Indian Journal of Entomology Online published Ref. No. e24775 DoI. No.: 10.55446/IJE.2024.1775

NIGHT-FLYER EXPLORATION: A CITIZEN SCIENCE SURVEY OF MOTHS IN THE DESIGNATED REGION OF THE UNION TERRITORY OF DAMAN

Meghavi Purohit[1]*

[1]Wildlife Institute of India, Chandrabani, Dehradun 2480014, Uttrakhand, India
*Email: purohitmeghavi@gmail.com (corresponding author): ORCID ID 0009-0002-0368-3882

ABSTRACT

The present study was conducted in the Union territory of India- Daman during the National Moth Week 2020, with the goal of observing the moth population in and around the Moti Daman area. This study aimed to establish baseline data on the diversity of moth species (Lepidoptera: Heterocera) in the region and serve as the first report on identifying moth species through the use of light traps. Moth trapped in July-August 2020 revealed 36 diverse species from nine families and 19 subfamilies, with Erebidae having the highest records, followed by Crambidae and Noctuidae. This study explores distribution, host plant, and habitat preferences based on indicator species recorded, offering a baseline for moth records and revealing the diversity of these night-time wonders in the coastal town Daman.

Key words: Lepidoptera, baseline study, light trapping, taxonomic richness, host pant, indicator species, sub-urban environment, ecological impacts, National Moth Week, insect conservation

Moths, known as night-flyers because of their nocturnal habits, remain enigmatic with limited data on their ecology and distribution (Shubhalaxmi, 2018). Belonging to the order Lepidoptera, alongside butterflies, moths constitute the world's second-largest group of insects. Globally, over 160,000 species of moths have been recorded (IUCN, 2019), and approximately 12,000 species are reported from India (Chandra and Nema, 2007) leaving many undescribed. Moths are an important component of terrestrial ecosystems because of their role as food resources for birds and small mammals, pollinators (Proctor et al., 1996; Devoto et al., 2012), and nutrient recyclers (Merckx et al., 2013), making them an interesting taxon for studying their dynamic roles. Moths can be easily studied in large numbers using light traps, allowing an effective understanding of diversity and distributional patterns along with their abundance (Choi, 2008). Changes in their number and distribution indicate habitat changes; hence, moths are considered an indicator of the environmental health of the ecosystem. They are also considered vital for ecosystem services because of their various roles as agricultural pests (Sharma and Bisen, 2013). Changes in vegetation can alter the species composition and abundance of plant communities, and the negative impact of host plant interaction of moths can lead to loss of endemic host plants and a corresponding loss of specialist moth fauna as well (Faiz et al., 2018). Thus, recording the occurrence and diversity of moth species is a crucial step in providing ecological insights and habitat monitoring. They are best observed during or just after the monsoon, as they go into diapause during the summer and winter months (Shubhalaxmi, 2018). Despite their diversity, data on moth occurrence and diversity remain limited. To encourage more records, National Moth Week is celebrated globally each year during the last week of July. Data from citizen science initiative aid in recording moth species distribution, aligning with the global observance of the National Moth Week (Riyaz et al., 2021). The present study was conducted with the onset of the National Moth Week for 21 days between July-August, 2020, which assessed the taxonomic richness of moths in the Union Territory of India - Daman, where data pertaining to moth species diversity and distribution are scarce.

MATERIALS AND METHODS

The study was conducted in the outskirts of Boriya Talab in Moti Daman area (20°24'4.51"N, 72°50'3.94"E and 20°23'58.51"N, 72°50'13.40"E). The Moti Daman encompasses suburban and rural regions with open forests, moderately dense wooded areas, and prevalent tree species like *Cocos nucifera, Moringa* sp., *Leucaena leucocephala* and *Mangifera indica.* Classified under Champion and Seth's Forest Types (1968) as 'littoral and swamp forests,' Daman and Diu forests exhibit annual rainfall ranging from 2,300 mm to 4,800 mm and a mean annual temperature of 25°C in Daman. Positioned on the western coast of India, (20.3974° N, 72.8328° E, 12

m masl). The district is located near the southern part of Gujarat and is divided by the Daman Ganga River into Moti Daman and Nani Daman.

The primary method used for the moth survey involved the use of light traps, predominantly in the evening from 7 PM to midnight. Few moths were observed during daylight hours during the field visits. The survey was conducted over a period spanning from July 21, 2020, to August 10, 2020, coinciding with the National Moth Week. To attract moths, 2 light traps using 13-volt LED bulbs and a white cloth screen (measuring 2 m in height) were deployed during specified nocturnal hours (Shubhalaxmi 2018). Photographic documentation of the moths was carried out using a Nikon p900 camera and a mobile phone, capturing images on the cloth screen throughout the 21-day survey period. The identification of specimens up-to species level was carried out through the available literature (Shubhalaxmi, 2018), as well as from online sources such as Moths of India (Sondhi et al., 2023). Apart from the moth traps, nearby locations within the periphery of 10m of light traps were also sampled for additional moth records. The total number of species per family were then counted for further assessment.

RESULTS AND DISCUSSION

This study provides an important baseline information on moth diversity in the Moti Daman area of the Union Territory (UT) of Daman, offering insights into the distribution and taxonomic richness of species, families, and genera. During the study period, 36 moth species belonging to nine families, 19 subfamilies, and 35 genera were identified (Table 1). The Erebidae emerged as the most dominant family, comprising 12 species and the highest number of genera (Fig. 1). Notably, the Crambidae family represented with ten distinct species spread across different subfamilies, including Crambinae, Spilomelinae, and Acentropinae. The Erebidae family plays an important role in contributing to the overall richness, encompassing a diverse array of subfamilies such as Arctiinae, Eulepidotinae, Lymantriinae, and Erebinae, with a total of 11 identified species. Among the 36 species identified in this study, five indicator species recorded from the Erebidae family (Erebinae subfamily) and the Noctuidae family (Noctuinae subfamily) which serve as indicators of disturbed habitats (Shubhalaxmi, 2018). In contrast, three species recorded from the Geometridae family (specifically, the Geometrinae subfamily) act as indicators of undisturbed habitats (Shubhalaxmi, 2018).

The identification of 36 moth species (Fig. 2) during the study period sheds light on the dynamics of insect communities in urban and suburban environments and the crucial role they play, such as pollination, a key ecological service that influences plant reproduction, biodiversity maintenance, and overall ecosystem health indication (Mishra et al., 2015; Gill et al., 2016). The current findings offer insights into the taxonomic richness and ecological roles of various moth species, families, and genera, serving as a reference for future research (Braga and Diniz, 2015; Dar and Jamal, 2021). The goal of future investigations is to better understand the relationships among moths inhabiting diverse habitats within the study area (Choi, 2008; Gohil et al., 2022).

The study highlights the valuable contribution of citizen science initiatives like National Moth Week in documenting the unexplored moth diversity (Riyaz et al., 2021). In view of increasing urbanization and industrialization, the data presented here provides a baseline for comparing environmental changes with alterations in moth diversity and abundance patterns. The growing database of observations from such events also provides an important resource for tracking changes in species distribution over time, which is essential in the context of global environmental change (Dar and Jamal, 2021). The examination of diet preferences and host plants, gathered from literature and online sources, enhances our understanding of resource utilization viz. host-plant interaction (Table 1). The interaction between moths and their native host plant is often crucial for moth survival as many indicator moth species rely on specific plants for feeding and reproduction. This interaction can be disrupted by factors such as non-native species and habitat degradation that can lead to a decline in moth population (Trigo et al., 2018).

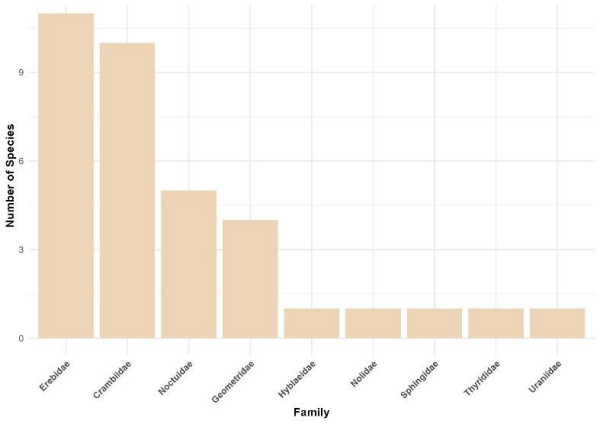

Fig. 1. Composition of species from each family recorded from the Moti Daman area

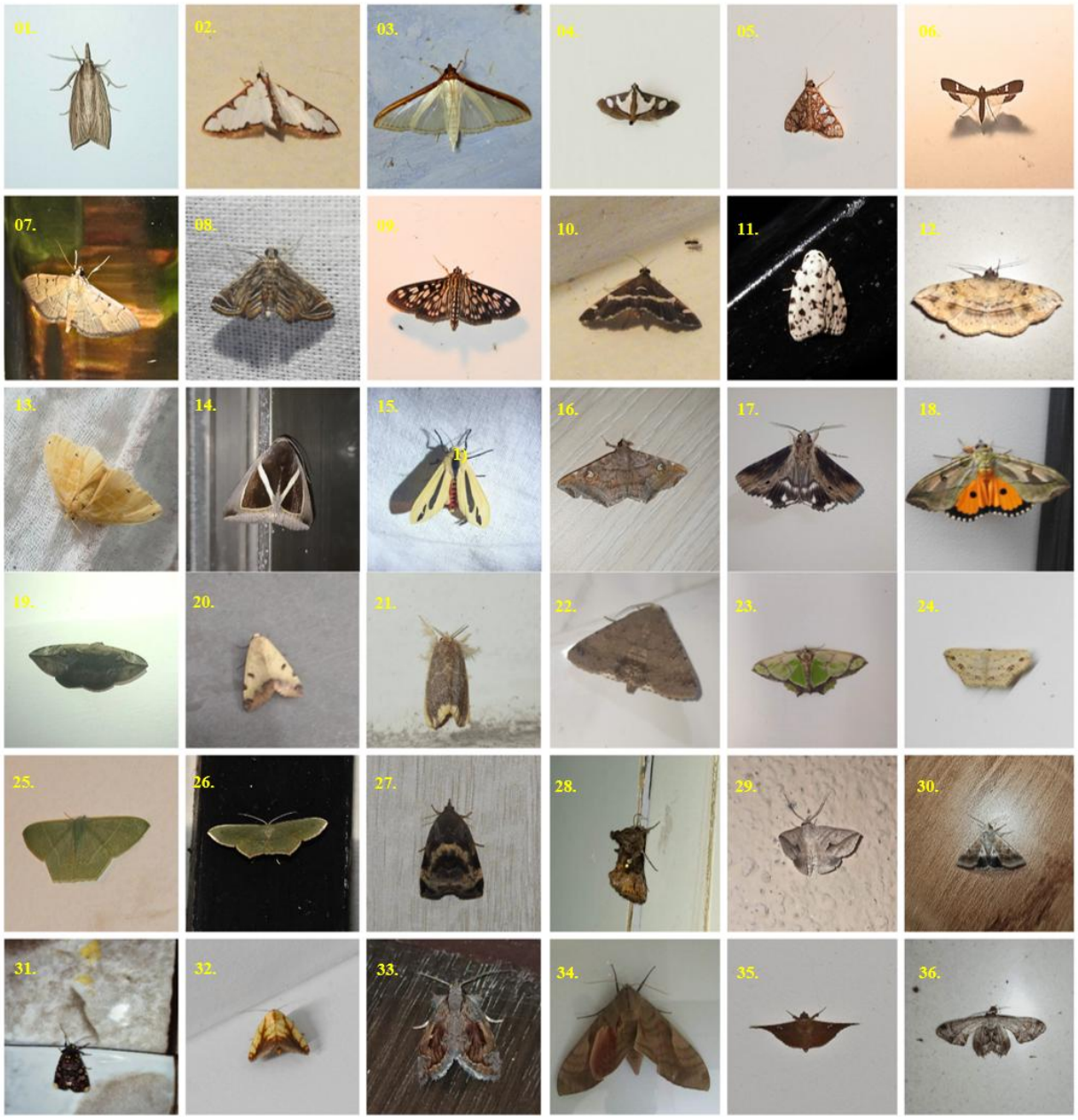

Fig. 2. Photographic representation of moths recorded from the Moti Daman area: (1) *Chilo sacchariphagus*, (2) *Cirrhochrista brizoalis*, (3) *Cydalima laticostalis*, (4) *Glyphodes bicolor*, (5) *Glyphodes canthusalis*, (6) *Maruca vitrata*, (7) *Omiodes indicate*, (8) *Parapoynx bilinealis*, (9) *Pygospila tyres*, (10) *Spoladea recurvalis*, (11) *Aemene* spp., (12) *Anticarsia irrorate*, (13) *Artaxa guttata*, (14) *Chalciope mygdon*, (15) *Creatonotos gangis-interrupta* complex, (16) *Episparis tortuosalis*, (17) *Ercheia cyllaria*, (18) *Eudocima maternal*, (19) *Hypopyra* spp., (20) *Ophiusa tirhaca*, (21) *Orvasca subnotata*, (22) *Pandesma* spp., (23) *Agathia laetata*, (24) *Scopula pulchellata*, (25) *Thalassodes quadraria*, (26) *Traminda mundissima*, (27) *Hyblaea puera* complex, (28) *Chrysodeixis eriosoma*, (29) *Dierna patibulum*, (30) *Helicoverpa armigera*, (31) *Polytela gloriosae* (female laying eggs), (32) *Xanthodes transversa*, (33) *Selepa celtis*, (34) *Clanis phalaris*, (35) *Banisia* spp., (36) *Phazaca theclata*.

Table 1. List of the moth species recorded under each family and subfamilies. The description of larval host plants preferences for different species were provided based on the available literature (Robinson et al., 2010; Shubhalaxmi, 2018; Sondhi et al., 2023)

Family	Sub family	Species	Larval host plants
Crambiidae	Crambinae	1. *Chilo sacchariphagus* (Bojer, 1856)	*Saccharum officinarum* L. (Poaceae).
		2. *Cirrhochrista brizoalis* (Walker, 1859)	Generalist, preferentially feeds on *Ficus* spp.
		3. *Cydalimalati costalis* (Guenée, 1854)	*Chonemorpha fragrans, Holarrhena pubescens*
		4. *Glyphodes bicolor* (Swainson, 1821)	*Alstonia scholaris, Carissa carandas* (Apocynaceae), *Artocarpus integer, Ficus benghalensis* (Moraceae), *Desmodium oojeinense* (Fabaceae).
		5. *Glyphodes canthusalis* (Walker, 1859)	*Ficus religiosa* (Moraceae)
		6. *Maruca vitrata* (Fabricius, 1787	*Lablab purpureus, Cajanus cajan* (Fabaceae)
		7. *Omiodes indicata* (Fabricius, 1775)	*Arachis hypogaea, Crotalaria juncea, Glycine max, Macrotyloma uniflorum, Vigna radiata, Vigna unguiculata* (Fabaceae), *Trichosanthes cucumerina* (Cucurbitaceae), *Trichosanthes cucumerina* (Cucurbitaceae).
		8. *Pygospila tyres* (Cramer, 1780)	*Olarrhena pubescens, Tabernaemontana alternifolia, Wrightia arborea, Wrightia tinctoria* (Apocynaceae)
	Spilomelinae	9. *Spoladea recurvalis* (Fabricius, 1775)	*Beta vulgaris* L., *Amaranthus caudatus, Achyranthes aspera, Chenopodium macrospermum, Celosia* spp., *Chenopodium album, Gomphrena* sp., *Plectranthus* sp., *Trianthema portulacastrum, Vigna radiata.*
	Acentropinae	10. *Paraponyx bilinealis* (Snellen, 1876)	*Hygrophila triflora* (Acanthaceae).
	Arctiinae	11. *Aemene* spp. (Walker, 1854)	NA
	Eulepidotinae	12. *Anticarsia irrorata* (Fabricius, 1781)	*Sorghum bicolor* (Poaceae), *Cajanus cajan, Cyamopsis tetragonoloba, Lablab purpureus, Vigna aconitifolia, Vigna unguiculata, Vigna radiata* (Fabaceae)
Erebidae	Lymantriinae	13. *Artaxa guttata* (Walker, 1855)	*Erminalia phillyreifolia* (Combretaceae), *Barringtonia acutangula* (Lecythidaceae), *Carissa carandas* (Apocynaceae), *Jasminum* (Oleaceae), *Lagerstroemia indica* (Lythraceae), *Lantana camara* (Lamiaceae), *Maesa ramentacea* (Primulaceae), *Mallotus philippensis, Ricinus communis* (Euphorbiaceae), *Mangifera indica* (Anacardiaceae), *Shorea robusta* (Dipterocarpaceae), *Terminalia myriocarpa, Terminalia elliptica (Combretaceae), Ziziphus mauritiana (Rhamnaceae).*
	Arctiinae	14. *Creatonotos gangis-interrupta* complex (Linnaeus, 1763)	*Arachis hypogaea, Medicago sativa, Vigna mungo* (Fabaceae), *Eleusine coracana, Oryza sativa, Pennisetum glaucum, Zea mays* (Poaceae), *Ipomoea batatas* (Convolvulaceae), *Mimulus gracilis* (Phrymaceae)
	Pangraptinae	15. *Episparis tortuosalis* (Moore, 1867)	Species belonging to Meliacae and Magnoliaceae
	Calpinae	16. *Eudocima materna* (Linnaeus, 1767)	*Citrus aurantium, Citrus aurantiifolia* (Rutaceae),*Tinospora sinensis* (Menispermaceae)
	Lymantriinae	17. *Orvasca subnotata* (Walker, 1865)	*Lantana camara* (Verbenaceae), *Plumeria alba* (Apocynaceae) and *Ricinus communis* (Euphorbiaceae)

(contd.)

Geometridae	Erebinae	18. *Chalciope mygdon* (Cramer,1777)	*Rhynchosia minima*
		19. *Ercheia cyllaria* (Cramer, 1782)	*Dalbergia horrida* (Fabaceae)
		20. *Hypopyra* spp. (Guenee, 1852)	*Albizia lebbeck* (Fabaceae), *Camellia sinensis* (Theaceae)
		21. *Ophius atirhaca* (Cramer, 1777)	*Pistacia lentiscus, Rhus coriaria* (Anacardiaceae), *Psidium guajava* (Myrtaceae), *Shorea robusta* (Dipterocarpaceae), *Terminalia bellirica, Terminalia tomentosa* (Combretaceae)
		22. *Pandesma* spp. (Guenée, 1852)	NA
	Geometrinae	23. *Agathia laetata* (Fabricius, 1794)	*Nerium Oleander, Ichnocarpus* sp.
		24. *Thalassodes quadraria* (Guenee, 1857)	*Barringtonia* sp., *Calophyllum inophyllum, Litchi chinensis, Mangifera indica, Moullava spicata, Polyalthia longifolia, Xylia xylocarpa*
		25. *Traminda mundissima* (Walker, 1861)	*Acacia polycantha, Acacia nilotica, Pithecellobium dulce* (Fabaceae)
	Sterrhinae	26. *Scopula pulchellata* (Fabricius, 1794)	*Plumbago auriculata* (Plumbaginaceae)
Hyblaeidae		27. *Hyblaeapuera complex* (Cramer, 1777)	*Avicennia marina* (Acanthaceae), *Avicennia officinalis* (Acanthaceae), *Tectona grandis, Callicarpa arborea*, Callicar*pa macrophylla, Premna serratifolia, Premna mollissima, Premna tomentosa, Symphorea involucratum, Vitex canescens, Vitex altissima, Vitex glabrata, Vitex negundo, Vitex peduncularis, Vitex pinnata, Vitex trifolia, Vitex megapotamica* (Lamiaceae), *Engelhardia spicata (Juglandaceae), Catalpa ovata, Markhamia stipulata, Fernandoa adenophylla, Heterophragma quadriloculare, Millingtonia hortensis, Oroxylum indicum, Stereospermum neuranthum, Stereospermum tetragonum, Heterophragma sulfureum, Kigelia africana, Markhamia lutea, Handroanthus chrysanthus, Spathodea campanulata, Stereospermum chelonoides, Bignonia* spp. (Bignoniaceae), *Megathyrsus maximus* (Poaceae), *Rhizophora apiculata, Carallia brachiata, Rhizophora mucronata, Bruguiera cylindrica (Rhizophoraceae), Heptapleurum venulosum* (Araliaceae), *Schrebera swietenioides* (Oleaceae), *Terminalia chebula* (Combretaceae), *Eugenia myrobalana* (Myrtaceae).
	Plusiinae	28. *Chrysodeixis eriosoma* (Doubleday, 1843)	*Abelmoschus esculentus, Alcea* spp. (Malvaceae), *Arachis hypogaea, Cajanus cajan, Cicer arietinum, Glycine max, Phaseolus vulgaris* (Fabaceae), *Beta vulgaris* (Amaranthaceae), *Brassica oleracea, Raphanus raphanistrum subsp. sativus* (Brassicaceae), *Canna indica* (Cannaceae), *Citrus* spp. (Rutaceae), *Cucumis sativus, Cucurbita pepo* (Cucurbitaceae), *Cyphomandra betacea, Lycopersicon esculentum, Solanum melongena, Solanum tuberosum* (Solanaceae), *Dahlia* spp. (Asteraceae), *Eleusine indica, Zea mays* (Poaceae), *Ipomoea* spp. (Convolvulaceae), *Morus* spp. (Moraceae), *Pelargonium* spp. (Geraniaceae), *Coleus* spp. (Lamiaceae), *Spathoglottis* spp. (Orchidaceae), *Theobroma cacao* (Sterculiaceae).

(contd.)

(contd. Table 1)

	Calpinae	29. *Dierna patibulum* (Fabricius, 1794)	NA
Noctuidae	Heliothinae	30. *Helicoverpa armigera* (Hübner, 1808)	*Allium cepa* (Amaryllidaceae), *Cannabis sativa (Cannabaceae), Dianthus caryophyllus* (Caryophyllaceae), *Carthamus tinctorius, Guizotia abyssinica, Saussurea candicans, Zinnia violacea* (Compositae), *Ricinus communis* (Euphorbiaceae), *Avena sativa, Oryza sativa, Pennisetum glaucum, Sorghum bicolor* (Poaceae), *Acacia catechu, Albizia procera, Arachis hypogaea, Cajanus cajan, Crotalaria juncea, Dalbergia sissoo, Medicago sativa, Pisum sativum* (Fabaceae), *Linum usitatissimum* (Linaceae), *Abelmoschus esculentus, Alcea rosea, Gossypium hirsutum, Hibiscus mutabilis* (Malvaceae), *Platanus orientalis* (Platanaceae), *Citrus sinensis* (Rutaceae), *Populus euphratica, Salix tetrasperma* (Salicaceae), *Antirrhinum majus* (Plantaginaceae), *Datura stramonium, Hyoscyamus niger, Solanum lycopersicum, Solanum tuberosum* (Solanaceae), *Verbascum thapsus* (Scrophulariaceae), *Helianthus annuus* (Asteraceae).
	Noctuinae	31. *Polytela gloriosae* (Fabricius,1781)	*Crinum asiaticum, Zephyranthes* sp. (Amaryllidaceae), *Gloriosa superba* (Colchicaceae)
	Bagisarinae	32. *Xanthodes transversa* (Guenée, 1852)	*Abelmoschus crinitus*, *Abelmoschus esculentus*, *Alcea rosea*, *Grewia tiliifolia*, *Urena lobata* (Malvaceae), *Solanum melongena* (Solanaceae)
Nolidae	Eligminae	33. *Selepa celtis* (Moore, 1860)	*Vachellia nilotica* (Fabaceae), *Mangifera indica, Anacardium occidentale, Lannea coromandelica, Spondias pinnata (Anacardiaceae), Bischofia javanica* (Phyllanthaceae), *Camellia* spp. (Theaceae), *Castanea* spp. (Fagaceae), *Cinnamomum* spp. (Lauraceae), *Elaeodendron glaucum* (Celastraceae), *Syzygium cumini* (Myrtaceae), *Excoecaria agallocha, Mallotus philippensis* (Euphorbiaceae), *Ficus racemosa* (Moraceae), *Gmelina arborea* (Lamiaceae), *Litchi chinensis, Schleichera oleosa, Mischocarpus sundaicus* spp. (Sapindaceae), *Loranthus* spp. (Loranthaceae), *Manilkara zapota* (Sapotaceae), *Mussaenda frondosa* (Rubiaceae), *Phyllanthus emblica* (Phyllanthaceae), *Planchonia careya* (Lecythidaceae), *Pyrus* spp., *Rosa* spp. (Rosaceae), *Shorea robusta* (Dipterocarpaceae), *Trema orientale* (Cannabaceae), *Theobroma cacao (Sterculiaceae), Terminalia elliptica, T. chebula, T. catappa, T. myriocarpa* (Combretaceae), *Stereospermum chelonoides* (Bignoniaceae), *Solanum melongena* (Solanaceae), *Duabanga grandiflora, Lagerstroemia indica, Woodfordia fruticosa Lagerstroemia speciosa* (Lythraceae).
Sphingidae	Smerinthinae	34. *Clanis phalaris* (Cramer, 1777)	*Butea monosperma, Callerya atropurpurea, Mucuna pruriens, Pongamia pinnata, Pterocarpus marsupium, Xylia xylocarpa* (Fabaceae).
Thyrididae	Striglininae	35. *Banisia* spp. (Walker, 1632)	NA
Uraniidae	Epipleminae	36. *Phaza catheclata (Guenée, 1857).*	*Haldina cordifolia, Catunaregam spinosa* (Rubiaceae), *Tectona grandis* (Lamiaceae)

The literature survey of host plants and diet preferences in the present study further adds to the existing knowledge vital for both conservation and habitat restoration efforts. The findings reinforce the importance of preserving native flora, as these plants often serve as the primary food source for specialist species. The specialized feeding behaviours observed, exemplified by *Ercheia cyllaria, Glyphodes canthusalis,* and *Parapoynx bilinealis*, emphasize the ecological importance of specialists and offer crucial insights for informed conservation strategies for moths (Robinson et al., 2010; Shubhalaxmi, 2018).

ACKNOWLEDGEMENTS

The author thanks the organizers of National Moth Week-2020, India and country coordinator Dr. Pritha Dey for providing guidance and support. The author also thank Dr. Vineet K. Dubey and Dr. Aashna Sharma for providing technical inputs and guidance for writing the manuscript.

FINANCIAL SUPPORT

The authors did not obtain any financial support for conducting the study.

AUTHORS CONTRIBUTION STATEMENT

MP: conceived and designed research, analysed data and wrote the manuscript.

CONFLICT OF INTEREST

No conflict of interest

REFERENCES

Braga L, Diniz I R. 2015. Importance of habitat heterogeneity in richness and diversity of moths (Lepidoptera) in Brazilian Savanna. Environmental entomology 44(3): 499-508.

Champion H G, Seth S K.1968. A revised survey of the forest types of India. Manager of publications, Government of India, Delhi.

Chandra K, Gupta D. 2022. Biodiversity issues and challenges: non-agricultural insects. pp. 285-324.

Choi S W. 2008. Diversity and composition of larger moths in three different forest types of Southern Korea. Ecological Research 23: 503-509.

Dar A A, Jamal K. 2021. The decline of moths globally: A review of possible causes. Munis Entomology and Zoology 16(1):317-326.

Devoto M, Bailey S, Craze P, Memmott J. 2012. Understanding and planning ecological restoration of plant–pollinator networks. Ecology Letters 15(4): 319-28.

Faiz A H, Hassan M, Bagaturov M F, Tariq G, Khan F M, Faiz L Z. 2018. Status and distribution of status and distribution of amphibians in Tolipir National Park, Pakistan. Journal of Bioresource Management 5(1): 8-15.

Gill R J, Baldock K C, Brown M J, Cresswell J E, Dicks L V, Fountain M T, Garratt M P, Gough L A, Heard M S, Holland J M, Ollerton J. 2016. Protecting an ecosystem service: approaches to understanding and mitigating threats to wild insect pollinators. pp. 135-206.

Gohil B, Thakkar K, Gondaliya G. 2022. Moths (Lepidoptera: Heterocera) of Bhavnagar city, Gujarat, India: A preliminary checklist. International Journal of Entomology Research 7(4):62-71.

IUCN 2022. The IUCN red list of threatened species. Version 2022-2. Accessed on 10th November,2023. https://www.iucnredlist.org.

Mishra M, Lomate P R, Joshi R S, Punekar S A, Gupta V S, Giri A P. 2015. Ecological turmoil in evolutionary dynamics of plant–insect interactions: defense to offence. Planta 242: 761-771.

Merckx T, Huertas B, Basset Y, Thomas J. 2013. A global perspective on conserving butterflies and moths and their habitats. Key Topics in Conservation Biology 2: 237-57.

Proctor M, Yeo P, Lack A. 1996. The natural history of pollination. Harper Collins Publishers. 479 pp.

Riyaz M, Sivasankaran K, Packiam S M. 2021. Midnight heroes brought to Daylight: insights from the National Moth Week-India. Insect Environment 24(3):442-6.

Robinson G R, Ackery P R, Kitching I J, Beccaloni G W, Hernández L M. 2010. Hosts a database of the world's lepidopteran hostplants. Available at: http://www.nhm.ac.uk/research-curation/research/projects/hostplants/index.html (accessed 22 July, 2013).

Sharma A K, Bisen U K. 2013. Taxonomic documentation of insect pest fauna of vegetable ecosystem collected in light trap. International Journal of Environmental Science: Development and Monitoring 4(3): 1-8.

Shubhalaxmi V. 2018. Field guide to Indian moths, Birdwing Publishers, India. (Ed. 1) 461 pp.

Sondhi S, Sondhi Y, Singh R P, Roy P, Kunte K (Chief Editors) 2023. Moths of India, v. 3.62. Indian Foundation for Butterflies.

Trigo J R, Martins C H, Cunha B P, Solferini V N. 2018. Native or nonnative host plants: What is better for a specialist moth? Biological Invasions 20: 849-860.

(Manuscript Received: January, 2024; Revised: September, 2024;
Accepted: September, 2024; Online Published: November, 2024)
Online First in www.entosocindia.org and indianentomology.org Ref. No. e24775