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Summary

The present study was carried out at the apiary of the research unit of apiculture, Plant Protection Research Institute. Dokki, Giza on the F1 Carniolan hybrid, the well known and usually used in the Egyptian apiaries.

This study was carried out during 2004 and 2005 to clarify the following aspects:-

I- The effect of adding pollen and pollen substitutes on the colony.

II-The effect of different types of queen rearing.

The obtained data could be summarized as follow:

I - The effect of adding pollen and pollen substitutes on the colony.

Eight kinds of pollen and pollen substitutes were used:

1- Dry yeast 2- Drone larvae 3- Palm pollen 4- Bean pollen

5- Lentils 6- Crude protein 7- Fish powder 8- Soybean.

To evaluate the effect of these substances the following points were studied:

1-Brood rearing measurement:

There were a highly significant differences between brood rearing in that colonies.

The colonies fed on bean pollen, drone larvae, fish powder and protein show high brood rearing (440.52, 393.52, 392.69 and 378.416 inch²), respectively, than those fed on Lintes, dry yeast and control (242.10, 236.96 and 218.69 inch²), respectively.

2- Rate of consumption:-

The obtained results indicated that the tested substances had a highly significant effect on the rate of consumption.

The highest mean of consumption was in bean pollen and drone larvae that recorded (100 and 96.946 g/week), respectively.

The lowest mean of consumption appear when the colonies fed on dry yeast that recorded (7.838g/week).

3- The quantity of royal jelly produced from the tested colonies:

The quantities of royal jelly produced from colonies fed on drone larvae, fish powder and bean pollen were (0.3411, 0.3320 and 0.2963 g/cup) respectively, while the quantities of royal jelly produced from colonies fed on dry yeast , lintes and control were (0.2006, 0.19756 and 0.1730 g/cup), respectively.

It is clear that, there are significant differences between the quantities of royal jelly produced from colonies fed on the tested supplementary feeding materials.

4- Queen rearing:

a- Acceptance percentage:

The mean number of accepted queen cell cups were (17.66, 25.33, 19.66, 25.0, 19.33, 21.0, 22.0, 19.33 and 14.66 cups/colony) fed on dry yeast, drone larvae, pollen grain, bean pollen, lintes, protein, fish powder, soyabean and control, respectively.

Statistical analysis shows a significant difference in the acceptance percentage.

b- Emerging percentage:

Statistical analysis show that, there is no significant differences between the emerging percentages of queen cell for colonies fed on the tested supplementary feeding materials.

c-Weight of virgin queens:

The results showed a significant differences between the means of fresh body weight of newly emerged virgin queens; the highest means were found in

colonies fed on drone larvae and fish powder (172.62 and 169.96mg) respectively. The lowest means were found in colonies fed on lintes and control (152.29 and 141.47mg), respectively.

5-Total protein in worker heamolymph:

a) Total protein in larval stage heamolymph:

Statistical analysis shows highly significant differences in total protein on larval heamolymph that fed on different type of supplementary feeding.

The high percentage of total protein found in larvae that fed on fish powder and drone larvae (7.14 and 6.9 g/dl), while it was low in larvae fed on dry yeast and control (5.42 and 5.18 g/dl), respectively.

b) Total protein in newley emerged bees:

The maximum mean content of total protein in newly emerged bees was found when the colony fed on fish powder (2.32 g/dl), while the minimum mean content was found in control colonies (1.25g/dl).

The results show significant differences in total protein content in newly emerged bees.

c) Total protein in nurse bees:

Statistical analysis shows significant differences in the total protein content in nurse bees.

When the colonies fed on drone larvae and fish powder the total protein content was (4.109 and 4.0533g/dl), while it recorded (3.57 and 3.2133g/dl) when fed on dry yeast and control, respectively.

6- Dissection of hypopharyngeal glands:

a) The length and width of its lobes:

The data show highly significant differences in the length and width in the lobes of hypopharyngeal glands in colonies fed on different supplementary

diets. The maximum length and width appears when colonies fed on fish powder (296.488 and 183.244 μm).

The minimum length and width was (144.426, 79.162 and 92.7377, 67.355 μm) for lintes and control, respectively.

b) The surface area for the lobes of hypopharyngael gland:

Statistical analysis indicated that there was a significant difference between the surface areas of the lobes of hypopharyngeal glands when bees fed on different supplementary feeding. It is recorded (0.08299 and 0.07231 μm^2) when fed on fish powder and drone larvae and recorded (0.02089 and 0.00849 μm^2) when fed on lintes and control.

C) Number of lobes in unit area:

The maximum number of lobes be when colonies fed on drone larvae, pollen grain, bean pollen and fish powder were (53.6, 52.533, 53.6 and 52.266) respectively. The minimum numbers of lobes were (46.933 and 44.266) with feeding on lintes and control.

7- The total protein and lipid in the tested supplementary feeding materials:

<u>materials</u>	<u>total protein (%)</u>	<u>total lipid (%)</u>
Yeast	42.00	2.00
Drone larvae	32.25	41.17
Pollen grain	30.56	15.15
Bean pollen	24.98	23.42
Lentils	21.82	1.59
Protein	53.66	8.185
Fish powder	64.08	16.37
Soybeans	39.96	12.70

II-The effect of different types of queen rearing.

In this experiment 4 types of queen rearing were used:

- 1-single graft:** that the larva of 1-old-day will graft to the wax cell cup and let to complete its life cycle.
- 2- Double graft:** in the second day of single graft, the old larva was removed and new larva of 1-old-day larva will graft.
- 3- Third day graft:** in the third day of single graft, the old larva was removed and new larva of 1-old-day larva will graft.
- 4- Fourth day graft:** in the fourth day of single graft, the old larva was removed and new larva of 1-old-day larva will graft.

To evaluate this type of grafting the following parameters were study:

1- Acceptance percentage:

The mean numbers of successful queen cell cups (per colony) produced from different types of grafting were (93.3, 87.766, 84.433 and 87.866%) for fourth, third, double and single graft, respectively.

The statistical analysis shows significant difference as a result of different type of grafting.

2- Emerging percentage:

Statistical analysis show that there is no significant differences between the emerging percentage of queen cells produced from different types of grafting which recorded (97.766, 96.667, 93.33 and 92.233%) for fourth, third, double and single graft.

3- Weight of virgin queens:

The weight of virgin queens which produced from fourth, third, double and single graft was (182.146, 167.1, 158.473 and 141.473 mg), respectively.

These results indicated that there was a highly significant difference between the weights of virgin queen produced from different types of grafting.

4- Length and width of right fore wing:

There were a significant differences between length and width of the right fore wing of queens produced from different types of grafting.

The maximum length and width found in queens produced from the fourth graft (9.756 and 3.373mm) and the minimum length and width were (9.16 and 2.19mm) for queens produced from single graft.

5- Weight of right ovary of virgin queens:

The weight of the right ovary of queens produced from different types of grafting was (3.166, 2.882, 2.526 and 2.19mg) for fourth, third, double and single graft, respectively. Statistical analysis showed that there were highly significant differences between weights of right ovary of virgin queens produced from different type of grafting.

6-Total protein content in queens' ovary:

The significant differences in the calculated mean content of protein were shown among the tested ovary of queens produced from different types of grafting.

The highest mean content (3.166g/dl) was found for the fourth graft followed by third graft (2.883g/dl), double graft (2.526g/dl) and the least in single graft (2.19g/dl).

7- Volume of spermatheca:

There were significant differences between the volume of spermatheca of queens produced from different types of grafting. The volume of spermatheca recorded (1.4636, 1.3922, 1.268 and 1.0522 mm³) for fourth, third, double and single graft.

8- Pre-oviposition period:

The pre-oviposition periods of resulted mated queen, show a significant difference due to the different types of graft. The queens produced from single and double graft took long period of time to mate and start egg laying (14.33 and 14.0 days), respectively. While, the shortest period before the queen mated and starting egg laying was recored for fourth and third graft (11.33 and 12.66 days), respectively.