



Additions to the subfamily Alysiinae (Hymenoptera: Braconidae) from Iran: first detection of the genus *Grammospila* Foerster, 1863 and new records of four species

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Abstract. The subfamily Alysiinae (Hymenoptera: Braconidae) is one of the most peculiar and diverse groups of endoparasitoids of Diptera. The present paper provides additional information on the subfamily Alysiinae in Iran. The specimens were collected using Malaise traps during May - September 2010. The genus *Grammospila* Foerster, 1863, and four species of Alysiini were discovered for the first time from Iran: *Grammospila fuscula* Griffiths, 1968, *G. rufiventris* Nees, 1812, *Dacnusa maculipes* Thomson, 1895 and *D. plantaginis* Griffiths, 1966. Including our findings, the number of species of the genera *Dacnusa* and *Grammospila* are raised to 22 and 2 species in Iran, respectively. Diagnostic characters and distribution of the newly recorded species and an updated list of *Dacnusa* and *Grammospila* are provided.

Keywords: *Dacnusa*, *Grammospila*, Iran, Parasitoid, New record

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Introduction

The braconid wasps (Hymenoptera: Braconidae) are one of the most diverse and powerful parasitoids which have an efficient role in the biological control of various agricultural and forest pests (Goulet & Huber, 1993). This family comprises about 21,221 described species and an estimated 40,000 to 70,000 species worldwide (Yu *et al.*, 2016). The majority of the species are larval parasitoids of herbivorous insects in various orders including Coleoptera, Diptera, Hymenoptera, and Lepidoptera (Shaw & Huddleston, 1991), which play an important role in the biological control of pests in natural and agro-ecosystems (Godfray *et al.*, 2023). Recently, the catalogue of Iranian Braconidae has been published by Gadallah *et al.* (2022), in which they reported 1363 species belonging to 203 genera. Subfamily Alysiinae Leach, 1815 with 107 genera, and more than 2442 species worldwide, is divided into two large tribes, namely, Alysiini Leach, 1815 and Dacnusiini Foerster, 1863 (Shaw & Huddleston, 1991; Stigenberg & Peris-Felipo, 2019; Peris-Felipo *et al.*, 2016 a, b, c, d). This subfamily is represented by 213 species in 32 genera and two tribes in the Middle East, of which 171 species in 28 genera have been reported from Iran (Cortés *et al.*, 2016; Farahani, *et al.*, 2016; Yu *et al.*, 2016; Gadallah *et al.*, 2022). About 10 species of Alysiinae were originally described from Iran (Fischer *et al.*, 2011; Peris-Felipo *et al.*, 2015, 2016 a, b, d; Yu *et al.*, 2016). From a biological point of view, members of the tribe Alysiini interact with a wide range of hosts from more than twenty families of Cyclorrhaphous Diptera, but the majority of the hosts belong to Anthomyiidae, Calliphoridae, Drosophilidae, Lonchopteridae, Muscidae, Phoridae, Sarcophagidae and Scathophagidae (Shenefelt, 1974; Belokobylskij & Kostromina, 2011; Yu *et al.*, 2016), often in humid habitats and ephemeral substrates (Wharton *et al.*, 1997). On the contrary, members of the tribe Dacnusiini are almost exclusively specialized on leafminer and fruit flies of the families Agromyzidae,

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Chloropidae, Drosophilidae, Ephydriidae, and Pisilidae (Shaw & Huddleston, 1991; Belokobylskij & Kostromina, 2011; Peris-Felipo & Jiménez-Peydró, 2012). Many species of the subfamily Alysiniinae are considered biological control agents of economically important Diptera pests (Griffiths, 1968; Drea *et al.*, 1986; Wharton, 1997; van Achterberg *et al.*, 2012), having a significant role in regulating pest populations in agricultural and natural ecosystems (Safahani *et al.*, 2017).

Dacnusa Haliday, 1833 is the second largest genus of the tribe Dacnusiini, with about 425 described species up to 2015, according to Yu *et al.* (2016). Since then, three additional species have been described from the palaeartic region in China (Zheng & Chen, 2017). Members of this genus are mainly parasitoids of leaf-miner flies (Agromyzidae) and fruit flies (Drosophilidae) (Ashmead, 1900; Griffiths, 1967; Shaw, & Huddleston, 1991). Prior to this paper, 20 species of the genus *Dacnusa* were reported from Iran (Gadallah *et al.*, 2015; Ghotbi Ravandi *et al.*, 2015; Lotfalizadeh *et al.*, 2015; Cortés *et al.*, 2016; Peris-Felipo *et al.*, 2016a; Yari *et al.*, 2016).

Grammospila Foerster, 1863, is a small Palearctic and Northeast Oriental genus of the tribe Dacnusiini (van Achterberg, 2018), which are koinobiont parasitoids of Agromyzidae (Yu *et al.*, 2016) and Scathophagidae (Zhu *et al.*, 2017, van Achterberg, 2018). Members of this genus were originally described in the genus *Dapsilarthra* Foerster, 1863 (van Achterberg, 1983), but recently separated from *Dapsilarthra* by a combination of the following characters: third antennal segment distinctly longer than the fourth segment (subequal in *Dapsilarthra*), and different fore wing venation and usually a shorter first discal cell (Zhu *et al.*, 2017). This genus has seven species, of which six species (i.e., *G. tirolensis*, *G. martae*, *G. fuscata*, *G. isabella*, *G. rufiventris*, *G. ochrogaster*) are described from the western Palearctic (Chen & Wu, 1994) and one species (*G. eurys*) from eastern Palearctic region (Chen & Wu 1994; Yu *et al.*, 2016; Zhu *et al.*, 2017). The latter species (i.e., *Grammospila eurys*) was originally established in the genus *Adeluroloa* Strand, 1928. It was then transferred to the genus *Dapsilarthra* Foerster, 1863 by Peris-Felipo *et al.* (2016), and finally, Zhu *et al.* (2017) placed this species in the genus *Grammospila* Foerster, 1863, establishing *Grammospila eurys* (Chen & Wu, 1994) as a new combination.

Despite previous studies carried out to increase our knowledge about the diversity and ecological information of Alysiniinae in Iran (Lashkari-Bod *et al.*, 2010, 2011; Fischer *et al.*, 2011; Khajeh *et al.*, 2014; Sedighi *et al.*, 2014; Gadallah *et al.*, 2015; Ghotbi Ravandi *et al.*, 2015; Hazini *et al.*, 2015; Cortés *et al.*, 2016; Peris-Felipo *et al.*, 2016a; Iranmanesh *et al.*, 2017; Safahani *et al.*, 2017; Gadallah *et al.*, 2022), their biological and taxonomical knowledge is still largely unknown.

This work aims to provide further studies on Alysiniinae, which leads to the discovery and identification of more species as part of ongoing faunistic studies of Braconidae in the Hyrcanian forests in northern Iran, which contain the highest biodiversity of Braconidae in Iran (Rakhshani *et al.*, 2005; Zargar *et al.*, 2015; Farahani *et al.*, 2016; Rahmani *et al.*, 2017; Dolati *et al.*, 2018; Abdoli *et al.*, 2019a,b, 2021a,b; Ameri *et al.*, 2020). More investigation is required to identify the biological features of Alysiniinae to conserve them as biological control agents of herbivore insects in natural and ecosystems.

Materials and methods

Specimens were collected in two localities in Guilan province (Fig 1A) using Malaise traps (Fig 1B). The trapped specimens were collected from May to September 2010. The traps operate continuously over the season, with a two-week collection interval and are preserved in 70% ethanol as the killing and preservation agent, and then stored in the laboratory for further study. For the preparation of samples, specimens were placed on a piece of absorbing paper for drying. The dried specimens were card-mounted and labelled. Illustrations were taken using an Olympus SZX9 stereomicroscope equipped with a BMZ-04-DZ digital imaging system (Behin Pajouhesh Co., Iran) and LED ring light illuminator, MIC-209. A series of 15-20 captured images were merged into a single in-focus image using the image-stacking software Combine ZP1.0. Morphological terminology follows van Achterberg (1990). The specimens were identified using the key of Tobias & Jakimavicius (1986), Tormos *et al.* (2008), Zhu *et al.* (2017) and van Achterberg (2018). The species distribution map was created using SimpleMappr (Shorthouse, 2010). Specimens are deposited in the insect collection of the Department of Entomology, Tarbiat Modares University, Tehran (TMUC).



Fig. 1. The sampling localities in Guilan province (northern Iran). **A.** Hyrcanian forests; **B.** Malaise trap.

Results

Family Braconidae Nees, 1811

Subfamily Alysiinae Leach, 1815

Tribe Alysiini Leach, 1815

Genus *Dacnusa* Haliday, 1833

Diagnosis

Sides of the metathorax and propodeum are sometimes fairly evenly pubescent, setae thin, and uniformly distributed, precoxal sulcus smooth (Figs. 2C,D; 3C,D); pterostigma long and thin, reaching beyond the middle of the radial cell, or characterized by sharp sexual dimorphism (Figs. 2E,3E) (Tobias, 1986).

Dacnusa maculipes Thomson, 1895 (Fig. 2 A-F)

Material examined: 1 ♀, IRAN: Guilan province, Orkom (36°45'44.34" N, 50°18'11.88" E, 1201 m), 17.V. – 05.VII.2010, TMUC, leg.: M. Khayrandish.

Diagnosis

(Female): Body length 2.0 mm; antenna 1.1 times as long as body, with 29 antennomeres (Fig. 2B,F); mandible three-toothed, upper and middle teeth pointed, lower tooth wide (Fig. 2A); mesosoma 1.1 times as long as high, mesoscutum not densely pubescent, the posterior half of the lateral lobes bare, notaulices shortly indicated anteriorly (Fig. 2C), metasomal tergite I black, tergite II dark brown, other tergites yellow (Fig. 2D); length of fore wing 2.43 times its maximum width, fore wing with the pterostigma widened towards its apex, metacarp and marginal cell comparatively short, vein SR3 rather strongly curved (Fig. 2E).

Zoogeographical distribution

Palearctic (Austria, Azerbaijan, Belgium, Bulgaria, Czech Republic, Denmark, France, Hungary, Iran, Italy, Ireland, Germany, Lithuania, Netherlands, Poland, Portugal, Romania, Russia, Spain, Switzerland, United Kingdom) (Yu *et al.*, 2016).

Distribution in Iran

Guilan province. New record from Iran.

Host

Diptera: Agromyzidae: *Phytomyza albiceps* Meigen, 1830, *P. alpina* Groschke, 1957, *P. anemones* Hering 1925, *P. astantiae* Hendel, 1924, *P. atricornis* (Meigen, 1838), *P. autumnalis* Griffiths, 1959, *P. campanulae* Hendel, 1920, *P. cinerea* Hendel, 1920, *P. cirsii* Hendel, 1923, *P. conyzae* Kaltenbach, 1859, *P. corvimontana* Hering, 1930, *P. crassiseta* Zetterstedt, 1860, *P. fuscula* Zetterstedt, 1833, *P. gentiana* (Hendel, 1920), *P. glechomae* (Kaltenbach, 1862), *P. griffithsi* Spencer, 1963, *P. heracleana* Hering, 1937, *P. lappina* Goureaux, 1851, *P. milii* Kaltenbach, 1864, *P. myosotica* Nowakowski, 1959, *P. petoei* Hering, 1924, *P. plantaginis*

Robineau-Desvoidy, 1851, *P. primulae* (Robineau-Desvoidy, 1851), *P. rydeniana* Meigen, 1830, *P. salviae* (Hering, 1924), *P. marginella* Fallén, 1823, *P. succisae* (Hering, 1922), *P. buhri* Hering, 1930, *P. populi* Kaltenbach, 1864 (Griffiths, 1967).

***Dacnusa plantaginis* Griffiths, 1967 (Fig. 3 A–F)**

Material examined: 1 ♀, IRAN: Guilan province, Orkom (36°45'44.34" N, 50°18'11.88" E, 1201 m), 17. V. - 05.VII. 2010, TMUC, leg.: M. Khayrandish.

Diagnosis

(Female): Body length 2.1 mm; antenna 1.2 times as long as body, with 21 antennomeres, more apical flagellomeres are not more than twice as long as wide (Fig. 3B); ocelli forming a small equilateral triangle (Fig. 3C); mandible small, three-toothed; palpi short; face smooth, covered with fine pubescence (Fig. 3A); pronotum with a small medial pit (Fig. 3C); metapleural pubescence dense, whitish, concealing much of the surface beneath; propodeum covered by similar conspicuous white pubescence; first metasomal tergite rugose, evenly covered with rather dense pubescence, tergite III with few or no basal setae (Fig. 3D); ovipositor sheath slightly projecting beyond the apical tergite of metasoma; hind tarsus as long as hind tibia (Fig. 3E,F).

Zoogeographical distribution

Palaearctic (Azerbaijan, Germany, Hungary, Iran, Ireland, Italy, Uzbekistan, United Kingdom and Poland) (Yu *et al.*, 2016).

Distribution in Iran

Guilan province. New record from Iran.

Host

Diptera, Agromyzidae: *Phytomyza griffithisi* Spencer, 1963, and *P. plantaginis* Robineau-Desvoidy, 1851 (Griffiths, 1967; Van Achterberg, 1998).

Genus *Grammospila* Foerster, 1863

Diagnosis

Antenna with 27–41 antennomeres, first flagellomere 1.2–1.5 times longer than the second flagellomere (Figs. 4C, 5C); head to some extent widened posteriorly in dorsal view (Figs. 4A,5A); mesoscutum with medio-posterior depression (Figs. 4D,5D); vein m-cu of hind wing absent; pterostigma narrowly elliptical; vein m-cu of the fore wing just antefurcal; diagonal width of the first discal cell of fore wing often 1.4–1.6 times vein 1-M (Figs. 4E,5E) (van Achterberg, 2018).

***Grammospila fuscula* (Griffiths, 1968) (Fig. 4A–F)**

Material examined: 1 ♀, IRAN: Guilan province, Orkom (36°45'44.34" N, 50°18'11.88" E, 1201 m), 07.VI.2010–14.VI.2010, TMUC, leg.: M. Khayrandish.

Diagnosis

(Female): Body length 1.9 mm; length of antenna 1.35 times as long as body, with 27 antennomeres (Fig. 4C); mandible three-toothed, first tooth sharp, middle tooth curves slightly downward, lower tooth rounded (Fig. 4B); head in dorsal view with several scattered setae (Fig. 4A); mesoscutum in dorsal surface bare and strongly shining; notaulices with only their internal extensions distinct, not extending longitudinally on the dorsal surface of the mesoscutum (Fig. 4D); length of fore wing 2.0 times its maximum width; length of vein r of fore wing 0.2 times as long as vein 2-SR (Fig. 4E,F); ovipositor sheath slightly projecting beyond the apical tergite of metasoma (Fig. 4F).

Zoogeographical distribution

Palaearctic (Austria, former Czechoslovakia, Iran, Italy, Poland, and Switzerland) (Yu *et al.*, 2016; van Achterberg, 2018).

Distribution in Iran

Guilan province. New record from Iran.

Host

Diptera: Agromyzidae: *Cerodontha caricicola* (Hering, 1926), *C. tatrica* Nowakowski, 1967, *Phytomyza adenostylis* Hering, 1926 (Fischer, 1971; Griffiths, 1968, 1984).



Fig. 2. *Dacnusa maculipes* Thomson, 1895: **A.** head in lateral view, **B.** antenna, **C.** head and mesosoma, **D.** basal part of metasoma, **E.** fore wing, **F.** general habitus.



Fig. 3. *Dacnusa plantaginis* Griffiths, 1967: **A.** head in lateral view and mandibles, **B.** antenna, **C.** head and mesosoma, **D.** metasoma, **E.** fore wing, **F.** general habitus.

***Grammospila rufiventris* (Nees, 1812) (Fig. 5A–F)**

Material examined. 1 ♀, IRAN: Guilan province, Ziaz (36°52'27.18" N, 50°13'24.78" E, 490 m), 06. IX. 2010–13. IX.2010, TMUC, leg.: M. Khayrandish

Diagnosis

(Female) Body length 2.0 mm; length of antenna 1.37 times as long as body, with 33 antennomeres; penultimate flagellomere 2.7 times as long as wide (Fig. 5C); clypeus comparatively narrow and rather convex (Fig. 5B); head in dorsal view smooth and shiny (Fig. 5A); notauli are largely absent on mesoscutal disc (Fig. 5D); Length of fore wing 2.2 times its maximum width; first subdiscal cell of fore wing parallel-sided; length

of vein r of fore wing 0.3 times as long as vein 2-SR (Fig. 5E); metasoma darkened or dark brown apically, the base of hind coxa and second tergite brownish yellow (Fig. 5D,F).

Zoogeographical distribution

Palearctic (Austria, Bulgaria, China, former Czechoslovakia, France, Germany, Ireland, Italy, Latvia, Lithuania, Mederia Island, Mongolia, Netherlands, Poland, Portugal (Azores), Romania, Russia, Sweden, Switzerland, Türkiye, Ukraine, United Kingdom and former Yugoslavia (Belokobylskij *et al.*, 2003; Yu *et al.*, 2016; van Achterberg, 2018); Oriental (Japan) (Takada & Imura, 1994).

Distribution in Iran

Guilan province. New record from Iran.

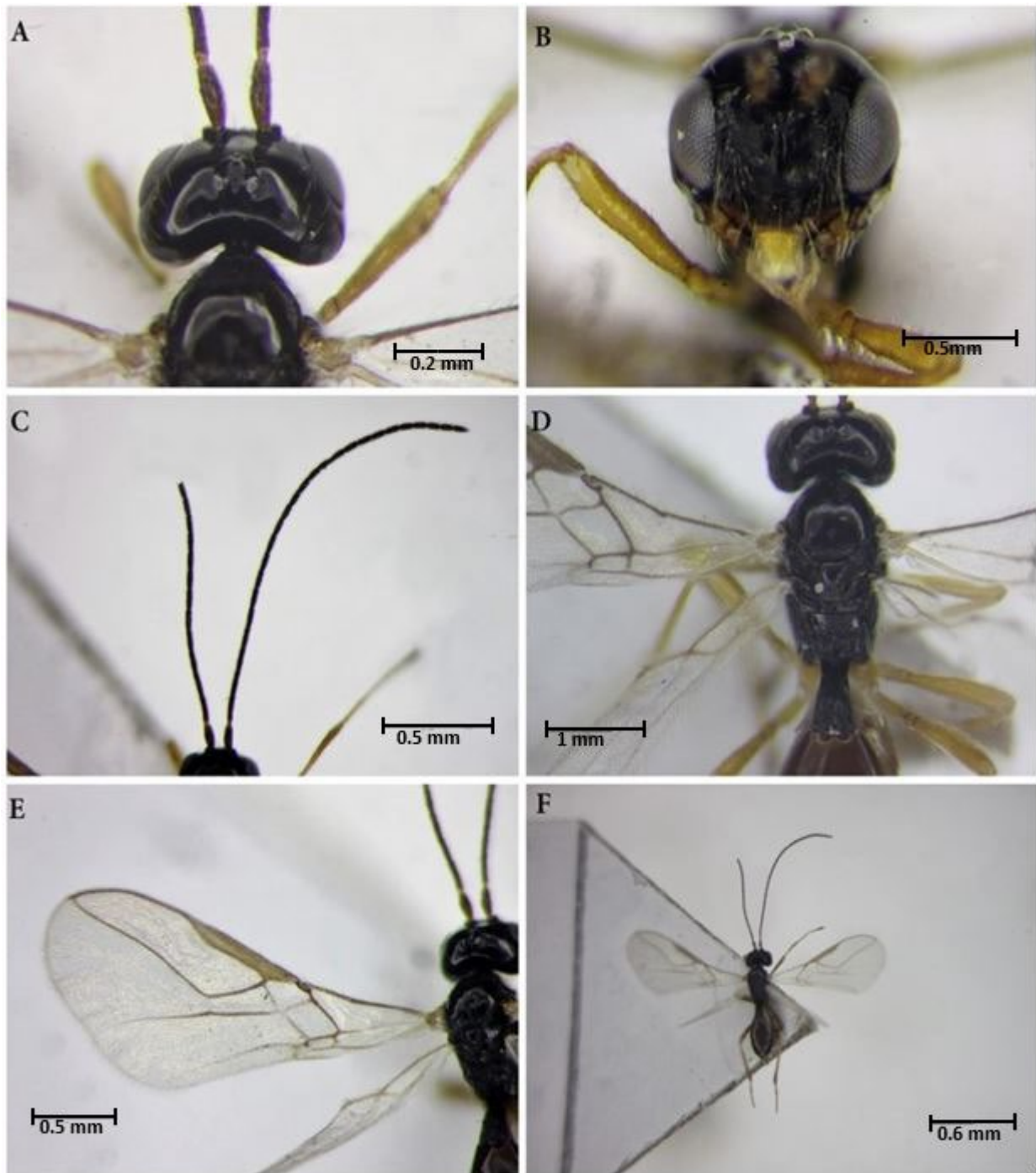


Fig.4. *Grammospila fuscula* (Griffiths, 1968), **A.** head in dorsal view, **B.** head in frontal view, **C.** antenna, **D.** mesosoma, **E.** fore wing, **F.** general habitus.

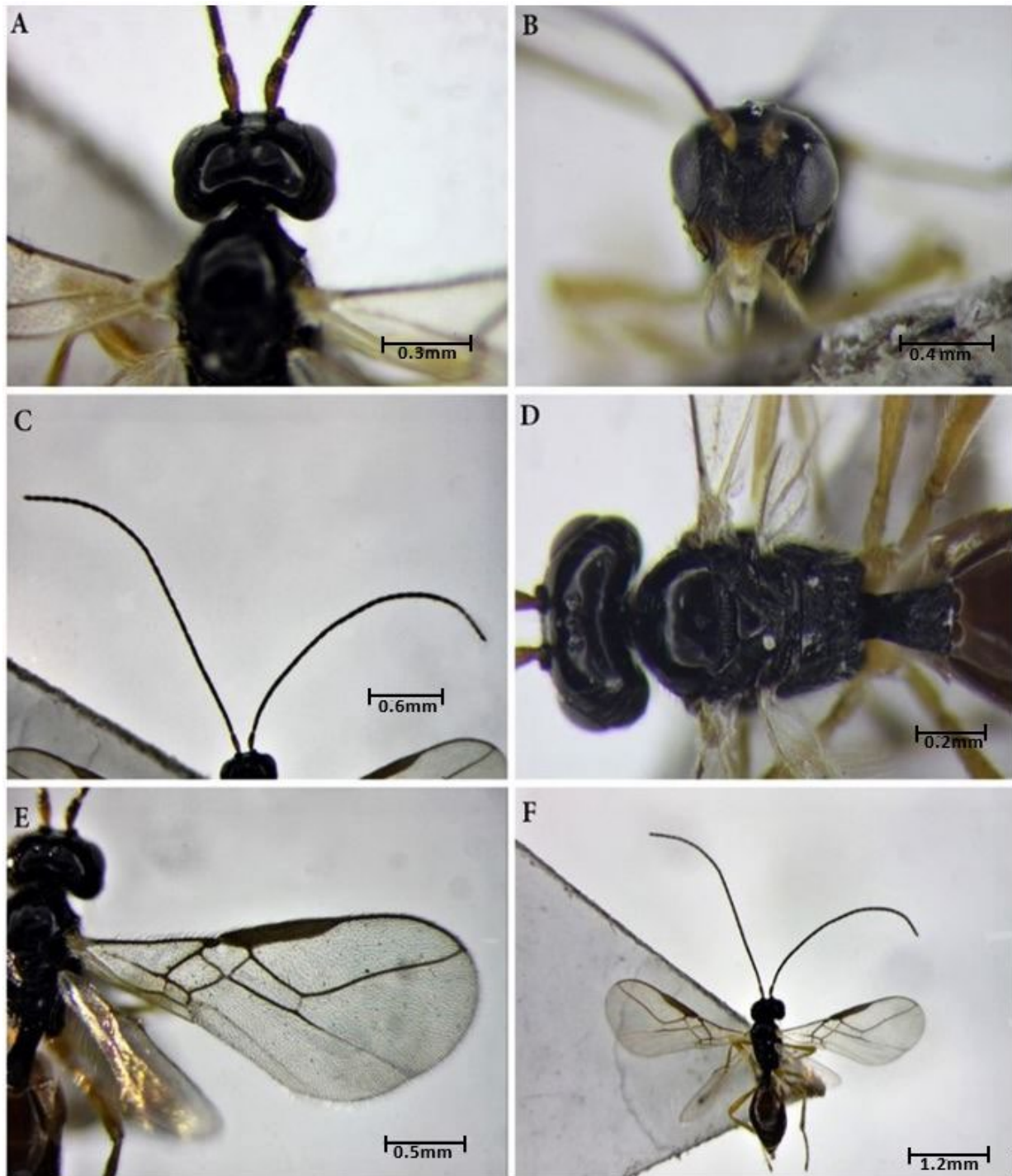


Fig. 5. *Grammospila rufiventris* Nees, 1812; **A.** head in dorsal view, **B.** head in frontal view, **C.** antenna, **D.** mesosoma, **E.** fore wing, **F.** general habitus.

Host

Agromyza potentillae (Kaltenbach, 1864), *Agromyza sulfuriceps* Strobl, 1898 (Dip: Agromyzidae) (Takada & Imura, 1994).

Discussion

Several checklists, revisions, and catalogues have been published for different genera of Iranian Alysiinae (Peris Felipe *et al.*, 2012, 2016; Khajeh *et al.*, 2014; Gadallah *et al.*, 2015). In this study, four species are reported for the first time from Iran.

Table 1. Updated list of the genus *Dacnusa* Haliday, 1833 and *Grammospila* Forster, 1863 (Hymenoptera: Braconidae, Alysiinae) from Iran (Species records marked with an asterisk need confirmation).

Number	Species	Distribution in Iran(Provinces)	References
1	<i>Dacnusa abdita</i> (Haliday, 1839)	Kerman	Ghotbi Ravandi <i>et al.</i> , 2015
2	<i>Dacnusa adducta</i> (Haliday, 1839)*	Ardabil	Samin <i>et al.</i> , 2020
3	<i>Dacnusa alpestris</i> Griffiths, 1967*	Ilam	Ghahari <i>et al.</i> , 2011c
4	<i>Dacnusa aquilegiae</i> Marshall, 1896	Fars, Hormozgan, Kerman	Cortés <i>et al.</i> , 2016
5	<i>Dacnusa areolaris</i> (Nees, 1811)	Hormozgan, Kerman	Cortés <i>et al.</i> , 2016
6	<i>Dacnusa aterrima</i> Thomson, 1895	East Azarbaijan	Gadallah <i>et al.</i> , 2015
7	<i>Dacnusa clematidis</i> Griffiths, 1967	East of Iran	Yari <i>et al.</i> , 2014
8	<i>Dacnusa confinis</i> Ruthe, 1859*	Qazvin	Ghahari <i>et al.</i> , 2011a
9	<i>Dacnusa discolor</i> (Foerster, 1863)*	Ardabil	Samin <i>et al.</i> , 2020
10	<i>Dacnusa evadne</i> Nixon, 1937	East of Iran	Yari <i>et al.</i> , 2014
11	<i>Dacnusa faeroensis</i> (Roman, 1917)*	Guilan	Ghahari <i>et al.</i> , 2020
12	<i>Dacnusa gentianae</i> Griffiths, 1967*	Isfahan	Ghahari <i>et al.</i> , 2011b
13	<i>Dacnusa heringi</i> Griffiths, 1967	East Azerbaijan	Lotfalizadeh <i>et al.</i> , 2015
14	<i>Dacnusa hospita</i> (Foerster, 1863)	Fars, Kermanshah	Fischer <i>et al.</i> , 2011; Khajeh <i>et al.</i> , 2014; Lashkari Bod <i>et al.</i> , 2010, 2011; Hazini <i>et al.</i> , 2015
15	<i>Dacnusa laevipectus</i> Thomson, 1895*	Khuzestan	Samin <i>et al.</i> , 2020
16	<i>Dacnusa metula</i> (Nixon, 1954)	Hormozgan	Cortés <i>et al.</i> , 2016
17	<i>Dacnusa monticola</i> (Foerster, 1863)	East of Iran	Yari <i>et al.</i> , 2014
18	<i>Dacnusa maculipes</i> Thomson, 1895	Guilan	Current study
19	<i>Dacnusa pubescens</i> (Curtis, 1826)*	West Azarbaijan	Samin <i>et al.</i> , 2014
20	<i>Dacnusa plantaginis</i> Griffiths, 1967	Guilan	Current study
21	<i>Dacnusa sasakawai</i> Takada, 1977	East of Iran	Yari <i>et al.</i> , 2014
22	<i>Dacnusa sibirica</i> Telenga, 1935	Ardabil, Isfahan, Kerman, Sistan and Baluchestan, Tehran	Fathi, 2011; Ghahari and Gadallah, 2021; Sedighi <i>et al.</i> , 2014; Shojai <i>et al.</i> , 2003, 2005
23	<i>Grammospila fuscula</i> (Griffiths, 1968)	Guilan	Current study
24	<i>Grammospila rufiventris</i> (Nees, 1812)	Guilan	Current study

The genus *Dacnusa* includes 425 species worldwide (Yu *et al.*, 2016; Zheng & Chen, 2017). Including our finding, the number of species of the genus *Dacnusa* in Iran is now raised to 22 species (Table 1), representing about 5.17% of global diversity, which compares to adjacent countries of Iran as follows: 94 species in Russia (Yu *et al.*, 2016; Godfray, 2022, 2023; Gadallah *et al.*, 2022), three species in Azerbaijan two species in Turkey (Beyarslan & İnanç, 2001; Yu *et al.*, 2016; Gadallah *et al.*, 2022), one species in Tajikistan and none yet recorded from Turkmenistan, and Afghanistan (Yu *et al.*, 2016).

The known assemblage of *Dacnusa* in the country is sporadically recorded from 14 provinces. Most species were recorded from Kerman province (18.1 %) followed by Ardabil, Guilan and Hormozgan provinces (each with 13.6%). Seventeen provinces of the country remain unsurveyed (Fig. 7). However, it should be noted that the records of some species, which are marked with an asterisk (Table 1), are considered doubtful. The voucher specimens of these species are also unavailable (Samin *et al.*, 2014, 2020; Ghahari *et al.*, 2011a, b, c).

Six species of the genus *Grammospila* were previously recorded from the Palaearctic region (i.e., *G. tirolensis*, *G. martae*, *G. fuscula*, *G. isabella*, *G. rufiventris*, *G. ochrogaster*) (van Achterberg, 2018), and one species (i.e., *G. euryis*) from Oriental China (Zhu *et al.* 2017). In this study, the genus *Grammospila* and two species, *G. fuscula* and *G. rufiventris* are recorded from Iran for the first time. In the neighbouring countries of Iran, only *G. rufiventris* was reported from Türkiye (van Achterberg, 1983), and no species of this genus have been reported from other countries of the Middle East (Yu *et al.*, 2016) (Fig. 6).

In general, the limited number of known Alysiinae from Iran reflects the paucity of research on this group, as well as their relative rarity. A comprehensive literature review indicates that the Iranian Alysiinae, are distributed in the Palaearctic region (Fischer *et al.*, 2011; Lashkari Bod *et al.*, 2011; Peris Felipe *et al.*, 2012, 2015, 2016 a, b, d; Khajeh *et al.*, 2014; Gadallah *et al.*, 2015; Ghotbi Ravandi *et al.*, 2015). Further investigations on both fauna and host association of the Iranian Alysiinae, are necessary to provide the basis for biological control. Recently, study on the hymenopteran parasitoids has grown due to the increasing demand for biological control of pests and their possible use as natural enemies (van Achterberg *et al.*, 2012). Alysiinae are koinobiont parasitoids of about 20 families of cyclorrhaphous Diptera (Lasalle & Gauld, 1993). Iran, as one of the largest countries in the Middle East, has a variety of ecosystems (Kiani *et al.*, 2017), most of which are poorly studied. Therefore, we expect to discover several additional species of Alysiinae (Ghotbi Ravandi *et al.*, 2015). In addition, some habitats in other parts of Guilan province have not yet been studied

in detail. Further taxonomic investigations, along with host association data, are necessary to enhance our knowledge of the diversity and applicability of this group of insects in Guilan province and other parts of Iran.

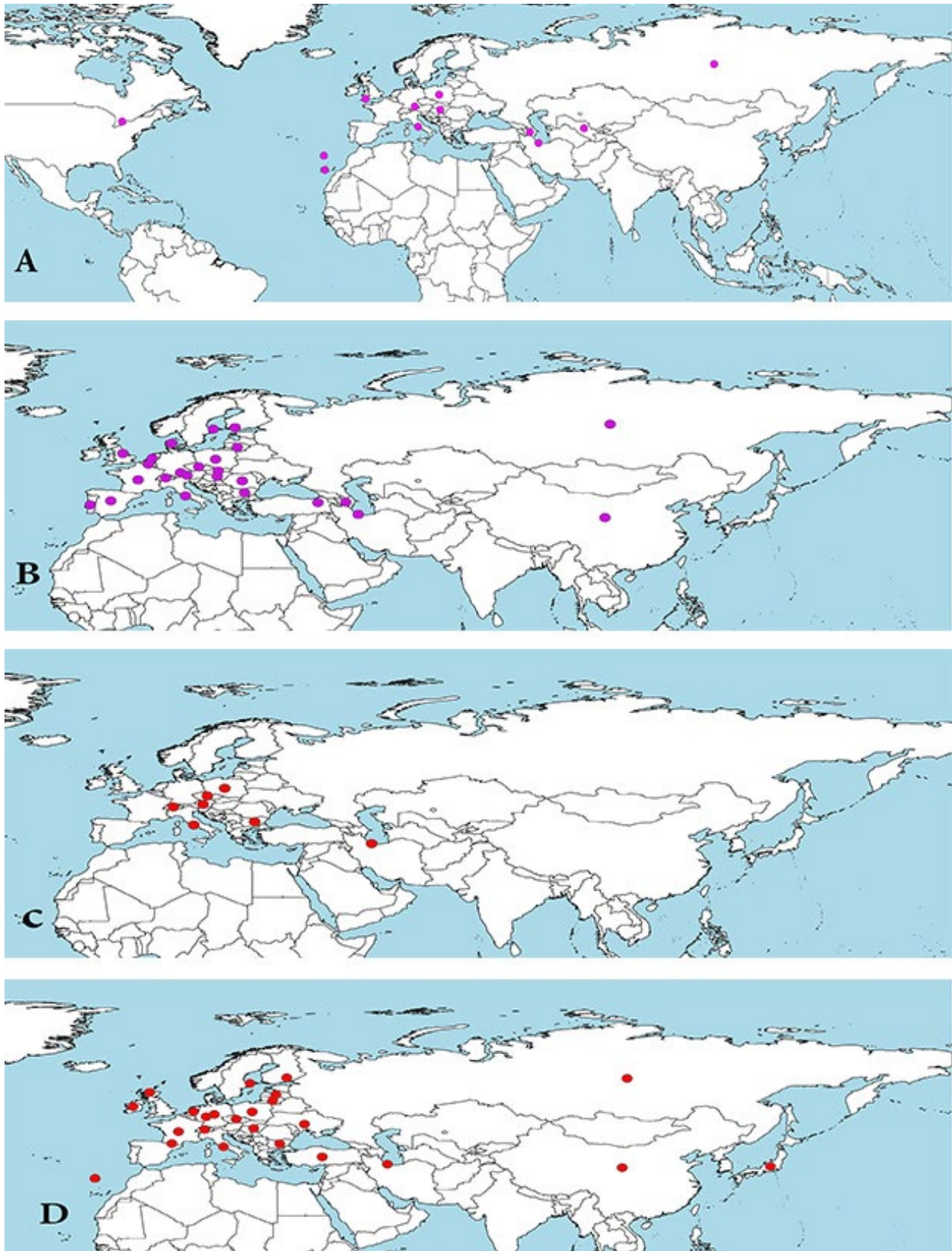


Fig. 6. Worldwide distribution map of Alysiinae collected in this study from Iran; **A.** *Dacnusa plantaginis* **B.** *Dacnusa maculipes* **C.** *Grammospila fuscula* **D.** *Grammospila rufiventris*.



Fig. 7. Provincial distribution of *Dacnusa* (Hymenoptera: Braconidae, Alysiniinae) in Iran and their abundance percentage.

Author Contributions

The authors confirm their contribution to the paper as follows: MA, AAT, CVA: conceptualization, methodology; MA: investigation, draft preparation; AAT, CVA: final review and edit, visualization, supervision; AAT: project administration and funding acquisition.

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Data Availability Statement

The specimens listed in this study are deposited in the Tarbiat Modares University Collection (TMUC), Tehan, Iran, and are available from curator, upon request.

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Ethics Approval

This study only included plants and insects material. 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.

Conflicts of Interest

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

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اطلاعات تکمیلی در مورد زیرخانواده (Hymenoptera: Braconidae) Alysiinae از ایران: اولین گزارش جنس *Grammospila* Foerster, 1863 و گزارش جدید چهار گونه

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مکیده

زیرخانواده Alysiinae یکی از تخصص یافته ترین و متنوع ترین پارازیتوئیدهای داخلی دوبرالان است. مقاله حاضر اطلاعات تکمیلی در مورد زیرخانواده Alysiinae در ایران ارائه می دهد. نمونه ها با استفاده از تله های مالیز طی در ماه های اردیبهشت تا شهریور ۱۳۸۹ جمع آوری شدند. جنس *Grammospila* Foerster, 1863 و چهار گونه برای اولین بار از ایران گزارش شد: *Dacnusa maculipes* Thomson, 1895، *D. plantaginis* Griffiths, 1966، *Grammospila fuscata* Griffiths, 1968 و *G. rufiventris* Nees, 1812. با احتساب یافته های این تحقیق، تعداد گونه های جنس *Dacnusa* و *Grammospila* به ترتیب به ۲۲ و ۲ گونه در ایران افزایش یافت. خصوصیات تشخیصی و پراکنش گونه های تازه ثبت شده و لیست به روز شده *Dacnusa* و *Grammospila* ارائه شده است.

کلمات کلیدی: *Dacnusa*، *Grammospila*، ایران، پارازیتوئید، گزارش جدید

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