

SEASONAL FLUCTUATION OF THE ORIENTAL WASP *Vespa orientalis* L.,(HYMENOPTERA: VESPIDAE) AND EFFICIENCY OF STICKY TRAPS AS A TOOL FOR ITS CONTROL

Hussain, A. E. ; M. W. El-Kordy ; I. A. A. Shehata ; M. M. El-Refaay
Dept. of Plant Protection, Fac. of Agric., Al-Azhar Univ. Cairo – Egypt

ABSTRACT

Oriental hornet *Vespa orientalis* L., causes a great damage to apiaries , where it attacks larvae and adult of the bees also it attacks the honey , Our research carried out in apiary of faculty of agriculture Al-Azhar university at Mosturod location, Kalubia governorate during 2002 and 2006 seasons, The population dynamic of this pest was studied by using sticky traps and the effect of the coloured sticky traps on the wasps catching number. Oriental wasps appear in the first week of April and decreased gradually to the minimum levels during June and July. Then the activity of wasps increased gradually from the second week of August to the fourth week of September. The maximum Total numbers of wasps recorded in October, September and November, after that these numbers decreased gradually at the first week of December.

The pink sticky traps proved to be the most, attractive method followed by orange and the white ones. On the other hand, black color proved to be the least one. The mean numbers of captured hornets by these sticky traps were 43.33, 30.66, 17.33, 11.66 wasps/ trap/ day respectively. Opposite trend was recorded for the mean numbers of captured honey bees by these coloured sticky traps

Keywords: Oriental Wasps, seasonal fluctuation, capturing, Sticky traps.

INTRODUCTION

The oriental wasp, *Vespa orientalis* L. is considered one of the most important insect pests affecting honey bee industry in Egypt. Furthermore, it attacks many fruit trees Ibrahim, and Mazeed, 1967.

The wasp attacks bee colonies resulted in destroying the colonies and reducing their productivity (Matheson et al 1989 and Sihag ,1992 a) .

The population activity of the hornet varied greatly according to prevailing weather factors and the time of the day (sihag ,1992 b and Yousef khalil et al 2000).

In Egypt many authors(Sharkawi, 1964 , Ibrahim, and Mazeed.(1967). Yousif-Khalil, et al 2000 and ,Khater, et al 2001) mentioned that the activity of oriental wasps is very low in winter, spring and early summer and gradually increased to reach the peak of abundance in the autumn particularly during October. The number of wasps starts to fall off gradually during the second half of November and disappeared in the middle of December.

Different types of traps either baited or not baited for capturing oriental wasps were used by Ibrahim and Mazeed 1967; they tested seven types of traps that currently used in Egypt.

They found that the wooden trap recommended by Ministry of Agriculture in Egypt with honey baits was the most efficient one followed by the ordinary tin-can trap.

Ahmed, 1999, Recorded that " Using Ministry of Agriculture trap exhibited a highest fitness for the high season of hornet population than the hanged trap" (Abou- Elezz trap). and used sweep-net as control method to catch the hornets.

Therefore the present work was carried out to study the seasonal fluctuations in numbers and activity of the wasps in Mosturod location, Kalubia governorate

MATERIALS AND METHODS

The present investigation was carried out in a private apiary to reach the peak of abundance in the autumn particularly apiary yard located at faculty of Agriculture, Al-Azhar univ. at Mosturod location, Kalubia governorate during 2002 and 2006 seasons. Color sticky traps (Yousif-Khalil *et al* 2000) were used in the present work.

1- Seasonal fluctuation of the oriental wasps (*Vespa orientalis* L.):

The population density of oriental hornets attacking the colonies of honey bees were determined by collecting hornets by sweep-net described by (Borror and Delong, (1970) and total number of captured wasps were counted every week. Weekly mean temperatures and relative humidity (R.H) at Mosturod region Table (1) were obtained from Agricultural Meteorology Magazine, Agricultural Ministry, Giza, Egypt.

(This experiment was conducted from March to December 2002)

2- Preparing the sticky traps :

Glass sheets of 30X40X0.5 cm with smooth surfaces were coated with thin film of the sticky material TEMPO (non poisonous glue for trapping rats) thereafter , the glass sheet was placed upon outer cover of a bee hive , where the filmed surface was upward . A sheet of paper (of different colours) of the area width and length was installed under the treated glass sheet to reflect the desired color of the trap.(Yousif-Khalil *et al* 2001).The sticky traps were put upon the outer cover of a working hives . the total number of rapped wasps were counted once/week during the period extended from August – November

3- Evaluating the effect of trap colour:

Twelve sticky traps were prepared with paper sheets the coloured paper sheets were black, white ,orange and pink colours were placed under the treated glass sheet to reflect these tested colours. Three sticky traps were used for each colour. Two dying oriental wasps were stickled in the center of each trap to act as wasp as well as, worker bees were counted once/week during the period from August to November 2006.

Analysis of variance (ANOVA) was carried out for the obtained data according to the method of (Waller and Duncan, 1969) . The correlation coefficient values between the number of captured wasps and both temperature and relative humidity were calculated.

RESULTS AND DISCUSSION

1- Seasonal abundance of the oriental wasps (*Vespa orientalis* L.):

Regarding to the seasonal abundance of the oriental wasps (*Vespa orientalis* L.) the data presented in Table (1) and Fig. (1) indicated that the wasps started to appear by small numbers in Mosturod location during the first week of April but in scarce number (13 wasps/ week) then increased gradually to give the first peak at the end of April. Thereafter, the weekly numbers of captured wasps in the traps decreased gradually till first week of July where the lowest number (11 wasps /week) (earlier summer). Gradual increase in numbers were recorded in summer season from the second week of August (104 wasps/ week) to reach the maximum level in the fourth week of September (1010 wasps/week) to give the second peak. Weekly total numbers of oriental wasps reached to the high values during the autumn season particularly in the second week of October (762 wasps/ week) and the second week of November (471 wasps/ week), the numbers followed during October and November. A sharp decline took place during the second week of December and the wasps decreased gradually in number at the fourth week of December. The highest monthly Total number of the wasps reached in October (2665 wasps) followed by (2126 wasps) in September and (1526 wasps) in November.

The obtained results seem to confirm the findings of (Ibrahim, and Mazeed.(1967)) (Mellor, 1928) (Sharkawi, 1964) and Gomaa and Abd El-Wahab (2006)

, Sharkawi ,Ibrahim and Mazeed at Giza, Egypt where they stated that the population density of the oriental wasp *Vespa orientalis* L. was very low during spring and early summer then gradually increased to reach the peak of abundance in September, October and early November.

In Upper Egypt Ahmed,(1999) recorded that the population density of the oriental wasp in three sites Abu-Tisht, Quena and Isna started in spring from March and reach the highest numbers in September and October.

Another studies on the population density of wasps at Zagazig and El-Mullak districts in Egypt, Khater et al. 2001 found that *Vespa orientalis* L. started to appear in both Zagazig and El-Mullak districts during March but in scarce numbers. Gradual increases occurred during the June and recorded the highest numbers during the first period of September then decreased gradually to completely disappear at the end of December.

Correlation coefficient between weekly average numbers of wasps and both of temperature and relative humidity.

Table (1) and (2) reveals that there is insignificant negative correlation between the weekly numbers of oriental wasps and daily mean temperature during 2002. as respect to the correlation between the weekly numbers of oriental wasps and RH% means ,it is clear that there is negative correlation between the weekly numbers of wasps and daily mean RH% which significant during 2002.

Table (1) population fluctuation of *vespa orientalis* L., weekly mean temperature and RH% at Mosturod location, Kalubia governorate during the period from April to December 2002

Month	week	Average number of wasps	Mean temp.	mean RH%
April	A	13	21.1	58
	B	29	20.2667	62.6667
	C	58	22.2333	61.6667
	D	110	20.325	60.5
	Total	210	83.925	242.8334
May	A	79	25.4	55.6667
	B	58	23.1667	57
	C	41	25.4	54.6667
	D	35	27.65	56.25
	Total	213	101.6167	223.5834
June	A	30	28.5333	55.6667
	B	27	28.4667	54
	C	22	29.3667	57
	D	24	28.725	58.75
	Total	103	115.0917	225.4167
July	A	11	27.9	59.3333
	B	18	29.6	62.6667
	C	30	29.6	59.3333
	D	38	31.35	59.75
	Total	97	118.45	241.0833
Aug.	A	60	30.1	66
	B	104	29.0333	63.3333
	C	162	30.5333	66
	D	177	30.9	64.75
	Total	503	120.5666	260.0833
Sept.	A	401	28.6333	50.6667
	B	290	31.6	44
	C	425	29.5	48.6667
	D	1010	31.475	50
	Total	2126	121.2083	193.3334
Oct.	A	553	24.3667	48
	B	762	21.8	47.6667
	C	650	21.2667	47
	D	700	22.9	46.75
	Total	2665	90.33337	189.4167
Nov.	A	450	23.6	44.3333
	B	471	22.2333	38.6667
	C	300	21.4667	39
	D	305	20.125	42.75
	Total	1526	87.425	164.75
Dec.	A	72	19.4333	37.3333
	B	35	18.9	40.3333
	C	19	18.9667	39.6667
	D	9	18.075	36.25
	Total	135	75.375	153.5833

A= First week B= Second week C= Third week D= Fourth week

Khater et al. (2001) found a positive significant correlation between the monthly oriental wasps caught and the mean of daily temperature. Also he

stated a slight negative correlation between the mean numbers of wasps and RH % was detected.

Also, Ibrahim and Mazeed (1967) observed that the degree of temperature affects the activities of the oriental wasps where warm nights lead to the mortality of all the trapped wasps. In contrast, warm nights lead to great activities of the wasps during the following day as indicated by the large numbers caught in the traps.

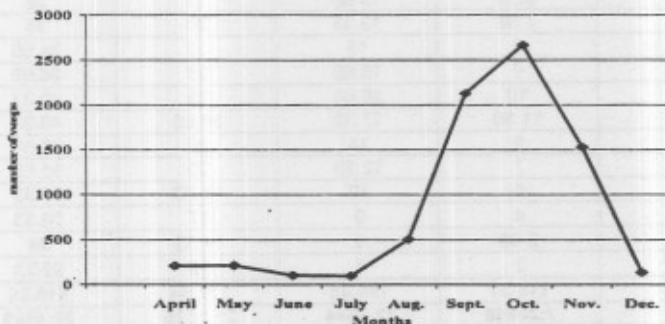


Fig (1): seasonal fluctuation of the oriental hornet population in Mosturod (2002)

Table (2) Correlation coefficient between weekly average numbers of wasps and both of Temperature and relative humidity.

X variable	Y variable	Correlation (r)	Slope (b)
population	temp.	-0.046558	-6.38599
population	R.H.%	-0.6828802	-0.016541

2- Trap colour and number of captured wasps :

ata tabulated in Table 3 , indicated that the tested colour could be divided into two groups according to their attraction to the oriental wasp; the first group contains the higher attractant colours, that included Pink and Orange colours, and the second less attractant group which included Black and White colours. Pink sticky trap proved to be the most attracting, as it captured 32.49 wasps per trap/week . the lowest mean number was recoded by White sticky trap which came in the second class (12.16 wasps per trap/week), followed by Black trap (7.2 wasps per trap/week)

3 - Trap colour and number of captured Bees:

From data tabulated in Table 4, It is obvious that the lowest mean number was caught by Pink sticky traps, recording 3.6 bees/trap/week .The Orange sticky traps caught slightly higher mean number 6.77 bees/trap/week). On the other hand, the Black sticky trap captured the highest mean number of bees 15.01 bees/trap/week), followed by white traps.(11.87 bees/trap/week)From foregoing data, it could be concluded that the highest number of caught wasps achieved by the black sticky trap while the lowest number of captured bees achieved by the pink sticky trap.

Table 3: Effect of sticky trap colour on the number of captured *Vespa orientalis* L during August, September, October and November 2006.

Month period		Average number of wasps/trap/weekly			
		Black	White	Orange	Pink
Aug	9/8/	7	10	18	27.33
	16/8/	8.33	11.66	19.33	28.33
	23/8/	8	13	19.66	30
	29/8/	7.33	12.33	18.33	30
Sep	5/9/	8.33	13.66	19	32
	12/9/	7.66	13.33	20	33
	19/9/	9	15	23	34.66
	26/9/	9	15.66	28	36.66
Oct	3/10/	10	16.66	29	40.33
	10/10/	11.66	17.33	30.66	43.33
	17/10/	9	14	28	40.66
	26/10/	7	12.33	23	35.66
Nov	2/11/	5	10	18.33	33.33
	15/11/	4	9	17	28.33
	22/11/	2.66	6	14.33	24
	29/11/	2	5	12	22.33
Total		115.31	194.63	337.64	519.95
Mean		7.20688	12.1644	21.1025	32.4969

L.S.D.0.05 between the mean number of wasps captured by different colour sticky traps were 3.2205509076

Table 4: Effect of sticky trap colour on the number of captured *Apis mellifera* during August, September, October and November 2006.

Month period		Average number of Bees/trap/weekly			
		Black	White	Orange	Pink
Aug	9/8/	12.66	11	3.66	2.33
	16/8/	13.33	12	4.33	3
	23/8/	14.33	14	5.33	3.66
	29/8/	13.66	13	6	3.33
Sep	5/9/	17.33	14.66	7.66	5.66
	12/9/	21	16.33	10	4
	19/9/	26.33	16.66	11	6.66
	26/9/	23.66	17	10	7.66
Oct	3/10/	20.66	18.33	9.66	6.33
	10/10/	20.33	15	9	5.66
	17/10/	16.66	13	9	3.66
	26/10/	10	10	8.33	1
Nov	2/11/	10	7.33	6	1.66
	15/11/	7.33	4.33	3.33	1
	22/11/	6.66	3.66	2.66	1.33
	29/11/	6.33	3.66	2.33	1
Total		240.27	189.96	108.29	57.94
Mean		15.0169	11.8725	6.76813	3.62125

L.S.D.0.05 between the mean number of Bees captured by different colour sticky traps were 3.0622438954

Meanwhile banaszak *et al* (1994) reported that the white colour traps caught 4-7 times more bees than yellow and blue ones. This phenomenon

could be attributed to the more intensive wasp odor arising from the higher number of stung wasps (Ono *et al.* 1995) that perhaps repels bees

REFERENCES

- Ahmed, N.S.M. (1999). Studies on oriental hornet *Vespa orientalis* FAB. (Vespidae, Hymenoptera) as a predator of honey bee *Apis mellifera* L. (Apidae, Hymenoptera) in Upper Egypt. Ph. D. Thesis, Faculty of Agriculture, Minia University, pp: 167
- Banaszak, J.; T. Cierznia and R. Szymanski (1994). Influence of colour moericke traps on number and diversity of collected bees (Apoidea , Hymenoptera) katedra Biologii Ochrony Srodowiska , wyzsza Szkola pedagog . Ul, Chodkiewieza , 51:85-667 Bydgoszcz .Poland (AA863-95)
- Borner, D.J and D.H Delong. (1970). An introduction to the study of insects 2nd ed Hoit .Rinehart and Winston, N.Y., 812 pp
- Gomaa, A.M. and T.E. Abd El-Wahab. (2006). Seasonal Abundance and the Efficiency of Yeast Liquid Culture (*Candida tropicalis*) as Bait for Capturing the Oriental Wasps (*Vespa orientalis* L.) Under Egyptian Environment. *J. Applied Sciences Research*, 2(11): 1042-1046,
- Ibrahim, M.M. and M.M. Mazed. (1967). Studies on the oriental hornet, *Vespa orientalis*, *Agric. Res. Rev.* 180-163:45
- Khater, A.M., I.M.A. Ebada and S.I. Yousif-Khalil. (2001) The seasonal activity of oriental wasps, *Vespa orientalis* L. populations attacking honey bee colonies. *Arab Univ. J. Agric. Sci.*, Ain Shams Univ., Cairo, 9: 447-455
- Matheson, A.; K. Clapperton; H. Moller and P. Alspach (1989). The impact of wasps on New Zealand beekeeping-the 1986/1987 wasp survey. *New Zealand Beekeeper* No.203: 2831 (AA 1286-90).
- Mellor, I.E.M. (1928). The oriental hornet (*Vespa orientalis* Fab.). *Plant Prot. Sect.*, Minist. Agric., Cairo, Leaflet, pp: 1-6.
- Ono, M.; T. Igarashi ; E. Ohno and M. Sasak (1995). Unusual thermal defence by a honeybee against mass attack by hornets . *nature (London)* , 377 (6547) 334-336 (AA 1283-96).
- Sharkawi, S.G., (1964) The morphological, biological, ecological and control studies of *Vespa orientalis*. Hymenoptera: Vespidae) M.Sc. Thesis, Faculty, Agric. Cairo Univ. pp: 208.
- Sihag, R.C. (1992 a). The yellow banded brown wasp. *Vespa orientalis* L. 1- A predator and colony robber of honeybee (*Apis mellifera* L.) in Haryana (India). *Korean J. Apic.*, 7(1): 32-34 (AA 673-96) .
- Sihag, R.C. (1992 b). The yellow banded brown wasp. *Vespa orientalis* L. 2- Population density ,bee capture efficiency and predation rate on honeybee *Apis mellifera* L. *Korean J. Apic.*, 7(1): 35-38 (AA 674/96) .
- Waller, R.A. and D.P. Duncan, (1969). A bay's rule for symmetric multiple comparison problem. *Amer. Stat. Assoc. J.* December: 1485-1503
- Yousif-Khalil, S.I.; I.M.A. Ebada and A.M. Khater (2000) .Preliminary investigation on the efficiency of developed sticky trap in controlling *Vespa orientalis* attacking honey bee colonies . *Egypt. J. Appl. Sci.*, 15(3): 282-294.

Yousif-Khalil, S.I.; I.M.A. Ebadah and A.M. Khater (2001) The efficiency of a developed sticky trap for mass trapping *Vespa orientalis* L. Arab Univ. J. Agric. Sci., Ain Shams Univ., Cairo, 9(1) : 457 – 469 ,

التذبذب الموسمي لدبور البلح وكفاءة المصائد اللاصقة كوسيلة لمكافحة
عذرية عيد حسين- محمد وجدي الكردي - ابراهيم عبد الرازق عبد الله شحاتة و
محمد مندوه اسماعيل الرفاعي
قسم وقاية النبات - كلية الزراعة - جامعة الازهر- القاهرة

الدبور الاحمر يسبب ضررا عظيما في المناحل حيث يهاجم اليرقات و النحل البالغ كما يتغذى على العسل وقد تم اجراء هذا البحث في منحل كلية الزراعة - جامعة الازهر - مسطرد - محافظة القليوبية خلال عامي ٢٠٠٢ و ٢٠٠٦. لدراسة التذبذبات الموسمية لهذه الحشرة و كفاءة المصائد اللاصقة في مكافحتها

وقد ظهرت الحشرة في الاسبوع الاول من شهر ابريل وازداد التعداد تدريجيا خلال هذا الشهر ثم انخفض التعداد تدريجيا حتى وصل الى ادنى مستوياته في شهرى يونية و يوليو ثم ازداد نشاط الدبور بشكل تدريجي اعتبارا من الاسبوع الثانى من اغسطس الى نهاية سبتمبر و اعلى اجمالى لاعداد الدبور سجل في شهر اكتوبر يليه في سبتمبر ثم في نوفمبر وانخفضت اعداد الدبور تدريجيا اعتبارا من اول ديسمبر .

وقد اثبت اللون الوردي للمصائد اللاصقة انه الأكثر جاذبية للدبور يليه اللون البرتقالى ثم الابيض بينما كان اللون الاسود هو الاقل جاذبية للدبور ومتوسط الاعداد التى تم اصطيادها بتلك المصائد هى (٤٣,٣٣ ، ٣٠,٦٦ ، ١٧,٣٣ ، ١١,٦٦ دبور /مصيدة / يوم) على التوالي وقد لوحظ ان اتجاه تاثير تلك المصائد فى جذب النحل كان عكس تاثيرها فى جذب الدبور.