

CEREAL APHIDS ON MAIZE AND THEIR ASSOCIATED PREDACEOUS INSECTS

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ABSTRACT: Studies on cereal aphids infesting maize plants and their associated predaceous insects were carried out in Meet-Elezz village, Fakous district, Sharkia Governorate during 1997 and 1998 growing seasons. The obtained data revealed the following aspects:

1. Two aphid species, i.e., *Rhopalosiphum maidis* (Fitch) and *Rhopalosiphum padi* (Linnaeus) (Homoptera: Aphididae) infested maize plants.
2. Cereal aphids infest maize plants from the third week of July till the end of September in both seasons of study. The number of aphids gradually increased, attained their highest peaks with counts of 59050 and 70455 individuals / sample (10 tassels) in the fourth and third weeks of August during the first and second seasons, respectively.
3. Ten predaceous insect species belonging to five families and four orders were surveyed, associated with aphids infesting maize plants. Dipterous species came in the first rank, comprised 50.65 and 37.83% of the total numbers of recorded predators in the first and second seasons, respectively. Coleopterous ones, occupied the second category, represented by 20.86 and 25.31% in the two successive seasons. As species, *Metasyrphus corollae* (Fabr.) ranked the first category, followed in descending order by *Scymnus interruptus* (Gocze) and *Chrysoperla carnea* (Steph.).
4. Syrphid species reached their highest values with counts of 200 predators / 59050 aphids and 388 predators / 70455 aphids in the fourth and third weeks of August during the two respective seasons. *S. interruptus* indicated its highest values with numbers of 47 predators / 59050 aphids and 178 predators / 70455 aphids

in the fourth and third weeks of August during the first and second seasons, respectively. The two *Orius* species showed peaks of 68 bugs/ 59050 aphids in the fourth week of August during the first season and 147 individuals/ 70455 aphids in the third week of August during the second season. The highest counts of *C. carnea*, 30 and 89 predators/ 59050 and 70455 aphids, occurred in the fourth and third weeks of August during the two respective seasons. In general, the highest total counts of all recorded predators were in the fourth and third weeks of August during the two respective seasons. They were synchronized with the highest populations of the aphids. The means of predators: prey ratios of whole predators were 1:110.07 and 1:50.88 in the first and second seasons, respectively.

Key words: Maize, cereal aphids, predaceous insects.

INTRODUCTION

Maize is one of the most important cereal crops in Egypt. It is using for human food, as well as in animal and poultry feeding. In addition, maize is a major component in several industries such as corn oil, starch and fructose sugar. The Egyptian Agricultural policy aims to increase maize production to reduce the food gap between the consumption and production, The total cultivated area with maize in Sharkia Governorate reached about 235048 feddans, with an average production of about 3.368 tons/ feddan (Anonymous, 2004).

Many pests attack maize plants from sowing till harvest. The main insect pests are cereal aphids (Hassan, 1957; El-Heneidy and Abbas, 1984 ; Hegab *et al.*, 1988; Darwish and Ali, 1991; Ismail *et*

al., 1993; Asin *et al.*, 1998; Tawfik and El-Husseini, 2002 and Youssef, 2006), which sometimes cause severe losses in yield. The injurious of aphids comes through either direct feeding or transmission of viral diseases (Mahlooji and Makoui, 1990).

Chemical insecticides induced major well known problems such as health hazards to human and animals, destruction of biological control agents and increased resistance of insects to insecticides.

Recently, entomologists suggested Integrated Pest Management (IPM) , using all other control methods which emphasize on biological control (Havlickova and Holubec, 1999; Dent, 1999 and Schüler *et al.* 1999).

Since, the entomophagous especially predatory insects have important role in suppression aphid populations. The present work was carried out to study the following objectives:

1. Surveying the cereal aphids infesting maize plants and their associated predaceous insects.
2. Seasonal abundance of cereal aphids and their associated predaceous insects on maize plants in relation with prevailing temperatures and relative humidities.

MATERIALS AND METHODS

Field experiments were conducted at Meet-Elezz village, Fakous district, Sharkia Governorate during two successive maize growing seasons of 1997 and 1998.

An area of about half feddan was sowed with maize, *Zea mays* L., Tribile hybrid 310 (T.C. 310) in the first week of June during 1997 and 1998 seasons. The normal agricultural practices were applied in the due time without using any insecticides.

To study the population fluctuations of aphids and aphidophagous insect predators, 10 tassels of maize infested with aphids were weekly selected at random, picked up, placed in paper

bags and transferred into laboratory, where carefully examined by the aid of stereoscopic microscope. The adults and nymphs of aphids were directly counted. The adults and immature stages of predators in most cases were directly counted, but in some few cases laboratory rearing was necessary for the immature stages till emergence of the adults.

Daily records of temperatures and relative humidities during the period of investigation were obtained from Agrometeorological station at Zagazig region.

RESULTS AND DISCUSSION

Survey and Seasonal Abundance of Aphids Infesting Maize Plants

Survey of aphid species

Two aphid species (Homoptera: Aphididae) were recorded infesting maize plants, namely *Rhopalosiphum maidis* (Fitch) and *Rhopalosiphum padi* (Linnaeus).

The obtained results are in agreement with those of El-Henidy and Abbas, (1984), Hegab *et al.*, (1988) and Youssef (2006) in different regions of Egypt. Tawfik and El-Husseini (2002) mentioned that about 66 families belonging to 14 orders are pests on field crops, and about 40 of these

representative species were recorded as corn feeders. Among these feeders, the aphids *Macrosiphum avenae* F.(=*Sitobion avenae* F.) and *Rhopalosiphum maidis* (F.) (= *Aphis maidis* F.) are considered as major pests of corn plants.

Seasonal abundance of aphid species

The differentiation of cereal aphids infesting maize plants was not taken into consideration during the course of this investigation. So, aphids will be referred to the counting of different aphid species.

Data represented in Table 1 illustrate the fluctuations in the population of aphids complex on maize plants under the prevailing climatic conditions through the two successive seasons of 1997 and 1998.

As shown in the first season, aphids began to appear in the third week of July, with 32 individuals/sample (10 tassels) at means of 28.4°C and 53.7% RH. Then, a gradual increase occurred during the following successive weeks to reach the highest peak of activity with 59050 aphids / sample in the fourth week of August at means of 27.5°C and 60.4% RH. Thereafter, the population sharply decreased through the following two weeks, then slightly increased to show the second peak of activity, the lowest, with count of 6440 aphids/ sample

in the third week of September at means of 24.0°C and 54.9% RH. Afterwards, aphids populations continued their decrease, reaching its minimal value at the end of the season in the last week of September, with 630 individuals / sample at means of 22.3°C and 56.1% RH. The minimum monthly total count, 163 aphids, was recorded during July and the maximum one, 67510 individuals, was observed during August.

In the second season, the occurrence of aphids on maize plants started also in the third week of July, with only 17 aphids/sample at means of 30.6°C and 62.1% RH. Then, sharply increased to record their maximum value, 70455 individuals/ sample, in the third week of August at means of 31.3°C and 59.4% RH. The aphids number sharply decreased in the following week to only 2200 individuals / sample at means of 29.8°C and 59.7% RH. Afterwards, reaching the following peak in the first week of September, with count of 5050 aphids / sample at means of 30.6°C and 58.6% RH. Then, fluctuated with a tendency to decrease and disappear completely in the last week of September. The minimum and maximum total monthly counts of aphids occurred during July and August, respectively.

Table 1. Seasonal abundance of aphids infesting maize plants during 1997 and 1998 growing seasons

Weekly date of sample	No. of aphids/ sample (10 tillers)		Corresponding means of			
	1997	1998	Temp. °C		RH%	
			1997	1998	1997	1998
Jul., 3 rd	32	17	28.4	30.6	53.7	62.1
4 th	131	1175	28.7	31.5	56.3	57.3
Total	163	1192				
Aug., 1 st	225	2875	26.6	33.3	62.6	60.0
2 nd	2855	5375	28.1	31.1	61.6	59.8
3 rd	5080	70455	27.2	31.3	60.4	59.4
4 th	59050	2200	27.5	29.8	60.4	59.7
Total	67510	80905				
Sep., 1 st	17775	5050	26.6	30.6	60.3	58.6
2 nd	6000	752	24.7	31.0	56.5	57.5
3 rd	6440	960	24.0	30.6	54.9	53.0
4 th	3850	595	22.6	24.3	50.8	63.2
5 th	630	-	22.3	25.1	56.1	62.3
Total	34695	7357				
General total	102368	89454				

It could be noticed that maize plants severely infested with cereal aphids and the second season was slightly insignificant infested ($t=0.042$), Table 2.

The results of the present investigation are in agreement with the findings of the following workers. El-Heneidy and Abbas (1984), who reported that aphids infesting maize plants during August and early September. Hegab *et al.* (1988) who mentioned that *R. maidis* had one peak. Darwish and Ali (1991) who revealed that aphid infested maize in the beginning of August with maximal value in the fourth week of the same month, and began to decrease in the third week of September. The present results also agree with those of Hance (1997), Ding *et al.* (2002) in China and Tawfik and El-Husseini (2002) who mentioned that *S. avenae* and *R. maidis* are considered major pests of corn plants.

The seasonal abundance of aphids on maize differed greatly according to plantation date and location: Ismail *et al.* (1993) found that the infestation in Giza, started in the second week of June on maize planted in the first week of May, and continued until the second week of September on the mid June plantation. At Qualubia, the infestation began in the fourth week of June on mid May plantation, and continued until the

last week of September on the mid July plantation. The infestation continued for nine, eight and six weeks on maize planted in mid May, mid June and mid July, respectively.

Survey and Seasonal Abundance of Predaceous Insect Species

Survey of predaceous insects

As shown from obtained data in Table 3, ten predaceous insect species belonging to five families and four orders were found associated with aphids infesting maize plants. They were *Metasyrphus corollae* (Fabr.), *Xanthogramma aegyptium* Wied., *Paragus aegyptius* Macq. (Diptera: Syrphidae), *Leucopis puncticornis aphidivora* Rond. (Diptera: Ochthiphilidae), *Coccinella undecimpunctata* L., *Coccinella septempunctata* L., *Scymnus interruptus* (Goeze) (Coleoptera: Coccinellidae), *Chrysoperla carnea* (Steph.) (Neuroptera: Chrysopidae), *Orius laevigatus* Fieb. and *Orius albidipennis* (Reut.) (Hemiptera: Anthocoridae).

As a total of the four orders, dipterous species came in the first rank, comprised 50.65 and 37.83% of the total number of recorded predators in the first and second seasons, respectively. Coleopterous ones occupied the second category, represented 20.86 and 25.31% in the two successive seasons. Both of neuropterous and hemipterous

Table 2. Statistical analysis of the differences between mean number of aphids and mean number of predaceous insects on maize plants during the two seasons of study

Factor	t-calculated	t- tabulated		Sig. level
	No.	0.05	0.01	No.
Difference between Mean number of aphids during 1997 and 1998 seasons	0.042	2.09	2.80	N.S
Mean number of predaceous insects during 1997 and 1998 seasons	3.200**	2.09	2.8	H.S

N.S. = Non significant H.S. = High significant

predaceous species had the latter positions with percents of 15.05 and 13.44 in the first season, and 17.63 and 19.23% in the second one, successively.

As species, *M. corollae* ranked the first category, represented 28.71 and 23.44% of all recorded predators in the first and second seasons, respectively. It followed in descending order by *S. interruptus*, *C. carnea*, *Orius* spp., *L. puncticornis aphidivora*, *X. aegyptium*, *P. aegyptius* and *C. undecimpunctata*, constituting 18.17, 15.05, 13.44, 11.08, 6.88, 3.98 and 2.58% of the total counts of recorded predators in the first season, and 23.61, 17.63, 19.23, 6.08, 4.32, 3.98 and 1.54% in the second season, respectively.

Syrphids species as predators of cereal aphids infesting maize plants were recorded by Hassan (1957) in Egypt, Grigorov (1982) in Bulgaria, Hance (1997) in Belgium, Asin *et al.* (1998) in

Spin, Ahmed (2000) and Tawfik and El-Husseini (2002) in Egypt. The present results are in agreement with those of Tawfik and El-Husseini (2002) who reported that *C. undecimpunctata*, *Orius* spp. and *L. puncticornis aphidivora* are predators of cereal aphids on maize plants. *C. undecipunctata* and *C. carnea* were recorded also by Hassan (1957), Grigorov (1982), Darwish and Ali (1991) and Ahmed (2000) in Egypt. *C. septempunctata* was found by Hance (1997), Asin *et al.* (1998), Ahmed (2000) and Elliott *et al.* (2002). *Scymnus* spp. were reported by Hassan (1957), Tawfik *et al.* (1962) in Egypt, Darwish and Ali (1991) and Asin *et al.* (1998).

Population densities of predaceous insects

The population densities of the main predaceous insects associated with cereal aphids infesting maize plants during the two seasons of study are presented in Tables 4 and 5.

Table 3. Total numbers and percentages of predaceous insect species associated with aphids infesting maize plants during 1997 and 1998 growing seasons

Predaceous insect species	Season					
	1997			1998		
	No. of predators	% order	% sp.	No. of predators	% order	% sp.
Diptera	471	50.65		665	37.83	
Syrphidae	368			558		
<i>Metasyrphus</i> (=Syrphus) <i>corollae</i> (Fabr.)	267		28.71	412		23.44
<i>Xanthogramma aegyptium</i> Wied.	64		6.88	76		4.32
<i>Paragus aegyptius</i> Macq.	37		3.98	70		3.98
Ochthiphilidae	103			107		
<i>Leucopis puncticornis aphidivora</i> Rond.	103		11.08	107		6.08
Coleoptera	194	20.86		445	25.31	
Coccinellidae	194			445		
<i>Coccinella undecimpunctata</i> L.	24		2.58	27		1.54
<i>Coccinella septempunctata</i> L.	1		0.11	3		0.17
<i>Scymnus interruptus</i> (Goeze)	169		18.17	415		23.61
Neuroptera	140	15.05		310	17.63	
Chrysopidae	140			310		
<i>Chrysoperla carnea</i> (Steph.)	140		15.05	310		17.63
Hemiptera	125	13.44		338	19.23	
Anthocoridae	125			338		
<i>Orius</i> spp.*	125		13.44	338		19.23
Total number	930	100.00	100.00	1758	100.00	100.00

**Orius laevigatus* Fieb. and *Orius albidipennis* (Reut.)

Total syrphid species

The population densities of *M. corollae*, *X. aegyptium* and *P. aegyptius* were considered as total numbers of syrphid species.

In the first season of study (Table 4), the first record of syrphids started with three predators/ sample in the fourth week of July, one week latter after appearance of aphids infestation. The population increased gradually to reach its highest peak, 200 individuals / 59050 aphids in the fourth week of August at means of 27.5°C and 60.4% , then decreased gradually till the end of the season. The maximum total monthly count, 254 predators /67510 aphids, was recorded during August, followed by 111 predators/ 34695 aphids in September and only three predators/ 163 aphids in July.

As shown in Table 5, similar trend was observed in the second season. The seasonal abundance of the syrphids showed two peaks. The first one occurred in the third week of August with count of 388 predators/ 70455 aphids, synchronized with the peak of aphids, at means of 31.3°C and 59.4% RH.

Azab *et al.* (1965) indicated that the highest abundance of syrphids occurred during the fall, while their least abundance was

attained in spring. Syrphids was poorly represented on cotton infested with *Aphids gossypii* Glover. The peak of activity was recorded in August, coincided with the second peak of aphid. Grigorov (1982) reported that aphids on maize are most often destroyed by the syrphid larvae, followed by chrysopids and coccinellids. Glustina and Foessel (1987) mentioned that syrphids are the most important predators on maize, and have two generations. Hance (1997) stated that the abundance of the main predators associated with aphids species infesting maize crop are syrphids, coccinellids and chrysopids. Tawfik and El-Husseini (2002) mentioned that the aphids in corn and wheat fields are checked by several predaceous species. Among these species are the larvae of the syrphids, *S. corollae*, *Sphaerophoria flavicauda* Zett and *P. aegyptius*.

Scymnus interruptus (Goeze)

Data given in Table 4 reveal that in the first season, the predator started to appear with only four adults in the third week of July in coincident with the first record of aphids, 32 individuals / sample, at means of 28.4°C and 53.7% RH. The number of the predator was gradually increased, reaching its first peak of activity, 19 predators

Table 4. Population fluctuations of predaceous insect species associated with aphids infesting maize plants during 1997 growing season

Weekly date of sample	No. of aphids/ sample	Number of predaceous insects / sample							Total
		<i>Orius</i> spp.	<i>C. carnea</i>	<i>C. undecimpunctata</i>	<i>C. septempunctata</i>	<i>S. interruptus</i>	Syrphid species	<i>L. puncticornis aphidivora</i>	
Jul., 3 rd	32	0	2	1	0	4	0	0	7
4 th	131	0	3	3	1	7	3	0	17
Aug., 1 st	525	4	9	4	0	19	9	0	45
2 nd	2855	8	8	2	0	15	19	11	63
3 rd	5080	15	14	0	0	12	26	8	75
4 th	59050	68	30	0	0	47	200	30	375
Sep., 1 st	17775	12	10	2	0	23	33	50	130
2 nd	6000	4	18	4	0	6	31	2	65
3 rd	6440	6	22	4	0	5	24	0	61
4 th	3850	3	21	4	0	16	13	0	57
5 th	630	5	3	0	0	15	10	2	35
Total	102368	125	140	24	2	169	368	103	930
Predators:									
prey ratio									1:110.07

Table 5. Population fluctuations of predaceous insect species associated with aphids infesting maize plants during 1998 growing season

Weekly date of sample	No. of aphids/ sample	Number of predaceous insects / sample								Total
		<i>Orius</i> spp.	<i>C. carnea</i>	<i>C. undecimpunctata</i>	<i>C. septempunctata</i>	<i>S. interruptus</i>	Syrphid species	<i>L. puncticornis aphidivora</i>		
Jul., 3 rd	17	0	2	0	0	1	0	0	3	
4 th	1175	4	27	13	0	29	7	9	89	
Aug., 1 st	2875	10	50	7	3	30	17	16	133	
2 nd	5375	21	41	0	0	23	38	21	144	
3 rd	70455	147	89	0	0	178	388	38	840	
4 th	2200	7	5	0	0	18	6	3	39	
Sep., 1 st	5050	41	27	5	0	63	70	9	215	
2 nd	752	57	25	2	0	42	18	5	149	
3 rd	960	36	4	0	0	25	14	4	83	
4 th	959	15	40	0	0	6	0	2	63	
5 th	-	-	-	-	-	-	-	-	-	
Total	89454	338	310	27	3	415	558	107	1758	
Predators:										
prey ratio									1:50.88	

/ 525 aphids, in the first week of August at means of 26.6°C and 62.6% RH. Then, its number slightly increased, recording the second peak, 47 individuals/ 59050 aphids, in the fourth week of August coincided with the first peak of aphids, whereas the means of temperature and relative humidity were 27.5°C and 60.4% RH. Afterwards, the abundance of *S. interruptus* deceased to reach its minimal value, five predators / 6440 aphids, in the third week of September at means of 24.0°C and 54.9% RH. The maximum monthly total count of the predator, 93, was found during August, followed by that of 65 individuals in September and only 11 individuals during July.

The weekly fluctuations of the predator in the second season (Table 5) showed similar trend as in the first one, whereas three peaks were recorded. The first one, 30 predators/ 2875 aphids, took place in the first week of August at means of 33.3°C and 60.0%RH . The second peak, 178 predators/ 70455 aphids, occurred in the third week of August at means of 31.3°C and 59.4%RH. The predators attained the third peak, 63 individuals / 5050 aphids in the first week of September at means of 30.6°C and 58.6% RH. It also, could be noticed that the peaks of

this predator were synchronized with that of the aphids.

In this respect, different findings were obtained by several workers owing to the host plants, prey species and sowing dates as follow: Azab *et al.* (1965) reported that *Scymnus* spp. were found very active on *A. gossypii* infesting cotton plants in July and August, and the peak of activity was synchronized with the peak of aphid infestation. Youssef (1990) mentioned that *S. interruptus* occupied the fourth category among the predators during the period of aphid infestation on maize. Ahmed (2000) stated that the highest number of *Scymnus* spp. in June maize plantation was 12-31 individuals/ plant, while they were 5-44.5 predators/ plant in July plantation.

***Orius* spp. (*Orius laevigatus* Fieb. and *Orius albidipennis* (Reut.))**

In the first season (Table 4), the first appearance of *Orius* spp. was detected in the first week of August, with four individuals /525 aphids at means of 26.6°C and 62.6% RH. Their population increased gradually, reaching a peak of 68 predators/ 59050 aphids in the fourth week of August at mean of 27.5°C and 60.4%RH. After that, the population fluctuated between three and 12

individuals during September. The maximum monthly total count, 95 predators, was recorded during August, followed by 30 individuals in September. Early of the season, July, no predators could be detected.

Orius spp. in the second season (Table 5) started to appear two weeks early with four individuals, increased gradually to reach their first and highest peak, 147 predators/ 70455 aphids, in the third week of August synchronized with the first peak of aphids, whereas the means of temperature and relative humidity were 31.3 and 59.4% RH, respectively. The second peak, 57 predators/ 752 aphids, was observed in the second week of September at means of 31.0°C and 57.5% RH. The maximum monthly total count, 185 predators, was detected during August, followed by 149 predators during September and only four individuals during July.

El-Heneidy and Abbas (1984) revealed that *Orius* spp. in maize fields occurred mainly in September and October. The present results are in agreement with those of Youssef (1990) who reported that *Orius* spp. were the most dominant predators on maize plants during the period of maximum levels infestation for *R. maidis*, third and fourth weeks of August and first week of

September. Also, the obtained results are in harmony with those of Ahmed (2000) who mentioned that *Orius* spp. ranged between 3.6-3.9 bugs/ plant in June maize plantation. Tawfik and EL-Husseini (2000) indicated that the aphids infesting corn plants are checked by several predaceous species. Among these species, are nymphs and adults of the anthocorids, *Orius albidipennis* and *O. laevigatus*.

Chrysoperla carnea (Steph.)

As shown in Table 4, in the first season the predator was detected through the period from the third week of July to the last week of September. *C. carnea* showed three peaks of activity. The first one, nine predators/ 525 aphids, was in the first week of August at means of 26.6°C and 62.6% RH. The second peak, 30 predators/ 59050 aphids, took place in the fourth week of August at means of 27.5°C and 60.4% RH. The third one, 22 predators/ 6440 aphids, occurred in the third week of September at means of 24.0°C and 54.9%RH. The maximum total monthly count of the predator, 74 individuals, was found during September.

In the second season (Table 5), four peaks of abundance were found. The first one, 50 individuals/ 2875 aphids, took place in the first week of August at

means of 33.3°C and 60.0% RH. The second peak, 89 predators / 70455 aphids, occurred in the third week of August at means of 31.3°C and 59.47% RH. The third peak, 27 predators/ 5050 aphids, was detected in the first week of September at means of 30.6°C and 58.6% RH. The last one, 40 predators/595 aphids, was recorded in the fourth week of September at means of 24.3°C and 63.2% RH. The maximum total monthly count, 185 predators, was obtained during August.

These findings are in agreement with those of Youssef (1990) who stated that the peaks of *C. carnea* activity occurred during the third and fourth weeks of August and the first week of September. Also, the present results are in accordance with those of Ismail *et al.* (1996) who indicated that *C. carnea* and *R. maidis* have harmonious correlation on maize. Ahmed (2000) mentioned that *C. carnea* in June maize plantation reached 2.6-3.8 larvae / plant and the predator population was coincided with aphid population to reach 4.75 -5.15 larvae / plant in July plantation.

Total number of predaceous species in relation to aphids infestation

As seen from data obtained in Table 4, the initial aphids

infestation in the first season was recorded in the third week of July. The highest count of the predators was detected in the fourth week of August, with maximum value of 375 predators, synchronized with the first peak of aphids, 59050 aphids/10 tassels, at means of 27.5°C and 60.4% RH. The maximum monthly total number, 558 predators, was recorded during August, followed by 348 predators during September. The minimal value, 24 predators, was obtained during July.

In the second season of study, data presented in Table 5, reveal that the predaceous insects began to appear in the third week of July and synchronized with the first aphids infestation with count of three predators/ 17 aphids at means of 30.6°C and 62.1%RH. The number of the predators increased gradually, reaching its first peak in the third week of August synchronized with the first peak of aphids, 840 predators/ 70455 aphids, at means of 31.3°C and 59.4% RH. Also, the second peak of the predators was synchronized with the second peak of the aphids in the first week of September, with value of 215 predators 5050 aphids at means of 30.6°C and 58.6% RH. The maximum monthly predators count, 1156 predators, was observed during August, followed by 510 individuals during

September. The minimal value, 82 predators, was recorded during July.

Statistical analysis (Table 2) showed that there was high significant differences ($t=3.2^{**}$) between mean numbers of predators during both seasons of study.

Metwally (1967) in Egypt, indicated that the peaks of the predators was associated with the activity of corn borers and *R. maidis* in maize fields. He also found that the peak of *Orius* spp., *Scymnus* spp. and *C. undecimpunctata* together, 1270 individuals / 100 plants, was during the fourth week of September. This population of predators was in coincident with an obvious decrease in the aphid population.

Grigorov (1982) observed a clear correlation between aphids on cereal crops and their predators, which indicated the positive effect of the predators in regulation of the aphids populations. El-Heneidy and Abbas (1984) revealed that the number of insect predators in maize fields were lowest in September, while *Paederus alfieri* (Koch.) dominated in August, *Orius* spp. and *C. undecimpunctata* occurred mainly in September and October. Youssef (1990) mentioned that the most abundant predators during the period of

maximum infestation levels for *R. maidis* on maize plants, third and fourth weeks of August and first week of September, were *P. alfieri* and *Orius* spp., followed by *C. undecimpunctata*, *Scymnus interruptus* and finally *C. carnea*.

Ismail *et al.* (1996) mentioned that there was high and positive correlation between the fluctuations in the population of aphids and fluctuations in the population of aphidophagous insect predators. Ahmed (2000) revealed that the peaks of high populations of different predaceous insects on maize plants were found in association with peaks of high abundance of certain pests including *R. maidis*. Tawfik and El-Husseini (2002) indicated that the aphids infesting maize plants are checked by several predaceous species.

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من النجيليات على الذرة والحشرات المفترسة المرتبطة به

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أجريت تلك الدراسة بهدف حصر ودراسة الوفرة الموسمية لأنواع من النجيليات التي تصيب الذرة الشامية والحشرات المفترسة المرتبطة به خلال موسمى ١٩٩٧ و ١٩٩٨ بقرية ميت العز بمنطقة فاقوس - محافظة الشرقية .

وقد لخصت النتائج كما يلى :

١- يصيب الذرة نوعان من من النجيليات هما (*Rhopalosiphum maidis* (Fitch)

Rhopalosiphum padi (Linnaeus)

٢- من النجيليات يصيب الذرة من الأسبوع الثالث من يوليو حتى نهاية سبتمبر فى الموسمين . أزداد تعداد المن تدريجياً مسجلاً أعلى ذروات وبأعداد ٥٩٠٥٠ ، ٧٠٤٥٥ فرد / أ عينة (١٠ نورات مذكرة) فى الأسبوعين الرابع والثالث من أغسطس فى الموسمين الأول والثانى على التوالى .

٣- سجلت عشرة أنواع تتبع أربعة رتب وخمسة عائلات كمفترسات حشرية مرتبطة بالمن . احتلت الأنواع التابعة لرتبة ذات الجناحين المرتبة الأولى ممثلة ٥٠،٦٥ ، ٣٧،٨٣ % من كل المفترسات المسجلة خلال الموسمين الأول والثانى على التوالى . وشملت الأنواع التابعة لرتبة غمدية الأجنحة للمرتبة الثانية ممثلة ٢٠،٨٦ ، ٢٥،٣١ % من التعداد الكلى للمفترسات خلال موسمى الدراسة على التوالى . من بين كل الأنواع المسجلة ، احتل المفترس (*Metasyrphus corollae* (Fabr.) المرتبة الأولى ، تلاه *Scymnus Chrysoperla carnea* (Steph.) ، *interruptus* (Goeze)

٤- المفترسات التابعة لعائلة *Syrphidae* وصلت إلى أعلى قيم لها وبأعداد ٢٠٠ مفترس/ ٥٩٠٥٠ فرد من و ٣٨٨ مفترس / ٧٠٤٥٥ فرد من فى الأسبوعين الرابع والثالث من أغسطس خلال موسمى الدراسة الأول والثانى على التوالى . أوضح المفترس *S. interruptus* أعلى قيم له وبأعداد ٤٧ فرد / ٥٩٠٥٠ ضحية و ١٧٨ مفترس / فرد من فى الأسبوعين الرابع والثالث من أغسطس خلال الموسمين الأول والثانى على التوالى . سجل النوعان التابعان للجنس *Orius* أعلى ذروات وبأعداد ٦٨ مفترس / ٥٩٠٥٠ ضحية و ١٤٧ مفترس / ٧٠٤٥٥ فرد من فى الأسبوعين الرابع والثالث من أغسطس خلال موسمى الدراسة على التوالى . أوضح نشاط المفترس *C. carnea* أعلى ذروات وبأعداد ٣٠ و ٨٩ مفترس / ٥٩٠٥٠ و ٧٠٤٥٥ فرد من فى الأسبوعين الرابع والثالث من أغسطس فى موسمى الدراسة على التوالى . بوجه عام سجل أعلى تعداد كلى لجميع المفترسات فى الأسبوعين الرابع والثالث من أغسطس خلال موسمى الدراسة على التوالى، وكان ذلك متزامناً مع أعلى تعداد للمن . كان متوسط نسب المفترسات إلى المن ١ : ١١٠،٠٧ ، ١ : ٥٠،٨٨ فى الموسمين الأول والثانى على التوالى .