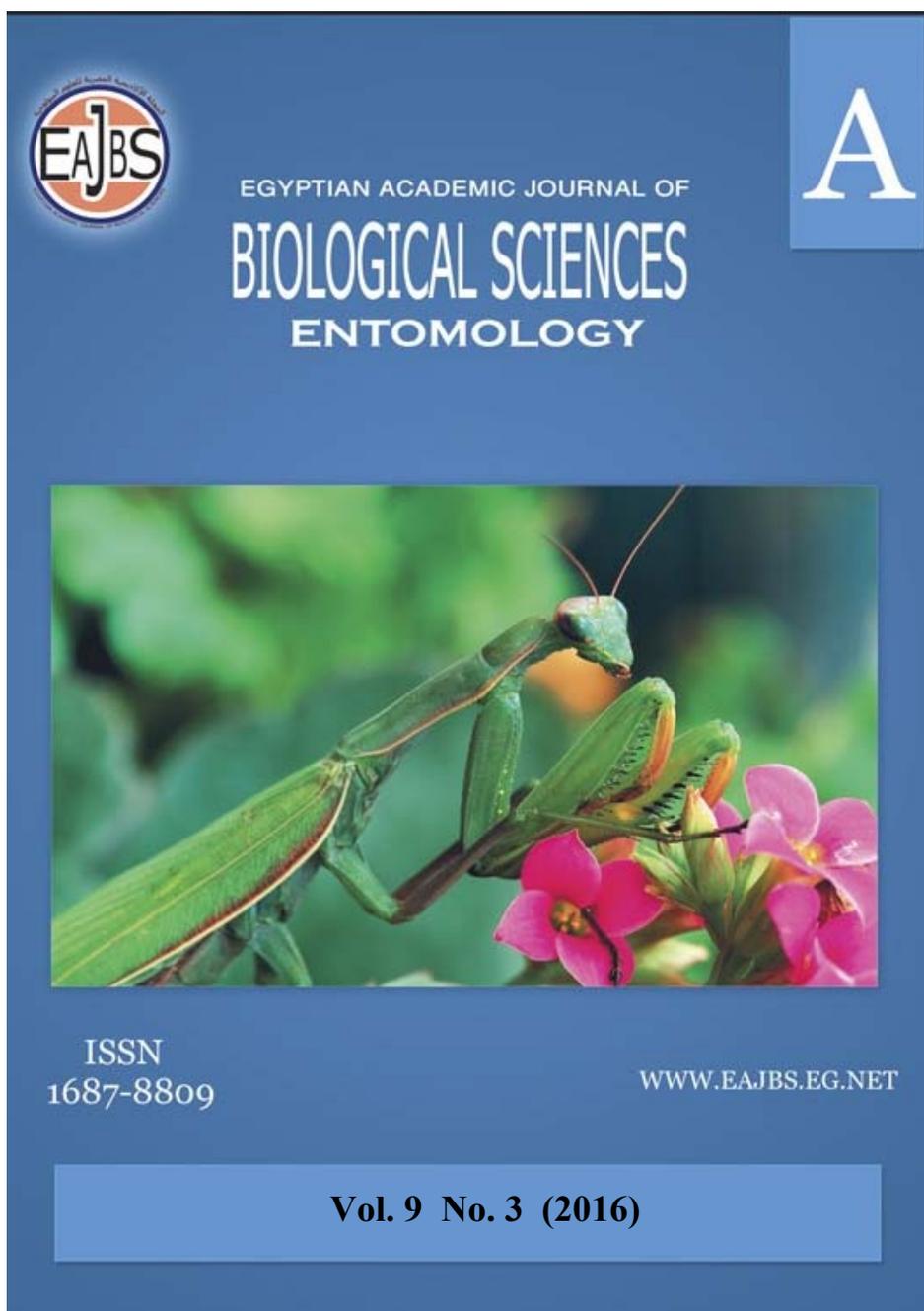


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**The First Record of the Cotton Mealybug, *Phenacoccus solenopsis* Tinsley (Hemiptera: pseudococcidae) as A new Insect Pest on Tomato, Peper, Eggplant, Maize Plants and Population Density at Fayoum Governorate in Egypt.**

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**ABSTRACT**

Cotton mealybug, *Phenacoccus solenopsis* Tinsley was recorded as a new pest for the first time attacking three important vegetable crops and another important field crop in Egypt, especially at Fayoum Governorate in two districts. *P. solenopsis* was recorded on tomato, eggplant, pepper and maize during growing summer plantation 2016 from July till September, at Fayoum Governorate, in Egypt. Specimens of insect mealybug pests were collected from the four crops from two locations (Fayoum and Itsa districts). The mealybug was identified as *P. solenopsis* according to taxonomic key of this genus and species in the Scale insects and Mealybugs Department, Plant Protection Research Institute, PPRI, ARC. .

Population density of *P. solenopsis* was done during field work season. Results of density showed that tomato plants infected with a high numbers *P. solenopsis* by mean 15.3 and 15.4 individuals/ plant and has one peak in the first week of August by mean 35 and 39 individuals/plant, for Fayoum and Itsa districts, respectively. But the other two crops such as, eggplant and pepper infected with a few numbers of this pest by mean (5.2 & 7.8 individuals/ plant) and (4.5 & 6.5 individuals/ plant) for the first and second crop, for Fayoum and Itsa districts, respectively. There was one peak in the second week of August by mean (15 & 20 individuals/ plant) for eggplant and (14 &15 individuals/ plant) for pepper, for Fayoum and Itsa districts, respectively. While in maize a very few numbers occurred it by mean (1.4 & 2.8) individuals/plant, and has one peak during the second week of August, being (5 & 8 individuals/ plant), for Fayoum and Itsa districts, respectively. Statistical analysis of data showed that, there were highly significant differences between the two locations cultivated by tomato crop, but no significant between the same location cultivated by eggplant and pepper crops. On other hand, there was a significant difference between the two locations cultivated by maize crop and significant differences between (eggplant+ pepper) and maize. This study was represented the first record of *P. solenopsis* as a new pest attacking three important vegetable crops and another important field crop in Egypt, especially at Fayoum Governorate.

**INTRODUCTION**

In Egypt, all of four crops are very important for all egyptian people and the area which cultivated by it are very large because of the short cultivated period but get a lot of money for egyptian farmers. Cotton mealybug, *P. solenopsis* Tinsley (Hemiptera: Pseudococcidae) is very important insect pest which cause significant damage to leaves, stem and fruits due to greatly reduce in marketability of four crops (Miller *et al.* 2002, 2005a and b).

The occurrence of *P. solenopsis* infestation in Egypt, was recorded on weed plants (Cyprus) by Abd-Rabou *et al.* (2010); EPPO, (2011). Recently, Ibrahim *et al.*, (2015) recorded *P. solenopsis* as a new pest of tomato plants, *Lycopersicon esculentum* Mill at Qalyoubia Governorate during summer season 2014. El-Fatih *et al.*, (2015) recorded *P. solenopsis* as a new pest on banana at Beni-Swief Governorate, in Egypt during July 2015. The cotton mealybug (Hemiptera: Pseudococcidae) are important plant pests worldwide (McKenzie 1967; Williams 1985; Williams and Granara de Willink 1992). Their feeding may cause leaf yellowing, defoliation, reduced plant growth, and in some cases death of plants. Indirectly, they may also damage plants by serving as vectors of plant diseases. In addition, production of honeydew contributes to the development of sooty mold that decreases photosynthesis and may reduce the marketability of plant products such as fruits. Besides direct and indirect damage to crops, mealybugs are also of quarantine concern, adding to costs of production to prevent or eliminate their presence on plants and produce. The genus *Phenacoccus* currently contains about 180 species and is one of the largest genera in the Pseudococcidae (Ben-Dov,1994). The cotton mealybug *P. solenopsis*, is a polyphagous insect feeding on more than 200 plant species. There are plant species assigned to approximately 60 families. The cotton mealybug *P. solenopsis*, has a wide geographical distribution with its origin in Central America (Fuchs *et al.*1991; Williams and Granara 1992), the Caribbean, Ecuador (Ben-Dov 1994), Chile (Larrain 2002) and Brazil (Culik and Gullan 2005). *Phenacoccus solenopsis* was described as a serious and invasive pest of cotton in Pakistan and India (Hodg-son *et al.* 2008) and on *Hibiscus rosasinensis* (L.) in Nigeria (Akintola and Ande 2008).

This study was conducted during a monitor study of pests from June to September 2016 as a part of searching about new pests in Egyptian cultivated fields of tomato, eggplant, pepper and maize at Fayoum and Itsa districts, Fayoum Governorate, Egypt and the cotton mealybug, *Phenacoccus solenopsis* Tinsley(Hemiptera: Pseudococcidae) was recorded for the first time on tomato at Fayoum Governorate, middle Egypt and especially in eggplant, pepper and maize in Egypt

## MATERIALS AND METHODS

All cotton mealybug specimens were collected from Fayoum and Itsa districts on tomato, eggplant, pepper which are the most important vegetable crops for fresh consumption and processing (Abd El-Ghany 2011) and maize plants at Fayoum Governorate (Middle Egypt) from during summer season 2016 from July till September. Mealybug specimens were collected when noticed on plants during the fieldwork. All mealybug specimens were slide-mounted according to the procedures of Ben-Dov and Hodgson (1997) , for identification using the method out-lined in Williams & Granara de Willink (1992). The specimens were identified by Abd-Rabou S., at the Scale Insect Department, Plant Protection Research Institute, Agriculture Research Centre, Ministry of Agriculture. Identification of the genus was carried out using the key of the Pseudococcidae family (Hemiptera: Coccoidea) according to Mohammad and Moharum (2012). Nine plants were picked from each plant species and divided into three replicates for each to study the population dynamic of *P. solenopsis*. Normal agricultural practices were followed for all plant species. Statistical analyses of *P. solenopsis* density was analysed according to, Duncan (1955).

## RESULTS AND DISCUSSION

The current study clearly that the first record at Fayoum in two districts, Middle Egypt, Egypt, of tomato, eggplant, pepper and Maize plants infestations by the cotton mealybug. The mealybug specimens were collected from two districts at Fayoum Governorate (Fayoum and Itsa) from during summer season 2016 from July till September. The mealybug was identified as *P. solenopsis* Tinsley (Hemiptera: Sternorrhyncha: Coccoidea: Pseudococcidae) using Mohammad and Moharum (2012) taxonomic key. Different photos of *P. solenopsis*, infestation on four crops are illustrated in Figures (1-5). The cotton mealybug *P. solenopsis* has not been previously noted as a pest of the four crops in Egypt, especially at Fayoum Governorate. The first record of *P. solenopsis* infestation in all Egypt was recorded only on weed plants by Abd-Rabou *et al.* (2010). For that reason, the present work is the first published record of tomato eggplant, pepper and Maize plants as a new host for *P. solenopsis* in Egypt, especially Fayoum Governorate. The first record all over the world was reported in USA on cultivated cotton (Fuchs *et al.*, 1991).

Also, the pest has been recorded on 183 plants in 52 families (Ben- Dov, 2009), especially Malvaceae, Solanaceae and Amaranthaceae families (Prishanthini and Vinobaba, 2011).

In Pakistan, Abbas *et al.*, (2010) mentioned that since 2005, when migrated from cotton to other field crops and weeds. *P. solenopsis* was noticed on grapes, palm, apple, avocado, banana, citrus, okra, tomato, cucurbits, cotton and ornamentals as, *Hibiscus sp.*

According to the previous mentions, the current work was first evidence occurrence of the cotton mealybug *P. solenopsis* on four very important crops as a new host in Egypt, especially at Fayoum Governorate.

From the above mentioned results, must be studied the population dynamic for *P. solenopsis* during the period of field work.

According to data results in Table (1), clearly that the very high mean number of *P. solenopsis* was recorded on tomato being 15.3 and 15.4 individuals / plant, for Fayoum and Itsa, respectively. But, eggplant and pepper were recorded a low mean numbers being 5.2&7.8 for eggplant and 4.5&6.5 for pepper individuals/ plant, for Fayoum and Itsa, respectively.

On the other hand, maize plant was recorded a very low mean numbers of *P. solenopsis* being 1.4 and 2.8 individuals/ plant, for Fayoum and Itsa, respectively. There was one peak only on each crop through the two locations at Fayoum Governorate. The maximum mean number of *P. solenopsis* was occurred on tomato during 2<sup>nd</sup>. week of August for Fayoum and Itsa locations, being 35 and 39 individuals/ plant, respectively. While, the peak of *P. solenopsis* on eggplant being 15&20 individuals/ plant but on pepper being 14&15 individuals/ plant during the 3<sup>rd</sup>. week of same month with a lowest mean number, for Fayoum and Itsa, respectively. On other hand, *P. solenopsis* was recorded his during the 3<sup>rd</sup>. week of August with a very few numbers being 5&8 individuals/ plant, for Fayoum and Itsa, respectively.

Statistical analysis of the data in Table, (1) showed that, there was a significant differences between tomato and the other three crops. On other hand, there was a significant differences between (eggplant + pepper) and maize, but there was no significant between eggplant and pepper, respectively as shown in the same Table.

From the above motioned results, it could be concluded that the cotton mealybug, *P. solenopsis* prefers tomato at first stage began eggplant & pepper in the

same stage (second stage), finally, maize was the third stage. This results due to wide host range of *P. solenopsis* require attention to alternate control measures and studying the population dynamics of this pest with the long term records of climatic changes will be useful to manage the pest problem and avoid its spread and potential risk, Muthuingm and Vinobaba (2009).

Table 1: Weekly mean numbers of cotton mealybug, *Phenacoccus solenopsis* on tomato, eggplant, pepper and maize in Fayoum and Itsa districts, Fayoum Governorate, Egypt during summer season 2016.

Date of inspection	Mean numbers of <i>Phenacoccus solenopsis</i> / plant for each district							
	Fayoum				Itsa			
	Tomato	Eggplant	Pepper	Maize	Tomato	Eggplant	Pepper	Maize
1-7-2016	2	0	0	0	1	0	0	0
8	5	0	0	0	7	1	1	0
15	9	1	2	0	11	4	1	1
22	15	3	2	1	17	6	6	2
29	19	7	5	1	24	9	8	4
5-8-2016	23	11	7	2	28	13	12	5
12	35	13	11	3	39	15	14	7
19	30	15	14	5	20	20	15	8
26	17	5	6	2	10	9	10	3
2-9-2016	10	2	2	1	7	7	4	1
9	3	0	1	0	5	2	1	0
<b>Total</b>	168	57	50	15	169	86	72	31
<b>Mean</b>	15.3a	5.2b	4.5 b	1.4c	15.4a	7.8 b	6.5 b	2.8c

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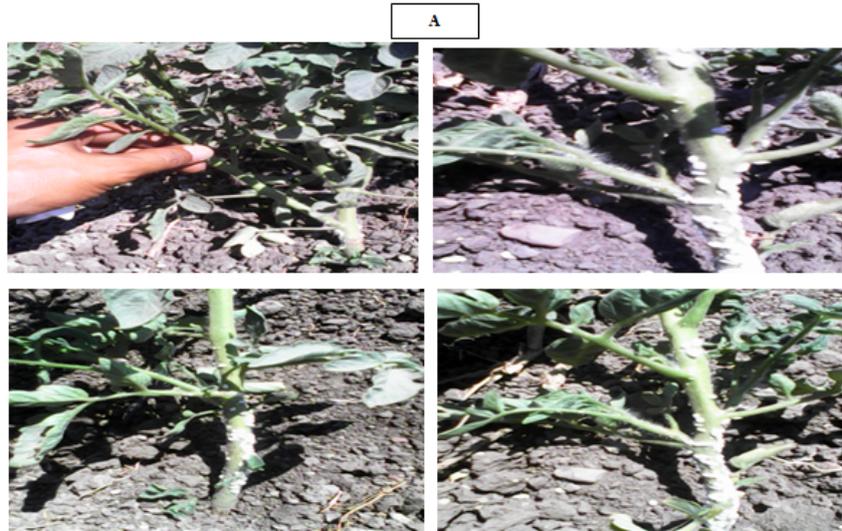


Fig.1: Infestation of *Phenacoccus solenopsis* Tinsley on tomato, at Fayoum Governorate, Fayoum and Itsa districts, Middle Egypt, in Egypt.

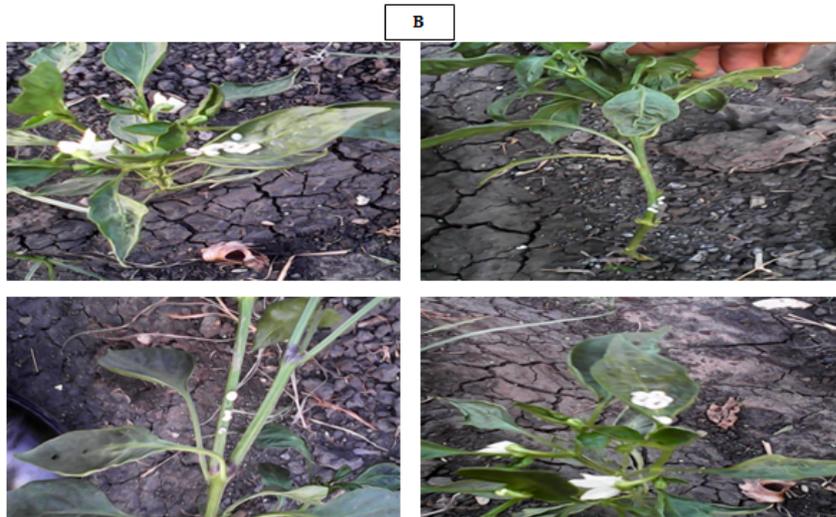


Fig. 2: Infestation of *Phenacoccus solenopsis* Tinsley on pepper, at Fayoum Governorate, Fayoum and Itsa districts, Middle Egypt, in Egypt.

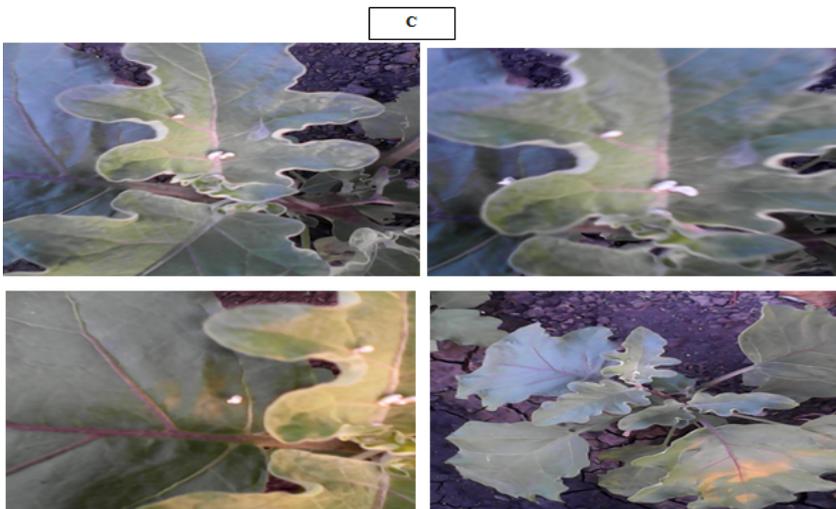


Fig. 3: Infestation of *Phenacoccus solenopsis* Tinsley on eggplant, at Fayoum Governorate, Fayoum and Itsa districts, Middle Egypt, in Egypt.



Fig. 4: Infestation of *Phenacoccus solenopsis* Tinsley on maize, at Fayoum Governorate, Fayoum and Itsa districts, Middle Egypt, in Egypt.

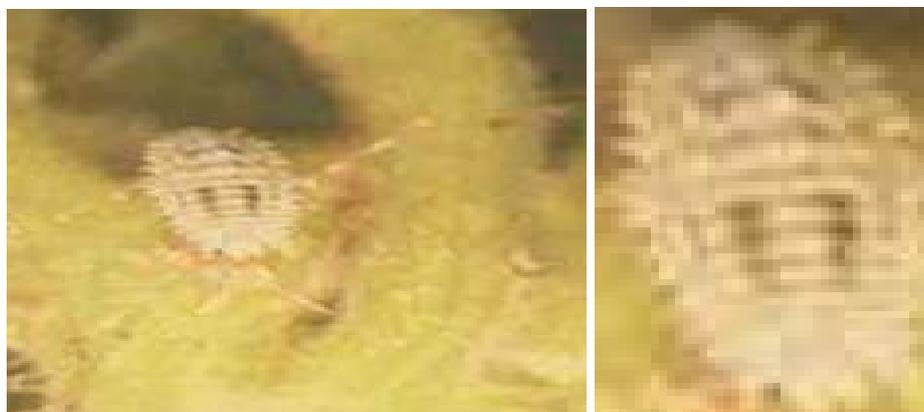


Fig. 5: Typical live appearance of the adult female of *P. solenopsis* (photo. By Prof. Dr.: Abd-Rabou, S., Professor of Scale Insects and Mealybugs)

## ARABIC SUMMERY

التسجيل الأول لحشرة بق القطن الدقيقي كافة حشرية جديدة علي نباتات الطماطم والباذنجان والفلفل والذرة وكثافتها العددية بمحافظة الفيوم في مصر

حمادة محمد عبد الحميد عبد الوارث

معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقي- الجيزة- ١٢٦١٨ مصر

تم تسجيل حشرة بق القطن الدقيقي لأول مرة بمنطقتين بمحافظة الفيوم في مصر تهاجم ثلاث محاصيل خضر ومحصول حقل. فقد تم تسجيل افة بق القطن الدقيقي علي نباتات الطماطم والباذنجان والفلفل والذرة المنزرعة خلال الموسم الصيفي ٢٠١٦ خلال الفترة من شهر يوليو حتي شهر سبتمبر. تم جمع عينات من آفة البق الدقيقي الحشرية من علي المحاصيل الأربعة خلال موسم الزراعة الصيفي ٢٠١٦ من موقعين هما منطقتا الفيوم وأطسا. تم تعريف عينة البق الدقيقي علي انها بق القطن الدقيقي علي مفتاح التقسيم الخاص بتعريف الجنس والنوع بقسم الحشرات القشرية والبق الدقيقي بمعهد بحوث وقاية النباتات مركز البحوث الزراعية. تم دراسة الكثافة العددية لتلك الآفة اثناء الموسم الزراعي وأوضحت النتائج أن نباتات الطماطم تصاب بأعداد كبيرة من من بق القطن الدقيقي بمتوسط ١٥.٣ & ١٥.٤ فرد لكل نبات ولها قمة واحدة خلال الأسبوع الأول من شهر أغسطس بمتوسط ٣٥ & ٣٩ فرد لكل نبات بمنطقتي الفيوم وأطسا علي التوالي. لكن كلا من محصولي الباذنجان والفلفل يصابوا بأعداد قليلة من هذه الآفة بمتوسط (٥.٢ & ٧.٨) و (٤.٥ & ٦.٥) فرد لكل نبات لمحصول الباذنجان والفلفل بمنطقتي الفيوم وأطسا علي التوالي. وتوجد قمة واحدة لها خلال الاسبوع الثاني من شهر أغسطس بمتوسط (١٥ & ٢٠) للباذنجان و (١٤ & ١٥) فرد لكل نبات لمنطقتي الفيوم وأطسا علي التوالي. بينما علي محصول الذرة لوحظ تواجد أعداد قليلة جدا منها بمتوسط (٥ & ٨) فرد للنبات بمنطقتي الفيوم وأطسا علي التوالي. أوضحت نتائج التحليل الأحصائي وجود فرق معنوي عالي بين كلا الموقعين المنزرعين بمحصول الطماطم مقارنة مع المحيل الاخري. لكن لا يوجد فرق معنوي بين كلا المحصولين التاليين وهما الباذنجان والفلفل في كلا الموقعين مقارنة مع المحاصيل الاخري. علي الجانب الآخر يوجد فرق معنوي بين نتائج محصول الذرة في كلا الموقعين مقارنة مع المحاصيل الثلاثة الاخري.