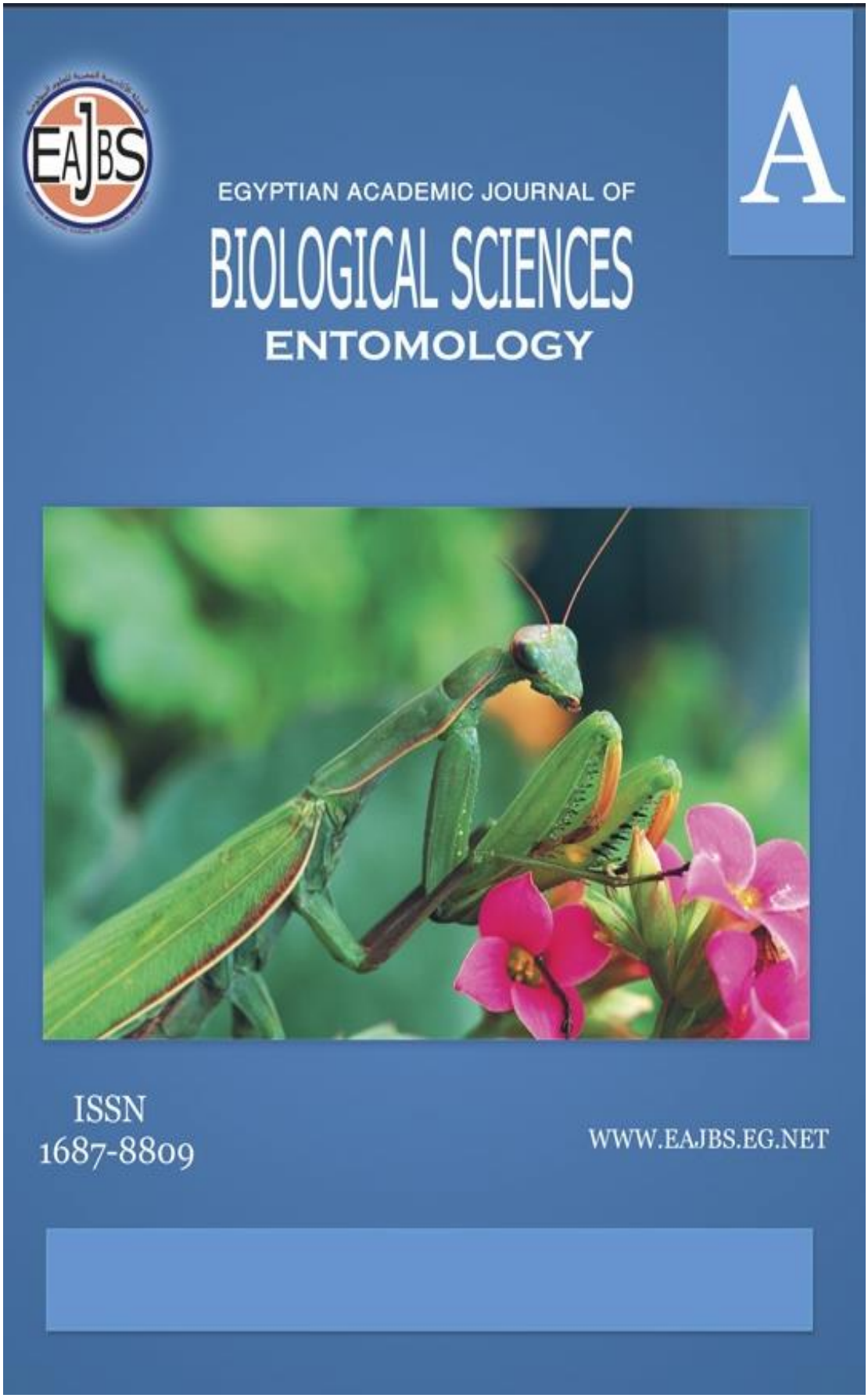

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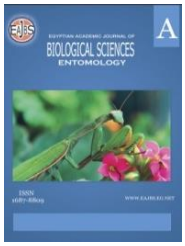

Performance of Certain Mango Varieties to Infestation with The Plum Scale Insect, *Parlatoria oleae* (Colvee) (Hemiptera: Diaspididae) in Luxor Governorate, Egypt.

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P. oleae, population density, infestation incidence, host preference, and mango varieties.

ABSTRACT

Field experiments were conducted at a private mango orchard at Esna district, Luxor Governorate, Egypt during two successive years (2016/2017 and 2017/2018) to study the performance of some mango varieties to infestation with the plum scale insect, *Parlatoria oleae* (Colvee) (Hemiptera: Diaspididae). In this study, using different insect expressions, which articulated the population density of this pest. Two insect expressions were utilized, *i.e.*, insect population and incidence of infestation. The obtained results showed that insect population of *P. oleae* occurred on all different mango varieties all the year round and has three peaks of seasonal activity per year, which was recorded in October, April, and July during the first year (2016/2017) and through in November, April, and July during the second year (2017/2018) in all tested mango varieties. Furthermore, the percentages of infestation incidence by pest showed have three peaks per year, were recorded in November, April, and July on all different mango varieties during both the two years.

The obtained results indicated that the mango varieties varied significantly in their susceptibility to population density and the percentages of infestation incidence by *P. oleae*. Balady mango variety was the highest population density and was rated as highly susceptible (H.S.) to infestation by the total population density of *P. oleae*, followed by Ewaise and Goleck mango varieties were appeared as susceptible (S), then by Zebda variety was seemed as relative resistant (RR). In contrast, Sediek variety had the lowest population density and was rated as moderate resistant (MR) of pest over the entire year. The results of this research here could be used as a tool for establishing IPM strategies against this pest.

INTRODUCTION

Mango trees (*Mangifera indica* L.) are subjected to infestation by different pests. Among several pests, infesting mango trees (*Mangifera indica* L.), the plum scale insect, *Parlatoria oleae* (Colvee) (Hemiptera: Diaspididae) is considered one of the most main destructive pests of mango trees (Bakr *et al.*, 2009). This pest injures the shoots, twigs, leaves, branches, and fruits by sucking the plant sap with the mouthparts, causing thereafter deformations, defoliation, drying up of young twigs, dieback, poor blossoming, death of twig by the action of the toxic saliva and so affecting the commercial value of fruits where it causes

conspicuous pink blemishes around the feeding sites of the scales. A characteristic symptom of infestation by the pest is the appearance and accumulation of its scales on attacked mango parts (El-Amir, 2002 and Hassan *et al*., 2009).

Plant resistance to insect pests is one of the most important components of integrated pest management (IPM). A wide array of chemical substances including inorganic chemicals, primary and intermediary metabolites, and secondary substances are known to impart resistance to a wide cultivar of insect pests. The host plant may also be deficient in certain nutritional elements required by the insects and hence prove resistant (Dhaliwal and Singh, 2004).

The host plant may also be deficient in certain nutritional elements required by the insects and hence prove resistant (Karar *et al*., 2015). There are many factors, which have affected on the feeding attraction of the scale, one of these factors inside the plant itself which makes the plant resistant or susceptibility and may be genetic factors, or phenotypic due to differences in environmental factors such as the nutritional status of the soil (Dale, 1988) or air pollution (Riemer and Whittaker, 1989), or variation in plant age or seasonal phenology (Marino and Cornell, 1993). A resistant variety may be less preferred by the insect pest, adversely affect its normal development and survival or the plant may tolerate the damage without an economic loss in yield or quality (Hoffmann and Frodsham 1993).

Having information about density and changes in the population of *P. oleae* during the year, identification of factors affecting population fluctuations, and determination of their effects will help mango producers in the management of this pest. Little pieces of information were available in the literature concerning the effect of the host preference on the infestation level by *P. oleae*. Therefore, the present work was carried out to evaluate the susceptibility degrees among five varieties of mango to infestation by *P. oleae* at Esna district, Luxor Governorate, Egypt, by considering the general mean number of insect population or infestation by *P. oleae* per variety, as the standard of classification. The results of this research here could be used as a tool to establish pest management programme strategies for *P. oleae*.

MATERIALS AND METHODS

Study Area:

A private mango orchard, *Mangifera indica* L., of approximately twenty feddans, of 10 years-old was selected in the Esna district, Luxor Governorate, Egypt, for sampling. The different mango varieties were Goleck, Balady, Ewaise, Zebda, and Sediek. The orchard was at an altitude of 99 m a.s.l., latitude and longitude of 25.67° N, and 32.71° E, respectively, and was sampled twice monthly from the beginning of September, 2016 until mid of August, 2018.

Ten mango trees from each variety, of almost uniform and of similar in size, height, vegetative growth, and received the same horticultural practices (*i.e.* irrigation, fertilization, and pruning), were selected and labeled. These randomly chosen mango trees did not receive any pesticidal control measures before and during the period of investigation. Regular bimonthly samples of 30 leaves per tree were randomly picked representing the four directions and three levels (heights) of each tree. Leaf samples were randomly picked from the terminal shoots of the tree. Every sample was placed in a polyethylene bag and all samples of every date were transferred to the laboratory for inspection using a stereo-microscope.

Many authors used different insect expressions, which articulated the population density of this pest. In this investigation, two expressions of insects were utilized, *i.e.*, insect numbers and the percentages of infestation incidence by the pest.

Numbers of alive insects on upper and lower surfaces of mango tree leaves were

individually sorted into immature stages (nymphs) and mature stages (adult females) and then were counted and recorded, linked to the inspection date, and presented as mean number of individuals per leaf ± standard error (SE), to express the population size of pest, but, the data were discussed through monthly records.

The infestation incidence or the percentages of infested leaves by pest were calculated according to the formula described by Facylate (1971):

A = (n / N) x 100.

Where,

A = The infestation incidence percentage.

n = No. of infested leaves in which the pest appeared.

N = Total number of leaves (Uninfested + Infested) taken of each inspection date.

General Sampling Method:

All sampling was conducted from 72000 leaves on 48 dates over a 2-year period, *i.e.* 10 trees × 30 leaves × 5 varieties × 48 dates. Samples were frozen to preserve them for subsequent processing.

The data obtained were statistically analyzed by using the analysis of variance. The means were compared according to Duncan's Multiple Range Test (Duncan, 1955) and Least Significant Difference test (LSD) at the 5% level was used to determine the significance among means of varieties, was carried out by computer (MSTATC Program software, 1980). Averages of different stages of insect population and the percentages of infestation incidence were calculated and shown graphically by Excel sheets.

- Coefficient of variance (*C.V.*): To assess the fidelity of sampling and the comparison between different mango varieties:

$$C.V. = \frac{S}{\bar{X}} \times 100$$

where *S* is the standard deviation of the mean and $\bar{X}$ is the mean of the population between different mango varieties.

Susceptibility Degrees:

Classification of the tested mango varieties to their susceptibility degrees was adopted as described by (Semeada, 1985 and Nosser, 1996) based on a quantitative approach found to the following assumptions:

A- Varieties were grouped into five categories; i.e. resistant (R), moderate resistant (MR), relative resistant (RR), susceptible (S), and highly susceptible (HS).

B- General mean number of individuals = (MN)

C- Range of change (RC) between the maximum mean number values and minimum for the varieties was calculated by applying the following equation:

RC = MN max – MN min

Where,

MN max = maximum number of individuals/ varieties.

MN min= minimum number of individuals/ varieties.

D- Unit change in varieties (UC) was the amount of change in varieties from one degree of resistance or susceptibility to the preceding degree (from MR to R or from MR to RR …etc).

According to the above-mentioned equation, the tested varieties could be classified as follows:

1-The highly susceptible group (HS): varieties with infestation more than (MN+ UC).

2-The susceptible group (S): varieties with infestation ranging from MN to (MN+UC).

3-The relative resistant group (RR): varieties with infestation less than MN to (MN-UC).

4-The moderate resistant group (MR): varieties with infestation ranging from < (MN-UC) to (MN-2UC).

5-The resistant group (R): verities with infestation less than (MN- 2UC).

However, it is important to point out herein that the pest mean numbers must refer to and / or agree with the resistance degree of variety.

RESULTS AND DISCUSSION

Population Density of *P. oleae* and Percentages of Infestation Incidence on Certain Mango Varieties:

The monthly counts of *P. oleae* different stages on certain mango varieties and the infestation incidence percentages by pest at Esna district, Luxor Governorate were recorded through the two successive years (2016/2017 and 2017/2018) are represented illustrated in Figs. (1 and 2). But the data were discussed through monthly records.

1- The First Year (2016/2017):

The obtained results are illustrated in Figure (1), showed that the nymphs, adult females, and total insect population by *P. oleae* occurred on all tested mango varieties all year-round and has three peaks of seasonal activity per year, which was recorded in October, April, and July. But, the percentages of infestation incidence happened on all tested mango varieties all year round and have three peaks were take place in November, April and July, (Fig. 1).

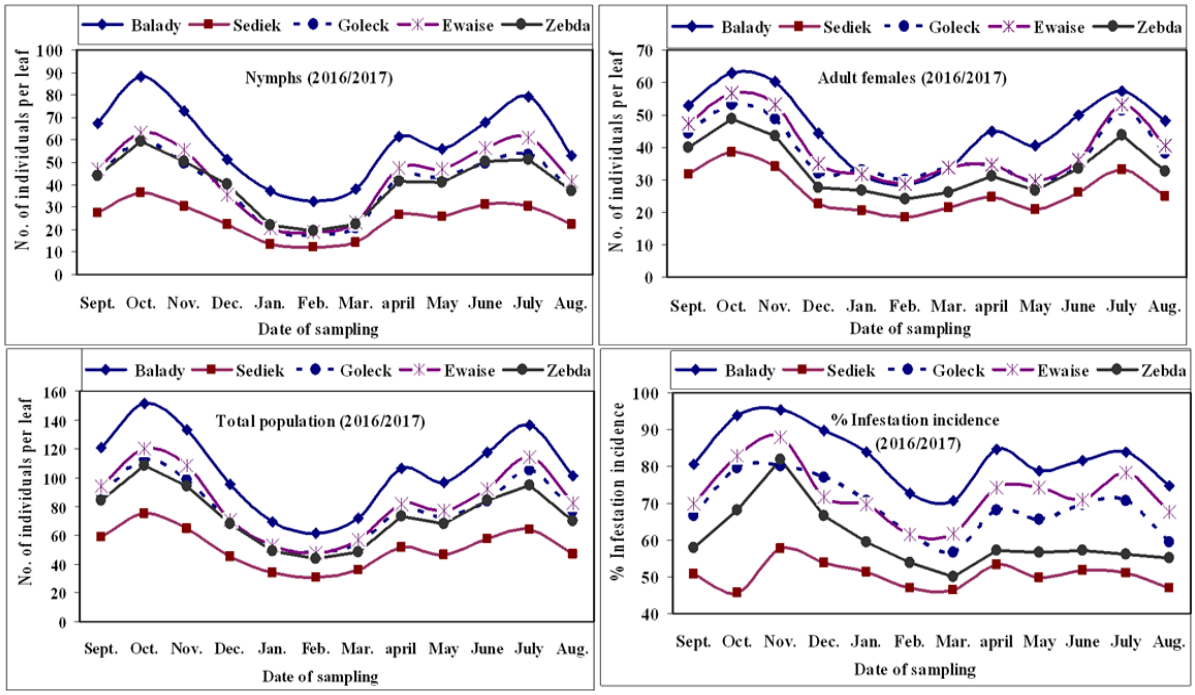

Fig. 1: Seasonal abundance of different stages of *P. oleae* and percentages of infestation incidence on certain mango varieties during the first year (2016/2017).

2-The Second-Year (2017/2018):

Data obtained are represented in illustrated in Figure (2), showed that the different stages, total insect population and percentages of infestation incidence by *P. oleae* occurred on all tested mango varieties all the year-round and has three peaks of seasonal activity per year, which was observed in November, April and July for nymphs, total mixed population and percentages of infestation incidence by *P. oleae***.** But, the seasonal activity of adult females' population was recorded were recorded in November, April, and June, (Fig. 2).

These results coincided with those obtained by El-Hakim and Helmy (1982) in Egypt, who mentioned that *P. oleae* had three peaks in Cairo and Fayoum, and two peaks in

Alexandria on olive trees. Asfoor (1997), in Qalyobia Governorate, Egypt, reported that three generations of *P. oleae* annually on pear trees, but only two generations on plum, pear, and apple trees. Also, recorded three annual peaks on Hollywood plum, maribosa plum, apricot, and peach these peaks occurred in May, August, and October.

Ezz (1997) in Egypt, indicated three generations on four deciduous trees, the first generation appeared on first May, the second appeared on first August and the third generation appeared on first October.

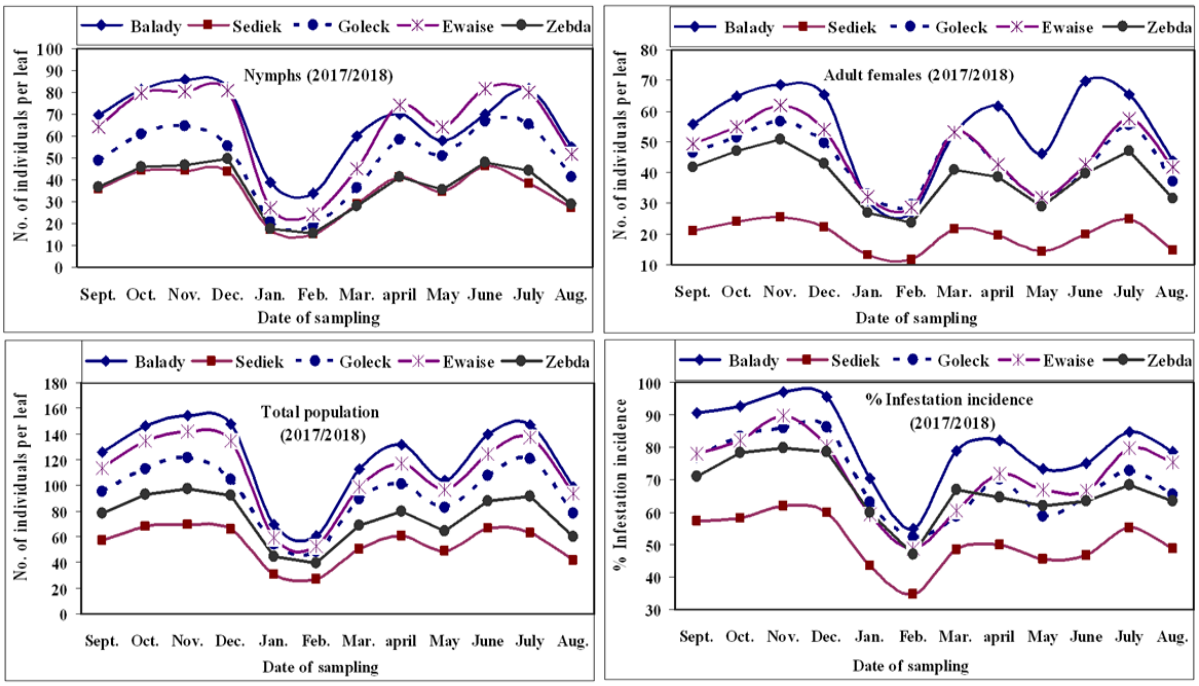

Fig. 2: Seasonal abundance of different stages of *P. oleae* and percentages of infestation incidence on certain mango varieties during the second year (2017/2018).

Results are represented in Figures (1 and 2), showed that the nymphs population was relatively higher than the adult females population in all tested mango varieties during the two successive years. Also, the least population density of different stages and total population by pest and the percentages of incidence of *P. oleae* were recorded during February in all different mango varieties during the two years of study, which may be attributed to the high relative humidity with the gradual decrease in temperature and dormancy of the trees during winter time which is expected to affect dramatically the insect behavior and on the rate of growth and infestation. On the contrary, the maximum values of the insect population in October month during the first year and in November month through the second year in all tested mango varieties. When crawlers emerged after the egg-laying period, their population decreased during several months due to the mortality of the nymphs stage in the winter. It appeared that the annual fluctuations in the population density during the two years were affected by the variability in these physical factors in both years of investigation.

Susceptibility of Certain Mango Varieties to Infestation by *P. oleae*:

1- Different Stages of *P. oleae*:

A- Nymphs Population:

Data represented in Table (1), showed that the mean population density of *P. oleae* nymphs per leaf from each of the five mango varieties. It is clear that Balady mango variety occupied the highest number of *P. oleae* nymphs with an average of 58.75 ± 1.56, 65.42 ± 1.54 and 62.08 ± 1.48 individuals per leaf over the first, second years and on the average

year's data, respectively as compared to the other tested varieties and was appeared as highly susceptible (HS). However, the lowest number was recorded on Sediek variety with an average of 24.50 ± 0.70, 34.67 ± 0.97, and 29.58 ± 0.81 individuals per leaf and was seemed as moderate resistant (MR) through the first and second years, and on the average year's data, respectively. On the other hand, Ewaise variety was rated as susceptible (S) with an average of 43.12 ± 1.39, 62.77 ± 1.97, and 52.95 ± 1.63 individuals per leaf during the first and second years, and on the average years, respectively. While, Goleck and Zebda varieties were moderately population of a pest during the first and second years, and on the average years, with an average of 39.94 ± 1.18, 36.44 ± 1.07 and 38.19 ± 1.09 individuals per leaf for Goleck variety and was 39.94 ± 1.18, 36.44 ± 1.07 and 38.19 ± 1.09 individuals per leaf for Zebda variety, respectively. These varieties were observed as relative resistant (RR) during the two years, respectively.

Statistically, highly significant differences among the five tested mango varieties regarding the level of infestation by *P. oleae* nymphs were obtained (L.S.D. values were 3.90, 4.81, and 4.10) through the first, second year and average the two years, respectively. As well, highly significant differences between the first and the second years for *P. oleae* nymphs population (L.S.D. was 0.40). It is clear from the results that the mean numbers of nymphs were higher in the second year (49.66 ± 0.83 per leaf) as compared to the first year (41.20 ± 0.72 per leaf). As well, the coefficient of variance between different mango varieties was recorded (6.81, 6.98, and 6.50%) through the first and second years, and on the average years, respectively.

Table 1: Mean numbers of *P. oleae* nymph's population on different mango varieties during the two successive years of (2016/2017 and 2017/2018)

Mango varieties	Average no. of nymphs individuals of insect per leaf ± S.E			Susceptibility degree
	First year (2016/2017)	Second year (2017/2018)	Average of both years	
Balady	58.75 ± 1.56 a	65.42 ± 1.54 a	62.08 ± 1.48 a	HS
Sediek	24.50 ± 0.70 c	34.67 ± 0.97 c	29.58 ± 0.81 e	MR
Goleck	39.69 ± 1.28 b	49.02 ± 1.50 b	44.36 ± 1.36 c	RR
Ewaise	43.12 ± 1.39 b	62.77 ± 1.97 a	52.95 ± 1.63 b	S
Zebda	39.94 ± 1.18 b	36.44 ± 1.07 c	38.19 ± 1.09 d	RR
General mean	41.20 ± 0.72 b	49.66 ± 0.83 a	45.43 ± 0.74	
C.V.%	6.81	6.98	6.50	
L.S.D. at 0.05 between varieties	3.90**	4.81**	4.10**	
L.S.D. at 0.05 between two years	0.40**			

B- Adult Females' Population:

Regarding the data in Table (2), showed that the population density of *P. oleae* adult females per leaf from each of the five mango varieties. Out of the five varieties of mango, Sediek variety was found as moderate resistant (MR) and occupied the smallest number with an average of 26.49 ± 0.60, 19.41 ± 0.44 and 22.95 ± 0.49 individuals per leaf over the first and second years, and on the average years, respectively as compared to the other tested varieties. On contrary, Balady mango variety was appeared as highly susceptible (HS) with an average of 46.32 ± 1.03, 54.36 ± 1.33, and 50.34 ± 1.11 individuals per leaf through the first and second years, and on the pooled data, respectively. Meanwhile, Ewaise and Goleck varieties were moderately population of a pest during the first and second years, and on the average year's data, with an average 40.12 ± 0.93, 45.90 ± 1.03 and 43.01 ± 0.93

individuals per Ewaise mango leaf and was 38.60 ± 0.87, 43.96 ± 0.98 and 41.28 ± 0.87 individuals per Goleck mango leaf, respectively. These varieties were seemed as susceptible (S) during the two years, respectively. But, Zebda variety has appeared as relative resistant (RR) with an average of 33.74 ± 0.79, 38.34 ± 0.83, and 36.04 ± 0.77 individuals per leaf during the first and second years, and on the average year's data, respectively.

Table 2: Mean numbers of *P. oleae* adult females' population on different mango varieties during the two successive years of (2016/2017 and 2017/2018)

Mango varieties	Average no. of adult females individuals of insect per leaf ± S.E			Susceptibility degree
	First year (2016/2017)	Second year (2017/2018)	Average of both years	
Balady	46.32 ± 1.03 a	54.36 ± 1.33 a	50.34 ± 1.11 a	HS
Sediek	26.49 ± 0.60 d	19.41 ± 0.44 d	22.95 ± 0.49 d	MR
Goleck	38.60 ± 0.87 b	43.96 ± 0.98 b	41.28 ± 0.87 b	S
Ewaise	40.12 ± 0.93 b	45.90 ± 1.03 b	43.01 ± 0.93 b	S
Zebda	33.74 ± 0.79 c	38.34 ± 0.83 c	36.04 ± 0.77 c	RR
General mean	37.05 ± 0.47 a	40.39 ± 0.64 b	38.72 ± 0.54	
C.V.%	6.66	7.65	6.86	
L.S.D. at 0.05 between varieties	3.43**	4.29**	3.69**	
L.S.D. at 0.05 between two years	0.34**			

Statistical analysis of data resulted in highly significant differences among the five tested varieties regarding the level of infestation by *P. oleae* adult females was obtained (L.S.D. values were 3.43, 4.29, and 3.69) through the first and second years, and on the average year's data, respectively. Also, the coefficient of variance between different mango varieties was recorded (6.66, 7.65, and 6.86%) through the first and second years, and on the average years, respectively. As well, highly significant differences between the first and the second years for *P. oleae* adult females' population (L.S.D. was 0.34). It is clear from the results that the mean numbers of adult females were smaller in the first year (37.05 ± 0.47 per leaf) as compared to the second year (40.39 ± 0.64 per leaf).

C- Total Population of *P. oleae* (nymphs + adult females):

Data are represented in Table (3), revealed that the statistical analysis of data indicated that, there was a highly significant difference among mango varieties to infestation by *P. oleae* total mixed population (L.S.D. values were 6.19, 7.69 and 6.72) through the first and second years, and on the average year's data, respectively. The maximum number of the total population of the pest was observed on Balady variety with an average of 105.07 ± 2.54, 119.78 ± 2.81 and 112.43 ± 2.55 individuals per leaf during the first and second years, and on the average years, respectively as compared to the other tested varieties and was appeared as highly susceptible (HS). However, the minimum individuals of the total population of *P. oleae* were recorded on Sediek variety with an average of 50.99 ± 1.25, 54.08 ± 1.35 and 52.53 ± 1.24 individuals per leaf through the first and second years, and on the average years data, respectively and was rated as moderate resistant (MR).

On the other hand, Ewaise and Goleck varieties were moderately population of a pest during the first and second years, and on the average years, with an average of 83.25 ± 2.17, 108.67 ± 2.79 and 95.96 ± 2.38 individuals per leaf for Ewaise variety and was 78.29 ± 2.01, 92.98 ± 2.25 and 85.64 ± 2.05 individuals per leaf for Goleck variety, respectively. These varieties were seemed as susceptible (S) during the two years, respectively. But, Zebda variety was rated as relative resistant (RR) with an average of 73.68 ± 1.89, 74.78 ± 1.82, and

74.23 ± 1.78 individuals per leaf during the first and second years, and on the average year's data, respectively. It is clear from the results that, the general averages of total live *P. oleae* individuals were higher during the second year was (90.06 ± 1.40 per leaf) in comparison to the first year of study (78.26 ± 1.15 per leaf). As well, highly significant differences between the first and the second years for *P. oleae* total population (L.S.D. was 0.51). As well, the coefficient of variance between different mango varieties was recorded (5.69, 6.15 and 5.75%) through the first and second years, and on the average years, respectively.

Table 3: Mean numbers of *P. oleae* total population on different mango varieties during the two successive years of (2016/2017 and 2017/2018):

Mango varieties	Average no. of total population of insect per leaf ± S.E			Susceptibility degree
	First year (2016/2017)	Second year (2017/2018)	Average of both years	
Balady	105.07 ± 2.54 a	119.78 ± 2.81 a	112.43 ± 2.55 a	HS
Sediek	50.99 ± 1.25 d	54.08 ± 1.35 e	52.53 ± 1.24 e	MR
Goleck	78.29 ± 2.01 bc	92.98 ± 2.25 c	85.64 ± 2.05 c	S
Ewaise	83.25 ± 2.17 b	108.67 ± 2.79 b	95.96 ± 2.38 b	S
Zebda	73.68 ± 1.89 c	74.78 ± 1.82 d	74.23 ± 1.78 d	RR
General mean	78.26 ± 1.15 b	90.06 ± 1.40 a	84.16 ± 1.23	
C.V.%	5.69	6.15	5.75	
L.S.D. at 0.05 between varieties	6.19**	7.69**	6.72**	
L.S.D. at 0.05 between two years	0.51**			

2- Percentages of Infestation Incidence by *P. oleae*:

It was shown as recorded in Table (4), obtained that the percentages of infestation incidence by *P. oleae* on certain mango varieties. Out of the tested varieties of mango, Balady mango variety was rated as highly susceptible (HS) to percentages of infestation incidence, and taking the highest percentages of infestation with an average of 82.57 ± 0.74, 81.13 ± 1.11 and 81.85 ± 0.85 % through the first and second years, and on the average year's data, respectively.

Table 4: Mean percentages of infestation incidence by *P. oleae* on different mango varieties during the two successive years of (2016/2017 and 2017/2018):

Mango varieties	Average of the infestation incidence % ± S.E			Susceptibility degree
	First year (2016/2017)	Second year (2017/2018)	Average of both years	
Balady	82.57 ± 0.74 a	81.13 ± 1.11 a	81.85 ± 0.85 a	HS
Sediek	50.42 ± 0.45 d	50.83 ± 0.75 c	50.63 ± 0.50 d	MR
Goleck	68.81 ± 0.74 b	69.86 ± 1.12 b	69.33 ± 0.84 b	S
Ewaise	72.57 ± 0.76 b	71.58 ± 1.11 b	72.08 ± 0.86 b	S
Zebda	59.94 ± 0.92 c	66.94 ± 1.04 b	63.44 ± 0.83 c	RR
General mean	66.86 ± 0.56 b	68.07 ± 0.61 a	67.47 ± 0.55	
C.V.%	6.25	7.59	4.82	
L.S.D. at 0.05 between varieties	5.80**	7.18**	10.57**	
L.S.D. at 0.05 between two years	0.70**			

On contrary, Sediek variety was found as moderate resistant (MR) and occupied the smallest percentages of infestation incidence by *P. oleae* with an average of 50.42 ± 0.45, 50.83 ± 0.75 and 50.63 ± 0.50% over the first and second years, and on the average years, respectively as compared to the other tested varieties.

On the other hand, Ewaise and Goleck mango varieties were moderately infestations by pest through the first, second years, and on the average year's data, respectively, with an average of 72.57 ± 0.76, 71.58 ± 1.11 and 72.08 ± 0.86 % for Ewaise variety and was 68.81 ± 0.74, 69.86 ± 1.12 and 69.33 ± 0.84 % for Goleck variety, respectively. These varieties were appeared as susceptible (S) to percentages of infestation incidence during the two years, respectively. But, Zebda variety was seemed as relative resistant (RR) to infestation incidence by P. oleae with an average of 59.94 ± 0.92, 66.94 ± 1.04, and 63.44 ± 0.83% during the first and second years, and on the average year's data, respectively.

Statistical analysis of data resulted in highly significant differences among the five tested varieties regarding the percentages of infestation incidence by *P. oleae* was obtained (L.S.D. values were 5.80, 7.18, and 10.57) through the first and second year, and on the average years, respectively. As well, highly significant differences between the first and the second years for percentages of infestation incidence by *P. oleae* (L.S.D. was 0.70). It is clear from the results that, the percentages of infestation incidence by *P. oleae* through the second year were higher (68.07 ± 0.61 %) as compared to the first year of study (66.86 ± 0.56 %). As well as, the coefficient of variance between different mango varieties was recorded (6.25, 7.59 and 4.82%) through the first and second years, on the average year's data, respectively.

It is obvious that the differences in the values of population densities and percentages of infestation incidence by *P. oleae* on certain mango varieties which may be due to the differences not only in the environmental conditions (such as temperature, relative humidity) but also there are numerous other factors such as the leaf structure (density of stomata, softness of tissues and size of leaves) as well as growth features (such as growing period) for the tested varieties of mango.

In general, it could be concluded that Balady mango variety was the most preferred for population density and infestation incidence by the plum scale insect, *P. oleae*, followed by Ewaise, then by Goleck and Zebda, while the Sediek variety was less preferable variety for this insect. The tested varieties could be arranged according to their susceptibility in descending order as follows:

Balady > Ewaise > Goleck > Zebda > Sediek.

We concluded that the host plant affects the development of pest and that the choice of the most appropriate variety can help to reduce pest infestation, and is, therefore, an additional component to be included in the integrated pest management of mango.

The degree of infestation on different mango varieties varied according to insect species. In this respect, Salem (1994) in Egypt, however with different insect species, also studied the susceptibility of five mango varieties to infestation with three species of scale, *Insulaspis pallidula* (Green) (Hemiptera: Diaspididae), *Kilifia acuminata* (Signoret) (Homoptera: Coccidae) and *Parlatoria oleae* (Colvee) (Homoptera: Diaspididae), he reported that Zebda and Hindy varieties were highly susceptible to infestation with the previously scale insects; Dabsha cultivar was moderately susceptible, while Timour and Alphonso cultivars were highly resistant. He suggested that the differences in susceptibility could be attributed to the morphological characters of the leaves of these cultivars. Selim (2002) in Egypt, however with different insect species, also studied the susceptibility of five mango varieties to infestation with two armoured scale insect pest, *I. pallidula*, and *A. aurantii* and recorded that *I. pallidula* infested all varieties more than *A. aurantii*. On the other hand, the variety Hindy was the most susceptible variety to infestation with both scale insects followed

by Mabrouka, then by Kobania and Taimour, while the least susceptible variety was Dabsha. Bakry (2009) in Egypt, however with different insect species, also studied the variability among four mango varieties in the levels of infestation with two armoured scale insects, *I. pallidula* and *A. aurantii*. He recorded that the population density of *A. aurantii* was greater than that of *I. pallidula*. On the other hand, grafted Balady was the most infested variety with the two-scale insects followed by Hindy, then by Goleck, while the least infested variety was seedy Balady variety for two-scale insects.

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ARABIC SUMMARY

أداء بعض أصناف المانجو للإصابة بالحشرة البرقوق القشرية (هيمبترا - دياسبيددى) فى محافظة الأقصر- مصر.

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تعتبر حشرة البرقوق القشرية من أهم الآفات الخطيرة التى تصيب أشجار المانجو فى محافظة الأقصر. تمتص هذه الآفة العصارة النباتية مما يؤدى إلى أصفرار الأوراق وجفافها وتساقطها وتسبب موت الفروع وفى حالة الإصابة الشديدة تنتقل إلى الثمار وتسبب تشوهات فى الثمار مما يودى الى تقليل القيمة التسويقية للثمار. ولذلك تم دراسة تقييم تأثير خمسة أصناف من أشجار المانجو للإصابة بحشرة البرقوق القشرية فى مزرعة مانجو (خاصة) تقع فى مركز إسنا محافظة الأقصر-مصر خلال عامين متتاليين من (2017/2016 و2018/2017). في هذا البحث، أستخدمت تعابير مختلفة للحشرة، والتي أظهرت الكثافة السكانية لهذه الآفة، أي تعداد الحشرات وحدوث الإصابة.

حيث أظهرت النتائج إلى أن حشرة البرقوق القشرية تتواجد على جميع أصناف المانجو المختلفة على مدار العام، ولها ثلاثة قمم لنشاط التعداد الكلي للحشرة خلال العام والتي سجلت فى أكتوبر وأبريل ويوليو خلال العام الأول من الدراسة، بينما فى شهر نوفمبر وأبريل ويوليو خلال العامِ الثانيِ من الدراسة لكلا منهما. أيضا، أظهرت نسب حدوث الإصابة بالحشرة أن لها ثلاثة قمم خلال العام والتى سجلت فى نوفمبر وأبريل ويوليو فى جميع أصناف المانجو المختلفة على مدار العام.

أوضحت النتائج، وجود أختلافات عالية المعنوية بين أصناف المانجو المختبرة فى قابليتها للتعداد الحشرى وكذلك نسب حدوث الإصابة. ولوحظ أن صنف المانجو البلدى أحتل أعلى كثافة عددية للحشرة وذا أعلى نسبة حدوث للإصابة وتميز بأنه شديد الحساسية للإصابة خلال الموسمين المتتاليين, يليه أصناف المانجو العويسى و الجولك تم تصنيفهما على أنهما حساس للإصابة، وأظهر صنف المانجو الزبدة مقاومة نسبية للإصابة. وعلى العكس، أحتل الصنف المانجو "الصديق" أقل كثافة عددية للحشرة وذا مقاومة متوسطة للإصابة خلال كل عام من عامي الدراسة.

ويمكن أستخدام نتائج هذا البحث، كأداة لوضع أستراتيجيات المكافحة المتكاملة ضد هذه الآفة تحت الظروف المناخية لهذه المنطقة.