

THE SERIOUS EFFECT OF ORIENTAL HORNET *Vespa orientalis* L. ON HONEYBEE COLONIES IN GIZA REGION, EGYPT.

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ABSTRACT

The population fluctuation of oriental hornet during its active season (August-November) was weekly determined using modified screen trap fixed on empty brood box provided with some sealed honey combs for two successive seasons, 2007 and 2008. The obtained results revealed that the total numbers of trapped hornet were, 41242.5 individuals/trap and 9577.9 individuals/trap during 2007 and 2008 respectively. The highest mean numbers of hornet individuals was recorded during October, for the two studied seasons represented 41.9% and 65.7% of the total trapped hornets. The highest wiped out colonies due to direct attack of hornet was occurred during October (29.03 % & 17.65%) for the two observed years, respectively. The percentage of the total destroyed honeybee colonies during hornet active seasons were 45.16% and 35.29% of the total wiped out colonies during each year. Many of the survived colonies, after hornet active season, were weak and unable for wintering. The percentages of finished colonies from them were 5.65% and 2.94% as a latent negative effect of hornet. The percentage of total wiped out colonies were 50.81% and 38.24% for the two successive years in Giza region

INTRODUCTION

The oriental hornet, *Vespa orientalis* L. (supfamily Vespinae), is a predatory carnivorous insect present in south Europe, Asia and North Africa. It occurs wherever water and insect prey are available throughout the summer and autumn seasons. (Nicolaos *et al.*, 2006) stated that hornets mainly feed their brood with animal protein(insects, Pieces of meat) while the adults are fed with carbohydrates (nectar and ripe fruits). The hornet foragers are predacious on many insect species; however it prefers beehives as constitute places where they can find the best source of protein and carbohydrates. They often lay siege to the hive, enter and rob brood and honey, causing serious damage resulting destruction of the bee colony (De Jong , 1979, Edwards , 1980, Shoriet , 1998). Various studies has been done in Egypt on *V. orientalis* from different view point, i.e. ecology, biology, control and it's negative effect on apiculture (Wafa , 1956, Sharkawi , 1964, El- Deeb *et al* ,. 1965, Wafa *et al* ,. 1968) . Population dynamics of hornets are seasonally fluctuated according to several environmental factors (Sharkawi , 1964, Ahmed , 1999), where its activity is low in spring and early summer and then gradually increase during late summer and reach the highest peak of abundance during autumn season. However, by the beginning of November ,hornet numbers decline and disappeared by the second week of December (Ibrahim and mazed , 1967, Yousief- Khalil *et al.* ,2000 and Khater *et al.*, 2001).In spite of there were many indication concerning the serious injuries of hornets to honeybee colonies throughout numerous loss of them, a little critical evidences were represented in the literature (Ishay and Ikan,1968and

Donovan, 1992) about the number and percentage of the lost colonies by hornets or other wasps whether during the direct attack or after spent its active season.

Therefore this work aimed to study the abundant and fluctuation of oriental hornet population during active season through trapping as an indicator of seasonal dynamic at Giza region, Egypt. Also, the number of Wiped out colonies due the direct impact of hornet during active season (from August to November) and those Wiped out due latent negative effect of this enemy during wintering (December and January) were take inconsideration.

MATERIALS AND METHODS

1-Fluctuation of oriental hornet population during its active season:

To determine weekly population fluctuation of oriental hornet during its active season screened traps were used. Each trap was made of wooden bars and wire screen with diameters of 50 X 30 X 30 cm. The trap was placed on the top of open Langstroth brood box hold over hive stand. Eight traps each having 3 combs of capped honey or empty wax combs with sugar syrup were placed in the site of the experimental apiary. These traps established and baited from the first week of August until the last week of November through the two years of study due to the peak of activity of hornet. The hornets attracted and caught within the given traps were weekly collected and counted.

2- Wiped out honeybee colonies due to direct attack and latent negative effect of oriental hornet:

The number of wiped out honey bee colonies during the period from August to November (hornet active season) and during December and January (latent negative effect) was weekly recorded and calculated as a percentage of the initial started number before hornet appear for each season. All beekeeping ordinary procedures were done to investigate colonies including feeding, varroa control by Apistan strips from beginning of September and full wintering. 124 and 102 moderate colonies, (each had from 7-10 combs covered with bees and 4-7 brood combs) were observed during 2007 and 2008, respectively.

RESULTS AND DISCUSSION

1- Seasonal abundance of hornet population:

Weekly and monthly count of trapped hornets caught by traps in 2007 and 2008 are shown in Table (1). The total numbers of trapped hornet during 2007 were, (41242.5 individuals/trap) higher with about 4.3 times than those trapped during 2008, (9577.9 individual/trap). Gradual increase in hornet population was occurred in the following weeks by the first week of August to reach its climax (4725.1 and 1850 hornet/trap) in the second week of October of both 2007 and 2008 seasons, respectively. On the other hand, the numbers of trapped hornets were noticeably declined from the 3 rd. and 1 st. Week of November during the previous season respectively, Fig (1). The highest mean numbers of hornet individual was recorded during October, for the two studied seasons where represented 41.9% and 65.7% of the total trapped hornets, Fig (1)

Table (1): Weekly average no. of oriental hornet *V. orientalis* /trap during active seasons of 2007 and 2008.

Month	Week	Hornet average no./ trap			
		2007	%	2008	%
August	1 st week	311.5	0.76	0.0	0.00
	2 nd week	1252.2	3.04	15.0	0.16
	3 rd week	1801.5	4.37	112.0	1.17
	4 th week	2304.0	5.59	245.3	2.56
	Total	5669.3	13.75	372.3	3.89
September	1 st week	2393.2	5.80	412.0	4.30
	2 nd week	2953.1	7.16	645.3	6.74
	3 rd week	3061.1	7.42	637.3	6.65
	4 th week	2966.5	7.19	629.0	6.57
	Total	11373.9	27.58	2323.6	24.26
October	1 st week	3469.1	8.41	1059.0	11.06
	2 nd week	4725.1	11.46	1850.0	19.32
	3 rd week	4489.2	10.88	1787.0	18.66
	4 th week	4612.0	11.18	1600.0	16.71
	Total	17295.4	41.94	6296.0	65.73
November	1 st week	4663.9	11.31	431.0	4.50
	2 nd week	1760.0	4.27	87.0	0.91
	3 rd week	320.0	0.78	38.0	0.40
	4 th week	160.0	0.39	30.0	0.31
	Total	6903.9	16.74	586.0	6.12
Total		41242.5		9577.9	

F1

The obtained results indicated that the oriental hornet individuals started to appear in pronouncing figures in the apiaries of Giza region in the second half of summer season (August) during the two studied years. These numbers were exponentially increased throughout the followed month to reach the highest peak in the second week of October. These finding are confirmed by the previous reports, under the same circumstances of (Mollor, 1928, Wafa.,1956, wafa *et al.*, 1968 and Ibrahim & Mazeed, 1967). They stated that the population density of the oriental hornet, *V. orientalis* was very low during spring and early summer, then it gradually increased to attained its peak of abundance in September and October. In upper Egypt,(Ahmed, 1999 and Gomaa & Abd El-wahab, 2006) recorded the highest hornet population in the third week of October. Also , (Khater *et al.*, 2001 and El-Sherief, 2003) in lower Egypt demonstrated that the highest trapped numbers of hornet workers were recorded during September while the new generation of hornet queens was in a maximum account during October (Elbassiouny, 2007 and Abdel-Gahny *et al.*, 2008).

2- Seasonal number and percentage of wiped out colonies due to direct attack and negative latent effect of oriental hornet

The Weekly and monthly numbers and percentages of wiped out colonies whether due to direct attack of oriental hornets during its active season, which expanded from August to November or due to negative latent effect (December and January) are presented in Table (2) and Fig(2)

It is clear from results that the wiped out colonies during direct attack of hornet were gradually increased during hornet active season to reach the climax of destruction in the third week of October (14.52%) in 2007 and in the last week of October and first week of November (8.82%) in 2008. The highest destruction in honeybee colonies was occurred in October (29.03 % & 17.65%)for the two observed years, respectively, Table(2)

The exhausted colonies at the end of hornet active season can not continue through the unfavorable winter season, (December & January) and many of them were finished. The percentage of wiped out in this case were 5.65% and 2.94% for the two studied years, respectively. Therefore, the percentage of total wiped out colonies were 50.81% and 38.24% for the two successive years in Giza region, respectively, Fig (2).

The result of wiped out colonies appeared problematic and considerable damage to honeybee colonies in late summer, autumn and winter seasons under the circumstances of Giza governorate (middle Egypt). This serious wiped out may be due to that the honeybee colonies to be the best and preferable food source for the oriental hornet where it can be find the combination of animal protein (bees and immature stages) carbohydrate,(Ishay *et al.*, 1967 and Nicolaos *et al.*,2006) Beside, the hornet population are peaking for the season ,(Ifaantidis,2003 and wegner& Jordan,2005. Khater *et al.*, 2001). According to Shoriet, (1998), Edwards, (2008) and Pokhrel, (2008) the large hornet *V. Orientals* has caused serious damage to bee colonies. Hornets individuals are commonly attacking on the weak colonies and the damage is extended to the strengthen ones mostly causing a severely reduction in their adult population, (Akranakul, 1986; Ifantidis, 2003). Therefore, the obtained findings are in agreement with the

previous authors in the point of beekeeping industry in Egypt. It is necessary to find speed solution to district the great injury caused by this strong insect pest.

Table (2): Total numbers and percentages of wiped out honeybee colonies due to direct attack (during hornet active season) and latent negative effect (after hornet active season) of *V. orientalis* at Giza region during two successive seasons (2007 and 2008).

period			wiped out colonies during 2007		wiped out colonies during 2007		wiped out colonies during 2008	
			2007	2008	%	No.	%	No.
Wiped out During hornet active season	August	1 st week	102	124	0.00	0	0.00	0
		2 nd week			0.00	0	0.00	0
		3 rd week			1.61	2	0.00	0
		4 th week			0.81	1	0.00	0
		total			2.42	3	0.00	0
	September	1 st week			2.42	3	5.88	6
		2 nd week			0.00	0	0.00	0
		3 rd week			0.81	1	0.00	0
		4 th week			4.03	5	2.94	3
		total			7.26	9	8.82	9
	October	1 st week			3.23	4	2.94	3
		2 nd week			3.23	4	2.94	3
		3 rd week			14.52	18	2.94	3
		4 th week			8.06	10	8.82	9
		total			29.03	36	17.65	18
	November	1 st week			0.81	1	8.82	9
		2 nd week			2.42	3	0.00	0
		3 rd week			0.00	0	0.00	0
		4 th week			3.23	4	0.00	0
		total			6.45	8	8.82	9
Total wiped out					45.16	56	35.29	36
Wiped out due negative latent effect	December	1 st week			0.00	0	0.00	0
		2 nd week			0.00	0	0.00	0
		3 rd week			2.42	3	0.98	1
		4 th week			0.00	0	1.96	2
		total			2.42	3	2.94	3
	January	1 st week			0.00	0	0.00	0
		2 nd week			0.00	0	0.00	0
		3 rd week			2.42	3	0.00	0
		4 th week			0.81	1	0.00	0
		total			3.23	4	0.00	0
Total wiped out					5.65	7	2.94	3
Total wiped out due hornet attack					50.81	63	38.24	39

Fig2

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التأثير الضار للدبور الشرقي (*Vespa orientalis*) على طوائف نحل العسل في منطقة الجيزة, مصر

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أجرى هذا البحث بمنحى محطة التجارب الزراعية كلية الزراعة, جامعة القاهرة خلال موسمي نشاط الدبور في ٢٠٠٧-٢٠٠٨ وتناول النقطتين التاليتين:

١- تغيرات تعداد الدبور الشرقي خلال موسم النشاط (من أغسطس إلى نوفمبر) : استخدم في ذلك المصائد السلوكية المثبتة على صناديق خلايا فارغة و مزودة بأقراص عسلية أو أقراص مزودة بمحلول سكري كطعوم جاذبة للدبور. تم حصر أعداد الدبور المتجمعة داخل كل مصيدة (٨ مصائد بالمنحل) أسبوعيا و أتضح من هذا التعداد النتائج التالية:

أ- متوسط أعداد الدبور الكلية خلال السنة الأولى ٤٢٤٢,٥ دبور/ المصيدة بينما أنخفض العدد في السنة الثانية مسجلا ٩٥٧٧,٩ دبور/ المصيدة

ب- أعلى نسبة من أفراد الدبور داخل المصيدة سجلت خلال شهر أكتوبر خلال عامي الدراسة حيث كانت ٤١,٩% خلال الموسم الأول بينما ارتفعت في الموسم الثاني إلى ٦٥,٧%

٢- أعداد ونسبة الفقد في طوائف النحل خلال الهجوم المباشر و التأثير السلبي نتيجة التعرض لهجوم دبور البلح : تم تسجيل أعداد الطوائف التي أبيدت و قدرت نسبة الفقد في طوائف النحل خلال موسم نشاط الدبور (من أغسطس إلى نوفمبر) وكذلك نتيجة التأثير السلبي لهجوم الدبور (من ديسمبر حتى يناير) و أمكن التوصل إلى النتائج التالية:

أ- أعداد طوائف النحل المفقودة تزايدت تدريجيا خلال فترة نشاط الدبور لتصل لأعلى معدل لها خلال الأسبوع الثالث من شهر أكتوبر (١٤,٥٢%) في السنة الأولى و الأسبوع الأخير من شهر أكتوبر و الأسبوع الأول من شهر نوفمبر (٨,٨٢%) خلال السنة الثانية من الدراسة.

ب- معدل فقد الطوائف نتيجة التأثير السلبي لهجوم الدبور كان ٦٥.٥% و ٢,٩٤% للسنة الأولى و الثانية من الدراسة على التوالي

ج- نسبة الفقد الكلية لطوائف النحل بلغت ٥٠,٨١% و ٣٨,٢٤% خلال عامي الدراسة في منطقة الجيزة على التوالي. مما سبق تتضح مدى خطورة هذه الآفة الحشرية على تقدم و ازدهار النحالة خاصة في تلك المرحلة من العام والتي تستفيد فيها الطوائف لقضاء فترة الشتاء ويلزم البحث السريع عن وسائل فعالة لتقليل الضرر الاقتصادي الناجمة عن هذه الآفة للنحالة المصرية.



