

Effect of some Climatic Factors on Daily Activity of Pollen Gathering by Honeybee *Apis mellifera* L. during Spring and Summer Season

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ABSTRACT

This study was conducted to measure the daily activity of collecting pollen during the activity seasons (spring and summer) under the influence of some climatic factors (Temperature °C, relative humidity % and photoperiods). The results showed that, the highest quantities of pollen collected from 10 am to 12 pm (10 am-12 pm). In each of the spring and summer seasons with an average of 4.80 g / colony, the highest daily amount recorded during the month of May with a total average of 26.80 g / colony, while the lowest daily amount was recorded in August at 4.34 g / colony. There were insignificant difference between the amount of pollen collected in spring and summer during the period (8-10 am), (12-2 pm), (2-4 pm), (4-6 pm). While there were significant differences between the quantities of pollen collected in the period (10 am – 0.12 pm) in both spring and summer. Honey bees were more active in pollen collection (10 am – 12 am) and less active (4-6 pm) in both spring and summer seasons.

INTRODUCTION

Nectar and pollen are the main raw materials in the beekeeping industry. Therefore, the knowledge of plants producing nectar and pollen in the area is of utmost importance because pollen activity depends mainly on the availability of pollen produced by flowers as well as environmental factors such as day temperature, sunrise and sunset etc.. Thus, plant flora interaction and environmental factors probably determine the pollen collection activity., Rahman and Rahman (1993).

Pollen is one of the most important components of honey bees and bee breeders, which is the main source of protein food during the beginning of breeding brood and even adult (Day *et al.*, 1990 and Loidl and Crailsheim, 2001). Lack of pollen leads to weak honey bee colonies as it is the main source of protein, amino acids, vitamins, fats and mineral salts, (Standifer *et al.*, (1977) and Roulston *et al.*, 2000). Pollen is very important for the development of brood and young bees, Bees need to collect large quantities of pollen from different plants during the season and stop the ability of honeybees to collect pollen on the weather conditions and the ability of bees to sores and the availability of flowers in the fields surrounding the colonies of honey bees (Serra *et al.*, 1986).

In the dietary requirements of proteins, minerals, fats and vitamins of pollen collected by honeybee from a large group of flowering plants,(Standifer *et al.* (1977) and Roulston *et al.*, 2000). Larval nutritional requirements are some what different from those of adult honey bees. adults can live for a relativity long time on a diet of pure carbohydrate but proteins are essential for larval growth and development. Thus, the present study will cover the Daily activity of pollen gathering.

MATERIALS AND METHODS

The current study was conducted in private apiary located in EL-Hafer district, Belkas – Dakhliya governorate in a whole year 2014 to measure daily pollen gathering activity during two season (spring and summer) under some deferent climatic conditions (temperature, relative humidity and photoperiod) for comparison between the quantities of pollen collected during the spring and summer seasons. 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. These colonies were provided with pollen traps for studying daily activity of pollen collecting in activity seasons during spring and summer in a whole year 2014.

Construction of pollen trap:

The pollen trap is a wooden box, it has a slope roof and two vertical metal strips each 11 cm in width and 32.5 cm in length. Each strip has hole of about 3 cm in diameter, a slide wooden box (collection tray) 7 cm in width, 30 cm in length fixed under the fine wire screen to collect pellets which fall from the workers legs when ery to pass from the trap to the hive. (Fig 1)



Fig. 1. Construction of pollen trap

Estimation of daily activity of collecting pollen:

On the mid of every month during two activity season for collecting pollen (spring and summer in a whole year 2014) pollen grains were taken and weighted every two hours from 8 a.m. to 6 p.m.

Statistical analysis:

The differences among means of the treatments were separated using Duncan's Multiple test and The obtained data were subjected to one-way analysis of variance (ANOVA), statistical analysis were done according to Mead *et al.*,(1993).

RESULTS AND DISCUSSION

Pollen was collected by pollen traps every two hours during the day in the mid of each month from March to August (spring and summer) from 8 am to 6 pm The data indicated in Table (1) and Figs (2 and 3) the highest quantities collected by the pollen traps were from 10-12 am with months average 4.80 g/colony, representing 33.7 % during two season (spring and summer) in a whole year 2014.

Table 1. Average pollen collection (g/colony) every two hours on mid of spring and summer months, during 2014

Months & Seasons	8-10 a.m	10-12 a.m	12-2 p.m	2-4 p.m	4-6 p.m	total	Av.of temperature	Av. of relative humidity %	photoperiod
March	1.30	1.98	2.41	0.37	0.12	6.18	19	64	11:57
April	2.82	5.36	4.50	2.66	0.74	16.08	20	64.5	12:55
May	4.58	10.91	6.50	3.42	1.39	26.80	24.5	62.5	13:44
Spring season	8.70	18.25	13.41	6.45	2.25	49.06	21.17	63.67	12:52
June	6.86	5.63	3.65	2.08	1.12	19.34	27.5	60.5	14:09
July	3.17	3.84	2.85	2.04	0.70	12.60	29	63	13:58
August	1.17	1.06	0.83	0.77	0.51	4.34	28.5	63	13:17
Summer season	11.20	10.53	7.33	4.89	2.33	36.28	28.33	62.17	13:48
Total	19.90	28.78	20.74	11.34	4.58	85.34			
Monthly average (g/ colony) percentage	3.32	4.80	3.46	1.89	0.76	14.22			
	23.32%	33.72%	24.30%	13.29%	5.37%	100.00%			

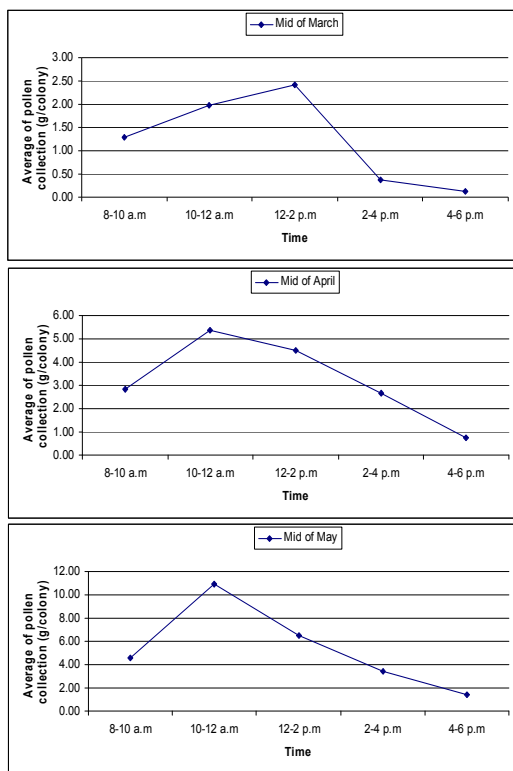


Fig. 2. Average Pollen Collection (g/colony) by Trapped colonies every two hours on mid of Spring months, 2014

These results are consistent with the results of Tony, 2015, Fathy, 2008. It notes that the second highest peak was during the period from 12 to 2 pm with an average 3.46 g/colony, representing 24.30%. The minimum amount of pollen grains collected by pollen traps was recorded from 4-6 pm with an average 0.76 gm/colony, representing 5.37% for the two seasons.

The highest activity for collecting pollen during spring and summer occurred between 10-12 a.m , these results were disagreement with Awad.1998 , Tony, 2015 and Fathy,2008 .

showed that bees collected the highest amount of pollen grains during May with an average 26.80 g/colony /day , representing 31.40 % , According to the daily activity of bees in different months as in table (1) and Fig (2,3) While the lowest amount of pollen collected by pollen trapped was in August with an average of 4.34

g/colony /day , representing 5.09% . The highest daily activity for collecting pollen Minia grains was in May, while Tony, 2015) found in August .

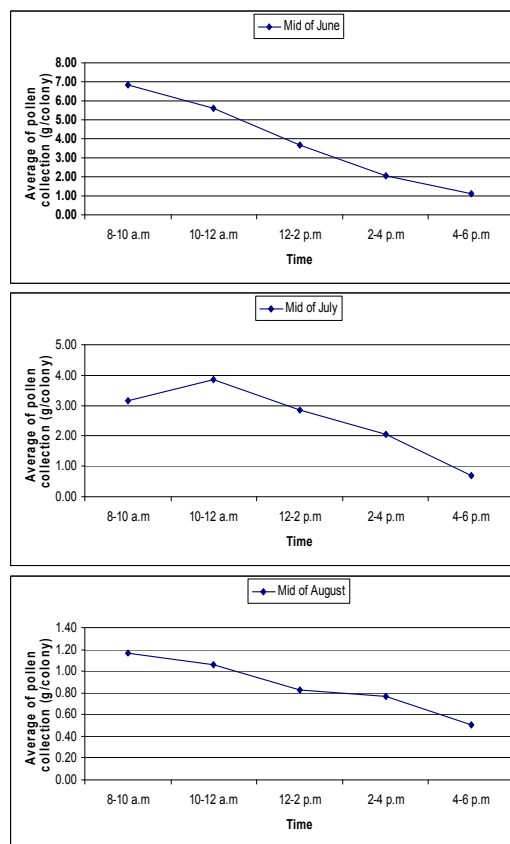


Fig. 3. Average Pollen Collection (g/colony) by Trapped colonies every two hours on mid of summer months, 2014

Table 2. Analysis of variance of trapped pollen on mid of the spring and summer months, 2014

Season	8-10 a.m	10-12 a.m	12-2 p.m	2-4 p.m	4-6 p.m	Total
Spring	2.90 a	6.08 a	4.47 b	2.15 a	0.75 a	16.35 a
Summer	3.73 a	3.57 b	4.44 b	1.63 a	0.78 a	14.08 b

The lowest daily activity for collecting pollen grains was in August and this was disagreement with the some author, who found in March the highest daily total of collection pollen was occurred in May under temperature, relative humidity and photoperiod (23.7 °C, 62.6 % and

805.8 minute, respectively). While the lowest daily total of collection pollen was occurred in August under 29.2 °C, 62.8% and 786 minute, temperature, relative humidity and photoperiod, respectively (fig 4).

Analysis of variance of trapped pollen on mid of the spring and summer months, 2014 was tabulated in table (2) and illustrated in Fig (5). It could be concluded that there were insignificant differences between spring and summer during the period from 8-10 a.m, 12-2 p.m, 2-4 p.m and 4-6 p.m, while there were significant differences between spring and summer during period from 10-12 a.m

It can be concluded that bees were more active in collecting pollen in the period from 10-12 a.m in both spring and summer. The lowest amounts of pollen were 0.75 and 0.77 g/colony, collected from 4-6 p.m in both season spring and summer respectively.

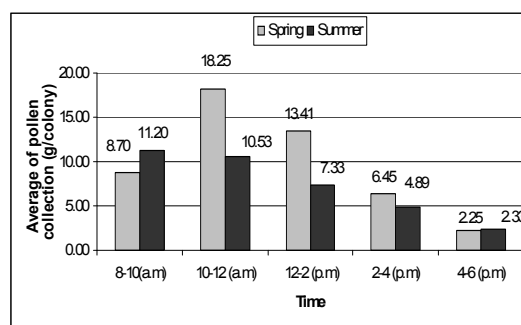


Fig. 5. Average pollen collection (g/colony) on mid months of spring and summer 2014

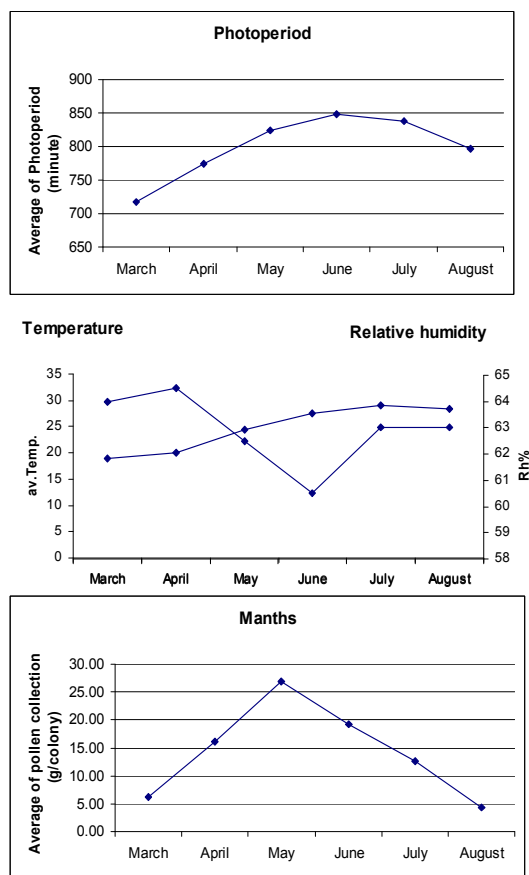


Fig. 4. Daily Total of collection pollen in mid of spring and summer months under Temperature, Relative humidity and Photoperiods (2014)

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تأثير بعض العوامل المناخية على النشاط اليومي لجمع حبوب اللقاح خلال موسمي الربيع والصيف حسن محمد فتحي ، ليلى عبد الستار البطران و عماد السيد محمددين سالم كلية الزراعة – جامعة المنصورة

اجريت هذه الدراسة لقياس النشاط اليومي لجمع حبوب اللقاح خلال موسمي النشاط (الربيع ، الصيف) تحت تأثير بعض العوامل المناخية (الحرارة – الرطوبة النسبية – الفترات الضوئية) . ولقد اظهرت النتائج مايلي :- اعلى كميات من حبوب اللقاح المجموعه سجلت في الفترة من الساعة العاشرة الى الساعة الثانية عشرة (12-10) في كل من موسمي الربيع والصيف بمتوسط 4.80 جرام / طائفة . اعلى كمية يومية سجلت خلال شهر مايو بمتوسط اجمالي 26.80 جرام / طائفة بينما اقل كمية يومية سجلت في شهر اغسطس حيث بلغت 4.34 جرام / طائفة. لم توجد فروق معنوية بين كمية حبوب اللقاح المجموعه في الربيع والصيف خلال الفترة من (10-8) ، (2-12) ، (4-2) ، (6-4) بينما وجدت فروق معنوية بين كميات حبوب اللقاح المجموعه في الفترة من (12-10) في كلا من الربيع والصيف. نحل العسل كان اكثر نشاطا في جمع حبوب اللقاح في الفترة من (12-10) واقل نشاطا في الفترة من (6-4) في كل من موسمي الربيع والصيف .