Madras Agric. J. 89 (7-9) : 400-402 July-September 2002
https://doi.org/10.29321/MAJ.10.A00234

Enhancement of cocoon yield in silkworm, *Bombyx mori*. L. by protein supplementation in shoot rearing

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Abstract : Two laboratory experiments were conducted during winter 2000 to study the effect of fortification of mulberry leaves and shoot with soyaflour on the larval and cocoon characters in a bivoltine race NB4D2 and a cross breed, PMXNB4D2 of silkworm, *Bombyx mori*. Soyaflour @ 5 g and 10 g kg^{-1} of shoot was compared with 10 g kg^{-1} of leaves.

Key words: Bombyx mori, Soyaflour, Fortification, Shoot and leaf rearing, Cross breeds Bivoltine race, Economic characters.

Introduction

The mulberry silkworm, *Bombyx mori* L. requires sugars, proteins, aminoacids and vitamins for their normal growth and survival. The amount and quality of food ingested in the larval stage affect the growth rate, development period, body weight, besides its effect on fecundity, longevity, movement and capacity of competition (Parra,1991). Exogenous application of soyaflour which is an important source of protein improved the quality of leaves and thereby the cocoon yield.

In the present study, attempts were made to study the effect of soyaflour on larval and cocoon characters and fecundity of silkworm cross breed, PMXNB4D2. and a bivoltine race, NB4D2.

Materials and Methods

Laboratory experiments were conducted with a bivoltine race, NB4D2 and a cross breed, PMXNB4D2 with five treatments *viz.* soyaflour @ 5 g kg^{-1} of shoot, 10 g kg^{-1} of shoot, 10 g kg^{-1} of leaves along with two controls (shoot and leaf) and replicated five times during winter 2000.

Finely sieved soyaflour was dusted uniformly on the required quantity of shoots and leaves using muslin cloth twice, once during the fourth instar and another on fifth instar immediately after moulting. Observations were made on larval and cocoon characters. In addition to the above parameters, fecundity was also studied in NB4D2.

Results and Discussion

The data obtained from the experiments on NB4D2 and PMXNV4D2 are presented in Tables 1 and 2 respectively.

Larval weight

All the treatments recorded higher larval weight than control. The highest larval weights of 3.73 g and 3.64 g were recorded in NB4D2 and PMXNB4D2 respectively at 10 g kg^{-1} of shoot. The lowest dose of 5 g kg^{-1} shoot was on par with 10 g kg^{-1} of shoot and 10 g kg^{-1} of leaves in both the experiments. The results obtained in NB4D2 confirms with the findings of Sekar (1995) who reported that supplementation of soyaflour at 10 g kg^{-1} of leaves was highly suitable for the race, NB4D2. The role of soyaproducts in influencing the larval traits was also reported by Subburathinam *et al.* (1993).

Cocoon characters

The cocoon weight was the highest at 10 g kg^{-1} of shoot in NB4D2 (1.66 g) and PMXNB4D2 (1.60 g). However, it was on par with both 5 g kg^{-1} of shoot and 10 g kg^{-1} of leaves. Similar trend was obtained with respect to shell weight wherein the highest shell weight of 0.31 and 0.28 g was obtained at 10 g kg^{-1} of shoot in NB4D2 and PMXNB4D2 respectively. The increase in cocoon weight and least number of cocoons per litre were reported due to supplementation of soyaflour on the fifth instar larvae. (Sundar Raj *et al.* 1999). Increased cocoon weight due to protein supplementation was also reported by Krishnan *et al.* 1995 and Vanishree *et al.* 1996.

Shell ratio and silk filament length

The shell ratio and silk filament length of 19.40 and 981 m in NB4D2 and 17.50 and 758 m in MPXNB4D2 were obtained at 10 g kg^{-1} of shoot. The present findings confirm with the results of Horie and Watanabe (1983) who

Table 1. Effect of soyaflour supplementation on larval and cocoon characters in pure bivoltine race, (NB4D2) of *B.mori.*

Treatment (Soyaflour)	Larval weight (g)	Cocoon weight (g)	Shell weight (g)	Shell retio	Cocoon yield (kg/100 dfl)	Silk filament length (m)	Fecundity No.of eggs/dfl
5 g kg^{-1} of shoot	3.60^{ab}	1.61^{a}	0.31^{a}	19.25^{a}	62.39^{a}	962b	485^{b}
10 g kg^{-1} of shoot	3.73^{a}	1.66^{a}	0.32^{a}	19.40^{a}	65.92^{a}	981^{a}	524^{a}
10 g kg^{-1} of leaves	3.65^{b}	1.60^{a}	0.31^{a}	19.38^{a}	63.30^{a}	963^{b}	495^{b}
Control (shoot)	3.35^{c}	1.54^{b}	0.28^{b}	17.94^{b}	56.88^{b}	921c	434^{c}
Control (leaves)	3.17^{d}	1.47^{c}	0.25^{c}	17.00^{c}	52.07^{c}	868^{d}	418^{c}

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

Table 2. Effect of soyaflour supplementation on larval and cocoon characters in cross breed (PMXNB4D2) of *B.mori.*

Treatment (Soyaflour)	Larval weight (g)	Cocoon weight (g)	Shell weight (g)	Shell ratio (%)	Cocoon yield (kg/100 dfl)	Silk filament lenght (m)
5 g kg^{-1} of shoot	3.58^{ab}	1.58^{a}	0.27^{a}	17.09^{a}	60.48^{a}	749^{ab}
10 g kg^{-1} of shoot	3.64^{a}	1.60^{a}	0.28^{a}	17.50^{a}	62.20^{a}	758^{a}
10 g kg^{-1} of leaves	3.53^{b}	1.57^{a}	0.27^{a}	17.18^{a}	61.10^{a}	744^{b}
Control (Shoot)	3.02^{c}	1.47^{b}	0.23^{b}	15.65^{b}	54.80^{b}	608^{c}
Control (leaves)	2.79^{d}	1.37^{c}	0.20^{c}	174.60^{c}	50.10^{c}	589^{d}

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

reported that the protein supplementation increased the silk filament length.

Cocoon yield

The highest cocoon yield of 65.93 kg/ 100 dfls in NB4D2 and 62.20 kg/100 dfls in PMXNB4D2 were recorded at 10 g kg^{-1} of shoot which was on par with 5 g kg^{-1} of shoot and 10 g kg^{-1} of leaves which registered 62.39 and 63.30 kg/100 dfl in NB4D2 and 60.48 and 61.10 kg/100 dfl in PMXNB4D2 respectively. The present findings confirm with the findings of Nalini *et al.* (1994) who reported that dusting of soyaflour at 1.25 per cent concentration increased the cocoon yield in silkworm. The increase in seed cocoon yield due to supplementation of soyaflour was also reported by Sundar Raj *et al.* (2000).

Fecundity

The fecundity was tested for NB4D2. The highest fecundity of 524 eggs/dfl was obtained at the dose of 10 g kg^{-1} of shoot. The dose of 5 g kg^{-1} of shoot and 10 g kg^{-1} of leaves were on par with each other wherein the number conclusion of eggs/ dfl produced were 485 and 495 respectively.

The results showed that the highest cocoon yield of 65.93 kg/100 dfl and 62.20 kg/100 dfl was recorded at the dose of 10 g kg^{-1} of shoot in NB4D2 and PMXNB4D2 respectively.

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The same dose registered the highest shell ratio of 19.40 per cent and 17.50 percent respectively for NB4D2 and PMXNB4D2. However the dose of 5 g kg^{-1} of shoot was found to be on par with 10 g kg^{-1} of shoot and 10 g kg^{-1} of leaves with respect to all characters except the fecundity.

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(Received : December 2001 ; Revised : April 2002)