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Seasonal Abundance of the Important Scale Insects and Mealybugs and Their Natural Enemies on Mango Trees at Ismailia Governorate

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ABSTRACT

Certain aspects of scale insect and mealybugs' population dynamics as well as their natural enemies infesting mango trees were studied throughout year 2013 in Ismailia Governorate, Egypt. The obtained data revealed the existence of two common scale insects were *Aulacaspis tubercularis* (Newstead), *Kilifia acuminate* (Signoret) and two mealybugs were *Planococcus citri* (Risso) and *Icerya seychellarum* (Westwood). The existence period of surveyed insects on mango trees covered all the year round. *A. tubercularis* showed the highest total mean values than others on 1st March (260.06 individuals/ branch), followed by *P. citri* that showed its highest total mean values on 1st May (149.28individuals/ branch), then *I. seychellarum* showed the highest total mean values on 1st April (124.58 individuals/ branch), and at last *K. acuminate* peaked on 15th May (72.78 individuals/ branch). The overall means of total number of scale insects predators recorded on the mango trees showed the highest values on 15th May (15.34 individuals/ branch), followed by scale insects parasitoids that showed its highest values on 1st September (2.46 individuals/ branch). Meanwhile, the predacious mites showed their highest values on 15th February (4.58 individuals/ branch).

Key words: Scale insects, mealybugs, natural enemies, mango trees, Egypt.

INTRODUCTION

Mango, (*Mangifera indica* L.) a member of family Anacardiaceae, is one of the most important tropical fruits of the world and economic fruit trees in Egypt. It is known as the king of fruits due to its sweetness, excellent flavour, attractive colour, delicious taste and high nutritive value (Litz, 1997).

Scale insects are the most important pests that attack mango trees in Egypt (Radwan, 2003 and Sayed, 2012). They are related insects of the order Hemiptera, suborder Sternorrhyncha. They comprise the superfamily Coccoidea, previously placed in the now deprecated suborder Homoptera (Ben-Dov *et. al*., 2010). These insect pests are found within 23 families while only 12 out of that number are found in Egypt. The most important of these are 3 families of armored scale insects (Diaspididae), mealybug (Margarodidae and Pseudococcidae) and soft scale insects (Coccidae) and these are dangerous species that attack different important economic crops in Egypt. Most of these species belong to families that are polyphagous, eurymerous, and attack various parts of the host plant, leaves, stem, bark, fruits and roots.

The present work aimed to study certain aspects of the population dynamics of scale insects and mealybugs and its natural enemies associated with mango trees at Ismailia Governorate.

MATERIALS AND METHODS

Field survey of the most certain scale insects and mealybugs and their natural enemies was conducted during one year, 2013 on mango tree at Ismailia Governorate. The selected mango orchard did not receive any pesticide treatments before and throughout the studying period. All trees received the same routine horticultural practices.

Samples of mango leaves were chosen to take samples from them was taken biweekly throughout year of the study. Selected trees were similar in size, shape, height and homogenous in infestations as possible. Five infested branches, about 15 cm long. 25 cm diameter, and from cardinal directions (north, south, east and west) and tree core of each selected trees were picked up using a garden scissor. The branches represented different sides, the peripheral inner zones, lower and middle strata of the shrubs. The collected samples were packed in paper bags, transferred to the laboratory and examined by the aid of a needle using a stereoscopic microscope at the laboratory of the Ismailia Agriculture Research Station.

A live stage of insects and natural enemies were categorized and counts were recorded. Specimens were enclosed in glass jars (15 cm diameter and 20 cm height). The jars were covered with muslin held in position by a rubber band and checked daily. The predators and parasitoids were separated from the collecting leaves parts during the initial examinations. The predacious, parasitic insects and mites were identified by members of the Biological Control Research Department, Plant Protection Research Institute, Doki, Giza, Egypt.

Population fluctuations of the scale insects and mealybugs and their natural enemies (predators and parasitoids) were estimated during one year. The main weather factors maximum temperature (Max.Temp.),

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minimum temperature (Min.Temp.), relative humidity (%R.H) were recorded to determine their effects on the population densities of the common surveyed scale insects. The biweekly records of these weather factors in Ismailia Governorate were obtained from Central Laboratory for Agricultural Climate (CLAC) - Agricultural Research Center, Dokki, Egypt, corresponding to the precise period of sampling dates. Simple correlation (r) and partial regression (b) values were calculated to obtain information about the relationship between the mean number of individuals/tree and the mean records of the three tested weather factors. The obtained results were statistically analysed using Costat software program.

Results and Discussion

Survey and population dynamics for scale insects species on mango trees were taking placed around Ismailia city at Ismailia Governorate. This study was carried out from January to December 2013. Data showed that the infested mango trees with two common scale insects and two mealy bugs were *Aulacaspis tubercularis*, *Kilifia acuminate*, *Planococcus citri* and *Icerya seychellarum*. All stages (eggs, nymphs and adult females) of each scale insect species and mealybugs, were existed throughout the inspecting intervals.

Population dynamics of *A. tubercularis*

Table (1) showed densities of the *A.tubercularis* stages (eggs, nymphs and adult females) on mango trees at Ismailia Governorate. The eggs stage showed three peaks, the first found was observed in 1st April, while the second was in 1st may and the third was peak in 1st October. On other hand, the nymphs' stages were reached their maximum in 1st March (120.28 individuals/ branch), while their minimum value found in 15th December (16.34 individuals/ branch). The percentages of total nymphs in relation to the total population were highest on 15th April (70.07 individuals/ branch). Three peaks for adult females were explained during 2013. The first peak was in 1st March, the second in 15th May and the third peak in 1st October.

The total population for *A. tubercularis* during year 2013 had maximum value in 1st March (260.06 individuals/ branch) at 9.9 – 20.9 °C and 59.5 % R.H., while the lowest value showed in 15th February (38.34 individuals/ branch) at 10.1- 20.4 °C and 65.7 % R.H. at 11.4 – 25.1°C and 56.3% R.H. These results revealed that *A. tubercularis* had three generations from early March to early May, while the second from early May to early October and the third from early October to early January. These results are in agreement with those obtained by Radwan (2003) and Sayed (2012) who indicated that *A. tubercularis* had three generations on mango at Beni- Swief and at Suez Governorates, Egypt respectively.

Table (1): Average numbers of, *A. tubercularis* and weather factors during 2013 at Ismailia Governorate.

Sampling dates		Mean no. individuals/branch					Climatic factors		
		Egg stage	Nymphal stage	Adult Females	Total	Nymph %	Temperatures °C Minimum	Temperatures °C Maximum	R.H.(%) Means
Jan.	1st	24.12	16.59	1.4	42.11	39.39	12.3	20.2	73.9
	15th	26.56	18.59	1.93	47.08	39.49	7.6	18.2	71.9
Feb.	1st	27.28	19.31	2.18	48.77	39.59	8.7	20.4	64.9
	15th	21.59	15.53	1.22	38.34	40.51	10.1	20.4	65.7
Mar.	1st	134.62	120.28	5.16	260.06	46.25	9.9	20.9	59.5
	15th	143.74	17.56	3.24	164.54	10.67	12.1	26.8	54
Apr.	1st	48.36	42.62	3	93.9	45.39	10.8	26.2	54.8
	15th	39.74	100.52	3.18	143.46	70.07	11.4	25.1	56.3
May	1st	129.88	65.24	4.52	199.64	32.68	13.1	27.5	59.5
	15th	105.54	59.42	6.62	171.58	34.63	16.7	31.7	62.3
June	1st	38.64	32.64	5.62	76.9	42.44	18.8	33.6	51.3
	15th	48.72	30.44	2.36	81.52	37.34	19.6	33.4	54.1
July	1st	34.42	26.64	1.46	62.52	42.61	24.4	30.6	71.7
	15th	37.56	28.28	1.16	67	42.21	24.8	28.3	74.8
Aug.	1st	28.42	23.42	1.24	53.08	44.12	24.4	30.6	71.7
	15th	29.56	20.16	2.24	51.96	38.79	25.4	30.5	74.8
Sept.	1st	44.22	27.56	0.84	72.62	37.95	24.1	30.1	70.2
	15th	49.58	26.42	1.62	77.62	34.04	23.5	29.9	70.9
Oct.	1st	132.66	45.26	3.68	181.6	24.92	23.2	28.6	69.3
	15th	83.82	62.44	3.24	149.5	41.77	22.3	26.7	72.4
Nov.	1st	75.66	33.22	2.14	111.02	29.92	20.8	27.4	68.5
	15th	23.34	24.14	1.18	48.66	49.61	16.6	23.9	66.7
Dec.	1st	26.42	18.42	1	45.84	40.18	17.1	22.1	66.8
	15th	24.66	16.34	1.26	42.04	38.87	13.5	19	68.8

Population dynamics of *K. acuminate*.

The egg stage had three peaks the first peak was found in 1st March, the second in 15th May and the third was in 1st October table (2). Nymphal stage showed its maximum value in 1st April (43.62 10.8 – 26.2 °C and 54.8 % R.H., while its minimum value found in 15th December (6.12 individuals/ branch). Nymphal stage showed three peaks the first peak was found in 1st April, the second in 15th May and the third was in 1st October. The maximum mean number of adults female be noticed in 1st March (1.26 individuals/ branch), while the lowest value was found in 15th December (7 individuals/ branch). As shown in table (2) illustrated, the greatest peak of total population abundance for *K. acuminate* occurred in 15th May (72.78 individuals/ branch) at 16.7 – 31.7 °C and 62.3 % R.H., while the lowest value showed in 15th December (13.26 individuals/ branch) at 13.5 – 19 °C and 68.8 % R.H. On other hand the percentages of total nymphs were highest on 1st April (68.13 individuals/ branch) at 10.8 – 26.2 °C and 54.8 % R.H. *K. acuminate* had three generations from early March to early April, the second from early April to early May and the third from early May to early October. These results were in agreement with those obtained by Habib *et al.,* (1971) showed that the *K. acuminate* increased its population density on mango trees at different directions in Qualubia Governorate, Egypt. Bakry *et al.* (2013) obtained that the half monthly of the *Kilifia acuminate* (Hemiptera: Coccidae) had two peaks of seasonal activity per year.

Table (2): Average numbers of *K. acuminate* and weather factors during 2013 at Ismailia Governorate

Sampling dates		Mean no. individuals/branch					Climatic factors		
		Egg stage	Nymphal stage	Adult females	Total	Nymph %	Temperatures ºC Minimum	Temperatures ºC Maximum	R.H.(%) Means
Jan.	1st	11.78	10.36	0.42	22.56	45.92	12.3	20.2	73.9
	15th	12.84	10.91	0.18	23.94	45.61	7.6	18.2	71.9
Feb.	1st	15.36	12.64	0.26	28.26	44.73	8.7	20.4	64.9
	15th	15	13	0.36	28.36	45.84	10.1	20.4	65.7
Mar.	1st	51.24	13.52	1.26	65.86	20.53	9.9	20.9	59.5
	15th	21.48	11.24	0.38	33.1	33.96	12.1	26.8	54
Apr.	1st	20.16	43.62	0.24	64.02	68.13	10.8	26.2	54.8
	15th	17.22	12.58	0.3	30.1	41.79	11.4	25.1	56.3
May	1st	14.18	14.64	1	29.82	49.09	13.1	27.5	59.5
	15th	36.46	35.84	0.48	72.78	49.24	16.7	31.7	62.3
June	1st	18.62	10	0.14	28.76	34.77	18.8	33.6	51.3
	15th	16.48	11.82	0.34	28.64	41.72	19.6	33.4	54.1
July	1st	12.12	7.48	0.22	19.82	37.74	24.4	30.6	71.7
	15th	15.36	13.52	0.32	29.2	46.3	24.8	28.3	74.8
Aug.	1st	10.58	10.44	0.18	21.2	29.25	24.4	30.6	71.7
	15th	8.66	11	0.28	19.94	55.17	25.4	30.5	74.8
Sept.	1st	16.12	8.82	0.4	25.34	34.81	24.1	30.1	70.2
	15th	15.44	10.16	0.42	26.02	39.05	23.5	29.9	70.9
Oct.	1st	32.14	28.44	0.16	60.74	46.82	23.2	28.6	69.3
	15th	19.24	14.12	0.38	33.74	41.85	22.3	26.7	72.4
Nov.	1st	10	7.84	1.12	19.1	41.05	20.8	27.4	68.5
	15th	8.62	6.26	0.16	15.04	41.62	16.6	23.9	66.7
Dec.	1st	7.14	8	0.2	15.34	52.15	17.1	22.1	66.8
	15th	7	6.16	0.14	13.26	46.15	13.5	19	68.8

Population dynamics of *P. citri*

Data in Table (3) indicated that *P. citri* egg stage had three peaks. The first peak was found in1st April, while the second in 15th June and the third peak in1st November. The mean number for the nymphal stage for *P. citri* showed that the highest mean number found in1st March (89.62 individuals/ branch), while the lowest value found in 15th December (14.16 individuals/ branch). Nymphal stage showed three peaks, the first was found in 1st March, the second in 1st May and the third peak found in 1st October. The percentages of total nymphs in relation to the total population were highest on 1st October (74.06 individuals/ branch). Females stage showed three peaks the first peak was found in 1st May, the second peak found in 1st May and the third in 15th October. The total population for *P.citri* during year 2013 had maximum value in 1st May (149.28 individuals/ branch) at 13.1 – 27.5 °C and 59.5 % R.H., while the lowest value showed in 15th December (33.12 individuals/ branch) at 13.5 – 19 °C and 68.8 % R.H. at 23.2 – 28.6 °C and 69.3 % R.H. Thus, indicating that *p.citri* had three generations from early March to last April, while the second from last April to early October and the third from early October to early January. So these data are consistent with Murray (1978) found that *Phenacoccus citri* were lowest in September on passion fruits in south-eastern Queensland and increased to peak populations in January-June.

Table (3): Average numbers of *P. citri* and weather factors during 2013 at Ismailia Governorate.

Sampling dates		Mean no. individuals/branch					Weather factors		
		Egg stage	Nymphal stage	Adult Females	Total	Nymph %	Temperatures °C		R.H.(%)
							Minimum	Maximum	Means
Jan.	1st	17.86	14.54	0.98	33.38	43.56	12.3	20.2	73.9
	15th	20.62	15.92	1.38	37.92	41.98	7.6	18.2	71.9
Feb.	1st	18.12	15.34	1.28	34.74	44.16	8.7	20.4	64.9
	15th	22.26	16.58	1.78	40.62	40.82	10.1	20.4	65.7
Mar.	1st	28.82	89.62	2	123.06	72.83	9.9	20.9	59.5
	15th	29.46	43.16	4.62	74.62	57.84	12.1	26.8	54
Apr.	1st	108.18	36.42	1.14	145.74	24.99	10.8	26.2	54.8
	15th	59.28	32.68	1.64	93.6	34.91	11.4	25.1	56.3
May	1st	43.42	102.22	3.64	149.28	68.48	13.1	27.5	59.5
	15th	28.56	62.54	2.84	93.94	66.57	16.7	31.7	62.3
June	1st	33.46	28.16	1.64	63.26	44.51	18.8	33.6	51.3
	15th	94.22	23.62	1.76	119.6	19.75	19.6	33.4	54.1
July	1st	30.24	17.28	0.96	48.48	35.64	24.4	30.6	71.7
	15th	26.66	14.56	1.82	43.04	33.83	24.8	28.3	74.8
Aug.	1st	21.14	24.32	1.22	46.68	52.09	24.4	30.6	71.7
	15th	17.48	29.46	0.78	47.72	61.74	25.4	30.5	74.8
Sept.	1st	17.26	16.54	1.28	35.08	47.15	24.1	30.1	70.2
	15th	24.58	20.18	1.88	46.64	43.27	23.5	29.9	70.9
Oct.	1st	22.62	66.64	0.72	89.98	74.06	23.2	28.6	69.3
	15th	34.44	41.42	2.84	78.7	52.63	22.3	26.7	72.4
Nov.	1st	83.68	22.76	0.92	107.36	21.19	20.8	27.4	68.5
	15th	56.32	22.14	1.42	79.88	27.72	16.6	23.9	66.7
Dec.	1st	26.56	16.58	1	44.14	37.56	17.1	22.1	66.8
	15th	18.12	14.16	0.84	33.12	42.75	13.5	19	68.8

Population dynamics of *I. seychellarum*

Data in Table (4) showed the eggs stage had three peaks. The first peak was found in1st March, while the second peak in 1st May and the third peak in1st October. On other hand, nymphs stage showed its maximum mean number in 1st April (90.46 individuals/ branch), while its minimum found in 1st January (11.35 individuals/ branch). Nymphs stage showed three peaks the first peak was found in 1st April, the second peak found in 15th May and the third in 1st November. The density of adults female stage for *I. seychellarum* showed its highest level in 1st August (2 individuals/ branch), whereas the lowest was on 15th December (0.18 individuals/ branch).

The total population for *I. seychellarum* during year 2013 had maximum value in 1st April (124.58 individuals/ branch) at 10.8 – 26.2°C and 54.8 % R.H., while the lowest value showed in 15th December (24.34 individuals/ branch) at 13.5 - 19 °C and 68.8% R.H. The percentages of total nymphs in relation to the total population were highest on 1st November (85.19 individuals/ branch) at 20.8 – 17.4°C and 68.5% R.H. Thus, indicating that *I. seychellarum* had three generations from early April to middle May, while the second one from middle May to early November and the third one from early November to early January. These results were in agreement with those obtained by osman (2005) found that *I. seychellarum* had three to four successive overlapping generations.

The relationship between the population dynamics and weather factors

The weather factors, minimum, maximum temperatures (°C) and mean relative humidity were studied with the biweekly total counts of *A.tubercularis* on mango trees during the studied period. Results showed that there were significant negative relationships between relative humidity and population densities of *A.tubercularis*, *P. citr* and *I. seychellarum* Table (5).

Analysis of variance in Table (5) showed that the combined effect of the studied factors was significant on *A. tubercularis*, *P. citr* and *I. seychellarum*. The explained values of total populations of *A.tubercularis*, *P. citr, I. seychellarum* and *K. acuminate* were 17.7, 40.4, 34.9, and 21.1%, respectively. The remaining unexplained variances assumed to be due to the influence of other unconsidered factors.

Table (4): Average numbers of *I. seychellarum* and weather factors during 2013 at Ismailia Governorate.

Sampling dates		Mean no. individuals/branch					Climatic factors		
		Egg stage	Nymphal stage	Adult Females	Total	Nymph %	Temperatures °C		R.H.(%)
							Minimum	Maximum	Means
Jan.	1st	13.18	11.35	0.76	25.29	44.88	12.3	20.2	73.9
	15th	14.54	12.28	0.98	27.81	44.16	7.6	18.2	71.9
Feb.	1st	16.28	15.42	0.24	31.94	48.28	8.7	20.4	64.9
	15th	16	11.48	0.38	27.86	41.21	10.1	20.4	65.7
Mar.	1st	31.18	21.64	0.3	53.12	40.74	9.9	20.9	59.5
	15th	82.82	28.52	1.12	113.22	25.19	12.1	26.8	54
Apr.	1st	33.64	90.46	0.48	124.58	72.61	10.8	26.2	54.8
	15th	36.46	32.66	0.42	69.54	46.97	11.4	25.1	56.3
May	1st	72.16	34.82	0.34	87.32	16.97	13.1	27.5	59.5
	15th	41.52	60.54	0.26	102.32	59.17	16.7	31.7	62.3
June	1st	14.64	15.82	0.28	30.74	51.46	18.8	33.6	51.3
	15th	16.86	14.32	0.44	31.62	45.29	19.6	33.4	54.1
July	1st	23.14	20.58	0.32	44.04	46.73	24.4	30.6	71.7
	15th	21.58	16.18	0.36	38.12	42.44	24.8	28.3	74.8
Aug.	1st	22.44	10.64	0.22	33.3	31.95	24.4	30.6	71.7
	15th	15.12	13.46	1.24	30.58	44.02	25.4	30.5	74.8
Sept.	1st	13.82	12.82	0.48	27.12	47.27	24.1	30.1	70.2
	15th	24.18	22.14	0.18	36.5	33.26	23.5	29.9	70.9
Oct.	1st	52.54	16.48	0.88	65.14	17.62	23.2	28.6	69.3
	15th	18.62	26.42	0.26	45.3	58.32	22.3	26.7	72.4
Nov	1st	11.54	65.82	0.36	77.26	85.19	20.8	27.4	68.5
	15th	12.32	13.46	0.28	26.06	51.65	16.6	23.9	66.7
Dec.	1st	12	13	0.2	25.2	51.59	17.1	22.1	66.8
	15th	11.68	12.48	0.18	24.34	51.27	13.5	19	68.8

Table (5): Simple correlation (r), partial regression (P.reg.) and analysis of variance of weather factors (mim., max. temp., and mean relative humidity to the corresponding percentage of explained variance (% E. V.) throughout 2014 on certain scale insects infesting mango at Ismailia Governorate.

Species name	Weather factors						Analysis variance	
	Maximum Temperature		Minimum Temperature		Mean relative humidity			
	r.	P. reg.	r.	P. reg.	r.	P. reg.	F.	E.V.%
A. tubercularis	**0.143**	**1.414**	**-0.133**	**-0.4339**	**-0.413**	**-3.129**	**1.429**	**17.7**
P. citri	**0.242**	**1.904**	**-0.184**	**-0.781**	**-0.619**	**-2.587**	**4.522**	**40.4**
I. seychellarum	**0.208**	**5.207**	**-0.221**	**-4.127**	**-0.512**	**0.003**	**3.568**	**34.9**
k. acuminate	**0.139**	**2.571**	**-0.192**	**-2.149**	**-0.376**	**0.227**	**1.781**	**21.1**

Population dynamics of the associated natural enemies

The surveyed predators were : *Chrysoperia carnea* (Neuroptera: Chrysopidae), *Cybocephalus rufifrons* (Coleoptera: Cybocephalidae), *Sympherobius pygmeueus* (Coleoptera: Hemerobiidae) , *Scymnus coccivora*, *Cydonia vicina* nilotica and *Cydonia vicina* subsignata (Coleoptera: Coccinellidae) while the predacious mites *Amblyscius zaheri* and *Amblyscius reticulates* (Phytosiidae: Mesostigmata) and the parasitoids were *Leptomastix abnormis* and *Anagyrus kamali*.

Data presented in table (6) and fig. (1) show the predators , parasitoids and predacious mites and their total means that were associated with scale insects infested mango trees in Ismailia Governorate throughout 2013 year. The overall means of scale insects and mealybug predators recorded on the mango trees showed the highest values on 15th May (15.34 individuals/ branch). *Sympherobius pygmeueus* was the highest predator mean number found on 15th May (6 individuals/ branch), followed by *Scymnus coccivora* that showed the highest values on 15th May (3.42 individuals/ branch).

On other hand the overall means of total number of scale insects and mealybug parasitoids on the mango trees showed the highest values on 1st September (2.46 individuals/ branch). *Leptomastix abnormis* was the highest parasitoid mean number found on 1st September (2 individuals/ branch), followed by *Anagyrus kamali* that showed the highest values on 1st November (0.48 individuals/ branch). Predacious mites showed its highest values on 15th February (4.58 individuals/ branch). *Amblyscius zaheri* was the highest parasitoid mean number found on 15th March (3.12 individuals/ branch), followed by *Amblyscius reticulates* that showed the highest values on 15th February (3 individuals/ branch).

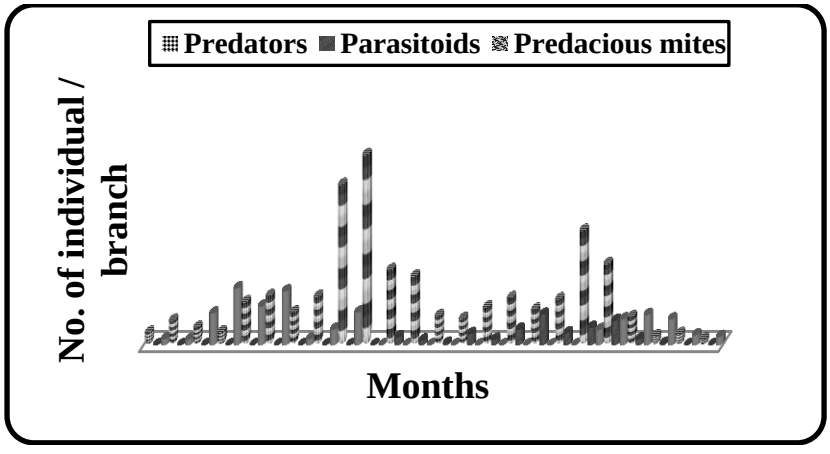

Figure (1): Total mean numbers of predators, parasitoids and predacious mites associated with scale insects infested mango trees during 2013 at Ismailia Governorate.

Table (6): Total mean numbers of predators, parasitoids and predacious mites associated with scale insects infested mango trees during 2013 at Ismailia Governorate.

Sampling dates		Total No. individual/ branch			Total No.for N. enemies
		Predators	Parasitoids	Pre. Mites	
Jan.	1st	1	0	0.48	1.48
	15th	1.98	0	0.44	2.42
Feb.	1st	1.4	0	2.56	3.96
	15th	1.04	0	4.58	5.62
Mar	1st	3.46	0	3.12	6.58
	15th	3.96	0	4.34	8.3
April	1st	2.64	0	0.48	3.12
	15th	3.9	0	1.26	5.16
May	1st	12.94	0	2.64	15.58
	15th	15.34	0	0	15.34
June	1st	6.04	0.64	0	6.68
	15th	5.54	0.38	0	5.92
July	1st	2.34	0.12	0	2.46
	15th	2.12	0.9	0	3.02
Aug.	1st	3.04	0.44	0	5.06
	15th	3.8	1.26	0	5.06
Sept.	1st	2.86	2.46	0	5.32
	15th	3.7	0.96	0	4.66
Oct.	1st	9.22	1.4	1.22	11.84
	15th	6.54	1.96	2.08	10.58
Nov.	1st	2.26	0.48	2.44	5.18
	15th	0.72	0.12	2.08	2.92
Dec.	1st	0.9	0	0.8	1.7
	15th	0.48	0	0.66	1.14

The results agreed with those of Sayed (2013) who reported that the insect predator *Cybocephalus rufifrons flaviceps* Reitter is associated with mango white scale, *Aulacaspis tubercularis* in mango trees in Ismailia Governorate. Attia and Radwan (2013) also found that three primary parasitoids and two secondary parasitoids associated with *Kilifia acuminate*. Wakgari and Gilimoee (2003) identified eight primary and four secondary parasitoids and two predator species related to *Planococcus citri*.

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التعداد الموسمي لأهم الحشرات القشرية و البق الدقيقي و أعدائهم الحيوية علي أشجار المانجو بمحافظة الإسماعيلية

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الملخص العربي

تم حصر أهم أنواع الحشرات القشرية و البق الدقيقي لأشجار المانجو بمحافظة الإسماعيلية خلال عام ٢٠١٣ و أهم الأعداء الحيوية المصاحبة لهم.ويمكن تلخيص النتائج كالتالي:- انتشار نوعين من الحشرات القشرية وهما الحشرة القشرية البيضاء *Aulacaspis tubercularis* (Newstead), و الحشرة القشرية الرخوة *Kilifia acuminate* (Signoret) ، ونوعان من البق الدقيقي هما بق الموالح *Planococcus citri* (Risso) وبق السيشلازم *Icerya seychellarum* (Westwood) . كانت الحشرية القشرية البيضاء اعلي قيمة تعداد في أول شهر مارس بنسبة 260.06 % ياليه بق الموالح في أول مايو بنسبة 149.28% ثم بق السيشلازم أول ابريل بنسبة 124.58 و أخيرا الحشرة القشرية الرخوة في نصف شهر مايو بنسبة 15.34%. ومن خلال الدراسة أظهرت الأعداء الحيوية المصاحبة لهذه الآفات أن المفترسات كان اعلي نسبة تعداد لها في نصف شهر مايو بنسبة 15.34% بينما الطفيليات كان تعدادها 2.46% في أول شهر سبتمبر أما المفترسات الأكاروسية كان تعدادها بنسبة 4.58 في منتصف شهر فبراير.