



Original Research Article

doi: <https://doi.org/10.20546/ijcrbp.2017.407.010>

An Update on the Systematic Checklist and Biodiversity of Caterpillars of Butterfly-Fauna on Food /Host Plant Species of Jammu & Kashmir State (India) - Papilionoidea: Hesperiiidae, Lycaenidae and Pieridae

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Abstract

This paper deals with 23 species, under 15 genera of butterfly caterpillars, belonging to family Hesperiiidae, Lycaenidae and Pieridae, associated with 33 species of food / host plant species (agricultural crops and economically important plant species), covering 14 families. The highest number of caterpillar species *i.e.* 8 (Lycaenids, Pierids) has been found on medicinal plants, followed by 6 spp. (Hesperiiids, Pierids) on vegetable crop species. The food crops, fruit crops and ornamental plant species, served as food / host plants for 4 spp. each, pertaining to family Hesperiiidae, Lycaenidae and Pieridae. The lowest number of caterpillar species *i.e.* 2 (Lycaenid, Pierid), is known to be on forest / timber trees. An-up-to date systematic checklist of butterfly caterpillar species, with food/ host plant species, have been provided. Besides, species diversity of caterpillar-fauna on host plant species has been discussed.

Article Info

Accepted: 15 June 2017

Available Online: 06 July 2017

Keywords

Butterfly caterpillar
Diversity
Food plants
Hesperiiids
Lycaenids
Pierids

Introduction

In Jammu and Kashmir State, 23 species of butterfly caterpillars, under family Hesperiiidae, Lycaenidae and Pieridae, are found to be associated with 33 species of agricultural crops and other economically important plant species, belonging to 14 families. The adult butterflies can obtain nectar as food from suitable flowers of the plant species in this region. The adult butterfly species lay eggs on the food plant species on which the larvae, known as caterpillar feed. The survival of butterfly population actually depends on food for its caterpillar stage, by feeding on specific plant species, referred to as butterfly host

plant. Most species accept one or few species of plants that provide necessary food for caterpillar (larval stages).

In case of Lycaenids, the caterpillars are flattened in appearance and may be green, blue, orange or dull brown in colour, with gland that may produce secretion to attract or subdue ants. The Hesperiid caterpillars are cylindrical, with large head. They are usually green or transparent green and sometimes conspicuously marked. These caterpillars feed within cells made, out of rotted leaves of the host plant. The caterpillars of Pierids are generally green, with hairs or spine and mostly feed on the plants belonging to the family Brassicaceae and

legumes. Species of genus *Pieris* are serious pests of Brassicas vegetables in this region.

Materials and methods

The database provided in this paper pertains to 23 species of butterfly caterpillars of 3 families, feeding on diverse food / host plant species under 14 families, including agricultural crops and economically important plant species, occurring in vast areas and localities of Jammu and Kashmir State. This State is located in the northern part of Indian sub-continent, in the vicinity of Karakorum and the Western Himalayan ranges. Jammu and Kashmir (J & K) State is divided into three geographically and climatically different Provinces, viz. Ladakh (cold desert), Kashmir (temperate) and Jammu (sub-tropical). This State is of paramount zoo-geographical significance as well as rich in biodiversity.

In the present paper, a first attempt has been made to consolidate the scattered data on butterfly caterpillar species with reference to their host/ food plant species and is being given in the form of updated annotated checklist. The data pertaining to the taxa as well as host/ food plant species, has been updated in the light of the latest nomenclatural / systematic changes.

For the purpose of updating of faunal taxa and diversity, relevant published works (national and international), besides online information on taxonomic surveys and latest systematic checklist / catalogue of the world, have been consulted. For the changes in nomenclature/ systematics of faunal taxa, the important monographs and online databases followed are: Anonymous (2017a, 2017b), Beccaloni et al. (2016), Greishuber and Lama (2007), Varshney and Smetacek (2015) and Ziegler (2017).

The faunal records of valid butterfly caterpillar species, with their host/ food plant species are given in the Systematic Checklist. The synonymies of the taxa are listed under the valid species, given in the parentheses and in case of food plant species, the synonymies are given in front of valid species, also in parentheses. The checklist provides the references pertaining to authors recording and describing taxa from different regions and localities, are in the form of code numbers, given in the long brackets in front of each listed species. The keys to the code numbers, are cited at the end of systematic checklist.

Results and discussion

Systematic Checklist

Superfamily: Papilionoidea

Family: Hesperidae

Subfamily 1: Hesperinae

Tribe 1: Baorini

1. *Parnara guttatus* Bremer & Gray (Common Straight Swift) [12]

Caterpillar Food / Host plants: *Vigna unguiculata* (Cow pea), *Phaseolus vulgaris* (French beans) and *Oryza sativa* (Rice).

2. *Pelopidas methias* (Fabricius) (Variable Swift) [3, 28]

Caterpillar Food /Host plants:*Brassica* spp., *Raphanus sativus*

Tribe 2: Hesperini

3. *Hesperia comma* (Linnaeus) (Chequered Deter) [23]

Caterpillar Food / Host plant: *Oryza sativa*

Subfamily 2: Pyrginae

Tribe: Celaenorrhini

4. *Celaenorrhinus leucocera* (Kollar) (Common Spotted flat) [11, 14, 39]

Caterpillar Food / Host plants:*Eranthemum roseum* (= *Daedalaneathus roseum*), *Epilobium*, *Strobilanthes*

Family 2: Lycaenidae

Subfamily 1: Polyommatainae

Tribe: Polymmatini

5. *Celastrina huegelii huegelii* Huegel (Large Hedge Blue) (= *Lycaenopsis huegelii* Huegel) [11, 39]

Caterpillar food / host plant: *Cylista scariosa*, *Xylia dalabrifformis*

Subfamily 2: Thecalinae

Tribe 1: Theclini

6. *Chaetoprocta odata* (Hewitson) (Walnut Blue)

Caterpillar Food / host plant: *Juglans regia* (Walnut)

Tribe 2: Deudorigini

7. *Deudorix epijarbas* (Moore) (The common Cornelian) [21, 26, 37, 39, 40]

Caterpillar Food / host plants: *Aesculus indica* (Indian horse chestnut), *Citrus sinensis* (Sweet orange), *Punica granatum* (Pomegranate)

8. *Rapala nissa* (Kollar) (Common Flash) [11, 14]

Caterpillar Food / host plant: *Astilberivularis*

9. *Rapala varuna* Horsfield (Indigo Flash) [12, 22]

Caterpillar host plant: *Psidium guajava* (Guava)

10. *Virachola isocrates* (Fabricius) (Pomegranate, Guava butterfly) [6, 12, 15, 31]

(= *Deudorix isocrates* Fabricius) [10, 34, 36]
Caterpillar food / host plants: *Emblica officinalis* (Aonla), *Punica garnatum*, *Citrus sinensis*, *Citrus reticulata* (Mandarin orange), *Psidium guajava*

Family 3: Pieridae

Subfamily 1: Coliadinae

11. *Catopsilia pomona* (Lemon emigrant) (= *Catopsilla crocale* (Cramer) [29]

Caterpillar food / host plants: *Senna siamea* (= *Cassia siamea*)

12. *Colias fieldii* (Menetries) (Dark Clouded Yellow) (= *Colias electo fieldi*) [16, 28, 38, 39]

Caterpillar food / host plants: *Indigofera heterantha*, *Medicago* spp., *Robinia pseudoacacia*, *Trifolium* spp. and *Vicia* (Vetch)

13. *Colias erate* (Esper) (Pale Clouded Yellow) [7]

Caterpillar food / host plant: *Melilotus alba*

14. *Colias hyale glia* Linnaeus (Pale-clouded yellow) [7]

Caterpillar food / host plants: *Medicago* spp., *Melilotus* sp., *Trifolium* sp., *Vicia cracca* (Vetch)

Subfamily 2: Pierinae

Tribe 1: Pierini

15. *Aporia leucodice* (Eversmann) (Arrow head black vein) [11, 39]

(= *Metaporis leucodice* Eversmann) [38]

Caterpillar food / host plant: *Berberis lycium*

16. *Aporia nabellica nabellica* (Boisduval) (Kashmir Dusky Black vein) [35, 38]

Caterpillar food plant: Plant species of Umbelliferae and Rosaceae

17. *Pieris brassicae* (Linnaeus) (Large cabbage butterfly) [5, 9, 19, 24, 25]

Caterpillar food plants: *Brassica oleracea* var. *acephala* (Haak), *B.o. botrytis* (Cauliflower); *B.o. capitata* (Cabbage); *B. rapa* (Turnip), *Lepidium latifolium* (Pepper grass), *Raphanus sativus* (Radish)

18. *Pieris brassicae kashmirensis* Rishi (Large cabbage butterfly) [32]

Caterpillar food / host plants: *Brassicacae* spp. and its varieties and *Brassica juncea* (Mustard)

19. *Pieris canidia* (Linnaeus) (Indian Cabbage White) [4, 7, 27]

Caterpillar food/plants: *Brassica o.* var. *capitata*, *B.o. botrytis*, *B.o. gongyloides*, *Raphanus stavius* (Raddish)

20. *Pieris rapae* (Linnaeus) (Small white butterfly) [5, 24, 32, 38]

Caterpillar food / host plants: *Brassica.o.* var. *capitata.*, *B.o. botrytis*, *B.o. gongyloides*, *Brassicarapa*, *R. stavius*

21. *Pontia daplidice* (Linnaeus) (Bath White) [5, 7, 17,

28, 38, 39]

Caterpillar food / host plants: *B.o. acephala*, *B.o. botrytis*, *B.o. gongyloides*, *B. rapa*, *R. stavius*

Tribe: Teracolini

22. *Ixias marianne* (Crammer) (White orange tip) [4]

Caterpillar food plant: *Capparis grandis*

23. *Ixias pyrene* (Linnaeus) (Yellow orange tip) [4]

Caterpillar food plant: *Capparis*

Key to numerical in the long brackets [], cited in the above checklist

1= Ahmad et al. (2007); 2 = Ahmad and Zaki (2008); 3= Atwal and Dhaliwal (1999); 4= Bala et al. (2014); 5 = Bhat et al. (2011); 6 = Bhat (1991); 7 = Bingham (1907); 8= Butani and Jotwani (1984); 9 = Chandra and Sidhu (2009); 10= Chhetry et al. (2015); 11= Dar et al. (2002); 12= Kaul and Kesar (2003); 13 = Khan et al. (2013); 14= Kollar (1884); 15 = Malik et al. (1965); 16= Mandal (1984); 17 = Mani and Singh (1962); 18 = Masoodi and Trali (1987); 19 = Mathew and Ahmad (2005); 20 = Mir and Wani (2005); 21 = Mir et al. (2012); 22 = Mohi-ud-Din et al. (2015); 23 = Now-Bahaar and Bhat (2011); 24 = Pandey and Dwivedi (2005); 25 = Pandey et al. (2006); 26 = Parry and Pawar (1988); 27 = Qureshi et al. (2013a); 28 = Qureshi et al. (2013b); 29 = Reen and Sharma (2006); 30 = Rishi (1967); 31= Rishi (1968); 32 = Rishi (1973); 33=Sharma et al. (2008); 34 = Shankar et al. (2007); 35 = Talbot (1939); 36 = Tara et al. (2006); 37 = Thukar et al. (1995); 38 = Varshney (1993); 39 = Wynter-Blyth (1957); 40 = Zaka-ur-Rab (1980).

The above cited Systematic Checklist incorporated a total of 23 species, belonging to 15 genera of butterfly caterpillar-fauna, under family Hesperidae, Lycaenidae and Pieridae of Superfamily Papilionoidea. The caterpillar taxa under these families are associated with 33 species of agricultural crops (food, fodder, fruits, vegetables) and economically important plants (medicinal plants and timber/ forest trees, ornamental plants), distributed over 14 families. A total of 4 species under 4 genera of Hesperiid caterpillars are known to have their food/ host plants as food and vegetable crops, besides ornamental plants. In case of Lycaenidae family, 6 spp. (5 genn.), have their food / host plants as fruit crops, medicinal plants and forest trees. The family Pieridae incorporated as many as 13 spp. (6 genn.) and their caterpillars are known to thrive on agricultural crops (food, fodder and vegetables), medicinal and ornamental plants, forest trees (see Checklist and Table 1).

Table 1. Species diversity of Hesperiid, Lyncaenids and Pierids caterpillars, infesting agricultural crops and economically important plants of various families in Jammu and Kashmir State.

Caterpillar host crops and plants (Family)	Caterpillar families and genus (no. of species)			Total no. of species
	Hesperiidae	Lycaenidae	Pieridae	
Food crops				
Peppergrass (BR)	-	-	<i>Pieris</i> (1)	01
Paddy/Rice (PO)	<i>Hesperia</i> (1), <i>Parnara</i> (1)	-	-	02
Vetch (FA)	-	-	<i>Colias</i> (1)	01
Fodder crops				
<i>Medicago</i> spp. (FA)	-	-	<i>Colias</i> (1)	01
<i>Trifolium</i> spp. (FA)	-	-	<i>Colias</i> (1)	01
Food crops				
Aonla (EL)	-	<i>Virachola</i> (1)	-	01
Guava (MY)	-	<i>Rapala</i> (1), <i>Virachola</i> (1)	-	02
Mandarin orange (RU)	-	<i>Virachola</i> (1)	-	01
Pomegranate (PU)	-	<i>Deudorix</i> (1), <i>Virachola</i> -(1)	-	02
Sweet orange (RU)	-	<i>Deudorix</i> (1), <i>Virachola</i> (1)	-	02
Walnut (JU)	-	<i>Chaetoprocta</i> (1)	-	01
Medicinal plants				
<i>Aesculus</i> (SA)	-	<i>Deudorix</i> (1)	-	01
<i>Astilbe</i> (SX)	-	<i>Rapala</i> (1)	-	01
<i>Berberis</i> (BE)	-	-	<i>Aporia</i> (1)	01
<i>Capparis</i> (CA)	-	-	<i>Ixias</i> (2)	02
<i>Cylista</i> (FA)	-	<i>Celastrina</i> (1)	-	01
<i>Melilotus</i> (FA)	-	-	<i>Colias</i> (2)	02
Ornamental plants				
<i>Arabis</i> (BR)	-	-	<i>Pieris</i> (1)	01
<i>Ecbolium</i> (AC)	<i>Celaenorrhinus</i> (1)	-	-	01
<i>Eranthemum</i> (AC)	<i>Celaenorrhinus</i> (1)	-	-	01
<i>Indigofera</i> (FA)	-	-	<i>Colias</i> (1)	01
<i>Rorippa</i> (BR)	-	-	<i>Pieris</i> (1)	01
<i>Senna</i> (FA)	-	-	<i>Catopsilia</i> (1)	01
<i>Strobilanthes</i> (AC)	<i>Celaenorrhinus</i> (1)	-	-	01
Timber/forest trees				
<i>Robinia</i> (FA)	-	-	<i>Colias</i> (1)	01
<i>Xylia</i> (FA)	-	<i>Celastrina</i> (1)	-	01
Vegetable and oil crops				
Brassicac vegetables and oil crop (mustard) (BR)	<i>Peleopidas</i> (1)	-	<i>Pieris</i> (4), <i>Pontia</i> (1)	06
Cowpea (FA)	<i>Parnara</i> (1)	-	-	01
French beans (FA)	<i>Parnara</i> (1)	-	-	01
Yam (DI)	<i>Parnara</i> (1)	-	-	01

AC= Acanthaceae; BR= Brassicaceae; BE= Berberidaceae; CA= Capparaceae; DI= Dioscoraceae; EU=Euphorbiaceae; FA= Fabaceae; JU=Juglandaceae; PO = Poaceae; MY= Myrtaceae; PU= Punicaceae; RU=Rutaceae; SP= Spindaceae; SX= Saxifragaceae

Species Diversity of caterpillar-fauna on agricultural crops and economically important plant species

Medicinal plants: The highest number of caterpillar species i.e. 8, belonging to the family Lycaenidae and Pieridae (5 spp.) have found on 6 species of medicinal plants. The medicinal plants are: *Aesculus*, *Berberis* and *Cylista*, each serving as food plant for single species

each of caterpillar; *Capparis* and *Melilotus*, serve as food plants for 2 spp. each of caterpillar (Pierid), belonging to genus *Ixias* and *Colias* respectively (see Table 1).

Vegetable crops: 6 species of caterpillars (Hesperiid, Pierid) are known to be associated with 7 species of vegetables (brassicac, radish, cowpea, beans, and yam)

and oil crop (mustard). The highest number of species *i.e.* 5, belonging to genus *Pieris* and *Pontia*, feed on brassicas vegetables (*Brassica oleoracea* and its varieties), *Brassica rapa*, mustard (oil crop), radish. Besides, Hesperiid, *Parnara guttatus* caterpillar is potential pest of vegetables like cow pea, French beans and yam (*see* Table 1).

Food and fruit crops: 4 species each of caterpillar, belonging to family Hesperidae, Lycaenidae and Pieridae, have been found to be associated with food crops (peppergrass, paddy and vetch). Hesperids-*Hesperia comma* and *Parnara guttatus* feed on food crop, *viz.* Paddy (Rice), whereas, peppergrass and vetch serve as food for the caterpillars of butterfly species, *viz.* *Pieris brassicae* and *Colias fieldi* respectively. 4 species of butterfly caterpillars (Lycaenidae) feed on 6 species of fruit crops such as aonla, guava, mandarin orange, pomegranate, sweet orange and walnut. The caterpillars of *Virachola isocrates* feed on all these kinds of fruits, excepting walnut. The caterpillars of *Deudorix epijarbas* devour fruit crops- pomegranate and sweet orange. The walnut crop serves as food for the caterpillars of butterfly, *viz.* *Chaetoprocta odata* (*see* Table 1).

Ornamental plants, fodder crops and forest trees: 4 species of butterfly caterpillars also feed on 7 species of ornamental plants such as *Arabis*, *Ecbolium*, *Eranthemum*, *Indigofera*, *Rorippa*, *Senna* and *Strobilanthes*. The caterpillar of butterfly, *viz.*, *Celaenorrhinus leucocera* has three three species of ornamental plants as host/ food plants. The lowest number of caterpillar species *i.e.* 2 (Pierid), are noticed to be infesting host species, belonging to 2 genera of fodder crop, *viz.*, *Medicago* and *Trifolium*. The caterpillars Lycaenids- *Colias* and *Celaenorrhinus*, feed on forest tree, *Robinia* and *Xylia* respectively (*see* Table 1).

Conflict of interest statement

Authors declare that they have no conflict of interest.

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How to cite this article:

Bhagat, R. C., 2017. An update on the systematic checklist and biodiversity of caterpillars of butterfly-fauna on food /host plant species of Jammu & Kashmir State (India) - Papilionoidea: Hesperidae, Lycaenidae and Pieridae. Int. J. Curr. Res. Biosci. Plant Biol. 4(7), 81-87. doi: <https://doi.org/10.20546/ijcrbp.2017.407.010>