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Effect of different grafting larvae genotype under cub's position and bar's level on acceptance percentages and royal jelly quantity mean

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Abstract:

Royal jelly is a yellowish-white, creamy, acidic secretion, with a slightly pungent odor and taste, produced by the hypopharyngeal and mandibular glands of worker honey bees [*Apis mellifera* L. (Hymenoptera :Apidae)]. In this study, the effect of the different grafting larvae genotype under different cub's position and bar's level on the acceptance percentages mean and the royal jelly produced quantity mean were examined. The fourth day is the first larval age (larvae of one day) which takes the shape of the crescent was used for grafting. Two different grafting larvae genotype were used (Italian and Carniolan hybrids). The Italian grafting larvae, middle bar and the medium cubs have the highest acceptance percentages mean more than the other treatments (71.3). As the Italian grafting larvae, right cubs and the middle bar have the highest royal jelly quantity mean more than the other treatments (167.2). For the best results of high acceptance percentage and the highest royal jelly quantity mean the Italian hybrid grafting larvae and were recommended. As the middle bar should be used for the best results.

Introduction

The queen bee holds the most important position in a colony. The performance of a honey bee colony is the result of its queen's function as well as of that of the drones that mated with her. Commercialization of queen breeding requires the mass production of large numbers of high quality queens (Büchler *et al*., 2013). Periodical requeening with young queens less than one year old, results in more honey production than colonies headed by old queens. Moreover, the loss of a queen represents a serious threat to the survival of the honey bee colony and beekeepers frequently require new queens to start new colonies and replace dead or failing queens. Royal jelly is widely consumed in the community and has perceived benefits ranging from promoting growth in children and improvement of general health status to enhancement of

longevity for the elderly (Leung *et al*. ,1997). Royal jelly has a much larger market in Asia than in the USA or Europe, and in Asia it is commonly found in products including cosmetics, food supplements, and beverages and is used in commercial medical products (FAO, 2007). Rearing of a quality queen is depends on many factor, the most important of which is the queen cub acceptance percentage and the produced of royal jelly quantity mean. The aim of this work is to study the effect of different grafting larvae genotype under cub's position and bar's level on acceptance percentages mean and the royal jelly quantity mean.

Material and methods

The experiments were conducted under the conditions of Kafr Elsheikh Governorate during year of 2017. Twelve honey bee colonies were used in the experiment of the Italian (six replicates) and Carniolan (six replicates) honey bee hybrids

The bee colony under the study was as follows:

1. Choose the parent colony of the Italian and Carniolan honey bee hybrids to lay the eggs between the brood frames to force the queen to lay eggs and follow until the hatching is completed three days later. The fourth day is the first larval age (larvae of one day) which takes the shape of the crescent was used.

2. Processing of grafting frames with three strips, 7 cm away from each other arranged in three different locations (upper, middle, lower) and each frame carrying 45 plastic cups (fifteen cups/strip). The rearing frame is then exposed to the rearing colony two hours before the grafting. Each grafting larvae genotype was rearing in the same rearing colony genotype.

Each colony has 8 comps covered with bee divided as follows: five sealed brood comps plus three honey and pollen comps + plastic honey bee feed.

The queens of the breading colony were removed for 48 hours. The method of Doolittle was obtained in 1909 - wet method of grafting (1 gram of royal food: 1 cm distilled water).

3. Grafting: The one day larvae were transferred into the plastic cup by the grafting needle and then the breeding frame that carried three wooden par placed between the sealed brood comps for both the queenless and queenright in the breeding chamber. The Italian grafting larvae was rearing in Italian colony and the Carniolan grafting larvae was rearing in Carniolan colony.

4. Nutrition: Sugar solution with concentrate of 1 Kg. sugar: 1.5 water was used. Energized feed was done before grafting. Each colony fed on half a liter of the solution every three days until the experiment was end.

On the day following the grafting, the number of acceptable royal cups were collected and the acceptance percentage were calculated. On the same date of grafting, after 72 hours the breeding frames were raising from the breeding colonies and removing the larvae from the plastic cups, then collecting the successful royal cups with a wooden spoon according to the location of the bar (upper, middle, lower). The royal jelly stored in plastic containers which were weighed empty and full with royal jelly and numbered with a code number, the capacity of each container was five grams. Each bar cubs were weighed according to its location and bar's level. The royal jelly was stored in the fridge. The grafting process is repeated every three days. Statistical analysis using Duncan's Multiple Range Test (Duncan, 1955).

Results and discussion

Effect of different grafting larvae within cub's position and bar's level:

1.Acceptance percentages mean:

Data in Table (1) showed that the grafted queen cups acceptance percentages mean

of using Italian and Carniolan grafting larval in cups position and bar level. In the Italian larvae, the highest acceptance percentages mean was (71.3, 70.4 and 57.9%) recorded in the medium, right and left cubs position with middle bar respectively. while the lowest acceptance percentages mean was (48.7, 62.8 and 64.8%) recorded in the left, right and medium cubs position with upper bar respectively. In the Carniolan larvae, the highest acceptance percentages mean were (65.2, 63.3 and 50.1%) recorded in the medium, right and left cubs position with middle, middle and lower bars respectively. while the lowest acceptance percentages mean were (44.9, 56.1 and 56.3%) recorded in the left, right and medium cubs position with upper bar respectively.

Table (1): Grafted queen cups acceptance percentages mean using Italian and Carniolan grafting larval in cups position and bar level.

Bar Level	Acceptance percentages						
	Italian larvae			AV±S.E	Carniolan larvae		
	Cub position				Cub position		
	Left	Medium	Right		Left	Medium	Right
Upper	48.7	64.8	62.8	58.8±5.120	44.9	56.3	56.1
Middle	57.9	71.3	70.4	66.5±4.477	50.1	65.2	63.3
Lower	57.9	71.2	70.4	66.5±4.344	50.5	62.7	60.1
Mean	54.9	69.1	67.8	63.9±2.961A	48.5	61.4	59.8

Mean / cups position on stripe Left 51.7±2.448C Medium 65.3±22.586A Right 63.8± 2.552B
Mean in each factor designated by the same letter are not significantly different at 5 % level using Duncan's Multiple Range Test.

2. The royal jelly quantity mean:

Data in Table (2) showed the grafted queen cups royal jelly quantity mean of using Italian and Carniolan grafting larval in cups position and bar level. In the Italian grafted larvae, the highest royal jelly quantity means were (167.2, 160 and 139.8) recorded in the right, medium and left cubs position with middle, middle and lower bars respectively. while the lowest royal jelly quantity means were (123.7, 143.9 and 145.7) recorded in the left, right and medium cubs position with upper bar respectively. In the Carniolan grafted larvae, the highest royal jelly quantity means were (162.1, 153.5 and 137.8) recorded in the right, medium and left cubs position with lower, middle and lower bars respectively. While the lowest royal jelly quantity means were (126, 145.1 and 145.2) recorded in the left, medium and right cubs position with upper bar respectively.

Table (2): Royal jelly quantity mean (mg/cups) using Italian and Carniolan grafting larval in cups position and bar level.

Bar Level	Royal jelly quantity mean (mg/cups)						
	Italian larvae			AV±S.E	Carniolan larvae		
	Cub position				Cub position		
	Left	Medium	right		Left	Medium	Right
Upper	123.7	145.7	143.9	138.1±7.936	126	145.1	145.2
Middle	139.8	160	167.2	155.7±8.524	134.3	156.4	158.9
Lower	140.2	157.7	154.2	150.7±6.198	137.8	153.5	162.1
Mean	134.6	154.8	155.1	148.2±5.119A	132.7	151.7	155.4

Mean / cups position on stripe Left 133.7±3.576B Medium 153.3±3.395A Right 155.3± 4.263A
Mean in each factor designated by the same letter are not significantly different at 5 % level using Duncan's Multiple Range Test.

From the obtained data the following conclusions can be drawn; The Italian grafting larvae has acceptance percentages mean more than the Carniolan with significant differences between both. As the medium cubs showed the highest acceptance percentages mean with significant differences between all cub's position. Additionally, the middle bar showed the highest acceptance percentages mean with significant differences between upper and middle/lower bars respectively. The Italian grafting larvae has royal jelly quantity mean more than the Carniolan with non-significant differences between both. As the right cubs showed the highest royal jelly quantity mean with significant differences between it and left cub's position. Additionally, the middle bar showed the highest royal jelly quantity mean with significant differences between upper and middle/lower bars respectively. Many researchers had discussed these findings i.e. Weiss (1967) , Garcia and Nogueira-Couto (2005), Sahinler and Kaptanoglu (2005) , Albarracin *et al*. (2006) , Macicka (1985), Sarling (1992), Ali (1994), Ibrahim (1997), Li (2000) , Shah (2000), Albarracin *et al.* (2006), El-Barbary (2007) and Sharaf El –Din (2010).

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