

FACTORS AFFECTING THE ACCEPTANCE OF HONEYBEE QUEEN CUPS AND ROYAL JELLY PRODUCTION

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ABSTRACT: *Royal jelly is one of the most important honey bee products. it plays vital roles in honeybee biology and in the improvement of human health. Production of royal jelly affecting by many factors. The study aimed to investigate some factors affecting the honeybee queen's acceptance and the amount produce of royal jelly. Effecting of different batches within cub positions during different seasons were studied. The colonies were moved from their original place in the middle of the day to another place away inside the apiary. It was equipped with empty wooden colonies that placed in the places of the original breeding colonies. The highest acceptance percentage mean was 62.7 ± 5.013 % recorded at third batch. As the lowest percentage mean was 54 ± 4.855 % recorded at fifth batch, the highest royal jelly quantity mean was 153.5 ± 5.887 % recorded in third batch. As the lowest percentage mean was 141.2 ± 6.149 recorded in fifth batch. The grafted queen cups acceptance percentages mean affecting significant by cups position, different seasons and patches.*

Key words: *Acceptance - royal jelly -cups position — batches -grafted queen cups*

INTRODUCTION

Royal jelly is stand out amongst the most significance items in honey bee products. It created from hypopharyngeal and mandibular glands of 6-12 days old workers, (Deseyn and Billen, 2005 and Hassan and Khater, 2006). Royal jelly is a white creamy substance contains basically of proteins, sugars, and lipids (Schmidt, 1997). Additionally, it has many benefits for humans such as stimulate the immune system, strengthens the body and as a good assistant cure for many diseases such as leukemia, cancer, high blood pressure, high cholesterol, and infertility in males and females (Krell, 1996).

Royal jelly contains amazing measures of proteins, lipids, glucides, vitamins, hormones, compounds, and mineral substances (Howe *et al.*, 1985). The arrangement of components in the Royal jelly are water (50 to 60%), proteins (18%), sugars (15%), lipids (3% to 6%), mineral salts (1.5%), and vitamins (trace

amount) (Nagai and Inoue, 2004). There are a few elements influencing Royal jelly production. The most essential of them are the age of transferred larvae (Sahinler *et al.*, 1997), encouraging (Fuhai *et al.*, 1993), number of transferred queen cell cups (Van-Toor and Littlejohn, 1994 and Kutluca *et al.*, 1998) gathering interim (Fiahinler and Fiahinler 2002), regardless of whether, the settlement is queenless or queenright (Van-Toor and Littlejohn, 1994). The royal jelly has three uses: feeding worker honeybee larvae, up to 90 hour of larval life; feeding of the queen during all its larval phase and adult life (Wang, 1965); and feeding of drone larvae during all its larval phase (Haydak, 1970).

MATERIAL AND METHODS

This experiment was conducted during the spring, summer and late summer season in 2015-2016 under the conditions of Kafr El-Sheikh governorate (with the facility of the agricultural research station in Sakha).

The colonies of the experiment were equal strong prepared with 8 combs (brood, honey, pollen) cover with bees, 12 replicates were used in the experiment.

Procedure:

1. Exposing the breeding frames that carry the plastic cups to the breeding colony for two hours before the grafting. provide nutrition to the breeding colony
2. 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 combs.
3. Sugar solution with concentrate of 1kg sugar: 1.5 litter water was used. Each colony fed on half a liter of the solution.
4. On the day following the grafting, we collect the number of acceptable royal cups and calculate the acceptance ratio.
5. 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 by a Celestin needle. royal jelly was collected with a wooden spoon, and collecting the royal jelly according to the position of the cup on the bar (right, middle and left), according to the successful royal cups. The royal jelly containers were weighed empty and numbered with a code number. the capacity of each container was five grams. Each bar was weighed according to the cup's position (1-5 cup or less). The cups were divided by its number; the mean was calculated. The royal jelly was Saved in the fridge. The grafting process is repeated every three days. During the experiment, five grafting process were taken.

RESULTS AND DISCUSSION

1- Effect of different batches within cub positions at different seasons.

1-1. Acceptance percentages:

Data in Table (1) show the mean of the grafted queen cups acceptance percentages under cups position and different patches during year seasons.

At spring season, the highest acceptance percentage means were recorded as (80.7, 80.2 and 63.9%) in the anterior, medium, and posterior / third, second and first batches, respectively, while the lowest acceptance percentage means were (52.1, 64.9 and 66.8) recorded in the posterior, medium and anterior / fifth batch, respectively.

At summer season, the highest acceptance percentage means were (75.6, 67.7 and 57.1%) recorded in the medium, anterior, and posterior / first, fourth, and first batches, respectively. while the lowest acceptance percentage means were (52.1, 63.3 and 67.8) recorded in the posterior, anterior and medium / fifth, second and fifth batches, respectively.

At late summer season, the highest acceptance percentage means were (53.8, 53.8 and 41.8%) recorded in the anterior, medium, and posterior / third, third and second batches, respectively. while the lowest acceptance percentage means were (32.7, 39.5 and 45.1) recorded in the posterior, medium and anterior / fifth batch, respectively.

From the obtained results it could be concluded that the medium cubs had high acceptance percentages compared with the other position cups, furthermore, statistical analysis of the obtained data showed high significant differences between all treatments of the cup positions.

Factors affecting the acceptance of honeybee queen cups and royal jelly

Table 1

Date showed that the highest mean of acceptance percentages was recorded at the spring season, followed by summer and late summer, respectively. The statistical analysis of the data indicated that there were significant differences between the compared seasons.

Moreover, the third batches recorded the highest mean of cup acceptance percentages, followed by first batches, but the lowest one was in fifth batches. Statistical analysis of the data indicated that no significant differences between first/second/third batches, but there are significant differences between fourth, fifth and other batches.

Many researchers had discussed these findings and found that, Royal jelly is being produced as a result of grafting process and the acceptance of grafted queen cups is being affected by type of nutrition and queen cups introduced to the bees (Mohanny, 1999) and (Zeedan, 2002). In addition, acceptance percentage of queen cell was significantly higher when the grafted larvae were less than 48 hrs old (Abd Al-Fattah *et al.*, 2003).

1-2. The royal jelly production:

Data in Table (2) show means of the royal jelly quantity (mg/cup) from different seasons as affected by cups position and grafting batches.

At spring season, the highest means of the royal jelly weights were (175.3, 173.3 and 149.2 mg/ cup) recorded in the anterior, medium, and posterior at the second batch, respectively. While, the lowest means of the royal jelly weights were (134.7, 158.8 and 159.5 mg/cup) recorded in the posterior, medium and anterior at the fifth batch, respectively.

At summer season, the highest means of the royal jelly weights were (162.5, 157.2 and 145.5 mg/cup) recorded in the medium, anterior, and posterior at the third and fourth batches, respectively.

While, the lowest means of the royal jelly weights were (123.7, 142.6 and 144.3 mg/cup) recorded in the posterior, anterior and medium at the first and second patches, respectively.

At late summer season, the highest means of the royal jelly weights were (152.1, 151.5 and 124.7 mg/cup) recorded in the medium, anterior, and posterior second batches respectively. While the lowest means of the royal jelly weights were (112, 128.3 and 137.5 mg/cup) recorded in the posterior, medium and anterior at the fifth batch, respectively.

From the obtained results it could be concluded that the anterior cups have royal jelly weights more than the medium and posterior with significant differences between them. As the spring season , it showed the highest royal jelly weights followed by summer and late summer seasons , respectively with significant differences between them. However, the third batch showed the highest royal jelly weights with significant differences between first/fourth, second, third and fifth patches respectively.

Many researchers had discussed these findings and found that, the majority of royal jelly producers harvest at the third day after grafting where the amount of royal jelly in queen cells reaches its peak (Lercker *et al.*, 1984). In Egypt, (Khattab *et al.*, 1998) reported that the worker larvae grafted at the age of 12 hours were more acceptable and the queen cells gave more royal jelly than older ones. The best time for collecting royal jelly from queen cells was 3 days after grafting process. They revealed that, quantities of royal jelly produced from 28 F1 Carniolian colonies which used for grafting of queen-cups was 6036.6 grams. In Egypt, (Saleh, 1999) pointed out that the Carniolian race was better than Italian race in royal jelly production.

Factors affecting the acceptance of honeybee queen cups and royal jelly

Table 2

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العوامل المؤثرة على قبول كؤوس ملكات نحل العسل وإنتاج الغذاء الملكي

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الملخص العربى

أجريت هذه الدراسة في ناحية سخا محافظة كفر الشيخ في عام ٢٠١٥ - ٢٠١٦ لدراسة تأثير بعض العوامل على نسبة قبول الملكات وكمية إنتاج الغذاء الملكي ، وكانت العوامل محل الدراسة هي : موقع الكؤوس على السدابه (أمامية وسطية وخلفية) وكذا مقارنة النزلات خمس مرات متتالية ، وكذلك تأثير ميعاد الإدخال للملكات في مواسم الربيع والصيف والصيف المتأخر .
وأثبتت النتائج ان الكؤوس الموجودة في الامام وكذا النزلة الثالثة وفصل الربيع كانت الأفضل في نسبة القبول للملكات وكذلك في كمية إنتاج الغذاء الملكي بالمقارنة بالمعاملات الاخرى.

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Table (1): Acceptance percentages of grafted queen cups fixed on five patches at three positions along three seasons

Grafting Batch	Spring			Av.± SE	Summer			Av.± SE	Late Summer			Av.± SE	Grand Mean ±SE/ batch
	Cup position on stripes				Cup position on stripes				Cup position on stripes				
	Pos	Med	Ant	Pos	Med	Ant	Pos	Med	Ant				
1st batch	63.9	78.2	77.8	73.3±5.106	57.1	75.6	64.2	65.6±5.627	40.6	52.8	52	48.4± 4.071	62.4± 4.920A
2nd batch	63.2	80.2	78.9	74.1± 5.701	54.7	69.8	63.3	62.6±5.453	41.8	52.5	52.1	48.8± 3.744	61.8± 4.924A
3rd batch	62.5	79.6	80.7	74.3± 5.886	57.1	71.4	66.7	65.0±4.454	39.5	52.9	53.8	48.7± 4.736	62.7± 5.013A
4th batch	57.6	72.7	75.8	68.7± 5.842	54	72.7	67.7	64.7±5.635	37.2	46.1	46.1	43.2± 3.175	58.9± 5.210B
5th batch	52.1	64.9	66.8	61.3± 4.913	52.1	67.8	64.7	61.5±4.888	32.7	39.5	45.1	39.1± 4.030	54.0± 4.855C
Mean	59.9	75.1	76	70.3±2.784 A	55	71.4	65.3	65.3±2.280 B	38.4	48.8	49.8	45.6± 2.065 C	60.0± 2.269
Grand mean	Posterior 51.1±3.018 C			Medium 65.1±3.841 A			Anterior 63.7± 3.513 B						

Pos.= Posterior Med.=medium Ant. =Anterior

Mean in each factor designated by the same letter are not significantly different at 5 % level using Duncan's Multiple Range Test.

Table (2): Average weights of royal jelly (mg/cups) from different seasons within cups position on five grafting batches

Grafting Batch	Spring			Av.± SE	Summer			Av.± SE	Late Summer			Av.± SE	Grand Mean ±SE/ batch
	Cup position on stripes				Cup position on stripes				Cup position on stripes				
	Pos	Med	Ant		Pos	Med	Ant		Pos	Med	Ant		
1st batch	145.2	165.7	167.6	159.5±7.552	123.7	148.5	142.6	139.4±8.835	118.2	147.9	150.4	138.8±10.57	145.9 ±6.28C
2nd batch	149.2	173.3	175.3	164.6±8.171	131.8	144.3	150.9	142.3±8.757	124.7	152.1	151.5	142.8±9.1.50	150.4±6.5552B
3rd batch	148.8	171.1	174.0	156.3±8.343	144.7	162.5	157.2	154.8±6.946	123.6	149	150.5	141.1±9.097	153.5±5.887A
4th batch	140	163.1	165.7	156.3±8.343	145.5	155.8	156.8	152.7±3.653	120.2	140	143.3	134.5±7.400	147.8±5.295BC
5th batch	134.7	158.8	159.5	151.0±8.495	140.1	149.1	150.7	146.6±3.597	112	128.3	137.5	125.9±10.21	141.2±6.149D
Mean	143.6	166.4	168.4	159.5±3.897A	137.1	152	151.3	147.2±3.387B	119.7	143.5	146.6	136.6±4.382C	147.7±2.760
Grand mean	Posterior 133.5±3.951B				Medium 154.0±3.949A				Anterior 155.6± 3.372A				

Pos.=posterior Med.=medium Ant.=anterior

Mean in each factor designated by the same letter are not significantly different at 5 % level using Duncan's Multiple Range Test

