



Are There Honey Bees *Apis Mellifera* on Farwa Island, Libya?

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Abstract:

Islands and isolated areas are unique and important environmental habitats in the study of their biodiversity. Objectives: Determine the distribution and spread of honey bee species in Farwa Island, Libya, and classify them morphologically. Study area: Farwa Island is located about 150 km west of the city of Tripoli in the State of Libya at 33°. 05 N latitude and 11°. 40 E longitude. Methods: a survey to determine the distribution and spread of honey bees in Farwa Island, Libya by using sticky traps. Results: The results of the present work indicate that the study area is free of any diversity of honey bees from all the traps that were distributed in the study sites within the borders of Farwa Island.

Keywords: Libya, Farwa Island, Bees (*Apis Mellifera*).

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هل يوجد نحل عاسل *Apis mellifera* في جزيرة فروة بليبيا؟

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الملخص

تعد الجزر والمناطق المعزولة مواطن بيئية فريدة ومهمة في دراسة تنوعها الحيوي. الأهداف: تحديد توزيع وانتشار أنواع نحل العسل *Apis mellifera* في جزيرة فروة بليبيا وتصنيفه مورفولوجيًا (من ناحية الشكل الخارجي). منطقة الدراسة: تقع جزيرة فروة على بعد حوالي 150 كم غرب العاصمة طرابلس بشمال غرب عند خط عرض 33.05 درجة شمالاً وخط طول 11.40 درجة.

الطريقة: مسح لتحديد توزيع وانتشار نحل العسل في جزيرة فروة بليبيا باستخدام الفخاخ اللاصقة. النتائج: أشارت النتائج إلى خلو منطقة الدراسة من أي تواجد للنحل العاسل *Apis mellifera* من جميع المصائد التي تم توزيعها في مواقع الدراسة داخل حدود جزيرة فروة.

Introduction

The Mediterranean ecosystems are among the most important in terms of biodiversity (Pergent et al. 2002, p119). The honey bee is one of the most successful species in the animal kingdom. For the same species, the semi-desert has been adapted to as many different environmental conditions as possible to survive in tropical regions and climate conditions (Ruttner, 1988). The relation between human beings and bees is endemic in Africa where modern beekeeping has taken various forms, starting from wild honey harvesting from hollow nests of bees in hollow trees and clefts. Historically, hunting has been practiced in many countries. However, honey is much less known in the Mediterranean region. Honey hunting charts can be seen in many parts of Africa. In their paintings, bears, hunters and their primitive tools, (Essayah, 2018, p1).

Bees (Hymenoptera: Apoidea: Apiformes) likely arose in the Cretaceous, perhaps 120 million years ago, when they diverged from the carnivorous habits of their closest relatives, the sand wasps (Hymenoptera: Apoidea: Spheciformes). Flowering plants (angiosperms) had made their debut by this time (John, 2008, p419). There are more species of bees today than the sum total of mammals, reptiles, amphibians and birds; 17,000 species of bees have been described, perhaps another 10,000 await discovery. They are distributed among only seven families. The largest genus (*Andrena*) has 1,400 described species. Bees are native to all continents but Antarctica. Few species are found on isolated oceanic islands, but ranges of some hardy species extend well north of the Arctic Circle (John, 2008, p420).

Honeybees are hymenopterans, a group that generally feed on pollen and nectar and constitute about 20,000 species throughout the world, known taxonomically as the superfamily Apoidea (Michener, 2000). Although the question of how many honeybee species exist is still debated among taxonomists, at least four species are commonly recognized: the dwarf or midget bee (*A. florea*), the giant or rock bee (*A. dorsata*), the Asian bee (*A. cerana*), and the common European honeybee (*A. mellifera*) (Suwannapong et al, 2011, p3). *Apis* species are classified into two groups, based upon nesting. The first group builds single comb, open-air nests: *A. andreniformis*, *A. florea*, *A. dorsata*, *A. breviligula*, *A. binghami* and *A. laboriosa*. These bees are restricted to the Asian tropics and subtropics. The second group consists of species that nest inside cavities where they build multiple combs: *A. cerana*, *A. koschevnikovi*, *A. nigrocincta*, *A. nuluensis*, and *A. mellifera* (Hepburn and Radloff, 2011, p4).

Honey bees, *Apis mellifera* L., have many subspecies of which some are distributed in Europe and Asia, and others in Africa (Abou-Shaara, 2019, p96). The ability of the honey bee *Apis mellifera* Linnaeus, 1758 to adapt to a great variety of environments resulted in the evolution of numerous subspecies that deserves morphological and population analyses (Chahbar et al, 2013, p385). Honeybees of the genus *Apis* are the most studied because of their fascinating and complex lifestyle, communication systems, role as keystone pollinators of native plants, pollination of agricultural crops, and the valuable hive products that they produce, such as honey, royal jelly, bee wax, bee pollen, propolis and even bee venom (Suwannapong et al, 2011, p2).

In the last five decades beekeeping thrived and spreaded for wide regions in Libya. (Alfallah and Gajda, 2015, p15). Libya's coastline (1,770 km²) is the longest of any African country bordering the Mediterranean. The climate is mostly dry and desert-like in nature. However, the northern regions enjoy a milder Mediterranean climate. Most of commercial beekeepers are located in an agricultural belt that extends to about 30 km from the coast (Keshlaf, 2014, p37). The indigenous bee of Libya. "This bee has nothing to do with *A.m. intermissa* (Keshlaf, 2014, p37). It is reported to be similar in the color of the abdomen and the white hair of the thorax to the Egyptian, but larger and more docile (Ruttner. 1988, p211). Beekeeping in Libya has been practiced traditionally since early times (Keshlaf, 2014, p37). Over 25 subspecies of *A. mellifera* have been identified and biogeographic studies suggest a centre of distribution in the Middle East or Northeast Africa. Libya has been identified as a particular diversity hotspot for *Apis mellifera*, because it is here where the African biogeographic lineage "A" meets the Oriental lineage "O" (Shaibi and Moritz, 2010, p97).

Because Libya was historically so isolated, its local bees had no outside contact with other bees. The native bees have been described as predominantly of the Taillan race, *A. mellifera intermissa* (Keshlaf, 2014, p37:38). Shaibi 2013, indicated that bees from northeast Libya belong neither to *A. m. intermissa* nor to *A. m. lamarckii*. Also, Ruttner 1988 subsequently indicated, based on morphometric analyses of adjacent countries, that the Libyan honey bees belong to *A. m. intermissa*, in spite Shaibi et al, 2009 investigated honey bee populations of *A. mellifera* in Saharan and coastal locations in Libya to fill the North Africa gap of biogeography and distribution of honey bees. They found that Libyan honey bees are different, morphologically and genetically, from adjacent subspecies; and the majority of Libyan bees (92%) belong to oriental evolutionary lineage (O). As well as they also found local impacts of imported European honey bees. They suggested naming Libyan bees as a separate subspecies (Keshlaf, 2014, p38). It is also, a morphometrical analysis of Libyan bees from coastal and desert locations showed

that they are a unique distinguishable ecotype, distinct from both the adjacent *A. m. intermissa* and *A. m. lamarckii* (Shaibi, 2013, p40).

Islands and isolated areas are unique and important environmental habitats in the study of their biodiversity. Farwa Island is located about 150 km west of the city of Tripoli in the State of Libya at 33° 05' N latitude and 11° 40' E longitude. The island is about 12 Km in length with a maximum width of about 3 km, and the total area is about 31 Km². The island is connected to the sea on the west with an opening of 10 m wide (Essghaier et al, 2013, p79), and contains Farwa lagoon that covers an area of 32 km² and is the largest lagoon on the Libyan coast (Banana et al, 2016, p2). The Farwa Lagoon and Abukammash area comprise the Libyan stretch of the Gulf of Gabes, an area known for its high fishery productivity, but also its vulnerability to pollution and other man-made threats to the marine and coastal environment (IUCN, 2011, p38). This study aims to determine the distribution and spread of honey bee species in Farwa Island, Libya, and to classify them morphologically.

Material and methods

1.2. Study area:

Farwa Island in Libya is located about 150 km west of the city of Tripoli in the State of Libya at 33° 05' N latitude and 11° 40' E longitude. The island is about 12 Km in length with a maximum width of about 3 km, and the total area is about 31 Km², see Figure 1.

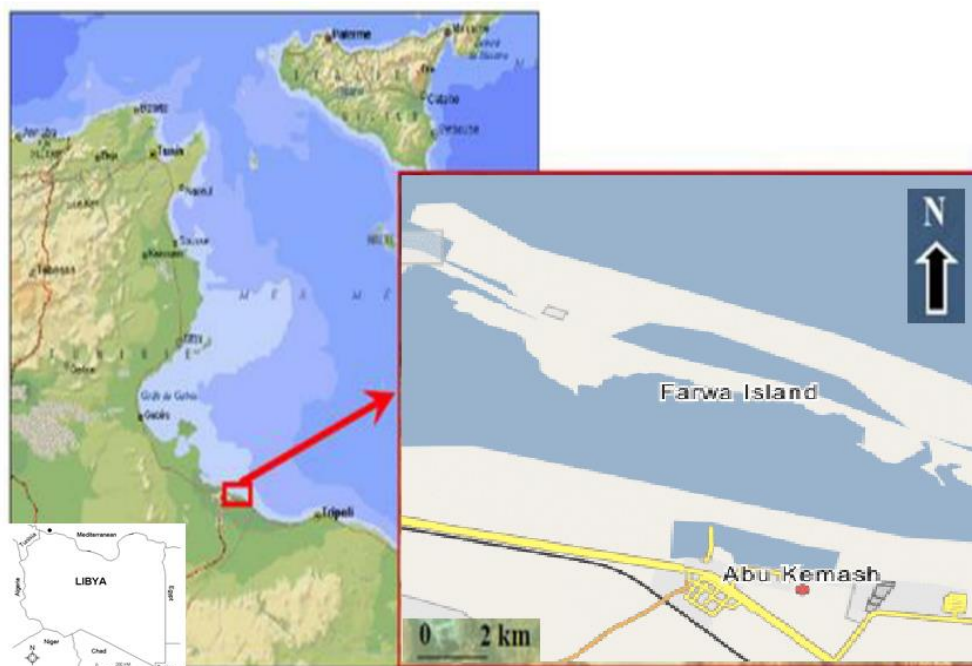


Figure 1 Study area (Farwa island) in the northwest of Libya.

2.2. Methods.

The researchers conducted a survey to determine the distribution and spread of honey bees in Farwa Island, Libya. Using sticky traps (Adhesive material on a paper plate containing a pot of honey) were placed in 14 sites covered within Farwa Island (fig 2) in different geographical areas (With monitoring the availability of flowering and nectar plants), situated between latitudes 33°05' and 11°40' E longitude, in the north-east and the south of Farwa Island, during three consecutive semesters, which are the spring, summer and fall semesters of year 2021. Subsequently, sticky traps were collected from different sites for study within the island range.



Figure 2 Sites placed Sticky traps within Farwa Island.

Results and discussion

The results of the present work indicate that the study area is free of any diversity of honey bees from all the traps that were distributed in the study sites within the borders of Farwa Island. This may be due to the scarcity of food, high salinity, climate warming, soil texture and lack of different habitats, even though all might be considered as limiting factors for the presence, abundance, diversity and stability of the Organisms prolong and form colonies in the area.

Shaibi in 2013 investigated honeybee populations of *A. mellifera* in Saharan and coastal locations in Libya to fill the North Africa gap of biogeography and distribution of honeybees, morphologically and using mt DNA analysis. It was found that Libyan honeybees are different, morphologically and genetically, from adjacent subspecies; and the majority of Libyan bees (92%) belong to the oriental evolutionary lineage (O).

These results are consistent with what was indicated by (El-Magsodi and Haddoud, 2011, p79) when study The Salt Marsh (Sabkha) in the Western Part of Libya, that most of the plants in the area (around the sabkha) are halophytes and desert species. These are not favored by animals, and there is no great variation between the flora of the mainland (the area around the sabkha) and that of the nearest island (Farwa Island). As indicated by Shaibi and Moritz, 2010, there are large sand deserts of the Sahara that preclude any survival of wild honeybees due to the complete lack of vegetation.

Furthermore, the lack of freshwater sources and their lack of availability in the study area may be a major factor in the lack of settlement of honey bees in the Farwa Island area under study, and this is consistent with what was indicated by Mercedes and Sarmiento 2000, the water is needed to maintain the osmotic balance of adult bees, prepare liquid food for the brood, and to cool the hive, which prevents irreparable damage to the brood. High ambient temperatures increase the consumption of water because intensive evaporative cooling is necessary.

It should also be noted that there is one of the largest sabkhas in the Abu Kammash area, adjacent to Farwa Island, which is characterized by the vegetation of xerophytes and halophytes with few date palms, the rest being coarse sand. Most of the plants in the area (around the sabkha). There is no great variation between the flora of the mainland (area around the sabkha) and that of the nearest island (Farwa Island).

Conclusion

From this study of the distribution and spread of honey bees, we conclude that Farwa Island has no general honey bee diversity. This may be due to the scarcity of food, high salinity, soil texture, and lack of different habitats. Furthermore, the lack of freshwater sources and their lack of availability on the island might be considered as limiting factors for the presence, abundance, diversity and stability of the honey bees in the area. Moreover, semiarid conditions are prevailing in the area.

Recommendations

The study recommended conducting other studies in order to determine more the reasons for the non-proliferation of honey bees in Farwa Island

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