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SURVEY ON MAJOR HONEY BEE: *APIS MELLIFERA* (HYMENOPTERA: APIDEA) INSECT PESTS IN AL-QADISIYAH GOVERNORATE, IRAQ,

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Abstract

Honey bee (*Apis mellifera*) colonies are subjected to several insects that influence adult bees and larvae. Thus, this study aimed to describe the recognition of the some more common pests in five locations (A, B, C, D, and E) in Al-Qadisiyah province, Iraq. Several samples of insects (*Galleria mellonella*, *Vespa orientalis*, and *Monomorium pharaonis*) were collected from the period of 01/06/2020 to 01/06/2021 to identify the insects. The results showed that the most sites in Al-Qadisiyah province were infested with Oriental hornet and ant more than Greater wax moth. Significant differences of infection with the Oriental hornet compared with other insects was observed in the two Locations C and E in Al-Qadisiyah province. The study indicated that *Vespa orientalis* was the most common insects of the honey bee in Al-Qadisiyah with a recommendation not to depend on the visual inspection to identify the infection of pests.

Keywords: Honey bee, Insects, Ant, Greater wax moth, Oriental hornet.

Introduction

Honey bees (Apis mellifera) cause large ecological impacts, which is related to its role in the pollination of a wide range of plant species in the world. Moreover, honey bees have been utilized as a natural source and multifunctional products such as beeswax, venom, royal jelly, pollen, and honey (Al-Ameri et al., 2022; Johny et al., 2021; Neov et al., 2019). In Iraq, the one of most ecologically and economically important insect species is honey bee. (Al-Ameri and Alhasan, 2020). The lifecycle of honey bees consists three main stages, including larval, pupal, and adult stages. The colony of honey bees consists a queen, several thousand of workers (facultatively sterile females), and a few thousand of drones (seasonal males) (Ranger and Fisher, 2019). The honey bee colonies have been known in Iraq since 6000 B.C. when the first reported on honey bee production found writings on the clay tablets. However, the honey bee colonies can be influenced by different abiotic and biotic factors, which influence the honey bee production and decline the number of honey bee colonies in Iraq. the biotic factors include different natural enemies, including pathogens, parasites, and different pests. Thus, the production of honey bee colonies can be influences negatively and declined the number of honey bee colonies in the world (Faraj, 2019; Abdulhay and Yonius, 2020; Parveen et al., 2022).

The decline in the number of homey bee colonies has been reported in many countries in Asia during the winter and summer seasons. The colony losses are difference depending on the environmental conditions. In the tropical and semi tropical regions, beekeeping is mostly infected by different pests leading to economic losses in the honey bee production (Chemurot et al., 2016).

In Iraq, the most damaging pest and predators identified in the honey bee colonies are the hornets, ants, and wax moths causing beekeeping to abscond its hives (Kadhem and Hamza, 2020; Faraj, 2019; Abdulhay and Yonius, 2020). Greater Wax Moth (GWM) is considered one of the most important insects of honey bee colonies, because GWM in the larvae stage can attack the beekeeping through making the tunnels and borings on the cell caps makes holes through which honey leaks out. Moreover, larvae and adults of GWM are considered as potential vectors of different apicultural pathogens (Kwadha et al., 2017). The oriental hornet is another important insect that attacks beekeeping in Iraq and other countries in the world. In Iraq, predation activity of *Vespa orientalis* L. on honey bees increases during the summer and reaches its maximum in October when the oriental hornet feeds its sexual brood. Thus, the honey bee production can be reduced when the hornets can be found the best combination of proteins from honey bees (queen, workers, and drones) and carbohydrates from honey (Requier et al., 2019; Glaiim, 2009). It is important to evaluate whether the existing natural enemies have had an effect on the high absconding rates of honeybees, as well as examine the prevalence of pests and predators plaguing Al-Qadisiyah's beekeeping practices. This study, therefore, was initiated with the following objective to assess the prevalence the pests and predators, and other factors causing honeybees to abscond from the existing beehives used by local beekeepers.

Materials and Methods

Study site and beekeeping research design

The field diagnostic data on the issues influencing honeybee abscondment and the testing of the newly designed beehives' efficiency were carried out from June 2020 to June 2021. The study was carried out at the different counties (A, B, C, D and E) in Al-Qadisiyah governorate, Iraq (Figure 1.).

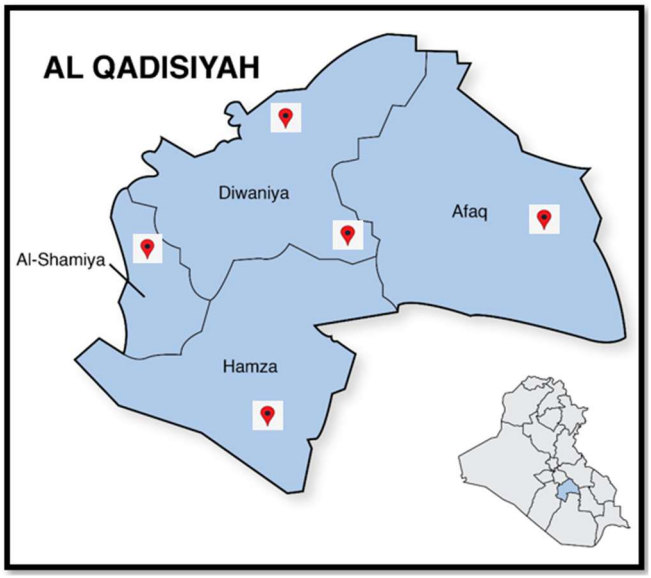

Figure 1. Locations of the populations studied.

Collection of GWM samples

The samples of greater wax moth (GWM) were collected from cells selecting randomly from each honeycomb base in a colony and kept to next test. When the colony of honey bees has been open, the wax foundation was tested by using the magnifying glass to identify if there is infection by GWM or not. The honeycomb base contains galleria mellonella and its tunnels, which mean the colony infected by GWM.

Collection of hornet samples

The samples of hornet *Vespa orientalis* were collected depending on the baiting method. The ground meat in five grams has been treated with the pesticide AGITA, and it was utilized in the baiting method to feed the hornets. It is also that hornet can be collected by using the insect net. Finally, the red hornet was collected and kept for next test.

Collection of ants samples

Ants sample was collected from its nest that is near from the honey bee colony. The sugar baits were used to collect the samples of ants. Moreover, other samples of ants were collected from inside of colony when the ants found on the cell root.

Statistical analysis

Data frequencies, graphs, and all statistical analyses were carried out by using Microsoft Excel 2017. The means were compared using last significant difference teat (LSD) at $P \leq 0.05$.

Results and discussion

The honeybee pests identified during the beehives commonly utilized by local beekeepers in five locations (A, B, C, D, and E) in Al-Qadisiyah, Iraq were greater wax moth (GWM), hornet, and ants. Different honey bee species were subjected to different pests and predators, with some influencing the stored food and adult bees in the beehives (Monceau et al., 2018). In general, most countries at the tropical regions in the world reported that greater wax moth (GWM), hornets and ants are significant enemies of the honeybee, which frequently cause the weak and abscond to the colonies of honeybee (Gela et al., 2017). From the different hives inspected in this study, 90% of the colonies were emptied due to abscondment caused by different pests of the bees. Hornets and ants had infected almost all tested beehives, while greater wax moth (GWM) was less observed in all studied beehives. This finding was also in line with many studies that have indicated that one of the significant damages to beehive were the existence of pests and predators (Jatema and Abebe, 2015; Kebede et al., 2015).

In Asia, the greater wax moth (GWM) is the most destructive pest of honeybee (Vijayakumar et al., 2019). In Iraq, GWM influences the colonies of honeybee have caused massive economic losses, which can reach up to a 90% economic loss for beekeepers during the summer season (Mohameed, 2020). Kwadha et al., (2019) reported that the colonies of honeybee and production are influenced by the larvae of GWM. In this study, GWM was less influenced the all studied beehives (Figure 2 and 3). However, GWM causes extensive damage to both bee combs and the brood frames of the beehives, which lead to destroyed the stored beeswax. Thus, the continuous infestation by GWM caused the colonies to be weakened and absconded. Hornets have been reported to be the most common predators of honeybees, that caused colonies to abscond in different countries in Asia (Sarwar, 2016). In this study, the hornet was one of the most predators

of honeybees found and caused massive economic losses (Figure 2 and 3). During the study, the hornet invasion on the honeybee colonies observed in the sixth week caused the honeybees to abscond by the seventh week. Moreover, the developing larvae and pupae of the bee will be killed when the hornets entered into a beehive. Ants have been reported to be a nuisance to the honey bee (*Apis mellifera*) colonies in the tropical region of Asia (Sarwar, 2016). In this study, the ants entered a hive to establish their nesting site and to steal honey and pollen, which particularly lead the honeybee colonies to be weaker. Another study has reported that ants were often challenging to control once they had established their nesting site in the hives, where they often destroyed the weak honeybee colonies (Aryal and Dhakal, 2020).

Conclusion

The health of honeybee colonies did not detect by any diseases. However, the high rate of intrusion was detected by pest and predators of honeybee, leading to bee abscondment, and may cause a severe threat to the beehive industry of Al-Qadisiyah in Iraq.

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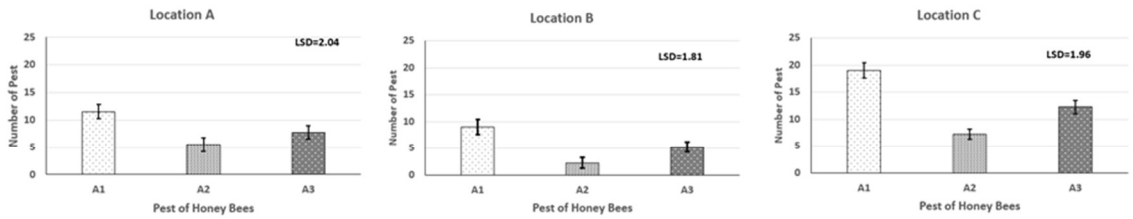

Figure 2. The number of honeybee pests including hornets (A1), GWM (A2), and ants (A3) in three locations (A, B, and C) in Al-Qadisiyah, Iraq.

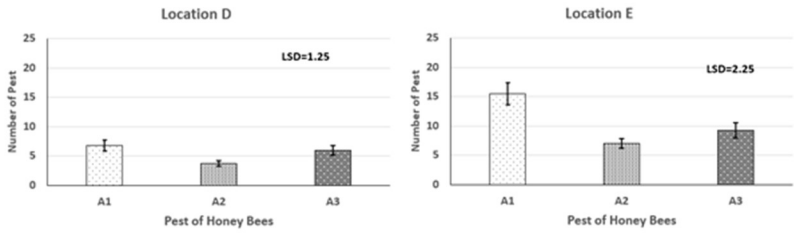

Figure 3. The number of honeybee pests including hornets (A1), GWM (A2), and ants (A3) in two locations (D and E) in Al-Qadisiyah, Iraq.

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