

Diversity and Economic Importance of Erebidae Moths in Pandharkawada Forest Division, Maharashtra, India



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ABSTRACT

The present study documents the diversity of habitat and spatial distribution of moths of family erebidae of six selected study sites within the Pandharkawada Forest Division, of Yavatmal district, Maharashtra, from June 2023 to October 2025 using opportunistic day and night surveys. Of 56 records, 49 were identified to species and seven to genus, subfamily or tribe level. The 49 species belonged to 12 subfamilies, with Arctiinae the richest (11 species, 22.4%), followed by Catocalinae, Calpinae and Erebiniae (seven each) and Lymantriinae (six). Only six species (12.2%), including the castor semi-looper *Achaea janata*, the cotton looper *Anomis flava*, the sugarcane looper *Mocis frugalis* and the fruit-piercing moth *Eudocima materna*, are known to damage crops or fruit, whereas *Hypena laceratalis* feeds on the invasive weed *Lantana camara*. About 41% of the species use forest, scrub or wild vegetation as larval food, about 35% have unknown hosts and 87.8% have no known crop damage. The cotton-dominated landscape with adjoining forest therefore supports a diverse and mostly non-pest erebid fauna, and forest patches appear important for maintaining it.

Keywords: Erebidae, moths, economic importance, cotton agroecosystem, Pandharkawada

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Introduction

Most Lepidoptera are moths, which act as herbivores, night-time pollinators and food for bats, birds and other insect-eaters. Erebidae is one of the largest families of Noctuoidea, with over 24,000 described species [17]. After the molecular study of Zahiri et al. [18], the family was enlarged to include the tiger and lichen moths (Arctiinae), the tussock moths (Lymantriinae) and several subfamilies formerly placed in Noctuidae, such as Catocalinae, Calpinae, Erebiniae and Hypeninae.

Erebid caterpillars use many foods, from grasses and legumes to lichens and algae. A few species damage crops, others help to control weeds, and the adults of some groups pierce ripening fruit. Because many moths respond to changes in vegetation, pesticide use and artificial light, moth communities are increasingly used to indicate habitat condition.

Indian moths were first catalogued by Hampson [4], and recent field guides make regional recording easier [13,15]. In Maharashtra, moths have been inventoried in the northern Western Ghats [5,14], in northern Maharashtra [3] and in the state fauna volume [10], and Pawara et al. [11] reported 55 erebid species in 10 subfamilies from Nandurbar district. Erebidae have also been studied in the agroecosystems of northern Kerala [16], the Indian Erebiniae have been listed [8], and checklists exist for Delhi [7] and Uttar Pradesh [2]. Local inventories from Vidarbha, however, remain scarce.

The author has earlier studied the birds, butterflies, odonates and moths of Pandharkawada, and the present work adds the Erebidae of this cotton-dominated landscape to provide a baseline checklist and to note the ecological and economic significance of the species.

The objectives of the present study were to prepare a checklist of the Erebidae of the Pandharkawada Forest Division, to describe their subfamily composition and larval host use, and to assess their economic importance and the role of forest and scrub in supporting them.

Materials and Methods

Study area

The study was carried out in the Pandharkawada Forest Division, Yavatmal district, in the Vidarbha region of Maharashtra, close to the border with Telangana. Pandharkawada Forest Division lies between 19°52' N and 20°42' N latitude and 77°31' E and 78°34' E longitude (Figure 1). The climate is tropical, with a hot summer, a monsoon from June to September and a mild winter. The landscape is a mosaic of tropical dry deciduous forest with teak, scrub and grassland, farmland where cotton, soybean and pigeon pea are widely grown, villages and water bodies. Moths were surveyed at six sites with different habitats (Figure 1b; Table 1).

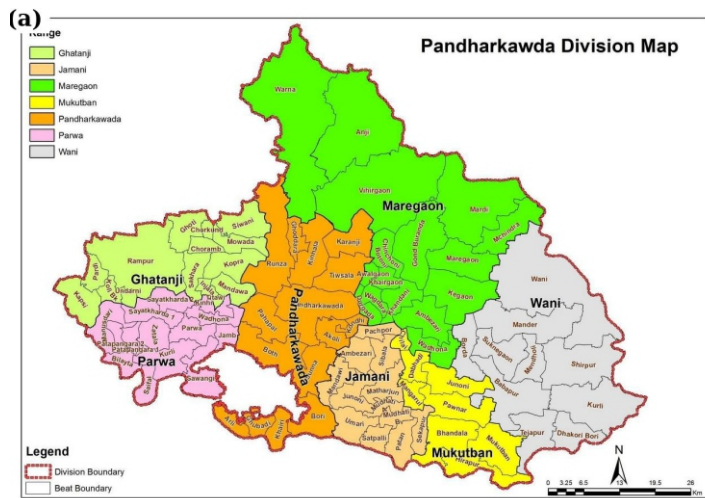


Figure 1. Study area. (a) Location map of Pandharkawada Forest Division, Maharashtra, India. (b) Study sites around Pandharkawada on a satellite map. Sources: (a) Office of the Deputy Conservator of Forests, Pandharkawada Forest Division; (b) Google Earth.

Table 1: Study sites and their habitats in the Pandharkawada Forest Division

Site	Name	Habitat	Coordinates
1	Krishna Tekadi	Forest ecopark with a semi-man-made ecosystem	20°01'33" N, 78°34'22" E
2	Pandhardevi	Old forest near the Hemadpanthi Temple	20°06'52" N, 78°39'21" E
3	Gopalpur Nursery	Forest Department nursery with natural forest and a perennial nala with agricultural fringe	19°58'24.18" N, 78°35'51.2" E
4	Roadside shrub forest between Maregaon and Wani	Unique shrub habitat	20°05'33" N, 78°52'38" E
5	Inzala Forest	Teak-dominant forest	20°03'53.70" N, 78°21'24.75" E
6	Plantation area near Botoni village	Grassy belt with bushes	20°06'19" N, 78°41'40" E

Survey and identification

Moths were recorded from June 2023 to October 2025 at six sites (Table 1). Records were obtained through opportunistic day and night surveys, and each moth was photographed in the field with a Sony a9 III camera and 90 mm lens. Photographs were identified with Hampson [4], Shubhalaxmi [13], Sondhi [15] and online moth databases. Classification follows Zahiri et al. [18] and van Nieukerken et al. [17], and subfamily placements are provisional. Larval host plants were taken from Robinson et al. [12] and the literature. Species were grouped by

subfamily and host use, percentages were calculated from the number of species, and records identified only to genus, subfamily or tribe level were not counted as species.

Results

A total of 56 erebid records were obtained, of which 49 were identified to species level (Table 2). The remaining seven records were identified only to genus, subfamily or tribe level and are not counted among the 49 species: *Gesonina* sp., *Hypena* (*Hypenia*) sp., an unidentified Hypeninae, Lithosini spp., *Plecoptera* spp., *Rhesala* sp. and *Synpoides* sp.

Table 2: Checklist of Erebiidae species recorded from Pandharkawada Forest Division, grouped by subfamily († identification provisional; — no common name or host not documented)

Sr.	Species	Common name	Larval host / remark
Arctiinae (11)			
1	<i>Aloa lactinea</i>	Red Costate Tiger Moth	Polyphagous
2	<i>Amata huebneri</i>	Hübner's Wasp Moth	Rice, sweet potato, Mikania, Oxalis
3	<i>Cretonotos gangis-interrupta</i> complex	Bophomet Moth	Polyphagous
4	<i>Lyclene struncta</i> †	Banded Lichen Moth	Lichens
5	<i>Macrobrochis gigas</i> †	—	Lichens
6	<i>Miltochrista obsolata</i>	—	Lichens
7	<i>Oeonistis entella</i> †	—	Probably lichens
8	<i>Olepa ricini</i>	—	Castor
9	<i>Rajendra biguttata</i>	—	—
10	<i>Syntomoides imaon</i>	—	—
11	<i>Utetheisa pulchella</i>	Crimson-speckled Moth	Heliotropium, Crotalaria
Catocalinae (7)			
12	<i>Artena dotata</i>	Artena White Underwing	—
13	<i>Entomogramma torsa</i>	—	Fabaceae (genus)
14	<i>Hypopyra meridionalis</i>	—	Fabaceae (genus)
15	<i>Mocis frugalis</i>	Sugarcane Looper	Grasses, sugarcane
16	<i>Mocis undata</i>	Brown-striped Semi-looper	Grasses, Fabaceae
17	<i>Ophiura tirhaca</i>	—	Polyphagous
18	<i>Polydesma boarmoides</i>	—	—
Calpinae (7)			
19	<i>Chalciope mygdon</i>	Triangular-striped Moth	—
20	<i>Eudocima materna</i>	Dark-banded Fruit-piercing Moth	Larva on Menispermaceae; adult fruit-piercing

21	<i>Grammodes geometrica</i>	—	—
22	<i>Hypospila bolinoides</i>	—	Fabaceae (Pongamia, Dalbergia)
23	<i>Metaphoena carneipennis</i> †	—	—
24	<i>Plecoptera oculata</i>	—	Euphorbiaceae / Fabaceae (genus)
25	<i>Trigonodes hyppasia</i>	—	Fabaceae (Pongamia, Cassia)
Erebinae (7)			
26	<i>Achaea janata</i>	Castor Semi-looper	Castor, also Citrus, Terminalia; occasional pest
27	<i>Bastilla crameri</i>	—	Phyllanthus, Sandoricum
28	<i>Ercheia cyllaria</i>	Merry Graphic Moth	—
29	<i>Erebus caprimulgus</i>	White-barred Owl Moth	Fabaceae (genus)
30	<i>Erebus hieroglyphica</i>	Yellow-bar Red Owl Moth	Fabaceae (genus)
31	<i>Spirama recessa</i>	Blue-line Scarlet Moth	Fabaceae (genus)
32	<i>Spirama retorta</i>	Common Owlet Moth	Albizia, Cassia, Acacia
Lymantriinae (6)			
33	<i>Euproctis cf. semisignata</i> †	—	—
34	<i>Euproctis lunata</i>	—	Castor, Sesbania, Acacia; urticating larva
35	<i>Euproctis similis</i>	Yellow-tail Moth	Polyphagous
36	<i>Lymantria dispar</i> †	Spongy Moth	Polyphagous (trees)
37	<i>Olene mendosa</i>	Brown Tussock Moth	Polyphagous
38	<i>Orvasca subnotata</i>	—	—
Boletobiinae (3)			
39	<i>Eublemma accedens</i>	Banner Eublemma	Probably scale-insect predator
40	<i>Eublemma roseana</i>	—	—
41	<i>Gesonia obeditalis</i>	—	—
Hypeninae (2)			
42	<i>Hypena iconicalis</i>	—	—
43	<i>Hypena laceratalis</i>	Lantana Defoliator	Lantana camara
Rivulinae (2)			
44	<i>Rivula inconspicua</i>	—	Grasses
45	<i>Rivula sericealis</i>	Straw Dot	Grasses, sedges
Aganainae (1)			
46	<i>Asota caricae</i>	Tropical Tiger Moth	Ficus spp.
Herminiinae (1)			
47	<i>Nodaria externalis</i>	—	—
Pangraptinae (1)			
48	<i>Throana pectinifer</i> †	—	—
Scoliopteryginae (1)			
49	<i>Anomis flava</i>	Cotton Looper	Cotton, Okra, Hibiscus; pest

Photographs of Pest Species



Achaea Janata Olepa ricini, Anomis flava Mocis frugalis, Euproctis lunata Eudocima materna

The 49 species were placed in 12 subfamilies (Figure 2). Arctiinae was the richest subfamily with eleven species (22.4%), followed by Catocalinae, Calpinae and Erebiniae with seven each (14.3%) and Lymantriinae with six (12.2%); Boletobiinae had three species, Hypeninae and Rivulinae two each, and four subfamilies one each.

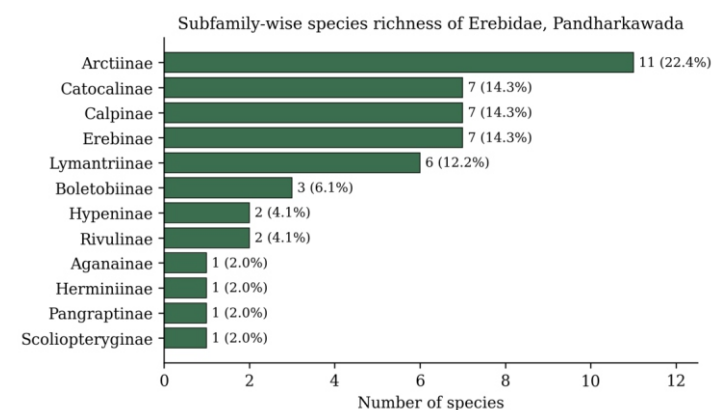


Figure 2. Subfamily-wise species richness of Erebidae in Pandharkawada Forest Division (n = 49 species; percentages in brackets).

Based on the available host information, the main groups were legume feeders (for example *Erebus caprimulgus*, *Spirama retorta* and *Hypospila bolinoides*), grass and sedge feeders (two *Mocis* and two *Rivula* species), lichen feeders (*Macrobrochis gigas*, *Mitochrista obsolata* and the Lithosini) and polyphagous tiger and tussock moths (*Aloa lactinea*, *Cretonotos gangis* and *Euproctis* spp.) (Figures 3 and 4).

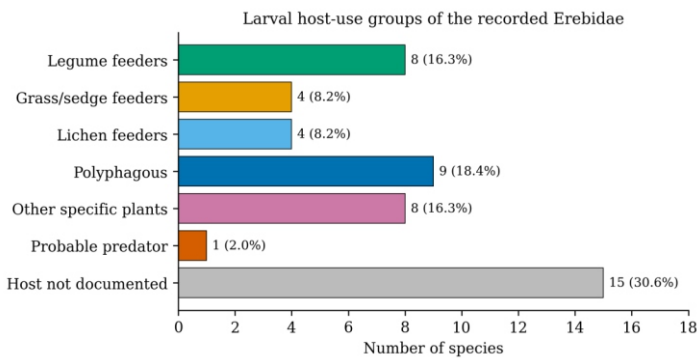


Figure 3. Larval host-use groups of the 49 recorded species. Legume feeders include records based on genus-level host information.

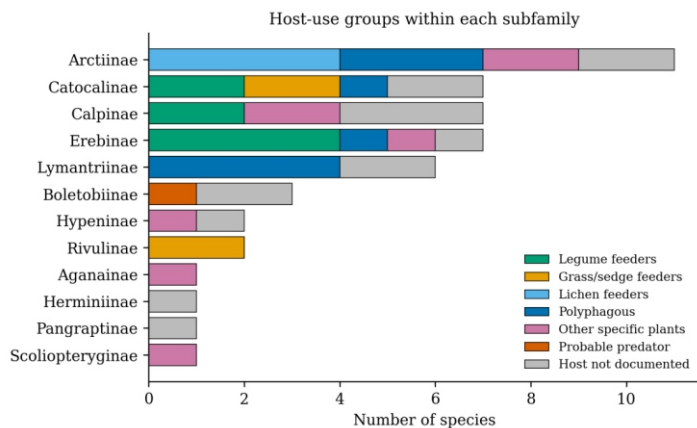


Figure 4. Composition of host-use groups within each subfamily.

Six species are crop or fruit pests: *Achaea janata* and *Olepa ricini* (castor), *Anomis flava* (cotton and okra), *Mocis frugalis* (sugarcane and grasses), *Euproctis lunata* (castor, *Sesbania* and *Acacia*; urticating larvae) and *Eudocima materna*, whose adults pierce ripening fruit. *Hypena laceratalis* feeds on the invasive weed *Lantana camara* and is beneficial, while *Utetheisa pulchella* and *Cretonotos* spp. sequester pyrrolizidine alkaloids from *Crotalaria* and *Heliotropium*.

Taking all species together, 20 (40.8%) use trees, climbers, lichens, grasses or weeds of forest, scrub and field margins as larval food, six (12.2%) are polyphagous species that are not crop pests and six (12.2%) are crop or fruit pests, while the larval hosts of 17 species (34.7%) are unknown or unclear (Figure 5). Thus 43 of the 49 species (87.8%) have no known crop damage.

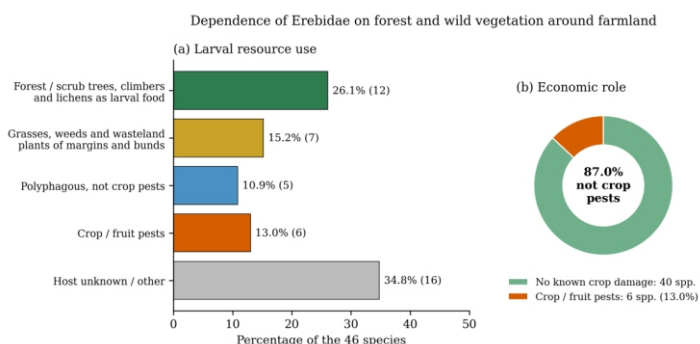


Figure 5. Dependence of the 49 Erebidae species on forest and wild vegetation around farmland. (a) Larval resource use, based on host information from the literature (see Table 2), with each species placed in one group only; *Eudocima materna* is counted as a pest because of adult fruit-piercing. (b) Economic role. Percentages are indicative, as the larval hosts of many species are not documented.

Discussion

The 49 species show that the Pandharkawada Forest Division and the surrounding farmland support a diverse erebid fauna of 12 subfamilies, with Arctiinae and Catocalinae together making up about 37% of the species. Erebininae was the richest subfamily in Nandurbar district, Maharashtra (20 of 55 species) [11], and 121 erebid species in ten subfamilies were recorded in agroecosystems of northern Kerala [16]. Such differences probably reflect vegetation, rainfall, sampling effort and changing subfamily concepts [18].

Only six species (12.2%) are crop or fruit pests, so about 88% of the fauna has no known crop damage (Figure 5). *Anomis flava* is the only species tied to cotton, and the best-known cotton bollworms belong to other moth families. *Eudocima materna* is a pest only as an adult, while its larvae feed on wild Menispermaceae climbers [12]. Pest status can change if broad-spectrum insecticides remove natural enemies, so periodic monitoring is useful.

Several species also provide indirect benefits. *Hypena laceratalis* feeds on the invasive weed *Lantana camara*, and many species develop on wild plants, grasses and sedges of margins and bunds and not on crops. Adults are eaten by bats, birds, lizards and spiders, and insectivorous bats are known to suppress agricultural pests [19]. These benefits are inferred from the biology of the species and were not measured here.

More than three times as many species (20, 40.8%) use forest, scrub or wild vegetation as larval food as are crop or fruit pests (6, 12.2%) (Figure 5). Forest and scrub therefore appear to supply larval food and shelter that cotton fields alone cannot, and to act as a source of moths and their predators for the farmland. Protecting forest patches, tree rows and bund vegetation and reducing broad-spectrum insecticides would help sustain these moths and support sustainable agriculture.

This study has limitations: records are largely photographic, there are no abundance data, sampling effort was uneven, seven records are identified only to genus, subfamily or tribe level and seven species are provisional. Similar-looking species in groups such as *Olepa* can be separated reliably only by DNA barcoding [6]. In conclusion, the cotton-dominated landscape of the Pandharkawada Forest Division supports 49 erebid species, mostly non-pests, and seasonal sampling of forest, field-margin and cotton habitats, host rearing and barcoding are needed to confirm these patterns.

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Conflict of Interest: The author declares that there is no conflict of interest.

Ethical Statement

The study was based on non-invasive field photography, and no animal was collected or harmed. Permission for the field work in the forest areas was given by the Deputy Conservator of Forests, Pandharkawada Forest Division.

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