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Monitoring The Moth Diversity Of Family Noctuidae In And Around Agroecosystem Of Lovely Professional University**Harjinder Kaur Gill
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Abstract

The objectives of research were to monitor the moth diversity in and around agroecosystem of Lovely Professional University, Punjab. The moths were collected using light traps. The collected specimens were stretched and then identified. Fourteen species of six families viz., Noctuidae, Arctiidae, Lymantridae, Sphingidae, Notodontidae and Pyralidae were identified. Noctuidae appeared to be the abundant family as seven species of it were identified. *Spodotera litura* Fabricius was registered as most prevalent while *Plusia orichalsia* Fabbrius was the rarest showing index of dominance 0.30 and 0.009 respectively.

Introduction

Biodiversity is defines as the variation of life at all levels of biological organisation or it can be defined as the relative diversity among living organisms present in different ecosystems. India is one of the twelve mega diversity countries in the world. According to a recent documentation there are 1,719,183 species present on this globe, out of which 1,26,656 species have been enlisted from India, so far (MoEF,1998). Estimates of global species diversity have varied from 2 to 100 million species, with a best estimate of somewhere near 10 million (Anonymous, 1992). Insect diversity is very important because it can be used as a food, and also for other ecological services like recycling of nutrients, detoxification of toxic chemicals and pollination. Over thousand species of insects are used as food. They are cosmopolitan. Insects rule the planet earth, by occupying all possible niches, as more than four out of every five animal species are insects (New,1984). Insects represent more than 56% of the total global biodiversity (Groombridge,1992). According to Holloway *et al*(1992), there are about 2,00,000 species of Lepidoptera on global basis and out of these, only 15,000 species belong to the butterflies (Papilionoidia) and the remaining being moths. Agricultural pests causing damage to grains and vegetables mostly belong to family Noctuidae. Hampson

(1894) classified family Noctuidae into 9 subfamilies and later on revised this classification in 1902 by suggesting 15 subfamilies. Kitching (1984) suggested 16 subfamilies viz., Rivulinae, Hypenodinae, Catocalinae, Aconitinae, Nolinae, Chleophorinae, Sarrothripinae, Plusiinae, Pantheinae, Acronictinae, Amphipyrynae, Cucullinae, Hadeninae, Noctuinae, Heliothinae and Hypeninae.

From the foregoing, it becomes crystal clear that family i.e., Noctuidae is of great economic importance. The taxonomic studies on this family are warranted in order to bring to book different pest species and other taxa to light. Such taxonomic studies are necessary in different parts of this vast country in order to take up revisionary studies on these families.

Methodology

Location

Study area i.e. Lovely Professional University is located near Phagwara. This city is located (31 degree 13'4"N to 75 degree 46'10"E) .The altitude is 234m (767 feet). Phagwara is located on Delhi –Amritsar National highway between two big cities Ludhiana & Jalandhar.

Vegetation

Vegetation of the Phagwara includes crops like wheat, rice, maize, barley, bajara and jowar. It also includes number of seasonal flowers which attracts the moths.

Collection Of The Material

The intial and the most important requirement to achieve the objectives of the present research proposal is the procurement of the research material. The collection of the material required for present studies was done with the help of portable light traps. The traps comprise a funnel (diameter top 30cm, bottom 6cm, height 30cm) fitted with baffle plates. The source of light to attract the moths was a 125w mercury vapour lamp, which is fitted in the centre of the funnel, the lower end of which goes into the collecting chamber (30cm×30cm×12cm) of the light trap. In some light traps, the sources of light is the U.V tube. The collecting chamber is fitted with two sliding collection trays (29cm×29cm).These traps were located at four different location in LPU campus.

Pinning, Spreading And Preservation Of Specimens

The specimens collected were processed as per methodology discussed by workers such as Amsel (1935), Holland (1937), Lindquist (1956), Hodges (1958), Tagestad (1974), Zimmerman (1978), Nielson (1980), Mikkola (1986) and Landry and Landry (1994).

Observations

Superfamily Noctuoidea:

Members of this group possess thoracic tympanum, situated laterally on metathorax; an ear like structure on first segment known as counter tympanal hood.

Keys To The Three Families Of Superfamily Noctuoidea

Abdomen with post spiracular tympanal hood.....	Noctuidae
Abdomen with pre- spiracular tympanal hood.....	2
Tymbal organ present on metathorax.....	Arctiidae
Metathorax without tymbal organ.....	Lymantriidae

Family Noctuidae

Diagnosis

Proboscis well developed; maxillary palpi one segmented, minute; labial palpi usually porrect, rarely upturned; antennae typically filiform, sometimes pectinate; forewing with aerole usually present, vein CuA₂ from middle of discal cell, vein M₁ arises from the point at which R₄₊₅ arises or close to the upper angle of cell; hindwing with Sc+R₁ fused briefly, diverges before vein Rs vein M₂ arising at equal distance from M₁ and M₃ forming a 'trifine condition' or vein M₂ arising approximately close to the base M₃ forming the 'quadrifine condition'; frenulum always present.

Genus *Spodoptera* Guenee

Guenee, 1852, *Noctua*, **1**: 153.

Type Species: *Spodoptera maurita*, Boisduval.

Old Distribution: West Indies, North & South America, Africa, North China and throughout Oriental Australian region.

***Spodoptera litura* (Fabricius)**

Fabricius, 1775, *Noctua*, **1775** : 601.

Diagnosis

Dark grey with a rusty tinge; abdomen fuscus. Forewing with subbasal, antemedial and postmedial double waved lines indistinct; the orbicular small and ochreous; the reniform blackish spot; the submarginal line whitish and irregularly waved; a whitish patch is often present between the orbicular and reniform and a dark patch on central marginal area. Hind wing opalescent and semihyaline white with a dark marginal line.

Old distribution: India, Himachal Pradesh.

Genus *Chrysodeixis* Hubner

Hubner, 1816, *Verz. bek. Schmett* : 1816 : 252.

Type species : *Phalaena noctua* Chalcities.

Old distribution : India, Himachal Pradesh.

Diagnosis:

Uncus prominent, pointed at tip; tegmen sclerotized; valvae simple, uniform, sacculus marked, harpe present; saccus broad at base, triangular; aedeagus with vesica embedded with cornuti.

Chrysodeixis eriosoma

Diagnosis:

Adult have 30mm wingspan and have dark brown forewings with small silver 'figure eight' markings. Male vegetable loopers also have long orange hair like scales on either side of the abdomen, which are characteristic of this species.

Old distribution: Throughout Asia, Pacific to Hawaii, East Island and Australia.

Host: Soyabeans, mung beans, tomatoes, citrus, dahlias, geraniums, lettuce and Potatoes.

Key To The Subfamilies Of Noctuidae

- | | |
|---|--------------------|
| 1. Hindwing with vein M ₂ prominent..... | Ophiderinae |
| 2. Hindwing with vein M ₂ obsolescent..... | Noctuinae |

Subfamily: OphiDerinae

Diagnosis:

Proboscis well developed; labial palpus with second segment thickened, reaching upto vertex; hindwing with vein M₂ well developed, approximated to M₂ at base, arising from close to lower angle of cell; tibiae hairy, without spines; frenulum single in male but multiple in female.

Genus *Aedia* Hubner

Aedia Hubner, 1816, *Verz. Bekannter Schmett.*, 260.

Type species: *Noctua leucomelas* Linnaeus

Noctua leucomelas Linnaeus *sensu* Hubner (1803), *Samml. Eur. Schmett.*, 4 : pl. 62.

Diagnosis: Labial palpus upturned reaching upto vertex of head. Antenna simple. Forewing with discal cell less than half the length, R₃₊₄ much shorter than free portion of R₃ and R₄.

Hindwing with discal cell more than one third the length of wing. Abdomen with tufts of hair on dorsal side.

Aedia species

Diagnosis:

Forewing with ground colour olive or brownish with white suffused with fuscous, the outer half (terman) black; prothoracic legs in males without tufts of scales, metathoracic legs with tibiae not spined.

Old Distribution: West and south Africa; India; Ceylon; Burma; Andamans; Germany (West).

Genus *Plusia* Hubner

Hubner, 1806, *Tentanen* 1806 : 2.

Type Species: *Plusia chrysitis* Linnaleus; from Europe.

Diagnosis:

Palpi upturned, second joint reaching vertex of head and thickened. Antennae of male ciliated. Thorax with a very large spreading tuft of on vertex. Abdomen with three large dorsal tufts on basal segments, lateral and anal tufts more or less strongly developed in male. Forewing forked at outer angle.

***Plusia orichalsia* Fabricius**

Diagnosis:

Head covered with brown scales; labial palpus upturned; antenna simple; eye yellowish with brown spots. Thorax densely covered with fuscous brown scales, with orange ting. Forewing with ground colour brownish yellow, irregular silvery white band at basal and subbasal region, indistinct postmedial line.

Old Distribution: N. and S. America; Wadelai; Aden; Japan; China; Throughout the Indian, Malayan and Australian region.

Subfamily: Noctuinae

Diagnosis:

Probosis well developed; labial palpi reaching upto vertex; hindwing with vein M₂ obsolescent in nature, veins Sc+ R₁ rapidly diverging from base; legs with tibiae armed with tibial spines.

Genus *Agrotis* Ochsenheimer

Ochsenheimer, 1816, *Ochs. Eur. Sch.*, **4** : 66.

Type Species: *Agrotis segetis* Schiff.

Diagnosis:

Proboscis fully formed. Palpi obliquely porrect, the second joint evenly scaled, third segment prominent. Thorax and abdomen without tuft, abdomen flattened. Tibia very strongly spined. Hindwing with vein M₃ and Cu₁ from cell, M₂ obsolescent.

Agrotis species

Diagnosis:

Antenna bipectinate, forewing brown fuscous, typically narrow with termen squarish, a small wedge shaped, dark brown patch beyond the reniform; hindwing semihyaline white, irrorated with brown scales at apex and submarginal area.

Old Distribution: Universally distributed, except America.

Host: Ground nut, linseed, rapeseed, mustard.

Agrotis species

Diagnosis:

Head dark brown, labial palpus porrect; antenna simple; eye black. Thorax covered with fuscous scales. Forewing with ground colour grey brown, comparatively lighter band in postmedial region.

Old Distribution : Universally distributed, except South America.

Subfamily: Chloephorinae

Earias vitella

Diagnosis:

Abdomen and hindwings uniform, silvery or creamy white in colour; green band on forewings.

Host: Cotton, shoe flower, hollyhock and several other malvaceous plants.

Old distribution: Throughout the plains of India and Pakistan.

Bibliography

- Amsel, H.G. (1935). Neue Palastinensische Lepidopteran. *Mitt. Zool. Mus. Berlin.*, 20 : 271-319.
- Anonymous (1992). Global Biodiversity Strategy, WRI, IUCN, UNEP : 1-244.

- Groombridge, B. (1992). *Global Biodiversity, World conservation monitoring centre*, Chapman and Hall, London.
- Hampson, G.F. (1892). *Fauna of British India including Ceylon and Burma, Moths*. Vol.I. Taylor and Francis, London, xii + 527pp.
- Hampson, G.F. (1892). *Fauna of British India, (Moths)*. Vol. I. Taylor and Francis, London: xii + 527 pp.
- Hampson, G.F. (1894). *Fauna of British India including Ceylon and Burma, Moths*. Vol.II. Taylor and Francis, London, xii +546pp.
- Hampson, G.F. (1894). *Ibid. Vol. II. Ibid.*, 1-xxviii + 1-546
- Holloway, J.D., Bradley, J.D. and Castor, D.J.(1992). *The Guide to Insects of importance to man (Lepidoptera)*. 1-21.
- Hubner (1816). *Vertz. Bekannter Schmett.*, 407.
- Linnaeus, C. (1758). *Sys. Nat.* (Edn. 10) : 824 Holmiae.
- Linnaeus, C. (1758). *Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species cum characteribus, differentiis, synonymis, locis*. 10th ed. Tom. I. Laurentii Salvii, Holmiae., 824.
- Mikkola, K. (1980). Two new noctuid species from Northern-Europe : *Polia sabmeana*, new species and *Xylomina strix*, new species. (Lepidoptera- Noctuidae : Hadeninae and Amphipyrrinae). *Not. Entomol.*, 60(4) : 217- 222.
- MoEF, (1998). Implementation of Article 6 of the Convention on Biological Diversity in India (National Report) : 1-59.
- New, T.R. (1984). *Insect Conservation – as Australian Perspective*. Dr. W. Junk Publishers, Dordrecht/Boston/Lancaster, pp. 184.
- Nielsen, E.S. (1985). The monotrystian heteroneuran phylogeny puzzle : a possible solution. *Proc. Cong. Eur. Lep.*, 138-143.