Academic Journal of Entomology 3 (2): 52-54, 2010
ISSN 1995-8994

Acceptance of Queen Transplantation in Honey Bee Colonies Influenced with Artificial Feeding (Syrup, Nectar or Pollen)

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Abstract: Queen transplantation for a colony is depending on environmental and nutritional factors. Aim of this study was to investigate the effect of supplementation of syrup, nectar or pollen on increasing the acceptance rate of a new queen. The experiment was conducted in three treatments (syrup, nectar or pollen) with various levels. namely: A) pollen (a_1: 1/2 of comb or a_2: one comb), B) Syrup (b_1: four time, b_2: two time and b_3: one time, daily supplemented for each colony and 250 cc for each time, C) nectar (c_1:1/2 of comb,c_2: one comb or c_3:two comb). Pollen supplemented for one comb and artificial nutrition with 500 cc for two time daily (morning and evening) and nectar included combs (only two combs) is prepared suitable nutritive condition for highest queen acceptance rate as 97.1 present of accepted queen.

Key words: Artificial feeding · Queen rearing · Honey bee

INTRODUCTION

Honey bee queen and her offspring are responsible to colony activities, functions and productivity. The queen can produce 1500-2000 eggs daily. The young queens with high qualitative characteristices are required for these critical functions and colony management [1].

In natural condition, every honey bee colony can produce limited number of queens, but if a colony can't produce a new queen, it may be destroyed soon. The queen can lay 50, 30 and 10 percent of her eggs at first, second and third year of her life and 10 percent of eggs are layed at the next two years [2]. With attention to young queen impacts for colony productivity, bee queen rearing is completely special technique for apiaries.

Nowadays, honey bee regimens and diet formulations are common approach in beekeeping. Also artificial feeding includes supplementation of syrup, syrup with pollen or vitamins [3], carbohydrates and or proteins [4], Soy flour, yeast, milkprotein, linseed oil [5], pollen, sugar, exogenous honey [6] and etc.

Both larvae and adults are highly dependent on food stores in colony and adult honey bees can adapt their foraging or broad-care strategies according to the respective need and supply of carbohydrates and proteins [7].

Goodman [2] mentioned importance of feeding for high queen acceptance rate. Aim of this study was investigation of the affect of artificial feeding with nectar and pollen supplementation in various dosages. on transplanted queen acceptance in honey bee colonies.

MATERIALS AND METHODS

This experiment has been conducted at bee queen breeding station, Langerood city - north of Iran during 2008-2009. Experimental design was completely randomized design (CRD) which include three treatments; A) pollen (a_1: 1/2 of comb or a_2: one comb), B) Syrup (b_1: four time, b_2: two time and b_3: one time, daily supplemented for each colony and 250 cc for each time, C) nectar (c_1:1/2 of comb,c_2: one comb or c_3:two comb).

Next, combs containing 36-hours-old queen larva, were transferred to transplantation room (35-37°C, RH: 40-60%). the larva were transferred to waxy cup-cells containing royal jelly. In this experiment transplants were located in first nurse-hive and after 48 hours we recorded 1512 successful accepted transplants, from 2430 transplant totally. Next, transplants were transferred to secondary or completivenurse-hive.

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Queen transplants acceptance rate in treatments (hives supplemented with different feeds) were recorded at excel software and analyzed by SPSS Ver.10 for detection of significant differences between treatments.

RESULTS

In the Table 1, results obtained from three dietary treatments on queen acceptance rate are presented. Treatments had significant effect on acceptance trait.

DISCUSSION

Currently, artificial dietary supplementations in the hive, regardless to its nutritive functions, also have behavioral and neoro-physiological aspects for honey bee colony. For example, Gao *et al*.[8] showed that high concentration of supplemented nectar in a hive can make workers insensitive for queen signals and allow queen for consumption of higher amounts of nectar without allowing to workers for consumption of supplemented feed.

In queen rearing, the pollen, nectar and syrup are so important nutritional factors. Lack of pollen reduces the number of drone's reared. Also, feeding sugar syrup to cell rising colony has been recommended.

Table 1: Effects of different levels of pollen, nectar and artificial nutrition on acceptance of transplantation in three experimental groups (number of accepted transplanted queen)

X.jkl	X.jkl	3	2	1	a	b	c
12	36	14	12	10	1	1	1
12.6	38	15	12	11	1	1	2
13.67	41	14	14	13	1	1	3
16	48	15	17	16	1	2	1
17	51	16	18	17	1	2	2
27.67	83	28	26	29	1	2	3
25.3	76	27	24	25	1	3	1
26.3	79	29	27	23	1	3	2
25.67	77	24	27	26	1	3	3
24	72	23	21	28	2	1	1
32.3	97	30	33	34	2	1	2
36.3	109	36	35	38	2	1	3
39.67	119	42	38	39	2	2	1
36.67	110	37	35	38	2	2	2
39.67	119	40	40	39	2	2	3
31.67	95	31	30	34	2	3	1
42.67	128	44	41	43	2	3	2
44.67	134	45	45	44	2	3	3
Xooo =	1512	510	495	507	Xiooo		

In this case, management of the nutritional status of drone mother colonies becomes critical for the success of rearing quality long lived queen bees that have been satisfactorily mated [9]. Bin *et al*. [10] showed grow promotion and development of queen bee larvae supplemented with extra honey and water beside royal jelly. They had suggest that supplementation of 10% honey for queen larvae ration can match the grow needs of larvae.

Findings of current study (Table 1) with positive effects of artificial feeding include nectar, syrup and pollen was in agreement with Vasfigençer *et al.* [3], *Bin et al.* [10] and Avni *et al.* [6] reports.

In overall, it is concluded pollen supplemented for one comb and artificial nutrition with 500 cc for two time daily (morning and evening) and nectar included combs (only two combs) is prepared suitable nutritive condition for highest queen acceptance rate as 97.1 present of accepted queen. Our observations showed that introducing transplantation comb as middle comb in hive is another positive factor for queen acceptance (may be because of near contact of queen with workers bee or nurse bee).

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