Two torymid species (Hymenoptera: Chalcidoidea, Torymidae) developing on *Artemisia* gall midges (Diptera: Cecidomyiidae)

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**Abstract:** Two parasitoid wasps, *Torymus artemisiae* Mayr and *Torymoides violaceus* (Nikol’skaya), were reared on *Artemisia herba-alba* (Asteraceae) galls, in central Iran. *Torymus artemisiae* and *T. violaceus* were developed from the gall midges: *Rhopalomyia navasi* Tavares and *R. hispanica* Tavares, respectively. The occurrence of these two parasitic wasps in Iran, and their associations with *R. navasi* and *R. hispanica*, are new. Data on the wasps’ biological associations and geographical distribution are provided. The parasitoid compositions of the genus *Rhopalomyia* (Diptera: Cecidomyiidae) were also discussed.

**Key words:** distribution, new records, parasitoids, *Torymoides*, *Torymus*

**Introduction**

The family Torymidae has about 986 existing species. Torymidae usually develop inside galls or developing seeds. The Torymidae larvae may be parasitoids of gall makers, phytophagous or even of both (Noyes 2013). Torymids of Iran are now represented by 48 species in 16 genera (Lotfalizadeh and Gharali 2005, 2012; Tatogh et al. 2008; Zarnegar et al. 2008; Fallahzadeh et al. 2009; Nazemi-Rafie and Lotfalizadeh 2012), but there is no biological association available. Only limited biological information has been reported about chalcidooids in Iran (Sohrabi et al. 2014).

Recently two gall midges, *Rhopalomyia navasi* Tavares, 1904 and *R. hispanica* Tavares, 1904 (Diptera: Cecidomyiidae), have been reported from the Yazd province in central Iran (Skuhravá et al. 2014). Larvae of *R. navasi* and *R. hispanica* caused large, dense, white, pubescent stem and small pitcher-shaped (globular) bud galls on *Artemisia herba-alba* (Asteraceae), respectively (Skuhravá et al. 2014). Species of the genus *Rhopalomyia* are parasitized by 65 species of Chalcidoidea including 12 species of Torymidae in two genera (Noyes 2013). Here, we report two torymids parasitizing *R. navasi* and *R. hispanica* for the first time in Iran.

**Materials and Methods**

This study was carried out in Gharbalbiz, Mehriz county, Yazd province, central Iran (31°31′N, 54°23′E, elevation 1580–1720 m a.s.l.). White, pubescent stem galls of *R. navasi* (Fig. 1A) and pitcher-shaped bud galls of *R. hispanica* (Fig. 1B) were randomly sampled on *A. herba-alba* from March–June 2011. The galls were put separately inside plastic bags and transported to the laboratory. They were reared in suitable 500 cc plastic jars, in shade, and at room temperature, until the adults of the gall midges and/or their associated parasitoids, emerged.

Rearred parasitoids were conserved in ethanol 75%. Specimens were card-mounted, based on Noyes (1982). The identification and illustrations were made using an Olympus™ SZH stereomicroscope which was equipped with a Canon™ A720 digital camera. The specimens were identified according to reliable keys and descriptions (Nikol’skaya 1952; Peck et al. 1964; Nikol’skaya and Zerova 1978; Doğanlar 1989; Graham and Gijswijt 1998).

The specimens are deposited in the insect collection of the Department of Plant Protection, Agricultural and Natural Resources Research of East-Azarbaijan, Tabriz, Iran.

**Results**

This study showed that two torymids from the subfamily Toryminae and tribes Torymini and Torymoidini, parasitized the gall making cecidomyiids on *Artemisia, R. navasi* and *R. hispanica*, in the province of Yazd, Iran.

**Torymus artemisiae** Mayr, 1874 (Hym.: Toryminae, Torymini)

1) *Callimome artemisiae* (Mayr, 1874), in: Erdős, 1946: 54;
Iran, Yazd province, Mehriz county, Gharbalbiz, 25.iii.2011, 3 ♀♀ & 5 ♂♂, ex large globular stem galls of *R. navasi* on *A. herba-alba*, A. Mohammadi-Khoramabadi leg.

**Diagnostic characters**

This species is close to *Torymus valerii* Graham & Gijswijt, 1998 that was reared from *Rhopalomyia valerii* Tavares on *Juniperus oxycedrus*. Separating characters of these species are pedicellus + flagellum 1.17–1.25 times of head breath (1.25–1.35 times in *T. valerii*) and postocellar line slightly less than 1.9 times ocello-ocular line (1.9–2.1 times in *T. valerii*) (Graham and Gijswijt 1998).

**Note**

Host-parasitoid association of *T. artemisiae* and *R. navasi* on the plant *A. herba-alba* is newly established. *Rhopalomyia navasi* has a wide zoogeographical distributional area in Spain, Romania, Morocco, Algeria, Tunisia, Libya, Egypt, Syria, and Iran (Skuhravá et al. 2014). This species was reared from large globular stem galls of *R. navasi* with white pubescent galls (Fig. 1A). *Torymus artemisiae* has also been recorded on *Rhopalomyia artemisiae* Bouche (reported as *Cecidomyia artemisiae*) and *Rhopalomyia baccarum* (Wachtl) (reported as *Misospatha baccarum*) (Diptera: *Cecidomyiidae*) (Noyes 2013).

**Distribution**

Europe (France, Hungary, Romania, Russia), Asia (Turkmenistan) (Noyes 2013), and Iran (new record).

*Torymoides violaceus* (Nikol’skaya, 1954) (Hym.: Toryminae, Torymoidini)


**Material examined**

Iran, Yazd province, Mehriz county, Gharbalbiz, 25.iii.2011, 1 ♀ & 2 ♂♂, ex small pitcher-shaped bud galls of *R. hispanica* on *A. herba-alba*, A. Mohammadi-Khoramabadi legs.

**Diagnostic characters**

Body dark bluish-violaceous, mid and hind tibiae concolorous with femora; forewing bare basally, with two transverse bands; ovipositor as long as body; flagellar segments squared, flagellum + pedicellus 1.15 times as long as width of head.

**Note**

*Torymoides violaceus* was reared for the first time from *R. hispanica* on *A. herba-alba*. Its host, *R. hispanica* is recorded only from Spain and Iran (Skuhravá et al. 2014). *Asphondylia mikii* Wachtl and *Dasineura loewei* (Mik) (Diptera: *Cecidomyiidae*) are known as other hosts of *T. violaceus* (Noyes 2013).

**Distribution**

Europe (Bulgaria, Moldova, Russia, Spain), Caucasus (Azerbaijan, Georgia), Asia (Kazakhstan), (Noyes 2013), Japan (Askew et al. 2001), and Iran (new record).

**Discussion**

With the introduction of these two torymids to the fauna of Iran, the number of reported species of the family Torymidae reached 50, and the genera *Torymus* reached 6, and *Torymoides* to 2 species (Lottalizadeh and Gharali 2005, 2012; Tatogh et al. 2008; Zarnegar et al. 2008; Fallahzadeh et al. 2009; Nazemi-Rafie and Lottalizadeh 2012).
Two torymids parasitoids of *Artemisia* gall midges

*Torymus artemisiae* and *Torymoides violaceus* have been found for the first time on *R.* *navasi* and *R.* *hispanica*, respectively. Eleven species of *Torymus* and an unknown species of *Torymoides* have been reported on different species of *Rhopalomyia* (Noyes 2013). Including these two species, 45 chalcidoid species from six families are now known as parasitoids of *Rhopalomyia* species: Eulophidae 36% with 16 species, Torymidae 29% with 13 species, Pteromalidae 22% with 10 species, Eupelmidae 9% with four species, Encyrtidae 9% with one species, and Eurytomidae 2% with one species (Fig. 2). The fauna of the family Cecidomyiidae of Iran is considerably rich and composed of 61 species (Skuhravá et al. 2014). Future rearing studies will hopefully reveal new associations.

References


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