

RESEARCH ARTICLE

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Record of *Phenacoccus solenopsis* (Hemiptera, Coccoidea, Pseudococcidae) in the eastern province of Saudi Arabia

Suudi Arabistan'ın doğu bölgesindeki *Phenacoccus solenopsis* (Hemiptera, Coccoidea, Pseudococcidae) kayıtları

Soad ABDEL-RAZAK ^a 

^a Department of Biology, Faculty of Science, Hafr Al Batin University, 38039, Alexandria, Egypt

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*Corresponding author:

e-mail: siramadan@uhb.edu.sa

ORCID: 0000-0001-5509-5332

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ABSTRACT

The polyphagous pest, *Phenacoccus solenopsis* (Hemiptera: Pseudococcidae) was recorded for the first time in Eastern Province, Hafr Al batin, Saudi Arabia, infested two ornamental plants *Hibiscus rosa-sinensis* (Malvaceae) and *Passiflora* sp. (Passifloraceae) and Eggplants, *Solanum melongena* (Solanaceae). The results obtained revealed that the pest is now widely spread in Saudi Arabia since it's first recorded in the western side in Al Taif in 2020. The morphological characteristics to distinguish the species are given to help in future identification. In order to stop its spread and its impact on vegetation throughout the Kingdom, more studies are needed regarding its seasonal activity, distribution, host range, economic damage, and the presence of any natural enemies to reduce its population especially it is listed as a pest of date palm, *Phoenix dactylifera* (Arecaceae).

Öz

Doğada çok yönlü bir zararlı olan *Phenacoccus solenopsis* (Hemiptera: Pseudococcidae), Suudi Arabistan'ın Doğu Bölgesi'nde, Hafr Al-Batin'de ilk kez kaydedilmiştir. Zararlı, iki süs bitkisi olan *Hibiscus rosa-sinensis* (Malvaceae) ve *Passiflora* sp. (Passifloraceae) ile birlikte *Solanum melongena* (Solanaceae) türü patlıcan bitkilerine zarar vermiştir. Elde edilen sonuçlar, zararlarının 2020 yılında Suudi Arabistan'ın batısındaki Taif'te ilk kez kaydedilmesinden bu yana ülkede geniş bir alana yayıldığını göstermektedir. Türlerin tanımlanmasına yönelik ayırt edici morfolojik özellikler, gelecekteki təhsis çalışmalarına yardımcı olmak amacıyla sunulmuştur. Krallık genelinde zararlarının yayılmasını ve bitki örtüsü üzerindeki etkisini durdurmak için mevsimsel aktivitesi, yayılımı, konak bitki yelpazesi, ekonomik zararı ve popülasyonunu azaltmak için doğal düşmanlarının varlığı gibi konularda daha fazla araştırmaya ihtiyaç duyulmaktadır. Özellikle bu zararlı, hurma ağacı *Phoenix dactylifera* (Arecaceae) üzerinde tehdit oluşturan önemli bir zararlıdır.

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1. INTRODUCTION

Phenacoccus solenopsis Tinsley (Insecta, Hemiptera: Coccoidea, Pseudococcidae) is a mealybug native to North America which has recently spread worldwide. The pest could reproduce rapidly and disperses easily by farmers, animals, wind, and Agriculture machinery. It is a polyphagous insect which recorded infests on all plant parts. The species has been reported infesting 55

host plants belonging to 18 families (Hodgson et al., 2008). Watson (2020) stated that, the pest accidentally spread and has been collected and identified outside its native range and has become established as an invasive pest in the Afrotropical, Australasian, Nearctic, Neotropical, and Oriental regions and could cause direct economic damage reducing plant vigour and causing plant death.

Its small size, the hydrophobic waxy cover, different habits, ability to feed on all parts of the plant,

overlapping generations, and highly reproductive rates, allow *P. solenopsis* the opportunity to disperse over extended areas. Its camouflage and small size help to be overlooked on infested plant, facilitating transport to other regions (Watson, 2020). Once the pest has established within a region, it has the capability of rapid multiplication resulting in significant damage to the crop (Sharma, 2007). The infestation with the pest by extraction of phloem sap turning leaves yellow and crinkled which leads to loss of plant foliage resulting in fruit drop, if not treated it resulting to potential death of the plant which leads to a reduction in fruit yields (Dhawan et al., 2009 ; Jagadish et al., 2009). It was first recorded in Saudi Arabia in 2020 from the city Al- Taif in the south- western part of the Kingdom infested *Hibiscus rosa-sinensis* (Bader & Al-Jboory, 2020).

According to (Miller et al., 2014), The introduction of *P. solenopsis* into Saudi Arabia does not seem to be recent since it was noticed 198 times at US ports of entry between 1995 and 2012, with specimens originating from many countries including Saudi Arabia and United Arab Emirates.

It was first described by Tinsley, 1898 from specimens infesting the roots and stems of *Boerhavia spicata* and *Kallstroemia californica* within the nests of ants, *Solenopsis geminata* in New Mexico, USA. *Phenacoccus solenopsis* is a bisexual species with multiple overlapping generations annually (Badr et al., 2020). The species identifying using the morphology of the adult female, and its separation from *P. solani* can be difficult (Zhao et al., 2014). The adult female is covered with a powdery white wax secretion, its dimension ranged from 2 to 5 mm long and 2 to 4 mm wide with apart from two interrupted, submedian longitudinal dark bands formed of about six dark grey patches of bare cuticle on the proto metathoracic segments. Paired segmental wax filaments extend from the margin around the body, with the terminal pair of filaments longest (Watson, 2020). Slide-mounted females are distinguished by the presence of nine-segmented antennae, legs with translucent pores on the hind femur and tibia, there is two sizes of ventral tubular ducts, absence of quinquelocular pores, presence of a large circulus,

multilocular pores located around: the vulva, the posterior abdominal segments and in the submarginal areas of the abdominal segments (McKenzie, 1967; Kosztarab, 1996; Hodgson et al., 2008). On dorsum side, there are 18 pairs of cerarii, each with two enlarged setae around the margin. Oral rim and oral collar tubular ducts and multilocular pores are absent from the dorsum (Watson, 2020).

2. MATERIALS AND METHODS

Samples of the mealybug were collected on 27 October 2021, which noticed infesting leaves, stems, and branches of the ornamental plant, *Hibiscus rosa-sinensis* L. (Malvaceae), at Faculty of Science Hafr Al Batin University. On 25 July 2022 other samples were collected from the ornamental plant, *Passiflora* sp., (Passifloraceae) in a private garden in the northern part of Hafr Al Batin which observed a severe attack on leaves, stems, and branches and causing economic damage. On 15 November 2024 the pest noticed attacking Eggplants, *Solanum melongena* L. (Solanaceae). Planted at home backyard in the northern eastern part of Hafr Al Batin.

Samples transferred to the laboratory to classify the existing species. For classifying the collected mealybugs, either temporary or permanent slides making techniques were made of the mature adult female as stated by (McKenzie, 1967) and (Ezz, 1965) and examined microscopically and then classified taxonomically using scale insect's keys.

3. RESULTS AND DISCUSSIONS

3.1. Material examined

All species collected and slid mounted were identified as *P. solenopsis*. The infested host plants were *H. rosa-sinensis* (Malvaceae); *Passiflora* sp. (Passifloraceae) (Figure 1) and *S. melongena* (Solanaceae) (Figure 2).



Figure 1. *P. solenopsis* infestations symptoms in *Passiflora* sp.



Figure 2. *P. solenopsis* symptoms in *Solanum melongena*

Data in (Table 1) illustrates host plants; numbers of individuals/plant; localities and date of collection. Data revealed that the highest population was noticed on the vegetable plant, *S. melongena* followed by the ornamental, *Passiflora* sp. and the lowest infestation was on the ornamental, *H. rosa-sinensis*. Data obtained clarify that the pest is getting abundant in the region and started attacking different host plants during the noticed period from 2021 until 2024.

3.2. Field appearance

P. solenopsis, in its general appearance, is oval covered with a powdery white wax secretion about 2 to 5 mm long and 2 to 4 mm wide and is, apart from two interrupted, longitudinal submedian dark bands formed of about six dark grey patches on the pro-to metathoracic segments. The ovisac is fluffy and a loose-textured wax strands is produced (Figure 3), which agreed with McKenzie, 1967 and Kosztarab, 1996.

Table 1. Host plants, number of individuals and localities of *P. solenopsis* collected from Hafr Al Batin governorate Saudi Arabia

Host Plant	Host Plant Family	No. of Individuals/Plant	Locality	Date of collection
<i>H. rosa-sinensis</i>	Malvaceae	23	Faculty of Science Hafr Al Batin University 28.4322° N, 45.9601° E	27/10/2021
<i>Passiflora</i> sp.	Passifloraceae	125	A private garden in the northern part of Hafr Al Batin. 28.4556° N, 46.0062° E	25/7/2022
<i>S. melongena</i>	Solanaceae	180	Home backyard in the northern eastern part of Hafr Al Batin 28.4556° N, 46.0062° E	15/11/2024



Figure 3. Appearance in life of *P. solenopsis* adult female

No males were found among the specimens collected which agreed with those obtained by (Bader & Al-Jboory, 2020), they didn't record any males for the insects in a specimens collected from Taif, Saudi Arabia. Whoever all populations of *P. solenopsis* are known to reproduce sexually except for one population in India, which may suggest its introduction to the kingdom of Saudi Arabia from India. (Hao-Jie et al., 2019).

3.3. Mounted Adult Female

Mounted adult females matched the description of (McKenzie, 1967; Hodgson et al., 2008) and (Watson, 2020) (Figure 4) as follows: "Presence of nine-segmented antennae, segmented legs with translucent pores on the hind femur and tibia, each claw with a minute tooth, two sizes of ventral oral collar tubular ducts, absence of quinquelocular pores, presence of a large circulus, and multilocular pores concentrated around the vulva and posterior abdominal segments, often with a few also present in the submarginal areas of the abdominal segments". On the dorsum, 18 pairs of cerarii, each with two enlarged setae, are located around the margin. Oral rim and oral collar tubular ducts and multilocular pores

are absent from the dorsum. No male stages recorded among the collected specimens.

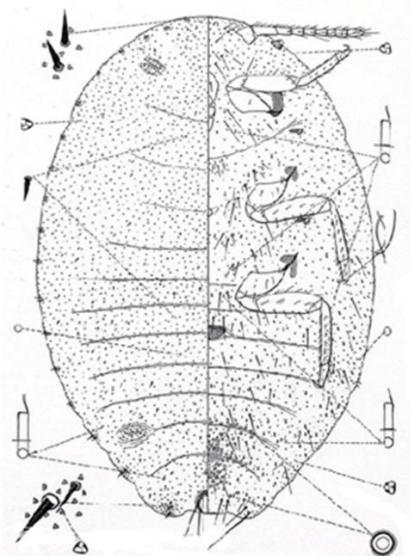


Figure 4. Description of adult female of *P. solenopsis* Tinsley (McKenzie, 1967)

This is the first record of the pest in the Eastern province of Saudi Arabia, which is an important part from the Kingdom for date palm production, which consider an economic crop in Saudi Arabia Agriculture (Al-Abbad et al., 2018). Unfortunately, *P. solenopsis* recorded as one of date palm, *Phoenix dactylifera* host plants in Pakistan and Ethiopia. (Arif et al., 2009; Alemu & Taye, 2020). The discovery of this pest in the Eastern Province of Saudi Arabia raises an alarm for further studies aimed at halting its spread and mitigating its impact on the Saudi agricultural economy. This is particularly critical for date palm cultivation, a cornerstone of the region's agricultural and economic sustainability.

Our results do not agree with those obtained by (Wei et al., 2017) which presented the global potential distribution map of *P. solenopsis* based on current and future climate variables under different scenarios up to

2070, They concluded that most of Saudi Arabia was in the unsuitable habitat area of *P. solenopsis* except for the south-western part, our results and observation with the heavy infestation we noticed in the Eastern province especially in Hafr Al- Batin government suggested that more studies should be conducted to investigate the distribution and host range of *P. solenopsis* in Saudi Arabia.

4. CONCLUSION

From the results obtained the study consider the first record of the invasive polyphagous pest, *P. solenopsis* Tinsley in the eastern province of Saudi Arabia and the study clarify that the pest is establishing to be an economic and expected to be spread on many areas and host plants in Saudi Arabia. More studies are needed regarding its seasonal activity, distribution, host range, economic damage, and the presence of any natural enemies to reduce its population.

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