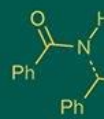


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; 8(12): 774-777
www.biochemjournal.com
Received: 09-09-2024
Accepted: 13-10-2024

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Identification and collection of different syrphidflies from the Pir Panjal biodiversity Park Baba Ghulam Shah Badshah University (BGSBU), Rajouri, Jammu

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DOI: <https://doi.org/10.33545/26174693.2024.v8.i12j.3284>

Abstract

The survey revealed 11 species of syrphidflies across 9 genera. These species include *Episyrphus balteatus*, *Eristalis cerealis*, *Batasyrphus sereius*, *Syrpitta pipiens*, *Eristalis taeniops*, *Eristalis arbustorum*, *Eupeodes lungri*, *Sirphus ribsil*, *Eristalis tenax*, *Helophilus pendulus*, and *Simosyrphus scutellaris*. Most of the species were foraging on flowers of different plant species. During the present studies the maximum number of individuals of syrphidflies were found to be that of *Episyrphus balteatus* (580 individuals) followed by *Eristalis tenax* (410 individuals) and *Eristalis arbustorum* (300 individuals). It was observed that *Episyrphus balteatus* was the most abundant species and has the highest individual species observed during the study, and also *Simosyrphus scutellaris* had the least number of species observe respectively from the survey. The study showed a rich Syrphidfly diversity mainly attributed to the micro-habitats available within the eco-forest.

Keywords: Syrphid flies, identification, collection, survey

Introduction

Biodiversity can be defined as the range and variability of living organisms and the habitats in which they are found. In other words, biodiversity can be defined as the sum of all different types of genetic material, species and ecosystems in a particular area. Therefore, biological diversity includes all types of flora, fauna, micro-organisms and the ecological systems they form. The hover flies (Diptera) is huge collection of insects with about 1.6 million species, and thus forming the major collections of organisms on Earth (Hammond, 1992) ^[4]. There are ever lasting interactions between plants and pollinators, and both developed together over millions of years. The Syrphid family is one of the most geologically distinct families present in most regions of the world and in many aquatic ecosystems. Hover flies act as pollinators for spring flowering in oriental regions and very rare throughout the hot and cold in warm and dry regions of Asia (Sajjad and Saeed, 2010) ^[7].

Hover fly belongs to family Syrphidae, and are one of the biggest family in the order Diptera and consisting of well known hover flies or Flower flies or sun flies. The family of Hover flies comprised of medium sized flies about six to eighteen mm long, mostly vibrantly coloured with black and pale lined bodies similar to Wasps and Bees.

The Syrphidae family members have a distinctive feature of spuria veins with vein like thickenings on the wing membranes (Khan *et al.*, 2016) ^[5]. In the fields, they can be known by hovering over flowers in sunlight, by making loud droning sound with their rapid vibrating wings. The Syrphidae family is comprised of three subfamilies viz., Syrphinae, Milesnae and Microdontinae. Syrphid flies are of great economic value because to their pollinating function. Gharali *et al.*, (2002) ^[2] investigated the flower biota of Iran and mentioned that Hover flies are general pollinating agents approximately in all places where flowers are found, and are not present in wet and glacial regions. In a few agro-ecosystems, such as orchards, they do better than local honey bees in pollinating the fruits (Gilbert, 1981) ^[3]. Adult hoverflies commonly feed on nectar and pollen of blossoming flowers of different types.

Material and Methods

1. Camera: Syrphid flies were photographed with a high resolution digital camera. Nikon DSLR D 7000.

2. Insect collection Net: The syrphid flies were collected through insect Collection Net with telescopic handle consisting of strong wire ring (diameter 30cm).

3. Killing Bottle/ Jar: One of the easiest ways to kill syrphidflies is to make use of a killing bottle. It was prepared by placing 1-2 inch thick layer of absorbent material (Plaster of Paris) on the base of the jar, pouring some ethyl acetate and let it to soak. Blotter is placed over the absorbent materials, and has sealed tightly. Cover the bottom half of the bottle with masking tape to increase the efficacy of the killing bottle and save it from, sunshine. The captured syrphidfly were placed in the killing jar for a while until it died.

4. Paper Envelopes: Killed specimens with folded wings are placed in paper envelopes.

5. Entomological Pins: An insect needle differs in length and thickness and is numbered as 0, 1, 2, 3, 4, 5, etc. The most commonly used needles are of size 0-3, while as larger needles of 37-39 mm in measurement are also used for big insects.

6. Stretching board: Stretching board consists of the groove in the middle of the body of syrphidfly, and it vary in size for diverse sized insects. Gently press the wings down to lay them flat, then cover each wing with a thin piece of paper and protect the ends of the strip of the board. This will keep the wings straight until they dry. The drying procedure may take up to 2 weeks.

7. Ordinary pins: They were used to hold the paper strips over the wings.

8. Forceps: Forceps are used to expand the wings of the syrphidfly on the spreading board. It minimizes the damage while handling the wings.

9. Scissors: It was required to cut the strips of variable sizes.

10. Insect cabinet: They were used to preserve the killed specimen.

11. Ethyl acetate: Used to kill insects and also acts as a good preserving agent.

12. Naphthalene Balls and Phenol: These were used as preserving agents.

13. Labels: The following information was appended in the labels:

a) Location	b) Date of collection
c) name of the student who collected the sample	d) place from where the sample was collected

14. Field Dairy: Field dairy was maintained properly. It holds all the records of day to day activity.

Data Analysis

For analysis, the data about collected specimen of syrphidflies were arranged according to the source. Mean values were calculated. There are many ways to determine species variety. Biodiversity was collected using the Shannon Diversity Index (Shannon, 1948) ^[9] to assess species richness and uniformity of species diversity.

Species Diversity

Species diversity indices were calculated using Shannon Wiener's Diversity Index formula.

$$H = - \sum (N_i/N) \ln (N_i/N)$$

Where

N_i = Number of individuals of the species, I and N = Total number of all the species.

Uniformity of Species: Uniformity indices were calculated using the Hill method.

$$J = H / \ln S$$

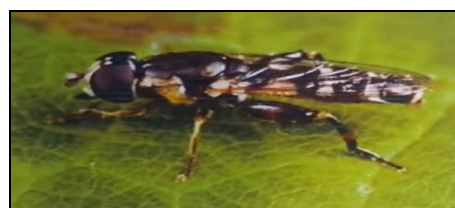
Where

S = Total number of species, N = Total number of individuals of all species, H = Diversity Index.

Results and Discussion

Identification list of syrphidflies recorded from Pir Panjal Biodiversity Park BGSBU

The present study identified 11 species of syrphidflies belonging to 9 genera. These species include *Episyrphus balteatus*, *Eristalis cerealis*, *Batasyrphus sererius*, *Syritta pipiens*, *Eristalis taeniops*, *Eristalis arbustorum*, *Eupeodes lungri*, *Sirphus ribsil*, *Eristalis tenax*, *Helophilus pendulus*, and *Simosyrphus scutellaris*. Most of the species were foraging on flowers of different plant species (Table 1). My findings are in accordance with Khan and Riyaz (2017) ^[6] who find that the *Eristalis tenax* was highly abundant, after that by *Eristalis cerealis*, *Eristalis interrupts* and *Episyrphus balteatus* were the major syrphidflies species in Kashmir crop lands. Also many authors such as Mitra *et al.*, (2005) also revealed very exact number of hover flies. My findings are in accordance with Arif *et al.*, (2014) ^[1]; Khan and Riyaz (2017) ^[6] who studied the syrphidflies Jammu and Kashmir Himalaya. Ghorpade and Shehzad (2014) ^[1] presented an annotated checklist of Syrphidflies of Pakistan.



Syritta sererius



Batasyrphus sererius

*Syrphus ribesii**Simosyrphus scutellaris**Eupeodes luniger**Eristalis tenax**Eristalinus taeniops**Eristalis arbustorum***Table 1:** Identification list of Syrphid flies

Order	Family	Genus	Species	Author/ Year
Diptera	Syrphidae	<i>Episyrphus</i>	<i>E. balteatus</i>	De Geer, (1776)
Diptera	Syrphidae	<i>Batasyrphus</i>	<i>B. sereius</i>	Wiedemann, (1830)
Diptera	Syrphidae	<i>Syritta</i>	<i>S. pipiens</i>	Linnaeus, (1758)
Diptera	Syrphidae	<i>Eristalinus</i>	<i>E. taeniops</i>	Wiedemann, (1818)
Diptera	Syrphidae	<i>Eristalis</i>	<i>E. arbustorum</i>	Linnaeus, (1758)
Diptera	Syrphidae	<i>Eristalis</i>	<i>E. ceralis</i>	Fabricius, (1805)
Diptera	Syrphidae	<i>Eupeodes</i>	<i>E. luniger</i>	Meigent, (1822)
Diptera	Syrphidae	<i>Syrphus</i>	<i>S. ribesii</i>	Linnaeus, (1758)
Diptera	Syrphidae	<i>Eristalis</i>	<i>E. tenax</i>	Linnaeus, (1758)
Diptera	Syrphidae	<i>Helophilus</i>	<i>H. pendulus</i>	Linnaeus, (1758)
Diptera	Syrphidae	<i>Simosyrphus</i>	<i>S. scutellaris</i>	Fabricius, (1805)

Table 2: Number of individuals of the Syrphid flies in BGSBU biodiversity park Rajouri

Genus	Species	Number of individuals
<i>Episyrphus</i>	<i>E. balteatus</i>	580
<i>Batasyrphus</i>	<i>B. serarius</i>	100
<i>Syritta</i>	<i>S. pipiens</i>	60
<i>Eristalinus</i>	<i>E. taeniops</i>	150
<i>Eristalis</i>	<i>E. arbustorum</i>	300
	<i>E. ceralis</i>	30
	<i>E. tenax</i>	410
<i>Eupeodes</i>	<i>E. luniger</i>	50
<i>Syrphus</i>	<i>S. ribesii</i>	150
<i>Helophilus</i>	<i>H. pendulus</i>	40
<i>Ischiodon</i>	<i>I. scutellaris</i>	10

During the present studies the maximum number of individuals of syrphidflies were found to be that of *Episyrphus balteatus* (580 individuals) followed by *Eristalis tenax* (410 individuals) and *Eristalis arbustorum* (300 individuals) (Table 2).

My findings are in accordance with Mitra *et al.*, 2015, who reviewed as well as documented three hundred fifty-seven species of syrphid flies in India, out of that 22.13% are found in Jammu & Kashmir. Khan and Hanif (2016) [5] revealed sixteen species of syrphidflies from Chakwak, Pakistan and Khan and Riyaz (2017) [6] reported 19 species of hover flies from Kashmir crop lands.

Syrphidflies are usually selective for floral resources, except a few species are extra particular from others, and males are highly particular than females (Gilbert 1981) [3]. Big, hairy hover flies such as *Eristalis tenax* L. and *Lasiptericus* (Scaeva) *pyrastris* L. frequently contains pollens of many plant species in their crops (Holloway, 1976) [8], floral wandering manner may be accountable from some of this variety, although there appears to be little flower permanence.

Conclusion

The study area supports the rich diversity of syrphidflies with a wide variety of plants which provide an ideal breeding environment for syrphidflies. It is estimated that there are more than 11 syrphidfly species on the BGSBU Campus as they are specific to different seasons and this survey was conducted for only six months. Therefore, it is difficult to collect, preserve, photograph and identity all species within the study area. The study is an attempt to provide a checklist for syrphidflies in the study area and will be continually updated for future reference. It was observed that *Episyrphus balteatus* was the most abundant species and has the highest individual species observed during the

study, and also *Simosyrphus scutellaris* had the least number of species observed respectively from the survey. The study showed a rich Syrphidfly diversity mainly attributed to the micro-habitats available within the eco-forest. Changes in the landscape, land use patterns, and loss of habitat vegetation can adversely affect syrphidfly diversity in terms of species richness, leading to a potential loss of endemism and threatened extinction. Syrphidfly diversity depends upon the floral diversity (among other factors).

Therefore, it is possible that Syrphidflies can be protected by improving the vegetation composition of habitat around the study area.

Acknowledgement

I am very thankful to my advisor Dr. Sajad Hussain Parrey, Assistant Professor, Department of Zoology, BGSBU, Dr. Ajaz Ahmad Wachkoo, Head Department of Zoology, Shopian who helped in identification of Syrphid Flies and I am also thankful to my dear sister Ulfat Jan, Division of Entomology, Skuas Kashmir who helped and motivated me during the entire course of work.

Conflict of Interest: None.

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