

## Monthly and Seasonally Amounts of Stored Pollen under some Different Climatic Factors during Bee Activity Seasons

Fathy, H. M.; Laila A. EL-Batran and E. E. M. Salem  
Dept. Econ. Ent., Fac., Agric., Mansoura University, Egypt



### ABSTRACT

This study carried out to measure amounts of stored pollen during two bee activity season (spring and summer) under effect of some climatic factors (Temperature °C, relative humidity % and photoperiods). The results showed that, it found relationship between amounts of stored pollen and degrees of these climatic factors. Large amounts of stored pollen were recorded in July and August, reached to 910 and 934 sq.in/colony, respectively. less amounts of stored pollen were noticed in March and April, reached to 375 and 414 sq.in /colony, respectively . High rate of stored pollen were recorded in summer season (2554 sq.in/colony) under temperature 28.5°C, relative humidity 62.37% and photoperiod 13:5 hour. There were found high significant differences between amounts of stored pollen in July and both March and April. While it was found insignificant differences between amounts of stored pollen in spring and summer months

### INTRODUCTION

Pollen is a very important component to bees and bee breeders as it is the main source of protein and essential for the normal growth of honey bees (Day *et al.*, 1990 and Liu, *et al* 2009).

Pollen is not only the main source of protein but also source of amino acids and provides vitamins, minerals and fats. Without pollen, the bee colonies are subjected to deterioration (Standifer *et al.* (1977) and Roulston *et al.*, 2000). Pollen is necessary for normal growth of all members of bee colonies. The quantities of pollen collected by bees vary depending on the dominant crops, bee health, bee race, environmental conditions and the cultivation area around honey bee colonies. (Serra *et al.*,1986).

Pollen collecting activity depends on the availability of pollen that produces flowers and environmental conditions such as sunrise, sunset, daytime temperature, etc. Thus, the interaction of flora and these interactions is likely to determine the pattern of pollen activity. As nectar, pollen and raw materials from the beekeeping industry, knowledge of honey and pollen plants in the area is of paramount importance, Rahman and Rahman (1993).

Honey bees collect a large quantity of pollen from different crops during the year. Pollen collecting activity depends on some factors such as the strength of honey bees, the bees race, the environmental conditions and the area of cultivation in the vicinity of the honeybees colonies. (Serra *et al.*, 1986).

Thus, the study covers the seasonal activity of pollen collected as well as the monthly activity of the pollen collected as quantities of pollen stored in honey bee colonies.

### MATERIALS AND METHODS

The present study was carried out in private apiary located in EL-Hafer district, Belkas – Dakhliya governorate in a whole year 2014 to estimation of amounts stored pollen during two season, (spring and summer) under effect of some climatic condition. six colonies of carniolan hybrid (*apis mellifera* L.) were used . the experimental colonies were in an equal strength (bee covered 8 combs) and headed with sister recently mated queens . Pollen gathering activity, including, monthly and seasonal amounts of stored

pollen during spring and summer in a whole year (2014).

Estimation of stored pollen in a whole year 2014 to estimation of amounts stored pollen during two seasons (spring & summer) under effect of some climatic condition a typical langstroth frame (19 inch in length and 7 inch in width) was divided into 133 square inches by means of wire.

This frame was laid against any comb to count the number of stored pollen (Fig 1).



Fig. 1. Frame to calculate the number of stored pollen

Ten samples of stored pollen were taken randomly from same colonies, each samples (containing pollen of 20 cells) was weight and average weight of pollen cell was estimated according to Taha, (2006). The average weight of pollen cell was estimated (0.084 gm. / cell) as square inch of stored pollen = 2.1 gm

#### Statistical analysis:

The data obtained were analyzed for one-way variance analysis (ANOVA). Differences between treatments were separated using a multiple Duncan test, and statistical analysis was conducted according to Mead *et al.*, (1993).

### RESULTS AND DISCUSSION

The climatic factors such as temperature, relative humidity and photoperiod play an important role in activity of pollen gathering. The activity of bee colonies in pollen gathering were studied during spring and summer awhole year 2014 under different temperature, relative humidity and photoperiods.

Data in Table (1) and Fig. (2) showed an obvious relationship between amounts of stored pollen ( activity of

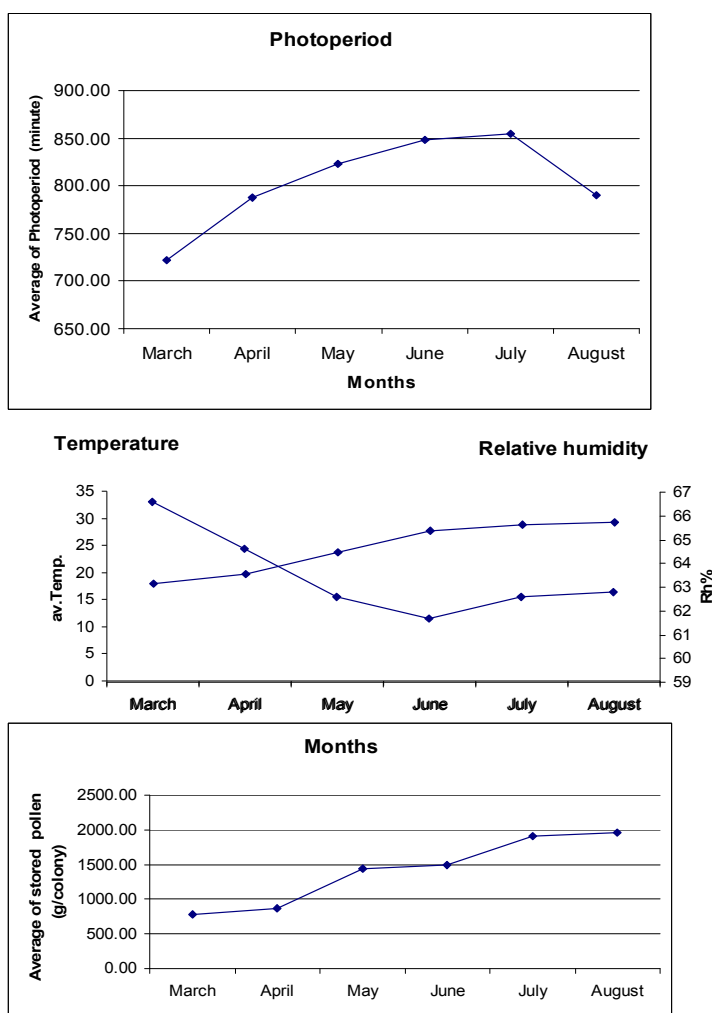
pollen gathering) and degree of temperature, relative humidity and photoperiods and these factors may affect amounts of stored pollen.

Large amounts of stored pollen were recorded in July and August and these amounts recorded to 910 and 934 sq.in / colony representing 22.58 % and 23.17 %, respectively this occurred through activity months during summer season 2554 sq.in / colony, representing 63.36%

Analysis of variance in Table (3) revealed that there were insignificant differences between pollen quantities in the spring months and summer months, whereas these differences were statistically significant between quantities of pollen in July and March, as well as between August and both. March and April. Significant low differences were found between the amounts of pollen collected in the spring and summer season.

**Table 1. Monthly and seasonal average of stored pollen (sq.in/colony) under deferent of temperature, relative humidity and photoperiod of spring and summer, 2014**

months & seasons	stored pollen sq.in	Percentage %	Av.of temperature	av.of relative humidity %	photoperiod
March	375	9.30	17.9	66.6	12:02
April	414	10.27	19.7	64.6	13:07
May	688	17.07	23.7	62.6	13:43
Spring season	1477.00	36.6410	20.43	64.60	12:57
June	710	17.61	27.7	61.7	14:08
July	910	22.58	28.7	62.6	14:15
August	934	23.17	29.2	62.8	13:10
Summer season	2554.00	63.36	28.53	62.37	13:51
Total	4031.00	100.00			



**Fig. 2. Amount of stored pollen under outer temperature, Relative humidity and photoperiod a whole spring and summer 2014**

**Table 2. Seasonally average amount of stored pollen (g/colony) during spring and summer 2014.**

seasons	stored pollen (gm/colony)
spring	3101.7
summer	5363.4

Table (3). under temperature 28.53 °C, relative humidity 62.37 % and photoperiod 13:51 hour (fathy,2008) found that large amounts of stored pollen were in May and June. And (Tony, 2015) found that large amount in June and July and This difference maybe due to effect of temperature,

relative humidity and photoperiods in the three research locations.

Less amounts of stored pollen were noticed in March and April, amounts of stored pollen recorded to 375 and 414 sq.in / colony, representing 9.3% and 10.3 %, respectively. This occurred through spring season (1477 sq.in / colony, representing 36.6 %) under temperature 19.9 °C, relative humidity 63.5 % and photoperiods 12:57 hour.

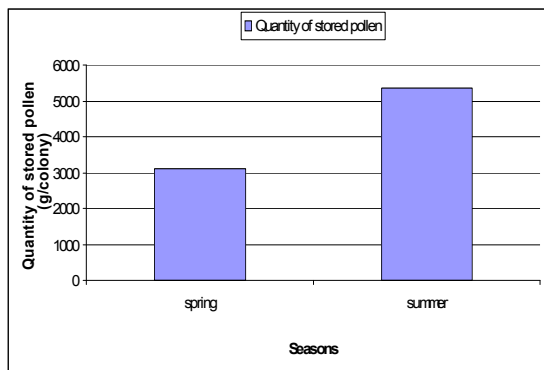


Fig. 3. Seasonally average amount of stored pollen (g/colony) during spring and summer 2014

Table 3. Analysis of variance of average amounts of stored pollen (g/colony) in different months of spring and summer season (2014)

season	months	av.pollen grains (g/colony)	
spring	march	196.75	c
	april	217.5	c
	may	289	bc
summer	june	373	ab
	july	446	a
	august	422.5	a
f test		7.0475238	***
total spring		1033.9	b
total summer		1787.8	a
f test		8.7436887	*

The highest percentage of pollen stock was recorded in spring and summer. This may be due to the fact that honeybees begin their activity at warm temperatures and with the onset of flowering at this time of year, honey bees increase their population and at the same time the sources of pollen were available in Summer, prevailing high of temperature help the bees for collecting pollen by using their handlings and mouth parts, while it is difficult to gather pollen in cold weather therefore, the amounts of stored pollen were more in summer than in spring table (2) and Fig.(3) . These results were in agreement with (Abd

Elfattah, 1983, El-Dakhkhni *et al*, 1986, Fathy, 2008 and Tony, 2015).

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## الكميات الشهرية والموسمية لحبوب اللقاح المخزونة تحت تأثير بعض العوامل المناخية المختلفة خلال مواسم نشاط نحل العسل

حسن محمد فتحي، ليلى عبد الستار البطران وعماد السيد محمدين سالم  
قسم الحشرات الاقتصادية - كلية الزراعة - جامعة المنصورة

اجريت هذه الدراسة لقياس كميات حبوب اللقاح المخزونة خلال موسمي نشاط النحل في الربيع والصيف تحت تأثير بعض العوامل المناخية ( الحرارة - الرطوبة - الفترات الضوئية ) . اظهرت النتائج مايلي :- وجدت علاقة بين كميات حبوب اللقاح المخزونة ودرجات هذه العوامل المناخية حيث \* سجلت اعلى كميات من حبوب اللقاح المخزونة في شهر يوليو ، اغسطس حيث بلغت 910 ، 934 بوصة مربعة / طائفة على التوالي \* سجلت اقل كميات من حبوب اللقاح المخزونة في شهر مارس ، ابريل حيث بلغت 375 ، 414 بوصة مربعة / طائفة على التوالي \* اعلى معدل من حبوب اللقاح المخزونة سجل خلال موسم الصيف تحت ظروف درجة حرارة 28.5 ° م ، رطوبة نسبية 62.37 % وفترات ضوئية بلغت 13:5 ساعة \* لم توجد فروق معنوية بين كميات حبوب اللقاح المخزونة في شهور الربيع وكذلك في شهور الصيف بينما وجدت فروق معنوية بين حبوب اللقاح المخزونة في يوليو وكل من مارس وابريل.