



## Larval growth of silkworm (*Bombyx mori*) influenced by spirulina supplemented mulberry leaves

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### Abstract

The better growth and development of silkworm *Bombyx mori* is dependent on nutrition. Nutritional value of mulberry leaves affects the larval growth. In the present study the silkworm larvae were fed on *Spirulina* supplemented mulberry leaves. *Spirulina* is blue-green micro algae containing 18 amino acids and vital vitamins. The weight of fifth instar larvae feeding on mulberry leaves and larvae before spinning was taken. The *Spirulina* increased the larval weight in experimental group as compared to control group.

**Keywords:** spirulina, larvae, mulberry, nutrition, algae, spin

### Introduction

Silkworm (*Bombyx mori*) is monophagous feeder on mulberry leaves and the primary producer of silk. It is highly domesticated and economically important insect. Besides to its economic significance from applications in agriculture, it is also used in scientific analysis as a genetic resource capable of revealing a broad range of biological issues (Mandal *et al.*, 2007) [9]. The improvement of the growth and development of silkworm is significantly influenced by nutrition.

One method to enhance the growth rate of Silkworm *Bombyx mori* is to enrich the leaves of mulberry with nutrient supplement. Several studies have been conducted on the diet supplementation of mulberry leaves fed to silkworms. This supplementation includes vitamins such as ascorbic acid, thiamine, niacin, folic acid and multivitamins (Etebari *et al.*, 2004) [3]. *Spirulina* is blue green algae. It contains 18 amino acids viz., glutamine, glycine, histidine, lysine, methionine, creatine, cysteine, phenylalanine, serine, proline, tryptophan, asparagine, pyruvic acid and vital vitamins like biotin, tocopherol, thiamine, riboflavin, niacin, folic acid, pyridoxoic acid, beta-carotene and vitamin B12. Fifty different minerals and trace minerals, beta-carotene, chlorophyll, GLA, omega3 fatty acid and many other nutrients found in *Spirulina*.

Nutritional study on silkworm is vital necessity for its proper economic exploitation. The one thing that individually increases the quality and amount of silk is the silkworm nutrition (Laskar and Datta, 2000) [8]. Vitamins, amino acids, proteins and probiotics such nutritional supplements when added to larval feed tend to enhance the nutritional value and economic features of the silkworm (Etebari and Matindoost, 2005; Amalarani *et al.*, 2011) [4, 1]. *Spirulina* contains water soluble proteins and vitamins viz., B2, B6 and C that promote growth (Ravi *et al.*, 2010, Yadav and Bagadi, 2015) [10, 14] and fed to silkworm with vitamins and amino acids have played an important role in the larval and cocoon length, width and weight, cocoon shell parameters. Mulberry leaf supplemented with *Spirulina* as a feed to *Bombyx mori* was found to be effective in enhancing the larval and cocoon characters (Venkatramana *et al.*, 2003; Venkatesh *et al.*, 2009) [12, 13]. The present study is to

find out influence of *Spirulina* on larval growth of silkworm *Bombyx mori*.

### Material and Methods

The disease free layings (DFL'S) of multivoltine cross breed 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±5<sup>0</sup> C, 65±5%RH) as per Krishnaswami (1978) [5]. 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 four times per day. The mulberry leaves were sprayed with an aqueous solution of *Spirulina* from the 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. During experimentation larval weight of fifth instar feeding on mulberry leaves and larval weight before spinning was observed.

### Result

The weight of ten randomly selected larvae feeding on leaves was taken. The mean weight of larvae in control group was 2.7g±0.279 and in experimental group it was 3.3±0.365. The weight in experimental group increased as compared to control group. Weight of larvae before spinning was taken in both the group. In control group mean weight of larvae was 2.5g±0.371 and in experimental group it was 3.1g±0.416. There was increase in weight of experimental group larvae as compared to control group.

**Table 1:** Showing effect of *Spirulina* on the mean weight (g) of fifth instar larvae of silkworm

Larval weight	Control	Experimental
Feeding on leaves	2.7± 0.279	3.3± 0.365
Before spinning	2.5± 0.371	3.1± 0.416

Values are mean± SD

### Discussion

In the present study larval weight increased in *Spirulina* treated mulberry leaves experimental group. The present results correlate with the findings of earlier workers. The larval characters increase by complexes of different concentrations such as ascorbic acid, folic acid, thiamine and vitamin B complex observed (Balasundaram *et al.*, 2008) [2]. Concentration of 1 gm of *Spirulina* found to be effective and mulberry leaves supplemented with it fed to *Bombyx mori* showed increase in larval weight (Kumar and Balasubramanian, 2013) [6]. Larval growth and development by supplementation of *Spirulina* on mulberry leaves was also reported (Venkataramana *et al.*, 2003) [12]. The fifth instar larvae weight was found to be increased with 1%, 3%, 5% *Spirulina* treated mulberry leaves (Kumar and Balasubramanian, 2014) [7]. The larval weight a day before spinning when silkworms reared on mulberry leaves supplemented with *Spirulina* and other probiotics had better final fifth instar larval weight in comparison with control (Shruti *et al.*, 2019) [11]. The present finding was worked out on growth parameter of silkworm mulberry leaves supplemented with *Spirulina*.

### Conclusion

The present study revealed that the nutritional content of mulberry with *Spirulina* for successful silkworm larval rearing can be utilized. As silk production is directly related with larval growth on mulberry the supplementation of *Spirulina* to silkworm diet would be beneficial to sericulture industry by economically boosting the quantum and quality of silk production.

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