

## COMPARATIVE STUDIES ON SOME HONEYBEE ACTIVITIES AT ELSHARKIA GOVERNORATE

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Received: Jan. 22 , 2018

Accepted: Feb. 10 , 2018

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**ABSTRACT:** *The activities of honeybee colonies were recorded along two successive years 2014 and 2015 at three localities of Elsharkia Governorate. Statistical analysis of the obtained data revealed that there were no significant differences in the monthly average area of sealed brood honey bee along the years of study , while there were significant differences in the monthly average area of sealed brood honey bee in inch<sup>2</sup> / colony among the year months , where the highest mean area of sealed brood honey bee per colony were recorded at July and August recording 220.2 and 208.9 inch<sup>2</sup> at 2014 year , and the highest mean area of sealed brood honey bee per colony were recorded at July and August recording 220.2 and 208.9 inch<sup>2</sup> at 2015 year. As for the average weights of pollen grains (g) /trap/month at the three localities of Sharkia governorate along 2014 and 2015 months, the highest mean average weights of pollen grains (g/trap/month) were recorded at July and August months recording 203.7 and 219.9 (g/trap/month) at 2014 , and the highest mean average weights of pollen grains (g/trap/month) were recorded at July and August months recording 207.8 and 224.0 (g/trap/month) at 2015. The highest weights of honey were recorded at clover season recording 15.83 kg / colony at citrus season (LSD 5% = 2.03), followed by cotton and citrus seasons giving 10.42 and 9.61 kg / colony without significant differences at 2014 months, and the highest mean average weights of pollen grains (g/trap/month) were recorded at July and August months recording 203.7 and 219.9 (g/trap/month) at 2015 months.*

**Key words:** *Apis mellifera, foraging, sealed brood, pollen grains, honey*

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### INTRODUCTION

Strains of honeybees differ in morphometrical and physiological characteristics, and these differences affect the production aspects of their products, Shawer (1980) Polishchuk, (1984) and Abou El-Enain (2000) Bankova, *et al.*, (2007). Honeybees, *Apis mellifera* L produce different products which use mainly in food and others in different purposes i.e., therapeutic or in the apitherapy science. The most spread colonies of honeybee in Egypt are Carniolan hybrids. The large needs of different honeybee products propolis, pollen grain, need further comparative studies on bee hybrids. There are a few studies on the Honeybee *Apis mellifera* L

products which use mainly in food and others in different purposes i.e., therapeutic or in the apitherapy science .

As for honey production, Farrar (1968) revealed that there were wide variations in production efficiency between strains of bees within three common races: Italian, Caucasian and Carniolan than between them. Sugden and Furgala (1982) stated that the variation of honey production between colonies in the same apiary may due to variation of genetic makeup of the colony. Hussein (1983) in Assuit region, Upper Egypt, found that the gain weights of the tested colonies were 36.8, 31.2, 27.8, 14.1, 6.5 and 4.3 kg. During July, August, May, June,

September and March. Rashad, et al. (1979) mentioned that, four major pollen sources were observed in Giza region, Egypt. The total amounts of pollen trapped from four honey bee colonies averaged 401.4, 257.9, 113.3 and 29.0 grams/colony related to Egyptian clover, maize, wild mustard and broad bean, respectively. Richard, et al. (1986) mentioned that honeybees (*Apis mellifera*) from a line which had been selected for high pollen-hoarding behaviour (HPH) hoarded more pollen than bees from a low pollen-hoarding line (LPH) when were kept in observation colonies with known amounts of brood. In Brazil, Malaspina and Patenate (1995) reported that Africanized and Italian bees being more efficient than Carniolan bees. In addition, Funari, et al. (2003) studied the effects of pollen collection on colony development and its activities of *Apis mellifera*. Moreover, in Egypt, Mansour et al. (2008) conducted a comparative study on some activities and products between hybrids of Carniolan and Italian honeybee colonies.

The aim of this study is to compare some characters and products of honey bee Carniolan hybrids at three localities of Elsharkia Governorate.

## MATERIALS AND METHODS

The field experiments were carried out in private apiaries located at Zagazig city, Diarb Negm city, Belbis city of Elsharkia Governorate.

### 1. Honeybee colonies:

All private apiaries of the honeybee colonies, *Apis mellifera* at El Elsharkia Governorate were chosen for this study was Carniolan hybrids. Twenty one honeybee colonies from each city were selected which were similar in its strength and population.

### 2. Experimental design :

Chosen colonies were arranged as

completely randomized block design representing twenty one honeybee colonies of each locality.

### 3. Procedure of work :

Chosen colonies were observed and examined monthly during the period from January 2014 till December 2015 where some characters and products were recorded.

### 4- Observed activities:

#### 4-1- Brood rearing activity:

The previous colonies were used for this test to determine the brood rearing activity as effected by different localities of Elsharkia Governorate from January 2014 till December 2015. For estimating the brood rearing activity, sealed brood areas of workers and drones were measured for each colony in square inches at 12 days intervals (Fresnay, 1962).

#### 4-2- Pollen grains :

Pollen traps were placed at the entrance of colonies. The traps were similar to the types used by Dimou and Thrasyvoulou (2007). The traps were emptied every 3 days and the contents were weighed and recorded.

The colonies were compensated by pollen substitutes.

#### 4-3- Honey bee yield :

Honey was collected three times, clover season, citrus season and cotton season, weighted and recorded as kg / colony according to Shawer, 1987, Mansour et al. (2008).

### 5. Statistical analysis of the data:

Collected data were subjected to statistical analysis of variance (ANOVA) at 5 % probability, and the measurements were separated using Duncan's Multiple Range Test (DMRT) through CoStat software program (Version 6.400). CoStat version 6.400 Copyright © 1998-2008

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Cohort Software. 798 Lighthouse Ave.  
PMB 320, Monterey, CA, 93940, USA.

**RESULTS AND DISCUSSION**

The obtained results in Table (1) show the monthly average area (inch<sup>2</sup>) / colony of sealed brood honey bee at 3 localities of Sharkia governorate along 2014 and 2015 months.

Statistical analysis of the obtained data revealed that there were no significant differences in the monthly average area of sealed brood honey bee in inch<sup>2</sup> / colony, where it was 129.6 , 137.4 , 145.8 inch<sup>2</sup> / colony, for Zagazig, Diarb Nigm, Belbis localities, respectively, while there were significant

differences in the monthly average area of sealed brood honey bee in inch<sup>2</sup> / colony among the year months , where the highest mean area of sealed brood honey bee per colony were recorded at July and August recording 220.2 and 208.9 inch<sup>2</sup> (LSD 5% = 15) , while the least mean area of sealed brood honey bee per colony were recorded at December and January recording 42.5 and 48.4 inch<sup>2</sup> (LSD 5% = 15) .

The obtained results in Table (2) show the monthly average area (inch<sup>2</sup>) / colony of sealed brood honey bee at 3 localities of Sharkia governorate along 2015 months.

**Table (1): Monthly average area (inch<sup>2</sup>) / colony of sealed brood honey bee at 3 localities of Sharkia governorate along 2014 months**

2014 Months	average area (inch <sup>2</sup> ) / colony of sealed brood honey bee			Total	Mean
	Zagazig	Diarb Nigm	Belbis		
January	46.4	48.6	50.2	145.2	48.4h
February	74.8	78.2	80.6	233.6	77.9g
March	117.0	118.6	122.8	358.4	119.5f
April	138.4	143.4	150.2	432	144.0e
May	161.0	168.8	176.6	506.4	168.8d
June	188.4	197.2	201.8	587.4	195.8b
July	198.2	221.6	240.8	660.6	220.2a
August	195.0	210.4	221.2	626.6	208.9ab
September	164.6	172.8	200.4	537.8	179.3c
October	150.0	158.4	168.8	477.2	159.1d
November	80.6	88.0	92.0	260.6	86.9g
December	40.4	42.2	44.8	127.4	42.5h
Total	1554.8	1648.2	1750.0	4953.0	1651.0
Mean	129.6 ns	137.4 ns	145.8 ns	412.8	137.6
L.S.D 5%	25.6				15.0

Means in column or row followed by different letter(s) are significantly different at 5% level

Table (2): Monthly average area (inch<sup>2</sup>) / colony of sealed brood honey bee at 3 localities of Sharkia governorate along 2015 months

2015 Months	average area (inch <sup>2</sup> ) / colony) of sealed brood honey bee			Total	Mean
	Zagazig	Diarb Nigm	Belbis		
January	47.2	49.4	50.4	147	49g
February	75.8	79.6	81.4	236.8	78.9f
March	118.2	121.4	123.8	363.4	121.1e
April	141.0	145.6	148.4	435	145.0d
May	163.8	171.8	177.2	512.8	170.9c
June	191.6	198.4	202.8	592.8	197.6b
July	203.6	227.8	236.2	667.6	222.5a
August	198.6	216.8	219.6	635	211.7ab
September	166.8	175.6	196.2	538.6	179.5c
October	153.8	164.2	169.4	487.4	162.5c
November	78.4	86.6	89.2	254.2	84.7f
December	41.8	44.2	45.6	131.6	43.9g
Total	1580.6	1681.4	1740.2	5002.2	1667.3
Mean	131.7 ns	140.1 ns	145.0 ns	416.8	138.9
L.S.D 5%	18.2				17.8

Means in column or row followed by different letter(s) are significantly different at 5% level

Statistical analysis of the obtained data revealed that there were no significant differences in the monthly average area of sealed brood honey bee in inch<sup>2</sup> / colony, where it was 129.6 , 137.4 , 145.8 inch<sup>2</sup> / colony, for Zagazig, Diarb Nigm, Belbis localities, respectively, while there were significant differences in the monthly average area of sealed brood honey bee in inch<sup>2</sup> / colony among the year months , where the highest mean area of sealed brood honey bee per colony were recorded at July and August recording 220.2 and

208.9 inch<sup>2</sup> (LSD 5% = 17.8) , while the least mean area of sealed brood honey bee per colony were recorded at December and January recording 42.5 and 48.4 inch<sup>2</sup> (LSD 5% = 17.8).

The obtained results in Table (3) show the monthly average weights of pollen grains (g) /trap/month at the three localities of Sharkia governorate along 2014 months.

Statistical analysis of the obtained data revealed that there were significant differences in the monthly average

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weights of pollen grains (g/trap/month), where it was 120.55, 111.26 , 84.48 g/trap/month , for Zagazig, Diarb Nigm, Belbis localities, respectively (LSD 5% = 6.5). In addition, there were significant differences in the monthly average weights of pollen grains (g) /trap/month among the year months, where the highest mean average weights of pollen grains (g/trap/month) were recorded at July and August months recording 203.7 and 219.9 (g/trap/month) (LSD 5% = 17.1)

, while the least average weights of pollen grains (g) /trap/month were recorded from October to February months ranging from 35.4 to 51.2 (g/trap/month) (LSD 5% = 17.1) .

The obtained results in Table (4) show the monthly average weights of pollen grains (g) /trap/month at the three localities of Sharkia governorate along 2015 months.

**Table (3): Monthly average weights of pollen grains (g) /trap/month collected by workers at three localities of Sharkia governorate along 2014 months**

2014 Months	Ave. weights of pollen grains (g) /trap/ month			Total	Mean
	Zagazig	Diarb Nigm	Belbis		
January	47.1	42.1	30.1	119.3	39.8e
February	56.2	51.4	24.8	132.4	44.1e
March	118.2	93.7	70.8	282.7	94.2c
April	119.2	97.1	73.8	290.1	96.7d
May	150.7	138.7	115.1	404.5	134.8c
June	192.4	184.2	135.4	512	170.7b
July	227.8	214.8	168.4	611	203.7a
August	237.5	228.1	194.0	659.6	219.9a
September	138.1	132.5	121.3	391.9	130.6c
October	61.4	59.5	32.8	153.7	51.2e
November	53.7	49.6	28.8	132.1	44.0e
December	44.3	43.4	18.4	106.1	35.4e
Total	1446.6	1335.1	1013.7	3795.4	1265.13
Mean	120.55 a	111.26 b	84.48 c	316.3	105.43
L.S.D 5%	6.5				17.1

Means in column or row followed by different letter(s) are significantly different at 5% level

Table (4): Monthly average weights of pollen grains (g) /trap/month collected by workers at three localities of Sharkia governorate along 2015 months

2015 Months	Ave. weights of pollen grains (g) /trap/ month			Total	Mean
	Zagazig	Diarb Nigm	Belbis		
January	50.8	44.5	37.4	132.7	44.2e
February	59.5	54.2	49.4	163.1	54.4e
March	123.0	98.9	82.5	304.4	101.5d
April	125.1	103.2	91.0	319.3	106.4d
May	155.9	141.1	120.8	417.8	139.3c
June	196.2	188.1	140.4	524.7	174.9b
July	230.9	219.6	172.9	623.4	207.8a
August	241.1	231.8	199.2	672.1	224.0a
September	140.9	136.1	123.8	400.8	133.6c
October	65.6	62.1	37.5	165.2	55.1e
November	55.8	50.9	32.6	139.3	46.4e
December	45.6	45.9	24.1	115.6	38.5e
Total	1490.4	1376.4	1111.6	3978.4	1326.1
Mean	124.2a	114.7 b	92.6 c	331.5	110.5
L.S.D 5%	7.5				18.5

Means in column or row followed by different letter(s) are significantly different at 5% level

Statistical analysis of the obtained data revealed that there were significant differences in the monthly average weights of pollen grains (g/trap/month), where it was 124.2, 114.7, 92.6 g/trap/month, for Zagazig, Diarb Nigm, Belbis localities, respectively (LSD 5% = 7.5). In addition, there were significant differences in the monthly average weights of pollen grains (g) /trap/month among the year months, where the highest mean average weights of pollen grains (g/trap/month) were recorded at

July and August months recording 207.8 and 224.0 (g/trap/month) (LSD 5% = 18.5), while the least average weights of pollen grains (g) /trap/month were recorded from October to February months ranging from 38.5 to 55.0 (g/trap/month) (LSD 5% = 18.5) .

The obtained results in Table (5) show the annual average weight of honey (kg/ 5 colony) collected by workers at 3 localities of Sharkia governorate along 2014 months.

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Statistical analysis of the obtained data revealed that there were no significant differences in the average weights of honey (kg/colony/ year) collected by workers among the tested three localities, where it was 11.48 , 12.18, 12.2 kg/ colony / year at Zagazig, Diarb Nigm, Belbis localities , respectively (LSD 5% = 1.0), while it was significant differences in the seasonally average weights of honey (kg/colony/season ) at 2014 year. The highest weights of honey were recorded

at clover season recording 15.83 kg / colony at citrus season (LSD 5% = 2.03), followed by cotton and citrus seasons giving 10.42 and 9.61 kg / colony without significant differences (LSD 5% = 2.03).

The obtained results in Table (6) show the annual average weight of honey (kg/ 5 colony) collected by workers at 3 localities of Sharkia governorate along 2015 months.

**Table (5): Annual average weight of honey( kg/ 5 colony) collected by workers at 3 localities of Sharkia governorate along 2014 seasons**

Seasons	Ave. weights of honey (kg/ 5 colony)			Total	Mean
	Zagazig	Diarb Nigm	Belbis		
Citrus	8.5	9.65	10.7	28.85	9.61 b
Clover	15.15	16.75	15.6	47.5	15.83a
Cotton	10.8	10.15	10.3	31.25	10.42b
Total	34.45	36.55	36.6	107.6	35.86
Mean	11.48 ns	12.18 ns	12.2 ns	35.86	11.95
L.S.D <sub>5%</sub>	1.0				2.03

Means in column or row followed by different letter(s) are significantly different at 5% level

**Table (6): Annual average weight of honey (kg/ 5 colony) collected by workers at 3 localities of Sharkia governorate along 2015 seasons**

Seasons	Ave. weights of honey( kg/5colony)			Total	Mean
	Zagazig	Diarb Nigm	Belbis		
Citrus	8.65	9.95	11.2	29.8	9.93b
Clover	15.35	16.95	15.81	48.11	16.04a
Cotton	10.95	10.53	10.09	31.57	10.52b
Total	34.95	37.43	37.1	109.48	36.49
Mean	11.65 ns	12.47 ns	12.37 ns	36.49	12.16
L.S.D <sub>5%</sub>	1.4				1.98

Means in column or row followed by different letter(s) are significantly different at 5% level

Statistical analysis of the obtained data revealed that there were no significant differences in the average weights of honey (kg/colony/ year) collected by workers among the tested three localities, where it was 11.65, 12.47, 12.37 kg/ colony / year at Zagazig, Diarb Nigm, Belbis localities, respectively (LSD 5% = 1.4), while it was significant differences in the seasonally average weights of honey (kg/colony/season) at 2015 year. The highest weights of honey were recorded at clover season recording 16.04 kg / colony at citrus season (LSD 5% = 1.98), followed by cotton and citrus seasons giving 10.52 and 9.93 kg / colony without significant differences (LSD 5% = 1.98).

The obtained results are similar to that of Abouel-Enain (2002) summarized that under Alexandria local condition, the average honey yield per colony was 3.5, 6.2 and 8.5 kg/colony for the Egyptian Carniolan and the hybrid, respectively, most of honey harvested was during clover season in June and during cotton season in September. Helal *et al.* (2003) stated that the highest amount of honey throughout the three different Blooming seasons of citrus, clover and cotton was obtained from colonies moved to food source- rich area, the largest yield of honey was collected during may (clover season), followed by April (citrus blooming period). Dukku (2003) reported that, in Nigeria , beekeepers obtain large crops of honey during a brief period from September to October. Serag El-Dein (2004) mentioned that, the highest mean of honey yield in Biala, Kafr el sheikh region, was obtained during cotton nectar flow. Abd El-Rahman (2004) stated that, in Assuit region the largest average honey yield (8.61 kg/colony) was obtained from cotton plants, followed by clover (3.96 kg/colony), then medical plants (3.08 kg/colony). Taha (2006) reported that, at Kafr Elsheik region the

highest mean honey yield was (3.10&3.09 kg/colony) recorded in two years. Abd El-Hady (2007) reported that the highest rate of stored honey was during spring season (31.49%) followed by summer, autumn and winter recorded 29.16, 17.45 and 5.43%, respectively. El-barbary (2007) found that the maximum amount of stored honey was recorded during may, 25 while the minimum amount was at June 15, after honey extraction, the highest rate of stored honey was registered during spring season (31.49% of the total stored honey), followed by summer (29.16%) then autumn , ( 17.45%) and winter (5.43%)seasons.

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## دراسات مقارنة على بعض الانشطة النحلية بمحافظة الشرقية

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### الملخص العربي

أجريت هذه الدراسة فى ثلاث مراكز بمحافظة الشرقية لدراسة بعض أنشطة طوائف نحل العسل وذلك خلال عاميين متتاليين 2014 ، 2015 . حيث أختير منحل خاص فى كل مركز يتكون من 21 خلية نحل كرنيولى هجين أول وذلك لاجراء التجارب ، حيث تم حساب مساحة الحضنة كل 12 يوم فى الخلايا المختبرة كما تم تقدير كمية حبوب اللقاح التى جمعتها الشغالات عن طريق تركيب مصادم بمدخل الخلايا المختبرة . كما تم تقدير إنتاج العسل على مدار مواسم الموالح والبرسيم والقطن .

أظهرت نتائج الدراسة ان متوسط مساحة الحضنة 126.6 ، 137.4 ، 145.8 بوصة مربعة / خلية فى العام الاول فى مراكز الزقازيق وديربر نجم وبلبيس على التوالي ، بينما كانت فى العام الثانى 131.7 ، 141.1 ، 145.0 بوصة مربعة / خلية فى العام الثانى .

كما أوضحت نتائج الدراسة أن متوسط وزن حبوب اللقاح 120.55 ، 111.26 ، 84.48 جرام لكل مصيدة فى العام الاول لمراكز الزقازيق وديربر نجم وبلبيس على التوالي ، بينما كانت فى العام الثانى 124.2 ، 114.7 ، 92.6 جم لكل مصيدة فى العام الثانى 2015 وكان هناك فرق معنوى بين المراكز واعطى مركز الزقازيق اعلى النتائج.

كما أوضحت الدراسة ان متوسط أوزان العسل الناتج من مواسم الموالح والبرسيم والقطن كان 34.45 ، 36.55 ، 36.6 كجم / خمسة طوائف فى مراكز الزقازيق وديربر نجم وبلبيس على التوالي فى العام الاول بينما كانت 34.95 ، 37.43 ، 37.1 كجم / خمسة طوائف فى مراكز الزقازيق وديربر نجم وبلبيس على التوالي فى العام الثانى دون فروق معنوية.

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