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COMPARATIVE STUDY ON SOME ACTIVITIES AND PRODUCTS BETWEEN HYBRIDS OF CARNIOLAN AND ITALIAN HONEYBEE

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ABSTRACT

The present study was carried out at the apiary of Beekeeping Research Section at Sakha Agricultural Research Station, Kafr El-Sheikh Governorate, during 2005 and 2006 seasons. Sixty colonies were divided into three groups, twenty colonies each to compare among F_1-F_2 Italian and F_1-F_2 carniolan honey bees on brood rearing activity, propolis and pollen gathering, royal jelly secretion and honey yield production. The results indicated that the F_1 Italian hybrid performed larger areas of sealed workers brood than did F_1 Carniolan, F_2 Italian and F_2 Carniolan hybrid with averages of 1079.93, 792.76, 847.40 and 771.72 inch^2/colony/month in the first year, and 929.08, 738.96, 794.95 and 756.79 inch^2/colony/month, in the second one, respectively. In case of drone brood, F_1 Carniolan hybrid (11.00 & 9.90 inch^2/colony/month) was higher than F_2 Carniolan (7.96 & 7.14), F_2 Italian (7.05 & 6.17) and F_1 Italian hybrid (6.86 & 5.11 inch^2/colony/month) in the first and second year, respectively. Also, F_2 Italian hybrid collected the largest amount of propolis (8.40 & 6.95 g/colony) compared with F_2 Carniolan (7.77 & 5.99), F_1 Italian (7.56 & 6.63) and F_1 Carniolan (6.98 & 4.56 g/colony) in the first and second years. The largest amount of pollen was gathered during clover nectar flow followed by maize and broad bean for the four honeybee hybrids (F_1-F_2 Italian and F_1-F_2 Carniolan) in both seasons. Analysis of variance revealed highly significant difference in amount of gathering pollen between F_1 Italian and other hybrids on broad bean, Egyptian clover and maize plants during the first and second seasons. F_1 Carniolan hybrid secreted more natural royal jelly in the first and second seasons (17.40 & 18.50 g/colony) than F_1 Italian (14.5l & 15.40), F_2 Carniolan (13.00 & 14.20) and F_2 Italian (12.60 & 13.60 g/colony), respectively. Also, F_1 Carniolan honey bees gathered the largest amount of artificial royal jelly (106.00 & 115.60 g/colony) during the period from 15 April until 15 June compared with other honey bee hybrids; F_1 Italian (97.25 & 100.40), F_2 carniolan (93.40 & 100.00) and F_2 Italian (92.40 & 99.40 g/colony) in two tested seasons, respectively. Data revealed that F_1 Carniolan produced the highest honey yield (6.55 & 6.95 kg/colony) followed by F_2 carniolan (5.75 & 7.85), F_1 Italian (5.51 & 5.70) and F_2 Italian (4.55 & 4.95 kg/colony) at the end of clover blooming season, respectively. Also, at the end of cotton blooming season, the honey yield of F_1 Carniolan hybrid (8.50 & 8.53 kg/colony) was more than other honey bee hybrids during 2005 and 2006 seasons. From the current results, it could be concluded that the F_1 Italian honeybee performed larger areas of worker brood and greater amounts of propolis and pollen than F_1 Carniolan, F_2 Italian and F_2 Carniolan honeybee. By contrast, the F_1 Carniolan achieved larger areas of drone brood and produced greater amounts of royal jelly and clover and cotton honey yield than other honey bees hybrids.

INTRODUCTION

Beekepers are always interested in the behaviour of honeybee (*Apis mellifera* L.) and its Italian and Carniolan hybrids under Egyptian ecological conditions to achieve more successes in their management of apiaries. Honeybees have been used in honey, royal jelly, pollen and propolis production, besides being very important as pollinator agents (Haydak, 1970).

Orchards and fields have grown larger, at the same time wild pollinators have dwindled. In several areas of the world, the pollination shortage is compensated by migratory beekeeping with beekeepers supplying the hives during the crop bloom and moving them after bloom is complete (Javovek *et al.*, 2002). Bees collect pollen in the pollen basket and carry it back to the hive. In the hive, pollen is used as a protein source necessary during brood rearing. Honey is the complex substance made when the nectar and sweet deposits from plants and trees are gathered, modified and stored in the honeycomb by honeybees. Honey is a complex biological mixture that contains mostly inverted sugars, primarily glucose and fructose. Royal jelly is a nutritional food product provided to larval bees, particularly those intended to become queens. It is also harvested and consumed by humans as a dietary supplement, as it contains various vitamins and amino acids. Propolis (or bee glue) is created from resins, balsams and tree saps. Honey bee use propolis to seal crack in the hive. Propolis is also sold for its reported health benefits (Taber and Barker, 1974 and Root, 1975). Several investigators evaluated the races and hybrids of honeybee (*A. mellifera* L.) from some aspects about pollen gathering activity, brood rearing, secretion of royal jelly, propolis collection activity and honey bee production such as Khattab (1976), El-Sarrag (1977), Mizis (1978), Marietto and Olivero (1981), El-Shaarawy (1989), Pearson and Braiden (1990), Villa *et al.* (1991), Kassem (2000), Serag El-Dienn (2004) and Matilla and Otis (2006). Therefore, the researchers and beekeepers are requested to find out the best honeybee hybrids for increasing the yield. From this stand point, the present work was designed and performed to compare among the honeybee (*A. mellifera* L.) hybrids: F_1-F_2 Italian and F_1-F_2 Carniolan regarding with the following points: brood rearing activity, propolis gathering activity, pollen gathering, royal jelly secretion activity and honey production from Egyptian clover yield and cotton yield.

MATERIALS AND METHODS

This experiment was carried out at the apiary of Beekeeping Research Section at Sakha Agricultural Research Station, Kafr El-Sheikh Governorate, Arab Republic of Egypt, beginning from January, 2006 to December, 2007.

In each season, sixty colonies were assigned and divided into three groups, twenty colonies each. All the honeybee colonies were approximately equal in strength and in number of combs covered with bees and had sufficient food. Colonies were headed with newly and naturally mated queens; F_1 Italian hybrid (Italian queen x Local drones), F_1 Carniolan hybrid (Carniolan queen x Local drones), F_2 Italian hybrid (F_1 Italian queen x Local drones) and F_2 Carniolan hybrid (F_1 Carniolan queen x Local drones).

The following aspects were investigated:

1. Brood rearing activity:

Twenty colonies were assigned for this test; five honeybee colonies for each hybrid (F_1 Italian, F_1 Carniolan, F_2 Italian and F_2 Carniolan bees). For estimating the brood rearing activity, sealed brood areas (workers and

drones) were measured in square inches at 12-day intervals (according to Fresnay, 1962) starting from January, 2006 till December, 2007.

2. Propolis gathering activity:

Propolis was gathered at 15-day intervals for all hybrids. The propolis was scrapped from the top of combs, inner sides of hive boxes, bottom and entrance of the hives. Also, the propolis was collected from jute located on tops of combs inside the brood chamber. The collected propolis was weighed in grams.

3. Pollen gathering activity:

Twenty colonies were used for this test; five colonies for each hybrid. The pollen traps were placed at the entrance of colonies. The traps were similar to the types used by Sung (1974), Taber (1984) and Dimou and Thrasyvoulou (2007). Trapping the pollen started in broad bean, *Vicia faba* L. from 15th January until 15th March, clover, *Trifolium alexandrinum* L. from 15th April until 15th June and maize, *Zea mays* L. from 15th June until 15th September during the two tested years. The colonies were compensated by pollen substitutes. The traps were emptied every two days and the contents were weighed and recorded.

4. Royal jelly secretion activity:

During this test, 20 honeybee colonies were used; (5 colonies for each hybrid). Each colony contained 9 combs, 5 brood combs, 4 combs of honey and pollen since all combs were covered with young bees. Each colony was headed with a laying recently mated queen. Naturally produced royal jelly was collected every 4 days while that produced artificially was collected every 3 days (Doolittle method, 1909).

5. Honey production:

Honey yield was evaluated by weighting the combs before and after extraction of honey collected from Egyptian clover and cotton fields (Shawer, 1987).

Statistical analysis:

Data were subjected to analysis of variance (ANOVA) and significantly different means were compared according to Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

1. Brood rearing activity:

F_1 Italian hybrid performed larger areas of sealed worker brood than did F_1 Carniolan hybrid, F_2 Italian hybrid and F_2 Carniolan hybrid with averages of 1079.93, 792.76, 847.40 and 771.72 inch^2/colony/month in the first year, respectively (Table 1). The corresponding values in 2006 were 929.08, 738.96, 794.95 and 756.79, respectively (Table 2).

As indicated in Tables (1 & 2), the opposite was recorded in case of drones brood; F_1 Carniolan honeybee hybrid was higher than F_2 Carniolan hybrid, F_2 Italian hybrid and F_1 Italian hybrid with averages of 11.00, 7.69, 7.05 and 6.86 inch^2/colony/month in the first year, while they were 9.90, 7.14, 6.17 and 5.11 inch^2/colony/month in the second one, respectively. Significant differences were found between Italian and Carniolan hybrids in both sealed worker brood and sealed drone brood in both years.

Table (1): Monthly areas of sealed brood (inch^2/colony) in F_1-F_2 Italian and Carniolan hybrids of honeybees, 2005 season.

Month	Workers				Drones			
	F_1		F_2		F_1		F_2	
	Italian	Carniolan	Italian	Carniolan	Italian	Carniolan	Italian	Carniolan
Jan.	386.20	330.00	390.50	335.50	1.00	2.60	1.50	1.90
Feb.	895.50	850.50	810.30	810.35	4.00	6.00	3.90	4.30
Mar.	1750.30	1050.30	1150.35	1100.50	11.50	21.00	11.00	13.00
Apr.	1145.25	880.50	900.25	870.50	15.30	26.50	14.25	16.50
May	2450.30	2100.60	2150.30	2000.00	19.50	28.50	17.50	20.00
Jun.	2010.00	910.30	1200.00	1000.50	10.30	19.30	9.90	11.50
Jul.	1780.50	1395.50	1300.50	1201.30	8.50	11.30	8.60	10.50
Aug.	1710.35	1170.50	1200.00	1090.50	5.50	7.60	5.10	6.50
Sept.	800.00	500.50	600.50	510.50	4.00	5.50	4.30	4.30
Oct.	290.20	210.30	205.30	210.50	2.50	2.50	1.90	2.25
Nov.	90.25	20.50	70.25	30.00	0.25	1.00	0.00	1.00
Dec.	150.30	93.60	190.50	100.50	0.00	0.30	0.00	0.50
Total	12959.15	9513.10	10168.75	9260.65	82.35	132.10	77.35	92.25
Mean	1079.93d	792.76b	847.40c	771.72a	6.86a	11.00c	7.05a	7.69b

In a row, means having the same letter are not significantly different at 5% level.

Table (2):Monthly areas of sealed brood (inch^2/colony) in F_1-F_2 Italian and Carniolan hybrids of honeybees, 2006 season.

Month	Workers				Drones			
	F_1		F_2		F_1		F_2	
	Italian	Carniolan	Italian	Carniolan	Italian	Carniolan	Italian	Carniolan
Jan.	190.50	200.50	195.50	190.50	1.30	1.80	1.20	1.50
Feb.	393.50	460.50	390.40	410.40	2.80	5.90	2.40	3.00
Mar.	1167.40	1140.20	1161.40	1001.40	8.50	20.50	10.40	12.80
Apr.	960.30	870.40	1005.40	1000.40	8.00	15.60	10.50	12.80
May	2399.50	2000.40	2113.50	2100.50	12.40	30.60	15.50	18.80
Jun.	1495.20	809.20	915.60	900.40	9.20	16.40	11.50	13.40
Jul.	1860.40	1360.20	1550.40	1500.50	10.40	13.40	12.50	12.50
Aug.	1480.30	1200.50	1310.50	1199.50	3.50	6.30	4.00	4.90
Sept.	870.50	600.50	690.40	580.40	3.50	5.00	4.00	4.00
Oct.	175.50	108.40	115.40	101.50	1.00	2.00	1.00	1.00
Nov.	10.50	16.20	15.50	15.40	0.25	0.35	0.00	0.00
Dec.	85.30	100.50	75.40	80.50	0.50	1.00	1.00	1.00
Total	11088.90	8867.50	9539.40	9081.50	61.35	118.85	74.00	85.70
Mean	924.08d	738.96a	794.95a	756.79a	5.11a	9.90c	6.17a	7.14b

In a row, means having the same letter are not significantly different at 5% level.

These results are in agreement with the findings of El-Shaarawy (1989), Kassem (2000) and Mansour (2002) who indicated that F_1 Italian gave higher amounts of worker brood than F_1 hybrid at Kalubia, Menoufiya and Dakahlia Governorates, respectively. Similar results indicated that the F_2 Italian gave less areas of worker brood than did F_1 Italian hybrid, (Huang and Otis, 1991 and Soszka, 1996). Also, as indicated in Tables (1 & 2), the highest average of sealed worker brood was found during May (2450.30, 2100.60, 2150.30 and 2000.00 inch^2/colony) and July (1780.50, 1395.50,

1300.50 and 1201.30 inch^2/colony in the first year, for F_1 Italian, F_1 Carniolan, F_2 Italian and F_2 Carniolan, respectively.

The corresponding values were 2399.50, 2000.40, 2113.50 and 2100.50 inch^2/colony and 1860.40, 1360.20, 1550.40 and 1500.50 inch^2/colony in the second year.

2. Propolis gathering activity:

Results in Table (3) indicated that the amount of propolis gathered by F_2 Italian honeybees (8.40 g/colony) was greater than those of F_2 Carniolan, F_1 Italian and F_1 Carniolan (7.77, 7.56 and 6.98) in the first year, respectively. Also, in the second year, the F_2 Italian honeybees gathered larger amounts of propolis (6.95 g/colony) than those of F_1 Italian, F_2 Carniolan and F_1 Carniolan bees (6.63, 5.99 and 4.56 g/colony), respectively.

Table (3): Monthly amount (g/colony) of propolis collected by F_1-F_2 Italian and Carniolan hybrids of honeybees.

Month	2005				2006			
	F_1		F_2		F_1		F_2	
	Italian	Carniolan	Italian	Carniolan	Italian	Carniolan	Italian	Carniolan
Jan.	1.00	1.20	1.50	1.20	2.40	2.10	2.90	2.50
Feb.	3.50	3.20	4.00	3.50	2.70	2.50	3.20	3.00
Mar.	3.70	3.00	4.50	4.20	4.60	4.00	5.50	4.50
Apr.	7.50	7.00	8.00	7.00	10.00	6.40	10.00	7.00
May	8.00	7.90	9.40	8.00	7.30	5.00	8.40	6.50
Jun.	9.20	8.50	11.50	9.40	8.50	6.50	9.00	7.00
Jul.	16.30	15.50	16.20	16.50	11.50	8.25	12.40	9.40
Aug.	20.50	17.50	21.40	20.50	18.40	9.40	18.50	18.60
Sept.	8.50	7.90	9.60	9.00	5.20	3.40	3.50	4.00
Oct.	8.00	8.00	9.20	9.00	4.50	3.40	5.00	4.90
Nov.	2.50	2.00	3.00	2.90	3.00	2.50	3.50	3.00
Dec.	2.00	2.00	2.50	2.00	1.50	1.25	1.50	1.50
Total	90.70	83.70	100.80	93.20	79.60	54.70	83.40	71.90
Mean	7.56b	6.98a	8.40c	7.77b	6.63c	4.56a	6.95c	5.99b

In a row, means having the same letter are not significantly different at 5% level.

Highly significant differences were found between the amounts of propolis of the four hybrids in the first and second years. The highest amount of propolis collected by F_1 Italian bees, F_1 Carniolan, F_2 Italian and F_2 Carniolan were found during July (16.30 & 11.50), (15.50 & 8.25), (16.20 & 12.40) and (16.50 & 9.40 g/colony) and August (20.50 & 18.40), (17.50 & 9.40), (21.40 & 18.50) and (20.50 & 18.60 g/colony) in the first and second seasons, respectively. The lowest amounts of propolis gathered by either hybrid were during November, December and January, ranging between 1.00 – 3.50 g/colony/month in both seasons. The amount of propolis harvested per colony depends on many factors such as the race of bees, strength of the hive, plant sources, weather conditions and needs of the hive (El-Shaarawy, 1989; Bonvehi, 2000 and Al-Shaher *et al.*, 2004). Also, these results are in harmony with the results of Kassem (2000), Marcucci *et al.* (2000) and Bankova *et al.* (2007).

3. Pollen gathering activity by the honeybee hybrids:

As indicated in Table (4), the largest amount of pollen was gathered during clover nectar flow followed by maize and broad bean for the four hybrids in both seasons. F_1 Italian bees gathered more pollen during broad bean season (800.60 & 793.50 g/colony) than F_1 Carniolan (610.40 & 700.40 g/colony), F_2 Italian (600.50 & 751.50 g/colony) and F_2 Carniolan (595.00 & 741.40 g/colony) in the first and second seasons, respectively. Also, F_1 Italian bees collected more pollen during maize season (925.40 & 975.50 g/colony) than F_1 Carniolan (810.50 & 861.50 g/colony), F_2 Italian 9803.40 & 951..50 g/colony) and F_2 Carniolan (795.40 & 911.60 g/colony) in the first and second seasons, respectively.

Table (4): Weight of pollen (g/colony) collected by F_1 and F_2 honey bee hybrids from different plant sources.

Source	Duration of collection	2005					
		F_1		%	F_2		%
		Italian	Carniolan	Reduction	Italian	Carniolan	Reduction
Broad bean	15/1-15/3	800.60b	610.40a	23.76	600.50a	595.00a	0.92
Egyptian	15/4-15/6	1100.50b	950.40a	13.64	908.30a	880.50a	3.06
clover Maize	15/6-15/8	925.40c	810.50b	12.42	803.40b	795.40a	1.00
Total		2826.50	2371.30	49.82	2312.20	2270.90	4.98
Mean		942.17	790.43	16.11	770.73	756.97	1.79
		2006					
Broad bean	15/1-15/3	793.50d	700.40a	11.73	751.50c	741.40b	1.34
Egyptian	15/4-15/6	1143.30b	993.60a	13.10	1001.40a	991.60a	0.98
clover Maize	15/6-15/8	975.50d	861.60a	11.68	951.50c	911.60b	4.19
Total		2912.30	2555.60	36.51	2704.40	2644.60	6.51
Mean		970.77	851.87	12.25	901.47	881.53	2.21

In a row, means having the same letter are not significantly different at 5% level.

Data in Tables (3 & 4) revealed highly significant differences in the amount of gathered pollen between F_1 Italian and other hybrids on broad bean, Egyptian clover and maize plants during the first and second seasons. These results are in agreement with the findings of Attalah *et al.* (1989) who found that the total amount of pollen was greatest from Egyptian clover followed by maize and broad bean. Pearson and Braiden (1990), Kassam (2000) and Baum *et al.* (2004) found that F_1 Italian hybrid gathered more amount of pollen than F_1 Carniolan hybrid at New Zealand, Menoufia – Egypt, Texas – USA, respectively.

4. Royal jelly secretion activity:

4.1. Natural secretion:

Data in Table (5) showed that the largest amount of naturally produced royal jelly was gathered during the period from 15 February until 15 April for all hybrids in the two tested seasons.

F_1 Carniolan hybrid performed more natural royal jelly in the first and second seasons (17.40 & 18.50/colony) compared with F_1 Italian (14.5 & 15.40 g/colony), F_2 Carniolan (13.00 & 14.20 g/colony) and F_2 Italian (12.60 & 13.60 g/colony), respectively. Also, during the periods from 15 April until 15 June, F_1 Carniolan hybrid performed largest amount of royal jelly in both years (14.60 & 15.60 g/colony) compared with F_1 Italian (12.50 & 13.00), F_2 Carniolan (11.40 & 12.60) and F_2 Italian (10.00 & 11.00 g/colony),

respectively. While this hybrid performed lowest amount of royal jelly during the periods from 15 June until 15 August in the first and second seasons. Krol (1985) and Serag El-Dien (2004) indicated that the Carniolan bees was the best in royal jelly secretion. The current results disagree with those of Kassem (2000) who reported that F_1 Carniolan hybrid gave the highest secretion of royal jelly at Menoufiya governorate.

Table (5): The amounts of royal jelly (g/colony) naturally produced by the F_1 and F_2 hybrids of honeybee.

Duration of collection	2005				2006			
	F_1		F_2		F_1		F_2	
	Italian	Carniolan	Italian	Carniolan	Italian	Carniolan	Italian	Carniolan
15/2-15/4	14.50b	17.40c	12.60a	13.00a	15.40b	18.50c	13.60a	14.20a
15/4-15/6	12.50c	14.60d	10.00a	11.40b	13.00b	15.60c	11.00a	12.60b
15/6-15/8	10.40c	12.20d	8.60a	9.40b	11.50b	13.40c	9.00a	10.80b
Total	37.40	44.20	31.2	33.80	39.90	48.50	33.60	36.60
Mean	12.47	14.73	10.40	11.27	13.30	16.17	11.20	12.20

In the same row, means having the same letter are not significantly different at 5% level.

4.2. Artificial secretion:

As indicated in Table (6), F_1 Carniolan honeybees gathered the largest amount of artificial royal jelly (106.0 & 115.60) during the period from 15 April until 15 June compared to other hybrids, F_1 Italian (97.25 & 100.40), F_2 Carniolan (93.40 & 100.00) and F_2 Italian (92.400 & 99.40 g/colony) in the two tested seasons, respectively. Also, during the same period, the analysis of variance recorded significant differences in amount of artificial royal jelly production between F_1 Carniolan and other hybrids. The results of both years revealed that F_1 Carniolan honeybees gathered the lowest amount of artificial royal jelly (93.40 & 96.60) during the period from 15 June until 15 August compared with F_1 Italian (86.4 & 93.60), F_2 Carniolan (83.40 & 93.90) and F_2 Italian (81.60 & 92.60 g/colony), respectively. In 2005, statistical analysis revealed significant differences in the amount of royal jelly during the period from 15 June until 15 August between F_1 Carniolan and other hybrids, F_1 Italian, F_2 Carniolan and F_2 Italian honeybees, while in 2006, there was a significant difference between F_1 Carniolan and F_2 Italian, only in the same period.

Table (6): The amounts of royal jelly (g/colony) artificially produced by the F_1 and F_2 hybrids of honey/bee.

Duration of collection	2005				2006			
	F_1		F_2		F_1		F_2	
	Italian	Carniolan	Italian	Carniolan	Italian	Carniolan	Italian	Carniolan
15/2-15/4	78.20a	79.00a	75.40a	76.40a	73.60ab	75.00b	72.50a	72.50a
15/4-15/6	97.25a	106.00b	92.40a	93.40a	100.40a	115.60b	99.40a	100.00a
15/6-15/8	86.40b	93.40c	81.60a	83.40ab	93.60ab	96.60b	92.60a	93.90ab
Total	261.85	278.40	249.40	253.20	267.60	287.20	264.50	266.40
Mean	87.28	92.80	83.13	84.40	89.20	95.73	88.17	88.80

In the same row, means having the same letter are not significantly different at 5% level.

5. Honey yield production:

Data in Table (7) revealed that F_1 Carniolan produced higher honey yield (6.55 & 6.95 kg/colony) than F_2 Carniolan (5.75 & 7.85), F_1 Italian (5.51

& 5.70) and F_2 Italian (4..55 & 4.95 kg/colony) at the end of clover blooming season, respectively. Also, at the end of cotton blooming season, the honey yields of F_1 Carniolan hybrid was more (8.50 & 8.53 kg/colony) than F_2 Carniolan (7.52 & 7.85), F_1 Italian (7.10 & 7.30) and F_2 Italian hybrid (6.50 & 6.55 kg/colony) in 2005 and 2006 seasons, respectively. It was noted that F_1 Carniolan hybrid tended to achieve more sealed honey combs than did F_2 Carniolan, F_1 Italian and F_2 hybrids. On the other hand, F_1 and F_2 Italian hybrids tended to store more nectar in new combs than F_1 and F_2 Carniolan hybrids. In 2005 and 2006 years for clover and cotton blooming seasons, the analysis of variance recorded significant differences in amount of honey yield between F_1 Carniolan hybrid and other honey bee hybrids. Serag El-Dien (2004) found that F_1 Carniolan hybrid was higher in the honey yield (6.50 & 6.25 kg/colony) than Italian hybrid (4.75 & 5.25 kg/colony) at the end of clover blooming season.

Table (7): The amounts of honey yield (kg/colony) produced by four honey bee hybrids during 2005 and 2006 seasons.

Season	Crop	Honeybee hybrid			
		F_1		F_2	
		Italian	Carniolan	Italian	Carniolan
2005	Clover	5.51b	6.55c	4.55a	5.75b
	Cotton	73.10b	8.50d	6.50a	7.52c
2006	Clover	5.70b	6.95c	4.95a	6.00b
	Cotton	7.30b	8.53d	6.55a	7.85c
Total		25.61	30.53	22.55	27.12
Mean		6.40	7.63	5.64	6.78

In the same row, means having the same letter are not significantly different at 5% level.

From the current results, it could be concluded that the F_1 Italian honeybee performed larger areas of worker brood and greater amounts of propolis and pollen than F_1 Carniolan, F_2 Italian and F_2 Carniolan honeybee. By Contrast F_1 Carniolan produced greater amounts of royal jelly and clover honey yield than F_1 Italian, F_2 Carniolan and F_2 Italian honey bees.

REFERENCES

Al-Shaher, A.; J. Wallace; S. Agarwal; W. Bretz and D. Daugh (2004). Effect of propolis on human fibroblasts from the pulmp and periodontal ligament. J. Endod, 30(5): 359-361.

Atallah, M.A.; F.K. Aly and H.M. Eshbah (1989). Pollen gathering activity of worker honeybee, on field crops and medical plants in Minia region, middle Egypt. Proc. 4th Int. Conf. Apic. Trop. Climates, Cairo: 109-115.

Bankova, V.S.; S.S. Popov, and N.L. Marekov, (2007). Comparative study between honeybees on propolis. J. Natural Products, 46: 471-474.

Baum, K.H.; W.L. Rubink; R.N. Coulson and V.M. Bryant (2004). Pollen selection by feral honeybee (Hymenoptera: Apidae) colonies in a coastal prairie landscape. Environ. Entomol. 33(3): 727-739.

Bonvehi, J.S. (2000). Study on propolis quality from China and Uruguay, Z. Naturforsch, 55: 778-784.

Dimou, M. and A. Thrasyvoulou (2007). A comparison of three methods for assessing the relative abundance of pollen resources collected by honeybee colonies. J. of Apic. Res., 46(3): 144-148.

Doolittle, G.M. (1909). Scientific queen rearing. 5th Edition, Standpoint, Idaho.

El-Sarrag, M.S.A. (1977). Morphometrial and biological studies on Sudanese honeybees (*Apis mellifera* L.) (Hymenoptera: Apidae). Ph.D. Thesis, Cairo Univ.

El-Shaarawy, M.O.A. (1989). Studies on some secondary products of honeybees (*Apis mellifera* L.). Ph.D. Thesis, Fac. Agric., Moshtohor , Zagazig Univ. 171 pp.

Frasnay, J. (1962). A new instrument for brood measurement in a honeybee colony. Cited from American Bee J., 111(1): 20-21.

Haydak, M.H. (1970). Honeybee nutrition. Annual Review of Entomology, 15: 143-156.

Huang, Z.Y. and G.W. Otis' (1991). Nonrandom visitation of brood cells by worker honeybees (Hymenoptera: Apidae).J. of Insect Behavior, Vol. No. 2.

Javorek, S.K.; K.E. Mackenzie, and S.P. Vander Kloet, (2002). Comparative pollination effectiveness among bees (Hymenoptera: Apoidae) on low bush blueberry (Ericaceae: *Vaccinium anngustifolium*). Annals of the Entomological Society of America, 95: 345-351.

Kassem, S.I. (2000). Ecological and physiological studies on queen rearing of some honeybee races (*Apis mellifera* L.). Ph.D. Thesis, Fac. Agric. Moshtohor, Zagazig Univ., 139.

Khattab, M.M. (1976). Effect of ecological factors on honeybees activities. M.Sc. Thesis, Fac. Agric., Cairo Univ.

Krol, A. (1985). Provision of royal jelly during the development of queen larvae on the results of queen rearing. Pszeselnicze Zesygte Neukowe, 18: 135-143.

Mansour, A.M.S. (2002). Effect of artificial feeding on some activities of honebee. M.Sc. Thesis, Fac. Agric., Mansoura Univ., pp. 104.

Marcucci, M.C.; F.F. Erreres; A.R. Custodio; M. Ferreira; V.S. Bankova; C. Garcia-Viguera, and W.A. Bretz, (2000). Evaluation of phenolic compounds in Brazilian propolis from honeybee hybrids at different geographic regions. Z. NNaturforesch, 55: 76-81.

Marietto, F. and G. Olivero (1981). Collection and uses of propolis by honeybees in Italian Apicoltore Moderno. 72(4): 131-140.

Matilla, R.M. and G.W. Otis (2006). The effects of pollen availability during larval development on the behaviour and physiology of spring-reared honeybee workers. Apidologie, 37: 533-546.

Mizis, A.P. (1978). Production of propolis. A remarkable hive products "Propolis". Apimondia, Bucharest.

Pearson, W.D. and V. Braiden (1990). Seasonal pollen collection by honeybees from grass/shrub highlands in Canterbury, New Zealand. J. Apic. Res., 29(4): 206-213.

Root, A.I. (1975). ABC and ZYZ of bee culture. Medline: Root Co.

Serag El-Dien, F.Sh. (2004). Comparative study on some products of Italian and Carniolan honeybee hybrids at Kafr El-Sheikh Governorate. J. Agric. Sci. Mansoura Univ., 29(1): 409-416.

Shawer, M.B. (1987). Major pollen sources in Kafr El-Sheikh, Egypt and the effect of the pollen supply on broad area and honey yield. J. of Apic. Res., 26(1): 43-46.

Soszka, M. (1996). Brood survival in non-fed bee colonies of three races during beekeeping season. Pszczelnicze Zeszyte Nnaukowe, 40(2): 261-266.

Sung, A.D. (1974). Pollen collection by honeybees. J. Anim. Ecol., 16.

Taber, S. (1984). Pollen and pollen trapping. Amer. Bee J. 124(7): 512-513.

Taber, S. and R.J. Barker (1974). Honeybee collect chalking material as propolis. Amer. Bee J. 114(3): 90.

Villa, J.D.; N. Kieniger and T.E. Rinderer (1991). Overwintering of Africanizal, European and hybrid honeybee in Germany. Environ. Entomol., 20(1): 39-43.

دراسة مقارنة على بعض انشطة ومنتجات هجن نحل العسل الكرينولى والايطالى

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أجريت هذه الدراسة بقسم بحوث النحل بمحطة البحوث الزراعية بسخا - كفرالشيخ خلال موسمين متتاليين ٢٠٠٥ ، ٢٠٠٦. تم استخدام ٦٠ خلية قسمت إلى ثلاث مجموعات كل مجموعة ٢٠ خلية لدراسة المقارنة بين هجن النحل (الهجين الأول والثانى الإيطالى مع الهجين الأول والثانى الكرنيولى على بعض منتجات وانشطة نحل العسل مثل تربية الحضنة - جمع البروبوليس - جمع غذاء الملكات طبيعيا وصناعيا وإنتاج عسل النحل). وأوضحت الدراسة أن الهجين الأول الإيطالى أعطى أكبر مساحة من حضنة الشغالات عن الهجين الأول الكرنيولى والهجين الثانى الإيطالى والهجين الثانى الكرنيولى بمتوسطات ١٠٧٩.٩٣ ، ٧٩٢,٧٦ ، ٨٤٧,٤٠ ، ٧٧١,٧٢ بوصة مربعة لكل خلية فى الموسم الأول على التوالى. بينما فى الموسم الثانى كانت المتوسطات ٩٢٩,٠٨ ، ٧٣٨,٩٦ ، ٧٩٤,٩٥ ، ٧٥٦,٧٩ على التوالى.

وفى حالة حضنة الذكور تفوق الهجين الأول الكرنيولى بمتوسطات (١١,٠ ، ٩,٩ بوصة مربعة/خلية) عن الهجين الثانى الكرنيولى (٧,٩٦ ، ٧,١٤) ، والهجين الثانى الإيطالى (٧,٠٥ ، ٦.١٧) والهجين الأول الإيطالى (٦,٨٦ ، ٥,١١ بوصة مربعة/خلية) فى السنة الأولى والثانية على التوالى.

جمع الهجين الثانى الإيطالى كميات أكبر من البروبوليس (٨,٤٠ ، ٦,٩٥ جرام/خلية) مقارنة بالهجين الثانى الكرنيولى (٧,٧٧ ، ٥,٩٩) ، الهجين الأول الإيطالى (٧,٥٦ ، ٦,٦٣) والهجين الأول الكرنيولى (٦,٩٨ ، ٤,٥٦ جرام/خلية) فى السنة الأولى والثانية على التوالى. قام النحل بتجميع كميات كبيرة من حبوب اللقاح أثناء موسم تزهير البرسيم مقارنة بالذرة والفول البلدى خلال موسمى الدراسة وأظهرت نتائج التحليل الإحصائى أن هناك فروقاً معنوية كبيرة بين هجن النحل فى تجميع حبوب لقاح الفول البلدى ، البرسيم ونباتات الذرة. أنتج الهجين الأول الكرنيولى كميات أكبر من غذاء الملكات طبيعيا (١٧,٤٠ ، ١٨.٥٠ جرام/خلية) مقارنة بالهجين الأول الإيطالى (١٤,٥٠ ، ١٥,٤٠ جرام/خلية) ، الهجين الثانى الكرنيولى (١٣,٠٠ ، ١٤,٢٠ جرام/خلية) ، والهجين الثانى الإيطالى (١٢,٦٠ ، ١٣,٦٠ جرام/خلية) على التوالى أما بالنسبه لغذاء الملكات المنتج صناعيا تفوق الهجين ألأول الكرنيولى فى جمع غذاء الملكات بمتوسط (١٠٦,٠٠ ، ١١٥,٦٠ جرام/خلية) خلال الفترة من ١٥ إبريل حتى ١٥ يونيه مقارنة بالهجن الأخرى ، الهجين الأول الإيطالى (٩٧,٢٥ ، ١٠٠,٤٠ جرام/خلية) ، الهجين الثانى الكرنيولى (٩٣,٤٠ ، ١٠٠,٠٠ جرام/خلية) والهجين الثانى الإيطالى (٩٢,٤٠ ، ٩٩,٤٠ جرام/خلية) أثناء موسمى الاختبار على التوالى. أظهرت النتائج أن الهجين الأول الكرنيولى كان الأكثر لمحصول العسل (٦,٥٥ ، ٦,٩٥ كجم/خلية) مقارنة بالهجين الثانى الكرنيولى (٥,٧٥ ، ٧,٨٥ كجم/خلية) ، الهجين الأول الإيطالى (٥,٥١ ، ٥,٧٠ كجم/خلية) والهجين الثانى الإيطالى (٤,٥٥ ، ٤,٩٥ كجم/خلية) عند نهاية موسم تزهير البرسيم على التوالى. وأيضا فى موسم تزهير القطن تفوق الهجين الأول الكرنيولى (٨,٥٠ ، ٨,٥٣ كجم/خلية) مقارنة بالهجن الأخرى خلال موسمى ٢٠٠٥ ، ٢٠٠٦م. يمكن أن نستنتج من الدراسة أن الهجين الأول الإيطالى جاء فى المرتبة الاولى فى إنتاج الحضنة والبربوليس وإنتاج حبوب اللقاح متفوقا على الهجين الأول الكرنيولى والثانى الإيطالى والثانى الكرنيولى لكن الهجين الاول الايطالى كان اقل من الهجين الثانى الايطالى فى انتاج البروبوليس ، بينما جاء الهجين الأول الكرنيولى متفوقا فى إنتاج حضنة الذكور وغذاء الملكات ومحصول عسل القطن والبرسيم عن الهجن الأخرى.