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INFLUENCE OF DIFFERENT DIRECTIONS AND LEVELS OF THE POMEGRANATE TREES ON THE WHITEFLY *Siphoninus phillyreae* (HAL.) AND ITS PARASITOID *Encarsia inaron* (WALK.) AT KAFER EL-SHEIKH GOVERNORATE, EGYPT

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ABSTRACT

Population abundance of the pomegranate whitefly, *Siphoninus phillyreae* (Haliday) larvae and pupae, the rate of parasitism were studied on pomegranate trees at Kafr El-Sheikh Governorate during 2006 and 2007 seasons. Results indicated that the highest abundance of *S. phillyreae* larvae and pupae were recorded during August through October in the two season. *Encarsia inaron* was only the parasitoid emerged from *S. phillyreae* larvae and pupae during the two successive seasons (2006 and 2007). Highest rate of parasitism occurred in October 48.6% on south direction 2006 season. The overall mean of parasitism on north, south east and west during 2006 were 18.9, 19.9, 12.4 and 15.4% respectively, these rates in 2007 season, were 17.8, 18.5, 15.3 and 19.4% respectively. As for the level, the lower level received the most of larvae and pupae of the pest and their parasitoid. The highest rate of parasitism occurred in October and reached 50.7% on lower level. The overall mean of parasitism was 3.3, 15.7 and 36.1% on upper, middle and lower levels of pomegranate trees during 2006 season, while in 2007 these percentages were 2.1, 16.3 and 34.2% respectively.

Keywords: *Siphoninus phillyreae*, larvae and pupae, *Encarsia inaron*

INTRODUCTION

The pomegranate whitefly, *Siphoninus phillyreae* (Haliday) (Hemoptera: Alyrodidae) is one of the most important species of whiteflies in Egypt (Priesner and Hosny, 1932 and Abd-Rabou, 1998). This whitefly attacking 60 host economic plants, including apple, pear, citrirus, olive and pomegranate. It cause several damage to pear and apple in Europe. Heavy infestations caused wilt, early leaves drop and smaller fruit (Bellows *et al.,* 1990). Two species of natural enemies, the parasitoid *Encarsia inaran* Walker and the predator, *Clitostehus arcuatus* (Rossi) (Coleoptera: Coccinellidae) were introduced for biological control of *S. phillyreae* whitefly in California (Bellows, *et al.,* 1992). The densities of *S. phillyreae* were declined to four orders of magnitude on both ash and toyon in California, U.S.A. after the introduction and establishment of *E. inaron* and *C. arcuatus* (Dreistadt and Flint, 1995). Seven species of aphelinid parasitoids (Hymenoptera: Aphelinidae) were reared from three locations in Egypt and the parasitoid, *E. inaron* was the most effective parasitoid in controlling *S. phillyreae* (Abd-Rabou, 1998). Two parasitoid species, *E. inaron* and *E. lutea* (Masi) emerged

from *S. phillyreae* Larvae and Pupae and *E. inaron* was the most dominated species (Mesbah, 2003).

MATERIALS AND METHODS

The study was carried out on pomegranate orchard, at the experimental farm, Faculty of Agriculture, Kafr El-Sheikh University, in 2006 and 2007 seasons. Percentages of parasitism were estimated by picking 40 leaves from each cardinal direction and three levels upper (0-1m), middle (1-2 m), lower (2-3m). The pomegranate leaves were put into plastic bags and transferred to the laboratory for examination. Second, third larval instars and pupae of *S. phillyreae* were counted, eggs, first larval instar as well as other associated insects were eliminated. Collected larvae and pupae from *S. phillyreae* of each cardinal direction and the three levels were confound separately into Petri-dishes (7.5 cm diameter) until emergence of either the parasitoid or the whitefly adults. Percentage of the parasitism was calculated as follows:

Parasitism % = A/B x 100

Where:

A = No. of emergence parasitoid

B = Total no. of *S. phillyreae* larvae and pupae.

Parasitoid adults were slide mounted in Hoyere's medium and identified to the species level according to Abd-Rabou and Abou Seta (1998).

RESULTS AND DISCUSSION

Influence of different directions on the population abundance of *S. phillyreae* larve and pupae and their parasitoid *E. inaron:*

Season 2006:

Data illustrated in Fig. (1) indicated that the *S. phillyreae* larvae and pupae were appeared earlier than parasitoid *E. inaron* on the north and south direction about one month, where the larvae and pupae were appeared in July, while the parasitoid appeared in August. As for the east and west, the pest and its parasitoid were appeared together in August. The period extended from late August until November was considered abundance period for the pest larvae and pupae at their parasitoid *E. inaron*. The highest relation between the parasitoid and its host was detected during October (Table 3).

Season 2007:

As Fig. (2) in season 2007 the result have the same trend of season 2006, except the north direction, the pest larvae and pupae and their parasitoid were appeared together in August. The highest abundance of the parasitoid *E. inaron* was September throughout October. The present results are in agreement with those of Abd Rabou (1998) and Mesbah (2003).

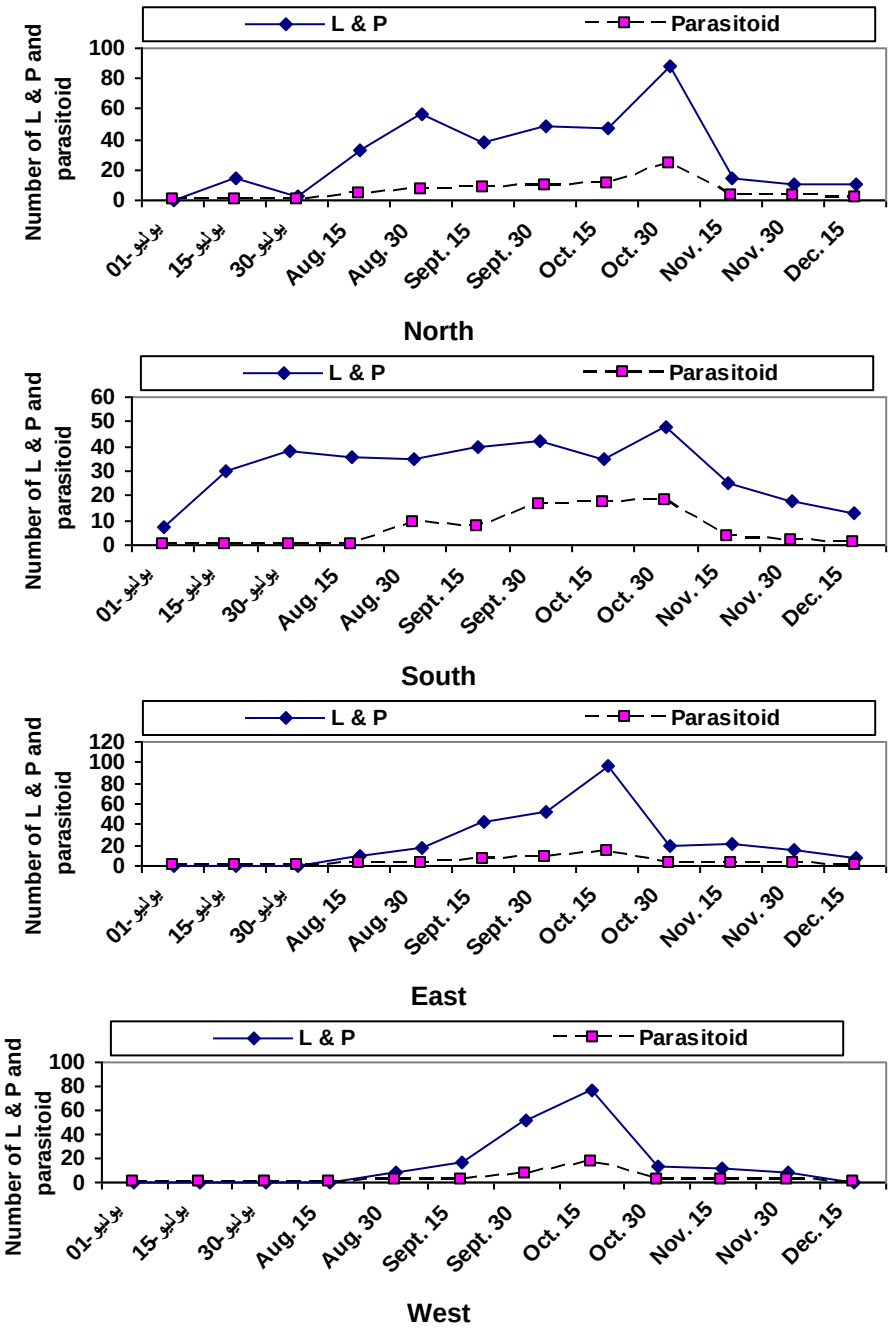

Fig. (1): Influence of different directions on the population abundance of *S. phillyrea* larvae and pupae and its parasitoid *E. inaron* during 2006 season.

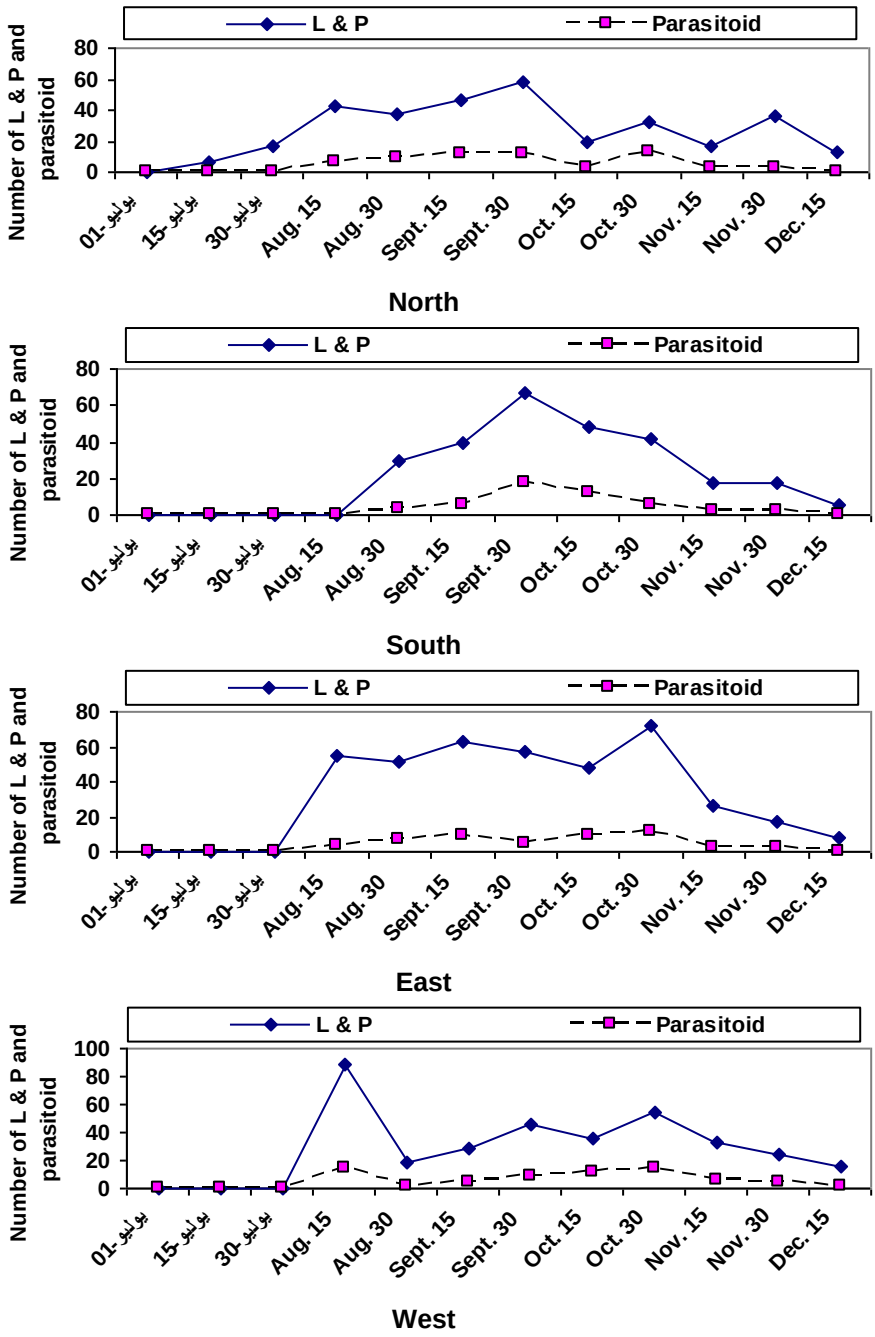

Fig. (2): Influence of different directions on the population abundance of *S. phillyrea* larvae and pupae and its parasitoid *E. inaron* during 2007 season.

Parasitism rate on the different directions:

Data in Table (1) indicated that the north direction of pomegranate trees were free from the pest and its parasitoid until August 15, while the parasitism rates was represent with 12.2 and 14% in 2006 and 2007 seasons, respectively. The highest parasitism rates in north direction were recorded on 30 October, 27.3 and 40.6% in the two seasons, respectively.

In the south direction, the pest larvae and pupae and their parasitoid were deleted until the late of August. The highest percentage of parasitism was recorded on October 15 (48.6%) in 2006 season and September (26.9%) in 2007 season Table (1).

Table (1): Prasitism rates of *S. phillyrea* larvae and pupae by *E. inaron* on the different directions of pomegranate trees during 2006 and 2007 seasons.

Inspection date	North		South		East		West	
	2006	2007	2006	2007	2006	2007	2006	2007
July 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
July 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
July 30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aug. 15	12.2	14.0	0.0	0.0	10.0	7.3	0.0	16.9
Aug. 30	12.5	23.7	25.7	10.0	11.8	13.7	11.7	10.5
Sept. 15	21.1	23.4	17.5	12.5	14.3	14.3	12.5	17.9
Sept. 30	18.4	19.0	38.1	26.9	13.5	8.8	11.5	17.4
Oct. 15	22.9	10.5	48.6	25.0	14.4	18.8	20.8	30.6
Oct. 30	27.3	40.6	37.5	11.9	10.5	15.3	14.3	25.9
Nov. 15	21.4	17.7	12.0	11.1	9.5	7.7	8.3	18.2
Nov. 30	18.2	8.3	11.1	11.8	6.3	11.8	12.5	16.7
Dec. 15	9.1	0.0	7.7	0.0	0.0	0.0	0.0	12.5
Total	18.9	17.8	19.9	17.5	12.4	15.3	15.4	19.4

The highest rate of parasitism on the east direction of the pomegranate trees in September 15 and October 15 during 2006 and 2007 and represented with 14.3, 14.3, 14.4 and 18.8%, respectively (Table 1).

One peak on the west direction during 2006 and 2007 seasons. The two peaks were recorded on October 15 and represent with 20.8 and 30.6% in 2006 and 2007 seasons, respectively. Generally, the period from the end of August until the late of November considerable period of the parasitism on different directions. The overall mean of the parasitism rates on the north, south, east and west during 2006 and 2007 season, were 18.9, 17.8, 19.9, 17.5, 12.4, 15.3,15.4 and 19.4, respectively. Elwan (1982) recorded that the rate of parasitism increased gradually from June until December and a maximum parasitism ranged from 27 to 38%. Abd Rabou and Abou -Setta (1998) reported that the parasitoid species and parasitism rates were differentiated by the location and *Encarsia inorom* was the most dominant parasitoid in Giza and Assiut, with an average parasitism 38 and 46.5% over the year, respectively. Similar findings about the parasitoid *E. inaron* was recorded by Abd-Rabou (1998) and Mesbah (2003).

Influence of different levels on the population abundance of *S. phillyreae* larvae and pupa and their parasitoid *E. inaron:*

Season 2006:

Data illustrated in Fig. (3) revealed that the upper level harboured the little number of *S. phillyreae* larvae and pupae compared with middle and lower levels. No parasitoid was recorded on the upper level except three parasitoids found on October. Highest number of *S. phillyreae* larvae and pupae and their parasitoid *E. inaron* were recorded on the lower level, while the middle level take a medium position between the upper and lower levels as for the pest larvae and pupae and their parasitoid the period from late August until the late one of November considered the active period of *S. phillyreae* larvae and pupae and their parasitoid *E. inaron.* The total number of the pest larvae and pupae on the three levels upper, middle and lower were 90, 421 and 608 indiv., respectively, while the parasitoid was 3, 66 and 210 invid., respectively.

Season 2007:

Data in Fig. (4) show that the results in 2007 approximately as in season 2006 except that only one parasitoid was recorded on October 15. The total number of pest larvae and pupae were 47, 374 and 666 indiv.., while the total number of the parasitoid was 1, 61 and 228 parasitoids on upper, middle and lower, respectively. The present data in Table (4) are in agreement with those of Elwan (1982) who stated that the northern, eastern, and western sides of pomegranate trees received about 24-25, 27-28, 21-27, and 22-27% of the larval population, respectively, and about 24-25, 27-28, 21-26 and 22-27% of pupal population, respectively. Also, Elwan (1982) stated that all stages were mainly concentrated on the lower third of the pomegranate tree (47-52%), while the middle and upper third received 32-35% and 14-19%, respectively. Mesbah (2003) recorded that *E. inaron* was the most dominant and representing 98.7, 97.1 and 98.8% of the total parasitoids during the studied seasons. He also found that the overall means of the percentages of the parasitism were 24.4, 18.5, 17.5 and 20.1% in the north, south, east and west directions, respectively during the first season and ranged from 12.8 to 17.7% during the second two other seasons.

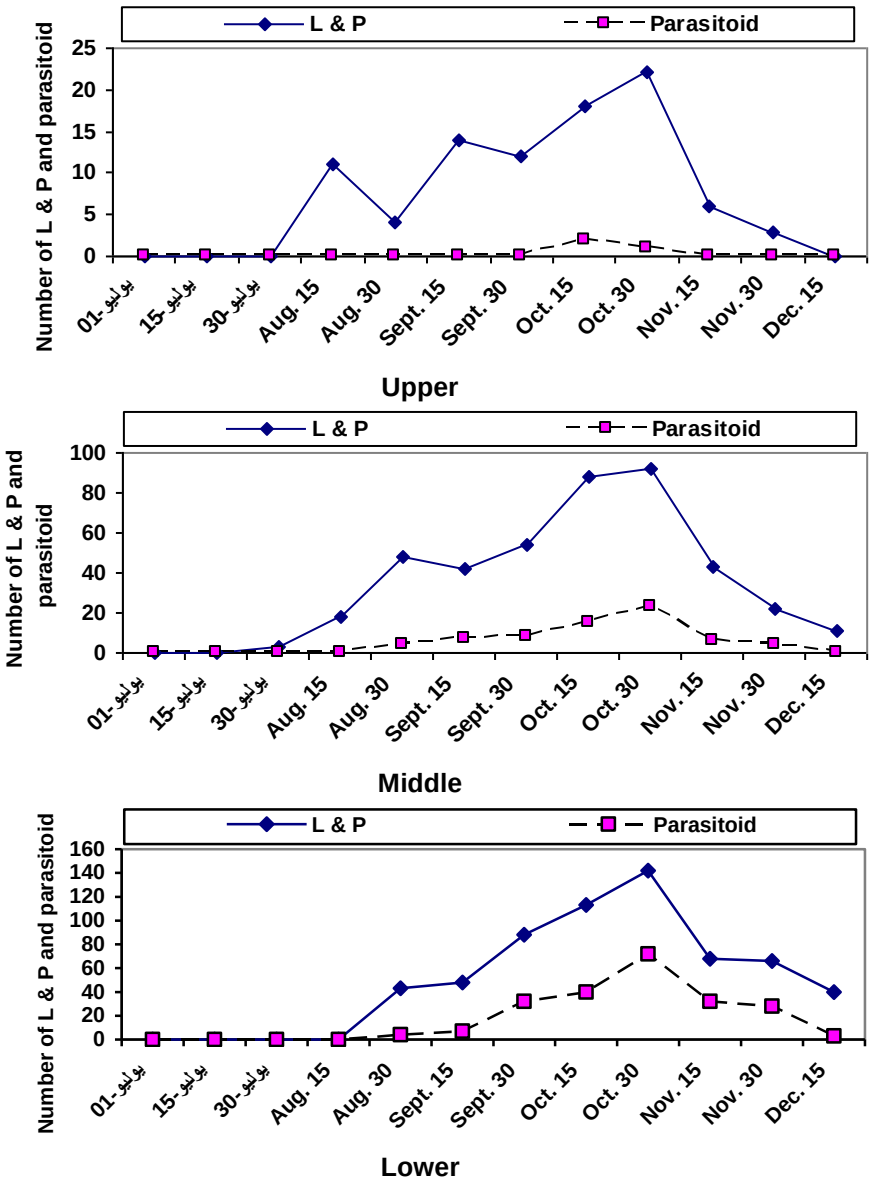

Fig. (3):Influence of different levels on the population abundance of *S. phillyrae* larvae and pupae and their parasitoid *E. inaron* during 2006 season.

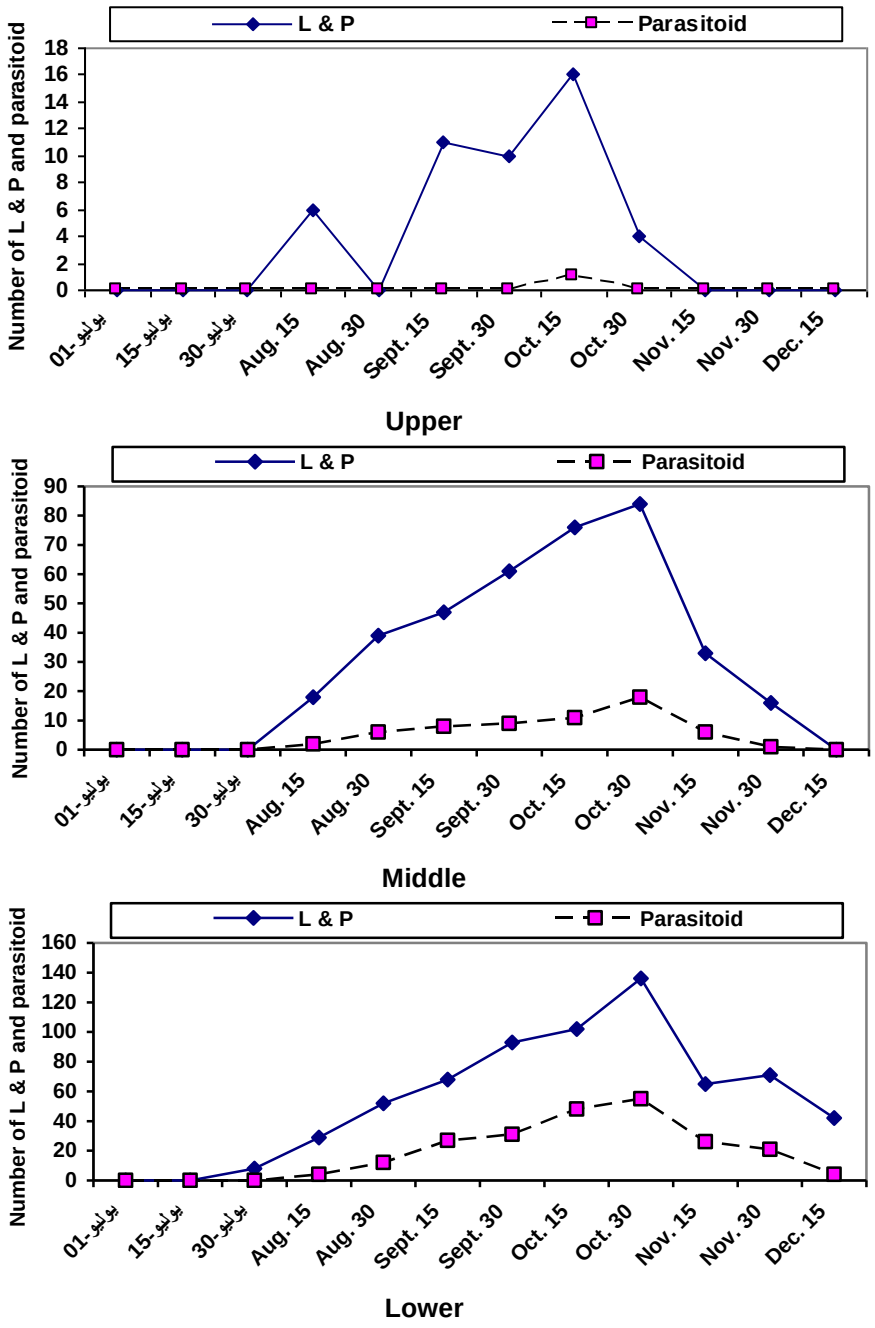

Fig. (4): Influence of different levels on the population abundance of *S. phillyrae* larvae and pupae and their parasitoid *E. inaron* during 2007 season.

Parasitism rate on different levels:

Data presented in Table (2) indicated that except October, *S. phillyreae* larvae and pupae does not occur on upper level during the two seasons. The overall mean of the parasitism on upper level were 3.3 and 2.1% during 2006 and 2007 respectively.

Table (2):Prasitism rates of *S. phillyrea* larvae and pupae by *E. inaron* on the different levels of pomegranate trees during 2006 and 2007 seasons.

Inspection dates	Upper		Middle		Lower	
	2006	2007	2006	2007	2006	2007
July 1	0.0	0.0	0.0	0.0	0.0	0.0
July 15	0.0	0.0	0.0	0.0	0.0	0.0
July 30	0.0	0.0	0.0	0.0	0.0	0.0
Aug. 15	0.0	0.0	0.0	11.1	0.0	13.8
Aug. 30	0.0	0.0	8.3	15.4	9.3	23.1
Sept. 15	0.0	0.0	16.7	17.1	14.6	39.7
Sept. 30	0.0	0.0	14.8	14.8	36.4	33.3
Oct. 15	11.1	6.3	17.1	14.5	35.4	47.1
Oct. 30	4.6	0.0	25.0	21.4	50.7	40.4
Nov. 15	0.0	0.0	14.0	18.2	47.1	40.0
Nov. 30	0.0	0.0	18.2	6.3	42.4	29.6
Dec. 15	0.0	0.0	0.0	0	6.8	9.5
Overall mean	3.3	2.1	15.7	16.3	36.1	34.2

The parasitism started on the middle level in August (Table 2). Two high peaks were detected on September and on October 30 and represented with 16.7 and 25% during 2006 season and 17.1 and 21.4 during 2007 season, respectively. The overall mean of parasitism on middle were 15.7 and 16.3% during the two seasons, respectively.

Data tabulated in Table (2) show that the highest rates of parasitism were recorded on lower level and the period from September until November considerable period of parasitism. The highest peak on 2006 season reach to 50.7% on October 30, while the highest one in 2007 season was recorded on October 15 and represent with 47.1%. The overall mean of parasitism on lower-middle during 2006 and 2007 seasons were 36.1 and 34.2%, respectively. The present results are in agreement with those of Elwan (1982) and Mesbah (1999).

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تأثير الاتجاهات والمستويات المختلفة لأشجار الرمان على ذبابة الرمان البيضاء وطفيلها انكرزيا انارون فى محافظة كفر الشيخ

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لقد تم فى هذا البحث دراسة الوفرة العددية لكل من يرقات وعذارى ذبابة الرمان البيضاء ، وكذلك معدلات التطفل على كل منهما على أشجار الرمان فى محافظة كفرالشيخ خلال موسمى 2006 ، 2007 وأوضحت النتائج أن أكبر وفرة عددية ليرقات وعذارى الذبابة توجد خلال الفترة من أغسطس وحتى أكتوبر من كل موسم ولقد سجل طفيل واحد فقط على كل من اليرقات وعذارى الذبابة وهو طفيل *Enacarsia inaron* (Walk.) وسجل أعلى معدل تطفل بهذا الطفيل خلال شهر أكتوبر 2006 وهو 48.6% على الجهة الشرقية للأشجار بينما كان المتوسط للتطفل خلال موسم 2006 على الجهات الأصلية وهى الشمال ، الجنوب والشرق والغرب هى 18.9 ، 19.9 ، 12.4 و 15.4% على التوالى. وفى موسم 2007 كانت تلك المعدلات هى 17.8 ، 17.5 ، 15.3 و19.4% على التوالى. وبالنسبة للتطفل على المستويات المختلفة على الأشجار وهى العلوى والوسطى والسفلى ، وجد أن معظم اليرقات وعذارى الذبابة تتواجد على المستوى السفلى وكذلك الطفيل. كما سجل أعلى معدل تطفل على المستوى السفلى فى أكتوبر حيث وصل إلى 50.7% بينما كان المتوسط العام للتطفل على المستويات العلوى والوسط والأسفل خلال موسمى 2006 هو 3.3 ، 15.7 ، 36.1% على التوالى وفى موسم 2007م كانت تلك المعدلات هى 2.1 ، 16.3 ، 34.2% على التوالى.

قام بتحكيم البحث

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