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SEASONAL BROOD REARING ACTIVITY ACCORDING TO BEE COLONY STRENGTH UNDER ENVIRONMENTAL CONDITION AT MANSOURA DISTRICT, DAKAHLIA GOVERNORATE

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ABSTRACT

The present work was carried out to study the seasonal activity of honeybee colonies in brood production (from March, 2007 – Feb 2008) at Mansoura district, Dakahlia governorate Summarized data are as follow.

The highest brood rearing activity was recorded during spring season, as sealed brood area attained 1219 and 1842 in²/colony, representing 36 and 38 % of the total brood production allover the year. While the least brood area was measured during Autumn, forming 13 and 10 % of the total annual sealed brood area in weak and strong colonies, respectively.

Two annual peaks of brood rearing activity were detected. The first and higher peak (473 and 744 in² sealed brood weak and strong colonies, respectively) was in April to be coincided with the flowering period of citrus trees and winter crops. The minor peak was detected in August to be coincided with cotton and maize flowering period.

The r value between brood rearing activity and both air temperature and relative humidity was less than 0.5, while that with photoperiod attained 0.614
Strong colonies reared significantly higher brood area (4596 in²/colony/year) than weak ones (3289 in²/colony/year).

INTRODUCTION

Weather conditions are the most important factors that affect honeybee activities, being dependent upon a number of factors a part from the others (Wille, 1985, Es'kov, and Toroptser,1989, and Darhous,1990.) colony strength during different months is affected by many factors, such as protection from diseases (Fries et al.,1984; Guzman and Zozaya,1984 and Wilson *et al*.,1984) and pesticides damage (Keith,1985) population size is another colony state factor that should influence individual worker behavior, since a large population increases colony survival and reproduction (Michener, 1964;Little,1979; Seeley and Visscher,1985; Lee and Winston,1987)

The present work aimed to investigate seasonal variation and some factors affecting brood rearing activity of honeybee colonies in Mansoura district, Dakahlia governorate

MATERIALS AND METHODS

The present study was carried out in a private apiary located at Belgay, Mansoura, Dakahlia province during the period extended from March 2007 and lasted to February 2008. Twelve honeybee colonies headed by sister open-mated hybrid Carniolan queens were used in the present study. Six colonies were considered as "strong", containing 10 combs covered by

bees, each. The other six colonies were "weak" ones; each contained 6 combs covered with bees.

Estimation of worker sealed brood area:-

To estimate worker sealed brood area a typical Langstroth frame divided into square inches by means of a wire was used. This frame was laid against any comb to measure sealed brood area (in^2). Sealed brood area was measured at 12 day intervals in each experimental colony.

Measurement of temperature and relative humidity:-

Monthly mean ambient temperature, relative humidity and photoperiod (day time) were received from meteorological station at Shawa, Mansoura region.

RESULTS AND DISCUSSION

The results in Table: (1) revealed two peaks of brood rearing activity allover the year round. The major peak of brood rearing activity was detected in April recording 744 and 473 in^2 sealed brood area /strong and weak colonies, respectively, representing 16% and 14% of the total brood production allover the year.

This peak of brood rearing is coincided with increased nectar and pollen from citrus, vegetables, and winter crops.

Another minor peak of brood rearing activity was taken place in august to be coincided with cotton and maize flowering period. Sealed brood area on that peak attained 483 and 347 square inches, representing 10.5 and 10.6% the total sealed brood area reared allover the year round in strong and weak colonies, respectively

The mean sealed brood area was sharply declined during November to attain 112 and 89 in^2/colony giving the lowest percentage for the strong and weak colony allover the year, recording 2.4 and 2.7% of the total annual brood production.

The rate of brood production was so limited during December, recording 291 and 166 in^2/colony, forming 6.3 and 5% of the total reared sealed brood area allover the year round for the strong and weak colonies, respectively.

It is quite obvious that the less populated colonies (weak) were significantly less active in brood rearing than the well developed colonies (strong).

The total annual sealed brood area was 4596 in^2/strong colony, and 3289/weak colony. Weak colonies reared as 71.6% as that of strong colonies. Analysis of variance revealed highly significant differences between monthly brood production along the year in both strong and weak colonies.

The correlation coefficient values between sealed brood area and the three climatic factors measured , i.e air temperature, R.H. % and photoperiod revealed very weak or no correlation between brood rearing activity in strong and weak colonies and both °C and R.H% where r value was 0.184 and 0.346 with air temperature, and 0.183 and 0.153 with relative humidity respectively. On the other hand r value between brood rearing activity and photoperiod attained 0.614 and 0.484 for weak and strong colonies, respectively.

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The present study showed that brood rearing activity continues to develop and increase, reaching the major peak during April to be coincided with the flowering period of citrus trees and Winter crops. The majority of brood rearing activity occurred during spring and summer seasons, while the less activity was observed during autumn and Winter seasons. Similar results were obtained by El-Dakhakhani (1980) and Fathy(1997). The variation among the two groups (strong and weak colonies) in brood rearing could be mainly attributed to the population size, which associated with worker life spans, worker foraging ages, rates of comb building, brood rearing (Winston and Fergusson 1985 and Winston et al, 1985). Brood rearing is known to be multi independent activity; however °C and R.H% are not included, meanwhile photoperiod has some effect, but the major effect seemed to be botanically, where the detected two peaks of brood rearing activity are coincided with one or more flowering crop.

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النشاط الموسمى لتربية الحضنة تبعا لقوة طائفة النحل تحت الظروف البيئية بمنطقة المنصورة- دقهلية.

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تم إجراء هذا البحث بهدف دراسة النشاط الموسمى لطوائف نحل العسل فى تربية الحضنة خلال الفترة من مارس ٢٠٠٧ حتى فبراير ٢٠٠٨ بالمنصورة –الدقهلية . ويمكن تلخيص النتائج المتحصل عليها كما يلى :-

تم تسجيل أقصى نشاط لتربية الحضنة خلال موسم الربيع حيث بلغت جملة مساحة الحضنة المقفلة التى تم قياسها ١٢١٩ ، ١٨٤٣ بوصة مربعة / طائفة وقد بلغت هذه المساحة ٣٦ ، ٣٨ % من جملة مساحة الحضنة المربعة خلال العام فى حين كان موسم الخريف هو الأقل فى تربية الحضنة حيث بلغت الحضنة المرباة ١٣ ، ١٠ % من جملة مساحة الحضنة المربعة طوال العام وذلك فى الطوائف الضعيفة والقوية على الترتيب .

تم تسجيل ذروتى نشاط لتربية الحضنة سجلت الذروة الأولى والأكبر فى شهر إبريل حيث بلغت مساحة الحضنة فى تلك الذروة ٤٧٣ و ٧٤٤ بوصة ٢ حضنة مقفلة / طائفة ضعيفة وقوية على الترتيب وقد تواكبت هذه الذروه مع فترة تزهير أشجار الموالح والمحاصيل الشتوية فى حين سجلت الذروة الصغرى فى شهر أغسطس متوافقة مع تزهير القطن والذرة.

كان معامل الإرتباط بين نشاط تربية الحضنة وكلا من درجة الحرارة ونسبة الرطوبة أقل من ٠,٥ أو يكاد يكون معدوما فى حين كان الإرتباط بين هذا النشاط وطول النهار (الفترة الضوئية) ٠,٦١٤ مظهراً إرتباطاً معتدلا بين العاملين .

كانت مساحة الحضنة المرباه فى الطوائف القوية (٤٥٩٦ بوصة ٢ /طائفة/سنة) أعلى بصفه معنوية عن تلك المرباة فى الطوائف الضعيفة والتى سجلت (٣٢٨٩ بوصة ٢ / طائفة / سنة).

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Table: (1) Seasonal brood rearing activity of Strong and weak honeybee colonies, measured at 12day intervals, at Mansoura district during 2007/2008

Season	month	sealed brood area in²/colony				Air temp. ºC	R.H. %	Photoperiod (h r s)
		weak colonies		strong colonies				
		area	%	area	%			
Spring	Mar	377±2.54 **c**	11.5	535 ±2.98 c	11.6	25	42	12:02
	Apr	473 ±2.14 **a**	14.4	744 ±2.29 a	16.2	26	62	13:07
	May	369 ±1.36 **c**	11.2	564 ±1.08 b	12.3	30	55	13:43
	total	1219	37.06	1843	40.1			
	mean	406	12.35	614				
Summer	Jun	420 ±0.58 **b**	12.8	499 ±1.28 d	10.9	32	58	14:08
	Jul	228 ±5 **f**	6.9	278 ±5 h	6.0	32	64	14:15
	Aug	347 ±3.35 **d**	10.6	483 ±3.45 e	10.5	32	53	13:10
	total	995	30.25	1260	27.4			
	mean	332		420				
Autumn	Sep	153 ±3.28 **h**	4.7	186 ±3.35 i	4.0	31	58	12:16
	Oct	176 ±3.19 **g**	5.4	182 ±3.19 i	4.0	28	55	11:52
	Nov	89 ±3.45 **i**	2.7	112 ±3.51 j	2.4	22	64	10:45
	total	418	12.71	480	10.4			
	mean	139		160				
Winter	Dec	166 ±3.47 **g**	5.0	291 ±3.39 g	6.3	18	53	10:47
	Jan	175 ±2.36 g	5.3	293 ±2.36 g	6.4	20	47	10:14
	Feb	316 ±1 e	9.6	430 ±1 f	9.4	21	43	10:58
	total	657	19.98	1014	22.1			
	mean	219	7	338				
Ground total		**3289**	100.00	**4596**	100	—	——	——
LSD 0.05		**8.202**		**8.39**		**t value = -1.513 between strong and weak colonies**		
r VALUE WITH ºC		**0.346**		**0.184**				
r VALUE WITH R.H.%		**0.153**		**0.183**				
r VALUE WITH PHOTOPERIOD		**0.614**		**0.484**				