



The Story of *Braula Coeca* (Bee Lice) in Honeybee Colonies *Apis Mellifera* L. in Libya

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Abstract – *Braula coeca* has been found in Libya since 1980s and the regular usage of miticides by beekeepers, to control varroa mites at the end of every season, resulted in the population of *Braula coeca* to decrease and disappear approximately in 1990. After beekeepers gradually reduced the utilization of miticides against varroa mites, and occasionally managing it without chemicals, *Braula coeca* reappeared in 2009. Questionnaire Survey results indicated that only 28% of the beekeepers can recognize bee lice from varroa. And the field study showed that the mean rates of parasitism due to bee lice did not exceed 0.5% in experimental colonies during interval periods.

Keywords – *Braula coeca*, Bee lice, infestation, *Varroa destructor*, *Apis mellifera* L., Libya.

I. INTRODUCTION

Honey bee *Apis mellifera* L., are infected with several diseases and attacked by parasites and pests similar to other animals [1]-[4]. The ectoparasite *Braula coeca* Nitzsch (bee lice) attack honey bee colonies, they are not true lice, but are highly modified wingless flies, the adult have lost the halteres as well as the wings, the eyes are reduced, and the claws are specially adapted [5], [6]. The adults apparently do not feed on honey stored in the cells, but rather take their food directly from the mouth of the host bee [7]. The presence of the bee louse, *Braula coeca*, was reported around the world [8] and in most African countries, from the north, such as Tunisia, Egypt, Algeria in 1981 and Morocco [9]-[12], to central and southern of the continent, in Ethiopia, Nigeria, Benin and South Africa [13]-[16].

Bee lice were found in Libya since the 1980s, however, when and how it was introduced into the country is unknown [10]-[12]. After the ectoparasite, *Varroa destructor* Anderson and Trueman, was introduced to Libya and spreaded through the western area apiaries in 1986, the regular usage of miticides by beekeepers, especially Apistan "fluvalinate" to control varroa mites at the end of every season, resulted in the decrease and disappearance of the population of *Braula coeca* approximately in 1990. At the turn of the century, beekeepers gradually reduced the usage of miticides against varroa mites, and by managing it without chemicals occasionally, *Braula coeca* reappeared in 2009.

The aim of this study was to assess the level of infestation by the bee lice among apiaries in northern west of Libya using a questionnaire survey, also to determine if the beekeepers could distinguish between bee lice and varroa mites. In addition, a small experiment was conducted to evaluate the rate of infection by the bee lice for three different periods in January, June, and October 2015 Tripoli area.

II. QUESTIONNAIRE SURVEY AND A FIELD STUDY

According to the harmlessness of the bee lice that probably pose limited threats to bee colonies in Libya, it became unknown to many beekeepers. A questionnaire was distributed to Libyan beekeepers to assess their abilities to recognize the bee lice and if they can differentiate between it and the varroa mites. The questionnaire included beekeeper experience, number of colonies owned, whom inspecting the colonies, if they relocate the apiary to another site, if their apiaries had been infested with bee lice and varroa mites, and their abilities to differentiate between both of them.

A field study was conducted to evaluate the status of infestation for three different periods in January, June and October 2015. About 200 to 300 adult honey bees were collected from each six colonies from apiary in Tripoli region and preserved in containers with kerosene, before being transported to Honey bee laboratory at the Faculty of Agriculture, University of Tripoli, for examination to determine bee lice infestation rates. A shaker were used for 10 minutes to detach the bee lice from bees, and then poured the jar contents on sieve 3x3 mm dimensions to separate the bee lice. The numbers of bees and bee lice were calculated to assess the infestation rate (number of *B. coeca* per 100 bees).

III. RESULTS AND DISCUSSION

In a recent study, occurrence of *B. coeca* was detected only in apiaries of the western region of Libya in weaken colonies [12]. So, most of the beekeepers whom answered the questionnaire were from this area in Libya. The results showed that the average beekeeper experience was 14 year of working with bees, and the average of colonies owned was 27 colonies per beekeeper. All beekeeper in this Questionnaire were inspecting their colonies by themselves and 86% of them moved their colonies to other places for food resources. The results also indicate that 78% of the beekeepers had no previous bee lice infection while colonies of the remaining 22% had been infested by the bee lice. Only 28% of the beekeepers can recognize bee lice and 72% cannot differentiate it from varroa mites, because of their similarities in appearance with the varroa mites, some Libyan beekeepers have difficulty in to discriminate between both of them [11]. In addition, relocating the colonies to new locations could spread the bee lice; however, 65% of the beekeepers who relocate their colonies had no infection, where as 22% of them had infestation with the bee lice. Although the percentage of the beekeepers who

answered owned colonies that were free of the bee lice was very high compared to those who had infection, that doesn't mean their colonies had not been infected before or at the questionnaire time because as mentioned above, 28% of the were able to distinguish between the bee lice and the varroa mites.

Moreover, 76% of the beekeeper in this study were using chemical acaricide to control the varroa mites, which could have an effect on controlling the bee lice too.

The infestation increased to become obviously on queens, workers and drones. Also tunnels appeared under sealed honeycomb (Fig. 1), because it is believed that bee lice larvae feed on honey and pollen while tunneling under the cell capping [17]. Smith and Caron [18], in testing bee lice preferences among workers, queens and drones, found that 62% of the queens which were inspected in June had infestation with the bee lice, while 36% of the workers and 2% of the drones. The highest number of bee lice were nine found and collected from the body of one queen, between thorax, abdomen in this experiment, (Fig. 2). The mean rates of parasitism due to bee lice did not exceed 0.5% in experimental colonies during interval periods (Fig. 3) and there was no significant difference throughout the three periods of investigation. Although, Zaitoun et al. [19] had mentioned that the numbers of bee lice differed depending on the host subspecies and the time of the year, they found that the highest number of the bee lice on *A. mellifera carnica* was on May, whereas on *A. mellifera syriaca* was on December through out three years of study. This field study supported the data which collected through the questionnaire survey. However, in Ethiopia a study revealed that there is a real threat due to bee lice infestation, predators, chemical pollution and drought to beekeeping and honey production [20]. Whereas Strauss et al. [21] suggested that the low infestation rates of *V. destructor* and *B. coeca* had no significant effects on the health of the honey bee population in South Africa. Bee lice usually considered harmless, however, the great numbers of adults sometimes found on a queen may reduce her egg laying [5]. In Yugoslavia the widespread use of acaricides to control *V. destructor* has reduced the prevalence of *B. coeca* in most regions [22]. The effects of fluvalinate was supported by Kulincevic et al. [22], large numbers of *B. coeca* was killed when honey bee colonies was exposed to fluvalinate in Yugoslavia. In Jordan, using tobacco some decreased the number of bee lice [23]; in addition, AL Ghzawi et al. [23] claimed that the beginning of the summer seasons is the best time in managing bee lice, they found that the colonies which treated with tobacco smoke produce higher quantities of honey. In Libya up to now bee lice are not considered a major pest threat, and there is no suggestion of practical control.

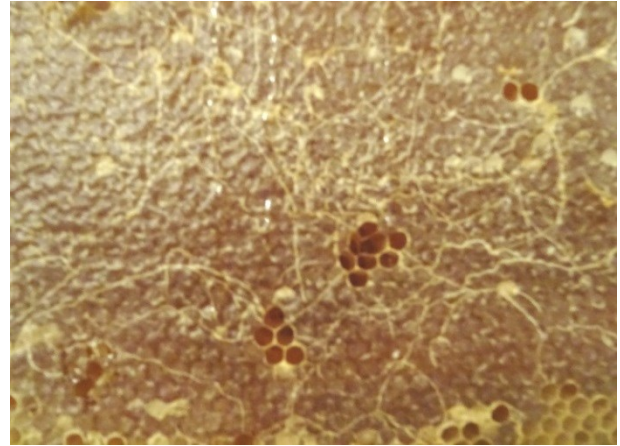


Fig. 1. Tunnels by *Braula coeca* larva appeared under capping of sealed honeycomb. Photo by Alfallah.



Fig. 2. Nine *Braula coeca* adults collected from one queen. Photo by Alfallah.

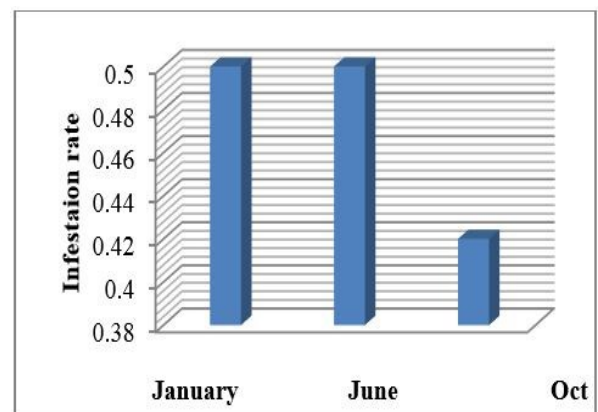


Fig. 3. The infestation rate of bee lice per colony in an apiary in Tripoli, Libya 2015.

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