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Isolation, identification and occurrence of major syrphid fly species of various agricultural, horticultural, medicinal and oil seed crops in Western Uttar Pradesh

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Abstract

The present investigation were undertaken with object of isolation, identification and occurrence of major syrphid fly species of various agricultural, horticultural, medicinal and oil seed crops in Western Uttar Pradesh was carried out during June, 2011 to May, 2012 at CRC and Bio-control laboratory, S.V.P. University of Agriculture and Technology, Meerut. Eighteen of predatory Syrphid flies were recorded during survey period, out of them 12 species with three families were identified i.e. *Episyrphus balteatus* (De Geer), *Ischiodon scutellaris* (Linnaeus), *Eristalis taphicus* (Wiedemann), *Paragus* spp., *Eristalis taeniops*, *Melanostoma* spp., Anthomyiidae, Muscidae, *Eupeodes confrater* (Wiedemann), *Eristalis tenax* (Linnaeus), *Syrphus* spp., *Eristalis obscurirarsis* de Meijere, *Eristalis* spp., Bombyliidae, *Allobaccha* spp. on the other hand three species were unidentified. *Eristalis balteatus* ranked first (22.73%) in position by registering maximum 4147 number of syrphid fly in a year and it was recorded as dominant species. It was followed by *Ischiodon scutellaris* (7.78%) and *Eristalis taphicus* (7.72%). While, least population *Syrphus* spp. (2.12%), followed by *Eristalis tenax* (3.06%) and *Eupeodes confrater* (3.58%) were noticed in Meerut region.

Keywords: Isolation, syrphid fly, species, identification, occurrence

Introduction

Every crop is teeming with insect life, both beneficial and harmful. In a balanced environment, insect populations are held in check by limited available food and water sources and by predators. Syrphid flies are considered beneficial insects for two reasons; adult flies are important pollinators, while larvae heavily feeders on aphids and other small insects. Adult Syrphid lay eggs in or near aphid population, and larvae appear within three days and feed on aphid. They enter the pupa stage for 1 to 2 weeks before emerging as adult, when they feed on nectar and honey dew.

They have the ability to keep the body motionless in the air for quite a period of time during flight (Hovering). This is the most significant character of the Syrphid flies, coupled usually with their yellow banded abdomens. Hover flies can be found in every biotope but not in deserts (Ghahari *et al.* 2008) [5]. Hoverflies adults display a wide range of life style and adaptations (Gilbert *et al.* 1994) [7]. Aphids alone cause tens of millions of dollars of damage to crops worldwide every year, because of this, aphidophagous hover flies are being recognized as important natural enemies of pests and potential agents for use in biological control (Chamber 1968) [3].

In India predatory Syrphidae is represented by 312 species (Ghorpade 1981) [6]. Kumar and Kapoor (1992) [9] collected and identified 29 species giving descriptions of the four new ones of the tribe Syrphini from the East Punjab in India. Radhakrishnan and Muraleedharan (1993) [15] reported six species of syrphid from Southern India. Nayar and Nayar (1995) [11] recorded 16 species of syrphids from Agra. Whereas, Anand *et al.* (1997) [1] reported only 9 species of Syrphid from Delhi. The agro-climatic zone of Meerut is different from the other areas of the country and there is no report on such study in this area. Thus, the proposed work to identify local species can prove an efficient tool for the biological control against aphid and other small insects.

Materials and Methods

A. Sampling Method: Sampling of adult Syrphid flies were carried out continuously during the study period. The insects were collected by a "Sweep net sampling Method", as per Gadagkar *et al.* (1990)^[4]. Other methods, based upon visual encounters, like hand picking were also used, depending on the type of habitat sampled.

B. Collection and identification of specimens: Maximum available specimens of adult Syrphid flies were collected with the form different crops Mustard, Wheat, Brinjal, Pea, Tomato, Mango Rose, Marigold, Candytuft and Paper flower *etc.* The collected specimens were placed in ordinary paper envelope after killing them in a killing bottle in order to bring them to the laboratory. The collection thus brought was placed in a desiccator (having water at the bottle) for about 24 hours in order to soak and softer them. Therefore, they were pinned, properly labeled and preserved in collection boxes to facilitate their morphological studies. For identification, the specimens mounted were sent to the National Bureau of Agriculturally Important Insects (Formerly PDBC) HA Farm Post, Bellary Road, Hebbal Bangalore (Karnataka), for identification of different species.

Results and Discussion

The result on "Isolation of major syrphid fly species of various agricultural, horticultural, medicinal and oil seed crops in Western Uttar Pradesh" are presented and discussed as follows:

Collection and Identification of different predatory syrphid fly

About 18248 individual Syrphid flies, belonging to 12 species from 9 genera and 3 families were recorded during the study period from different crops ecosystem (Table: 1). Fifteen species *i.e.* *Episyrphus balteatus* (De Geer) Fig. 4; *Ischiodon scutellaris* (Linnaeus) Fig. 2, 10; *Ischiodon scutellaris* (Fabricius) Fig. 21, 24; *Eristalis taphicus* (Wiedemann) Fig. 6; *Paragus sp.* Fig. 5, 12; *Eristalinus taeniops*, Fig. 3, 7, 11; *Melanostoma sp.* Fig. 8; Anthomyidae Fig. 25; Muscidae Fig. 27 *Eupeodes confrater* (Wiedemann) Fig.1; *Eristalis tenax* (Linnaeus) Fig. 13, 22; *Syrphus sp.* Fig. 9; *Eristalis obscurirarsis de Meijere* Fig. 17, 18; *Allobaccha sp.* Fig. 16; *Eristalis sp.* Fig. 19; Bombylidae Fig. 26; and three unidentified species of Syrphid flies (Fig. 14,20 and 23) were recorded from agriculture, orchard and garden ecosystem during the study period.

Episyrphus balteatus (De Geer)

Episyrphus balteatus (De Geer) also known as marmalade hoverfly were found hovering around flowers of different host plants *i.e.* Mustard, Bean, Chrysanthemum, Brinjal, and Marigold *etc.* (Table: 1). 4147 number of *E. balteatus* were recorded during the study period *i.e.* from June, 2011 to May, 2012 (peak in the months of March and February) and was observed to be the most dominant and common syrphid fly species in the Western plain zone of Uttar Pradesh. It is reddish orange in color measuring about 9.0-12 mm in length, 1.7-2.0 mm in wide with a wing length of 6-10 mm. It can be recognized by the peculiar double banded pattern of the terga. *E. balteatus* has bare eyes, short antennae, sub-oval abdomen pattern with orange and black bands. Two further identification characteristics are the presence of secondary black bands on 3rd and 4th dorsal plates and of faint grayish stripes on the thorax. The maximum population of this species

was found in March (1246 syrphids), followed by February (1054 syrphids), April (841 syrphids) (Table: 1); (Fig.4). *E. balteatus* was also reported by many authors from all over India and abroad. Lingappa *et al.* (2004)^[10] reported *E. balteatus* from Himachal, Punjab, Jachh, Southren India, Maharashtra and Karnataka, respectively. Presence of *E. balteatus* was also recorded by Yang *et al.* (2002)^[21] from Shanxi China and by Ghahari *et al.* (2008)^[5] from rice field and around grass land of Iran.

Ischiodon scutellaris (linnaeus)

Ischiodon scutellaris were found hovering around flowers of different host plants *i.e.* Cowpea, Marigold, Mustard, Paper flower, Mango and Tomato *etc.* (Table: 1). 1420 number of *Ischiodon scutellaris* was recorded during the study period *i.e.* from June, 2011 to May, 2012 (peak in the months of March, April and February). The observed data (Table: 1) showed that this syrphid species was the next dominant species (1420 syrphids/year) to *E. balteatus* in Meerut region throughout the year. The maximum population of this species was found in March (310 syrphids), April (275 syrphids) and followed by February (217 syrphids).

The adult measured about 10.0 mm in length and 2.3 mm in wide. They had a medium to slender body, yellow face with facial tubercle, shiny black scutum with lateral broad yellow vitta, hyaline wing membrane, black and yellow striped flat and slightly convex abdomen (Fig.2; 10; 24).

This species was also reported by Lingappa *et al.* (2004)^[10] and Puttannavar (2004)^[14] from Karnataka. Ghahari *et al.* (2008)^[5] observed the presence of this species in rice fields of Iran.

Eristalis taphicus (wiedemann)

Eristalis taphicus were found hovering around flowers of different host plants *i.e.* Mustard, Rose, Brinjal mango, paper flower, Marigold, Candytuft, Coriander and Tomato *etc.* (Table: 1). 1408 number of *E. taphicus* were recorded during the study period *i.e.* from June, 2011 to May, 2012 (peak in the months of April, March and February). The given data indicates that the population of this syrphid was maximum in the month of April (452 syrphids), while in other months population was less (March, 338 syrphids).

The adult are measuring about 10.0 mm in length and 3.7 mm in wide. The colour of the adult shows the black colour, the head of the adult are shows brown in colour and wing of the adult are transparent and the posterior portion of the abdomen possess the minute hair. This syrphid species was only reported by Singh *et al.* (1990)^[17] from Chandigarh region.

Paragus spp.

Paragus sp. were found hovering around flowers of different host plants *i.e.* cowpea, Marigold, Candytuft and Tomato *etc.* (Table: 1).1246 number of *Paragus sp.* were recorded during the study period *i.e.* from June 2011 to May 2012 (peak in the months of March and April). The maximum population (Table: 1) of this species was found in March (334 syrphids), followed by in April (308 syrphids) February (198 syrphids).

The adult is small, measuring about 3.0–5.5 mm in length and 1.5–2.0 mm in wide. The face is lightly yellow with facial tubercle on the side with a broad medium black band from antennae to oral margin. Wings are sigma pale, creamy-yellow in color with dark veins (Fig: 5).

This finding is in accordance with the studies of Joshi *et al.* (1997)^[8], who isolated syrphid *sp.* from different parts of India.

***Eristalinus taeniops* (Wiedemann)**

Eristalinus taeniops were found hovering around flowers of different host plants *i.e.* cowpea, Marigold, Candytuft and Tomato *etc.* (Table: 2). 1232 number of *Eristalinus taeniops* were recorded during the study period *i.e.* from June 2011 to May 2012 (peak in the months of April, February and March). The maximum population (Table: 2) of this species was found in April (324 syrphids), February (316 syrphids) and March (307 syrphids).

The adults were greenish brown head with circular markings on it, scutum black with faint white to prominent white longitudinal bands and blackish brown in color. Margin of the abdomen is hairy. Adults measure 13.0 mm in length and 6.0 mm in wide (Fig. 3, 7, 11).

This species was reported from Iran by Ghahari *et al.* (2008) [5], whereas *Eristalinus* species was reported by several workers *viz.* Saleem *et al.* (2001) [16] from Peshawar and Thompson (2002) [20] from tropical and Oriental regions. However, this is supposed to be a new record from India.

***Melanostoma* spp.**

Melanostoma sp. was found hovering around flowers of different host plants *i.e.* Mustard, mango, paper flower, Marigold, Candytuft and Tomato *etc.* (Table 2). 1012 number of *Melanostoma sp.* were recorded during the study period *i.e.* from June 2011 to May 2012 (peak in the months of March > February > January). The data indicates that the population of this syrphid was maximum in the month of April (235 syrphids), while in other months population was less (January, 22 syrphids). The presence of this adult was noticed from January to May only.

Adults of *Melanostoma sp.* are about 9 to 11 mm in length and wide 1.8 mm, dark color with silver or tan marking on the abdomen. The face is silver to dark gray to black the abdomen is elongated, black in color, almost curved with extensively yellow bands. Its distinctly longer head and narrow thorax is combine, shiny black in color (Fig. 8).

Presence of this species was also obtained by Singh *et al.* (1990) [17] and Ghahari *et al.* (2008) [5] in India and Iran respectively.

Anthomyidae

Syrphid flies of Anthomyidae family were found hovering around flowers of different host plants *i.e.* Cowpea, Marigold, Mustard, Paper flower, Brinjal, Pea, and Tomato *etc.* (Table 2). 723 numbers of syrphids were recorded during the study period *i.e.* from June 2011 to May 2012 (peak in the months of March and February). The maximum population of this species was found in March (323 syrphids), and in February (259 syrphids). This species was light black in color, measuring 2.2 mm. in length and 1.1 in wide. It had a black face, dark transparent wings.

Muscidae

Syrphid flies of muscidae family were found hovering around flowers of different host plants *i.e.* Cowpea, Marigold, Candytuft, Brinjal, Paper flower and Tomato *etc.* (Table: 1) .721 number of Muscidae were recorded during the study period *i.e.* from June 2011 to May 2012. The maximum population (Table: 1) of this species was found in February (158 syrphids), followed by in January (156 syrphids), March (125 syrphids).

The adult measuring 6x3.3 mm is slender to robust, usually strongly setulose flies, usually dull in colour, black, gray, yellowish, sometimes bright metallic blue or green, rarely

with brightly coloured hairs and resembling bumble bees, wings usually unmarked (Fig.27). This syrphid species was only reported by Singh and Singh (2003) [18] from Nainital region.

***Eupeodes confrater* (Wiedemann)**

Eupeodes confrater were found hovering around flowers of different host plants *i.e.* Cowpea, Marigold, Mustard and Tomato *etc.* (Table: 1). 653 number of *Eupeodes confrater* were recorded during the study period *i.e.* from June 2011 to May 2012 (peak in the months of February and January). The maximum population (Table: 1) of this species was found in February (195 syrphids), followed by in January (130 syrphids).

The adult are measuring about 9.0–12.0 mm in length and 4.0–5.0 mm in wide. The face is whitish yellow with black cheeks and a dark medial stripe, and male have a narrow cylinder at the tip of the abdomen. *Eupeodes confrater* is black to metallic green, and has 3 yellow bands on the abdomen (Fig. 1).

This is also found to be a common syrphid species reported by many workers like Patil (2003) [12] and Puttanavar (2004) [14] from different parts of India. Whereas, Smith and Chaney (2007) [19] and Ghahari *et al.* (2008) [5] reported this syrphid fly from different parts of world.

***Eristalis tenax* (Drone fly)**

Eristalis tenax were found hovering around flowers of different host plants *i.e.* Mustard, mango, paper flower, Marigold, Candytuft and Tomato *etc.* (Table: 1). 359 number of *E. tenax* were recorded during the study period *i.e.* from June 2011 to May 2012. The adult was first time noticed in the month of January (Table: 1). Data indicates that the population of this syrphid was maximum in the month of April (235 syrphids), while in other months population was less (January, 22 syrphids). The presence of this adult was noticed from January to May only.

Eristalis tenax commonly known as the drone fly (adult) or rat-tailed larvae (immature stage), can be easily differentiated from honey bees because they lack a constricted waist between the thorax and the abdomen, and they only have two wings. Body length is 13-16 mm and 4-4.5 wide. A part from the head it really does look like a honey bee (Fig. 13, 22).

This species was also reported from Peshawar by Saleem *et al.* (2001) [16] and from Iran by Ghahari *et al.* (2008) [5].

***Syrphus* spp.**

Syrphus sp. was found hovering around flowers of different host plants *i.e.* Cowpea, Mustard, Rose, Marigold and Tomato. A total number of 387syrphids were recorded from different host plants during the study period (Table: 1). Maximum population of this species was found in February (171 syrphids), followed by March (91 syrphids) and in January (84 syrphids).

Adult's measures 10.0 to 13.5 mm in length and 3.5 to 4.5 mm in wide. The adults are medium to large, moderately slender to robust species with very clear wings, oblique and often undulate abdominal maculae and usually with strongly swollen frons in male. The abdomen is dark with six white curved stripes. The dorsum is bounded laterally by two narrow irregular white lines that follow the ridge of the dorso-lateral segmental bristles. (Fig. 9)

This syrphid species was reported by *et al.* (2001) [2], Prabhakar and Roy (2010) [13] from different parts of India.

Eristalis obscurirarsis

Eristalis obscurirarsis were found hovering around flowers of different host plants *i.e.* Paper flower, Marigold, Brinjal, Candytuft, Parthenium and Tomato *etc.* (Table: 1). 209 number of *Eristalis obscurirarsis* was recorded during the study period *i.e.* from June 2011 to May 2012 (peak in the months of April and March).

Adults measure 11.0 to 12.5 mm in length and 3.0 to 4.0 mm in wide. The wings are transparent and head shows the brown color. The abdomen of the adults is showed white bands and the posterior portion of the abdomen posse’s minute hair. This species was only reported by Singh *et al.* (1990) [17] from Chandigarh. No other work was recorded so far.

Eristalis spp.

Eristalis sp. were found hovering around flowers of different host plants *i.e.* Paper flower, Marigold, Brinjal, Candytuft and Tomato *etc.* (Table: 1).138 number of *Eristalis sp.* were recorded during the study period *i.e.* from June 2011 to May 2012 (peak in the months of April and March). The maximum population of this species was found in April (101 syrphids) followed by March (37 syrphids), Adult measuring 9.0 mm in length and 3.0 mm in wide.

Eristalis sp. have orange front and mid tarsi, they might be as often there is some blackish colour on them but yours looks to have more than a little black. Without seeing the hind leg properly, and as mid leg colour, facial features *e.g.* dark stripe down the middle of the face, colour of antennae (Fig. 19) Studies of Saleem *et al.* (2001) [16] and Gharhari *et al.* (2008) [5] showed the produce of *Eristalis* species in Peshwer and Iran respectively.

Bombyliidae (Family)

Bombyliidae were found hovering around flowers of different host plants *i.e.* Chickpea, Paper flower and Marigold. (Table: 1).74 number of Bombyliidae were recorded during the study period *i.e.* from June 2011 to May 2012. (Table: 1) This species was found in April hovering on different host plant. Adult generally feeds on nectar and pollen, Adult measures about 5.0 mm long and 2.0 mm wide (Table: 1) (Fig 26).

Allobaccha spp.

Allobaccha sp. were found hovering around flowers of host plants *i.e.* Pea, and Tomato *etc.* (Table: 1). Only 2 number of *Allobaccha sp.* could be procured. The population during the study period (June 2011 to May 2012) in the month of february 2012. It had a narrow yellow colored face with small facial tubercle and broad black vitta from antenna base to below tubercle but not reaching oral margin, hyaline wing membrane, entirely yellow legs excepted dark coxae and flat elongate strongly petiolate abdomen. The adult measured 10.0 mm in length and 2.0 mm in wide. This scarce species was only reported Radhakrishnan and Muralledharan (1993) [15] from south India. No other work was recorded so far.

Unidentified predatory Syrphid flies

Out of collected samples of predatory Syrphid flies, three were unidentified. (Fig. 14, 20 and 23) and (Table: 1).

Unidentified species (Fig. 14)

Syrphid fly was light black in color, measuring 6.5 mm in length and 1.7 mm in wide, having a yellow face with dark stripes, clear transparent wings, anteriorly thin abdomen broaden abruptly (3.5 times) posteriorly. Only two numbers of this species were found on Brinjal and Candytuft in the month of February 2012. (Table: 1). Adult was noticed pollinating on different host plants.

Unidentified species (Fig. 20)

This species was black in color, having light yellow face with light stripes and dark black thorax. Wings were transparent and clear. The adults were 5 mm long and 2 mm wide. Syrphid fly of this species was found in the month of May 2012 on tomato plants. (Table: 1).

Unidentified species (Fig. 23)

This species was also brownish black in color. The abdomen was cylindrical and black. The adult measured 4.5-5.0 mm long and 1.5 mm wide. Only one of this species was found in the month of April 2012 on Brinjal (Table: 1).



Fig 1: *Eupeodes confractor*



Fig. 2: *Ischiodon scutellaris*



Fig 3: *Eristalinus sp.*



Fig. 4: *Episyrphus balteatus*



Fig 5: *Paragus sp.*



Fig 6: *Eristalis taphicus*



Fig 7: *Eristalinus sp.*



Fig 8: *Melanostoma sp*



Fig 9: *Syrphus* sp.



Fig 10: *Ischiodon scutellaris*



Fig 11: *Eristalis taeniops*



Fig 12: *Paragus* sp.



Fig 13: *Eristalis tenax*



Fig 14: *Unidentified*



Fig 15: *Eristalinus* sp.



Fig 16: *Allobaccha* sp.



Fig 17: *Eristalis obscurirarsis*



Fig 18: *Eristalis obscurirarsis*



Fig 19: *Eristalis* sp.



Fig 20: *Unidentified*



Fig 21: *Ischiodon scutellaris* F.



Fig 22: *Eristalis tenax*



Fig 23: *Unidentified*



Fig 24: *Ischiodon scutellaris* F.



Fig 25: *Anthomyidae*



Fig 26: *Bombyliidae*



Fig 27: *Muscidae*

Table 1: Different species of predatory Syrphid flies recorded on various field crops, ornamental and fruit crops during 2011-2012.

Sample No./Predatory Syrphid flies	Host plant	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	Total
1. <i>E. balteatus</i> (De Geer)	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,24	00	00	00	15	45	126	301	421	1054	1246	841	98	4147
2. <i>I. scutellaris</i> (Linnaeus)	1,2,3,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21,22,23,24	24	35	42	34	58	65	85	165	217	310	275	110	1420
3. <i>Eristalis taphicus</i> (Wiedemann)	1,3,4,5,7,8,9,11,16,17,19,20,22,23	25	00	00	00	00	00	72	114	285	358	452	102	1408
4. <i>Paragus sp.</i>	1,2,3,4,5,6,7,9,11,14,17,18,11,14,17,18	00	02	18	49	85	45	55	115	198	334	308	37	1246
5. <i>Eristalis taeniops</i>	3,4,5,7,8,9,10,11,15,16,18,19,20		00	00	00	12	24	51	158	316	307	324	40	1232
6. <i>Ischiodon scutellaris</i> (Linnaeus)	1,2,3,4,5,7,8,9,10,11,15,17,18,20,2,22,24	00	00	00	15	25	41	65	215	333	362	175	00	1231
7. <i>Eristalinus sp.</i>	3,4,5,6,7,8,9,10,11,15,16	00	00	00	00	14	41	88	104	215	265	304	00	1031
8. <i>Melanostoma sp.</i>	1,2,3,4,5,7,8,9,10,11,15,23	00	00	00	00	08	15	24	131	345	402	52	35	1012
9. <i>Eristalinus sp.</i>	3,4,5,7,8,9,10,11,15,16,,20,21,14,18	00	00	00	00	00	05	12	151	236	133	185	21	743
10. Anthomyidae	3,4,5,7,8,9,10,11,15,17,24	00	00	00	00	08	12	15	81	259	323	25	00	723
11. Muscidae	1,3,4,5,6,7,8,9,10,11,14,20	00	00	15	21	35	52	45	156	158	125	72	42	721
12. <i>Eupeodes confrater</i> (Wiedemann)	1,2,3,4,5,7,8,9,10,17,	00	00	00	8	110	75	90	130	195	45	00	00	653
13. <i>Eristalis tenax</i> (Linnaeus)	1,3,4,5,7,10,11,15,16	00	00	00	00	00	00	00	01	71	191	225	14	502
14. <i>Syrphus sp.</i>	1,3,5,7,9,11	00	00	00	00	00	00	7	34	84	91	00	00	387
15. <i>Eristalis tenax</i> (Linnaeus)	1,3,5,7,9,11,15,16,17,18,22	00	00	00	00	00	00	00	22	68	201	235	33	359
16. <i>Eristalis obscurirarsis de Meijere</i>	1,7,11,15,16,19,20,	00	00	00	00	00	00	00	00	00	68	98	43	209
17. <i>Eristalinus sp.</i>	4,5,7,8,9,10,11,15,16	00	00	00	00	00	00	00	21	94	52	32	00	199
18. <i>Eristalis obscurirarsis de Meijere</i>	1,4,7,8,9,11,15	00	00	00	00	00	01	01	00	19	61	75	00	157
19. <i>Eristalis obscurirarsis de Meijere</i>	1,3,4,7,9,10,11,15,	00	00	00	00	00	00	00	00	15	41	65	24	145
20. <i>Eristalis sp.</i>	7,11,15,16	00	00	00	00	00	00	00	00	00	37	101	00	138
21. <i>Ischiodon scutellaris</i> (Fabricius)	3,5,7,8,9,10,11,15,20,21,24	00	00	00	00	00	00	00	00	20	38	54	13	125
22. Bombylidae	7,14,15,17,18,24	00	00	00	00	00	00	00	00	00	00	120	00	120
23. <i>Paragus sp.</i>	7,9	00	00	00	00	00	00	00	02	31	60	05	1	99
24. <i>Ischiodon scutellaris</i> (Fabricius)	7,9,15,20	00	00	00	00	00	00	00	00	00	00	74	00	74
25. <i>Allobaccha sp.</i>	10,11	00	00	00	00	00	00	00	00	02	00	00	00	2
26. Unidentified	7,9	00	00	00	00	00	00	00	00	02	00	00	00	2
27. Unidentified	11	00	00	00	00	00	00	00	00	00	00	1.0	00	1
28. Unidentified	7	00	00	00	00	00	00	00	00	00	00	00	01	1
Total		49	37	75	142	400	509	938	2071	4304	5075	4033	629	18248

*N= Number of observation (48)

Host plants: Cowpea=1, Wheat=2, Mustard=3, Chrysanthemum=4, Rose=5, Barseem=6, Marigold=7, Brinjal=8, Candytuft=9,Pea=10, Tomato=11, Radish=12, Oat=13, Chickpea=14, Paperflower=15, Denthus=16, Saem=17, Mango=18, Oak=19 *Parthenium*=20, *Chenopodium*=21, Coriander=22, Amaltas=23 and other weeds=24

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