



Studies on the Selected Economically Important Pyraloidea of Punjab, India

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ABSTRACT: Lepidoptera being a second largest order of class Insecta having about forty seven super families. Out of these the super family Pyraloidea ranked as third largest with most assorted life history adaptations. To study this varied life, several surveys were conducted in different agricultural fields of Punjab in pre-monsoon, monsoon and post-monsoon periods during 2005-10. In this paper, about fifteen economically important species of super family Pyraloidea have been studied including their life history aspects and host.

Keywords: moth, pyraloidea, economic, pyralidae, crambidae

INTRODUCTION

The super family Pyraloidea comprises more than 15,576 described species worldwide (Nieukerken *et al.* 2011), and perhaps lot more yet to be described. Among Lepidoptera, pyraloids encompasses varied life history adaptations. Due to their diverse feeding habits, many species noticed to be feed internally or externally on plants as leaf rollers, webbers, leaf miners, borers, root feeders, and some as seed feeders in their imago stage. Ant nests are also noticed to be infested by some species as parasite (Wurthiinae spp.), predate upon scale insects (Phycitinae spp.), or survive in the nests of bees (Galleriinae spp.). Certain Phycitinae and Pyralinae caterpillar are adapted to very rough environments and feed on stored food commodities. With such a range of living habits, pyraloids become a supreme group for biodiversity studies (Schulze, 2000; Nuss, 2000). The present studies deals with the fifteen such economically important species which are enlisted as under mentioned.

MATERIAL AND METHODS

The immature stages of family Pyralidae and Crambidae such as eggs, larvae and pupae were collected from the infested plants, then brought and reared in the Lepidoptera laboratory, Punjabi University, Patiala as per methodology proposed by Genc *et al.* (2003), Rosário *et al.* (2007), Nagaraj (2014) and Juanz *et al.* (2016). For breeding purpose,

the larvae then put into the breeding cages (8"× 8"× 8") along with their host plants for further investigation. The ecological parameters such as temperature and relative humidity were also recorded properly. The eggs were scanned through scanning electron microscope (SEM) for studying the various sculptures present on the egg surface. The setal examination of the last instar larvae of all the fifteen species was carried out by dipping them in boiling water for proper distention and then preserved in 75% ethyl alcohol and glycerin in the ratio of 9:1 (Stehr, 1987 and Peterson, 1948).

In the present paper, the classification proposed by Nieukerken *et al.*, (2011) is followed.

Order Lepidoptera Linnaeus, 1758
Clade Obtectomera Minet, 1986
Super family Pyraloidea Latreille,
Family Pyralidae Latreille, 1809
Subfamily Galleriinae

Galleria mellonella (Linnaeus)

Tinea mellonella Linn. 1758, Syst. Nat. edit. 10:537

Material examined: 2 , 2 , 13.ix.2006, Rajpura; 1 , 1 , 15.ix.2006, Bahadurgarh.

Study period: March to October.

Egg: Incubation period 9.50±1.75 days; length 0.38±0.02 mm, width 0.30±0.01 mm; ovoid, smooth, creamish white in colour; laid in crevices or cracks of bee hive; in cluster of 50-100 eggs; chorion with poorly developed ridges showing polygonal cells.

Pupa: Duration: 6.75±1.25 days; length 16.10±0.04 mm, width 3.50±0.30 mm; last instar makes white thick silken cocoons in hive, shield the pupa, the latter orange in colour; segmentation clearly visible in mature pupae before eclosion.

Larva: Number of instars: 07

Larval duration: 24.25±3.81 days.

Adult longevity: 9.25±2.75 days.

Larval host: Honeybee hives.

***Corcyra cephalonica* (Stainton)**

Melissoblyptus cephalonica Sttn. 1866, Ent. Mo. Mag. 2: 172

Material examined: 9 , 1 , 21.iv.2007, Ludhiana; 13 , 1 , 19.vi.2007, Patiala.

Study period: April to September.

Egg: Incubation period 6.50±0.40 days; length 0.52±0.02 mm, width 0.36±0.01 mm; creamish white in colour; somewhat rounded; laid in clusters of 7 to 12 on the grains: smooth chorion with weak ornamentation.

Larva: Number of instars: 05

Larval duration: 19.75±2.58 days.

Pupa: Duration: 7.25±1.65 days; length 13.50±0.30 mm; width 3.98±1.14 mm; the caterpillars make dirty white silken cocoons among the grains and faecal matter and pupates in it.

Adult longevity: 6.75±1.25 days.

Host stored product: *Pennisetum typhoides* (Graminae).

Subfamily: Phycitinae

***Emmalocera depressella* Swinhoe**

Melissoblyptus deprssella Swinh. 1885, Proc. Zool. Soc. Lond., 1885: 876, pl. 57. f. 5

Material examined: 1 , 1 , 3.x.2006, Noormahal, Haripur; 1 , 20.x.2006, Moii.

Study period: April to October.

Egg: Incubation period: 5.60 ± 0.38 days; length 0.48±0.01 mm, width 0.31±0.01mm; the eggs creamish white in colour; scale like; laid singly or in group of 2-3 eggs near the base of stem; the egg surface sculptured with wavy ridges without any ornamentation.

Larva: Number of instars: 05.

Larval duration: 15.60±3.50 days.

Pupa: Duration: 7.25±0.65 days; length 7.90±0.37 mm, width 2.50±0.32 mm; pupae thicker towards head, the latter clearly visible; cremaster dark brown, flattened, rounded caudally, naked without any setae or spines.

Adult longevity: 5.80±1.25 days.

Host plant: *Sachharum officinarum* Linnaeus (Poaceae).

Family Crambidae Latreille, 1810

Subfamily: Schoenobiinae

***Scirpophaga nivella* (Fabricius)**

Tinea nivella F., 1794, Ent. Syat, 3(2): 296

Material examined: 1 , 1 , 27.vii.2006, Noormahal; 2 , 1 , 3.viii.2006, Haripur, Moii.

Study period: March to November.

Egg: Incubation period: 6.62 ± 0.35 days; length 0.70±0.01 mm, width 0.58±0.02 mm; female lay eggs on the lower surface of the leaves; eggs covered with light brown tuft of hairs and can easily identify on leaves; dirty white; lay in clusters of 40 to 70 eggs.

Larva: Number of instars: 05.

Larval duration: 20.95±1.34 days.

Pupa: Duration: 8.75±0.70 days. Length 16.30±0.51 mm, width 3.20±0.24 mm; freshly formed head region of pupa uniquely pinkish in colour; rest of the pupal body whitish; changes to light brown near eclosion; thorax wider as compared to head; maxillary palpi present; labial palpi not clearly visible; cremaster with hooked setae.

Adult longevity: 5.75±0.35 days.

Host plant *Sachharum officinarum* Linnaeus (Poaceae).

Subfamily: Crambinae

***Chilo partellus* (Swinhoe)**

Crambus partellus Swinhoe, 1885, P.Z.S.: 879

Material examined: 2 , 1 , 2.ix.2006, Haripur, Phillaur.

Study period: April to October

Egg: Incubation period 6.25±0.35 days; length 0.58±0.02 mm, width 0.35±0.01 mm; the eggs are flat, somewhat oval; creamy yellow in colour; laid on the underside of the leaves in clusters of 18-25.

Larva: Number of instars: 06.

Larval duration: 19.49±1.78 days.

Pupa: Duration: 8.50±0.70 days; length 10.90±0.35 mm, width 2.40±0.35 mm; freshly formed pupae brown in colour.

Adult longevity: 6.25±1.25 days.

Host plant: *Zea mays* (Graminae).

***Chilo infuscatellus* Snellen**

Chilo infuscatellus Snell. 1890 Tijds. Ent, 34:347

Material examined: 1 , 2 , 22.vi.2005, Nakodar; 2 , 1 , 24.vi.2005, Patiala; 1 , 15.xi.2005, Phillaur

Study period: May-June, October-November.

Egg: Incubation period: 4.65±0.20 days; length 0.61±0.07 mm, width 0.65±0.01 mm; scale-like; creamy white, become darker after four days; laid in group of 12 to 35 on lower surface of leaf; somewhat smooth egg surface and weak ornamentation.

Larva: Number of instars: 05.

Larval duration: 12.37±1.11 days.

Pupa: Duration: 7.25±0.65 days. Length 12.50±0.26 mm, width 2.46±0.05 mm; freshly formed pupa whitish green, become to light mud coloured after 6 to 7 hours; changes to light brown near eclosion; thorax broader as compared to head; maxillary palpi present, labial palpi visible; cremaster with hooked setae, mesothoracic legs and antennae extend beyond caudal margin of wings.

Adult longevity: 6.15±0.25 days.

Host plant: *Sachharum officinarum* Linnaeus (Poaceae).

***Chilo auricillia* Dudgeon**

Chilo auricillia Dudgeon, 1905. J. Bombay Soc. 16:405

Material examined: 1 ♀, 1 ♂, 10.iii.2005, Patiala; 1 ♀, 2 ♂, 13.iii.2005, Guraya, Phillaur

Study period: March to September.

Egg: Incubation period: 5.35±1.65 days; length 0.32±0.07 mm, width 0.39±0.01 mm; scale-like; dirty white in colour; soon becomes darker; laid in group of 50 to 75 on underside of leaves; alternating and longitudinal ridges reaches the micropylar area of the egg, irregularly reticulate egg surface.

Larva: Number of instars: 05.

Larval duration: 14.06±1.15 days.

Pupa: Duration: 9.25±0.75 days. Length 14.96±0.10 mm, width 3.42±0.10 mm; changes to light brown near eclosion; thorax and head width almost equal; cremaster with hooked setae; maxillary palpi and labial palpi present.

Adult longevity: 5.67±0.30 days.

Host plant: *Sachharum officinarum* Linnaeus (Poaceae).

Subfamily: Glaphyriinae

***Hellula undalis* (Fabricius)**

Phalaena undalis Fabricius, 1781 Syec. Ins. 2:272

Material examined: 2 ♀, 1 ♂, 11.xi.2007, Malerkotla, Amargarh

Study period: September to February.

Egg: Incubation period: 3.25±0.65 days; length 0.41±0.01 mm, width 0.84±0.01 mm; the eggs are ovoid and becomes flattened slightly from the surface of deposit; eggs pearly white in colour and become pinkish and subsequently turned into dark brown near hatching; laid singly or in clusters of 4 or 5 near the bud of its host plant; the egg chorion with very fine and prominent ridges and longitudinal ridges reaching the micropyle except alternating ridges.

Pupa: Duration: 6.50±0.50 days. Length 5.70±0.30 mm, width 2.00±0.20 mm; pupae yellowish white in colour; colour changed in to dark brown near maturity.

Larva: Number of instars: 04.

Larval duration: 13.62±1.82 days.

Adult longevity: 5.50±0.25 days.

Host plant *Brassica oleraceae* (Brassicaceae).

Subfamily: Pyraustinae

***Pyrausta bambucivora* Moore**

Ebulea bambusivora Moore, 1888, Lep. Atk: 224

Material examined: 2 ♀, 1 ♂, 13.vi.2007, Lemlehri; 1 ♀, 1 ♂, 15.vi.2007, Hoshiarpur.

Study period: June to September.

Egg: Incubation period 5.60±0.18 days; length 0.38±0.02 mm, width 0.36±0.01 mm; eggs deposited in singly or groups 5-6 eggs on the lower surface of leaves or on culms, oval, dirty white in color; chorion with ill-defined ridges.

Larva: Number of instars: 05.

Larval duration: 19.33±2.16 days.

Pupa: Duration: 6.75±0.75 days; length 9.70±0.24 mm, width 2.00±0.31 mm; brown in colour; various developmental markings clearly seen on the pupal body.

Adult longevity: 5.50±0.70 days

Host plant: *Dendrocalamus giganteus* (Graminae).

***Diaphania indica* (Saunders)**

Eudiotpes indica Saund. 1851, Trans. Ent. Soc., 1851: 163, pl. 12. ff. 5, 6.7

Material examined: 4 ♀, 1 ♂, 20.vi.2006, Sanour; 1 ♀, 22.x.2006, Devigarh.

Study period: March to October.

Egg: Incubation period: 4.12 ± 0.18 days; length 0.57±0.01 mm, width 0.30±0.01 mm; female moth laid eggs on the lower surface of the leaves; singly or in small groups of 5-6 eggs; the eggs are ovoid and smooth; creamish white in colour; chorion finely reticulated and sculptured with wavy ridges.

Larva: Number of instars: 05

Larval duration: 16.00±1.40 days.

Pupa: Duration: 13.50±0.70 days. Length 14.01±0.40 mm, width 3.50±0.30 mm; freshly formed pupae greenish in colour and then changed into golden brown.

Adult longevity: 7.25±0.39 days.

Host plant: *Luffa cylindrical* (Cucarbitaceae).

Subfamily: Spilomelinae

***Nausinoe geometralis* (Guenée)**

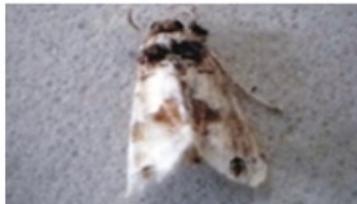
Lepyrodes geometralis Guen. 1854, Delt. & Pyr. : 278, pl. 8 .f.6

Material examined: 2 ♀, 1 ♂, 25.vi.2006, Lemlehri; 1 ♀, 2.viii.2007, Patiala.

Study period: June to August.

Egg: Incubation period 3.25±0.45 days; length 0.52±0.02 mm, width 0.47±0.01 mm; the eggs laid singly or in small groups of 5-6 eggs on the leaf lamina; spherical; yellowish green and shiny in colour; irregular ridges present on chorion join the rosetts which surrounds the micropyle.

Pupa: Duration: 6.00±1.25 days; length 9.30±0.24 mm; width 2.00±0.32 mm; freshly formed pupae green in colour; the eyes appear very prominent as black spots on the anterior margin of the pupa.

*Galleria mellonella* (Linnaeus)*Corcyra cephalonica* (Stainton)*Emmalocera depressella* Swinhoe*Scirpophaga nivella* (Fabricius)*Chilo partellus* (Swinhoe)*Chilo infuscatellus* Snellen*Chilo auricillia* Dudgeon*Hellula undalis* (Fabricius)*Pyrausta bambucivora* Moore*Diaphania indica* (Saunders)*Nausinoe geometralis* (Guenée)*Syllepte derogata* (Fabricius)*Antigastra catalaunalis* (Duponchel)*Leucinodes orbonalis* Guenée*Syngamia abruptalis* Walker

Larva: Number of instars: 05.

Larval duration: 24.71±3.46 days.

Adult longevity: 7.45±2.33 days.

Host plant: *Jasminum sambac* (Nyctaginaceae).

***Syllepte derogata* (Fabricius)**

Phalaena derogata Fabricius, 1775, Syst. Ent.: 641

Material examined: 4 , 1 , 16.iv.2005, Lemlehri.

Study period: March to October.

Egg: Incubation period 4.65±0.35 days; length 0.47±0.02 mm, width 0.42±0.01 mm; eggs laid in rolled leaf cases singly or in smaller groups; rounded; creamish white in colour; the egg surface rough with small reticulations.

Larva: Number of instars: 07.

Larval duration: 20.19±1.70 days.

Pupa: Duration: 7.25±1.25 days; length 14.30±0.50 mm; width 2.50±0.50 mm; pupation occurs with in the rolled leaves.

Adult longevity: 6.50±0.70 days.

Host plant: *Gossypium hirsutum* (Malvaceae).

***Antigastra catalaunalis* (Duponchel)**

Botys catalaunalis Duponchel. 1833, Hist. Nat. Lep. Fr. 8(2) (Noct. 5 pt. 2): 330 pl. 232. f. 8

Material examined: 1 , 1 , 9.vi.2005, Lemlehri.

Study period: June to August.

Egg: Incubation period 4.75±1.45 days; length 0.32±0.02 mm, width 0.42±0.01 mm; pale yellowish green; shiny; deposits on tender leaves and pods; oval; lay singly; the egg chorion having irregular reticulations with alternating ridges reaching the micropyle end.

Larva: Number of instars: 05.

Larval duration: 14.49±1.25 days.

Pupa: Duration: 8.75±0.45 days; length 10.90±0.35 mm, width 2.40±0.35 mm; freshly formed pupae light brownish in colour.

Adult longevity: 12.30±3.04 days.

Host plant: *Sesamum indicum* (Linaceae).

***Leucinodes orbonalis* Guenée**

Leucinodes orbonalis Guen. 1854, Delt & Pyr. : 223

Material examined: 2 , 3 , 29.v.2006, Malerkotla; 1 , 3.vi.2006, Sirhind.

Study period: March to June.

Egg: Incubation period: 4.75 ± 0.70 days; length 0.76±0.01mm, width 0.42±0.02mm; whitish cream in colour; laid on the undersurface of leaves; females also seen laid eggs on the walls of container in a laboratory observation; singly or in clusters of 5-6; oval.

Larva: Number of instars: 05.

Larval duration: 16.75±1.65 days.

Pupa: duration: 12.25±2.75 days. Length 9.60±0.40 mm, width 2.80±0.24 mm; pupae light brown in colour but later on changes in to dark brown; packed in a case.

Adult longevity: 5.75±0.35 days.

Host plant: *Solanum melongena* (Solanaceae).

***Syngamia abruptalis* Walker**

Asopia abruptalis Walker. 1859, Cat.Lep.17: 371

Material examined: 2 , 1 , 26.x.2006, Patiala, Sanour.

Study period: June to October.

Egg: Incubation period: 4.58 ± 0.38 days; length 0.29±0.01 mm, width 0.33±0.02 mm; dirty creamish in colour; somewhat cylindrical; laid singly or in groups of 5-6 eggs on the lower surface of leaves near the buds; irregular ridges reaching to the rosette near the micropyle with prominent and longitudinal ridges.

Larva: Number of instars: 05.

Larval duration: 13.12±2.03 days.

Pupa: Duration: 5.50±0.75 days. Length 13.50±0.32 mm, width 3.00±0.44 mm; brown in colour; head appears very prominent on the anterior part of pupae; antennae extend from head towards thoracic region.

Adult longevity: 6.25±1.25 days.

Host plant: *Acyranthus aspara* Linnaeus (Amrntaceae).

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