

EFFECT OF *MATRICARIA RECUTITA* L. AS FOOD ADDITIVES ON THE PRODUCTIVITY OF SILKWORM, *BOMBYX MORI* L.

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ABSTRACT

The present work was carried out at Plant Protec. Dept. Fac. of Agric., Fayoum Univ. during spring season of 2019 to study the effect of *Matricaria recutita* as food additives on some characteristics of silkworm, *Bombyx mori* L. Dried flowers of *M. recutita* were crushed and dissolved in distilled water to prepare different concentrations (0.1, 0.2, 0.3 and 0.4 mg/ml.). Results showed that, the larval mortality % of *B. mori* fed on mulberry leaves sprayed with different concentrations of *M. recutita* decreased with increasing each of concentrations and the stages of the larvae. On the contrary, the mean weights of each of the 5th instar larvae and pupae, increased with increasing concentrations with significant differences between treatment and control. For the duration of the 5th instar larvae, statistical analysis proved that there were significant differences between treatments. The means of, cocoon weights, cocoon shell weights and cocoon shell ratio, increased with increasing concentrations. Statistical analysis proved that there were significant differences between 0.4 mg./ml. concentration and each of other concentrations and control.

INTRODUCTION

The silkworm *Bombyx mori* L. is a mono phytophagous insect feeding on mulberry leaves. The silk industry plays an important role in the economy, so research on silkworm and mulberry crop enhancement is of high importance. Fortification of mulberry leaves with certain nutritive materials as carbohydrates, amino acids, proteins, lipids, antibiotics, vitamins, enzymes, minerals and other chemicals have proved to be useful for improving crop yield (**Rajegowda 2002**). Pharmacological studies have acknowledged the value of medicinal plants as potential source of bioactive compounds (**Prusti et al., 2008**). *Matricaria recutita* L. is aromatic and medicinal plant . A total of 120 chemical constituents have been identified in *M. recutita*, including terpenoids (chamazulene), flavonoids (apigenin and luteolin), and coumarins (umbelliferone, alpha-bisabolol). The flavonoids apigenin and luteolin possess anti-inflammatory, carminative, and antispasmodic properties (**Zadeh et al., 2016**). The present study was carried out to determine the effect of *M. recutita* as food additives on the productivity of silkworm , *B. mori*.

MATERIALS AND METHODS

Evaluation of *Matricaria recutita* as food additives on the productivity of silkworm, *Bombyx mori* was studied during spring season of 2019 at Plant Protec. Dept. Fac. of Agric., El Fayoum Univ. Dried flowers of *M. recutita* were crushed

and dissolved in distilled water to prepare different concentrations (0.1, 0.2, 0.3 and 0.4 mg/ml.). Egg box of silkworm, *B. mori* (Egyptian hybrid) were obtained from the Seric. Res. Dept., Plant Protec. Res. Inst, Agric. Res. Center. Dokki, Giza. Newly hatched larvae of *B. mori* were reared on fresh mulberry leaves (*Morus alba* var. *indicia*) under laboratory conditions ($27\pm 2^{\circ}\text{C}$, $76\pm 5\%$ RH). Mulberry leaves were obtained from Mulberry trees grown in the farm of Faculty of Agriculture at Fayoum (at Dar El Ramd region). At the beginning of the 1st instar, larvae were divided into five groups, each of 50 larvae. Each group was divided into five replicates.

For treatment, mulberry leaves sprayed with different concentrations (0.1, 0.2, 0.3 and 0.4 mg/ml.) of *M. recutita* after drying on ambient air temperature for one minute. The larvae of control fed on mulberry leaves sprayed with distilled water. The characteristics of *B. mori* , namely, the 5th instar larval weights, larval durations, mortality percentages, pupal weights, cocoon weights, cocoon shell weights and cocoon shell ratio were recorded.

Statistical analysis

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

Table (1) illustrates that the larval mortality % of *B. mori* fed on mulberry leaves sprayed with different concentrations of *M. recutita* decreased with increasing each of concentrations and the stages of the larvae. The mortality % of the 1st instar larvae , were 13,33 , 13,20 , 12,45 and 10,90 % for 0.1, 0.2, 0.3 and 0.4 concentrations, respectively, compared with 14.67 % for control. For the 5th instar larvae the mortality % were 6.29, 6.09, 6.1 and 5.11%, for the same concentrations, respectively compared with 6.50% for control. Statistical analysis proved that there were significant differences between 0.4 mg./ml. concentration and each of other concentrations and control. The obtained results are in general agreement with the findings of **Muruges and Bhaskar, (2007)** when used mulberry leaves treated with aqueous extract of *Parthenium hysterophorus*, *Tridax procumbens* and *Tribulus terrestris* on 5th instar mortality percentages of *B. mori*. **Samba, et al., (2016)** when used aqueous extract of *Azadirachta indica*, *Parthenium hysterophorus*, *Osimum sanctum* and *Pongamia pinnata*.

TABLE (1) Effect of mulberry leaves treated with *Matricaria recutita* on mortality percentages of silkworm, *Bombyx mori* L.

| Concentrations (mg/ml.) | Mortality percentages | | | | |
|----------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|
| | 1 st instar) | 2 nd instar | 3 rd instar | 4 th instar | 5 th instar |
| 0.1 | 13.33±0.2680 | 11.22±0.4323 | 9.88±0.4332 | 7.62±0.5550 | 6.29±0.0600 |
| 0.2 | 13.20±0.2132 | 11.90±0.3221 | 9.20±0.4000 | 6.00±0.4766 | 6.09±0.1900 |
| 0.3 | 12.45±0.2344 | 10.56±0.7554 | 8.00±0.2333 | 6.23±0.3556 | 6.10±0.1908 |
| 0.4 | 10.90±0.66332 | 10.22±0.4332 | 7.05±0.3442 | 6.40±0.7483 | 5.11±0.1123 |
| control | 14.67±0.2300 | 12.55±0.50990 | 9.00±0.5667 | 8.43±0.4100 | 6.50±0.0990 |
| F value | ** | * | - | * | * |
| LSD at 0.05% | 1.566 | 1.787 | - | 1.500 | 0.444 |

According to data in **Table (2)** the mean weights of the 5th instar larvae fed on mulberry leaves sprayed with different concentrations of *M. recutita*, as well as pupal weights, increased with increasing concentrations. The mean weights of the 5th instar larvae were, 2.011, 2.107, 2.150 and 2.300 g., for concentrations of 0.1, 0.2, 0.3 and 0.4, respectively, compared with 2.001g. for control, with significant differences between 0.4 mg./ml. concentration and each of other concentrations and control. For pupal weights, they were 0.780, 0.800, 0.805 and 0.829 g. for the same concentrations, respectively, compared with 0.713g. for control, with significant differences between treatment and control. For the 5th instar larval durations, they were, 239.69, 240.36, 243.36 and 240.36 h. for the same concentrations, respectively, compared with 244.32 h. for control. Statistical analysis proved that there were significant differences between treatments.

The obtained results are in general agreement with the findings of many authors who found that improving in weights of *B. mori* larvae and larval duration when using mulberry leaves treated with *amlaki rasayan* (**Madhuri and Jitendra, 2002**); mulberry leaves treated with aqueous extract of *Withania somnifera* (**Sridevi et al, 2004**) and with **Kuntamalla and Rao, (2005)** when used mulberry leaves treated with *Azadirachta indica*. The obtained results are also in general agreement the findings of many authors who found that increasing in pupal weights of *B. mori* when used mulberry leaves treated with *Coffea Arabica*, (**Jeyapaul et al., 2003**); mulberry leaves treated with aqueous extract of *Nephrolepis auriculata*, *Christella parasitica*, *Dicranopteris linearis* and *Pityrogramma calomelanos* (**Padmalatha et al., 2005**); mulberry leaves treated with aqueous extract of *Murraya koenigii* (**Ganesan and Isaiarasu, 2007**) and **Samba, et al., (2016)** when used aqueous extract of *Azadirachta indica*, *Parthenium hysterophorus*, *Osimum sanctum* and *Pongamia pinnata*.

TABLE (2)Effect of mulberry leaves treated with concentrations of *Matricaria recutita* on some biological parameters of silkworm, *Bombyx mori* L.

| Concentrations (mg/ml.) | Parameters | | |
|----------------------------|---|--|----------------------|
| | 5 th instar larval weights(g) | 5 th instar larval durations (hours) | Pupal weights (g) |
| 0.1 | 2.011±0.0500 | 239.69±0.0877 | 0.780±0.0332 |
| 0.2 | 2.107±0.1120 | 240.36±0.0680 | 0.800±0.0202 |
| 0.3 | 2.150±0.0890 | 243.36±0.0110 | 0.805±0.0321 |
| 0.4 | 2.300±0.0980 | 240.36±0.0677 | 0.829±0.0554 |
| control | 2.001±0.0999 | 244.32±0.0433 | 0.713±0.0444 |
| F value | ** | | * |
| LSD at 0.05% | 0.032 | 0.140 | 0.069 |

Data in **Table (3)** indicate that, the means of each of the cocoon weights, cocoon shell weights and cocoon shell ratio, increased with increasing concentrations. The mean weights of the cocoon weights were, 1.054, 1.066, 1.090 and 1.276 for the concentrations of 0.1, 0.2, 0.3 and 0.4 mg/ml, respectively, compared with 2.001g. for control.

For cocoon shell weights, they were 0.187, 0.195, 0.203 and 250 g for the same concentrations, respectively, compared with 0.188 g for control.

For cocoon shell ratio, they were, 17.93, 18.29, 18.62 and 19.59% for the same concentrations, respectively, compared with 18.76 for control. For the previous parameters, Statistical analysis proved that there were significant differences between 0.4 mg./ml. concentration and each of other concentrations and control.

The obtained results are in general agreement with the findings of many authors who found that increasing in cocoon weights, cocoon shell weights and cocoon shell ratio of *B. mori* when used mulberry leaves treated with *amlaki rasayan* (**Madhuri and Jitendra, 2002**), mulberry leaves treated with aqueous extract of *Coffea Arabica*, (**Jeyapaul et al., 2003**), mulberry leaves treated with aqueous extract of *Azadirachta indica*, (**Kuntamalla and Rao, 2005**), mulberry leaves treated with aqueous extract of *Murraya koenigii*, (**Ganesan and Isaiarasu, 2007**), mulberry leaves treated with aqueous extract of *Lantana camera* and *Ocimum sanctum*, (**Sumathi, 2008**) and mulberry leaves treated with aqueous extract of *Andrographis paniculata* and *Plumbago zeylanica*, (**Takhliq, 2011**).

TABLE (3) Effect of treated mulberry leaves with concentrations of *Matricaria recutita* on cocoon indices of silkworm, *Bombyx mori* L.

| Concentrations (mg/ml.) | Parameters | | |
|----------------------------|-----------------------|-----------------------------|---------------------------|
| | Cocoon weights (g) | Cocoon shell weights (g) | Cocoon shell ratio (%) |
| 0.1 | 1.054±0.0311 | 0.187±0.0122 | 17.93±0.2000 |
| 0.2 | 1.066±0.0422 | 0.195±0.0100 | 18.29±0.2010 |
| 0.3 | 1.090±0.0200 | 0.203±0.0122 | 18.62±0.2000 |
| 0.4 | 1.276±0.0201 | 0.250±0.0140 | 19.59±0.1544 |
| control | 1.002±0.0300 | 0.188±0.0120 | 18.76±0.1988 |
| F value | ** | ** | ** |
| LSD at 0.05% | 0.088 | 0.050 | 0.599 |

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تأثير البابونج كإضافة غذائية على انتاجية دودة الحرير التوتية نجاه حامد سليمان

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تمت هذه الدراسة في قسم وقاية النبات بكلية الزراعة جامعة الفيوم خلال فصل الربيع لعام ٢٠١٩ لدراسة تأثير البابونج كإضافة غذائية على الانتاجية في دودة الحرير التوتية. حيث تم الحصول على هجين محلى من قسم بحوث الحرير بمركز البحوث الزراعية بالجيزة. تم تربية اليرقات على ورق توت هدى خلال الخمس أعمار اليرقية. بعد الفقس تم تقسيم اليرقات إلى اربع مجموعات بالإضافة للكنترول. كل مجموعة قسمت إلى خمس مكررات وكذلك الكنترول. تم طحن ازهار البابونج وإذابتها في الماء المقطر لتحضير التركيزات المختلفة (١, ٢, ٣, ٤, ٥, ٤, ٥, ٤, ٥, ٤ مجم/ملتر). حيث تم تغذية هذه اليرقات على أوراق التوت المعامل بهذه التركيزات. وكانت النتائج كالتالى: أفضل تركيز هو ٥, ٤ مجم/ملتر. حيث ادى الى انخفاض كل من نسب الموت ومدة العمر اليرقى الخامس مقارنة بالكنترول. بينما ادى الى زيادة وزن اليرقات والعداوى ووزن الشرنقة وقشرة الشرنقة ونسبة الحرير مقارنة بالكنترول.