Journal of Entomological Society of Iran
https://jesi.areeo.ac.ir

Entomological Society of Iran
2024, 44 (3), 279–290
Research Article
https://doi.org/10.61186/jesi.44.3.4
pISSN: 0259-9996
eISSN: 2783-3968

OPEN ACCESS

Diversity of Hoverflies (Diptera, Syrphidae) in Darab damask rose rain-fed plain, Fars province, Iran

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Abstract. Diversity, community structure, and estimation of flower fly species richness (Diptera: Syrphidae) were measured in Darab damask rose plain, Fars province, Iran. Four Malaise traps were installed in a nearly 500-hectare site from April to October 2019 and checked periodically. The 4-step integrated approach was used to assess the sample completeness profile, to infer true diversities of entire assemblages, to standardize the sample coverage, and to infer diversity via an evenness profile. To estimate the species richness of the Syrphidae community, two models and seven non-parametric indices were used. As a result, a totally of 96 specimens representing 18 species were collected in 18-Malaise trap months (MTM) sampling efforts. One species, *Paragus auritus* Stuckenberg, 1954 was recorded for the first time from Iran. The aphidophagous hoverflies included 76.3% of all collected specimens. The dominant species were *Sphaerophoria scripta* (Linnaeus, 1758), *Eupeodes corolla* (Fabricius, 1794), and *Eumerus ahmadii* Barkalov & Gharali, 2004. The estimated sample completeness profile showed that our data covers 85% of the total species in this community. Shannon and Simpson diversity indices are measured at 10.88 and 7.04, respectively. The models and non-parametric estimators estimated the species richness of syphids varied from 19 – 24 species. The biodiversity of Syrphidae community in the world's largest rain-fed organic damask rose plain, located at high altitudes of ca. 2600 m a.s.l. of the Zagros Mountains ranges in the south of Iran, provides fundamental data for any future conservation efforts of pollinators and predators and biocontrol programs of sucking pests.

Keywords: Community structure, conservation, Syrphidae, rarefaction

Article History
Received:
09 November 2023
Accepted:
18 April 2024
Subject Editor:
Mar Ferrer-Suay

Citation: Mohammadi-Khoramabadi, A., Dousti, A. & Gharaei, B. (2024) Diversity of Hoverflies (Diptera, Syrphidae) in Darab damask rose rain-fed plain, Fars province, Iran. *J. Entomol. Soc. Iran* 44 (3), 279–290.

Introduction

Hoverflies or flower flies (Diptera, Syrphidae) with more than 6300 extant species have been known as a highly diverse dipteran family and an essential component of ecosystems (Skevington *et al.,* 2019). Adults effectively pollinate plants while their larval stage harbours a great variety of habitats and feeding modes including predation of hemipteran sternorrhynchans (subfamilies Syrphinae and Pipizinae), saprophagy, phytophagy (subfamily Eristallinae), and association with ants (subfamily Microdontinae) (Dunn *et al.,* 2020). Due to the aphidophagy behaviour of syrphids, they are considered valuable biological candidate agents for controlling aphid pests in agricultural ecosystems (Jalilian *et al.,* 2011; Amiri-Jami & Sadeghi-Namaghi, 2014; Farsi *et al.,* 2014; Földesi & Kovács-Hostyánszki, 2014; Jalilian, 2015; Bellefeuille *et al.,* 2019; Farsi *et al.,* 2020; Irvin *et al.,* 2021; Karimi & Madadi, 2021; Jiang *et al.,* 2022; Radev, 2022). Furthermore, their sensitivity to agricultural practices, widespread distribution and heterogeneity of larval habitat and food

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Corresponding author Abbas Mohammadi-Khoramabadi (Email: mohamadk@Shirazu.ac.ir) requirements make them important bioindicators (Sommaggio & Burgio, 2014; Popov *et al.*, 2017; Montoya *et al.,* 2021).

Species of Syrphidae of Iran include 269 valid species distributed in 70 genera and four subfamilies (Dousti, 2023). Documents show that flower flies richness and abundance are under threat and declining due to climate change or human disturbances (Biesmeijer *et al.,* 2006; Chisausky *et al.*, 2020; Barendregt *et al.*, 2022). Therefore, there is a need to expand and document the community structure, abundance and diversity indices of flower flies, and biodiversity data in both natural and agricultural ecosystems (Mehrabi *et al.*, 2006; Bedoreh *et al.*, 2010; Ahmadian & Pashaei Rad, 2011; Kazerani, 2012; Jabbari *et al.* 2013; Naderloo & Pashaei Rad, 2014; Shayeghi *et al.,* 2014; Babaei *et al.,* 2016; Jalilian, 2019; Zarei Sarchogha *et al.,* 2019; Robertson *et al.*, 2020) for any future ecological studies, conservation efforts and biological control programs (Jabbari *et al.,* 2018; Milić *et al.,* 2019; Gaytán *et al.*, 2020; Montoya *et al.*, 2021; Demirözer *et al.*, 2022; Georgi *et al.*, 2023).

In the south of Iran, Fars province, Darab County, the damask rose, *Rosa damascena*, has been traditionally cultivated almost organically under rain-fed conditions in the high altitudes of Zagros mountain ranges, covering more than 5300 hectares. This area is known as the world's largest damask rose rain-fed plain (Ebadzadeh *et al.*, 2018). However, this ecosystem is facing human pressure for development through changes in land use, which are impacting the natural *Juniperus-Amigdalus-Pistacia* vegetation type. Concerns also exist regarding rose pest outbreaks (Mehrparvar *et al.,* 2017; Nematollahi, 2018) necessitating the spreading of chemical pesticides and human interventions. A project was conducted in 2019 to investigate the diversity of various insect groups in this region (Mohammadi-Khoramabadi & Khayrandish, 2021; Mohammadi-Khoramabadi, 2023). This study focuses on the diversity of hoverflies (Diptera: Syrphidae) caught by Malaise traps in Darab Damask Rose Plain, providing fundamental data for future research by describing the community structure and estimating the maximum species richness of syrphids in this plain.

Materials and methods

Study area and sampling procedure. This research was conducted in Darab damask rose rain-fed plain (28° 41′ N, 54°53′ E,), Fars province, located in the southern region of Iran, with an altitude ranging from 2570 to 2650m a.s.l. during the year 2019 (April- October) (Fig. 1A). To effectively capture Syrphidae, a combination of pan trapping, plot observation, hand netting and Malaise trapping was recommended (Gaytán *et al.*, 2020; Robertson *et al.*, 2020). However, due to logistic constraints and the availability of roads, an approximately 500-hectare site was chosen. Four Malaise traps were installed within this area, all aligned on a north-south axis, as depicted in Figure 1B. The specific coordinates of the traps were as follows: T1: 28°42'01"N, 54°54'13"E, 2615 m a.s.l.; T2: 28°42'15"N, 54°54'14"E, 2641 m a.s.l.; T3: 28°41'27"N, 54°55'21"E, 2571 m a.s.l.; T4:28°42'38" N,54°53'17"E, 2646 m a.s.l. The containers of traps were filled with 70% ethanol (about 1 litre) as the killing and preservation medium. Traps were checked biweekly, to ensure the accurate collection of specimens. Containers were wrapped in aluminium sheets to minimize alcohol evaporation. Unfortunately, Malaise traps T3 and T4 were destroyed during April and May, resulting in a total sampling effort of 18 Malaise trap months (MTM), a convenient expressed term (Gómez *et al.*, 2017).

Sample processing, species mounting, and identification. All Syrphidae specimens were pinned and identified to the species level based on the morphological and genital characters by the junior authors. Seven species were not identifiable but were considered as distinct morphospecies, and included in all statistical analyses. The voucher specimens were deposited in the Insect Museum of Darab College of Agriculture and Natural Resources, Shiraz University.

Statistical analysis. The relative abundance (D) of each species was calculated as:

$$D = \frac{b}{a} \times 100$$

Where, b = number of the individuals of the species and a = number of the individuals of all species. The dominance class of each species was determined using Engelmann's (1978) procedure, with categories including Eudominant (Eu): species with over 32 – 100% of all collected individuals; Dominant (Do): 32 – 10%; Subdominant (Sd): 10 – 3.2%; Recedent (Rc): 3.2 – 1%; Subrecedent (Sr): 1 – 0.32%; and Sporadic (Sp): less than 0.32% of all individuals.

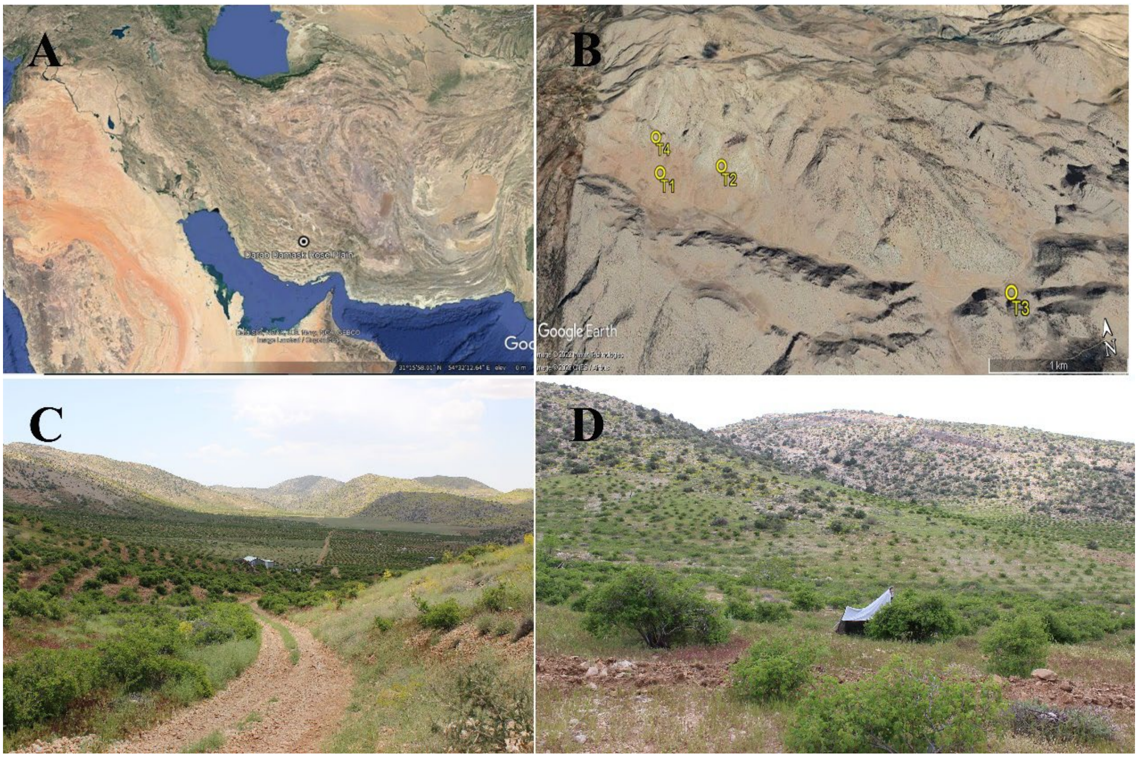

Fig. 1. Map of the study area and Malaise trap locations. A. Darab Damask Rose Plain, Fars province, Iran; B. Location of Malaise traps (T1-T4); C. Overall vegetation; D. An installed Malaise trap in the field.

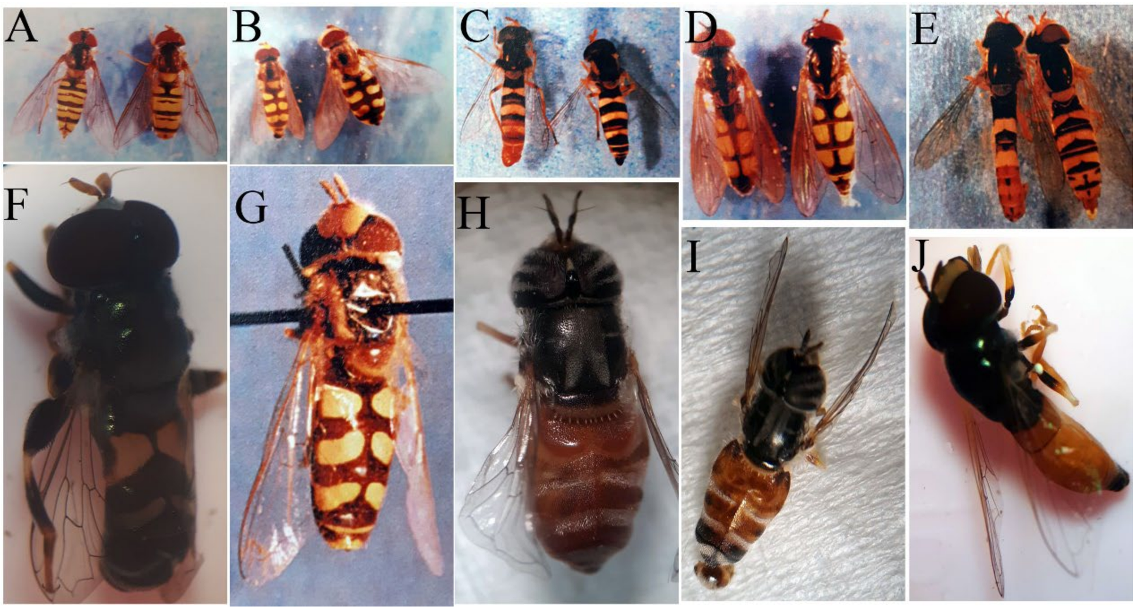

Fig. 2. Habitus of hoverflies in Darab Damask Rose Plain, 2019. A. *Episyrphus balteatus* (De Geer, 1776); B. *Eupeodes corollae* (Fabricius, 1794); C. *Ischiodon aegyptius* (Wiedemann, 1830); D. *Melanostoma mellinum* (Linnaeus, 1758); E. *Sphaerophoria scripta* (Linnaeus, 1758); F. *Eumerus* sp.; G. *Scaeva albomaculata* (Macquart, 1842); H. *P. azureus* Hull, 1949; I. *Paragus auritus* Stuckenberg, 1954; J. *Paragus* sp.

An integrated approach based on the framework of Hill numbers, proposed by Chao *et al.* (2020), was used. This approach includes a four-step analysis to assess sample completeness based on incomplete abundance and incidence data to compare diversity and evenness among assemblages. The sample completeness ($q = 0$), the detected and undetected species ($q = 1$) and the detected highly abundant species ($q = 2$) were assessed in step 1. Step 2, involved size-based rarefaction and extrapolation analysis to estimate the asymptotic diversity for species richness (q = 0), Shannon diversity (q = 1), and Simpson diversity (q = 2), the three most widely used diversity indices. Step 3 standardized sample coverage is standardized for any fair comparisons among communities and finally step 4 computed the evenness profile for the Maximum standardized coverage C_{max}, for diversity orders $0 < q \leq 2$ (*https://chao.shinyapps.io/inext_4steps*). The confidence interval obtained from the bootstrap method with 100 replications was 95%.

Non-parametric/Model estimators. Species richness of the Syrphidae community and seven non-parametric estimators were calculated by an online statistical software, SPADE (Species Prediction and Diversity Estimation) available at: *https://chao.shinyapps.io/SpadeR* (Chao & Shen, 2016). Non-parametric estimators included: Homogenous, Homogenous (MLE), of Chao1, Chao1-bc, iChao1, ACE (Abundance-based Coverage Estimator), ACE-1, 1st order jackknife, and 2nd order jackknife. The confidence interval was similar to the other analysis.

Results

In this study, 44 collecting jars of malaise traps were examined, revealing that 14 of them contained a total of 97 syrphid specimens. These specimens belonged to 18 species from two subfamilies, namely Syrphinae and Eristallinae. The Syrphinae subfamily includes species: *Episyrphus (Episyrphus) balteatus* (De Geer, 1776)*,* *Eupeodes (Metasyrphus) corollae* (Fabricius, 1794)*, *Ischiodon aegyptius* (Wiedemann, 1830)*, *Melanostoma mellinum* (Linnaeus, 1758)*, *Paragus (Paragus) auritus* Stuckenberg, 1954**, *P. azureus* Hull, 1949**, P. bicolor* (Fabricius, 1794), *P. compeditus* Wiedemann, 1830*, *P. quadrifasciatus* Meigen, 1822*, *Paragus* sp.*, Scaevaa lbomaculata* (Macquart, 1842), *S. latimaculata* (Brunetti, 1923)*, *Sphaerophoria bengalensis* Macquart, 1842*, *S. scripta* (Linnaeus, 1758). The Eristalinae subfamily includes: *Eumerus ahmadii* Barkalov & Gharali, 2004, and *Eumerus* sp. (3 species) (Fig. 2). Notably one species is recorded for the first time from Iran while eight species are newly recorded from Fras province which are marked with two and one asterisks, respectively.

These species were grouped into two trophic groups, aphidophagous species of the subfamily Syrphinae and saprophagous ones from the subfamily Eristalinae. The aphidophagous hoverflies constituted 76.3% of all collected individuals. *Sphaerophoria scripta* was the most abundant species, followed by *E. corollae* and *E. ahmadii* (Table 1).

Assessment of sample completeness profile (Step 1) (Fig. 3a, Table 2)

The sample completeness profile (Fig. 3a) indicates that at q= 0, numerous syrphid species are detectable. Our data sampling encompasses 85% of the total species within this community leaving approximately 15% undetected. Among the detected and undetected species, they represent 95% and 5% of this community's individuals at q = 1 (95%), respectively. Notably, almost all of the highly abundant Syrphidae species are detected (q = 2, 99.9%).

Size-based rarefaction and extrapolation analysis and the asymptotic diversity profiles (Step 2) (Figs 3b, 3c, Table 2).

The size-based rarefaction and extrapolation analysis depicted in Figures 3B and 3C, along with Table 2, reveal insights into the diversity orders q = 0, 1, and 2. The extrapolation for q = 0, extending up to double the reference sample size (194), shows variability, suggesting insufficient data for accurate species richness estimation. However, the curves for the diversity of orders q = 1 and 2 stabilize, indicating satisfactory asymptotic diversity estimates. The undetected species richness for this dataset is estimated to be at least 3.09 (21.09 – 18) (≥ 5%) (Species richness for q = 0) (Fig. 3c, Table 2). The values for Shannon (q = 1) and Simpson (q = 2) diversity indices are 10.88 and 7.04, respectively. The undetected Shannon and Simpson diversity values within the data are 1.20 and 0.41 (Table 2), implying successful detection of nearly all abundant and highly abundant species.

Non-asymptotic coverage-based rarefaction and extrapolation analysis (Step 3). (Fig. 3d, Table 2).

This step provides the values for species richness, and Shannon and Simpson diversity indices for any fair comparisons among Syrphidae communities.

The value for C_{max} was defined as 99% (the level of coverage reached by the sample that attains the lowest coverage when all samples are extrapolated to double the reference sample size, 194 individuals) (Table 2, Step 3). At the Maximum standardized coverage C_{max} = 99%, the values for q = 0 (species richness), q =

Table 1. Hoverflies of Darab Damask Rose Plain, Fars province, ranked in order of abundance, 2019

	Species	Raw abundance (No.)	Relative abundance (%)	Dominance*
1	*Sphaerophoria scripta*(Linnaeus, 1758)	26	26.8	*Do*
2	*Eupeodes corollae* (Fabricius, 1794)	18	18.55	*Do*
3	*Eumerus ahmadii* Barkalov&Gharali, 2004	17	17.5	*Do*
4	*Ischiodon aegyptius* (Wiedemann, 1830)	8	8.25	*Sd*
5	*Paragus bicolor* (Fabricius, 1794)	3	3.1	*Rc*
6	*Paragus quadrifasciatus* Meigen, 1822	3	3.1	*Rc*
7	*Eumerus* sp1	3	3.1	*Rc*
8	*Scaeva latimaculata* (Brunetti, 1923)	3	3.1	*Rc*
9	*Sphaerophoria bengalensis*Macquart, 1842	3	3.1	*Rc*
10	*Eumerus* sp2	2	2.06	*Rc*
11	*Scaeva albomaculata* (Macquart, 1842)	2	2.06	*Rc*
12	*Episyrphus balteatus* (De Geer, 1776)	2	2.06	*Rc*
13	*Melanostoma mellinum* (Linnaeus, 1758)	2	2.06	*Rc*
14	*Paragus auritus* Stuckenberg, 1954	1	1.03	*Rc*
15	*Paragus azureus* Hull, 1949	1	1.03	*Rc*
16	*Paragus compeditus* Wiedemann, 1830	1	1.03	*Rc*
17	*Paragus* sp.	1	1.03	*Rc*
18	*Eumerus* sp3	1	1.03	*Rc*
	Total species: 18	97		

* Dominance class is indicated by: *Do* (dominant), *Sd* (subdominant); and *Rc* (recedent).

1(Shannon diversity) and q = 2 (Simpson diversity) were 20.47, 10.43 and 6.83, respectively (Table 2, Fig. 3d).

Evenness profile (Step 4) (Fig. 3e, Table 2). In this step, the evenness profile is computed for $C_{max} = 99\%$, with Pielou J', q1 and q2 values determined as 0.78, 0.48 and 0.30, respectively.

Non-parametric species richness estimators. The models and non-parametric estimators estimated the species richness of syrphids in the studied area as follows: The Homogenous model yielded an estimated species richness of 20.42 ± 2.18; while the Homogenous (MLE) model estimated a richness of 18.08 ± 0.29; The Chao1 estimator produced a richness estimate of 21.09 ± 3.62; The Chao1-bc estimator yielded a richness estimate of 19.98 ± 2.56; The iChao1 estimator produced a similar estimate to the Chao1, with a richness of 21.09 ± 3.62; The ACE yielded a higher estimate of 22.16 ± 3.89; and the ACE-1 produced an even higher estimate of 22.91 ± 5.10; The 1st order jackknife estimator produced a richness estimate of 22.95 ± 3.14; and the 2nd order jackknife estimates a richness of 23.99 ± 5.40 (Fig. 4). These results imply that additional sampling in the study area would yield some new species of syrphids, as the estimated species richness is higher than the observed richness in the reference sample data. The high number (15) of rare species with 10 or fewer individuals (cut-off point=10) in the reference sample data (Table 1) is the reason for the increased estimation values. This highlights the importance of considering rare species when estimating species richness in a given area.

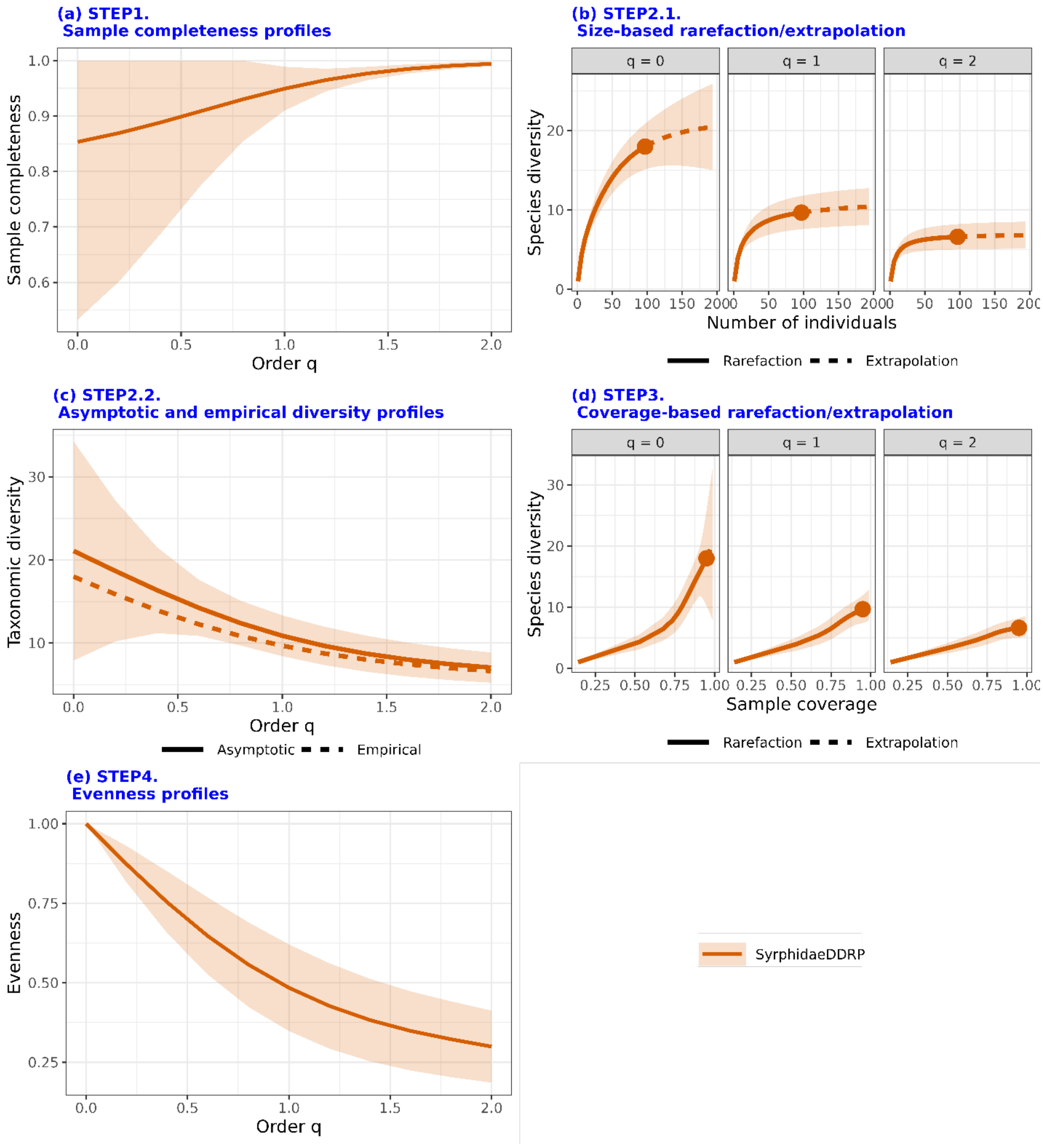

Fig. 3. A. The plot of sample completeness curve as a function of order q (ranging from 0 to 2) in the reference sample data (Sobs = 18, n = 97) for Syrphidae of Darab damask rose plain, Iran,2019; B. Sample-size-based rarefaction and extrapolation curves up to size 194 for Syrphidae sample data, with solid lines and dashed lines representing rarefaction extrapolation, respectively; C. Asymptotic estimates of diversity profiles (solid lines) and empirical diversity profiles (dotted lines) for Syrphidae sample data, with numerical values indicating estimated asymptotic diversities; D. Coverage-based rarefaction (solid lines) and extrapolation (dashed lines) curves up to the corresponding coverage value for size 982; E. Evenness profile as a function of order q, for $0 < q \leq 2$, based on the normalized slope of Hill numbers. observed data points are denoted by solid dots and triangles. All shaded areas in A–D denote 95% confidence bands obtained from a bootstrap method with 100 replications.

Table 2. Numerical values for the three special cases q = 0, 1 and 2 for abundance-based Syrphidae collected from Darab damask rose plain, Fars province, 2019

Step 1. Sample completeness profile			
Sample completeness	q= 0	q= 1	q= 2
	85%	95%	99%
Step 2. Asymptotic analysis			
Diversity	*q = 0 (species richness)*	*q = 1 (Shannon diversity)*	*q = 2 (Simpson diversity)*
Asymptotic estimator	21.09	10.88	7.04
Empirical	18	9.68	6.63
Undetected	3.09	1.20	0.41
Step 3. Non-asymptotic coverage-based rarefaction and extrapolation			
Maximum standardized coverage Cmax = 99%			
Diversity	q = 0 (species richness)	*q = 1 (Shannon diversity)*	*q = 2 (Simpson diversity)*
	20.47	10.43	6.83
Step 4. Evenness among species abundance			
Evenness	Pielou J'	q = 1	q = 2
	0.78	0.48	0.30

Discussion

The present study offered the inaugural biodiversity data, described the community structure, examined the sample completeness and inferred the diversity indices of the Syrphidae community in damask rose cultivated land at high altitudes of ca. 2600 m a.s.l. of the Zagros Mountain ranges in the southern part of Iran. Eighteen hoverfly species were collected and identified which make up 6.69% of the Iranian Syrphidae fauna (Dousti, 2023). This richness can increased to a maximum of 24 ± 5.40 species as estimated (Fig. 4) so it indicates that many rare and cryptic species present in the studied area are detectable by more intensive sampling or by implementing other sampling methods (Földesi & Kovács-Hostyánszki, 2014; Moisan-DeSerres *et al.,* 2015; Gervais *et al.,* 2018; Gaytán *et al.,* 2020). Considering whole country with highly diverse natural habitats will give a more complete picture of Iran's hoverfly richness (Zamani *et al.,* 2018; Babaei *et al.,* 2019; Shojaei Hesari & Pashaei Rad, 2019; Mengual *et al.,* 2021; Gilasian *et al.,* 2022).

In this study, we report a relatively low number of captured specimens (97) which may be attributed to the arid nature, rain-fed environment (Kazerani, 2012; Medeiros *et al.,* 2018), poor floral habitat, and the specific sampling procedure employed (Ahmadian & Pashaei Rad, 2011; Földesi & Kovács-Hostyánszki, 2014; Moisan-DeSerres *et al.,* 2015; Gervais *et al.,* 2018; Gaytán *et al.,* 2020). The life of flower flies is highly associated with water (high rainfall) and flowering plants, this is more likely why the high species diversity of these insects is in regions such as north-western Europe and temperate North America (Robertson *et al.,* 2020).

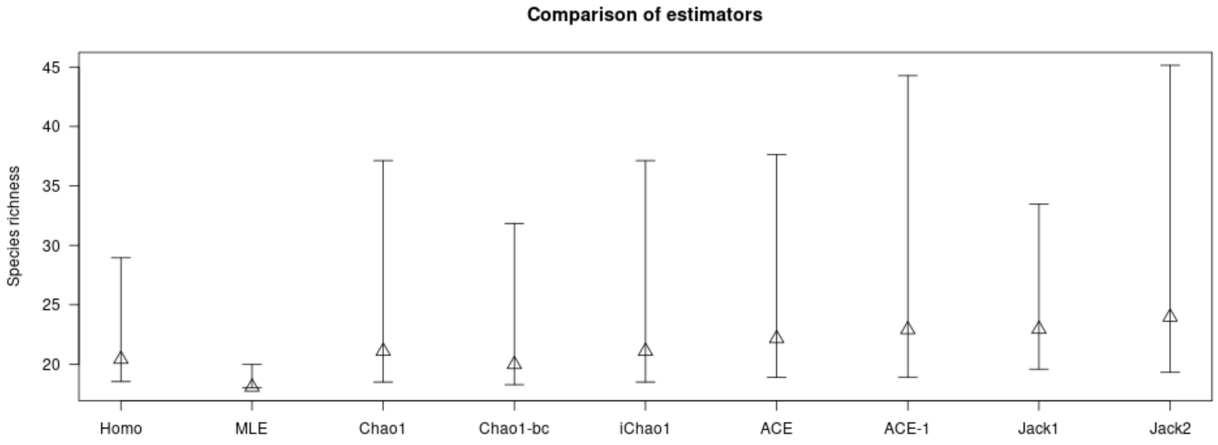

Fig. 4. Comparison of species richness estimators for Syrphidae community in Darab damask rose plain, Fars province (Iran), 2019. Triangles represent the estimated species richness ± 95% confidence intervals obtained from a bootstrap method with 100 replications.

Our current sampling procedure was based on a single method, Malaise trapping. Likely, the species richness of the family increases if other sampling methods including pan trapping, netting and visual observation extend.

Collected species are common species widely distributed in Iran except for the genus *Paragus serratus* group of species that are more abundant in the south of Iran. *Paragus auritus* is here recorded for the first time from Iran. This species is easily distinguished from the other species of the *serratus* group by a triangular protuberance on the hypandrium. *Paragus auritus* is a species which occurs in Afrotropical and oriental regions, nicely was detected in this study at the south of Iran (Ante Vujic, personal communication). The dominant and subdominant species of syrphid flies in the studied area were *S. scripta*, *E. corollae*, *E. ahmadii* and *I. aegyptius*. In common, the most widespread species in Iran are *E. balteatus*, *S. scripta* and *E. corolla*, *Eristalis arbustorum* (L., 1758), *Eristalis tenax* (L., 1758), *Syritta pipiens* (L., 1758), *P. bicolor*, *M. mellinum* and *Eristalinus aeneus* (Scopoli, 1763) (Ahmadian & Pashaei Rad, 2011; Kazerani, 2012; Naderian *et al.,* 2012; Jabbari *et al.,* 2013; Kamangar & Gharali, 2014; Naderloo & Pashaei Rad, 2014; Babaei *et al.,* 2016; Jalilian, 2019; Rasapour *et al.,* 2021; Dousti, 2023). Some of these species are among dominant and common species in the western Palaearctic (Földesi & Kovács-Hostyánszki, 2014; Gaytán *et al.,* 2020). We recommend the two dominant aphidophagous species, *S. scripta* and *E. corolla*, as more suitable in biological control programs in this area.

To conserve this valuable diversity of Syrphidae in the Darab plain of Damask rose, it is strongly recommended that pesticide application is reduced or restricted (Barendregt *et al.,* 2022; Wojciechowicz-Żytko & Wilk, 2023), to ensure natural vegetation and forests as floral, shelter and habitat resources for syrphids within and surrounding of the plain are conserved (Moisan-DeSerres *et al.,* 2015; Gervais *et al.,* 2018; Medeiros *et al.,* 2018; Gaytán *et al.,* 2020; Madureira *et al.,* 2023; Ortega *et al.,* 2023).

In light of these findings, we propose that future research should focus on expanding Syrphidae diversity inventories and monitoring across Iran; taxonomic diversity of the genera *Paragus* and *Eumerus* in the southern half of Iran, investigating the ecological requirements of dominant Syrphids for implementing biological control programs, inventing conservation and management strategies.

Author's Contributions

Abbas Mohammadi-Khoramabadi: conceptualization, methodology, formal analysis, investigation, draft preparation, final review and edit, visualization, supervision, project administration and funding acquisition; **Abulfazel Dousti**: species identification, final review and edit; **Babak Gharaei:** species identification, final review and edit.

Funding

This study was supported by the College of Agriculture and Natural Resources of Darab, Shiraz University, Grant Number [96GRS1M2228].

Data Availability Statement

All data supporting the findings of this study are available within the paper.

Acknowledgments

We sincerely thank Dr. Ante Vujic for the identification of the *Paragus* species. Our sincere gratitude to Gholam Abbas Khaghaninejad, Yaghoub Jafari, and Akbar Norouzi for their generous assistant to the first author during field sampling.

Ethics approval

Insects were used in this study. All applicable international, national, and institutional guidelines for the care and use of animals were followed. This article does not contain any studies with human participants performed by any of the authors.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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تنوع گونه‌ای مگس های گل (Diptera, Syrphidae) در دشت گل محمدی دیم داراب، استان فارس، ایران

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تاریخچه مقاله

دریافت: ۱۴۰۲/۰۸/۱۳ | **پذیرش:** ۱۴۰۳/۰۱/۳۰ | **دبیر تخصصی:** مار فرر سوای

چکیده

تنوع گونه‌ای، ساختار جامعه و تخمین غنای گونه‌ای مگس‌های گل (Diptera, Syrphidae) در دشت گل محمدی دیم داراب، استان فارس، ایران ارزیابی گردید. نمونه‌برداری با استفاده از چهار تله چادری در یک بخش به مساحت تقریبی ۵۰۰ هکتار از فروردین تا مهر سال ۱۳۹۸ انجام شد. روش چهار مرحله‌ای تلفیقی به منظور ارزیابی کامل بودن نمونه‌برداری، استخراج تنوع حقیقی جامعه، استانداردسازی میزان پوشش نمونه و نیز استخراج شاخص تنوع مورد استفاده قرار گرفت. به منظور تخمین غنای گونه‌ای جامعه مگس‌های سیرفید از دو مدل و هفت شاخص ناپارامتریک استفاده شد. نتایج نشان داد که در مجموع ۹۶ فرد متعلق به ۱۸ گونه از مگس‌های سیرفید طی ۱۸ ماه در تله مالیز جمع آوری شدند. یک گونه، *Paragus auritus* Stuckenberg, 1954، برای اولین بار از ایران گزارش می‌شود. گونه‌های غالب عبارت بودند از: *Sphaerophoria scripta* (Linnaeus, 1758)، *Eupeodes corollae* (Fabricius, 1794) و *Eumerus ahmadii* Barkalov & Gharali, 2004. نمودار تخمینی کامل بودن نمونه برداری نشان داد که داده‌های به دست آمده، ۸۵٪ کل گونه‌های جامعه را پوشش می‌دهند. مقادیر شاخص‌های تنوع گونه‌ای شانون و سیمپسون برای این جامعه به ترتیب ۱۰.۸۸ و ۷.۰۴ محاسبه گردید. مدل‌ها و تخمین‌گرهای ناپارامتری غنای گونه‌ای مگس‌های سیرفید را ۱۹-۲۴ گونه، تخمین زدند. داده‌های تنوع گونه‌ای مگس‌های سیرفید، در بزرگ‌ترین دشت گل محمدی دیم جهان در ارتفاع ۲۶۰۰ متر در کوه‌های زاگرس، اطلاعات لازم برای برنامه‌های حفاظتی از این گروه مهم شکارگر و گرده افشان و نیز بکارگیری آنان در کنترل زیستی حشرات زنده‌مکنده را فراهم می‌سازد.

کلمات کلیدی: ساختار جامعه، حفاظت، سیرفیده، تنک‌سازی

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***Citation*:** Mohammadi-Khoramabadi, A., Dousti, A. & Gharaei, B. (2024) Diversity of Hoverflies (Diptera, Syrphidae) in Darab damask rose rain-fed plain, Fars province, Iran. *J. Entomol. Soc. Iran* 44 (3), 279–290. https://doi.org/10.61186/jesi.44.3.4