

## **INFLUENCE OF BEEVENOM COLLECTION ON SOME HONEYBEE PRODUCTS**

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### **ABSTRACT**

This work was conducted in apiary of Plant Protection Institute at Qanater, Qalubia governorate. The study handled the effect of bee venom collection from honey bee colonies on royal jelly and honey production in spring season, 2013. Results showing that the honey bee colonies exposed to collecting bee venom gave less amounts of royal jelly and honey production than non-exposed honey bee colonies. There were significant differences between amounts of royal jelly and honey in exposure and non-exposed colonies to collect bee venom. All colonies were fed with sugar syrup and pollen supplements.

**Keywords:** Honey bees; bee venom, honey, royal jelly.

### **INTRODUCTION**

Bee venom is a natural toxin, secreted by the poison and accessory gland of the worker honey bee (*Apis mellifera* L) that located in the abdominal cavity and it is play major role in the defense of bee colonies (Hider, 1988). There are two methods to collect bee venom; manual and electrical method, electrical stimulation provides a much more consistent and clearer venom solution the bees than manual collection there are significant differences between venom have been collected by two methods in the shape, distribution, intensity and presence or absence of peaks (Junior *et al.*, 2010). Factors affect bee venom content such as age of the bees, (Owen *et al.*, 1990), strain (Funari *et al.*, 2001), castes of bees and method of collection (Baracchi and Turillazzi, 2010). Different diets can be affecting the content from peptide(s) and cytotoxicity activity of bee venom (Aida, 2012). Bee venom collection affect on some products of honey bee colonies such as honey (13.9% less) and wax (11.34% less) than the control colonies (Mitev, 1971). Royal jelly is a secretion from the hypopharyngeal and mandibular glands of worker bee (*Apis mellifera* L) between 5 -8 days old, his secretion is fed only for three days to the brood of workers and drones but it constitutes the exclusive food of the queen bee for the entire span of both its larval and adult lives (Dietz *et al.*, 1979). The larvae 12-24 hours old more royal jelly was collected at 72 hours than at 48 hours after grafting with larvae 48 hours old (Chang, 1977). For increasing the production of royal jelly new cups should not be palsied on the frame contained old cell cups because the worker honey bee prefer to feed larvae in old cell cups (Li, 1981). The strong colonies containing more than fifteen combs of bees, with about 7-9 sealed brood combs. One unsealed brood combs was left in the middle of the brood chamber after removing the queen on the third day, queen larvae were discarded from queen cells, and then royal jelly was collected (Ismail, 1984). The different seasons had the amount of royal jelly was significantly affected

by the season. The largest amount was obtained in spring followed by summer (Khattabe, 1981). The amount of royal jelly produced of F<sup>st</sup> Carniolan bees was 6.1 g/ colony, while of F<sup>st</sup> Italian bees the mean average was 5.3 g/colony (Kassem, 1995). Methods of production of royal jelly in Italy are grouped into 2 categories, i.e. natural or small-scale production by amateur beekeepers, and artificial one by introduction of one-day-old larvae placed in artificial cells (honeycombs) into a queenless colony and use of supplementary feeding for bees, especially in times of insufficient availability of nectar and pollen. Illustrations are provided on box-shaped hives with royal jelly collection (Vedova and Annoscia, 2006). Some factors can be affects on royal jelly production such as the age of worker honey bee larvae (12 or 36 h old), period between grafting of queen-cups and harvesting of royal jelly (48 or 72 h), hive type (double queen hives, normal hives or swarm box), diet (sugar syrup or yeast cake), queen-cup type (rubber queen-cups or bee wax cups), and honey bee hybrid race (F<sup>st</sup> Carniolan, F<sup>st</sup> Italian or F<sup>st</sup> Caucasian) on the amount of royal jelly (Khattab *et al.*, 1998).

This work is aimed to study the effect of collecting bee venom on royal jelly and honey production from honey bee colonies.

## **MATERIALS AND METHODS**

This experiment was carried out in apiary of Plant Protection Institute in Qanater, Qaluobia governorate during spring season from 1/3/2013 to 31/05/2013.

### **Honey bee race and numbers:**

The strength colony contains at least eight standard frames covering with bees. These colonies were without queens. Six honey bee carniolan colonies were selected. The colonies have been divided into 2 groups (each of 3 colonies) of about bee venom collection, royal jelly and honey production.

### **The experimental colonies:**

#### **1-Extraction of bee venom:**

Venom was extracted according to Benton *et al.*, (1963). Collector frame was placed on the upper body of the hive in the middle space on the super and then the battery and collector frame were connected with wire. When bee covered the frame and come into contact with the wire grid, they receive a mild electrical impulse shock that generate an immediate response of the bees and they sting the surface of the collector sheet. The duration of the venom-collecting event was 30 min once each week. The venom was then rapidly dried on a glass plate, then scraped from that plate and stored in dark glass at 3°C.

#### **2-Royal jelly production:**

The queenless colony consisted of 2 honey combs and pollen, 2 sealed brood combs in the center; a suitable space was left to insert a frame holding the wax cups. The queenless colony was provided with 2 sealed brood combs every week. The colonies were examined before and after inserting the grafted cells, and all the natural built queen cells were

destroyed. Each queenless colony received one grafted frame, with three bars that inserted between two combs of brood and pollen, fifteen artificial wax cups were fixed on each bar before grafting. Dray grafting method was used and cell cups were grafted larvae aged 24 hours according to (El-Banby and El- Sheriff, 1982).The royal jelly collected after 72 hours from grafting.

**3-Honey production:**

The honey yield from tested colonies was estimated in kg/colony through June month by calculating the difference between the weight of honey combs before and after honey extraction (Erdogan *et al.*, 2009).

**Statistical analysis:**

T-test and M. static computer analysis program were conducted according to Sendecor and Coehran (1973).

**RESULTS AND DISCUSSION**

The results in Table (1) summarized that the total/ 3 colonies amount of royal jelly production from honeybee colonies were: (20.90, 27.69 and 35.88 g) for months March, April and May during the 2013 year, respectively. With averages of (6.96, 9.23 and 11.96 g/colony) during the same months when Royal jelly production without bee venom collection from same honeybee colonies. The total amounts of Royal Jelly from three honeybee colonies were (84.47g). The mean amount of collected royal jelly per colony was (9.71g). The mean productions were (9.43, 8.53 and 10.19 g) from the three tested colonies for months 3, 4 and 5 during the 2013 year, respectively. The mean amount was (28.15g) from three honeybee colonies. In addition, the mean amount of royal jelly per colony was (9.71g).

**Table (1): Mean of Royal jelly production during March-May months, 2013 year in non-exposed colonies to collecting bee venom**

Treatments	Mean amounts of Royal jelly in g			Total	Mean/Months
	March	April	May		
1	7.10	9.23	11.96	28.29	9.43
2	6.30	8.70	10.59	25.59	8.53
3	7.50	9.76	13.33	30.59	10.19
Total	20.90	27.69	35.88	84.47	28.15
Mean/colony	6.96	9.23	11.96	28.15	9.71

**Table (2): Mean of Royal jelly production during March-May months 2013 year in exposed colonies to collecting bee venom**

Treatments	The mean amounts of Royal jelly collection in g during successive of months			Total	Mean/Months
	March	April	May		
1	6.54	7.13	8.38	22.05	7.35
2	5.80	7.13	8.33	21.26	7.08
3	6.24	7.87	8.23	22.34	7.44
Total	18.58	23.38	23.69	65.65	21.87
Mean/colony	6.19	7.79	7.89	21.87	7.29

The results in Table (2) cleared that the total royal jelly amounts production from three honeybee colonies were: (18.58, 23.38 and 23.69 g) for months 3, 4 and 5 during the 2013 year, respectively. The mean amounts of Royal jelly production with bee venom collection from the same honeybee colonies were (6.19, 7.79 and 7.89 g/colony) during the same months. Moreover, the total amounts were (65.65g) from three honeybee colonies. The mean amount of collected royal jelly per colony was (7.29g). The mean of royal jelly production were: (7.35, 7.08 and 7.44g) from colony number one, two and three for months 3, 4 and 5 during the 2013 year, respectively.

The mean amounts of Royal jelly were (21.87g) from three honeybee colonies. The mean amount of royal jelly per colony was (7.29g) when Royal jelly production with bee venom. There were significant more Royal jelly production colonies than the colonies were production bee venom and Royal jelly. Khattab *et al.*, 1998 stated that the highest total amounts of RJ were obtained with 12-h-old worker larvae (22.58 g), harvesting at 72 h after grafting (19.62 g), swarm box (20.51 g), brewer's yeast (19.93 g), rubber queen-cups (20.97 g), and F<sup>st</sup> Carniolan colonies (24.49 g). Results obtained were in agreement with El-Shaarawy (2008).

**Table (3): Statistical analysis of royal jelly production from colonies exposed and non-exposed to bee venom collection**

Treatments	The mean of Royal jelly/g without bee venom collection	The mean of Royal jelly/g after bee venom collection
1	9.43	7.35
2	8.53	7.08
3	10.19	7.44
T	28.15	21.87
Mean/colony	9.38	7.29
T state = 7.5		T table at 5% = 2.78

**Table (4): Effect of bee venom collecting on clover honey yield (kg/colony) at Quanater during 2013 year**

<b>Honey production (kg/colony)</b>		
Treatments	The mean of honey production without bee venom collection	The mean of honey production with bee venom collection
1	7.30	5.17
2	6.97	5.38
3	7.69	4.99
Total	21.96	15.54
Mean/colony	7.32	5.18

**Table (5): Bee venom collection during successive of (March-May) months 2013 year.**

Treatments	Amounts of bee venom/g			Total	Mean/Months
	March	April	May		
1	0.498	0.118	0.127	0.743	0.247
2	0.487	0.108	0.117	0.712	0.237
3	0.509	0.127	0.130	0.766	0.255
Total	1.494	0.353	0.374	2.221	0.739
Mean/colony	0.498	0.1176	0.1246	0.740	0.246

Table (4) in clover honey yield, the results showing that the mean of honey production (kg/colony) for 3 colonies without bee venom collection was 7.32 kg/colony, while the mean of honey production after bee venom collection was 5.18 kg/colony. The results in Table (5) cleared that bee venom amounts collected from three honeybee colonies were: (1.494, 0.353 and 0.374g) for months 3, 4 and 5 during the 2013 year, respectively. With averages of bee venom production from honeybee colonies was (0.498, 0.1176 and 0.1246 g/month) for the same months, respectively. The total amounts were (2.221g) from three honeybee colonies. The mean amount of bee venom collected per colony was (0.246g).

### **CONCLUSION**

From results obtained it could be concluded that royal jelly and honey collected from honey bee colonies were more significant than the colonies produced bee venom. The beekeepers could be obtained the one producing from honey bee colony to obtain more amounts from this producing.

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تأثير جمع سم النحل على بعض منتجات نحل العسل  
نجلاء الأحمدي غزالة و عمرو أحمد طه  
قسم بحوث النحل – معهد بحوث وقاية النباتات – مركز البحوث الزراعية- مصر

أجرى هذا البحث بمنحل محطة بحوث النحل بالقناطر الخيرية، محافظة القليوبية، التابعة لمعهد بحوث وقاية النباتات في الفترة من 2013/3/1-2013/5/31. يهدف البحث إلى دراسة تأثير جمع سم النحل من طوائف نحل العسل على إنتاجية هذه الطوائف من الغذاء الملكي و العسل في موسم الربيع. و قد أظهرت النتائج أن طوائف نحل العسل التي تعرضت لجمع السم كانت أقل إنتاجية في كمية الغذاء الملكي و العسل المنتج مقارنة بالطوائف الغير معرضة لجمع السم. و أظهرت النتائج وجود فروق معنوية واضحة بين كميات الغذاء الملكي و العسل في الطوائف المعرضة والغير معرضة لجمع سم النحل. مع ملاحظة أن جميع الطوائف قد تم تغذيتها بالمحلول السكري ومكملات حبوب اللقاح.