The Seasonal Activity of Oriental Hornet Vespa orientalis L. Attacking Honeybee Colonies in North Sinai Governorate.

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Abstract: The present work was concerned with studying seasonal abundance of the oriental hornet *Vespa orientalis* in North Sinai Governorate especially in Al-Arish and Rafah districts. The oriental hornet *Vespa orientalis* was not found in January, February and March and it started to appear in April in the two locations. Activity of the oriental hornet *Vespa orientalis* reached its peak during (October 2006 and September 2007) in Al-Arish district and during (November 2006 and October 2007) in Rafah districts.

Keywords: The oriental hornet *Vespa orientalis,* abundance, population density.

INTRODUCTION

Honeybee *Apis mellifera* have numerous serious pests such as: bee wolf *Philanthus triangulm*, the greater wax worm *Galleria mellonella*, and bee lice *Braula coeca*. The oriental hornet *Vespa orientalis* L. is one of these pests which attacking honeybee apiaries causing serious damages.

In Suez Canal area, the first appearance of the hornet was in April, 1989 and reached its peak during the period from August to September, while in 1990, the first appearance was in May, reached its peak during September. On the other hand the highest number of hornets during 1989, was 36 in the third week of August, while in 1990, the maximum number of attracted hornets was 40 in the second week of September, the total number of hornets was 263 and 238 in 1989 & 1990, respectively. (Sallam, 1992)

The changes in the seasonal activity of the oriental wasp population; trap types were used for trapping wasps. Ahmed (1999) compared between fermented sugar, fresh honey, fermented dead bees, fresh animal lung and fresh fish as bait for trapping wasps. The mean number of attracted hornet visiting those bait in descending order were fresh fish (88.33±3.03/h.) animal lung (83.00±3.21/ h.) fresh honey (65.33±5.36), fermented sugar (43.67±4.91) then dead bees (26.67±3.18) in 1995 season. While in 1996 season, the fermented baits were as follows: animal lung (77.00±0.11/h.), fresh honey (52.33±1.45/h.), fermented sugar (43.00±1.15) then dead bees (26.33±3.76).

The use of developed sticky trap, situated at Zagazig and El-Mullack districts, Sharkia governorate during 1999 season. Obtained results revealed that *V orientalis* adults started to appear in the beginning of March, but in few numbers. Thereafter, a gradual increase was took place up to mid June at the two districts. A distinct increase in the number of captured wasps was then noticed until recording the maximum rate of occurrence during the first period of September at El-Mullack followed by gradual decrease and disappeared at the end of December. For Zagazig district, the highest rate of occurrence, was recorded during the 1st period of July, followed by the three peaks during the 4th period of August, the 3rd period of September and the 1st period of November, then a sharp decrease was observed until the 4th period of December after which the wasps disappeared entirely. (Khater *et al.*, 2001)

Using liquid culture of yeast *(Candida tropicalis)* as bait to capture the oriental wasp by using the modified traps recommended by Ministry of Agriculture in Dirut, Assiut governorate. The wasps started to appear in the first week of April and gradually decreased to the minimum levels during June (late spring) and July (earlier summer). The activity of wasps increased gradually from the second week of August to the fourth week of September. Total number of wasps reached the highest values in October followed by September and November. Also using 100% of freshly prepared yeast liquid culture, the highest mean number of oriental wasps were captured after 24 hr. and 7 days during the active period of wasps (September, October and November). (Gomaa and Abd EL-Wahab, 2006)

Bacandritsos *et al.* (2006) compared three improved types of traps (wood - glue, plastic bottle, double chamber) in combination with two different animal baits (fish and meat) in order to control the populations of the wasps in apiaries, during summers from 2001 to 2004. Trapped wasps were collected and the bait was replaced three times per week. The obtained results showed that use of the wood-glue trap in combination with fish as a bait was a reliable solution for controlling the wasps in apiaries.

For catching wasps, *Vespa orientalis*, 5 attractive materials were used during the period from August up to December, 2004, and the highest rate of caught wasps was in October, November and December, while the lowest one was in August and September. Varroazal recorded the highest mean of attraction (282.4), followed by fermented sugar solution (206.2), normal sugar solution (150.4), Tuna fish (105.2), then pollen supplements (64.8). (Abd EL-Fatah, 2007)

EL-Hady (2008) showed that, the oriental wasp (*Vespa orientalis)* was not found in January, February and March in the two locations. It appeared from April (6.66 and 12.33) and increased gradually up to October (51.60 and 90.30) then decreased during winter months November and December (15.60 and 28.30) in EL-Mehalla EL-Kobra and Moshtohor, respectively.

MATERIALS AND METHODS

The present paper throws alight on the seasonal activity of oriental hornet *Vespa orientalis* L. in Al-Arish and Rafah apiaries, North Sinai Governorate. This work was conducted during two successive years; 2006-2007 to study the abundance of oriental hornet *V. orientalis* L. The locations, sampling and used techniques were as the following:

One Abou El-Enain modified trap (Abou El-Enain, 1999) was placed in each apiary during the two successive years (2006 and 2007). The traps (Fig. 1) were checked weekly for the presence or absence of the hornets. The hornets were collected and spread over a white piece of paper for counting.

Description of the trap:

It was started by a bottomless Langestroth hive with two chambers (Fig. 1) the lower chamber contained old wax combs full with honey or sugar syrup as baits.

1- Queen excluder.
2- Empty hive chamber.
3- Wire screen cone.
4- Wooden roof.
5- Hive chamber containing bait combs.
6- A screw nail for fixing the queen excluder.
7- Hive stand.

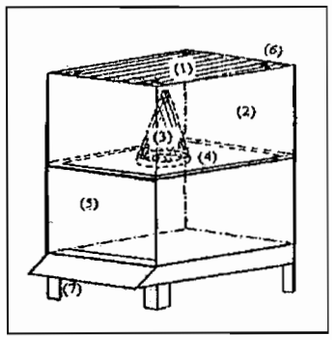

Fig. (1):Abou El-Enain modified trap 1st model.

Meteorological Data :

Meteorological data were obtained from the Central Agency for Public Mobilization and Statistics annual book for Al-Arish and from the Desert Research Center (about 12Kms from Rafah apiary).

Statistical Analysis :

Data were statistically analyzed by using a randomized complete block design (RCBD) in factorial arrangement according to (Snedecore and Cocheran, 1990) by using SPSS computer program V.10 (1999). For mean separations, least significant differences (L.S.D, Duncan,1955) was used.

RESULTS AND DISCUSSION

In Al-Arish apiary:

Results in Table (1) and fig. (2) show the highest monthly number of *V. orientalis* during the first year which was (31) occurred during October 2006 while during the second year it was (12) in September 2007. On the other hand, the lowest number (6) was recorded during April 2006, and (4) during April and November 2007.

During 2006 the maximum average numbers were (7.75 and 2.0) during October and September at temperatures (23.49 and 26.46°C) and relative humidity of (79.53 and 83.37% R.H.), respectively. On the other hand, the minimum average numbers were (1.75 and 1.50) in November and April when the average temperature was (18.91 and 19.99°C), while the relative humidity average was (77.06 and 78.82% R.H.), respectively. The relatively high records of *Vespa orientalis* during 2006 due to the hornet's nest site which was 20 meter far from the apiary.

The statistical analysis of the data showed highly significant difference between the total weekly numbers of the hornet caught during 2006.The L.S.D value (2.14) emphasizes the obtained results.

In 2007, the highest average numbers were recorded during September and October (3.0 and 2.0) when the average temperature was (25.15 and 22.7°C) and the relative humidity was (72% R.H.), while the lowest recorded average number was (1.0) during each of April and November at (18.85, 19.00°C) and (66 and 72% R.H.), respectively.

The statistical analysis of the data showed highly significant difference between the

total weekly numbers of the hornet caught during 2007. The L.S.D value (1.88)

emphasizes the obtained results.

Analysis of the data in relation to meteorological records revealed a positive effect of temperature on the average numbers of V. *orientalis* (r = 0.450), also a positive effect of relative humidity on the same numbers (r = 0.490) during 2006,while in 2007 records revealed a positive effect of temperature on the average numbers of *V. orientalis* (r = 0.104), and a negative effect of relative humidity on the same numbers (r = - 0.706).

In Rafah apiary:

Results in Table (2) and Fig. (3) show the highest monthly number of *V. orientalis* was (4) occurred during November 2006 while during the second year it was (5) in September 2007. On the other hand, the lowest number (2) was recorded during October 2006 and during November 2007.

During 2006 the maximum average numbers were (1.0 and 0.75) during April and November at temperatures of (18.24 and 17.64°C) and relative humidity of (93.70 and 89.30% R.H.), respectively. The minimum average number on the other hand, was (0.5) in October when the average temperature was (22.92°C), while the average relative humidity was (91.67% RH).

The statistical analysis of the data showed highly significant difference between the total weekly numbers of the hornets caught during 2006.The L.S.D value (0.57) emphasizes the obtained results.

In 2007, the highest average number was recorded during October (1.25) at the average temperature (23.21°C) when the relative humidity (99.06% R.H.), while the lowest recorded average number was (0.75) during November at the average temperature (18.81°C) and relative humidity (93.32% R.H.).

The statistical analysis of the data showed highly significant difference between the total weekly numbers

of the hornets caught during 2007.The L.S.D value (0.74) emphasizes the obtained results.

Analysis of the data in relation to meteorological records revealed a positive effect of temperature on the average numbers of *V. orientalis* (r = 0.516), and a positive effect of relative humidity on the same numbers (r = 0.548) during 2006, while in 2007 records revealed a positive effect of temperature on the average numbers of *V. orientalis* (r = 0.068), and a positive effect of relative humidity on the same numbers (r = 0.001).

Generally speaking, it could be stated that in 2006 and 2007 the hornet first appearance in April at the both apiaries. The total number of hornets was (46) and (9) during 2006, while it was (24) and (12) during 2007 in Al-Arish and Rafah apiaries respectively.

Hornets were seen allover late-spring and summer in Al-Arish city markets specially on fish, meat, date palm fruits and in garbage baskets but, in few numbers. Hornets nests rarely were found near apiaries because of the lack of food and habitat, in relation to food, there is no care with date palms pollination procedure because most of people attempt to get rid of date palms for construction purposes.

And in relation to the habitat, houses which were made of clay were rarely found in Al-Arish and Rafah city and it's owners are always ready to control the hornets if its appeared, hornets only appear in the deserted clay houses which were very few.

Table (1): Monthly abundance of Oriental hornet *Vespa orientalis* during 2006 and 2007 years in Al-Arish apiary (Mean numbers of trapped hornets±SE)

Month	2006				2007			
	No. of Hornet	Mean No. of hornets	Mean °C	Mean RH	No. of Hornet	Mean No. of hornets	Mean °C	Mean RH
January	0	0	13.74	80.35	0	0	13.25	72.00
February	0	0	14.82	81.30	0	0	13.70	70.00
March	0	0	17.07	74.63	0	0	15.55	70.00
April	6	1.50±0.87	19.99	78.82	4	1.00±0.58	18.85	66.00
May	0	0	21.03	82.77	0	0	21.25	68.00
June	0	0	24.79	83.32	0	0	24.25	70.00
July	0	0	30.03	83.39	0	0	26.35	71.00
August	0	0	27.54	84.87	0	0	26.60	73.00
September	8	2.00±1.41	26.46	83.37	12	3.00±1.91	25.15	72.00
October	31	7.75±1.70	23.49	79.53	8	2.00±0.91	22.70	72.00
November	7	1.75±1.03	18.91	77.06	4	1.00±0.58	19.00	70.00
December	0	0	16.10	81.58	0	0	14.65	71.00
Total	52				28			
Mean		1.08				0.58		
F Value		8.99**				2.31**		
L.S.D at 0.05		2.14				1.88		

** Highly significant.

Table (2): Monthly abundance of Oriental hornet *Vespa orientalis* during 2006 and 2007 years in Rafah apiary (Mean numbers of trapped hornets±SE)

Month	2006				2007			
	No. of Hornet	Mean No. of hornets	Mean °C	Mean RH	No. of Hornet	Mean No. of hornets	Mean °C	Mean RH
January	0	0	12.86	93.54	0	0	12.22	97.78
February	0	0	13.93	92.46	0	0	13.77	97.51
March	0	0	15.51	90.24	0	0	15.19	94.09
April	3	0.75±0.48	18.24	93.70	4	1.00±0.41	17.72	95.61
May	0	0	20.17	98.14	0	0	21.41	96.05
June	0	0	23.71	98.03	0	0	23.61	98.12
July	0	0	25.58	97.97	0	0	26.04	99.24
August	0	0	26.20	99.05	0	0	26.45	99.55
September	0	0	25.68	93.65	0	0	25.53	93.38
October	2	0.50±0.29	22.92	91.67	5	1.25±0.63	23.21	99.06
November	4	1.00±0.41	17.64	89.30	3	0.75±0.48	18.81	93.32
December	0	0	13.33	88.50	0	0	14.38	94.16
Total	9				12			
Mean		0.19				0.25		
F Value		3.17**				3.27**		
L.S.D at 0.05		0.57				0.74		

** Highly significant.

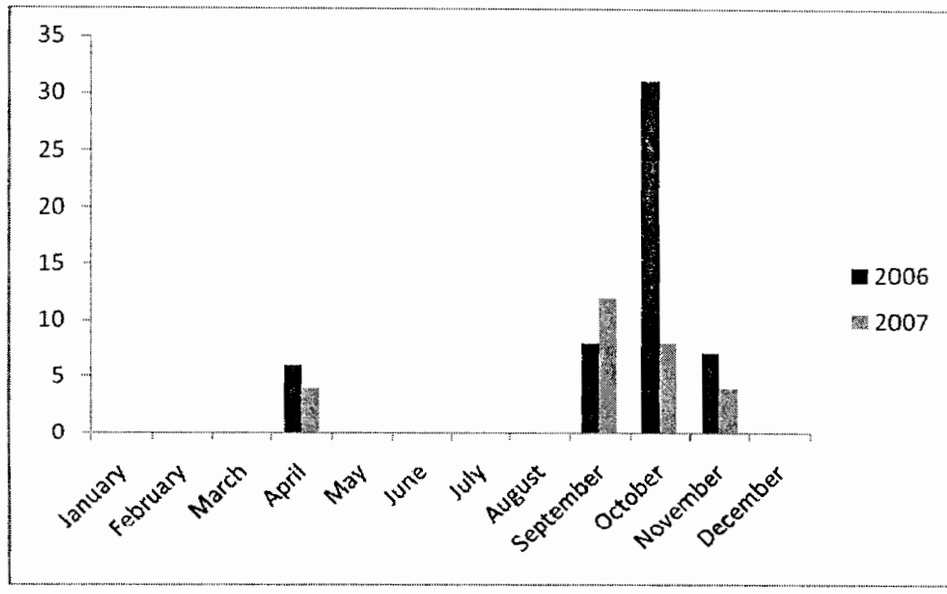

Fig. (2): Monthly abundance of Oriental hornet Vespa orientalis during 2006 and 2007 years in Al-Arish apiary.

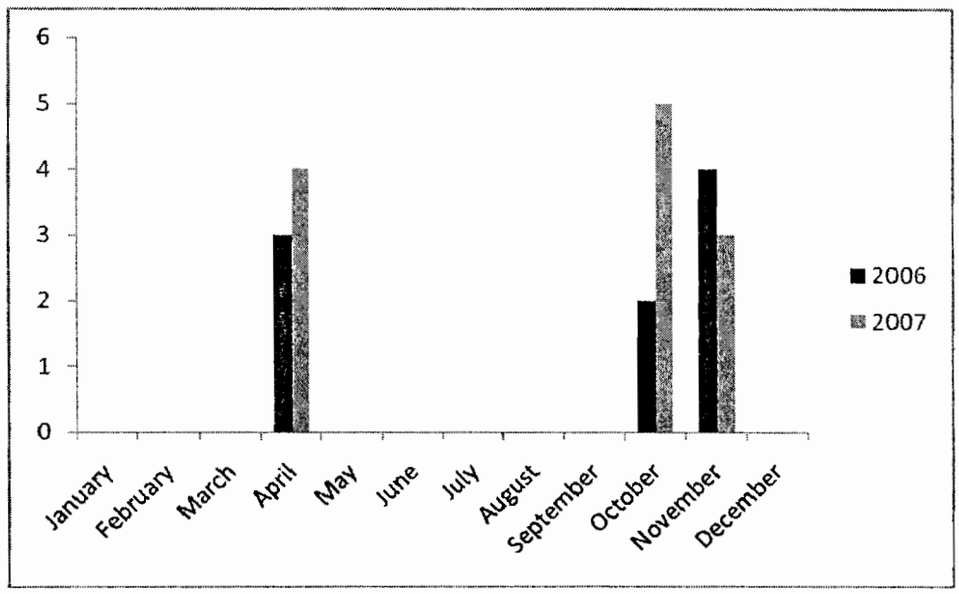

Fig. (3): Monthly abundance of Oriental hornet *Vespa orientalis* during 2006 and 2007 years in Rafah apiary.

Hornets were able to nest in an alternative nests made of bamboo in a roof in Al-Arish apiary instead of the usual clay nest but, in low density.

According to the fore-mentioned records of hornets, Oriental hornet *V. orientalis* reveals very low densities in both apiaries during 2006 and 2007 years, in a comparison with hornets trapped by Sallam (1992), Abou El-Enain (1999), Ahmed (1999) and Gomaa and Abd EL-Wahab (2006), the Oriental hornet *V. orientalis* should be considered a minor honeybee pest in North Sinai governorate.

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النشاط الموسميّ لدبور البلح المهاجم لطوائف نحل العسل في محافظة شمال سيناء

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أجريت هذه الدراسة بمنحلي كلية العلوم الزراعية البيئية بمدينتي العريش ورفح خلال الفترة من يناير ٢٠٠٦ وحتى ديسمبر ٢٠٠٧ بهدف دراسة التذبذبات العددية لدبور البلح ففي منحل الكلية بالعريش تم تسجيل أعلي تعداد لدبور البلح (٣١) خلال شهر أكتوبر لعام ٢٠٠٦ بينما في عام ٢٠٠٧ كان أعلي تعداد لدبور البلح (١٢) خلال شهر سبتمبر. وقد تم تسجيل أقل تعداد وكان (٦) خلال أبريل٢٠٠٦ و كان (٤) خلال أبريل ونوفمبر لعام ٢٠٠٧.أما في منحل الكلية بمدينة رفح فقد أظهرت النتائج أن أعلي تعداد لدبور البلح كان (٤) خلال شهر نوفمبر في عام ٢٠٠٦ بينما أعلي تعداد كان (٥) شهر خلال سبتمبر٢٠٠٧. وعلي الجانب الآخر، كان أقل تعداد لدبور البلح (٢) في شهر أكتوبر ٢٠٠٦و نوفمبر٢٠٠٧. ومن خلال هذه الأعداد يتضح أن تعداد دبور البلح منخفض للغاية ويمكن اعتباره آفة صغري لنحل العسل في محافظة شمال سيناء.