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Exploring the Strength Impact of Starter-Finisher Orphan Colonies and Rearing Season on Some Economic Characteristics of the Produced Queens in the Middle Delta Region, Egypt

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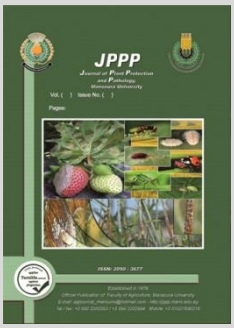

ABSTRACT

This study aimed to explore the effect of two worker's population densities on the basic of comb number covered with bees (8 combs as high density and 5 combs as low density) within starter - finisher queen-less rearing colonies on the larval graft acceptance, sealing and queen emergence as well as weight of neonate queens during the variations between the spring, summer and autumn seasons of 2022 in the middle Delta region. The percentages of acceptance (85.8 vs. 70.1 %), sealing cells (84.9 vs. 68.8 %), and queen emergence (83.9 vs. 67.1 %) as well as newly virgin queen weight (160.8 ± 17.7 vs. 126.8 ± 8.1 mg.) were significantly higher in colonies of low population densities, respectively. Queen rearing during the summer season attained the highest percentages of acceptance, sealing cells and emergence (83.9, 82.9 and 81.9 %, respectively), followed by autumn (78.5, 77.8 and 77.1 %, respectively) then spring season (71.5, 69.8 and 67.7 %, respectively). On the contrary, the heavier queens were produced during the spring (159.8 ± 26.3 mg /queen), than both resulted during summer, (139.7 ± 14.8 mg / queen) and autumn (131.8 ± 15.3 mg / queen) seasons. In conclusion the queen-rearing colony should have a high density of workers to provide suitable food to queen larvae and building queen cells and choose the suitable times in which sources of nectar and pollen are abundant.

Keywords: Queen rearing, colony strength, rearing season, acceptance and emergence percentages, queen weight

INTRODUCTION

It is known that the queen is the most important individual within the honeybee colony dependent on its reproducing ability and maintaining the colony's survival. Besides, the economic characteristics of the honeybee colony are dependent mainly on the quality of its queen. The queen quality in turn depends on genetic and both internal and external conditions, (Hoopingarner&Farrar, 1959; Laidlaw, 1979; DeGrandi-Hoffman, et al., 1993; Abd Al-Fattah et al., 2003a). Thus, Yi et al., (2020) stated that queen rearing is a crucial step in beekeeping. The rearing conditions that offered by nursery colonies are the most important requirement among the internal factors to obtain good queens, (Johansson & Johansson, 1973, Woyke, 1980, Harris, 2009; Abd Al-Fattah et al., 2011). So, the density of colony workers population plays the main role in this manner and got great interesting from many investigators (Morse, 1979; Weiss, 1983; Laidlaw, 1985; Abd Al-Fattah & El-Shemy, 1996; Abd Al-Fattah et al., 2003b; Fathy, et al., 2019). Also, the geographic region, (El-Sarrag and Nagi, 1985; Zeedan, 2002; Hamada, 2019; Abd Al-Fattah, et al., 2021; Canverdi, et al., 2023) and rearing season (Koç&Karacaoğlu, 2004; Chuda-Mickiewicz &Samborski, 2015; Elenany & Abdallah, 2016; El-Kady, et al., 2021; Guda, et., al., 2023) were got similar attention.

In this respect, numerous worldwide researchers correlate between various reproductive characters of the future gyne such as, the size of ovary, ovarioles number, volume of spermatheca, spermatozoa count, pre- and post- mating period, rate of egg-laying …etc. and the weight of queen at emergence, (Szabo, 1973; Taranov, 1973; Nasr, 1976; Szabo, 1977;Szabo, et al., 1987;Chuda-Mickiewicz &Samborski, 2015;Cengiz, et al., 2019; Dolasevica, et al., 2020; Yi, 2020;Guda, et al., 2023; Abd Al-Fattah et al., 2024).

Therefore, the aim of this work is to study the effect of different worker population densities within rearing queen-less colonies on some economic characters of the resultant queens during spring, summer and autumn seasons at Gharbia governorate, the middle Delta, Egypt.

MATERIALS AND METHODS

This study was conducted in a private apiary located in Tanta district, Gharbia Governorate, during the spring (April, 8 to May, 20), summer (July, 10 to August, 25) and autumn (September, 18 to October, 31) seasons of 2022. The effect of two different densities of worker's population within queen rearing colonies on some commercial characteristics, (as percentages of larval graft acceptance, sealing of queen cells and queen emergence) and quality of resultant queens, (on the basic of their weights at emergence) was evaluated through this work.

Preparation of treatment colonies:

During each experimental season, two groups of honeybee Carniolan hybrids, three colonies of each, were chosen according their densities of worker's population. Each colony of the first group contained eight combs covered with bees were considered as high density worker's population. The arrangement of these combs from the left hive wall was as follows: the first comb was honeycomb facing the entrance, one bee bread comb, one completely sealed brood, two combs contained mix of uncapped and capped brood, one completely

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capped brood, one bee bread comb, and one honey comb. Each colony of the second group had five combs covered with bees which considered as low density of worker's population. These combs were arranged as follow: 1 comb of honey and bee bread beside the left hive wall, 1 completely sealed brood, 1 comb of unsealed and sealed brood, 1 sealed brood, 1 comb of bee bread and honey. The wax comb that completely covered with bees was previously determined by 2000 – 2500 workers according to estimation of Abd Al-Fattah, (1987). Therefore, colony of the high worker's density had about 16 – 20 thousand bees against about 10 – 12.5 thousand bee for those of low worker's density. Queen rearing operation was performed during each season in three stages, with about 15 days between them, using two pairs of colonies, one with a high bee density and the other with a low density. Throughout the experiment, one batch of 48 grafted queen cups was received by each tested colony. The mother queens of the tested colonies were removed 24 hours before inserting the grafted frame which put in the center of rearing colony between comb of beebread and comb of unsealed and sealed brood. Sugar solution in concentration of 1:1 (w / v) was continuously provided to colonies two weeks before and during the rearing course.

Preparation of grafted larval queen cups

According to the method of Laidlaw and Page, (1997), tiny larvae less than 36 hours old, (depending on size) were transferred by a metal grafting needle from the peripheral of selected open brood area in a comb of the same bee race. These transferred larvae were gently floating on droplets of a 50% aqueous solution of fresh royal jelly contained within plastic cups fixed to a wooden bar. Each bar, which contained 16 grafted cups, was held in a grafting frame that housed three bars. The grafting operation was carried out in a room with a temperature of 25 ± 2°C and a relative humidity of 70-80%. The accepted cells were left in their positions until capped then after 5 -6 days from capping, each mature queen cell was put on an unripe honey comb in a position similar that in grafted frame. These cells were separated from each other by wire crown cages until emergence.

Parameters of evaluation

To evaluate the effect of the different workers densities on the commercial characters of the resulted queens during various seasons the following parameters were selected:

A. The acceptance percentage of grafted larval queen cups, which calculated by the following formula:

Accepted queen cells % = (No. accepted queen cells \ No. grafted queen cups X100).

B. The sealing percentage of queen cells, which calculated by the following formula:

Sealed cells % = (No. capped cells\ No. accepted queen cells X100).

C. The emerging percentage of queen cells, which calculated by the following formula:

Emerged %= (No. emerged queens\ No. sealed queen cells X100).

D. Weight of newly emerged virgin queens:

This parameter was recorded using an electric balance to the nearest 0.01 mg.

Statistical analysis:

Data were subjected to analysis of variance (ANOVA) using "Co-stat" computer statistical program, (Version 6.303.). The randomized complete Block Design was used and the mean values were compared using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

1 - The effect of colony population density on some commercial characters of resulted queens

A – Effect on Acceptance percentage

Results in Table (1) represent the mean numbers and their acceptance percentages of grafted queen cups as affected by two different densities of worker's population in starter-finisher queen rearing colonies during three successive seasons of 2022. The mean percentage of accepting grafted larval cups was significantly affected by the strength of queen-less rearing colonies during all tested seasons. There was highly significant increase in this character for high density rearing colonies ranged from 79.2 – 83.8 % with a mean value of 80.6 % against a range of 58.3 – 66.7 % with a mean value of 62.5 % in the case of those colonies contained a low density of worker's population during spring season. This significant progression of high density worker population colonies was noticed during both seasons of summer,(with a mean percent of acceptance valued 91.7 %, and ranged from 89.6 – 93.8 %) and autumn, (with a mean of 85.4 %, and ranged from 83.3 – 87.5 %) against a mean percentages of 76.5 %, (ranged from 75.0 – 77.1 %) and 71.5 %, (ranged from 68.8 -75.0 %) in the case of colonies contained low worker population density during the two seasons, respectively as shown in Fig. (1).So, the general means of accepted percentages over seasons was 85.8 % and 70.2 % for high and low densities of workers population, respectively as appeared in Table (1).

Table 1. Effect of worker population density of rearing colony on the acceptance percentage of grafted queen cups during different seasons of year 2022

Season	High density of workers		Low density of workers		Mean ± sd. / Season
	Range	Mean ± sd.	Range	Mean ± sd.	
Spring	38 - 40	38.7±1.2 a	28 - 32	30.0 ± 2.0 b	34.3 ± 5.0 C
%	79.2 - 83.3	80.6	58.3 - 66.7	62.5	71.5
Summer	43 - 45	44.0 ±1.0 a	36 - 37	36.7 ± 0.6 b	40.3 ± 4.1 A
%	89.6 - 93.8	91.7	75 - 77.1	76.5	83.9
Autumn	40 - 42	41.0 ±1.0 a	33 - 36	34.3 ± 1.5 b	37.7 ± 3.8 B
%	83.3 - 87.5	85.4	68.8 – 75.0	71.5	78.5
General	41.2 ± 2.5 A		33.7 ± 3.2 B		37.4
mean %	85.8		70.1		77.9

Means in the same row or column with the same small or capital letters do not significantly differ according to DMRT at probability of 0.05.

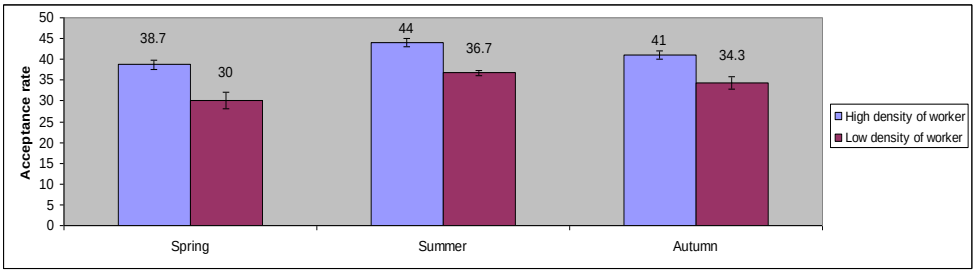

Fig. 1. Effect of worker population density of rearing colony on the acceptance percentage of grafted queen cups during different seasons of year 2022.

B – Effect on sealing queen cell percentage

Similarly, the mean percentages of sealed queen cells were, also, affected by strength of rearing colony. The sealed queen percentages in strong colonies were significantly higher than those in weak ones during different study seasons. They were 90.2 % vs. 75.6 % during summer, 85.4 % vs. 70.2 % during autumn and 79.2 % vs. 60.4 % during spring seasons for strong and weak colonies, respectively. The grand means of sealed queen percentages were 85.0 % vs. 68.8 % for the two strengths, respectively as shown in Table (2) and Fig., (2).

Table 2. Effect of worker population density of rearing colony on the sealing percentage of larval queen cells during different seasons of year 2022

Season	High density of workers		Low density of workers		Mean ± sd. / Season
	Range	Mean ± sd.	Range	Mean ± sd.	
Spring	37 – 39	38.0 ±1.0 a	27 - 31	29.0 ± 2.0 b	33.5 ± 5.1 C
%	77.1 - 81.3	79.2	56.3 - 64.6	60.4	69.8
Summer	43 - 44	43.3 ± 0.6 a	35 - 37	36.3 ±1.2 b	39.8 ± 3.9 A
%	89.6 - 91.7	90.2	72.9 - 77.1	75.6	82.9
Autumn	40 – 42	41.0 ±1.0 a	32 - 35	33.7±1.5 b	37.3 ± 4.2 B
%	83.3 - 87.5	85.4	66.7 - 72.9	70.2	77.8
General	40.8 ± 2.4 A		33.0 ± 3.5 B		36.9
mean%	84.9		68.8		76.9

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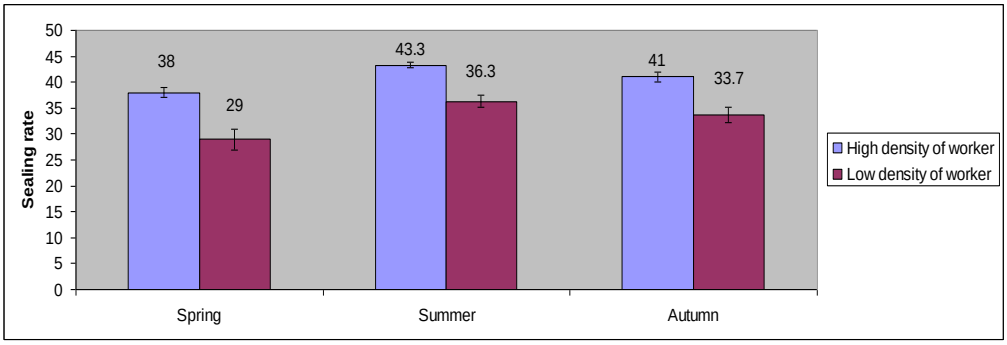

Fig. 2. Effect of worker population density of rearing colony on the sealing percentage of larval queen cells during different seasons of year 2022

C - Effect on emerging queen cell percentage

The emerged queen cells percentage was, also, higher in strong rearing colonies where it recorded values of 88.9 %, 85.4 % and 77.8 % against 75.0 %, 68.8 % and 57.7 % for low density of worker's population during seasons of summer, autumn and spring, respectively, (Table 3). The general over seasons means were 84.0 % and 67.1 % for colonies of high and low of worker's population densities, respectively, (Fig., 3).

It is noteworthy that the perfect commercial production of honey bee queens depends on a large extent on the population density of nursery workers within rearing colony as they play an important role in feeding and caring the available stages of larvae and pupae queen cells. Many researchers confirmed this important note such as Laidlaw and Eckert, (1962); Morse, (1994); Laidlaw & Page, (1997) and Kusuma and Bhat, (2003) where they stated that the number of workers population in the rearing colony has a great effect on the number of queens reared by this colony. Depending on this context, Hanna, (1963) indicated that a large force of young workers was necessary for building queen cells and this could be obtained by the addition of sealed brood. Taber, (1979) reported that 500 young nursery workers were sufficient to raise a good queen. Also, Zhu, (1981) studied the ratio between workers and queen cells which were l comb of bees to 2-3queen cells and found that a 10 -comb colony could prefer an average of 1000-l500 nurse bees to feed each queen larva and, in turn, could raise 20-30 queen cells in one batch.

Table 3. Effect of worker population density of rearing colony on the emerging percentage of sealed queen cells during different seasons of year 2022

Season	High density of workers		Low density of workers		Mean ± sd. / Season
	Range	Mean ± sd.	Range	Mean ± sd.	
Spring	37 - 38	37.3 ± 0.6a	26 - 30	27.7± 2.1 b	32.5 ± 5.5 C
%	77.1 - 79.2	77.8	54.2 - 62.5	57.7	67.7
Summer	42 - 43	42.7± 0.6 a	35 - 37	36.0 ±1.0 b	39.3 ± 3.7 A
%	87.5 - 89.6	88.9	72.9 - 77.1	75.0	81.9
Autumn	40 - 42	41.0 ±1.0a	32 - 34	33.0 ±1.0 b	37.0 ± 4.5 B
%	83.3 - 87.5	85.4	66.7 - 70.8	68.8	77.1
General	40.3 ± 2.4 A		32.2 ± 3.9 B		36.3
mean %	83.9		67.1		75.6

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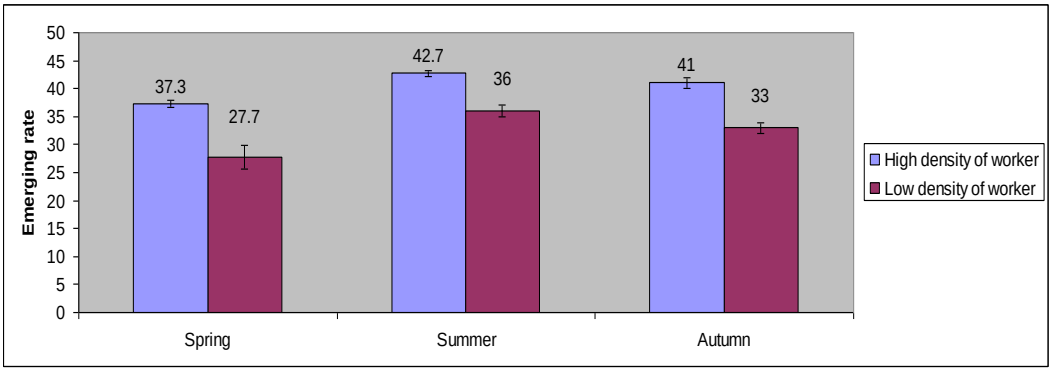

Fig. 3. Effect of worker population density of rearing colony on the emerging percentage of sealed queen cells during different seasons of year 2022

Therefore, due to the strong correlation between the strength of rearing colony and the economic traits of the obtained queens such as the accepting, sealing and emerging percentages of the inserted queen cups or cells, the present results are agreed with the findings of many authors. Abd Al-Fattah, et al., (2003b) Showed that, the higher percentages of larval acceptance, sealing queen cells and queen emergence were obtained using queen rearing colonies consisted of ten combs, (strong colonies) than using seven, (moderate colonies) or five, (nuclei) combs covered with bees. They also, indicated that the mean acceptance percentage which attained by strong colonies was about two times higher than in nuclei and they attributed this increase to the favorable conditions, specially nest temperature, offered by crowded than not crowded colonies. The present finding was also, agreed with the findings of Hamada, (2019) who determined that the mean accepted rate for the low population was significantly less, (mean 81.5%; ranged from 52.3 -100 %%), than that occurred for the high population density, (mean 95.6%; ranged from 89.9 -100 %). Likewise for the emergence rate where the mean value for the low population colonies was 90.1 %, (ranged from 85.8 - 97.3 %), while it was 93.7% (ranged from 88.6 - 100 %), in the case of the high population colonies.

D – Effect on weight of newly emerged queens

The weight of neonate of emerged queens was also, related to the strength of colony that the queens raised in. Therefore, the honeybee queens nursed in high density of workers population were significantly heavier than those cared in low density of workers population. The mean of these queens weighed 183.7 mg vs. and 136.0 mg during spring, 153.0 mg vs. 126.0 mg during summer and 145.7 mg vs. 118.0 mg during autumn for the strong and weak colonies, respectively. The over seasons means for the two tested strength were, also, significantly differed as gained 160.8 mg / queen and 126.8 mg / queen, respectively, (Table 4 and Fig.4).

Table 4. Effect of worker population density of rearing colony on the weight of newly emerged virgin queens during different seasons of year 2022.

Season	High density of workers			Low density of workers			Mean/Season	
	No. of weighed queens	Range	Mean ± sd.	No. of weighed queens	Range	Mean ± sd.	Range	Mean ± sd.
Spring	111	180 -188	183.7 ± 4.0 a	80	134 -138	136.0 ± 2.0 b	134 -188	159.8 ± 26.3 A
Summer	128	150 -156	153.0 ± 3.0 a	105	125 -128	126.0 ± 1.5 b	125 -156	139.7 ± 14.8 B
Autumn	123	144 -147	145.7 ± 1.5 a	99	115 -121	118.0 ± 3.0 b	115 -147	131.8 ± 15.3 C
General mean	160.8 ±17.7 A			126.8 ± 8.1 B			143.8	

Means in the same row or column with the same small or capital letters do not significantly differ according to DMRT at probability of 0.05.

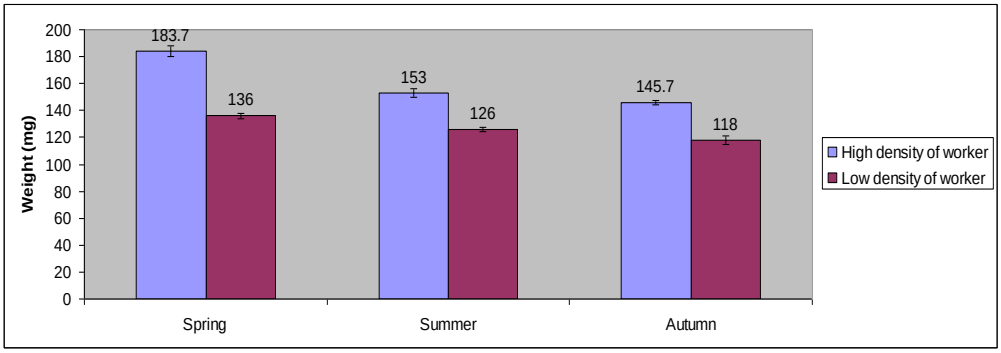

Fig. 4. Effect of worker population density of rearing colony on the weight of newly emerged virgin queens during different seasons of year 2022.

Regarding to affect the weight of neonate of emerged queens by the colony strength, Abd Al-Fattah et al., (2003b) recorded that the heaviest queen weight (177.3mg / queen) was produced from colonies which contained 10 combs covered with bees, followed by colonies with 7 combs (155.3mg), while those with 5 combs (147.5mg) produced the lightest queens. The inferior queens that resulted from low density of nursery workers, (weak colonies) may be due to the deficiencies in feeding, (Zhu, 1981; Ali, 1994; Tarpy et al., 2000; Mohammad, et al., 2002; Sahinler and Kaftanoglu, 2005 and Sakla and El-Shafeiy, (2022) and warming, (Eskov, 1990; Spivak, et al., 1992) throughout the development of different queen cell stages within the builder colony.

On the other hand, the obtained results were not in line with those found by Hamada, (2019) who recorded insignificant difference in queen weights produced in strong, (1.5 Kg bees/colony) and weak, (1 Kg bees/colony) queen rearing colonies. The mean weights of queens were 160.58 mg and 159.63 mg for the two mentioned strengths, respectively. Likewise, Kamboj et al., (2023) in Himachal Pradesh, India, compared the effect of different strengths of queen-less rearing colonies (as no. of combs covered with bees/colony) on the weight of emerged queens. They found that the heaviest queens, (201.75± 10.06 mg/queen with a range of 181-224mg) rose by the strongest colonies, (9.18± 0.34 bee combs / col.), but not significantly differed with those produced by colonies contained 8.4± 0.40 bee combs / col., (184.0 mg; 172-207) or 7.81± 0.37 bee combs / colony, (191.85mg; 174-214). This little variation may be attributed to the narrow difference between the tested colonies strengths.

2 - The effect of rearing season on some commercial characters of resulted queens

The results in Tables (1 - 4) represent the percentages of acceptance, sealing, queen emergence as well as the weight of neonate of emerged queens as affected by rearing season.

A – Effect on Acceptance percentage

Concerning the number of acceptance of grafted queen cups, there were significant differences between seasons where the highest accepted number, (40.3 ± 4.1 grafted cups / colony) was recorded during summer season represented a percent of 83.9 %. The lowest number of acceptances occurred during spring, (34.3 ± 5.0 grafted cups

/ colony) which attained a percent valued 71.5 %. The acceptance during autumn season had an intermediate position, (37.7 ± 3.8 grafted cups / colony represented 78.5 %) as recorded in Table, (1) and illustrated in Fig., (1).

B – Effect on sealing queen cell percentage

The same trend was noticed in the percentage of sealed queen cells, (Tables 2). This percent was significantly increased during summer, (39.8 ± 3.9 sealed cell/ colony represented 82.9 %) than that recorded during both autumn, (37.3 ± 4.2 sealed cell/ colony valued 77.8 %) and spring, (33.5 ± 5.1 sealed cell/ colony with 69.8 %) seasons as shown in Fig., (2).

C - Effect on emerging queen cell percentage

The percent of emerged queen cells was noticeably increased during summer than other seasons, (Table 3). This commercial character was also, significantly increased during autumn than spring season. The numbers of emerged queen cells were 39.3 ±3.7queen cells/ colony, 37.0± 4.57queen cells/ colony and 32.5± 5.5 queen cells/ colony during summer, autumn and spring seasons, respectively. The corresponding percentages were 81.9 %, 77.1 % and 67.7 % for the previous seasons, respectively as illustrated in Fig. (3).

It is worth noting that the effect of the rearing seasons on the commercial characteristics and productive efficiency of newly emerged virgin queens has received a great deal of study resulted in many conflicting reports depending on the region in which the study was conducted. The obtained results concerned the acceptance; sealing and emerged percentages are in line with several authors. Fotti, et al., (1971) found that, the queen acceptance was highest (about 88%) in August, and lowest (about 45-77%) during May. El-Mohandes, (1993) reported that, the most suitable seasons for rearing queens were late summer, followed by summer and then spring. Ali, (1994) attained the highest rates of both acceptance and royal jelly production during summer, (middle June to early October) than spring (end March) or autumn (late October) and winter (December). Abd Al-Fattah et al., (2003b) recorded significant increase in accepting rate during summer, (82.8%) than the other seasons. The lowest percentage was in winter (36.1%) while the moderate results were noticed during spring (70.0%) and autumn (72.8%) seasons under the environmental conditions of North Sinai region. Cengiz, et al., (2009) noticed that the average acceptance rate in queen- less colonies in June, July and August were 95, 86.6 and 78.3%, respectively. Also, Abd Al-Fattah et al., (2021) recorded significant progression in rates of acceptance, (75.0 ± 2.125%), sealing, (97.6 ±1.101%) and emergence, (96.1 ± 2.906 %)queen cells during summer than late winter, (64.4±4.496 %, 95.5±1.038 % and 98.0±0.894 %, respectively) season. On another side, Sharaf El-Din et al., (2000) revealed an increase in larvae acceptance during spring than summer season. Zeedan, (2002) at Giza region found that there were insignificant differences between the accepted percentages of spring (84.2%) and summer (82.3%) seasons from one side, but they differed than those occurred during autumn (73.4%) and winter (71.1%) from the another ones. Sharma, et al., (2020) in India, reported that the acceptance of larvae and the emergence of queens varied non-significantly during autumn and spring seasons. The mentioned variations in the studied characters between the different seasons may be attributed to available suitable weather conditions (especially air temperature) that help the workers maintain optimum warming, wax secretion as well as build queen cells, in addition to making it easier for the new queens to emerge, (Taber, 1979; Spivak, et al., 1992; De Grandi-Hoffman, et al., 1993; Taha, 2005; Abd Al-Fattah et al., 2011 and Akongte, et al., 2022).

D – Effect on weight of newly emerged queens

Data in Table, (4) revealed that the quality of newly emerged queens, (on the basic of weight at emergence) was also influenced by the rearing season. The heaviest queens were raised during spring season with a range of 134 – 188 and a mean value of 159.8 ± 26.3 mg. / queen. Queens bred during summer season came next with a weight ranged from 125 – 156 mg and a mean of 139.7 mg / queen. The lightest weights of queens were recorded for those produced during autumn season with weights ranged between 115 – 147 mg and a mean of 131.8 ± 15.3 mg /queen as shown in Fig., (4).

In contrast to the effect of summer season on productive characters, the obtained results cleared that the quality traits represented by the weight of queens at emergence were significantly the best in the spring season. This may be due to availability of numerous sources of nectar and pollen, (Mohanna, 1969; Taha, 2000; Mohammad, 2002; Hamada, 2012 and Guda, et al., 2023). Therefore, the findings coincided with those reported by many researchers as Li, (2000) noticed that strong and better queens could be obtained when reared in the season during honey and pollen flows. However, when reared in the hot summer in poor honey and pollen flows, the queens will be smaller. In autumn, the queens may be under-fertilized due to low temperatures and thus do not perform well at egg laying. Koc and Karacaoglu, (2004) in the temperate region, mentioned that queen bees can be reared from the end of March to September, but better quality of queens is obtained from the end of March until the end of April. Taha, (2005) at neighboring region, Kafr El-Sheikh governorate, observed that the highest level of building queen cups and queen cells were affected by nectar and pollen sources during the blooming periods of faba bean, citrus, squash, clover and cotton in the different sites and the best results were recorded in May (clover nectar flow season) followed by April, (Citrus nectar flow). In the another side, several authors recorded progression the weight of queens reared during summer season than those raised during others, where this may be reflecting the variation in the date, time and the prevailing species of cultivated plants that rich in pollen and nectar for bees, (Abd El-Aziem, 1999; Zeedan, 2002; Moustafa et al., 2014; Hamada, 2019; Sharma, et al., 2020 and Abd Al-Fattah, et al., 2021).

CONCLUSION

The finding results obvious that a queen-rearing colony should be vigorous and have a lot of young workers to provide enough and suitable food to queen larvae and constructing queen cells. A single story beehive is used when only a small number of queen cells are to be raised, and should have at minimum eight combs completely covered with bees. Weak colonies produce inferior queens and are unsuitable for queen rearing.

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استكشاف تأثير قوة الطوائف اليتيمة البادئة والناهية وموسم التربية على بعض الخصائص الاقتصادية للملكات المنتجة في منطقة وسط الدلتا بمصر

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الملخص

تهدف هذه الدراسة إلى استكشاف تأثير الكثافة العددية من الشغالات مقدرة على أساس عدد الاقراص المغطاة بالنحل (8 اقراص تمثل كثافة عالية و5 اقراص تمثل كثافة منخفضة) داخل طوائف التربية اليتيمة البادئة والمتممة على العدد و النسبة المئوية لقبول اليرقات المطعومة وغلق البيوت الملكية وفقس الملكات وكذلك وزن الملكات حديثة الفقس اثناء التباينات المناخية لفصول الربيع والصيف والخريف لعام 2022 في منطقة وسط الدلتا. كانت النسب المئوية للقبول (85.8% مقابل 70.1%)، والبيوت المغلقة (84.9 مقابل 68.8%)، والفقس (83.9 مقابل 67.1%) وكذلك وزن الملكة العذراء حديثة الخروج (160.8 ± 17.7 مقابل 126.8 ± 8.1 مجم) أعلى بكثير في الطوائف ذات الكثافة العالية مقارنة بالكثافة المنخفضة على التوالي. وحققت الملكات التي تمت تربيتها خلال فصل الصيف أعلى النسب المئوية للقبول والغلق والفقس، (83.9 و82.9 و81.9 % على التوالي)، يليها فصل الخريف (78.5 و77.8 و77.1 % على التوالي) ثم فصل الربيع (71.5 و69.8 و67.7 % على التوالي). وعلى العكس من ذلك فقد تم إنتاج الملكات الأثقل وزنا خلال فصل الربيع، (159.8 ± 26.3 مجم/ملكة)، مقارنةً بكل من موسمي الصيف، (139.7 ± 14.8 مجم/ملكة) والخريف، (131.8 ± 15.3 مجم/ملكة). وخلصت الدراسة إلى أن طائفة تربية الملكات يجب أن تكون ذات كثافة عالية من الشغالات لتوفير الغذاء المناسب لليرقات الملكية وبناء تلك البيوت بالحجم المناسب ويفضل دائما أن يكون ذلك فى الفترات التي تتوافر فيها مصادر الرحيق وحبوب اللقاح بكثرة.