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Effect of Selected Feed Additives on Economics of Mulberry Silkworm Hybrids $ND_7 \times CSR_2$ and $PM \times CSR_2$ at Laboratory and Farmers Field Condition with Yield Gaph Analysis

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Abstract

A laboratory and field study was undertaken to know the effect of standardized feed additives on economics of mulberry silkworm hybrids $ND_7 \times CSR_2$ (at laboratory) and $PM \times CSR_2$ (at field) in Kolar district. The results revealed that for both hybrids, horse gram flour + grain amaranthus flour (50 : 50) registered significantly maximum cocoon yield, absolute values increase over control, highest market price of cocoons, total value realized, maximum net profit with maximum returns per rupee spent. Next best feed additive was CFTRI mixture over unsupplemented control.

Key words : Silkworm hybrids, Feed additives, Horse gram, Grain amaranthus, CFTRI mixture.

Mulberry leaves, *Morus alba* L. are the sole food of mulberry silkworm *Bombyx mori* L. Literature indicates that overall lower productivity or total crop failures largely at late instars are mainly due to poor quality of leaf. It becomes necessary to improve nutritive value of mulberry leaves, which influences growth and development of the silkworm *Bombyx mori* L. One way of improving the cocoon yield is through achieving an enhancement in larval weight by enriching the feed of silkworm by supplementing mulberry leaves with extra nutrients that are locally available. Hence the present investigation was conducted at laboratory and farmer's field level to know the effect of standardized feed additives on economics of mulberry silkworm hybrids $ND_7 \times CSR_2$ and $PM \times CSR_2$.

Methods

The silkworm hybrids $PM \times CSR_2$ (at field) and $ND_7 \times CSR_2$ (Jayalakshmi) (at laboratory) were experimented in the present investigation. In laboratory experiment Jayalakshmi hybrid ($ND_7 \times CSR_2$) was selected, as claimed in literature it was reportedly performing best in all quantitative and qualitative traits of silk (1). However in laboratory study, silkworm hybrid reared on mulberry shoots supplemented separately with nine different feed additives besides maintaining control was practiced. For field study, $PM \times CSR_2$ was chosen in Srinivasapura taluk of Kolar district, 15 farmers were selected randomly in five villages with three farmers per village.

For laboratory and field study on economics of silkworm rearing, only two feed additives horse gram + grain amaranthus flour (50 : 50), CFTRI mixture (100%) were selected along with control. However common rearing procedures for laboratory and field study were practiced as indicated hereunder. Bulk rearing was done up to third moult and worms were then separated to provide feed additive treatments. The feed additive application was through measuring cups having ensured the flours were sieved (150 μ) and then dusted by plastic sieves on mulberry shoots at 5g/kg of V_1 shoots and fed to silkworm hybrids during late age with daily once feeding schedule. However, the remaining two feeds per day were normal (unsupplemented). Two mulberry silkworm rearings were conducted during 2008 in both laboratory and field conditions. Ten dfls per treatment were maintained with three replication in both laboratory and field level. The rearing was practiced following shoot method of feeding i.e. in accordance with standard package (2). The economic traits were recorded in accordance with yield gaph.

For field trial, due to non availability of Jayalakshmi hybrid, as an alternative $PM \times CSR_2$ was selected for field experiment since it was already popu-

Table 1. Comparative economics of feed additives on mulberry silkworm rearing hybrids $ND_7 \times CSR_2$ and $PM \times CSR_2$ under laboratory condition and farmers participation (yield gaph analysis). Labor cost is assumed to be constant.

Feed additive treatments	Cocoon yield/ 100 dfls		Increase in cocoon yield over control				Market price of cocoons (Rs/kg)		Total value realized (Rs)	
			Absolute (kg)		(%)					
	Lab	Field	Lab	Field	Lab	Field	Lab	Field	Lab	Field
Horse gram flour + Grain amaranthus flour (50 : 50)	94.67	91.76	18.67	17.06	24.56	22.83	142.14	139.66	13456.39	12815.20
CFTRI mixture (100%)	94.46	86.81	18.46	12.11	24.28	16.21	136.28	133.80	12873.00	11615.17
Unsupplemented control	76.00	74.70	-	-	-	-	121.00	122.00	9196.00	9113.40

Feed additive treatments	Cost of feed additive treatments (Rs)		Labor cost (Rs)		Net profit (Rs)		Returns per rupee of expenditure (Rs)	
	Lab	Field	Lab	Field	Lab	Field	Lab	Field
Horse gram flour + Grain amaranthus flour (50 : 50)	67.50	67.50	1400	1400	11988.89	11347.70	9.17	8.73
CFTRI mixture (100 %)	62.50	62.50	1400	1400	11410.50	10152.67	8.80	7.94
Unsupplemented control	-	-	1400	1400	7796.00	7713.40	6.57	6.51

lar among farmers besides it was the ruling multi × bivoltine hybrid. The shoot requirement was 250 g per day. Feed additive application after third moult was 2.5 g per day for 100 worms. Each day, shoot weight was increased by 50 g. After fourth moult for 100 worms, shoot requirement was 500 g per day and feed additives was 5 g. Each day shoot weight was increased by 50 g. For 100 dfls, 2.5 kg of feed additives were required for daily once application.

Results and Discussion

Mulberry silkworm hybrids, $ND_7 \times CSR_2$ and $PM \times CSR_2$ was reared on mulberry shoots fortified with horse gram flour + grain amaranthus flour (50 : 50) under laboratory condition and at farmers field, respectively registered maximum cocoon yield of 94.67 and 91.76 kg/100 dfls, absolute values registered were 18.67 and 17.06 kg increase over control and 24.56 and 22.83%, highest market price of cocoon was Rs 142.14/kg and Rs 139.66/kg, total value realized was Rs 13,456.39 and Rs 12,815.20, the cost of treatment was constant for laboratory and field trials (Rs 67.50) having obtained maximum net profit of Rs 11,988.89 and 11,347.70 with maximum returns per rupee spent was Rs 9.17 and 8.73 respectively followed by CFTRI mixture (94.46 and 86.81 kg/100dfls ; 18.46 and 12.11 kg with 24.28% and 16.21% ; Rs 136.28/kg and Rs 133.80/kg ; Rs 12873.00 and Rs 11615.17 ; Rs 62.50 and Rs 62.50 ; Rs 11410.50 and Rs 10152 ; Rs 8.80 and Rs7.94, respectively) over control (76.00 and 74.70 kg/100 dfls ; Rs 121.00/kg and Rs 122.00/kg ; Rs 9196.00 and Rs 9113.40 ; Rs 7,796.00 and Rs 7,713.40 ; Rs 6.57 and Rs 6.51, respectively). However, labor cost was constant in all treatments including unsupplemented control (Rs 1400) (Table 1).

Obviously, the feed additive flours namely horse gram + grain amaranthus flours (50 : 50) and CFTRI mixture following daily once feeding schedule, other two feeds being normal, has certainly improved the qualitative features of the silkworms in the production of better commercial characteristics. Further, improvement in the cocoon yield due to feed supplement has directly contributed to an additional income to the sericulturists. The economics of feed additives was ascertained after the marketing of cocoons.

The present findings are in tune with the results of Safdar et al. (3) who assessed supplement Serifeed

under different field locations and showed that Serifeed was economical and cost effective for silkworm rearing.

The present findings are in harmony with the findings of Narayanaswamy et al. (4, 5) who supplemented mulberry leaf with *Kohiko Silcare* to silkworm hybrid $CSR_2 \times CSR_4$ and obtained good economic traits of silkworm and reported returns per rupee of investment was higher (Rs 13.40), strangely spraying a solid at 1000 g/100 dfls.

Kumaresan and Vijaya Prakash (6) compared the economics of sericulture with that of the major crops cultivated in Erode district of Tamil Nadu. The revenue obtained from sericulture was comparatively higher than that of all other major crops viz. paddy, sugarcane, ginger, groundnut and sorghum. The major reasons expressed by the farmers for practicing sericulture were high profitability and continuous income throughout the year.

Field performance of cross breed $PM \times CN_2$ was conducted on mulberry leaves in rainfed gardens of Chamarajanagar and Mysore districts of Karnataka, total of 90 thousand dfls were reared and it showed improvement in yield by 6.58 kg/100 dfls and attracted higher price of Rs 28/kg of cocoons. Rearers in this area were expected to get extra profit of Rs 5,000/acre (7)

Lakshmanan and Geethadevi (8) attempted an economic analysis of mulberry sericulture at farmer's level to estimate the cost and returns from bivoltine (CSR races) and cross breed races in Mandya district of Karnataka. The net profit earned from bivoltine cocoon production was much higher than cross breed rearing.

Sericulture is a labor intensive agro-based rural industry, which provides periodical income throughout the year. It needs low capital and provides year round employment. Balasaraswathi et al. (9) selected 100 farmers randomly from Dharmapuri districts in Tamil Nadu. Data were collected on information of cost incurred for different inputs and return including value of by-products. The results showed that, highest cost was associated with garden establishment incurred for human labor followed by FYM application.

India is the second largest producer of mulberry raw silk. Mandya and Chamarajanagar districts of Karnataka were selected for irrigated and rainfed areas for the case study. In the irrigated area the productivity of Kolar gold ($PM \times CSR_2$) was more (988.80 kg/acre per year) than that of CSR (973.70 kg/acre per year) hybrid due to brushing of more number of dfls per unit area per year. The average cocoon yield of 60 kg/100 dfls was realized for Kolar gold. Whereas, 65 kg/100 dfls was realized for CSR hybrids. Similarly, in rainfed area, the cocoon productivity was found be more for Kolar gold (171.00 kg/acre per year) than that of C-nichi hybrids (140.00 kg/acre per year). The average cocoon yield of 38 kg/100 dfls was realized for Kolar gold and 28 kg/100 dfls was realized for C-nichi hybrids. It could be concluded that the new multivoltine hybrid, Kolar gold has performed better than that of other popular hybrids with respect to productivity and economics even with less input usage (10).

In the light of all related and available literature discussed, the findings of present investigation confirmed the economic viability of feed additives. Further, the improvement in the cocoon yield and increased profit margin, due to feed supplement has directly contributed to an additional income to the sericulturists. Higher additional income generated for hybrid through feed additive supplementation implies its usefulness to the sericulturists to boost the production.

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