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IDENTIFICATION OF EUROPEAN LEAFMINER INSECT *Scaptomyza flava* FALLEN (DIPTERA: DROSOPHILIDAE) FROM BRASSICACEAE PLANTS IN BASRAH PROVINCE FIELDS SOUTHERN IRAQ

Hussain A. Mahdi[1], Shurooq A. Najim[2*] and A.A. Fadhil[1]

1. Plant Prot. Dept., Coll. Agric., Basrah Univ., Basrah, Iraq

2. Nat. History Museum, Bsarah Univ., Basrah, Iraq

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ABSTRACT: The identification of European leafminer *Scaptomyza flava* Fallen is depending on the morphological characters of larvae, pupae and adults of insects which were collected from three plants of Brassicaceae, *i.e.*, mustard, watercress and radish. The specimens were collected by different methods including sweeping nets, sticking traps and hand picking, during the period from 2015-2018 in months of December, January, February and March. The first appearance of insect was in December 2015 on radish plant, the specimens were studied and identified at laboratories of science college, Basrah University, Iraq using taxonomical key. The specimens were sent to Natural History Museum of Baghdad University to be confirmed.

Key words: *Scaptomyza flava*, Iraq, European leafminer, radish plant.

INTRODUCTION

The Drosophilidae is a cosmopolitan family of acalyptrate flies encompassing 73 extant and 3 extinct genera with 3,950 species (**Brake and Bachli, 2008**). One of the important genus is *Scaptomyza* Hardy, many species belong to the genus *Scaptomyza* are leafminers. *Scaptomyza flava* is an alienate species of Eurpean origin (**Bock, 1977**).

The first description of this species was by Fallen in 1823, he named it *Drosphila flava* Fallen (**Lastovokai and Jan, 1978**), then Hardy put it in new genus called *Scaptomyza* in 1849 (**Whiteman *et al*., 2011**). Now this species is known as *Scaptomyza flava* (Fallen).

Scaptomyza flaveola (Meigen) and *Scaptomyza apicalis* (Hardy) are the synonyms of *Scaptomyza flava* (**Martin, 2004**). The species of this genus are often small in size, slender bodied, arista is plumose with 1-2 branches on ventral side, 2-4 rows of acrostichal hairs on mesonotum, no prescullar hairs, carina reduced (**Wheeler and Takada, 1964**).

The leafmining larvae of this species were found in many plants particularly Brassicaceae. The harmful phase is a larva which feeds on chlorophyll found between the two layers of the leaf epidermis causing white spots with a significant economic damage to the plant (**Seraj, 1994**). The feeding and oviposition pores made by adult females reduce photosynthesis ability and general plant health (**Johnson *et al*., 1983**). *Scaptomyza flava* is widespread in Europe (Norway to Austria) was reported in Canary, islands, Uzbekistan, Turkmenistan, Afghanistan, China, Japan, Russia and Turkey, (**Dubatolov, 1998**), Iran (**Seraj, 2000**), North America and Australia (**Bjorksten *et al*., 2005**). This study was carried out to identify the European leafminer (*Scaptomyza flava*, Fallen) on three plants of Brassicaceae in Basrah province fields, Southern Iraq.

*** Corresponding author: Tel. :** 009647800804743
E-mail address: Shurooq.najim@uobasrah.edu.iq

MATERIALS AND METHODS

In recent study the specimens were collected from various fields of Brassicaceae in Bsarah province (south of Iraq, Map1), during the period of December, January, February and March (2015- 2018), the agricultural period of Brassica plants. Many methods have been used to collect the specimens: sweeping nets, sticking traps and hand picking.

The specimens were kept in 75% ethanol alcohol, 200 specimens were examined (50 males and 150 females). In recent study, larvae, pupae and adults were studied in Insect Laboratory of Biology Department in Science College, Basrah University, examined and photographed by dissecting microscope (LEICA EZ 4 HD) using the identification key of **Maca (1972)**. The specimens were also sent to the Natural History Museum of Baghdad University to confirm the diagnosis.

RESULTS AND DISCUSSION

Three plants belong to Brasicaceae have been infected with *Scaptomyza flava*, Fallen the specimens were collected from radish, mustards, watercress. The adults deposit their eggs in leaf plants make harmful mines (Plate 1).

Description

Larvae

Larvae is cylindrical and maggot- like with tapering anterior end, 5-5.2 mm in length, yellowish white color, mouth parts with toothed black jaws and stigmata is prominent and pointed (Plate 2).

Pupa

Puparium is dark brown, has a pair of branched stigmata at the front and end of the body (Plates 3 and 4).

Adult

Male

Total length of male is 2.5-3 mm body slender, color yellow (Plate 5) and arista is plumose (Plate 6), acrosticheal setae in four rows (Plate 7), humeral bristles unequal in size, external genitalia wide black segment at the end of the body (Plates 8 A and B). Internal genitalia is gonite narrow, distally more or less spiked, aedeagus with sensillae (Plate 8C)

Female

Female is resembles male (Plate 9), but differs in size (3.1 -3.6 mm), dark terminal segment at the end of the body, underside it an ovipositor has a ling slit and toothed ridge on each side (Plate 10).

Maca (1972) pointed out that the members of the genus *Scaptomyza* can be distinguish by branching arista, acrosticheal setae in 2-4 rows, slender body, wings narrower than in *Drosophila* Fall, *Scaptomyza flava* can be distinguish from another congeners by presence of 4 rows of acrostichal setae on mesonotum.

Scaptomyza flava Fallen is of European origin (**Bock, 1977**). In Europe *S. flava* is generalist, it has been recorded there in plants of ten families, for example it has been recorded from mustard, wavy bitter cress, watercress, sea rocket, hairy bitter cress, wild radish, beans, hedge mustard, rocket and potato (**Martin, 2004**). Three of these plants (mustard, radish, watercress) were infected with *S. flava* in recent study.

The generalist nature and invasive capabilities elucidate why this species was transported to Iraq. The first specimens had been appeared in December 2015 on radish plants, during 2015- 2018, the numbers of infected fields were increased and the pest was recorded from addition plants such as watercress and mustard.

Scaptomyza falava Fallen has been reported and studied in neighboring countries, Iran (**Seraj, 2000**) and from Turkey (**Dubatolov, 1998**). So the insect is considered an alien species according to insect collection of Iraq, it has never seen in Iraqi fields before 2015, may be introduced intentionally or unintentionally by human activity like any another alien species.

Map 1. Map of Basrah southern of Iraq, with location and occurrence (red circle) of *Scaptomyza flava* Fallen (Diptera: Drosophilidae)

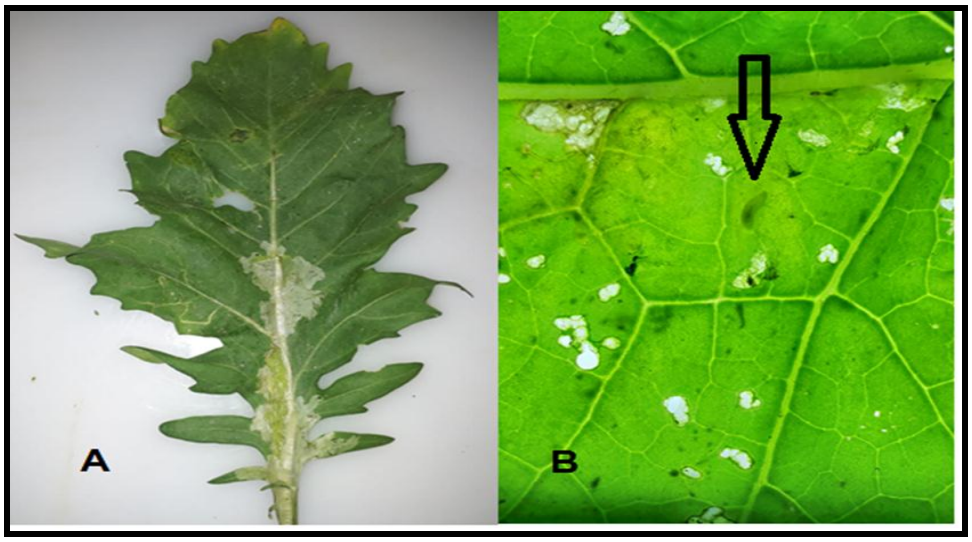

Plate 1. A. Leaf mine in mustard plant leaf, formed by the larvae of *Scaptomyza flava* Fallen. B. Larva of *Scaptomyza flava* Fallen inside the leaf of mustard plant

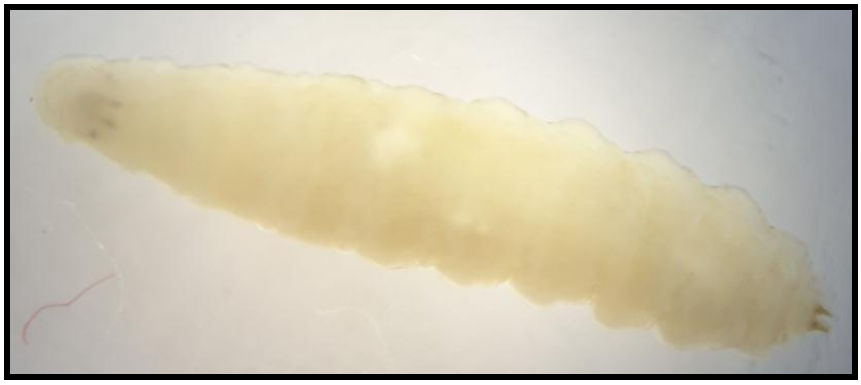

Plate 2. Larva of *Scaptomyza flava* Fallen (Diptera : Drosophilidae)

Plate 3. Pupa of *Scaptomyza flava* Fallen (Ditera : Drosophilidae).

Plate 4. Branched stigmata at the anterior end of puparium of *Scaptomyza flava* Fallen (Diptera: Drosophilidae)

Plate 5. Habitus of male of *Scaptomyza flava* Fallen (Ditera : Drosophilidae)

Plate 6. Plumose arista of *Scaptomyza flava* Fallen (Ditera : Drosophilidae), with two ventral branches

Plate 7. Mesonotum with 4 rows of acrosticheal setullae.

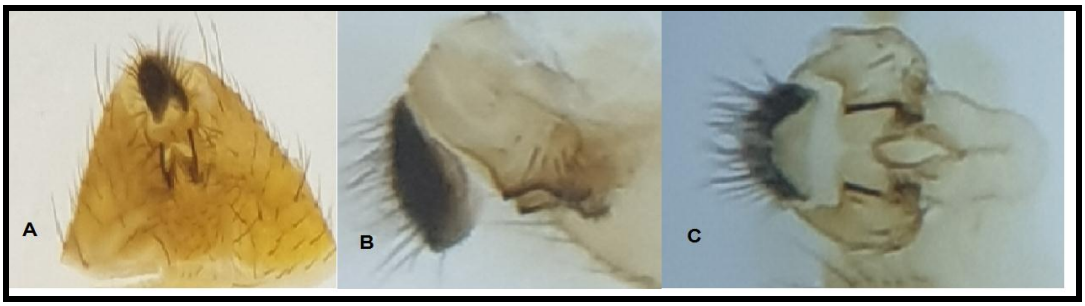

Plate 8. Male genitalia. A: Ventral view; B: Lateral view; c: Entire male terminalia of *Scaptomyza flava* Fallen (Ditera : Drosophilidae).

Plate 9. Habitus of female of *Scaptomyza flava* Fallen (Ditera : Drosophilidae).

Plate 10. Serrated ovipositor of *Scaptomyza flava* Fallen (Diptera : Drosophilidae)

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تشخيص حشرة صانعة الأنفاق الأوربية *Scaptomyza flava* Fallen (Diptera: Drosophilidae) من نباتات العائلة الصليبية في حقول محافظة البصرة جنوب العراق

حسين علي مهدي[١] - شروق عبدالله نجم[٢] - امجد عباس فاضل[١]

١- قسم وقاية النبات – كلية الزراعة – جامعة البصرة – العراق

٢- متحف التاريخ الطبيعي – جامعة البصرة – العراق

شخصت حشرة صانعة الانفاق الاوربية *Scaptomyza flava* Fallen (Diptera : Drosophilidae) اعتمادًا على الصفات المظهرية لكل من اليرقات، العذارى والحشرات الكاملة، والتي جمعت من ثلاث نباتات تابعة للعائلة الصليبية وهي الخردل، الجرجير والفجل، جمعت العينات بطرق مختلفة كالشباك الكانسة، المصائد اللاصقة والجمع اليدوي خلال الفترة من ٢٠١٥-٢٠١٨ في شهور كانون الأول والثاني وشباط و آذار، كان أول ظهور للحشرة في ديسمبر ٢٠١٥ على نبات الفجل، تمت دراسة العينات وتشخيصها في مختبرات كلية العلوم، جامعة البصرة باستخدام المفاتيح التصنيفية وأرسلت العينات إلى متحف التاريخ الطبيعي في جامعة بغداد لغرض التأكيد.

المحكمـــــون:

١- أ.د. كامل عبداللطيف حماد أستاذ الحشرات الاقتصادية المتفرغ – كلية الزراعة – جامعة الزقازيق.

٢- أ.د. شادية مصطفى عماره أستاذ الحشرات الاقتصادية المتفرغ – كلية الزراعة – جامعة الزقازيق.