



The Egyptian German Society for Zoology
The Journal of Basic & Applied Zoology

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Bionomics of *Pollinia pollini* (Costa) (Hemiptera: Asterolecanidae) in Egypt

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Received 15 January 2012; accepted 20 March 2012

Available online 30 August 2012

KEYWORDS

Scale insects;
Hemiptera;
Asterolecanidae;
Predators;
Population dynamics;
Pollinia pollini

Abstract *Pollinia pollini* (Costa) (Hemiptera: Asterolecanidae) is considered as one of the most important pest infesting olive trees in Egypt. The aim of this work is to study the survey of host plants, geographical distribution and natural enemies as well as the dynamic of *P. pollini* on olive trees in Egypt. The obtained results indicated that *P. pollini* infested only olive trees in two Governorates. These are Alexandria and Fayoum Governorates. No parasitoid species were collected and recorded in the present work. Three species of predators were recorded that attacked *P. pollini* in Egypt. These are the coccinellids, *Coccinella undecimpunctata* L., *Scymnus seriaticus* Mars. and the Neuroptera species, *Chrysoperlla carnae* Steph. Also the present study included the dynamics of *P. pollini* and its predators on olive trees in Alexandria Governorate during 2010 and 2011. Statistical analysis of the effect of weather factors on the population of *P. pollini* during the 2 years under consideration was discussed. It was concluded that maximum, minimum temperatures and % relative humidity are significant on the population of *P. pollini*. The trend over both years indicated the occurrence of two generations per year for *P. pollini* on olive trees in Alexandria.

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Introduction

Polliniines (Hemiptera: Asterolecanidae) are one of the most important pests attacking olive trees, oaks and bromeliads in Palearctic, Nearctic and Neotropical regions. They include three genera and seven species, they are *Mycetococcus corticis* (Townsend and Cockerell), *Mycetococcus ehrhorni* (Cockerell), *Pollinia pollini* (Costa), *Sclerosococcus bromeliae* McKenzie,

Sclerosococcus chilensis Lambdin, *Sclerosococcus ferrisi* McKenzie and *Sclerosococcus tillandsiae* Lambdin. They are characterized by tubular ducts eight-shaped, without an invagination or enlarged truncate filament, legs absent, antennae reduced to one segment; anal ring reduced apparently without pores or setae (McKenzie, 1958; Lambdin, 1980; Gill, 1993).

P. pollini (Costa) (Hemiptera: Asterolecanidae) attacks branches and may dry them off, leaves may bear deformities and it causes defoliation. Also these scales have been found in fruits, where they cause deformities. The larvae are able to move, they are yellow and measure one to 1.5 mm long. The adult females are orange red and are covered with a grayish waxy substance that protects entire colonies made up of nymphs and females; these are usually found in the buds. The males are elongate; they host in twigs and branches, or in the crevices or cracks of the bark. They are grayish white

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Peer review under responsibility of The Egyptian German Society for Zoology.



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(Murúa and Fidalgo, 2001; Barros, 2006; Orecchia et al., 2007). In Egypt, Polliniines comprise one species, *P. pollini* (Abd-Rabou, 2000).

Outbreaks of *P. pollini* have occurred on olive trees in Crete, Greece. There were two annual generations, the crawlers of the first (and larger) being present in March–April and those of the second in August–September. Most of the overwintering population was young females. Details are given of the duration of the different developmental stages. The scale insect was always more abundant on the sunny (south) side of the trees. The numbers of living individuals among the population were reduced from about 73% to 75% in April 1977 to 2.85%, 7.44% and 11.24% in July by an application (in April) of preparations containing methidathion, chlorpyrifos and azinphos-ethyl, respectively, as compared with 47.93% on untreated trees (Alexandrakis, 1980). Later Rexhep (1990) showed that *P. pollini* is widely distributed in Mediterranean countries. In Greece, the scale appeared in focus, the warmest places and weak olive trees where it causes severe damages. In Albany the infestation is low and the damage negligible. The natural enemies keep the scale population low. Chrysopids are the most abundant predators in olive orchards. They are active from late spring to late autumn and contribute to biological control of important olive tree pests as scales, that include *P. pollini* (Argyriou et al., 1976).

The aim of this work was to study host plants, geographical distribution and natural enemies of *P. pollini* as well as the dynamics of this pest and its predators on olive trees in Egypt.

Materials and methods

Host plants and distribution of P. pollini

Infested leaves and twigs were examined in the field using a pocket magnification lens. Infested leaves and twigs were collected from different host plants and different locations in Egypt during 2010–2011. Identification of *P. pollini* was done by examining adults in Canada Balsam (Abd-Rabou, 2003).

Natural enemies of P. pollini

Infested olive tree leaves and twigs were examined in the field, using a pocket lens. The leaves and twigs were collected and placed separately in paper bags for further examination in the laboratory. Materials were kept in a well-ventilated container until the emergence of any natural enemies. Identification of natural enemies was made by examining mounted adults in Hoyers medium and on card as follows.

Preservation

The specimens of natural enemies are best preserved as slide mounts and card. It may not be possible to see all the characters and measure some structures in carded specimens. However, when more specimens are available, it is preferable to have both slide mounted and carded specimens. Since body colour is likely to fade during clearing process, it might be necessary to note the colour and sculpture either from dried or freshly collected specimens preserved in alcohol. The smaller size of the specimens and their soft, less sclerotized bodies, make the specimens almost useless for study if preserved in alcohol for longer periods.

The procedures of slide mounts as follows

Dried specimens are soaked in glacial acetic acid (seven drops) mixed with chlorophenol (five drops) in small watch glasses.

- a. After 48 h specimens were cleared.
- b. The cleared specimens were then mounted in Hoyer's medium.

After drying for about 2 weeks in 40 °C, the slide cover was ringed with a suitable sealer.

Dynamics of P. pollini and its predators

Dynamics of *P. pollini* on olive trees was carried out in Alexandria Governorate, during 2010 and 2011. The selected orchard did not receive any chemical control for 2 years before starting these studies and during the study period. All trees received the same horticultural practices.

Twenty trees were selected at each grove infested with this scale insect. Selected trees were similar in size, shape, height and vegetation. Samples were picked up at 2-week intervals throughout the study. Samples' random size was 60 leaves and 30 twigs presenting from all directions. The samples were packed in polyethylene bags with minute holes and transferred to the laboratory for examination, using stereoscopic microscope binocular. All alive insects found on each leaf surface were assorted and recorded as: eggs, nymphs and adults. Obtained data were pooled for each inspection, direction and leaf surface.

The abundance of the predators of *P. pollini* was carried out in 2010 and 2011 on olive trees in Alexandria. The location heavily infested by the *P. pollini* was selected to undergo investigations and was sampled monthly. During the study, no chemical control for the pest was performed on these trees. In the locations 20 trees were selected randomly for sampling. Units of sampling consisted of 60 leaves and 30 twigs. These were detached off and brought to the laboratory for inspection. Simple correlation and regression values were calculated to obtain information about the relationships between the three tested weather factors and the population of *P. pollini*.

To calculate the age structure per sample, the mean number of each stage was divided by the total and multiplied by 100. This way gave each stage a percent proportion of the total per sample regardless of the total number of insects present (i.e. population density). The number of generations was determined using the obtained data throughout the two successive years using the age–structure technique per sample over the year. Generation is defined, as the time required for an insect to complete its life cycle.

Results and discussion

Host plants of P. pollini

The results of the present work indicated that *P. pollini* infested only *Olea europaea* (olive) trees in Egypt.

Geographical distribution of P. pollini

The results of the present work indicated that *P. pollini* was distributed in two Governorates (Map 1). These are Alexandria and Fayoum Governorates.

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