



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2018; 6(6): 1465-1469

© 2018 IJCS

Received: 26-09-2018

Accepted: 30-10-2018

Ajaz Ahmad Kundoo

Division of Entomology,
Sher-e-Kashmir University of
Agricultural Sciences and
Technology of Kashmir, Wadura
Campus, Baramullah, Jammu
and Kashmir, India

Akhtar Ali Khan

Division of Entomology,
Sher-e-Kashmir University of
Agricultural Sciences and
Technology of Kashmir,
Shalimar Campus, Jammu and
Kashmir, India

Ishtiyah Ahad

Division of Entomology,
Sher-e-Kashmir University of
Agricultural Sciences and
Technology of Kashmir, Wadura
Campus, Baramullah, Jammu
and Kashmir, India

NA Bhat

Plant Pathology, Sher-e-
Kashmir University of
Agricultural Sciences and
Technology of Kashmir, Wadura
Campus, Baramullah, Jammu
and Kashmir, India

MA Chatoo

Vegetable Science, Sher-e-
Kashmir University of
Agricultural Sciences and
Technology of Kashmir,
Shalimar Campus, Jammu and
Kashmir, India

Khalid Rasool

fruit science, Sher-e-Kashmir
University of Agricultural
Sciences and Technology of
Kashmir, Wadura Campus,
Baramullah, Jammu and
Kashmir, India

Correspondence**Ajaz Ahmad Kundoo**

Division of Entomology,
Sher-e-Kashmir University of
Agricultural Sciences and
Technology of Kashmir, Wadura
Campus, Baramullah, Jammu
and Kashmir, India

International Journal of Chemical Studies

Taxonomic redescription of the species of sub-family Chilcorinae (Coleoptera: Coccinellidae) from Jammu and Kashmir, India

Ajaz Ahmad Kundoo, Akhtar Ali Khan, Ishtiyah Ahad, NA Bhat, MA Chatoo and Khalid Rasool

Abstract

Ladybugs are diverse group of living organisms. They belong to family Coccinellidae of order Coleoptera. The family has been subdivided into six subfamilies: Sticholotidinae, Chilochorinae, Scymninae, Coccidulinae, Coccinellinae and Epilachninae. These are universal predators and occupy important place in biological control. In this paper four species of the subfamily Chilcorinae have been collected and rediscrbed as no taxonomic work has been done on this group in Kashmir, India. This paper provides a detailed taxonomy of *Chilocorus infernalis*, *Chilocorus rubidus*, *Pricibrumus uropygialis* and *Platynaspidius saundersi* on the basis of advanced taxonomic character that is male genitalia. Detailed description of adults, male genitalia and taxonomic keys are provided for each species along with color plates.

Keywords: Chilcorinae, Kashmir, male genitalia, taxonomy, taxonomic keys.

Introduction

Coccinellids are commonly known as ladybird beetles. These are known for their predacious nature. They belong to the order Coleoptera, suborder Polyphaga, super-family Cucujoidea and family Coccinellidae. The family Coccinellidae comprises 6,000 described species worldwide and is divided into six subfamilies: Sticholotidinae, Chilcorinae, Scymninae, Coccidulinae, Coccinellinae and Epilachninae although a recent phylogeny suggests a seventh subfamily, Ortaliinae (Fursch 1990; Kovar 1996; Slipinski 2007) [8, 17, 29]. Of these sub-families Epilachninae is phytophagous and rests are predatory (Slipinski 2007) [29]. The sub-family Chilcorinae occupies the most important position as its members possess predacious nature against scale insects, aphids, mealy bugs and psyllids (Hayat *et al*, 2017) [11]. The individuals of this sub-family are shiny color and usually have no spots or patterns on their elytra. This sub-family was investigated by many authors throughout the world like (Kirsch 1871; Crotch 1874; Bedel 1892; Andres 1913; Stephens 1832 ;) [16, 6, 7, 4, 2, 32]. It was Dobzansky (1926) that laid the foundation of the modern classification of the genus *Coccinella* based on the structure of male and female genitalia. From Indian subcontinent, Joshi and Sharma (2008) [12] recorded *Brumoides suturalis* (Fabricus) and *Chilocorus nigritus* (Fabricus) from Haridwar district, Uttarakhand, India. Harit (2015) [10] reported the occurrence of *Chilocorus circumdatus* and *Chilocorus sp.* in champhai District of Mizoram state, North East India. Murali *et al.* (2017) [23] recorded the presence of *Brumoides suturalis* on Brinjal crop in Bengaluru Karnataka. Singh and Sharma (2010) [28] reported the *Chilocorus nigrita* and *Brumoides suturalis* from Punjab. Poorani (2003) [25] in her checklist mentioned 36 species of the sub-family Chilcorinae from India. Diversity of predaceous coccinellids from temperate agro-ecosystems Jammu and Kashmir has been studied by many workers such as Verma and Joshi (1988) [31] reported *Chilocorus infernalis* Mulsant and *Priscibrumus (Exochomus) uropygialis* (Mulsant), Bhagat *et al.* (1988) [5], Pawar and Parray (1989) [24], Azim and Bhat (2005) [3] published the taxonomic notes on *Chilocorus infernalis* and Shah and Khan (2014) [27] published 17 species of predaceous coccinellids from agro ecosystems of Kashmir, belonging to 15 genera and three subfamilies viz. Coccinellinae, Chilcorinae and Platynaspinae. The above cited literature reveals that a very little taxonomic works have been done on this aspect in India as well as in Jammu and Kashmir. In the present study a comparative redescription of each species was given along with synonyms, past record, present record, distribution and remarks.

Materials and Methods

Collection of ladybird beetles was carried out from the selected localities during 2016 and 2017 in the active season of Ladybird beetles. The survey was conducted in ten districts of Kashmir region and two districts of Ladakh region, during the period from May to September. Each locality was visited fortnightly. The method of Majerus and Kearns (1989) ^[19] with some modification was followed for dissection and genitalia extraction. With the help of two entomological needles, abdomen was detached from the body and boiled in 10% potassium hydroxide (KOH) solution for half an hour to dissolve extra body tissues and some partially clear dense body formations. The abdomen was then washed in hot water and transferred to pure glacial acetic acid for five minutes. To dehydrate it, abdomen was washed in 80% Ethanol and then in absolute alcohol for 5 minutes, respectively. The processed abdomen will be put in a cavity glass slide containing one or two drops of glycerin. After that abdomen was opened with the help of two entomological needles under binocular fluorescent microscope and the genitalia was extracted. The extracted genitalia was mounted on a Canada balsam after a brief dip in xylene. The permanent slides were kept for identification.

Photography

In order to examine the adult specimens and fine details of genitalia, Binocular Fluorescent Microscope BX 43 and Stereo Zoom microscope SZX7 were used. Adult specimens and their genitalia was photographed with attached digital camera having image capturing and measuring software.

Identification

Identification was conducted on the basis of morphological characteristics and male genitalia. The collected specimens were identified up to species level with the help of available taxonomic keys, by comparison with already identified species in reference collections and with the help of internal or external experts.

Results and Discussion

Chilocorus infernalis, Mulsant 1853.

Chilocorus infernalis Mulsant, 1853: 189

Chilocorus bijugus Mulsant, 1853: 189

Chilocorus bijugus Kapur, 1956:259

Chilocorus infernalis Gordon, 1987 ^[9]: 23.

Diagnostic characters

Body blackish, shiny, convex, oblong, bulged dorsally and narrowed posteriorly. Head is deeply inserted and not visible from above. Pronotum bears square shaped projection on anterior margins. Scutellum is clearly visible. Four yellowish-orange spots or reddish testaceous spots are present in middle portion of elytra. Inner spots are little larger than outer spots. Epipleura of elytra is very broad (figure 1a).

Male genitalia

Phalobase: Trab long in size, thin at base and distally slightly broad. Parameres have uniform thickness from base to apex, tips rounded provided with short dense hairs. Median lobe similar in length with Parameres, gradually tapering towards apex (figure 1b).

Siphon: Siphonal capsule asymmetrical, inner arm thin and long form hook like structure directed towards siphonal tube. Outer arm is short and thick. Siphonal tube is curved, then

straight upto apex, more or less uniform in thickness. Siphonal apex thin slightly curved, covered with transparent membrane (figure 1b).

Remarks

This is one of the important predators of apple scale insects (*Q. Penicicoccus*). There exists controversy about the validity of its name. Some authors like Mulsant (1850) ^[22] declared *C. infernalis* and *C. bijugus* as two distinct species on the basis of minor differences. Crotch (1874) ^[6, 7] declared these two species as same. Kapur (1958) ^[13] supported the Crotch's view and regarded both as synonyms. Miyatake (1970) ^[21] consider *C. bijugus* as its valid name. Khan *et al.* (2007) reported this species as *Chilocorus infernalis* from Kashmir, India. Recently, Gordon (1987) ^[9] and Poorani (2002) ^[26] considered *C. infernalis* as its valid name. Therefore we also name it *C. infernalis*.

Host plant

Apple, pear, willow, walnut, kikar and hedges feeding on scale insects.

Past record

Khan *et al.* (2007) reported this species from Srinagar, Kashmir.

Present record

During the present study it was recorded throughout the Kashmir valley, Minji and Sclinkchey (District kargil).

Seasonal occurrence

This species was found in May-September in Kashmir and July-August in kargil.

Distribution

India, Pakistan, China and Nepal.

Chilocorus rubidus, Hope 1831.

Chilocorus rubidus Hope, 1831: 31-Mulsant, 1850 ^[22]: 453.-Crotch, 1874 ^[6, 7]: 183

Chilocorus tristis: Mulsant, 1850 ^[22]: 452; Crotch, 1874 ^[6, 7]: 183

Chilocorus rubidus ab. *tristis*: Korschefsky, 1932: 241-Kapur, 1956: 262.

Diagnostic characters

Body larger than *Chilocorus infernalis*, completely black, strongly convex and narrowed posteriorly. Head small, not visible from above. Pronotum bears square shaped projections on anterior margins. Scutellum black, triangular. Epipleura is very broad (figure 2a).

Male genitalia

Phalobase: Trab long, uniform in thickness. Parameres possess uniform thickness, tip rounded provided with short hairs. Median lobe shorter than Parameres, gradually narrow, apex pointed (figure 2b).

Siphon: Capsule asymmetrical, outer arm broad, inner arm narrow, hook like directed towards siphonal tube. Siphonal tube is curved at base, then straight upto apex but base is not much circular as in *Chilocorus infernalis*. Siphonal apex thin slightly curved (figure 2b).

Remarks

This species is widely distributed both in Palearctic and

oriental zone. This is an important predator of scale insects. Superficially it resembles with *C. infernalis* but *Chilocorus rubidus* is larger than *Chilocorus infernalis*.

Host plant

Apple, pear, *Euonymus* hedges feeding on scale insects.

Past record

Kapur (1954)^[14], Khan *et al.* (2007) recorded this species from Kashmir.

Present record

During the present study it was recorded from Shalimar, Harvan, Talibal (District Srinagar), Chadoora, Narkara (District Budgam), Shuhama, Shalabugh (District Ganderbal).

Seasonal occurrence

Specimens of this species was found in month of June.

Distribution

India, Pakistan, Nepal, China, Indonesia, Korea, Malaysia, Mongolia, Russia, Japan, Vietnam.

Pricibrumus uropygialis (Mulsant, 1853)

Exochomus uropygialis Mulsant, 1853: 196- Korschefsky, 1932: 261

Brumus uropygialis: Crotch, 1874:^[6, 7] 196

Priscibrumus uropygialis: Kovar, 1997^[18]: 117.

Diagnostic characters

Body is oval in shape. Head dark brown with pubescence visible from above. Elytra is reddish brown with dark-brown triangular spot at anal angles. Pronotum is also dark brown in colour with pubescence (figure 3a).

Male genitalia

Phalobase: Trab medium in size, narrow at base then gradually becomes slightly broad towards distal end. Median lobe shorter than parameres, broad at base, gradually tapering towards apex, tip sharply pointed. Parameres longer than median lobe, broad at base, highly depressed at middle, then widen, round, bulb like distally (figure 3b).

Siphon: Siphonal capsule is asymmetrical, inner arm thin, longer than outer arm, directed towards siphonal tube. Outer arm short and thick. Siphonal tube uniformly thick, circular from base to apex, while apex is slightly turned further (figure 3b).

Remarks

This species was previously known as *Exochomus uropygialis* Mulsant. Kovar (1997)^[18] shifted this species from *Exochomus* to *Priscibrumus*. Kapur (1993) reported it from Himalayan region of India and Nepal. Khan *et al.* (2007) reported it on apple, pear and *Euonymus* hedges in Kashmir India. Khan *et al.* (2007) reported it from chapali site of Pakistan, feeding on *Q. Perniciocus* on apple and pear orchards.

Host plant

Apple, pear, *Euonymus* hedges, willow tree, feeding on scale insects.

Past record

Khan *et al.* (2007) reported this species from Kashmir.

Present record

During the present study it was recorded from Shalimar, Nishat, Talibal (District Srinagar), Gadoora, Shalabugh, Fatehpoura (District Ganderbal).

Seasonal occurrence

Specimens of this species were collected from May to August.

Distribution

India, Pakistan, Nepal, Bhutan.

Platynaspidius saundersi Crotch, 1874^[6, 7].

Platynaspis saundersi Crotch, 1874^[6, 7]: 197

Platynaspidius saundersi: Miyatake, 1961^[20]: 127-133.

Platynaspidius saundersi: Miyatake, 1985: 11.

Diagnostic characters

Body small sized, oval shaped, brownish yellow in colour with small thin silky hairs. Head is black and not visible from above. Pronotum and Scutellum is completely black. Yellowish margins are present on lateral sides of Pronotum. Thin short hairs are present on the whole body except mid elytral portion, that possess no hairs. 10 irregular black elytral spots are present. Four spots on each elytra, one large spot on anterior portion of mid-dorsal line, while another spot on posterior side of same (figure 4a).

Male genitalia

Phalobase: Trab long proximally thin, distally expanded and curved at apex end. Median lobe thick, longer than parameres, broad at middle portion, then narrowed, pointed at apex. Parameres thin, slightly curved, tip provided with apical thorns (figure 4b).

Siphon: siphonal capsule asymmetrical, highly thickened, no clear distinction for outer and inner arm. Siphonal tube thick and semicircular at base, then gradually becomes straight, narrow upto apex, apex slightly constricted (figure 4b).

Remarks

Initially this species was reported as *platynaspis saundersi* from India and Afghanistan. Miyatake (1961)^[20] shifted this species to *Platynaspidius saundersi*. It has been reported as an accidental predator of certain aphids (Agarwala and Ghosh, 1988)^[1].

Host plant

Apple, pear and wild apple.

Past record

Khan *et al.* (2007) reported this species from Kashmir.

Present record

During the present research work the specimens were collected from chadoora, Narkara (District Budgam), Naranag, kanga, Akhal (District Ganderbal).

Seasonal occurrence

Specimens were collected from May to September.

Distribution

India, Pakistan, Afghanistan, Nepal.

Key to the species of sub-family Chilocorinae from Jammu and Kashmir

1. Body completely black-----2

--- Body not completely black with four yellowish-orange spots or reddish testaceous spots present on middle portion of elytra. Basal piece oblong. Trab distally slightly broad. Parameres oblong, oval shaped, median lobe similar in length with parameres, gradually slightly tapering towards apex, base of siphonal tube highly circular-----

-----*Chilocorus infernalis*.

2. Elytra completely black. Basal piece not oblong. Trab uniform in thickness. Median lobe shorter than parameres, base of siphonal tube is not much circular as in *Chilocorus infernalis*-----*Chilocorus rubidus*.

---Elytra not completely black-----3

3. Elytra reddish brown with triangular black spot at anal portion. Male genitalia with parameres longer than median lobe, broad at base, highly depressed at middle, and then widen, round and bulb like distally. Siphonal capsule is asymmetrical, inner arm thin form hook like structure; siphonal tube is highly circular-----

-----*Pricibrumus*

uropygialis.

--- Elytra with variable number of black spots on elytra. Siphonal capsule triangular, highly thickened, no clear distinction for outer and inner arm. Parameres thin, slightly curved, tip provided with apical thorns-----

-----*Platynaspidius saundersi*.

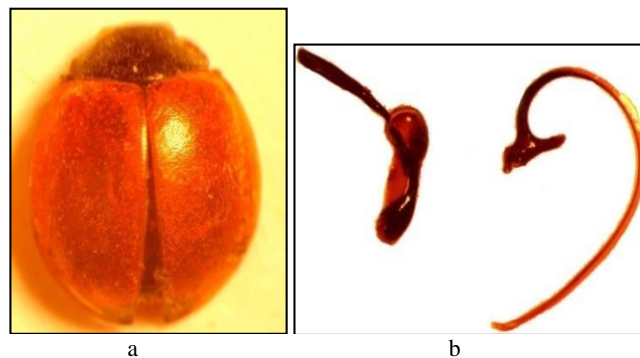


Fig 3: *Pricibrumus uropygialis* a: Adult; b: male genitalia (Phalobase, siphon)

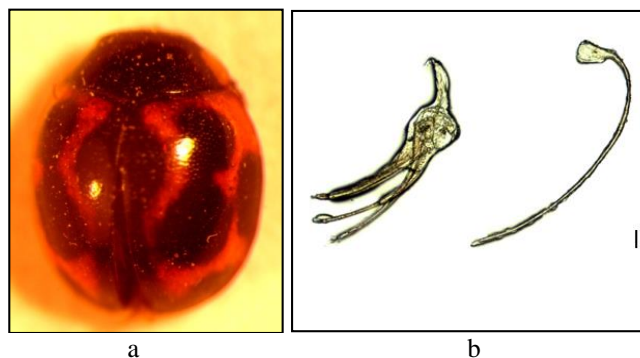


Fig 4: *Platynaspidius saundersi* a: Adult; b: male genitalia (Phalobase, siphon)

Acknowledgement

The author is highly thankful to his supervisor, SKUAST-K, Shalimar, for providing the necessary laboratory facilities and also to Department of Science and Technology for providing me the financial assistance to conduct this research work.

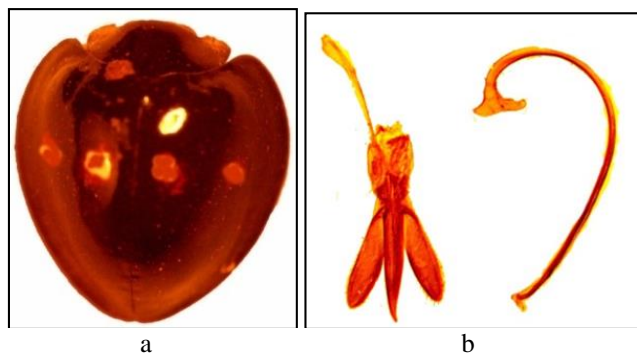


Fig 1: *Chilocorus infernalis* a: Adult; b: male genitalia (Phalobase, siphon)

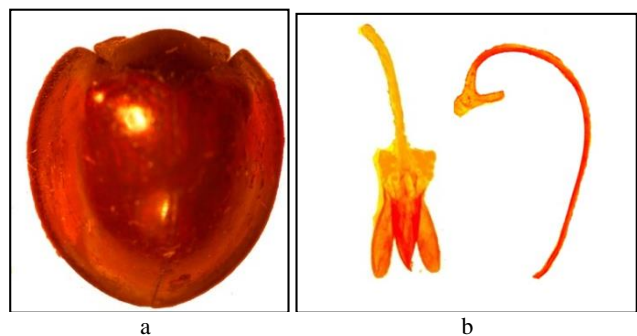


Fig 2: *Chilocorus rubidus* a: Adult; b: male genitalia (Phalobase, siphon)

References

1. Agarwala BK, Ghosh AK. Prey records of aphidophagous Coccinellidae in India; A review and bibliography. *Tropical Pest Management*. 1988; 34:1-14.
2. Andres A. Sur une listed Coleopteres captures en 1867 a 1869 par le D. O. Schneider a Ramleh Pres d' Alexandrie. *Bull. Soc. Ent. Egypte*. 1913b; 3:39-48.
3. Azim MN, Bhat AM. Notes on some coccinellid beetles (Coleoptera: Coccinellidae) of Kashmir. *Oriental Insects*. 2005; 10:89-100.
4. Bedel L. Supplement aux Coccinellidae de Weise. *Abeille*. 1892; 28:85-95.
5. Bhagat KC, Masoodi MA, Koul VK. Some observations on the incidence of arthropod natural enemies of Aphis pomi DeGeer (Homoptera: Aphididae) occurring in apple orchard ecosystems. *Journal of Aphidology*. 1988; 2:80-89.
6. Crotch GR. Description of new species of Coleoptera from Pacific Coast of the United States. *Transactions of the American Entomological Society*. 1874; 5:73-80.
7. Crotch GR. A revision of the Coleopterous family Coccinellidae. E. W. Janson and Rippon, London, 1874, 311.
8. Fursch H. Valid genera and subgenera of Coccinellida. *Coccinella*. 1990; 2(1):7-18.
9. Gordon RD. Catalogue of Crotch collection of Coccinellidae (Coleoptera). Intercept Ltd. 1987, 46.
10. Harit ND. Exploration of Coccinellid (Coleoptera: Coccinellidae) fauna of different Ecosystems in Champhai District of Mizoram state, North East India. *Research Journal of Agriculture and Forestry Sciences*. 2015; 3(5):21-24.
11. Hayat A, Rafique KM, Falak Naz F, Rafi MA. Ladybird beetles of sub-family chilocorinae (coccinellidae):

- coleoptera) of azad jammu and Kashmir. Pak. Entomol. 2017; 36(2):135-143.
12. Joshi CP, Sharma KP. First Records of Coccinellid Beetles (Coccinellidae) from the Haridwar, (Uttarakhand), India. The Natural History Journal of Chulalongkorn University. 2008; 8(2):157-167.
 13. Kapur AP. Coccinellidae of Nepal. Records of Indian Museum. 1958; 53:309-338.
 14. Kapur AP. Systematic and biological notes on the lady bird beetles predacious on the san jose scale in Kashmir with description of a new species (Coleoptera : Coccinellidae). Rec. Indian Mus. 1954; 52:257-274.
 15. Khan AA, Mir RA, Zaki FA. Relative abundance of predacious ladybird beetle (Coleoptera: Coccinellidae) in Kashmir. Journal of Aphidology. 2007; 21:23-30.
 16. Kirsch TFV. Neue Käfer- Artenaus Egipten, gesammelt von Dr. Schneider. Berliner Entomologische Zeitschrift. 1871; 14(1870-1871):389-396.
 17. Kovar I. Phylogeny in Hodek, I. & Honěk, A. (Ed.) *Ecology of Coccinellidae*. Dordrecht, The Netherlands, Kluwer Academic Publishers, 1996, 19-31
 18. Kovar I. Revision of the genera *Brumus* Muls. And *Exochomus* Redtb. (Coleoptera: Coccinellidae) of the Palaearctic region. Part I. Acta Entomol. Mus. Nat. Praga, 1995, 1997, 445-124.
 19. Majerus M, Kearns P. Lady Birds Naturalists Hand Books. University of Cambridge. Richmond Publishing Co. Ltd. P.O. Box 963, Slough, SL2 3RS, England. 1989, 101.
 20. Miyatake M. The East-Asian Coccinellid-beetles preserved in the California cademy of Science, tribe Hyperaspini. Memoir of the Ehime University. 1961a; 6(6):147-155.
 21. Miyatake M. The East- Asian Coccinellid-beetles preserved in the California Academy of Sciences, tribe Chilacorini. Memoirs of Ehime University. 1970; 14(3):303-340.
 22. Mulsant ME. Species de Coleopteres trimeres securipalpes. Annales des Sciences Physiques et Naturelles d'Agriculture et d'Industrie Lyon, 1850; 2:1-1104.
 23. Murali S, Jalali SK, Shylesha AN, Shivalinga STM, Gandhi GR. Relative abundance and species composition of predatory coccinellids fauna in different seasons of Brinjal crop. Journal of Entomology and Zoology Studies. 2017; 5(5):682-686.
 24. Pawar AD, Parry M. Record of natural enemies of important fruit pests in Ladakh (J & K). Indian Journal of Plant Protection. 1989; 17:291-292.
 25. Poorani J. An Annotated Checklist of the Coccinellidae (Coleoptera) of the Indian Subregion. 2003, 90. (www.nbaii.res.in/poorani.html.)
 26. Poorani J. Review of the genus *Oenopia* Mulsant (Coleoptera: Coccinellidae) of the Indian sub-continent, with description of a new species. Oriental-Insects. 2002; 36:97-116.
 27. Shah MA, Khan AA. Assessment of coccinellid biodiversity under pesticide pressure in horticulture ecosystem. Indian Journal of Entomology. 2014; 76(2):107-116.
 28. Singh S, Sharma DR. Coccinellid predators beetles of insect pests of citrus in the Indian Punjab. Crop Improvement. 2010; 37(2):207.
 29. Slipinski A. Australian Ladybird beetles (Coleoptera: Coccinellidae), their biology and Classification. Australian Biological Resources Study.coll.illus. 2007, 288.
 30. Stephens JF. Illustrations of British entomology. Mandibulata, London. 1832; 4:367-413.
 31. Verma RR, Joshi R. Studies on the natural enemies of insect pests of temperate region. Progressive Horticulture. 1988; 20:335-336.