Flight of White Peach Scale, Pseudaulacaspis pentagona, Males and Time of Crawler Appearance in Northern Greece

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https://doi.org/10.12681/eh.14000

To cite this article:
Kyparissoudas, D. (1992). Flight of White Peach Scale, Pseudaulacaspis pentagona, Males and Time of Crawler Appearance in Northern Greece. ENTOMOLOGIA HELLENICA, 10, 21-24. doi:https://doi.org/10.12681/eh.14000
Flight of White Peach Scale, \textit{Pseudaulacaspis pentagona}, Males and Time of Crawler Appearance in Northern Greece$^1$

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ABSTRACT

The seasonal flight of white peach scale (WPS), \textit{Pseudaulacaspis pentagona} Targioni-Tozzetti, males was studied during 1989, 1990 and 1991 in a peach orchard of Central Macedonia in Northern Greece by sex pheromone trapping. Three periods of male flight activity (mid-May to late June, mid-July to late August and early September to early November) were recorded annually. These flights correlated with three periods of crawler emergence (late June to early August, second ten days of August to third ten days of September, and mid-April to early May – late May to early June of the next year). The first two periods of crawler activity came approximately 33 and 27 days after the beginning of the two first periods of male flight, respectively, while the crawlers corresponding to the third male flight emerged approximately 15 days after the deposition of the first spring eggs.

Introduction

The white peach scale (WPS), \textit{Pseudaulacaspis pentagona} Targioni-Tozzetti (Homoptera: Diaspididae), is a key pest in peach orchards of Northern Greece. It was first recorded in Central Greece in 1960 and it has been found in many locations throughout the country ever since (Paloukis and Mentzelos 1971, Paloukis 1979). The phenology of the scale has been studied in peach orchards of Central Macedonia, using sampling methods (Paloukis and Mentzelos 1971, Paloukis 1983). The identification and synthesis of the WPS sex pheromone (Health et al. 1979, Heath et al. 1980, Einhorn et al. 1983) offered the possibility of developing pheromone trapping techniques for male WPS. Pheromone traps have been used to monitor male adult flight activity (Bénassy et al. 1983, Cravedi and Molinari 1988, Nicolas and Bonet 1992). Male flight has been used to forecast emergence of crawlers and their control by determining timely applications (Bénassy et al. 1983).

The objective of the present work was to study the flight activity of WPS males by sex pheromone trapping, to monitor seasonal crawler activity by a sampling method, and to examine the possible relationship between male appearance and crawler emergence in a peach orchard of Central Macedonia in Northern Greece.

Material and Methods

Male flight activity and crawler appearance were studied for three years (1989-1991) and during the spring of 1992 in an untreated 0.8 ha peach orchard, in Krya Vryssi, Central Macedonia.

Adult males were monitored from May to mid-November using standard WPS pheromone «Trap-test-S» traps (Gruppo Montedison, Farmoplant S.P.A. Piazza Republica 14/16, 2014 Milano, Italy). In early May three pheromone traps were placed 1.8-2.0 m above the ground in the north-east side of the trees. Trap catches were recorded two or three times per week and attractive caps were replaced every four weeks. WPS males were counted in...
the lab under a dissecting microscope where traps were transferred.

Seasonal crawler activity was determined by samplings (Bobb et al. 1973, Paloukis 1983) made once or twice per week from early April through September. On each observation date, scale-infested twings, about 30 cm long, were collected and ca. 150 live scales examined in the laboratory. Data were recorded on the egg deposition and egg hatching timing.

To estimate the relationship between first appearance of the males in the first and second flight, and the corresponding first crawler emergence two techniques were used: pheromone traps and direct observation. Trap observations were taken daily from the installations of the traps to the first male catches. For this purpose in the experimental orchard three pheromone «Traptest-S» traps were placed. First crawler emergence was detected by careful visual observations starting 22-25 days after the onset of male flight and repeated at two or three day intervals in selected peach trees.

Results and Discussion

The seasonal WPS male flight is shown in Fig. 1A. Three almost discrete flights were recorded in each year. The first flight began in mid-May to early June and continued for 6 weeks. The second flight – lasting for 6 weeks – appeared in the middle of July, while the third one occurred in early September and continued until late October – early November. In 1989 and 1990 the 1st flight was followed by a 2-week period with no male activity, while in 1991 the 1st and 2nd flights overlapped. Furthermore, in all years the 2nd and 3rd flights partly overlapped and the trap captures of both flights were progressively higher than those of the 1st one.

It is evident from the Fig. 1B that there were three distinct periods of crawler appearance, as was also reported by Paloukis (1983) under similar conditions. Emergence of crawlers, corresponding to the 1st male flight of the year, began approximately in the last part of June and continued for 4 weeks. Emergence of crawlers, corresponding to the second flight, started in the second ten days of August and continued until mid-to late September. The crawlers, corresponding to the third male flight, emerged from mid-April to early May of the following year. These last crawlers derive from eggs laid in the spring by females mated during the previous fall (Paloukis and Mentzelos 1971). Their activity lasts approximately 6 weeks known as the first generation of the year.

The first crawlers emerged approximately 33 to 27 days after the beginning of the first and second male flight, respectively (Table 1). Based on this information it is possible to forecast the appearance of crawlers by sex pheromone trapping of the males. This technique can not be used to forecast the emergence of the first generation crawler of the year (mid-April to early June), because these crawlers derive from eggs laid in the spring by females mated during the previous fall (3rd male flight). The above forecast may be possible to be based on the relationship between the deposition of the first spring eggs, as a biofix, and the first crawler emergence. This can be justified by our 4-year observa-
TABLE 1. Appearance dates and time elapsed from first male flight to first crawler emergence, Krya-Vryssi, 1989, 1990, 1991 and 1992.

| Male flight | Appearance date | Period from 1st male to 1st crawler |
|-------------|-----------------|-------------------------------------|
|             | 1st male        | 1st crawler                        |
| First       | 21 May 1989     | 27 June 1989                       |
|             | 15 May 1990     | 20 June 1990                       |
|             | 6 June 1991     | 7 July 1991                        |
|             | 25 May 1992     | 25 June 1992                       |
| Average     |                 |                                     |
| Second      | 21 July 1989    | 19 August 1989                     |
|             | 14 July 1990    | 10 August 1990                     |
|             | 29 July 1991    | 24 August 1991                     |
|             | 21 July 1992    | 19 August 1992                     |
| Average     |                 |                                     |

From mid-March 150 mated females were examined in the lab twice of three times every week.

The present study showed that pheromone traps can be used to accurately monitor flight activity of male WPS and to identify discrete generation of the scale under field conditions. Forecasting the emergence of the 2nd and 3rd generation crawlers of the year is essential in timing application of chemicals against the immature stages of scale, under conditions prevailing in Northern Greece.

Acknowledgement

Appreciation is expressed to Prof. E. Tremblay University of Naples, Italy, for his useful suggestions and criticism on the text and to N. Niklis for his assistance with laboratory work. This research was supported in part by the National Program of Agricultural Forecasting System of the Ministry of Agriculture.

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KEY WORDS: *Pseudaulacaspis pentagona*, Pheromone, Monitoring.