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ACTIVITIES OF HONEY BEE COLONIES IN EL-OMEID, NATURAL PROTECTORATE AREA, EGYPT

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ABSTRACT

To develop honey quantities produced by honey bee colonies in the Nile valley, 120 bee colonies were transported (mid-October) to El-Omeid area at El-hamam center (120 km west of Alexandria) a natural protectioraten area, rich with wild medicinal and ornamental plants and depends on the rainfall only. The blooming period started in mid – December. The experimental colonies were divided into 3 groups according to their strength and queen status [1st group(queens are less than one year old and bees covered 5 combs), 2nd group(queens are less than one year old and bees covered 3 combs) and 3rd group (queens are about two years old and bees covered 4 combs)]. It was found that colony strength (combs covered with adult worker bees) increased from 5 to 7.3 combs, from 3 to 7.1 combs and from 4 to 5.7 in the successive groups, respectively. Moreover, the brood combs, which depend on the colony strength, were also increased from 3 to 5.7, from 2 to 5.1 and from 2 to 3.4 brood combs / colony for 1st, 2nd and 3rd groups, respectively. In addition, 40 divisions of bee swarms representing the fourth group were grown up from 3.3 to 5.1 combs / colony and the brood combs increased from 2.3 to 2.8 combs / colony. The percentages of adult workers infestation by Varroa mites were decreased from 6.7 to 1.6 % in the 1st group, from 8.1 to 1.2 % in the 2nd group, from 5.1 to 2.0 % in the 3rd group and from 3.4 to 2.1% in the 4th group, at the period extended from Mid-October till the 3rd week of March. This may be due to feeding the bees on medicinal and ornamental plants (this trend was noticed in El-Arish, north Sini). The quantities of produced honey were 7.1, 6.4, 4.3 and 2.8 Kg / colony for 1st, 2nd, 3rd and 4th Sinai groups, respectively with an average of 5.15 Kg per colony.

Key words: *Apis mellifera, beekeeping , honey bee, natural protectorate area.*

1. INTRODUCTION

Bee honey is considered the main product for beekeepers. In the last decade, and according to the report of the Egyptian Ministry of Agriculture (2004) the honey bee, *Apis mellifera*, colonies reached about 1.5 million but the honey production still ranging between 5 – 6 kg / colony. Nowadays, beekeepers face many problems, one of which, the absence of cropping cycle, which in turn reduced the production of honey. This allows foraging bees to scatter in a larger area for searching for food sources. To avoid such a problem, beekeepers tend to transfer their bee colonies to suitable places cultivated either for available honey crops (Sanford, 1992) or for wintering (Khmara *et al.*, 1988 and Kato *et al.*, 1999). The survival rates of bee colonies depend on the area of honey and pollen crops (Menzel, 1998 and Dreller *et al.*, 1999) and bee race (Moritz and Hillesheim, 1989). The weather conditions (Stabentheiner and Kastberger, 1997 and Blaschon *et al.*, 1999) affect the tendency of worker bees for foraging to collect nectar and pollen (Wille, 1985; Pankiw *et al.*, 1998 and Basilio and Romero, 2002).

In Egypt, there are many places such as the northern beach, out of the Nile valley depend on rainfall for growing many plants especially the medicinal plants. So, the present work aimed to throw some light on a new approach for beekeeping in Egypt by transporting the bee colonies out of the valley in such areas full of wild medicinal and ornamental plants and depend on rainfall for agriculture.

2. MATERIALS AND METHODS

One hundred and twenty honey bee colonies were transported (mid-October) to El-Omeid area at El-hamam center (120 km west of Alexandria) as a natural protectorate area. The colonies were divided according to the queens' status and the colony strength (number of combs covered with worker bees) into three groups:

1st group: colony headed with a newly open mated local Carnica queen (less than one year old) and bees covered 5 combs.

2nd group: colony headed with a newly open mated local Carnica queen (less than one year old) and bees covered 3 combs.

3rd group: colony headed with an old open mated local Carnica queen (about two years old) and bees covered 4 combs.

Each colony was fed with one liter of 50% sugar syrup twice monthly from mid-October till the first half of December, then feeding was stopped, when plants started to bloom, where plant irrigation is achieved by rainfall. Most of the plants were identified under the authority of scientists responsible for wild plants as follows: *Anabasis setifera, Anthemis* microsperma, *Asteriscus graveolens, Calligonum comosum, Capparis deciduas, Capparis orientalis, Centaurea calcitrapa, Centaurea glomerata, Cistanche phelypaea, Citrullus colocynthis, Cleome droserifolia,Conyza dioscoridis, Cuscuta campestris Cyperus alopecuroides, Diplotaxis harra, Echinochloa colonum, Echinopsspinosis- simus, Eichhornia crassipes, Epilobium hirsutum, Euphorbia helioscopia, Fagonia mollis, Gladiolus segetum Hormuzakia aggregate, Hyoscyamus muticus, Imperata cylindrical, Juniperus phoenicea, Jussia repens, Lemna gibba, Leopoldia comosa, Limoniumangustifolium, Lygeum spartum, Mentha microphylla Mesembryanthemum crystalinum, Mesembrya- nthemum forsskalei, Paspalum distichum, Peganum harmala, Phlomis floccose, Pistia stratiotes Polgonum serrulatum, Potamogeton nodosus, Reaumuria mucronata, Rumex, Saccharum spontaneum, Salsola kali, Sesbania sesban, Sphaeranthus suaveolens, Suaeda pruinosa, Thymelaea hirsute, Thymuscapitatus, Tribulus longipetalus, Verbascum letourneuxii, Zilla spinosa.* These plants produce either nectar or pollen and some produce both nectar and pollen. The blooming period started in mid – December and extend to the end of March.

In the first half of February, the 1st and 2nd groups were divided to obtain new 40 colonies to increase the number of the experimental colonies. The divisions were done by taking combs of honey and brood from different colonies, but the adult worker bees from the same colony. Newly virgin local Carnica queens bred *in situ*) were inserted into the division. At that time, the queens of the 3rd group were replaced by another virgin ones. After five days, all the queens (3rd &4th groups) were not mated and started to lay eggs. The queens of the 1st &2nd groups were not replaced.

The parameters used for this experiment were:

- Colony strength (number of combs covered with adult worker bees).
- Brood rearing activity (number of brood combs).
- Rate of Varroa infestation.

Varroa mite infestation levels were estimated using approximately 100 adult worker bees collected from each colony and placed into jars containing warm water with a few drops of liquid soap. The jars were shaken vigorously and the contents strained through 8 cm screen cm screen. The screen retained the bees but let Varroa individuals pass where they were collected on a fine nylon cloth located below the screen. The process was repeated until no more mites were collected. Mites were then counted and the infestation level was estimated by dividing the number of Varroa mites recovered by number of bees (Shimanuki and Knox, 1991).

- Quantity of produced honey.

Harvesting the honey was done at the third week of March in spite of the presence of some bloomed plants. This is due to the migration of bee-eater, *Merops* sp. (warwaar) at this place. The data in this study were obtained every two weeks intervals starting from Mid-October till the 3rd week of March.

3. RESULTS AND DISCUSSION

3.1 Colony strength

The data in Table (1) show that the colonies headed with newly mated Carnica queens and the bees covered 5 combs (1st group) or 3 combs (2nd group), started to grow up until reached 7.3 and 5.9 combs / colony for 1st and 3rd group, respectively. On the other hand and in spite of the bees in the 3rd group were covered 4 combs but headed with old mated Carnica queens, the colonies strength decreased until reached 2.2 combs / colony, on February, 12. So, at that time, the queens of the 3rd group were replaced by another virgin one. Moreover 40 new colonies were (group 4), produced from the 1st

and 2nd groups add 3.3 combs / colony. As the time progress towards the third week of March, all colonies were grown until reached 7.8, 7.1, 5.7 and 5.1 combs / colony for the 1st, 2nd, 3rd and 4th groups, respectively.

3.2 Brood rearing activity

The number of worker brood combs in the honey bee colonies is considered a good indicator for queen vitality, weather conditions, nectar flow and the colony strength and conditions. The data obtained in Table (2) show that, at the beginning of the experiment on October 16, the mean number of broad combs were 3, 2 and 2 brood combs / colony for 1st, 2nd and 3rd groups, respectively.

At the beginning of the blooming stage, the number of brood combs in the 1st and 2nd groups increased gradually with two week interval until reached 5.2 and 4.6 combs / colony. At the same time, the number of brood combs in the 3rd group decreased on February 12 and recorded 1.7 combs / colony. This may be due to the age, vitality and or viability of the queens. After dequeening the queens of the 3rd group and division the colonies in the 1st and 2nd groups. The number of brood combs increased in all groups and reached 5.7, 5.1, 3.4 and 2.8 brood combs / colony for 1st, 2nd, 3rd and 4th groups, respectively (at the third week of March

Table (1): Average numbers of combs covered with adult worker bees in the experimental honey bee colonies (mean ± S.D.)

Inspection date	Average combs / colony (± S.D.)			
	1st Group (5 Combs)	2nd Group (3 Combs)	3rd Group (4 Combs)	New divisions
Oct. 16 / 2004	5.0 ± 0.0	3.0 ± 0.0	4.0 ±0.0	-
29	5.0 ± 0.0	3.0 ±0.5	3.8 ± 0.4	-
mean ± s.e.	5.0 ± 0.1	3.1 ±0.3	3.9 ± 0.1	-
Nov.12	5.1 ± 0.3	3.0 ± 0.5	3.2 ± 0.7	-
25	4.7 ± 0.2	3.1 ± 0.6	2.5 ± 0.5	-
mean ± s.e.	4.9 ± 0.2	3.05± 0.4	2.85± 0.2	-
Dec.8	4.6 ± 0.4	3.4 ± 0.4	2.5 ± 0.6	-
21	4.5 ± 0.3	3.2 ± 0.6	2.3 ± 0.4	-
mean ± s.e.	4.55± 0.1	3.3 ± 0.3	2.4 ± 0.1	-
Jan. 3 /2005	4.5 ± 0.5	3.9 ± 0.6	2.4 ± 0.3	-
16	4.9 ± 0.4	4.4 ± 0.5	2.3 ± 0.4	-
29	5.5 ± 0.4	4.9 ± 0.4	2.2 ± 0.5	-
mean ± s.e.	4.97± 0.3	4.4 ± 0.2	2.3 ± 0.1	-
Feb.12	7.3 ± 0.3	5.9 ± 0.7	2.2 ± 0.3	-
12	5.1 ± 0.5	4.8 ± 0.5	2.8 ± 0.2 *	3.3 ± 0.5
25	5.9 ± 0.3	5.2 ± 0.4	3.9 ± 0.3	4.1 ± 0.6
mean ± s.e.	5.5 ± 0.6	5.0 ± 0.3	3.35± 0.5	3.7 ± 0.4
Mar.10	6.7 ± 0.6	6.3 ± 0.4	4.8 ± 0.5	4.5 ± 0.5
23	7.8 ± 0.4	7.1 ± 0.6	5.7 ± 0.6	5.1 ± 0.6
mean ± s.e.	7.25± 0.5	6.7 ± 0.3	5.25± 0.4	4.8 ± 0.3
F values	7.253			
LSD	1.087			

***** newly mated queen

3.3 Adult workers infestation with *Varroa destractor*

The data recorded in Table (3) indicate that the rates of infestation with Varroa mite on the adult bees (about 100 workers) taken from the colonies were 6.7 and 8.1 and 5.1% for the 1st, 2nd and 3rd groups, respectively on Oct. 16. The rate of infestation in all groups gradually decreased as the time elapse till the end of the experiment (on March, 23) to reach the minimum (1.6, 1.2, 2.0 and 2.1%) for the 1st, 2nd, 3rd and 4th groups, respectively. This means that the wild medicinal and ornamental plants and the weather factors seemed to be more efficient for reducing the infestation rates of Varroa on adult bees (this trend was noticed in El-Arish, north Sinai).

3.4 Harvesting of honey

In spite of some plants were still producing nectar, honey was extracted. This is due to the migration of bee-eater (warwaar) in the experimental area, in addition to some other factors of beekeeping producers. The quantity of produced honey was 7.1, 6.4, 4.3 and 2.8 Kg / colony for 1st, 2nd, 3rd and 4th groups, respectively with an average of 5.15 Kg /colony (Table 4). The yields of honey were expected especially for the first three groups (newly queens) which were more than the fourth group.

Table (2): Average numbers of worker brood combs in the experimental honey bee colonies (mean ± S.D.)

Inspection date	Average brood combs / colony (± S.D.)			
	1st Group (5 Combs)	2nd Group (3 Combs)	3rd Group (4 Combs)	New divisions
Oct. 16 / 2004	3.0 ± 0.3	2.0 ± 0.3	2.0 ± 0.5	-
29	3.1 ± 0.3	2.0 ±0.4	1.9 ± 0.4	-
mean ± s.e.	3. 05± 0.5	2.0 ± 0.1	1.95± 0.1	-
Nov.12	3.2 ± 0.2	2.1 ± 04	1.9 ± 0.3	-
25	3.5 ± 0.6	2.2 ± 0.3	1.7 ± 0.4	-
mean ± s.e.	3.35 ± 0.2	2.15± 0.1	1.8 ± 0.1	-
Dec.8	3.4 ± 0.3	2.7 ± 0.4	1.4 ± 0.6	-
21	3.1 ± 0.5	2.5 ± 0.6	1.2 ± 0.4	-
mean ± s.e.	3.25 ± 0.2	2.6 ± 0.1	1.3 ± 0.1	-
Jan. 3 /2005	3.0 ± 0.5	2.7 ± 0.3	1.1 ± 0.5	-
16	3.9 ± 0.4	3.1 ± 0.2	1.2 ± 0.3	-
29	4.6 ± 0.6	3.8 ± 0.4	1.2 ± 0.3	-
mean ± s.e.	3.83 ± 0.5	3.2 ± 0.3	1.17± 0.1	-
Feb.12	5.2 ± 0.8	4.6 ± 0.7	1.7 ± 0.4	-
12	3.9 ± 0.4	3.6 ± 0.5	1.7 ± 0.6 *	2.3 ± 0.4
25	3.9 ± 0.3	4.3 ± 0.5	2.6 ± 0.5	2.4 ± 0.5
mean ± s.e.	3.9 ± 0.1	3.95± 0.4	2.15± 0.4	2.35± 0.1
Mar.10	5.0 ± 0.6	4.8 ± 0.7	2.9 ± 0.5	2.6 ± 0.4
23	5.7 ± 0.5	5.1 ± 0.4	3.4 ± 0.8	2.8 ± 0.6
mean ± s.e.	5.35 ± 0.3	4.95± 0.2	3.15± 0.5	2.7 ± 0.4
F values	8.762			
LSD	1.12			

***** newly mated queen

Table (3): Percentages of honey bee adult infestation with *Varroa destractor* in the experimental honey bee colonies (mean ± S.D)

Inspection date	Average % of varroa / colony (± S.D.)			
	1st Group (5 Combs)	2nd Group (3 Combs)	3rd Group (4 Combs)	New divisions
Oct. 16 / 2004	6.7 ± 0.0	8.1 ± 0.0	5.1 ±0.0	-
29	6.3 ± 0.2	8.0 ±0.3	5.3 ± 0.6	-
mean ± s.e.	6.5 ± 0.1	8.05± 0.1	5.2 ± 0.2	-
Nov.12	7.1 ± 0.2	7.4 ± 0.7	4.9 ± 0.8	-
25	7.0 ± 0.3	7.0 ± 0.5	4.8 ± 0.3	-
mean ± s.e.	7.05± 0.3	7.2 ± 0.3	4.85± 0.4	-
Dec.8	7.3 ± 0.5	6.9 ± 0.3	4.5 ± 0.8	-
21	6.4 ± 0.2	7.3 ± 0.5	4.1 ± 0.7	-
mean ± s.e.	6.85± 0.6	7.1 ± 0.3	4.3 ± 0.6	-
Jan. 3 /2005	5.9 ± 06	7.4 ± 0.9	4.6 ± 0.3	-
16	5.7 ± 0.4	7.2 ± 06	5.1 ± 0.5	-
29	5.2 ± 0.3	6.8 ± 0.3	4.7 ± 0.5	-
mean ± s.e.	5.6 ± 0.4	7.13± 0.2	4.8 ± 0.6	-
Feb.12	4.4 ± 0.4	5.4 ± 0.6	4.2 ± 0.2	-
12	4.4 ± 0.4	5.4 ± 0.6	4.2 ± 0.2 *	3.4 ± 0.4
25	2.7 ± 0.7	3.2 ± 0.5	3.1 ± 0.4	3.0 ± 0.9
mean ± s.e.	3.5 ± 0.5	4.3 ± 0.4	3.6 ± 0.4	3.2 ± 0.6
Mar.10	1.8 ± 0.8	2.1 ± 0.4	2.5 ± 0.6	2.4 ± 0.4
23	1.6 ± 0.2	1.2 ± 0.7	2.0 ± 0.4	2.1 ± 0.5
mean ± s.e.	1.7 ± 0.1	1.65± 0.2	2.25± 0.3	2.25± 0.4
F values	5.622			
LSD	0.55			

***** newly mated queen

Table (4): Average harvested honey (kg / colony) in the experimental honey bee colonies (mean ± S.D.).

Harvesting date	Average honey (kg) / colony (± S.D.)			
	1st Group (5 Combs)	2nd Group (3 Combs)	3rd Group (4 Combs)	New divisions
24 /3 / 2005	7.1 ± 0.	6.4 ±0.77	4.3 ±0.56	2.8 ± 0.63
General mean ± s.e.	5.15 0.502			

From the fore – mentioned results the first group of bees is considered the best colony status. Moreover, it is advisable to transfer the honey bee colonies out of the Nile valley to collect more nectar and pollen from several crops, especially wild medicinal plants. Such approach may positively affect the efficiency of honey bee colonies.

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نشاطات طوائف نحل العسل في محمية العميدالطبيعية، مصـــر

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ملخص

تم لرفع إنتاجية طوائف النحل من العسل الموجودة في وادي النيل نقل 120 طائفة نحل في منتصف اكتوبر إلى محمية العميد على طريق العلمين – مرسى مطروح (120 كم غرب الإسكندرية) وتوجد فى هذه المنطقة نباتات طبية وعطرية بكثافة و تعتمد على مياه الأمطار في النمو النباتي حيث تبدأ في التزهير في منتصف ديسمبر من كل عام. قسمت الطوائف إلى 3 مجموعات حسب قوتها وحالة الملكة وأظهرت النتائج أن قوة الطوائف قد ازدادت من 5 - 7.8 قرص / طائفة (المجموعة الأولى) ، من 3 – 7.1 قرص / طائفة (المجموعة الثانية) و 4 – 5.7 قرص/ طائفة (المجموعة الثالثة). ازدادت معدلات إنتاج الحضنة من 3 و 2 و2 قرص/ طائفة إلى 5.7 و 5.1 و 3.4 قرص / طائفة للمجموعات الثلاث على التوالي. هذا بالإضافة إلى تقسيم 40 طردا نحل ازدادت قوتها من 3و3 – 5.1 قرص / طائفة وأقراص الحضنة من 2.3 – 2.8 قرص / طائفة. انخفضت أيضاً وطبقاً لتغذية النحل على النباتات الطبية العطرية نسبة الإصابة بالفاروا من 6.7 إلى 1.6% (مجموعة أولى) و 8.1 إلى 1.2 (مجموعة ثانية) و 5.1 إلى 2.0 (مجموعة ثالثة) و 3.4 إلى 2.1% (مجموعة رابعة) وكان متوسط إنتاج العسل 7.1 ، 6.4 ، 4.3 ، 2.8 كجم / طائفة على التوالي بمتوسط قدرة 5.15 كجم / طائفة.

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