

EFFECT OF HONEY BEE PRODUCTS ON SOME BIOLOGICAL PARAMETERS OF THE MULBERRY SILK WORM *Bombyx mori* L.

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ABSTRACT

The present work aims to study the effect of some bee products and their mixture on certain biological parameters of local and foreign races of the mulberry silkworm *Bombyx mori* L.

The results indicated that the treatment with royal jelly at 0.02 and 0.03 g/100 ml water gave increased weight of larvae, pupa, cocoon shell and deposited eggs/female in comparison significantly to the control in foreign race, while propolis at 0.1g/100 ml water gave lowest effects on some biological parameters. The mixture of royal jelly 0.02 and pollen 0.2 g / 100 ml water gave highest effects on the biological parameters of foreign race, while the mixture royal jelly 0.02 and propolis 0.1 g / 100 ml water gave lowest effects. It was found that pollen at concentrations of 0.2 and 0.3 g / 100 ml water gave highest effects on the biological parameters than propolis at 0.1 g / 100 ml.

INTRODUCTION

In the developing countries like Egypt, the alternative diets of mulberry silkworm have not yet been applied due to the costs of these artificial diets as well as the lack of required technology. Hence, an economically cheaper technique which improves the cocoon and egg production is needed. Many investigators studied the effect of some bee products as supplementary nutrients to the mulberry leaves on the silkworm *Bombyx mori* L. (Singh, 1960; Hashida, 1961; Ito, 1961; Furu *et al.* 1968 and El.Karaksy, 1979. They studied the effect of some bee products on biological parameters.

The importance of bee honey in the nutrition of silkworm was reported by El.Hattab, 1985; El.Karaksy *et al.*, 1989 and El.Sayed, 1999.

The propolis is one of the most valuable bee products and characterized by antibacterial effects (El-Maasarawy 1995 Nour *et al.*, 1997) found that supplementing mulberry leaves with propolis extract seems to have anabolic effect on the silkworm.

Robert (1994) found that pollen has certain biological, physiological and pharmacological effects in human and animals.

The present work was designed to study the effect of honey, royal jelly, pollen and propolis as bee products on some biological parameters such as weight of the 5th instar larvae.

Weight of pupa, cocoon, cocoon shell and the number of deposited eggs per female

MATERIALS AND METHODS

The present experiments were carried out on Local race of silkworm *Bombyx mori* L.(R1) in Department of Economic Entomology ,Faculty of Agriculture , Mansoura University and Foreign race (R 2) in Faculty of Agriculture , Alexandria University during spring season 2005 to investigate the effect of some bee products and their mixtures on biological parameters of the silkworm *Bombyx mori* L .

Stock culture of *B. mori* L. eggs of two races (R1 & R2) were obtained from the Sericulture Research Department , Plant Protection Research Institute , Giza , Egypt .

Bee products used :

Four bee products (royal jelly , honey ,pollen and propolis) as food stimulant and supplementary nutrient

For the silkworms had been chosen in the present study with different concentrations according Robert , 1994 and El. Hattab, 2003

Rearing technique :

Larvae were reared in trays(150 x 80 x 10 cm) and fed four times daily on fresh mulberry leaves until the 4th instar . The fifth instar larvae which molted at the same day ,were randomly selected and grouped in separate trays for the testes .Rearing techniques were carried out under laboratory conditions of (24 ± 1 C and 72 % ±2 R.H.) .The honey bee products that have been used in this study were collected from Department of Agriculture, A .R.C. Alex., Egypt .

Experiment design :

At the beginning of the 5th instar,larvae were divided into eleven treatments and one as control for each race.ach treatment was contain 150 larvae distributed equally in thr replicates,each one of fifty larvae .

Treatments were carried out as follow:

Treatments 1 & 2 : royal jelly at concentration 0.02 and 0.03 g /100 ml water.

Treatments 3 & 4 : pollen at concentration 0.2 and 0 . 3 g /100 ml water

Treatments 5 & 6 : honey at concentration 1.5 and 2 g / 100 ml water

Treatments 7 & 8 : propolis at concentration 0.1 and 0.2 g / 100 ml water

Treatment 9 : mixture royal jelly 0 . 02 and pollen 0.2 g / 100 ml water

Treatment 10 : mixture royal jelly 0 . 2 and honey 2 g /100 ml water

Treatment 11 : mixture royal jelly 0 . 02 and propolis 0 . 1 g / 100 ml water

Treatment 12 (control) : larvae were fed only on mulberry leaves

Biological parameters :

A sample of fifty mature larvae were weighted individually from each treatment and average weights were calculated in each treatment .

Fifty cocoon produced were cut carefully on the seven day after cocoon spinning , pupae of each treatment were removed and weighed.

The pervious cocoons were carefully opened and pupae were removed .Cocoons were cleaned from exuviae and weighed.

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For determination of deposited eggs number, 10 pairs from each treatment were kept in special perforated paper bags and calculated number of deposited egg / female .

RESULTS AND DISCUSSION

I: Effects of bee products on Local race (R 1) :

The demonstrated results in table (1) show that the heaviest larval and pupal weights were gained for the treatment of pollen at concentration 0.3 g / 100 ml water (2.482 ± 0.01 and 1.35 ± 0.02 g, respectively) followed by the treatment pollen at concentration 0.2 g / 100 ml water (2.082 ± 0.02 and 1.27 ± 0.04 g, respectively) and royal jelly at 0.03 g / 100ml water (2.07 ± 0.04 and 1.25 ± 0.02 g, respectively) .

Among the other treatments, the lowest weights (1.90 ± 0.02 and 1.06 ± 0.05 g, respectively) were recorded for treatment of propolis at 0.2 g / 100 ml water, but they were still significantly heavier than those of the control treatment (1.53 ± 0.02 and 0.95 ± 0.007 g, respectively) . It noticed that the treatment of pollen at 0.3 g / 100 ml water significantly produced the heaviest weights of cocoon shell (0.626 ± 0.04 g) followed of pollen at 0.2 g / 100 ml water and royal jelly at 0.03 g / 100 ml water which gave 0.548 ± 0.01 and 0.530 ± 0.007 g, respectively The lowest weights of cocoon shell was 0.440 ± 0.04 g , recorded for the treatment propolis at 0.2 g / 100ml water but they were still higher than that of the control (0.350 ± 0.01 g) as in table (1) .

The treatment of pollen at 0.2 g / 100 ml water significantly increased the number of deposited egg /female up to 470 ± 5.7 eggs / female , followed by the treatment of pollen (0.3 g / 100 ml water) and royal jelly at 0.02 g / 100 ml water, (465 ± 8.2 and 415 ± 3.3 eggs / female, respectively) in comparison with the control which produced 284 ± 4.6 eggs / female .

In relation to effect of bee product mixtures on biological parameters of Local race , it found that mixture of royal (jelly 0.02 and pollen 0.2 g / 100 ml water) gave highest records for weights of larvae , pupae , cocoon shell and number of eggs /female . The mixture of (royal jelly 0.02 and propolis g / 100 ml water),gave lowest records on the previous parameters (table 1) .

II : Effects of bee products on Foreign race (R2) :

The demonstrated results in table (2) show that the heaviest larval and pupal weights were gained for the treatment of royal jelly at concentration (0.03 g / 100 ml water (3.301 ± 0.04 and 1.075 ± 0.01 g , respectively) followed by the treatments of royal jelly at concentration 0.02 g / 100 ml water (3.279 ± 0.03 and 0.966 ± 0.01 g respectively) and pollen at 0.3 g / 100 ml water (3.182 ± 0.05 and 0.944 ± 0.01 g respectively) .

Among the other treatments , the lowest weights (2.73 ± 0.03 and 0.720 ± 0.02 g, respectively) were recorded for treatment of propolis, at 0.1 g / 100 ml water, but they were still significantly heavier than those of the control treatment (2.22 ± 0.04 and 0.69 ± 0.01 g, respectively) .

water which gave 0.256 ± 0.005 and 0.242 ± 0.02 g respectively . The lowest weights of cocoon shell was 0.211 ± 0.01 g, for the treatment propolis at 0.1 g / 100 ml water ,but they were stil higher than that of the control (0.149 ± 0.005 g) as in table (2).

The treatment of roal jelly at 0.02 g / 100 ml water significantly increased the number of deposited egg / female up 345 ± 6.7 eggs / female, followed by the treatment of royal jelly (0.03 g / 100 ml water) and pollen 0.3 g / 100 ml water, (327 ± 12.7 320 ± 11.3 eggs / femal, respectively) in comparision with the control which produced 117 ± 3 eggs / female .

The royal jelly and pollen effects on biological parameters of silkworm in are in agreement with El .Hattab (2003). The effect bee product and its mixtures on biological parameters of foreign racewere in table (2).

Royal jelly 0.02 and 0.2 g pollen / 100 ml. water gave highest records in weights of larvae pupae , cocoon shell and number of eggs / female .

While mixture of(royal jelly 0.02 and propolis 0.1 g / 100 ml water) gave lowest records on the same biological parameters .

Generally, it can be used royal jelly could be used with mulberry leaves in feeding Foreign race larvae, Pollen may used with mulberry leaves in feeding Local race larvae.

Propolis records were low on both races ,therefore, it can not be used propolis in feeding of silkworm .

Also, it was found that bee products effects and their mixtures were more positively on biological parameters of Foreign race than Local race .

Table 1: Effect of some bee products and their mixtures on some biological parameters of Local race (R 1) .

No of treatment	Treatments	Weight of larvae (g)	Weight of pupae (g)	Weight of cocoon shell (g)	Number of eggs / female
1-	Royal jelly 0.02 g	$1.97 \pm 0.03ab$	$1.15 \pm 0.01b$	$0.521 \pm 0.009b$	$415 \pm 3.3ab$
2-	Royal jelly 0.03 g	$2.07 \pm 0.04a$	$1.25 \pm 0.02a$	$0.530 \pm 0.007b$	$400 \pm 5.3ab$
3-	Pollen 0.2 g	$2.082 \pm 0.02a$	$1.27 \pm 0.04a$	$0.548 \pm 0.01ab$	$470 \pm 5.7a$
4-	Pollen 0.3 g	$2.482 \pm 0.01a$	$1.35 \pm 0.02a$	$0.628 \pm 0.04a$	$465 \pm 8.2a$
5-	Honey 1.5 g	$1.96 \pm 0.04ab$	$1.16 \pm 0.08b$	$0.448 \pm 0.01c$	$390 \pm 4.08b$
6-	Honey 2 g	$1.97 \pm 0.04ab$	$1.18 \pm 0.05b$	$0.517 \pm 0.01b$	$375 \pm 2.00b$
7-	Propolis 0.1 g	$1.96 \pm 0.03ab$	$1.05 \pm 0.008c$	$0.440 \pm 0.04c$	$324 \pm 3.00b$
8-	Propolis 0.2 g	$1.90 \pm 0.02ab$	$1.06 \pm 0.05c$	$0.444 \pm 0.01c$	$360 \pm 3.1b$
9-	Royal jelly 0.02&Pollen 0.2 g	$1.87 \pm 0.01b$	$1.29 \pm 0.02a$	$0.408 \pm 0.02c$	$343 \pm 2.1b$
10-	Royal jelly 0.02&Honey 2 g	$1.72 \pm 0.02b$	$1.22 \pm 0.01a$	$0.406 \pm 0.01c$	$322 \pm 3.1b$
11-	Royal jelly0.02&Propolis0.1g	$1.96 \pm 0.01c$	$1.16 \pm 0.02b$	$0.338 \pm 0.02 d$	$314 \pm 2.5b$
12-	Control	$1.53 \pm 0.02c$	$0.95 \pm 0.007d$	$0.350 \pm 0.01d$	$284 \pm 4.6 c$

No significant differences among the means followed by the same letter(s)

Table 2 : Effect of some bee products and their mixtures on some biological parameters of Foreign race(R 2 .)

No of treatment	Treatments	Weight of larvae (g)	Weight of pupae (g)	Weight of cocoon shell (g)	Number of eggs / female
1-	Royal jelly 0.02 g	3.279± 0.03a	0.966 ± 0.01a	0.256 ± 0.005 a	345 ± 6.7a
2-	Royal jelly 0.03 g	3.301 ± 0.04a	1.075 ± 0.01a	0.257 ± 0.008a	327 ± 12.7a
3-	Pollen 0.2 g	3.075 ± 0.01a	0.897± 0.02b	0.235 ± 0.02a	313.9± 7.8a
4-	Pollen 0.3 g	3.182 ± 0.05a	0.944± 0.01a	0.242± 0.02a	320 ± 11.3a
5-	Honey 1.5 g	2.844 ± 0.04a	0.8569 ± 0.01b	0.219 ± 0.03a	290± 9.9ab
6-	Honey 2 g	3.009 ± 0.04a	0.8829 ± 0.02b	0.224± 0.01a	301.8 ± 5.3ab
7-	Propolis 0.1 g	2.73± 0.03b	0.7201± 0.008c	0.211 ± 0.01b	253.3 ± 12b
8-	Propolis 0.2 g	2.74± 0.03b	0.851 ± 0.01b	0.216 ± 0.04a	275 ± 11b
9-	Royal jelly 0.02&Pollen 0.2 g	2.941 ± 0.04a	0.868± 0.01b	0.242± 0.04a	269.1 ± 12b
10-	Royal jelly 0.02&Honey 2 g	2.835 ± 0.02a	0.834 ± 0.02b	0.211 ± 0.03a	232± 10.2c
11-	Royal jelly0.02&Propolis0.1g	2.78± 0.02b	0.795 ± 0.01c	0.149± 0.05 c	223.7 ± 7.1
12-	Control	2.22 ± 0.04c	0.6947± 0.001d	0.140± 0.03c	117± 3d

No significant differences among the means followed by the same letter(s)

REFERENCES

- El-Hattab, Samia M.(1985). Biological studies on eri silkworm *Philosamia ricini* Boisid with special referencet to its nutritional requirements . Ph.D. Thesis, fac. of Agric. Alex. Univ., Egypt.
- (2003). Effect of certain products of the honey bee on the productivity of the mulberry silkworm *Bombyx mori* L.J Adv. Agric. Res.8 (1) 85 – 93 .
- El-Karaksy, I. A . (1979). Studies on silkworm in Egypt Attempts for enhancing silk production by means of certain Food. Ph. D. Thesis. Fac. of Agric. Alex. Univ.
- El-Karaksy, I. A. ; I. A., Samia m. El-Hattab and Soad M. Moustafa.(1989). Eri silkworm *Philosamia ricini* Boisid Powdered pupae as an important source of protein in its Semi – artificial deit. Seventh Arab Pesticide conf., Tanta Univ. 118 – 125 .
- El-Sayed, Nagda A. A.(1999). Evaluation of six mixture of food additives on some bio – physiological and repro- Ductivity parameters of the mulberry silkworm *Bombyx mori* L. Monofia J. Agric. Res., 24 (6) 1971 – 1986 .
- El-Maasarawy, S. A. S.(1995). Anabolic effect of propolis extract on the larvae of silkworm, *Bombyx mori* L. Bull Ent. Soc. Egypt 73 :41 – 50 .
- Firu, D. ; L. S. Carmen ; O. Ilie and W. Florica .(1968). Ivestigation on the influence of amino acids and nutrients Supplied in food of silkworm . Biol. Abstr. 52 (24) : 136021 .

- Hashida, K.(1961). Effect of royal jelly on silkworm larvae Bombyx mori L. Apic. Abstr. 305 Ito, T.(1961). Nutrition effect of royal jelly on the silkworm Bombyx mori L. Apic. Abstr :489 .
- Nour, M. E.; S. A. S. El-Maasrawy and Souad, M. M. Abd El – Nabi .(1997). Propolis in the nutrition of the silk- worm Bombyx mori L. influence on biology, silk yield and biochemical changes in haemolymph . Proc. 1 st Int. Conf.of silk ICSAI Cairo Univ.133 – 148 .
- Robert, A. L.(1994). Bee pollen a wonderful food Ameri. Bee J. , 611 – 613.
- Singh, S. M. (1960). Influence of royal jelly and tiuracil (sic) on the larval development and on nitrogen component in the blood of two parent races and their hybrids in larval of B. mori L. Rv. Ver a Soie. 12 (3) : 247 .

تأثير منتجات نحل العسل على بعض القياسات البيولوجية لدودة الحرير التوتية
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- يهدف البحث الى دراسة تأثير بعض منتجات نحل العسل (الغذاء الملكي - العسل - البروبوليس - حبوب اللقاح) وخلانظها على بعض القياسات البيولوجية للسلالة المستوردة والمحلية لدودة الحرير التوتية هذا وقد اوضحت النتائج مايلي :
- ١- بالنسبة للسلالة المستوردة وجد أن استخدام الغذاء الملكي بتركيز ٠.٢ و٠.٣ و٠.٤ جم/ ١٠٠ مل ماء أدى الى زيادة كلا من وزن اليرقات - العذارى - قشرة الشرنقة وعدد البيض بالمقارنة بالكنترول وكان أقل منتجات نحل العسل تأثيرا هو البروبوليس.
 - ٢- أعطى خليط الغذاء الملكي مع حبوب اللقاح زيادة في (وزن اليرقات -العذارى - قشرة الشرنقة وعدد البيض في السلالة المستوردة
 - ٣- بالنسبة للسلالة المحلية وجد أن استخدام حبوب اللقاح بتركيز ٠.٢، ٠.٣، ٠.٤ جم / ١٠٠ ماء أدى الى زيادة في وزن اليرقات - العذارى - قشرة الشرنقة وعدد البيض بالمقارنة بالكنترول وكانت أقل المنتجات تأثيرا هو البروبوليس .
 - ٤- بالنسبة للخلانظ في السلالة المحلية أعطت نفس الاتجاه المتحصل عليه في السلالة المستوردة. وعليه ينصح باستخدام الغذاء الملكي المضاف الى أوراق التوت في تغذية يرقات السلالة المستوردة بينما يفضل استخدام حبوب اللقاح المضاف لأوراق التوت في تغذية يرقات السلالة المحلية ولاينصح باستخدام البروبوليس المضاف لأوراق التوت نظرا لتأثيراته الضعيفة في كلا السلالتين .
- وبصفة عامة كان تأثير منتجات نحل العسل وخلانظها على السلالة المستوردة ايجابيا أكثرمنها على السلالة المحلية