

COMPARATIVE STUDIES BETWEEN CARNIOLAN AND ITALIAN HYBRID HONEYBEES ACTIVITIES IN NASER CITY - CAIRO

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ABSTRACT

The present study was performed during (2008&2009) in the apiary hybrid of the Faculty of Agriculture in Al-Azhar University in Naser City -Cairo. Two hybrid races of honeybee (*Apis mellifera L*) colonies were used, hybrid of Carniolan and Italian honeybees. The present work aimed to evaluate the differences between brood area, comb built, honey production and amount of pollen grains collected by two hybrid races at different months during 2008-2009. The measured sealed brood areas in honeybee colonies were recorded two hybrid races colonies and they were different through year months. The statistical analysis showed significant differences between the mean weight of honey production between two hybrids ,Italian and Carniolan bees .While it not found significant differences between the mean amount of pollen grains collected by two hybrids races, at different months during 2008-2009 . Also the statistical analysis showed significant differences between the mean areas of comb built between two hybrids races.

INTRODUCTION

The domestic honeybee (*Apis mellifera L.*) has an original large area of distribution in Africa, Europe and in the Middle East. All the honeybee races from the different regions give fully fertile hybrids when crossed. However, different types which develop, during evolution, in the different areas, separated from each other by geographical barriers, or by ecological conditions are the geographical races. For beekeepers, these races are very important, and their biological characters may be predicted to some extent. Generally, these races differ in their morphometrics, activities, behaviour and production. The most known races are: the Carniolan race, *Apis mellifera carnica* Pollman, the Italian race, *Apis mellifera ligustica* Spinola, the Caucasian race, *Apis mellifera caucasica* Gorbatchow. In addition, the Egyptian race, *Apis mellifera lamarckii* Cockerelle. Races of honeybee and their hybrids, where evaluated in different countries. Also, in Egypt, evaluation of honeybee races and their hybrids was conducted in some regions. In Greece, the highest brood rearing by *Apis mellifera macedonia* was observed at the end of May and early June. The fluctuations in brood rearing were discussed in relation to the honeybee population dynamics (Liakosefa/., 2003). In Northern Oman (Rostaq), Hussein (1997) reported that the maximum workers brood rearing was observed in November, May and October and the minimum brood rearing ability of *A.m. jemenitica* colonies was noticed in December, June, and January. Abdelatif (1962) found that brood rearing ability of Carniolan natural hybrid was more than the Egyptian natural hybrid and the natural Carniolan hybrid gave more honey yield than the Italian hybrid, while the Egyptian gave the lowest yield. Ruttner (1975)

mentioned that brood rearing starts with the first income of pollen and fast development occurs thereafter. During summer, the Carniolan maintains a large brood nest if the pollen supply is adequate, while in fall the population of the colony declines rapidly.

Kathy and Hultgren (1985) showed that the brood rearing activity of Carniolan race has been found directly related to the availability of pollen. There are greater variations in production efficiency between strains of bees within the three common races, Italian, Caucasian and Carniolan than there are between the races (Farrar, 1968). Carniolan bees produced good honey production, have a good reputation as honey gatherers and are very prolific (Kathy and Hultgren, 1985). The fi Hybrid colonies (Syrian x Carniolan) were more productive in honey yield since average honey productions were 9.375, 8.750 and 6.625 kg. For the fi Hybrid, Carniolan and Syrian colonies, respectively (Edris, 1979). The stored pollen area was significantly correlated with corbicular area in three honeybee races, Carniolan, Italian and Egyptian bees (Aly *et al.*, 1989).

The present work aimed to evaluate the differences between the mean areas of brood area comb built, mean weight of honey production and mean amount of pollen grains collected by two hybrids strain ,Italian and Carniolan honeybee colonies at different months during 2008-2009.

MATERIALS AND METHODS

The present study was performed during (2008&2009) in the apiary of the Faculty of Agriculture in Al-Azhar University in Naser City -Cairo. Two hybrid races of honeybee (*Apis mellifera L*) colonies were used, 1st hybrid of Carniolan and Italian honeybees. Six colonies of honeybee almost equal in strength were selected. The colonies were divided into two equal groups. Each group contains 3 colonies to evaluate the differences between brood areas, comb built, honey production and amount of pollen grains collected by two hybrids races, Italian and Carniolan honeybee colonies at different months during 2008-2009.

Estimation of sealed worker brood:-

For estimating the rates of worker brood activity for each hybrid race during a whole year, a typical langstroth frame with dimensions of 17x8 inches was divided into evaluate the quantity of sealed brood. The frame was laid against side of brood comb and the area occupied by sealed brood was measured. The counts of workers brood were done at 12 days intervals according to Al-Takrity *et al.*, (1971).

Estimation of honey production:-

Comphore honey in experimental colonics (Carniolan and Italian hybrid races) was estimated from extracted frames at the end of August as net yield (Kg.)

Estimation of pollen grains:-

Pollen grains were collected by using pollen traps through the experimental period. The amounts of monthly. Pollen grains were weighted (gam)

Estimation of comb built area :

- (a) Providing wax foundation were conducted into all colonies under investigation at certain date.
- (b) Measurements of wax cells built were achieved regularly at one day interval during the work, in square inches.
- (c) Measurements of wax cells built started at the beginning of the experiments.
- (d) The average area of the wax foundation provided to different colonies under study was 264 inch.

Statistical analysis:-

L.S.D. test was used to determine the significance of differences between the means as given by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Brood rearing activity in two hybrid races, (Carniolan and Italian).

Data in Table (1) shows the measured sealed worker brood area in honeybee colonies collected by two hybrid races, Italian and Carniolan honeybee colonies at November month. It can be observed that Italian colonies gave the highest mean areas of brood (142.4 Inch³), than Carniolan colonies (113.1Inch³). The statistical analysis showed that there were no significant differences between the mean areas of brood between two hybrid races. Statistical analysis showed non significant differences between the mean areas of sealed brood between two hybrids races, at months of January, February, March, April, May and June. While, statistical analysis showed that there were significant differences between the mean areas of brood between two hybrids races, Italian (119.4Inch) and Carniolan (89.4Inch) honeybee colonies at December month. *Yakoub (1998)* studied worker brood rearing activity on three races, Carniolan, Italian and local Egyptian races. She found that the total numbers of produced workers during a year were 133,510; 159,154 and 138,283 for the Camiolan, Italian and local races, respectively. During spring, the Italian colonies produced about 37% of workers, the Carniolan (29.5%) and the Egyptian (28%).

Kezic et al. (1994) compared of brood amount and productivity of 3 ecotypes of Camiolan honeybees. The area of uncapped brood and the number of drone cells different significantly between ecotypes. The honey production of the Austrian ecotype was very much higher than that of the Croatian ecotype in Austria and slightly higher in Croatia. *Buchler (1992)* determined brood nest areas and colony population in colonies of *A.m. carnica*, *A.m. mellifera* and *A.m. macedonica*. Average populations at the start of winter were 8300 bees, at the end of winter 6400, and in mid-June 23,500.

Table (1): Mean of sealed worker brood areas two hybrid races, Italian and Caraniolan Colonies. (2008/2009)

| Periods | Caraniolan | | | Mean | Italian hybr. | | | Mean | F | LSD5 % |
|---------------|----------------|----------------|----------------|-------|----------------|----------------|----------------|--------|--------|----------|
| | R ₁ | R ₂ | R ₃ | | R ₁ | R ₂ | R ₃ | | | |
| November 2008 | 136.2 | 102 | 189 | 142.4 | 103.5 | 130.5 | 106 | 113.16 | 1.182 | 74.217NS |
| December | 114.7 | 132 | 111.6 | 119.4 | 84.66 | 93.66 | 90 | 89.44 | 19.142 | 19.058 |
| January 2009 | 160.3 | 127.9 | 109.6 | 132.6 | 103.66 | 90 | 125.66 | 106.44 | 2.097 | 50.23 |
| February | 317.4 | 288.6 | 242.4 | 282.8 | 236 | 192.5 | 244.5 | 224.33 | 4.641 | 75.349 |
| March | 291.9 | 416.7 | 405.6 | 371.4 | 354 | 290 | 367.33 | 337.11 | 0.544 | 129.027 |
| April | 535.2 | 646.8 | 301.2 | 494.4 | 439 | 368 | 424 | 410.33 | 0.652 | 289.02 |
| May | 467.5 | 370.3 | 281.1 | 372.9 | 364.33 | 312 | 185.33 | 287.22 | 1.285 | 210.003 |
| June | 390 | 222.6 | 419.4 | 344 | 264.5 | 224.5 | 299.5 | 274.5 | 1.182 | 173.225 |

Honey production by two hybrid races Italian and Carniolan honeybee colonies during 2008-2009 and 2009-2010

Data in Table (2) shows that mean weight of honey production by two hybrid Italian and Carniolan honeybee colonies were 13.03 and 7.7 kg, respectively. The statistical analysis showed that there were significant differences between the mean weight of honey production between two hybrids races, during 2008-2009(F=7.482,P=0.0003,LS D=4.8).

In this regard , Kepena (1987) mentioned that Carniolan hybrid bees gave 15.47% more honey in an average. Carniolan bees produced more honey per colony (9.75 kg.) during the flowering periods of Egyptian clover and cotton than either Italian (8.30 kg.) or Egyptian (4.90 kg.) bees. Average honey yields of colonies headed by Carniolan (A.m. carnica), Caucasian (A.m. caucasica) and hybrid (car. x cau. and cau. x car.) queens were 14.4, 24.2 and 10.0 kg., respectively (Romaniuk *et al.*, 1993). At the end of honey flow seasons of citrus, clover and cotton, the average honey yields of the Carniolan, Italian and Egyptian colonies were 7.25, 11.4 and 12.45 kg., respectively (Yakoub, 1998).

Table (2): Mean weight of honey production from two hybrid races, Italian and Coraniolan at end of August (2009)

| Hybrids | Honey production | | | Total | Mean | F | LSD5% |
|------------|------------------|----------------|----------------|-------|-------|-------|-------|
| | R ₁ | R ₂ | R ₃ | | | | |
| Italian | 15.8 | 14.5 | 8.8 | 39.1 | 13.03 | 5.416 | 6.362 |
| Caraniolan | 9.2 | 6.5 | 7.4 | 23.1 | 7.7 | NS | |

Activity of pollen collecting in Italian and Carniolan hybrid colonies.

Data in Table (3) shows the amount of pollen grains collected by two hybrids races, Italian and Carniolan honeybee colonies at November month. It can be observed that Italian colonies gave the highest mean the amount of pollen grains (9.00gm/colony), than Carniolan colonies (69.4gm/colony). At December month, the amount of pollen grains collected by two hybrid races, showed that Carniolan colonies gave the highest mean the amount of pollen grains (75.83gm/colony), than Italian colonies (73.2gm/colony). At January month, the amount of pollen grains collected by two hybrids races, showed

that Italian colonies gave the highest mean the amount of pollen grains (96.7gm/colony), than Carniolan colonies (93.1gm/colony). At February month, the amount of pollen grains collected by two hybrids races, showed that Carniolan colonies gave the highest mean the amount of pollen grains (136.4gm/colony), than Italian colonies (134.3gm/colony). At March month, the amount of pollen grains collected by two hybrids races, showed that Carniolan colonies gave the highest mean the amount of pollen grains (251.2gm/colony), than Italian colonies (240.9gm/colony).

At April month, the amount of pollen grains collected by two hybrids races showed that Italian colonies gave the highest mean the amount of pollen grains (301.1gm/colony), than Carniolan colonies (273.7gm/colony). At May month, the amount of pollen grains collected by two hybrids races showed that Carniolan colonies gave the highest mean the amount of pollen grains (207 gm/colony), than Italian colonies (204.9gm/colony). At June month, the amount of pollen grains collected by two hybrids races, showed that Italian colonies gave the highest mean the amount of pollen grains (247.6gm/colony), than Carniolan colonies (235.4gm/colony). The statistical analysis showed that there were no significant differences between the mean amount of pollen grains collected by two hybrids races, at November month and other months during 2008-2009.

The above results are agreed with El-Sherif *et al.* (1994) who found that the sample pollen period extended from mid-March to mid-September (about 6 months). pollen dearth, (from September to December) monthly harvested pollen as well as drone and worker production gradually decreased and began to increase from January till the beginning of the ample pollen period in mid-March. Both pollen stores and brood rearing over 4 years increased steadily in March, April and May. There was a direct relation between the amount of brood reared and the increase in pollen stores (Rosenthal *et al.*, 1981). Hussein (1981) stated that pollen collection was highest in March and September. The lowest activity was observed during June, November and December. A positive and highly significant correlation was found between pollen gathering activity and brood rearing activity.

Table (3): Amounts of Collecting pollen in two hybrid races, Carniolan and Italian Colonies during season (2008/2009)

| Periods | Carniolan | | | Mean | Italian hybr. | | | Mean | F | P | LSD5% |
|----------|----------------|----------------|----------------|--------|----------------|----------------|----------------|--------|--------|--------|-----------|
| | R ₁ | R ₂ | R ₃ | | R ₁ | R ₂ | R ₃ | | | | |
| November | 63.8 | 96.5 | 47.9 | 69.4 | 94.7 | 101.3 | 74 | 90 | 1.558 | 0.28 | 45.815NS |
| December | 74.7 | 86.3 | 66.5 | 75.83 | 83.1 | 73.6 | 62.9 | 73.2 | 0.1034 | 0.7638 | 22.732NS |
| January | 98.7 | 102 | 78.6 | 93.1 | 107 | 100 | 83.1 | 96.7 | 0.1248 | 0.7611 | 28.286NS |
| February | 142.4 | 163.7 | 103.2 | 136.43 | 167.1 | 112.3 | 123.5 | 134.3 | 0.0076 | 0.9344 | 67.629NS |
| March | 253.7 | 283.6 | 216.4 | 251.23 | 243.2 | 259.3 | 220.3 | 240.93 | 0.2097 | 0.6708 | 62.447NS |
| April | 261.8 | 346.7 | 212.8 | 307.1 | 319.2 | 301 | 283.2 | 301.13 | 4572 | 0.536 | 112.366NS |
| May | 229.3 | 213.5 | 178.2 | 207 | 221.7 | 259.3 | 133.9 | 204.96 | 0.0025 | 0.962 | 111.356NS |
| June | 233.1 | 269.6 | 203.5 | 235.43 | 226 | 277.4 | 119.6 | 247.66 | 0.3046 | 0.6104 | 139.501NS |

Measurements of comb built areas resulted by using two hybrid strains, Italian and Carniolan honeybee colonies during March 2009:

Data in Table (4) shows the measured of comb built area resulted by using two hybrid races, Italian and Carniolan honeybee colonies . It can be observed that Italian colonies gave the highest mean areas of comb built (2476.2 Inch³), than Carniolan colonies (2049.6Inch³). The statistical analysis showed that there were significant differences between the mean areas of comb built between two hybrid races, (F=33.054,P=0.0003,LSD=205.98).

Rashad *et al.* (1980) studied the monthly activity of honeybees in wax secretion. The highest amount of wax produced was during July, it constituted 28.9% of the total amount, April followed July, the amount of wax was 26.7%. August ranked next in frequency then came July and June. Production in these months constituted 16.9%, 16.7% and 10.8%, respectively of the total amount of wax produced.

Jay and Jay (1983) mentioned that the European bees produced significantly more wax than the African bees. In England, Portch (1994) recorded the total yield of wax during the period of 1982-1992. The average yield per colony was 36 lb. (29.5 kg) the pattern of results is compared with variation in local weather conditions.

Table (4): Measurements of comb built resulted by using different hybrids during March . (2009)

| Date | Italian bees | | | Carniolan bees | | | |
|-----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | R ₁ | R ₂ | R ₃ | Date | R ₁ | R ₂ | R ₃ |
| 28- Febr. | 115 | 258 | 69 | 28-Febr. | 254 | 75 | 420 |
| 04- March | 328 | 432 | 163 | 04- March | 224 | 240 | 210 |
| 08- March | 210 | 305 | 175 | 08- March | 220 | 222 | 201 |
| 12- March | 112 | 100 | 112 | 12- March | 230 | 250 | 256 |
| 16 March | 243 | 212 | 189 | 16- March | 266 | 247 | 239 |
| 20- March | 239 | 189 | 203 | 20- March | 301 | 252 | 247 |
| 24- March | 153 | 196 | 178 | 24 March | 288 | 302 | 199 |
| 28- March | 198 | 173 | 194 | 28- March | 192 | 212 | 209 |
| Total | 1598 | 1865 | 1283 | Total | 1975 | 1800 | 1981 |
| Mean | 1582 | | | Mean | 1918.66 | | |
| F | 3.562 | | | | | | |
| P | 0.1321 | | | | | | |
| LSD5% | 495.223 | | | NS | | | |

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دراسة مقارنة بين نشاط سلالتى هجين نحل العسل الكرنبولى والإيطالى فى مدينة
نصر بالقاهرة
عبد المنعم الحفنى ، عادل دياب محمد يوسف ، إبراهيم عبد الرازق عبدالله شحاته و
سعيد نافع احمد
كلية الزراعة جامعة الأزهر

اجريت هذه الدراسة عامى ٢٠٠٨ - ٢٠٠٩ بمنحل كلية الزراعة جامعة الأزهر بمدينة
نصر بغرض عمل مقارنة بين نشاط هجين لكل من سلالة النحل الإيطالى والنحل الكرنبولى من
حيث تقدير مساحة الحضنة ، وكمية العسل وحبوب اللقاح المجموعه و أيضاً مساحة الشمع
الممطوط . وقد أوضحت الدراسة وجود فروق معنوية بين سلالتى الهجين فى كمية العسل المنتجة
وأيضاً مساحة الشمع الممطوط بينما لم تكن هناك فرق معنوى فى كمية حبوب اللقاح
المجموعه.بينما أوضحت النتائج أن مساحة الحضنة المقدره بواسطة السلالتين تختلف باختلاف
الشهور خلال العام.

قام بتحكيم البحث

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