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Incidence of Parasitic and Non-Parasitic Mites of Honeybee, *Apis mellifera* (Linnaeus)

Ghada S. Refaei; Walaa R. Abou Zeid and Ola M. Roshdy
Plant Protection Research Institute, A. R. C., Dokki, Giza

ABSTRACT

A quantitative and qualitative survey of mites associated with of honeybee in Egypt was conducted in the present study. Data revealed that, the occurrence of 23 species of mites in beehives belonging three suborders: Mesostigmata, Prostigamata and Astigmata. These mites divided into parasitic and non-parasitic. The most important parasitic species collected in this study was the *Varroa destructor*. Non-parasitic mite species had been rarely collected and not frequent associate with honeybee. Some mites can prey on other mites and small arthropods (predators of scavengers), while others are pollen feeder, scavengers or use the honeybee just for transport from one plant to another. Data illustrated the geographical distribution of each species along with and type of associations.

INTRODUCTION

The honeybee, *Apis mellifera* L., is the world's most important single species of pollinator in natural ecosystems, whose damage has serious negative economic implications for both beekeeping industry and agriculture (Melathopoulos *et al*., 2000).

Mites make up the largest and most diverse group of honeybee associates due to the favorable conditions of the hive environment. Most of these mites are parasitic, nonparasitic, omnivorous, and pollen-feeding species, *Varroa destructor* (Anderson&Trueman) and *Acarapis woodi* (Rennie) are the most important parasitic species of honeybee (Ahn *et al*., 2015 and Mordecai *et al*., 2016).

The *varroa* mite is the most serious pest of the honeybee (*A. mellifera*) worldwide; it causes serious problems to beehives due to its parasitic relationship with bees (Anderson and Trueman, 2000). Although Several investigators have been studied *Varroa* mites and their impact on honeybee, there are less knowledge on other mite species associated with bees.

The study of incidence, diversity, host associations and distribution of mites associated with honeybee is necessary to monitor the economically important species and manage their effects on beehives. So, the objective of the present work was to investigate the incidence, type of associations and diversity of mites associated with honeybee in Egypt.

MATERIALS AND METHODS

An intensive survey was carried out during two successive years (2015-2016), throughout most Egyptian Governorates to study the incidence, prevalence & diversity of mites associated with honeybee.

The samples were collected using different methods: adult bees sampled by brushing them from the brood combs into jars filled with alcohol. To monitor the level of mite infestations in hives continuously, a white paper or plastic sheet was placed on the bottom boards under a wire frame, where falling mites were trapped and wire kept bees from removing them (De Jong *et al.,* 1982). For the separation of different mite species from of hive debris, pollen, dead bees and brood combs, the modified Tullgren funnels were used for 24 hours. The mites were received in Petri-dishes filled with water. A close examination of honeybee trachea was used to detect and survey *Acarapis woodi* infesting bees.

All the different stages of collected mites were recorded, counted and cleared in Nesbitt's solution, then mounted in Hoyer's medium on glass slides for further microscope examination.

Different identification keys had been used to identify samples (Lindquist & Evans, 1965; Summers & Price, 1970; Hughes, 1976; Krantz, 1978; Zaher, 1984; Zaher, 1986).

RESULTS AND DISCUSSION

In the present study, an intensive survey of beehives declared that 23 species of mites are commonly associated with honeybee in Egypt. These mites may be divided into: parasites, scavengers, predators of scavengers and phoretics. *Varroa destructor* (Anderson&Trueman) is the most important parasitic species (Sammataro *et al*., 2000).

Most of the non-parasitic mites had been rarely collected and arrived beehives accidentally. Some mites are predators on other mites and small arthropods, while others feed on pollen, old provisions or use the honeybee just for transport from one plant to another (De Jong *et al*., 1982 and Refaei, 2001).

Table (1) showed that, three suborders of mites (parasitic and non-parasitic) associated with bees were collected: Mesostigmata (Gamasida), Prostigmata (Actinedida), and Astigmata (Acaridida).

Non-Parasitic mites associated with honeybee:

In this study several mesostigamid mites were recorded in association with honeybee, including: *lasioseius sp*., *Blattisocius tarsalis*, *Proctolaelaps orientalis* and *Proctolaelaps sp*. *(*ascid mites*)* within the dead bees, brood comb & hive debris. Meanwhile, three laelapid species were collected from beehive debris. Several laelapid and ascid mite species were collected from bees worldwide, most of these mites feed on old provisions, small arthropods, pollen or phoretic on adult bees without causing any significant damage (De Jong *et al.*, 1982; Eickwort, 1994; OConnor and Klimov, 2004). However, the laelapid mite, *Tropilaelaps* is a genus that parasitize the brood of Asian honeybees & European honey bees (*A. mellifera*) & causes damage similar to *Varroa* and leads to colony decline and collapse (Lilia, *et al*., 2017)

The Macrochelid and Parasitid mites are phoretic on adult bees feed on other small arthropods (Richards and Richards, 1976; OConnor; Refaei, 2001and Klimov, 2004). In the present work, Macrocheles glaber & *Parasitus sp.* were rarely recorded from samples of hive debris. Schousboe, 1987, found *Parasitus* species in association of bumblebee nests in Canada.

In Table (1) Prostigmata were represented by 8 mite species found in association with honeybee in Egypt.

The cheyletid species, *Cheyletus eruditus* and *C. malaccensis, Cheletogenes ornatus* & *Eucheyletia sp.* were observed from adult bees and hive debris. These mites are phoretic on bees & feed on other mites and small arthropods. Several cheyletid genera were recorded as phoretic on carpenter bees & honeybee (De Jong *et al*., 1982; El-Naggar, 1982; El-Erksousy, 1996; Walter *et al*., 2002; OConnor and Klimov, 2004).

The Progamsid mites, *Tydeus and Anystis* are the most common plant-inhibiting genera recorded from beehives in this survey. These mites had been rarely collected, the levels of associations were unknown, although phoretic association was suggested.

The tarsonemid mite*, Tarsonemus* sp., was rarely collected from pollens (table 1), which support the suggestion that this mite is a probable pollen feeder not a parasite. Accordingly, several species of the genus *Tarsonemus* were recorded previously from honeybee [De Jong *et al*. (1982, Europe); Senna (1997, Egypt)].

The work presented herein indicated that five Astigmata mites were surveyed from beehives.

Most astigmatid mites are scavengers they live on the hive's floor, feeding on bee debris, dead insects and fungi (Chmielewski, 1989& Sammataro *et al*., 2000). In the present study, high abundance of these mites was collected from hive debris including: *Acarus farris, Caloglyphus sp. Tyrophagus putrescentia, Glycyphagus destructor & Glycyphagus* sp. These mites feed on fungi, pollen, stored pollen and honey and may introduce fungi to colonies. several authors recorded astigmatid mites associated with bees worldwide (OConnor, 1982; Baker *et al*., 1983; Fain and Gerson 1990; Senna, 1997; OConnor and Klimov, 2004)

Parasitic mites associated with honeybee:

Varroa destructor (Anderson and Trueman, 2000), previously known as *Varroa jacobsoni*, is considered the most dangerous parasitic mite of the honeybee, *A. mellifera* worldwide.

Table (1) illustrated that *Varroa* mites were detected in most inspected beehives

The parasite attacks different developmental stages of honey bees and feed on their internal tissue causing a severe damage and loss to colonies and in the process can vector a number of viruses (Mordecai *et al*., 2016).

Table 1. Incidence parasitic and non-parasitic mites associated with the honeybee *A. mellifera.*

Family	Mite species	Locality	Abundance
Suborder: Mesostigmata			
Ascidae	*Lasioseius sp.*	Fayoum	+
	Proctolaelaps orientalis Nasr	Giza	+
	Proctolaelaps sp.	Giza	+
Laelapidae	*Blattisocius tarsalis* (Berlese)	Fayoum	+
	Ololaelaps ussuriensis Bregetova & Koroleva	Giza	+
	Androlaelaps casalis (Berlese)	Giza	+
	Ololaelaps sp.	Fayoum, Giza	++
Macrochelidae	*Macrocheles glaber (Muller)*	Fayoum	+
Parasitidae	*Parasitus sp*	Fayoum	+
Varroidae	*Varroa destructor* Anderson & Trueman	All studied Gov.	+++
Suborder: Prostigmata			
Anystidae	*Anystis* sp	Giza	+
Cheyletidae	*Cheyletus malaccensis* Oudemans	Giza	+
	Cheletogenes ornatus (Can. & Fanz.)	Sharkia, Giza	+
	Cheyletus eruditus (Schrank)	Giza	++
	Eucheyletia sp	Beni-Suef	+
Pyemotidae	*Pyemotes sp.*	Giza	+
Tydeidae	*Tydeus sp.*	Giza	+
Tarsonemidae	*Tarsonemus apis*	Fayoum	+
Suborder: Astigmata			
Acaridae	*Acarus farris (Oudemans)*	Fayoum	++
	Caloglyphus sp.	Giza, Fayoum	++
	Tyrophagus. putrescentia (Schrank)	Menofia, Giza	+++
Glycyphagidae	*Glycyphagus destructor (Schrank)*	Fayoum	++
	Glycyphagus sp.	Giza, Dakahlia	+++

+: rare (1-3 mites) ++: moderate (3-9 mites) +++: high (more than 9 mites)

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تواجد الأكاروسات المتطفله والغير متطفله علي نحل العسل في مصر

غادة رفاعي ، ولاء ابوزيد وعلا رشدي
معهد بحوث وقاية النباتات ـ مركز البحوث الزراعية

أسفرت عملية الحصر الكمي والكيفي للأكاروسات المرتبطة بنحل العسل في مصرعن وجود 23 نوع من الأكاروسات منها ما هو متطفل اوغير متطفل وكان أهمهما على الإطلاق وأكثرهم انتشارا من طفيل الفارو . اما الاكاوسات الغير متطفله ، فمنها ما هو مفترس ، مترمم أو مستخدماً الحشرة كوسيلة انتقال من مكان لأخر . هذا وقد اوضحت عملية الفحص والتصنيف أن هذه الأكاروسات تنتمي لتحت رتبة الحلم ذات الثغر المتوسط، الحلم ذات الثغر الأمامي، الحلم عديم الثغر ، والحلم الخنفسى .