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INFLUNCE OF TYPE OF BEEHIVES ON COLONY GROWTH

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ABSTRACT

The present study was conducted at the experimental farm of Sakha Agricultural Research Station, Mahlet Musa, Kafrelsheikh Governorate during the period from the beginning of September 2012 to the end of August 2013, to study the impact of type of beehives on brood rearing and colony population size. The mean area of worker sealed brood/colony/ month, and mean numbers of bees/colony/month obtained from foam hive colonies were significantly higher than those from langstroth hive colonies ones during all experimental periods. The highest rate of colony growth was recorded in colonies of all beehives during May, while the lowest one was occurred during December.

Keywords: Beehives, Foam, brood, Langstroth, population size

INTRODUCTION

The amount of brood in the colony is reflecting its case, and can be used to expect the honey yield produced at the end of the season. Several investigators have proved positive correlation between stored pollen, brood production and honey yield (Fathy, 1998 a; Mladenovic *et al*., 1999; Shoreit *et al*., 2002; Jevtić *et al.*, 2009; Taha and Al-Khtani, 2013).

The growth of the colonies was found to be affected by several factors such as: bee flora (Matheson, 1991; Williams *et al*., 1993; Abdella, 1996; Shawer *et al*., 2003; Taha, 2007 and Taha, 2009), colony strength (Fathy, 1998 a; Georgijev *et al*., 2003; Jevtić *et al*., 2009; Taha and Al-Khtani, 2013), feed supply Fathy, 1998b; Mladenovic *et al*., 1999; Castagnino *et al*., 2004; Mattila and Otis, 2006; DeGrandi-Hoffman *et al*., 2008; Ghazy, 2009) and time of the year (Khanbash and Bin Ghodel, 1994; Rana and Goyal, 1994; Al-Humyarie *et al*., 1999; Shawer *et al*., 2003; Taha, 2009),

The present investigation aimed to study the variation of colony growth in relation to the type of beehives under the environmental conditions of Kafrelsheikh Governorate.

MATERIALS AND METHODS

The present study was conducted at the experimental farm of Sakha Agricultural Research Station, Kafrelsheikh Governorate during the period from the beginning of September 2012 to the end of August 2013. Twelve honeybee nucleus colonies (each five combs) of hybrid Carniola honeybee were equalized to be in the same strength (brood, bees and stored feed) headed by young sisters open mated hybrid queens. The colonies divided into two groups of six colonies. First one was housed in langstroth beehives and the second was housed in Foam ones.

The worker sealed brood area was measured at twelve days intervals using an empty standard frame divided into square inches (Al-Tikrity *et al*., 1971). Numbers of combs covered with bees/colony were recorded monthly to determine the colony population size. Bee population per colony was counted as one comb well covered with bees in the two sides equals 2000 bees (Taha, 2007).

Data were statistically analyzed by the analysis of variance (ANOVA) using SAS Institute (2003).

RESULTS AND DISCUSSION

The monthly worker sealed brood areas were significantly ($p<0.01$) affected by the type of beehives. The monthly worker sealed brood areas obtained from colonies in foam beehives were surpassed those from langstroth ones during all experimental months. The percentages of increment per colony were ranged from 1.02 to 8.46 % with average of 5.02 %. The highest increment was recorded in January, followed by 7.39 % in November, while the lowest one was observed in February.

Data illustrated in Fig. (1) showed that, the monthly worker sealed brood areas (sq. inches) were significantly ($p<0.01$) varied during the different months. The highest mean worker sealed brood areas were observed during May which formed the highest peak, followed by March that formed the second peak, while the lowest one was found in January in both types of beehives. The highest mean worker sealed brood area (1233.25sq. inches/colony/month) was obtained from colonies on Foam beehives, followed by colonies on langstroth (1152.33 sq. inches/month/colony) during May.

The large area of worker sealed brood was occurred during May and March may be due to the high population of worker bees that collected more pollen from Egyptian clover and faba bean, respectively. The presence of high ratio of nurse bees encourages the queen to lay more eggs. This results are supported by Shawer *et al.* (1987); Serag El-Dein (1991); Rana and Goyal (1994); Shawer *et al.* (2003) and Taha (2005) as they recorded that the largest worker sealed brood area was found in May. Rinderer and Hellmich (1991) reported that brood rearing by Africanized honeybee colonies in the near tropics is often considered to be less dependent upon the season but more dependent upon and more responsive to changes in floral resource supply than that of European honeybee colonies in temperate climates. On the contrary, Musa *et al.* (1989) recorded that, brood rearing was increased in November, the main season of nectar flow in Sudan.

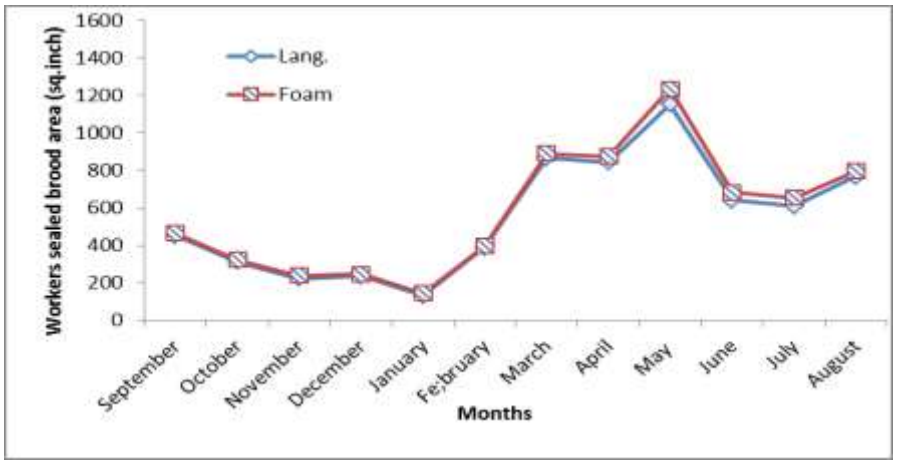

Fig. (1): Effect of beehives type(foam& langstroth hive)on mean area of workers sealed brood (sq. inch) during 2012/2013 season.

Highly significant differences were recorded between Foam and Langstroth beehives and among months. These differences may be due to the variability in colony strength according to beehives type that affect the temprrature incide the hive which may affect the activity of queen to lay eggs and colony to rear the brood. In this concern, Abdella (1996) stated that the productivity of honeybee colonies throughout the year is influenced by different factors: specially queen's age and egg laying capacity, colony population and available of empty combs as well as the climate temperature and the supply of both pollen and nectar. Lakshmi and Mahana Rao (1998) reported that movement of colonies to guava orchards caused high growth of colonies during its flowering period. Lakshmi *et al*. (2001) observed that dillenia (*Dillenia pentagyna*) flowers during March to April when the tree is leafless, nectar is used for brood rearing and colony build-up. Stefanic *et al*. (2003) stated that goldenrod serves as an important source of nectar for honeybees particularly as a reserve to help colonies survive the winter period.

Data presented in Table (1) revealed that the colony population size was significantly ($p<0.01$) affected by the type of beehives. The numbers of combs covered with bees obtained by colonies in Foam beehives were surpassed those from Langstroth ones during all experimental months. The percentages of increment per colony were ranged from 0.35 % in September to 28.67 % in December, with average of 12.44 %. The mean size of colony population (11800.00 bees/colony/month) in Foam beehives were significantly ($p<0.01$) higher than those (10640.00 bees/colony/month) of Langstroth ones. These differences may be due to simulative effect of Foam beehive, which stimulates high rate of egg lying by the honeybee queens, which resulted in higher amounts of sealed workers brood that resulted in higher bee population.

Table (1): Effect of bee hives type on colony population size during 2012/2013 season.

Months	Beehives type		Significant
	Lang.	Foam	
September	11500	11540	N.S
October	8200	8900	*
November	7200	7800	*
December	6000	7720	**
January	6900	7800	**
February	8240	10000	*
March	11400	12660	**
April	13720	14480	**
May	17100	19200	*
June	12000	14200	*
July	10000	11300	**
August	14500	16000	**
Mean	10640	11800	**

- *, ** and NS indicate P< 0.05, P< 0.01 and insignificant, respectively.

The population size of the colony was varied significantly ($p<0.01$) during the different months. The highest mean number of combs covered with bees was observed during May, which formed the highest peak of colony population size, followed by August that formed the second peak as a result of the high rate of stored pollen and worker sealed brood during these periods. These results are agreed with results of Fathy (1998) who found that the major peak of brood activity and higher rate of stored pollen were in May, consequently the maximum number of house bees was recorded during June and July Besides, Hammad (2007) stated that, pollen substitutes stimulate high egg laying by the honeybee queens which resulted in higher amounts of sealed workers brood as well as high number of combs covered with bees during spring and summer seasons. Also, Nour (1992) and Fathy, H. M. (1998a). found that, the number of combs covered with bees/colony showed a positive correlation with the amount of drone brood in winter and summer, while a negative correlation was noticed in spring. Taha and Al-Kahtani (2013) reported that the numbers of combs covered with bees in the strong colonies were higher than those in weak ones. The numbers of combs covered with bees in strong colonies ranged between 211.07 to 247.03% of that in weak ones with average of 224.25%.

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تاثير نوع الخلايا على نمو الطائفة

حســـــن محمـــــد فتحـــــى[1] ، ليلـــــى عبـــــد الســـــتار البطـــــران[1], حمدى احمد متولى منصور[2] ورضا عبده طه [2]
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2- قسم النحل - معهد بحوث وقاية النباتات - مركز البحوث الزراعية

اجريت هذه التجربة في المزرعة البحثية لمحطة البحوث الزراعية بسخا منطقة محلة موسى بمحافظة كفر الشيخ خلال الفترة من بداية سبتمبر 2012 وحتى نهاية شهر اغسطس عام 2013 ، لدراسة تأثير نوع خلايا النحل على تربية الحضنة وحجم الطائفة . مساحة الحضنة / طائفة/ الشهر، وكانت متوسط مساحة حضنة الشغالات المختومة بالنحل / طائفة / شهر تم الحصول عليها من الطوائف المرباة فى في خلايا الفوم أعلى بكثير من الطوائف المرباة فى في خلايا لانجستروث خلال جميع فترات الدراسة . وقد سجلت أعلى معدل لنمو الطوائف فى كل من الخليتين خلال شهر مايو، في حين كان اقل معدل خلال شهر ديسمبر.