Eulophid Wasps (Hymenoptera: Eulophidae) Associated with Poaceae in Northwestern Iran

Samaneh Salimi[1*], Hossein Lotfalizadeh[2], Younes Karimpour[3] & Majid Jafarlu[4]

1. Department of Plant Protection, Faculty of Agriculture, Urmia University, Urmia, Iran.Smanhslymy085@gmail.com,https://orcid.org/0009-0008-2150-6250

2. Insects Taxonomy Research Department, Iranian Research Institute of Plant Protection (IRIPP), AREEO, Tehran, Iran *h.lotfalizadeh@areeo.ac.ir, https://orcid.org/0000-0002-7927-819X*

3.Department of Plant Protection, Faculty of Agriculture, Urmia University, Urmia, Iran. y.karimpour@urmia.ac.ir, https://orcid.org/0000-0003-2468-8367

4. Department of Plant Protection, Faculty of Agriculture, Urmia University, Urmia, Iran. majidjafarlu@gmail.com , https://orcid.org/0000-0002-5829-8781

Abstract

During a survey conducted in West Azarbaijan Province, northwestern Iran, various grasses (Poaceae) were collected from 2021 to 2023. Plant tissue samples of *Bromus tectorum* (L.) Nevski, *Dactylis glomerata* L., *Lolium perenne* L., *Phalaris minor* Retzand, and *Phragmites australis* (Cav.) Trin. ex Steud. were transferred to the Entomology Laboratory at Urmia University, where chalcidoid wasps were reared. Eleven species of Eulophidae (Hymenoptera: Chalcidoidea) belonging to five genera and three subfamilies were identified, i.e. *Pediobius epigonus* (Walker, 1839) and *P. metallicus* (Nees, 1834) (Entedoninae); *Cirrospilus ingenuus* Gahan, 1932; *Diglyphus isaea* (Walker, 1838) and *D. sabulosus* Erdös, 1951 (Eulophinae); *Aprostocetus apiculatus* Graham, 1987; *A. forsteri* (Walker, 1847); *A. phragmiticola* Graham, 1987; *Aprostocetus* sp.; *Baryscapus endemus* (Walker, 1839), and *B. turionum* (Hatrig, 1838) (Tetrastichinae). Notably, two species, *A. apiculatus* and *A. phragmiticola*, are new records for the Iranian fauna. Except for *D. isaea* and *D. sabulosus*, all other species represent new distributional records. Additionally, the associations of these grasses with their corresponding eulophids are reported here for the first time. Furthermore, diagnostic characters of the newly recorded species are provided, accompanied with illustrations.

Key words: Chalcidoidea, Fauna, New record, Poaceae-associated parasitoids, Poaceae

Introduction

The grass family, Poaceae (or Gramineae), is the fourth-largest flowering plant family, containing approximately 11,000 species across nearly 800 genera worldwide (Peterson *et al.*, 2014). Poaceae is particularly significant for

phytophagous insects, including some Chalcidoidea (Gibson *et al.*, 1999). Economically, Poaceae is the most important plant family which serves as food crops, shelter, fodder, and lawn turf (Glimn-Lacy & Kaufman, 2006). In Iran, several studies have contributed to the knowledge of chalcid wasps associated with host plants. For instance, Moeinadini *et al.* (2014) reported members of the subfamily Tetrastichinae (Hym.: Eulophidae) associated with plant galls in Kerman Province, including ten new records for the Iranian fauna. Similarly, Lotfalizadeh *et al.* (2011) investigated the parasitoid community of *Diplolepis fructuum* (Hym.: Cynipidae), providing a checklist of associated Hymenoptera species in Iran. Additionally, Madjdzadeh *et al.* (2005) described a new species of *Tetramesa* (Hym.: Eurytomidae) from Iran, further highlighting the diversity of Chalcidoidea in the region.

The family Eulophidae (Hymenoptera: Chalcidoidea) is the largest within the superfamily with approximately 6,000 species in 328 genera (UCD Community, 2023). In Iran, this family comprises 183 species in 45 genera (Lotfalizadeh & Hosseini, 2014; Bayegan *et al.*, 2015; Darsouei *et al.*, 2018; Hesami *et al.*, 2018; Jafarlu *et al.*, 2021, 2022, 2023; Shahbazvar & Zeya, 2022; Karimpour *et al.*, 2023). Eulophidae exhibit remarkable biological diversity, with hosts belonging to over 100 families across ten orders (LaSalle, 1990, 1994; van den Berg *et al.*, 1990; Gadallah *et al.*, 2015). While many Eulophidae are known for their parasitic behavior, some have developed phytophagous tendencies, particularly those associated with economically significant plant families such as Poaceae (UCD Community, 2023). The present study investigates the chalcidoid community in northwestern Iran, focusing on Eulophidae species associated with the Poaceae family. By exploring new records and highlighting interactions between these insects and their hosts, this research aims to contribute significantly to understanding local biodiversity and the ecological roles of Eulophidae in Iranian ecosystems.

Material and Methods

From 2021 to 2023, we conducted a collection program for parasitic wasps in the southern part of West Azarbaijan Province, focusing on potentially infested Poaceae grasses: *Bromus tectorum* (L.) Nevski, *Dactylis glomerata* L., *Lolium perenne* L., *Phalaris minor* Retz and *Phragmites australis* (Cav.) Trin. ex Steud. Samples were collected from approximately 10 cm below the tops of the stems. The collected grasses were then transported to the Entomology Laboratory at Urmia University, where they were placed into prepared glass boxes (30 × 40 × 80 cm), organized by their respective collection sites, and covered with muslin to facilitate insect maintenance and rearing. The specimens were monitored daily under ambient conditions of 15 to 24°C and a relative humidity ranging from 40% to 60%. Emerging wasps were subsequently transferred to 75% ethanol for future studies. Specimens were prepared and mounted following the methods outlined by Noyes (1982). For card mounting, rectangular cards measuring 0.5 × 1.5 cm were used, with water-soluble glue applied to securely attach the specimens. Morphological terminology followed by Yoder *et al.* (2010). External morphology was examined using an Olympus SZH stereomicroscope. Images were captured with an Olympus digital microscope

equipped with a CMOS industrial camera (1920 x 1080 resolution at 60 FPS) and subsequently edited using Adobe Photoshop® CS6 software. The specimens examined in this study are deposited in the insect collection of the Hayk Mirzayans Insect Museum (HMIM) at the Iranian Institute of Plant Protection in Tehran, Iran

Results

We successfully reared 11 species of Eulophidae associated with the Poaceae family in northwestern Iran, representing five genera and three subfamilies: Entedoninae (two species), Eulophinae (three species), and Tetrastichinae (six species). Notably, two species *Aprostocetus apiculatus* Graham, 1987 and *A. phragmiticola* Graham, 1987 are recorded for the first time in Iran. Furthermore, the association of four species (*A. apiculatus* Graham, 1987, *A. forsteri* (Walker, 1847), *C. ingenuus* Gahan, 1932, and *D. sabulosus* Erdős, 1951) with Poaceae is new, and *D. isaea* (Walker, 1838) was reared from *Lolium perenne* for the first time.

Taxonomy

Order Hymenoptera Linnaeaus, 1758

Superfamily Chalcidoidea Latreille, 1817

Family Eulophidae Westwood, 1829

Subfamily Eulophinae Westwood, 1812

Genus *Cirrospilus* Westwood, 1832

The genus has a cosmopolitan distribution, comprising 155 species worldwide, with 44 species in the Palaearctic region (UCD Community, 2023), and nine species recorded from Iran (Lotfalizadeh & Delvare, 2011; Hesami *et al.*, 2018). Members of this genus are predominantly ectoparasitoids or hyperparasitoids associated with concealed larvae or pupae, and less frequently with insect eggs (Bouček, 1988).

Cirrospilus ingenuus Gahan, 1932

Material examined

IRAN, West Azarbaijan province, Mahabad, 36°45'29.724" N, 45°42'19.573" E, 1371 m, 5.vi.2022, Salimi, S. leg, 3♀♀.

Remarks

In this survey, *C. ingenuus* was reared from *B. tectorum* (Poaceae). *Cirrospilus ingenuus* has been widely documented as a parasitoid associated with the citrus leafminer, *Phyllocnistis citrella* Stainton (Lepidoptera: Gracillariidae), a major pest affecting citrus plants worldwide. Studies by Yefremova *et al.* (2007), Ebrahimi *et al.* (2009), and Fassihi and Malekzadeh (2015) highlight *C. ingenuus* as a biocontrol agent, demonstrating its effective role in parasitizing and controlling *P. citrella* populations, especially in citrus orchards where chemical control can be

challenging and ecologically detrimental. While *B. tectorum* is primarily a grass species not typically associated with the host preferences of *C. ingenuus*, it may still provide a suitable environment if leaf-mining pests susceptible to parasitism by *C. ingenuus* are present (Yefremova *et al.*, 2007; Ebrahimi *et al.*, 2009; Fassihi & Malekzadeh, 2015).

Distribution

Widely distributed in the Palaearctic and Nearctic regions (UCD Community, 2023), Iran (Bushehr, Sistan and Baluchestan) (Yefremova *et al.*, 2007; Ebrahimi *et al.*, 2009; Fassihi & Malekzadeh, 2015).

Genus *Diglyphus* Walker, 1844

This cosmopolitan genus within Eulophidae comprises 40 worldwide and 30 species in the Palaearctic region (UCD Community, 2023). In Iran, 13 species have been recorded (Jafarlu *et al.*, 2021). Species of this genus are primarily ectoparasitoids of leaf-mining larvae, particularly those of Agromyzidae (Diptera), and play an important role in biological control programs (Bouček, 1988; Hesami *et al.*, 2018).

Diglyphus isaea (Walker, 1838)

Material examined

IRAN, West Azarbaijan province, Miandoab, 36°57'22.019"N, 46°4'49.495" E, 1291 m, 23.viii.2022, Salimi, S. leg, 25♀♀&18♂♂.

Remarks

In the present survey, we reared this species within the family Agromyzidae in association with *Lolium perenne* (Poaceae). This species has previously been documented in association with *Chromatomyia nigra* (Meigen) (Diptera: Agromyzidae) (Shahreki *et al.*, 2012), *Phytomyza horticola* Goureau, *Liriomyza sativae* Blanchard, and *Liriomyza trifolii* (Burgess) (Lotfalizadeh *et al.*, 2015). Additionally, it has been linked to multiple plant families, including Cucurbitaceae, Malvaceae, Fabaceae, Brassicaceae, Solanaceae, and Rubiaceae (Mahmoudi *et al.*, 2011), as well as Asteraceae and Poaceae (Shahreki *et al.*, 2012, 2016).

Distribution

Widely distributed in the Holarctic, Oriental and Neotropical regions (UCD Community, 2023); Iran: Ardabil (Fathi, 2011), Chaharmahal and Bakhtiari (Yefremova *et al.*, 2007), East Azarbaijan (Lotfalizadeh *et al.*, 2015), Fars (Dousti *et al.*, 2006, 2008; Hesami *et al.*, 2006; 2010; Mahmoudi *et al.*, 2011), Golestan, Mazandran, Isfahan, Guilan, Kerman, Northern Khorasan, Semnan (Samin *et al.*, 2015), Kordestan (Khanizad *et al.*, 2006), Sistan and Baluchestan (Shahreki *et al.*, 2012, 2016), Tehran (Shojai *et al.*, 2003, 2005; Talebi *et al.*, 2005; Asadi *et al.*, 2006), West Azarbaijan (Asadi *et al.*, 2006).

Diglyphus sabulosus Erdős, 1951

Material examined

IRAN, West Azarbaijan province, Miandoab, 36°57'22.019"N, 46°4'49.495" E, 1291 m, 23.viii.2022, Salimi, S. leg, 16♀♀ &8♂♂.

Remarks

In the current study, we report the first instance of this species being sampled on *L. perenne* (Poaceae) in West Azarbaijan Province, thereby extending its known host range and geographical distribution. This novel association with *L. perenne* suggests potential adaptability to new host environments and warrants further research into the species' ecological plasticity and its potential agricultural impact on Poaceae-associated crops in the region. This species, previously reported in association with *Pegomya beta* (Curtis) (Diptera: Anthomyiidae) on *Beta vulgaris* (Amaranthaceae) in Iran, has been documented by several authors (Davatchi & Shojai, 1969; Shojai, 1998). The ecological specificity of *P. beta* to its host plants has predominantly focused on *B. vulgaris*, highlighting its significance in crop management and pest control within Amaranthaceae host families.

Distribution

Palaearctic region (UCD Community, 2023); Iran: Alborz (Davatchi & Shojai, 1969; Shojai, 1998); Tehran (Farahbakhsh, 1961); West Azarbaijan (Jafarlu *et al.*, 2022).

Subfamily Tetrastichinae Förster, 1856

Genus *Aprostocetus* Westwood, 1833

This cosmopolitan genus within the family Eulophidae comprises over 780 species globally, including 350 species in the Palaearctic region and 40 species in Iran (UCD Community, 2023; Hesami *et al.*, 2018). Species of this genus are primary parasitoids of insect eggs, larvae, and pupae, including those of gall-forming insects and other concealed hosts (Bouček, 1988).

Aprostocetus apicalatus Graham, 1987 (Figure 1~~Figure 1~~)

Material examined

IRAN, West Azarbaijan province, Piranshahr, 36°40'48.779"N, 45°12'12.269"E, 1401 m, 22.ix.2023, Salimi, S. leg, 3♀♀.

Diagnosis

Body color metallic green with golden tints, particularly on gastral tergites (Fig 1B); antennal scape mostly to entirely yellow, except for a dark brown inner surface; flagellum fulvous to testaceous (Fig 1A); upper angle of mesopleuron yellow (Fig 1C); legs, including forecoxa and sometimes mid-coxa, concolorous with thorax;

dorsellum yellow. Head with malar sulcus lacking a distinct fovea; pedicel shorter than the first funicular segment; funiculars segments decreasing in length and elongate; clava with a long, slightly downcurved, tapering terminal spine (Fig 1A). Median lobe of mesoscutum nearly always with a single row of three adnotaular setae on each side, median line faint, visible only in the posterior half. Propodeum medially as long as dorsellum, with a distinct median carina (Fig 1C). Forewing hyaline; summarginal vein with three dorsal setae (Fig 1D). Gaster with one seta on each cercus distinctly sinuate at its midpoint (Fig 1E).

Remarks

In this research, *A. apiculatus* was collected on *L. perenne* for the first time in Iran. To date, no specific host has been documented for this species in the available literature (UCD Community, 2023). However, Graham (1987) hypothesized that plants within Poaceae could potentially serve as hosts. The findings of the present study provide confirmation of this hypothesis.

Distribution

Palaearctic region (UCD Community, 2023), Iran (**new record**).

***Aprostocetus forsteri* (Walker, 1847)**

Material examined

IRAN, West Azarbaijan province, Miandoab, 36°58'53.855"N, 46°12'52.756″ E, 1312 m, 20.viii.2022; Salimi, S. leg, 11♀♀ 7♂♂; Piranshahr, 36°47'59.469"N, 45°14'51.051"E, 1453 m, 10.viii.2022, Salimi, S. leg, 2♀♀.

Remarks

In the present research, the species was successfully reared on *Dactylis glomerata*. It has been recorded in association with *Cephus pygmaeus* L. (Hymenoptera: Cephidae) in Iran (Yefremova *et al.*, 2007). Its primarily known host plants include Fabaceae, Asteraceae and Brassicaceae (Pourhaji *et al.*, 2020). This finding provides valuable information regarding the plant associations of this species and suggests potential adaptability to new host plants within the Poaceae.

Distribution

Palaearctic region (UCD Community, 2023); Iran: East Azarbaijan (Pourhaji *et al.*, 2020), Fars (Hesami *et al.*, 2008, 2010), Golestan (Ghahari & Yefremova, 2013), Tehran (Yefremova *et al.*, 2007).

***Aprostocetus phragmiticola* Graham, 1987 (Figure 2~~Figure 2~~)**

Formatte

Formatte
Script For

Material examined

IRAN, West Azarbaijan province, Miandoab, 36°57'22.019"N, 46°4'49.495" E, 1291 m, 23.viii.2022, Salimi, S. leg, 4♀♀.

Diagnosis

Body color predominantly yellow with metallic tinge throughout, except for black to fuscous parts (Fig 2B).Ocellar triangle, a spot on middle of frons (Fig 2C), a broad transverse band on occipital surface above foramen magnum, a spot on front of pronotum, a roundish spot on front of each scapula and axilla, sides of metanotum, paraspiracular area toward the median carina, transverse bands on gastral tergites, ovipositor sheaths (Fig 2E). Scape not extend above the vertex, ventral edge bearing at least one seta above the middle in addition to the subapical seta; first funicular segment not longer than pedicel; clava at most 4 times as long as broad, with long terminal spine (Fig 2A). Median lobe of mesoscutum without median line; submedian grooves of mesoscutellum nearly always at least slightly nearer to sublateral grooves than to each other; mesoscutellum in profile weakly convex, anterior setae slightly shorter than the posterior setae. Propodeum with median carina having a short triangular basal fovea (Fig 2E). Fore wing with 4 dorsal setae on submarginal vein (Fig 2D). Spur of mid tibia 0.75 length of basitarsus; hind coxa oblique with respect to plane of mesoscutum-mesoscutellum. Ovipositor elongate and conspicuous (Fig 2F).

Remarks

In this study, we report the association of *A. phragmiticola* with *Phragmites australis* (Poaceae) for the first time in Iran, providing new insights into its potential range of plant associations. This species is recognized as a parasitoid of dipterans within the family Cecidomyiidae (Belokobylskij, 2019). However, no specific plant associations have been documented for *A. phragmiticola*, highlighting the need for further research to clarify its ecological relationships and habitat preferences.

Distribution

Palaearctic and Nearctic regions (UCD Community, 2023), Iran (**new record**).

Aprostocetus sp.

Material examined

IRAN, Azarbaijan province, Miandoab, 37°4'38.213"N, 46°8'7.249"E, 1312 m,11.x.2022, Salimi, S. leg, 6♀♀; Naqadeh, 37°1'11.058"N, 45°25'48.583"E, 1281 m, 15.x.2022, Salimi, S. leg, 2♀♀; Shahin Dezh, 36°45'44.840"N, 46°26'58.154"E, 1327 m, 22.x.2022, Salimi, S. leg, 1♀.

Aprostocetus sp. has been reared from Cynipidae galls on the stems of *Phalaris minor* (Poaceae). Several species of the genus *Aprostocetus* have been documented in various host associations across different plant families in Iran. Notably, these undermined have been recorded within the pods of *Astragalus meridionalis* (Fabaceae) (Hesami *et al.*, 2006) and on oak gall wasps (Hymenoptera: Cynipidae) found on *Quercus* species (Fagaceae) (Tavakoli *et al.*, 2010). Additionally, *Aprostocetus* has been associated with *Liriomyza congesta* (Becker) (Diptera: Agromyzidae), a species that infests *Trigonella* sp. and *Medicago sativa* (Fabaceae) (Shahreki *et al.*, 2012, 2016). Another documented

association involves *Chaetorellia carthami* Stackelberg (Diptera: Tephritidae), an economically significant pest of safflower (Lotfalizadeh & Gharali, 2014). Furthermore, associations of *Aprostocetus* with other host plants in Iran have been reported by Moeinadini *et al.* (2014), who documented ten new records of Tetrastichinae (Hymenoptera: Eulophidae) associated with plant galls in Kerman province.

Among the 11 identified eulophid species in this research, only one specimen each of the following four species was obtained: *Pediobius epigonus*, *Pediobius metallicus*, *Baryscapus endemus*, and *Baryscapus torionum*. Based on our findings, we believe these species were transferred through associations with grasses of the family Poaceae, as no plants from other families were present in the laboratory or rearing area. However, we consider their association with the studied grass doubtful.

Discussion

This study significantly enhances our understanding of Eulophidae associations with Poaceae in northwestern Iran. It provides the first records of two Eulophidae species, *A. apiculatus* and *A. phragmiticola*, from Iran. Among the 11 species reared from various grass, three species are newly documented from the West Azarbaijan Province. Notably, several species identified in this study lacked previous plant associations records in Iran, and their newly recorded associations here enrich the existing knowledge.

The findings align with previous studies emphasizing the diversity and adaptability of Eulophidae, particularly regarding plant host associations (LaSalle, 1994; Heraty *et al.*, 2013). The adaptability of *A. apiculatus*, *A. phragmiticola*, and *A. forsteri* to new host environments is remarkable, with their associations with Poaceae suggesting potential for an expanded host range within this family. Notably, *A. apiculatus* is reported here from *Lolium perenne* (Poaceae) for the first time, with no earlier host plant associations recorded in either UCD Community (2023) or Graham (1987). This grass has previously been associated with other Eulophidae species (UCD Community, 2023). This association is consistent with references identifying *L. perenne* as a host plant for various Eulophidae species, such as *Asecodes lagus* (Walker, 1838) and *Chrysocharis nephereus* (Walker, 1839), as well as other Chalcidoidea families (Moore, 1983; Vidal, 1993).

Aprostocetus phragmiticola was previously recorded on *Phragmites australis* (Graham, 1987; Jennings, 2003). In the present study, it is recorded on Cecidomyiidae galls associated with *P. austalis* in Iran. Additionally, *Aprestocetus* species was documented in East Azarbaijan Province by Lotfalizadeh & Gharali (2014), and in this study, it was reared from Cynipidae galls associated with *P. minor*. Notably, *Phalaris* is a known plant associated with *Aprostocetus (Aprostocetus) verutus* (Graham, 1961) (Graham, 1987).

The associations of *P. epigonus*, *C. ingenuus*, and *D. sabulosus* with Poaceae in Iran offer new insights into the ecological flexibility of these parasitoids. *Pedibious epigonus*has has previously been recorded on *Melica nutans* and *Triticum aestivum* (Poaceae) globally (Vidal, 1997; Boucek, 1997). Additionally, *C. ingenuus* and *D. sabulosus* have

been documented from Agromyzidae hosts, consistent with prior studies (Massa *et al.*, 2001; Yefremova, 2015). Similarly, *Diglyphus* species, including *D. isaea*, have shown host diversity and are now associated with *L. perenne* (Shahrki *et al.*, 2012, 2016; Lotfalizadeh *et al.*, 2015). This study also documents the second record of *P. metallicus* on Cecidomyiidae galls and other Chalcidoidea associated with Poaceae in Iran, although it has not been previously documented on Poaceae. However, *P. metallicus* has been recorded on hosts from Agromyzidae, Braconidae, Cecidomyiidae, Eulophidae, Eupelmidae, and Pteromalidae families (Cebeci *et al.*, 2011; Yefremova *et al.*, 2010; Burks, 1979).

Baryscapus endemus was previously documented in northwestern Iran without specific plant associations (Hesami et al., 2018). In this study, it is recorded on other Chalcidoidea families associated with *B. tectrum* (Poaceae). Previous studies also recognize this species as a parasitoid of Eulophidae, Encyrtidae, Eurytomidae, and Pteromalidae (UCD Community, 2023).

Earlier findings suggest that host selection and adaptability among Eulophidae species may be influenced by both phylogenetic lineage and ecological factors driving host expansion and adaptation (Heraty *et al.*, 2013). Although associations between certain Chalcidoidea and Poaceae plants have been documented in Iran (Madjdzadeh *et al.*, 2005, 2011; Bayegan *et al.*, 2015; Fallahzadeh & Japoshvili, 2017), the current work introduces several new records and distributional data. These findings also carry implications for biological control strategies, particularly for species such as *D. isaea* and *C. ingenuus*, which have known pest control potential. Understanding their plant-host associations enhances our capacity to evaluate their utility in agroecosystems. Overall, this study underscores the value of continued taxonomic and ecological investigations to elucidate the diversity and host relationships of Eulophidae, particularly in grassland habitats of the Azarbaijan Provinces and other underexplored regions in Iran.

Author's Contributions

Samaneh Salimi**:** Fieldwork, sampling, and writing. Hossein Lotfalizadeh: project administration, identification of the chalcidoid specimens, and drafting. Younes Karimpour: project administration. **Majid Jafarlu**: identification and edit.

Author's Information

Samaneh Salimi Smanhslymy085@gmail.com https://orcid.org/0009-0008-2150-6250

Hossein Lotfalizadeh h.lotfalizadeh@areeo.ac.ir https://orcid.org/0000-0003-3536-1511

Younes Karimpour y.karimpour@urmia.ac.ir https://orcid.org/0000-0003-2468-8367

Majid Jafarlu majidjafarlu@gmail.com https://orcid.org/0000-0002-5829-8781

Funding

This paper is a part of Samaneh Salimi's Ph.D. thesis no. 7498, which was supported by Urmia University, Iran.

Data Availability Statement

The specimens examined in this study are deposited in the insect collection of the Hayk Mirzayans Insect Museum (HMIM) at the Iranian Institute of Plant Protection in Tehran, Iran. They are available from the curator upon request.

Acknowledgments

The authors are most grateful to the Plant Protection Department of Urmia University, Iran for support of this project.

Ethics Approval

This study only included plants and arthropod material, and all required ethical guidelines for the treatment and use of animals were strictly adhered to in accordance with international, national, and institutional regulations. No human participants were involved in any studies conducted by the authors for this article.

Conflict of Interest

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

REFERENCES

Asadi, R., Talebi, A. A., Fathipour, Y., Moharramipour, S. & Rakhshani, E. (2006). Identification of parasitoids and seasonal parasitism of the agromyzid leafminers genus *Liriomyza* (Dip.: Agromyzidae) in Varamin, Iran. *Journal of Agricultural Science and Technology*, 8, 293–303. https://doi.org/10.1590/s1516-89132009000300008.

Bayegan, Z. A., Lotfalizadeh, H. & Zargaran, M. R. (2015). Occurrence of eulophid wasps (Hymenoptera: Chalcidoidea, Eulophidae) in rice fields of eastern Guilan, Iran. *Journal of Crop Protection,* 4 (2), 199-205. https://doi.org/10.3906/zoo-1312-18.

Belokobylskij, S. A., Samartsev, K. G. & Il'inskaya, A. S. (2019). Annotated catalogue of the Hymenoptera of Russia. Volume II. Apocrita: Parasitica. Proceedings of the Zoological Institute Russian Academy of Sciences, Supplement, 8, 1–594. https://doi.org/10.31610/trudyzin/2019.supl.8.5.

Bouček, Z. (1988). Australasian Chalcidoidea (Hymenoptera): A Biosystematic Revision of Genera of Fourteen Families, with a Reclassification of Species. *CAB International*, London, 832 pp.

Brown, H. (1968). *Psephenus* (Coleoptera: Psephenidae) parasitized by a new chalcidoid (Hymenoptera: Eulophidae). II. Biology of the parasite. *Annals of the Entomological Society of America*, 61, 432–436. https://doi.org/10.1093/aesa/61.2.452

Burks, B.D. (1979). Family Eulophidae. In K.V. Krombein, P.D.J. Hurd, D.R. Smith, & B.D. Burks (Eds.). *Catalog of Hymenoptera in America North of Mexico*. Smithsonian Institution Press, Washington, D.C. Vol. 1, pp. 967–1022.

Cebeci, H. H., Grabenweger, G. & Ayberk, H. (2011). Eulophid parasitoids (Hymenoptera: Eulophidae) of the horse chestnut leafminer, *Cameraria ohridella* (Lepidoptera: Gracillariidae), from Istanbul, Turkey. *Turkish Journal of Zoology*, 35(5), 777–780. https://doi.org/10.3906/zoo-1002-94.

Darsouei, R., Karimi, J. & Morvej, G.H. (2018). *Colpoclypeus florus* (Walker, 1938) (Hymenoptera: Eulophidae) record a new genus from Iran. *Journal of Entomological Society of Iran*, 38(2), 253–255.

Davatchi, A. & Shojai, M. (1969). Les Hyménoptères entomophages de l'Iran (études faunistiques). Vol. 107. *Faculty Agriculture, University Publishing,* Tehran, 88 pp. [in Persian, English summary].

Dousti, A. F., Kamali, K., Nouri Ganbalani, G. & Ostovan, H. (2006). Study of the parasitoids of *Liriomyza trifolii* (Dip.: Agromyzidae) in Shiraz. Proceedings of the 17th Iranian Plant Protection Congress, 2–5 September 2006, Campus of Agriculture and Natural Resources, University of Tehran, Karaj, p. 74.

Dousti, A. F., Kamali, K., Nouri Ganbalani, G. & Ostovan, H. (2008). Report of four Hymenopteran species of Eulophidae, parasitoids of *Liriomyza trifolii* (Dip.: Agromyzidae) in Shiraz, Iran. *Journal of Entomological Society of Iran,* 27, 9–10.

Ebrahimi, E., Malekzadeh, M. & Yefremova, Z. (2009). Parasitoid wasps of *Phyllocnistis citrella* (Lep., Gracillariidae) in Iran. *Applied Entomology and Phytopathology*, 76, 81–92.

Jennings, M. T. (2003). *Aprostocetus calamarius* Graham, 1961 new to Britain and a host record for *A. phragmiticola* Graham, 1987 (Hym., Eulophidae). *Entomologist's Monthly Magazine*, 139, 232.

Fallahzadeh, M. & Japoshvili, G. (2017). An updated checklist of Iranian Encyrtidae (Hymenoptera, Chalcidoidea). *Zootaxa*, 4344, 1–46. https://doi.org/10.11646/zootaxa.4344.1.1.

Fassihi, M. T. & Malekzadeh, M. R. (2015). Natural parasitism of citrus leaf miner, *Phyllocnistis citrella* (Lep.: Gracillariidae) in Bushehr province, Iran. Proceedings of the 1st International Congress of Entomology, p. 174.

Farahbakhsh, G. (1961). A checklist of economically important insects and other enemies of plants and agricultural products of Iran. Tehran: Ministry of Agriculture, Department of Plant Protection. 153 pp.

Fathi, S. A. A. (2011). Tritrophic interactions of nineteen canola cultivars – *Chromatomyia horticola* – parasitoids in Ardabil region. *Munis Entomology and Zoology*, 6, 449–454.

Fursov, V. (1993). A review of European Chalcidoidea (Hymenoptera) parasitizing the eggs of aquatic insects. *Bulletin of the Irish Biogeographical Society*, 18, 2–12.

Gadallah, N. S., Yefremova, Z. A., Yegorenkova, E. N., Soliman, A. M., Abu-El-Ghiet, U. M. & Emardash, Y. A. (2015). A review of the family Eulophidae (Hymenoptera: Chalcidoidea) of Egypt, with thirty three new records. *Zootaxa*, 4058, 066–080. https://doi.org/10.11646/zootaxa.4058.1.3.

Gibson, G. A. P., Heraty, J. M. & Woolley, J. B. (1999). Phylogenetics and classification of Chalcidoidea and Mymarommatoidea – a review of current concepts (Hymenoptera, Apocrita). *Zoologica Scripta*, 28, 87–124. https://doi.org/10.1046/j.1463-6409.1999.00016.x.

Glimn-Lacy, J. & Kaufman, P. B. (2006). Botany illustrated: introduction to plants, major groups, flowering plant families. New York: Springer. 260 pp. https://doi.org/10.5860/choice.44-0304.

Graham, M. W. R. de V. (1987). A reclassification of the European Tetrastichinae (Hymenoptera: Eulophidae), with a revision of certain genera. *Bulletin of the British Museum (Natural History) (Entomology)*, 55(1), 332–333.

Hansson, C. & Navone, P. (2017). Review of the European species of *Diglyphus* Walker (Hymenoptera: Eulophidae) including the description of a new species. *Zootaxa*, 4269 (2), 197–229.https://doi.org/10.11646/zootaxa.4269.2.2. https://doi.org/10.11646/zootaxa.4269.2.2.

Hawkins, B. A. & Goeden, R. D. (1982). Biology of *gallforming Tetrastichus* (Hymenoptera: Eulophidae) associated with gall midges on saltbush in southern California (USA). *Annals of the Entomological Society of America,* 75, 444–447. https://doi.org/10.1093/aesa/75.4.444.

Heraty, J. M., Burks, R. A., Cruaud, A., Gibson, G. A. P. & Liljebad, J. (2013). A phylogenetic analysis of the megadiverse Chalcidoidea (Hymenoptera). *Cladistics*, 29, 466–542. https://doi.org/10.1111/cla.12006.

Hesami, S., Ebrahimi, E., Ostovan, H., Shojai, M., Kamali, K., Yefremova, Z. & Yegorenkova, E. (2010). Contribution to the study of Eulophidae (Hymenoptera: Chalcidoidea) of Fars province of Iran: I – Subfamilies Entedoninae and Tetrastichinae. *Munis Entomology and Zoology*, 5, 148–157. https://doi.org/10.3906/zoo-0805-10.

Hesami, S., Madjdzadeh, S. M., Moeinadini, A., Shafiee, S. & Yegorenkova, E. (2018). Checklist of Iranian Eulophidae (Hymenoptera: Chalcidoidea) with one new genus and eight new species records. *Transactions of the American Entomological Society*, 144, 359–388. https://doi.org/10.3157/061.144.0205.

Hesami, S., Ostovan, H., Ebrahimi, E., Yefremova, Z. A., Yegorenkova, E. N., Shojai, M. & Kamali, K. (2008). A contribution to the fauna of Eulophidae (Hym.: Chalcidoidea) in Fars province of Iran. Proceedings of the 18th Iranian Plant Protection Congress, 24–27 August 2008, University of Bu-Ali Sina Hamedan, p. 91.

Hesami, S., Yefremova, Z., Ebrahimi, E. & Ostovan, H. (2006). Little known and new species of Eulophidae (Hymenoptera, Chalcidoidea) from Iran. *Entomofauna*, 27, 393–402.

Jafarlu, M., Karimpour, Y. & Lotfalizadeh, H. (2021). Review of the genus *Necremnus* Thomson, 1878 (Hymenoptera: Eulophidae) in Iran. *Journal of Crop Protection*, 10(4), 787–797.

Jafarlu, M., Karimpour, Y. & Lotfalizadeh, H. (2023). The first occurrence of *Neotrichoporoides nyemitawus* (Rohwer, 1921) (Hymenoptera: Eulophidae) in the West Palaearctic with a key to the known species from Iran. *North-Western Journal of Zoology*, 19(2), 197–200.

Jafarlu, M., Lotfalizadeh, H. & Karimpour, Y. (2022). Fauna of the genus *Diglyphus* (Hymenoptera: Eulophidae) in the alfalfa fields of Iran. *Journal of Entomological Society of Iran*, 42(3), 213–221. https://doi.org/10.52547/jesi.42.3.5.

Karimpour, Y., Jafarlu, M. & Lotfalizadeh, H. (2023). *Diglyphus anadolucus* Doğanlar, 1982 (Hym., Eulophidae) a primary larval ectoparasitoid of Anthomyiidae (Diptera), with a checklist of *Diglyphus* species in Iran. *Journal of Insect Biodiversity and Systematics*, 9(2), 303–310. https://doi.org/10.52547/jibs.9.2.303.

Khandehroo, F., Moravej, G. H., Sadeghi Namaghi, H. & Fekrat, L. (2016). Introduction of four new species of Eulophidae on ash tree from Iran. *Journal of Plant Protection,* 30, 537–540 [in Persian, English summary].

Khanizad, A., Ghasemi, M. & Moradi, B. (2006). Study on bioecology of chickpea leaf miners and identification of natural enemies in Kurdistan. Proceedings of the 17th Iranian Plant Protection Congress, 2–5 September 2006, Campus of Agriculture and Natural Resources, University of Tehran, Karaj, p. 262.

LaSalle, J. (1990). Tetrastichinae (Hymenoptera: Eulophidae) associated with spider egg sacs. *Journal of Natural History,* 24, 1377–1389. https://doi.org/10.1080/00222939000770831.

LaSalle, J. (1994). North American genera of Tetrastichinae (Hymenoptera: Eulophidae). *Journal of Natural History,* 28, 109–236. https://doi.org/10.1080/00222939400770091.

LaSalle, J. (2005). Biology of gall inducers and evolution of gall induction in Chalcidoidea (Hymenoptera: Eulophidae, Eurytomidae, Pteromalidae, Tanaostigmatidae, Torymidae), pp. 507–537. In: Raman, A., Schaefer, C.W. and Withers, T.M. (eds) Biology, Ecology, and Evolution of Gall-inducing Arthropods. Vol. 2. *Science Publishers*, Enfield, New Hampshire, pp. 507–537.

Lotfalizadeh, H. & Delvare, G. (2011). Iranian species of *Cirrospilus* Westwood (Hymenoptera: Eulophidae) with the description of a new species. *Tijdschrift voor Entomologie*, 154, 173–180. https://doi.org/10.1163/004074912x13397496981427.

Lotfalizadeh, H. & Gharali, B. (2014). Hymenopterous parasitoids of safflower seed pests in Iran. *Applied Entomology and Phytopathology,* 82, 1–11.

Lotfalizadeh, H. & Hosseini, F. (2014). Chalcidoid parasitoids (Hymenoptera) of *Etiella zinckenella* (Treitschke)(Lep.: Pyralidae) on *Sophora alopecuroides* L. in Iran. *North-Western Journal of Zoology,* 10(2), 251-258.

Lotfalizadeh, H., Pourhaji, A. & Zargaran, M. R. (2015). Hymenopterous parasitoids (Hymenoptera: Braconidae,Eulophidae, Pteromalidae) of the alfalfa leafminers in Iran and their diversity. *Far Eastern Entomologist,* 288, 1–24.

Madjdzadeh, S. M., Zerova, M. & Dawah, H. (2005). A new species of *Tetramesa* (Hymenoptera: Eurytomidae) from Iran. *Vestnik Zoologii*, 39(1): 65- 66.

Madjdzadeh, S. M., Dawah, H. A. & Bruford, M. (2011). Morphometric differentiation of *Tetramesa leucospae* Zerova & Madjdzadeh (Hymenoptera: Eurytomidae) populations associated with two geographically isolated grass species in Iran. *Zoology in the Middle East* 52: 79-88. https://doi.org/10.1080/09397140.2011.10638482.

Massa, B., Rizzo, M. C. & Caleca, V. (2001). Natural alternative hosts of Eulophidae (Hymenoptera: Chalcidoidea) parasitoids of the citrus leafminer *Phyllocnistis citrella* Stainton (Lepidoptera: Gracillariidae) in the Mediterranean basin. *Journal of Hymenoptera Research,* 10(1), 91–100.

Mohammadi, R., Lotfalizadeh, H. & Pashayi-Rad, S. (2011). Hymenopterous parasitoids associated with rose gall wasps (Hymenoptera: Cynipidae) at the north of West-Azarbaijan province: Composition of species and their seasonal changes. *Journal of Crop Field Entomology,* 1, 17–30 [in Persian, English summary].

Moore, D. (1983). Hymenopterous parasitoids of stem-boring Diptera (for example *Oscinella frit*) in perennial ryegrass (*Lolium perenne*) in Britain. *Bulletin of Entomological Research,* 73(4), 601–608. https://doi.org/10.1017/s0007485300009202.

Munro, J. B., Heraty, J. M., Burks, R. A., Hawks, D. & Mottern, J. (2011). A molecular phylogeny of the Chalcidoidea (Hymenoptera). *PLoS ONE*, 6, e27023. https://doi.org/10.1371/journal.pone.0027023.

Noyes, J. S. (1978). On the numbers of genera and species of Chalcidoidea (Hymenoptera) in the world. *Entomologist 's Gazette,* 29, 163–164.

Noyes, J. S. (1982). Collecting and preserving chalcid wasps (Hymenoptera: Chalcidoidea). *Journal of Natural History*, 16, 315-334. https://doi.org/10.1080/00222938200770261.

Peterson, P. M., Romaschenko, K., Arrieta, Y. H., & Saarela, J. M. (2014). A molecular phylogeny and new subgeneric classification of Sporobolus (Poaceae: Chloridoideae: Sporobolinae). *Taxon*, 63(6), 1212-1243. https://doi.org/10.12705/636.19.

Pourhaji, A., Lotfalizadeh, H., Farshbaf-Pourabad, R. & Gharali, B. (2020). Parasitic wasps (Hymenoptera: Chalcidoidea) associated with flower-heads of Asteraceae in Iran. *Biologia*, 75, 547–565. https://doi.org/10.2478/s11756-019-00319-7.

Samin, N., Fischer, M. & Ghahari, H. (2015). A contribution to the study of Eulophidae (Hymenoptera: Chalcidoidea) in the alfalfa fields of Iran. Acta Zoologica Academiae Scientiarum Hungaricae, 61(2), 129–139.

Schauff, M. E., LaSalle, J. & Coote, L. D. (1997). Eulophidae. In: Gibson, G.A.P., Huber, J.T. and Wooley, J.B. (eds) Annotated Keys to the Genera of Nearctic Chalcidoidea (Hymenoptera). National Research Council Canada, *NRC Research Press,* Ottawa, pp. 327–429.

Shahbazvar, N. & Zeya, S. B. (2022).*Euderomphale ayeganus* sp. nov.: A new species of Eulophidae (Hymenoptera: Chalcidoidea) from Iran. *North-Western Journal of Zoology*, 18(2), 205–208. https://doi.org/10.11646/zootaxa.5134.4.6.

Shahreki, Z., Rakhshani, E. & Gumovsky, A. (2016). Identification of parasitoids of leafminer flies in Sistan region – Iran. *International Archive of Applied Sciences and Technology,* 7, 9–13.

Shahreki, Z., Rakhshani, E., Dousti, A., Ravan, S., Khajeh, N. & Taheri, S. (2012). A survey on parasitoids (Hym., Chalcidoidea, Eulophidae) of the Agromyzid leaf miners in Sistan region, Iran. Proceedings of the 20th Iranian Plant Protection Congress, 26–29 August 2012, University of Shiraz, p. 103.

Sheng, J. J. & Zhao, F. X. (1993). A new species of Aprostocetus from China (Hymenoptera: Eulophidae: Tetrastichinae). *Entomologia Sinica*, 2, 308–310. https://doi.org/10.1111/j.1744-7917.1995.tb00052.x.

Shojai, M. (1998). Entomology (Ethology Social Life and Natural Enemies) (Biological Control). 3rd vol., 3rd edn. *University of Tehran Publication,* Tehran, Iran, 550 pp. [in Persian].

Shojai, M., Ostovan, H., Darvish, F., Tirgari, S., Labbafyi, Y. & Rajabi, M. Z. (2005). Technology of biological control and pollination of Iranian cucumber cultivar in protected cultivation and organic production crop. *Journal of Agricultural Sciences (Islamic Azad University),* 11, 69–104 [in Persian, English summary].

Shojai, M., Ostovan, H., Zamanizadeh, H., Labbafi, Y., Nasrollahi, A., Ghasemzadeh, M. & Rajabi, M. Z. (2003). The management of cucumber and tomato intercrops and implementation of non-chemical control of pests and diseases for organic crop production in the greenhouse. *Journal of Agricultural Sciences (Islamic Azad University)*, 9, 1–39 [in Persian, English summary].

Talebi, A. A., Asadi, R., Fathipour, Y., Kamali, K., Moharramipour, S. & Rakhshani, E. (2005). Eulophid parasitoids of agromyzid leafminers genus *Liriomyza* (Dipt.: Agromyzidae) in Tehran, Iran. *IOBC WPRS Bulletin,* 28, 263–266.

Tavakoli, M., Melika, G., Sadeghi, S. E., Askew, R. R. & Stone, G. N. (2010). Parasitoid communities (Chalcidoidea) of oak gall wasps of Iran (Hymenoptera: Cynipidae). Proceedings of the 7th International Congress of Hymenopterists, 20–26 June 2010, Köszeg, Hungary, pp. 115–116.

UCD Community**.** (2023). Universal Chalcidoidea Database (UCD) curated in Taxon Works. https://sfg.taxonworks.org/api/v1/. Accessed on [May 2024].

van den Berg, E., Prinsloo, G. L. & Neser, S. (1990). An unusual host association: Aprostocetus sp. (Eulophidae), a hymenopterous predator of the nematode *Subanguina mobilis* (Chit and Fischer, 1975) Brzeski 1981 (Anguinidae). *Phytophylactica*, 22, 125–127.

Vidal, S. E. (1993). Determination list of entomophagous insects. No 12. *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique,*16(3), 56.

Vidal, S. E. (1997). Determination list of entomophagous insects. Nr. 13. *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique*, 20(2),53.

Yefremova, Z., Mishchenko, A. & Yegorenkova, E**.** (2010). Biology and morphology of immature stages of some species of Eulophidae (Hymenoptera: Chalcidoidea), parasitoids associated with leafminers (Lepidoptera: Gracillariidae and Gelechiidae). G. Melika (Ed). *Programme and Abstracts. Seventh International Congress of Hymenopterists, 20-26th January, 2010, Köszeg, Hungary.*, 68–69.

Yefremova, Z. A. (2015). An annotated checklist of the Eulophidae (excl. Tetrastichinae) (Hymenoptera: Chalcidoidea) of Israel. *Zootaxa*, 3957(1), 1–36. https://doi.org/10.11646/zootaxa.3957.1.1.

Yefremova, Z. A., Ebrahimi, E. & Yegorenkova, E**.** (2007). The subfamilies Eulophinae, Entedoninae and Tetrastichinae in Iran, with description of new species (Hymenoptera: Eulophidae). *Entomofauna,* 28, 405–440.

Yoder, M. J., Mikó, I., Seltmann, K. C., Bertone, M. A. & Deans, A. R. (2010). Hymenoptera Anatomy Consortium. Available on: http://glossary.hymao.org (accessed October 9, 2024). https://doi.org/10.1371/journal.pone.0015991.

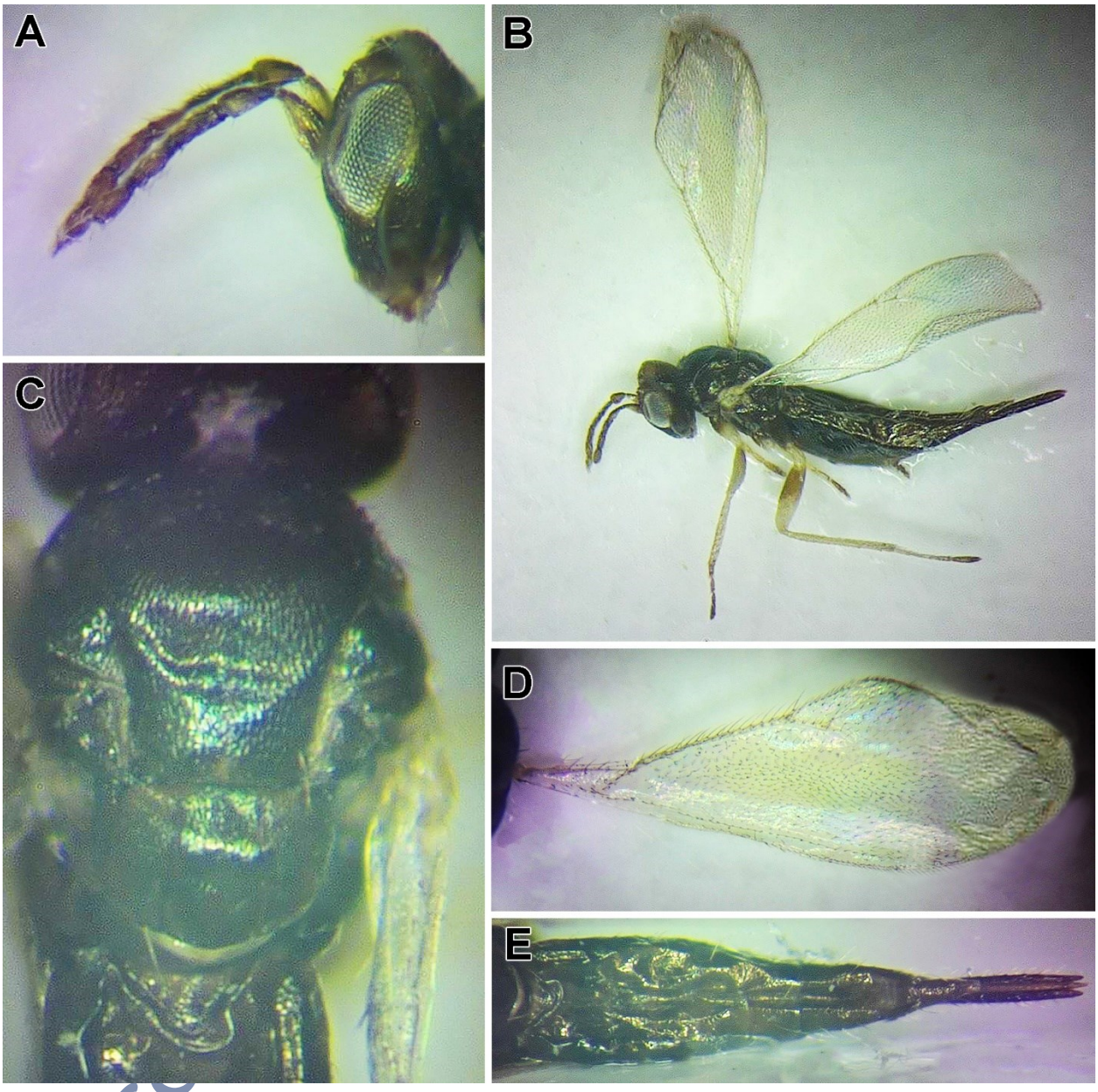

Figure 1. *Aprostocetus apiculatus* Graham, 1987, Female. A. Antennae and Head in lateral view; B. General habitus in lateral view; C. Mesonotum and Propodeum in dorsal view; D. Fore wing venation; E. Ovipositor

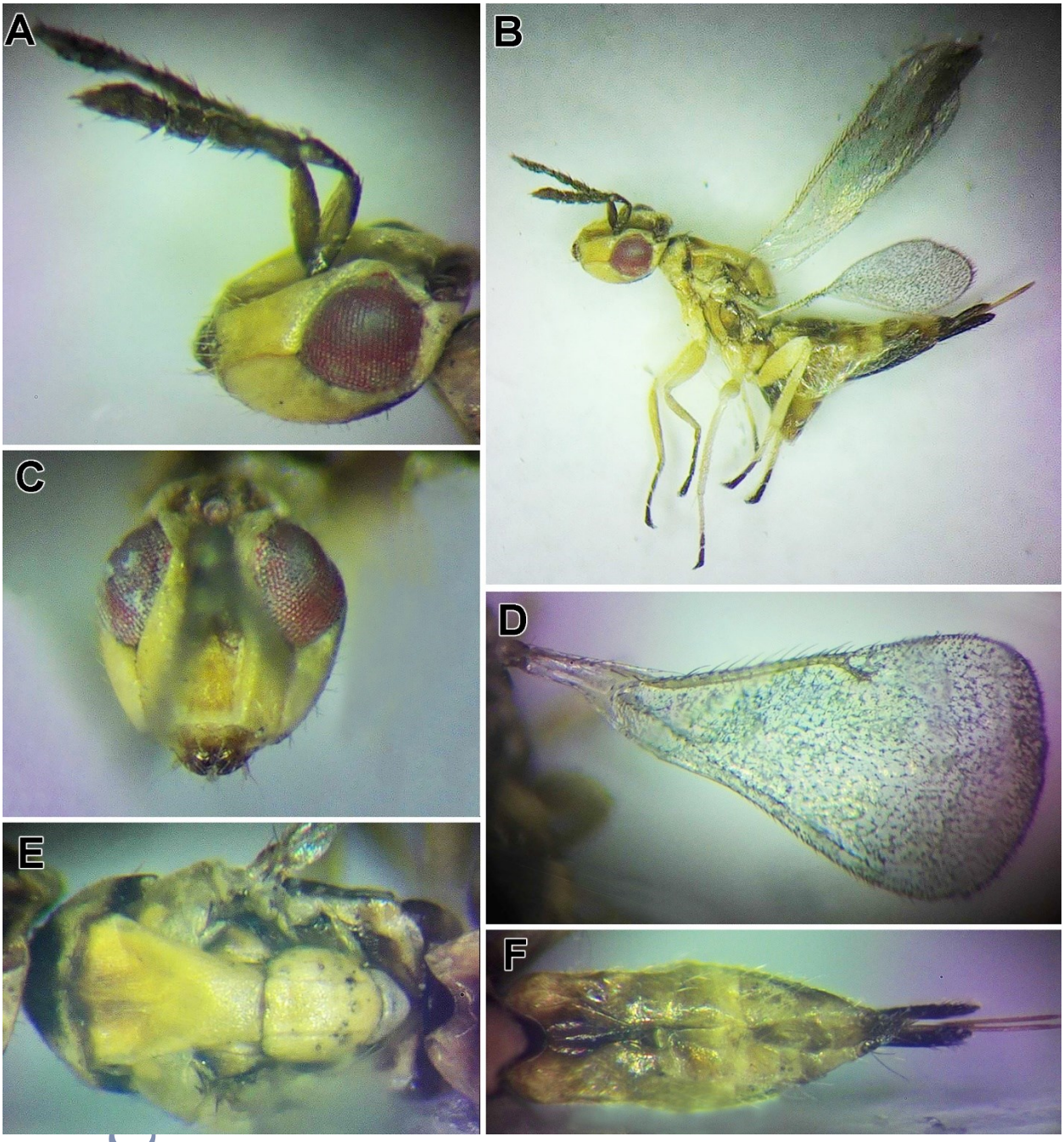

Figure 2. *Aprostocetus phragmiticola* Graham, 1987, Female. A. Antennae and Head in lateral view; B. General habitus in lateral view; C. Head in frontal view; D. Fore wing venation; E. Mesonotum and Propodeum in dorsal view; F. Ovipositor

زنبورهای (Hymenoptera: Eulophidae) مرتبط با گندمیان (Poaceae) در شمال‌غرب ایران

سمانه سلیمی[1*]، حسین لطفعلی‌زاده [2]، یونس کریمپور[3]، مجید جعفرلو [4]

۱–گروه گیاه‌پزشکی، دانشکده کشاورزی، دانشگاه ارومیه، ارومیه، ایران.

۲ -بخش تحقیقات رده بندی حشرات، موسسه تحقیقات گیاهپزشکی کشور، سازمان تحقیقات، آموزش و ترویج کشاورزی، تهران، ایران

۳ -گروه گیاه‌پزشکی، دانشکده کشاورزی، دانشگاه ارومیه، ارومیه، ایران

۴ -گروه گیاه‌پزشکی، دانشکده کشاورزی، دانشگاه ارومیه، ارومیه، ایران.

Smanhslymy085@gmail.com*https://orcid.org/0009-0008-2150-6250*

h.lotfalizadeh@areeo.ac.ir*https://orcid.org/0000-0002-7927-819X*

y.karimpour@urmia.ac.ir*https://orcid.org/0000-0003-2468-8367*

majidjafarlu@gmail.com*https://orcid.org/0000-0002-5829-8781*

چکیده

طی بررسی که در استان آذربایجان‌غربی، شمال‌غرب ایران، انجام شد، تعدادی از گونه‌های تیره گندمیان (Poaceae) در بازه زمانی ۲۰۲۱ تا ۲۰۲۳ جمع‌آوری شدند. نمونه‌های گیاهی از گونه‌های *Phragmites australis* (Cav.) Trin. ex و *Phalaris minor* Retz, *Lolium perenne* L., *Dactylis glomerata* L., *Bromus tectorum* (L.) Nevski Steud. به آزمایشگاه حشره‌شناسی دانشگاه ارومیه منتقل شده و پرورش یافتند. در مجموع ۱۱ گونه از خانواده Eulophidae راسته Hymenoptera بالاخانواده Chalcidoidea شناسایی شدند که در پنج جنس و سه زیرخانواده قرار داشتند: گونه‌های *Pediobius epigonus* (Walker, 1839) و *P. metallicus* (Nees, 1834) از زیرخانواده Entedoninae؛ گونه‌های *Cirrospilus ingenuus* Gahan, 1932 و *Diglyphus isaea* (Walker, 1838) از زیرخانواده Eulophinae؛ *D. sabulosus* Erdös, 1951 و گونه‌های *Aprostocetus apiculatus* Graham, 1987 و *Aprostocetus* sp., *A. forsteri* (Walker, 1847), *A. phragmiticola* Graham, 1987, *Baryscapus endemus* (Walker, 1839), و *B.turionum* (Hatrig, 1838) از زیرخانواده Tetrastichinae. نکته قابل توجه این است که دو گونه *A. apiculatus* و *A. phragmiticola* برای نخستین بار از ایران گزارش می‌شوند. همچنین، به‌غیر از گونه‌های *D. isaea* و *D. sabulosus* سایر گونه‌ها گزارش پراکنش جدید محسوب می‌شوند. علاوه براین، ارتباط میزبانی این گیاهان با یولوفیده‌ها برای نخستین بار گزارش شده است. افزون براین، ویژگی‌های تشخیصی گونه‌های جدید همراه با تصاویر ارائه شده است.

کلمات کلیدی: پارازیتوئیدهای مرتبط با گندمیان، فون Chalcidoidea، گندمیان، گزارش جدید