



Impact of Spirulina Supplemented Mulberry Leaves on Cocoon Parameters of Silkworm (*Bombyx mori*)

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Abstract: Silkworm (*Bombyx mori*) is an important economic insect. This study was carried out to determine impact of *Spirulina* on cocoon parameters like cocoon weight, shell weight, shell percentage of silkworm. The *Spirulina* blue green algae supplemented mulberry leaves were fed to larvae. Two groups control and experimental were taken. In both the groups study was done. It was found that *Spirulina* supplemented mulberry leaves showed increase in cocoon parameters in experimental group as compared to control group.

Index terms: Silkworm, *Spirulina*, Cocoon, Mulberry

Introduction

Silkworm (*Bombyx mori*) is one of the well-known beneficial lepidopteron insect. It is monophagous and eats only mulberry leaf. The sericulture industry largely depends on the production performance of silkworm and the primary goal of silkworm rearing is to produce high quality cocoon (Samami et al., 2019). Nutritional quality of mulberry leaves significantly influence the growth and development of larva and subsequent cocoon production. The impact of supplemental feed on intake and how it affects the quality and quantity of cocoon produced by silkworms have been clearly indicated such as serifeed (Ananda kumar and Michael, 2011), probiotics (Singh et al., 2005; Masthan et al., 2011a; Amalarani et al., 2011) and pre and probiotics (Lakshmi Bai and Ramani Bai, 2011).

Spirulina is blue green algae. It contains 18 amino acids viz., glutamine, glycine, histidine, lysine, methionine, creatine, cysteine, phenylalanine, serine, proline, tryptophan, asparagines, pyruvic acid and vital vitamins like biotin, tocopherol, thiamine, riboflavin, niacin, folic acid, pyrodozoic acid, beta-carotene and vitamin B12. In recent years attempts have been made in sericulture to fortify mulberry leaves with botanical extracts so as to improve the mulberry leaf quality and feed efficiency of silkworm which in turn increase cocoon production and silk quality. The larval and cocoon characters of silkworm, *Bombyx mori* influenced by plant extract *Xanthium indicum* (Pardeshi and Bajad, 2014). Increase in larval and shell weight subsequently commercial characters of cocoon on oral administration of foliage mulberry and eri silkworm supplemented with cyanobacteria (Kumar et al., 2009). *Spirulina* supplemented mulberry leaf found to be efficient in increasing larval and cocoon characters when orally fed to *Bombyx mori* (Sangamithirai et al., 2014). The growth rate of silkworm larvae and cocoon characters of silkworm *Bombyx mori* enhanced by *Spirulina* as it exhibits the presence of certain growth stimulant activity has been observed (Kumar and Balasubramanian, 2014). The present study is to investigate impact of *Spirulina* on cocoon quantitative parameters viz, cocoon weight, shell weight, shell percentage.

Methodology

The disease free layings (DFL'S) of multivoltine crossbreed of silkworm *Bombyx mori* was obtained from govt. sericulture centre at Indore (M.P.). The experiment was done at the same place. Silkworms were

reared at standard conditions ($25\pm 5^{\circ}$ C, $65\pm 5\%$ RH) as per Krishnaswami (1978). The third instar larvae were taken for the study. Larvae were divided into two groups control and experimental groups. The larvae of control group were fed with normal fresh mulberry leaves and larvae of experimental group were fed with *Spirulina* supplemented mulberry leaves. Fresh mulberry leaves were given according to the larval stages of silkworm.

Spirulina powder was purchased from the market. The powder was dissolved in distilled water and its aqueous solution was prepared. 1gm of *Spirulina* powder in 100ml of distilled water for third and fourth instar larvae and 2gm in 200ml of distilled water for fifth instar larvae was dissolved. Experimental doses were prepared for each feeding for four times per day. The mulberry leaves were sprayed with aqueous solution of *Spirulina* from sprayer in experimental group. The leaves were allowed to dry for few minutes before feeding to the third, fourth and fifth instar larvae of silkworm. Larvae were maintained up to cocoon stage.

When the cocoons were formed completely the ten cocoons were randomly selected and their weight, shell weight and shell ratio (percentage) in control and experimental group was recorded as done by Masthan et al.,(2017).

Statistical analysis

The data obtained were subjected to statistical analysis by using 't' test.

Results and Discussion

The weight of ten cocoon, shell weight, shell percentage was increased in experimental group as compared to control group (table 1). In the present study the cocoon weight increase in *Spirulina* treated mulberry leaves experimental group than control group. Cocoon weight in control group was 1.38g which increased to 1.8g in experimental group. The shell weight, shell percentage, cocoon weight enhanced which correlate with the finding of (Venkatesh et al., 2009). The shell weight and shell % in control group was 0.25g and 18.1% which increased to 0.43g and 23.8% in experimental group. The parameters governing quality of cocoon were influenced when the supplemented leaves with *Spirulina* was fed to the larvae. Nutrition is known to play a significant role on the growth, development and overall performance of the cocoon components. The results correlate with the earlier findings of (Masthan et al., 2011b and Venkataramana et al., 2003). The statistical analysis was significant. In view of the above, present study it is concluded that supplementation of *Spirulina* could be beneficial for quality and quantity of cocoon as compared to control. The cocoon characters were enhanced by *Spirulina* so its supplementation could be beneficial for sericulture industry.

Table 1. Effect of *Spirulina* on cocoon parameters

Parameters	Control	Experimental
Cocoon weight	1.38g ± 0.339	1.8g ± 0.522
Shell weight	0.25g ± 0.126	0.43g ± 0.158
Shell %	18.1 ± 0.548	23.8 ± 0.451

Values are mean \pm standard deviation

P value < 0.05

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