

## EFFECT OF SOME ARTIFICIAL DIETS HONEYBEE INFESTATION LEVEL WITH ECTOPARASITIC MITEVARROA DESTRUCTOR

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### ABSTRACT

The effect of feeding honeybee colonies with five different diets on the level of Varroa infestation was studied during spring , summer and autumn seasons of 2003.

It could be concluded that the lowest rate of Varroa infestation was noticed in colonies that fed on diet 5 ( 1part cooking potatos : 1 part defatted soya flour ) during spring and autumn , while in summer the lowest rate was observed with diet 4 ( 2 parts bean flour : 1 part date paste : 1part skimmed milk ).

The highest population growth of Varroa destructor was detected during summer with an average of 9.11% , while during spring and autumn seasons . The population was nearly similar ( 7.75 and 7.55 % , respectively ).

### INTRODUCTION

Varroasis is a dangerous pest of honeybee which is caused by the ectoparasitic mite Varroa destructor. Varroa disease causes a serious problem in world beekeeping due to its harmful effect to the insect host(Ritter 1981,Ifantidis 1987)(Fathy and Fouly 1993).

There are many methods for killing mites in bee colonies, several chemical miticides and management techniques are being used to control mites with some succes.

The level of Varroa infestation appeared to be related to the avaiability of feeding and the climatic conditions . Couto and Cotta (1988). stated that the level of Varroa infestation decreased in all the diet fed colonies during the study. While Garcia *et al* (1986), found that the feeding on amino acids did not reduce the Varroa infestation. On the other hand , Romaniuk and Duk (1983) showed that the average number of live Varroa destructor females per 100 bees was low in the period from April to July. In August, the mean number increased . Also, Otten (1991a) stated that the population growth of Varroa destructor in the colonies , showed a seasonal variation , of values in August , September were higher than in October.

Moretto (1995) Found that the rate of reproduction and the percentage of fertile females were minimun during June and peaked during November.

The present study deals effect of some artificial diets on honeybee infestation level with ectoparasitic mite Varroa destructor .

### MATERIALES AND METHODS

The experiments were carried out at the apiary of the Faculty of Agriculture, Assiut, Al-Azhar University during spring ,summer and autumn seasons of 2003.

Experimental colonies (Eighteen F1 Carnio – Egyptian honeybee colonies) were housed in langstroth hives . The colonies were headed by newly mated sister queens and nearly at the same strength . Colonies were distributed at random in six groups ( 3 colonies in each ) . Five groupes fed on different diets and 6<sup>th</sup> group fed on sucrose syrup ( 1 : 1 ) as control . The diets were offered to the tested colonies at the rate of 100 gm /colony/7days . Cakes were Placed over the brood nest and covered with wax paper.

1-Test diets :-

**Five test diets were selected according to Hassan . ( 2002 ) . these diets were:**

(1)10% Brewers yeast +3 parts chick pea flour: 1 part skimmed milk.

(2)10%Brewers yeast + 3 parts bean flour : 1 part skimmed milk.

(3)10%Brewers yeast +2 parts defatted soya flour : 1 part date paste.

(4)2 parts bean flower : 1 part date paste : 1 part skimmed milk.

(5)1 part cooking potatoes :1 part defatted soya flour.

The control colonies were fed on sugar solution 1: 1.

## **2-Rate of Varroa infestation :**

The rate of Varroa infestation was determined twice according to Khater ( 1992 ). The first was at the beginning of the experiment. The second was performed at the end of the experment as follow. About 100 house bees were picked up at random from each experimental colony, and anaesthetized with chloroform. Thereafter , the sample was put in 500 ml beaker , then 250 ml boiling water with a detergent was poured on the bee sample in the beaker. A filtration process was then applied, to separate the detached Varroa mites from the bees bodies using a glass funnel with a lining of wire screen net. Bees were washed with excess boiling water to ensure complete separation of the mites remaining between bee bodies. Hence, the number of Varroa mites found in the filtrate (V) and the number of bees in the funnel (B) were counted and the rate of infestation was then calculated according to the formula:

$$\% \text{ infestation} = \frac{V}{B} \times 100$$

The rate of Varroa infestation was determined during spring, summer and autumn seasons of 2003.

## **Statistical analysis:**

Data obtained were statistically analysed according to Snedecor and Cochran(1967)method using software costat program.Also,correlation coefficients were determined and discussed statistically.

## **RESULT AND DISCUSSION**

Data listed in Tables 1,2 and 3 showed the rate of Varroa mites infestation as affected by feeding honeybee colonies on the test diets was carried out before and after the experiment during Spring , Summer and Autumn seasons 2003.

In spring, the rate of Varroa mites infestation before the experiment was: 8.89, 6.71, 8.71, 8.07, 7.48 and 6.66 % in the colonies fed on experimented diets and control, respectively (Table 1). In the end of the experiment, this rate was 5.80, 5.29, 7.10, 5.96 and 1.53 % with decreasing rates being 34.76, 21.16, 18.48, 26.15, and 79.55 % for diets 1,2,3,4 and 5, respectively. The level of Varroa infestation in the control was 7.54 % with increasing rate being 13.66%.

**Table (1): Rate of Varroa mites infestation as affected by feeding honeybee colonies on the test diets during spring of 2003.**

Diets	Varroa infestation %		Increasing %	Decreasing %
	Before experiments	After experiment		
1 *	8.89	5.80	----	34.76
2 **	6.71	5.26	----	21.16
3 ***	8.71	7.10	-----	18.48
4 ****	8.58	5.96	-----	26.15
5 *****	7.48	1.53	-----	79.55
Control	6.66	7.57	13.66	----
Total	46.52	33.25	13.66	180.10
Mean	7.84	5.54	2.28	30.02

- \* 10% brewers yeast : 3 parts chick pea flour : 1part skimmed milk .
- \*\* 10% brewers yeast : 3 parts bean flour : 1part skimmed milk .
- \*\*\* 10% brewers yeast : 2 parts defatted soya flour : 1 part date paste .
- \*\*\*\* 2 parts bean flour : 1 part date paste : 1part skimmed milk
- \*\*\*\*\* 1part cooking potatos : 1 part defatted soya flour

**Table (2): Rate of Varroa mites infestation as affected by feeding honeybee colonies on the test diets during summer of 2003**

Diets *	Varroa Infestation %		Increasing %	Decreasing %
	Before experiments	After experiment		
1*	3.50	5.56	58.79	----
2**	10.82	19.02	75.79	----
3***	6.73	3.25	---	51.71
4****	14.83	5.64	----	60.78
5*****	14.08	21.93	55.75	----
Control	5.17	6.05	17.02	----
Total	54.68	70.45	207.35	112.49
Mean	9.19	10.24	34.56	18.75

- \* 10% brewers yeast : 3 parts chick pea flour : 1part skimmed milk .
- \*\* 10% brewers yeast : 3 parts bean flour : 1part skimmed milk .
- \*\*\* 10% brewers yeast : 2 parts defatted soya flour : 1 part date paste .
- \*\*\*\* 2 parts bean flour : 1 part date paste : 1part skimmed milk
- \*\*\*\*\* 1part cooking potatos : 1 part defatted soya flour

It is clear that the level of Varroa mites infestation decreased for all diets, while in the control, this level increased.

During summer, The results presented in table 2 showed that the rate of Varroa mites infestation before the experiment was a followed: 3.50, 10.82, 6.73, 14.38, 14.08 and 5.17 in the colonies fed on diets 1,2,3,4,5 and control,

respectively. In the end of the experiment, this rate was 5.56 % for diet 1 ( increasing rate = 58.79 % ), 19.02 % for diet 2 ( increasing rate = 75.79 % ), 3.25 % for diet 3 ( decreasing rate = 51.71 % ), 5.64 % for diet 4 ( decreasing rate = 60.78 % ), 21.93 % for diet 5 ( increasing rate = 55.75 % ) and 6.05 % for the control ( increasing rate = 17.02 % ).

It could be mentioned that feeding colonies on diets 3 and 4 causes decreasing the level of Varroa mites infestation, while feeding colonies on the rest of diets and control increased this rate.

In autumn, data indicated the rate of Varroa mites infestation in the beginning of the experiment was as followed: 6.74, 6.00, 9.68, 9.08, 9.27 and 4.55 % for diets 1,2,3,4,5 and the control, respectively. In the end of the experiment, this rate was 1.58 % for diet 1 ( decreasing rate = 76.56 % ), 2.61 % for diet 2 ( decreasing rate = 56.55 % ), 6.06 % for diet 3 ( decreasing rate = 37.40 % ), 4.92 % for diet 4 ( decreasing rate = 45.81 % ), 1.88 % for diet 5 ( decreasing rate = 79.72 % ) and 5.31 % with the control ( increasing rate = 16.70 % ).(Table 3).

**Table (3):Rate of Varroa mites infestation as affected by feeding honeybee colonies on the test diets during autumn of 2003.**

Diets *	Varroa infestation %		Increasing %	Decreasing %
	Before experiments	After experiment		
1*	6.74	1.58	----	76.50
2**	6.00	2.61	----	56.50
3***	9.68	6.06	----	37.40
4****	9.08	4.92	---	45.81
5*****	9.27	1.88	---	79.72
Control	4.55	5.00	16.75	---
Total	45.32	22.36	16.75	296.00
Mean	7.55	3.67	2.78	49.34

\* 10% brewers yeast : 3 parts chick pea flour : 1part skimmed milk .

\*\* 10% brewers yeast : 3 parts bean flour : 1part skimmed milk .

\*\*\* 10% brewers yeast : 2 parts defatted soya flour : 1 part date paste .

\*\*\*\* 2 parts bean flour : 1 part date paste : 1part skimmed milk

\*\*\*\*\* 1part cooking potatoes : 1 part defatted soya flour

It is worth noting that the level of Varroa infestation decreased in all the tested diets, while this level increased in control colonies ( Table 3 ) .

Analysis of data revealed highly significant differences between treatments in before and after the experment.Also found highly significant differences between means and inter treatments during spring, summer and autumn seasons.

The highest rate of Varroa infestation was detected during summer with an average of 9.11 % . While this rate during spring and autumn seasons was nearly similar ( 7.75 and 7.55 % , respectively). In this respect, Otten (1991 a) stated that the population growth of Varroa jacobsoni in the colonies showed a seasonal variation, of valued in August, september were highn than in October- Also, Romaniuk and Duk (1983) showed that the average number

of live *Varroa destructor* females per 100 bees was low in the period from April to July but in August the mean number increased. On the contrary, Afifi (1998) stated that the reproductive rate (RR) of *Varroa Jacobsoni* was higher during spring.

Generally, it could be concluded that The highest decreasing rate of *Varroa* infestation was observed in the colonies fed on diet 5 during spring and autumn. While in summer the highest decreasing rate was noticed for diet 4. Obtained results are in accordance with those of Couto and Cotta (1988) who stated that the level of *Varroa* infestation decreased in all the colonies fed the test diets. On the contrary, Garcia *et al.* (1986) stated that feeding colonies on amino acids did not reduce the *Varroa* infestation.

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## تأثير بعض البيئات الصناعية على مستويات إصابة نحل العسل بطفيل الفاروا

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أجرى هذا البحث بمنحل كلية الزراعة بأسيوط جامعة الأزهر بغرض دراسة تأثير التغذية على بيئات صناعية على معدل الإصابة بطفيل الفاروا في طوائف نحل العسل وذلك أثناء فصول الربيع والصيف والخريف لعام ٢٠٠٣ م .

وتشير النتائج بصفة عامة أن أعلى انخفاض في مستوى الإصابة لوحظ في الطوائف التي تغذت على البيئة الغذائية رقم ٥ ( ١ جزء بطاطس مسلوقة : ١ جزء دقيق فول صويا منزوع الدهن) وذلك خلال موسمي الربيع والخريف . بينما في فصل الصيف لوحظ أن أعلى انخفاض في مستوى الإصابة كان في الطوائف التي تغذت على الوجبة رقم ٤ ( ٢ جزء دقيق فول بلدي : ١ جزء عجوة ١ جزء لبن فرز مجفف ) .

لوحظ أيضا أن أعلى مستوى للإصابة بالفاروا كان خلال فصل الصيف بمتوسط قدرة ٩,١١ % ، بينما في موسم الربيع والخريف كان معدل الإصابة متشابه تقريبا ( ٧,٧٥ ، ٧,٧٥ على التوالي ) .