

COMPARISON OF HONEY PRODUCTION BETWEEN INSTRUMENTALLY INSEMINATED AND NATURALLY MATED QUEENS IN FIELD COLONIES IN EGYPT

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ABSTRACT

Instrumental insemination had become one of the most important methods for selection and control mating in honey bee. In this field study we compared the honey yields between two groups of honey bee colonies I: 7 colonies with instrumentally inseminated queens, II: 9 colonies with naturally mated queens.

The results showed that the I group yield (5.128kg) of honey while the II group yield (4.605kg). Colonies with instrumentally inseminated queens produced (10%) honey more but the difference was not significant ($p=0.464$). So with regard to the economic value of the (10%) of honey we recommended to use instrumental insemination in colonies used for honey production or at least for breeder queens production.

INTRODUCTION

Today Instrumental insemination had become one of the major used technique all over the world . Instrumental insemination should not be seen as a replacement for the natural mating of honey bee queens, but as an additional tool that gives a breeder absolute control of mating and is the only way that a breeder can control which drones mate with a queen, Harbo (1985).

Instrumental insemination of queen bees is widely applied by beekeepers in Poland. About 30.000 queens are inseminated instrumentally per year. Honey production of colonies headed by queens of particular crosses of breeding lines is much higher than that of colonies headed by sister queens mated naturally, Woyke *et al.* (2001).

Roberts (1946) in the USA, examined the honey yields from 3 groups of honey bee colonies, with a total of 31 instrumentally inseminated queens (95.3 kg) and 43 naturally mated queens (52.6kg). Comparatively, the honey yield production of the instrumentally inseminated queens was (15%) more.

Ruttner (1976) in Germany compared the performance of 45 colony with instrumentally inseminated queens (54kg) and 27 naturally mated queens (39kg) in 5 locations. The colonies with instrumentally inseminated queen produced (27%) more honey.

Harbo and Szabo (1984) in Canada and USA tested 59 instrumentally inseminated queens and 59 naturally mated sister queens in 4 locations. 18 instrumentally inseminated queens and 34 naturally mated queens survived. The instrumentally inseminated queens produced (50%) less honey.

Vesely (1984) in Czecho-slovakia tested 716 colonies with instrumentally inseminated Carnica queens in different locations and

mentioned that the honey yields from the instrumentally inseminated queens were (8%) more.

Wilde (1987) in Poland compared 39 instrumentally inseminated queens (7.0kg) with 19 naturally mated queens (4.6kg). The instrumentally inseminated queens produced (20%) more honey.

Bogenzhn and Pechhacker (1993) in Austria, compared the honey yields from 631 colony. He found a significantly higher honey yields from 186 colonies with instrumentally inseminated queens (20.47kg) compared to 399 colonies with queen mated in bee yards (19.02kg). While the honey yields from 46 colonies with uncontrolled mated queen were even less (17.8kg).

Szalaine (1995) in Hungary carried out a 2 year long study of groups of 8 bee colonies with instrumentally inseminated and naturally mated queen from the same descent as well as naturally mated queens of the same age from unknown descent. The instrumentally inseminated queens produced a significantly higher honey yield of (21.9kg), compared with (17.9kg) for the naturally mated queens from the same descent and (11.8kg) for the naturally mated queen from unknown descent.

Gerula (1999) in Poland compared the production of 85 colonies with instrumentally inseminated queens (45.3kg) to 54 colonies with naturally mated queens (50.0kg). The colonies with naturally mated queens produced (13%) more honey.

Pritsch and Bienefeld (2003) in Germany indicated that Instrumentally inseminated queens produced (37.9kg) of honey compared with queens mated in island mating stations (38.0kg) honey. The difference in yields between both groups is not significant. But comparing Instrumentally inseminated queens with naturally mated queens in different mating stations The honey yields for colonies with instrumentally inseminated queens were (37.4kg) are significantly higher ($P=0.036$) than for colonies with naturally mated queens (37kg).

Al-Qarni *et al* (2003) in the USA in 2 year study stated that honey production for naturally mated remained statistically the same with that of instrumentally inseminated queens and was recorded (251.7 lbs) and (241.1 lbs) during first season and (314.2 lbs) and (297.5 lbs) during the second season for naturally mated and instrumentally inseminated queens respectively.

MATERIALS AND METHODS

This filed study was carried out through the period from February (2008) till June (2008) in a privet apiary, Meat Fares Village, Bani Ebaied region, El-Dakahleya Governorate, Egypt 25 km. from Mansoura.

16 *Apis mellifera carnica* Queens were reared in Feb, 2008 by the Doolittle grafting method (Doolittle, 1888). Young larvae (1-2 days old) were grafted from breeder colonies to queen cell cups. The frame with the queen cells was introduced into queenless cell builder colony for 10 days. Then Queen cells were introduced into small colonies in Langstroth hives

containing 4 frames, 3 sealed brood, 1 frame of honey and pollen. The entrance of each hive was closed with a piece of queen excluder from inside. These colonies were queenless for at least 24 hours in dark cool place. Randomly Selected queens were divided into two groups. The first one of 9 queens: The queen excluder was removed from the entrance allowed to mate naturally and mating signet was recorded. The second group of 7 queens were instrumentally inseminated once with 8µl of semen at the age of 10 days. The instrumentally inseminated queens were clipped marked when they were anesthetized. Instrumentally inseminated queens were returned to their hives immediately after insemination. In the second day they were recollected and given two minutes carbon dioxide treatment before placing them back to their assigned colonies released immediately from their cages. Two weeks later, the queens in both groups began oviposition. The queen excluder was removed from the entrance of the instrumentally inseminated queen colonies. The naturally mated queens were clipped and marked for easy identification and all colonies were allowed to build up naturally into full-size colonies. Instrumentally inseminated queen colonies were checked for any supersede cells every week and they were removed immediately. All colonies were fed with 500g of sugar every 5 days in 1:1 syrup and pollen substitute was added as needed above the brood frames until the first of May. To determine honey production, colonies were weighed before and after harvesting with an attached scale and the difference was recorded.

RESULTS AND DISCUSSION

The honey production from colonies with instrumentally inseminated queens (table 1) and the honey production from colonies with naturally mated queens (table 2) showed that the average honey yield was (5.128 kg) for the instrumentally inseminated queens and (4.605 kg) for the naturally mated queens, The difference in yields between both groups was not significant ($p=0.464$) and this could be back to the low number of colonies in our study, but the honey yield for colonies with instrumentally inseminated queens was (10%) more. Most of the recent studies indicated that bee colonies with instrumentally inseminated queens were superior to those with naturally mated queens regarding honey production or at least the same in production.

Table (1): Honey production from instrumentally inseminated queens

Hive No	1	2	3	4	5	6	7	Mean
kg	5.000	5.300	5.250	4.800	5.450	4.950	5.150	5.128

Pritsch and Bienefeld (2003) assumed that some of the instrumentally inseminated queens and their mating partners were at least partly selected breeding animals. Al-Qarni *et al.* (2003) stated that the low performance of instrumentally inseminated queens in some studies could be due to: an insufficient amount of sperm, low genetic diversity, inbreeding, influence of CO₂ narcosis or damage to the queen's health caused by

insemination technique, attending workers and the somewhat shorter lifespan experienced in instrumentally inseminated queens.

The difference inside the instrumentally inseminated group was very low (s=225) Fig (1) while it was very high in second group (s=1811). Fig (2)

supersedure rates were high in the instrumentally inseminated group specially the first 30 days.

As a result we could determined that With regard to honey production instrumental insemination proves to be as good as natural mating.

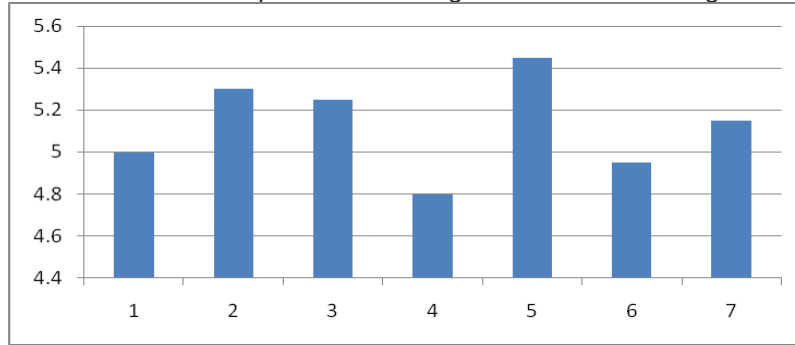


Fig (1) : Honey production from instrumentally inseminated queens

Table (2): Honey production from naturally mated queens

Hive No	1	2	3	4	5	6	7	8	9	Mean
kg	5.300	1.950	5.200	6.300	3.050	6.150	2.000	4.950	6.550	4.605

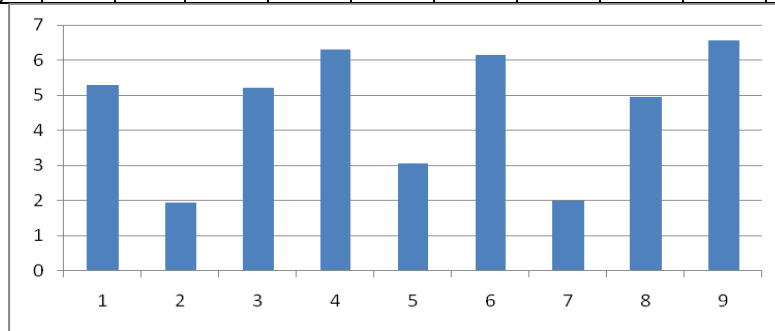


Fig (2): Honey production from naturally mated queens

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مقارنة إنتاج العسل بين طوائف ذات ملكات ملقحة صناعياً و طوائف ذات ملكات ملقحة طبيعية في مصر

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تصاعدت أهمية التلقيح الصناعي لملكات نحل العسل حتى أصبح التلقيح الصناعي من العمليات التي يجب على أي مربى ملكات الأمام بها.

أجريت هذه التجربة في عام ٢٠٠٨ في منحل خاص بقرية ميت فارس مركز بنى عبيد محافظة الدقهلية و كان الهدف من هذا البحث هو مقارنة إنتاج ملكات ملقحة صناعياً من العسل مع ملكات شقيقة لقت طبيعياً وقد أجريت هذه التجربة على ١٦ ملكة من السلالة الكرنبولية تم تربيتها كلها من ملكة واحدة قسمت الى مجموعتين الأولى : ٧ ملكات لقت صناعياً بذكور من طوائف منتخبة والثانية : ٩ ملكات لقت طبيعياً.

كانت النتائج المتحصل عليها من الدراسة كما يلي:

- إنتاج الطوائف ذات الملكات الملقحة صناعياً كان (٥,١٢٨ كجم) بينما كان إنتاج الطوائف ذات الملكات الملقحة طبيعياً (٤,٦٠٥ كجم) بزيادة بنسبة (١٠%) وبفارق غير معنوى .
- نتيجة للقيمة الأقتصادية للعسل نوصى باستخدام الملكات الملقحة صناعياً فى إنتاج العسل وتحسين السلالات و إنتاج الأمهات المستخدمة فى التربية.