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Parasitoid Insects of *Agromyza* Fallen (Diptera :Agromyzidae) of Iraq

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A B S T R A C T

The aim of this study to survey hymenopterous parasitoids on leafminer *Agromyza* Fallen in Iraq. The survey was showed five species belonging to five genera under three families, the parasitoids are : *Digylphus isaea* (Walker*) Pediobius metallicus* (Nees), *Cirrospilus vittatus* Walker, *Halticoptera circulus* (Walker), *Opius* sp.

Introduction

Agromyza is a large genus occurs predominantly in temperate areas of the northern hemisphere and consist of more than 150 species are known throughout the world,(Spencer,1983). 99 of them in the Palaearctic region (Martines, 2004), cites the presence of 72 species in Southwestern Europe, and 43 in continental Spine (Ortiz, 2009). Many of them are economically important pests of the field crops, ornamental vegetables throw out the world (Spencer, 1973, 1990).

Species of *Agromyza* can be recognized by their unique mine patterns on plant leaves. These pattern could lead to the isolation of populations of parasitoids, especially if the pattern are used in host recognition. The shapes of the mine are correlated with rates of parasitism (Specer, 1973; Parkman *et al*.,1989).

Based on host-plants of *Agromyza* is divided into 4 groups: the *nigripes* group feeding on Graminae; the *potentillae* group mainly on Rosaceae but also on Betulaceae, Geraniaceae, Polygonaceae and Salicaceae; the *rufipes* group feeding on Boraginaceae, Compositae, Urticaceae, and other groups associated with Leguminosae (Spencer, 1976). The vast majority of species with host-plants are known as leafminers, but may also be stem-miners or gall-causers. Most larvae form blotch mines or wide linear mines after reaching their third instar. Pupation always occurs outside of the mine, usually in the soil. However, in swamp areas puparia glued on their host plant surface can

be observed frequently (Dempewolf, 2004).

Agromyza species belonging to subfamily Agromyzinae and diagnosed with thes characters : sub-costa well developed and joining *R1* before reaching costa; either 3+1 strong dorso-centrals or 3 or more post-sutural *dc*, greatly decreasing in size, with any presutural small and weak; orbital setulae reclinate; pre-scutellars present; second cross-vein normally present, discal cell large; stout species, wing length ranges from 1.45-3.5 mm; most species entirely dark but a number with frons reddish or yellow; halteres also white or yellow; stridulating mechanism present in both sexes (Spencer, 1972, 1976).

Parasitoid assemblages of dipteran leafminers are dominated by Eulophidae, Braconidae and Pteromalidae that attack the larval and pupal stages of the flies. Overall, data from agricultural ecosystems suggest that agromyzid leafminers are attacked by a diverse assemblage of hymenopteran parasitoids that often are responsible for significant levels of leaf miner mortality (Gratton and Welter, 2001). Parasitoids also have been used successfully to control leafminer infestations in greenhouses (Minkenberg and Van Lenteren, 1986).

The number of parasitoids of leafminers have been recorded throughout the world (Neder de Roman and Arch de Hamity, 1985; Schuster, 1993; Shepard *et al*., 1998; Heimpel and Meloche, 2001; Cikman, 2006). The species of Braconidae are endo- and ectoparasitoids on the egg and larval hosts, whereas those of Eulophidae are solitary or gregarious ectoparasitoids on larval and pupal hosts.

The parasitoids of *Agromyza* spp. were studied in several countries of the world,(Al-Azawi, 1967, 1971; Gates *et al*, 2002; Cikman and Uygun (2003); Gencer, 2000); Cikman, 2006; Sha *et al*, 2007; Cikman and Salle, 2011; Yeferemove *et al*,2011; Cikman 2012.

Materials and Methods

The survey of parasitoids of leaf miners were carried out during February March, April, May and October 2015,from several provinces of Iraq (Baghdad, Kerbala, Nejef, Diywaniya, Kut, Dhyla. Basra and THi Qar.

The infested leaves of different host plants: *Medicago sativa, Trigonella phoenum, Melilotes indecus, Hordeum vulgare* and different kinds of Weeds and Compositae plants, were collected and brought to the laboratory of entomology and put in Petri Dishes covered with filter paper under constant conditions. Temperatures 25C°±1 and relative humidity 5%. After that parasitoids were impressed from field sample and kept in small capsule.

The *Agromyza* spp. were identified using external morphology and male aedegous, (Spencer, 1972), the parasitoids identified by Prof. M.S. Abdul Rassoul and according to the reliable keys of (Chao-Dong,. and Da-Wei, 2001; Gates *et al*, 2002; Yefremova *et al*., 2011). All specimens are deposited at Department of Entomology at Iraq Natural History Research Center and Museum.

The infested leaves of different host plants: *Medicago sativa, Trigonella phoenum, Melilotes indecus, Hordeum vulgare* and different kinds of Weeds and Compositae plants.

Results and Discussion

In this study five hymenopterous parasitoids species attacking *Agromyza* spp. belonging

to five genera under three families, Eulophidae, Braconidae and Pteromalidae, were collected from different region of Iraq. The list of species is given below:

Order: **Hymenoptera** (Linneus, 1758)

Family: **Eulophidae** (West wood, 1829)

1. Genus: ***Cirrospillus*** Westwood, 1832

Cirrospillus vittatus Walker, 1838

Material examined*:* It was found in Nejf on *Agromyza albipennis* on *Hordeum vulgare* 17.4.2015(2♀♀. 1♂). At Kut from *A. nigripes* on *capscum, Cucumis and Lycopersicon* in plastic houses (10♀♀, 4 ♂♂).2.5.2015

This species has been previously recorded as *Cirrospillus* sp. Hyperparasites of Lepidoptera pupae through its primary braconid and ichneumond hosts: Baghdad April (Al Ali,1977) recorded on *Phytomyza horticola* (Mechlif and Abdul-Rassoul,2002; Abdul Rassoul and Al Saffar, 2014 on *L. bryioniea* on *Trigonella Phoenum*).

Hosts: *Liriomysa* spp. (Cabello *et al.*, 1994 *C.horiticola*, Cikman and Uygun, 2003).

General Distribution: Cosmopolitan species, Europe, Asia, North Africa, Canada,USA (Hansson,1985).

2..Genus : ***Diglyphus*** Walker, 1844

D. isaea (Walker, 1838).

Material examined: *D. isaea* was found in Baghdad from *Agromyza nana* Maigen on *Melilotus indeca* on 14.2. 2015 (10 ♀♀, 6 ♂♂); Kerbala, *Agromyza albipennis Medicago sat*iva on 20 4. 2015(15♀♀, 10 ♂♂) in Nejef *Agromyza sp.* on *Cucuribta sativa* (20.5 2015.

(Notes: many specimens were brought from other provinces announced at material and methods).

This species has been previously recorded from *Phytomyza horticola* (Mekhlif and Abdul Rssoul, 2002) collected from different host plantsand from *Liriomyza sativa,L.cogesta from various plants*, (Abdul Rssoul and Al –Saffar, 2014).

Hosts: Many species of Agromyzidae and also Lyonetidae; Tephritidae and (Lepidoptera) (Zhu,*et al* 2000).

General Distribution: Widely Separated in Palearctic region and also Afrotropical, Australian, Pacific, Nearctic andOriental region (Boucek, 1965).

3. Genus: **Pediobius** Walker, 1846

Pediobius metalicus (Nees, 1834)

Material examined: It was found in Baghdad on *Agromyza* sp. on graminae weeds at 21.3. 2015 (.4♀♀, 1♂).

This species has been previously recorded as endoparasitoid from *Melanogromyza phaseoli* (Tryon) (Diptera : Agromyzidae) from gold stem of *Dolchos sesiquipedalis* (Abdul-Rassoul, 1976) endoparasitoid on *Phytomyza atricornis* from Baghdad Jan. and Feb. 1970 (Al- Ali, 1977) and on *Phytomyza horticola* (Mekhlif and Abdul-Rassoul, 2002).

Hosts: Primary sometimes secondary, solitary endoparasites of larveae and pupae of mining forms of Lepidopytera and Diptera, Particulary agromyzids genera *Phytomyza, Liriomyza,* and *Dizgomyza* (Boucek, 1965 Boucek and Askew,1968).

General Distribution: Europ, Asia, North America (Civelek and Oder, 1999).

Family:Pteromalidae Daiman, 1820

Genus :*Halticoptera* Spinola, 1811

Halticoptera circulus (Walker, 1833)

Material examined: It was found on ***Agromyza nana and A, albippenis*** on *Trigonella Phoenum* in 21.3.2015,from Baghdad, (4♀,♀).

This species has been previously recorded as *Halticoptera* sp, Baghdad on Ternip 26.3. 1970. (El- Haidari *et al.*), on**,** *Phytomyza atricornis* (Al Ali, 1977), on *Phytomyza horticola* (Mekhlif and Abdul Rassoul,2002).

Hosts: several genera of Agromyzidae (Peck, 1963; Lopes *et al*, 2004 ;Noyes, 2005).

General Distribution: Cosmopolitan species, Europe, Asia, North Africa, Canada,USA (Hansson,1985).

Family: Braconidae Nees, 1812

Genus: *Opius* Wesmael, 1835

Opius sp.

Material examined : Three samples were collected from *A*gromyza megalopsis on Compositae weeds

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