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First Survey of Nectar and Pollen Sources for Honeybees in Matrouh Province of West Northern Egypt

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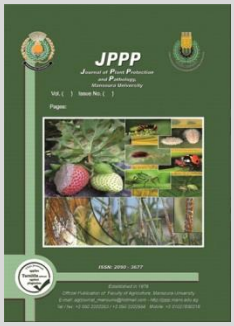

ABSTRACT

A study was conducted at an apiary belonging to Faculty of Desert and Environmental Agricultural, Matrouh University, and other apiaries in Matrouh province, West northern Egypt. during two successive years (2020 and 2021) to survey nectar and /or pollen sources in Matrouh province. Further, to determine the most important sources of pollen and nectar in the different places of the province. Survey showed that fifty one plant species belonging to 24 families were recorded as pollen and/or nectar floral resources in Matrouh province during the study period. Pollen floral resources in Matrouh province were 48 plants, where the nectar floral resources were 47 plants, they represented 94.1 % and 92.2%, respectively. The most important forages resources of pollen, nectar or both for honeybees in various districts were recorded by area, 9 plants flowering all over the year. The first time survey of bee plant resources in Matrouh province gives a good map to beekeepers for exploration this region as a guide for the suitable periods to transfer their colonies, as a way for more honey production and they can also get benefits from minor pollen sources in various province districts.

Keywords: Flora, Honeybee, Matrouh, Nectar, Pollen.

INTRODUCTION

Egyptian clover considered the main honey flow source in Egypt through April to June, citrus through March, cotton through July and August (Taha, 2005), and bananas through August and September (Taha, 2007). There is a large gap between successive seasons that negatively affects the life of honeybees (Taha, 2000, 2005).

In the case of scarcity of pollen, the queen is affected and may stop laying eggs, which leads to the weakness of the colonies (Manning, 2008; Taha and Alkahtani 2013). At that time, beekeepers must provide their colonies with food alternatives to pollen and nectar after harvesting (Taha, 2015a). Knowledge of the various confiscations of pollen and nectar make colonies more economic productivity (Carol, 1999; Taha, 2005, 2015b). Honeybee colonies are active throughout the year in tropical and sub-tropical regions due to availability of nectar and pollen sources through the months of the year (Neupane and Thapa, 2005). It is necessary for beekeepers to know the sources of pollen and nectar to plan well their beekeeping for economic productivity. That is why many studies around the world have been conducted to find out the sources of pollen and nectar like, in Brazil (Luz and Barth, 2012); in Costa Rica (Freitas, 1994); in Bulgaria (Atanassova and Lazarova, 2010); in Egypt (Taha, 2000; Helal et al., 2003; Fathy, 2008; Ismail et al., 2013; Abou-Shaara, 2015; Esmael et al., 2016; Taha et al, 2019); in Germany (Köppler et al., 2007; Beil et al., 2008); in India (Singh, 2003); in Iran (Mossadegh, 1990); in Italy (Fortunato et al., 2006); in Mexico (Villanueva, 1989); in Nibal (Paudayal and Gautam, 2011); in Nigeria (Dukku, 2003); in Palestine (Reyahi, 1999); in Philippines (Payawal et al., 1991); in Poland (Wróblewska et al., 2010); in Saudi Arabia (Taha, 2013, 2015a,c; Taha et al., 2016; Adgaba et al., 2017, Al-Kahtani et al., 2017; Taha et al., 2017); in Spain (Seijo et al., 1994); in Turkey (Bilisik et al. 2008); in USA (Baum et al., 2011). However, this is the first report that was interested with surveying the sources of pollen and nectar in one of the border desert provinces, in an attempt to help beekeepers to increase their productivity through transferring their hives to areas rich in these resources.

MATERIALS AND METHODS

Matrouh Governorate is located in the far northwest, extending from km 61 west of Alexandria to the Egyptian-Libyan border, 450 km long along the Mediterranean coast, and extending south into the desert at a depth of 400 km south of Siwa Oasis. Its total area is 166563 km^2, or about 16% of the area of Egypt. Matrouh lies at latitude 31˚ 21` 13` N and longitude 27˚ 14` 14`E. at an altitude of 7m. above sea level. It comprises 8 cities: Al hamam, El Alamein, Al Dubea, Marsa Matrouh, Al Najila, Salloum and Siwa.

This study is the first to survey sources of pollen and nectar for honeybees in Matrouh province during the year in an attempt to guide beekeepers and researchers with the most important information about places of distribution and spread of pollen and nectar sources in the governorate centers and their flowering times as listed in Tables (1).

The present study was carried out at the Faculty of Desert and Environmental Agricultural, Matrouh University, and other apiaries in Matrouh province during two successive years (2020 and 2021).

Recording of all plant species which were observed to be visited by honeybee workers was carried out throughout the two years in the eight regions that represented Matrouh province. Unidentified plant species were collected, transferred to the laboratory, then identified and recorded. Each source was identified by its scientific name and botanical family. Average date of the blooming period of each plant and the value for bees as a source of nectar and/or pollen were recorded.

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During the study in Matrouh Governorate, the most important sources of pollen and nectar or both were identified in the different centers of the governorate, as well as obtaining the area by feddan of each crop and flowering dates.

Table 1. Sources of pollen and nectar floral in Matrouh province during 2020 and 2021

	Common name	Scientific Name	Family	Flowering Period	Source	
					Pollen	Nectar
		Medicinal, aromatic and ornamental plants				
1	Mint	*Mintha* spp	Lamiaceae	June to October	-	+
2	Caraway	*Carum carvi*	Umbelliferae	April and may	+	+
3	Roselle	*Hibiscus Subdariffa*	Malvaceae	November and December	+	+
4	Basil	*Ocimum* sp	Lamiaceae	January-December	+	+
5	Marguerite	*Argyranthemum frutescens*	Asteraceae	December to April	+	+
6	Yellow Sweet clover	*Melilotus* spp	Fabaceae	February to April	+	-
7	Wild mustard	*Brassica* nigra	Brassicaceae	March to May	+	+
8	Black seeds	*Nigella sativa*	Ranunculaceae	February to April	+	+
9	Marjoram	*Origanum majorana*	Lamiaceae	July to August	+	+
10	Borago	*Borago officinalis*	Boraginaceae	March - April	+	+
		vegetable crops				
11	Watermelon	*Citrullus lanatus*	Cucurbitaceae	April - May	++	++
12	Squash	*Cucurbita pepo*	Cucurbitaceae	April to September	+	+
13	Eggplant	*Solanum melongena*	Solanaceae	March -December	+	+
14	Cucumber	*Cucumis sativus*	Cucurbitaceae	January -October	+	+
15	Cantaloupe	*Cucumis melo* var. *cantalupensis*	Cucurbitaceae	April - may	+	+
16	Tomato	*Solanum lycopersicum*	Solanaceae	March -December	+	+
17	Chili pepper	*Capsicum annuum*	Solanaceae	March -December	+	+
18	Muskmelon	*Cucumis melo*	Cucurbitaceae	April -May	+	+
19	Cabbage	*Brassica oleracea var. capitata*	Brassicaceae	February - April	+	+
20	Artichoke	*Cynara cardunculus var. scolymus*	Asteraceae	August - November	+	-
21	Cucumis	*Cucumis melo flexuosus*	Cucurbitaceae	January - October	+	+
22	Okra	*Abelmoschus esculentus*	Malvaceae	June - September	-	+
23	Pumpkin	*Cucurbita maxima*	Cucurbitaceae	August -September	+	+
24	bean	*Phaseolus vulgaris*	Fabaceae	September - October	+	+
25	Carrot	*Daucus carota*	Apiaceae	March - April	+	+
26	Pea	*Pisum sativum*	Fabaceae	October - January	+	+
27	Cauliflower	*Brassica oleracea var. botrytis*	Brassicaceae	March -May	+	+
28	Faba bean	*Vicia faba*	Fabaceae	January -March	++	++
29	Onion	*Ailium cepa*	Amaryllidaceae	May -June	+	+
		fruit crops				
30	Apricot	*Prunus armeniaca*	Rosaceae	February - March	+	+
31	Apple	*Malus* sp	Rosaceae	March - April	+	+
32	Peach	*Prunus persica*	Rosaceae	February - March	++	++
33	Plum	*Prunus domestica*	Rosaceae	February - March	+	+
34	Date palm	*Phoenix dactylifera*	Arecaceae	March - April	++	-
35	Mango	*Mangifera* sp.	Anacardiaceae	March - April	+	+
36	Carob	*Ceratonia siliqua*	Fabaceae	September -October	+	+
37	Barbary fig	*Opuntia ficus-indica*	Cactaceae	April - May	+	+
38	Persimmon	*Diospyros kaki*	Ebenaceae	July - August	+	+
39	fig	*Ficus carica*	Moraceae	June -September	-	+
40	Olive	*Olea europaea*	Oleaceae	April -May	+	+
41	Almond	*Prunus dulcis*	Rosaceae	December - March	+	+
42	Grape	*Vitis* spp	Vitaceae	March -May	+	+
43	Orange	*Citrus sinensis*	Rutaceae	March -April	+	++
44	Tangerine	*Citrus nobilis*	Rutaceae	March - April	+	++
45	Guava	*Psidium guajava*	Myrtaceae	May - July	+	++
46	pomegranate	*Punica granatum*	Lythraceae	March - April	+	+
		Field Crop				
47	Corn	*Zea mays*	Poaceae	June -November	++	-
48	Sesame	*Sesamum indicum*	Pedaliaceae	July - August	++	++
49	Alfalfa	*Medicago sativa*	Fabaceae	March - November	++	++
50	Sunflower	*Helianthus annuus*	Asteraceae	July - August	++	++
51	Egyptian clover	*Trifolium alexandrinum*	Fabaceae	April - June	++	++

$^{++}$ Major source. $^{+}$ Minor source. $^{-}$ Not source.

RESULTS AND DISCUSSION

Results:

As it stands in Table (1), 51 plant species belonging to 24 families were recorded as pollen and/or nectar floral sources in Matrouh province during two the successive seasons (2020 and 2021). The medicinal, aromatic and ornamental plants were represented by 19.6% of total surveyed plants, each pollen and nectar sources had 90% and 80% of them. The vegetable crops were act 37.3 % of the general total plants surveyed, in which the pollen sources were more than the nectar sources, represented 94.7 % and 68.4%, respectively. On the other hand the fruit crops were 17 plant belonging to 11 families representing 33.3% of the total. Pollen floral sources were 14 plants belonging to nine

Families with 82.3 % of total of fruit crops, but the nectar floral sources were 11 plants belonging to nine families with 70.6 % of total of fruit crops.

Data illustrated in Table (1) show that the field crops were five plants belonging to four families. They had 9.8% of total survey and pollen sources were more than nectar sources. The highest flowering number of plants were recorded in summer season with 34 plants, but the lowest season in flowering was the winter that represented by six plants.

Screening data showed that the pollen floral sources in Matrouh province were 48 plants, where the nectar floral sources were 47 plants, both represented 94.1% and 92.2%, respectively.

Data in Table (2) clearly represent the most important forages sources of pollen, nectar or both for honeybees, and also show that there were nine plants flowering in four seasons. Based on such results, beekeepers can move their colonies to the cultivation centers depending on the obtained data to increase the honeybee production.

Table 2. The most important sources of pollen, nectar or both and their cultivation centers in Matrouh province, and flowering dates in 2020 – 2021

Plant	Centers	Area / Feddan	Flowering dates	Season	Sources		Crop type
					Pollen	Nectar	
Mint	Al hamam, Matrouh, Salloum and Siwa	108	June to October	Spring/Summer	-	+	Vegetables
Faba bean	Al hamam, El Alamein, Al Dubea and Siwa	5528	January -March	Winter	++	++	Vegetables
Squash	Al hamam, Matrouh, El Alamein and Siwa	1387	April to September	Spring	+	+	Vegetables
Date palm	All the eight centers	10670	March - April	Spring	++	-	Fruit crop
Olive	All the eight centers	39616	April -May	Spring	+	+	Fruit crop
Alfalfa	Al hamam and Siwa	3508	March - November	Summer/Fall	++	++	Field crop
Egyptian clover	Al hamam	4077	April - June	Early summer	++	++	Field crop
Corn	Al hamam and El Alamein	11603	June -November	Summer	++	-	Field crop
Sesame	Al hamam	2347	July - August	Summer/Fall	++	++	Field crop

$^{++}$ Major source. $^{+}$ Minor source. $^{-}$ Not source.

Discussion

The survey of bee plant sources to beekeepers for the first time to exploration this region to guide them the suitable period to move their colonies for more economical honey production and they can also get benefit from scattered pollen in Matrouh province is a good map sources in various governorate centers.

Data showed that 51 plant species were visited by honey bees (*Apis mellifera* L.). Workers can collect pollen from 48 plants, and can collect nectar from 47 plants all over the year. Previous studies in Egypt cleared that there were thirty-nine bee forages belonging to fifteen families in Kafr-Elshiekh district (Taha, 2005; Fathy, 2008), 26 pollen plants in 15 families in Dakhalia, 24 pollen sources belonging to 16 families in Fayoum (Ismaail et al, 2013), and 65 bee plants belonging to 25 plant families in Alexandria and El-Beheira provinces (Esmael et al., 2016). Abou-Shaara (2015) surveyed the pollen, nectar or both in Egypt andhe found that 91 plant species belonging to 85 families were suitable for honeybees as floral sources, whereasTaha (2017) found that 69 plant species belonging to 33 families recorded as nectar sources, and eighty two sources belonging 36 families recoded as pollen sources in Kafr El-shiekh.

Because there was few studies done in Matrouh province on honey bee plants, more investigations needs to provide deep understanding of Matrouh honeybees floral resources.

CONCLUSION

Based on the obtained data, it could be concluded that, beekeepers can move their colonies to the olive and date palm cultivation in all districts of Matrouh province during spring season, alfalfa, Egyptian clover and corn cultivation in El Hmam, Al Alamin and Siwa districts during summer and fall seasons, sesame in El Hmam district during summer and fall and faba bean cultivation in El Hmam, Al Alamin, Al Dabea and Siwa districts during winter season to increase the honey yield and improve the colony performance.

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الحصر الأول لمصادر الرحيق وحبوب اللقاح لنحل العسل بمحافظة مطروح شمال غرب مصر

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أجريت الدراسة بمناحل كلية الزراعة الصحراوية والبيئية بجامعة مطروح ومناحل أخرى بمحافظة مطروح شمال غرب مصر خلال سنتين متتاليتين من الدراسة (2020 و 2021) لتحديد مصادر الرحيق و حبوب اللقاح في محافظة مطروح. كما تم تحديد أهم مصادر حبوب اللقاح والرحيق أو كليهما في مناطق المحافظة المختلفة. تم تسجيل 51 نوعا نباتيا تنتمي إلى 24 عائلة كمصدر لحبوب اللقاح والرحيق في محافظة مطروح خلال فترة الدراسة. وبلغت مصادر حبوب اللقاح في محافظة مطروح 48 نبات ، وكانت مصادر الرحيق 47 نبات تمثل 94.1٪ و 92.2٪ على التوالي. تم تسجيل أهم المصادر من حبوب اللقاح أو الرحيق أو كليهما لنحل العسل في مختلف مراكز المحافظة حيث وجد 9 نباتات تزهر في 4 مواسم على مدار العام. يعد حصر مصادر الرحيق وحبوب اللقاح بمحافظة مطروح بمثابة خريطة جيدة لمربي النحل لأول مرة لاستكشاف هذه المنطقة لإرشادهم للفترات المناسبة لنقل طوائفم من أجل إنتاج عسل أكثر كما يمكنهم الاستفادة من مصادر حبوب اللقاح المتوفرة في مراكز المحافظة المختلفة.

الكلمات الدالة: نحل العسل – مطروح – الرحيق – حبوب اللقاح