Survey Study On Ectoparasite Of Honey Bees *Apis mellefera* In Benghazi And Adjasent Area Of Al-Jabal Al- Akhdar

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Abstract

A survey study conducted on 10 apariares in Benghazi area including the first escapment of Al-jabal Al-Akhdar. Results indicate that honey bee infected by three species of mites. *Varroa destructor, Tropilaelaps clareae, Tyrophagus putrescentiae*. V. destructor accounted for 88.78% of the total samples. The mean of the total parasites collected throughout the study period was 0.3683±0.003327. The highest mean was recorded in June, 0.5317±0.005871 and the lowest was in February 0.1717±0.0055. Statistical analysis show significant differences between months, seasons, apariers and regions.

Introduction

Honey bees can be attacked at any stage of their development by various enemies acting either directly as predators or indirectly by disturbing the life of the colony in various ways. The enemies of bees can be classified as parasites, predators disturbers, or commensals, depending on the nature of their damage and their interdependence with bees. The most serious destructive enemies that behave as true parasites by raising their offspring in the bodies of bees, as the parasites may cause substantial economical damage, since they may develop to reach a stage of epidemic, especially in case of late discovery and bad treatment procedures. FAO reports of 1993 stated that in the Mediterranean region, estimated loose of more than $ 7 million per year has resulted from spreading of varroa parasite in honey bee hive. In the same report, substantial loose in agriculture production and beekeeper income were reported in Libya in 1986 due to varroa parasites. The mites usually spread by drifting of infested adult worker and drone bees, either by movement of swarms, or by robbing wicked colonies. Large-scale increases in the range of infestation have been caused by migratory beekeeping. In Yugoslavia, varroa spread from Bulgarian border to the Mediterranean, a distance of 500 km, in less than a year, through movement of hives. In Brazil infested colonies were transported over 2500 km from the state of Sao Paulo North to the state of Piaui in few days (De Jong and Goncalves, 1981and دى جونق, 2003).

In Africa, the first appearances of varroa mites was detected in Tunis in 1978 and these infections were believed to be brought in via 1500 hives imported from Rumania 1975 (الأنصارى، 1998 ؛ حجازى، 1998 و حسين، 2003)

In Libya, the varroa mites were introduced by infected colonies that were imported from Bulgaria in 1974 to Al-Jabal Al-Akhader region, and the infection was detected in this area in 1976 (FAO, 1993). By 1986, this parasite were spread throughout Libya as an epidemic form, which cause wastage in honeybee colonies and created missing of most colonies which may effect agriculture production.

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Therefore in Libya there are new opportunities for the spread of infections and for the introduction of diseases and pests into areas, where they are previously unknown or unrecognized, since beekeeping spread on different regions of the country and become one of the most highly income sources because of the increased demand on honey (الفلاح، 2001)

Materials and methods

Study area

It is well known that apiaries are subject to move between different places according to seasonal source of nectar. Therefore, sampling sites during the study period could be geographically divided into

Benghazi Plain Including AL-Gaursha , Sidifarag, Qaminis, AL-Nwkia, Teka and Wadi AL-Bab. Al Jabal Al Akhader Region

includes Battah, AL- Bayada, AL-Rjmha, Taknis and Gaser AL- Shareef. The movement between these areas following nectar sources that beekeepers considered as seasons with local nams , AL-Rabeea, Al-Eklil *Rosmarinus officinalis* and Al-Shmary *Arbtus pavarii*, Al-Seder *Ziziphus lotus*, and Al-Zater *Thymus.sp* .Generally the climate in the study area is typically a Mediterranean region which characterized by moderate weather with high relative humidity and lower temperature span. The temperature is low in wet months November to February, while high temperature dominates in summer season from May to August. Altitude and distance from the sea coast play an important role in determining the value of relative humidity as it rises in December, January and February, reaching its maximum in January, with about 82%. The relative humidity starts to decrease gradually after March and increases again during November (الفيتورى، 2003).

Sampling method

Sampling were started from February until July 2006; time of sampling was 11:00 am to 3:00 pm, following the method by (عبدالسلام، 1990). During this period, 10 apiaries belonging to different owners were selected randomly in various regions. Ten workers were collected from each selected hive on the 10^{th} day of each month during the study period. In laboratory each individual worker sample was shaked for 5 minutes. This method is almost enough to separate about 90% of ectoparasites (Anonoymous 1987). Each tube content was then poured into Petri dish and by using clamps, the parasites were removed. Parasites identified under Binocular using the keys to genus level. The primary identification confirmed by the museum of plant protection department in Agriculture Faculty, at Omer Al-Mokthar University. also by experts in plant protection research institute, Aldogi, Cairo, Egypt. Other confirmation done in Manchester museum at Manchester University.

The obtained data were subjected to one way ANOVA, using SPSS statistical package.

Result

The data obtained throughout the period from February until July 2006, indicated that the honey bees were infected with different parasites, the most important were those belongs to Arachidea, represented by *Varroa destructor,*

Tropilaelaps clareae, Tyrophagus putrescentiae. Infection percentage during the activity period was mainly made by *Varroa destructor* and was accounted for 88.78 %. The effects of months, seasons, apiaries and regions were considerable. Therefore, detailed description on the effect of these variables will be explained.

Monthly variations

The mean of the total parasites collected throughout the study period was 0.3683±0.003327. The highest mean was recorded in June, 0.5317±0.005871 and the lowest was in February 0.1717±0.0055 (Figure 1). The numbe of parasites throughout the study period show differences between months. *Varroa destructor,* Plate (1), was present all through the study period. The activity period has two peaks one in June and other in July with low levels of activity in February, March, April and May.

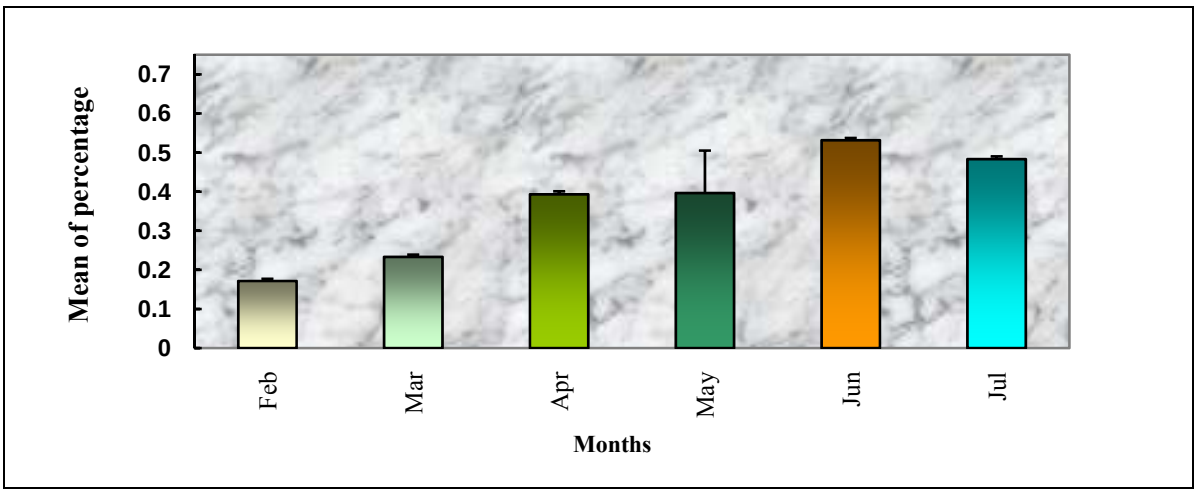

Figure 1: Mean ± SE of parasites during study period.

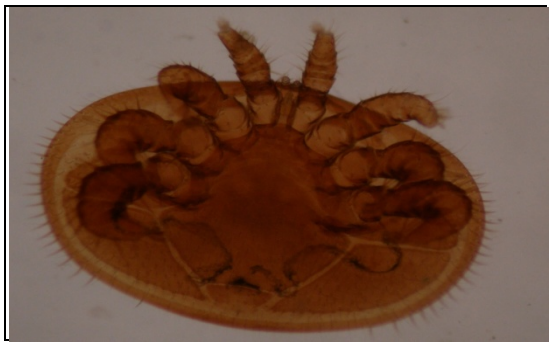

Plate 1: ventral view of *Varroa destructor* (Female)

Tropilaelaps clareae, Plate (2), was not recorded in February and show their apparition along the rest of the period with low numbers. However, *Tyrophagus putrescentiae* was not recorded in February and March while its active in the following months with few numbers, Plate (3).

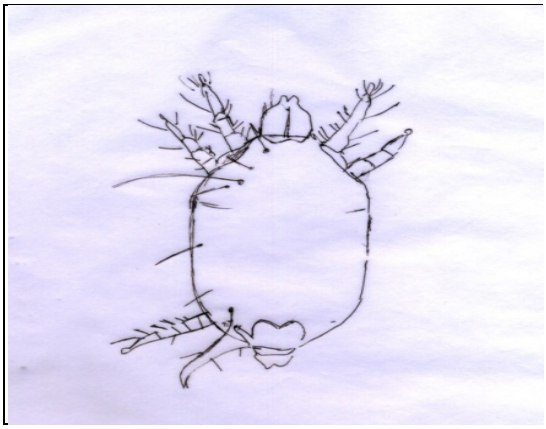

Plate 2: Illustration ventral view of *Tropilaelaps clareae* (Female).

Plate 3: Adult of *Tyrophagus putrescentiae.*

The (ANOVA) estimate of the significant difference between mean percentages of parasites showed significant differences between months (F=3.613, *P* 0.07).

Apiaries

The result show variable between apiaries. The mean of total population of parasites in all apiaries was 0.3683. The highest mean (0.6333 ±0.1498) was recorded at apiarie number (8), whereas the lowest population mean (0.1333 ±0.008433) was recorded in apiarie number (5). *Varroa destructor* was present in all apiaries (Figure 2). However, apiaries number 1,2,3,8 have higher infections while apiaries number 4, 7, 9, 10 showed medium infections. The lowest infections were recorded in apiaries numbers 5, 6. where *Tropilaelaps clareae* was present in apiaries 1, 2, 3, 8 and 9 and completely absent in other apariares. whereas *Tyrophagus putrescentiae was* recorded in apiaries number 1,3,4,7 and 8. ANOVA results indicate significant differences between apiaries (F=2.506; *p*=0.019).

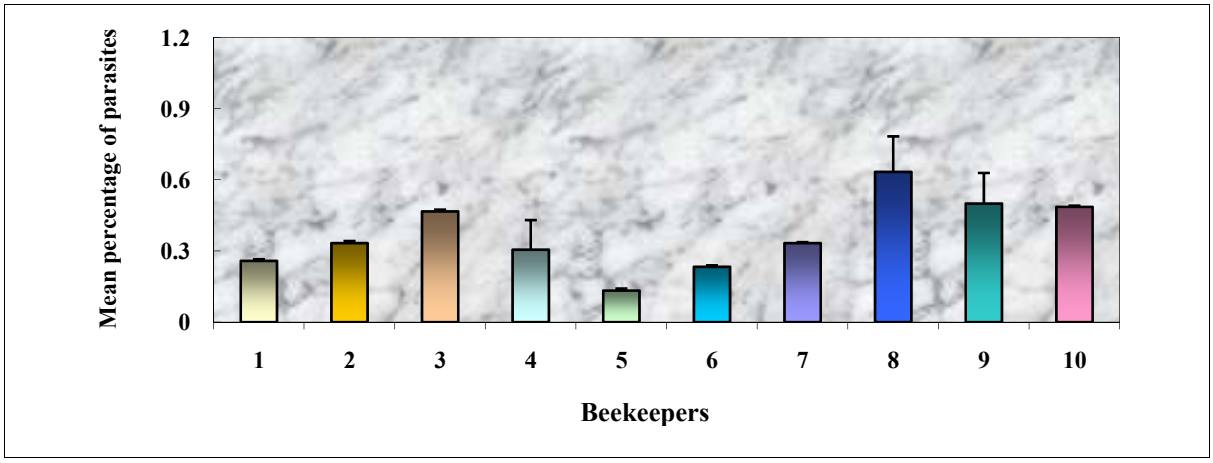

Figure 2: Mean ± SE of parasites percentage in different apiaries.

Seasons

Season according to food source for honey bee were considered as the most important factor. The total mean of parasites throughout these seasons were (0.3746 ±0.003395). The highest mean was recoded for Alsider (0.5094±0.005222) and the lowest mean was for Aleklil & Alshmary season (0.2292±0.009583). Figure (3) explains the mean±SE of parasites along the seasons. The percentage of infection severity of the parasites in each season is presented in Figure (3), where the highest percentage were recorded in Alsider season and the lower percentage is in Aleklil and Alshmary season. Varroa show the highest intensity during Alrabia, Alseder and Alkafour seasons, respectively, where the medium intensity was recorded in Alzater, whereas

the lowest intensity was noted during Aleklil & Alshamary seasons. *Tropilealpis clareae* showed the same low intensity during Alrabia, Alsider and Alkafour, and absent during Aleklil& Alshmary and Alzater seasons. *Tyrophagus putrescentiae* has the same pattern with low intensity during Alsider season ANOVA, showed significant differences between seasons (F=3.173; P=0.021) at 0.05 level

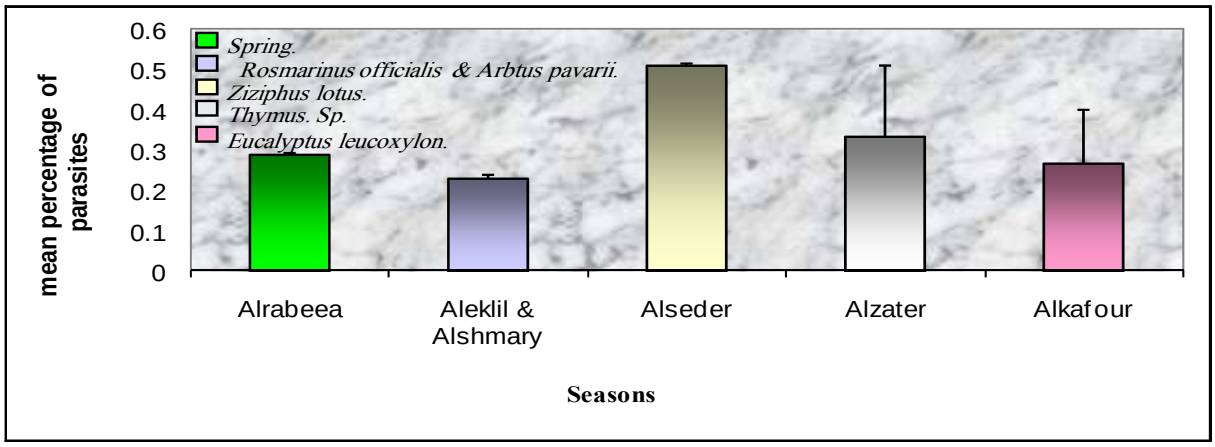

Figure 3: Mean ± SE percentage of parasites study seasons.

Region

Ecological changes between the study areas can interfere with the density of parasites. The total mean of parasites was 0.3754 ±0.003384 the highest population mean was 0.5556 ±0.004444 and the lowest population mean was 0.1600 ±0.009798 and these were recorded in Wadi AL-bab and Qaminas respectively. The highest percentage of parasitism in Wadi AL-Bab region, while the lowest percentage in Qaminas Figure (4). *Varroa destructor* found in all study regions, the higher density recoeded in Battah AL-Rajma, while the lowest density were recorded in Qaminas and AL-Byada respectively. While *Tropilaelaps clareae* was found in all study regions except Gamians where few numbers were recorded. The other parasites

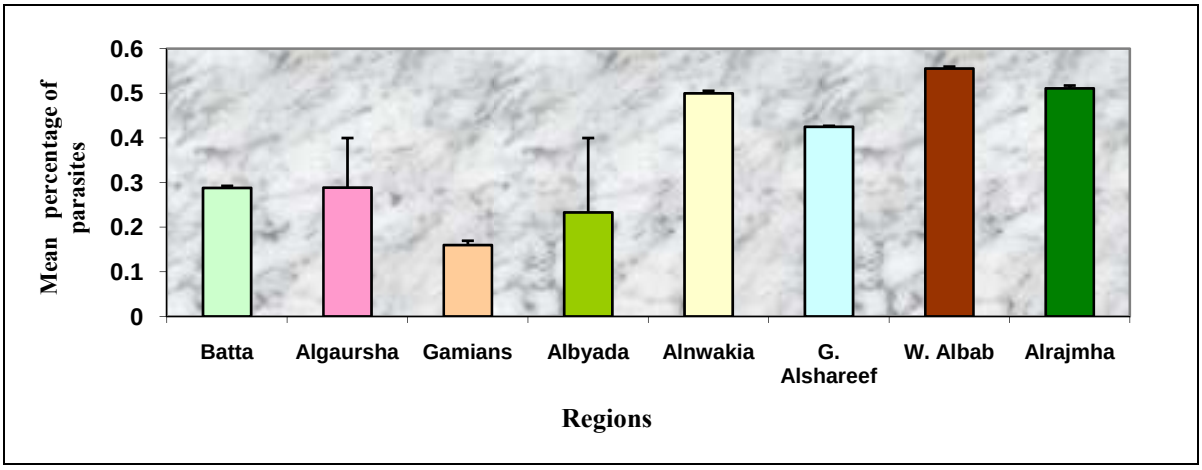

Figure 4: Mean ± SE percentage of parasites between the different regions.

Show presence in few numbers in some sites and completely absence in other sites. The one way ANOVA showed significant differences between regions (F=2.408, *p*=0.034) present brief description of one way ANOVA results at 0.05 level.

discussion

The mites (Acari) and insects that parasitize honey bees have become a global problem. They are threatening the survival of managed and feral honey bees, the beekeeping industry as well as the role of bees in pollination, which accordingly affect the future of many Agriculture activities.

The major parasites that detected in the present study included *Varroa destructer, , Tropilaelaps clareae, Tyrophgus putrescentiae,* among these parasites varroa mites were the most common. This species worldwide pest of honey bee, where, in heavy infection it can lead to complete destruction of the colonies. Its wide distribution is mainly due to its ability to parasite both worker and drons brood as the main host, as well as on adult at some stages of its life cycle, when there is no brood available. The above explanations confirmed the results, by دى جونق (2003) who indicate the common infection of bees by varroa mites.

Growth of mite population infesting honey bee colonies are influenced by a varity of factors, it is clearly noted that the environmental factors, harvesting season and knowledge of beekeepers played the most important role in the regulation of the mite populations. The highest population density recoded in Jun reaching the peak of activity, afterward, the population decreased in winter season which may suggest that the temperature may has played the major factors for such density change between season. Since the population density of pests interferes with the abiotic factors including temperature and humidity (De Jong *et al*., 1984; Moretto, *et al*., 1991; Aspaly, *et al.,* 2007; Sanchez-Ramos, *et al*., 2007). Likewise *Tropilaelaps clareae* and *Tyrophegus putrescentiae* recorded low density in the reast of the summer month and the population became comparatively less from February until March. Our results on the other parasites of honey bee strongly contradict the conclusion that this factor causes host resistance by suppressing the reproduction of the parasite, (Rosenkranz, *et al*., 1990). The our results have shown that bee colonies with such a level of mite infestion revealed sings of damage including detormed wings to developing bees. This investigation supported by (Bowen-walker, 1997) where they stated that the mite causes deformatly to the external morphology of honey bees.

Regarding to *Tyrophegus putrescentiae* (stored product mite), it has been recorded their presence in the colony of honey bees may be due to that the apiary very close to the farm store or it built in the same place of store farm.

However, Lubinerski *et al*., (1987) reported that the control system of the honey bee pests is usually depends on the variation in the ecological system. Similar results obtained in the present study,where, some pests unrecorded at February and April due to decrease in the temperature regime, as, the life cycle in summer month were 6 days, while in winter 24 days, which support the investigation by (2003 دى جونق, ; Harris, *et. al*., 2004 and 2005 أبوقيلة وأمين,). Varroa can have a tremendous impact on feral and managed honey bee colonies. These mites have caused massive losses in all parts of the world, wherever,

were they are known to occur. Varroa mite, have been known to kill entire colonies in 12 months, to 4 years depending on the level of infestation. This loss of colonies take its toll on beekeepers who must deal with the costs to replace colonies and the cost of reduced honey yield. The current investigation revealed the difference between the beekeeper in the study area and show that infestions levels was not similar during studied period. Hygienic system played an important role of infestions level (Harris, *et al.*, 2004; Harris and Rinderer, 2004).

Honey bees are naturally stringent and clean insects. This behavior is very important to the health and survival of the colony and for the individual bee. Worker bees are responsible for the maintenance of the hive and for the cane of the brood. However, beekeeper responsible for the maintenance of the hive and apiary. This involves keep up of the comb, removal of dead and hygienic method of the apiary.

The present data reported that two beekeeper no 7, 8 transfered there apiary from one area to other infested which increased the level of infestion to the honey bee. On the other hand our investigations to beekeeper no 5 who follow the hygienic method revealed no significant infestion level in his apiary. These results confirmed the results obtained by (2003,دى جونق).

The major finding was that density of varroa mite, varied significantly among season during the period of the study, and was considered an important factor in honey production industry. The movement of beekeeper from one place to another following the season was also considered to be an important character of the beekeeper. The present study classified the season according to the intensity of nectar source to the honey bee into Al-Rabeea-Al-Eklil (*Rosmarinus officinalis*), Al-Shmary (*Arbtus pavarii*), Al-Seder (*Ziziphus lotus*), Al-Zater and Al-Kafour (*Eucalyptus leucoxylon*).

The highest population density of varroa recorded in Al-Seder season, in which varroa reached the peak, while at Al-Shamary and Al-Eklil the population density decreased dramatically. Increase and decreases of varroa mite could be due to the temperature factor because in Al-Seder seasons temperature was high and in Al-Shamary and Al-Eklil temperature was low. This finding confirmed the result, obtained by (Melathopoulo *et al*., 2000). The other reasons for decrease of the population density of varroa mite during the seasons probably was due to fumigation of the colonies during the harvesting time and this is confirmed with (1998 حجازى) where the indicate of that the use of natural plant substance against varroa mite in Syria, decrease of the density of the parasite.

The significant change in varroa mite population in the current study could be due to the host plant cantentent and this is supported by the finding of (Melathopoulos, *et al*., 2000, and 2005, عابد, 2005 ,زيتون).

The severity of *Varroa destructor* depends, upon several factors, which may change between regions. Climate is thought to influence the reproductive success of varroa mite. The Mediterranean climate is considered to be favorable for an accelerated varroa mite population growth. Rinderer *et al*., (2004) confirmed our present investigation, where, varroa mite were observed in the most studied regions such as Wadi AL-Bab Qaminas- Battah and AL-Rajma. The highest population density was recorded in Wadi-AL-Bab while the lower density was recorded in Gaminas and AL-Bayada. The differences

between regions are probably due to the density of honey bee infested with parasites. The rate of infections correlated with local climate conditions which decrease the development time (Calderone and Kuenen, 2001). It has been reported that the different climate affects the biology of mite (Rosenkrane and Engele, 1994) and the level of population differences significantly correlated with region (Morelto *et al*., 1991; 2003 دى جونق,).

دراسة حصر للطفيليات الخارجية على نحل العسل *Apis mellefera* فى المناحل المتواجدة حول مدينة بنغازي والمناطق المجاورة من الجبل الاخضر

عبد الله فضل [1] ، فريحة شكري [2]

الملخص

اجريت دراسة حصر للطفيليات الخارجية التى تصيب نحل العسل فى مناطق مختلفة من سهل بنغازى والناطق المجاورة من الجبل الاخضر, حيث تمثل هده المناطق المساحة الجغرافية التى يتنقل خلالها النحالين خلال المواسم المختلفة. اشارة هده الدراسة الى ان نحل العسل فى هده المناطق يصاب بثلاثة انواع من الحلم هى *Varroa destructor, Tropilaelaps clareae, Tyrophagus putrescentiae*. وسجل النوع *V. destructor* اعلى نسبة تواجد (88.87%). كما تشير نتائج التحليل الاحصائى الى ان اعلى نسبة اصابة كانت خلال شهر الصيف (يونيو) واقل اصابة كانت خلال شهر النوار (فبراير) حيث كانت 0.5317±0.005871 و 0.1717±0.0055 على التوالى.كما اشارة الى وجود فروق معنوية ما بين الشهور, المناحل, المواسم و المناطق.

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