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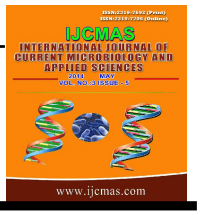

Original Research Article

Parasitoid of the genus *Liriomyza* Mik. In Iraq

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Keywords

Liriomyza , Agromyzidae, Hynenopterous parasitoids, Host plants, Iraq

A B S T R A C T

The aim of this study to survey hymenopterous parasitoids on leafminer *Liriomyza* Mik in Iraq . The survey was showed eight species belonging to seven genera under three families , the parasitoids are : *Digylphus isaea* (Walker), *Digylphus* crassinervis Erdős, *Pediobius metallicus* (Nees), *Neohcrysocharis Pormosa* (Westwood), *Cirrospilus vittatus* Walker, *Halticoptera circulus* (Walker), *Opius* sp. and *Ratzeburgiola incomplete* Boucek, and *Leriomyza bryionae* was recorded as new host of the last one .

Introduction

Liriomyza is a cosmopolitan group of pests that consist of more than 370 species which are widely distributed in the New and Old World, (Parrella, 1987; Asadi *et al*, 2006). Many of them are economically important pests of the field crops, ornamental vegetables throw out the world (Spencer, 1973, 1990). Larvae of the genus are polyphagous attacking ornamental and vegetable crops in the families Asteraceae, Brassicaceae, Cucurbitaceae, Fabaceae, Solanaceae and many of other families of plants (Cikman and Salle, 2011).

Infestation by *Liriomyza* spp. can caused both direct and indirect damage, such as : vectoring disease, destroying young seedling, causing reductions in crop yields, causing sun burning of fruits , reducing the aesthetic value of ornamental plants and causing problems for plant quarantine (Abdul Rassoul and Al -Saffar, 2013).

Species of *Liriomyza* 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 (Parkman *et al*,1989).

Liriomyza spp. are known to have many natural enemies, particularly in their native home in the New World (Murphy and LaSalle, 1999). In Asia 41 species of parasitoids in four different families were found. However in general and under natural conditions, parasitism is usually low early in crop development and gradually increases as the crop matures (Parrella, 1987).

Parsitoids assemblages of dipteran leafminers are dominated by Eulophidae, Braconidae and Pteromalidae that attack the larval and pupal stages of the flies. Noyes,(2004), listed over 300 species of agromyzids parasitoids , and over 80 species that are known to attack *Liriomyza* species.

Eulophid hymenopterous were the commonest and widely distributed parasitods such as *Diglyphus isaea, Pediobius metalicus* attack *Liriomyza* species which are very important that attack crops and plants in glasshouse in several region such as *L. sativa, L. bryonia, L. trifoli.* Some parasitoid species are also hyperparasitoeds such as *Neochrysocharis formosa,* which is an endoparasitoids of several parasitoids of *Liriomyza.* In one study , hyperparasitism by *N. formosa* was found to be as high as 100%for 2 months immediately following the firtst incuulative releas of *Diglyphus isaea* (Ozawa,*et al,* 2002 Liu, 2009) .

The parasitoids of *Liriomyza* spp. were studied in several countries of the world, Al–Azawi, 1967, 1971; Petcharat *et al,* 2002; Cikman *et al* (2006); Sha *et al,* 2007 Cinkman and Salle,(2011) Talebi *et al* (2011); Cinkman, (2012); Talibe *et al* (2011); Asadi *et al* , (2006*);* Gencer, 2004; (Ghahari and Yefremova, 2013).

Materials and Methods

The survey of parasitoids of leaf miners were carried out during February – March and October 2013, several provinces of Iraq(Baghdad, Kerbala, Nejef, Diywaniya, Takreet, Duhok.

The infested leaves of different host plants consist of *Trigonella phoenum, Trifolium hamosa, Medicago sativa, Raphanus sativus , Melilotes indecus , Cucumis melo, Cucuribta sativa, Citrulus vulgaris.*

The infested leaves 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 *Liriomyza* spp. were identified using external morphology and male aedegous, (Spencer, 1972), the parasitoids identified by one of us 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.

Results and Discussion

In this study eight hymenopterous parasitoids species attacking *Liriomyza* spp. belonging to seven 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 : ***Diglyphus*** Walker , 1844
D. isaea (Walker, 1838)

Material examined: *D. isaea* was found in Baghdad from *Liriomyza congesta* on *Medicago sativa* on 15.2. 2013 (4♀♀, ♂♂) Kerbala, *L. bryoniea* on *Medicago sat*iva on 15.3.2013(10♀♀, ♂♂) in Nejef *L.sativa* on *Cucuribta sativa* (20♀♀, 5♂♂). and (20♀♀, 5♂♂) *Trigonella phoenum 10.4.2013 (5♀♀, ♂) L. bryioniea* on *Melilotes indicus 20.4.2013*

(20♀♀, 5♂), *L.brassicae* on *Raphanus sativa 2.3.2013,(10♀, ♂).* In Basra on *L. congesta on Medicao sativa* 21.3.2103.(10♀♀,*2*♂♂).

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

This species has been previously recorded from *Phytomyza horticola* (Mekhlif and Abdul Rssoul, 2002) collected from different host plants.

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 and Oriental region (Boucek, 1965).

***Diglyphus crassinervis* Erdős, 1958**

Material examined : *D. crassinervis* was found in Baghdad on *L*. sp . on weeds (Abu Gharaib 2.3.2013) (2♀, ♂) *L. bryioniea* on *Melilotes indicus* (2♀♀,♂).

This species has been previously recorded from *Phytomyza horticola* (Mekhlif and Abdul Rssoul, 2002) collected from different host plants.

Hosts:Ectoparasitoids of larvae of Diptera (Agromyzidae) (Hesami,*et al* 2006).

General Distribution : Palaearctic Region

2. Genus: **Pediobius** Walker, 1846
Pediobius metalicus (Nees, 1834)

Material examined: It was found in Baghdad on *L.* sp. on weeds on 10.3.2013(2♀♀, ♂). in Tarimyia on *L. brassicae. Raphanus sativa 20.4.2013(*2♀♀, ♂) in Baghdad on *L.bryoniea* on *Melilotes indica* 15.4.2013 (10♀♀, 2♂).

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 genus *Phytomyza, Liriomyza,* and *Dizgomyza* (Boucek, 1965 Boucek and Askew,1968)
General Distribution: Europ, Asia, North America (Civelek and őnder,1999).

3. Genus: ***Cirrospillus*** Westwood, 1832
Cirrospillus vittatus Walker, 1838

Material examined*:* It was found in Baghdad on *L. bryioniea* on *Trigonella Phoenum* 16.3.2013, 30.3.2013 (15♀♀, 3♂).

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).

Hosts: *Liriomysa* spp. (Cabello *et al,* 1994 *C.horiticola,* Cikmanand Uugun, 2003).

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

4. Genus: ***Neochrysocharis*** Kurdjumov, 1912
Neochrysocharis formosa (Westwood,1833).

Material examined: It was found in Baghdad on .*L. congesta* on *Medicago sativa* on 20.3.2013(♀♀) from *L*.bryoniea on *Melilotes indica.*

This species has been previously recorded from *Phytomyza horticola* (Mekhlif and Abdul-rassoul,2002).

Hosts: Endoparasitoid of the larvae and pupae of Coleoptera (Chrysomilidae) and Lepidoptera (Torticidae, Pyralidae, Yponomutidae) (Hansson, 1995).

Family: Braconidae Nees, 1812
Genus: ***Opius*** Wesmael, 1835
Opius sp.

Material examined : Two samples were collected from *L.sativa* on weeds

Family:Pteromalidae Daiman, 1820
Genus :*Halticoptera* Spinola, 1811
***Halticoptera* circulus** (Walker, 1833)

Material examined: It was found on ***L.*** *sativa* on *Trigonella Phoenum* in 16.3.2013 ,from Baghdad, (4♀♀,♂) This species has been previously recorded as *H.* sp , Baghdadon 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 Cikman,2011).

Genera Distribution: Wide distribution through United State and Southern Canada also Mexico and Europe(Peck,1963 Burks,1979).

Genus : ***Ratzeburgiola*** Erdős
Ratzeburgiola incomplete, Boucek, 1971

Material examined: It was found on *L. bryoniea* on *M*elilotes indica from Baghdad on 20.3.2013.(3♀♀) .

This case of parasitism on *Liriomyza bryoniea* as a new alternative host record to Iraq.

Hosts: Lepidoptera and Diptera. Particularly *Agromyza hiemalis* Becker, *C.horticola, Liriomyza* sp. and *L. huidobrensis*, (Massa *et al.* 2001 Noyes,2005).

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