Identification Parasitoids of Leafminer flies in Sistan region –Iran

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ABSTRACT
This study has been carried out during 2009 and 2010 in Sistan (Iran) region. Parasitoids were collected from on leafminer flies that had attacked to cultivated plants and ornamental crops. In this study 200 samples were collected from 35 species host plant and among them eight genera and seven species of Eulophidae family were identified. Apotetrasiticus Graham (Family: Eulophidae) was new to Iranian fauna. Also, one species of parasitoid wasp which was their activities hadn’t been reported was also identified.

Key word: Parasitoids, leafminers, Agromyzidae, Eulophidae, Sistan (Iran)

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INTRODUCTION
Eulophidae family (Hymenoptera: Chalcidoidea) is one of the largest families of parasitic wasps containing over 4472 species placed in 297 genera [1]. Leafmining insects reduce plant metabolic activities and can lead to desiccation and premature fall of the leaves. Among the most serious leafmining pests are serpentine leafminers, which are flies in the family Agromyzidae. If leaves are seriously attacked, crops can be reduced or seedling plants even totally destroyed [2,3]. Many species of the families Braconidae and Eulophidae are important parasitoids of agromyzid leafminers.

Noyes [1] listed over 300 species of agromyzid parasitoids, and over 80 species that are known to attack various Liriomyza species. Sheng et al [5] studied the chalcidoid parasitoids of Liriomyza sativae. Eulophid wasps are the most common parasitoids recorded on leafminers worldwide [4], as well as the most successful agents used within biological control programs against agromyzids [6-9]. In this family, there are parasitoids of concealed larvae, including those of leaf-mining pests of economic importance on several vegetable and ornamental plants around the world. In Asia 41 species of parasitoids in four different families were found [9-11]. However, in general and under natural conditions, parasitism is usually low early in crop development and gradually increases as the crop matures [12]. The parasitoid Diglyphus isae is a primary ectoparasitoid capable of developing on at least 18 different agromyzid species [15]. Among the parasitoid complex of Liriomyza spp, Diglyphus is common for Iranian fauna which several parasitoid species are contain [14].

They play an important role in the biological control of serious insect pests in the field and many of them are employed successfully in biological control programs all over the world [13]. Parasitoids that we were unable to identify were sent to identification services, Schmalhausen Institute of Zoology in Ukraine.

MATERIALS AND METHODS
The survey on parasitoids of the vegetable leafminer was carried out during spring to winter in Sistan region, in 2009–2010. They parasited leafminer flies endoparasite and ectoparaparit and then directly placed within plastic boxes covered with mesh for ventilation. After the collection parasitoids of leafminer flies, the host plants were transferred to the laboratory, inside the climatic chamber with a temperature of 25±1°C and 65±5% RH, and were kept in the plastic containers (10 × 12 cm) covered with mesh on the upper side, for 1–2 weeks. Adults were caught by aspirator and gathered in test tubes containing 75 % ethanol. Illustrations were made using the Nikon SMZ645 stereomicroscope and Nickon Eclips E200.
RESULTS

Eight species of Eulophidae belongs to eight general and three subfamilies were identified in association with 11 different species host plants. One new genus and also, one species of parasitoid wasp which was their activities hadn’t been reported was also identified that listed below, are considered to be new record from Iran. This newly recorded genus is marked with an asterisk (*).

Sub Family: Tetrastichinae

Apotetrasticus (Graham, 1986)*

Material examined: 3♀, reared from Phytoliriomyza dorsata on Gailardia gradiflora, Zahac, 7 July 2009; leg.: Z.S.

Diagnosis: Female: Body dark; antenna brown to yellow, funicle is 4 segment and clava is 3 segment, funicle and clava with whorled long dark setae, antennifier is in middle of face (Because the sample was low we weren’t prepared slides from the antennae); mesoscutum with median line, scutellum 2 midle suture, submedian lines usually distinct, notaulli clear, their grooves striped and complete, axilla big and not lump, parasitigma is separated of submarginal, submarginal is 4 dorsal hairs, postmarginal is smaller than Stigma, speculum is small and it has 1-2 hair.

Biology: unknown [16]

Host associations: This species was known as parasitoid of Lepidoptera and Coleoptera [17].

Distribution: Italian and California [17].

Aprostocetus (Westwood, 1833)

Material examined: 7♂ 2♀ reared from Liriomyza congesta on Trigonella sp, Zabol, 28 October 2009, 5♀, 1♂ reared from Liriomyza congesta on Medicago sativa, Zahac, 16 November 2009; leg.: Z.S.

Diagnosis: Female: Body dark brown, antenna brown; scap black, funicle is 3 segment and clava is 2 segment, funicle and clava with whorled long dark setae, antennifier is at the top of clypeus; mesoscutum with median line, scutellum normally with 2 pairs of setae, submedian lines usually distinct; postmarginal vein is very small.

Biology: Hosts are very variable, most of them associated with galling arthropods such as Cecidomyiidae, Cynipidae and Eriophyidae, Also on Chrysomelidae, Curculionidae (Coleoptera), Agromyzidae, Tephritidae (Diptera), Coccidae (Hemiptera), Gracillariidae, Lasiocampidae, Lymantriidae, Lyonetiidae, Pyralidae, Tischeriidae, Tortricidae, Yponomeutidae, Pieridae (Lepidoptera) and Anguinidae (Nematoda).

Distribution: Cosmopolitan. This is a new record for the fauna of Iran.

Family: Eulophidae

Sub Family: Eulophinae

Diglyphus isaea (Walker, 1838)

Material examined: 1♂ 2♀ reared from Chromatomyia horticola on Helianthus annus, Hirmand, 28 October 2009; 8♂ 5♀ reared from Chromatomyia horticola on Brassica rapa, Zabol, 28 October 2009; 5♀ reared from Chromatomyia horticola on Silybum sp, Zabol, 27 February 2010; 2♀ reared from Chromatomyia nigra on Triticum aestivum, Hamoon plain , 28 May 2010; 25♀ reared from Liriomyza Congesta on Mellilotus sativa, Zahac, 22 March 2009; leg.: Z.S.

Host associations: Liriomyza sp. (Dip.: Agromyzidae) [14, 18].

Diagnosis: female: Body black to green shining; antenna dark brown, scape cylindrical in lateral view, funicle 2 segmented, clava 3 segmented; pronotum triangle shaped in dorsal view, mesoscutum with incomplete notaulli, scutellum with parallel submedian grooves; postmarginal vein as long as stigmal vein, cubital vein strongly curved at base, speculum not seen.

Distribution: Afrotropical, Pacific, Oriental and Paleartic regions [19] and can be considered as a cosmopolitan species because introductory releases have been carried out in the United States, Canada and New Zealand [1].

Diglyphus poppoea (Walker, 1838)

Material examined: 18♂ 12♀ reared from Chromatomyia horticola on Brassica rapa - Cucumis sativus, Zahac, 22 March 2009; leg.: Z.S.
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**Diagnosis:** female: Body black to green shining; antenna dark, funicle 2 segmented, clava 3 segmented; scutellum similar to *Diglyphus isae*; postmarginal vein as long as stigmal vein, cubital vein and stigma is thicker, speculum rather narrow and it has a low hair.

**Host associations:** *Agromyza ambiguia* Fallén (Dip., Agromyzidae) [20].

**Distribution:** Canary Islands, Czech Republic, Finland, Germany, Hungary, Italy, Moldova, Morocco, Netherlands, Portugal, Russia, Spain, Sweden, Switzerland, England, Scotland, Wales, Yemen [21].

**Hemiptarsenus zilahisebessi** (Westwood, 1833)

**Material examined:** 4♀ reared from *Calycomyza humeralis* on *Triticum aestivum*, Hamoon plain, 28 May 2010; leg: Z.S.

**Diagnosis:** Female: body brown with shiny metallic colouring; scape extends beyond level of vertex, scape completely dark, funicle 4 segmented, basal 3 segments of funicle branched in males; postmarginal vein longer than stigmal vein; mesosoma elongated and dorso-ventrally flattened, scutellum without submedian or sublateral grooves; propodeum medially with 2 subparallel carinae diverging posteriory and with distinct plicae.

**Biology:** Parasitoid of Lepidoptera, Coleoptera, Diptera and Hymenoptera, some species attack spider eggs often as secondary parasitoid.

**Host associations:** *L. bryoniae* (Kaltenbach), *L. congesta* and *L. trifolii*, *Liriomyza sativae* (Dip.: Agromyzaeidae) [18]; *Hypurus* sp. (Curculionidae: Coleoptera) and *Stigmella* sp. (Nepticulidae: Lepidoptera) [1].

**Distribution:** Bulgaria, China, Egypt, France, Poland, Turkey [15] and South Korea [22].

**Pediobius metallicus** (Walker, 1846)

**Material examined:** 2♂ reared from *Calycomyza humeralis* on *Triticum aestivum*, Hamoon plain, 28 May 2010, 15♀ reared from *Chromatomyia horticola* on *Mellilotus indicus*, Zahac, 13 March 2010; leg: Z.S.

**Diagnosis:** Female: Body dark green; antenna dark, funicle 4 segments and clava 1 segment, antenna segments cover of less long hairs; propodeum medially with 2 subparallel carinae diverging posteriorly and with distinct plicae; petiole in most species with ventrally pointed extension.

**Biology:** Parasitoid of Lepidoptera, Coleoptera, Diptera and Hymenoptera, some species attack spider eggs often as secondary parasitoid. **Host range is new.**

**Distribution:** Word wide.

**Symphesis acalle** (Forster, 1856)

**Material examined:** 5♀ reared from *Liriomyza trifolii* on *Cucumis sativus*, Zabol, 28 October 2009; leg.: Z.S.

**Diagnosis:** Female: Body dark brown; abdomen brown; funicle 3 segment and Clava 3 segment and in finally is sharp; notauli clear, grooves is unknown, axilla is small and less raised, scutellum has middle carina and there are two grooves in the sides; parastigma is connected by a curve to the vessel submarginal, submarginal has many dorsal hair.

**Biology:** Unknown on Agromyzidae but in the research reared from genus of *Liriomyza* sp. **Host range is new.**

**Distribution:** Central Europe, North West Italy, Turkey, Czechoslovakia, Hungary, Italy, Russia and Spain [23].

**Neotrichoporoides szelenyi** (Girault, 1913)

**Material examined:** 2♂ 3♀ reared from *Liriomyza trifolii* on *Cucumis sativus* - *Lactua serriola*, Zahac, 18 April 2010; leg: Z.S.

**Diagnosis:** Female: Body yellow; genal suture below eye with triangular; antenna of female with 4 discoid anelli, funicle 3 segment and Clava 3 segment and in finally is sharp, other segments usually strongly elongate; pronotum conical, mesoscutum without longitudinal median groove, length of scutellum no more than its width, subequal to length of mesoscutum.

**Biology:** Many species of the genus are trophically associated with Diptera (Diptesidae, Anthomyiidae, Lorchaeidae and Muscidae) especially on stems of Poaceae.

**Distribution:** Palearctic, Africa and Neotropical Regions [22].

**Sub Family: Entedoninae**

**Neochrysocharis formosus** (Westwood, 1833)
**REFERENCES**

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**REFERENCES**