

## A comparative study on the foliar supplementation of soyaflour on mulberry silkworm, *Bombyx mori* (L.)

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**Abstract:** The influence of soyaflour supplementation on the economic characters of silkworm cross breed, PM x NB4D2 was studied. The supplementation was done on mulberry both on leaf and shoot. The shoot method was found to be more effective compared to leaf method in recording the highest shell ratio of 15.95 per cent in experiment 1 and 16.88 per cent in experiment 2 at the dose of 10 g kg<sup>-1</sup> compared to 14.64 and 15.92 per cent in experiment 1 and 2 respectively in leaf rearing. The shell ratio was the highest in shoot control recording 13.69 per cent in experiment 1 and 14.28 per cent in experiment 2 compared to 12.87 and 13.33 per cent in leaf method. Soyaflour at the dose of 5 g kg<sup>-1</sup> of shoot was on par with 10 g kg<sup>-1</sup> of shoot.

**Key words :** *Bombyx mori*, Soyaflour supplementation, Leaf rearing, Shoot rearing, Economic characters.

### Introduction

The mulberry, *Morus alba* L. is the only source of food for mulberry silkworm, *Bombyx mori* L. The larvae of the later stages namely, third to fifth instar or fourth and fifth instar are reared either on leaves or shoots. The shoot method of rearing is effective and economical compared to leaf method (Sekharappa *et al.* 1997). Providing quality mulberry leaves is one way of enhancing the cocoon characters and ultimately quantity and quality of raw silk. Mathavan *et al.* (1984) emphasized upon the need for an economically cheaper technique to improve the cocoon characters.

Soyaflour is an important source of protein and supplementation of mulberry leaves with soyaflour improved the larval and cocoon characters of silkworm (Nalini *et al.* 1994). The quantity of amino acid in soyabean is almost same as that in mulberry leaves and besides it is an important source of iron and vitamins and is also cheaper. The silkworm requires sugars, proteins, amino acid, fatty acids, vitamins and minerals for their growth and production of silk. The present study was conducted by providing quality leaves by way of soyaflour supplementation by two different methods of rearing viz. shoot method and leaf method.

### Materials and Methods

A laboratory study (experiment 1) was conducted during August, 2000 at the Department

of Sericulture, Tamil Nadu Agricultural University on soyaflour supplementation in the crossbreed of silkworm, PM x NB4D2 with the treatments viz. 0, 5, 10, 15 and 20 grams of soyaflour per kg of leaves or shoot replicated four times. Commercially available soyaflour was finely sieved and dusted uniformly on the required quantity of shoot or leaves using muslin cloth. Soyaflour supplementation was done twice, once during the fourth and once during the fifth instar immediately after moulting. Observations were made on the larval and cocoon characters. The results obtained were confirmed by conducting another bioassay (experiment 2), with limited doses of soyaflour on the same crossbreed. The treatment consisted of soyaflour @ 5 g kg<sup>-1</sup> of shoot, 10 g kg<sup>-1</sup> of shoot, 10 g/kg of leaves along with shoot control and leaf control. The treatments were replicated five times.

### Results and Discussion

#### Larval weight

**Experiment 1 :** Significant difference in larval weight was observed between the leaf and shoot method of rearing. The highest larval weight of 3.97g was obtained in the shoot rearing at the dose of 10 g kg<sup>-1</sup> which was on par with 5 g kg<sup>-1</sup> and 15 g kg<sup>-1</sup> of shoot which recorded the larval weights of 3.91 and 3.88g respectively (Table 1).

In leaf method, the highest larval weight of 3.82g was obtained at the dose of 10 g

**Table 1.** Effect of foliar supplementation of soyaflour on larval and cocoon characters of *Bombyx mori* L. (PM x NB4D2) by two different methods of rearing

Dose of soya flour g/kg	Larval weight (g)		Cocoon weight (g)		Shell weight (g)		Shell ratio (%)		Silk filament length (m)	
	Method		Method		Method		Method		Method	
	Leaf	Shoot	Leaf	Shoot	Leaf	Shoot	Leaf	Shoot	Leaf	Shoot
0	2.72 <sup>d</sup> B	3.08 <sup>a</sup> A	1.32 <sup>c</sup> B	1.46 <sup>c</sup> A	0.17 <sup>d</sup> B	0.20 <sup>c</sup> A	12.87 <sup>b</sup> B	13.69 <sup>b</sup> A	574 <sup>c</sup> B	581 <sup>c</sup> A
5	3.72 <sup>ab</sup> B	3.91 <sup>ab</sup> A	1.58 <sup>a</sup> B	1.63 <sup>ab</sup> A	0.21 <sup>c</sup> B	0.26 <sup>a</sup> A	13.29 <sup>b</sup> B	15.95 <sup>a</sup> A	633 <sup>b</sup> B	736 <sup>ab</sup> A
10	3.82 <sup>a</sup> B	3.97 <sup>a</sup> A	1.57 <sup>a</sup> B	1.63 <sup>ab</sup> A	0.23 <sup>a</sup> B	0.26 <sup>a</sup> A	14.64 <sup>a</sup> B	15.95 <sup>a</sup> A	688 <sup>a</sup> B	740 <sup>a</sup> A
15	3.50 <sup>c</sup> B	3.88 <sup>ab</sup> A	1.47 <sup>b</sup> B	1.59 <sup>b</sup> A	0.22 <sup>b</sup> B	0.24 <sup>b</sup> A	14.97 <sup>a</sup> B	15.09 <sup>a</sup> A	691 <sup>a</sup> B	744 <sup>a</sup> A
20	3.66 <sup>b</sup> B	3.81 <sup>b</sup> A	1.46 <sup>b</sup> B	1.67 <sup>a</sup> A	0.21 <sup>c</sup> B	0.26 <sup>a</sup> A	14.38 <sup>a</sup> B	15.57 <sup>a</sup> A	688 <sup>a</sup> B	729 <sup>b</sup> A

In a column means followed by the same letter (upper case) and in a row means followed by the same letter (lower case) for a character are not significantly different by Duncan's multiple range test (P=0.05)

**Table 2.** Effect of soyaflour supplementation on larval and cocoon characters in *Bombyx mori* L. (PM x NB4D2)

Treatment (soyaflour)	Larval weight (g)	Cocoon weight (g)	Shell weight (g)	Shell ratio (%)	Silk filament length (m)
5 g/kg of shoot	4.22 <sup>ab</sup>	1.58 <sup>a</sup>	0.26 <sup>ab</sup>	16.46 <sup>a</sup>	729 <sup>ab</sup>
10 g/kg of shoot	4.26 <sup>a</sup>	1.60 <sup>a</sup>	0.27 <sup>a</sup>	16.88 <sup>a</sup>	738 <sup>a</sup>
10 g/kg of leaves	3.98 <sup>b</sup>	1.57 <sup>a</sup>	0.25 <sup>b</sup>	15.92 <sup>a</sup>	724 <sup>b</sup>
Control (shoot)	3.03 <sup>c</sup>	1.47 <sup>b</sup>	0.21 <sup>c</sup>	14.28 <sup>b</sup>	588 <sup>c</sup>
Control (leaves)	2.78 <sup>d</sup>	1.35 <sup>b</sup>	0.18 <sup>d</sup>	13.33 <sup>c</sup>	569 <sup>d</sup>

In each column, means followed by a common letter are not significantly different by DMRT (P=0.05)

kg<sup>-1</sup> of leaves. The role of soyaproducts in influencing the larval traits were reported by Subburathinam *et al.* (1992). The results of the present experiment agree with the earlier findings.

**Experiment 2:** The highest larval weight of 4.26 g was obtained at 10 g kg<sup>-1</sup> of shoot and it was on par with 5 g kg<sup>-1</sup> of shoot compared to 3.98g in 10 g kg<sup>-1</sup> of leaves (Table 2). The larval weight in shoot method (3.03g) was higher compared to leaf method (2.78g). The findings confirm with the results of experiment 1.

#### Cocoon characters

**Experiment 1 :** The highest cocoon weight of 1.67g was obtained at 20g kg<sup>-1</sup> of shoot which

was on par with 5 g kg<sup>-1</sup> (1.63g) and 10g/kg (1.63g) of shoot compared to 1.57g in 10 g kg<sup>-1</sup> of leaves. The highest shell weight of 0.26g and shell ratio of 15.95 per cent were obtained in 5 g kg<sup>-1</sup> and 10 g kg<sup>-1</sup> of shoot. In leaf method, the highest shell ratio recorded was 14.97 per cent which was on par with all the doses, except 5 g kg<sup>-1</sup> (Table 1).

The present findings are in confirmation with the results of Horie and Watanabe (1983) who reported that the protein supplementation along with mulberry leaves enhanced the larval weight, cocoon weight, shell weight and shell ratio. The increased cocoon weight due to soyaflour supplementation was also reported by Vanishree

*et al.* (1996) and Sundarraj *et al.* (1990). The highest silk filament length of 744m was obtained at 15 g kg<sup>-1</sup> of shoot which was on par with 5 and 10 g kg<sup>-1</sup> of shoot compared to leaf method wherein the highest silk filament length of 691m was obtained at 15 g kg<sup>-1</sup> which was on par with 10g and 20 g kg<sup>-1</sup> of leaves. The present findings on the effect of soyaflour in increasing the silk filament length conforms with the findings of Subburathinam *et al.* (1992).

**Experiment 2 :** The cocoon weight, shell weight, shell ratio and silk filament length were highest at the dose of 10 g kg<sup>-1</sup> of shoot but it was equal in its effectiveness to 5 g kg<sup>-1</sup> of shoot. The dose of 5 g kg<sup>-1</sup> of shoot was on par with 10 g kg<sup>-1</sup> of leaves (Table 2).

Soyaflour supplementation in shoots at different doses recorded higher larval and cocoon characters compared to leaf method. The present findings on the efficacy of shoot method over leaf method also conforms with the works of Sekharappa *et al.* (1997), who reported that, besides labour saving upto 70 per cent, and leaf saving upto 15-20 per cent, the shoot rearing also improved the cocoon characters and effective rate of rearing.

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