

## ECOLOGICAL STUDIES ON SOME IMPORTANT INSECT PESTS OF OLIVE TREES IN EL-FAYOUM GOVERNORATE, EGYPT

El-Hakim Aida M., Salwa K. Hanna  
and A.M.Z. Mosallam

Plant Protection Research Institute, Agricultural Research Centre, Dokki, Giza, Egypt.

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### Abstract

The inter-relationship between population density of both *Leucaspis riccae* Targ. (Homoptera, Diaspididae) and *Palpita unionalis* Hb. (Lepidoptera, Pyraustidae) on olive trees in El-Fayoum Governorate and three climatic factors (temperature, R.H. % and sunshine periods) was studied during the two consecutive years of 1999 and 2000. It was found that the population of *L. riccae* had 4 peaks and insignificantly correlated with the three tested environmental factors during the two years of investigation. Whereas, R.H. % significantly affected the population fluctuations of larvae of *P. unionalis* that had 2 and 3 peaks during 1999 and 2000, respectively. The highest mean numbers of larvae were recorded during spring months, whereas the lowest ones were recorded during summer season throughout the two years of investigation.

### INTRODUCTION

Olive trees are considered as one of the sub-tropical fruits, which attacked by several insect pests. The severity and majority of these harmful insects varied according to species, country and year. Many authors studied the population dynamics and inter-relationship between the climatic factors and numbers of the most injurious insects on olive such as Fouda (1973), El-Sherif (1975), Moursi & Hegazi (1983), Rizk & Mohammed (1985), Ali et al. (1987), Saleh et al. (1987), Fodale et al. (1990), Pinto & Salerno (1995) and Mosallam (1999).

The present work aims to study the population dynamics of two insect pests of olive, *Leucaspis riccae* Targ. and *Palpita unionalis* Hb. on olive trees in El-Fayoum Governorate as well as the inter-relationship between the population and predominant climatic factors of temperature, relative humidity and daily sunshine periods during two successive years, 1999 and 2000.

## MATERIALS AND METHODS

An area of about 5 feddans; in El-Okaily village, Ebshway district; heavily infested with both of *L. riccae* and *P. unionalis* was chosen for sampling. Vegetative samples of tender twigs were collected by small pruning scissors periodically every two weeks throughout the two consecutive years of 1999 and 2000, kept in polyethylene bags and transferred to laboratory.

Ten tender twigs representing all directions and sectors of tree were collected from 10 trees as replicates. Twenty five leaves for every tree were inspected by a stereoscope microscope for estimating all alive stages of *L. riccae* on both upper and lower surfaces of leaves.

With respect to *P. unionalis*, 50 newly vegetative twigs were collected from 10 trees as replicates. These twigs were incubated in tightly covered plastic pots (10 cm. in diameter x 8 cm. height) under laboratory conditions of  $25 \pm 3^{\circ}\text{C}$  and  $65 \pm 5\%$  R.H. After 5 days, all larval instars of *P. unionalis* were counted.

The daily mean records of climatic factors of temperature, atmospheric relative humidity and sunshine periods in both years were provided by the Meteorological Station in Etssa region, El-Fayoum Governorate. The correlation between these ecological factors and population density of the two investigated insects was statistically calculated according to Fisher (1950).

## RESULTS AND DISCUSSION

**1. *Leucaspis riccae* Targ.:** Data in Table 1 reveal that the seasonal fluctuations of population of olive scale insect during the two years of investigation, 1999 and 2000 was insignificantly affected with the three tested climatic factors; temperature, R.H. % and sunshine periods. Both temperature and sunshine periods had positive correlation, whereas the fluctuation of population was negatively correlated with R.H. %. The total influence of the three abovementioned climatic factors on the insect population density varied from year to year as it was 80.73 % in the first year, then reduced to be 20.72 % in the second one.

As shown in Figs. 1 & 2, *L. riccae* had four peaks of population during the two years of investigations, 1999 and 2000. In the first year, the highest peak of 4.47 individuals / leaf was recorded on mid-November, whereas those of the second year (11.67 insects / leaf) was recorded on the first of June.

**2. *Palpita unionalis* Hb.:** The effect of the three tested climatic factors on the building up of population of *P. unionalis* during 1999 and 2000 are given in Table 2.

The statistical analysis proved that R.H. % significantly affected the building up of the population of *P. unionalis* during both of the years, 1999 and 2000, while the two other climatic factors; temperature and sunshine period had insignificantly effects. The three tested climatic factors during 1999 and R.H. % alone during 2000 were negatively correlated with the population density of *P. unionalis*, whereas both temperature and sunshine period during the second year had positive correlations. The total effect of the three factors was higher in the second year (87.73 %) than that of the first year (57.99 %). The relative humidity gave the highest influence recording 17.04 % during 1999 and 72.54 % during 2000.

The population of *P. unionalis* had two and three peaks during 1999 and 2000, respectively (Figs. 1 & 2). The highest mean numbers of larvae of *P. unionalis* were shown during spring season, but it sharply decreased throughout summer months. Then the population gradually increased through November and December of the two years, 1999 and 2000.

Table 1. Simple correlation (r), partial regression and coefficient of determination (C.D. %) for the numbers of *Leucaspis riccae* on olive trees in El-Fayoum Governorate under temperature, relative humidity and sunshine period during two consecutive years.

Considered weather factors	1999			2000		
	r	b	C.D.%	r	b	C.D.%
Twice monthly mean Temp.	0.132	87.415	8.41	0.158	124.651	2.03
Twice monthly mean R.H. %	-0.163	-56.775	11.76	-0.191	-91.264	8.08
Twice monthly mean sunshine	0.138	22.634	12.84	0.073	-6.983	0.43
Interaction Temp. x R.H. %			13.55			5.88
Interaction Temp. x sunshine			15.97			1.42
Interaction R.H. % x sunshine			18.20			2.88
<b>Total C.D. %</b>			<b>80.73</b>			<b>20.72</b>

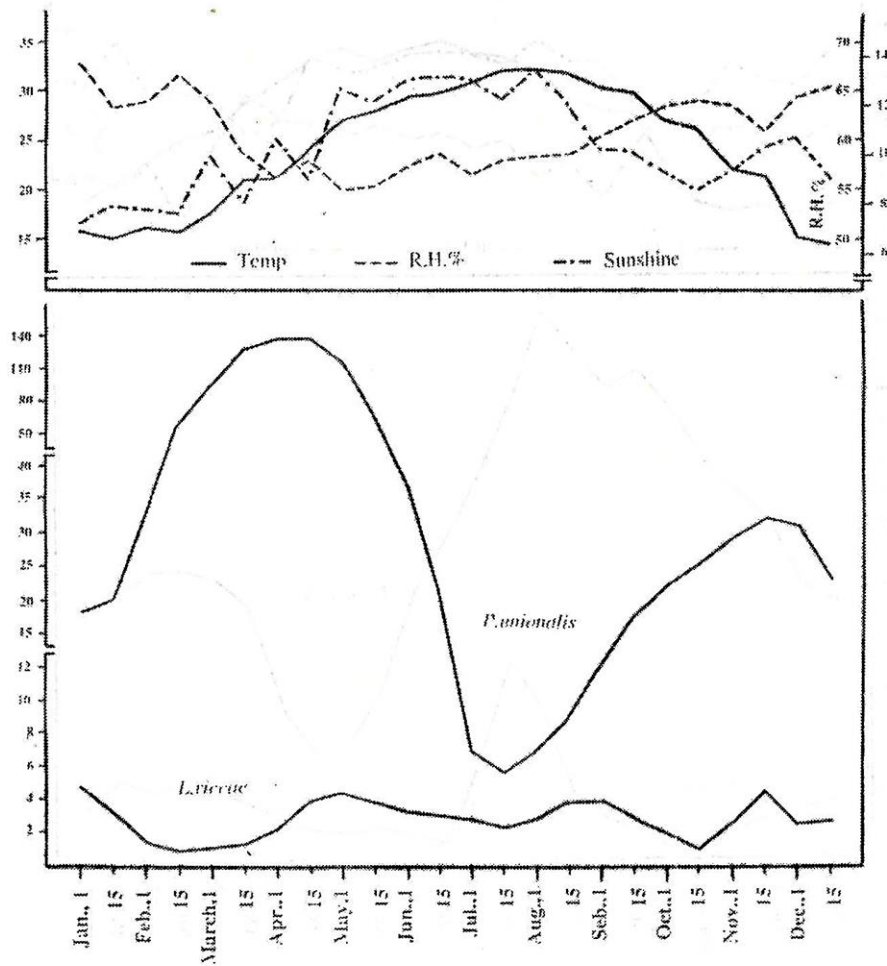


Fig. 1. Fluctuation in population of *L. riccae* and *P. unionalis* on olive trees at El-Fayoum Governorate during 1999.

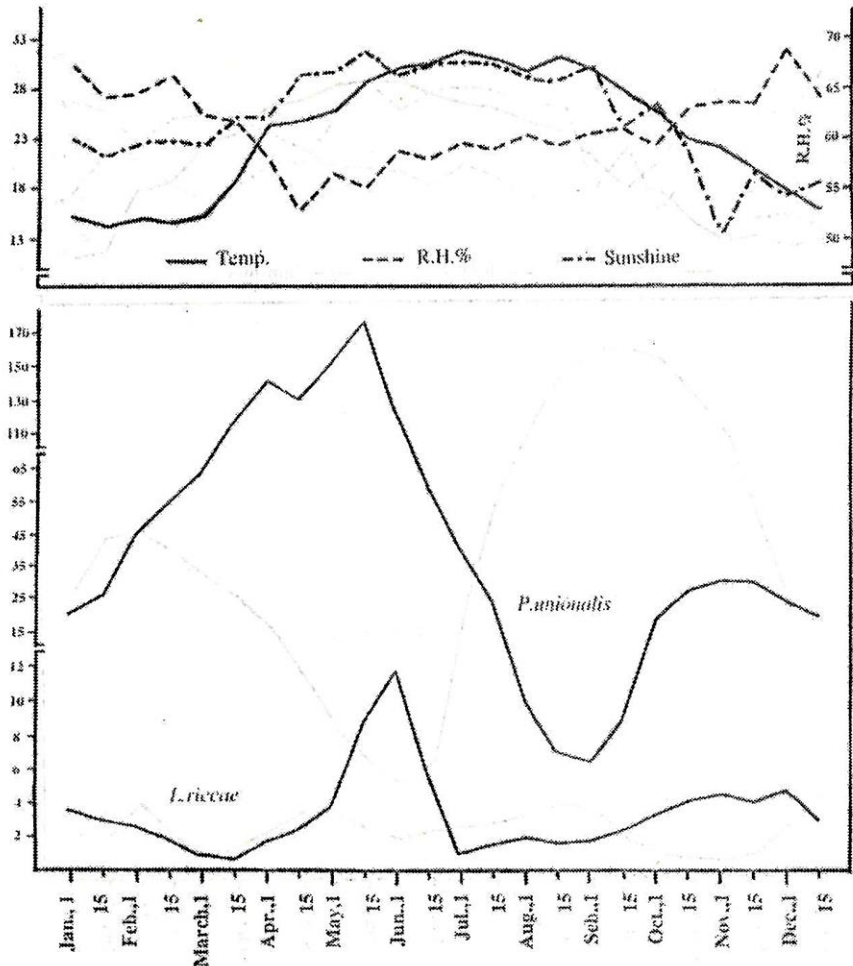


Fig. 2. Fluctuation in population of *L. riccae* and *P. unionalis* on olive trees at El-Fayoum Governorate during 2000.

Table 2. Simple correlation ( $r$ ), partial regression and coefficient of determination (C.D. %) for the numbers of larvae of *Paipita unionalis* on olive trees in El-Fayoum Governorate under temperature, relative humidity and sunshine period during two consecutive years.

Considered weather factors	1999			2000		
	$r$	b	C.D.%	$r$	b	C.D.%
Twice monthly mean Temp.	-0.239	-4285.830	6.49	0.123	1106.614	0.19
Twice monthly mean R.H. %	-0.412*	-4171.646	17.04	-0.548**	-4505.254	72.54
Twice monthly mean sunshine	-0.130	-812.157	2.94	0.366	1053.440	0.44
Interaction Temp. x R.H. %			14.34			5.42
Interaction Temp. x sunshine			6.71			0.44
Interaction R.H. % x sunshine			10.47			8.70
<b>Total C.D. %</b>			<b>57.99</b>			<b>87.73</b>

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## دراسة إيكولوجية لبعض الآفات الحشرية الهامة على أشجار الزيتون في محافظة الفيوم - مصر

عايدة مصطفى الحكيم ، سلوى كامل حنا ، أحمد محمود زكى مسلم

معهد بحوث وقاية النباتات مركز البحوث الزراعية - الدقى - الجيزة - مصر

تم دراسة العلاقة بين الكثافة العددية لكل من حشرة الزيتون الحاربية وبودة أوراق الزيتون الخضراء في محافظة الفيوم والعوامل المناخية الثلاثة (درجة الحرارة ، الرطوبة النسبية ، وفترة سطوع الشمس) وذلك خلال العامين المتتاليين ١٩٩٩ و ٢٠٠٠. وقد أظهرت نتائج الدراسة أن للحشرة الحاربية ٤ ذروات للتعداد والنوى لم يرتبط معنوياً بعوامل الطقس الثلاثة تحت الدراسة خلال العامين . بينما أثرت الرطوبة النسبية معنوياً على كثافة التعداد الموسمية ليرقات الدودة الخضراء والتي كان لها ٢ و ٣ ذروات تعداد خلال العامين ١٩٩٩ و ٢٠٠٠ على التوالي . وقد سجلت أعلى متوسطات لتعداد اليرقات إنشاء أشهر الربيع فى حين سجلت أقل متوسطات لها أثناء موسم الصيف وذلك خلال عامى الدراسة .