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Research Paper

INFLUENCE OF TENDER COCONUT WATER ON THE ECONOMIC PARAMETERS OF SILKWORM, *Bombyx mori* L

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Abstract

The effect of tender coconut water was tested on Vth instar multivoltine silkworm larvae for enhancing performance of economical traits of silkworm Bombyx mori. The fresh tender coconut water was administrated along with mulberry leaves on second and fourth day of Vth instar silkworm. All the economical parameters were highly influenced by coconut water supplementation. The cocoon weight, shell weight, shell ratio and filament length were increased by 10.18 %, 19.49 %, 8.39 % and 22.4 % respectively compare to that of control group. In the present study therefore can be concluded that the dietary supplementation of tender coconut water can be used to improve economical performance of silkworm.

Key words: Silkworm, tender coconut water, mulberry leaves, economic traits.

INTRODUCTION

Mulberry Sericulture is an art and science of raising monophagous silkworm, Bombyx mori for silk production. Since sericulture is one of the high employment potential, land based practice in India, capable of significant contribution toward easing the problems of unemployment and improving the socioeconomic status of the rural families. Mulberry silkworm being monophagous solely depends on mulberry leaf for its nutritional requirement for its growth, development and ultimately high quality cocoon production. Silkworm nutritionists have always been searching for better food supplements that can be manipulated to the benefits of the rearers [11]. A series of studies has been established the better food supplementing the mulberry leaves with different nutrients such as protein, vitamins, amino acid, mineral, hormones and antibiotics etc for better performance and to get high yield with quality cocoons [4,17-18,20].

On earth, plants are the richest sources of organic chemicals. Likewise other nutrients, is mentioned that enrichment of mulberry leaves with phytochemical supplementation enhanced the silk productivity [3]. Extracts of various medicinal plants such as aloe vera, *Moringa oleifera*, *Ocimum sanctum* etc has been elicited various response on silkworm and was shows influence

on economical characters such as body weight, cocoon weight, shell weight, shell ratio, thread length in Bombyx mori [6-7,10,14].

Since thousands of year coconut water and coconut products have valuable place in Indian folk medicine. About 4000 years ago its application in Ayurvedic medicine were documented in Sanskrit [15]. Recent scientific studies of coconut water had demonstrated its anti-cancerous, anti-inflammatory, cardio protective, anti-ageing, anti-thrombolytic, hepatoprotective, anti-bacterial activities as well as it enhances healing of wounds properties [8, 12]. Coconut water contains several a complex blend of biologically active components namely vitamins, minerals, sugars, enzymes, proteins, free amino acids, antioxidants, health enhancing growth hormones and other nutrients [12]. Therefore traditionally such a precious gift from nature used in both dietary and medicine supplementation for better health [12]. There has been a very limited attempt so far to study the effect of the green coconut water on silkworm. The present study is to assess the influence of immature green coconut water on the improvement of economical parameters in multivoltine silkworm, Bombyx mori.

MATERIALS AND METHODS

Silkworm

To perform the experiment, the disease free layings (eggs) of BAIF developed local multi-voltine B. mori variety were employed. Dfl's were collected from the Germ-plasm Bank of the BAIF Sericulture Division. They were disinfected with a 2% formalin solution for surface sterilization.

Collection of Tender coconut water

Tender coconut (*Cocos nucifera*) 5-6 months of age harvested from the coconut garden grown in BAIF campus were used for the present study. The coconuts were broken carefully and liquid endosperm was collected and used for the experiment.

Experimental design

Fifth instar larvae were selected for present study. Experiment carried out in three replicas. Larvae divide into two groups of 100 worms each and treated with following.
Group I: Control
Group II: Tender coconut water fed silkworms
The first group of silkworm fed with only mulberry throughout the experiment. The second group silkworm fed with tender coconut water fortified mulberry leaves on first feeding of 2nd and 4th day of fifth instar stage. Both first and second groups were fed mulberry leaves four times per day. The silkworms were maintained in their respective groups till cocoon formation.

At the end of the experiment economical parameters of cocoon were measured. Data on cocoon weight (gm), shell weight (gm), silk ratio (%), and filament length (m) were recorded.

Statistical analysis

The DB-State statistical program was used. The results were evaluated using the one-way analysis of variance (ANOVA) utilizing the F-test. The results were represented as the mean value ± SEM for control and experimental group. The fisher's least significance difference (L.S.D.) was used to compare treatment means at ***p= 0.001, **p=0.01 and *p= 0.05 level of significance.

RESULTS AND DISCUSSION

The balance nutrition is the key factor for growth and development in silkworm B. mori and there has been significant improvement when mulberry leaves were supplemented with different nutrients in addition with mulberry leaves (16). In the present study, feeding of tender coconut water treated mulberry leaves to Vth instar larvae was shown encouraging results on different economical parameters. It was observed that there was an increased trend in cocoon

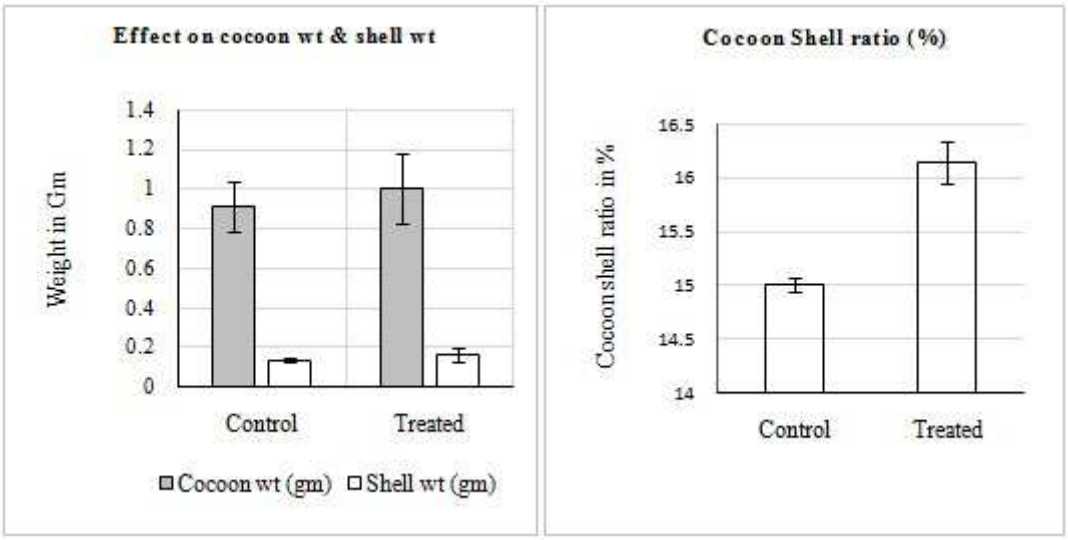
weight, shell weight, shell ratio, filament length by treatment with tender coconut water when compare to that of untreated control (Table 1).

Table-1 Economic traits of control and tender coconut water treated *Morus alba* leaves for V instar larvae of B. mori produced cocoon.

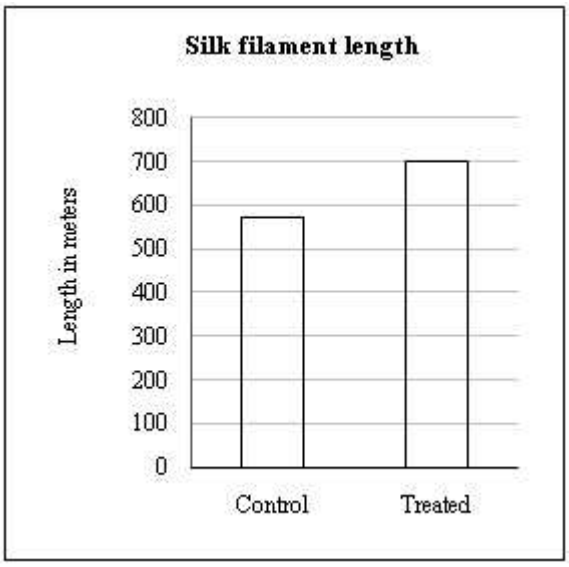
Treatment	Cocoon wt (gm)	Cocoon shell wt (gm)	Cocoon shell ratio (%)	Filament length (m)
Control (C)	0.91 ± 0.125	0.136 ± 0.013	15.00 ± 0.070	570.00 ± 2.646
Tender Coconut water (T1)	1.002. ± 0.173*** (10.18 %)	0.162 ± 0.033*** (19.49 %)	16.14 ± 0.204*** (8.39 %)	698.00 ± 0.577*** (22.4 %)

Values presented as means ± SD; *** Significant at $p < 0.001$
% increase in economical parameters over control

The silkworm fed with mulberry leaf treated with tender coconut water shows the highest cocoon weight (1.002. ± 0.173), shell weight (0.162 ± 0.033), shell ratio (16.14 ± 0.204 %) and filament length (698.00 ± 0.577). The statistical analysis (ANOVA) confirmed that high significant ($p<0.001$) increase in cocoon weight, shell weight, shell ratio and filament length by 10.18%, 19.49%, 8.39% and 22.40% respectively when compare to that of control group(Table.1).



Graph - 1: Influence of tender coconut water on cocoon parameters of silkworm.



Graph - 2: Effect of tender coconut water on silk filament length.

The increased economical characteristics might be due to the presence of maximum amount of essential micro-minerals, vitamins, phytohormons, antioxidant and other complex nutrient composition of tender coconut water. The enhancement in silk synthesis also due to the stimulation on digestibility and silk gland.

It was confirmed from earlier studies that minerals nutrition plays a pivotal role in growth regulation in silkworm like other organisms. In order to improve economical parameters dietary supplementations of various minerals have been studied by various scientists (1-2, 5, 16). The economical characters of silk cocoon even also improved by feeding the silkworm with mulberry leaves treated with vitamins, phytochemical (3, 19). Some medicinal plant extracts also capable of influencing the economic characters (6, 9, 14).

Therefore result obtained in the present study is on far with the studies conducted earlier on nutrient supplementation on enhancement of economical traits in silkworm Bombyx mori.

CONCLUSION

Coconut water is feasible, cheap, and inexpensive alternative food supplement for the enhancement of economical characteristics in silkworm. Improvement in commercial traits of silkworm on tender coconut water supplementation was comparable to that of untreated group. The study revealed that high significant difference between coconut water supplemented and non-supplemented silkworm groups with respect to all tested economical parameters of silkworm. It can be concluded that use and application of coconut water as supplement for improvement of economical traits of silkworm would be optimal both economically as well as feasibility wise.

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