

NOTE: RECORDING OF SOME BEETLES IN HONEY BEE COLONIES

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ABSTRACT. Honey bees are very valuable to human. These social insects contribute in the pollination of many crops. Also, the products from honey bee colonies have many nutritional and medicinal benefits. Thus, keeping honey bees are very valuable and can be considered as a source of income to many families. There are many diseases and pests that attack honey bee colonies. The pests attack bee colonies include; hornets, wax moths, bee-eater birds, and beetles. Such challenges can impact the survival and productivity of honey bee colonies. In this study, some beetle species belong to Fam. Nitidulidae, Dermestidae and Mycetophagidae were detected in honey bee colonies in Egypt, during spring. Despite the presence of many beetle species in the agricultural environment, only few species preferred the invasion of the colonies for feeding. These beetles do not attack stages of honey bees. They only feed on stored pollen or bee bread especially those fallen on the bottom of the beehives. This is an alarm to follow the feeding behavior and distribution of these beetles. These beetles' species can be considered as potential pests to weak honey bee colonies,

housed in old or damaged beehives. The presence of large numbers of these beetles in weak colonies may disturb the activities of the bees and may passively impact the survival of the colonies. Listing these beetles is very important to better understanding the interaction between honey bees and beetles. On the other side, small hive beetles were not detected in the colonies. These beetles are currently one of the major problems facing honey bees in different parts of the world. This study confirms the absence of small hive beetles from Egypt.

Keywords: Nitidulidae; Dermestidae; Mycetophagidae; debris.

INTRODUCTION

Honey bees, *Apis mellifera* L., provide the agricultural sector with pollination services for many crops. Any decline in number of bee colonies can impact these vital services greatly. The recent

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phenomena of the disappearance of honey bees, which known as colony collapse disorder (CCD), increased the public awareness about the vital importance of honey bees as plant pollinators. Many studies have been performed to investigate the exact reasons behind the disappearance of honey bees. Diseases of honey bees are considered as possible reasons behind this phenomenon, beside other environmental problems include the pollution with pesticides (VanEngelsdorp *et al.*, 2009; Neumann & Carreck, 2010). Another threat to bee colonies is pests of honey bees. These pests include: bee eaters, hornets, bee wolves, and small hive beetles (SHB) *Aethina tumida* Murray (Fam. Nitidulidae). SHB is a dangerous enemy to the bee colonies. These beetles feed as larvae and adults on bee food and larvae, but pupate in the soil (Neumann *et al.*, 2013), and can destroy the colonies in case of high infestation. These beetles are existed in some countries, including South Africa and the USA. In United States, the SHB is a new pest to bee colonies and showed genetic similarities to those from South Africa (Evans *et al.*, 2000). The SHB was detected in Egypt as reported by Mostafa & Williams (2000), but at present these beetles are not existed in the Egyptian apiaries according to extensive surveys. Thus, it has been suggested that these beetles are not well established in Egypt (Hassan & Neumann, 2008). SHB occurs in some parts in Sudan (El-Niweiri *et al.*, 2008). Recently,

SHB was reported in Italy (Palmeri *et al.*, 2015).

There are other species of beetles that can attack bee colonies. These beetles are not well documented and studied. For example, in southern and eastern Africa, the hive beetles *Oplostomus fuliginus* Olivier, 1789 and *Oplostomus haroldi* Witte, 1880 (Coleoptera: Scarabaeidae), respectively are pests to honey bees and predate on brood (Tihelka, 2016). Also, some beetles are considered as pests to other bee species. The wax beetle, *Platylolium alvearium* Blair (Coleoptera: Tenebrionidae), was recorded in north-eastern of India and has been considered as pest to the Indian honey bee (*Apis cerana himalaya*) feeding on wax (Pande *et al.*, 2015). The black fungus beetles (*Alphitobius laevigatus*, Coleoptera: Tenebrionidae) are associated with *Apis cerana* (Maitip *et al.*, 2017). In Brazil, the histrid beetle *Omalodes foveola* (Coleoptera: Histeridae) has been found as co-inhabiting Africanized honey bee hives, beside native bees (Meliponinae) (Krüger *et al.*, 2017). It seems that bee colonies are the target to many beetles. Here, beetles were captured from bee colonies and identified to shade more lights on the beetle species which can attack bee colonies.

METHODS

Honey bee colonies

The study was conducted at an apiary at Damanhour city, El-Behera governorate, Egypt, during spring 2017. Egyptian Carniolan honey bees, housed in

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Langstroth beehives were utilized in this study. The beehives were provided with bottom drawers with few holes to facilitate the accession of beetles to inside the colonies. All the colonies were provided with the same feeding type during the study period. Each colony contained five combs covered with bees (three brood combs and two food combs).

Collection and identification of beetles

The colonies were inspected carefully on weekly basis to monitor the presence of any beetles on the hive combs or in the hive bottoms. The beetles were detected only in the drawers of the beehives. The detected beetles were died and with hard bodies. The beetles were placed in Eppendorf tubes and then were photographed and were identified. The feeding behavior of these beetles and the potential damages to bee colonies were discussed.

RESULTS AND DISCUSSION

The detected beetles were one species (Fig. 1) belong to Fam. Dermestidae (*Attagenus fasciatus*) (Thunberg), and four species (Figs. 2 and 3) belong to Fam. Nitidulidae (*Epuraea* sp., *Carpophilus hemipterus* (L.), *Urophorus* sp. and *Carpophilus* sp.), and *Litargus* sp. (Fig. 4) from Fam. Mycetophagidae. Some beetles were found dry in the beehives, thus it was not possible to identify their species name.

The *Attagenus fasciatus* is cosmopolitan, especially in warmer regions. This beetle feeds on some materials of animal origin, including wool, fur, skins and is considered as

pest to stored food (Robinson, 2005). Also, it was considered as pest to stored seeds of *Eucalyptus* spp. in Karnataka, India (Rajashekhargouda *et al.*, 1985). Food type and environmental conditions can impact the developmental period of the immature stages of *Attagenus fasciatus*, and females live longer than males (Ali, 1993). Low relative humidity (RH) showed passive impacts on the development of these beetles (Ali *et al.*, 2011). These beetles can feed on stored pollens inside honey bee colonies, especially weak ones. The effects of stored pollen, in comparison with other food types on the development of these beetles, may require further investigations.

The four species from Fam. Nitidulidae are cosmopolitan. These beetles, in general, feed on stored food, and perhaps attack fruits in the field. *Carpophilus hemipterus* can complete the development at range of temperatures from 20 to 42.5°C (James & Vogele, 2000). This reflects the ability of these beetles to adapt with various environments. These beetles can feed on stored pollen inside weak colonies, without harming immature stages of honey bees.

The beetles from Fam. Mycetophagidae are mostly feed on fungi (Arnett *et al.*, 2002). A species from *Litargus* was recorded in Brazil feed on Fungi associated with fruit trees, and a significant positive correlation was detected between abundance of this beetle and RH (Milléo *et al.*, 2011). These beetles

may invade weak colonies, especially when the moisture inside the colony is

high and rotten pollens are existed.



Figure 1 - *Attagenus fasciatus*



Figure 2 - *Epuraea* sp. (A) and *Carphophilus hemipterus* (B)



Figure 3 - *Urophorus* sp.



Figure 4 - *Litargus* sp. (*Mycetophagidae*)

CONCLUSION

The detected beetles are expected to be pests to weak honey bee colonies, housed in old or damaged beehives. The invasion of large numbers of these beetles to bee colonies to feed on stored food can expose the immature stages to the risk of starvation. This can lead to the loss

of weak colonies. Following the distribution and feeding behavior of these beetles is advisable.

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