

Activity of the Greater Wax Moth *Galleria mellonella* L. and the Lesser Wax Moth *Achroia grisella* F. in Apiary and Storage in Kafr El-Sheikh Province.

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ABSTRACT

The greater wax moth (GWM) and the Lesser Wax Moth (LWM) are known to be harmful on wax combs in apiaries and in storage. Activity of GWM and LWM were carried out in the apiaries in different local (Sakha, Qallin and El-Reyad) and the store in Kaf El-Sheikh Governorate. In apiary, the lower number of wax moth were recorded during December, January, and February, the percentage numbers of larvae wax moth in December were (0.00, 1.49 and 0.00 %), January (0.00, 0.00 and 0.00 %) and February (0.00, 0.00 and 1.25 % larvae/ Colony) for three apiaries Sakha, Qallin and El Reyad. respectively. while the higher percentages number of larvae recorded during August, July, and September (19.23, 16.00 and 14.28%) in Sakha and (17.42, 16.96 and 12.50%) in Reyad but in Qallin the higher percentages numbers of larvae were during August, September and July (17.91, 15.71 and 12.31% larvae/ Colony), respectively. In storage, the experiment was carried out at storage of Beekeeping Research Section at Sakha Agriculture Research Station, five boxes (10 frames each) were vertically impacted in the store to record the number of the alive stages immature (larvae, pupa) and adult insect of the two wax moths. In General the high infection of larvae of the GWM and LWM in storage were in May, June and July but pupae and adult of The GWM and LWM in storage during June, July, August and September during (29-35°C⁰) and (50-55 Rh%) which might had helped in the rapid breeding of the moth.

INTRODUCTION

The greater wax moth (GWM) and The lesser wax moth (LWM) are extremely harmful pests, and damaging pests of honey bee colonies Wilson *et al.*, (1997); Watkins (2005); Ellis and Hayes (2009).

The GWM and LWM are known to be harmful to dropped and stored beeswax. Stored combs are ideal places for the breeding of wax moths. Wax moths, as adults, are nocturnal insects that fly at night and hide in dark places during the day, Püntener (1981). In Sudan GWM is the most serious pest of honeybee hives, it is the main cause of bee migration and destruction of 60% of the bee colonies. The pest found especially in the weak colony during all months of the year Ali, (1996). Beside damaging wax combs by larval feeding, and destroying frames and wooden parts in the hive. Adult wax moths and larvae can also transfer pathogens of serious bee diseases, e.g. foulbrood. However, in colonies infested with this disease, feces of wax moth contain large amounts of spores of the causative bacteria, *Paenibacillus* larvae, Charrière and Imdorf (1997) and Owayss and Abd-Elgayed (2007).

In India, the infestation of GWM started from June and increased progressively, to reached its peak in September and thereafter decreased to the minimum in November. Further, they noted that the extent of damage was very mild in June and August. The maximum colonies (54.8%) showing moderate damage were observed during September. In the October, the colonies with severe damage (45.4%) and complete damage (15%) excelled from that in other months. Braret *et al.*, (1993). While, in K.S.A, Al-Ghamdi (1990), during February-May 1989, observed Pests and predators included G.W.M, L.W.M, *Vespa orientalis*, *Philanthus triangulum*, *Bembix arenaria*, *Palaruslatifrons*, *Acherontia atropos*, *Polistes wattii* and *Meloevariegatus*. *Bee-eaters* (*Merops spp.*) in most apiaries.

In India, in apiary the maximum of infestation at the month of Sept and the least infestation was in full covered frames with bees. In the store the maximum infestation wax moths was in comb area kept without

fumigation whereas minimum was infestation when the frames were stored in the polythene sheet with fumigation (Kumari and Jha 2013).

Therefore, the present work aimed to study activity of the greater wax moth and the lesser wax moth in the apiary and in the storage.

MATERIALS AND METHODS

The activity of the greater wax moth and the lesser wax moth were carried out in the apiary and storage in Kafr El-Sheikh province during 2014-2015.

The experiments were carried out at the apiary of Sakha (belonging to Plant Protection Research Institute, Sakha Agriculture Research Station), apiary of Qallin (at Meet Al-Deeba) and the apiary of El-Reyad (at Al-Abassia). Apiaries contain 20 to 200 colonies of *Apis mellifera*, F₁. In each apiary, the samples were taken randomly each month to examine and counted the pests. In the storage, the experiment was carried out at the store of Beekeeping Research Section at Sakha Agriculture Research Station, five boxes (10 frames each) were vertically impacted in the store to recorded the number of the alive immature (larvae and pupae) and adult stage of the two wax moths.

Statistical analysis,

Data were analyzed using one-way ANOVA by Costat software program (2004) and Duncan's multiple range test 1955 (Duncan 1955)

RESULTS AND DISCUSSION

Data in Fig. (1) illustrated the monthly activity of the greater wax moth, at three different apiaries in Kafr El-Sheikh province (Sakha, Qallin and El-Reyad) during 2014. The percentage number of larvae wax moths changed greatly in different months during 2014. The lower number of the GWM recorded during December, January, and February, percentage number of GWM larvae and represented by December (0.00, 1.49 and 0.00 % larvae/ Colony), January (0.00, 0.00 and 0.00 %) and February (0.00, 0.00 and 1.25 % larvae/ Colony) for three apiaries Sakha, Qallin and El-Reyad, respectively. while the higher percentage number of larvae were during

August, July, and September and represented by (19.23, 16.00 and 14.28%) in Sakha and (17.42,16,96 and 12,50%) in El-Reyad, respectively. while in Qallin the higher percentage number of larvae recorded during August, September and July and represented by(17,91, 15,71and 12,31%),respectively.

Also, data presented in Fig. (2) Showed the percentage number of LWM larvae in different months during 2014. The lower percentage number of larvae recorded during the months in autumn and winter seasons (0.00, 0.00, 0.00, 0.00 and 0.00larvae/ Colony) in Sakha and each colony in different apiaries. while the higher percentage number of larvae were during January, July, August and September (11.11, 16.00, 7.69 and 3.57) in Sakha and all colonies in each apiaries ,respectively .

These results indicated that larvae of wax moth were developing and increasing in the high temperature

and moisture during months of summer and decreasing in the low temperature (cold condition), the peak of infection of GWM is in August, July and September.

This results are similar with Shylesha (1987), Abrol and Kakroo (1996) who mentioned that the peak population was during May to August which coincides with the floral dearth period in the area, but Ansary *et al.* (2001) In Bangladesh at Mirpur Dhaka ,reported that the swarm of *G. mellonella* and *A. ceranato* combs was the maximum in Jun., However, it was different with Pastagia (2006)who observed the maximum number of *G. mellonella* larvae during second fortnight of Sept. and second fortnight of Aug. during 2003 and 2004, respectively. While maximum activity of *A. grisella* was observed during second fortnight of Jun. and second fortnight of May.

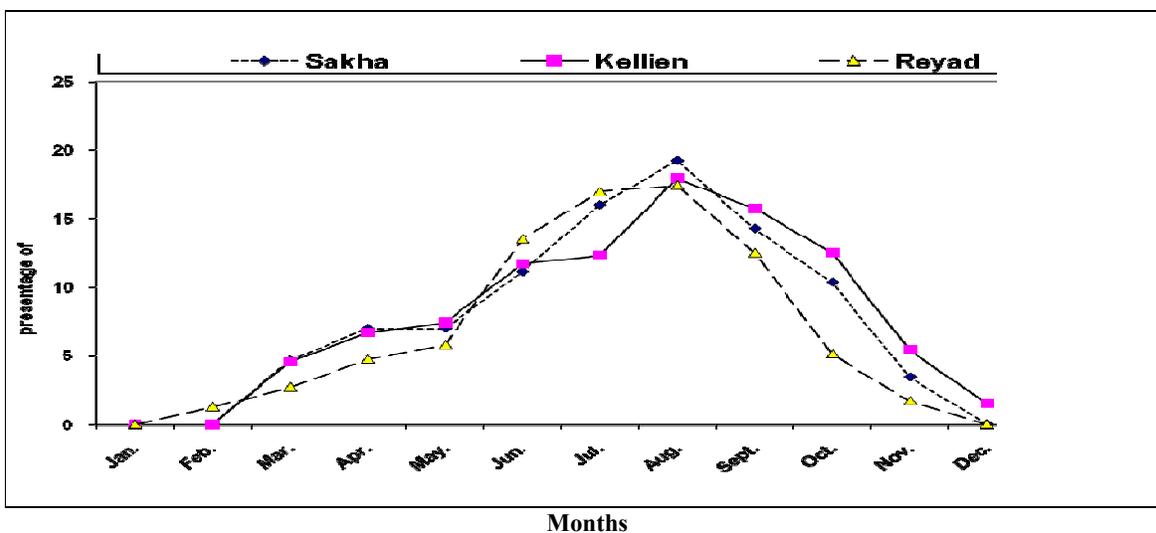


Fig. 1. The percentage number of the (GWM)in honey bee colonies during year 2014 in different apiaries in Kafr El-Sheikh province.

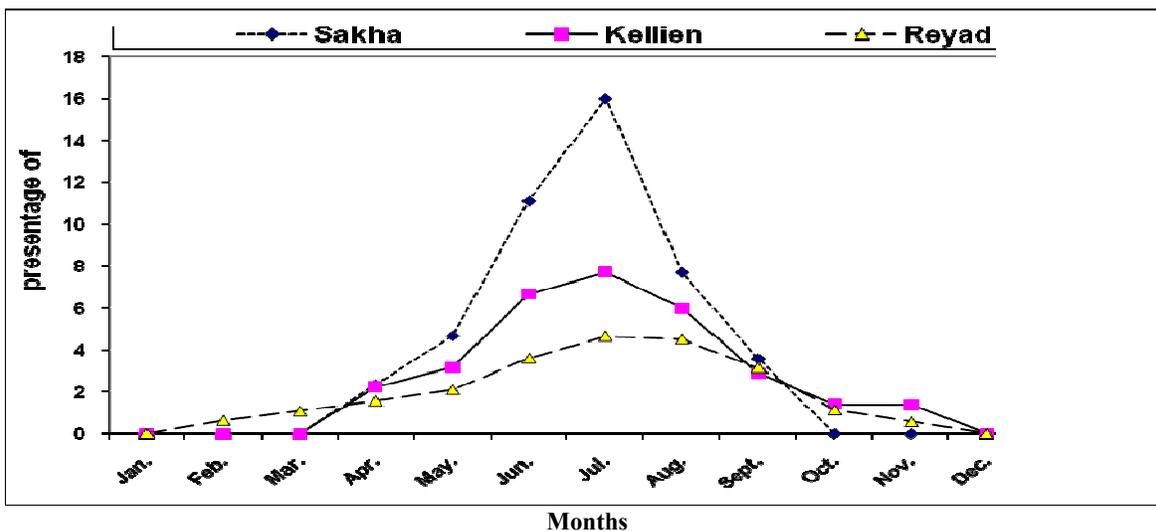


Fig. 2. The percentage number of the (LWM) in honey bee colonies during year 2014 in different apiaries in Kafr El-Sheikh province.

Data arranged in table (1) obtained the population abundance of the greater wax moth (GWM) in different months during year 2014 at store of beekeeping (belonging to Plant Protection Research Institute, Sakha Agriculture Research Station).

It can be noticed that, the highest Population activity of the larvae were recorded in June (36 larvae / Colony) followed by May (26 larvae / Colony). Meanwhile the highest population activity of the insect pupae showed in July (30 pupae/Colony) followed by June (22 pupae/Colony). Moreover, the highest Population activity of the insect adults

recorded in July and August and represented by 42 and 38 adult/ Colony, respectively. The highest Population activity for the immature stages (Larvae and pupae) and adult stage of the insect were coincided with the monthly average temperature degrees (30-35 C⁰) and relative humidity (50-55 Rh %).

On the other hand, the lowest population activity of the greater wax moths for the immature stages (larvae and pupae) as well as adult stage were recorded in January and February and coincided with the low temperature (19c⁰) and relative humidity (70%).

Table 1. population abundance of the greater wax moth *G. mellonella* L in The storage during 2014.

month	No. of <i>G. mellonella</i>				condition			
	Larvae	Pupa	Adult	Total	mean	C ⁰	RH %	
Jan.	00	00	00	00	00 e	19	70	
Feb.	00	00	00	00	00 e	19	70	
Mar.	13	00	00	13	2.6 de	22	60	
Apr.	15	3	00	18	3.6 de	25	60	
May.	26	4	18	48	9.6 bcd	26	55	
Jun.	36	22	32	90	18 a	30	55	
Jul.	10	30	42	84	16.8 ab	33	55	
Aug	12	9	38	59	11.8 abc	35	50	
Sep.	20	10	29	59	11.8 abc	29	55	
Oct.	6	6	20	32	6.4 cde	29	67	
Nov.	00	00	4	4	.8 e	22	63	
Dec.	00	00	0	00	0 e	20	62	
total	138	84	183	405				
mean	11.5	7	15.25	33.75				

The mean followed by same letters are not significantly different according to LSD test

Data arranged in table (2) showed the population abundance of the lesser Wax Moth (LWM) in different months during year 2014 .

The result obtained, the highest Population activity of the larvae were recorded in June (16 larvae / Colony) followed by July (19 larvae / Colony). Meanwhile the highest population activity of the insect pupae showed in July (15 pupae/Colony) followed by

August (16 pupae/Colony). Moreover, the highest Population abundance of the insect adults recorded in August and September and represented by 42 and 38 adult/ Colony, respectively. The highest Population abundance for the immature stages (Larvae and pupae) and adult stage of the insect were increasing activity with the monthly average temperature degrees (29-30 C⁰) and relative humidity (50-55 Rh %).

Table 2. Population abundance of the lesser wax moth *A. grisella* in the storage during 2014.

month	No. of <i>A. grisella</i>				condition			
	Larvae	Pupa	Adult	Total	mean	C ⁰	RH %	
Jan.	00	0.00	0.00	0	0.00 e	19	70	
Feb.	2	0.00	0.00	2	0.4 de	19	70	
Mar.	1	1.00	0.00	2	0.4 de	22	60	
Apr.	6	2.00	3.00	11	2.2 de	25	60	
May.	6	5.00	4.00	15	3.00 cd	26	55	
Jun.	16	5.00	4.00	25	5.00 bc	30	55	
Jul.	19	16.0	11.0	46	9.2 a	33	55	
Aug.	19	15.0	15.0	46	9.8 a	35	50	
Sept.	15	14.0	18.0	47	9.4 a	29	55	
Oct.	6	11.0	16.0	33	6.6 b	29	67	
Nov.	00	5.00	0.00	11	2.2 de	22	63	
Dec.	00	0.00	0.00	00	0.00 e	20	62	
total	90	74	77	241				
mean	7.5	6.61	6.42	20.1				

The mean followed by same letters are not significantly different according to LSD test

On the other hand, the lowest population activity of the lesser wax moths for the immature stages (larvae and pupae) as well as adult stage were recorded in January and February and coincided with the low temperature (19c⁰) and relative humidity (70%).

In General the high infection of larvae of The GWM and LWM in storage in May , June and July but pupae and adult of The GWM and LWM in storage through June. , July, August and September in (29-

35C⁰) and (50-55 Rh%) which might had helped in the rapid breeding of the moth.

This results are agreement with those of a Varshneya et al. (2008) that starting of infestation of *G. mellonella* in colonies from early July The swarm of larvae increased gradually from Jan. 26th standard week (SW) and acquired its peak in month of September , While, it were different with Watkins, (2005) in Australia that reported *G. mellonella* and *A. grisella* were extremely destructive pests, as they highly damage the empty wax combs during storage in winter in a relatively short time in the store .In India, Kumari and Jha (2013) the maximum of infestation at the month of September because the high humidity and temperature in the region. Recorded least infestation was in full covered frames with bees. It might be occurred because the self-defense behaviors of worker bees. In the store the maximum infestation wax moths in comb area kept without fumigation whereas minimum was infestation when the frames were stored in the polythene sheet with fumigation.

This result shows that Proper storage conditions of trials of honey bee colony are in low temperature and high relative humidity in the store.

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نشاط فراشة الشمع الكبرى وفراشة الشمع الصغرى في المنحل والمخزن بمحافظة كفر الشيخ دينا مندوه فتحي^١، حسن محمد فتحي^١، حمدي متولى منصور^٢ و محمد السعيد رجب زيدان^٢ ^١ قسم الحشرات الاقتصادية - كلية الزراعة - جامعة المنصورة ^٢ قسم بحوث النحل - معهد بحوث وقاية النباتات - مركز البحوث الزراعية

من المعروف أن دودة الشمع الكبرى والصغرى من أهم الآفات ضررا في المنحل والمخزن. تم عمل حصر لدودة الشمع الكبرى والصغرى في المنحل والمخزن في مناطق مختلفة (سحاقلين، الرياض) داخل محافظة كفر الشيخ في المنحل حيث سجلت اقل إصابة لدودة الشمع في شهر ديسمبر، يناير وفبراير فقد كانت النسبة المئوية في ديسمبر (٠.٠٠، ١.٤٩، ٠.٠٠) %، يناير (٠.٠٠، ٠.٠٠، ٠.٠٠) % وفبراير (٠.٠٠، ٠.٠٠، ٠.٠٠) و ١.٢٥ % يرقة/ خلية) للثلاث مناحل سحاقلين و الرياض على التوالي. بينما سجلت اعلى إصابة في شهر أغسطس. يوليو وسبتمبر (١٩.٢٣، ١٦.٠٠ و ١٤.٢٨% يرقة/ خلية) في سحا و (١٧.٤٢، ١٦.٩٦، ١٢.٥٠ % يرقة/ خلية) في الرياض ولكن في قلين حيث سجلت اعلى إصابة في شهر أغسطس ، سبتمبر و يوليو (١٧.٩١، ١٥.٧١ و ١٢.٣١% يرقة/ خلية) على التوالي في المخزن ، لقد تم إعداد التجربة في مخزن قسم بحوث النحل بمعهد الوقاية بسحا مركز البحوث الزراعية حيث تم معاينة عدد ٥ خلايا (١٠ براويز بكل خلية) في المخزن لتسجيل جميع الأطوار طور (اليرقة، العذراء) والفراشة الكاملة لكل من دودة الشمع الكبرى والصغرى. وعامة ان اعلى إصابة ليرقة كل من دودة الشمع الكبرى والصغرى في المخزن خلال شهر مايو، يونيو و يوليو بينما لعذراء وبالغات كل من دودة الشمع الكبرى والصغرى في المخزن خلال شهر يونيو، يوليو، أغسطس و سبتمبر خلال درجة حرارة تتراوح من (٩ او ٣٥) و رطوبة تتراوح من (٥٠ و ٥٥) والذئان ساعدنا في تربية وكثافة دودة الشمع.