

**EFFECT OF *ZINGIBER OFFICINALE* ON MORTALITY
PERCENTAGE AND COCOON SHELL RATIO OF THE SILKWORM,
BOMBYX MORI L.**

Nagat Hamed Soliman

Plant Protection Department, Faculty of Agriculture, El Fayoum University, Egypt.

ABSTRACT

The effect of *Zingiber officinale* was studied on mortality percentages and cocoon shell ratio of silkworm, *Bombyx mori* during spring season of 2015 at Plant Protec. Dept. Fac. of Agric., El Fayoum Univ. The powder of *Z. officinale* was dissolved in distilled water to prepare different concentrations (10, 20, 30, 40 and 50 mg/ml.). In the present study, results showed that, the concentration 20 mg/ml. of *Z. officinale* occupied the first category to reduce 1st, 2nd and 3rd instars mortality percentages. While 40 mg/ml. of *Z. officinale* occupied the first category for reducing 4th & 5th instars mortality percentages and improving cocoon shell ratio.

INTRODUCTION

The mulberry silk worm (*Bombyx mori* L.) is of great economic importance as a foreign exchange earner for many silk producing countries. It is a beneficial insect reared for the valuable commodity silk. Diseases attack the silkworm of all stadiums, and can inhibit the silkworm rearing (Krishnaswami *et al.*, 1992). In tropical countries, mulberry silk worm is continuously reared and this makes it highly susceptible to pathogens and hence occurrence of diseases is a major constraint (Samson *et al.*, 1998). *Zingiber officinale* is one of the important medicinal plant, the major active components is gingerol [5-hydroxy-1-(4-hydroxy-3-methoxy phenyl) decan-3-one] is the most abundant constituent in the gingerol series. The powdered rhizome contains 3.6% fatty oil, 9% protein, 60.70% carbohydrates, 3.8% crude fiber, about 8% ash, 9.12% water and 2.3% volatile oil (Kiuchi *et al.*, 1993) and (Mustafa *et al.*, 1993). Through out serving it was found that the promotional literature related to use aromatic and medicinal plant parts on *B. mori* characters were low. Therefore, the present study has been planned to determine, the effect of *Zingiber officinale* on some parameters of silkworm, *B. mori* L.

MATERIALS AND METHODS

Zingiber officinale was examined on mortality percentages and cocoon shell ratio of silkworm, *Bombyx mori* during spring season of 2015 at Plant Protec. Dept. Fac. of Agric., El Fayoum Univ. Egg box of silkworm, *B. mori* (Egyptian hybrid) were obtained from the Seric. Res. Dept., Plant Protec. Res. Inst, Agric. Res. Center. Dokki, Giza. Powder (dried rhizome) of *Z. officinale* were dissolved in distilled water to prepare different concentrations.

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Larvae of *B. mori* were reared on fresh mulberry leaves (*Morus alba* var. *indicia*) under laboratory conditions ($28\pm 2^\circ\text{C}$, $70\pm 5\%$ RH). At the beginning of the 1st instar, larvae were divided into five groups (in addition to the control). Each group was divided into five replicates (each of hundred larvae). Each replicate was reared in carton tray ($30\times 15\times 4^{\text{cm}}$).

Larvae of each group were fed on mulberry leaves sprayed with one of the different concentrations (10, 20, 30, 40 and 50 mg/ml.) of *Z. officinale* at the first and second day of all instars after drying on ambient air temperature for one minute. The control was fed on mulberry leaves sprayed with distilled water. Mortality percentages of all instars were recorded and cocoon shell ratio were calculated for all the replications of treatments and the control. Data was analyzed by ANOVA through statistical package for social science (SPSS) to find out the significance between treated and control (Berkowitz and Allaway, 1998). Means were separated by (L.S.D at 0.05%).

RESULTS AND DISCUSSION

Data in Table (I) show that, The means of the 1st instar mortality percentages ranged between 10.40 % for 20 mg/ml and 15.80 % for 50 mg/ml of *Z. officinale*. The mean values of mortality percentage at the 2nd instar ranged between 9.00 % for 20 mg/ml and 11.80 % for 40 mg/ml of *Z. officinale*. The means of the 3rd instar ranged between 8.20 % for 20 mg/ml of *Z. officinale* and 9.60% for 10 mg/ml of *Z. officinale* compering to 10% for control.

TABLE (I):Effect of *Zingiber officinale* concentrations on 1st, 2nd and 3rd instars mortality percentages (%) of silkworm, *Bombyx mori* L.

Concentrations (mg/ml.)	1 st instar mortality percentages (%)	2 nd instar mortality percentages (%)	3 rd instar mortality percentages (%)
10	14.60±0.400000 b	11.60±0.678233 b	9.60±0.678233
20	10.40±0.400000 a	9.00±0.547723 a	8.20±0.583095
30	15.20±0.374166 b	11.00±0.547723 ab	9.20±0.583095
40	14.60±0.400000 b	10.80±0.663325 ab	8.80±0.374166
50	15.80±0.663325 b	11.20±0.374166 b	8.80±0.583095
control	15.40±0.509902 b	10.60±0.509902 ab	10.00±0.632456
F value	**	*	-
LSD at 0.05%	1.369	1.642	-

The 4th instar mortality percentages ranged between 6.40 % for 40 mg/ml and 8.60 % for 20 mg/ml of *Z. officinale*. While the mortality percentage means of the 5th instar ranged between 5.60 % for 40 mg/ml and 7.80 % for 20, 30, 50 mg/ml of *Z. officinale* compering to 8.20 % for control. The means

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of the cocoon shell ratio ranged between 17.50 % for 50 mg/ml and 19.73 % for 40 mg/ml of *Z. officinale* .While the cocoon shell ratio of the control recorded 18.37% according to data in **Table (II)**.

TABLE (II):Effect of *Zingiber officinale* concentrations on 4th & 5th instars mortality percentages (%) and Cocoon shell ratio (%) of silkworm, *Bombyx mori* L.

Concentrations (mg/ml.)	4 th instar mortality percentages (%)	5 th instar mortality percentages (%)	Cocoon shell ratio (%)
10	8.40±0.509902 b	6.80±0.916515 ab	17.82±0.3042 b
20	8.60±0.447214 b	7.80±0.583095 b	18.29±0.3008 b
30	8.00±0.400000 ab	7.80±0.374166 b	18.53±0.1354 b
40	6.40±0.244949 a	5.60±0.400000 a	19.73±0.3377 a
50	8.40±0.748331 b	7.80±0.374166 b	17.50±0.2087 b
control	8.40±0.400000 b	8.20±0.734847 b	18.37±0.3543 b
F value	*	*	*
LSD at 0.05%	1.410	1.751	1.940

Mortality percentages of the five larval instars were decreased and cocoon shell ratio were improved in the treated groups of *Z. officinale* when compared to control as presented in **Table (I & II)**. These might be due to the effect of *Z. officinale* as anti microbial (**Gugnani & Ezenwanze, 1985 & James et al., 1999** and **Ficker et al., 2003**), anti-oxidant (**Jagetia et al., 2003** and **Kim et al., 2005**) and stimulate digestion and absorption (**Mowrey & Clayson, 1982** and **Stewart et al., 1991**).

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تأثير الزنجبيل على نسب الموت ونسب الحرير في دودة الحرير التوتية .

نجاهة حامد سليمان

قسم وقاية النبات – كلية الزراعة – جامعة الفيوم – مصر.

الملخص

في قسم وقاية النبات بكلية الزراعة جامعة الفيوم خلال فصل الربيع لعام ٢٠١٥ تم دراسة تأثير الزنجبيل كإضافة غذائية على نسب الموت ونسب الحرير في دودة الحرير التوتية. حيث تم الحصول على هجين محلي من قسم بحوث الحرير بمركز البحوث الزراعية بالحيزة. تم تربية اليرقات على ورق توت هندي خلال الخمس أعمار اليرقية. بعد الفقس تم تقسيم اليرقات إلى خمس مجموعات بالإضافة للكنترول. كل مجموعة قسمت إلى خمس مكررات وكذلك الكنترول. تم اذابة الزنجبيل في الماء المقطر لتحضير التركيزات المختلفة (١٠، ٢٠، ٣٠، ٤٠، ٥٠ مجم/ملتر). حيث تم تغذية هذه اليرقات على ورق التوت المعامل بهذه التركيزات خلال اليوم الأول و الثاني من كل عمر. وكانت النتائج كالتالي: أفضل تركيز هو ٢٠مجم/ملتر بالنسبة للأعمار اليرقية الصغيرة (الأول – الثاني – الثالث) حيث بلغت ١٠,٤٠%، ٩,٠٠%، ٨,٢٠% مقارنة ب ١٥,٤٠%، ١٠,٦٠%، ١٠,٠٠% في الكنترول على التوالي. اما نسب موت الأعمار اليرقية الكبيرة (الرابع - الخامس) ونسب الحرير والتي بلغت ٦,٤٠%، ٥,٦٠%، ١٩,٧٣% مقارنة ب ٨,٤٠%، ٨,٢٠%، ١٨,٣٧% في الكنترول على التوالي كان التركيز ٤٠مجم/ملتر هو الأفضل.