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ECOLOGICAL STUDIES ON THE OLIVE PSYLLID, *EUPHYLLURA STRAMINEA* LOGINOVA (HOMOPTERA:PSYLLOIDEA: APHALARIDAE) IN AL-ARISH, NORTH SINAI, EGYPT

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Abstract

The olive psyllid, *Euphyllura straminea* Log. is an economic important insect pest on olive trees in Egypt. The pest causes severe damage to the olive trees and decline the olive yield in Al-Arish, North Sinai. The present work was conducted for two successive years (1997/98 & 1998/99) on a heavily infested olive orchard in Al-Arish. The seasonal abundance, the number of generations and effect of certain weather factors on the population dynamics were studied.

The obtained results showed that, The pest have five nymphal instars before maturity. The 1st instar nymphs appeared through November or by early December and continued until late June and were abundant during March/April in both years. The 2nd instar nymphs appeared by mid- November or December and continued until late June and abundant in April in both years. The 3rd instar nymphs appeared from December/ January and continued until mid-July and abundant through April, whereas the 4th instar nymphs appeared during January and continued until mid-August and abundant through April in both years. The 5th instar nymphs appeared through January/February and continued until late August and more abundant through April/May in the two years. The adults occurred all the year round, abundant through April and have a reproductive dormancy in summer and autumn. Oviposition started in November, eggs are deposited in the twig buds of olive shoots and the newly twigs of crowded branches, individually or in batches (2- 4 eggs). The pest had one generation a year on olive trees in Al-Arish, North Sinai.

The obtained results showed that, the tested weather factors were significant and negative correlation on the nymphal and adult populations in both years, respectively. The exact effect of these factors on populations revealed that, night minimum temperatures (13.3-13.9°C) and maximum temperatures (25.3-26.3°C) were around optimal range for nymphal activity and within optimal range of the adult activity in the investigated years. The mean temperatures (19.3- 20.1 °C) were within optimal range of nymphal activity and around optimal range of adult activity in both years, respectively, whereas the relative humidity (67.6 69.4% R.H.) was above optimal range of nymphal and adult activities in both years, respectively.

The combined effect of tested weather factors on nymphal population were highly significant in both years and the amounts of variability were 68.8% and 63.3% for both years, respectively. Whereas, its effect on adult population were highly significant during the 1st year and significant in the 2nd year and the amount of variability were 71.4% and 53.2% for the studied years.

INTRODUCTION

The olive psyllid, *Euphyllura straminea* Log. was recorded in Egypt in 1988 (Nada, 1994) as a serious insect pest on olive trees at Al-Arish and Rafah in North Sinai. Two years latter, a heavily infested olive trees was observed at El-Fayom governorate. The pest have five nymphal instars before attaining to the adult stage (Zeinat, 1998).

Halperin *et al* (1982) reported that, *E.straminea* attacks olive trees in Cyprus, Lebanon, Israel, Iraq and Iran, whereas Lauterer *et al* (1986) found two species of *Euphyllura E.phillyura* Foerster and *E.straminea* Log.) infesting olive trees in Greece. The related species *E. olivina* causes severe damage to olive orchards in Tunisia (Jardak *et al,* 1986) and at low density of infestation (1-5 insect/racemes) the real loss in racemes appears almost negligible. While, with a density of 6-8 insects the loss reaches 13% and then reaching more than 40% when infestation exceeds 30 insects per raceme.

The pest causes severe damage to olive trees in Al-Arish, North Sinai. The damage is reflected in the fall of racemes or decline in the average number of the floral buds per raceme and in a reduction of flower fertility caused by the drying out of the pistil. The nymphs excrete large honeydew droplets, which set the stage for onset of sooty mould. Infestations cause a great damage to olive trees and decline olive yied. The nymph's feeding causes blossoms and premature fruit to drop and caused economic loss in the yield.

The present work was planned to throw light on the seasonal abundance and number of generations per year as well as, the effect of certain weather factors on population dynamics to plan an effective program for controlling the pest.

MATERIALS AND METHODS

The present work was conducted for two successive years (1997/98 & 1998/99) on a heavily infested olive orchard in Al-Arish, North Sinai. The olive trees in the selected orchard had the same age (25 years), homogeneous in vegetative growth with height of 4 meter and receive the same agricultural practices except chemical control and pruning.

Half-monthly samples were taken at early morning from 10 olive trees distributed at random in the orchard, each sample contain 10 twigs (24 leaves and 12 inter-

nodes) per each tree. The samples were picked up at random from the cardinal directions and the inner branches as well as from the lower branches of the tree near the ground. The collected samples were persevered in paper bags and transferred to the laboratory for further inspection with a stereomicroscope. The nymphs and adults were sorted, counted and recorded.

The Meteorological data were obtained from the Meteorological Station of Al-Arish. These data include minimum, maximum and mean temperatures as well as relative humidity (R.H.%). The seasonal abundance of nymphs and adults were correlated with these weather factors to test their effect on insect population. The C-multiplier methods (Fisher, 1950) of the partial regressions were carried out to obtain simultaneous effect of these factors on the variability within the population of nymphs and adults.

RESULTS AND DISSCUSSION

A. Seasonal abundance: The seasonal abundance of the olive psyllid, *E. straminea* during both years (1997/98 & 1998/99) are shown in Figures 1&2 as follows:

The nymphal instars population

1. The 1 st instar nymph: In mid-November, the newly hatched nymphs were observed with few individuals (two nymphs/twig) at 19.3°C & 75% R.H. on olive twigs especially in olive suckers and dwarf shoots found around olive mothers. In December, the population increased to 2-4 nymphs/twig in the 1st year at 15.6-19.4 °C & 70-72% R.H. whereas, the 1st instar nymphs appeared with few numbers (2-3 nymphs/twig) during the 2nd year (1998) at 18.3-19.2°C & 65-75 % R.H. During January 1998, the population increased gradually from 5-7 nymphs / twig in the 1st year at 13.1-15.2 °C & 75-76 % R.H. and 3-4 nymphs/ twig in the 2nd year (1999) at 13.7-13.9°C and 67-80 % R.H.

In February, the population increased gradually 10-12 nymphs/twig in the 1st year at 13.7-14.1°C & 69 -75% R.H. and 5-8 nymphs/twig at 12.5-14.1°C & 69-77% R.H. in the 2nd year (1999). During March, the population of the 1st instar nymphs increased sharply 16-20 nymphs/ twig in the 1st year at 14.4-16.4°C & 59-75 % R.H., whereas in the 2nd year the population increased 10-12 nymphs/twig at 15.1-16.7°C & 67-70% R.H.

The maximum population of the 1st instar nymphs was occurred during mid-

March in the 1st year, (20 nymphs/twig) at 16.4°C & 59% R.H. In April, the population decreased in the 1st year, 16-14 nymphs/twig at 15.4-21.2°C & 58-60 % R.H. whereas, in the 2nd year, the population increased to maximum number (16 nymphs/twig) at 17.4°C & 57% R.H. in the 1st half of April, then the population decreased by mid-April to 14 nymphs/twig at 18.3°C & 63% R.H.

Through May, the population decreased sharply in the two years, 8-5 nymphs/ twig in the 1st year at 21.7-22.1°C & 57-66 % R.H. and 10-7 nymphs/twig in the 2nd year at 19.3-21°C & 68% R.H. During June, the population observed with few numbers in both years. The decreasing of population were referred to increasing of ambient temperature in both years (22.9-26°C). In July and until mid-October, the 1st instar nymphs were entirely disappeared and neither nymphs nor eggs were observed in olive twigs during the two years.

The above results revealed that, the 1st instar nymphs appeared through the 2nd half of November or by early December and continued until late June and the population was more abundant during March/April in both years. In Iraq, Abdul-Baki and Ahmed (1985) mentioned that the 1st instar nymphs of *E.straminea* ppeared during January in Mosul region and continued until late May and were abundant during April at 13.7 °C & 59%R.H.

2. The 2nd instar nymph: The 2nd instar nymphs appeared with few numbers by mid-November, 1997. While in December, the population observed with 2-4 nymphs/ twig in both years. The population increased gradually during January in both years, it ranged between 5-7 nymphs/twig at 13.1-15.2°C & 70-75% R.H. in the 1st year and 2 nymphs/twig at 13.7-13.9°C & 67-80 % R.H. in the 2nd year.

In February, the population increased rapidly in both years, 6-10 nymphs/twig at 13.7-14.°C & 69-75% R.H. in the 1st year and 3-5 nymphs/ twig at 12.5-14.1°C & 69-77% R.H. in the 2nd year. During March, the 2nd instar nymph population increased to 12-13 nymphs/twig at 14.4-16.4°C & 59-75 % R.H. in the 1st year and 6-7 nymphs/ twig at 15.1-16.7°C & 67-70% R.H. in the 2nd year. In early April, the population increased sharply in both years, 10-14 nymphs/twig at 15.4-21.2°C & 57-63 % R.H. and the maximum numbers of the 2nd instar nymphs recorded during the 1st half of April.

In May, the population decreased from 7-5 nymphs/twig in the 1st year at 21.7-22.1°C & 57-66 % R.H. and 5-4 nymphs/twig in the 2nd year at 19.3-21°C & 68-71% R.H. A continuous decrease was observed in the population during June in the both years, 4-2 nymphs/twig at 22.9-26°C & 59-68% R.H. During July till late October, the

2nd instar nymphs disappeared.

The obtained results showed that the 2nd instar nymphs appeared by mid- November or December and continued until late June and were more abundant in April in both years. Whereas in Iraq, Abdul-Baki and Ahmed (1985) mentioned that the 2nd instar nymphs of *E.straminea* appeared through March until late May in Mosul region and abundant during April at 13.7 °C & 59%R.H.

3. The 3rd instar nymph: The 3rd instar nymph appeared during December 1997 with few individuals, 1 -2 nymphs/twig and appeared by mid-December, 1998 in the 2nd year. During January, the population increased 1-3 nymphs/twig at 13.1-15.2°C & 67-80% R.H. in the both years, respectively. In February, the population increased 5-8 nymphs/twig in the 1st year at 13.7-14.1°C & 69-75 % R.H. and 2-3 nymphs/twig in the 2nd year at 12.5-14.1°C & 69-77% R.H. During March, the population increased rapidly to 9-10 nymphs/twig in the 1st year at 14.4-16.4°C & 59-75 % R.H. While in the 2nd year, the population increased 4-6 nymphs/twig at 15.1-16.7°C and 67-70% R.H. In April, the population increased sharply in early April to 11 nymphs/ twig at 15.4°C & 58 % R.H. in the 1st year, recording a peak for the 3rd instar nymphs, then the population decreased in the 2nd half of April to 9 nymphs/twig at 21.2°C & 60% R.H. In the 2nd year, the population increased during April to 9-11 nymphs/twig at 18.3-19.3°C & 63-71% R.H.

During May, the population decreased continuously in both years from 8-7 nymphs/ twig in the 1st year at 21.7-22.1°C & 57-66 % R.H. and from 7-4 nymphs/ twig in the 2nd year at 19.3-21°C & 68-71% R.H. A continuous decreasing were observed in the population through June, it ranged from 5-2 nymphs/twig in both years. In July, the population decreased to minimum numbers (1-2 nymphs/twig) at ambient temperature of 25.3-27.8°C in both years. From August until late October, the 3rd instar nymphs disappeared in both years.

The above results indicated that, the 3rd instar nymphs appeared from December/January and continued until mid-July and were more abundant through April in both years. In Iraq, Abdul-Baki and Ahmed (1985) mentioned that the 3rd instar nymphs of *E. straminea* appeared during March and continued through June in Mosul region and were more abundant during May at 22.8 °C & 47.9%R.H.

4. The 4th instar nymph: The 4th instar nymphs appeared with few numbers on olive twigs through January in the two years. In February, the population increased gradually (2-3 nymphs/twig) in the both years, whereas in March, the population in-

creased rapidly, 7-8 nymphs/twig in the 1st year at 14.4-16.4°C & 59-75% R.H. and 2-4 nymphs/twig in the 2nd year at 15.1-16.7°C & 67-70% R.H.

During April, the population increased sharply to a maximum number (12 nymphs/twig) during 1st half of April at 15.4°C & 58% R.H. in the 1st year, by mid-April the population decreased to 11 nymphs/twig at 21.2°C & 60% R.H. While in the 2nd year, the population increased to maximum number by mid-April (14 nymphs/twig) at 18.3°C & 63% R.H. In May, the population decreased in both years from 9-7 nymphs/twig in the 1st year at 21.7-22.1°C & 57-66% R.H. and 12-8 nymphs/ twig in the 2nd year at 19.3-21°C & 68-71 % R.H.

Through June, the population decreased continuously, from 5-4 nymphs/twig in both years, whereas in July, the population occurred with few nymphs (1-3 nymphs/ twig) in both years at ambient temperatures of 25.3-27.8°C. During 1st half of August, the population observed with minimum numbers (one nymph/twig) in both years. From mid August till late October, no records of the 4th instar nymphs occurrence on olive twigs in the orchard.

The aforementioned results stated that, the 4th instar nymphs appeared during January and continued until mid-August and were more abundant through April in both years. In Iraq, Abdul-Baki and Ahmed (1985) mentioned that the 4th instar nymphs of *E.straminea* appeared through March and continued until late June in Mosul region and were more abundant during May at 22.8 °C & 47.9% R.H.

5. The 5th instar nymph: The 5th instar nymphs appeared in few numbers in mid-January in the 1st year. In February, the population increased to 2-3 nymphs/twig in the 1st year and few individuals were observed in mid-October in the 2nd year. During March, the population increased rapidly, 5-7 nymphs/twig in the 1st year at 14.4-16.4°C & 59-75% R.H. and 1-3 nymphs/twig in the 2nd year at 15.1-16.7°C & 67-70% R.H.

In April, the population increased sharply in the 1st year, 11-13 nymphs/twig at 15.4-21.2°C & 58-60% R.H. In the 2nd year, the population increased 7-13 nymphs/ twig at 17.4-18.3°C & 57-63% R.H. The maximum number of the 5th instar nymphs occurred in the mid-April in the both years.

During May, the population decreased from 11-6 nymphs/twig in the two years. Gradual decrease (8-4 nymphs/twig) were observed in the population during June in both years. The population decreased continuously in July 4-3 nymphs/twig in both

years, then few numbers of the 5th instar nymphs were recorded during August in the 1st year, whereas in the 2nd year, the 5th instar nymphs disappeared entirely from olive twigs by mid-August. From September till October, the 5th instar nymphs disappeared in both years.

The present results revealed that, the 5th instar nymphs appeared through January/February and continued until late August and were more abundant through April/ May in both years. In Iraq, Abdul-Baki and Ahmed (1985) reported that the 5th instar nymphs of *E.straminea* appeared through March until late June in Mosul region and were more abundant through June at 28.2 ºC & 25%R.H.

II. The adult population: During November, the adults were found in few individuals and the deposited eggs were observed in twigs. The adult population varied during November to December in both years (1997/98 - 1998/99), 4-5 adults/twig were recorded in the 1st year and 2-4 adults/ twig in the 2nd year, whereas in January, the population varied to 5-7 adults/twig in both years. During February, the adults population increased to 9-11 adults/twig in the 1st year at 13.7-14.1ºC & 69-75% R.H. and 7-9 adults/twig in the 2nd year at 12.5-14.1ºC & 69-77 % R.H.

In March, the population increased rapidly to 15-18 adults/ twig in the 1st year at 14.4-16.4ºC & 59-75 % R.H., whereas in the 2nd year, the adults population increased 11-13 adults/twig at 15.1-16.7ºC & 67-70 % R.H.

In April, the adult population increased to maximum number in early April in both years, (21 adults/twig) at 15.4ºC & 58% R.H. in the 1st year, and 16 adults/twig in the 2nd year at 17.4ºC & 57 % R.H., then the population decreased gradually by mid-April, 16 adults/twig at 21.2ºC & 60% R.H. in the 1st year and 11 adults/ twig at 18.3ºC & 63% R.H. in the 2nd year.

During May, the adult population decreased continuously 14-10 adults/ twig at 21.7-22.1ºC & 57-66 % R.H. and 9-6 adults/ twig at 19.3-21ºC & 68-71 % R.H. in the 2nd year. Continuous decrease was observed in adult population during June in both years, 8-7 adults/ twig at 25-26ºC & 59-64% R.H. in the 1st year and 4-3 adults/twig at 22.9-25.1ºC & 68 % R.H. in the 2nd year.

In July, the population decreased from 5-4 adults/ twig in the 1st year at 26.2-27.8ºC & 64-67 % R.H. and 4-3 adults/twig in the 2nd year at 25.3-27.5ºC & 71-72% R.H. Whereas in August, the adults population observed in few numbers, 3-5 adults/ twig in both years. During September-October, the adults were found in few individuals

(2-4 adults/twig) in the branch cracks and the suckers around olive trees.

The obtained results revealed that, the adults of *E.straminea* found with varied population on olive trees all the year round and were more abundant through April. In Iraq, Abdul-Baki and Ahmed (1985) showed that, the adults of *E.straminea* were seen through the year in Mosul region and their peak appeared during June at 28.2 °C & 25% R.H.

Reviewing the above-mentioned results, it could be concluded that the adults had a reproductive dormancy in summer and autumn and start oviposition by November. The present observation is in agreement with Prophetou-Athanasiadou and Tzanakakis (1986) in Greece, who showed that adults of *E.phillyreae* have an aestival - autumnal-hibernal reproductive dormancy as an adult that starts in June and the field diapause terminated between mid-December and early January. Subsequently, the psyllids remained in the reproductive quiescence until February or early March when environmental conditions allowed ovarian development and reproduction.

Prophetou-Athanasiadou (1993) stated that, laboratory and field studies on the time of diapause termination, the length of post-diapause quiescence and the time of post-diapause ovarian maturation and oviposition of *E.phillyreae,* coincided with the appropriate growth-stage of host plant. The same author (1997) mentioned that *E.phillyreae* in Greece has an aestivalautumnal-hibernal reproductive diapause as an adult on olive trees.

During early November 1997/98, eggs of *E.straminea* were observed deposited in the twig buds of olive shoots individually or in batches (2-4 eggs) and in few cases the eggs and newly hatched nymphs were observed in twigs of crowded olive branches. The present results are in agreement with the results of Abdul-Baki and Ahmed (1985) on the olive psyllid, *E.straminea* in Iraq, which started oviposition in November and continued until May.

The related species, *E.phillyreae* deposited eggs individually or in masses, from end of May to end of June on the terminal shoot, on open flowers and on stems of olive in Greece (Stavraki, 1980). On the other hand, Prophetou-Athanasiadou (1996) reported that, in northern Greece, the reproduction being limited to a brief period in spring and the eggs laid singly or in groups on young apical leaves of swollen leaf and flower buds in April and on developing and developed inflorescence closed flowers in May. The same author (1997) mentioned that, the oviposition and nymphal development of *E.phillyreae* are synchronized with the phonology of the certain growth stages

of olive trees in Greece.

B. Number of generation: The obtained results, Figures 1&2, showed that the olive psyllid, . *E.straminea* had one generation per year on olive trees in Al-Arish, North Sinai. The above results are in agreement with the related species *E. olivina* (Argyriou, 1985) and *E.phillyreae* (Prophetou-Athanasiadou (1996) in Greece.

C. Effect of certain weather factors on insect population

I. Nymphal population

1. Effect of night minimum temperature: The results in Tables 1&2 showed a significant negative correlation (r = - 0.483) in the Ist year and insignificant negative correlation (r = - 0.252) in the 2nd year for the night minimum temperature on nymphal activity in both years, respectively. The real effect of this factor on insect activity in both years were determined through mathematical calculation of partial regression values, which indicated insignificant negative relation (p.reg = -3.8 & -0.55) in both years when the other three factors remain constant around their averages (max. & mean temperatures and % R.H.). The above results indicate that, this factor (13.3-13.9°C) around the optimal range of nymphal activity in both years.

2. Effect of maximum temperature: The results in Tables 1 and 2 showed an insignificant negative correlation (r = - 0.399 & - 0.132) between the max. temperature and nymphal population in both years. The exact effect of this factor on nymphal activity was determined by the partial regression values which emphasized insignificant negative relation between this factor and the nymphal activity (p.reg. = -6.3 & - 0.33) during both years, when the other three factors (min. temperature, mean temperature and R.H.) remain constant round their averages in both years.

The above results for the effect of max. temperaturc (25.3-26.3°C) indicated that this factor was around the optimal range for nymphal activity during both years.

3. Effect of mean temperature: The results in Tables 1 and 2 showed an insignificant negative correlation (r = - 0.441 & - 0.196) for the mean temperature on nymphal activity in the two years, respectively. The real effect of this factor on nymphal activity in both years were determined through mathematical calculation of partial regression values, which indicated insignificant positive effect (p.reg. = 7.7 & 0.89) in both years, when the other three factors (min. & max. temperatures and % R.H.) remain constant round their averages in both years. The above results indicate that, this

factor (19.3-20.1°C) within the optimal range for nymphal activity during both years.

4. Effect of relative humidity: The results of the effect of relative humidity on the activity of nymphal population during negative effect on nymphal population in both years (r= - 0.522 & - 0.537). The partial regression values indicated strong and highly negative effect of this factor (p.reg. = - 2.5 & P > 0.01) on nymphal population during the 1st year, whereas in the 2nd year it has a significant effect on nymphal population (p.reg. = - 1.3 & P > 0.05).

The aforementioned results indicated that this factor (67.6-69.4% R.H.) was entirely above optimal range for nymphal activity during both years, when the other three factors (min. & max. and mean temperatures) remain constant around their averages.

5. The combined effect of the four weather factors on the changes in the nymphal population: The obtained results, Tables 1 and 2 show that the combined effect of these tested factors were highly significant on nymphal activity in both years, where the "F" values were 7.7 & 5.2 for the 1st and 2nd years, respectively. The amount of variability that could be attributed to the combined effect of these weather factors on nymphal population were 68.8% and 63.3% for the 1 st and 2nd years, respectively.

II. Adult population: The adult populations of the olive psyllid, *E.straminea* are highly affected with the ambient weather factors as follows:

1. Effect of night minimum temperature: The results of the effect of the night minimum temperature on adult population are presented in Tables 1 and 2 during both years, revealed that the correlation values "r" were significantly negative (r = - 0.450 & - 0.539) on adult population in the two years.

The partial regression values indicated the real effect of this factor on adult population during both years. It was positively insignificant (p.reg. = 2 & 0.88) in the 1st and 2nd years, respectively, when the other three factors (max. and mean temperatures and % R.H.) remain constant around their averages. The above results, showed that, this factor (13.3-13.9°C) within the optimal range for adult activity during the both years.

2. Effect of maximum temperature: Data presented in Tables 1 & 2 show the simple correlation and partial regression values of the daily mean maximum temperature on adult population in the 1st and 2nd years. The correlation coeffficient "r" values were negative in both years, insignificant effect (r = - 0.384) in the 1st year and significant effect (r = - 0.482) in the 2nd year.

The partial regression values indicated the exact effect of this factor on adult activity during both years, when the other three factors (min. & mean temperatures and % R.H.) remain constant around their averages. The obtained results showed that this-factor(25.3-26.3°C)was positively and insignificant (p.reg. = 0.91 & 2.7)on adult population in both years. The above results show that the max. temperature is around the optimal range for adult activity during both years.

3. Effect of mean temperature: The results indicated in Table 1 and 2 show a negative correlation between the daily mean temperature and adult population in both years, insignificant effect in the 1st year (r = - 0.418) and significant effect in the 2nd year (r = - 0.514). The exact effect of this factor on adult activity was determined by the partial regression values which indicated insignificant negative relation between this factor and adult activity (p.reg. = - 3.4 & - 3.9) during both years, when the other three factors (min. & max. temperatures and % R.H.) remain constant around their averages. The above results reveal that this factor is around the optimal range for adult activity during both years.

4. Effect of relative humidity: The results in Tables 1 and 2 show a negative relation during the two years, significant effect (r = - 0.547) in the 1st year and insignificant effect (r = - 0.447) on adult population in the 2nd year. The precise effect of this factor on adult population showed highly negative significant effect (p.reg. = - 0.68 & P > 0.01) in the 1st year and significant effect (p.reg. = - 0.33 & P > 0.05) in the 2nd year, when the other three factors (min. & max. and mean temperatures) remain constant around their averages. The above mentioned results indicate that this factor is above optimal range for adult activity during both years.

5. The combined effect of the four weather factors on the changes in adult populations: The application C-multiplier methods of partial regression was helpful in giving the variance ratio (F test) as a measure of significance for the collective partial regression results and amount of variability in the population dynamics of adults due to the combined effect of these tested factors. The obtained results revealed that the combined effect of these tested weather factors (Tables 1 & 2) was highly significant (P>0.01) during the 1st year and significant (P>0.05) during the 2nd year.

The influence of these combined climatic factors was expressed in tables 3 and 4 as percentage of explained variance (E.V. %); it had 71.4% and 53.2% for both years, respectively. The remaining unexplained variance are assumed to be due to the influences of other unconsidered factors (environmental, biological etc ...) in addition to the experimental error.

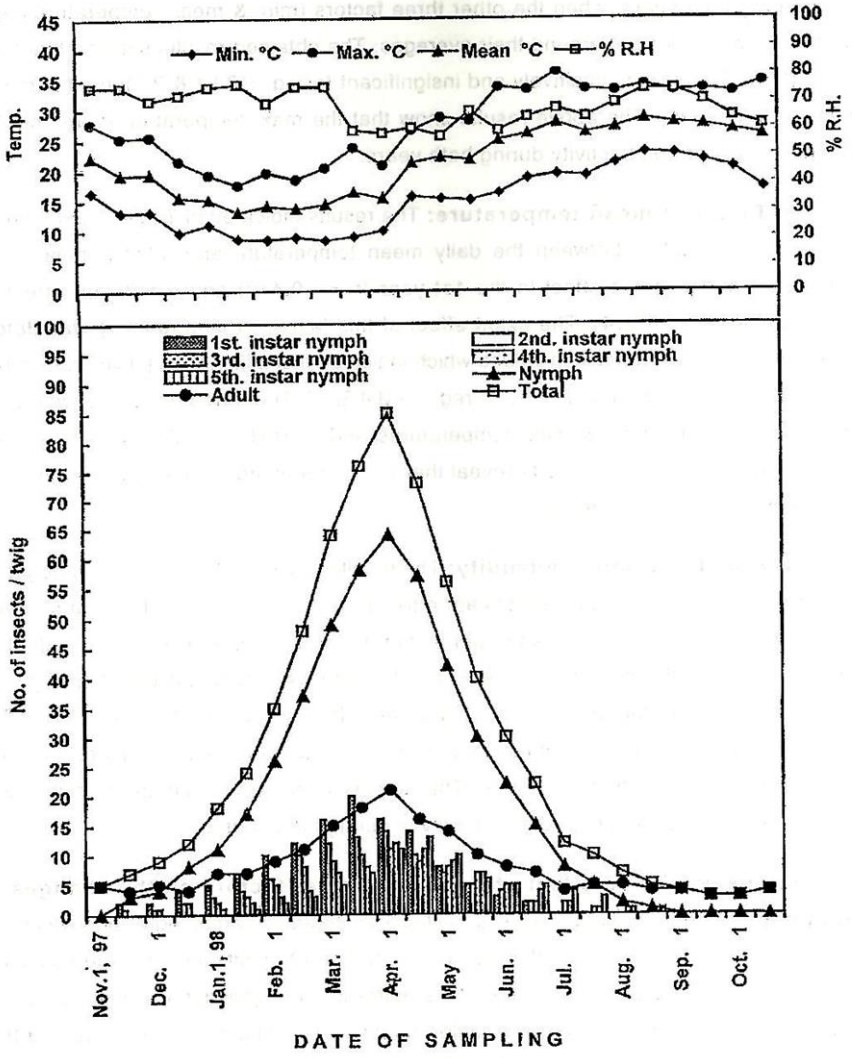

Fig. 1. Half-monthly counts of nymphs and adults of the olive psyllid *E. straminea* on olive trees in Al-Arish North Sinai during 1997/98 together with the corresponding half-monthly daily means of weather factors.

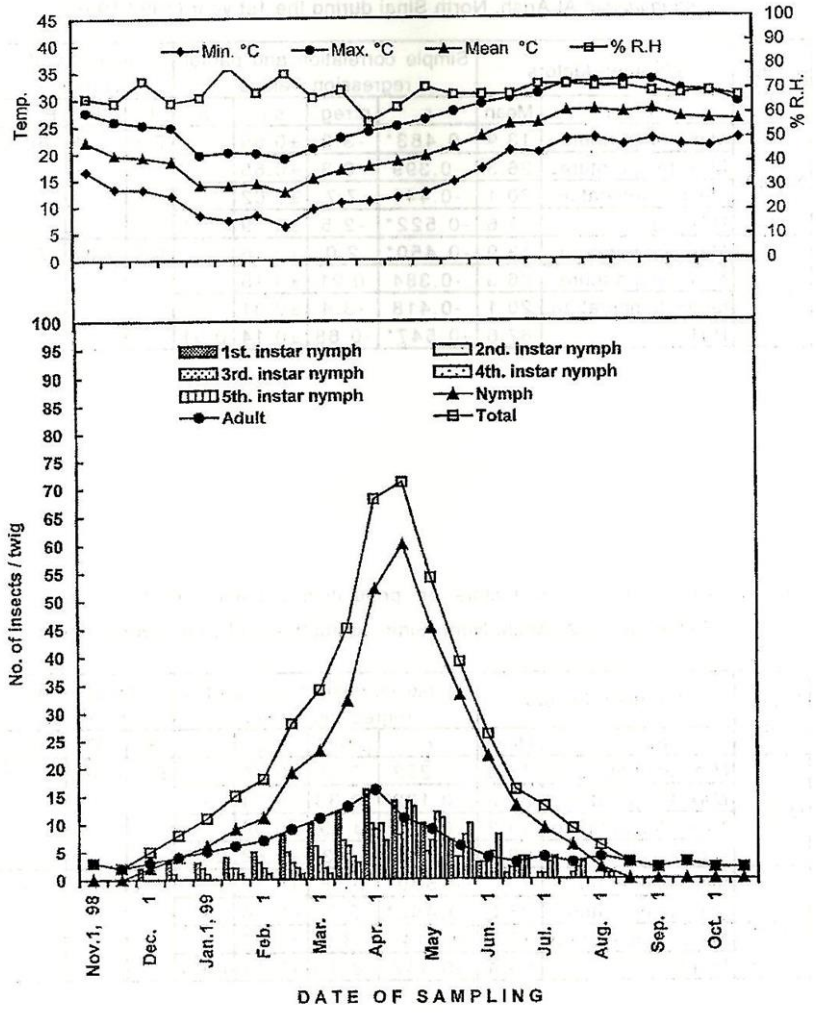

Fig. 2. Half-monthly counts of nymphs and adults of the olive psyllid *E. straminea* on olive trees in Al-Arish North Sinai during 1998/99 together with the corresponding half-monthly daily means of weather factors.

Table 1. Effect of weather factors on population dynamics of the olive psylid *E.straminea* in Al-Arish, North Sinai during the 1st year (1997/1998)

Insect stage	Weather factors		Simple correlation and partial regression values				Analysis of variance		
	Factor	Mean	r	p.reg.	s.e	p	F	P	E.V. %
Nymph	Min. temperature	13.9	-0.483*	-3.8	±0.65	-	7.7	0.01	68.8
	Max temperature	26.3	-0.399	-6.3	±0.65	-			
	Mean temperature	20.1	-0.441	7.7	±0.02	-			
	R.H.(%)	67.6	-0.522*	-2.5	±0.59	0.01			
Adult	Min. temperature	13.9	-0.450*	2.0	±0.16	-	8.8	0.01	71.4
	Max temperature	26.3	-0.384	0.91	±0.15	-			
	Mean temperature	20.1	-0.418	-3.4	±0.31	-			
	R.H.(%)	67.6	-0.547*	-0.68	±0.14	0.01			

Table 2. Effect of weather factors on population dynamics of the olive psylid *E.straminea* in Al-Arish, North Sinai during the 2 nd year (1998/1999)

Insect stage	Weather factors		Simple correlation and partial regression values				Analysis of variance		
	Factor	Mean	r	p.reg.	s.e	p	F	P	E.V. %
Nymph	Min. temperature	13.3	-0.252	-0.55	±0.75	-	5.2	0.01	63.3
	Max temperature	25.3	-0.132	-0.33	±0.74	-			
	Mean temperature	19.3	-0.196	0.89	±0.02	-			
	R.H.(%)	69.4	-0.537*	-1.3	±0.68	0.05			
Adult	Min. temperature	13.3	-0.539*	0.88	±0.18	-	3.4	0.05	53.2
	Max temperature	25.3	-0.482*	2.7	±0.18	-			
	Mean temperature	19.3	0.514*	-3.9	±0.37	-			
	R.H.(%)	69.4	-0.447	-0.33	±0.17	0.05			

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دراسات بيئية على حشرة الزيتون القطنية في منطقة العريش – محافظة شمال سيناء

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حشرة الزيتون القطنية *Euphyllura straminea* من الآفات الحشرية الهامة التي تصيب أشجار الزيتون في مصر، تسبب الإصابة بالحشرة أضرار بالغة لأشجار الزيتون تؤدي إلى نقص إنتاجه في منطقة العريش بمحافظة شمال سيناء، أجريت الدراسات البيئية على الحشرة في بستان زيتون بالعريش لمدة عامين متتالين ابتداء من نوفمبر ١٩٩٧ وحتى نهاية أكتوبر ١٩٩٩ . تضمنت الدراسة النشاط الموسمي للأعمار الخمسة لطور الحورية وكذلك طور الحشرة الكاملة، إضافة إلى تأثير عوامل الطقس السائدة في تلك المنطقة على نشاط طوري الحورية والحشرة الكاملة.

تبين من النتائج المتحصل عليها أن طور الحورية له خمسة أعمار قبل وصوله إلى طور الحشرة الكاملة. ظهرت حوريات العمر الأول خلال نوفمبر/ديسمبر واستمرت في وجودها حتى نهاية يونيو وكان أقصى تعداد لها في مارس/أبريل في العامين، وظهرت حوريات العمر الثاني في منتصف نوفمبر/ديسمبر واستمرت في وجودها حتى منتصف يوليو ووجد أن أكبر تعداد لها في أبريل في كلا العامين، ظهرت حوريات العمر الرابع خلال يناير واستمرت في تواجدها حتى منتصف أغسطس ووجدت أكبر كثافة عددية في أبريل في كلا العامين، بينما ظهرت حوريات العمر الرابع خلال يناير واستمرت في تواجدها حتى منتصف أغسطس ووجدت اكبر كثافة عددية في أبريل في كلا العامين، بينما ظهرت حوريات العمر الأخير خلال يناير / فبراير واستمرت في وجودها حتى نهاية اغسطس وكان اكبر تعداد لها خلال أبريل/مايو في كلا العامين على التوالي.

وجدت الحشرات الكاملة على مدار العام مع تباين في تعدادها من شهر لآخر وكان اكبر عدد للحشرات الكاملة في أبريل في كلا العامين، تدخل الحشرات الكاملة في طور سكون تناسلي بداية من يونيو وحتى نهاية اكتوبر ثم تبدأ الإناث في وضع البيض بداية من نوفمبر، تضع الإناث البيض في براعم النموات الخضرية الموجودة بجذوع الأشجار، وكذلك في النموات الحديثة بالأغصان المزدحمة ويوضع البيض إما منفرداً أو في مجاميع (٢-٤ بيضة). وجد للحشرة جيل واحد في العام في منطقة العريش بمحافظة شمال سيناء وكانت أقصى فترة لنشاط الجيل في أبريل / مايو في كلا العامين على التوالي.

كان لعوامل الطقس السائدة في منطقة العريش تأثير واضح على نشاط طوري الحورية والحشرة الكاملة في كلا العامين، حيث اتضح من التحليل الإحصائي وجود ارتباط سالب على أعداد طور الحورية والحشرة الكاملة في كلا العامين على التوالي.

اتضح من الدراسة أيضاً ان درجة الحرارة الدنيا والعظمى كانتا قريبة من المدى الحراري لنشاط طور الحورية في كلا العامين بينما كانتا في المدى الحرارى لنشاط الحشرة الكاملة في كلا

العامين على التوالي، وجد أن متوسط درجة الحرارة كانت في المدى الحرارى لنشاط طور الحورية ولكنها كانت قريبة من المدى الحرارى لنشاط الحشرة الكاملة في كلا العامين على التوالي، كانت الرطوبة النسبة بعيدة تماماً عن مجال الرطوبة اللازم لنشاط طورى الحورية والحشرة الكاملة في كلا العامين على التوالي.

كان التأثير المشترك لعوامل الطقس المختبرة عالي المعنوية فى تأثيرها على تعداد طور الحورية في العامين وكانت كمية الاختلاف في تعداد الحوريات والتي يمكن ارجاعها إحصائياً إلى التغير في عوامل الطقس المختبرة تقدر بـ٦٨,٨ - ٦٣,٨ ٪ خلال العامين على التوالي، وكان تأثير نفس العوامل مجتمعة على طور الحشرة الكاملة عالي المعنوية في العام الأول ومعنوي فقط فى العام الثاني وكانت كمية الاختلاف في تعداد الحشرات الكاملة والتي يمكن ارجاعها إحصائياً إلى التغير في عوامل الطقس المختبرة ٧١,٤ - ٥٣,٢ ٪ في كلا العامين على التوالي.