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ECOLOGICAL STUDIES ON *INSULASPIS PALLIDULA* ON MANGO TREES AND ITS ASSOCIATED PARASITES AT QENA GOVERNORATE

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ABESTRACT: Ecological studies were carried out through two successive annual seasons (2001- 2002) and (2002 - 2003) on the population density of *Insulaspis pallidula* and its parasites on mango trees at Qena Governorate.

The insect had four peaks throughout the two seasons the first peak occurred in spring, the second peak in Autumn the third and the fourth peaks occurred in winter. while the lowest population was registrated in summer. *I. pallidula* had four overlapping annual generations during the two studied years.

In the first year, the first generation lasted about 6 weeks (from early March to mid-April.) The second was about 14 weeks (from early May to mid-August) and third lasted about 10 weeks (from early September to mid-November). The fourth generation lasted about 10 weeks (from early December to mid-February). During the second season the 1st generation was found at (early March to early May,) with duration of 8 weeks, and the 2nd occurred (from mid-May to early September) with about 14 weeks, and the 3rd was observed between (mid-September and early December) with duration of 10 weeks. The 4th generation recorded (from mid-December to mid - February) with duration of 8 weeks.

The mango Armored scale insect was attacked by an endohymenopterous parasite *Aphytis hispanicus* (Mercet). In both studied years, the highest parasitism rates were recorded in Autumn., spring and winter. The lowest parasitism rates were recorded in summer.

Statistical analysis showed that, climatic factors efficacy play a great role on *I. pallidula* population activity and on its parasiloid.

INTRODUCTION

Mango is one of the most popular and favorite fruits in Egypt. Mango scale insect, *Insulaspis pallidula* (Homopetera: Diaspididae) is considered one of the most important mango's pests, which attacks branches, twigs, leaves and fruits. It sucks a great amounts of sap, the infested leaves become yellow dry and finally fall. Twigs are killed as a result of highly infestation and defoliation and the fruits are disfigure, so appreciable reduces in a market value,

I. pallidula has four annual generations; in February, June, July and September at Qaluobiya. Governorate (Elwan, 1990), in October, December, March and June at Moderiet El-Tahrier (Hassan, 1998).

In 2002, Moustafa found that *I. pallidula* was attacked by *Aphytis hispanicus* (Mercet).

The aim of the present work is to study the seasonal fluctuations, the number of generations, the monthly variations and the effect of climatic factors on the different stages of *I. pallidnla* on mango trees at Qena governorate. The relation between this insect pest and it's parasitoid, *A. hispanicus* (Mercet) as rate of parasitism had been also studied to determine the proper time for its control.

MATERIAL AND METHODS

The present work was carried out at (Hares orchard) Naga Hammadi center, Qena Governorate, (where no chemical measures were undertaken for several years and all trees received the same agricultural practices) during two successive seasons (From March 2001 until mid February 2003).

Samples of 30 infested leaves was taken every fortnightly from three mango trees replicated three times (nine trees). Samples were transferred to the laboratory in plastic bags, examined by the aid of stereomicroscope binocular. Alive individuals of *I. pallidula* (pre-adult Adult and Adult with eggs ovipositing females) were counted. Parasite individuals were separately recorded for each larval and pupal stages. Also, the number of generations for *I. pallidula* was estimated by using the changes in the half monthly counts of Pre-adult stages according to the formula proposed by Jacob (1977). Simple correlation (r), simple regression (b) and partial regression (P. reg.) analysis were calculated to study the effect of main weather factors (daily Min. temp., daily. Max. temp. and percent of D. R. H.) on I. pallidula population and on its parasitoid. Also, the explained variance (E.V.%) and analysis of variance (F. Test) of the combined weather factors were calculated to determine the preferable time for the insect development and the proper time for its control.

RESULTS AND DISCUSSION

1- Population Fluctuation of ***I. pallidula*** *on mango trees:-*

The data given in Tables (1,2) and graphically illustrated in Figs. (1, 2) show that of infestation *I. pallidula* had four peaks during the season of either (2001 - 2002) or (2002 - 2003). The first peak occurred in spring (from mid march to early April) with 41.7 and 59.3 individuals / mango leaf, respectively. The second peak in Autumn (from early October to mid November) with 17.1 and 23.2 individuals / leaf, respectively. The third and Fourth peaks occurred in winter (January and February) in both seasons, being 31.3 and 50.8 individuals /leaf for the third peak and 58.9 and 56.5 individuals /leaf for the fourth peaks in seasons (2001 - 2002) and (2002 - 2003), respectively. The lowest population was, however, obtained in summer (July & August) with 4.1 and 24 individuals / leaf respectively. The decrease in the population density of *I. pallidula* during the summer may be due to the high temperature at that time .

*2- Population Fluctuations of **I. pallidula** different stages:*

Data of the first experimental year (2001 - 2002) are given in Table (1) and graphically illustrated in Fig (3). The data revealed that the high population densities of pre-adult stages occurred during early of April, October and mid - February, being 22.2, 8.6 and 13.6 individuals /leaf respectively. On the other hand, the lower numbers of immature stages (1.0, 0.5 and 0.3 insects / leaf)were recorded in summer (June, July and August, respectively). Also, Seasonal abundance of females without eggs showed four peaks. The first and second peaks were found in spring with; means of 10.2 and 13.0 insect / leaf were recorded in March and April, respectively. The third and fourth peaks were however in obtained winter with as 5.8 and 10.9 insects / leaf were recorded in January and February, respectively. However, the lower population was recorded in summer and Autumn with 1.0 and 0.8 insect / leaf were given in August and October, respectively. The ovipositing females were observed in spring (late March), Autumn (late November) and winter (late January & February), with average numbers /leaf of 33.5, 14.4, 18 and 34.4 respectively, while the minimum abundance recorded in summer; being 2.0 females /leaf in early July.

According to the results of the second season (2002 - 2003) which are tabulated in Table (2) and illustrated in Fig (4) the Pre-adult stages of *I. pallidula* had five peaks; in early March, mid - April, early October, early January and early February with its climax in early January (29.8 insect / leaf). Also the optimum abundance of adult stage was recorded in late - March (10.2 insect / leaf). The Same Figure shows there were four periods of activity for ovipositing females; in late March, early May, early January and late February, being 22.2, 17.6, 15.0 and 34.0 insects / leaf, respectively .

3- The half - monthly variations (V):

The half-monthly variations in the total population of *I. pallidula* in relation to main proper climatic factors on mango trees throughout the two studied years are given in (Table 1). The data revealed that five high activity periods were recorded; in early

April (1.24), early September (1.7), early November (1.3), early January (2.12) and mid-February (2.38) in the first year. These results may be due to the suitable environmental conditions for the insect activity, as the daily Max. temp. ranged between 23°C - 35.5°C the daily Min. temp. ranged between 3.9°c - 14.2°C and R.H. ranged between 52.5 - 69.5%.

The maximum increase in *I. pullidula* population was recorded in winter (2.38) where, the parasitism rate (5.2%) was in lowest activity in mid. February and the abiotic factors were 23.0°C, 6.0°C and 63% with daily Max. and min. temp. as well as the R.H, respectively. On the other hand, six depressive periods in the total population of *I. pallidula* were recorded; 0.49, 0.30, 0.04, 0.78 & 0.79 with daily Max. temp. ranged between 18.9 - 41.8°C, daily Min. temp. ranged between 2.2 - 21.3°C and R.H ranged between 55 - 59%. To facilitate the presentation of data, each depressive period will be discussed separately in the following manner.

- The lowest infestation was recorded in spring (mid-April) when the high percentage of the associated parasitoid; *Aphytis hispanicus* (Mercet) (13%) was obtained.

- In summer, there were two depressive periods; in early June and early July, where the D. Max, temp. reached to 41.8 and 40.8 at the same times.

- In Autumn there were one depressive activity period; in mid-October, when the parasitism rate reached 18.3%.
- In winter there were two depressive periods; in mid-December and early February when the rate of parasitism were 11.0 and 14.5%, respectively.

In the second year Five activity periods of *I. pallidula* total population were recorded in mid-March (1.19), early September (1.12), early October (5.7), early January (1.88) and mid-February (1.74) The highly activity may be due to the favorable climatic factors. Whereas, in these periods D.Max. temp. ranged between 22.2 - 34.2°C, D.Min. temp. ranged between 30 - 18.4°C and R.H. ranged between 50 - 64 %.

The maximum increase in *I. pallidula* population was recorded in Autumn (5.7) where, the parasitism rate (14%) was in early October and the abiotic factors were 28.9°C, 14.5°C and 50% with daily Max. temp. and daily Min. temp. as well as the R.H, respectively.

On the other hand, Five depressive periods in the total population of *I. pallidula* were recorded.

In spring there were two depressive periods in early April and on mid May (0.76 & 0.44) when the daily Max. temp. reached to 32.7 & 35.0 and rate of parasitism 4.8 & 14.5%.

In summer there was one depressive period; (0.49) in early August when daily Max. temp. reached to 35.2°C, daily Min. temp. 19.8°C and R.H% reached to 67%.

In Autumn there was one lowest activity period on mid-Oct. (0.94) when the rate of parasitism reached 17.0%.

In winter there was one lowest infestation periods on mid January (0.49) when, the rate of parasitism reached 13.5% and the abiotic factors were 18.6°C, 2.8°C and 48% with daily Max. temp. and daily Min. temp. and R.H. respectively.

4- Number and duration of ***I . pallidula*** *generations on mango trees:*

The results presented in Tables (3,4) and graphically illustrated in Figs. (5 and 6) showed that *I. pallidula* had four overlapping annual generations under field conditions at Qena during the two experimental years.

In the first year (Table 3 and Fig 5), the first generation lasted about 6 weeks (from early March to mid-April), the second was about 14 weeks (from early May to mid-August) and third lasted about 10 weeks (from early September to mid-November). The fourth generation lasted about 10 weeks (from early December to mid - February). During the second season (Table 4 and Fig 6) the 1st generation was found at early March to early May, with duration of 8 weeks, The 2nd occurred from mid-May to early September with about 14 weeks, and the 3rd was observed between mid-September and early December and durated 10 weeks. The 4th generation recorded from mid-December to mid-February with duration of 8 weeks. The results agreed with those obtained by Elwan (1990) Hassan (1998) and disagreed with Salama and Hamdy (1973) who reported that *I. pallidula* had 3 generations per year.

*5- Parasitism on **I . pallidula** :-*

The mango Armored scale insect was attacked by an endohymenopterous parasite, *Aphytis hispanicus* (Mercet). The rates of parasitism are presented in Table (1)., which ranged between 5.2 (in mid-February) and 29.2% (in early September) in the first year, and between 5.8 (in mid-February) and 30 % (in early September) in the second year. In both studied years, the highest parasitism rates were recorded in Autumn., spring and winter with mean percentages of 21, 10.6 and 9.6 in the first year, and 18.7, 11.5 and 10.4 in the second year respectively.

The lowest parasitism rates were recorded in summer (5.8 and 5.5% in the first and second years, respectively). It can be advisable to apply pesticides for summer control during mid July and mid August, which was suitable for this pest. This may be due to the beginning increase of *I. pallidula* population and beginning decrease in parasitism rate.

*6- Effect of the main climatic factors on total population of **I. pallidula** :-*

A negative and highly significant correlation between the daily maximum temperature and total population during the two seasons was noticed with (r) values of - 0.426 and - 0.536, respectively. The partial regression showed insignificant positive relation in the two seasons with (p. r.) values of 0.607 & 0.222, respectively.

The correlation between the mean daily minimum temperature and total population of *I. pallidula* during two seasons was negative and highly significant with (r) values of - 0.500 ,- 0.842, for both years, respectively. The partial regression was negative significant, being - 1.080 in the first season and - 1.073 in second season.

The simple correlation between the daily mean relative humidity and total population of *I. pallidula* during the first year indicates positive insignificant with (r = 0.032) while negative insignificant was noticed in the second year (r = - 0.178). The partial regressions were positive insignificant (0.089 & 0.138) during two years, respectively .

The combined effect of the three weather factors on *I. pallidula* population was insignificant in the first season (F = 2.70, E.V.= 28.80%) and significant in the second season (F= 21.05 . E.V.= 72.3%).

*7- Effect of the main climatic factors on generations of **I. pallidula** on mango trees:-*

In the first year (2001-2002) the simple correlation and partial regression between the mean daily maximum temperature and the four generations of this pest were insignificant where the relation was positive in case of first generation and negative in case of other generations with (r) values of 0.486, - 0.606, - 0.080 and - 0.320. respectively, and with (p. r.) values of 0.994, - 0.216, - 1.00 and 0.442 respectively.

In the second year the simple correlation was positive significant in case of the first generation, and simple correlation and partial regression were positively insignificant in case of the second, third and fourth generations.

In the first year the simple correlation between the night minimum temperature and the second generation was negative insignificant while and positive insignificant in case of the other generations with (r) values -0.570, 0.373, 0.127 and 0.380

respectively. The partial regression showed positive insignificant in case of the fourth generation, and negative insignificant in case of the other generations with (p. r.) values of 0.694, -2.054, - 0.369 and - 0.284 respectively. In the second year the simple correlation was negative significant but the partial regression was negative insignificant in case of the first generation. In the second generation the simple & partial regression were negative highly significant and positive insignificant in case of the third and the fourth generations.

In the first year the simple correlation and partial regression between the daily mean relative humidity and the first, and second generations were negative insignificant with (r = - 0.893 & - 0.564) with (p. reg.) - 1.107 & - 0.455 respectively. While its were positive insignificant in case of the third and fourth generations with (r = 0.213 & 0.115) and with (p. reg.) 0.781 & 0.291. In the second year the simple correlation was positive and highly significant with (r = 0.958) in case the first generation while positive insignificant with (r = 0.334) in case of the second generation.

In the third, fourth generations the simple correlation were negative insignificant with (r = -0.350 & 0.426) respectively. The partial regression were positive insignificant in case of the first and second generations and negative insignificant in case of the third and fourth generations with (p. reg.) 0.767, 0.262, - 1.222 and - 0.306 respectively.

The combined effect of the three weather factors on generations of *I. pallidula* were insignificant in the first year with (F= 1.70, 1.99, 0.25 and 0.78. EV.= 71.8%, 59.9%, 27.1%, and 53.9%) in case of the first, second third and fourth generations respectively. In the second year it was insignificant in case of the first, third and fourth generations (F= 7.45, 2.15 and 0.09. E.V.=79.5%, 40.8% and 19.5%) respectively. and significant in case of the second generation (F= 10.96. E.V.= 81%). The effect weather factors on the activity of some scale insect were studied by Bodenheimer (1951), Helmy *et al.*, (1986), Mani and Krishnamoorthy (1990), Hassan (1993), Perruso and Cassino (1993), Kwaiz (1999) and Radwan. They proved that climatic factors have important effect on population dynamics of scale insect.

8- The effect of the main climatic factors on rate of parasitism:

A negative and insignificant correlation between the rate of parasitism and the daily-maximum temperature in the two seasons was noticed with (r) values of (- 0.216 & - 0.144) respectively. However the partial regression indicate a positive insignificant relation in the two seasons with (p. r.) values of (0.957 & 0.133).

A negative and insignificant simple correlation between the night minimum temperature and the rate of parasitism in the two years with (r) values of (- 0.148 & - 0.022). The partial regression showed a negative insignificant in the first year, and positive insignificant in the second year with (p. r.) values of (- 0.795 & 0.201).

The simple correlation between the daily mean relative humidity and the rate of parasitism was negative and insignificant with (r) values of (0.345 & - 0.280).

The partial regression showed positive significant in the first season but negative insignificant in second season with (p. r.) values were 0.362 & - 0.285.

The combined effect of the three weather factors on the rate of parasitism in the two seasons were insignificant (F= 1.82, 0.70 and E.V.= 21.4%, 14.1%).

Table (1) :- Seasonal abundance of *Insulaspis pallidula* population and its rate of parasitism in relation to main climatic factors on mango trees throughout (2001-2002) at Qena Governorate .

Seasons	Sampling dates	No. of pre. ad /lea	No. of adult females /leaf	No. of Gravid female /leaf	Total population	(V.)	Rate of Parasitism	Max. temp. (°C)	Min. temp. (°C)	R.H (%)
Spring	Mar.1st	9.3	10.2	22.2	41.7	-	9.0	28.6	7.1	-
	15th	9.6	4.6	33.5	47.7	1.14	10.0	33.4	10.3	1.14
	Apr.1st	22.2	13	24.1	59.3	1.24	6.2	34.8	14.2	1.24
	15th	9.4	5.6	13.8	28.8	0.49	13.0	38.3	16.2	0.49
	May 1st	4	6.3	18	28.3	0.98	19.0	36.9	19.8	0.98
	15th	5.3	6.8	16.6	28.7	1.01	6.3	38.0	20.7	1.01
Summer	Jun. 1st	1.1	3.1	4.4	8.6	0.30	25.9	41.8	21.3	0.30
	15th	1	2	3.9	6.9	0.80	9.0	40.9	23.5	0.80
	Jul. 1st	0.9	1	2	4.1	0.59	-	40.9	23.0	0.59
	15th	0.5	1	3	4.6	1.12	-	41.9	22.9	1.12
	Aug.1st	0.4	1	4.2	5.6	1.21	-	40.9	22.9	1.21
	15th	0.3	1.4	5.4	7.1	1.27	-	40.1	20.2	1.27
Autumn	Sep. 1st	5.6	1.5	5	12.1	1.70	29.2	35.5	20.0	1.70
	15th	7.5	1.5	5	14	1.16	26.3	36.8	17.3	1.16
	Oct. 1st	8.6	0.8	5.1	14.5	1.04	17.6	30.0	14.7	1.04
	15th	8.5	0.9	6.7	16.1	0.04	18.3	26.9	12.9	0.04
	Nov.1st	6.9	2.7	10	19.6	1.30	18.3	25.9	8.9	1.30
	15th	5.3	3.5	14.4	23.2	1.18	16.2	26.5	7.6	1.18
Winter	Dec. 1st	5.1	3.2	10.5	18.8	0.81	14.9	26.0	5.3	0.81
	15th	5.2	2.9	6.5	14.6	0.78	11.0	25.1	2.6	0.78
	Jan. 1st	7.6	5.8	17.5	30.9	2.12	11.7	19.3	3.9	2.12
	15th	8	5.3	18	31.3	1.01	14.5	19.4	1.8	1.01
	Feb. 1st	8.7	4	12	24.7	0.79	14.5	18.9	2.2	0.79
	15th	13.6	10.9	34.4	58.9	2.38	5.2	23.0	6.0	2.38

Table (2) :- Seasonal abundance of *Insulaspis pallidula* population and its rate of parasitism in relation to main climatic factors on mango trees throughout (2002-2003) at Qena Governorate .

Seasons	Sampling dates	No. of Pre. Ad /leaf	No. of adult females /leaf	No. of Gravid female /leaf	Total population	(V.)	Rate of Parasitism	Max. temp. (°C)	Min. temp. (°C)	R.H (%)
Spring	Mar. 1st	11.8	6	17.2	35	-	8.0	25.0	7.3	65.5
	15th	9.3	10.2	22.2	41.7	1.19	11.0	29.0	9.0	60.5
	Apr. 1st	7.5	4.3	20	31.8	0.76	4.8	32.7	10.0	56.5
	15th	10.4	6.6	15.8	32.8	1.03	12.3	32.0	10.0	60.5
	May 1st	6.3	7.8	17.6	31.7	0.97	15.7	37.2	11.9	56.0
	15th	4.8	2.7	6.6	14.1	0.44	14.5	35.0	12.0	60.0
Summer	Jun. 1st	1.5	3.1	4.4	9	0.64	25.0	37.5	15.5	58.5
	15th	1.1	2.7	4	7.8	0.87	8.0	35.5	17.5	60.0
	Jul. 1st	1	2.5	3.2	6.7	0.86	-	38.2	18.8	58.0
	15th	0.9	1.1	2.9	4.9	0.73	-	39.0	19.6	67.5
	Aug. 1st	0.4	1	1	2.4	0.49	-	35.2	19.8	67.0
	15th	0.5	1.1	0.9	2.5	1.04	-	36.8	18.0	60.5
Autumn	Sep. 1st	0.3	1.5	1	2.8	1.12	30.0	34.2	18.4	65.0
	15th	7	2	4	13	1.07	20.5	34.2	18.0	63.0
	Oct. 1st	9.7	2.6	4.8	17.1	5.7	14.0	28.9	14.5	50.0
	15th	7.1	3.1	5.8	16	0.94	17.0	24.9	13.4	55.0
	Nov. 1st	7	2.7	6.2	15.9	0.99	17.6	24.2	11.1	52.0
	15th	5.4	3.1	7.6	16.1	1.01	13.3	24.5	10.0	50.0
Winter	Dec. 1st	6	2.9	12	20.9	1.30	13.0	22.9	7.3	49.5
	15th	6.5	5.8	14.7	27	1.29	12.5	17.5	8.0	54.5
	Jan. 1st	29.8	6	15	50.8	1.88	10.8	22.2	5.7	51.0
	15th	8.7	4	12	24.7	0.49	13.5	18.6	2.8	48.0
	Feb. 1st	13.4	6	13	32.4	1.31	6.9	26.0	2.9	60.2
	15th	13	9.5	34	56.5	1.74	5.8	26.0	3.0	64.0

Table (3) : Total half monthly counts of *Insulaspis pallidula* arranged according to Jacob's method using count of immature stages during (2001 – 2002) .

Seasons	Sampling dates	Acumulated of sampling	Half monthly counts of nymphs	Acumulated monthly count	Acumulated %
Spring	Mar. 1st	0	9.3	9.3	6.0
	15th	15	9.6	18.9	12.2
	Apr. 1st	30	22.2	41.1	26.6
	15th	45	9.4	50.5	32.7
	May 1st	60	4.0	54.5	35.3
	15th	75	5.3	59.8	38.7
Summer	Jun. 1st	90	1.1	60.9	39.4
	15th	105	1.0	61.9	40.0
	Jul. 1st	120	0.9	62.8	40.6
	15th	135	0.5	63.3	40.9
	Aug. 1st	150	0.4	63.7	41.2
	15th	165	0.3	64.0	41.4
Autumn	Sep. 1st	180	5.6	69.6	45.0
	15th	195	7.5	77.1	49.9
	Oct. 1st	210	8.6	85.7	55.4
	15th	225	8.5	94.2	60.9
	Nov. 1st	140	6.9	101.1	65.4
	15th	255	5.3	106.4	68.8
Winter	Dec. 1st	270	5.1	111.5	72.1
	15th	285	5.2	116.7	75.5
	Jan. 1st	300	7.6	124.3	80.4
	15th	315	8.0	132.3	85.6
	Feb. 1st	330	8.7	141.0	91.2
	15th	345	13.6	154.6	100

Table (4) : Total half monthly counts of *Insulaspis pallidula* arranged according to Jacob's method using count of immature stages during (2002 – 2003) .

Seasons	Sampling dates	Acumulated of sampling	Half monthly counts of nymphs	Acumulated monthly count	Acumulated %
Spring	Mar. 1st	0	11.8	11.8	7
	15th	15	9.3	21.1	12.5
	Apr. 1st	30	7.5	28.6	16.9
	15th	45	10.4	39.0	23.0
	May 1st	60	6.3	45.3	26.7
	15th	75	4.8	50.1	29.6
Summer	Jun. 1st	90	1.5	51.6	30.5
	15th	105	1.1	52.7	31.1
	Jul. 1st	120	1.0	53.7	31.7
	15th	135	0.9	54.6	32.2
	Aug. 1st	150	0.4	55.0	32.5
	15th	165	0.5	55.5	32.9
Autumn	Sep. 1st	180	0.3	55.8	33.1
	15th	195	7.0	62.8	37.1
	Oct. 1st	210	9.7	72.5	42.8
	15th	225	7.1	79.6	47.0
	Nov. 1st	140	7.0	86.6	51.2
	15th	255	5.4	92.0	54.4
Winter	Dec. 1st	270	6.0	98.0	57.9
	15th	285	6.5	104.5	61.8
	Jan. 1st	300	29.8	134.3	79.3
	15th	315	8.7	143.0	84.4
	Feb. 1st	330	13.4	156.4	92.3
	15th	345	13.0	169.4	100

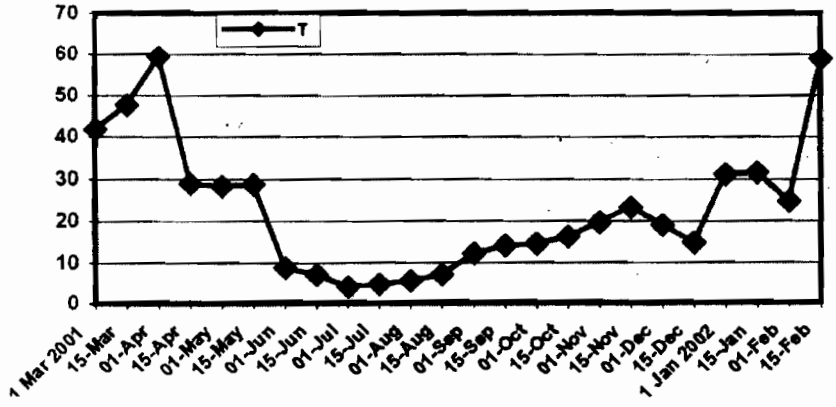

Fig. (1): The seasonal abundance of Insulaspis Pallidula total population on mango duriring (2001-2002)at Qena Governorat.

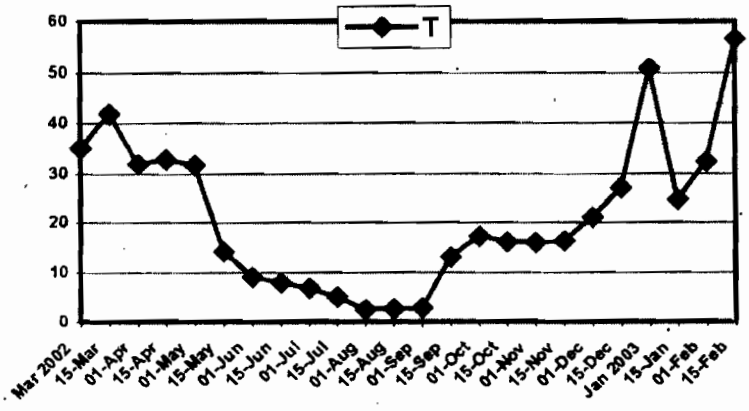

Fig. (2): The seasonal abundance of Insulaspis Pallidula total population on mango duriring (2002-2003)at Qena Governorat.

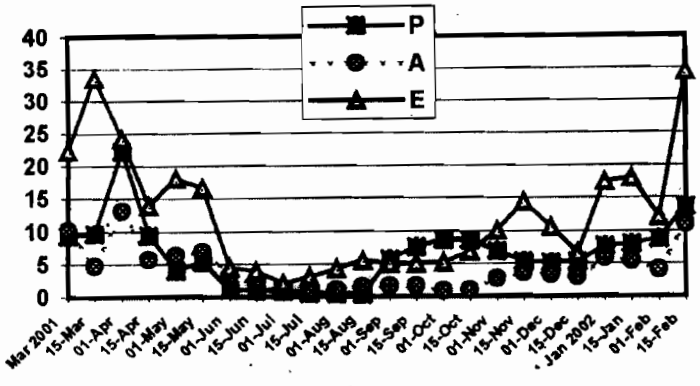

Fig. (3): The half monthly counts of Insulaspis Pallidula total population on mango duriring (2001-2001) at Qena Governorat.

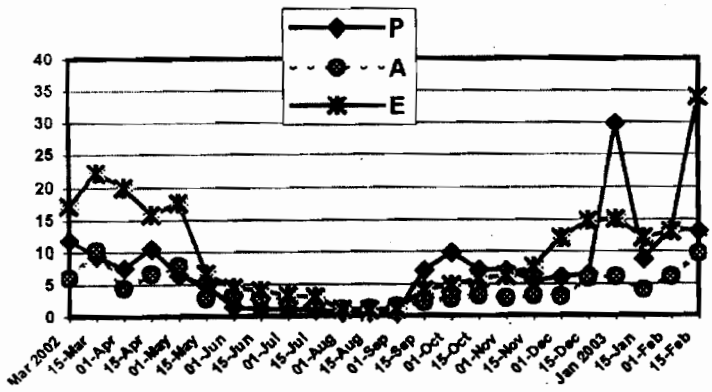

Fig. (4): The half monthly counts of Insulaspis Pallidula total population on mango duriring (2002-2003)at Qena Governorat.

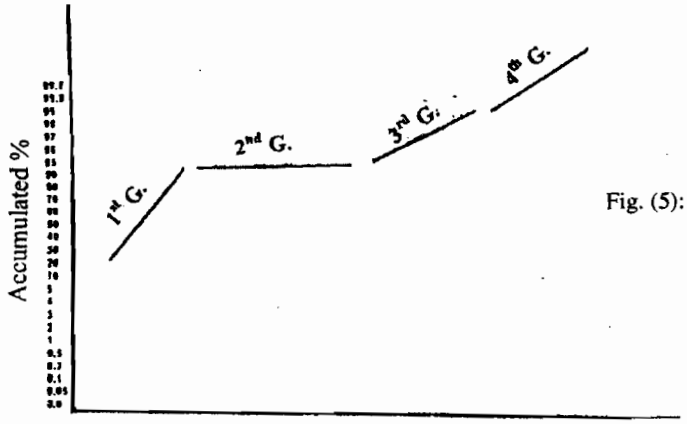

Fig. (5): Annual generations of Insulaspis pallidula on mango trees during (2001 - 2002) Qena.

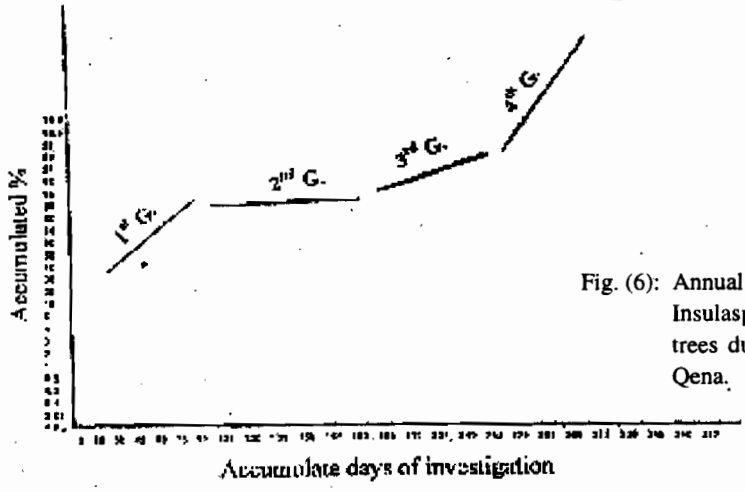

Fig. (6): Annual generations of Insulaspis pallidula on mango trees during (2002 - 2003) at Qena.

REFERENCES

Bodenheimer, F. S. (1951) : Citrus entomology in the middle east

Elwan, E. S. (1990) : Ecological and biological studies on certain insect pest of coccoidea (Homoptera) infesting mango trees. Ph. D. Thesis, Fac. Of Agric., al-Azhar university.

Hassan, N. A. (1993): Survey and toxicological studies on citrus diaspine scale insects and their parasites in Egypt. Ph. D. Thesis, Fac. Sci., Ain-Shams Univ., 204 pp .

Hassan, N. A. (1998): Ecological studies on insulaspis pallidla on mango trees. J. Agric. Sci. Mansoura Univ., 23 (8) 3979 - 3986 .

Helmy, E.I.; S.M. El-Imery and A. Habib (1986): Ecological studies on the florida wax scale Ceroplastes floridensis Comst. (Homoptera: Coccidae) on citrus in Egypt. Bull Soc. Ent., 66: 155-166 .

Jacob, N. (1977): Un mode matematic pentra stabilirea limitelor economice de toleranta a atacului moliilor Fructelor in lupte integrata. Analele I. C . P . P . 15 .

Kwaiz, F. A. M. (1999): Ecological and toxicological studies on the mango soft scale *Kilifia acumnata* (Signoret) with special reference to insecticide residues in Mango fruits. Ph. D. Thesis Fac. of Agric. Cairo Univ., 171pp .

Mani, M. and A. Krishnamoorthy (1990): Evaluation of exotic predator *Cryptolaemus montrouzieri* Mils. (Coccinellidae: Coleoptera) in the suppression of green shield scale *Chloropulvinaria psidii* (Mask.) (Coccidae: Homoptera) on guava. Entomon., 15 (1-2): 45-48.

Moustafa, M. (2002): Taxonomic studies of the genus Aphytis Howard (Hymenoptera: Aphyelinidae) and its rolein in controlling the scale insects (Homoptera coccoidea: Diaspididae) in Egypt. Ph. D. Thesis, Fac. of scien., Benha Braneh., Zagazig Univ., 206p .

Perruso, J. C. and P.C.R., Cassino (1993): Population fluctuations of *Selenaspidus articulatus* (Morg.) (Hemiptera: Diaspididae) on *Citrus sinensis L.* in Rio de Janeiro State. Anais. Dfa. Sociedade. Entomologica. Do. Brasil. 22 (2) : 401 - 404.

Radwan., S. G. A. (2003): Toxicologicl studies on some scale insects infesting Mango and Guava trees. Ph. D. Thesis fac. of Agric. Cairo Univ., 226. Qaluobiya, Egypt. The first conf. Of the central Agric. Pesticid lab., 141- 746.

Salama, H.S. and M.K. Hamdy (1973): Studies on the population dynamics of *lepidosaphes pallida* (Green). I. Distribution on mango trees Z. angew. Ent., 73, 82-92.

دراسات بيئية لحشرة المانجو المحارية والطفيل المصاحب لها على أشجار المانجو فى محافظة قنا.

فايزة أحمد كويز

معهد بحوث وقاية النباتات ــ مركز البحوث الزراعية ــ الدقى

أجريت دراسات بيئية على حشرة المانجو الرخوة والطفيل المصاحب لها على أشجار المانجو بمحافظة قنا خلال موسمى (٢٠٠١- ٢٠٠٢) & (٢٠٠٢-٢٠٠٣)

وقد أظهرت الدراسة :- أن للحشرة أربعة ذروات للكثافة العددية خلال عامى الدراسة الأولى فى الربيع والثانية فى الخريف والثالثة والرابعة فى الشتاء وكان أقل تعداد فى موسم الصيف .

كما وجد أن لحشرة المانجو المحارية أربعة أجيال متداخلة .

ففى السنة الأولى أستغرق الجيل الأول حوالى ٦ أسابيع من بدأ الدراسة فى أول مارس إلى منتصف إبريل والجيل الثانى إستمر ١٤ أسبوع من أول مايو إلى منتصف أغسطس والجيل الثالث أستغرق ١٠ أسابيع من أول سبتمبر إلى منتصف نوفمبر والجيل الرابع أستغرق ١٠ أسابيع من أول ديسمبر إلى منتصف فبراير

أما فى السنة الثانية أستغرق الجيل الأول ٨ أسابيع من ١ مارس إلى ١ مايو والجيل الثانى أستغرق ١٤ أسبوع من منتصف مايو إلى أول سبتمبر والجيل الثالث أستغرق ١٠ أسابيع من منتصف سبتمبر إلى أول ديسمبر والجيل الرابع أستغرق ٨ أسابيع من منتصف ديسمبر إلى منتصف فبراير .

- وبالنسبة للطفيل المصاحب لحشرة المانجو المحارية *Aphytis hispanicni-cus* (Mercat) فكانت أعلى نسبة تطفل فى مواسم الخريف و الربيع والشتاء وأقل نسبة تطفل كانت فى موسم الصيف

وقد أظهر التحليل الإحصائى لفاعلية العوامل الجوية أنها تلعب دور هام فى نشاط الحشرة والطفيل المصاحب لها .