ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 07, Issue, 07, pp.13681-13683, July, 2017

ORIGINAL RESEARCH ARTICLE

Open Access

IMPACT OF SELECTED FEED ADDITIVES ON ECONOMICS OF MULBERRY SILKWORM HYBRID PM × CSR_2 AT FARMERS FIELD LEVEL

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ARTICLE INFO

Article History:

Received 25th April, 2017
Received in revised form
14th May, 2017
Accepted 06th June, 2017
Published online 22nd July, 2017

Key Words:

Bombyx mori L., Feed additives, Horse gram, Grain amaranthus, Economic traits.

ABSTRACT

A field study was undertaken at Kolar district of Srinivasapura taluk, to know the impact of standardized feed additives on reeling traits of silkworm hybrid, *Bombyx mori* L. PM × CSR_2. Silkworm hybrid were fed on mulberry shoots fortified with feed additives flour combination of horse gram + grain amaranthus (50:50) recorded significantly maximum cocoon yield, absolute values, absolute increase over control, highest market price of cocoon, total value realized, cost of treatment and maximum net profit with maximum returns per rupee spent, followed by CFTRI mixture as compared to unsupplemented control. However, labour cost was constant in all treatments including unsupplemented control (Rs.1400/-).

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Citation: Sudhakara S. N. and Neelu Nangia, 2017. "Impact of selected feed additives on economics of mulberry silkworm hybrid PM × CSR_2 at farmers field level", *International Journal of Development Research*, 7, (07), 13681-13683.

INTRODUCTION

The domesticated silkworm, *Bombyx mori* L. being a monophagous insect derives all the nutrients required for its growth from the mulberry leaf. The knowledge of silkworm nutrition is of great fundamental and applied value, involving physiological and chemical activities, which transform food elements into body elements. Insect nutrition primarily involves biochemical substances that are necessary to achieve various metabolic processes resulting in healthy growth and development. Neelu Nangia *et al.* (2005) reported leaf supplementation of ragi flour enhanced economic parameters of CSR_2×CSR_4 and PM×CSR_2. Hence, in the present study, it is attempted to examine the impact standardized feed additives on economics of sericulture, where mulberry leaves were supplemented with feed additives provided as a fine dust during fourth instar up to spinning in popular silkworm hybrid PM×CSR_2.

MATERIAL AND METHODS

Fifteen farmers were selected randomly in five villages; *i.e.* in each village 3 farmers were selected, where silkworm rearing was practiced throughout the year. Mulberry V_1 shoots was harvested from irrigated mulberry garden and such shoots were supplemented with top two best treatments of flour supplements as confirmed in laboratory trial. Here individual measuring cups and plastic sieves were maintained in each of the feed additive treatments. Bulk rearing was done up to 3rd moult and worms were separated according to feed additive treatments with daily once feeding schedule. The flours of 5 g each of the feed additives were weighed and placed in plastic measuring cups in order to mark levels of each cup. Each time of feed additive application through measuring cups the flours were sieved (150 µ) and dusted on mulberry shoots @ 5g/kg of shoots on volume basis based on marked levels of measuring cups and fed to silkworm hybrid (PM×CSR_2) by plastic sieves

Table 1. Economics of feed additives on Mulberry silkworm hybrid PM × CSR_2 at fifteen farmers field $

Feed additive treatments	Cocoon Yield / 100 DFLs	Increase in Cocoon Yield over control		Market Price of Cocoons (Rs./kg)	Total Value Realized (Rs.)	Cost of Feed additives (Rs.)	Labour Cost (Rs.)	Net Profit (Rs.)	Returns per Rupee of Expenditure (Rs.)
		Absolute (Kg)	(%)						
FA_4	91.76	17.06	22.83	139.66	12815.20	67.50	1400	11347.70	8.73
FA_8	86.81	12.11	16.21	133.80	11615.17	62.50	1400	10152.67	7.94
FA_{10}	74.70	-	-	122.00	9113.40	-	1400	7713.40	6.51

Note: Labour cost is assumed to be constant
FA_4: Horse gram flour + Grain Amaranthus flour (50 : 50 %)
FA_8: CFTRI mixture (100 %)
FA_{10}: Control / Unsupplemented
$ Mean of fifteen farmers in village one to five

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 November and January, 2008. 10 DFL's per treatment were maintained with three replication. The rearing was practiced following shoot method of feeding *i.e.* in accordance with standard package (Dandin *et al.,* 2014). In laboratory experiment Jayalakshmi hybrid (ND_7×CSR_2) was taken, as literature claimed, it was performing best in all quantitative and qualitative traits of silk. Due to non availability of this hybrid in field trial, as an alternative PM×CSR_2 was selected for field experiment since it was already popular among farmers field besides it was one of the multi × bivoltine hybrid. The following economic traits were recorded. The shoot requirement was 250 g per day. Feed additive application after 3rd moult was 2.5 g per day for 100 worms. Each day shoot weight was increased by 50 g. After 4th 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. Meticulous observations were made on economics of the two silkworm hybrids.

RESULTS

In all five villages namely, Kambala halli, Dodda halli, Kanigana halli, Kumagunta and Byepalli mean data of 15 farmers was considered. The popular mulberry silkworm hybrid PM × CSR_2 was selected for field trials, where worms were reared on mulberry shoots fortified with Horse gram flour + Grain Amaranthus flour registered maximum cocoon yield of 91.76 kg/100DFLs, absolute values were 17.06 kg and recorded 22.83 per cent absolute increase over control, highest market price of cocoon was Rs.139.66/kg, total value realized was Rs.12815.20/-, the cost of treatment was Rs.67.50/- and maximum net profit was Rs.11347.70/- with maximum returns per rupee spent was Rs.8.73/- followed by CFTRI mixture (86.81kg/100DFLs; 12.11kg with 16.21per cent; Rs.133.00/kg; Rs.11615.17/-; Rs.62.50/-; Rs.10152.67/- and Rs.7.94/-, respectively) over control (74.70 kg/100DFLs; Rs.122.00/kg; Rs.9113.40/-; Rs. 7713.40/- and Rs.6.51/-, respectively). However, labour cost was constant in all treatments including unsupplemented control (Rs.1400/-) (Table 1).

DISCUSSION

The results of present study clearly indicates that the effectiveness of feed additives in improving the nutritional, physiological and biochemical status of silkworm and thereby enhancing the silk production. Relatively higher yields and improved characteristics of cocoons not only paved good returns to the rearer, but also proved the supplementation of feed additives was economical and cost effective. The present findings are in tune with the results of Safdar *et al*. (2000) who assessed feed supplement 'Serifeed' under different field locations and showed that 'Serifeed' was economical and cost effective for silkworm rearing. However, no documentation pertaining to the economics of feed additive has been noticed in literature for further discussion. Though literature regarding economics of other aspects of sericulture is discussed further. Kumaresan and Vijaya Prakash (2001) 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, gingerly, 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×CN_2 was conducted on Mulberry leaves in rainfed gardens of Chamarajanagar and Mysore districts of Karnataka during all the seasons. Total of 90 thousand dfls of this cross breed was 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.5000/acre. It may be due to rainfall in the rainfed area which directly influences the Mulberry quality and productivity. Generally the leaf quality in rainfed garden is inferior to the irrigated garden (Sekharappa *et al*., 2003). Karnataka, a leading Mulberry silk producing state in the country, has been practicing sericulture since Tippu Sultan period. It offers a regular income and own family employment opportunities within own farm. Lakshmanan and Geetha Devi (2005) 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. Here net profit earned from bivoltine cocoon production was much higher than cross breed rearing.

The present findings are in harmony with the findings of Narayanaswamy *et al.* (2005) who supplemented mulberry leaf with *Kohiko Silcare* feed to silkworm hybrid CSR_2xCSR_4 and obtained good results in respect of economic traits of silkworm. Similarly, returns per rupee of investment was higher (Rs. 13.40/-) when the silkworms were fed with Mulberry leaf treated with *Kohico Silcare* @ 1000 g/ 100 DFLs. Nutrient availability in *Kohoko Silcare* may enhance the larval growth and development, thereby increasing the profitability. Sericulture is a labour intensive agro-based rural industry, which provides periodical income throughout the year. It needs low capital and provides year round employment. Balasaraswathi *et al.* (2006) selected 100 farmers randomly from Dharmapuri districts in Tamil Nadu. Data was 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 labour 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/year) than that of CSR (973.70 kg/acre/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. Where as, 65 kg/100 dfls was realized for CSR hybrids. Similarly, in rainfed area, the cocoon productivity was found to be more for Kolar gold (171.00 kg/acre/year) than that of C-nichi hybrids (140.00 kg/acre/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 best with that of other popular hybrids with respect to productivity and economics even with less input usage (Hiriyanna *et al.,* 2007).

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