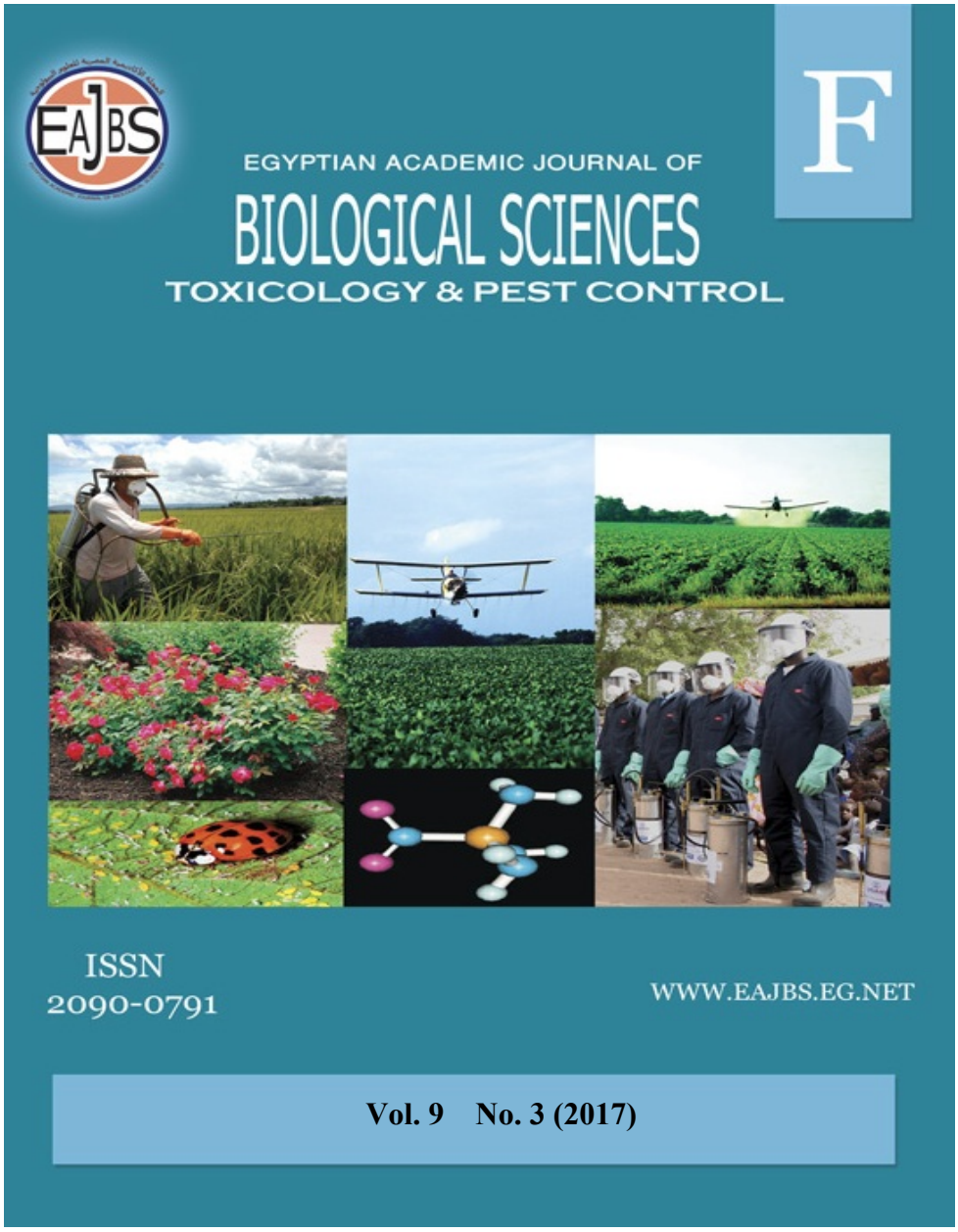

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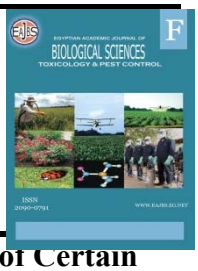
Egypt. Acad. J. Biolog. Sci., 9(3): 17-30 (2017)

Egyptian Academic Journal of Biological Sciences
F. Toxicology & Pest control
SSN: 2090 - 0791
www.eajbs.eg.net



The Role of Predators Insects in Regulating Population Densities of Certain Piercing Sucking Pests on Squash Plants in Egypt

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ARTICLE INFO

Article History
Received: 25/8/2017
Accepted: 10/11/2017

Key words:
Aphid
Whitefly
Thrips
Predators

ABSTRACT

Studies were carried out at Diarb Negim, Sharkia governorate during two successive seasons 2014-2015 and 2015-2016. Obtained results showed that in autumn plantation, there were two peaks of *Aphis gossypii* (Glover) on squash plants, one peak at last week of November and other at third week of December in 2014 season. On the other hand, *Bemisia tabci* (Genn.) had three peaks, in second week of November, first week of December and third week of December in 2014 season and two peaks of infestation in fourth week of November and December in 2015 season of autumn plantation while, three peaks in summer plantation were obtained on fourth week of (April &May) and second week of June in 2015 season respectively. Investigation revealed that, squash plants infested by few numbers of thrips during autumn plantation throughout the two seasons. Statistical analysis of the obtained data cleared highly negative correlation between aphid &whitefly and temperature in autumn plantation in both seasons. Also, the mean R.H showed a positive significant correlation on population density of *A. gossypii* in second season 2015 of autumn plantation. In summer plantation, the minimum R.H% showed a negative correlation with *Orius* spp. population and a positive significant correlation with *C. carnea* population in the first season 2015. The predaceous insects found associated with pericing sucking pests were *Orius* spp., *Coccinella undecimpuncta* L., *Chrysoperla carnea* Steph., *Metasyrphus corolla* F. and few number of *Paederus alferii* (Koch) and true spider. The results revealed that *Orius* spp. had three peak in two season in autumn plantation, in first and third week of November, and third week of December in both seasons respectively. Meanwhile there was two peaks in first week of May and third week of June in 2015 season of summer plantation. *Chrysoperla carnea* had two peaks in autumn plantation during two seasons, third week of November, second week in December in 2014 and fourth week of November, third week of December in 2015 respectively. Also two peaks in summer plantation during 2015 season in first week of April and second week of June.

INTRODUCTION

The vegetable crops are a primarily main component of human daily meals. These crops are used, either fresh or after preparation. Cucurbitaceous vegetable plants are consumed the most important vegetable crops, which consumed indifferent ways as food in Egypt.

Squash is one of the most important cucurbitaceous vegetable cultivated in Egypt. It cultivated was increased during the past years especially in new reclaimed land for local consumption and exportation .cucurbitaceous vegetable plants are subjected to attack by numerous insect pests through the growing season (El-Maghraby, *et al.* 1989 and El-Lakwah *et al*. 2011). Squash is consider very important crops from either, the fresh consumption .therefore , this crop was chosen as experimental crops in this investigation .it is well known that insects especially piercing sucking one cause yield losses in vegetable crops as well as other crops. (Ali 1996, El-Khouly *et al*., 1998 and El-Lakwah *et al*. 2011). Therefore, technique for mass production of some predators may be relatively help in solving the problem of insect pests on squash and environment in Egypt. Therefore, the objective of the current study was to:

Survey of certain piercing-sucking pest and their predators infesting squash during two seasons 2015 and 2016.

Study the effect of certain weather factors on the seasonal abundance of the mainperts and its predators during two seasons.

Release the chrysopid, *Chrysoperla carnea* (larvae) for controlling cotton aphid, *Aphid gossypii* (Glover) on squash.

MATERIALS AND METHODS

The present investigation was carried out at fields of (Diarb Negim) district Sharkia Governorate during 2014/2015 and 2015/2016 seasons.

Survey and population density of piercing sucking pests and their predators on squash.

Surveying major piercing sucking pests and their beneficial insects in the vegetable crop squash district during the successive growing seasons 2014 and 2015 on squash (summer and autumn). The cultivated area was half feddan in both season 2014 and 2015 . The sowing date was 4st of October in the first season, while it was 10th of October in the second season. Seeds were sown in rows, the distance between the hills was about 30cm, normal agricultural practice were followed. Sampling started after about two weeks from planting and continued to the harvesting time, the Size sample were 60 leave from squash choose randomly from plants early in morning before the whitefly adults tend to be more active. Direct count of adults of injurious insects and predators on squash. It was necessary to use one sampling method for all groups such as leaves sampling plant method in order to explain the relationship between pests and their associated natural enemies especially insect predators. Samples of 60 leaves of squash from 15 plants were done weekly in some few cases , picked up randomly and placed in paper bags to be examined carefully under microscope. The number of insect pests and predators in most cases were directly counted.

Study the effect of certain weather factors on the population density of the piercing sucking pests and their predators on squash:

To study the effect of certain weather conditions on the population density of the predators and its associated pests, the daily minimum, maximum and mean temperature and mean relative humidity were obtained from the Meteorological station, at Zagazig region. The correlation coefficient between weather parameters and the number of predators and its associated pests. Also, the numerical relation among these variables was calculated for the key weather factors, using regression coefficient (Fisher 1950).

Release of *Chrysoperla carnea* steph. (Neuroptera: chrysopidae) larvae to control aphid *Aphis gossypii* on squash:

In this experiment the second larval instar of C. *carnea* was released in caged

squash plant with previously artificially infested with *Aphis gossypii*. The experiment was carried at Diarb-Negim district, Zagazig governarte 2014-2015 season.

Experimental technique:

After appearance the plant, fifteen squash and cucumber ones, one plant-pot, were caged with wooden cage of 50× 50× 100 cm covered with muslin cloth. These plants were artificially infested with *A. gossypii* which collected from the field. The infested plants were followed until the population of the *A. gossypii* increased .Each plant was infested with 20 aphid adults. The second larval instar of *C. carnea* were released in all treatments. The releasing ratios as obtained 1:100, 1:150 and 1:200 predator: prey. Each treatment was represented by 5 plants, replicates. The corresponding control for each treatment, 5 replicates, were kept free from releasing and the number of aphid was exacted after removing the exceeding ones. The reduction percentage in aphids mean numbers were calculated according to Abbott's formula (1925).

$$\%R = \frac{Control - Treatment}{Control} \times 100$$

RESULTS AND DISCUSSION

Seasonal abundance of the insect pests infesting squash plants:

The seasonal abundance of the dominant insect pests infesting squash and cucumber plants were Aphid (*A. gossypii*), whitefly (*Bemisia tabaci*), thrips (*Thrips tabaci*) and few number of Jassids and *Nezra virdula* F.

Population density of insect pests and associated predators on squash plant cultivated in Diarb-Negme.

As seen from Table (1) in autumn season the percentage in fertation of whitefly was 77.4% and 37.62% during autumn seasons of 2014 and 2015, respectively , followed by aphid 22.2% and 62.25% while thrips 0.37% and 0.13%. Meanwhile in summer it's were 53.77% and 31.1 (whitefly), 31.07% and 51.74% (thrips) and 15.5% and 17.45% (aphid) during summer seasons of 2015 and 2016 Table (1).

Table 1: Mean numbers of different insect pests and the associated insect predators associated with Squash Cultivated at Diarb -Nigm distriin during 2014 and 2016 and 2016.

Insect Pests and Predators	Autumn season 2014		Summer season 2015		Autumn season 2015		Summer season 2016	
	No	%	No	%	No	%	No	%
Insect Pests								
Aphis gosypii	152.54	22.22	66.37	15.51	502.76	62.25	9.18	17.45
Thrips tabaci	2.52	0.37	131.52	30.72	1.03	0.13	28.93	51.47
Bemisia Tabaci	531.54	77.42	230.2	53.77	303.85	37.62	17.47	31.07
Total	686.6	100%	428.09	100%	807.64	100%	56.21	100%
Insect Predators								
Orius spp	228	50.67	437	69.25	80	18.18	166	52.87
Chrysoperla carnea	190	42.22	50	7.92	151	34.31	28	8.92
Metasyrphas corollae	15	3.33	90	14.22	87.05	19.78	22	7.016
C. undecimpunctata	17	3.78	54	8.54	122	27.72	98	31.21
Total	450	100%	631	100%	440.05	100%	314	100%

Results given in Table (1) show clearly that the number of *Orius* spp was the highest and represented by (50.67 and 18.18%) from the total number of insect predators during autumn seasons of 2014 and 2015, respective. *C. carnea* came in

the second rank after *Orius* spp during autumn season (42.22% and 34.31%).followed by *Coccinela* spp. 3.78 and 27.72% and *M. corollae* were represented 3.33% and 19.78% from total number of insect predators. In the summer season of 2015, results given in Table (1) show that *Orius* spp. Were the highest (69.25%) followed by *M. corollae* (14.22%) then *coccinella* spp. (8.54%), and (7.92%) for *C. carnea* of the total number of insect predators for *S. corollae*.

Autumn plantation season

Aphids (*A. gossypii*)

The data illustrated in Figs. (1and2) showed that infestation of *A. gossypii* were stated on 23 October (1.54 and 0.12 nymph/ leaf in both years 2014 and 2015 respectively. It was increased sharply to reach its maximum (37.5 and 167.89 nymph/ leaf) in two years respectively. In the First season of Study, autumn plantation of 2014, the respective two peaks of activity were 20.3 and 26.9 nymph in the last week of November mean temp. 17.33°C and R. H. 63.77% and 3rd week of December (Fig. 1). In 2015 season, the aphid began to appear early in squash (0.12 nymph and adults/ leaf) on October 28 and gradually increased to reach the maximum (167.89 nymphs and adults / leaf) on December16.

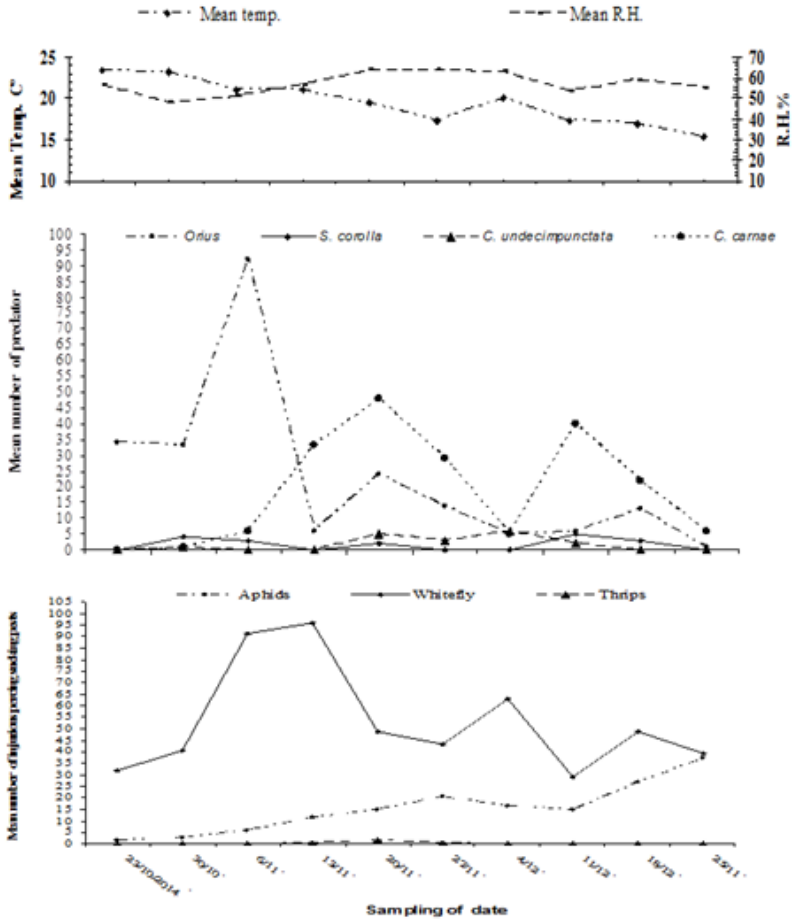

Fig. 1: Seasonal abundances of certain insects and their associated predators on squash plants in autumn plantation season of 2014at Diarb - Nigm district, sharkia Governorate.

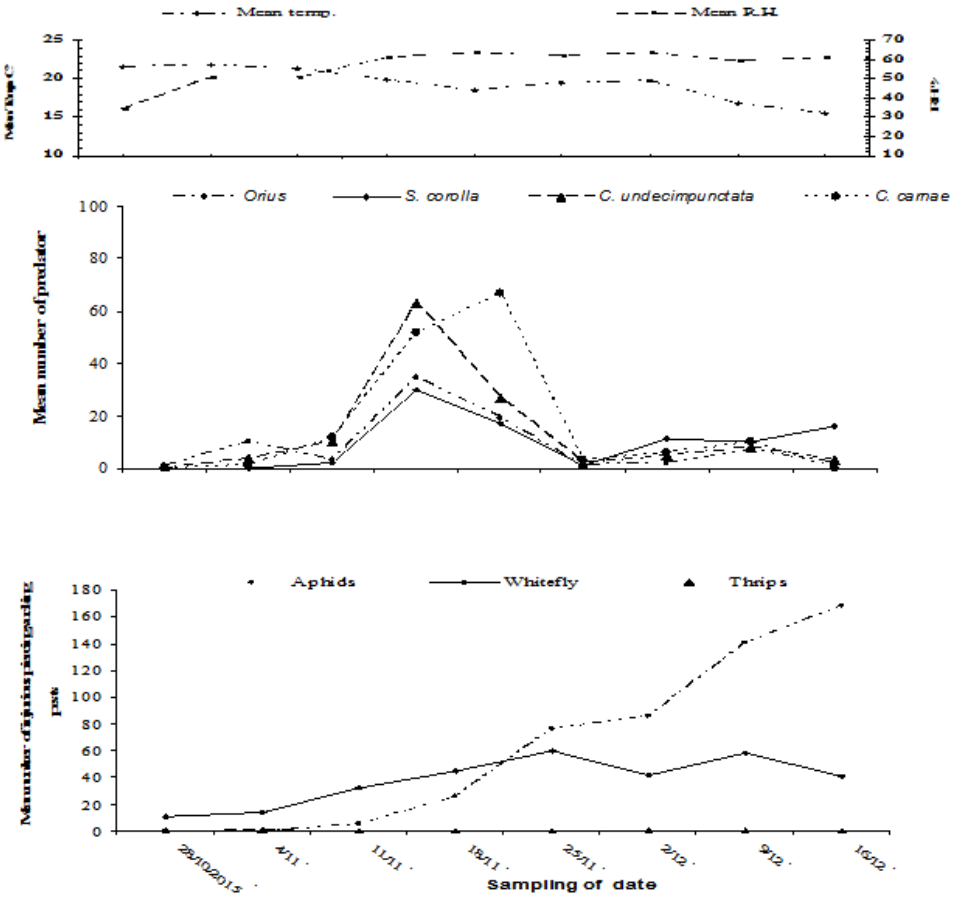

Fig. 2: Seasonal abundances of certain insects and their associated predators on squash plants in autumn plantation season of 2015 at Diarb - Nigm district, sharkia Governorate

***Bemisia tabaci*:**

The Following results deal with the changes in the population densities of different stages of whitefly sampled by direct counting in squash field during 2014 and 2015 autumn season. The obtained data are summarized in Figs. (1and 2). In 2014 season the whitefly began to appear on October 23 on squash. It was found three peaks of infestation were recorded, on November 13 (95.8 individuals/ leaf); December 4 (62.9 individuals/ leaf) and December 18 (48.6 individuals/ leaf). In 2015 season, the whitefly began to appear early on October 28 (11.28 individuals/ leaf) and its population gradually increased to reach the maximum (60.12 individuals/ leaf) at last week of November. Two peaks of infestation were obtained on November 25 and second week of December (60.12 and 58.06 individuals / leaf respectively). Fig. (2).

Thrips, *Thrips tabaci*:

The obtained data are summarizedin graphically illustrated in Figs. (1and 2). In 2014 season, the thrips began to appear early on October 30 (0.18 individuals/ leaf) and its population gradually increased to reach the maximum (1.62 individuals /leaf) on November 20 Fig. (1). Data presented in Fig. (2) showed the weekly population trend of *T. tabaci* infesting squash during 2015 season. The weekly population trend of *T. tabaci* indicated that the pest appeared on the low numbers at the beginning of November (0.43 individuals/ leaf) and then low numbers decreased gradually until middle of December. Abdallah *et al*. (2012) studied that effect of some biological and biochemical control against certain squash pests, *Thrips tabaci* Lind, *A. gossypii* and *B. tabaci* the reduction of the insect species under chemical control

was 25.14% as an average, while it was 11.53% as an average in case of biological control treatments.

Summer plantation season:

Aphids (*A. gossypii*), Data presented in Fig. (3) Show weekly counts of mean numbers of *A. gossypii* began to appear on April 16 (22.1 individuals/ leaf) and its population gradually decreased to reach the minimum (0.63 individuals/leaf) in the first season 2015.

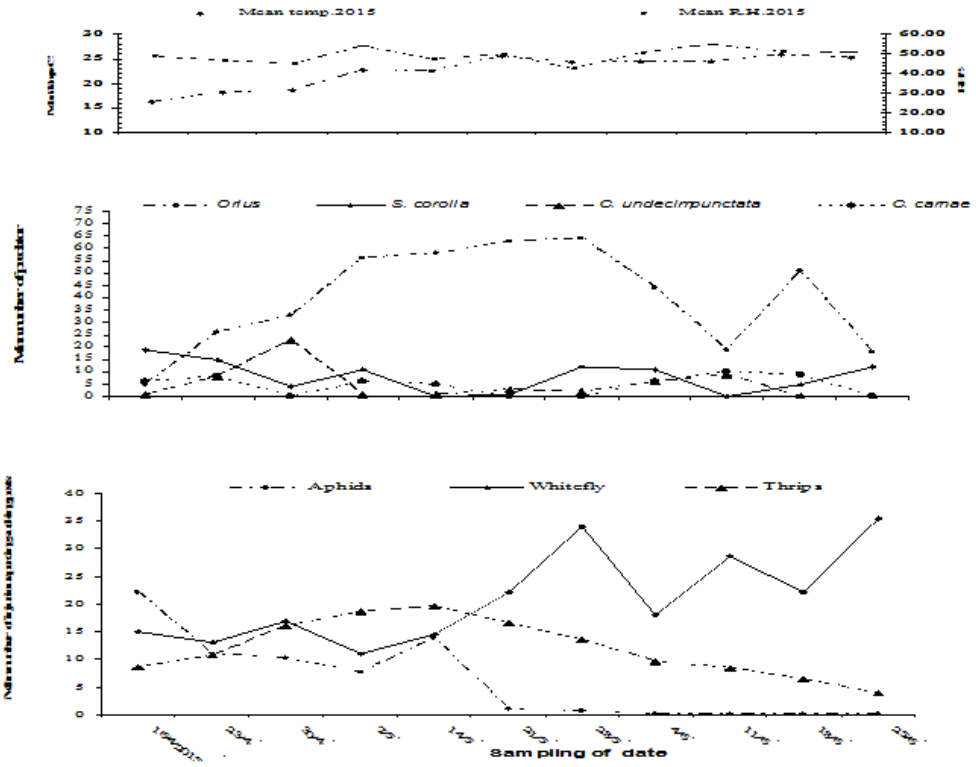

Fig. 3: Seasonal abundances of certain insects and their associated predators on squash plants in summer plantation season of 2015 at Diarb - Nigm district, sharkia Governorate.

In 2016 season, the infestation of *A. gossypii* were stated on 22 April (2.08 individuals/ leaf) and its population gradually increased to reach the maximum (3.2 individuals/ leaf) Fig. (4).

While fly (*Bemisia tabaci*). In 2015 season whitefly began to appear on 22 April (15 individuals/ leaf) and its population gradually increased to reach the maximum (35.4 individuals/leaf). Three peaks of infestation were obtained on April 30, May 28 and June 11 (16.8, 43 and 28.6 individuals/ leaf) respectively. Fig. (3). In 2016 season, whitefly started to appear with very few numbers at the beginning of April, 22 (0.07 individuals/ leaf) and then increased to reach the peak (2.57 individuals/ leaf) on second week of June Fig. (4).

Thrips, *Thrips tabaci*, As shown in Fig. (3), the thrips began to appear on April, 16 (8.60 individuals/ leaf) and its population gradually increased to reach the maximum (19.6 individuals /leaf) in the first season, 2015. In 2016 season, the weekly population trend of *T. tabaci* indicated that the pest appeared on the low numbers at the beginning of (0.13 individuals /leaf) on April 22 and its population gradually increased to reach the maximum (10.02 individuals/ leaf) on

May 13 Fig. (4). Similar findings were reported by El-Sharkawy (1989and1996); Hegab-Ola (1997 and 2001) and Abdel-Samed (1999 and 2005) which greatly correspond with the present results.

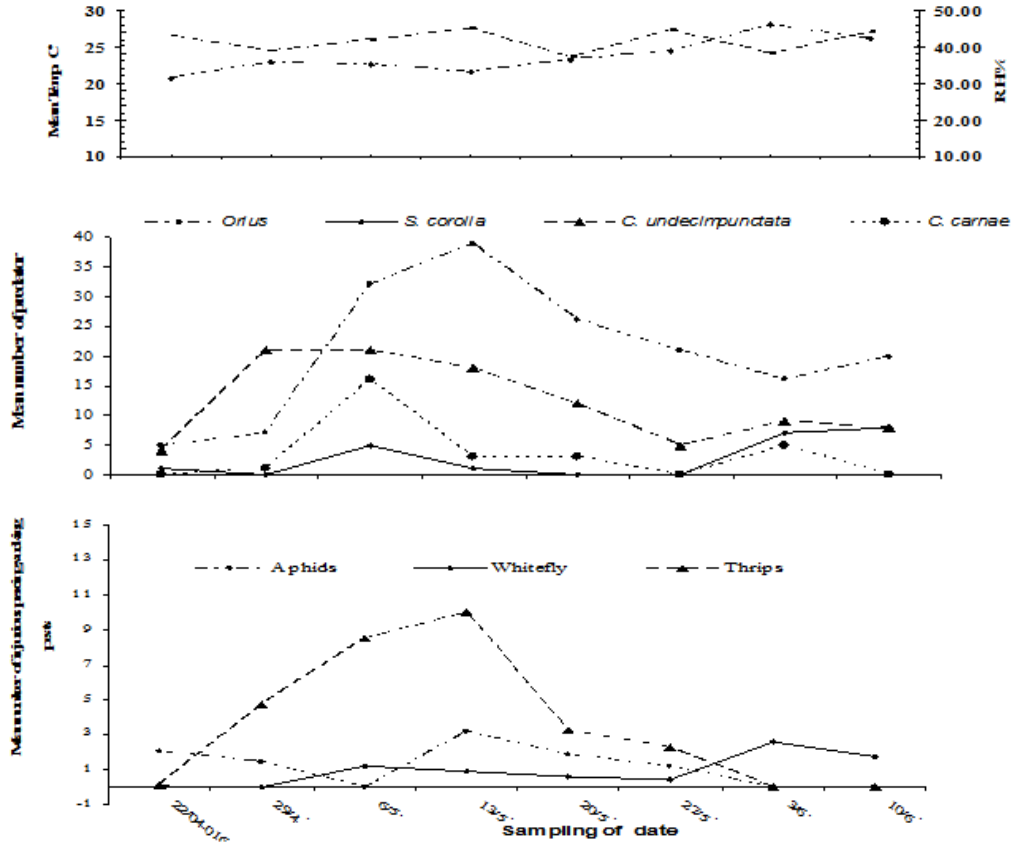

Fig. 4: Seasonal abundances of certain insects and their associated predators on squash plants in summer plantation season of 2016 at Diarb - Nigm district, sharkia Governorate.

Seasonal abundance of predators associated with pests infesting squash at Diarb Neigm district.

Catches of predatory species revealed the following species: *Orius* spp., *Metasyrphus corollae, Coccinella undecimpuncatata, Chrysoperla carenea* and few numbers of *Paederus alfierii* and true spiders on squash.

Autumn plantation.

***Orius* spp.**

Data in Fig. (1) show that the initial number of *Orius* spp. In 2014 season occurred in last week of October with a total number of 34 adult/ 60 leaves. Three peaks of activity were recorded at the first week of November, thrid week of November and third week of December (92, 24 and 13 individuals). (1). In 2015 season, the initial number of anthocorids began to appear in the last week of October (one individuals/ 60 leaves). Anthocorids number increased gradually, reaching their maximum (35 individuals / 60 leaves) Fig. (2). Also, three peaks of activity was recorded in the November 4, November 18 and December 16 (10, 35 and 7 individuals) respectively.

Metasrphs corollae:

As recorded in Fig. (1), the initial number of *Melasyrphus corollae* in the autumn season of 2014 began to appear in the first sample in last week of October (4 individuals/ 60 leaves). Its increased gradually, reaching their maximum (5 individuals/ 60 leaves) In 2015 season, the initial number of *M. corollae* were stated on second week of November (2individuals/ 60 leaves) and its increased

until reaching their maximum (30 individuals / 60 leaves) in Fig. (2).

***Coccinella undecimpunctata*:**

In 2014 season, *C. undecimpunctata* adults began to appear on squash on October 30 (one adult\ 60 leaves). It's increased until reaching their maximum (5 individuals/ 60 leaves) Fig. (1). As showed in Fig. (2), obtained data proved that the initial number of *C. undecimpunctata* were stated on November 4, (4 adult/ 60 leaves). Two peak of activity was recorded at the third week of November and December (63 and 8 individuals). Natural enemies may be very effective against melon aphid, including ladybirds and hoverflies. Under the influence of natural enemies the aphid populations increase only by fraction of their potential rates, in field experiments (Frazer 1988, Stary 1998).

***Chrysoperla carnea*:**

Data given in Fig. (1) showed that initial number of *C. carnea* in 2014 season occurred in October 30 (one individual/ 60 leaves). Two peaks was recorded at the November 20 and December 11, (48 and 40 individuals/ 60 leaves). In 2015 season, initial number of *C. carnea* appears in November 4 (one individuals/ 60 leaves). Also Two peaks was recorded at the November 25 and December 16 (67 and 10 individuals/ 60 leaves) Fig. (2). *Chrysoperla carnea* used against several pests on various vegetable corps, most of which were carried out in greenhouses. This predator has been mainly used against aphid, where the lacewing can be transferred to the greenhouse either as eggs or as second instar larvae (El Arnaouty *et al*., 1993).

Summer plantation.

***Orius* spp.**

Data given in Fig. (3), in summer plantation of 2015 season , the number of *Orius s*pp. Took place in the 3rd week of April (5 individuals/ 60 leaves). Two peaks of activity recorded in 4th week of May and 3rd week of June (64 and 51 individuals) respectively. In 2016 season, the number of *Orius* spp. Took place in the 4th week of April (5 individuals/ 60 leaves).its increased to reach their maximum in the 2nd week of May (39 individuals/ 60 leaves) Fig. (4).

***Metasyrphus corolla*:**

In 2015 season the *M. corolla* began to appear on squash plant in 3rd week of April (19 individual /60 leaves). Two peaks of Activity was recorded at 1st week of May and 4th week of May (11 and 12 individuals / 60 leaves) Fig. (3).

The obtained data are summarized in graphically illustrated. Fig. (4). In 2016 season, *M. corollae* began to appear in 4th week of April (one individuals/60 leaves) and its increased to reach their maximum in 2nd June (8 individuals/ 60 leaves).

***Coccinella undecimpunctata*:**

Data given in Fig. (3) Showed that initial number of *C. undecimpunctata* in 2015 season occurred in 3rd week of April (one individuals/ 60 leaves) and its reach their maximum in 4th week of April (23 individuals/ 60 leaves) In 2016 season, the dense population of *C. undecimpunctata*) was recorded on 4th week on April (one individual/ 60 leaves) and increased to reach their maximum 1st week may (21 individuals/ 60 leaves). On peak of activity was recorded at the first week of June (9 individuals/ 60 leaves). Fig. (4). Al-Allan *et al*. (2004) Stated that aphidophagous coccinellids play an important natural role in regulating and suppressing the population of their potential preys principally aphid species.

Chrysoperla carnea

Data presented in Fig. (3) Showed that the initial number of *C. carnea* in 2015 season occurred in 3rd week of April with a total (number of 6 individuals/ 60 leaves. Two peak of activity was recorded in 4th week of April and 2nd week of June (8 and 10 individuals). In 2016 season, the dense population of *C. carnea* was recorded on 4th of April (one individuals/ 60 leaves). Its increased to reach their maximum in 1st week of May (16 individuals/ 60 leaves) Fig. (4). The

efficacy of lacewings depended on the data of the first release, and the larvae needed to be present before the first winged aphid (Collet *et al*., 1998). El Arnaouty and Gamal (1998), reported that the use of *C. carnea* realeasded either at the egg or larval stage for several subsequent weeks, gave good results for the control of aphid pests on cotton.

Effect of weather factors on the population density of insects pests and their predators at Diarb Nigm.

Autumn plantation seasonPests:

On *A. gossypii*: Temperature (min. Temp. °C, max Temp. °C and mean Temp. °C) cleared a highly negative significant correlation with population of *A. gossypii* on squash during the two seasons 2014 and 2015 (r= -0.8499, -0.8579, -0.9189 and -0.8767, -0.9264, -0.8567) respectively (Table 2).

On *B. tabaci*: Minimum and mean temperature cleared a negative significant correlation (r= -0.7612 and -0.6652) and highly negative significant correlation (r = -0.7798) between Maximum temperature and population density of *B. tabaci* in 2015 season. Meanwhile Temperature and relative humidity showed insignificant correlation in first season with *B. tabaci* Table (2).

On *T. tabaci,* the temperature (min. Temp°C, max. Temp°C and max. Temp°C) showed an insignificant correlation in the first season .The maximum R.H. showed a negative significant correlation (r=- 0.6433) in the second season in 2015 Table (2).

El-Naggar *et al*. (2006) found that the effect of temperature on the adult stage of jassids and whiteflies was positive and insignificantly, while it was negative and insignificantly on immature stage of whiteflies during 2003 and 2004 seasons.

Table 2: Simple correlation between insect pests and climatic Factors on "Squash" during" Autumn" season of 2014 and 2015 at Diarb Nigm district.

Variable	Insect pests (Autumn Season)					
	2014			2015		
Source	***A. gossypii***	***B. tabaci***	***T. tabaci***	***A. gossypii***	***B. Tabaci***	***T. tabaci***
Min. Temp	-0.8499**	0.0862	0.01487	-0.8767**	-0.7612*	0.2979
Max. Temp	-0.8579**	0.1319	0.0014	-0.9264**	-0.7798**	0.5349
Mean Temp	-0.9189**	0.2478	-0.0062	-0.8567**	-0.6652*	0.3316
Min R.H	0.3377	-0.2528	0.6566*	0.0303	0.5308	-0.4166
Max R.H	0.0355	0.14839	0.3741	0.6743*	0.5379	-0.6433*
Mean R.H	0.3627	-0.0333	0.4997	0.6368*	0.8802**	-0.2048

*=Significant Ns= not Significant

Predators:

On *Orius* spp. The minimum temperature showed a positive insignificant correlation (r= 0.4331 and 0.1399) in the two season 2014 and 2015 effect (r= 0.1399) in the second season of the study. Table (3).The minimum R.H. showed a negative insignificant correlation (r=-0.4221) in the first season in 2014 and a positive insignificant effect (r= 0.2511) in the second season in 2015 of the study.

On *C. undecimpunctata*: The maximum and mean R.H. showed a positive significant correlation (r=0.5603 and 0.6596) in the first season in 2014 and 2015 Table (3).

On *C. carnea*: The maximum temperature showed a negative insignificant correlation in both season (r= -0.3477 and -0.0638) in the second season of the study Table (3).

The present results came in the same line with Ibrahim (2005) who mentioned that the correlation coefficient between temperature variables and *C. carnea* numbers were significant during 2002 and 2003. Moreover, R.H. variables showed insignificant effect on this insect population, except the effect of the maximum R.H. in 2003 was significant.

Table 3: Simple correlation between insect pests and climatic Factors on "Squash" during" Autumn" season of 2014 and 2015 at Diarb Nigm district.

Variable	Insect pests							
	2014				2015			
Source	*M. corolla*	*C. undecim punctota*	*c.carnea*	*orius* spp	*M. corolla*	*C. undecim punctota*	*c.carnea*	*orius* spp
Min. Temp	0.1768	-0.1348	-0.3986	0.4331	-0.3631	0.0223	-0.0492	0.1399
Max. Temp	0.2195	0.0722	0.3477	0.5079*	-0.4768*	-0.0455	-0.0638	0.0823
Mean Temp	0.01055	-0.0792	-0.3938	0.4757	-0.4682	-0.0721	-0.0853	0.0277
Min R.H	-0.4561*	0.4308	0.5654*	-0.4221	0.5541	0.3084*	0.4769*	0.2511*
Max R.H	-0.401	0.5603*	0.1101	-0.1539	0.0773	0.1357	0.0454	0.01049
Mean R.H	-0.5638**	0.6596*	0.4521	-0.4366	0.5777*	0.3672	0.3952	0.3022

*=Significant Ns= not Significant

On *M. corollae*: The mean R.H. showed negative highly a significant correlation (r= -0.5638) in the first season in 2014 and a positive an significant effect (r= 0.5777) in the second season in 2015 of the study Table (3).

The correlation between the number of *P. alfierii* and *Orius* sp. with the mean relative humidity, was positive significant (0.5999 and 0.6970 respectively) in the first season, meanwhile it was highly positive significant correlation with *Scymnus* sp. and *C. vicina isis* in the first season, respectively Ali *et al*. 2013). These results are in general agreed with those of Hassanein *et al.,* (1992) and El-Maghraby *et al.,* (2008).

Summer plantation season

Pests

On A. *gossypii*: The minimum and maximum temperature showed a positive significant correlation (r= 0.7036 and 0.71008) in the first season 2015 bul the minimum temperature in 2016 season cleared a negative significant correlation (r =-0.7154) Table (4). The mean temperature showed a highly negative significant correlation (r= -0.8853) in the first season and a negative significant effect (r= -0.5211) in the second season of the study Table (4).

On *B. tabacii:* The temperature (min Temp and max temp) showed a positive significant correlation (r= 0.5381, 0.4644, 0.5958 and 0.5275) in both seasons and a highly positive an significant effect (r= -0.8442) in the second season of the study Table (4).

Table 4: Simple correlation between insect pests and climatic Factors on "Squash" during" Summer" season of 2015 and 2016 at Diarb -Nigm district.

Variable	Insect pests					
	2015			2016		
Source	***A. gossypii***	***B. Tabaci***	***T. tabaci***	***A. gossypii***	***B. Tabaci***	***T. tabaci***
Min. Temp	0.704*	0.538*	-0.173	-0.715*	0.596*	-0.002
Max. Temp	0.71*	0.464*	0.086	-0.343	0.528*	-0.295
Mean Temp	-0.885**	0.583*	-0.135	-0.521*	0.844**	-0.53*
Min R.H	-0.482	0.402	-0.632*	-0.432	-0.146	0.105
Max R.H	0.062	-0.483	0.2	0.6*	-0.449	0.309
Mean R.H	-0.247	-0.049	-0.266	-0.09	-0.113	0.193

*=Significant Ns= not Significant

Pred On *T. tabaci*: The mean temperature showed negative significant correlation (r=-0.5299) in the sec and season and negative insignificant effect (r= -0.1347) in the second first of the study Table (4). The minimum R.H. showed a negative significant correlation (r= -0.6317) in the first season in 2015 and a positive insignificant effect (r= 0.1048) in the second season in 2016 of the study Table (4). Generally, from the previous results, the following conclusion could be discussed as follows: the temperature had positive effects with all insects, because the temperature effect on developmental rate, activity, dispersal and immigration, also the temperature effect on size and length of the plant (Ewin and Heins 1995), so if the area leaf (food of insects) decrease the total number of insects will be decrease as a results. One the other hand mean relative humidity has little effects.

pators

On *Orius* spp.: The minimum, maximum and mean temperature showed a positive significant correlation (r=0.4663, 0.6785 and 0.5370) in the first second. The minimum R. H%, showed a negative insignificant correlation (r= -0.3079) in the first season in 2015 and a positive significant effect (r= 0.4634) in the second season in 2016 of the study Table (5).

On *C. undecimpunctata*: The mean temperature showed a negative insignificant correlation (r=-0.3978) in the first season and a negative significant effect (r=0.4878) in the second season of the study Table (5).

On *C. carnea:* The minimum R.H. showed a positive significant correlation (r= 0.5159) in the first season in 2015 and a negative significant effect (r= -0.4533) in the second season in 2016 of the study Table (5).

On *M. corollae*: The (min., max, and mean) temperature showed a negative significant correlation (r= -0.4998, 0.5791 and - 0.4939) in the first season and a positive significant effect (r= 0.5964 and 0.6941) with (min and mean Temp) in the second season of the study Table (5).

Table 5: Simple correlation between insect pests and climatic Factors on "Squash" during " Summer" season of 2015 and 2016 at Diarb Nigm district.

Variable	Insect pests							
	2015				2016			
Source	***M. corollae***	***C. undecimpunctata***	***C. carnea***	***Orius* spp**	***M. corollae***	***C. undecimpunctata***	***C. carnea***	***Orius* spp**
Min. Temp	-0.4998	-0.3918	0.0639	0.4663*	0.5964*	0.0194	-0.0719	0.44077
Max. Temp	-0.5791*	-0.3025	-0.2199	0.6785*	0.3856	-0.2578	-0.3848	0.01162
Mean Temp	-0.4939*	-0.3978	-0.0971	0.537*	0.6941*	-0.4878*	-0.1646	-0.2891
Min R.H	-0.1583	-0.3017	0.5159*	-0.3079	0.0037	-0.1678	-0.4533*	0.46341*
Max R.H	-0.2232	-0.1584	0.4698	0.0493	-0.2921	0.0524	-0.0387	-0.0962
Mean R.H	-0.1745	-0.2991	0.5375	-0.2074	0.0349	-0.2287	-0.1619	0.3121

These results are in agreement with those of Hassanein *et al.* (1992) and El-Maghraby *et al.* (1989) who showed that values of explained variance by three metrological factors show that the considered factors have played a conspicuous role in detecting the activity of cucurbits insect pests and predators during the afore mentioned investigated seasons, these results ensure that the tested metrological factors play a great role in regulation the population density and seasonal abundance of such predators.

Release of second instar larvae of *C. carnea* for controling *Aphis gossypii* in Squash cages.

The 2nd instar larvae of *C. carnea* were released at 3 ratios after 14 days from artificially infested leaves of squash with *A. gossypii* (Table 6). One day later after predator release, different populations of *A. gossypii* were estimated in all cages, as the number of aphid averaged 100,150,200,72.6,110.6,and 167.4 aphid in control cage, and in cages received 1:100,1:150 and 1:200 larva aphid, respectively (Table 6). Two days after predator release, results demonstrated that the mean number of aphids reached 47.2, 81.6 and 99.0 Aphid/ cage treated with *C. carnea* at rates of 1:100, 1:150, and 1:200 (larvae / aphid), respectively, compared to 115,165 and 215 aphid/ cage in the control, respectively.

Table 6: Efficiency of releasing 2nd instar larvae of *C. carnea* on squash plants for control *Aphis gossypii* population in field cages.

	Release ratios of 2nd instar larvae of C. *carnea* on larva: of Aphid								
	One predator larva: 100 Aphid			One predator larva: 150 Aphid			One predator larva: 200 Aphid		
Date of inspection after	**No of Aphid in control**	**No of Aphid in treatment**	**% Reduction**	**No of Aphid in control**	**No of Aphid in treatment**	**% Reduction**	**No of Aphid in control**	**No of Aphid in treatment**	**% Reduction**
after 24 h.	100	72.6	27.4	150	110.6	26.26	200	167.4	16.3
after 48 h.	115	47.2	58.95	165	81.6	50.54	215	99.0	53.95
after 72 h.	145	31.0	78.62	180	45.2	74.89	230	70.1	69.52
After 96h.	185	13.0	92.97	195	28.5	85.38	245	47.2	80.73
Mean	136.25	40.95	64.49	172.5	66.48	59.27	222.5	95.93	55.13

Thus indicating reduction% in cucumber infestation due to releasing the 2nd instar larvae of *C. carnea* by 58.95% after releasing 1:100 (larvae: aphid) in cage and by 50.54and 53.95% after releasing of 1:150 and 1:200 larvae :aphid, respectively. The mean number of *A. gossypii* increased after three days to 145, 180 and 230 in control cages opposed to 31.0, 45.2 and 70.1 aphid in the three cages in which 1:100, 1:150 and 1:200 (larvae/ aphid) were released, respectively, indicating 78.62, 74.89 and 69.52 reductions due to treatment than control, respectively.

Four days after release, the mean counts of aphids became 13.0, 28.5 and 47.2 individuals / plant at rates of 1:100, 1:150 and 1:200 larvae: aphid, respectively, opposed to 185,195 and 245 individuals / plant in control. However, the reduction percentages were 92.97, 85.38 and 80.73% in cages received 1:100, 1:150 and 1:200 predaceous larvae: aphid, respectively.

The present results are in harmony with those of Hanafy (2004), found that releasing *C. carnea* 2nd instar larvae, at a rate of 9 larvae / plant gave the best results of bio-control of aphids infesting cucumber plants in the field, as it caused 92.32% as overall mean reduction percentage in aphids population after 21 days of release, followed by releasing 3 and 6 larvae / plant which suppressed the population by 81.86 and 80% respectively. Younes *et al*. (2012) found that the best results were obtained after 21 days from releasing date at the rate of 5 predatory larvae / plant however, these larvae reduced populations of aphids by 73.9%.

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RABIC SUMMERY

دور الحشرات المفترسة فى مكافحة بعض الحشرات الثاقبة الماصة التى تصيب نباتات الكوسة فى مصر

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تمت هذه الدراسة فى منطقة ديرب نجم – محافظة الشرقية خلال موسمى الدراسة (٢٠١٤-٢٠١٥ ، ٢٠١٥-٢٠١٦). واظهرت النتائج فى عروة الخريف ان لحشرة من القطن قمتين نشاط فى الاسبوع الاخير من نوفمر والاسبوع الثالث من ديسمبر خلال الموسم الاول ٢٠١٤ بينما كان لتعداد الذبابة البيضاء ثلاث قمم نشاط فى الاسبوع الثانى من نوفمبر والاسبوع الاول من ديسمبر خلال عام ٢٠١٤ بالاضافة الى قمتين نشاط للذبابة البيضاء فى الاسبوع الرابع من نوفمبر وديسمبر خلال عام ٢٠١٥ فى عروة الخريف بينما وجد لها ثلاث قمم نشاط فى العروة الصيفية فى الاسبوع الرابع من ابريل ومايو والاسبوع الثانى من يونيو خلال عام ٢٠١٥ على التولى واوضحت النتائج ان حشرة التربس تصيب نباتات الكوسة باعداد منخفضة خلال عروة الخريف خلال موسمى الدراسة. وبينت نتائج التحليل الاحصائى للنتائج وجود ارتباط معنوى عالى سالب بين الكثافة العددية لمن القطن والذبابة البيضاء ودرجات الحرارة فى عروة الخريف خلال موسمى الدراسة.وبينت نتائج التحليل الاحصائى وجود ارتباط معنوى عالى سالب بين الكثافة العددية لمن القطن والذبابة البيضاء ودرجات الحرارة فى عروة الخريف خلال موسمى الدراسة. بالاضافة الى وجود ارتباط معنوى موجب بين تعداد من القطن والرطوبة النسبية الصغرى فى عروة الخريف خلال موسم الدراسة الثانى ٢٠١٥. واظهرت النتائج فى العروة الصيفية ان لدرجة الرطوبة النسبية الصغرى ارتباط معنوى سالب على الكثافة العددية لبقة الاوريس وكذلك لدرجة الرطوبة النسبية الصغرى ارتباط معنوى موجب على الكثافة العددية لاسد المن فى موسم الدراسة الثانى ٢٠١٥ . ووجد ان المفترسات الحشرية التالية مصاحبة مع الحشرات الثاقبة الماصة التى تصيب نباتات الكوسة فى الحقل هى بقة الاوريس وابو العيد ذو احدى عشرة نقطة واسد المن وحشرة السيرفس بالاضافة الى اعداد قليلة من الحشرة الرواغة والعناكب الحقيقية واظهرت النتائج ان لبقة الاوريس ثلاث قمم نشاط فى عروة الخريف خلال موسمى الدراسة فى الاسبوع الثالث من نوفمبر وديسمبر خلال عام ٢٠١٤ والاسبوع الاول من نوفمبر والثالث من نوفمبر وديسمبر خلال عام ٢٠١٥ على التوالى بينما فى عروة الصيف وجد لبقة الاوريس قمتين نشاط فى الاسبوع الاول من مايو والاسبوع الثالث من يونيو خلال عام ٢٠١٥ ووجد لمفترس اسد المن قمتين نشاط فى عروة الخريف خلال موسمى الدراسة فى الاسبوع الثالث من نوفمبر والاسبوع الثانى من ديسمبر خلال عام عام ٢٠١٤ والاسبوع الرابع من نوفمبر والاسبوع الثالث من ديسمبر خلال عام ٢٠١٥ على التوالى. وايضا فى عروة الصيف كان لاسد المن قمتين نشاط خلال عام ٢٠١٥ فى الاسبوع الاول من ابريل الاسبوع الثانى من يونيو.