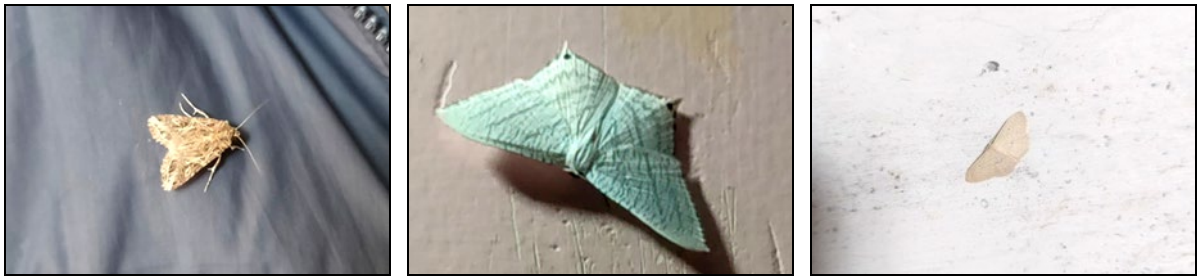


Fig 2: Percentage of species distribution under different family

Eudocima materna *Orvasca subnotata* *Olepa ricini*

Mocis undata *Nodaria nodosalis* *Spoladea recurvalis*



Spodoptera litura *Micronia aculeata* *Scopula umbilicata*

Photo Plate 1: Photographs of the collected moth species from the study area

Pleuroprucha insulsaria *Ephestia elutella* *Corcyra cephalonica*

Photo Plate 2: Photographs of the collected moth species from the study area

Discussion

The diversity of moths in and around some agricultural lands from Khamgaon taluka was explored with 12 species under 12 genera belonging to 6 families and 11 subfamilies during the time period of October 2022 to February 2023. A checklist of moths is provided with their respective species and family abundance with respect to study area. The moth diversity found was not similar in the different vegetation zones. Their presence or occurrence found abundant in relatively open and diverse agricultural area rather than in dense vegetative one and also found dependent on vegetation type, since they are specific for their host plants. In addition, their diversity and occurrence is largely depends on the vegetation but in particular season especially in post monsoon or early winter. Land use change of habitats in the natural habitats such as national parks and natural forests affects significantly the diversity of animals. The response of moths to fragmented habitats differs considerably from the response within natural and non-fragmented habitats (Hailay and Getu, 2023) [7].

The existence of moths in a habitat highly depends on the condition of the habitat and the availability of sources of nectar and other important parameters like rainfall, climate and topography of particular habitat. Areas rich in butterflies and moths are rich in other invertebrates (Ahmed *et al*., 2024) [1] and moths support a range of other predators and parasites, many of which are specific to individual host species, or groups of species. Some moths of family Noctuidae, Erebidae, Tortricidae and Pyralidae are generally regarded as pests of food or crops (Shubhalaxmi, 2018) [10], but killing them using pesticides and others kills the predators too depended on them and ultimately unbalances the ecosystem. Their presence is seems to be more or higher among such agricultural areas since number of larvae (caterpillars) of moths are dependent on their host plant species for food and in such areas there is abundance of different varieties of crops in each particular season.

Several studies about lepidopteron have shown that the diversity and abundance of moth species might be higher in non-disturbed habitats than in disturbed habitats (Kadlec *et al*., 2009; Sanyal *et al*., 2013) [9, 13]. Still there are not enough

studies related to the moths and their appearance in India, which are crucial to know their important roles.

Conclusion

From the present study, it is concluded that, diversity of moths among such agricultural areas shows higher abundance with species richness. It seems that pesticides greatly affect their abundance since many caterpillars and some adults also seen during the field surveys. Vegetation plays a significant role that provides the main food source to insect fauna and abiotic factors plays important role in habitat structure. The diversity and abundance of moths in the study area might be threatened by habitat disturbance from becoming anthropogenic disturbances by human for different purposes including road constructions or any other project activities being planned. All these actions done by human negatively affect the ecosystem and its balance and ultimately create the reason for biodiversity loss which is generally unknown for them and ignored it.

This is the original work in and around some agricultural lands of rural area from Khamgaon taluka; this study will helpful to understand the importance of such small insect fauna in nature and their contribution is vital in every small to large chains in an ecosystem. Further future study will help to understand widespread species diversity seasonal variations of moths and also ecological status of moths in this region.

References

1. Ahmed G, Das AN, Borah L & Ahmed R. Moth diversity in the Mahamaya reserve forest, Kokrajhar, Assam. *Indian Journal of Entomology*. 2024; 86(3):800-804.
2. Biswas O, Modak B, Mazumder A & Mitra B. Moth (Lepidoptera: Heterocera) diversity of Sunderban Biosphere Reserve, India and their pest status to economically important plants. *Journal of Entomology and Zoology Studies*. 2016; 4(2):13-19.
3. Broadbent E, Zambrano A, Dirzo R, Durham W, Driscoll L, Gallagher P & Randolph S. The effect of land use change and ecotourism on biodiversity: a case study of Manuel Antonio, Costa Rica, from 1985 to 2008. *Landscape ecology*. 2012; 27(5):731-744.
4. Goldstein PZ. Diversity and Significance of Lepidoptera: A Phylogenetic Perspective. *Insect Biodiversity: Science and Society*, 2017, 463-495.
5. Holloway JD. The Moths of Borneo (part 6); Family Arctiidae: subfamilies Arctiinae, Syntominae, Aganainae (to Noctuidae). Kuala Lumpur, Southdene Sdn. Bhd, 1988, 101-168.
6. Holloway JD. The moths of Borneo (part 18): Family Nolidae. Kuala Lumpur, Southdene Sdn Bhd, 2003, 279-611.
7. Hailay & Getu. Moth Diversity of Chebera Churchura National Park. *J Biores Manag*. 2023; 10(4):200-212.
8. Kitching IJ & Cadiou JM. Hawkmoths of the world: an annotated and illustrated revisionary checklist (Lepidoptera: Sphingidae) Press. 2000; 93(5):1195-1196.
9. Kadlec T, Kotela M, Novak I, Konvicka M & Jarosík V. Effect of land use and climate on the diversity of moth guilds with different habitat specialization. *Community Ecology*. 2009; 10(2):152-158.
10. Shubhalaxmi V. Field guide to Indian Moths. Ed.2, pp (VI+461), Birdwing Publishers, India, 2018.
11. Sharma AK & Bisen UK. Taxonomic documentation of insect pest fauna of vegetable ecosystem collected in light trap. *Int. J. Environ. Sci.*: Devel. Monitor. (IJESDM). 2013; 4:4-10.
12. Sanyal AK, Uniyal VP, Chandra K & Bhardwaj M. Diversity and indicator species of moth (Lepidoptera: Heterocera) assemblages in different vegetation zones in Gangotri landscape, Western Himalaya, India. *ENVIS Bulletin: Arthropods and their Conservation in India.* 2011; 14(1):114-129.
13. Sanyal A, Uniyal V, Chandra K & Bhardwaj M. Diversity, distribution pattern and seasonal variation in moth assemblages along altitudinal gradient in Gangotri landscape area, Western Himalaya, Uttarakhand, India. *Threat. Taxa*. 2013; 5(2):3646-3653.