

The impact of governmental legislation in the field of bee on queen characters and productivity in Egypt

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Abstract

This experiment was conducted in a private apiary at Sharkia and Dakahlia governorates during the years 2011, 2012. To study the effect of legislation issued by the Egyptian Ministry of Agriculture in the field of bees on productivity and biometric attributes of honeybee queens. The results revealed that the legislative intervention and not to allow the import of queens from abroad led to the weakening of the productivity of queens and biometric attributes of the imported strains Italian, Carniolian, which in turn has affected the productivity of honey and broods within colonies under test. Find recommended reviewing this legislation to Egypt importance of the site allows them the ability to issue packed production of bee honey and high import queens of modern productivity without the monopoly of the Ministry of Agriculture for this import.

Keywords: Honeybees, queen rearing, Carniolian, Italian

Introduction:

Egypt occupies privileged location in the middle of the three continents of the world, which makings to be a center for the production and marketing of bee products, especially for the mild climate throughout the year. The honey bee, *Apis mellifera* L., is critical not only for honey production but also for crop pollination (**Harbo and Harris, 2001**). Societies with high reproductive skew, such as social insect colonies, differ from most animal societies in that the entire group's reproductive output is typically channeled through just one reproductive female. A consequence of this feature is that the entire group's fitness depends greatly on the "quality" of this female. Social insect colonies with high-quality queens (i.e., those that successfully mate, have high fecundity, and produce viable offspring) will out-compete colonies with low quality queens. Thus, natural selection will favor any mechanism that ensures that a colony produces and retains a high-quality queen. (**Ildobler and Wilson 1990, Hatch et al. 1999; David et al 2003**). The inclusive fitness

of colony members changes with the reproductive state of a colony (**Hamilton, 1964a, b**). Since honey bee workers are sterile, competition among subfamilies has been postulated in the contexts of rearing reproductives (**Page and Erickson, 1984; Breed et al., 1984; Mohammadi and Le Conte, 2000**). The body weight of the queen is indicative of her robustness and is the prime element to be considered in her assessment. Heavy queens have ovaries with many ovarioles and the spermatheca of a larger volume (**Rachmatov 1967, Woyke 1971, Szabo 1973, Taranov 1973, Eid et al. 1980**). They also lay more eggs (**Harbo 1986**). Ministerial Decree No. 1600 of 2005, as amended by Resolution No 2007 of 2001 Article 59 "is prohibited to import honeybees from abroad in any form of image (queens - combs - Comb less swarms). The governmental intervention in the field of beekeeping led to the deterioration of the industry that includes more than 50,000 beekeepers. Therefore the current study aimed to measuring the impact of some biometric characteristics of breed queens, Measuring the efficiency of these queens in the brood production, the size of the production of these strains after multiple generations and inbreeding and compared to the current results of some previous studies on the issuance of the ministerial decree to know the extent of its impact.

Materials and methods:

Experimental Honeybee Colonies: The field part of the present investigations was carried out in two special apiaries (located at Sharkia and Dakahlia governorates), during spring season of 2011, 2012. Twenty colonies of the two hybrid Carniolan and Italian honeybees, (*Apis mellifera*) L. Used colonies in this study were established in a 10-framed Langstroth hive, and used for the full period of the study, which extended from the beginning of February 2011 to October 2012.

Queen rearing

Breeder queen from bee stock that has been locally selected for increased honey production. Each starter colony was given 40 larvae (12 and 24 h old) grafted into bee wax cups. Cell builder colonies were fed 50% sugar syrup and pollen substitute. The grafted cells were placed in the queenless starter colonies for 24 h, and then they were transferred to the finisher colonies (**Laidlaw 1979**). Seven days after grafting, the queen cells were placed inside nursery cages (**Laidlaw & Eckert 1962**). Adult queens were moved from finisher colonies into nucleus colonies for open mating.

Ten mated queens replaced in the used colonies and the rest of the mated queens were placed in an incubator and the queens were weighed.

Experiment 1:

In this experiment, transfer of larvae followed practices established in commercial queen rearing (**Laidlaw and Eckert, 1962**). 12 and 24 hours after hatching, single larvae were grafted into the queen cups, one larva to a cup. Cups with sibling or unfamiliar larvae were placed alternately on horizontal bars. Each colony received 20 own larvae and 20 others belonging to the other race. This experiment was repeated 9 times in each season. The number of grafted larvae of each type initially accepted was recorded one day after grafting.

Experiment 2:

Some characters of reared queens, this experiment used the rest of the queen cells were placed in an incubator and the queens were weighed just after emergence. (queen weight, Dry ovary weight, Thorax width, Thorax length, Wing length, Wing width, Spermatheca diameter, and Spermatheca volume)

Experiment 3:

Characters of some bee products (broods, honey, pollen and royal jelly), this experiment used the colonies of the two races Carniolian and Italian and all bee products were weighed (broods, honey, and pollen) and three grafted times to produce royal jelly in three colonies of the two races.

Data analysis

The data were analyzed by analysis of variance (**ANOVA**), and where significant differences were found.

Results and Discussion:

According to the data, there was a decrease in the acceptance of grafted larvae more than 24 hrs. The data in table (1) showed the acceptance percentage of grafted larvae according to her strain and the larval age.

Data in table (1) showed that the acceptance percentage in Carniolian strains was 90.5 % and 86.1 % with mean acceptance 88.3% during the two successive years 2011 and 2012, respectively. And the mean number of accepted larvae was 155 and 163 queen cup at the nine grafted times during the same seasons. On the other hand the acceptance percentage in Italian strains was 81.6 % and 81.7 % with mean acceptance 81.1% during the two successive years 2011 and 2012, respectively. And the mean number of accepted larvae was 145 and 147 queen cup at the nine grafted times during the same seasons.

Table (1): Mean number of accepted larvae and Acceptance percentage (%) of grafted larvae for both Carniolian and Italian strains during 2011 and 2012 seasons.

Year	Carniolan strain		Italian strain	
	Mean No. Accept. L.	% acceptance	Mean No. Accept. L.	% acceptance
2011	155	86.1b	145	81.6a
2012	163	90.5a	147	81.7a
Mean	159	88.3	146	81.1

Data in table (2) showed that the mean weight of queen in Carniolian strains was 163,173 mg at 2011 and 2012 successive years. And the mean was 155, 159 mg during 2011 and 2012 years for Italian strains, respectively. The

Also, the external characters , in Carniolian strains was 4.74 , 4.51, 9.44, and 3.17 mm for thorax width, thorax length , wing length and wing width at 2011 , respectively . and it was 4.51, 4.45, 9.37 and 3.11 mm for these measurements during 2012, respectively.

While the thorax width, thorax length, wing length and wing width at 2011 were 4.12, 3.97, 8.55 and 3.08 mm for Italian strains, respectively. Also during 2012 year for Italian strains the thorax width, thorax length , wing length and wing width were 3.99 , 3.85 , 8.45 and 3.01mm, respectively.

Also, the internal characters , in Carniolian strains was 9.2mm, 1.06mm, and 0.62mm³ for Dry ovary weight, Spermatheca diameter, Spermatheca volume at 2011 , respectively . and it was 8.9mm, 1.12 mm and 0.63mm³ for these measurements during 2012, respectively.

While the Dry ovary weight, Spermatheca diameter and Spermatheca volume at 2011 were 8.3mm, 0.996mm and 0.59mm³ for Italian strains, respectively. Also during 2012 year for Italian strains the Dry ovary weight, Spermatheca diameter and Spermatheca volume were 8.2mm, 1.01mm and 0.57mm³, respectively.

Table (2): External and internal measurements for reared queens*for both Carniolian and Italian strains during 2011 and 2012 years.

Strain	year	queen weight (mg)	Dry ovary weight (mg)	Thorax Width (mm)	Thorax Length (mm)	Wing Length (mm)	Wing Width (mm)	Sper. Diam. (mm)	Sper. Vol. (mm³)
Car.	2011	163±12b	9.2±0.20a	4.74±0.22a	4.51±0.44a	9.44±0.34a	3.17±0.21a	1.06±0.11a	0.62±0.015a
	2012	173±22a	8.9±0.18b	4.51±0.20b	4.45±0.37b	9.37±0.29a	3.11±0.19b	1.12±0.15b	0.63±0.011a
Ital.	2011	155±11d	8.3±0.15c	4.12±0.11c	3.97±0.34c	8.55±0.1b	3.08±0.15c	0.996±0.12c	0.59±0.012b
	2012	159±15c	8.2±0.17c	3.99±0.15d	3.85±0.31c	8.45±0.2b	3.01±0.11c	1.01±0.15c	0.57±0.011b

* Different letters denote significant differences between the means (P < 0.05).

Data in table (3) showed that the sealed brood area (inch²) , Honey (inch²) and Collected pollen (gr.) in Carniolian strains was 4650, 4950 inch² and 1530 gr at 2011 and the mean was 4720, 5150 inch² and 1490 gr, during 2012 year, respectively.

Also, the sealed brood area (inch²) , Honey (inch²) and Collected pollen (gr.) in was 3950, 4103 inch² and 1250 gr at 2011 and the mean was 4150, 3974 inch² and 1109 gr, during 2012 year, for Italian strains respectively.

Table (3): Mean sealed broad areas in inch², mean areas of honey in inch² and mean collected pollen in gr. for both Carniolian and Italian strains during 2011 and 2012 years.

Strain	year	sealed brood area (inch²)	Honey (inch²)	Collected pollen (gr.)
Car.	2011	4650	4950	1530
	2012	4720	5150	1490
Ital.	2011	3950	4103	1250
	2012	4150	3974	1109

Data in table (4) showed that the mean number of accepted cups , mean weight royal jelly (mg) per cup and mean weight per colony(gr) in Carniolian strains was 103, 225(mg) and 23.175(gr) at 2011 and the mean was 109, 235 (mg) and 25.615(gr), during 2012 year, respectively.

Also, the mean number of accepted cups , mean weight royal jelly (mg) per cup and mean weight per colony(gr) in was 98, 209 (mg) and 20.482 (gr) at 2011 and the mean was 99, 216 (mg) and 21.384(gr) , during 2012 year, for Italian strains respectively.

Table (4): Mean number of accepted cups, mean weight of royal jelly per cup and mean weight per colony for both Carniolian and Italian strains during 2011 and 2012 years.

Strain	year	Number accepted cups	Weight royal jelly per cup (mg)	Weight per colony (g)
Car.	2011	103	225	23.175
	2012	109	235	25.615
Ital.	2011	98	209	20.482
	2012	99	216	21.384

The data in this research showed that all queen measurements for external and internal was less than all measurements were recorded in all reviewed papers before the time of the governmental legislation. The results revealed that the legislative intervention and not to allow the import of queens from abroad led to the weakening of the productivity of queens and biometric attributes of the imported strains Italian, Carniolian , which in turn has affected the productivity of honey and broods within colonies under test. Find recommended reviewing this legislation to Egypt importance of the site allows them the ability to issue packed production of bee honey and high import queens of modern productivity without the monopoly of the Ministry of Agriculture for this import.(Aly, 1989, Attalh, 1981,Attalah 1989 ,El-banby 1954, El-banby 1958 , El-banby and abu-korah1976, El-banby and elsamni 1969 El-banby and El-sherif 1987 and Elsarrag 1977)

Conclusion:

The governmental intervention in the field of beekeeping led to the deterioration of the industry that includes more than 50,000 beekeepers, without searching for alternative ways to prevent the import and which directly affected the productivity of colonies and production quality and marketing of queens and various bee products. Perception that

governmental intervention in the trade of bee products is the protection of the environment Egyptian perception of improper and does not help to increase our exports of bee products and should therefore cancel the prohibitive laws to import strains of bees to promote the industry